Offshore : Risk & Technology Consulting Inc.
Dr. Malcolm Sharples, Houston, Texas
Brian J.M. Sharples, Penticton, British Columbia

Damage and Critical Analysis of Accidents to Assist in Avoiding Accidents on Offshore Wind Farms on the OCS

May 2010

Project No. 633, Contract M09PC00015

Prepared for:

Minerals Management Service
Department of the Interior

Note: Photo on Front Page from Ref. 15

Table of Contents

List of Tables and Figures

Preface

In order to understand the potential issues for offshore application of wind farm structures it was appropriate to review the accidents and incidents available in relation to onshore and offshore wind farm safety and to use those to draw insights into the potential for offshore wind farm safety and provide "experience" to anticipate likely potential events.

This document is part of a project sponsored by MMS to recommend design standards to ensure structural safety/ reliability/ survivability of offshore wind farms on the US Outer Continental Shelf (OCS).

This document is the Report on Damage and Critical Review of Accidents: documentation of significant damages relevant to wind farms for which appropriate information is available together with analyses of the causes when available.

Three other reports are companions to this document and address the following subjects:

1. A Safety Management System Template providing guidance on the content and subject matter for the owner's Safety Management System.

2. A Guideline for providing the recommended items to be provided in a Facility Design Report (outlining the basis of the design) that an offshore wind farm owner may submit to MMS for approval. This document allows the owner to site the standards that they are going to use in the design and propose a holistic design basis on which the project is to be built, and provide basis for regulatory approval.

3. A Commentary on the Guideline items to include a discussion and insight into issues which may be appropriate for selection of codes and standards upon which the approval can be based.

Acknowledgment

Several organizations track wind farm accidents. While we are unable to mention all of those organizations those which were most useful in diligently producing information about accidents, and issues were:

- Caithness Windfarm Information Forum (CWIF): www.caithnesswindfarms.co.uk
- Industrial Wind Action Group: www.windaction.org
- National Wind Watch: www.wind-watch.org

While these organizations are not necessarily pro-wind, they have provided a useful reference which the wind farm industry has not provided. In doing so, they in fact are doing the industry a huge favor (since they are non-profits), since the industry is not providing this information, and indeed if the industry is acting with safety in mind, tracking and measuring accidents statistics is mandatory for assuring long-term

credibility of the industry.

The general industry safety record, so far as we were able to ascertain was good and it may be of benefit to share experiences to ensure the steady growth of the industry. Since accidents do get reported on the internet, the lack of transparency in the industry is viewed as a negative in that the accidents occur with no explanation of root causes, and thus no closure on the events, and more important no industry lessons learned. Two exceptions are the recent report released on the February 2008 incidents in Denmark, and the OSHA report on the 2008 accident in Oregon.

Though industry organizations are funded to set up accident databases and provide statistics, they appear to do so only for their members who must be associated with the business. The information is not publically available.

The contribution to safety and to this project particularly by the Caithness Windfarm Information Forum, in particular, is gratefully acknowledged.

Authors' Note, Disclaimer and Invitation:

Many of the accidents and characterizations made in this report may be subject to a different interpretation, and the facts may differ from the information relied upon which is believed to be factual. This report has been written without prejudice to the interests of any parties mentioned or concerned and the Company and authors shall not in any circumstances be responsible or liable for any act, omission, default, or negligence whatsoever.

While we have used our best efforts to provide an impartial report, errors of fact or interpretation may have resulted: consequently, an invitation is issued to any readers to provide written comment for a limited period of time which will be reviewed for possible inclusion in an addendum to this report. Comments may be sent by email to msharples@offshore-risk.net.

1. INTRODUCTION

The safety goal of the research is to help the process of allowing safe access to OCS Resources to develop renewable energy resources. The Reports in this series were to provide a roadmap to achieve this goal. The overall intention of the research is to provide a roadmap to achieve a safe working culture, a safe working environment and to provide a cost effective technical framework to efficient approval.

The goal of the research was to chronicle the incidents and accidents of offshore and onshore wind farms to learn from experience and use that experience to consider which standards, guidelines and procedures should be adopted by the regulator and what items the Certified Verification Agent (CVA), provided for in 30 CFR 285, should review. The accidents and incidents and near misses are the experience that should be part of the CVA's consideration. With industry involvement and transparency in the information on accidents/incidents, the experience can be shared so that future accidents/incidents can be avoided, and so that regulatory approvals can be efficient.

The structures and issues of interest to the establishment of Offshore Wind Farms for this study are:

- Liftboats –observations on site and possibly met towers;
- Jack-up Vessels for coring, installation and maintenance;
- Cranes;
- Access Vessels;
- Secondary structures e.g. access items, emergency escape equipment;
- Transformer Stations for modifying the power for transmission to shore, and
- Wind Turbine foundations, towers, nacelle, blades and other equipment
- Subsea cables transmitting power to shore.

For the wind turbines and towers, particularly, there are the additional issues that the structural integrity may depend on:

- Power, control systems, automated shut-down
- Lightning, damage from
- Fire, suppression of
- Foundations, integrity of
- Codes – which may not have evolved with offshore wind farms structures in mind, and may be applied, with lack of appropriate provisions for structural safety.

By collecting and analyzing the data, insights are gained that will result in understandings and learnings to assist the regulator in ensuring that mistakes are not repeated when they involved safety, and destruction of the structures.

While there is a need to study each accident and incident it is also important to remember that failures that are not safety related are only of secondary importance. The key is to understand which of the apparently secondary issues can escalate a

situation. For example, if a failure of a blade can lead to a tower collapse that is a key incident of concern; a generator bearing that needs changing is generally of secondary concern.

The Oregon wind turbine collapse (2008), one of the few where there is a comprehensive report, points to a number of safety management issues, and may have been avoided by a robust Safety Management System. An apparently small change in a procedure led to a major structural collapse. This was not the first incident with the same cause. Awareness (through promulgation of findings), are an important factor in preventing future accidents.

2. SOURCES OF ACCIDENT DATA

The project was started with the view that a simple form requesting data from the various owners, certifiers, industry associations, manufacturers, construction companies, and transporters would net information, and coupled together with access to OSHA records, internet material and lawsuit records, it would be possible to compile a reasonable list of wind farm accidents. As it transpired, we were unable to persuade many of these sources to divulge anything but the most minimal of information. OSHA records that were accessible were not up to date, and scrounging through the older records led to little information tagged to wind farms. Falling off a ladder in the OSHA record is just that: its location (e.g. on a wind farm) on OSHA records appears to be immaterial. One OSHA presentation on wind farms was cause to call for the author but it transpired the records are not kept in such a fashion as to be accessible and tagged to wind farms. If the Certifiers had records, they were not accessible: and for most it was not even possible to obtain the structure of the database, if indeed it is kept in an organized way. There was a significant amount of “summary” information which was available from limited sources which form the basis of some of the reporting in several sections of this report. Fortunately the summary information appeared to give a reasonably consistent picture of the incidents and downtime, from different sources.

The Caithness (CWIF) database was a good source of data where it had been listed and accidents could be located easily. In many cases the website references had been closed down and the source information was no longer available. As discussed later, the database provided incredibly good information, fairly reported – so much so, that it was sensible, after verifying the majority of the data, to provide it as Appendix C, rather than try to characterize the data any differently. Further incidents that were located, and ones related to our purpose, e.g. offshore, were chronicled in a separate listing, and are presented in Appendix B. Additionally, reference to accidents, photos etc. formed parts of the compilation of both lists. In most cases root cause is not part of the record.

The problem of obtaining good accident information and statistics is described in a report on reliability by Sandia National Lab:

> “*The uncertainty associated with component life has direct bearing on the risk associated with a wind turbine project. The factors that affect the level of certainty are numerous and to some extent unique to the wind industry. First and foremost is*

the lack of data relating to component reliability. Turbine manufacturers maintain records of failures and wind farm operators maintain records of warranty claims and associated downtime, but this information is proprietary and is not accessible to the public. Even assuming that these data were accessible, one cannot expect that the format will be consistent or that the information will include enough detail to allow a systematic evaluation.

It must also be appreciated that although operators will have general information on the number of failures and general type, they may not have information on the root cause of the failure. This is especially true during the warranty period when, unless a serial defect is declared, the turbine manufacturer may not be obligated to disclose this information in any detail. The same argument may apply to the turbine manufacturer in the case of sub-supplier components, although the manufacturer will generally require this information as part of their sub-supplier agreement.

Several institutions record turbine production and availability data; these are TrustPower Limited (New Zealand), Global Energy Concepts (USA), Energimyndighet (Sweden), Kema (The Netherlands), Betrieber-Databasis/IWET (Germany), and Windturbinepark Zeebrugge (Belgium). The WindStats Newsletter collates and publishes this information periodically, and also includes more comprehensive data for turbines operating in Denmark, with comments describing reasons for downtime. In most cases, the data are self-reported and the format is inconsistent between sources. WindStats also publishes a summary of component failures for Danish production sites, broken down into broad subsystem categories.

The difficulty in obtaining useful component failure data is compounded by the rapid pace of development in wind turbine technology. There exist large fleets of similar model turbines, but in many cases detailed changes and revisions have been implemented, often in response to serial defects. Many turbine manufacturers source components from several sub-suppliers, and although the interface may be identical, the details of design and manufacturing process are frequently specific to the manufacturer. In turn, the sub-supplier may incorporate internal revisions and model variations."….." In addition, new technologies are being implemented on the next generation of MW-scale machines and many of these (for example, direct-drive permanent-magnet generators and carbon-fiber blades) are unproven in the wind turbine operating environment and employ subcomponents or manufacturing processes that are innovative."

[Ref. 1]

Anecdotal information from some students who had worked wind farms revealed there were many near misses for land work, and many unsafe acts, but fortunately they had not resulted in any fatalities and minimal injuries and thus do not appear in the record of accidents. One issue in west Texas that dogged an installation was that of cows stepping on the wind farm blades and causing repairs to have to be made prior to installation.

Wind turbines are like most other engineering products such as aircraft, helicopter or

very very expensive cars; designed to operate to high standards of safety when knowledgably designed and constructed. For wind farms, there have been a very small number of injuries and fatalities to operators. They have often been caused by failure to observe manufacturer's instructions, and standard safety management procedures whether or not they were actually in place. No accidents can be considered acceptable but they should be viewed in the context of the large number of turbines worldwide, the vast majority of which have been operating safely since they were built. Likewise the experiences from accidents in India, Japan, Philippines which are subject to cyclones and typhoons and thus have similarity to weather issues in much of the United States, should also not be ignored as these may lead to changes in fundamental design issues. The offshore experiences being chronicled in Europe at the present time, will also provide some useful lessons to be learned for application offshore on the OCS.

2.1 Accident Categories for the Wind Farm Structures

Accidents don't always fit into selected categories. Caithness Wind Farm Information Forum (CWIF) uses some of the following categories:

- Fire
- Fatal
- Ice Throw
- Transport
- Blade failure
- Environmental (including oil spill)
- Human Injury
- Lightning
- Mechanical Failure
- Structural Failure
- Miscellaneous

  …….Etc.

For the data we compiled additional categories were added:

- Safety Management System (SMS)
- Subsea Cable
- Material
- Quality
- Electrical
- Installation Vessel
- Transformer

  ……Etc.

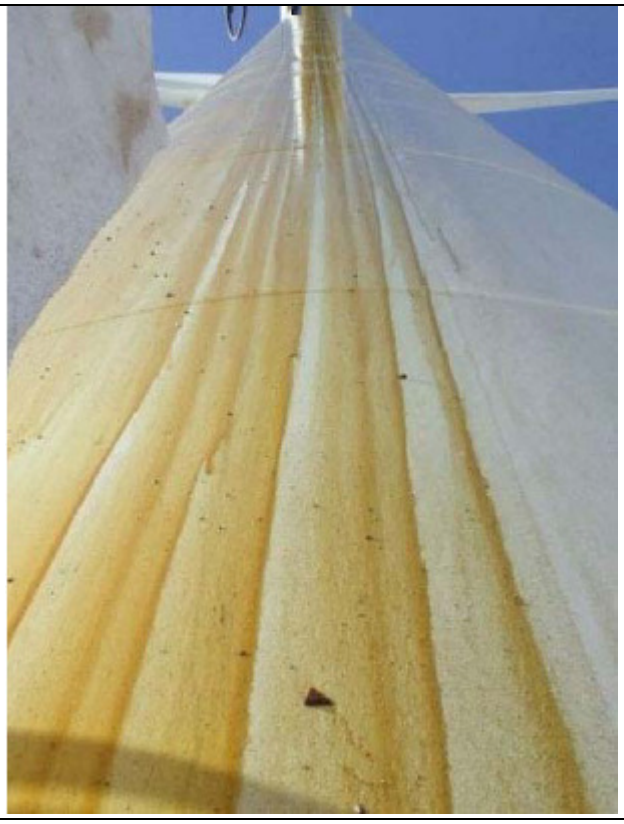
Some cases were repeated from the CWIF database in the supplemental database for specific purposes.

During installation and during repair there is the potential of accidents with the installation equipment of interest so items such as:

- Installation Vessel
- Crane
- Dropped object

were categorized.

2.1.1 Examples of Categories: Wind Farm Structures

	
Environmental – Oilspill down the tower from gearbox of wind turbine (Spain)	Lightning Strike

Turbine collapse in high wind conditions at the Searsburg, Vermont wind facility, 9/15/2008.

Fire: Bloomingdale, Minnesota, 2008

Blade Failure (delamination)

Figure 1: Illustration of Categories of Accidents

2.2 Examples of Accidents with Jack-up Construction Vessels

		Name	Summary	Location	Year
Incident List 1999-2008	1	Aarsleff Jack	Overturned	Horns Rev	1999
	2	Wijslift 6	Hull dropped	Blyth	2000
	3	Skate II	Punch-through: hull dropped	Gunfleet	2003
	4	Excalibur (ex Wijslift 6)	Broken leg	North Hoyle	2003
	5	MEG-JB1	Crane collapse	North Hoyle	2003
	6	Skate III	Wrecked	Brighton	2004
	7	A2Sea Ocean Ady (now Sea Energy)	Leg damage	Scroby Sands	2005
	8	Octopus	Ran aground during tow	Orkney	2006
	9	Smit Lisa	Punch-through: hull dropped	Robin Rigg	2007
	10	JB-104*	Capsize, 1 fatality	Milford Haven	2007
	11	Jakup	Wrecked	Teeside	2008
	12	Russell W. Peterson	Wrecked, 1 fatality	Delaware	2008
	13	Titan 1	Lost overboard from Heavy Lift Vessel	Atlantic	2008
	14	Dredging barge	Abandon ship by helicopter operations	Mallorca, Spain	2008
	*	JB-104 was not in wind farm service but alongside the dock			

Table 1: Accidents with Jack-up Construction Vessels

	Name	Summary	Location	Year
9	Smit Lisa	Punch-through: hull dropped	Robin Rigg	2007

Figure 2: Smit Lisa at Robin Rigg

	Name	Summary	Location	Year
12	Russell W. Peterson	Wrecked, 1 fatality	Delaware	2008

Figure 3: Russell W. Petersen Offshore Delaware

The **Russell W. Petersen** event occurred offshore United States and thus is described

in detail. Though this event occurred 2 years ago the investigation report by the USCG is not available at time of writing.

"Bluewater officials showed off the company's million-dollar investment today, chartering a vessel that will head out to sea this week. The vessel will start a 75-day study of bird activity in the area 11.7 miles off Rehoboth Beach, where the company's wind farm would be built. The studies will help determine the possible impact of 150 turbines on avian life."

[Ref. 2]

"The death of one of the crewmembers of the R/V Russell W. Peterson during Monday's storm has raised questions about the use of the vessel 14 miles off the coast of Rehoboth Beach.

The questions about the seaworthiness and possible problems with at least one of the tripod (sic. three) legs that helped to stabilize the liftboat are not being answered because no one is talking – not the owners of the ship and not the Coast Guard since an investigation is under way.

A Coast Guard rescue swimmer found one of the crewmembers of the Russell W. Peterson dead, possibly crushed by heavy objects, in the galley, when he boarded the ship during the May 12 nor'easter.

As the ship floundered 14 miles off the coast of Rehoboth Beach, the Coast Guard received a mayday distress call from the captain at 7:55 a.m. that the ship was breaking apart and taking on water. Within minutes, a helicopter from the Coast Guard station in Atlantic City, N.J., was in flight and at the location within 45 minutes. Rescue swimmer Tye Conklin was lowered from the helicopter, which was hovering 100 feet above the ship. Petty Officer Christopher McLaughlin, a Coast Guard spokesman in Atlantic City, said Conklin found the captain at the helm fighting to keep the crippled ship afloat and unable to leave to check on his crewmate.

With one of two engines failed, the captain was trying to keep the ship from flipping over as it started taking on water, McLaughlin said. McLaughlin said conditions were rough with some waves topping out at 12 to 14 feet with winds of 45 to 50 mph. Conklin found the other crewmember below in the galley covered with debris. "Everything that was not tied down was on top of him," McLaughlin said. "There were no vital signs."

The injured crewmember was hoisted in the rescue basket first, followed by the captain and Conklin together. By 9:30 a.m., the helicopter was on its way to Peninsula Regional Medical Center in Salisbury, Md. The abandoned ship washed ashore around noon near the boardwalk in Bethany Beach, and was expected to be towed from the shore by the end of the week……Salvage operations are under way as Coast Guard investigators try to piece together what happened aboard the Russell W. Peterson – a 65-foot liftboat, but considered a small craft.

McLaughlin said an investigation is under way to determine the cause of the accident. "We don't know why they were out there in the bad weather," he said. Coast Guard officials said since the Russell W. Peterson was converted to a research vessel it is exempt from most of the regulations and inspections as a liftboat.

During the storm, it's surmised that the liftboat had its three legs, or spuds, anchored to the sand, until one broke. "That was what came over the mayday call from the captain," McLaughlin said. The leg at the rear of the boat was the one with the apparent problem. In order to make the trip from the Gulf Coast up the intracoastal waterway and get under bridges, the owners cut the legs from 105 feet to 70 feet. McLaughlin would not comment whether shortening the legs contributed to the apparent failure of one. The boat, built in Louisiana 25 years ago, was christened in Wilmington on March 29, and arrived at the Lewes City Dock March 31.

Migratory bird information is one item requiring study to determine Bluewater Wind's proposed offshore wind farm's potential environmental impact. Bluewater Wind has proposed to construct a wind farm off the shore of Rehoboth Beach.

Before it was converted to a research vessel, the Peterson worked servicing oil platforms in the Gulf of Mexico. Liftboats have open decks and barge-shaped hulls that are equipped with three large metal legs in a tripod configuration that can be lowered to the sea floor. Once the legs are lowered, the ship becomes a working platform above the waves. Capt. Collin Clement, skipper of the ship, who was not aboard during the storm, said in a previous interview that the boats are commonplace around Texas and Louisiana. He also said there is a tilt alarm that warns the crews when the legs are down and the boat begins to list excessively. "Stability is not absolute. Sometimes you have to get up in the middle of the night and level it," Clement said.

Dave Morgan, Aqua Survey's director of engineering and a crewmember, said in a previous interview that test borings were done previously to check out the sea floor. "The bottom there is very sandy. We're confident it's stable," he said."

[Ref. 3]

From the little information above it appears that all of the items that are mentioned would be easily covered in the proposed Safety Management System Template (part of this study). The template includes recommendations for site specific approvals and the requirement for a safety management system with appropriate qualifications and training requirements for the crew. Liftboats on the Gulf Coast had a poor safety record before the Coast Guard got involved and established requirements for them. This one, not being in oil and gas industry service rendered it unregulated. It will be important to review the USCG report on this incident which hopefully will be available promptly.

	Name	Summary	Location	Year
5	MEG-JB1	Crane collapse	North Hoyle	2003

Figure 4: MEG-JB1 at North Hoyle

	Name	Summary	Location	Year
3	Skate II	Punch-through: hull dropped	Gunfleet	2003

Figure 5: Skate II at Gunfleet

	Name	Summary	Location	Year
2	Wijslift 6	Hull dropped	Blyth	2000

Figure 6: Wijslift 6 at Blyth

2.3 Near Misses

There are a few items where there was no accident but where there were near misses. These are also important since they point to particular items, in the case below to marine procedures being inadequate. There was no reported damage as a result of this but it is easy to imagine that such a situation can lead to damaging or ripping up the marine cable, or could lead to injury and/or los of life.

"Wind farm workers rescued 4 February 2009

E.on was forced to evacuate its workers to safety from its Robin Rigg offshore wind farm after a cable-laying barge broker free from its anchors in stormy seas. Wind farm workers who became stranded on an unanchored barge in stormy seas off the coast of Cumbria were rescued, the Maritime and Coast guard Agency said. As pre the information available, the 42 workers were aboard the UR101 barge at the Robin Rigg wind farm, eight miles west of Maryport, when three of their four anchor cables snapped. A spokesperson for the wind farm operator E.ON UK, the electricity and gas company, said the 270 ft barge was laying cables between turbines at the Robin Rigg wind farm when its anchors worked free in 16 ft seas. It was later anchored to a large tug to prevent it drifting. If the operation to re-anchor the vessel fails it will be towed out of the turbine field to prevent it colliding with the turbine foundations. Located 9 km out to sea in the Solway Firth, between England and Scotland, Robin Rigg will have 60 turbines once completed and a 180 MW capacity. The firm according to newenergyfocus.com, has said it hopes that the construction will not be delayed."

[Ref. 4]

2.4 Media Hype - Caution

We have diligently searched for incidents and accidents and have not been able to find *"U.S. Thousands of mishaps, breakdowns and accidents".* While the industry has had issues, the media hype in regards to the issues should be examined in relation to the facts chronicled elsewhere. There is an important awareness that needs to be made to people/structures in close proximity to wind turbines and review of these incidents and accidents will hopefully help that process. The following example may illustrate:

Tuesday, October 30, 2007
Wind Power's other unreliability problem [by Sterling Burnett]

> *"People have written at length concerning the numerous failings, weakness and drawbacks of the government push for wind power. Most feel that the greatest weakness of wind power is its unreliability or, more accurately, its intermittency.*
>
> *A second reliability problem has drawn little attention despite a worthwhile feature story that ran in Business Week in August.*
>
> *Business Week's story ran in the aftermath of the late August collapse of a wind turbine in Sherman County Oregon which killed one worker and seriously injured a second. While this is may be the first recorded death from a wind turbine collapse, it is not the first recorded failure (This does not count any big rigs carrying wind blades or towers that have wrecked killing or injuring either the driver or other vehicle drivers and passengers). The European experience is instructive, because they have much more experience – both in years and numbers of turbines – than the U.S. Thousands of mishaps, breakdowns and accidents have been reported in recent years. Gearboxes atop of the towering masts have short shelf lives, often failing in less than five years. After only limited operation, fractures have been found both in the rotors and in the concrete foundation anchoring the towering turbines. Short circuits and overheated propellers have caused fires. And all this despite, as Business Week reports, "manufacturers' promises that the turbines would last at least 20 years." This is adding to the expense of wind power. Delivery of new rotor mounts can take up to 18 months (all the while the turbine(s) sit idle). And new gear boxes can cost up to 10 percent of the original construction cost. With many of the wind facilities up for new insurance coverage, insurers are now balking at providing new coverage without regular maintenance agreements and at much higher prices. One insurer reported more than 1000 claims alone in 2006, not including uninsured malfunctions and breakdowns. While there have been no deaths from mechanical failure of wind turbines in Europe, in 2006 alone the incidents that have occurred hint that such a result may only be a matter of time. In one incident, in the city of Trier fragments of a broken rotor blade landed on a road shortly before rush hour traffic. In another mishap, two wind turbines caught fire near Osnabrück and in the Havelland region while firefighters could only watch since their ladders weren't tall*

enough to reach the fire. And in Schleswig-Holstein, a 230-foot tall wind turbine folded in half in -right next to a highway.

[Ref. 5]

2.5 Sources of Data and Details

- **Caithness Windfarm Information Forum (CWIF): www.caithnesswindfarms.co.uk.**

The detailed table they provide includes all documented cases of wind turbine related accidents which could be found and confirmed through press reports or official information releases up to 31 December 2009. CWIF believe that this compendium of accident information may be the most comprehensive available anywhere.

"Caithness Windfarm Information Forum - CWIF - is run by a group of people concerned about the proliferation of windfarms in Scotland, particularly the Highlands and more particularly Caithness and Sutherland".

While the above quote is their stated goal their work is certainly of assistance to many organization who use the data and quote it.

Information consists of Accident type, Date, Location, State/Country, Turbine Type/Size, Brief Details, Information Source, and a Web Reference Link. Total incidents as of Dec 2009 stood at (715);

- Industrial Wind Action Group: www.windaction.org. "*Industrial Wind Action is dedicated to providing information on industrial wind energy to enable communities and government officials to make informed decisions".*

  Their categories are limited but include:

  - Icing
  - Injury
  - Structural Failure etc.

  Information consists of news media reports, and information from the internet, publications and photographs and many of the detailed stories of incidents;

- National Wind Watch www.wind-watch.org– contains many of the detailed stories of incidents and many of the photos of incidents.

- BWEA British Wind Energy Association (185 reports as of 2006/7) for Members only and Members must be involved in the industry as Manufacturers [Ref. 6];

  Input consists of information gathered on incident details, location, phase, work process, competence, time on shift, injury, damage etc. and whether low, medium or high impact potential. As of April 2007 there were only 15 companies participating mainly representing UK operating wind assets;

- AWEA American Wind Energy Association – said to be working on one, but no

information was provided;

- International Association of Engineering Insurers, IMIA: www.imia.com G-Cube, Munich Re, Swiss Re & other Insurers gather data, and though this was not able to be released they provided some summaries of some the issues in conference papers;
- Manufacturers (for their manufactured turbines primarily, but not publically available);
- Certification organizations – e.g. DNV, BSH, GL, (for their certified equipment it is said that root causes are examined but not publically available);
- Department for Business, Enterprise & Regulatory Reform (in Reports produced for UK subsidized wind farms) The Offshore Wind Capital Grants Scheme, Dept of Business Enterprise & Regulatory Reform (BERR), UK present annual reports of UK wind farms and many times provide a list of accidents/incidents in the year. These turned out to be most helpful as a very good source of data and lessons learned. The organization has been renamed to the Department of Energy and Climate Change (DECC) and future annual reports will appear on their website.
- Death's Database, Paul Gipe (limited information) www.wind-works.org (36 reports to 2006);
- Bundesweite Datenbank Der Windrad - Unfälle reported (in German - "nationwide databank of wind turbine accidents) however it appears to be shut down at the time of writing [Ref. 7];
- POWER: Case Study: European Offshore Wind Farms [Ref. 8]. A survey for the Analysis of the experiences and Lessons Learnt by Developers of Offshore Wind Farms (part of the POWER (Pushing Offshore Wind Energy Regions). Deutsche WindGuard GmbH, University of Groningen – yielded a number of good datapoints and is excellent reading and contains very useful information in terms of lessons learned;
- A source of photos and root causes, without case references, was obtained in a publication VdS 3523EN [Ref. 9] - a European standard put out by a group in Germany.
- Windpower Monthly Magazine kept articles that were particularly helpful but required a subscription which was well worthwhile and covered events outside of Europe and America.
- A listing of crane accidents provided a few useful cases although it required a subscription: http://craneaccidents.com. Lifting accidents from anecdotal information are probably not well chronicled.
- The website http://ventdubocage.net/accident.htm yielded some useful photos not found elsewhere.
- Legal cases involving wind farms were mined, and yielded a few cases where technical issues were part of the claim. We do not claim this is comprehensive

but it gave an idea of what sorts of accidents occurred e.g. transporting blades where the truck went off the road; nacelles catching fire in ports in Texas when welding/cutting tie-downs etc. We had limited access to the legal intelligence but this is an area that could be mined for further information – our issue was that it took a lot of time to separate technical cases from employee lawsuits and contractual lawsuits, nonetheless we reported some.

- And many other newspaper sources, magazines etc.

Compilations of reliability data are helpful in understanding accidents:

- ISET Institut fur Solare Energieversorgungstechnik e.V. was founded 21 years ago, ISET is now part of the new Fraunhofer Institute for Wind Energy and Energy System Technology (IWES).

  http://www.iset.uni-kassel.de/pls/w3isetdad/www_iset_new.main_page

  http://reisi.iset.uni-kassel.de/wind/reisi_dw.html - contains much of the data

- WindStats www.windStats.com – a very interesting database on reliability with data on a number of turbines including (in 2006) 5280 in Denmark, 17940 in Germany and 769 in Sweden and some in other countries including New Zealand. The reports include information on the number of stops and the hours stopped. While this is reliability data it relates to failures though the reason is not documented. Our enquiries have led to the opinion that no such data is collected in an organized way on such a large number of wind farms in the US.

Construction vessel accidents and accidents from similar vessels involved in construction were made available through a jack-up working group involved with offshore drilling jack-ups. Much can be anticipated about incidents and accidents by looking at the track record of jack-ups in the North Sea and liftboats in Gulf of Mexico. Several incidents in Europe are also instructive.

- Jack-up information is kept in databases primarily related to the offshore oil and gas business including those of GL Noble Denton (not publically available) and others.

- DNV keeps a useful database on offshore accidents called WOAD (Worldwide Offshore Accident Database) focusing on the offshore oil and gas vessels which is for sale through a subscription.

None of the databases had considered root cause. In most incidents there is a news report or company news release but no further information. Scanty information is sometimes obtainable from company annual reports. Lessons can't be learned if there is no root cause to know what was learned.

Many of our sources were later eliminated from internet postings. For example there were some photos of wind turbines on the www.sgs.com website showing corrosion issues with 2 windfarms that we were able to capture: we were unable to locate the same information a month later.

While the work was on-going it was possible to gather information daily to add to the list.

3. INSURANCE SOURCES AND INSIGHTS

3.1 Munich Re Insights

Munich Re is a reinsurance company based in Germany but involved in worldwide operations. Their insights are useful:

> *"It is not clear how offshore wind parks will survive severe storms. The experience with onshore plants is contradictory: in one case in India 40% of the wind turbines were demolished by a cyclone. In Denmark, on the other hand, the gale Anatol merely destroyed 13 older plants out of a total of 3500 installed plants. The probability of storms occurring is appraised by experts in Munich Re's Geo Risk Research Department. One storm scenario which they have developed for Germany with a probable return period of one hundred years shows that such a storm will pass through precisely the area where offshore wind powerplants are being planned, for that is where the wind is strongest."*

[Ref. 10]

> *"Exceptional storms sweeping over wind farms have also affected onshore installations. In 1998, for example Tropical Cyclone 03/A destroyed 129 or 40% of the 315 wind turbines at a wind farm in India."*
>
> *"Accidents can still happen though. For instance a ship at the Horns Rev wind farm tore the heavy power cable in a row of wind turbines with its anchor. The ensuing repairs cost much more than a comparable repair job onshore."*

[Ref. 11]

Another interesting article by Munich Re discusses the methods that are used in Europe to minimize accidents and is worthy of note. This is instructive when determining the CVA role. The article refers to Munich Re's marine warranty surveyor and there are a variety of marine warranty surveyors available in the United States who work on behalf of insurers to prevent losses in the marine and offshore oil and gas world.

Marine warranty survey – Safety on rough seas 1 September 2009

> *"To ensure the safety of the components of offshore wind farms during transportation and particularly during installation, the operators of wind farms use independent experts. These experts, known as "marine warranty surveyors", provide support for risk mitigation at work – and are now standard in the offshore*

wind power sector.

Despite the relatively small number of offshore projects that have been completed, insurers already have extensive claims experience. As the various manufacturers' plant concepts differ substantially, there are not yet any meaningful risk statistics. This highlights the need to critically analyse every individual offshore project, assess it with respect to insurance criteria and quote for it individually. Munich Re's know-how in the offshore sector means that it can offer risk-commensurate coverage concepts and thereby make a considerable contribution towards risk minimisation in promising offshore projects. In addition, the collaboration with marine warranty surveyors that we demand adds significantly to safety during the construction and operation of offshore wind power plants. Most insurers of offshore wind power projects require them to be used as an essential prerequisite for the insurability of projects.

One of the leading certification bodies for wind power plants is Germanischer Lloyd. We asked Gabor Bohner, Manager of the Marine Operations Department at Germanischer Lloyd in Hamburg, about his experience of the risk situation in the offshore market.

There has recently been a lot of damage to offshore wind power plants during transportation and installation. Why?
Gabor Bohner: Transportation and erection at sea are very complex operations. In most cases, the prescribed weather restrictions are not adhered to, or unauthorised equipment is used. But sometimes the cause of damage is also simply human error.

At what points can you identify risks in advance and help to reduce losses?
Gabor Bohner: Our long-term experience as independent marine warranty surveyors are the ideal complement to the insurers' coverage concept. Germanischer Lloyd basically checks all relevant documents for the project, such as the shipping documents. Our qualified warranty surveyors also monitor every operation on site themselves. In this way we prevent risks before they arise and can protect investments. We see the biggest risks in the stability of the transport barge, the bollard pull of tugs, the offshore capacity of cranes and the equipment of the cable-laying vessel.

A number of mega offshore wind power plants are planned over the next few years. How will the claims situation change?
Gabor Bohner: The companies operating offshore will acquire vast experience in the years ahead. The equipment used for transport and installation, such as barges, ships, cranes or cable-laying vessels, is also becoming more sophisticated. I am therefore firmly convinced that there will be fewer losses per wind power plant in future. However, it is possible that the high number of new projects will lead to a worse claims situation overall. Consequently, high quality standards on the part of all companies involved and well-trained personnel will be particularly important parameters for insurers and marine warranty surveyors

[Ref. 12]

The marine warranty surveyor role is somewhat aligned with the interests of the CVA. Thus the roles and what is being checked may avoid some duplication in a particular project. Their interests are not, however, completely aligned. The marine warranty surveyor does not concentrate greatly on fabrication, quality control, or longterm material issues, but does concentrate on loss prevention often just until the end of the installation period. Their scope may only relate to the construction phase and any reliance of the CVA on marine warranty surveyor opinions should ensure understanding of the specific role in the project.

3.2 International Association of Engineering Insurers (IMIA)

www.imia.com

Several reports from these underwriters highlight their main concerns - they are very acutely aware of the risks from various technical issues – so we quote some of their information:

> *"The worst possible scenario is if one of the underwater cables connecting the offshore wind farm to the mainland is breached by trawling or a marine accident. In such situation a whole wind farm is prevented from delivering its power to the mainland. The cost of re-establishing the marine cable and the bill for consequential loss can be astronomical."*

One of the issues about assembling data is aptly illustrated by the report in this document about a fire in an offshore wind turbine. There is no specific date or other information to tag it to the database – nevertheless some information is better than none:

> *"The entire nacelle was destroyed by fire, and there was damage to the upper tower section and blades. The cost of repairing the damage and consequential loss is estimated at EUR 2 Mill., of which 30% was for the hire of equipment necessary for carrying out the repair. It has been established with great certainty that the cause of the damage was a fault occurring at the time of installation, made by the contractor who erected the turbine".*

[Ref.13]

There is, however, no "lessons learned" offered since it is not stated what the fault was that caused the fire or even if there was fire detection and protection in the turbine at the time. (A construction fault was also stated to be the cause in Case C20090306.1 chronicled in the Caithness data).

The report goes on to say:

> *"Unfortunately after a few years of operation, many of the 600-kW and 750-kW wind turbines turned out to suffer from defects and errors in design, manufacture or post-installation. A lot of faults occurred in gear and on blades. Claims were usually*

covered by the manufacturer's warranty. The cost of repairing damage caused by defects and errors was extensive. At an early stage of its development the wind-turbine industry was plagued by serial defects – but it was nothing compared with the current high level.

Noting that this is a 2002 report.
[Ref. 13]

It is interesting to note that Vestas' Annual report 2008 states:

"In 2008, Vestas made warranty provisions of EUR 240m corresponding to 4.0 percent of revenue, against 5.0 percent in 2007"

"For 2009, warranty provisions are expected to amount to 3-4 per cent of revenue. At the end of 2008, total warranty provisions amounted to EUR 183m.

It is not clear whether these are costs outside of insured provisions. Insurers often cover the first of an incident but not a series failure for subsequent units. The 3-5% provision gives a good estimate of the likely issues that may arise. The contracts are primarily for a 2 year period; however, some extend to 5 years. Since the likelihood of failure does not decrease over time and may increase over time, the expectation of 3-5% of failure may be a reasonable figure.

Likewise Gamesa Annual Report 2008 states:

"Gamesa's warranty period is established at two years and the costs associated therewith represent between 3.5% (Spain) and 4.5% (abroad) of the unit's sales, depending on the market in which the turbines are sold."

IMIA [Ref. 14] give some information on characteristics of an example project (Horns Rev):

"The wind farm consists of 80 2 MW wind turbines. The wind park is located 14-20 km off the coast at a water depth of 6-12 meters. In winter, weather conditions are often severe, with strong winds and waves up to 14 metres. The distance between the wind turbines is just over 500 metres. The time of erection was estimated at two years with limited activities in the winter period

The project was not completed on time, and the erection all risks insurance cover was extended several times.

During the period of erection, (2002) *eight recoverable claims were reported, of which six related to the erection phase, one resulted from a stroke of lightning and one from storm damage. Of the erection claims, one claim was for damage to the sea cable to the wind turbine, by far the largest individual claim to have occurred during the erection of the wind farm.*

Total claims amounted to approx € 2.5m, of which the storm and lightning claims

accounted for approx. 3.5%.

Total claims incurred:

- *Repair - direct payroll costs and costs for new component or repair of damaged property 12%*
- *Costs incurred in connection with disassembly and reassembly of damaged parts 3%*
- *Costs incurred in connection with mobilization and demobilization of contractor ships 31%*
- *Costs incurred in connection with hiring contractor ship with crew 54%"*

Additionally,

"The main differences of offshore turbines compared to onshore installations of the same type with the identical performance can be concluded as follows:

- *Extended measures for corrosion protection of mechanical and electrical equipment and special facilities for dehumidification*
- *Metal cladding and special design of the machine housing*
- *Different location of the transformer and the frequency converter offshore wind turbines in the nacelle and onshore wind turbines in the foot of the tower*
- *Redundant and automatic cooling system*
- *Special facilities for service at sea (i.e. crane)*
- *Facilities for extended condition monitoring which allow extension of periods between maintenance works.*

As a result of such special features the weight of offshore turbines becomes higher than the weight of onshore machines. This means an extended effort during erection by use of specific erection equipment.

Obviously manufacturers try to compensate for the increased weight by changes in the construction of components where possible.

As an example, the weight of the gearbox of a 2.5 MW turbine of a specific type is in the onshore version 500 kg less than in the offshore version."

The experience with losses is also interesting:

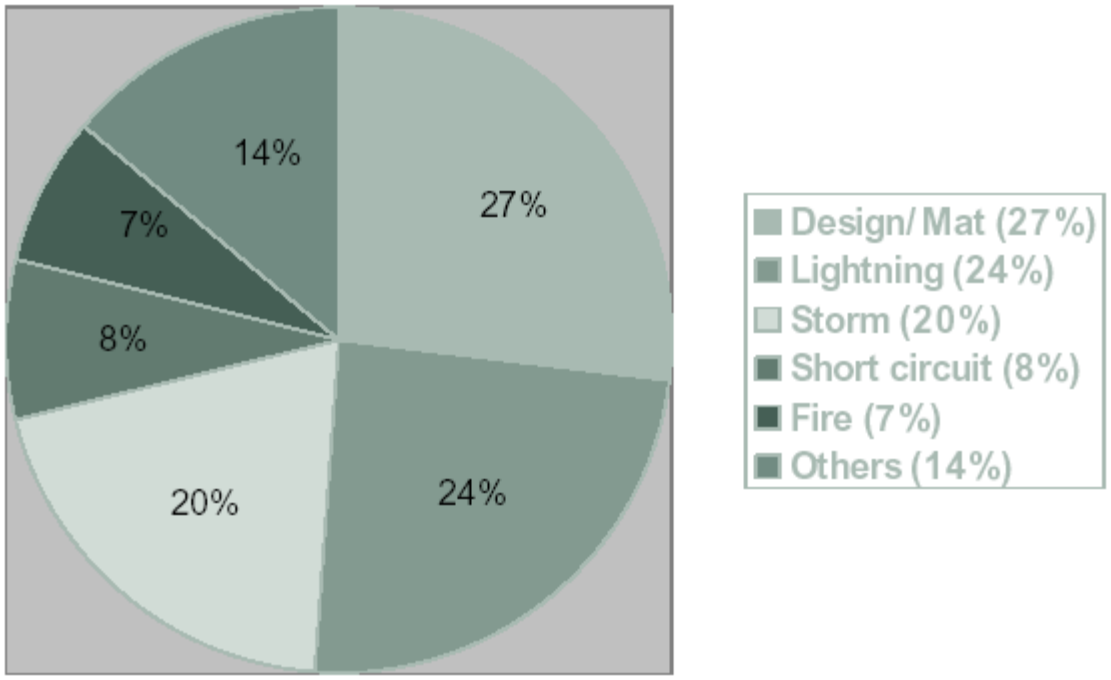


Figure 7: Breakdown of Accident Causes

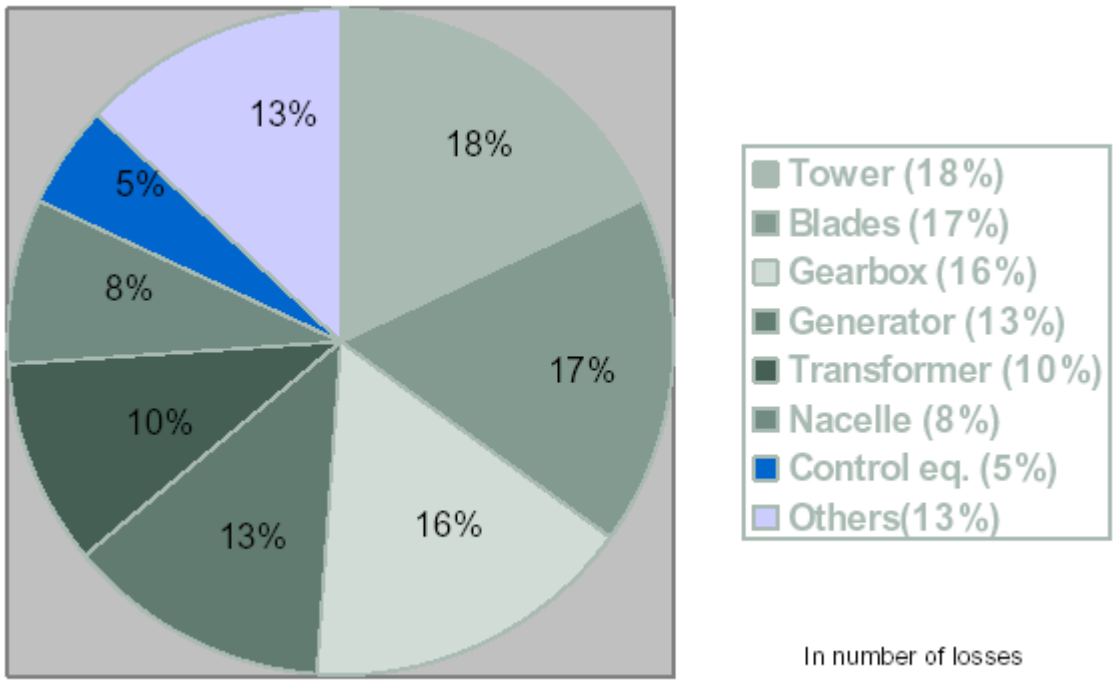


Figure 8: Breakdown of Component Damages

[Ref. 14]

The IMIA report points to the issue of subsea cables in particular being an area needing careful attention to prevent insurance claims:

"The following problem areas have been encountered:

- *Inexperience on the part of the team monitoring and supervising offshore cable installation (e.g. relating to the speeds and drag forces involved);*
- *Weather conditions, weather forecast;*
- *Lack of communication between manufacturer and installation contractor;*
- *Poor route selection and site survey;*
- *Unrealistic permit conditions;*
- *Inadequate design/contingency planning (water blockers/ seals)'*
- *Poor cable condition (e.g. armouring not sufficiently substantial)".*

[Ref. 14]

For Global Wind Energy, which contributes to IMIA, some 20% of their claims were from gearbox issues. A photo in their presentation is given below showing a collapsed turbine, though the date and details are not noted:

[Ref. 15]

While the transformers in the following remarks are not from the wind farm industry an interesting study carried out by IMA showed the failures of transformers over 94 reporting when claims for transformers was running high. It may give some insight into expected claims in the future for the offshore wind industry as well. [Ref. 16]

Cause of Failure	Number	Total Paid
Insulation Failure	24	$149,967,277
Design/Material/Workmanship	22	$64,696,051
Unknown	15	$29,776,245
Oil Contamination	4	$11,836,783
Overloading	5	$8,568,768
Fire/Explosion	3	$8,045,771
Line Surge	4	$4,969,691
Improper Maint/Operation	5	$3,518,783
Flood	2	$2,240,198
Loose Connection	6	$2,186,725
Lightning	3	$657,935
Moisture	1	$175,000
Total	94	

Table 2: Transformers: Causes of Failures

Another IMIA document reports as follows:

"Gears must be easy to maintain, and replacement of components must be possible without removing the whole gear assembly. Gear lubrication must be optimum; this should include forced lubrication of all bearings and gear cogs, with conditioned oil being fed to critical points and harmful particles removed by filtration. The installation should be fitted with both inline and offline filters. Filtration of gear oil should ensure a purity of 17:15:12. "

"Unfortunately, after a few years in operation, many of the 600-kW and 750-kW wind turbines turned out to suffer from defects and errors in design, manufacture or post-installation. A lot of faults occurred in gear and on blades. Claims were usually covered by manufacturer's warranty. The cost of repairing damage caused by defects and errors was extensive.

At an early stage in its development, the wind-turbine industry was plagued by serial defects –but it was nothing compared with the current high level.

Repairing damage to gears and blades, in addition to being expensive, is often a very complex process. Large cranes are necessary, and replacing large components requires good-not-windy-weather conditions.

The cost of repairing serial defects (and still is) a very heavy burden on the wind turbine industry and its suppliers. Only the large wind turbine manufacturers can overcome the economic problems and find acceptable technical solutions. Some manufacturers are finding that the job of repairing serial defects is continuous. "
[Ref. 13]

3.3 Changes From the Historical Incidents:

Insurers have influenced the improvement of technology together with the industry. In the research there were very many studies which provided technical solutions often funded by government entities mainly in Europe. The German activities with insurers and others have yielded many changes as chronicled by IMIA.

"Some specific changes:

- *The so-called open generators are no longer used, and this has reduced the occurrence of corrosion damage caused by humidity.*
- *The gearboxes have been developed in relation to their ability to resist impact caused by changing speeds.*
- *The gear wheels in the gearboxes now have inclined toothing to increase power transmission and reduce noise.*
- *The gears now have oil coolers to extend the intervals between oil changes and increase the useful lives of the gears.*
- *The noise insulation in the nacelle was previously flammable but has now been replaced by flame-retardant materials.*
- *The disc brakes have been shielded so as to avoid a scattering of sparks in the nacelle.*
- *The brake strategy has been changed so that the generator is disconnected from the grid as late as possible in order to use the energy of the generator to slow down.*
- *The rotor blades now have lightning conductors as the risk of lightning cannot be minimized merely by insulation. By means of the so-called receptor method the electric charge from the lightning is captured by a receptor built into the tip of the blade, diverted from the vital parts of the turbine and taken through the tower construction to the ground.*
- *And lastly, modern wind turbines allow the remote monitoring for ongoing control of the vital components."*

"Damage

The table below, which does not necessarily reflect the risk situation in other countries, is based on 15 years of experience in Denmark. The figures come from wind turbine claims for which repair work began within 24 hours of damage having been discovered, and for which access was readily available.

Type of Damage	% of Number of Claims	% of Cost of Claims
Mechanical	*40*	*40*
Lightening	*20*	*25*
Fire	*7*	*9*
Storm	*4*	*2*
Others (short circuit etc).	*29*	*24*

Table 3: Type of Damage (IMIA)

*"**Mechanical damage** The most frequently occurring type of mechanical damage is damage to gears. Damage may happen to bearings due to breakdown or wear (pitting), backlash and tooth breakage. These types of damage usually occur due to defects in material, fatigue, the use of wrong oil or wrong oil temperature, vibrations and overloading….*

…more serious types of damage which involve the lifting of major spare parts up to the nacelle, often find a more worthwhile solution in a replacement of a gear, as this will reduce interruption time and requires only one call for a crane.

Mechanical damage may also happen to the rotor blades. So-called edgewise vibrations which arise in case of an (unfortunate) combination of a specific temperature and a certain wind speed may cause the rotor blades, and even the whole wind turbine, to start shaking to the point where, in the worst case, the result is a total loss…... Edgewise vibrations can be avoided if the safety system of the turbine has a feature enabling it to stop the turbine automatically if it registers too large vibrations.

Damage by lightning is the second most frequently occurring type of damage. However, the extent of damage differs widely from one case to the next. Damage by lightning can be anything from a case of minor damage to the electric control panels to a case of total damage to rotor blades, gearbox, generator, and control system. Damage by lightning may be followed by consequential damage to machine parts and generator due to, among other things, 'wounds' caused by the electric charge of the lightning. Failure to install protection against lightning will cause the electric charge to travel through rotor blades, gearbox, generator and to the control panel where it may cause considerable damage.

*"**Damage by fire** in wind turbines is usually caused by overheated bearings, a strike of lightning or sparks thrown out when the turbine is slowing down. The possibilities of fighting a fire in a wind turbine are often severely hampered due to the height of the tower, …. Consequently, even the smallest spark can easily develop into a large fire. Fire in wind turbines usually lead to a total loss of nacelle and rotor.* "
[Ref. 13]

An IMIA Report which was authored by Codan Insurance Risk Engineer Truels Kjer September 2007 is an excellent background to some of the casualties where root causes were determined [Ref. 17]. Pages from this report are produced in Appendix A.

3.4 Secondary Structures

Not much has been written about Secondary structures but they have significance to safety and access. The appurtenances such as the boat landing or J-tubes being damaged by attending boats is a feature than has been spoken about by an insurer at a recent conference. According to his presentation there has been damage because the clips such as shown in Figure 9 allow upward load, and the waves reached up to it and lifted it from the retainers. This effect and other secondary effects of collision by attending service craft had apparently been underestimated in the early offshore turbine towers. He cautions that they have had claims on these secondary structures. There is a need to provide better estimates of these potential loads and design for them.

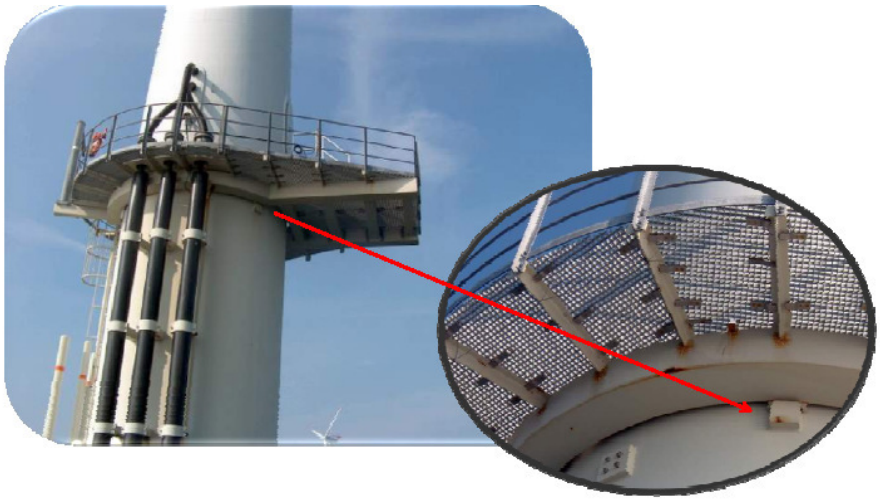


Figure 9: Secondary Structure

In Europe some of the offshore wind farms have a safety zone designated around them and a device installed to give an auditory warning to ships in the area.

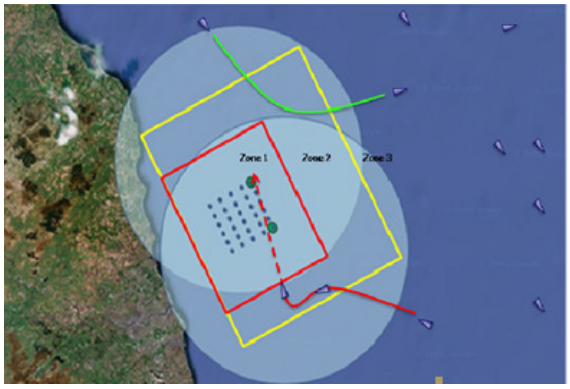


Figure 10: Safety Warning Alarm

The detection takes place when a ship crosses into the safety zone. A warning message is sent to the ship via the AIS (Automatic Identification System) and an auditory alarm given. Safety zones for oil and gas structures in the United States are given (and noted in the CFRs), to high production platforms. There has, so far, been nothing published on the intent for offshore wind farms in the US.

[Ref. 17]

3.5 Subsea

Figure 11: Kinks in Subsea Cables

[Ref. 18]

In a recent presentation one of the Danish insurers [Ref. 17] commented on the losses they have received from the subsea cable equipment incidents. He commented that the Cable is complicated piece of equipment; every part of handling the cable has to be done with an enormous amount of care and he expressed concern about the decision of one Captain of the cable laying vessel that had disconnected when weather was marginal and dropped the subsea cable to run for safety.

There have apparently been very many examples of cable damages both during the laying of cables, and from traffic after the installation. Apparently jack-ups have jacked up on cable that has just been laid, and anchors of laying vessels have tangled with the cable being laid. Another issue was that of creating kinks. There is an important experience factor in maneuvering the ship around the turbine with typically 6 anchors. It is very easy to get a kink into the line particularly when preparing to install the cable through the J-Tube, and unkinking is a major exercise requiring special skills. Finally the presentation warned that one should always be prepared for a problem leaving spare cable along the line in case of a break (since it's necessary to pull the cable up, cut the ends back (due to water ingress), and join the cable). Contractors need to be pre-arranged and on-call to respond in the case of an incident. The construction of the cable can have features which prevent kinking according to one expert [Ref. 19].

As one example in the installation of the Middelgrunden subsea cable there were 3

accidents with damage to the subsea cables [Ref. 20].

A report gives the following which does not directly chronicle the accidents but uses the experience to site the solution to cable installation issues, which itself is useful.

"Cable Installation"

"There has been a poor history of cable installation so far for offshore wind projects. Cable damage and/or subsequent cable problems or failures have occurred in the majority of projects. Even large interconnector projects such as Nor-Ned (Norway to Netherlands) and Basslink (Australia to Tasmania) have had delays due to cable installation related issues.

These issues can be mitigated by the following measures:

- *Good cable route engineering, to ensure that the route avoids known key risk areas (such as ship anchorages and explosives dumping grounds), whilst not adding significantly to route length.*
- *Thorough ground investigation campaign(s) to inform the supply and installation specifications.*
- *Production of appropriate burial specifications based on an assessment of those external risks and ground conditions.*
- *Selection of contractors with good track record and sound financial standing.*
- *Ensuring that the proposed installation spread (vessel, handling and burial equipment) is 'fit for purpose' for the project in hand.*
- *Linking the cable supply and installation contracts to other construction contracts through robust interface management.*
- *Use of experienced client representatives during cable installation.*

[Ref. 21]

4. TROPICAL REVOLVING STORM EXPERIENCE

The reason for looking to Indian, Japan, Taiwan, and Philippines for incidents is that they experience cyclones, typhoons (tropical revolving storms) much like the hurricanes in the United States. They are generally more severe and much more frequent. There is an additional issue of winter lightning in Japan.

4.1 India

In 1998 Tropical Cyclone 03/A destroyed 129 or 40% of the 315 wind turbines at a wind farm in India.

Figure 12: Gujarat, India 1998

Approx. 40 MW was damaged during the cyclone of May 1998.

[Ref. 22]

Another report gave the following view:

"The area presented a staggering picture of wind turbines totally uprooted from the base, blades scattered around, generators on the ground," says wind consultant Dr A Jagadeesh, who travelled to view the scene of devastation from Nellore in Andhra Pradesh. Towers in many cases had crumpled, bringing nacelles crashing to the ground, he reports. Power lines linking the wind farm to the grid were still down last month……"

"Unlike its countrymen, Südwind suffered badly with 24 of its 38 turbines knocked out of action. The S33 is certified by both German and Indian authorities. Once the grid was down, the yaw systems were unable to turn the machines out of the wind, says the company's Martin Kühl, though this might not have been an important factor. "During the cyclone the wind changed direction by as much 180 degrees in fractions of a second," he says. Loads on the turbines were over seven times greater than design loads, he says. Südwind has asked Germanisher Lloyd to report on the failures.

*A major lesson from the catastrophe is that new standards have to be set for weather conditions in India, Kühl believes. "**Standards for Europe shouldn't simply be copied by countries in other parts of the world.**"*

Commenting on the total failure of all seven NEG Micon turbines, company director Jens Erik Kristensen says winds were so strong at the centre of the cyclone that nothing could have withstood them -- and the Micon units were directly in its path. All the machines were under one year old, but they were subject to loads way beyond their design criteria. "We are talking here of wind strengths which only happen once in the course of hundreds of years," says Kristensen.

Vestas' Johannes Poulsen echoes Kristensen's words, calling the cyclone "a terrible and atypical situation where so far we have found that winds were over the survival speed of 54-56 m/s the turbines were built to withstand." Vestas has subsequently raised its wind speed safety margin, he adds."

[Ref. 23]

A further report:

"Recent letters (November 1998) continue the debate about the failure of wind turbines in the recent cyclone in India. Were the wind speeds much higher than could have been anticipated or were some of the wind turbines simply not sufficiently robust?

Your report of the cyclone (September 1998) describes the wind as gusting to 70 m/s. In the context of UK wind farm sites, the maximum design wind speed (three second gust likely to occur once in 50 years) could exceed 70 m/s for many Scottish sites and could approach 65 m/s on some English and Welsh sites with significant topographic features.

I believe that a critical factor in the failures in India is that the grid also failed. If this happened at the height of the cyclone, then turbines would move to the downwind position as the cyclone raged, with blades feathered in the case of pitch regulated machines. Yawing could be slow enough that the full force of the wind would hit the side of the nacelle and across the full face area of the feathered blades. In this case, the tower top loading could be significantly higher than for the "following wind" condition and the robustness of any wind turbine would be tested to the full.

Wind turbine manufacturers would be well advised to check that this load case has been included in their design calculations.

[Ref. 24]

The issue which is referred to here is that of the nacelle having to maintain its direction in tropical revolving storms and when there is loss of power to the grid, it no longer can do that. This results in loads which have not been designed for, and perhaps there should be consideration of this issue for tropical revolving storm areas particularly for offshore applications.

4.2 Japan

There have been a very few reports published accessible and several attempts were made to contact the writers of technical papers for more information on Japan's accidents but without limited results.

"July 2, 2007 by Hisashi Hattori in Asahi Shimbun

Power-generating wind turbines will soon have to comply with tough new technical standards to ensure they can withstand typhoons, lightning strikes and other extreme weather conditions.

Wind-power generation is a major pillar in the government's push to use alternative energy sources to fight global warming. In recent years, however, storms have caused extensive damage to many wind turbines.
International standards drawn up in Europe are not sufficient to protect wind turbines from Japan's weather patterns, according to officials of the Nuclear and Industrial Safety Agency, an arm of the Ministry of Economy, Trade and Industry.

Officials have resolved to introduce new standards of durability for the giant structures by fiscal 2008. Currently, wind turbines need only satisfy a stipulation in the Electric Utilities Industry Law that they be "structurally safe" against strong winds.

However, there is nothing to regulate how they should be designed to cope with thunder and lightning.

In 2006, about 75 percent of the wind turbines in Japan were foreign made, although local manufacturers are now rapidly entering the market.
In fiscal 2005, there were 100 cases of malfunctions and accidents reported in a survey of 900 wind turbines by the New Energy and Industrial Technology Development Organization (NEDO).

The survey found that 38 cases were caused by natural phenomena, in particular strong winds and lightning strikes.

Twenty-five were due to faults in construction or manufacturing, and four were the result of poor management. In 33 cases, the causes were unknown.
Wind turbines stand about 100 meters, making them vulnerable to lightning strikes.
Wind-power generators facing the Sea of Japan in the northwestern Tohoku and Hokuriku regions are hit by lightning strikes each winter.
As a result, they experience at least four times as much damage as similar structures elsewhere.

In addition, 13 percent of the reported damage was caused by powerful winds in years when many typhoons hit Japan. Wind turbines apparently are especially vulnerable to sudden gusts of wind.

Mitsubishi Heavy Industries Ltd. and other domestic manufacturers of wind-power generators have already adopted designs in their new models that cater to Japan's weather conditions.

NEDO officials will study weather patterns, strong winds and thunder in particular, on a nationwide basis so as to compile a report by the end of this fiscal year."

[Ref. 25]

"Data collected from one winter season in Japan alone reveals losses of horrifying proportions. In just one season, and just one area of Honshu, at least 55 machines had blades destroyed by lightning. The total estimates [that] one year loss for those machines exceeded $5.5 million, and the cost of prevention is approximately one half that value".

[Ref. 26]

An interesting paper on turbines failing in Japan was reported [Ref. 27, Ref. 28].

Figure 13: Failure of 7 Turbines in Japan in Typhoon Maemi (2003)

- Turbine failure rate in Japan is 3 times that of Denmark
- Gust winds experienced about 7 times larger than IEC guidelines.
- Source: Suguro (MHI) [Ref. 29, Ref. 30, Ref. 31]

Design load cases call for alignment of the wind turbine to various yaw limits leading to an important assumption which is not customary on most structures: that the structural survival of the tower may depend on electrical power, control systems being operational, as well as load cases particular to the location being considered.

An interesting report on failures from Typhoon Miyako is reported on the issue of the yaw control:

> *"The wind turbine failures in Mikyako have been well investigated by several groups. They detected that the direction was different between tower falling and rotor about Karimata No. 3 and Nanamata No. 1. And the electric stems were broken and power failed former than wind turbines broken. When typhoon passed through, the wind direction changes from North to Southwest for 3 hours. From these evidences, these turbines would lose yaw control, then subjected to the side attack of strong gust and broke. This experience shows the importance of wind turbine protection against power failure."* [Ref. 29].

The paper concludes that the turbines were indeed overloaded beyond their design values, but points out some other interesting aspects:

> *"Following points were learned and should be useful in wind turbine design in the*

future: a) the locked yaw can be slipped undesirably; b) the tenacity of the foundation is very low causing the easy destruction; c) some tower have its most weak part of its entrance door, which might cause undesired buckle and collapse of the tower.

Very little help was provided by manufacturers during the investigation of the accident. This made the understanding of the mechanism of the damages of the wind turbines during the typhoon. In Japan external force is strong, so it is necessary to evaluate the ultimate strength of the turbine in design process and it is important that the manufacturer provide data necessary to perform structural analysis and wind resistant design."

[Ref. 28].

While the wind speeds exceeded that of design and so failure was predicable the remarks made in the paper are useful in lessons learned. Lessons learned from Japanese experience are useful to the US design process however we were unable to find source of root cause of incidents to wind farms there, or in Taiwan where several were damaged in the recent typhoons of 2009 and China.

Very little is reported on incidents from China. One reference however is of note.

"Dujuan, China: 13 of the 25 units were damaged in the wind power works of Honghai Bay, after a Typhoon".

[Ref. 32].

An interesting remark made in a paper "Toward More Accurate Prediction of Damage Due to Strong Winds" [Ref. 33]. Referred to the fact that the peak pressures on the nacelle had been considerably underestimated by the available code. At this time we have not been able to gain understanding of the importance of the statement in the paper.

Ongoing work in Japan is being conducted by "Task Committee on Wind Resistant Design of Wind Turbine Generator System, the Structural Engineering Committee, Japan Society of Civil Engineers, [Ref. 34]].

The Task Committee on Wind Resistant Design of Wind Turbine Generator Systems was organized to establish a guideline suitable for the design of the wind turbine support structures in Japan. The committee proposed:

- Design wind speed assessment method by CFD (Computational Fluid Dynamics)
- Gust loading factor considering the non-linearity of base bending moment
- Seismic loading analysis methods
- Estimations for the buckling of the tower and the shear transfer failure of the connection etc.

These works were published as Guidelines for Design of Wind Turbine Support Structures and Foundations in November 2007. The contents of the guidelines are:

- Chapter 1 Introduction
- Chapter 2 Design principles
- Chapter 3 Wind climate
- Chapter 4 Aerodynamic coefficients
- Chapter 5 Wind load
- Chapter 6 Earthquake and other loads
- Chapter 7 Tower
- Chapter 8 Connection
- Chapter 9 Foundation
- Chapter 10 Designs of support structures and foundations by the guideline
- Chapter 11 Numerical analysis
- Chapter 12 Laws and regulations
- Chapter 13 Documents and reference data

While there is a reference about this activity it has not been possible to obtain a copy [Ref. 34]. Prof. Takahara of the University of Tokyo has said that this document is currently still in draft form and will be available, with English translation toward the end of 2010.

Another report from Japan indicates the following distribution of wind turbine failures: Over 30% of wind turbine failures were caused by Lightning strikes in Japan as indicated in the Figure [Ref. 35] which depicts the causes with a downtime equal to or greater than 1 week.

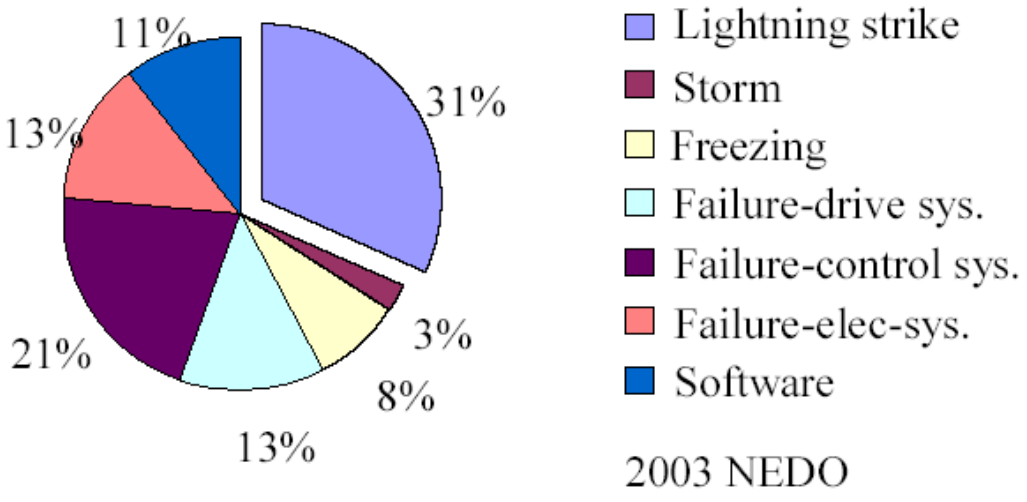


Figure 14: 2003 Analysis of causes of Incidents

There are many windfarms built in China and Japan and a few in the Philippines. A study done by Risoe's Tarp-Johansen et al (now Dong Energy) provided a few useful datapoints. It led us to some papers on a hurricane in Japan and to a professor at Univ. of Tokyo who was most helpful in discussions of root cause which was referred to in his papers, but needed some clarification. After the 2009 typhoon that impacted Taiwan, we noted some of the wind turbines outside Taipei airport had been damaged but despite trying to find someone interested through the Chairman of one of the Universities in Taiwan to send data, we drew a blank. There are references in the literature to a devastating incident in India that eliminated a number of wind turbines in a cyclone in 1998. Following that lead was most instructive to our situation in the US on hurricane reliability of wind turbines.

[Ref. 36].

5. EUROPEAN OFFSHORE EXPERIENCE

Horn's Rev is a good example of the variety of things that can go wrong. These were early adventurers into the offshore market place, and subject to Murphy's Law: "what can go wrong, will go wrong", there are some useful insights in the reports [Ref. 9]. The Danish Industry is to be commended for adventuring into this alternative energy solution, and in adventuring offshore, there is much we can learn from them.

They had problems in almost all aspects of the wind farm:

- Gear
- Generator
- Hydraulic System
- Blades
- Transformer
- Lighting arrester system
- Secondary Construction
- Corrosion Protection
- Cables

Figure 15: Horns Rev.

"During the commissioning process, the grid connection cable onshore failed around Christmas 2002, leaving the wind farm at black-out for 14 days. This further delayed the commissioning process, along with other faults in the wind farm SCADA and the turbine controller software.

The network failure, leading to a standstill of the turbines for 14 days, caused further problems. Standstill marks in the gearboxes could be identified in 8 of the installed

turbines. As the specification for the turbines demands for a period of no power – and thus a possible standstill for one month – the turbine manufacturer was required to cover the costs of this fault. A technical solution was found in case of future blackouts of the network connection. It enables the turbines to run slowly at idle speed, to prevent damage to the gearbox and drive train."

"Selecting a prototype with only a short trial period turned out to be a problem. The new turbine concept (variable rotor speed) and enlarged size became a problem, as did the transformers.

During the first year of operation, the insulation of the generator windings turned out to be insufficient. The increased demands of a marine environment had not been met.

To avoid the major effort needed to replace turbine components (not to mention complete turbines), the selected turbines needed to demonstrate a sufficient trial period and a first low-volume production series of the turbine type. In particular, the demands of the offshore environment had to be tested and met thoroughly."

[Ref: 9]

"Bending with the wind
"The Horns Rev offshore wind farm development was shut down on 4 November when a test wind turbine of the type being used in the project suffered damage owing to the failure of a safety system. The unit in question was a Vestas V80-2.0 MW offshore unit located at Tjæreborg, Denmark. All damage was confined to the turbine blades. But it was the second turbine failure due to overspeed in just a few days, the other occurring on a Nordex site in Norway. Both were caused by human interference in control systems, and have serious implications for how testing and service procedures are currently carried out, and how they should be".

"In relatively low speed wind (10 m/s), a failure occurred in the control system causing the turbine to over-speed. The safety system that has to stop the turbine in such a situation failed. However, the turbine's secondary emergency system cut in and stopped the rotor…."

"Despite Vestas's confidence about recurrences, the Nordex event, a remarkably similar accident - similar, that is, in cause, not outcome - had happened only a few days before, but to a turbine sited at the Arctic Wind site near Havöygavlen, Norway. It occurred on October 29 and the mechanical damage was far more extensive. It also was an overspeed accident, in 15 m/s wind, with the rotor getting up to 44 rpm (tip speed 663 km/h [over 400 mph]) before catastrophic failure occurred and the entire nacelle with its rotor was ripped from the tower".

[Ref. 37]

In another report:

> *"Horns Rev runs into generator 06 April 2005*
>
> *DENMARK . RENEWABLES*
>
> *Operator Elsam is hoping to have all 80 turbines at its Horns Rev offshore wind farm up and running by the autumn following several months of repairs dealing with defective transformers and generators. For some time there have been technical problems with the V80 2MW-rated turbines at the site, causing them to run at below design output, which made operation of the site impossible to sustain. Twenty turbines are currently down for repairs; the remaining sixty will be assessed and repaired during the remainder of the summer.*
>
> *The problem first became apparent at the end of last year when problems arose with the transformers, and later it was discovered that a large number of generators incorporated apparent production defects. Elsam has a contractual agreement with Vestas covering reliability, so the current difficulties will have only limited consequences for the operator.*
>
> *Manufacturer Vestas has acknowledged the problems and is making a vigorous effort to get the wind turbines working satisfactorily. Current status of the work is that most transformers have now been replaced. However the harsh conditions in the North Sea have impeded repairs and Vestas is considering whether it would be appropriate to dismantle all nacelles and bring them ashore to work on their generators under optimum conditions. It is not known at present whether the defects reside in the ABB-manufactured transformers and generators or in a misapplication of the components offshore.*
>
> *Such problems have not occurred before with these turbines, but the service history of the 2 MW versions, especially under offshore conditions, is not yet very extensive."*

[Ref. 38]

…and further:

> *"Failures at Horns Rev*
> *Technical failures of the transformers began in August 2003. By the winter some 20-30% of the transformers had been affected, owing to a combination of factors – manufacturing problems, weather conditions offshore, possibly salt in the air affecting the transformers, and after effects from the transformers' being stored onshore.*
>
> *With a fifth of the turbines affected within the first year, Elsam judged that eventually all the transformers would develop faults and decided to replace them in a single operation. Along with transformer problems there were also generator*

failures, although fewer than with the transformers, but again, mainly because of apparent manufacturing faults, Elsam decided to replace them all.

Vestas decided that a root cause was a manufacturing problem in the components, first tracked down during 2003. Company director Sven Sigaard stated: "It's a question of the transformers – they are not insulated correctly and the faults in the insulation cause shorts." Discussing the generators, he said "a number of the generators are part of a bad series. The windings are not functioning." Corrosion due to salt ingress was another problem. Component suppliers insist that it was 'environmental' in origin, but it has caused far more corrosion damage at this site than anywhere else. In any event the pressure was then on Vestas and Elsam to complete an ambitious investigation, rebuilding and recommissioning programme by the end of the summer weather 'window'.

Fixing the problem
Elsam, Vestas, and ABB, who supplied the transformers and generators, analysed the situation. Alleged salt water ingress into generators and unit transformers along with what appeared to be manufacturing faults led to the decision in the spring of 2004 to return the complete nacelles to the works at Ringkøbing and Lem for dismantling, followed by replacement of the transformers and some of the generators. For many reasons, mainly the availability of vessels, and favourable weather forecasts covering the period until likely re-installation, Elsam had decided to do the work ashore. Because it had become apparent that all the nacelles were likely to develop faults, and because of the cost of a crane ship, all 80 turbines together with the test nacelle situated on-shore in Tjaereborg were to be dismantled on a continuous schedule. Meanwhile, the blades were to be returned to the manufacturing facility for cleaning and minor repairs to damage caused by lightning strikes and some minor surface cracking.

In fact the original plan to begin in July and finish by end-October has been going more slowly than was hoped, owing mainly to poor weather. At time of writing all 80 off-shore nacelles had been taken ashore, and 47 of them repaired and re-installed. Elsam now hope to have Horns Rev to be back to full capacity by December. But its costs will be minor. According to a company spokesman "We have lots of spare capacity in Denmark so it's not a problem to replace the power," and as for the turbines, "Vestas has responsibility under the five-year reliability guarantee."

Offshore futures
None of this bodes well for the future of offshore wind energy which is currently seen as the preferred solution to so many critical economic and environmental problems – particularly in the UK which is already committed to installing large capacities of offshore wind energy around a coastline rich in ideal wind conditions and suitable sea bed sites.

But despite flaws in the generators and transformers Elsam believes that the technical problems are containable, not least because of manufacturer Vestas' responsible attitude to their warranty obligations. It is now known that the

generators failed because of incorrect factory settings in a particular batch, and not a design flaw, although resolution of the transformer question has yet to be resolved, at least publicly. What has also been gained, say Elsam, is a more realistic attitude to the costs of creating and running such a project, an attitude that will affect their appraisal of bids for the planned extension, which will not, they say, be held up by technical problems at the site. The pre-bid process continues and four bidders have applied for pre-qualified status."

[Ref. 39]

"The official start of operation was scheduled for 15 December 2002, but in fact became 11 July 2003 due to the prolonged commissioning period. Quality problems turned up for a number of components in the individual turbines: rotor blades, gearboxes, transformers and generators. A significant number of individual turbine transformers failed in the autumn of 2003; wind farm availability sank to 50%. It turned out that the transformer winding insulation did not meet the required standards and the transformer windings failed due to the highly corrosive climate. In December 2003, a decision was taken to exchange all of the turbines transformers and replace them with a Siemens type. The exchange was performed between December 2003 to February 2004. In addition, the air ventilation system was changed from bottom of the nacelle to the middle, to minimize the exposure of the transformer to outside air.

After two years of operation, the influence of corrosion seems to be comparatively low. The quality of the delivered components has to be high to reduce the influence of the rough environment to on turbine reliability. For offshore wind farms, where access can be quite difficult at specific times, the reliability of the components must be as high as possible.

Severe generator problems occurred in 2004. To solve this problem, as well as problems with the rotor blade coating and the lightning system, it was decided to dismantle the turbine rotors and nacelles and ship them onshore. The nacelles were overhauled in Ringköbing, the rotor blades were brought to Nakskov, Lolland for improvement of the lightning systems. The plan was to have at least 30 turbines running all the time, but in fact only 4 turbines were operating in September. Dismantling of the turbines went much faster than calculated, while the erection was delayed. All turbines were in operation again by mid-December 2004. The availability of Horns Rev has been above 96% since January 2005, a remarkable figure for an offshore wind farm."

[Ref. 9]

Lest that was seen as the end of it, after installation of Horns Rev 2 there were issues. The report that follows gives rather an inappropriate view of the situation; nevertheless it is reported as it contains a couple of useful facts.

"The heart of the problem is that the technology being used offshore is generally onshore technology that has not been modified sufficiently to meet the different

demands of an offshore environment.

The classic example of this is the disaster at Horns Rev wind farm in 2005, following which Vestas is reported to have removed and repaired 80 of its V90 models, designs for offshore use, owing to the effect of salty water and air on the generators and gearboxes, which became corrupt after only two years. A similar procedure has been reported this year with Vestas 30 turbines requiring a change of rotor bearings at an estimated cost of €30m."

[Ref: 40 The Problem with O & M, Renewable Energy, January/February 2009.]

*"**Still wind farm costing energy company millions***
Faulty terminal strips in the cables from Horns Rev 2 have shut down the massive wind farm. After just two months of operation technical problems have forced the blades of the world's largest offshore wind farm to stop turning. But it isn't Dong Energy's Horns Rev 2 itself that is the problem. Rather, there are problems with the terminal strip on the 56-kilometer-long power land cable that sends the turbines' energy on to the grid along the West Coast.

The wind farm has not been producing energy since last weekend and Dong Energy, which owns the wind farm, is losing approximately 1.1 million kroner each day the turbines stand still. Kim Kongstad, maintenance manager at Energinet.dk, which is responsible for the cable, said the turbines would probably not be back in operation until the end of the month. 'We hope to have all terminal strips repaired by 29 November, after which the cable can be reconnected so the turbines can start turning again and provide power to the grid,' Kongstad said.Kongstad said that the terminal strips have been a problem since before Horns Rev 2 opened this past summer, where 24 were repaired prior to setting the turbines in operation."

Dong's information states that the farm's 91 turbines produce an average of 2.2 million kWh each day – energy sold on to electricity customers both in Denmark and abroad.

[Ref. 41]

Though not as extensive, the Nystad wind farm also had a few issues:

The following defects were handled after commissioning:

- Exchange of two gear-box bearings
- Lightning strikes
- Improved air conditioning of transfer
- Improved cooling in main transformer
- Improved aircraft warning lights synchronization (via satellite).

[Ref. 9]

Many of the issues have now been dealt with for future offshore wind farms, however, the message from Spanish philosopher George Santayana (1863) comes to mind:

"Those who cannot remember the past are condemned to repeat it"

6. RELIABILITY DATA

6.1 ISET

ISET provides information on wind parks in general, including average installed capacity per location. It provides averaged cost data for operations and for maintenance and repair. For our purposes the section on the Reliability Data is useful.

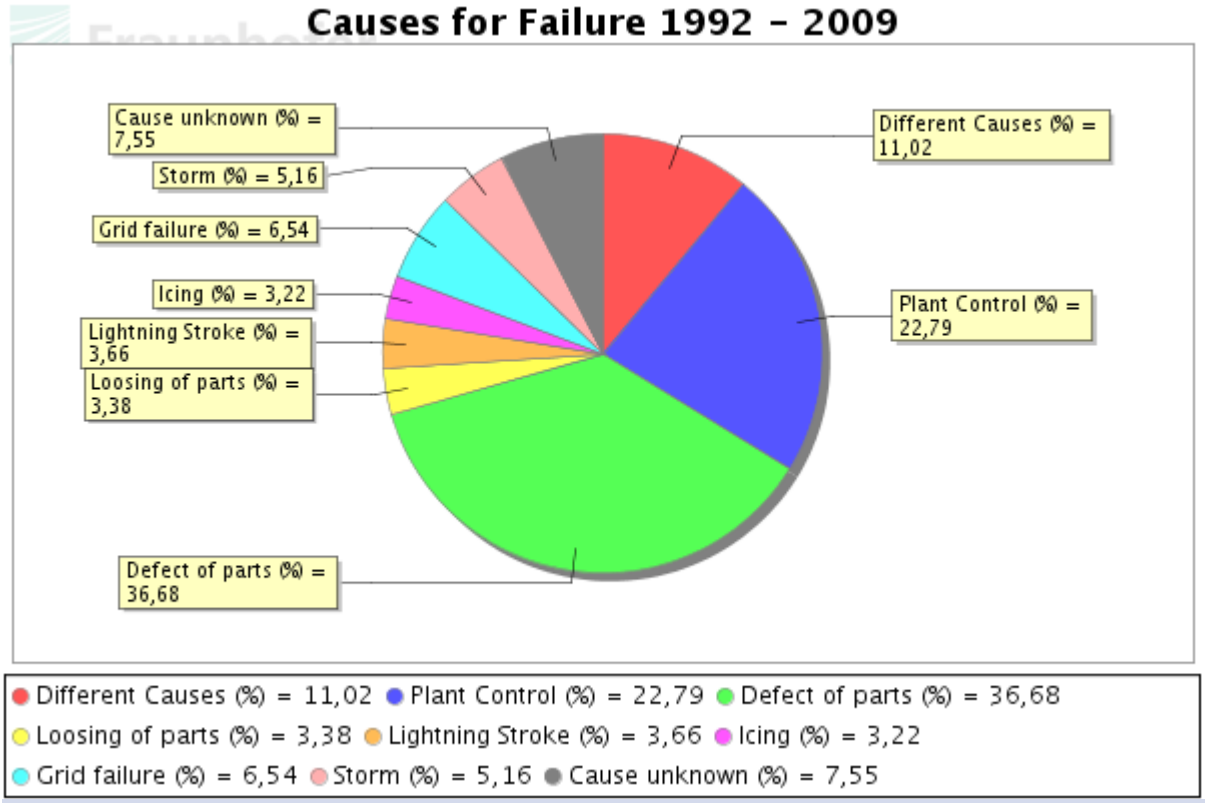


Figure 16: Causes of Failure 1992-2009

When considering the number of reports depicted, it should be taken into account that more than one cause, consequence and repaired component can be marked per report sheet.

Data source: ISET, IWET - last update: Feb 2007.

It is noted that the caption notes last updated Feb 2007 and the Figure states 2009.

It is interesting to note that of the identifiable failures “Defect of Parts” is the largest, with “Plant Control” second. “Defect of Parts” if these are indeed “Certified” either type or project certified is alarming. Plant Control likely includes training and competence of workers as well as the control systems. One has, of course, to look closer at the data to understand what is included, excluded.

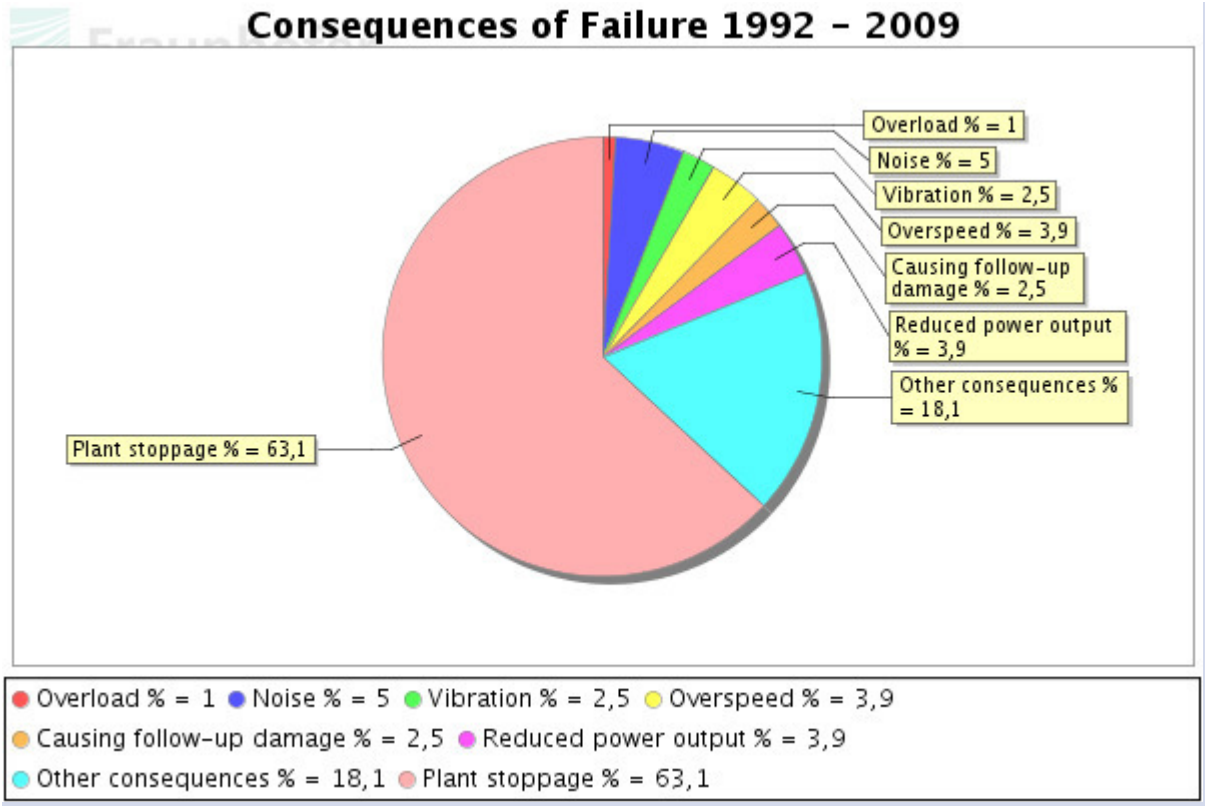


Figure 17: Consequences of Failure 1992-2009

Most malfunctions continue to result only in automatic plant shutdown, thus avoiding follow-up damage. Usually, no major repair is required to resume operation after a shutdown caused externally. Internal causes for malfunction often have more severe consequences.

Data source: ISET, IWET - last update: Feb 2007

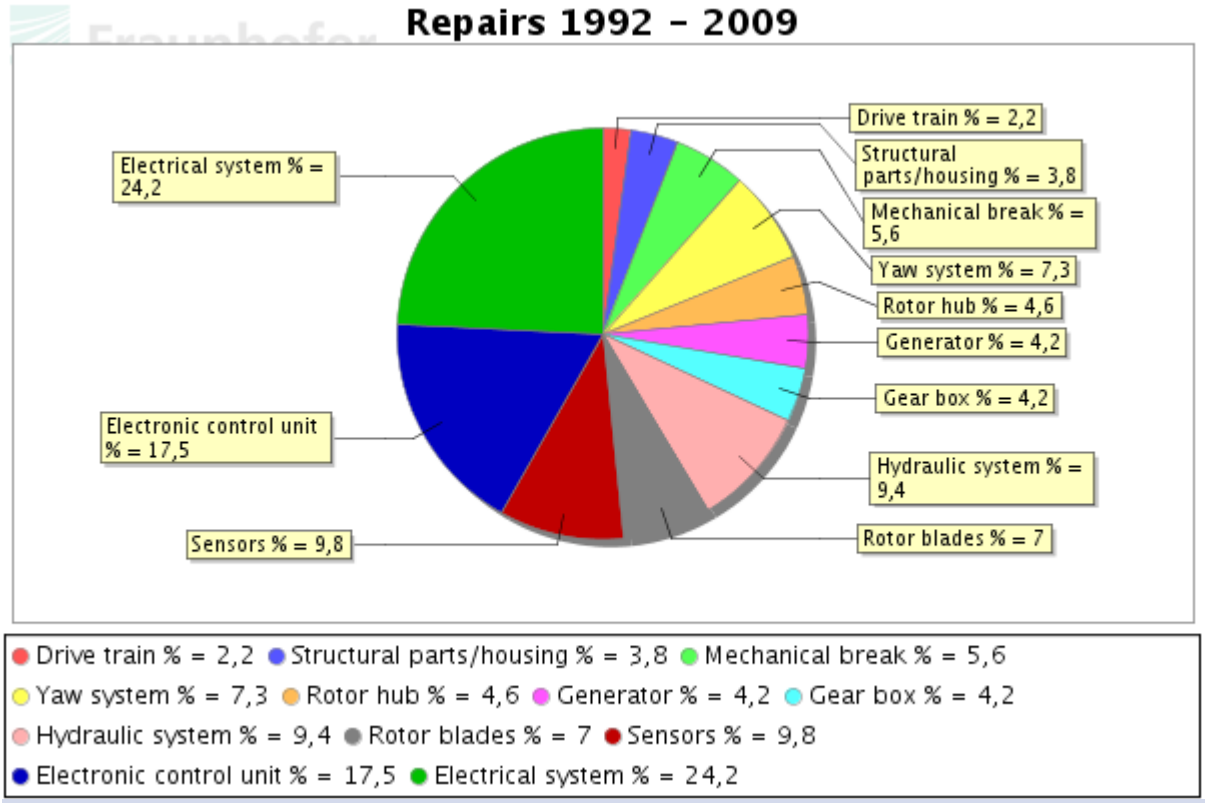
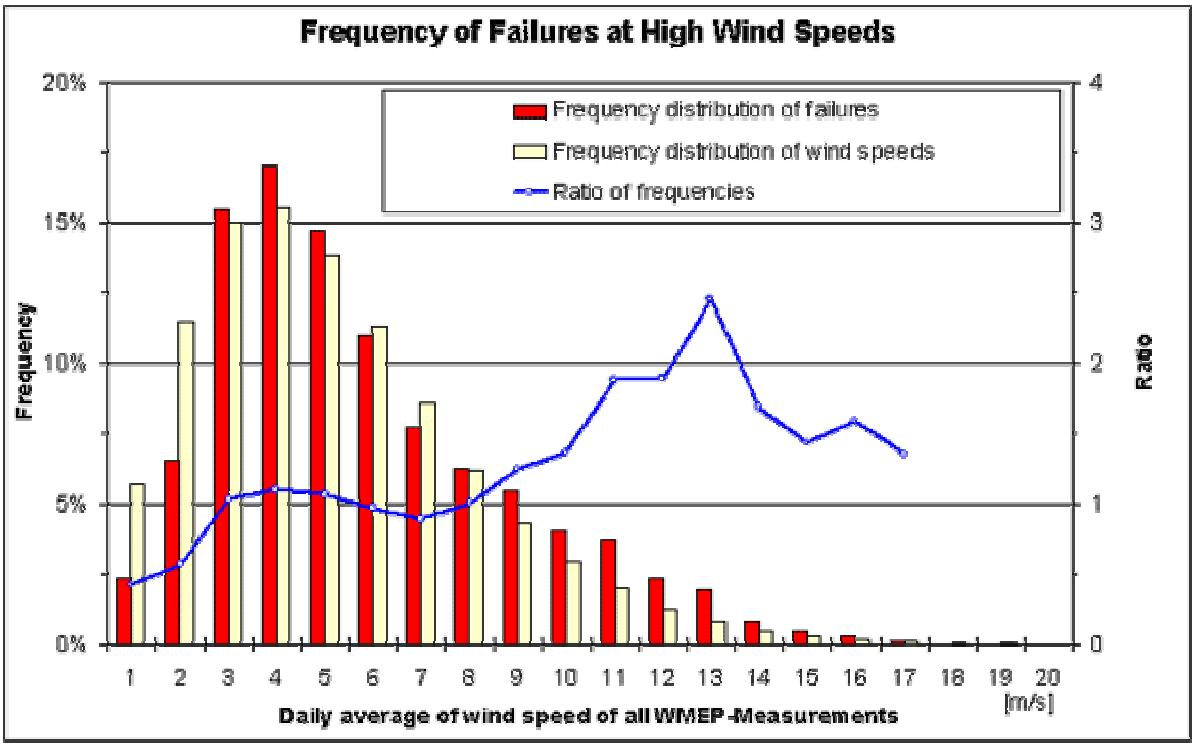


Figure 18: Repair Breakdown 1992-2009

The electrical component groups 'Generator', 'Electrical System' (converters, fuses etc.), 'Sensors' and 'Electronic Control System' were affected in more than half the cases and this apparently was the case in previous analyses.

Data source: ISET, IWET - last update: Feb 2007



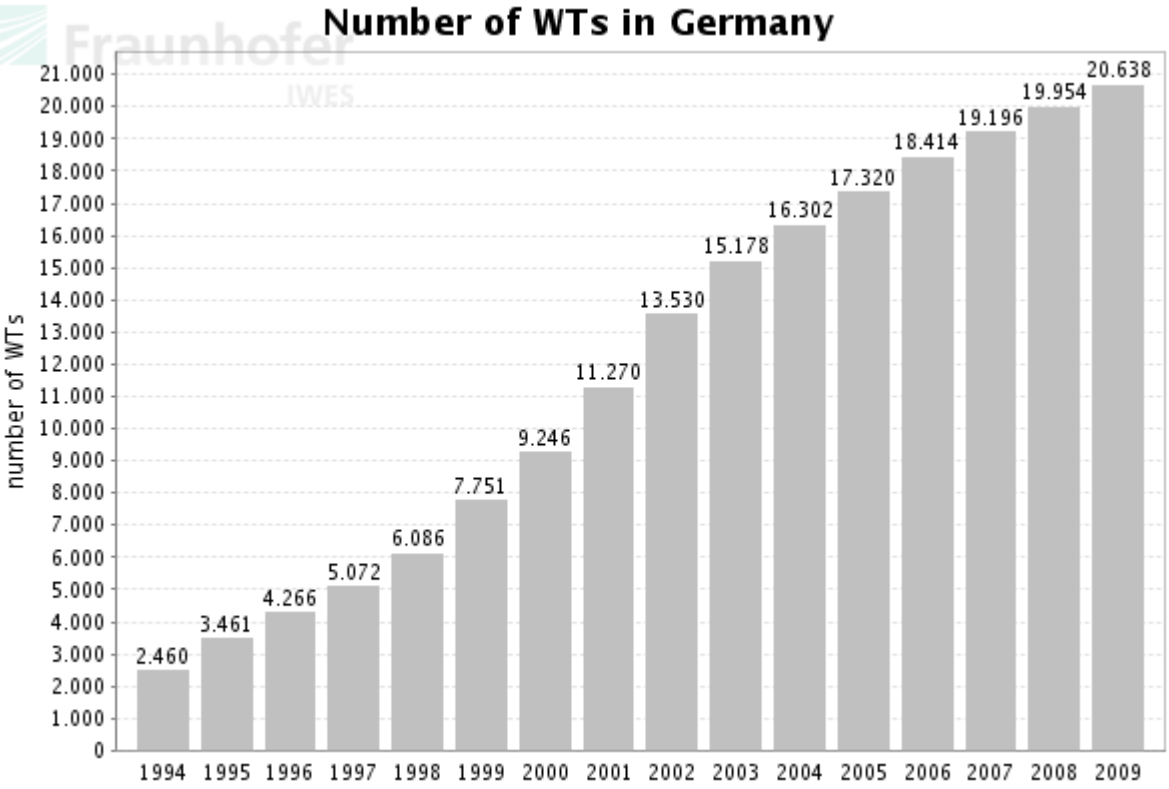
www.windmonitor.de

Figure 19: Frequency of Failures at High Wind Speeds

The frequency distributions of wind speeds and WT failures appear similar. Most failures were determined in the more frequent wind classes. Above 12 m/s, the frequency of failures is about twice as high as the frequency of wind classes.

Data source: ISET, IWET - last update: Feb 2006

The data reflects that at higher wind speeds the reliability of the equipment is not as good. Thus a wind site with strong winds is more likely to have damage than those with lower wind speeds.



www.windmonitor.de

Total: 20638 WTs - 24934 MW rated power

Figure 20: Number of Wind Turbines in Germany over Time

In order to present figures concerning the overall state of wind energy in Germany, the base data collected and supplied by the Ingenieurwerkstatt Energietechnik (IWET), Hamburg, is utilised. This data, which encompasses a description of the plant type, rated power, rotor diameter and hub height as well as the location, is given by WT manufacturers and reflects the current situation quite comprehensively.

Data source: ISET, IWET - last update: 08 Jan 2010

It has been assumed that the reports include all the German wind farms which amount to approximately 20,000. With an installed capacity of about 25,000 MW we can assume an average of about 1 MW/turbine. The early turbines were probably smaller and the later ones likely larger, and thus one can conclude that the distributions in the above charts probably reasonably reflect the current conditions and ratios and are not inappropriately skewed by the early data.

ISET in their 2008 publication at the 9th German Wind Conference DEWEK, provided the same insight [Ref. 42] showing that the large wind turbines were not as good as the small turbines for reliability and that Electrical failure was more frequent but caused less downtime. They did not analyse cost data as WindStats effort did.

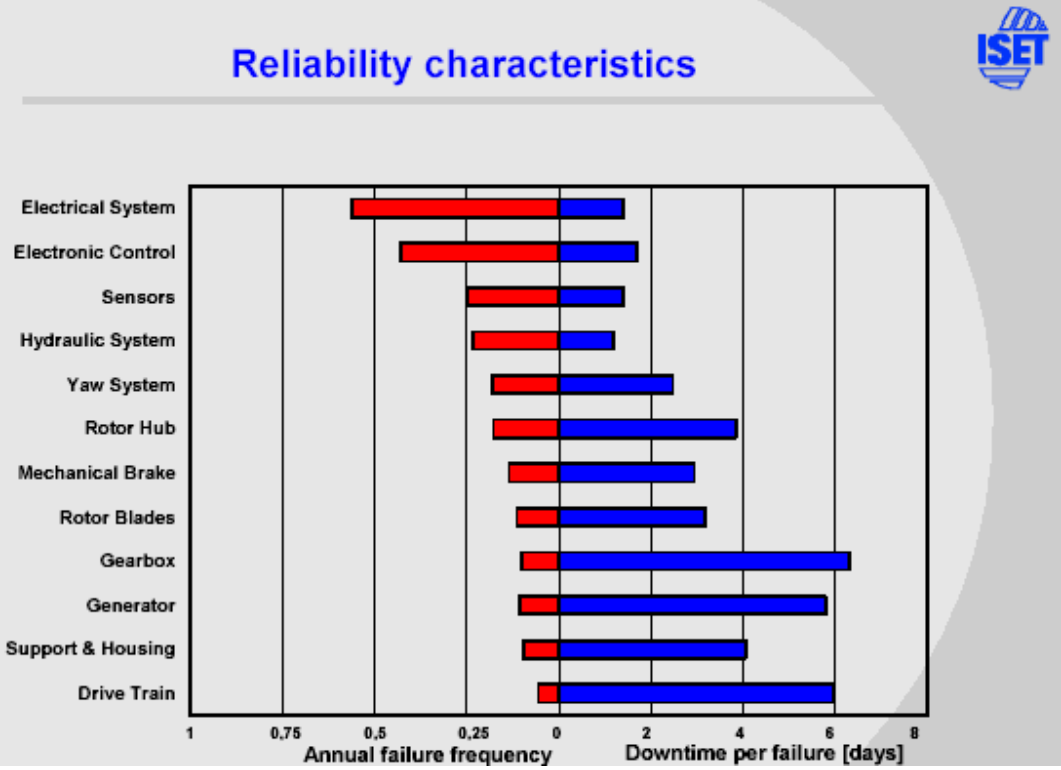


Figure 21: Reliability Characteristics
[Ref. 42]

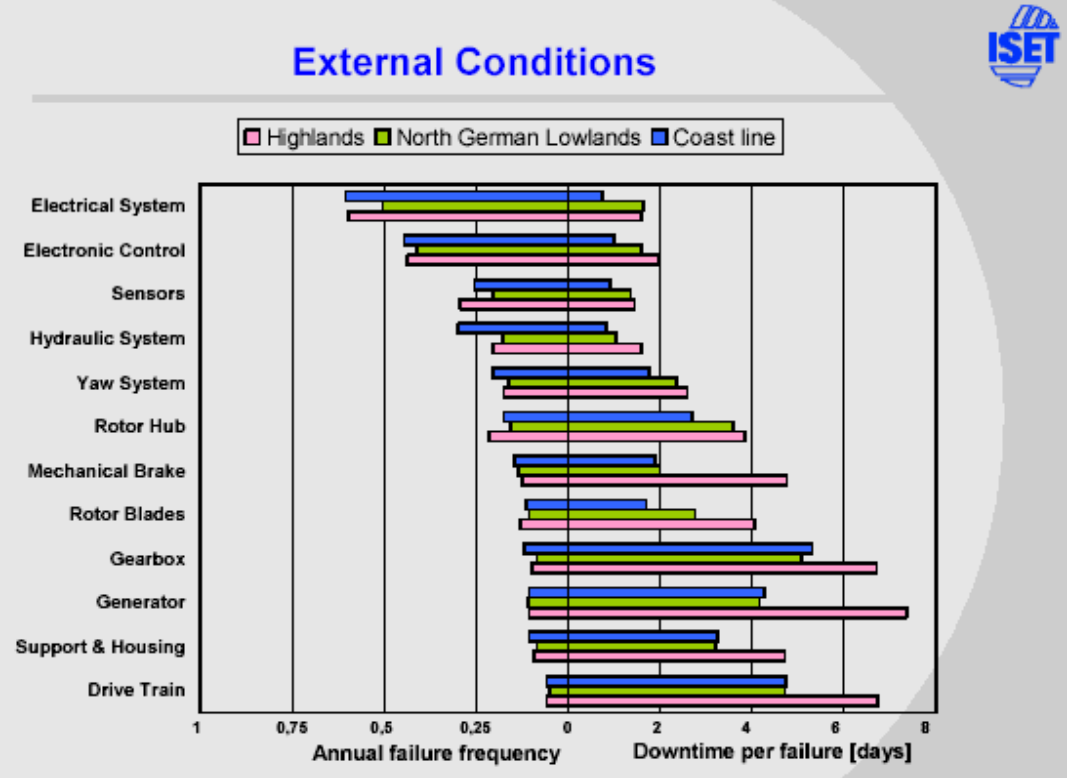


Figure 22: Effect of External Conditions on Reliability
[Ref. 42]

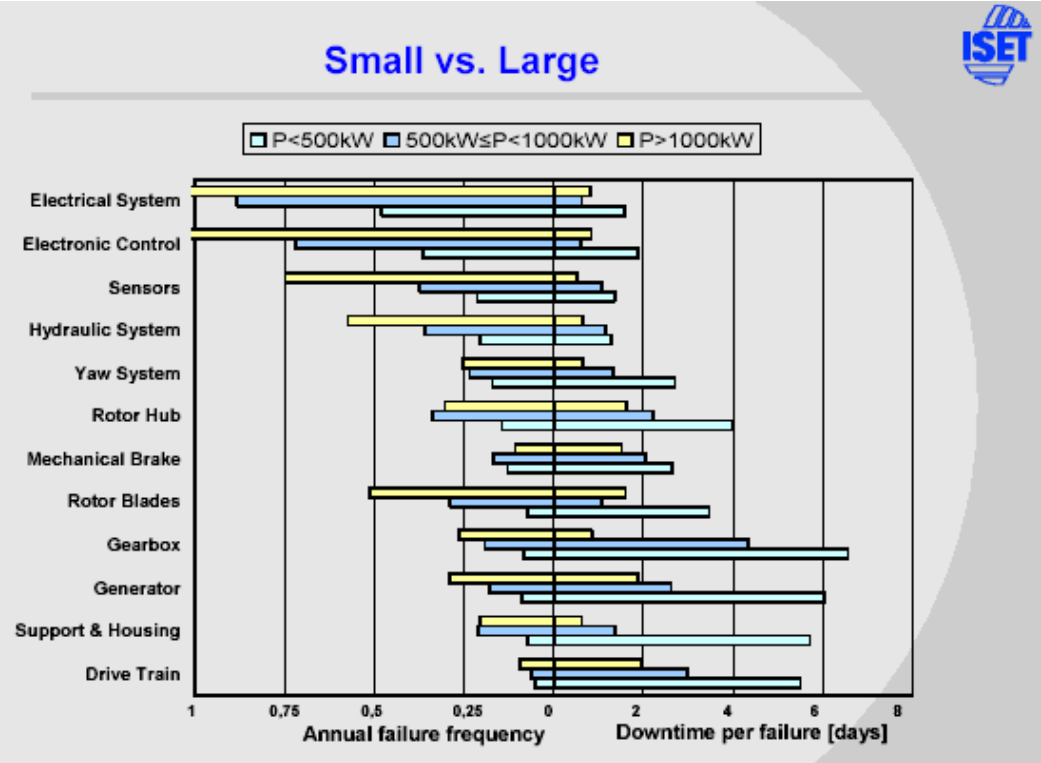


Figure 23: Component Reliability Small vs. Large
[Ref. 42]

Further statistical analysis gives insights into the different types of installation. The authors characterize the information based on turbine different technical concepts:

	Simple Danish concept	*Advanced Danish concept*	*Variable-speed concept*	*Direct-drive*
Exemplary turbine groups (WMEP)	AN Bonus 100/150 Vestas V 17/20	Vestas V 25/27/29 Ventis 20-100	Vestas V 63/66 Enercon E 32/33	Enercon E 40 Enercon E 66
Control	Stall	Pitch		
Speed characteristic	Constant		Variable	
Gearbox	Gearbox			Direct-drive

Figure 24: Characteristic Turbine Technical Concepts
[Ref. 44]

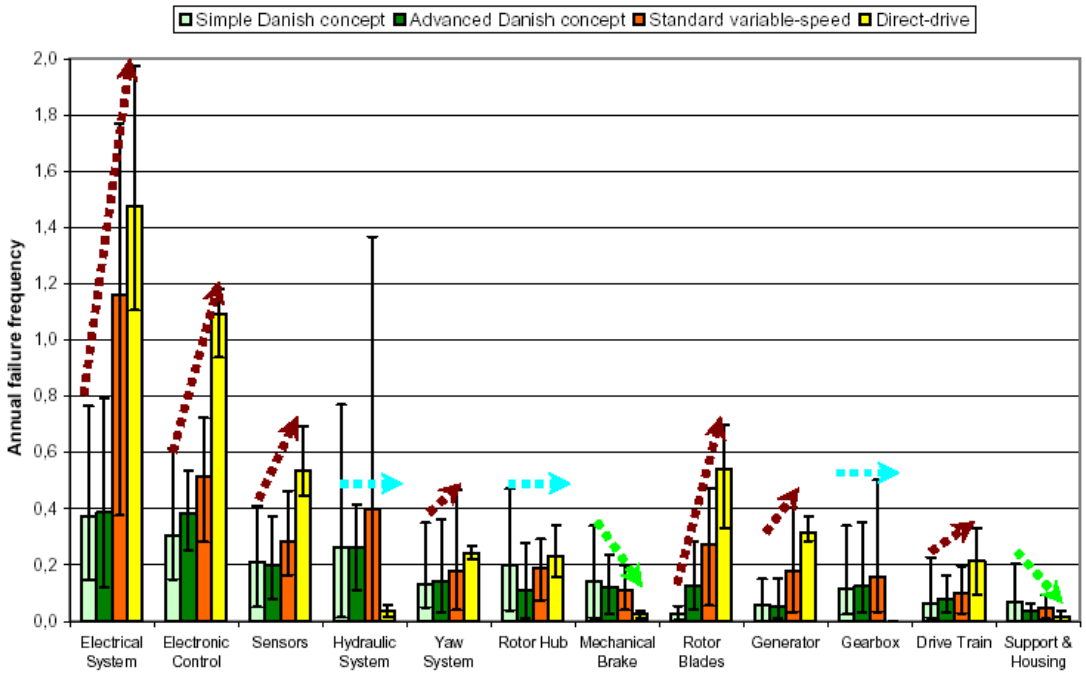


Figure 25: Annual failure rate of WT subassemblies for different technical concepts [Ref. 43]

Note: manufacturers are constantly making improvements to their designs and by the time the analysis takes place, any changes in design may already have compensated for the issues.

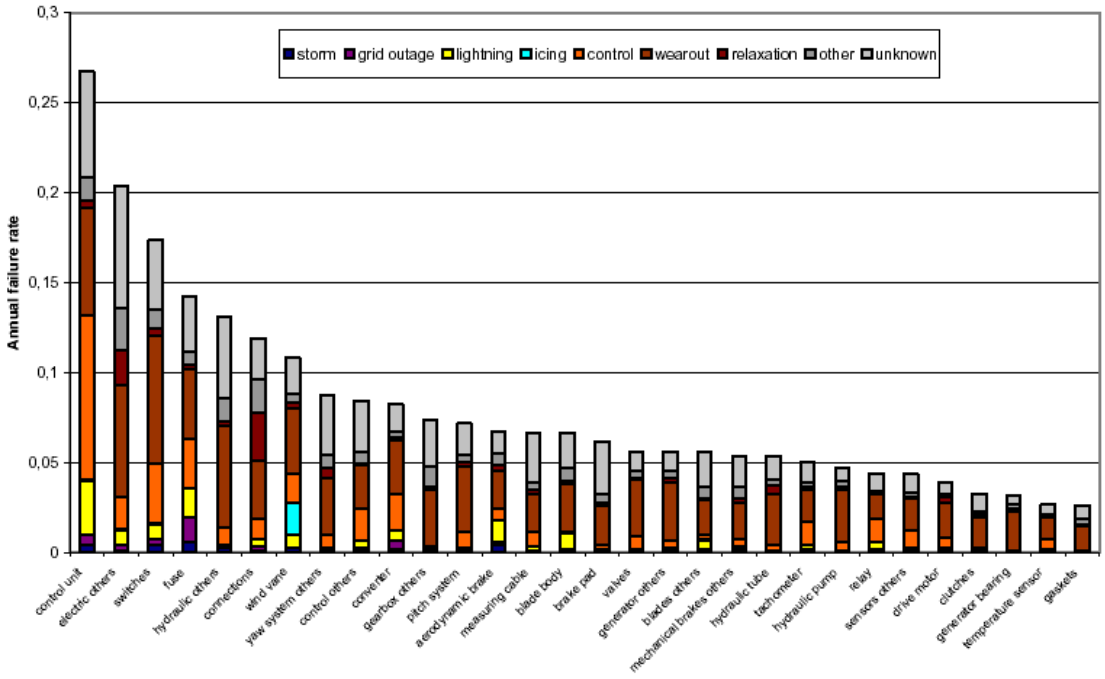


Figure 26: Weak-Point analysis for WT Subassemblies

The conclusion of paper is: *"It is obvious that reliability of WTs and subassemblies needs to get improved. Otherwise availability, especially for offshore application will not reach suitable results".*
[Ref. 43]

There are two other important points to make from the statistics presented.

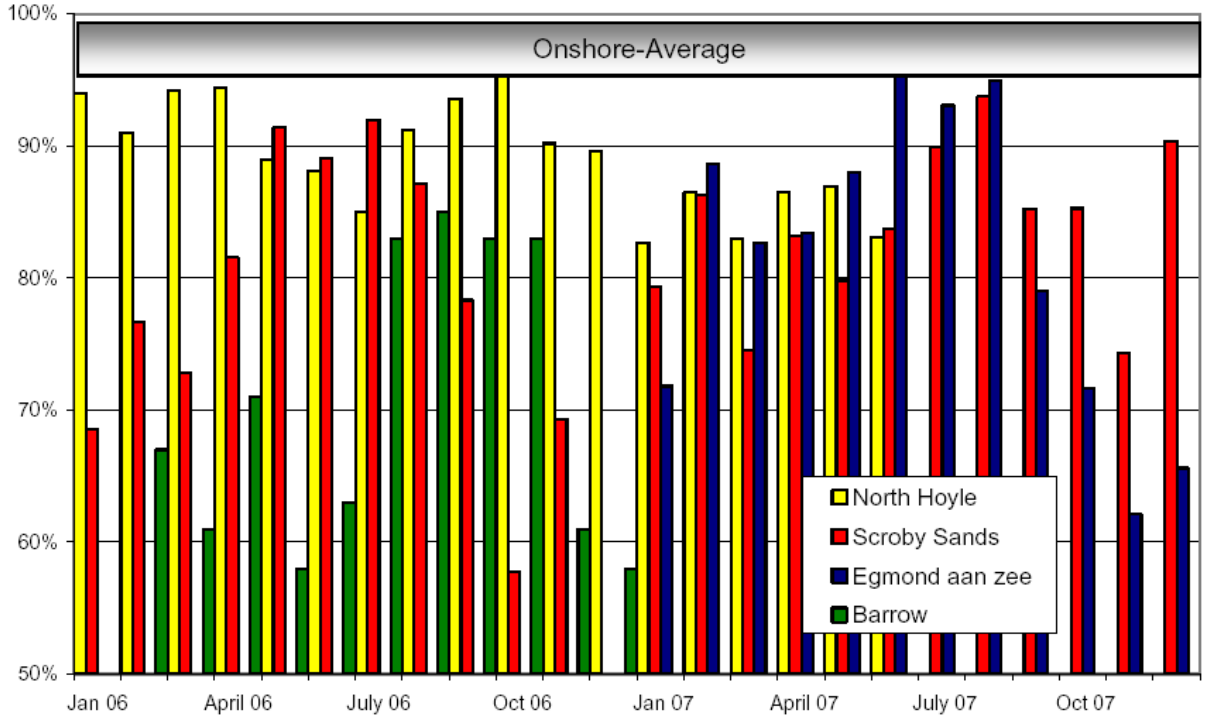


Figure 27: Availability offshore (all the colored columns) vs onshore
[Ref. 44]

Note the gray block at the top is the area that the onshore wind farms fall into a 95%-99% range in terms of availability. The sample from 4 offshore wind farms has shown that the availability is much less. There is hope, however, in that the author goes on to present further diagrams that show:

- WTs from the first production year show the highest failure rate in the first operating year (first serial) not first prototype).
- WTs from subsequent production years were able to benefit from the experience gained from previous production years.

It is anticipated that offshore wind turbines will improve with time.

Onshore plants often have a number of times when they are not available due to a variety of faults, which result in frequent on-site attendance/maintenance. Such on-site attendance/maintenance is more difficult to achieve offshore. As an illustration time to transit from one on-shore wind turbine to another might take less than 5 minutes, whereas transit by boat from one to another might take more than ½ hr even if there is no requirement to wait for a boat that may be attending to another maintenance

worker's mission and weather is good.

6.2 Durham University & Technical University of Delft Analysis

Information from WindStats [Ref. 45] and LWK was used to carry out an extensive analysis of data to understand the reliability of different wind turbine concepts for Offshore application, as part of the UK EPSRC Supergen Wind Programme [Ref. 46].

The study showed that the larger MW turbines showed a more frequent breakdown.

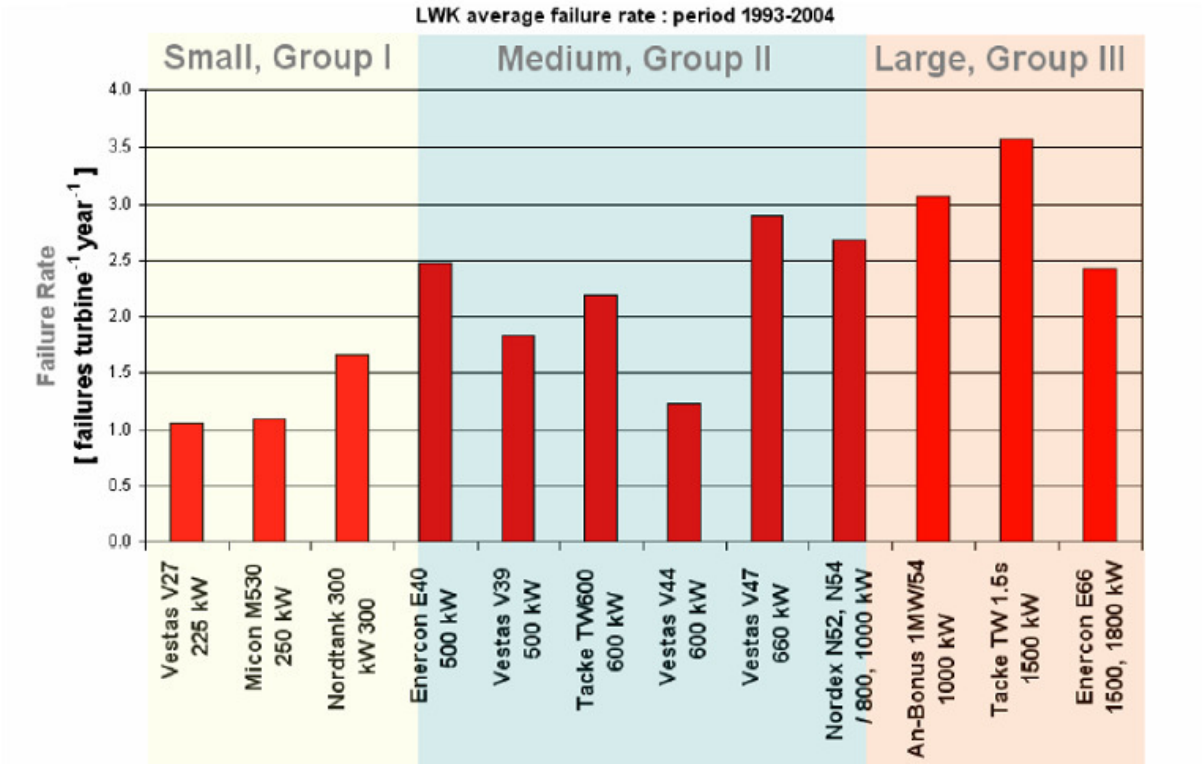


Figure 28: Wind Turbine Types
[Ref. 46]

These turbines are not the ones that will get used for offshore projects anticipated but it nevertheless points out that the larger turbines are unlikely to have a higher reliability, at least, initially.
]
The researchers took failure data from 2 sources which had been gathered for over about 10 years. They took data from 3 populations of turbine of between 300 and 4000 turbines:

- WindStats in Germany and Denmark
- LWK in Schleswig Holstein, Germany

The results are shown in graphical form:

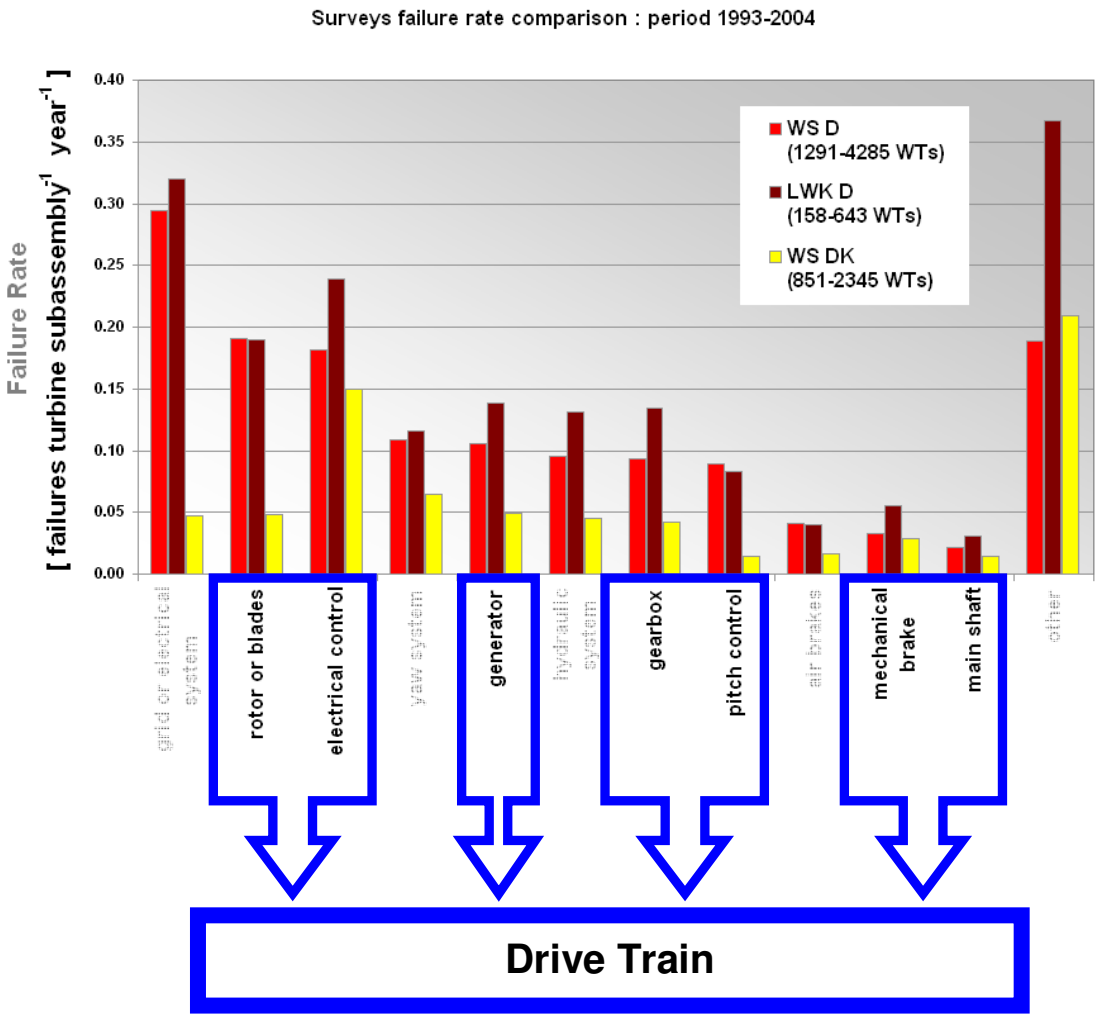


Figure 29: Survey of Failure Rate comparisons 1993-2004
[Ref. 46]

Their conclusions are interesting:

- *"Unreliability > 1 failure/year/turbine is common;*
- *Unreliability is higher for larger turbines;*
- *Such unreliability will be unacceptable offshore, we need reliability < 0.5 failure/year/turbine;*
- *Unreliability concentrated mainly in the Drive Train;*
- *Some unreliable subassemblies are surprising;*
- *For example gearboxes are not unreliable;*
- *But gearbox failures do cause large downtime and costs;*
- *But electrical parts are unreliable;*
- *And cause relatively little downtime but large costs".*

One further set of data worth examining comes from a study on the Reliability of

offshore Turbines - Identifying Risks by Onshore Experience [Ref. 46].

The population for which the data existed:

	Country	Time Span	Number of Turbines	Turbine - Years of Experience
WMEP	Germany	1989-2006	1500	15000
LWK	Germany	1993-2006	241	5719
Windstats	Germany Denmark	1995-2004 1994-2003	4285 904	27700 18700
VTT	Finland	2000-2004	92	356
Elforsk	Sweden	1997-2004	723	4378

Figure 30: Population of Data for Reliability of Offshore Turbine study

The results in average failure rate and annual downtime:

	Average failure rate [failures/turbine/year] over whole survey period	Annual downtime [hours/turbine/year] over whole survey period
WMEP	2.4	156
LWK	1.9	27
Windstats	1.8 0.7	93 -
VTT	1.5	237
Elforsk	0.8	58

Figure 31: Average Failure Rate and Annual Downtime for Reliability of Offshore Turbine study

The conclusions are reported as:

- *A small number of large failures, complicated repairs leading to increasing duration of downtimes*
- *Numerous small failures, complicated access resulting in increasing duration of downtimes.*
- *Large WTs with more complex technical concepts leads to an increasing number of failures*
- *Higher wind speeds results in an increasing number of failures*
- *Additional stress through climatic conditions and wave loads results in an increasing number of failures.*

Another ISET publication gives further interesting remarks:

"But for a cost effective condition based maintenance strategy for offshore wind farms, there are still some requirements to get fulfilled:

Maintenance actions must get documented and evaluated to find weak link points and to adapt intervals of scheduled measures as well as the volume of maintenance activities. The current documentation of most of the onshore WTs is not satisfactory for computerized evaluation.

Condition monitoring does not necessarily need to be automated for all components, but Condition based maintenance needs reliable information at least about the condition of the most critical subassemblies and components. Up to now, there only exist several systems for the drive train components.

Failures need to get investigated in, to better understand the reason of offshore WT specific problems. Also the propagation of faults, depending on different operational conditions needs to get physically explained. Currently, no CMS provides a reliable prediction of remaining life time.

Empirical experience with as many as possible WTs of similar design running under similar operational conditions should be evaluated commonly, to increase the statistical basis. Up t o now, only few data are publically accessible and even operators and manufacturers do hardly share experience and cooperate in evaluating data.

ISET is now starting with a new monitoring programme 'OWMEP' which shall anonymously provide operational data from all offshore wind farms. Hopefully, this experience can be shared with those from the offshore wind farms from abroad.
[Ref. 47], [Ref. 48].

An interesting summary presented by Johan Ribrant in his Thesis on Reliability Performance and Maintenance – A Survey of Failures in Wind Power Systems [Ref. 49] presents an interesting table contrasting different issues in Sweden, Finland and Germany:

Findings	Sweden	Finland	Germany
Average number of failures per turbine	0,402 times a year	1,38 times a year	2,38 times a year (1,86 times a year for 2004-2005)
Average downtime per year	52 hours per year	237 hours per year	149 hours per year
Average downtime per failure	170 hours per failure	172 hours per failure	62,6 hours per failure
Most number of failures	1. Electrical system	1. Hydraulics	1. Electrical system
	2. Sensors	2. Blades/Pitch	2. Control system
	3. Blades/Pitch	3. Gears	3. Hydraulics, Sensors
Most amount of downtime	1. Gears	1. Gears	1. Generators
	2. Control system	2. Blades/Pitch	2. Gears
	3. Electrical system	3. Hydraulics	3. Drive train
Longest downtime per failure	1. Drive train	1. Gears	1. Generators
	2. Yaw system	2. Blades/Pitch	2. Gears
	3. Gears	3. Structure	3. Drive train

Figure 32: Downtime failures by component in 3 countries.

While these statistical studies substantiate each other (in overview terms), there is a need to understand the root causes of each of the incidents. The researchers are unable to get cooperation in order to publish statistics without making the data anonymous since it is thought to not allow a commercial disadvantage to the manufacturer/designer. This confidentiality has to be balanced against the information that will propel the business.

6.3 Further Reports from Europe

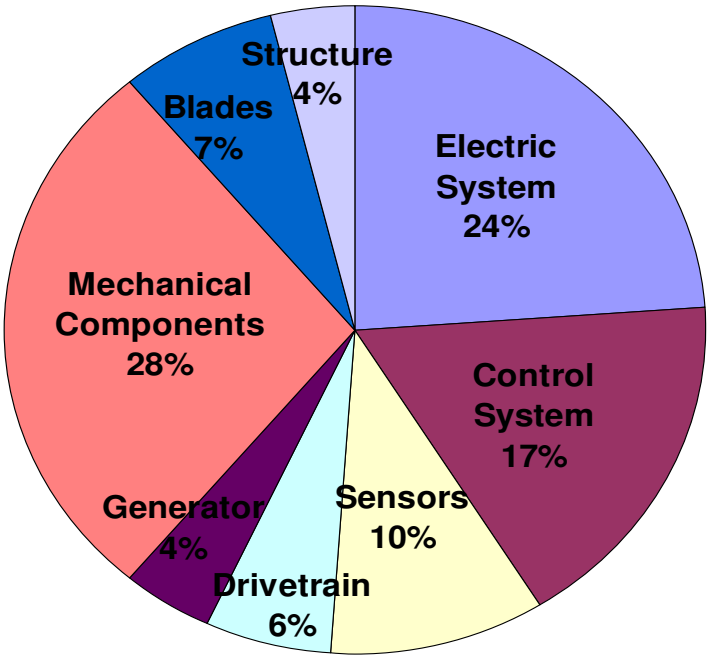


Figure 33: Percentage of Total Failures by Component Type

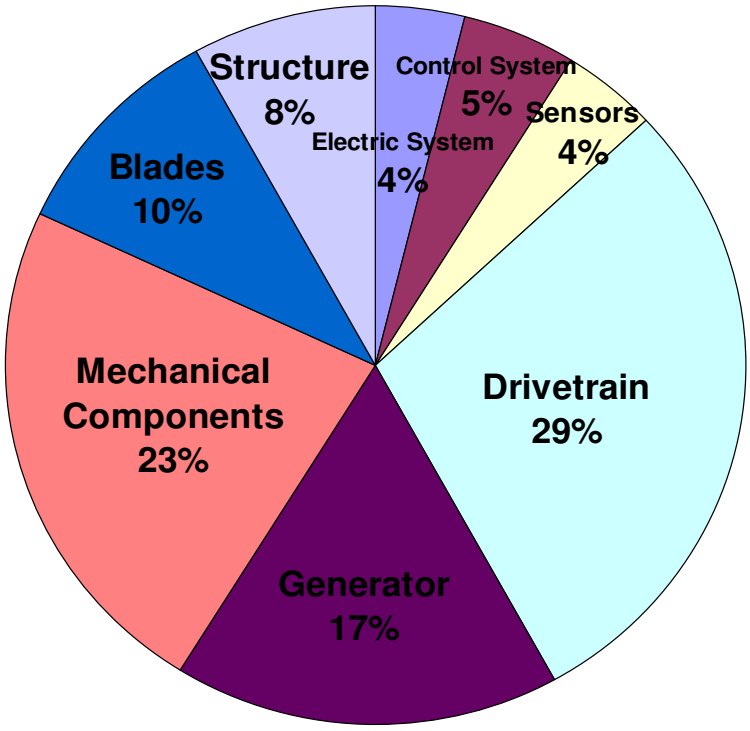


Figure 34: Percentage of Total Downtime by Component Type
[Ref. 50]

In this annex, the incidents reported in the German WMEP database from ISET, a Danish database, owned by Energie og Miljodata, and a Dutch database have been analysed in order to determine the data given in Table 4. The annex contains among others the process used for the data analyses considerations if incidents are a risk for the environment or not, and throwing distances reported by eye witnesses.

Scenario	Expected Value	Recommended value [1/yr]
Loss of entire blade	6.3×10^{-4}	8.4×10^{-4}
Loss at rated speed		4.2×10^{-4}
Loss at 1.25 x rated speed		4.2×10^{-4}
Loss at 2 x rated speed		5.0×10^{-6}
Loss of blade tip	1.2×10^{-4}	2.6×10^{-4}
Collapse of entire turbine at tower foot	2.0×10^{-4}	3.2×10^{-4}
Collapse of rotor and/or nacelle	5.9×10^{-5}	1.3×10^{-4}
Falling down of small parts from nacelle and hub	1.2×10^{-3}	1.7×10^{-3}

Table 4: Frequencies of occurrence of scenarios relevant for risk analysis. The recommended values correspond to the 95% upper limits.

[Ref. 51].

A further breakdown is given by a European study:

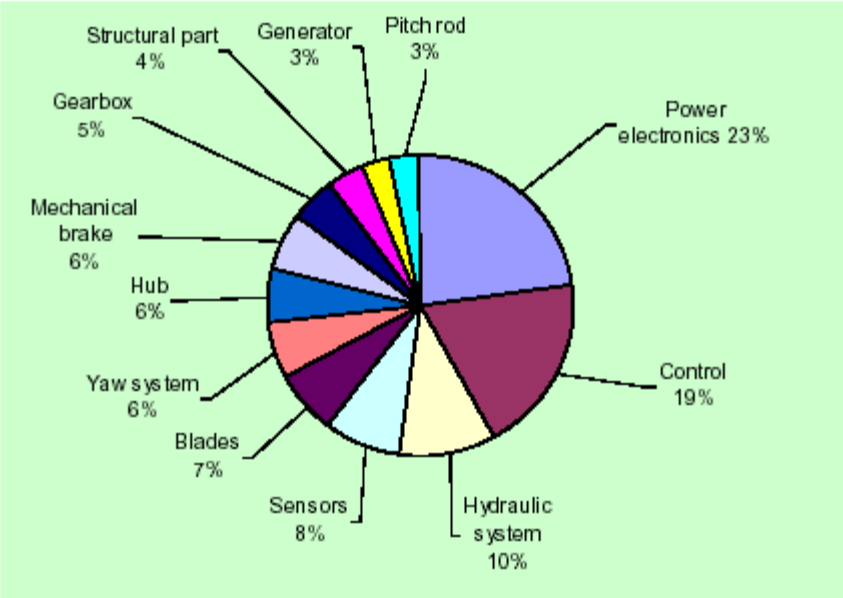


Figure 35: Breakdown of damage from RECOFF study 2004 [Ref. 52].

7. CAITHNESS (CWIF) RESULTS

The Committee for Renewable Energy for Barrington Rhode Island has commented on the CWIF group's 1975-2008 report [Ref. 53].

"During this time, there were 49 deaths reported, none caused by structural failure. Deaths resulted mainly from accidents during transport, falling by maintenance workers, or distraction of drivers going by the turbine. The vast majority of victims were wind power industry workers. There were 14 public deaths, related primarily to transport accidents and aircraft incidents, but none of these was related to structural/blade failure." Case 20070825.1 has certainly changed the view that deaths do not result from structural failure. 60 deaths are now reported to end of 2009.

"Five non-lethal injuries to the public have been reported since 1975, of which one case involved structural/blade failure: spinal injury from a falling turbine part (Incident 130 in the detailed accident report). That accident occurred when "the turbine was being dismantled for inspection after the blades had stopped turning," i.e. outside of normal operating conditions." To the end of 2009 this has increased to 9 injuries to the public and 29 involving workers.

CWIF (2008) posits that their database is incomplete and that accidents before 1999/2000 are under-reported. Data on failure rates in Rademakers and Braam (2005) agree with the data in CWIF (2008). CWIF (2008) also points out that the number of failures has increased along with the number of turbines put into production.

In summary, although structural failures have occurred, to date all but one of the documented injuries from wind turbines have been associated with accidents involving wind industry workers and not structural failure. Incidence of accidents is rising as the number of turbines in service increases. Attention to safety in transport, installation, and maintenance is essential in reducing the risk of injury

Types of Failures Associated with Wind Turbines
According to CWIF (2008), rotor failure represented the largest number of incidents worldwide (16 in 2007), followed by fire (11) and structural failure of major components such as towers (11)".

For 2009, rotor failure represented the largest number of incidents 24 in 2009, followed by fire (10 in 2009 but 16 in 2008 and 24 in 2002), and structural failure reached an all time high of 15, the highest in the years that this has been chronicled.

The report on the CWIF Wind Turbine Accident database can be found on www.caithnesswindfarms.co.uk It is useful to extract some of the points:

The total record as of December 2009 was 715 accidents; of those 112 were in 2008 and 106 in 2009.

The majority of accidents were blade and fire, followed by structural failure.

"Pieces of blade are documented as travelling up to 1300 meters. In Germany, blade pieces have gone through the roofs and walls of nearby buildings."

Many incidents of fires are caused by lighting.

"Of the 66 fatalities

- *47 were wind industry and direct support workers (maintenance/engineers, etc), or small turbine owner/operators.*
- *19 were public fatalities, including workers not directly dependent on the wind industry (e.g. transport workers)."* (Several traffic fatalities were attributed to driver distraction).
- One parachutist and one pilot were killed

"A further 38 accidents regarding human injury are documented.

- *29 accidents involved wind industry or construction /maintenance workers, and a further nine involved members of the public."*

Structural Failure – From the data obtained, this is the third most common accident cause, with 84 instances found. "Structural failure" is assumed to be major component failure under conditions which components should be designed to withstand. This mainly concerns storm damage to turbines and tower collapse. However, poor quality control, lack of maintenance and component failure can also be responsible.

- There were **11 structural failures in 2007**; **9 in 2008** and **15 in 2009**.

27 incidents of Ice Throw were found. One was reported at 140 meters.

45 reported accidents in the category Transport – *"including a 45 m turbine section ramming through a house while being transported, a transporter knocking a utility pole through a restaurant, and a turbine section falling off in a tunnel." "Most involve turbine sections falling from transporters, though turbine sections have also been lost at sea, along with a £50M barge".*

8. OVERALL SAFETY STATISTICS

Although wind-turbine structural failures have occurred, most commonly in the form of blade failures, sometimes in the form of fires and occasionally in the form of the towers falling, to date the documented injuries from wind turbines reflect the injuries and fatalities have been associated with almost all the accidents involving wind industry workers and workplace accidents and neither structural failure nor the public. Incidence of accidents will rise as the number of turbines in service increases. While the record on safety is good, as offshore wind turbine numbers rise there is much more potential for accidents and incidents. This will particularly be the case if a suitable rigorous Safety Management System is not in place for workers in the offshore wind farm workplace.

There have been several transport accidents, construction/installation accidents not directly associated with the operation and maintenance of wind farms which are in the record, where the workplace accidents do not appear to have been attributed to the location at wind farms (e.g. ladder falls are not recorded as being at a wind farm). For transportation accidents of blades by road, the information recorded against the wind farm business. This inconsistency should be accounted for when interpreting the data.

There are some interesting recent (2008) statistics offered in a report on Health and Safety by the Committee for Renewable Energy for Barrington, RI [Ref. 53].

> *"Manufacturing quality is a major factor in the integrity of any structure. Flawed material mixes can weaken the structure so that it cannot sustain even normal operating loads for short times. Recently, the India-based firm Suzlon Energy Ltd. had to reinforce all 1,200 blades sold in the U.S. because 65 of its giant blades had cracked under high wind conditions (Wall Street Journal, 2008). Edison Mission Energy, a large U.S. customer, cancelled orders for 150 turbines because Suzlon had been unable to determine the cause of the blade cracking.*
>
> *For a risk analysis, Rademakers and Braam (2005)* [29] *developed five categories of failure, cited verbatim below:*
>
> 1. *Whole turbine blades or very large blade pieces breaking off and being thrown.*
> 2. *Brake tips [plates activated to slow down the rotor] and other blade pieces such as blade surface panels, composite material, bolts, etc. being thrown from the turbine.*
> 3. *Tower collapsing.*
> 4. *Large parts, such as the nacelle, the whole rotor, or other main components falling down.*
> 5. *Small parts, such as the anemometer (wind speed meter) or bolts, falling down from the nacelle or the hub.*

Failure Probabilities

As for any human-made structure, the fact that failure can occur must be considered in light of the likelihood that a failure occurs. This likelihood is expressed in terms of the probability of failure per turbine per year. Such probabilities are arrived at by counting the incidence of failures worldwide over the number of operating turbines over a number of years. Thus, the total count includes turbines that have been in service for a long time. The probability of failure of a new turbine should be lower than that for the entire fleet of turbines in service because of constant improvements in design and materials. Additionally, the probability of failure of a turbine purchased now can be influenced by factors that are under the control of the purchaser, e.g.:

- *Dealing with reputable manufacturers that have a good, well-documented safety record.*
- *Careful installation by a reputable contractor.*
- *Attentive maintenance and routine inspection of the turbine.*

Rademakers and Braam (2005) conducted a literature survey of reported turbine failures in any of the five categories listed above in California and from Danish, German, and Dutch reports. From this, the probabilities of failure were estimated to be:

Failure at nominal operating speed	*420 x 10^{-6} per*
Failure at 1.25 times nominal operating	*420 x 10^{-6} per*
Failure at 2 times nominal operating speed	*5 x10^{-6} per*

Table 5: Failure rates

"The failure probabilities of individual parts of the turbine were estimated by Rademakers and Braam (2005) as follows:

Turbine Part	Totals from German and Danish Databases		Probability of Failure	
	Number of Incidents	Turbine-Years	Mean Estimate	95% Upper Limit
Blades	27	42,889	630 x 10^{-6}	840 x 10^{-6}
Tips	3	24,006	120 x 10^{-6}	260 x 10^{-6}
Nacelle	8.5	42,889	200 x 10^{-6}	320 x 10^{-6}
Tower	2.5	42,889	58 x 10^{-6}	130 x 10^{-6}
Small	21	17,452	1,200 x 10^{-6}	1,700 x 10^{-6}

Table 6: Base Population of Turbines for Risk Comparison

"In summary, the worldwide incidence of structural failures is on the order of 420 per million turbine years. This means that each turbine has a risk of blade or other failure of about 1 in 2400 in a given year. The probability of failure of a new turbine can be lowered by dealing with reliable manufacturers and contractors and following good maintenance and operational practices".

Probability of Injury

That failure occurs does not necessarily mean that injury to a person results. For injury to occur, the turbine must undergo failure in a hazardous way, and a person must be within harm's way at the time of failure. This line of inquiry leads to throw analysis of turbine debris under failure, combined with the probability that a piece of debris will fall in a certain area, combined with the probability that a person is in that area."

"The probability of being hit is highest within the first hundred feet, flattens out, then rises to another peak of 0.0016 near the maximum throw distance of 450 ft for a whole blade and 900 ft for a tip fragment.

The probability of injury is the probability of being hit by a blade or fragment near the maximum throw, 0.0016, multiplied by the 95% upper limit probability for blade and fragment failure per the recommendation of Rademakers and Braam (2005) in the table given earlier. This gives:

> *Probability of injury near the whole-blade-throw maximum distance of 450 ft = 0.0016 x 840 x 10^{-6} = 1.3 x 10^{-6} per person per year (i.e. a risk of 1.3 in one million per person per year).*
> *Probability of injury near the 10 m-tip-fragment-throw maximum distance of 900 ft*
> *= 0.0016 x 260 x 10^{-6} = 0.4 x 10^{-6} per person per year (i.e. a risk of 4 in ten million per person per year).*

The probabilities are lower than these at distances between 150 ft and the maximum throw distance.

For comparison, the following table shows probabilities for other kinds of risks as given by Ropeik and Gray (2002).

Cause of death or harm (in the U.S.)	Probability of death or injury per person per year
Death in motor vehicle	149×10^{-6}
Struck by falling object	3×10^{-6}
Hit by lightning	0.3×10^{-6}
Death by homicide	56×10^{-6}
Death by gun	36×10^{-6}
Death on the job	21×10^{-6}
Death from electrocution	3×10^{-6}

Table 7: Comparative Risk

The above charts and table indicate that:

- *A person who remains all year long at a distance of just under 900 ft from the turbine has a probability of about 0.4×10^{-6} per year of being hit by a blade tip fragment. This is about the same probability of being hit by lightning in a year.*
- *A person who remains all year long at a distance of just under 450 ft from the turbine has a probability of about 1.3×10^{-6} per year of being hit by a whole blade. This is about half the probability of dying from electrocution in a year.*

Icing on wind turbines occurs under the same wintry conditions as icing on other structures or plants. According to Seifert et al. (2003), ice fragments thrown from rotors were primarily in the range of 0.1 to 1.0 kg (3 oz to 2.2 lbs) and landed mostly within 15 to 100 m (50 to 330 ft) of the turbine. An 0.1 kg ice fragment, if spherical, would have a diameter of 2.2 inches; a 2 lb ice fragment, if spherical, would have a diameter of almost 5 inches. Smaller ice fragments are affected more by the wind than larger fragments. Thus, in a strong wind, smaller fragments will be blown downwind further than larger fragments.

The recent compilation by CWIF (2008) of accidents from around the world found 23 incidents of ice fall or ice throw since 1975. Only one case resulted in human injury. However, safety concerns were raised in many of the incidents as evidenced by road closings or damaged cars.

In summary, icing on wind turbines occurs under the same wintry conditions as icing on other structures or plants. Ice fragments thrown from wind turbines have been reported as being typically up to 2 lbs and generally landing within 330 ft of wind turbines.

In summary, a person who remains all year long at a distance of just under 900 ft from the turbine has a probability of being hit by a blade tip fragment about the same as being hit by lightning. A person who remains all year long at a distance of just under 450 ft has a probability of being hit by a whole blade about half the chance of being electrocuted in a year
[Ref. 53]

9. DATABASE DETAILS

In order to formulate a comprehensive safety management template for designating the requirements of a safety management system, and to select the appropriate items that needed engineering attention in the regulatory approval process, it was appropriate to build some sort of database of incidents and accidents and other important events. From this it was hoped to look at the root causes and ensure that appropriate checks were put in place to prevent these accidents, incidents and, if we could find them, near misses from happening in the future to offshore wind farms on the OCS.

Hours spent on phone calls and email enquiries led to very little information being divulged even on the accidents/incidents and almost none on root causes except in a very general sense. We did come across a number of organizations that report accidents on a regular basis. There was just an absence of root cause information except when there had been a fatality and an agency like OSHA investigated (e.g. Case-20070825). Even for other fatalities the data was sparse. The fatality on board the Russell Peterson, liftboat (Case -20080512) observing off the East Coast of the US was investigated by the USCG but as of our Report date no formal report has been issued.

OSHA had been aware of wind farm incidents and a good presentation [Ref. 54], excited us about finding information from this source. Despite good correspondence with the author we ended up with only two cases. Going through the OSHA data we found that accidents are reported as a “fall” or “injury” but no notation as to whether it was in a wind farm or a typical building site. We spent hours pouring through the data trying to recognize names and issues that would point to wind and came up with only 2 cases we could tag to a wind farm site.

One manufacturer told us theirs was confidential information that couldn’t be disclosed: but that they indeed did keep the data and act on it. Other manufacturers had the same basic story. It was not clear what process was used to ensure lessons were learned either by the manufacturer of the failed product or other industry members that might have the same problem.

We tried the BWEA (British Wind Energy Association) who clearly had some data and were promoting the use of it, but only by their members – and we were not of a membership category. BWEA is clearly concerned about safety and have produced a

number of interesting documents to ensure safety of personnel which they did share with us and also safety of installation equipment. Their data form was presented in one presentations but did not focus on all the information we were attempting to capture, and of course, that may not have been the only form in their database. Several calls and emails to the person who was dealing with the database resulted in no further contact – but that may have been because of pressure of work.

AWEA (American Wind Energy Association) say they are keeping information but we were unable to obtain any information.

Insurers were quizzed but likewise did not give us access to their databases, though we have a number of their accidents recorded from presentations that were made in Europe on wind farm accidents. Codan, a Danish insurer provided some useful presentations, and Munich Re (a reinsurer) provided some information in their publications.

We are told that financial firms keep data but we were unable to access any of this, though it would not surprise us to find it is in the hands of their consultants (e.g. Garrad Hassan) who probably build internal reports.

We made contact with the UK HSE who were cooperative and gave us some data which was in a form disguised they had in-house, but some of these we already had, and others we have listed in the database, but may be duplicates. Since we had no dates or details it is hard to tell if this was fresh information or just from UK.

We contacted a few wind farm owners but again they did not appear to have a comprehensive system of keeping information – some data we did obtain was to be confidential and we have listed it this way in the database.

Certifiers have strict requirements to not disclose their client's information. DNV seem to provide a useful database for offshore oil and gas installations for sale at a reasonable price by subscription but this does not include wind farms. Germanischer Lloyd provided a couple of very useful references where they had analysed data and come to conclusions about the results and these were helpful, but source data was not released.

We thus got left with cruising the internet for anyone complaining about wind turbine structures and piecing together information from a number of sources. Here we found some very useful information in a number of publications and wish to mention a few.

9.1 The Sources

CWIF Database – top of the list, is an excellent database and contains almost all of the publically available newsworthy articles. Some of the original data sources had regretfully, references that no longer were there, one of them a significant internet site that had been closed down. It was not until much later after we had assembled an

amazing amount of source data, sorted it into case numbers that could be automatically reorganized and compared to the CWIF Database that we realized a number of things about the database:

- It is incredibly comprehensive
- It contained almost all the information we had, and each item had been diligently searched to assure a good date. Though we disagreed in a few instances that the date of the incident was the date named, we decided to adopt their dates for simplicity (though this happened only in a very few cases).
- The database statements indicate that they think the number of incidents reported is lacking: we agree there are probably a whole lot of cases out there that are not included, but it was a rare instance that we could come up with any they had not found from general sources.
- The information that was missing came out of a number of "technical publications" and papers (e.g. presentations from the Reliability Workshop Sandia National Lab 2009, or a Wind Update Conference on Maintenance in Dallas 2008), and conference proceedings, presentation where the photos may or may not be identified. (In some instances we communicated with the presenters but were unable to get further definition of the case/location related to the photos).

Some old data was available on line BUNDESWEITE DATABASE OF WINDRAD. It appears this is no longer gathered. It may have been assembled from those who were protesting the effect of wind turbines on the Landscape in Germany. It was translated with Google and the translation is not the best, but was left as it was, since the original can be easily found if more detail is needed. Most of this had already been incorporated into the CWIF database but there were one or two we could not correlate to their items.

9.2 The Mechanics of the Database Assembly:

It became apparent that the best way to approach this was to leave the CWIF database intact, chronicle, ensure we had no duplicates, and build a separate list of information supplemental to that list.

9.2.1 Case Number:

We were able to obtain a copy of the CWIF database in Excel format, thanks to the generosity of the author and organizers of the database. With this we were able to translate the date into a case number which was designated as: YYYYMMDD. When we did not know one of those digits, it became a 9. Thus 20050999 means we know it happened in September 2005 but don't know the date. 20069999 means in happened sometime in 2006 and 99999999 means that we don't know when it happened but have some information that it did happen or what we believe to be a legitimate photo. Thus we had a database sortable by date. We applied this to the CWIF list and our own so we were able to make direct comparisons. One small glitch was that sometimes the dates were reversed month and day from the European to American systems: the case number itself is of little importance except as it allowed us to align

the databases and delete duplicates.

The Case Number was appended by sequential numbers as ".1" or ".2" when we had backup information. Thus any case number with a .1 means there is some backup information which is available which may be a report, extracts of a report, or a newspaper reference.

To further delineate as to where the information is found any backup information or any photos involving the CWIF database has a C associated with the number – thus C20050912.1 would mean it is listed in the CWIF database on 12th September 2005 and has some backup information that is accessible. A photo with a number C20050912.1 means there is a photo associated with that case number and if there is more than one photo they are numbered C20050912.1a, C20050912.1b etc.

If the photo is numbered 20060312.1 without a C preceding it then it would be found in the supplemental database we assembled. Originally we found it necessary when we had more than one document to create a directory for the information rather than a single file. It later added confusion for there to be two systems so eliminated the single files and made directories for each of the entries.

9.2.2 The Supplemental Data

We assembled our own data in a similar manner to CWIF but cutting a few columns and adding a column for "Photos & Videos", and one for "Offshore" or Land.

We added those marine accidents that were directly relevant from the marine industry, such as those accidents from jack-up rigs performing the installation or involved in construction.

We chronicled things like replacement of gearboxes, re-burial of cables and items which might be designated maintenance and not accidents since we thought it was important to note these various items which may affect safety of the structure.

9.2.3 Sorting and Eliminating Duplicates.

With identical case numbers we mixed the two databases together and went through meticulously eliminating duplicate data. Where we had a difference in date, we simply went with the CWIF date, since it would have been too confusing to go back and forth and CWIF had done an excellent job in selecting the date. Our purpose was to track down types and examples of accidents – the date was only useful in ensuring we did not have duplicate data and could tie pictures to the stories.

This was when most we appreciated how good and careful a job CWIF had done in assembling their data. One at a time we eliminated the majority of the data assembled in favor of using the CWIF database information.

In the end we decided it was best to present the CWIF data, and present the others we found in a supplemental list. We characterized everything we could under CWIF even though we may have obtained the info from different references. When we liked our source better than the one CWIF referred to we included the same data in our database noting the case as appearing in the CWIF data. We noted some engineering points, explanations of which were useful to our purpose: like comments from experiences in India and cautions such as when blades break make sure you double check the tower for a hit and any other stress damage. Sometimes we noted oil spills that were not prominently noted in CWIF data but very relevant to us.

For all the Offshore cases in the CWIF database we clipped and pasted it into ours and adjusted the information in the columns to suit. Those are painted 'yellow' and 'green' just as they came out of the CWIF database so can be easily identified as theirs. The general idea was that we wanted to record all the offshore data in one place so it could be separately sorted and reviewed.

9.2.4 Photos

Any photos we put in a Photo subdirectory and recorded a P for Photo or V for Video in the column in each of the CWIF database or our database.

Photo Contact Sheets: Besides the database we put together a photo "contact" sheet which printed out the photo with the casenumber (file name) underneath. Thus one can review the photos and decide to work backwards into what the case is and further explanation.

For convenience two separate printings were made in the appendices, one using 36 photos per page and one with 12 photos per page. A file of the photos in larger format is available for downloading.

9.3 The Databases

Appendix C1 contains and Excel database from the CWIF: Caithness Windfarm Information Forum www.caithnesswindfarms.co.uk up to date to the end of 2009 with 2 additional columns added for Case Numbers and Photo/Video material. The yellow and green colors merely help distinguish by change of color the period in which the incidents occurred (these are the colors that are used by CWIF) – in later years they are changed year-by-year and in early years groups are banded together.

Also included in Appendix C2 is a photo "contact" sheet giving thumbnail photos of a variety of accidents that were chronicled in the CWIF database. While they are only a small subset of the total accidents they do give most of the important issues in pictorial form.

Appendix B1 contains an Excel database that we have compiled from separate

information together with the injected lines from the CWIF database. The lines from the CWIF database are identified in yellow or green (as they were in the CWIF database). We have additional columns for Offshore designation and a column indicating if there is Photo and/or Video material. The data from the CWIF database was injected if they were offshore, if we had additional material to add, or a different perspective.

Also included in Appendix B2 is a photo "contact" sheet giving thumbnail photos of a variety of accidents that were chronicled in our supplemental database. While they are only a small subset of the total accidents they do give most of the important issues in pictorial form.

9.4 Observations

We learned that the industry does not keep their own comprehensive database and that non-profits like CWIF, National Wind Association and Windaction.org do a magnificent job of chronicling data. Indeed it shows that for the most part the industry has been remarkably safe and that there are few accidents. It's regrettable industry does not keep their own comprehensive database to show a good job and put further results of enquiries down so that technical details can be learned and the industry is not making the same mistake over and over.

We confirmed the CWIF database is a good, robust source, and we also confirmed how much effort it must take to keep up their quest for the most comprehensive database etc.

We confirmed that one can be very confident of their data. The usefulness of their database suggests it would be useful to support them financially in order that they can keep it up as it is an incredibly useful resource.

10. OBSERVATIONS AND CONLUSIONS

10.1 Observations

From the information we were able to extract sufficient data to provide for the safety management system information, things we otherwise wouldn't have thought of:

- Ensuring that maintenance persons understand the importance of following the instructions (20050827).
- Providing instruction to firefighters NOT to open the door to the turbine to create a chimney effect on a fire (C20041207.1)
- Ensuring that the installation vessel go through a proper procedure on sampling soil data and preloading (20000210).

- Training the personnel to understand that if the power is lost, either through grid loss or battery backup loss the wind tower may fall down in a storm (1990999.1) and (19980609.1)

For the equipment side we learned much about the cautions:

- Multiple tower failures are possible and hurricane areas are particularly prone to that. Several researchers have reported that loss of power, presumably to prevent improper yaw, have been at least partly responsible for the failures (19980609.1), (19990999.1)and (20030911.1).
- Burying the subsea cable to the appropriate depth to avoid anchor issues is probably one of the most important factors in preventing major downtime and the grid loss can put the wind turbines at risk for a storm that occurs due to the outage. It was a surprise that there were a number of issues with the subsea cable
- The terminations to the subsea cables need to be of the right material, quality, and installed correctly without damaging the subsea cable with moisture. The quality control of the aspects of the subsea cable is very important.
- Oil does leak from these wind turbines (20060303), and (99999999.34).
- Lightning is so frequent it becomes mandatory for offshore application of wind turbines.
- Fire is so frequent it becomes mandatory for offshore application of wind turbines.
- The equipment which is Certified to last 20 years often has to be replaced in 2-3 years and with a guarantee of no longer than a further 5 years (20080630.1), leading to questions about the certification process.
- Foundations need inspecting carefully (20079999.7) and (20091227).
- Marine issues that plagued the early development in offshore oil are likely to be an issue with offshore wind installations (20091122.1), (20081028.1), (20069999.4), (20070899.8) and (20090130) – these are standard marine procedures that a reasonable Safety Management System should be able to cope with preventing.
- While no-one had been hurt from blades letting loose it is important to note that one should adhere to the practice of turning the turbine off when it is under maintenance.
- Component integrity is most important (19990301.1) and each component must be well-scrutinized before being put into use.
- There is a lot of understanding and skill needed in maintenance and personnel need to know much more about key structural issues that result in a potential safety threat.
- While we did not chronicle it, we did note one case of a snake bite that was able to be dealt with on land, resulting from a snake having crawled into the nacelle when on the ground, only to attack a maintenance worker some days later – it reminded us of the need to be cautious against the possibility of dangerous situations such as this.
- Ensuring the integrity of transformers is important (20029999.1), and (20039999).

- Hurricanes (typhoons, and/or cyclones) can produce multiple failures – thus requiring careful examination of the load cases (20030911), (20070111)
- There is a great importance to having condition monitoring installed (99999999.6).
- Whenever lifting is going on it is very important to stay out of the way some considerable distance (20061221.1) and (20071107.1) and (20100308.1),
- Blades will from time to time need replacement and repair, and should be considered as more of a maintenance item since for the most part personnel are away from the area (if they are shut down during maintenance).
- ….and many other factors were learned from this data.

10.2 Conclusions

The CWIF organization has presented statistical information from what has been gathered. Since were able to verify their data, their analysis is also valid as quoted in Section 7. We added a number of relevant issues in a supplemental database.

There is little comfort in the Certification results, assuming that most of the wind farms do have certification of some sort, when it comes to structural reliability. Perhaps the issues would be worse without certification but we would like to see more "evidence" of the benefits of the current scheme and will look forward to future discussions of how the system can be improved. Certainly maintaining a database of issues that are fed by the industry with root cause analysis is a most important item going forward.

The things that were learned were input into the Safety Management System template and the requirements and commentary on the Structural and Equipment guidance documents which are part of this series of Reports.

Much of the complied information is of limited use since the design requirements for offshore US waters will be significantly different (hurricane issues), and safety issues will not be addressed by European codes. Electrical personnel will need to be trained and knowledgable about any potential differences if foreign standards are used for manufacture, and installation of the electrical equipment.

There needs to be an active body disseminating information to the industry about the statistics of incidents such as the information chronicled and distributed by the International Association of Drilling Contractors in their safety reports. Monitoring worldwide incidents and informing the US industry is most important.

[Ref. 55].

11. REFERENCES

1. Walford C., Wind Turbine Reliability: Understanding and Minimizing Wind Turbine Operation and Maintenance Costs, Sandia National Laboratory Report SAND2006-

1100, March 2006.
2. March 29, 2008 by Aaron Nathans in The News Journal.
3. Ron MacArthur, ronm@capegazette.com.
4. http://www.ecofriendlymag.com/sustainable-transporation-and-alternative-fuel/wind-farm-workers-rescued; also www.Windenergyupdate.com.
5. http://planetgore.nationalreview.com/post/?q=OWViNmMzMDE1ZjJjZTgzYjkzMDA4O.
6. BWEA H & S Database - Helen Bolt, All-ENERGY'07, May 23 2007.
7. Bundesweite Database of Windrad Accidents 2000, 2001, 2002.
8. Wind Turbines: Fire Protection Guidelines VdS 3523EN, http://www.vds.de.
9. Gerhard Gerdes, Albrecht Tiedemann, Zeelenberg S., Case Study: European Offshore Wind Farms - A survey for the Analysis of the Experiences and Lessons Learnt by Developers of Wind Farms, POWER, Pushing Offshore Wind Energy Regions.
10. Munich Re Perspectives 2003.
11. Munich Re: Renewable Energies http://www.munichre.com/publications/302-04062_en.pdf.
12. http://www.munichre.com/en/ts/renewables/offshore/marine_warranty_survey/default.aspx.
13. Jakobsen C., Reymann-Carlsen H., Boogaard J., Martin A., Kragelund N., Balschmidt B., Danish Insurance Association, IMIA Insurance of Wind Turbines, IMIA - WGP 26(02)E, July 1999.
14. Ciamberlano F., Swiss Re; Nitschke J., Munich Re; Kragelund N., Codan; Thiede J., Gerling; Fusselbaugh M., HSB; Johst M., IF; van de Velde F., Gen Re; Engineering Insurance of Offshore Wind Farms IMIA WGP 45 (06) 39th IMIA Annual Conference 12 September 2006, Boston.
15. Clear Sky – Renewable Energy Wind Proposition, Niels Kragelund General Manager Global Wind Energy, www.imia.com.
16. Bartley W.H., Hartford Steam Boiler, Inspection and Insurance Co., Analysis of Transformer Failures, IMIA- WGP33_2003, www.imia.com.
17. IMIA Wind Turbine Generators. Claims. Codan Insurance September 2007 Risk Engineer Truels Kjer.
18. Truels Kjer, Offshore Wind - The Importance of Insurance, Eye for Energy Conference, November, London 2009.
19. Private Communication. Prof Minoo Patel, BPP-Tech, Cranfield.
20. H.C. Sorensen, L.K. Hansen, SPOK and J H Molgaard Larsen, KMEK Middelgrunden 40 MW Offshore Wind Farm Denmark - Lessons Learned., Realities of Offshore Wind Technologies Case: Middelgrunden, Orkney, October 2002.
21. http://www.energyengineering.co.uk/latestissue/EE19_PMSS.html.
22. Poul Sørensen and Peter Hauge Madsen, Risø, Denmark, Anders Vikkelsø and K. Kølbæk Jensen, DEFU, Denmark, K.A. Fathima, A.K. Unnikrishnan and Z.V. Lakaparaml, ER&DCI(T), India, RisoReport R1172-EN.
23. Windpower Monthly Magazine, 01 September 1998. http://www.windpowermonthly.com/news/957297/Cyclone-winds-exceeded-survival-margins/?DCMP=ILC-SEARCH .
24. Windpower Monthly Magazine, 01 December 1998, http://www.windpowermonthly.com/news/963347/critical-cyclone-

factor/?DCMP=ILC-SEARCH.
25. http://www.windaction.org/news/10484.
26. http://www.windaction.org – wind turbines to be made of tougher stuff.
27. T. Ishihara, A. Yamaguchi, K. Takahara,T. Mekaru and S. Matsuura An Analysis of Damaged Wind Turbines by Typhoon Maemi in 2003, Sixth Asia-Pacific Conference on Wind Engineering (APCWE-VI) Seoul, Korea, September 12-14, 2005.
28. Takahara K., Mekaru T., Shinjo F, Ishihara T., Yamaguchi A, Matsuura S., Damages of Wind Turbine on Miyakojima Island by Typhoon Maemi in 2003., Published Paper.
29. Suguro Y., Ueda Y., High Performance MW class Wind Turbine for Asian Region.
30. MMI Engineering, Dan Dolan et al. "Comparative Study of Offshore Wind Turbine Generators (OWTG) Standards http://www.mms.gov/tarprojects/618.htm.
31. "An Analysis of MW-Class Wind Turbines for Hurricane Prone Areas, J. Tracy Livingston, www.wasatchwind.com.
32. Zhang L., Ren L., Jao J., Xu W, The analysis of Influence on Wind Generating Units of Trocious Weather Conditions.
33. Kichiro Kimura, Toward More Accurate Prediction of Damage Due to Strong Winds, Published Pper Kyushu Institute of Technology.
34. "Task Committee on Wind Resistant Design of Wind Turbine Generator Systems", Structural Engineering Committee, Japan Society of Civil Engineers, http://windeng.t.u-tokyo.ac.jp/TCWRDWT (in Japanese).
35. Nagao T., Kato H., Noborisaka Y, Yoshida S., Shiraish T., Development of a New 2 MW Wind Turbines Adaptive to Japanese Particular Conditions, EWEC 2006.,
36. Clausen N., Candelaria A, Gjerding S., Hernando S, Nørgård P, Ott S, Niels-Jacob Tarp-Johansen, "Wind Farms in Regions Exposed to Tropical Cyclones", http://130.226.56.153/rispubl/art/2007_141_paper.pdf.
37. www.modernpowersystems.com/story.asp?storyCode=2018094, 5 Nov 2002
38. http://www.modernpowersystems.com/story.asp?storyCode=2027852
39. http://www.modernpowersystems.com/story.asp?storyCode=2030103
40. The Problem with O & M, Renewable Energy, January/February 2009.
41. The Copenhagen Post.
42. ISET, Faulstich S., Hahn B., Jung H., Rafik K., Ringhandt A., Appropriate Failure Statistics and Reliability Characteristics, Paper, Presentation & Poster DEWEK November 27, 2008.
43. ISET, Faulstich S., Hahn B., Rafik K., Jung H.,Suitable Failure Statistics as a key for improving availability Paper 2009 & Poster.
44. Faulstich S., Hahn B., Lyding P., Tavner P., Reliability of offshore Turbines - Identifying Risks by Onshore Experience European Offshore Wind Conference 2009.
45. WindStats Newsletter, P O Box 100 KDK 8420 Knebel Denmark, Vol 19, No 3, Summer 2006. www.windstats.com.
46. Tavner P, Spinato F., Durham University & van Bussel G., Koutoulakos E., Technical University, Delft, The Reliability of Different Wind Turbine Concepts, with Relevance to Offshore Applications, Presentation EWEC 2008.
47. ISET, Geibhardt J., Hahn B., Durstewitz M., Requirements for Condition Based Operation and Maintenance of Wind Farms, EWEC 2007.
48. Final Report of the project "Offshore M & R" http:/.www.iset.uni-kassel.de/osmr/

49. Ribrant J., Reliability Performance and Maintenance - A survey of failures in the wind power systems, Master's Thesis, ITH School of Electrical Engineering 2005/6.
50. J. Ribrant, "Reliability Performance and Maintenance – A Survey of Failures in Wind Power Systems," KTH School of Electrical Engineering, 2006.
51. Braam H., Rademakers L., Guidelines on the Environmental Risk of Wind Turbines in the Netherlands, ECN Wind Energy-February 2004.
52. Curvers A., Rademakers L., Optimisation of O & M Costs to Lower Energy Costs, RECOFF November 2004.
53. Health and Safety Report of the Committee for Renewable Energy for Barrington RI. Aug 21, 2008.
54. Wind Farm Safety, John Newquist, CSP, Assistant Regional Administrator, OSHA Region V. February 4, 2008.
55. International Association of Drilling Contractors accident statistics information http://www.iadc.org/asp.htm.
56. Rademakers, L.W.M.M, and Braam, H. 2005. Analysis of risk-involved incidents of wind turbines. Attachment I in "Permitting Setback Requirement for Wind Turbines in California." http://www.energy.ca.gov/pier/project reports/CEC-500-2005- 1 84.html.
57. Kaiser S., Frohlingsdorf M., Wuthering Height: The Dangers of Wind Power, NY Times, 9/10/2007.
58. Barnes N., An Ill Wind - An Objection Against Windfarms in Ireland, www.geocities.com.nigbarnes/?200927.
59. Ragheb M., Safety of Wind Systems, 3/12/2009, Published Paper.
60. Ben Shepperd, AON, Eye for Energy Conference, November, London 2009.
61. M Durstewitz, C. Ensslin, B Hahn, K Rohrig, +15 Years Practical Experience with Wind Power in Germany, ISET, circa Dec 2005.
62. Wind Power: Environmental and Safety Issues, Wind Energy Fact Sheet 4, Department of Trade and Industry UK, BERR August 2001.
63. Noble Environmental Power, Noble Environmental Power Update on Turbine Incident at its Altona Windpark, March 6, 2009.
64. Tylec-Birdsall A., Song Y., Lee S., Integrated Software for Wind Turbine Gearbox Design & Analysis, EWEC 2006.
65. Wind Flow Technology Ltd., Newsletter No 13, April 2005.
66. Bischoff White E. and Hyers R., University of Massachusetts, Condition Monitoring and Prognosis of Wind Turbines, Poster, July 16, 2008
67. Khatri D., URS Corp., Structural Failures of Wind Towers and Dynamic Analysis Procedures, AWEA Conference.
68. ISET, Institut fur Solare Energieversorgungstechnik e.V., A Statistical Evaluation of Icing Failures in Germany's 250 MW Wind Program -Update 2005.
69. ISET, Big Experience with Small Wind Turbines - 235 Small Win Turbines and 15 Years of Operational Results, Paul Kuhn, May 2007.
70. Rademakers L., Braam H., Obdam T., Frhbose P., Kurse N., Tools for Estimating Operation and Maintenance Costs of Offshore Wind Farms: State of the Art, EWEC 2008.
71. Rademakers L., Braam H., Obdam T., Estimating Costs of Operation & Maintenance for Offshore Wind Farms, EWEC 2008.
72. Large-Scale Wind Power Generation Offshore, WE@SEA, 2003.
73. Shiloh II Wind Project Final EIR, Corps of Engineers, February 2007.

74. Kragelund N., Renewable Energy Insurance: Wind Proposition, Global Wind Energy (RSA) Presentation. www.imia.com.
75. Curvers A., Rademakers L., Standardisation of Collecting Failures and Maintenance Data, RECOFF 2000, November 2004.
76. Ciechanowicz M., Condition Monitoring Techniques Applicable for Wind Turbines. NZWEC 2008.
77. ISET, Hahn B., Reliability Assessment of Wind Turbines in Germany, 2005.
78. Roeper U., Chant A., Ortech Power, Warranty and Long Term Maintenance Risk of Wind Farms, 2005 CanWEA Annual Conference.
79. The Horns Rev Offshore Contractors Presentation
80. Boris Valov, ISET, Transformers for Offshore Wind Platforms: Expected Problems and Possible Approaches, 8th International Workshop on Large-Scale Integration of Wind Power into Power Systems as well as Transmission Networks for Offshore Wind Farms, Bremen Germany 14-15 October 2009.
81. Ropeik, D., and Gray, G. 2002. Risk: A Practical Guide for Deciding What's Really Safe and What's Really Dangerous in the World Around You. Harvard School of Public Health. Houghton-Mifflin Publishing Company.
82. Wall Street Journal. 2008. Suzlon's U.S. wind turbine plans hit new turbulence. http://www.livemint.com/2008/07/01003655/Suzlon8217s-US-wind-turbine.html.
83. Seifert, H., Westerhellweg, A., and Kroning, J. 2003. Risk analysis of ice throw from wind turbines. Proceedings of the International Conference, Wind Energy Production in Cold Climate, BOREAS VI, Pyha, Finland, Finnish Meteorological Institute. http://web1.msue.msu.edu/cdnr/icethrowseifertb.pdf.
84. Hirscherg S., Spiekerman G., and Dones R., Severe Accidents in the EnergySector, Project GaBE, Aul Scherrer Institute, November 1998.
85. Hansen L.H., Helle L., Blaabjerg F., Rictchie E., Munk-Nielsen S., Bindner H., Sorensen P., and Bak-Jensen B., Conceptual survey of Generators and Power Electronics for Wind Turbines, RISO-R-1205(EN), December 2001.
86. Lawate S., Graf M., The Lubrizol Corp., Wind Turbines Pose Lubrication Challenges, Power Engineering August 2007.
87. Kvitrud A., Ersdal G., Deonhardsen R., On the Risk of Structural Failure on Norwegian Offshore Installation, 2001 Stavanger, Norway.
88. Summary of Wind Turbine Accident data to 31 December 2009, Caithness Wind Information Forum 2009.
89. ISET, Institut fur Solare Energieversorgungstechnik e.V., Konigstor 59, D 34119 Kassel Germany.
90. Garrad Hassan Report - Review of Offshore Wind Farm Project Features, Appendix 3-F, U.S. Army Corps of Engineers 23 July 2003.
91. Report from the Bethany Wind Turbine Study Committee 26 January 2007.
92. Richard Ven Vertloh, Mark Tayrien, Labella, Presentation on Environmental Issues: Utility Scale Wind Farms, 2005.
93. Losses and Loss Prevention, Schadenspiegel, Special feature is Risk Factor for Air, Munich Re Insurance, Jan 2008.
94. Erection of 6 Giant Industrial 125 metre high 2.5 MW Wind Turbine Generators, Highly Access, Junction Improvement and Ancillary Development, Westfield Lane, Darrington, Pontefract WF8 3HX, 2007.
95. W. Musial and S. Butterfield & B McNiff, Improving Wind Turbine Gearbox Reliability, 2007 European Wind Energy Conference, Milan, Italy, May 2007.

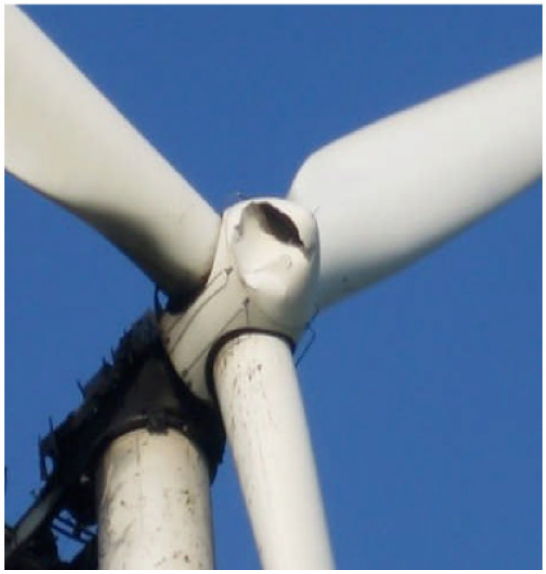
96. F. Rasmussen, K Thomsen, T.J. Laarsen, The Gearbox Problem Revisited, AED-RB-17(EN), RISO National Laboratory, Denmark.
97. Hubert J. Sutherland, On the Fatigue Analysis of Wind Turbines, Sandia National Laboratory, June 1999.
98. Walt Musial, and Brian McNiff, Wind Turbine Testing in the NREL Dynamometer Test Bed, AWEA WindPower 2000 Conference, Palm Springs, California 2000.
99. Hicks R., Cunliffe F.,and Giger U., Optimised Gearbox Design for Modern Wind Turbines, Orbital2 Limited, Wales, UK.
100. Blankinship S., Keep Wind Turbines Spinning, (gear box issue), Power Engineering August 2008.
101. Kaiser S., Frohlingsdorf M., Wuthering Height: The Dangers of Wind Power, Der Spiegel, 8/20/2007.
102. Offshore Wind Power - Brochure on Insurance., www.marsh.com.
103. ENSAD - Energy-Related Severe Accident Database – Switzerland.
104. Wind Turbines to be made of Tougher Stuff, Windaction.org. www.asahi.com.englilsh/Herald-asahi/TKY20070.
105. Advanced Maintenance and Repair for Offshore Wind Farms using Fault Prediction and Condition Monitoring Techniques, Funded by European Commission DG TREN. Offshore M & R Final Public Report, ISET, December 2005.
106. BWEA H & S Database - Helen Bolt, Rod Blunden, Lisa Mallon, 3rd BWEA Health & Safety Seminar, 26 April 2007.
107. Wind Energy Researchers Cite Accident Statistics, Suite101.com, Feb. 2, 2009.

APPENDIX A –"WIND TURBINE GENERATOR - CLAIMS"

Pages from IMIA Report "Wind Turbine Generators – Claims" authored by Truels Kjer, Risk Engineer, with Codan Insurance, September 2007. This report highlights Claims involving the main components of the turbine.

Overspeed I. Fire in the nacelle.

Root causes. Pitch system.
Due to mechanical/electrical problems with the pitch system the turbine went overspeed. Oil from a broken component was ignited when the oil hit the disk brake which due to overspeed was activated.
Damaged parts. Nacelle, at least one blade, upper section of the tower.
Estimated costs. 800.000 Euro. Plus business interruption.



The burned nacelle.
Notice the nosecone. Due to the overspeed an implosion have occurred.

Overspeed II. Mechanical damages.

Root causes. Pitch system.
Due to problems with the control system of the pitch system the turbine went overspeed. *Damaged parts.* Nacelle (repairable), 3 blades, upper section of the tower, foundation *Estimated costs.* 600.000 Euro. Plus business interruption.

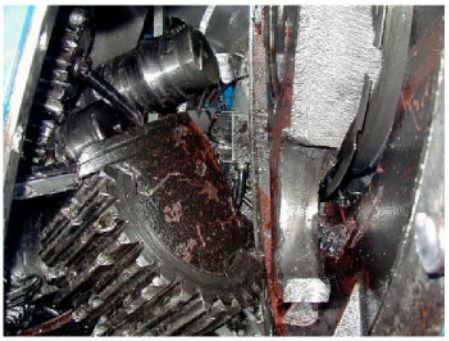
The damaged turbine.
Notice the cracks in the foundation and damaged upper tower section.

Overspeed III. Mechanical damages.
Root causes. Bad workmanship. Pitch system.
Due to human interference with the control system of the pitch system the turbine went overspeed. During this one of the blades hit the tower and the whole nacelle broke loose and fell to the ground. *Damaged parts.* Nacelle, 3 blades, upper section of the tower.
Estimated costs. 1.300.000 Euro. Plus business interruption.

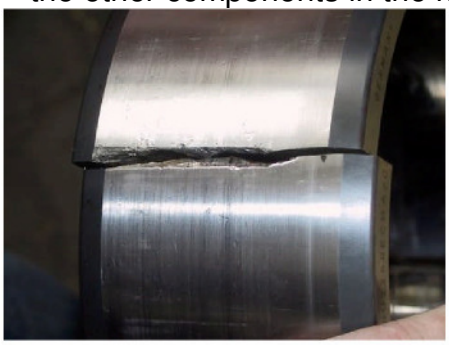
The damaged turbine. Notice the marks on the tower from one of the blades. When the nacelle crashed to the ground it was totally destroyed.

Gearbox. Bearing and gearwheel damages.

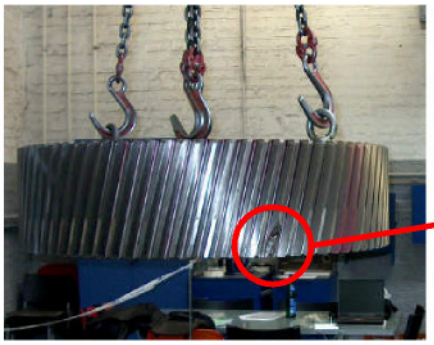
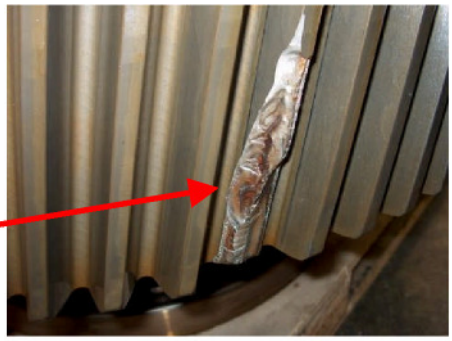
Root causes. Never concluded. It has been a general problem for many years independent of the manufacturer.
Damaged parts. All parts of the gearbox. Bearings, shafts and gear mesh both in the planetary and the helical stage. Though pitting/wear of the bearings in the planetary stage are most common. *Estimated costs.* Up to 270.000 Euro. Plus business interruption. At the moment the lead-time can be up to 15 month both on gearboxes and on the big components such as the low speed gearwheel.


Damages gearbox in a 750 kW turbine, resulting in damage of the generator, hydraulic system and the control system. Of some reasons the turbine was not stopped at time and the planetary stage locked resulting in server damages not only on the gearbox but also on the other components in the nacelle.



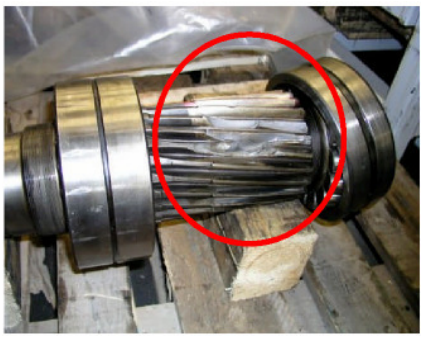
Broken bearing from one of the two helical gears

Broken tooth on the low speed gearwheel in a 2 MW gearbox

The three wheels and the 6 bearings from the planetary stage of a typical gearbox

Pitting (wear) on one of 6 bearings from the planetary stage



Broken tooth on the pinion in a 750kW gearbox

Electrical components. Generator, transformer, power panels.

Root causes. Bad component, bad construction, external causes such as lightening, bad workmanship among others. *Damaged parts.* The component itself. But it can result in burning and loss of a complete nacelle. *Estimated costs.* Up to 1.000.000 Euro. Plus business interruption.

Hot bearing from a 1 MW generator. Root cause could among others be lack of grease, unsuitable grease or loose connection between bearing and shaft.

Short circuit in a power panel. Root cause was a forgotten tool. It was traced back to the manufacturer.

Short circuit in a power panel. Root cause was a bad connection on a high power cable.

Short circuit in a power panel. Root cause was lightening.

Short circuit in the transformer. Root cause was probably high temperature due to insufficient cooling.

APPENDIX B1:

DATABASE/LIST OF OFFSHORE & ADDITIONAL ITEMS OF INTEREST

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
19819999.1		No	No	Structural Failure		Various	Denmark	250 Turbines exposed to wind speeds of 35 m/sec for 10 min resulted in 9 failures and 30% damaged			Safety of Wind Systems, M Ragheb, 3/12/2009	
19929999.1		No	No	Structural Failure		Bradworthy, Devon	UK	Delabole was struck by lightning, damaging some of its rotors in its early days and a wind-farm at St. Clether (near Launceston) of 26 turbines commissioned in 1993 was closed down in Spring 2000 due to metal fatigue in its towers			Bradworthy News March 2001	http://www.bradworthy.com/user/nonIEbrowser/200103/local%20wind%20farm.html
19950401.1		No	No	Material			Canada	Two of the 30 metre structures have toppled, following metallurgical failures which are still under investigation. They appear attributable to poor quality control by Adecon in the manufacturing and installation process.			Windpower Monthly Magazine, 01 April 1995	http://www.windpowermonthly.com/news/956306/NEW-TRY-GOING-COMMERCIAL/?DCMP=ILC-SEARCH
19969999		No		Lightning			Germany	The German electric power company Energieerzeugungswerke Helgoland GmbH shut down and dismantled their Helgoland Island wind power plant after being denied insurance against further lightning losses. They had been in operation three years and suffered in excess of 800.000 German Marks damage.			National Lightning Safety Institute by Richard Kithil, president & CEO in September 2007.	http://www.lightningsafety.com/nlsi_lhm/wind1.html.
19970404.1		No	Yes	SMS		Kaiser-Wilhelm-Koog wind turbine testing facility	Germany	The person died in the complete destruction of a prototype wind turbine which ran out of control during a squall.	1		Windpower Monthly Magazine, 01 May 1997,	http://www.windpowermonthly.com/news/960816/Test-field-death-turbine-technician/?DCMP=ILC-SEARCH
19979999.1		Yes	No	Subsea Cable		Bockstigen	Sweden	The water current was larger than assumed due to an acceleration of the flow over a ridge and the difficulty to anchor the sea-cable to the sea bed was underestimated.			Offshore Wind Farm Bockstigen – Installation and Operation Experience, Bernhard Lange, Erik Aagaard, Paul-Erik Andersen, Anders Moller, Staffan Niklasson, Andreas Wickman, Wind World af 1997, Sweden.	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
19980201.1		No		SMS		Lemvig	Denmark	Denmark's HSE has asked the police to start proceedings against manufacturer in connection with a fatal accident on November 6 when a technician was killed during the dismantling of a wind turbine. It was said that the contractor was not properly instructed in the correct procedure for the work involved. The nacelle of the turbine, to which he was attached by a safety line, toppled from the tower as the blades were being removed from it			Windpower Monthly Magazine, 01 February 1998	http://www.windpowermonthly.com/news/958760/Vestas-taken-court/?DCMP=ILC-SEARCH
19980601.1		No		Quality		Simonsberg near Husum	Northern Germany	Germanischer Lloyd is still investigating the cause of a serious failure of an Enercon 500 kW E40 machine during a storm in early March. The nacelle and blades of the turbine crashed to the ground from the 42 metre concrete tower			Windpower Monthly Magazine, 01 June 1998,	http://www.windpowermonthly.com/news/954388/Nacelle-rotor-topple-tower/?DCMP=ILC-SEARCH
19980609.1		No		Structural Failure		Gujarat	India	A critical factor in the failures in India is that the grid also failed. If this happened at the height of the cyclone, then turbines would move to the downwind position as the cyclone raged, with blades feathered in the case of pitch regulated machines. Yawing could be slow enough that the full force of the wind would hit the side of the nacelle and across the full face area of the feathered blades. In this case, the tower top loading could be significantly higher than for the "following wind" condition and the robustness of any wind turbine would be tested to the full. Wind turbine manufacturers would be well advised to check that this load case has been included in their design calculations			Windpower Monthly Magazine, 01 December 1998	http://www.windpowermonthly.com/news/963347/critical-cyclone-factor/?DCMP=ILC-SEARCH
19981226.1		No		Structural Failure		Owenreagh, County Tyrone	Ireland	A Zond nacelle and rotor in Northern Ireland fell from their tower during hurricane force winds which hit the province on December 26			Windpower Monthly Magazine, 01 March 1999	http://www.windpowermonthly.com/news/953938/Winds-blow-turbine-tower/?DCMP=ILC-SEARCH
19990117.2		No		Structural Failure		Vogelsberg Windenergie	Germany	Enercon is still investigating the cause of a failure of an E40 500 kW turbine on January 17 when the nacelle and rotor toppled off the tower. The incident happened in winds gusting up to 30 m/s.			Windpower Monthly Magazine, 01 March 1999	http://www.windpowermonthly.com/news/957696/Enercon-turbine-failure/?DCMP=ILC-SEARCH

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
19990301.1		No		Material		Hesse	Germany	Five Enercon E40 machines in Hesse have failed this year. The nacelles of two machines recently crashed to the ground, both suffering from a failed "kingpin," a cast iron component used to attach the nacelle to the turbine tower. The material of the failed component in each case was sub-standard, Only three more wind turbines could potentially suffer the same fate as two Enercon E40 machines in Hesse that failed earlier this year, according to Enercon's owner, Aloys Wobben. The nacelles of the two machines crashed to the ground within weeks of one another, both suffering from a failed "kingpin," a cast iron component used to attach the nacelle to the turbine tower			Windpower Monthly Magazine, 01 April 1999	http://www.windpowermonthly.com/news/958060/Material-fault-identified/?DCMP=ILC-SEARCH
19990999.1	P	No	No	Structural Failure			Japan	Tower that has been knocked down by the typhoon in September 1999. The situation is very close to the case of Miyako, such as loss of grid and speed up due to the topography			Private Communication Univ of Tokyo	
19991023.1		No	Yes	Structural Failure		Bakersfield, California	United States	OSHA- Guy wire came loose from come-along device resulting in the collapse of the tower. "The guy cables were never directly attached to the guy anchors or the guy anchor turnbuckles. Instead, the guy cables were attached to a cam-actuated cable grip. This grip was then attached to a tensioning device, what CalOSHA calls a "come-along device." This tensioning tool was then attached to the guy anchor turnbuckle". (commentary from Steen Aagard, the worker who was injured)	2		Steen Aagaard's Crippling Fall.mht	www.wind-works.org/articles/Aagaard.html
19991203.1	P	No		Structural Failure			Denmark	The gale Anatol destroyed 13 older plants out of a total of 3500 installed plants.			Munich Re Perspectives 2003	www.munichre.com/en/publications/default.aspx?category=18
19991215.1		No		Structural Failure		Various	Denmark	Only six of Denmark's 5500 operating wind turbines were destroyed in a hurricane that blasted the country early last month with winds of up to 51.4 metres per second (m/s).			Windpower Monthly Magazine, 01 January 2000	http://www.windpowermonthly.com/news/955035/Turbines-weather-hurricane/?DCMP=ILC-SEARCH
19999999		Yes	No	Installation Vessel		Horns Rev	Denmark	Aarsleff Jack overturned			Jack-up Database	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20000104.1		No	No	Electrical			USA	A wind turbine technician was replacing a fuse holder in the base of a wind turbine control panel. An electrical fault occurred, and the ensuing electric arc burned the employee. Emergency medical services transported the employee to a local hospital. He was subsequently transferred to a burn center for treatment. He was hospitalized for 10 days for second- and third-degree burns to his hands.	1		Osha Report Accident: 119947315 -- Report ID: 0950633 -- Event Date: 01/04/2000	
20000210.1	P	Yes	No	Installation Vessel		Blyth	UK	Wijslift 6 ; Hull Dropped			Jack-up Database	
20000210.2	P	No	Yes	Structural Failure				In Germany, four turbines experienced sudden and total collapse due to "concrete damage" at the base. Forty-four similar turbines were shut down pending investigation.			Report From Bethany Wind Turbine Study Committee 25 Jan 2007	
20000210.2	P	No	Yes	Structural Failure		Asel in Wittmund, Lower Saxony	Germany	1992 constructed Enercon E32, 300kw Tower Collapsed.			Economics of Wind Energy within Generation Mix. Prof Helmut Alt	http://www.wind-watch.org/documents/wp-content/uploads/AltEconomicsofWindEnergy.pdf
20010101.1		No		Structural Failure		Palencia in the Spanish province of Castile and León	Spain	Storm force winds with gusts claimed to be as high as 55 metres per second (m/s) tore the nacelle, rotor and two tower sections from a 660 kW Gamesa Eólica G-47 turbine at Palencia in the Spanish province of Castile and León in early January. In December in Merindades, a G-47 tower was fractured, apparently struck by a blade and again in high winds			Windpower Monthly Magazine, 01 February 2001	http://www.windpowermonthly.com/news/951963/Extreme-winds-topple-turbine---Twice-two-months-Gamesa/?DCMP=ILC-SEARCH

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20010302.1		No		Structural failure		Sierra Cabrera wind farm in Valencia	Spain	For the third time since December storm force winds have toppled a wind turbine being erected by Gamesa Eólica, On March 2, average wind speeds at the Sierra Cabrera wind farm in Valencia were measured at 140 kilometres per hour (39 m/s), with gusts as strong as 180 km/h (50 m/s). The winds brought down part of the rotor and generator of a 850 kW unit. The turbine was still awaiting grid connection and was not able to yaw out of the wind, says Perea. The two previous accidents happened for the same reason, according to Gamesa (Windpower Monthly, February 2001). Perea says the company is now providing on-site standby generation to all new plant going up			Windpower Monthly Magazine, 01 April 2001	http://www.windpowermonthly.com/news/959281/Third-Gamesa-storm-victim-December/?DCMP=ILC-SEARCH
20010701.1		No		Quality		Various	Various	LM Glasfiber, supplier of rotor blades to nearly half the wind power development industry, has started a major retrofit program of more than 600 sets of blades on 1 MW and 1.3 MW turbines. The retrofits have been launched following blade failures and the discovery of manufacturing faults in the early blades of four separate series			Windpower Monthly Magazine, 01 July 2001,	http://www.windpowermonthly.com/news/951001/Construction-faults-megawatt-blades---LM-Glasfiber-retrofits-600-rotors/?DCMP=ILC-SEARCH
20010801		No		Fire		Big Spring, Tx	USA	Jasper Energy vs Vestas. Fire in Big Spring Texas. Damage $2 million. Aug 1, 2001			Legal System Intelligence	
20011001.1		No		Material		Vogelsberg region in Hesse	Germany	The loss of an entire rotor and hub from an NEG Micon 500 kW turbine in Germany last month was the result of an extraordinary material failure following welding work by a sub-contractor, reports the machine's manufacturer			Windpower Monthly Magazine, 01 October 2002	http://www.windpowermonthly.com/news/959196/One-off-NEG-Micon-turbine-failure-blamed-subcontractor/?DCMP=ILC-SEARCH
20019999		Yes		Subsea Cable		Horns Rev Installation	Denmark	Vestas V80 (2 MW) During the installation of the power cable leading to shore, a construction vessel's anchor hit the cable "which lay unprotected on the sea bed". Damages = EUR 2 million			POWER: accidents an lessons learned on European wind farms.pdf	http://www.offshore-power.net/
20019999.1		No		Lightning		Various		Damage Events for Fort Davis, Tx; Searsburg Vt.; Algona IA; Springview NE; giving information on a number of lightning damage events for example for Ft Davis 12 in 1996/7; 11 in 1997/8 and 5 in 1998/9 and specifying resultant damages.			Wind Turbine Lightning Protection Project 1999-2001 McNiff B., NREL Report May 2002	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20019999.2		Yes		Subsea Cable		Blyth Harbour Wind Farm	UK	In early 2001, there was a cable fault on the link between the two turbines. This was the result of poor installation. V66 (2MW) Cable fault due to poor installation and contracting assumptions. Cable was left in temporary condition for winter. Cable was cut through by wear and tear. "The lessons learned from this problem were; • try to use installation methods with no or very little diver intervention • the detail of the cable entry is very important and requires close cooperation between the teelwork designer and the cable laying contractor • detailed repair strategies need to be worked out in advance."			AMEC_Blyth_Operational_Aspects_2004 DTI Report	
20020122.1		Yes	Yes ORIG	Blade failure		Blyth, Northumberland, England	UK	Vestas, operated by Amec Broken blade on first UK offshore turbine. Broke in 70mph wind. Photos "Wind farm closed after blade snaps", BBC news on-line. Also Windpower Monthly February 2002				http://news.bbc.co.uk/1/hi/england/1777268.stm
20020128.1	P	No	Yes	Blade failure		Remlinger Windpark, Wolfenbütteler	Germany	On 27January 2002 saw the mayor of Samtgemeinde Wolfenbuettel himself like a fiberglass wing Remlinger Windpark in thousands of individual parts fragmented. As the wind power plant about 500 meters from the village had had no risk for the population existed.			newspaper Wolfenbütteler (29. 2. 2002).	
20020225		No		Blade Failure		Grand Haber village in the district of Fürth	Germany	On 25 February 2002, the lightning a wind turbine near Grand Haber village The fire brigade had to watch powerless as the 24-meter-long wing 70 meters in height burned. Damage: 50 000 Euros				
20020310.1	P	No		Fire		Sillenstede	Germany	Fire in Afternoon			BUNDESWEITE DATABASE OF WINDRAD	
20020315		Yes	Yes ORIG	Fire		Yttre Stengrund	Sweden	NEG Micon Fire burnt out turbine in March 2002. Replaced in May 2002. Offshore. Date simply used as mid-point for the month			Windpower Monthly, May 2002	
20020315.1		No		Transformer		Mönchhof	Austria	Transformer had short and had to be changed out			Winrad Accident Database	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20020599		Yes		Subsea Cable		Horns Rev	2002	"During installation, a construction vessel destroyed one of the interconnection cables in the wind farm: the anchor hit the cable, which laid unprotected on the seabed. The costly repair was performed by a Dutch specialist company; the EUR 2 million repair costs were covered by insurance. This accident turned out to be the biggest event in the construction phase."			Case Study: European Offshore Wind Farms – A survey for the Analysis of the experiences and Lessons Learnt by Developers of Offshore Wind Farms (part of the POWER (Pushing Offshore Wind Energy Regions). Deutsche WindGuard GmbH, University of Groningen.	http://www.offshore-power.net/
20020909.1	P	No		Blade Failure		Vogelberg circle Hesse	Germany	Completely broke at the hub, and the cause of accident a material error in a drive hub. Cost 50,000 Euro			Hessischer Rundfunk 19.30 HR-clock news and various press releases on 10.9.02.	
20021104		No	Yes	SMS		Tjærborg Meadow	Western Denmark	Human error was behind a control system error, which resulted in the machine running out of control in winds of just 5-8 m/s. The secondary automatic emergency stop system cut in, bringing the turbine to such an abrupt halt that all three blades were severely overloaded and suffered serious damage, reports the company.			Windpower Monthly Magazine, 01 December	http://www.windpowermonthly.com/news/953956/Isolated-failure-new-prototype---Vestas-2-MW-3-MW/?DCMP=ILC-SEARCH
20021105.1		Yes		SMS	Blade Damage	Horns Rev	Denmark	Suffered damage owing to the failure of a safety system; All damage was confined to the turbine blades				www.modernpowersystems.com/story.asp?storyCode=2018094

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20021231		Yes	Yes ORIG	Miscellaneous		Horns Rev offshore wind park	Denmark	Vestas Horns Rev was constructed during 2002. A presentation by the contractors reports zero fatalities, one lost time accident (therefore worker injury), six lost time accidents, and 39 near misses during the construction project. 90			*"The Horns Rev Offshore Contractors"* presentation to BWEA, safety section by Esbjerg Safety Consultants, page 16.	http://www.owen.eru.rl.ac.uk/documents/BWEA24/Nielsen31_Pres.pdf
20021299.1	P	Yes		On-Shore Cable: Grid Outage		Horns Rev	Denmark	The network failure, leading to a standstill of the turbines for 14 days, caused further problems. Stand-still marks in the gearboxes could be identified in 8 of the installed turbines.			POWER: accidents an lessons learned on European wind farms.pdf	http://www.offshore-power.net/
20029999		Yes		Generator Failure		Blyth Harbour Wind Farm	UK	V66 (2MW) Two generator failures, first caused by carbon dust from the brush unit (from back emf) entering the stator. The build up on the winding tails caused a short circuit. "The second failure was due to overheating in the stator windings causing deformation of the rotor and contact with the rotor. This was caused by poor varnish impregnation of the stator windings". Change in manufacture of generators. Also the type of boat used when lowering the generator onto the boat was crucial as it would have to be large and stable enough to handle ocean swells etc.			AMEC_Blyth_Operational_Aspects_2004 DTI Report	
20029999		Yes		Crane - Caution		Blyth Harbour Wind Farm	UK	V66 (2MW) Removal of generator for repairs. In lowering the generators onto a vessel from the nacelle and tower, it was noted that the type of vessel was extremely important for a successful transfer.			AMEC_Blyth_Operational_Aspects_2004.pdf	
20029999		Yes		Miscellaneous		Blyth Harbour Wind Farm	UK	V66 (2MW) SO2 found inside pile drilling… chemicals were added to get rid of bacteria causing this gas buildup			AMEC_Blyth_Operational_Aspects_2004.pdf	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20029999.1		Yes		Transformers and Switchgear		Middelgrunden	Denmark	Middelgrunden in Denmark, as an example, had "Problems with the switchgear and the transformers have been the main issue from the very beginning. In December 2002 the #9 transformer short-circuited. Six of the damaged transformers belong to Copenhagen Energy Wind and the last three to the Cooperative. One breakdown was caused by a misplaced phail." Initially "the switchgears were leaking SF6 gas and had to be repaired."				http://middelgrunden.dk/middelgrunden/sites/default/files/public/file/mg-pjece_72dpi_rgb.pdf; www.emu-consult.dk/includes/middelgrunden_munich.pdf
20029999.2		Yes		Subsea Cable		Middelgrunden	Denmark	3 accidents with damages of the subsea cables			Realities of Offshore Wind Technologies, Middelgrunden, Orkney, October 2002	
20029999.3		Yes		Subsea Cable		Middelgrunden	Denmark	In the installation of the Middelgrunden subsea cable there were 3 accidents with damage to the subsea cables			Ref. Sorensen H., Hansen L., Larsen J., Middelgrunden 40 MW Offshore Wind Farm Denmark – Lessons Learned, After Johannesburg, Local Energy and Climate Policy: From Experience Gained Towards New Steps in Wind Energy and Involvement of Local Partners Munich September 2002	
20029999.4		Yes		Lighting; Storm Subsea Cable		Horns Rev	Denmark	During the period of erection, eight recoverable claims were reported, of which six related to the erection phase, one resulted from a stroke of lightning and one from storm damage, one from subsea cable			Ref: IMIA Report WGP 26 (2002) www.imia.com	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20030314.1		No		Structural Failure		New Caledonia	French Pacific Islands	V27 and V29 Vestas Wind plant operators in France's overseas tropical territories are counting the costs and learning the lessons of dealing with tropical storms after Cyclone Erica struck the islands of New Caledonia on March 14. Three of the four groups of turbines in New Caledonia are operated by French company Vergnet, which specializes in smaller turbines for storm prone regions. All three escaped with minor damage. The fourth larger scale plant, Plum, consisting of 20 Vestas V27 and V29 turbines operated by the utility Electricité et Eau de Calédonie (EEC) suffered far more damage.			Windpower Monthly Magazine, 01 June 2003	http://www.windpowermonthly.com/news/962563/Cyclone-Erica-puts-turbines-test/?DCMP=ILC-SEARCH
20030406.1	P	No	No	Structural Failure		Siebenlehn	Germany	Crash of Wind Tower			Economics of Wind Energy within Generation Mix. Prof Helmut Alt	http://www.wind-watch.org/documents/wp-content/uploads/AltEconomicsofWindEnergy.pdf
20030513.1		No		Lifting		Burlington ND.	USA	Employee was struck in head by pipes being lowered at a wind farm. He later died of a blood clot in hospital.			OSHA Report 0830300 dated 06/09/2003	
20030825.1		No		Generator		Oberstrahlbach	Germany	n a wind turbine of the wind WEB AG has come to a generator damage. In the westernmost facility at the transfer station after various tests, the generator must be replaced. Cause may have been a very intense thunderstorm. After this storm, the ratio wind / electricity production rose to one another in a completely wrong ratio. Now, the bug was found in the windings. The damage amounts to a conservative initial estimates, about 25,000 euros.				
20030899.1		Yes		Transformers		Horns Rev	Denmark	20-30% of the transformers had been affected, owing to a combination of factors – manufacturing problems, weather conditions offshore, possibly salt in the air affecting the transformers			POWER Report	www.modernpowersystems.com/story.asp?storyCode=2030103

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20030911.1	P	No	Yes	Structural Failure		Miyako	Japan	7 Turbines collapsed in Typhoon			Takahara K., Mekaru T., Shinjo F, Ishihara T., Yamaguchi A, Matsuura S., Damages of Wind Turbine on Miyakojima Island by Typhoon Maemi in 2003., Published Paper	
20030911.1	P	No		Structural failure		Okinawa Electric Power co, Inc. (Miyakojima site)	Japan	Micon M750 (400 kW), Tower: 36m, WT No. 3 & 5; Typhoon, Wind speed: 38.4m/s Gust: 74.1m/s (Miyakojima Meteorological Station).			The Okinawa Electric Power Co, Inc. presented PDF at the 2004 European Wind Energy Conference & Exhibition	
20030911.1	P	No		Structural failure		Okinawa Electric Power co, Inc. (Miyakojima site)	Japan	Vestas (600kW) Tower: 46m, Micon M750 (400 Kw) Tower: 36m, Enercon E40 (500 Kw) Tower: 35m .WT No. 2,4, & 6; Typhoon, Wind speed: 38.4m/s Gust: 74.1m/s (Miyakojima Meteorological Station).			The Okinawa Electric Power Co, Inc. presented PDF at the 2004 European Wind Energy Conference & Exhibition	
20030921		No		Collision near miss		Lolland	Denmark	Floating dock broke loose from tug and threatened the wind farm; it was however reconnected in time.			Weser courier, Bremen of 19.12.03	
20039999		Yes		Gearbox; Lightning; Bearings; Air Conditioning		Nysted	Denmark	The following defects were handled after commissioning: Exchange of two gear-box bearings; Lightning strikes; Improved air conditioning of transfer; Improved cooling in main transformer; Improved aircraft warning lights synchronization (via satellite).			POWER Report	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20039999		No		Environmental			Germany	The hydraulic system inside the nacelle includes many gallons of oil in a sealed system. Sealed systems sometimes leak. In Germany, 2003, a turbine destroyed by a storm was found to have been leaking oil into the ground. Three other turbines were found to leak that same year. As these were situated in an area protected for municipal drinking water supply, the municipality sued the turbine company. No information is available on the result.			Report From Bethany Wind Turbine Study Committee 25 Jan 2007	
20039999		Yes		Overhaul		Blyth	UK	modifications to the hydraulic system, including the pump and control valves; modifications to the generator rotors, generator mounting and generator cooling system; additional contactor features and replacement of some relays; modifications to the yaw system; installation of arc detections system, shields and new mounting brackets for the transformer; upgrade to software; changes to the lubrication system;				www.berr.gov.uk/files/file20295.pdf
20039999		Yes	No	Installation Vessel	Leg damage	North Hoyle	UK	Excalibur (ex Wijslift 6) Foundation Issue at North Hoyle -			Jack-up Database	
20039999.1		Yes		Lightning		Blyth Harbour Wind Farm	UK	V66 (2MW) " In early 2003 one turbine was struck by lightning and a blade folded in two, but remained attached". The damage then became apparent during operation where the blade folded in half.			AMEC_Blyth_Operational_Aspects_2004.pdf	
20039999.2	P	Yes	No	Installation Vessel		Gunfleet	UK	Skate II : Hull Punch-Through			Jack-up Database	
20039999.3		No	No	Structural Failure		Dujuan	China	13 of the 25 units were damaged in the wind power works of Honghai bay. After a Typhooon.			Zhang L., Ren L., Jao J., Xu W, The analysis of Influence on Wind Generating Units of Trocious Weather Conditions.	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20039999.3	P	No		Ice Throw			Japan	Example of Ice throw			Zhang L., Ren L., Jao J., Xu W, The analysis of Influence on Wind Generating Units of Trocious Weather Conditions.	
20039999.4		Yes		Lightning		Blyth	UK	Damage to blades				www.berr.gov.uk/files/file20295.pdf]
20039999.5		Yes		Generator		Blyth	UK	Two generator failures. The first was caused by carbon dust from the brush unit entering the stator, building up on the winding tails and causing a short circuit. The generator was replaced with a one that had modified end shields to remove this problem. The second failure was due to overheating in the stator windings, causing deformation of the rotor and contact with the rotor. This was caused by poor varnish impregnation of the stator windings.				www.berr.gov.uk/files/file20295.pdf]
20039999.6		Yes		Access ladders and platforms		Blyth	UK	Access Ladders and platforms: Problem with Secondary structure damage: The grating brackets on the platforms have been strengthened as the waves in high seas lifted one or two gratings. This appears to have solved this problem.				www.berr.gov.uk/files/file20295.pdf
20039999.7	P	Yes		Crane Collapse on Installation Vessel		North Hoyle	UK	MEG-JB1: Crane Collapsed			Jack-up Database	
20040101.1	P	No	Yes	Structural Failure		Bologne	France	The Lagerwey turbine was a 750 kW model at the Le Portel Plage wind station near Boulogne. A blade problem is being put forward as the most likely reason why the turbine buckled at its centre section in the early hours of January 1.			Windpower Monthly Magazine, 01 May 2004	http://www.windpowermonthly.com/news/962675/Two-turbines-fall-down-France---Unrelated-failures/?DCMP=ILC-SEARCH

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20040129.1	P	Yes	No	Blade Quality		Nerefco Refinery	Netherlands	Balancing weight within a blade became detached and jettisoned 60m from the turbine. Cause was inadequate design from scaling up, inadequate assessment of failure modes and inadequate quality.			Private Communication	
20040201.1		No		Structural Failure		Caluengo wind plant in Navarra	Spain	Investigation into the fall of a GE 1.5 MW turbine at the 49.5 MW Caluengo wind plant in Navarra discards the possibility of a series fault			Windpower Monthly Magazine, 01 February 2004	http://www.windpowermonthly.com/news/951780/No-series-fault-concludes-investigation-toppled-GE-Wind-15-MW-unit-Navarra/?DCMP=ILC-SEARCH
20040320.1		No	Yes	Structural Failure		Dunkirk	France	The second failed Lagerwey turbine -- an older 300 kW model -- was brought down by gusts of winds reaching 31 m/s (110 kmh) at Dunkirk on March 20. Early investigations have identified weak foundations as the cause			Windpower Monthly Magazine, 01 May 2004	http://www.windpowermonthly.com/news/962675/Two-turbines-fall-down-France---Unrelated-failures/?DCMP=ILC-SEARCH
20040609.1	P	No		Fire		Wulfshagen/Tüttendorf in the circle Rendsburg Eckernförde/Schleswig-Holstein	Germany	Burning wind-power plant caused a 2 million- euro. previous fire in the same place was to 9.6.2004 damage to the Monday afternoon in Wulfshagen with Eckernförde.			BUNDESWEITE DATABASE OF WINDRAD	
20040617		Yes	Yes ORIG	Miscellaneous		Horns Rev offshore wind park	Denmark	Vestas; Report that all 80 offshore turbines at Horns Rev need to be taken ashore for repair due to transformer and generator failure.			Die Zeit from 17.6.2004 (supplement)	http://members.aol.com/fswemedien/ZZUnfallDatei.htm
20040799.1	P	Yes		Corrosion		Horns Rev	Denmark	Failure analysis of coating problems on 80 offshore wind turbine foundations.			SGS	
20040799.2	P	Yes		Corrosion		Arklow Bank	Ireland	Services : Failure analysis of coating problem on 7 offshore wind turbine foundations			SGS	
20040810		Yes	Yes ORIG	Fire		Borkum offshore windpark	Holland	Fire in ship "Kingfisher" reported while undertaking geological investigations for the Borkum offshore windpark. 35 crew members reported safe			Reported in Jeversches Wochenblatt http://www.jewo-online.de/ from 11.8.2004	http://members.aol.com/fswemedien/ZZUnfallDatei.htm

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20041001.1		No		Hydraulic Failure		Zeebrugge	Belgium	The dramatic failure of a Turbowinds 600 kW in the Belgian port of Zeebrugge in August has so alarmed the Bruges city council that it has demanded a safety check on all wind turbines in its area. The Turbowinds failure appears to have been caused by a loose oil pipe. With the resulting loss of oil pressure, the braking system failed and the machine ran out of control, shedding all three blades. These flew some 100 metres, though missed the neighbouring LNG terminal on the eastern harbour wall.			Windpower Monthly Magazine, 01 October 2004	http://www.windpowermonthly.com/news/952248/Call-safety-checks-dramatic-failure-turbine-Zeebrugge/?DCMP=ILC-SEARCH
20041001.1		No		SMS		Meyersdale wind farm, Pennsylvania	USA	A Danish contractor working on a wind turbine fell to his death at FPL Energy's 30 MW wind farm, the turbine's blade unexpectedly turned. The blade knocked the worker from a crane and he fell 18 metres to the ground. Safety procedures may not have been followed.		1	Windpower Monthly Magazine, 01 October 2004	http://www.windpowermonthly.com/news/957527/Danish-contractor-dies-fall-turbine-FPL-site/?DCMP=ILC-SEARCH
20041121		No		Transport		Tiskalaw, Illinois	USA	Bay Machinery vs Vestas. November 19, 2004 Bay Machinery picked up the nacelle from the port of Beaumont. On Nov 21, 2004 during transit to Tiskalaw Illinois the truck was involved in an accident near Crossroads Arkansas. The nacelle was damaged.			Legal System Intelligence	
20041228		No		Human		New Mexico	USA	Caprock, Mitsubishi and Texas wind power Company constructing a wind farm of eighty 1 MW turbines near San Jon, New Mexico. On Dec 28, 2004 the subcontractor for erecting the turbines left the site having completed the work. On Jan 2, 2005 the rotor and blade assembly for Turbine #43 broke free from the head and fell to the ground resulting in a total loss of the turbine and damaged the foundation. Subsequently it was found that several other turbines were not correctly assembled and bolted down. Cost $4 million.			Legal System Intelligence	
20041299		Yes		Transformer		Middelgrunden	Denmark	"The most recent failure occurred in December 2004 on a turbine that Siemens had already retrofitted with a new transformer in December 2001.			Windpower Monthly 01 April 2005,	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20049999		Yes		Subsea Cable		Arklow Bank	Ireland	Cable fault due to an anchor dragging over it. It took a week to repair			Case Study: European Offshore Wind Farms – A survey for the Analysis of the experiences and Lessons Learnt by Developers of Offshore Wind Farms (part of the POWER (Pushing Offshore Wind Energy Regions). Deutsche WindGuard GmbH, University of Groningen	
20049999.1		No		Human			Sweden	Fatal accident. Procedures and instructions and training in place and safety practices were disregarded		1	Environmental Statement 2004, Vestas Northern Europe and Vestas Blades Videbaek, Denmark	
20049999.2	P	No		Lightning	Fire		Germany	2 mil Eur - Total Loss			VdS 3523en: 2008-07(01) Wind Turbines: Fire Protection Guideline	
20049999.3		Yes		Generator		Horns Rev	Denmark	Severe generator problems occurred in 2004. To solve this problem, as well as problems with the rotor blade coating and the lightning system, it was decided to dismantle the turbine rotors and nacelles and ship them onshore			POWER Report	
20050301.1		No		Structural failure		Various	Denmark	In the hurricane that wreaked havoc in Denmark in early January, felling thousands of trees and removing rooftops, the country's 5400 wind turbines stood firm, although a few suffered rotor or nacelle damage. A 660 kW Vestas turbine suffered most, with one lost blade and another damaged along with the nacelle after it ran out of control			Windpower Monthly Magazine, 01 March 2005,	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20050310.1		No		Structural Failure			New Zealand	A gust caught the turbine side-on in the middle of a shut down. The entire gearbox/hub/blade assembly was ripped from its mounting and fell to the ground. The control and protection system was modified; the hold-down bolts strengthened.			Windflow Technology News No 13 April 2005. New Zealand.	
20050401.1		Yes		Transformer		Middlegrunden	Denmark	As supplier of failed transformers in a 40 MW offshore wind power station in Denmark, Siemens is being sued in a EUR 2.3 million law suit. The transformer breakdowns on 14 of 20 Bonus turbines started within three months of the Middelgrunden wind station starting operation off the Copenhagen coastline in May, 2001". 13 transformers short-circuited and burnt out.			Windpower Monthly Magazine, 01 April 2005; Experiences from Middelgrunden 40 MW Offshore Wind Farm, Copenhagen Wind Conference 2005;	http://www.windpowermonthly.com/news/952194/Offshore-plant-owners-sue-supplier-transformers---Shareholders-resort-court-action-against-Siemens-others/?DCMP=ILC-SEARCH
20050406.1		Yes		Generator		Horns Rev Rev	Denmark	Several months of repairs dealing with defective transformers and generators.				http://www.modernpowersystems.com/story.asp?storyCode=2027852
20050601.1		No		Structural Failure		Weatherford, Oklahoma	USA	The turbine, ran out of control on May 6 in moderate winds before the tower folded after a blade hit its middle section, was a slightly modified version of the standard GE 1.5 MW "We have not seen something like this before. It was something to do with the machine's operation,"			Windpower Monthly Magazine, 01 June 2005	http://www.windpowermonthly.com/news/962335/Turbine-collapse-investigation/?DCMP=ILC-SEARCH
20050601.2		No		Blade Failure		Montjoyer-Rochefort wind power plant	France	All three blades fell off a Jeumont J48 750 kW turbine just 15 days after it had been commissioned in December at the Montjoyer-Rochefort wind power plant: the accident occurred when the turbine's braking system malfunctioned during final tests			Windpower Monthly Magazine, 01 May 2005	http://www.windpowermonthly.com/news/960573/Brake-failure-causes-Jeumont-turbine-collapse-Montjoyer-Rochefort-plant/?DCMP=ILC-SEARCH
20050703.1	P	No		Blade Failure		Stormschade Wommels	Denmark	Damaged Blade				http://www.wind-watch.org/pix/displayimage.php?album=1&pos=368

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20051025		No		Transport Fire		Houston, Tx	USA	Coastal Cargo of Texas vs Suzlon wind Energy. A wind generator was on board the M/V BBC CANADA in the port of Houston on 25 October 2005. The generator was mounted on a metal skid which was secured by metal bands which were welded to the tanktop of the vessel's number 2 tween deck. At the time of the fire the bands securing the skid were being removed by one of the CCT's longshoreman using a welding torch. Sparks from the burning ignited the spongy urethane egg-carton-appearing insulation lining the inside of the generator's fiber composite housing.			Legal System Intelligence	
20051202		No		Transport		Larrabee, Iowa	USA	Suzlon vs Anderson Trucking. Damage for the in-transit loss and damage to a nacelle being transported from Barbour's Cut Houston to Bingham Lake, Minnesota. December 2 2005 on Hwy 59 in Larrabee Iowa the carrying tractor left the load and flipped in the adjacent ditch in a single vehicle collision. Claim for $208000.			Legal System Intelligence	
20051299.1		No		Storm			Canada	$ 5 million claim during construction as a result of a tornado activity				
20059999		Yes		Foundation		OWEZ, Nuon	Netherlands	Olthoff – Project Manager Nuon. Olthoff said an issue with the Nuon wind farm was that significant movement of subsea sand dunes, moving 4 meters per year caused the cable to become unburied.			J.Olthoff, Nuon, Marine Technology Society, Offshore Wind Farm Conference, Crystal City, 2009	
20059999		Yes		Installation Vessel	leg damage	Scroby Sands	UK	A2Sea Ocean Ady (now Sea Energy) Leg damage			Jack-up Database	
20059999		No		Design		Oak Creek, California	USA	Oak Creek, California vs Vestas. Since 1999 the NEG Micon gearboxes and other parts have continued to f ail. NEG Micon started retrofitting a large number of its wind turbine gearboxes with Flender manufactured ones. This took 2 years to complete. Within this time frame the retrofitted gearboxes began to fail. The Vestas American supplied wind turbine generators do not have an economic useful life of at least 20 years and parts do not have the expected service life as set forth in the DNV Certificate of Design Suitability.			Legal System Intelligence	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20059999		No		Design		Foote Creek Wyoming	USA	Foote Creek, Wyoming vs Vestas re 33 wind turbines from NEG Micon predecessor of Vestas for $26 million. They have experienced “massive” equipment failures. The gearbox, and other major components including the SPIDEX couplers and gear oil pump seals, which are serially defective, the main bearings and the nose cones. Per contract they are obligated to redesign or remanufacture each and every defective wind turbine or part. Vestas has replaced failed gearboxes with those manufactured by Brook Hansen and Flender, which have an expected replacement time of 5 to 6 years vs 20 on the original gearboxes. Claim $26 million.			Legal System Intelligence	
20059999.1	P	Yes		Foundation		Scroby Sands	UK	Scour around foundation			Scroby Sands Capital Grant Scheme for Offshore Wind Annual Report – January 2005 – December 2005, Executive Summary” BERR, UK.	http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/lc_business/env_trans_fund/wind_grants/wind_grants.aspx
20059999.2		Yes		Foundation		Scroby Sands	UK	Scour around foundation; filled with rock			Scroby Sands Offshore Wind Farm – Coastal Processes Monitoring Cefas, UK 2006	http://cefas.co.uk/media/21503/ae0262-final-report-scroby-owf.pdf
20059999.3		No		Various			Japan	2005, there were 100 cases of malfunctions and accidents reported in a survey of 900 wind turbines				www.windaction.org/news/10484

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20059999.4		Yes		Generator		Scroby Sands	UK	27 generator side intermediate speed shaft bearings and 12 high speed shaft bearings have had to be replaced, together with four generators.			Scroby Sands offshore windfarm report, prepared by E.ON UK and published by the DTI (now the Department for Business, Enterprise & Regulatory Reform),	www.berr.gov.uk/files/file46398.pdf; www.berr.gov.uk/files/file34791.pdf
20059999.5		Yes		Rotor Bearings		Horns Rev	Denmark	Owing to the effect of salty water and air on the generators and gearboxes, became corrupt after only two years. A similar procedure has been reported this year with Vestas 30 turbines requiring a change of rotor bearings at an estimated cost of €30m.			The Problem with O & M, Renewable Energy, January/February 2009.	
20060118		No		Transport Fire		Houston, Tx	USA	Suzlon owned 13 packages including four 2 MW nacelles. Codan insured. The shipment was packed in Mumbai Indian and transported on M/V SAUDI HOFUF, and discharged at Barbours Cut Terminal Houston on Nov 18 2005. On January 18 2006 one of the nacelles was loaded about a trailer for transport. It was needed to add additional support points in the shipping stands. A fire broke out causing extensive damage to the Nacelle. Damage was $850,000.			Legal System Intelligence	
20060118		No		Fire				Shipper's Stevedoring vs Suzlon. Fire on Jan 18, 2006 damaged a nacelle Port of Houston. The nacelles were being prepared for transport via truck and Shippers Stevedoring arranged for a welder to cut additional holes on the metal skids attached to the nacelles. When the welder began cutting holes into the second skid the nacelle caught fire and was a total loss.			Legal System Intelligence	
20060122		No		Fire		Lake Bonney Wind Farm, South Australia	Australia	During a heatwave, a turbine caught fire and due to the height, firefighters could not do much. Wind Farm Operator, Miles George, claimed the fire "Had been caused by an electrical fault while maintenance crews were working on it after it had shut down". That summer "maximum temperatures exceeded 40C".				www.canberratimes.com.au;http://www.abc.net.au/news/items/200601/1553257.htm; http://www.windaction.org/news/1607

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20060124.1		No		Fire		Grömitz in Ostholstein / Schleswig-Holstein	Germany	The police estimated the damage at around two million Euros. Die Brandursache is unbekannt. The cause of the fire is unknown.			Lubeck News, 24.1.2006	
20060201.1		No		Structural Failure		Windpark Kreekraksluis	Germany	Turbine failure at Windpark Kreekraksluis All but one of the 26 NedWind 500 kW turbines that make up the Windpark Kreekraksluis from 1995 are back online following the self-destruction of a single unit at the end of October.			Windpower Monthly Magazine, 01 February 2006	http://www.windpowermonthly.com/news/956363/Turbine-failure-Windpark-Kreekraksluis-investigation/?DCMP=ILC-SEARCH
20060213		No		Transport Fire		Houston, Tx	USA	GE vs Industrial Terminals. GE purchased turbine blades from Brazil. On Feb 13, 2006 the blades were delivered to the M/V BELUGA ENDEAVOUR in Santos Brazil for carriage to US. The vessel arrived in Houston and discharged the cargo to the IT Terminal. 12 hrs after discharge afire erupted that destroyed the blades. Claim $250,000.			Legal System Intelligence	
20060303.1	P	No		Environmental		Aragon Province	Spain	Oil Leak Spain with Photos			Safety of Wind Systems, M Ragheb, 3/12/2009	www.wind-watch.org/pix/displayimage.php?pos=-66
20060399		No		Structural Failure		PMLD wind site (Princeton Municipal Light Department), Mass.	United States	During a gusty weekend of high winds, one of the seven deactivated windmills waiting to be taken down collapsed. The top half of the turbine fell on a spare parts shed for the turbines. No injuries.			http://www.windaction.org/pictures/2288	
20060399.1		Yes		Subsea Cable		Cambois, Northumberland	UK	Rotor blades on the two turbines off Cambois, Northumberland have not turned since March 2006, when the seabed cable connecting them to the mainland snapped.			David Black National Wind Watch	http://www.wind-watch.org/news/2008/12/05/cambois-turbines-; http://www.wind-watch.org/news/2008/09/01/offshore-wind-farm-due-to-restart/
20060399.2		Yes		Subsea Cable		Blyth	UK	The installation has not produced electricity since March last year after the main power cable, which lies on the seabed and connects the turbines to a sub-station on the coast, was severed.				http://www.wind-watch.org/news/2007/07/05/armour-plan-to-save-wind-farm/

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20060424.1	P	No		Dropped Object		Montana	USA	10 KW turbine on a guyed 100 ft lattice tower fell. A cotter pin that formed part of the support failed causing a guy wire to fail and tower falling over..	0	0	Private HSE Communication	
20060599.1		No		Gearbox Failure		Oregon	USA	Generator bearings failed 11 months after tower was first brought online. The bearings were replaced, but failed five months later, then 11 months later (September 2007). After installing Electro Static Technology bearing protection, previous pattern has ceased.				http://www.powergenworldwide.com/index/display/articledisplay/355449/articles/power-engineering/volume-113/issue-3/departments/field-notes/bearing-failure-prevented-at-oregon-wind-farm.html
20060806		No		Transport	Fire	Beaumont, Tx	USA	BBC Chartering and M/V NORDOEN vs Vestas. Cargo was loaded in Grenaa Denmark on July 20 2007 and discharged in Beaumont on Aug 6, 2007. As welders were working to discharge the cargo, one of the V80 nacelle units caught fire and was damaged.			Legal System Intelligence	
20060815.1		No		Structural Failure		Hedingshan wind farm in East China's Zhejiang Province	China	Longyuan Electric Power's coastal 15.85 MW Hedingshan wind farm in East China's Zhejiang Province suffered heavy damage after being swept by Typhoon Saomai and winds of 67 m/s in mid August. Eight of the 28 turbines installed barely survived.			Windpower Monthly Magazine, 01 November 2006,	http://www.windpowermonthly.com/news/960650/Typhoon-damage-affects-Hedingshan-wind-farm-East-China/?DCMP=ILC-SEARCH
20060824		No		Transport		Portland, Oregon	USA	Vestas vs Wilhelm Trucking. On 24 Aug 2006 the tractor and trailer transporting the Nacelle from Vancouver Washington was involved in a single vehicle accident in a tunnel near Portland Oregon. The trailer tipped and the nacelle fell off the trailer sustaining significant damages. It was determined that the trailer was not sufficient for the load. Claim $800,000 plus.			Legal System Intelligence	
20060999.5	P	No		Blade Failure		Lake Wilson, Minnesota		Catastrophic equipment failure at wind facility in September and November 2006. Photo				http_www.windaction.org_pictures_14799.pdf

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20061001.1		No		Blade Failure		Jawe Konstrukt of Wesseling at a site near Herzogenrath	Germany	A Repower Systems 2 MW turbine, newly installed near Herzogenrath, lost a blade tip during high winds in early September requiring a main road to be closed for several hours "The fault appears to have been in the charger for the batteries operating the blade brakes and the sensor system that should have signalled that the batteries were not charged,"			Windpower Monthly Magazine, 01 October 2006,	http://www.windpowermonthly.com/news/951160/Repower-2-MW-wind-turbine-loses-blade-tip/?DCMP=ILC-SEARCH
20061006		Yes	Yes ORIG	Transport		Scroby Sands, Norfolk, England	UK	"Barge smashes into wind turbine". Vital maintenance work on Scroby Sands windfarm, off the Norfolk coast, has been interrupted after an accident involving the giant jack-up barge Sea Energy. While maneuvering off the Yarmouth coast on Friday, one of the vessel's huge legs, which provides a stable working platform by anchoring itself to the seabed, clipped a blade on one of the 30 turbines. Windfarm owner E.ON UK and the Health and Safety Executive immediately launched a full investigation into the incident that has put the turbine out of action. Company spokesman Jamee Majid said: "It was only a light touch but about 20cm was broken off the tip of the 40m blade.			October 6, 2006 by Stephen Pullinger in EDP24 ; http://new.edp24.co.uk/content/news/story.aspx?brand=EDPOnline&category=News&tBrand=edponline&tCategory=news&itemid=NOED05%20Oct%202006%2019%3A24%3A09%3A423	http://www.windaction.org/news/5585
20061007.1	P	No		Blade Failure		Brittany	France	Photo only				http www.windaction.org pictures 12310
20061116.1		No		Dropped Object		Locust Ridge	USA	Chain lifting hoist deposited excess chain in bag that could easily tip and pour the chain out onto personnel below: electric hoist system where the chain exited the collection bag, fell through the access door, struck and damaged a hydraulic pump being raised from the ground and then continued to fall, striking the wind turbine's lower tower entry door.			Legal System Intelligence	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20061127			Yes ORIG	Human injury		Scroby Sands, Norfolk, England	UK	Scroby Sands windfarm was shut down following electrocution of a worker. A spokesman for the East of England Ambulance Service said they were called to North Denes Road, Yarmouth, at 9.53am on Monday, November 27 after the 22-year-old engineer suffered an electric shock. He was taken to the James Paget University Hospital in Gorleston. The problem at Scroby is the latest setback to hit the £75m windfarm, which became one of the UK's first commercial offshore wind farms when it was built in 2004, but the government's first annual report painted a very different picture with the turbines generating only a fraction of the power they were meant to. The DTI report showed the wind farm was riddled with mechanical problems which lowered production.			Reported on December 9th by Norwich Evening News 24.	http://www.eveningnews24.co.uk/content/news/story.aspx?brand=ENOnline&category=News&tBrand=ENOnline&tCategory=news&itemid=NOED09%20Dec%202006%2011%3A40%3A08%3A107
20061201.1		No	Wind	Blade Failure		Kansas	United States	"A routine wind plant installation in America's heartland took an unnerving hit recently from a small tornado, which whipped through the construction site and damaged blades waiting for installation. The same airfoil properties designed to capture wind energy allowed the twister's 70 mile-per-hour (31 m/s) winds to scatter as many as ten blades around the site, including one that was moved as much as 55 metres and had to be replaced".			Windpower Monthly December 2006.	http://www.windpowermonthly.com/news/login/954963/
20061219.1		No		Dropped Object		Allegheny Ridge	USA	Chain lifting hoist deposited excess chain in bag that could easily tip and pour the chain out onto personnel below: incident occurred when QC Mgr tried to stop the chain falling and got injured in doing so.	1		Legal System Intelligence	
20061221.1		No		Crane		Lee/LaSalle County wind farm	USA	The accident occurred at a wind turbine site about five miles north of Mendota near West Brooklyn Road. Papiech said the crane was lifting a turbine off a truck when the boom folded over				http://craneaccidents.com/group/reports/2006/dec06.htm

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20069999.1		Yes		Injuries		Kentish Flats Offshore Windfarm, North of Herne Bay & Whitstable	UK	V90, 3MW Minor Injuries: 1) cut/bruised finger (lifting injury) 2) Black-eye (lifting injury); 3) carbon dust irritates workers eye after dismantling slipring.	4			www.berr.gov.uk/files/file41600.pdf
20069999.1		Yes		Crane Dropped Object		Kentish Flats Offshore Windfarm, North of Herne Bay & Whitstable	UK	V90, 3MW "2 episodes with items being lifted, falling down into the sea or onto the boat deck.				www.berr.gov.uk/files/file41600.pdf
20069999.2		Yes	No	Gearbox, Cable faults, cracked hub strut, yaw motor failure		North Hoyle	UK	Various major components failed throughout the reporting year.			North Hoyle Capital Grant Scheme for Offshore Wind Annual Report – 2006-7" BERR, UK.	
20069999.3		Yes	No	Gearbox		Kentish Flats	UK	12 out of 30 gearboxes needed to be replaced			Barrow Capital Grant Scheme for Offshore Wind Annual Report – 2006" BERR, UK.	
20069999.4		Yes	No	Constructi on Vessel		Orkney	UK	Octopus			Jack-up Database MAIB Report	
20069999.5		Yes	No	Generator Subsea Cable		Scroby Sands	UK	Failures on 3 outboard intermediate shaft bearings, 9 high speed shaft bearings and 8 generators. One of the transition joints connecting the submarine cable to land had to be replaced.			Scroby Sands Capital Grant Scheme for Offshore Wind Annual Report – 2006" BERR, UK.	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20069999.6		No		Structural failure		Cangnan Wind Farm	China	Super Typhoon Saomai almost destroyed the coastal Cangnan Wind Farm in August 2006, damaging 20 of its 28 turbines. "We may boldly develop offshore wind farms in coastal areas to the north of the Yangtze River estuary, considering the present technological levels. But we must take great care to develop offshore wind farms to the south of the Yangtze River estuary, because of the typhoons," says Wu Yundong, general manager of Zhejiang Huayi Wind Energy Development.			Windpower Monthly Magazine, 01 October 2009,	http://www.windpowermonthly.com/news/965674/China-Special---Offshore-Donghai-litmus-test-offshore-plan/?DCMP=ILC-SEARCH
20070101.1	P	No		Lightning	Fire	Meller Westendorf	Germany	New Year's (01.01.2007), the nacelle of a wind turbine. By lightning, the wind power plant was on fire. ...			www.kreisfeuerwehr-osnabrueck.de	
20070111.1	P	No		Structural failure		Higashidori, Aomori Prefecture	Japan	A 68 meter high wind power generator has fallen down from its base at Iwaya Wind Farm (part of 25 total operating). No record of high winds.				http://mdnmainichi-msn.co.jpnational/news/20070110p2a00m0na012000c.html
20070199		No	No	Blade Failure		Brandenberg	Germany	Rotor blades ripped off at a height of 100 meters landing in a grain field next to the road.			Ragheb M. Safety of Wind Systems, 3.12.2009	
20070199.1	P	No		Structural Failure			Germany	Failure near an Autobaun			Der Spiegel August 24,2007	http www.wind-watch. Der Spiegel Physical dangers of wind turbines pdf
20070199.2	P	No		Human Factor			Germany	Nosecone fell off reportedly - due to loose screw				http://www.bild.de/BTO/news/leser-reporter/artikel/2007/01/windrad/windrad-unfall.html
20070218.1	P	No		Inadequate management of change.		Amsterdam Terminal	Netherlands	Level 3 fire detection caused fire suppression system to activate. A 10m plume was observed rising from the nacelle. An incorrect software version was uploaded to the WTG Fire detection system, leading to automated activation when an alarm condition sounded. Cause inadequate Management of change.			Private Communication	
20070223		No		Transportation		Port	USA	Thomas Turner II vs Suzlon. On Feb 23 2007 Turner was injured when working helping load wind blades owned by Suzlon. One of the blades fell on him. Injuring his right leg, hip, pelvis etc. Costs etc in excess of $75000	1		Legal System Intelligence	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20070416.1	P	No		Blade Failure		Edom Hills, California	USA	700 lb Blade thrown 100 yards from turbine on weekend when location was not manned. More formal inspection of blades is required.			Private Communication	
20070499		Yes		Cable Exposed		Barrow	UK	Survey of the export cable identified some exposed sections of the export cable. Further work has been undertaken in May 2007 at exposed sections along the export cable in order to bury these sections. The collected data is now evaluated and the need for further work on the cable will be considered.			BERR Capital Grants Scheme Annual Report: Barrow Offshore Wind Farm 1st annual Report July 2006-June 2007	
20070499.2		Yes		Subsea Cable		Scroby Sands	UK	The wind farm has suffered a cable fault due to installation deficiencies and a lightning strike which destroyed a blade			Scroby Sands offshore windfarm report, prepared by E.ON UK and published by the DTI (now the Department for Business, Enterprise & Regulatory Reform),	www.berr.gov.uk/files/file46398.pdf; www.berr.gov.uk/files/file34791.pdf
20070499.3		Yes		Lightning		Scroby Sands	UK	The wind farm has suffered a cable fault due to installation deficiencies and a lightning strike which destroyed a blade			Scroby Sands offshore windfarm report, prepared by E.ON UK and published by the DTI (now the Department for Business, Enterprise & Regulatory Reform),	www.berr.gov.uk/files/file46398.pdf http://www.berr.gov.uk/files/file34791.pdf
20070508		No		Blade failure		Wahrenbrück	Germany	In the Lusatian Observations at 08.05.2007 was reported by a rotor blade fracture in Wahrenbrück. It was assumed that a tornado was responsible.				http://www.erlauholz.de/2009/01/unfalle-an-windkraftanlagen/
20070509.1		No		Blade failure		Ortsverbindungsstraße Wahrenbrück	Germany	One of the five wind turbines at the B 183 broke a rotor wing. Good 150 meters to 200 meters, the wing parts sailed across the street and set up scattered in a nearby cornfield.				http://www.lr-online.de/vermischtes/LR-Panorama;art1676,1631323
20070599.1	P	No		Fall from Height		Scotland	UK	Fall blamed on improper Safety Equipment – see Safety Alert issued by HSE				www.hse.gov.uk/falls/fixedrail011007.htm

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20070609.3		Yes	No	Transformer		Nysted Transformer	Netherlands	Late last month the 140 tonne transformer, supplied by Italian company Tironi, was ready to be shipped back to the Rødsand facility in Denmark from an ABB factory in Drammen, Norway, where it had been taken for repair			Windpower Monthly Magazine, 01 October 2007	http://www.windpowermonthly.com/news/959405/Transformer-its-back-sea/?DCMP=ILC-SEARCH
20070609.3		Yes	No	Transformer		Nysted Transformer	Netherlands	"The transformer of the Nysted offshore substation, for instance, experienced a significant failure in 2007, which led to a 4-1/2 month outage of the entire wind farms, see Andersen et al 2008			ISC Consulting Engineer's Brochure on the Nystad Offshore Wind Farm Transformer Platform www.windaction.org/news/11042 Windpower June 2007 by Torgny Moller	http://www.windaction.org/news/11042 http://www.isc.dk/Internet/ISCPub2.nsf/0/19e3b632f9968f4ec125729000330eb4/$FILE/ISC_Nysted_Transformer_Platform.pdf;
20070730		Yes	Yes ORIG	Human injury		Offshore	Holland	A worker was injured when a 60m high crane on an offshore work platform collapsed.			Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
20070730.1	P	Yes	Yes	Crane Collapse		IJmuiden, near Amsterdam.	Netherlands	The Manitowoc M1200 ringer crane on the jack up rig 'Jumping Jack', owned by wind turbine installation specialists A2Sea has collapsed, at the port of IJmuiden, near Amsterdam.	1			http://www.vertikal.net/en/news/story/4366/; http://home.kpn.nl/windsh/N-incident.html
20070799.3	P	No		Fire		Burgos	Spain	Fire on hill in Spain - movie				http://whenwindturbinesgobad.blogspot.com/2008/03/fire-burgos-spain-july-2007.html
20070822		No		Transport		Green River, Wyoming	USA	Suzlon and Evanston Insurance vs Fitzley Inc. On 22nd Aug 2007 a Fitzley truck with trailer had nacelle stowed. It flipped over during transit near Green River, Wyoming, on transit from Freeport, Texas completely destroying the nacelle.			Legal System Intelligence	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20070825.1	P	No	Yes	Structural failure		Oregon	USA	Maintenance Worker killed during runaway of turbine when brakes appear to have been bypassed. Mfct. Instructions not followed; SMS weak.	1	1	OSHA Report Ragheb M., Safety in Wind Systems 3.12.2009	
20070899.8		Yes	No	Installation Vessel		Robin Rigg	UK	Smit Lisa: Punch-through : hull dropped			Jack-up Database	
20070904		No		Blade Failure		Aachener Zeitung,	Germany	The Aachener Zeitung, 04.09.2007 (windmill wing dissolves - the cause is unclear) reports that are inexplicably broke one of the 45 meter long rotor blades struck the main mast, and then individual components up to 100 meters have been thrown away.				http://www.erlauholz.de/2009/01/unfalle-an-windkraftanlagen/
20070905		No		Gearbox		Ponnequin Wind Facility, Colorado	USA	Notice of Removal Filed: Repairs to Gearbox			Legal System Intelligence	
20070917		No		Transport		Beaumont, Tx	USA	Vestas Vs Swiss Re Underwriters. September 17, 2007 equipment including turbine blades and other wind equipment was damaged while being stored on land at the Port of Beaumont, Texas as a result of Hurricane Humberto. Claim $15 million.			Legal System Intelligence	
20070925			Yes ORIG	Miscellaneous		Various offshore locations	Various offshore locations	Vestas V90 "Vestas develops replacement for damaged offshore wind turbines". Danish wind turbine manufacturer Vestas Wind Systems AS is developing a new offshore wind turbine model following recent gear box problems at several of its currently operating turbines, Swedish magazine Ny Teknik said. 'We are working with a completely new model of the big offshore turbine V90 3 MW, but the details of the work are secret,' said Vestas spokesperson Peter Wenzel Kruse. At the same time, Vestas and Swedish subcontractor SKF AB are trying to determine the causes of the damage to gear boxes, which recently induced the Danish group to stop sales of the V90 3 MW windmill for offshore installations. The two companies are currently unsure of the reasons for the accidents, but Peter Wenzel Kruse said gear boxes are a problem for the entire wind power industry, because strains on the boxes increase as ever bigger windmills are built.			Reported by Thomson Financial, Copenhagen, 25 September 2007.	http://www.forbes.com/markets/feeds/afx/2007/09/25/afx4152963.html http://www.windaction.org/news/11929

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20071002.1		No		Human		Edom Hills, California	USA	480V Cable was cut by accident when repowering turbine; cable cutter had insulated handle but could have resulted in a fatality. More training and JSAs.			Private Communication	
20071008.1				Human		Milford Haven	UK	Construction Barge looses stability alongside dock, 1 person killed another injured	1	1	Ref HSE Report	http://news.bbc.co.uk/2/hi/uk_news/wales/7033356.stm
20071022		No		Transport		Green River, Wyoming	USA	Suzlon vs Fitzley Codan insured. On 22 Aug 2007 a Fitzley truck with trailer with Nacelle on board, flipped over near Green River, Wyoming. Suit in amount of $1,034,000.			Legal System Intelligence	
20071107.1		No		Crane		Smoky Hills Wind Farm	USA	A 320-foot crane used to construct turbines at the under-construction Smoky Hills Wind Farm fell Wednesday morning while it was being moved from one site to another				http://craneaccidents.com/group/reports/2007/nov07.htm
20071112.1		No		Transport		Columbia River	USA	5 sections of wind turbine lost overboard in transit due to bad weather on arrival at Columbia River mouth.			Legal System Intelligence	
20071199.1		N		Mechanical Issues		Lake Wilson, Minnesota	USA	Suzlon blade failure			Safety of Wind Systems, M Ragheb, 3/12/2009	
20071211.1		N		Gearbox		Lackawanna, N.Y.,	USA	Malfunctioning due to faulty gear sets “Over the summer, a gear-timing issue in the drive train’s secondary stage was detected in some of Clipper Windpower’s Liberty wind turbines at the Steel Winds site. The cause was found to be a supplier quality deficiency in the drive train attributable to the suppliers’ manufacturing process. Liberty 2.5 Megawatt Due to bad installation instructions leading to faulty gear timing, the gearbox required replacing on all eight turbines.			January 10, 2008 by Jennifer Zajac in SNL Financial	http://www.windaction.org/news/13518
20079999				N/A		N/A		The database of Germanischer Lloyd which at present contains the result of approx 2,000 assessed turbines, shows that approx. 3% of the defects were found in the main gearbox, approx. 23% in the generator, and approx. 11% in the main bearing. In total approx 2/3 of all defects are hence to be found in the main components of the d rive train. This evaluation is confirmed by the damage statistics of the insurance companies.			GL Guideline on Condition Monitoring	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20079999.1		Yes		Mechanical Failure		Kentish Flats	UK	Gearboxes in all 30 turbines on the Kentish Flats have been replaced with newer, improved parts			November 25, 2009 in BBC News	http://news.bbc.co.uk/2/hi/uk_news/england/kent/83
20079999.2		Yes		Subsea Cable		Scroby Sands	UK	Generating capacity was affected following a transition joint failure on one of the three export cables, causing the circuit to be taken out of service for repairs			Scroby Sands Offshore Wind Farm 3rd Annual Report 2007, Offshore Wind Capital Grants Scheme, Dept of Business Enterprise & Regulatory Reform, UK.	
20079999.4		Yes	No	Gearbox		Barrow	UK	30 generator gearboxes needed to be replaced			Barrow Capital Grant Scheme for Offshore Wind Annual Report – 2007" BERR, UK.	
20079999.5		Yes	No	Gearbox		Kentish Flats	UK	30 Generators needed to be replaced			Kentish Flats Grant Scheme for Offshore Wind Annual Report – 2007" BERR, UK.	
20079999.6		Yes	No	Lifting		Kentish Flats	UK	One of the more severe incidents occurred when on board 'Sea Energy'. During the mounting of a ballast block there was a misunderstanding between the operator and signalman (no radio was in use). The block was dropped some five meters away from three Vestas engineers working on the gangway. Radios are now to be used for all lifting operations and no personnel are allowed on deck or near the working area when lifts are underway. Another severe incident occurred during a gearbox change. Crane operations were being undertaken on the deck of the 'Sea Energy' when the boom out-rigger cylinder hit and damaged a blade on the WTG.			Kentish Flats Grant Scheme for Offshore Wind Annual Report – 2007" BERR, UK.	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20079999.7	P	No		Mechanical Issues				4 months after service, failure resulted in deep discharge of battery thus alarm system did not alarm, failure on orientation caused physical cracks in foundation and loss of blade.			Munich Re Report 1/2008	
20079999.9	P	No		Lightning		Twin Groves wind farm, Bloomington Illinois	USA	Fire from lightning even though it had lightning protection			Safety of Wind Systems, M Ragheb, 3/12/2009	
20080115.1		No		Theft		Dhule Windfarm	India	Thefts of internal copper cable from WTGs V33 and V02 and some damage to fencing. Intruders forced entry into the bases and after tripping machines cables were cut at 18m level and removed. Thieves were 2 groups of 25 people - more than the 2 security guards could cope with.			Private Communication	
20080121		Yes	Yes ORIG	Miscellaneous		Blyth, Northumberland, England	UK	"Repair plan for offshore windfarm" E.on's other off-shore windfarm at Blyth, Northumberland, is also awaiting repair after a sub-sea cable broke. ...			http://www.windaction.org/news/13711 Reported in BBC News on 21 January 2008	http://news.bbc.co.uk/1/hi/england/norfolk/7190082.stm
20080121		Yes	Yes ORIG	Miscellaneous		Scroby Sands, Norfolk, England	UK	"Repair plan for offshore windfarm" A cable that brings power ashore from an offshore windfarm has failed and needs to be replaced in the spring. E.on, the firm that owns Scroby Sands windfarm two kilometres off the Norfolk coast at Caister, said one of its three high-voltage cables had failed. This means that if the wind turbines are working at full capacity only 66% of the power can be brought ashore. E.on's other off-shore windfarm at Blyth, Northumberland, is also awaiting repair after a sub-sea cable broke. ...			http://www.windaction.org/news/13711 Reported in BBC News on 21 January 2008	http://news.bbc.co.uk/1/hi/england/norfolk/7190082.stm
20080121.1		Yes		Electrical Fault		Scroby Sands	UK	A worker was treated in hospital for burns caused by an electrical flash while working to repair the shore cables.	1		BBC News 21st Jan 2008	
20080127.1	P	No		Transportation		Cohocton	USA	Blade meets truck. Photo				www.windaction.org_pictures_17097.pdf

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20080202.1		Yes		Installation Vessel		Redcar	UK	A drilling rig Jakup carrying out test bores for a proposed wind farm at Redcar has been smashed off its legs and driven ashore by heavy seas, the RNLI said today. On the beach at Redcar.			The Northern Echo 2 Feb 2008	http://archive.thenortheernecho.co.uk/2008/2/2/241455.html
20080225		No		Collapse			Denmark	Hedegaard, is calling for an investigation to determine the cause of two violent wind turbine collapses in Denmark in the past week. Both of the windmills were produced by Vestas, and Hedegaard's request to the Energy Board comes after other breakdowns both here and abroad have been reported in the past two months."			Copenhagen Post (25.02.2008),	
20080225.1		No		Collapse			Denmark	• The inspection performed by Vestas on the broken bolts showed that they broke due to insufficient tension in some of the bolts [they had not been tightened well enough]. Over time, this resulted in metal fatigue and breakage, followed by a domino effect on the remaining bolts. • Vestas have stated that the insufficient tension could have been there since the turbine was originally erected, and it was regrettably never found at the annual checkups.				http://www.windaction.org/documents/21858
20080306.1	P	No		Fall from Heights		Edom Hills, California	USA	Contract employee at 12 ft height, fall protection was tied to a frame that was not secure. Another employee was below. Hard hat fell off before impact. Several other frames in the same field were welded to the tower.	1		Private Communication	
20080306.2	P	No		Lightning	Blade Failure		USA				Case Study of Lightning Damage to Wind Turbine Blade by Richard Kithil, Founder & CEO National Lightning Safety Institute (NLSI) www.lightningsafety.com 6/1/2008	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20080512.1	P & V	Yes	Yes ORIG	Fatal		Off US Delaware Coast	UK	Liftboat Russell W. Peterson damaged in storm, 1 person died, 1 person injured ; "One dead, one rescued as research vessel sinks off Rehoboth". One crewman died today after gale force winds pounded a specialized research ship that was launched in March to study Delaware's offshore wind power resources, forcing the Coast Guard to pull two crewmen from the sinking vessel. Coast Guard Petty Officer Nick Cangemi said one of the two crew members of the RV Russell W. Peterson did not have any vital signs when a helicopter arrived on the scene this morning. "We took both people to the hospital in Maryland, where the hospital declared one of the gentlemen deceased," Cangemi said. They were taken to Peninsula Regional Medical Center in Salisbury, MD. The ship was left adrift and ran aground at Bethany Beach.	1	1	Ref: By Ron MacArthur, ronm@capegazette.com	http://www.windaction.org/news/15798
20080515.1	P	No		Blade Failure			Netherlands	Photo - news report only			Newspaper Report	
20080518		No		Collision		West Creek near the Eagles Nest Airport, New Jersey	United States	In Saturday's crash near the Eagles Nest Airport, scientist Stephen Claussen, of Seattle, and plane-owner and pilot John Ambroult, 60, of Eastham, Mass., were killed. Two other scientists aboard the flight, Juan Carlos Salinas, 43, of Mexico City, and Jacalyn Brown, 28, of Pemberton, Burlington County, were seriously injured. "The Cessna 337 Skymaster they were on was hired by Geo-Marine, Inc., a Plano, Texas,-based environmental and engineering firm that was hired by the New Jersey Department of Environmental Protection to study the effects a planned off-shore wind farm would have on marine animals".	2	2	http://www.windaction.org/news/15962	http://www.wind-watch.org/news/2008/05/21/plane-crash-was second-fatal-accident-in-week-releated-to-wind-turbine-research/
20080599		No		Transportation		Sac County, Iowa	USA	Transporting Turbine Blades: While transporting turbine blades, the rear steering malfunctioned. The Semi ended up veering into a utility pole and damaged a near by restaurant. Flying debris and the felling of the utility pole caused an estimated $11,000. cars and a restaurant were damaged.			http://www.windaction.org/news/15624	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20080601		No		Blade failure		Windpark Tuitjenhorn in the province of Noord-Holland.	Netherlands	A 23 metre blade came off an eight-year-old V47 660 kW machine installed at Windpark Tuitjenhorn in the province of Noord-Holland. During the failure, which occurred on May 13 at 10 pm, a section of the blade landed on the nearby N245 road between the villages of Oudkarspel and Dirkshorn in the community of Harenkarspel			Windpower Monthly Magazine, 01 June 2008, 00:00am	http://www.windpowermonthly.com/news/953829/Blade-thrown-public-road/?DCMP=ILC-SEARCH
20080616		No		Blade failure		Ortsverbindungsstraße Wahrenbrück	Germany	Shortly after midnight, it must have crashed heavily yesterday, when) one of the five wind turbines at the B 183 to Ortsverbindungsstraße Wahrenbrück (Elbe-Elster broke a rotor wing. Gut 150 bis 200 Meter entfernt sind die Flügelteile über die Straße hinweg gesegelt und verstreut in einem benachbarten Getreidefeld aufgeschlagen. Good 150 meters to 200 meters, the wing parts sailed across the street and set up scattered in a nearby cornfield.				www.lr-online.de/panorama/LR-Panorama;art1676,1631323 Source: http://www.lr-online.de/panorama/LR-Panorama; art1676,1631323
20080623.1		No		Blade failure		Sheffield	UK	University of Sheffield - near Advanced Manufacturing Research Center				www.2uhb.com
20080630.1		Yes	No	Mechanical		Barrow	UK	Change 30 gearboxes; Change 30 generators; Change transformer in 1 turbine; Due to insufficient burial depth of cable additional work was carried out and when they still couldn't be buried to spec. they were covered with special mattresses. March 2008 the hub needed replacing due to some issues with the locking pins.			Barrow Offshore Wind Farm 2nd Annual Report July 2007-June 2008. DECC (Dept of Energy and Climate Change).	
20080714.1	P	No		Quality Improper Procedure		Brahamasagara	India	9 of the connecting bolts were in place during assembly of rotor blade and crane released; suddenly the rotor detached itself and fell.1 person on ground injured; Bolts failed; Employee turned the rotor to fit more bolts when not secure; Yoke bolts fitted incorrectly. Needs more training; more procedure; better language communication; more supervision.	1		Private Communication	
20080719.2	P	No		Blade failure		Lower-Weeze Wemb	Germany	The 32 meter long, several-ton piece of a wing of the wind turbines broke off and fell from 70 meters perpendicular to the floor.				http://www.wdr.de/themen/politik/nrw01/windkraft/080727.jhtml
20080727.1		No		Blade		Weeze	Germany	Blade broke off				http://www.wdr.de/themen/politik/nrw01/windkraft/080727.jhtml

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20080730.1	P	No		Fire		Buxtehude Hedendorf	Germany	The approximately 107-meter high wind turbine from the wind farm between Apensen and fundamental Oldendorf fell in the range of so-called "hub", in which the technical facilities are located, on fire.				www.polizeipresse.de/p_story.htx?firmaid=59461
20080802.1		No		Insufficient Training		Silver Star	USA	Subcontractor brushed against an exposed 120V Cable; Lack of thought; lack of LOTO understanding; person was not skilled with LOTO. No injury.			Private Communication	
20080924.1	P	No		Insufficient Training		Flat Ridge	USA	Crane Op. was preparing to lift a conex box when he two-blocked the crane damaging the aux. hoist. As it turned out no parts fell. The Op. then overrode controls and boomed down the crane causing it severe damage. He did not clear area before proceeding.			Private Communication	
20080926.1		No		Lightning			Germany	Fire on wind farm in Germany. Fireman watch it burn out due to lack of equipment to fight the fire.			Safety of Wind Systems, M Ragheb, 3/12/2009	
20081022.1	P	No		Blade Defect		Wyanet Illinois	USA	Suzlon blade shed. Started the recall of 1251 Suzlon blades. Flew 150 feet.			Safety of Wind Systems, M Ragheb, 3/12/2009	
20081028.1	P	Yes		Marine Tiedown			Mid Atlantic	Titan 1 Liftboat Lost while being transported on heavy lift vessel				Jackup Database
20081028.2	P	No		Abandoned		Palm Springs, Ca	USA	100 broken turbines are on the landscape - Photo				http_www.windaction.org_pictures_18606.pdf
20081099		No		Crane		Iowa	USA	Fines for deadly Worth County windfarm accident . A North Dakota based construction company is facing three proposed penalties following a deadly Iowa wind farm accident last October. ..."The employer did not ensure the all terrain fork truck operators were competent and capable of identifying existing and predictable hazards." IOSHA claims Wanzek "did not instruct each employee in the recognition and avoidance of unsafe conditions and the regulations".			December 30, 2008 in KIMT News 3	http://craneaccidents.com/group/reports/2008/nov08.htm

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20081113		Yes	Yes ORIG	Transport		Rhyl Flats offshore wind, North Wales	UK	"£50m windfarm barge sinks on way to North Wales" A barge worth £50 million toppled into the sea and sank as it was being towed to the site of an offshore North Wales windfarm. Work on the controversial Rhyl Flats windfarm will now be delayed as a result. The barge was carrying giant cranes set to carry out vital work at the windfarm when it was lost overboard and sank to the bottom of the Atlantic. There was reported to be no loss of life or injury to the crew during the incident at the end of October and the company say the barge is fully insured. Date is of news report.			http://www.windaction.org/news/18767 Reported by Daily Post on 13 November 2008	http://www.dailypost.co.uk/news/north-wales-news/2008/11/13/50m-windfarm-barge-sinks-on-way-to-north-wales-55578-22245339/
20081120.1		Yes		Gearbox		Nordzee Windpark	Netherlands	In the second half of 2007, a problem was detected in the wind turbine gearboxes. To prevent further damage and ensure continued production, these gearboxes were replaced by Vestas Wind Systems a/s, the manufacturer of the wind turbine generators. Meanwhile a modified type of gearbox has become available which will ultimately be retrofitted to every wind turbine.				http://www.noordzeewind.nl/index.php?url=news_read_more_64.html
20081123		Yes	Yes ORIG	Human injury		Robin Rigg offshore windfarm, Solway Firth, Scotland	UK	"Wind farm worker hurt" A windfarm worker hacked off the top of his finger in a horror accident on Sunday afternoon. The 45-year-old commercial marine surveyor was working on the Robin Rigg offshore wind farm in the Solway Firth when the accident happened. Kirkcudbright Lifeboat and Coastguard were called to the scene and rushed the Portsmouth man – and the tip of his finger in a bag of ice – to the mainland, where he was treated at Dumfries and Galloway Royal Infirmary.			Reported by the Dumfries and Galloway Standard on 26 November 2008	http://www.dgstandard.co.uk/dumfries-news/local-news-dumfries/local-news-dumfriesshire/2008/11/26/wind-farm-worker-hurt-51311-22338883/ http://www.wind-watch.org/news/2008/11/27/wind-farm-worker-hurt/
20081125.1		No		Crane		Winnebago, Iowa	USA	Crane tipped over; worker had to be rescued				http://craneaccidents.com/group/reports/2008/nov08.htm

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20081231.1		Yes		Gearboxes		Kentish Flats	UK	20 Gearboxes replaced and numerous other parts.			Offshore Wind Capital Grants Scheme 3rd Annual Report January 2008-Dec 2008 BERR.	
20089999		Yes	Yes ORIG	Fire		Offshore	Holland	No details of incident. Provision of analysis and advice on fire damaged components. Location likely to be of AREPA's work			AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
20089999		Yes	Yes ORIG	Release of gas		Lynn & Inner Dowsing Offshore Wind Farm	UK	No details of incident. Provision of analysis, advice and restoration of fire damaged components. Location likely to be of AREPA's work			AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
20089999.2		Yes		Subsea Cable		Blyth	UK	Blyth offshore wind farm has been out of action for months after the underwater power cable was damaged by the rocky conditions on the seabed. But owners E.ON say work to replace the cable from the two giant turbines is almost complete.				http://www.wind-watch.org/news/2008/09/01/offshore-wind-farm-due-to-restart/
20090130.1	P	Yes		Installation Vessel		Robin Rigg	UK	42 Wind farm workers rescued when UR 101 barge came adrift				http://www.ecofriendlymag.com/sustainable-transporation-and-alternative-fuel/wind-farm-workers-rescued; also www.Windenergyupdate.com
20090130.1	P	Yes	Yes ORIG	Miscellaneous		Robin Rigg, Irish Sea	UK	Offshore workers operating on a new UK wind farm development were forced to evacuate a construction barge in severe sea conditions after their vessel lost three anchor lines. 42 workers were rescued			Reported on 30 January 2009 in offshore247.com	http://www.offshore247.com/news/art.aspx?Id=12808#
20090202.1		Yes		Miscellaneous		Barrow (near Robin Rigg)	UK	Barge used with installation of wind farm smashes into dock after arrival from loosing moorings offshroe.			http://www.wind-watch.org/news/2009/02/05/icdumfries-barge-crew-safe-after-dramatic-rescue/	http://www.nwemail.co.uk/news/barrow/stricken-barge-hits-barrow-dock-1.507190?referrerPath=pictures/news_slideshow_archive

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20090214.1		Yes		Subsea Cable		Skegness	UK	Skegness wind turbine cable snaps £1m pm loss			National wind watch.org	http://www.wind-watch.org/news/2009/02/15/skegness-wind-turbine-cable-snaps-1m-pm-loss/
20090223.1	P	No		Ice Throw		Newburyport MA	USA	This turbine is 318 ft from a public rail trail and 350 ft from US Route 1, 800 ft from a residence.			www.windaction.org/videos/20143	http_www.windaction.org_pictures_20144.pdf
20090599		No		Gear box failure		East point, PEI	Canada	6 out of 10 turbines were shutdown due to gearbox breakdown. Strong winds make it difficult for repairs to commence.				http://www.gov.pe.ca/index.php3?number=news&lang=E&newsnumber=5699
20090810.1		No	Yes ORIG	Fire		Kent Hills wind farm New Brunswick	Canada				Telegraph -Journal	http://www.moorsydeactiongroup.org.uk/safety.html
20090917		Yes	Yes ORIG	Miscellaneous		Greater Gabbard offshore wind farm, England	UK	"Broken Wind". Plans for the world's biggest wind farm off Britain's coast have been blown off course - by faulty windmills built on the cheap in China. Serious welding faults were found in many of the structures shipped to a Dutch port. Thank goodness they were found before construction and operation.			Reported by The Sun on 17 September 2009 http://www.thesun.co.uk/sol/homepage/news/Green/2643141/Duff-turbines-eco-farm-blow.html	http://www.windaction.org/news/23163
20090917		No	Yes	Quality		Greater Gabbard	UK	Cracks in foundation piles found after transit from China – 65 Chinese welders allegedly brought in to repair under warranty			Private Communication	
20090922		No		Crane Collapse		First Wind Cohocton		Crane Collapse - no one hurt- no cause given			Article by Mary Perham Corning Leader Cohocton New York	www.windaction.org
20091001.1		No		Gearbox		East Point Wind Plant on Prince Edward Island, Canada,		All ten Vestas 3 MW turbines at the 30 MW are being fitted with new gearboxes for the second time in just over a year. The turbine manufacturer says the machines are now receiving an "improved validated version" of the gearbox that corrects a problem with the planet bearing.			Windpower Monthly Magazine, 01 October 2009, 00:00am	http://www.windpowermonthly.com/news/966003/Wind-business-Gearboxes-replaced-second-time/?DCMP=ILC-SEARCH

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20091103.1		Yes		Foundation		Nordzee Windpark	Netherlands	Earlier inspections showed that some minor clearance has arisen in the vertical direction between the foundation pier and the transition piece. In collaboration with Bouwcombinatie Egmond we worked out a repairs plan, which will now be rolled out. The foundation piers of three turbines will be filled up with concrete. This will form a solid basis and will prevent a further shifting				http://www.noordzeewind.nl/index.php?url=search_en.html%3Fqry%3Drepairs
20091120.1		Yes		Subsea Cable		Horns Rev 2	Denmark	Terminal Strips cause subsea cable outage for a month or so.			Copenhagen Post Nov 20, 2009	http://www.denmark.dk/en/servicemenu/News/BusinessNews/StillWindFarmCostingEnergyCompanyMillions.htm
20091122.1		Yes		Inadequate Tugs		Eemshaven	Germany	The platform built in Klaipeda, Latvia and fitted out in Belfast is a new build for the German offshore wind energy industry and on its delivery voyage from Belfast to Eemshaven in Germany, arrived in this area seeking shelter during the evening of Monday 19/10. It must have become obvious that the two small German tugs, Bugsier 9 and the Taucher O.Wulf 4, were not man enough for the job			Daily Collection of Maritime Press Clippings 20091122.	
20091129.1		No		Contract			New Zealand	Contract Dispute over Certification issues, fitness for purpose, and upgrades made to subsequent contracts				http://www.stuff.co.nz/business/market-data/3108494/Windflow-faces-1m-turbine-bill
20091201.1		No		Blade Failure		Falkenberg	Sweden	The first failure involved a Vestas 225 kW turbine, a model manufactured in large numbers in the early 1990s, at Falkenberg on the west coast. After becoming detached from the hub for reasons not known, the blade fell to the ground at the base of the tower. The second lost blade was from an 18-metre wind turbine from Liten Vindkraft, a little known Swedish make. It was installed in the centre of Malmo but collapsed a few hours after being turned on. A sister machine in Malmo, installed close to a school, has been stopped until the cause of the accident is known.			http://www.windaction.org/news/18767 Reported by Daily Post on 13 November 2008	http://www.windpowermonthly.com/news/970564/Europe-Flying-blades-investigated/?DCMP=ILC-SEARCH

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20091201.1		No		Blade Failure		Liten Vindkraft	Sweden	Blade failure from 2 machines in Sweden this month.			Windpower Monthly Magazine, 01 December 2009	http://www.windpowermonthly.com/news/970564/Europe-Flying-blades-investigated/?DCMP=ILC-SEARCH
20091202	P	No		Fire		Uelzen	Germany	Dec. 2, 2009 - A wind turbine burns in the German city of Uelzen. The fire on the 130 meter tall turbine caused €750,000 in damage and is believed to have been caused by a technical defect. - DPA			http://www.wind-watch.org/pix/displayimage.php?pos=-552	http://www.wind-watch.org/pix/
20091207.1		No		Lightning		Kumeyaay Wind project on the Campo Indian Reservation ; Calif.	USA	75 wind turbines damaged; witness saw explosive blue light before Campo-area wind farm went dark “All 75 blades from all 25 turbines were removed and only some of the FAA required lights are working,” Tisdale wrote. “There is speculation that the high winds flowing across the composite blades created an electrostatic discharge that then arced between turbines damaging the blades and the electrical system.”				http://www.wind-watch.org/news/2010/02/11/75-wind-turbines-damaged-witness-saw-explosive-blue-light-before-campo-area-wind-farm-went-dark/
20091227.1	P	No		Structural Failure		Fenner NY	USA	Tower collapsed with no storm; foundation failure; possible code issue, or quality issue				http://www.gouverneurtimes.com/local-news-stories/60-st-lawrence-news/9779-200-ft-wind turbine-collapses-in-upstate-ny.html
20091231.1		Yes		Gearboxes		Kentish Flats	UK	Gearboxes in all 30 turbines had to be replaced in 2006 and 2007, but just a year later 20 were changed again with another 10 due for replacement in 2010.				www.yourcanterbury.co.uk
20091231.1		Yes		Generator		Kentish Flats	UK	During 2008, 20 gearboxes were exchanged due to failures on bearings in the planetary gear stage. This upgrade will be applied to the remaining WTGs later. A total of 27 generator exchanges have been completed since 2007 due to the following faults: damage on internal rotor cable and rotor cable connection; Drive End/Non-Drive End shaft intolerance, and Grounding of bearings to avoid current passage. During 2008 only 2 very minor injuries			Kentish Flats 3rd Annual Report 2008, Offshore Wind Capital Grants Scheme, DECC.	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20099999.8	P	No		Blade Failure		Scansano	Italy	The blades of all ten turbines (2-MW Gamesa G90's) on Poggi Alto near Scansano, Italy, were repaired in the summer of 2009. This one did not survive the first storm. Photo by courtesy of Gail Mair.				http://www.wind-watch.org/pix/displayimage.php?pos=-539
20100113.1	P	No		Blade Failure		San Diego California	USA	The blades from the 25 turbines at the Kumeyaay Wind project at the Campo Indian Reservation were removed after a storm on Dec. 7 brought winds that topped 70 mph, causing extensive damage.			San Diego Tribune	http://www.signonsandiego.com/news/2010/jan/13/damaging-blow/
20100119.1	P	No		Blade Failure		Bartlett's Ocean View Farm, Nantucket, Mass.	USA	A 20-foot-plus piece of one of the blades snapped off and fell to the ground nearby. The wind turbine immediately shut down			nantucketindependent.com/news/2010-01-2	
20100221.1		NO		Environment		Johnsburg, Wisconsin	USA	At the We Energies Blue Sky/Green Field wind project near the Town of Johnsburg in Fond du Lac County, at least seven turbines appeared to be leaking oil as shown in the photo.				http://www.windaction.org/pictures/25752
20100299.1		No		Blade Failure		Union City	Indiana	Blade failed due to the "perfect storm", including damage from transport, low temperature, and Third, the material compatibility and internal bond adhesion between the tip brake mechanism and the blade structure was stretched beyond its limits due to the above factors			Winchester News	http://www.winchesternewsgazette.com/articles/2010/04/16/news/doc4bc8ad2a22331712862436.txt
20100308.1	P	No		Lifting		Hennickendorf in Brandenburg	Germany	Large turbine rotor dropped with a 1,200 tonne Liebherr LTM11200-9.1 erecting a large wind turbine. Reports sketchy. Local news stations say a violent and unexpected gust of wind caused the rotor to take-off pulling the crane's boom and Jib with it, causing it to collapse. The boom, jib and rotor with its blades came crashing to the ground.				www.windaction.org
20100314.1		No		Blade Failure		Marston Mills	USA	Two blades of a wind turbine were blown off during the strong nor'easter ravaging Cape Cod. According to spectators near the scene, two blades atop the approximately 60 foot wind turbine blew off around noon. A section of the blades could be seen on the ground approximately 100 feet from the wind turbine				http://www.windaction.org/pictures/26179

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
20100323.1	P	No		Blade Failiure		Glasgow	UK	Engineers at Whitelee wind farm, which is run by ScottishPower Renewables, were trying to work out why the blade came crashing down. They are looking into whether lightning could have struck the turbine or if it was caused by a mechanical problem.It sheared off and hit the ground in the early hours of Friday morning in blustery conditions.			The Daily Record, www.dailyrecord.co.uk 23 March 2010	http://www.wind-watch.org/news/2010/03/23/scots-wind-farm-shut-over-safety-fears-after-150ft-turbine-blade-falls-off/print/
20100407.1		Yes		Faulty Design			Denmark, Sweden, Netherlands	A construction flaw in the foundations of many sea-based wind turbines was not discovered by inspectors who approved the structures' operation One of the most common foundations for sea-based wind turbines has a critical flaw but was nonetheless approved by a Nordic certification company			April 7, 2010 in Copenhagen Post	http://www.windaction.org/news/26568
99999999		No		Faulty installation Lightning protection			Europe (?)	2 MW Turbine blade struck by lightning in seasonal weather. Shutdown procedures initiated, and the blade that was burning stopped at an upright position. Burning debris ignited a second fire in the nacelle. An investigation found improper installation of the lightning protection system. Nacelle and rotor blades total replacement; Upper tower had been destroyed. Damage costs: (time)150 days, (EUR) 2 million.			VdS 3523en	http://www.vds.de/VdS-Guidelines-English.688.0.html
99999999		No		Electrical	Bad connection			1 MW. The input contact to a low voltage power (control?) switch had a bad connection. Ohmic heating ignited "combustible material" in the switchgear cabinet. Fuses did not respond. Due to the boxes being placed together, the control, inverter and switchgear cabinets were a complete loss. Nacelle chasis did not ignite due to non combustible construction. Damages = EUR 500,000			VdS 3523en	http://www.vds.de/VdS-Guidelines-English.688.0.html
99999999		No		Ice Throw				1.8 MW, Vestas V90 No injuries, but ice throw landing in domestic and industrial areas sparked media attention.				
99999999		No		Environmental				While lowing a hoist bag (tool bag), the bag fell into the water due to either karabiner or the handles of the bag.				

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
99999999				Electrical				The electrical circuitry did not take into account the possibility of resonance. This damaged the capacitors and caused their containers to burst. Proper failsafe equipment were not installed.				
99999999.11		Yes		Foundation		One Example East Coast Ireland	Ireland	Example of Sand mobility			Sarah Wootton, Robin Comrie, Setech Ltd., A Risk Based Approach to Cable Installation for Offshore Wind Farms, Technical Paper.	
99999999.12	P	No		Generator Failure	Fire			Slip ring fan broke: fan impeller caused sparks. 1.5 MW Nacelle 'burn out'. Slip ring fan (commutator) broke. Arcing from the fan set a filter pad on fire initiating the burn. Damage costs: 800k EUR			VdS 3523en	http://www.vds.de/VdS-Guidelines-English.688.0.html
99999999.13		Yes		Collision		Horns Rev	Denmark	“Accidents can still happen though. For instance a ship at the Horns Rev wind farm tore the heavy power cable in a row of wind turbines with its anchor. The ensuing repairs cost much more than a comparable repair job onshore.”			Re: Renewable Energies	http://www.munichre.com/publications/302-04062_en.pdf
99999999.14	P	No		Fire	Broken Component			Due to mechanical/electrical problems with the pitch system the turbine went overspeed. Oil from a broken component was ignited when the oil hit the disk brake which due to overspeed was activated.			Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	
99999999.15	P	No		Overspeed	Pitch System			Due to problems with the control system of the pitch system the turbine went overspeed			Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	
99999999.16	P	No		Structural Failure	Human			Due to human interference with the control system of the pitch system the turbine went overspeed. During this one of the blades hit the tower and the whole nacelle broke loose and fell to the ground. (Possible Jan 2007).			Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
99999999.17	P	No		Various		Various		Various Examples Gearbox, Bearing & Gearwheel Damages			Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	
99999999.18	P	No		Various		Various		Various Examples Electrical components. Generator, transformer, power panels.			Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	
99999999.19		No		Fire				A fault occurring at the time of installation, made by the contractor who erected the turbine".			Ref: IMIA Report WGP 26 (2002) www.imia.com	
99999999.2	P	No		Lightning Damage				Examples of results on Blades			Wind Blade Issues and Solutions, Presentation Gary Kanaby, Knight and Carver, Wind Update Conference on Maintenance, Dallas, 2008.	
99999999.21	P	Yes		Secondary Loading			Denmark	The appurtenances such as the boat landing being damaged or J-Tubes by attending boats believed to be at Horns Rev. this structure was uplifted by waves			Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	
99999999.22	P	No		Typhoon		NorthWind, Bangui Bay	Philippines	Survived two typhoons but with damage to cabling (flooding)				www.windpower.org/downloads/363/ott_extremewindsinnwpasific.pdf
99999999.23	P	No		Transportation			USA	Transportation accident photo			Safety of Wind Systems, M Ragheb, 3/12/2009	
99999999.25		No		Lightning		Honshu	Japan	At least 55 machines had blades destroyed by lightning.				http://www.windaction.org – wind turbines to be made of tougher stuff

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
99999999.28	P	No		Blade failure		Unknown	Germany	No Information other than Photo				http://www.mobypicture.com/user/Masselink/view/240802
99999999.3	P	No		Lightning			USA	Damage Examples			National Lightning Safety Institute by Richard Kithil, president & CEO in September 2007..	http://www.lightningsafety.com/nlsi_lhm/wind1.html
99999999.34	P	No		Enviromental ; Structural Crack		Rheidol Wind Farm Wales	UK	Oil leak and structural stress, Rheidol wind farm, Wales				www.wind-watch.org/pix/displayimage.php?pos=-40
99999999.35	P	No		Fire		Tuettendorf	Germany	Photo only				www.rommersheim-gegenwind.de/unfalle.htm
99999999.36	P	No		Blade		Minnesota	USA	Blade destroyed by hitting tower - NW Minnesota				www.wind-watch.org/pix/displayimage.php?pos=-132
99999999.37	P	No		Fire				Photo only			Wind and Fire, Renewable Energy World, Sept-Oct 2004	
99999999.38	P	No		Unknown				Michael Melsheimer presentation turbine and blade destroyed			Wind Energy O&M Conf. 11/09 London	
99999999.39	P	No		Unknown				Michael Melsheimer presentation turbine and blade destroyed			Wind Energy O&M Conf. 11/09 London	
99999999.4	P	No		Lightning		Southern Minnesota	USA	Xcel energy: Destroyed Nacelle and blades.			Safety of Wind Systems, M Ragheb, 3/12/2009	
99999999.41	P	No		Wear and Tear				Michael Melsheimer presentation crack in blade			Wind Energy O&M Conf. 11/09 London	
99999999.42	P	No		Wear and Tear				Michael Melsheimer presentation blade edge cracks			Wind Energy O&M Conf. 11/09 London	
99999999.43	P	No		Wear and Tear				Michael Melsheimer presentation damaged blade.			Wind Energy O&M Conf. 11/09 London	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
99999999.44	P	No		Wear and Tear				Michael Melsheimer presentation Destroyed blade.			Wind Energy O&M Conf. 11/09 London	
99999999.45	P	No		Blade failure				SGS Example on website sgs.com of damage to blade - possible delamination			www.sgs.com	
99999999.47	P	No		Delamination		Utgrunden	Sweden	Example of delamination.			www.sgs.com	
99999999.48	P	No		Structural failure				Example of overspeed with tower collapsed.			www.sgs.com	
99999999.49	P	No		Structural Failure		Unknown		Photo of wind tower collapsed shown by David Roach and day 2 of Reliability Workshop Sandia National Lab 2009.			Reliability Workshop Sandia National Lab 2009.	
99999999.5	P	No		Fire	Electrical			Input contact to low-voltage switch gear sparked			VdS 3523en: 2008-07(01)	
99999999.51	P	No		Dropped Object			Unknown	Photo from Allianz describing human issue with flawed cable in what appears to be lifting accident on a ring generator			Navigating Wind Risks by Wolfram Haller , Safety & Technology alianz Global Risk Report 2004.	
99999999.52	P	No		Blade			Unknown	Photo of Wind tower collapse due to NDT flaw in Blade			A Review of NDT techniques for wind farms, M.A. Grewry and G A Georgiou presented at NDT 2006, Stratford-on-Avon, Sept 2006.	www.ndt.net/search/docs.php3?id=4550
99999999.6	P	No		Bearing Damage		Unknown	Denmark	Bearing Damage Photos			Remote Condition Monitoring of Vestas Turbines, Jacob Juhl Christensen Vestas, Carsten Andersson Bruel & Kjaer Vibro, Marseille EWEC 2009 Paper	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
99999999.7		No		Lightning			Japan	Data collected from one winter season in Japan alone reveals losses of horrifying proportions. In just one season, and just one area of Honshu, at least 55 machines had blades destroyed by lightning. The total estimates [that] one year loss for those machines exceeded $5.5 million, and the cost of prevention is approximately one half that value'			Skioka S., Yamamoto K., Minowa M., Yokoyama S., Damages in Japanese Wind Turbine Systems due to Winter Lightning, IX International Symposium on Lightning Protection, Foz do Ignacu, Brazil November 2007.; Wind and Fire, Renewable Energy World, Sept-Oct 2004.	http://ws9.iee.usp.br/sipdax/papersix/sessao04/4.5.pdf
99999999.8	P	No		Fire				Photos only			www.firetrace.com	
99999999.9	P	Yes		Subsea Cable Kink							Offshore Wind-The Importance of Insurance, Truels Kjer, Codan-RsA Group, Eye for Energy	
99999999.9	P	Yes		Subsea Cable				Kink in Subsea Cable and caution on handling			John Foreman Presentation BWEA Wave and Tidal Supply Chain Seminar 2009	http://www.bwea.com/marine/supply_chain_seminar2009.htm
UK HSE UNDATED Location: UK possible duplication		No		Fall from Heights		Unknown		IP entered the blade and started to slide in an uncontrolled manner downwards until his right foot caught a rail resulting in fractures to his ankle foot and heel			Private Communication	
UK HSE UNDATED Location: UK possible duplication		No		Lifting		Unknown		IP suffered back pain whilst lifting a bracket approx 70kg in weight			Private Communication	

Case # Date yyyymmdd	P or V	Off-shore	CWIF	Cause 1	Cause 2	Location	Country	Details	Inj	Death	Source	Web Reference
UK HSE UNDATED Location: UK possible duplication		No		Trip		Unknown		Whilst coming out of the bottom tower door on the Wind Turbine IP slipped off bottom step and lost his footing. IP hurt his knees and lower back.			Private Communication	
UK HSE UNDATED Location: UK possible duplication		No		Structural Failure		Unknown		Turbine (Vestas V47, 660 kW) collapsed in high winds - no injuries to workers or public. Lock nut failure in blade pitch mechanism along with control system response to the failure resulted in blades over-speeding and the tower collapsing.			Private Communication	
UK HSE UNDATED Location: UK possible duplication		No		Structural Failure		Unknown		Collapse of 20-year old Vestas turbine (V25, 220kW) - no injuries to workers or public. Failure in joint between the base and centre tower sections.			Private Communication	
UK HSE UNDATED Location: UK possible duplication		No		Transportation		Unknown		Fatality to a worker arising from a workplace transport incident (maneuvering lorry collided with worker).			Private Communication	
UK HSE UNDATED Location: UK possible duplication		No		Lifting		Unknown		During lifting of a monopile upending the bucket lugs came loose of the frame which resulted in the bucket and monopile turning out of the upending frame and coming to rest on the deck of the vessel			Private Communication	

APPENDIX B2: Photo Collection from Database

- ***35 to a Page for easy selection***

Section following gives 6 to a page for clearer viewing


19990999.1.bmp


19991203.1.jpg


19991203.1a.jpg


19991212.1a.bmp


19991212.1b.bmp


19991212.1c.bmp


19991212.1d.bmp


20000210.1.bmp

20000210.2.bmp


20020128.1.bmp

20020128.1a.bmp


20020128.1c.jpg


20020310.1.bmp


20020310.1a.bmp

20020909.1.bmp


20021299.1.bmp

20030406.1.bmp

20030911.1.bmp

20030911.1a.bmp


20030911.1b.bmp

20039999.2.bmp


20039999.3.bmp


20039999.7.bmp


20040101.1.jpg


20040129.1.bmp


20040799.1.bmp

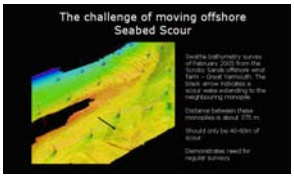

20040799.2.bmp


20049999.2.bmp


20050516.1.JPG


20050703.1.jpg


20050827.1b.jpg



20059999.1.bmp


20060303.1.jpg


20060424.1.bmp


20060999.5.jpg


20061007.1.bmp


20069999.4.bmp

20069999.4a.bmp


20070101.1.bmp


20070111.1.bmp


20070111.1a.bmp


20070111.1b.bmp


20070111.1c.jpg


20070199.2.bmp


20070199.2a.jpg


20070218.1.bmp


20070416.1.bmp


20070599.1.bmp


20070730.1.bmp

20070799.3.bmp


20070799.3a.bmp


20070825.1.jpg


20070825.1a.jpg


20070899.8.bmp


20079999.7.bmp

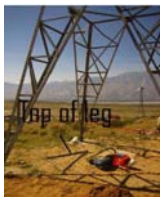
20079999.7.jpg


20079999.9.bmp


20080127.1.bmp


20080222.1.JPG


20080222.1.THM



20080306.1.bmp


20080306.2.bmp


20080306.2a.bmp


20080306.2c.bmp


20080512.1.bmp


20080512.1.jpg


20080512.1a.jpg

20080515.1.jpg


20080623.jpg


20080714.1.bmp

20080719.2.bmp

20080730.1.jpg

20080924.1.bmp

20080926.1.bmp

20080926.1a.bmp

20081022.1.jpg

20081028.1.jpg

20081028.2.jpg

20081028.2a.jpg

20090130.1.bmp

20090202.1.jpg

20090223.1.bmp

20091122.1.bmp

20091227.1.jpg

20091227.1a.jpg

20091227.1b.jpg

20091227.1c.jpg

20091227.1d.jpg

20091227.1e.jpg

20099999.8.jpg

20100113.1.bmp

20100119.1.jpg

20100201.1.jpg

20100308.1.jpg

20100308.1A.jpg

20100314.1.jpg

99999999.1.bmp

99999999.1a.bmp

99999999.2.bmp

99999999.2d.bmp

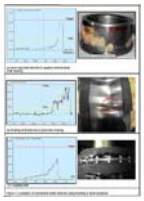
99999999.3.bmp

99999999.3a.bmp

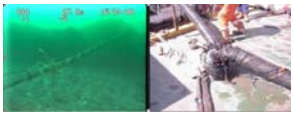
99999999.3b.bmp

99999999.4.bmp

99999999.5.bmp


99999999.6.bmp


99999999.8.bmp


99999999.9.bmp


99999999.12.bmp


99999999.14.bmp


99999999.15.bmp

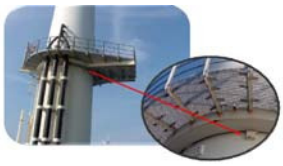

99999999.16.bmp


99999999.16a.bmp


99999999.17.bmp


99999999.17a.bmp


99999999.18.bmp


99999999.21.bmp


99999999.22.bmp


99999999.23.bmp


99999999.24.bmp


99999999.28.bmp


99999999.34.jpg


99999999.35.jpg


99999999.36.jpg


99999999.37.bmp


99999999.38.jpg


99999999.39.jpg


99999999.41.jpg


99999999.42.jpg


99999999.43.jpg


99999999.44.jpg


99999999.45.png


99999999.47.bmp

99999999.48.jpg


99999999.49.bmp


99999999.51.bmp


99999999.52.bmp


finale.jpg


hohenzell-oelverlust05.jpg


wuennen2.jpg

- ***6 to a Page for clearer viewing***

19990999.1.bmp

19991203.1.jpg

19991203.1a.jpg

19991212.1a.bmp

19991212.1b.bmp

19991212.1c.bmp

19991212.1d.bmp

20000210.1.bmp

February 10, 2000: Tower Collapse
Enercon E 32, 300 kW
Year of construction: 1992

Location: Asel in the district of Wittmund / Lower Saxony

20000210.2.bmp

Fig. 18: Structural collapse of a wind turbine in 2002 in a storm. Source: Der Spiegel, DPA.

20020128.1.bmp

Trümmer Arbeiter sammeln die Trümmer einer aus 50 Metern abgestürzten Gondel ein. Die Windkraftanlage steht bei Husum

20020128.1a.bmp

20020128.1c.jpg

20020310.1.bmp

20020310.1a.bmp

20020909.1.bmp

20021299.1.bmp

Crash of nacelle in Siebenlehn, April 6, 2003

20030406.1.bmp

20030911.1.bmp

20030911.1a.bmp

20030911.1b.bmp

20039999.2.bmp

20039999.3.bmp

20039999.7.bmp

20040101.1.jpg

20040129.1.bmp

20040799.1.bmp

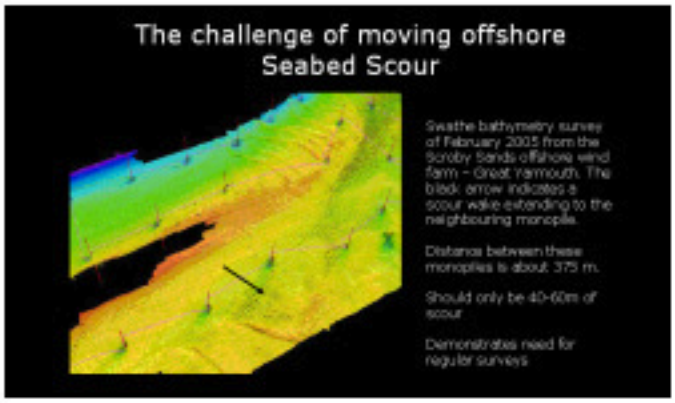
20040799.2.bmp

20049999.2.bmp

20050516.1.JPG

20050703.1.jpg

20050827.1b.jpg



20059999.1.bmp

20060303.1.jpg

20060424.1.bmp

20060999.5.jpg

20061007.1.bmp

20069999.4.bmp

20069999.4a.bmp

20070101.1.bmp

20070111.1.bmp

20070111.1a.bmp

20070111.1b.bmp

20070111.1c.jpg

20070199.2.bmp

20070199.2a.jpg

20070218.1.bmp

20070416.1.bmp

20070599.1.bmp

20070730.1.bmp

20070799.3.bmp

20070799.3a.bmp

20070825.1.jpg

20070825.1a.jpg

20070899.8.bmp

20079999.7.bmp

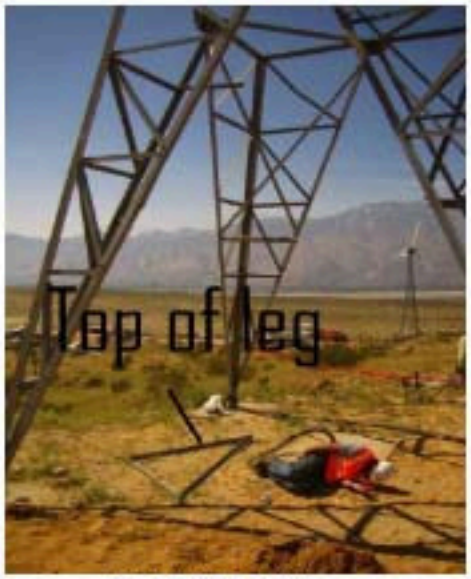
Cracks in the concrete left no alternative but to remove the foundations and rebuild them.

20079999.7.jpg

20079999.9.bmp

20080127.1.bmp

20080222.1.JPG



20080306.1.bmp

20080306.2.bmp

Figure 2: Damaged blade showing internal spars and lightning conductors

20080306.2a.bmp

Figure 3: Removal of damaged blade root by crane

20080306.2c.bmp

20080512.1.bmp

20080512.1.jpg

20080512.1a.jpg

20080515.1.jpg

20080623.jpg

20080714.1.bmp

20080719.2.bmp

20080730.1.jpg

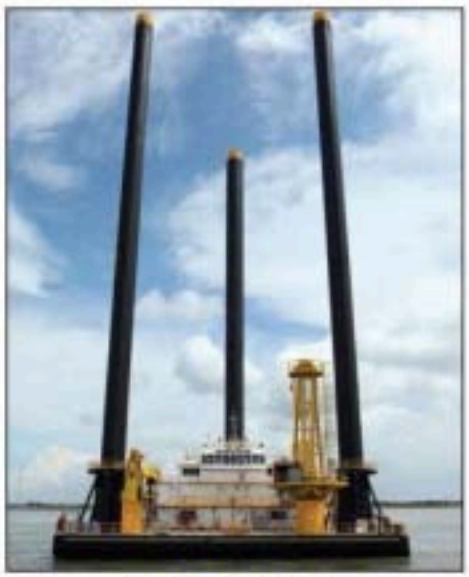
20080924.1.bmp

20080926.1.bmp

Fig. 20: Debris falling from burning wind turbine, Germany, 2008.

20080926.1a.bmp

20081022.1.jpg



20081028.1.jpg

20081028.2.jpg

20081028.2a.jpg

20090130.1.bmp

20090202.1.jpg

20090223.1.bmp

20091122.1.bmp

20091227.1.jpg

20091227.1a.jpg

20091227.1b.jpg

20091227.1c.jpg

20091227.1d.jpg

20091227.1e.jpg

20099999.8.jpg

20100113.1.bmp

20100119.1.jpg

20100201.1.jpg

20100308.1.jpg

20100308.1A.jpg

20100314.1.jpg

99999999.1.bmp

99999999.12.bmp

99999999.14.bmp

99999999.15.bmp

99999999.16.bmp

99999999.16a.bmp

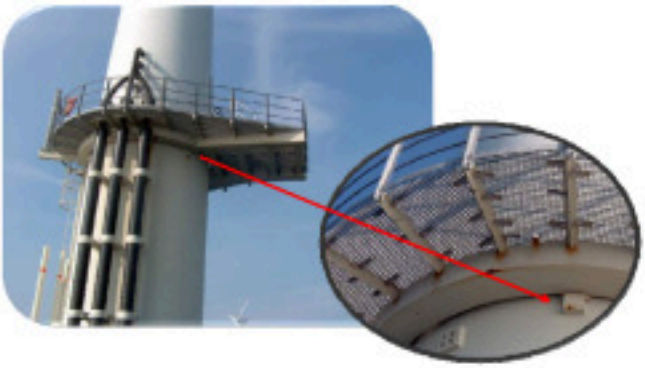
99999999.17.bmp

99999999.17a.bmp

99999999.18.bmp

99999999.1a.bmp

99999999.2.bmp

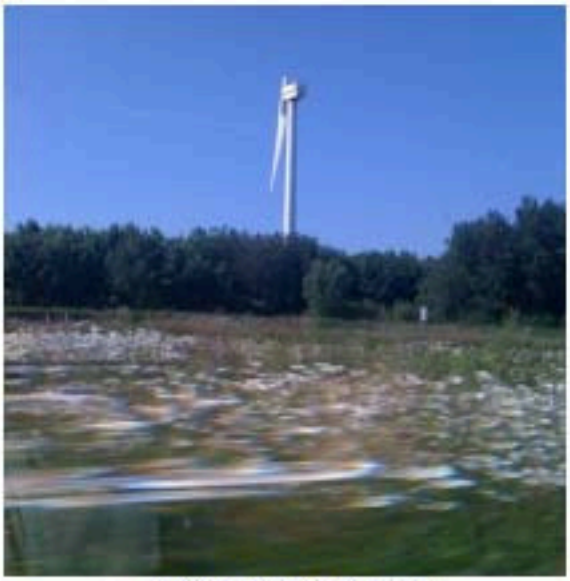


99999999.21.bmp

99999999.22.bmp

99999999.23.bmp

99999999.24.bmp



99999999.28.bmp

99999999.2d.bmp

Figure 1: Characteristic lightning signature to blade tip

99999999.3.bmp

99999999.34.jpg

99999999.35.jpg

99999999.36.jpg

Fig. 7: Lightning strike damage on a wind turbine operated by Xcel Energy in southern Minnesota resulted in destruction of the nacelle and the rotor blades.

99999999.37.bmp

99999999.38.jpg

99999999.39.jpg

Figure 2: Damaged blade showing internal spars and lightning conductors

99999999.3a.bmp

Figure J: Removal of damaged blade root by crane

99999999.3b.bmp

99999999.4.bmp

99999999.41.jpg

99999999.42.jpg

99999999.43.jpg

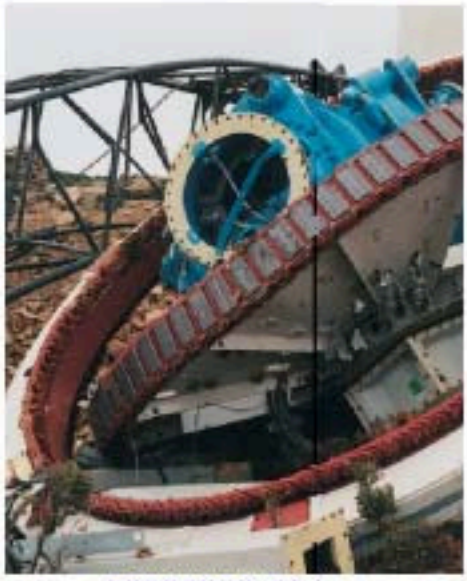
99999999.44.jpg

99999999.47.bmp

99999999.48.jpg

99999999.49.bmp

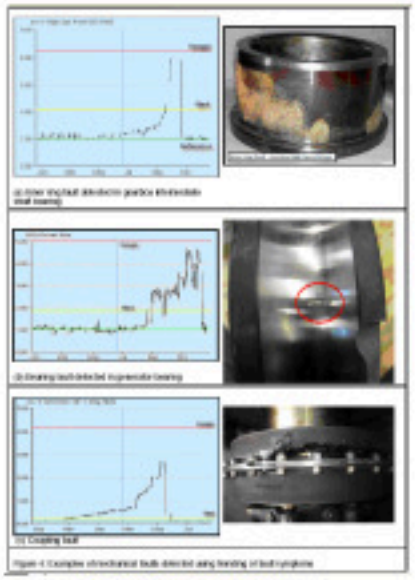
99999999.5.bmp



99999999.51.bmp

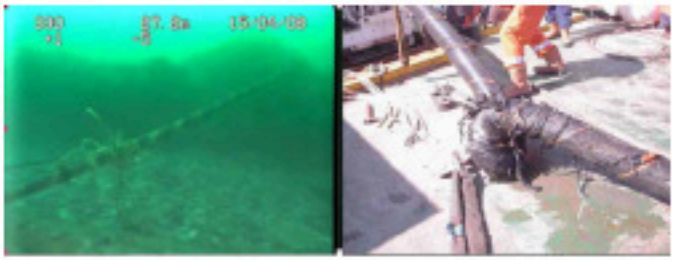
Figure 5. The loss of the turbine due to rotor bearing flaws

99999999.52.bmp



99999999.6.bmp

99999999.8.bmp



99999999.9.bmp

finale.jpg

hohenzell-oelverlust05.jpg

wuennen2.jpg

APPENDIX C1:

DATABASE COMPILED BY CAITHNESS WINDFARM INFORMATION FORUM

(CWIF): www.caithnesswindfarms.co.uk

WIND TURBINE ACCIDENT COMPILATION

Last updated at 12/31/2009 Compiled by CWIF

	Accident type	Case	Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
1	Fatal	19759999	1975	Choteau, near Conrad, MT	USA	2kw	Tim McCartney, fall from tower while removing small turbine. Body found near tower.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
2	Fatal	19811230	12/30/1981	Boulevard, CA	USA	40kw	Terry Mehrkam, atop nacelle, run-away rotor, no lanyard, fell from tower.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
3	Fatal	19829999	1982	Bushland, TX	USA	40kw	Pat Acker, 28, rebar cage for foundation came in contact with overhead power lines, electrocuted.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
4	Fatal	19829999	1982		Denmark	50kw	Jens Erik Madsen, during servicing of controller, electrocuted.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
5	Fatal	19839999	1983	Palm Springs, CA	USA	500kw	Eric Wright on experimental VAWT - tower collapsed while he was on it.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
6	Fatal	19849999	1984	Altamont Pass, CA	USA	65kw	J.A. Doucette, unloading towers from a truck, towers rolled off truck, crushing him.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
7	Fatal	19849999	1984	Palm Springs, CA	USA	80kw	Art Gomez, servicing Dynergy crane	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
8	Fatal	19849999	1984	Iowa	USA	Jacobs 10kw	Ugene Stallhut, ground crew, driving tractor as tow vehicle, tractor flipped over crushing him	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
9	Fatal	19899999	1989	Palm Springs, CA	USA	65kw	John Donnelly, atop nacelle, servicing Nordtank nacelle, no brake, lanyard caught on main shaft protrusion, death attributed to "multiple amputations" as he was dragged into the machinery.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
10	Fatal	19909999	1990		Holland	100kw	Dick Hozeman, atop nacelle, entered Polenko nacelle in storm, no brake, caught on spinning shaft.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
11	Fatal	19909999	1990	Island of Lolland	Denmark	400kw	Leif Thomsen, & Kaj Vadstrup, both killed servicing rotor, no locking pin on rotor, brake released accidentally, rotor began moving catching man basket & knocking it to the ground, third man clung to tower until rescued.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
12	Fatal	19919999	1991	Tehachapi, CA	USA	90kw	Thomas Swan, crane operator, travelling, locking pin failed, boom swung downhill into 66 kV power line, electructing him.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
13	Fatal	19919999	1991		Australia	Farm windmill	A 16 year old boy died of asphyxiation in a windmill accident on his family's farm. Apparently he climbed the windmill to retrieve a broken coupling, and in doing so he was caught by the rotating shaft, and strangled by his own clothing. His mother found him with his arms above his head and his clothing twisted up around his neck. His skivvy was twisted very tightly around the windmill shaft. His mother desperately tried to untangle him, or to lift him, but she was unable to do so. Despite her frantic efforts, she was aware that her son was already dead when she found him. The 1991 date is uncertain but hinted at by a pro-wind group.	Windmills sourced material by Farmsafe - a compilation of material sourced from range of websites (as identified within this document) Farmsafe WA Alliance 31/5/04 following an enquiry concerning sending workers out to maintain windmills.	http://www.farmsafewa.org/downloads/Windmills%20sourced%20material%20by%20Farmsafe.pdf
14	Fatal	19919999	1991		Australia	7m high farm windmill	A farmer died after falling from a windmill while attempting to repair its tail section. The top of the windmill was approximately seven metres from the ground and the tail section of the windmill was broken and hanging down. The fan portion was not turning and several blades on the fan were missing. There was a steel ladder, constructed on one side of the windmill, which extended from the ground to the platform (five metres above the ground).	Farm-Related Fatalities in Australia, 1989-1992. Australian Centre for Agricultural Health and Safety and Rural Industries Research and Development Corporation. ISBN 1 87649196 5	http://www.rirdc.gov.au/reports/HCC/00-70.pdf

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
15	Human injury	19920399		Mar-92	California	USA	Fayette turbine	Case Brenda Behrens (Plaintiff) vs Fayette Manufacturing Company Inc (defendants). C009749, Court of appeal, Third District, CA, March 31st 1992. Plaintiff worked for Fayette as a turbine technician. As part of her job she inspected, maintained, and performed repairs on wind turbines, windmills [4 Cal.App.4th 1570] used to generate electricity. She was injured on the job when she got her hand caught between the yaw pinion and the yaw gear of the wind turbine. At the time of the accident she was in the process of attempting to lock-off a wind turbine so it could be repaired. She climbed the tower of the wind turbine and entered the work cage; seeing the yaw motor pivoting towards her and fearing it would strike her legs, she swung her legs out of the way and pushed off with her right hand. In so doing, her hand was caught in the yaw gear. The turbine had broken it's mooring bolts.	Case Brenda Behrens (Plaintiff) vs Fayette Manufacturing Company Inc (defendants). C009749, Court of appeal, Third District, CA, March 31st 1992. Behrens v. Fayette Manufacturing Co., 7 Cal.Rptr.2d 264, 4 Cal.App.4th 1567 (Cal. App. 3 Dist., 1992)	
16	Blade failure	19929999		1992	Delabole, Cornwall, England	UK	Vestas 400kw	Blades damaged by lightning two weeks after opening	"Accidents", D Krämer, BLS, Dec. 2000.	http://www.bradworthy.com/user/nonIEbrowser/200103/local wind farm.html
17	Fatal	19929999		1992	Palm Springs, CA	USA	65kw	Richard Zawlocki, descending tower without lanyard, without fall restraint system in place, lanyard found holding nacelle cover open, found at base of tower, fell to death.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
18	Environmental	19929999.3		1992	FloWind site, Tehachapi Pass, California	USA	Darrieus turbines	Accelerated, human-induced erosion caused by rain runoff from service roads and wind turbine pads in the Tehachapi Pass, CA. The site is now owned by Florida Power & Light and the eggbeater or Darrieus turbines have since been removed and several erosion control practices instituted. While these practices have reduced erosion in the gullies shown, new gullies have formed elsewhere along the ridge, hence erosion continues.	"Erosion Gullies in the Tehachapi Pass: An Example of Improper Wind Development" - article by Paul Gipe with photos. Originally written in 1996, the article has recently (2005) been brought up to date, saying that essentially nothing has changed since then	http://www.wind-works.org/articles/TehErosion.html
19	Fire	19930702		7/2/1993	Antelope Valley, CA	USA		Antelope Valley. An overheated wind turbine triggered a fire Thursday that burned 220 acres of brush northeast of Cameron Road and Tehachapi-Willow Springs Road, firefighters said. Kern County firefighters from Tehachapi, Keene, and Edison and U.S. Bureau of Land Management firefighters responded to the 8:45 a.m. fire, and gained control of it about four hours later. About 45 firefighters, two helicopters and two bulldozers fought the blaze, Capt. Mike Cody said.	Published on July 2, 1993, Daily News of Los Angeles (CA)	
20	Blade failure	19931209		12/9/1993	Mynydd-y-Cemmaes, Powys, Wales	UK	WEG 300kw	Several turbines severely damaged during a storm, including a large blade part which was thrown over 400m. An independent witness estimated the blade piece to weigh 1 tonne and travel almost 500m.	Windpower Monthly January 1994.	
21	Structural failure	19931215		12/15/1993	Cold Northcott, Cornwall, England	UK	WEG MS-3 300kw	Complete blade and rotor broke away from tower during December 1993 only one month after opening. Date simply used as mid-point for the month	Windpower Monthly January 1994.	
22	Fatal	19939999		1993	Illinois, IL	USA	2kw	Robert Skarski, erecting small wind turbine, tower collapsed with Skarski strapped to it, fell to death.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
23	Human injury	19940315		3/15/1994	Mojave, CA	USA		"Big Blue not at fault, crane company's president says". An employee broke his left leg when a wind turbine control panel he was removong from a packing crate tipped over. The reference date given is simply "March 1994"	"Big Blue not at fault, crane company's president says". Published on JS Online, Milwaukee Journal Sentinel, last updated 21 July 1999.	http://www2.jsonline.com/news/metro/jul99/lamp22072199.asp
24	Miscellaneous	19940601		6/1/1994			Bonus 300kw	"Birds nest caused major failure". Date is of magazine publication	Windpower Monthly June 1994	

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
25	Blade failure	19949999	P	Not known. 1994 or after	Kirkby Moor, Cumbria, England	UK	Vestas 400kW	One of the turbines on Kirby Moor failed in spectacular fashion following a lightning strike, the blades disintegrated hurling debris across the moor. Tattered remains of the glassfibre coating are all that remained on the blade tips. The nose cone was also blown off by the lightning strike. Commisioned in 1994, the accident must have happened sometime later	MAIWEG web site with photos	http://www.windfarm.fsnet.co.uk/gallery.htm
26	Fatal	19949999.1		1994	Minnesota, MN	USA	300kw	Mark (Eddie) Ketterling, inside Kennetech base tower section, winter, large chunk of ice fell, cutting him in half.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe Also Windpower Monthly April 1994	http://www.wind-works.org/articles/BreathLife.html
27	Blade failure	19950718		7/18/1995	Rüdersdorf, Branderburg	Germany		11m long piece of rotor blade landed adjacent to children's nursery. Date is of newspaper	Newspaper "Märkische Oder", 18/7/1995. Also "Accidents", D Krämer, BLS, Dec. 2000	
28	Blade failure	19951115		11/15/1995	Tarifa	Spain	Kenetech 90 kw S-33	Two separate occurrences of blades broken off during November 1995. Date simply used as mid-point for the month	Windpower Monthly, December 1995.	
29	Blade failure	19951201		12/1/1995		Greece	34 Windmaster 300kw	Cracks found in blades. Date is of magazine publication	Windpower Monthly December 1995	
30	Fire	19959999		1995. Actual date not known	Mynydd-y-Cemmaes, Powys, Wales	UK	WEG 300kw	Turbine fire. It took firemen 2 and a half hours to control the blaze. No mains water supply so bowsers were used. Local MP Lembit Opik later called for an independent inquiry over the safety of turbines at Cemaes, and was "critical of the way the windfarm's owners Wind Energy Group had handled the situation".	Cambian News, 8 Jan 1998	
31	Miscellaneous	19959999.2		1992 to 1995		Germany		393 reports of lightning strikes from 1992 to 1995, 124 of those direct to the turbine, the rest are to electrical distribution network	Data from WMEP database: taken from report "External Conditions for Wind Turbine Operation – Results from the German '250 MW Wind' Programme", M Durstewitz, et al, European Union Wind Energy Conference, Goeteborg, May 20-24, 1996	
32	Blade failure	19960222		2/22/1996	East Friesland, Niedersachsen	Germany		Parts of rotor blade reported landing in people's garden. Date is of newspaper	East Friesland daily newspaper, 22/2/1996. Also "Accidents", D Krämer, BLS, Dec. 2000	
33	Blade failure	19960915		9/15/1996	Eesmond	Holland	Kenetech	Second blade failure reported during September. Date simply used as mid-point for the month	Windpower Monthly January 1997	
34	Ice throw	19961029		10/29/1996	Krummendeich, Niedersachsen	Germany		"In winter the rotors sling ice lumps through the air – we were cheated". Date is of newspaper	Interview regarding turbine planning permission, East Friesland newspaper 29/10/96. Also "Accidents", D Krämer, BLS, Dec. 2000	
35	Blade failure	19961030		10/30/1996	Satrup-Esmark to Havetoft road, Schleswig-Flensberg County	Germany		Turbine blades broke and fell. Pieces landed on the road and damaged an adjacent turbine. Date is of newspaper	Newspaper "Schleswiger Nachtichten", 30/10/1996. Also "Accidents", D Krämer, BLS, Dec. 2000	
36	Ice throw	19961108		11/8/1996	Werdum/Buttforde, Kreis Wittmund/ Niedersachsen	Germany		Kg weight ice lumps landing in the street. Date is of newspaper	Interview with Werdum's Mayor, East Friesland newspaper 8/11/96. Also "Accidents", D Krämer, BLS, Dec. 2000	
37	Fatal	19969999		1996		China		China, cleaning blades, unconfirmed	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
38	Fatal	19969999		1996		USA		US, boat operator decapitated by small machine, unconfirmed	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.wind-works.org/articles/BreathLife.html
39	Human injury	19969999		1996	Bensersiel, East Friesland/ Niedersachsen	Germany	AN Bonus	Thrown ice - Case before Crown Court in Oldenburg. **Public injury**	"Accidents", D Krämer, BLS, Dec. 2000	
40	Ice throw	19969999		1996	Borgholzhausen, Sauerland	Germany		30cm ice lumps landing on footpath, and damage to trees.	"Accidents", D Krämer, BLS, Dec. 2000	
41	Ice throw	19970110.1		1/10/1997	Selbitz-Sellanger, Kreis Hof/Bayern	Germany		Ice documented as thrown up to 85m, weight up to 0.5kg, between 8th and 10th January. Photographs available	"Accidents", D Krämer, BLS, Dec. 2000. Reporter contact details available. Also	http://members.aol.com/fswemedien/ZZUnfalldatei_97_99.htm
42	Ice throw	19970121.1		1/21/1997	Stein-Neukirch, Westerwald/Kreis/Theinland-Pfalz	Germany		Ice from Lichtenthäler turbine landed on road. Ice pieces "bigger than A4 paper" missed colleague by only 2m, travelled 80m	"Accidents", D Krämer, BLS, Dec. 2000. Letter from Mayor of Stein-Neukirch dated 22/1/1997	http://wilfriedheck.tripod.com/2unf.htm
43	Blade failure	19970218		2/18/1997	Island of Nordstrand, Kreis North Friesland/Schlesvig-Holstein	Germany	HSW-250	Blade parts flew over 300m across a road. Two of three blades came off.	Newspaper "Nordfriesland Tageblatt" 20/2/1997. Also "Accidents", D Krämer, BLS, Dec. 2000. Also Windpower Monthly May 1997	http://members.aol.com/fswemedien/ZZUnfalldatei_97_99.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
44	Blade failure	19970221		2/21/1997	Waldaubach, Westerwald/Hessen	Germany	Enercon	Rotor blade blown off. Blade parts found 400m to 500m away. Parts landed in summer house. Date is of newspaper	"Accidents", D Krämer, BLS, Dec. 2000. Eyewitness report – contact details available.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
45	Fatal	19970404		4/4/1997	Kaiser-Wilhelm-Koog, Schlesvig-Holstein	Germany	HSW 600KW prototype	Bernhard Saxen, 42, inside prototype turbine at KWK test field. Blade parts flew up to 500m. Part of turbine housing also blown off, killing Bernhard.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe Also Windpower Monthly May 1997 and September 1997. Newspaper "Nordwest-Zeitung" 5/4/1997.	http://www.wind-works.org/articles/BreathLife.html
46	Blade failure	19970412		4/12/1997	Großenwiehe /Wanderup, Schleswig-Holstein	Germany	Tacke	Large blade part (66%) travelled >50m. Road only 20m away.	"Accidents", D Krämer, BLS, Dec. 2000. Eyewitness report – contact details available.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
47	Fatal	19970801.1		8/1/1997	Sibley, Iowa	USA	500kw	Randy Bruce Crumrine, 36, crane operator, tower crane collapsed, crushed to death. August 1997 - actual day not known	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe Also Windpower Monthly August 1997	http://www.wind-works.org/articles/BreathLife.html
48	Ice throw	19971129		11/29/1997	Willmandinger Alb/Himmelbjerg, Kreis Reutlingen/Baden-Württemberg	Germany		Damage to car on road by "tennis-ball" sized piece of ice. Date is of newspaper	Newspaper report – "Suuwest Presse", 29/11/1997, Reutlingen edition. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
49	Blade failure	19971215		12/15/1997	Four Burrows, Cornwall, England	UK	Bonus 300kw	Blades damaged by lightning during December 1997. Date simply taken as mid-point for the month.	New Review, Issue 36, May 1998.	http://www.dti.gov.uk/NewReview/nr36/html/wind.html
50	Blade failure	19971215.1		12/15/1997	Taff Ely, Mid Glamorgan, Wales	UK		Blades damaged by lightning during December 1997. Date simply taken as mid-point for the month.	New Review, Issue 36, May 1998.	http://www.dti.gov.uk/NewReview/nr36/html/wind.html
51	Miscellaneous	19971224		12/24/1997	Mynydd-y-Cemmaes, Powys, Wales	UK	WEG 300kw	Turbine had its transformer door blown off which left direct access to 660 volt machinery. Turbine remained operational with the door off for at least 3 days. Date confirmed by independent witnesses	Cambrian News 8 Jan 1998	http://www.dti.gov.uk/NewReview/nr36/html/wind.html
52	Fire	19971224.1	P	12/24/1997	Mynydd-y-Cemmaes, Powys, Wales	UK	WEG 300kw	Turbine overheated then burnt out. Witnesses reported "balls of fire" coming from the turbine. Burning debris was thrown 150 meters, setting the hillside and a public right-of-way on fire. (Separate turbine to above)	Cambrian News 8 Jan 1998. Also Windpower Monthly February 1998	http://www.dti.gov.uk/NewReview/nr36/html/wind.html
53	Miscellaneous	19971225		12/25/1997	Mynydd-y-Cemmaes, Powys, Wales	UK	WEG 300kw	Serious damage to most of the turbines observed following the storm and fire the previous day. Wintesses reported only 4-5 turbines operating out of 24. One witness finally reported the incident to Fire Brigade, Police and HSE on 29th December. None had been informed by the operators.	Private account. Also Cambrian News 8 Jan 1998.	
54	Blade failure	19971227		12/27/1997	Dollrottfeld, Schleswig-Holstein	Germany	Tacke, 600 KW	Blade broken off. Road only 20m away. Photographs available. Date is of newspaper	Newspaper "Schleswiger Nachtichten" 27/12/1997. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
55	Fatal	19979999		1997	Lemvig	Denmark	50kw	Ivan Sørensen, 'Vestas windsmith, repowering project, removing turbine, removed nacelle fixing bolts prematurely	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe Also Windpower Monthly December 1997 and February 1998	http://www.wind-works.org/articles/BreathLife.html
56	Fatal	19979999.2		1997	Erneuter Tödlicher Autounfall bei Erftstadt-Erp, Westphalia	Germany		First of three public fatalities at the same location put down to driver distraction. Accident spot is where turbines become visible to drivers - on circular road 33 (Kreisstraße 33)	Kölner Stadtanzeiger-Erftkreis from 8.3.2003	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
57	Human injury	19980201.1	P	2/1/1998	Cloncurry, McKinlay, North Queensland	Australia		"Max cheats death after falling eight meters" Report (in 2008) of a man who fell 8m from a farm windmill and survived.	Reported on Australian Broadcasting Company North Queensland on 26 February 2008	http://www.abc.net.au/northqld/stories/s2173081.htm
58	Structural failure	19980305		3/5/1998	Simonsberg near Husum, Kreis North Friesland/Schleswig-Holstein	Germany	Enercon E40	Rotor and housing fell 42m off turbine tower. Date is newspaper date	Newspaper "Husumer Nachrichten" 5/3/1998. Also "Accidents", D Krämer, BLS, Dec. 2000. Also Windpower Monthly June 1998	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
59	Blade failure	19980531.1		5/31/1998	Green Mountain Power Wind Power Project, Searsburg, Bennington, VT	USA	11 x Zond 550kW turbines, 40m diam, 40m tower	AWEO reports that in May 1998, lightning damaged 8 turbines. Confirmed by the EPRI report referenced. 2 suffered cracked blades, the remained suffered other damage. It took 4 months to replace the blade on Turbine 7.	American Wind Energy Association report - see URL. Also "Green Mountain Power Wind Power Project. First Year Operating Experience: 1997-1998, TR-111437, Final Report, December 1998, EPRI."	http://www.aweo.org/windsearsburg.html
60	Structural failure	19980609.1	P	6/9/1998	Gujarat, Between Ahmadabad and Bombay	India	Various: e.g. Bonus , Vestas, Micon	129 of 315 turbines destroyed.	Various newspaper articles. This followed a major storm (cyclone). Also "Accidents", D Krämer, BLS, Dec. 2000. Also Windpower Monthly September 1998	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
61	Miscellaneous	19980901.1		9/1/1998	Green Mountain Power Wind Power Project, Searsburg, Bennington, VT	USA	11 x Zond 550kW turbines, 40m diam, 40m tower	EPRI report states damage to SCADA equipment during September 1998, resulting in 12 hours downtime.	"Green Mountain Power Wind Power Project. Second Year Operating Experience: 1998-1999, TR-113917, Final Report, December 1999, EPRI."	http://epriweb.com/public/TR-113917.pdf
62	Fire	19980920		9/20/1998	Saron, Kreis Demmin/ Mecklenburg/ Vorpommern	Germany		Turbine housing completely destroyed by fire. Public damage - car also destroyed.	Newspaper "Lübecker / Mecklenburger Nachtrichen" 20/9/1998. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
63	Blade failure	19981018		10/18/1998	Goonhilly, Helston, Cornwall, England	UK		Blades hit by lightning – "considerable damage"	"Accidents", D Krämer, BLS, Dec. 2000. Photographs available.	
64	Structural failure	19981227		12/27/1998	Llangwyryfon, Dyfed, Wales	UK	WEG MS-3 300kw	Two blades ripped from hub. Tower bent. Blade pieces travelled 500m.	"Winds blow turbine from tower" Windpower Monthly March 1999. Also "Accidents", D Krämer, BLS, Dec. 2000.	
65	Ice throw	19990105		1/5/1999	Gebrannten Rücken, Bromskirchen, Frankenberg County, Hessen	Germany		Damage to car by ice. Approx. 20 pieces of ice from a turbine 100m away.	"Accidents", D Krämer, BLS, Dec. 2000. Eyewitness report – contact details available.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
66	Structural failure	19990116		1/16/1999	Rebgeshain, Vogelsbergkreis, Hessen	Germany	Enercon E-40	Blade and turbine fell 63m off turbine tower. Attributed to failure of securing "kingpin" bolt. Same failure as 1/3/99 incident below	Windpower Monthly March 1999, May 1999 and July 1999. Also "Accidents", D Krämer, BLS, Dec. 2000. Letter to building inspection authorities in Nordrhein-Westfalen, 12/3/99. Also press release by BLS 25/3/99. Also Newspaper "Ostfreisische Nachrichen", Aurich, 26/3/99 and report by Enercon to Harlingerland 8/4/99, plus newspaper "Jeversches Wochenblatt" 8/4/99.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
67	Blade failure	19990205	P	2/5/1999	Renkenberge, Kreis Emsland /Niedersachsen, Lower Saxony	Germany	Micon 64/1500 1.5MW	Blade parts blown off. Parts found 100m away	"Accidents", D Krämer, BLS, Dec. 2000. Also newspaper "Meppener Tagespost" 4/3/1999. Photos	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
68	Blade failure	19990205		2/5/1999	Wilsickow, Kreis Uchermark/ Brandenburg	Germany	AN Bonus, 1MW	At least 20 separate blade parts up to 1m recorded – blown to greater than 300m	"Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
69	Blade failure	19990205		2/5/1999	Hachenburg, Westerwald-Kreis/Rheinland-Pfalz	Germany	Fuhrländer, 250 KW	Blade parts flew almost 40m and fell near heavily used footpath. Possible lightning cause.	Newspaper "Rhein-Zeitung", Westerwälder Zeitung edition, 6/2/99 – article title "How dangerous are wind turbines?" Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
70	Blade failure	19990205		2/5/1999	Burmönken, Kreis Wittmund/ Niedersachsen	Germany	Tacke 600 KW	Blade broken off. Blade parts flew off	"Accidents", D Krämer, BLS, Dec. 2000. Photos.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
71	Blade failure	19990205		2/5/1999	Lathen, Ems County, Lower Saxony	Germany	NEC Micon64, 1.5kW	Frozen rotor blade detached from main rotor and disintegrated. Parts flew 100m	Meppeners Daily Mail of 4/4/99. Also Gerd Jansen.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
72	Blade failure	19990205		2/5/1999	Wijnaldum	Holland	Vestas, V 39/500	Lightning strike destroyed turbine blades	WSH-WINDNIEUWS. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://home.wxs.nl/~windsh/nieuws.html
73	Blade failure	19990205		2/5/1999	Lelystad	Holland	4 x Windmaster 43/750	Blade parts of 4 turbines badly damaged by lightning.	WSH-WINDNIEUWS. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://home.wxs.nl/~windsh/nieuws.html
74	Blade failure	19990205		2/5/1999	Seglabera in Halland	Sweden	Vestas	Blade part flew almost 150m	Newspaper "Hallandsposten" 12/3/1999. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
75	Blade failure	19990216		2/16/1999	Sustrum, Kreis Emsland/ Niedersachsen	Germany	Micon 64/1500 1.5MW	7m to 8m long blade part flew >200m. More than 10 other pieces up to 1m long were recovered. 32 similar turbines at two sites shut down by manufacturer due to safety reasons	"Accidents", D Krämer, BLS, Dec. 2000. Also newspaper "Meppener Tagespost" 4/3/1999.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
76	Blade failure	19990301		3/1/1999	Allstedt/Nienstedt (Galgenberg), Kreis Sangerhausen/ Sachsen-Anhalt	Germany	GET 41	Two blade parts >20m long blown off and travelled >150m. Photos.	Newspapers "Mitteldeutsche Zeitung" 2/3/1999 and "Volksstimme" 3/3/1999. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
77	Fire	19990301		3/1/1999	Eemmerdijk	Holland		"Turbine fire at Eemmerdijk" Date is for magazine publication	Windpower Monthly March 1999	
78	Structural failure	19990301.1		3/1/1999	Helpershain, Vogelsbergkreis, Hessen	Germany	Enercon E-40	Blade and turbine fell off turbine tower. 63m drop. Attributed to failure of securing "kingpin" bolt. Same failure as 16/1/99 incident above. 17 identical turbines shut down.	Windpower Monthly March 1999, May 1999 and July 1999. Also "Accidents", D Krämer, BLS, Dec. 2000. Letter to building inspection authorities in Nordrhein-Westfalen, 12/3/99. Also press release by BLS 25/3/99. Also Newspaper "Ostfreisische Nachrichen", Aurich, 26/3/99 and report by Enercon to Harlingerland 8/4/99, plus newspaper "Jeversches Wochenblatt" 8/4/99.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
79	Blade failure	19990412	P	4/12/1999	Blankenheim, Kreis Sangerhausen/ Sachsen-Anhalt	Germany	Tacke TW 600	Blade fell to ground.	Newspaper "Mitteldeutsche Zeitung" 13/4/1999. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfall datei_97_99.htm
80	Ice throw	19990427		4/27/1999	Grebenhain, Lauterbach	Germany		Pieces of ice thrown 70 to 80m from turbine during the week prior to 27 April.	Newspaper report "Lauterbacher Anzeiger" 27/4/1999. Also "Accidents", D Krämer, BLS, Dec. 2000	

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
81	Ice throw	19990427		4/27/1999	Engelrod Helpersheim with Grebenhain/ Vogelsbergkreis, Hessen	Germany		Ice thrown 80m between Engelrod and Helperscheim. Large ice plates	Source: forest officer Jeurgen Fornof. Grebenhain	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
82	Blade failure	19990501		5/1/1999		Germany	NEG Micon 1.5MW	Lightning damaged wood epoxy blades. Date is for magazine publication	Windpower Monthly May 1999. Also "Accidents", D Krämer, BLS, Dec. 2000	
83	Miscellaneous	19990701		7/1/1999	Green Mountain Power Wind Power Project, Searsburg, Bennington, VT	USA	11 x Zond 550kW turbines, 40m diam, 40m tower	4 turbines damaged. EPRI report states considerable control system damage to turbines 1 & 10 and further damage to turbines 7 & 9 by two lightning storms during July 1999.	"Green Mountain Power Wind Power Project. Second Year Operating Experience: 1998-1999, TR-113917, Final Report, December 1999, EPRI."	http://epriweb.com/public/TR-113917.pdf
84	Fire	19990920		20/9/1999	Zielenser Weg, Grafschaft Kreis Friesland / Niedersachsen, Lower Saxony	Germany	GET 600kW	Turbine completely burnt out. Fire crew could do nothing due to height of fire and danger from falling debris. Turbine 4 years 4 months old	Newspaper "Jeversches Wochenblatt" 21/2/99. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
85	Miscellaneous	19991007		10/7/1999	Spieka-Neufeld, Gemeinde Nordholz, Landkreis Cuxhaven	Germany		Weather ring 1.3m diameter fell 53m off the turbine. Poor maintenance blamed. Photos.	Newspaper "Nordsee-Zeitung", local Landkreis edition 13/10/99. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
86	Human injury	19991023.1		10/23/1999	Lake Isabella, Bakersfield, CA	USA	STS was installing a Bergey Excel on an 80-foot (24-meter) guyed lattice tower near Lake Isabella for Buckeye Farms	Cause not determined. Turbine toppled while being erected - on to operator. Operator suffered spinal injuries and is wheelchair bound. Another fell 15 feet and suffered minor injuries.	Newspaper "Bakersfield Californian" 23/10/1999. Also Aagaard web page. Web article quotes 19 deaths from working on wind turbines over 25 years	http://www.wind-works.org/articles/Aagaard.html
87	Blade failure	19991107		11/7/1999	Heath/ Schleswig-Holsein	Germany		Brake system failure. 25m blades turning 4x normal speed. 60 residents within 500m evacuated between 6th and 7th November	Reuters 7.11.99	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
88	Blade failure	19991203		12/3/1999	Zennhusen	Germany		Two turbines damaged by lightning – one lost a blade and two others were shattered.	Newspaper "Dithmarscher Landeszeitung" 4/12/99. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
89	Blade failure	19991203.1		12/3/1999	Sievern-Langden, Kreis Cuxhaven	Germany	AN Bonus 1MW/54	Blade blown off. Parts travelled 200m.	Newspaper "Nordsee-Zeitung" 6/12/1999. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
90	Structural failure	19991203.1		12/3/1999	Bocholt-Hemden, Bocholt-Hemden	Germany		The 15kg turbine tip flew off and travelled more than 50m. Flew over road.	"Accidents", D Krämer, BLS, Dec. 2000. Eyewitness account – contact details available. Photos.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
91	Structural failure	19991203.1		12/3/1999	Jutland	Denmark	Various, including Windmatic, Wincon, Bonus, Vestas, Nordtank & Kuriant	Storm destroyed 8 turbines. Commonest accident - brake failure, rapid rotation followed by fire	On line report from Dutch website. Reporter details also available. Also "Accidents", D Krämer, BLS, Dec. 2000	http://home.wxs.nl/~hzwarber/wind/welkom.html
92	Blade failure	19991204		12/4/1999	Westermarsch II, Norddeich, Lower Saxony	Germany	Enercon E33	Rotor blade destroyed by lightning strike. Photos.	Newspaper "Emder Zeitung", Aurich, 8/12/1999. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
93	Structural failure	19991209		12/9/1999	Eemshaven	Holland	Kenetech (US)	Two rotor blades fell off in a period of weeks. 94 turbines shut down.	On line report from Dutch website. Reporter details also available. Also "Accidents", D Krämer, BLS, Dec. 2000. Also newspaper "Ostfriesen-Zeitung" 11/12/1999. Photos.	http://home.wxs.nl/~hzwarber/wind/welkom.html
94	Structural failure	19991212.1	P	12/12/1999	Lichtenau-Asseln, Paderborn, Nordrhein-Westfalen	Germany	Sudwind S 46/600 kw	60m high turbine tower broke 10m above the ground. Rotor parts and parts of the 46m blades travelled up to 200m.	Newspaper "Westfalenblatt", Paterborn, 13/12/1999. Photos. Also Newspaper "Westfalenblatt", Paterborn, 18/12/1999. Also Weekly paper "Landwirtschaftliche Wochenblatt" No. 52/99, p29-30. Also FOCUS 18/12/1999, p13 "Low pressure in first half of December converted many wind turbines into dangerous metal centrifuges". Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
95	Blade failure	19991219		12/19/1999	Stöffin, Neuruppin	Germany	Südwind	Blade bend, hit tower and shattered. Pieces over a circle of about 50m diameter	Newspaper "Berliner Morgenpost" 22/12/1999. Also Newspaper "Gransrr-Zeitung" 4/1/2000. Also "Accidents", D Krämer, BLS, Dec. 2000.	http://members.aol.com/fswemedien/ZZUnfaldatei_97_99.htm
96	Blade failure	19991222.1		12/22/1999	Leewarden	Holland	NEDWIND NW 46/3/500	Serious damage to rotor blades after lightning strike	Newspaper "Leewarden Courant" 23/12/1999. Also "Accidents", D Krämer, BLS, Dec. 2000	http://home.wxs.nl/~windsh/nieuws.html
97	Fatal	19999999		1999	Erneuter Tödlicher Autounfall bei Erftstadt-Erp, Westphalia	Germany		Second of three public fatalities at the same location put down to driver distraction. Accident spot is where turbines become visible to drivers - on circular road 33 (Kreisstraße 33)	Kölner Stadtanzeiger-Erftkreis from 8.3.2003	http://members.aol.com/fswemedien/ZZUnfaldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
98	Fire	20000104.1		1/4/2000	Dörpen, Papenburg, Lower Saxony	Germany	Tacke TW 600a	Turbine fire – cordoned off by police. Blades could not be shut down and continued to turn. Turbine head totally destroyed. 21m 3.8Te blades rotated uncontrollably at speed and on fire for many hours	Newspaper "Ems-Zeitung", Papenburg, 6/1/2000. Photos. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
99	Human injury	20000110		1/10/2000	St Hülfe / Heede, Niedersachsen	Germany		Local vet Dr. Victoria Roloff injured on shoulder by thrown ice, 50m from turbine. **Public injury.** Also reports of damaged cars - holes in roof	Newspaper "Diepholzer Kreisblatt", Niedersachsen, 12/1/2000. Eyewitness account and contact details available. Photo. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
100	Blade failure	20000111		1/11/2000	Green Mountain Power Wind Power Project, Searsburg, Bennington, VT	USA	11 x Zond 550kW turbines, 40m diam, 40m tower	AWEO reports that in January 2000, lightning damaged a turbine which could not be repaired until the following April. The EPRI report provides more detail - the date was January 11th and the turbine lost a blade as a result.	American Wind Energy Association report - see URL. Also "Green Mountain Wind Power Project. Third Year Operating Experience 1999-2000", US DOE, EPRI	http://www.aweo.org/windsearsburg.html
101	Fire	20000120.1	P	1/20/2000	Lichtenau Kreis Paderborn, Westphalia	Germany	Sudwind S 46/600 kw	Lightning strike, followed by fire. Mast then split approx 10m above base. Total loss.	Developer's website: K106	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
102	Blade failure	20000121		1/21/2000	Samso, Aalborg, Jutland	Denmark	55 kW Nordtank	Complete rotor and housing with blades broken. One of the blade pieces went through a window and landed in a swimming pool at 200 metres distance; another piece was thrown 600 metres.	On line report at Dutch website. Also Paul Gipe "Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates". Also Stichting Windhoek 21/1/00	http://home.wxs.nl/~hzwarber/wind/welkom.html
103	Structural failure	20000129.1	P	1/29/2000	Jutland	Denmark	Various	Storm destroyed three turbines. Commonest accident - brake failure, rapid rotation followed by fire	On line report from Dutch website. Reporter details also available. Also "Accidents", D Krämer, BLS, Dec. 2000	http://home.wxs.nl/~hzwarber/wind/welkom.html
104	Structural failure	20000210.1	P	2/10/2000	Wittmund, Harlingerland	Germany	Enercon E32	Sudden and total collapse of turbine. Spokesman quoted "concrete damage". Reported to be the "fourth turbine break within 8 weeks". 44 similar turbines shut down	Press statement by Joachim Schmidt, Enercon, via Reports for Harlingerland, 20/4/2000. Also "Accidents", D Krämer, BLS, Dec. 2000	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
105	Structural failure	20000215.1		2/15/2000	Wehe den Hoorn bei Groningen	Holland	Lagerwey	Tower collapsed during storm. Total loss. All 44 Lagerwey turbines in Holland stopped from 15 February and were still stopped at 8 April 2000.	Groninger Dagblad 8.4.2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
106	Structural failure	20000311		3/11/2000	Wieringerwaard/Kolhorn in West-Friesland	Holland	Newinco in Rhenen, 30m tower	Between 10 and 11 March, turbine destroyed by storm. Tower collapse. Total loss.	Dagblad voor West-Friesland 13.3.2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
107	Miscellaneous	20000313		3/13/2000	Groetpolder, Niedorp	Holland	Micon 600kW	19 turbines shut down due to short-circuit. Melting insulation on wiring reported. Date is of newspaper article	Dagblad voor West-Friesland 13.3.2002	http://home.wxs.nl/~hzwarber/wind/welkom.html
108	Human injury	20000313.1		3/13/2000	Rio Vista, CA	USA		Pilot was flying in an area cluttered with wind turbines and powerlines. He hit a line and plunged 120 feet. Lucky to be alive but should not have been flying in the area in the first place.	AERIAL GUNNING CRASH REPORT, USDA/APHIS/WILDLIFE SERVICES, Wendy Keefover-Ring Sinapu, 1989-2005, Accident and Injury Summary	http://www.goagro.org/crash.htm
109	Human injury	20000401		4/1/2000	Palm Springs, CA	USA	Seawest Windpower Inc	Operator suffered severe burns from electrical fault in fuse holder. Hospitalised for 10 days with second and third degree burns.	From US Safety (OSHA) database.	http://www.osha.gov/pls/imis/accidentsearch.accident_detail?id=119947315
110	Structural failure	20000415		4/15/2000	Cold Northcott, Cornwall, England	UK	WEG MS-3 300kw	Entire wind power station (22 turbines) closed during April due to metal fatigue. Date simply used as mid-point for the month	"Accidents", D Krämer, BLS, Dec. 2000. Also "Review of MS3 Turbines at Cemmaes, Cold Northcott and Llangwyryfon, Part 3: Structural/mechanical audit", WS Atkins report L4104.003/R03	
111	Structural failure	20000415		4/15/2000	Mynydd-y-Cemmaes, Powys, Wales	UK	WEG MS-3 300kw	Entire wind power station closed during April due to metal fatigue. Date simply used as mid-point for the month	"Accidents", D Krämer, BLS, Dec. 2000. Also "Review of MS3 Turbines at Cemmaes, Cold Northcott and Llangwyryfon, Part 3: Structural/mechanical audit", WS Atkins report L4104.003/R03	
112	Structural failure	20000415		4/15/2000	Llangwyryfon, Dyfed, Wales	UK	WEG MS-3 300kw	Entire wind power station closed during April due to metal fatigue. Date simply used as mid-point for the month	"Accidents", D Krämer, BLS, Dec. 2000. Also "Review of MS3 Turbines at Cemmaes, Cold Northcott and Llangwyryfon, Part 3: Structural/mechanical audit", WS Atkins report L4104.003/R03	
113	Fire	20000502		5/2/2000	Zurndorf bei Eisenstadt/Burgenland	Austria		Fire destroyed turbine - cause unknown, suspected lightning strike or mechanical source. 2 blazing rotors blades fell to ground. Over 100 firemen watched over night - could do nothing else due to fire height. Total loss.	Austrian report on internet	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
114	Fatal	20000527		5/27/2000	Lenkenfeld, Fehmarn, Schleswig-Holstein	Germany	Enercon 500kw	23 year-old parachutist on first solo jump drifts into turbine. **Public fatality.** She jumped at 1200m and the parachute opened normally at 1100m. Turbine was 4km from the intended landing site	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe Also Windpower Monthly July 2000. Also Schweriner newspaper 31.5.200	http://www.wind-works.org/articles/BreathLife.html
115	Blade failure	20000528.1	P	5/28/2000	Insel Norderney / Niedersachsen, Lower Saxony	Germany	Enercon E15	Storm tore the rotor nacelle and cover off. One blade travelled between 100m and 150m, landing on a factory and private house (family Zilles). It pierced a 24cm thick stone wall, timber floor and roof of the house. Luckily, the factory was closed due to holidays, and the family were absent on vacation. Turbine was constructed in 1986. The turbines were subsequently shut down on 30 August 2000 following a court ruling on safety grounds and that they were too close to housing.	Anzeiger für Harlingerland, 29.5.2000	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
116	Miscellaneous	20000601		6/1/2000	Green Mountain Power Wind Power Project, Searsburg, Bennington, VT	USA	11 x Zond 550kW turbines, 40m diam, 40m tower	The EPRI report confirms that 2 turbines suffered extensive control system damage following a lightning strike in June 2000.	"Green Mountain Wind Power Project. Third Year Operating Experience 1999-2000", US DOE, EPRI	http://epriweb.com/public/000000000001000960.pdf
117	Miscellaneous	20000710		7/10/2000	Limburg-Offheim im Kreis Limburg-Weilburg/Hessen	Germany	DeWind	Problems with transformer at the wind park causes major power fluctuations in the nearby towns. Reports of computers, TVs and fridges damaged. Eventual mains failure which was restored some time later.	Nassauische Neue Presse from 11.7.2000	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
118	Fatal	20000729		7/29/2000	Baraboo, WI	USA	150 foot high turbine	"Plane crash kills 4 men SW of Baraboo". The plane was flying in fog and hit a wind turbine. Authorities found marks on a 150-foot wind generator pole.	Milwaukee Journal Sentinal JSOnline, 29th July 2000	http://www2.jsonline.com/news/state/jul00/crash29072800a.asp
119	Miscellaneous	20000729		7/29/2000	Hamm-Sieg	Germany		Road "L290 to be defused" article in local newspaper. On a 4km stretch of the L290 road where wind turbines are clearly visible, 73 accidents reported over 4 years. Four accidents very serious but none fatal. Components and ice reported thrown over 400m, onto and over the road. Date is of newspaper article	"Rhein-Zeitung", Lokalteil Westerwald-Sieg, 29 July 2000	http://wilfriedheck.tripod.com/2unf.htm
120	Human Injury	20001026		10/26/2000	Kern County, CA	USA		Kern County Fire Department report wind turbine rescue on 26 October 2000. On arrival at the turbine they were faced with an injured man inside the centre of the turbine support column. He had been performing maintenance at 175 feet above ground when a tie strap failed, almost severing his foot.	Reported in Kern Heavy Rescue Newsletter, Q1 2001.	www.kernheavyrescue.org/1stQnewsletter.PDF
121	Blade failure	20001030.1		10/30/2000	Utgast in Ostfriesland / Niedersachsen, Lower Saxony	Germany	Tacke 600 KW	21m long blade section weighing 2 tonnes flew approx 100m. Turbine had passed an inspection only 4 weeks before. Constructed in 1996	Anzeiger für Harlingerland, 31.11.2000	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
122	Miscellaneous	20001106		11/6/2000	Barlth bei Heide, Kreis Dithmarschen / Schleswig-Holstein	Germany		Failed hydraulic value - turbine running at 100rpm - over twice normal speed. Could not be shut down in the wind. 20 houses evacuated overnight until turbine was shut down.	Dithmarschener Landeszeitung / Brunsbütteler Zeitung	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
123	Miscellaneous	20001201		12/1/2000			Nordtank 600kw	Gearbox failure warning – 270 turbines guaranteed to fail within 5 years Date is of magazine publication	Windpower Monthly December 2000	
124	Structural failure	20001209.1	P	12/9/2000	Burgos, Merindales	Spain	GamesaEólica G-47 660kw	Tower fractured after being struck by blade on 9 December 2000. According to the online article, **blade parts travelled almost 1000m**	Windpower Monthly February 2001. Also online photos (see right)	http://ventdubocage.net/accident4.htm
125	Fatal	20001219		12/19/2000	Erwitte - Westfalen	Germany		20-year old car driver killed in accident with loaded turbine transporter. The transporter was turning and blocking the entire road. No warnings were given and the 20-year old driver could not stop in time. Operators considered the use of police escort unnecessary. **Public fatality.**	Lippstädter Zeitung - Der Patriot vom 20.12.2000	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
126	Structural failure	20009999		2000	Port la Nouvelle, Aude	France		Turbine mast broke during a storm. No further details. There are 5 turbines on the site - 4 x 500kW constructed in September 1993, and 1 x 200kW constructed in 1991. No details of which type was destroyed. The first of several such French incidents which led to a formal investigation of wind turbine safety	*"Rapport sur la sécurité des installations éoliennes", Conseil général des Mines, N° 04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	
127	Miscellaneous	20010105.1		1/5/2001	Windpark Opitzhöhe bei Groß-Opitz bei Dresden / Sachsen, Saxony	Germany	Sudwind N3127	Failed pin between gearbox and turbine. Turbine dates from 1995.	Operators own website	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
128	Structural failure	20010115		1/15/2001	Castile	Spain	GamesaEólica G-47 660kw	Nacelle rotor toppled from tower during January. Date simply used as mid-point for the month	Windpower Monthly February 2001	
129	Structural failure	20010115		1/15/2001	León	Spain	GamesaEólica G-47 660kw	Tower damaged during January. Date simply used as mid-point for the month	Windpower Monthly February 2001	
130	Environmental	20010308		3/8/2001	Martinshöhe bei Kaiserslautern / Rheinland-Pfalz	Germany		Leak of hydraulic oil into the surrounding ground. Had to be cleaned up by a specialist firm.	Die Rheinpfalz 10.3.01	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
131	Blade failure	20010315.1	P	3/15/2001	Oederquart bei Stade / Niedersachsen, Lower Saxony	Germany	Vestas V66	33m blade piece broke off and travelled 100m. Cause - pin breaking. Turbine only 2 years old. Investigation by Vestas into 200 other V66 turbines in Germany found similar defects at Emden.	Stader Tageblatt	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
132	Fire	20010319		3/19/2001	Goldenstedt im Kreis Vechta / Niedersachsen, Lower Saxony	Germany	GET 600	Technical defect quoted as source of fire. Fire brigade could not fight the fire at 75m height so it was left to burn out. Total loss. Turbine constructed in 1997. Also it could have been worse (near miss) - a natural gas plant is only 200m from the turbine. For this reason, the turbine has never been replaced. Charred remains still stood in October 2002	Oldenburger Volkszeitung (Vechta) from 20.3.2001	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
133	Human injury	20011009.1		10/9/2001	Brithdir Mawr eco-commune, Newport, Wales	UK	African Air Corporation turbine	"Film crewman hurt in turbine accident". Injury to UK member of public. A BBC film crew member was airlifted to a Cardiff hospital after being hit by part of a wind turbine at the Brithdir Mawr eco-commune near Newport. The man, a sound recorder, was working on a series of educational programmes called Made in wales. The turbine was being dismantled for inspection after the blades had stopped turning. The cameraman and the sound recorder were both under the turbine as it was lowered. The entire head of the turbine fell and hit the sound recorder on the back. The incident has been blamed on a sheared drive shaft. The injured man was taken to Withybush Hospital under police escort, and was later confirmed to have spinal injuries. In June 2007, it was confirmed that the man is now wheelchair bound. He was awarded damages from the BBC. **Public injury.**	Preported in the Western Telegraph, Tuesday 9th October 2001. Follow up article on damages award from BBC website 22 June 2007.	http://archive.westerntelegraph.co.uk/2001/10/9/7757.html
134	Blade failure	20011122		11/22/2001	Wybelsum, Stadt Emden / Niedersachsen, Lower Saxony	Germany	Enercon E66	33m long blade part weighing 4 Tonnes broke off and fell to the ground. Turbine only 2 years old.	Bild am Sonntag 16.12.2001	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
135	Blade failure	20011206		12/6/2001	Dirlammen bei Lauterbach/Vogelsberg kreis / Hessen	Germany	AT Bonus 1.3MW/62	Large blade part 4m x 1m broke off and travelled 150m. Landed only 50m from a road	Landratsamt Lauterbach + Lauterbacher Anzeiger from 7.12.2001	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
136	Blade failure	20011221		12/21/2001	Bad Doberan / Mecklenburg-Vorpommern (unter Vorbehalt)	Germany		Preliminary details only. Turbine blade broke off. Nearby motorway A20 closed off.	Ingrid Lange, Rostock and internet	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
137	Miscellaneous	20011224		12/24/2001	Windpark Opitzhöhe bei Groß-Opitz bei Dresden / Sachsen, Saxony	Germany	Sudwind N3127	Failed pin between gearbox and turbine. Second occurrence. Turbine dates from 1995.	Operators own website	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
138	Blade failure	20019999		1999 - 2001	Lincoln Township, WI	USA	Vestas V-47 660kW	Reports of turbine blade failure and also damage to nearby homes and property	Excerpts from the Final Report of the Township of Lincoln Wind Turbine Moratorium Committee	http://www.glebemountaingroup.org/Articles/Lincoln120403.doc

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
139	Blade failure	20020122.1	P	1/22/2002	Blyth, Northumberland, England	UK	Vestas, operated by Amec	Broken blade on first UK offshore turbine. Broke in 70mph wind. Photos	"Wind farm closed after blade snaps", BBC news on-line. Also Windpower Monthly February 2002	http://news.bbc.co.uk/1/hi/england/1777268.stm
140	Miscellaneous	20020125		1/25/2002	Windpark Opitzhöhe bei Groß-Opitz bei Dresden / Sachsen, Saxony	Germany	Sudwind N3127	Failed pin between gearbox and turbine. Third occurrence. Turbine dates from 1995.	Operators own website	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
141	Fire	20020127		1/27/2002	Westernieland, Groningen	Holland		Fire at night - cause unknown. Total loss.	Groninger Dagblad 28.1.2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
142	Blade failure	20020128		1/28/2002	Remlingen bei Wolfenbüttel / Niedersachsen, Lower Saxony	Germany	Enercon	Blade shattered with an audible "crack". Pieces scattered across the surrounding fields	Wolfenbütteler Zeitung 29.1.02 + Bürgermeister Siegbert Pfeifer (eyewitness)	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
143	Structural failure	20020128.1	P	1/28/2002	Husum / Schleswig-Holstein	Germany	Windrad HSW 250	Turbine completely destroyed during storm. 28m tower, 25 Tonnes.	Husumer Nachrichten, 30.1.02. Also Weisbaden news online 29/1/2002. Photos	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
144	Blade failure	20020201.1		2/1/2002	Wormhout (Nord)	France	400kW	A blade was torn off during a storm. Date uncertain - quoted as February 2002. Only one turbine detailed for the site - 400kW - constructed in October 1997.	*"Rapport sur la sécurité des installations éoliennes", Conseil général des Mines, N° 04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	http://ventdubocage.net/accident.htm
145	Miscellaneous	20020209		2/9/2002	Windpark Opitzhöhe bei Groß-Opitz bei Dresden / Sachsen, Saxony	Germany	Sudwind N3127	Failed pin between gearbox and turbine. Fourth occurrence. Turbine dates from 1995.	Operators own website	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
146	Structural failure	20020219.1	P	2/19/2002	Javenloch bei Carolinensiel / Niedersachsen, Lower Saxony	Germany	Lagerwey 250kW	Blades and turbine blown off tower. Blades were 27m long - large parts travelled 235m. Photos show this. The turbine housing fell onto a transformer and also destroyed it.	Nordwest-Zeitung, Jever. Photos available online	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
147	Blade failure	20020222		2/22/2002	Huppelbroich, Gem. Simmerath bei Aachen, Westphalia	Germany		Turbine blade torn off during snow storm. 7.5m blade part reported to travel 40m. Turbine 10 years old.	Ingenbroich-Nachrichten, 26.2.2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
148	Fire	20020223	P	2/23/2002	Oostburg, South West Holland	Holland	NedWind 500kW	Lightning strike suspected as source. Complete loss. Turbine 9 years old. Burning debris also destroyed a nearby transformer. Nearby towns without power.	BN/De Stem 25 febr 2002, Dagblad voor Zuidwest - Nederland. Also Windpower monthly, April 2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
149	Fire	20020223.1	P	2/23/2002	Großhabersdorf-Vincenzenbronn bei Fürth / Bayern, Bavaria	Germany		Lightning strike set turbine blade ablaze. Fire brigade could do nothing due to the 70m height. Left to burn out. Burning blade parts reported travelling several hundred meters. Confirmed the following morning. Burning parts not extinguished by driving sleet.	Nürnberger Nachrichten, Sackaktuell Vogstreichenbach and CSU Ammendorf. Spectacular photos of blazing turbine at night	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
150	Ice throw	20020226		2/26/2002	Sefferweich bei Bitburg / Rheinland-Pfalz	Germany		Ice thrown during a meeting of CDU state parliament delegates with the site operator. No-one hurt. No further details	Trierischer Volksfreund - online	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
151	Transport	20020301.1		3/1/2002	Fargo, North Dakota	USA		Reported in November 2007 "In March 2002, one hit the underside of the west and eastbound I-94 overpass as it was traveling on I-29 through Fargo."	Reported in The Forum by Associated Press 24 November 2007	http://www.windaction.org/news/12847
152	Fire	20020309		3/9/2002	Heiden in Kreis Borken, Westphalia	Germany		Fire in connecting substation at foot of turbine. Extinguished successfully.	Fire brigade report 9/3/2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
153	Blade failure	20020313.1		3/13/2002	Dörenhagen bei Paderborn, Westphalia	Germany	NEG Micon 750kW	Loss of blade at night during storm. One blade section 30m long weighing 5.5 Te fell off. Smaller blade parts covered an area 400m from the turbine. Turbine only 2.5 years old	Neue Westfälische, Ausgabe OWL, and www.nw-news.de 13/3/2002. Photos	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
154	Fire	20020315		3/15/2002	Yttre Stengrund	Sweden	NEG Micon	Fire burnt out turbine in March 2002. Replaced in May 2002. Offshore. Date simply used as mid-point for the month	Windpower Monthly, May 2002	
155	Fire	20020319.1	P	3/19/2002	Strocken im Landkreis Döbeln / Sachsen, Saxony	Germany	Vestas V66	Fire started 5pm and could not be fought by the fire brigade due to the height. Left to burn out. Total loss. One of 5 x V66 fires in Germany during 2002	Döbelner Anzeiger, 20.3.2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
156	Blade failure	20020320		3/20/2002	Nettetal-Oirlich im Kreis Viersen, Westphalia	Germany	DeWind 46	Lightning strike removed 1m of blade. Constructed in 1999	Westdeutsche Zeitung, 17.5.2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
157	Blade failure	20020408.1	P	4/8/2002	Großröhrsdorf im Landkreis Kamenz / Sachsen, Saxony	Germany		"Technical defect" led to blade damage. Turbine shut down and blade had to be replaced	Sächsische Zeitung 9/4/2002 and SP-online 9/4/2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
158	Fire	20020420.1	P	4/20/2002	Bad Wünnenberg-Haaren (Helmern) bei Paderborn, Westphalia	Germany	Vestas 1.5MW 108m overall height (V80?)	Turbine fire 300m from A44 motorway. No wind that day so luckily no debris scattered over wide area. Fire brigade could not fight the fire at 78m height - was left to burn out. Burning debris around perifery of turbine. Motorway closed for over 12 hours. Turbine constructed in 2000. Total loss	Lots of coverage - www.nw-news.de Neue Westfälische, Ausgabe OWL / WDR Studio Bielefeld - Fernsehen and Radio. Photos available.	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
159	Blade failure	20020429		4/29/2002	Lohe bei Lippstadt im Kreis Soest, Westphalia	Germany	Enercon	Blade broke off during storm	Lippstadter newspaper - Der Patriot, 30.4.2002. Photos	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
160	Structural failure	20020515.1	P	5/15/2002	Colorado, CO	USA	WTC	Crack from first accident led to blade striking tower in second accident. First accident in May 2002. An electronic device failure and a control system software glitch caused a blade to strike the tower. Date simply used as mid-point for the month	Info from developers own website	http://www.windturbinecompany.com/milestones/
161	Fire	20020612		6/12/2002	Holzheim bei Diez im Rhein-Lahn-Kreis (Bad Ems) / Rheinland-Pfalz	Germany		Fire spread from blazing car to neighbouring wind turbine and destroyed parts and cables in the lower part of the tower. Further spread stopped by fast action of the Fire Brigade.	Nassauische Neue Presse, 14.6.2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
162	Environmental	20020630		6/30/2002	Vanarra	Spain		"Bird Death Claims Cloud Positive Poll". Environmentalists accused the Navarro government of a cover up after unearthing information indicating that over sixty times as many birds deaths occurred as a result of wind turbines than was previously admitted. Environmental group Gureler found the data in an official report which was not made public, and are questioning the results of a recent opinion poll carried out by Spains biggest wind developer, Energia Hidroelectrica de Navarra (EVN), which claimed extremely favourable pro-wind results.	Wind Power Monthly, June 2002	
163	Human injury	20020701		7/1/2002	Sigean, Aude	France	660kW	Mechanic electrocuted after metal tool contacted a live transformer connection. The survived but was badly burned and shocked. He facility was closed for 4 months during accident investigation. Turbines operational from May 2000	*"Rapport sur la sécurité des installations éoliennes", Conseil général des Mines, N° 04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	
164	Fire	20020804.1	P	8/4/2002	Katzenberg bei Meißen / Sachsen, Saxony	Germany	Vestas V66	SZ-online reports fire on a brand-new turbine still undergoing commissioning. Total loss. No thunder or lightning recorded. The developers website records a light thunderstorm. Turbine had zero operational hours. Vestas investigated but no report was made public. One of 5 x V66 fires in Germany during 2002	SZ-online 5/8/2002 and local information. Also "Spectacular damage with MW plants" Developer's website	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
165	Human injury	20020805.1		8/5/2002	Heidenheim, Kreis Weißenburg-Gunzenhausen, Bavaria	Germany		53 year old member of public severely injured during accompanied visit to 100m tower. Failed safety device. He fell 10m then ended up hanging by his legs with his ear torn off. Emergency surgery required to get the man removed from the tower. **Public injury.**	Nürnberger Nachrichten, 6/8/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
166	Miscellaneous	20020806.1		8/6/2002	Limburg-Offheim im Kreis Limburg-Weilburg, Hessen	Germany	DeWind 600kW	Lighning strike hit turbine. No obvious outward damage. Shut down until sometime between 22 August and 19 October when repair was completed. Constructed July 2000	Eye witness report	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
167	Miscellaneous	20020807		8/7/2002	Windpark Extertal im Landkreis Lippe, Westphalia	Germany	Jacobs MD-77	Lightning strike led to complete loss of plant. Constructed December 2001. No further details	Developers web site	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
168	Fire	20020808		8/8/2002	Brokstedt, Schleswig-Holstein	Germany	Vesta V66	Lightning struck the tower and caused a fire. Fire brigade unable to do anything due to the height - had to let it burn out. Debris from burning blades dropping over local environment. Turbines operational since December 1999. One of 5 x V66 fires in Germany during 2002	"Lightning burns out nacelle" - Windpower Monthly October 2002. Also Nordfriesland news sheet dated Friday 9 Aug 2002. Also local radio.	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
169	Fire	20020815		8/15/2002	Schleswig-Holstein	Germany	Vesta V66	Heavy thunderstorm and substantial lighning reported. Total loss. August 2002 (mid-point date assumed). One of 5 x V66 fires in Germany during 2002	"Spectacular damage with MW plants" Developer's website	
170	Fire	20020901		9/1/2002		Denmark	Elsam 2MW	"Elsam 2MW fire" Date is for magazine publication	Windpower Monthly September 2002	
171	Structural failure	20020909		9/9/2002	Ulrichstein Helpershain	Germany	NEG Micon M1500	Rotor broke off completely at the hub. Weighing several tonnes and with a diameter of 44m, it fell from 50m height on to a local track. Six identical turbines shut down for safety checks. Turbine in place since 1996.	Windpower Monthly October 2002. Local TV coverage (video and photos available) and various press releases	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
172	Fire	20020924		9/24/2002	Elm bei Schlüchtern im Main-Kinzig-Kreis, Hessen	Germany	ENRON (ex Tacke)	Transformer at the foot of the turbine went on fire due to "technical defect"	Kinzigtal message of 25/9/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
173	Fire	20021001		10/1/2002		Holland	Vestas	"Fire in Vestas turbine prompts wind farm retrofit". Date is for magazine publication	Windpower Monthly October 2002	
174	Fire	20021003.1	P	10/3/2002	Sillenstede-Grafschaft bei Jever im Kreis Friesland, Lower Saxony	Germany	GET 600kW	Fire brigade could not fight fire due to height, so left to burn out. Flaming debris ignited nearby hay. Constructed 1995/96	Jever weekly newspaper 11/10/2002. Photos available online	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
175	Fatal	20021007		10/07/2002	Eemmeerdijk, Zeewolds, Flevoland	Holland	1MW	Two men reported to fall 10m within the turbine tower. The one above fell on his fellow worker and was killed on the spot. The survivor had serious head and neck injuries. No names or ages given.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe. Updated May 2005. Also newspapers Trouw 11 July 2002, Veluwsch Dagblad 10 July 2002, and Veluws Dagblad, 11 July 2002 "Man dies after fall from windmill".	http://www.traumahelikopter.nl/load.htm?Kranten/2002/juli.htm
176	Fire	20021022		10/22/2002	Kell am See bei Hermeskeil im Kreis Trier-Saarburg / Rheinland-Pfalz	Germany	Grogmann	Police alerted by passing driver. Fire brigade could not fight fire due to height. Left to burn out, but in the strong wind flying sparks and broken rotor parts were reaching the main road (distance unknown). Main road closed for 11 hours. Constructed 1988	Local radio broadcast 23/10/2002. Also Trieri newspaper 24/10/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
177	Blade failure	20021026		10/26/2002	Erkelenz-Holzweiler im Kreis Heinsberg, Westphalia	Germany	NEG Micon	Rotor blade bent and fell to ground. Nearby farm evacuated. Constructed in 2000.	Aachener messenger newspaper 27/10/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
178	Blade failure	20021027		10/27/2002	Kaiserslautern	Germany		Storm damage to blade - blade broke off. It was later admitted by operators that there was a known defect in the blade prior to storm but they had ignored it.	Rheinpfalz of 28/10/2002 and 30/10/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
179	Blade failure	20021027		10/27/2002	Loehme, Werneuchen, Brandenburg	Germany		Storm tore off two of three blades on a turbine at Loehme (Barnim). Pieces hurled "far" but no distance data.	Berlin newspaper of 28/10/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
180	Blade failure	20021027		10/27/2002	Duelken, Viersen, Westphalia	Germany	NEG Micon	Blade bent then broke in storm	Rheini Post 28/10/2002 and CR Viersen 29/10/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
181	Structural failure	20021027.1	P	10/27/2002	Goldenstedt Ellenstedt, Lower Saxony	Germany	GET 41a 600kW. Hub height 70m, rotor diameter 41m	Turbine completely toppled in storm - concrete base pulled out of ground. Operational since 1/1/1997. Weights: rotor = 10.3Te, hub = 26Te, tower 80Te.	TV news NDR 27/10 and 28/10. Also Oldenburgi newspaper. Extensive photos available.	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
182	Structural failure	20021027.2		10/29/2002	Navöygavlen	Norway	Nordex	Nacelle and rotor severed from the tower following problems with control system. Operators appear to have over-riden the safety system on the turbine brakes	Nordex AG statement dated 5 Nov 2002. Also Ventus Vigor wind energy portal online. Also "Accidents", D Krämer, BLS, Dec. 2000	http://www.ventusvigor.com/modules.php?name=News&file=article&sid=121
183	Blade failure	20021028		10/28/2002	Tauernwindpark Oberzeiring, Steiermark	Austria	Vesta V66	Turbine blades on turbine being installed damaged during storm. Winds reported at 130 km/hr.	Developer's website	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
184	Blade failure	20021104.1		11/4/2002	Tjaereborg, Esbjerg	Denmark	Vestas V80 2.0 MW	All three blades damaged. Turbine still being commissioned. Wind speed only 5-8 m/s (Force 4)	Nordfriesland paper of 6.11.2002. Ventus Vigor wind energy portal online. Also Windpower Monthly December 2002	http://www.ventusvigor.com/modules.php?name=News&file=print&sid=122
185	Miscellaneous	20021105		11/5/2002	Laubuseschbach, Limburg, Hessen	Germany	Fuhrländer	Lightning strike paralysed turbines and knocked out a rotor blade for brand new turbines not yet commissioned. The site has a high lightning strike rate and the development was rushed through by the local authority	Weilburger daily newspaper 13/11/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
186	Transport	20021115.1	P	11/15/2002	Hersfeld/Huenfeld, Hessen	Germany	Not applicable	56 tonne turbine section fell off overnight from transporter on public road	Darmstaedter Echo 16/11/2002. Also Weilburger Daily 16/11/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm
187	Transport	20021119		11/19/2002	Dahlenburg, Lueneburger	Germany	Not applicable	Transporter sagged but fortunately did not fully tilt. Main road to Dahlenburg Tosterglope closed until the following morning	Lueneburger newspaper of 20/11/2002	http://members.aol.com/fswemedien/ZZUnfaldatei_00_02.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
188	Structural failure	20021119.1		11/19/2002	Wachusett Wind Site, Princeton, MA	USA	Anemometer	Anemometer tower 130 feet high collapsed following an ice storm. The tower had been installed in July 2000. It was only 110 feet from a public trail.	Brief on the dangers of ice and structural failure at the proposed Wachusett reservation windfarm, presented to: The Joint Committee on Bonding, Capital Expenditures and State Assets at a public hearing on Bill S.40, Tuesday, July 5, 2005. With photos.	http://www.princetonwindfarm.com/Wachusett%20Mountain%20Wind%20Farm%20Danger%20Brief.pdf
189	Transport	20021203		12/3/2002	Oberlieck, Heinsberg	Germany	Not applicable	"Turbine transport causes substantial damage". Road, roundabout and housing badly damaged after turbine transporter slid on roundabout. Road between Breberen and Saeffelen closed for 3 hours.	Aachener messenger newspaper 4 Dec 2002	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
190	Ice throw	20021208.1	P	12/8/2002	Muensingen, Reutlingen, Wuerttemberg	Germany		Ice throws observed and photographed up to 130m from turbine on Dec 7th and 8th 2002. Pieces weighing up to 1.6kg	Private website with photographs and records	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm
191	Structural failure	20021218.1	P	12/18/2002	Schneeberg, Kirchheimbolanden	Germany	Vestas V80 2.0MW	Complete collapse of tower during commissioning. Turbine had been up for 2 weeks. Put down to faulty welding	Press release by Vestas (see online). Also Windpower Monthly January 2003. Also Rheinpfalz 19.12.2002. Photos	http://www.vestas.com/nyheder/presse/2002/UK/pres20021220uk.html
192	Blade failure	20021228.1	P	12/28/2002	Nevian, Aude	France	600kW, 75m total height	Blade torn off during storm followed by collapse of the turbine mast. The turbine was being installed at the time. The second of several such French incidents which led to a formal investigation of wind turbine safety	*"Rapport sur la sécurité des installations éoliennes", Conseil général des Mines, N° 04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	http://ventdubocage.net/accident.htm
193	Miscellaneous	20021231.1		12/31/2002	Horns Rev offshore wind park	Denmark	Vestas	Horns Rev was constructed during 2002. A presentation by the contractors reports zero fatalities, one lost time accident (therefore worker injury), six lost time accidents, and 39 near misses during the construction project.	*"The Horns Rev Offshore Contractors"* presentation to BWEA, safety section by Esbjerg Safety Consultants, page 16.	http://www.owen.eru.rl.ac.uk/documents/BWEA24/Nielsen31_Pres.pdf
194	Fire	20029999		2002	Bonnerup	Denmark	NEG Micon	No details of incident. Provision of analysis and advice to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
195	Fire	20029999		2002	Silkeborg	Denmark	DMP Molleservice	No details of incident. Restoration of analysis and advice to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
196	Fire	20029999		2002	Silkeborg	Denmark	DMP Molleservice	No details of incident. Provision of analysis and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
197	Fire	20029999		2002	Silkeborg	Denmark	Bonus Energy	No details of incident. Provision of analysis and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
198	Fire	20029999		2002	Lindesnes	Norway	NEG Micon	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
199	Fire	20029999		2002	Silkeborg	Denmark	Bonus Energy	No details of incident. Restoration of analysis and advice to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
200	Fire	20029999		2002	Hejnsvig	Denmark	NEG Micon	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
201	Fire	20029999		2002	Silkeborg	Denmark	Bonus Energy	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
202	Environmental	20030127.1		1/27/2003	Ober-Flörsheim bei Alzey im Kreis Alzey-Worms / Rheinland-Pfalz	Germany		Turbine constructed in December 2002 and leaking oil into the surrounding land. Attempts to capture the oil with granules failed. Quantity of oil not known. Local newspaper reported the leak which had been ongoing for over 1 month when discovered	Rhein-Mainer from 29.1.2003 + http://huegelland.tripod.com/	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
203	Miscellaneous	20030201.1		2/1/2003		Canada	Nordex 1.3MW	"Gearbox failure damages turbine". Date is of magazine publication	Windpower Monthly February 2003	
204	Fire	20030202		2/2/2003	Geesthacht im Kreis Herzogtum Lauenburg / Schleswig-Holstein	Germany	Enercon	Total destruction of 40m tower and turbine by fire. Fire was un-noticed and the fire brigade were not called out. Total loss.	TAZ Hamburg, 3.2.2003	http://members.aol.com/fswemedien/ZZUnfalldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
205	Blade failure	20030225.1		2/25/2003	Salles-Limousis, Aude	France	750kW	Three blades broke off during storm - from three separate turbines. Turbines were constructed in July 1998. Following the incident, 7 out of the 10 turbines on this site were shut down and were eventually dismantled	*"Rapport sur la sécurité des installations éoliennes", Conseil général des Mines, N° 04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.* Also La Dépêche of 26 February 2003	http://translate.google.com/translate?hl=en&sl=fr&u=http://www.juracretes.ch/centre1.asp/1-3-1301-145-83-1/0-0-884-147-70-0/&prev=/search%3Fq%3DSall%25C3%25A8les%2Bpales%2Bbris%25C3%25A9es%26hl%3Den%26lr%3D%26sa%3DG
206	Structural failure	20030301.1	P	3/1/2003	Wachusett Wind Site, Princeton, MA	USA	Anemometer	Anemometer tower 165 feet high collapsed. The tower had been installed two months previously. Date uncertaiun - simply says "March 2003"	Brief on the dangers of ice and structural failure at the proposed Wachusett reservation windfarm, presented to: The Joint Committee on Bonding, Capital Expenditures and State Assets at a public hearing on Bill S.40, Tuesday, July 5, 2005. With photos.	http://www.princetonwindfarm.com/Wachusett%20Mountain%20Wind%20Farm%20Danger%20Brief.pdf
207	Fatal	20030307		3/7/2003	Erneuter Tödlicher Autounfall bei Erftstadt-Erp, Westphalia	Germany		Third of three public fatalities at the same location put down to driver distraction. 25 year old driver of red Audi. Accident spot is where turbines become visible to drivers - on circular road 33 (Kreisstraße 33)	Kölner Stadtanzeiger-Erftkreis from 8.3.2003	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
208	Environmental	20030405		4/5/2003	Reinsberg im Kreis Freiberg / Sachsen, Saxony	Germany	Tacke 600a, 600kW, hub 70m, rotor diameter 46m	Turbine destroyed by storm spilled oil over a wide area. This is in a protected area for drinking water supply. Possible prosecution threatened (no information on whether it was carried out)	MDR-Radionachrichten of 5.4.2002. Also internet http://www.freiepresse.de/TEXTE/NACHRICHTEN/REGIONAL/ERZGEBIRGE/FREIBERG/TEXTE/590200.html and http://www.sz-online.de/nachrichten/artikel.asp?id=468790 Also see detailed internet report with photos (second right)	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
209	Structural failure	20030405.1	P	4/5/2003	Reinsberg im Kreis Freiberg / Sachsen, Saxony	Germany	Tacke 600a, 600kW, hub 70m, rotor diameter 46m	A spring storm totally destroyed a turbine. Automatic shut down failed and it ran out of control prior to destruction. Rotor blade points computed to reach speeds of 800km/hr. Blade pieces were found 500m away from the turbine. Houses are situated 400m from the turbine - luckily in the opposite direction. Surrounding roads were closed off. Year of construction 1999. Oil also spilled into the surrounding ground (see separate entry)	MDR-Radionachrichten of 5.4.2002. Also internet http://www.freiepresse.de/TEXTE/NACHRICHTEN/REGIONAL/ERZGEBIRGE/FREIBERG/TEXTE/590200.html and http://www.sz-online.de/nachrichten/artikel.asp?id=468790 Also see detailed internet report with photos (second right)	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
210	Fire	20030415		4/15/2003	Greußen im Kyffhäuserkreis / Thüringen	Germany	RePower 1.5 MW	The first of 2 fires at the same turbine within 3 weeks. This one was in the switchgear housing within the tower. Year of construction 2003	Thüringer Allgemeine, 12.5.2003. Photos.	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
211	Miscellaneous	20030421		4/21/2003	Iven im Kreis Ostvorpommern / Mecklenburg-Vorpommern	Germany		Rotor exchange required due to mechanical problems	Nordkurier, 30.7.2003	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
212	Environmental	20030504		5/4/2003	Dortmund-Eichlinghofen, Westphalia	Germany	General Electric 1.5MW, 100m hub, 77m rotor diameter	Oil leak into surrounding ground reported over several days	Homepage from 8.5.03 http://www.eichlinghofen-online.de/Aktuelles/aktuelles.html#Wind	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
213	Fire	20030511.1		5/11/2003	Greußen im Kyffhäuserkreis / Thüringen	Germany	RePower 1.5 MW	Lightning strike assumed - lound "bang" reported at 0500. Fire brigade called out but could do nothing because of the height. 4m piece of blazing blade reported to fall off. Year of construction 2003. Earlier fire at same turbine on 15/4/2003	Thüringer Allgemeine, 12.5.2003. Photos.	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
214	Blade failure	20030608		6/8/2003	Damme im Landkreis Vechta / Niedersachsen, Lower Saxony	Germany	Vestas V80	Lightning dame to turbine blades. Blade parts scattered over approx 150m area from the turbine. Blade pieces collected by operators who denied damage. Turbine built in 2001	Eyewitness reports and local newspaper Photos	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
215	Structural failure	20030615.1	P	6/15/2003	Colorado, CO	USA	WTC	The May 2002 accident caused an undetected crack in the turbine's rotorshaft and led to a second accident in June 2003. Date simply used as mid-point for the month	Info from developers own website	http://www.windturbinecompany.com/milestones/
216	Blade failure	20030623		6/23/2003	Wöhrden im Kreis Dithmarschen / Schleswig-Holstein	Germany	WKN - Windkraft Nord KG, Hedwigenkoog	Damage reported to windpark following local tornado on evening of June 23rd 2003	Reported in national newspaper Dithmarschener Landeszeitung / Brunsbütteler Zeitung from 25.6.03	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
217	Blade failure	20030714		7/14/2003	Köstorf im Kreis Lüneburg / Niedersachsen, Lower Saxony	Germany		Despite being fitted with lightning conductors, a lightning strike damaged turbine blades. Blade tips were broken off. Witnesses report a very loud "bang" when the lightning hit.	Lüneburger Zeitung, 15.7.2003	http://members.aol.com/fswemedien/ZZUnfaldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
218	Blade failure	20030715		7/15/2003	Kirburg bei Bad Marienberg / Rheinland-Pfalz	Germany		Lightning strike to two turbines - damage to multiple blades on each.	Eyewitness reports and 65594 Runkel. Photos	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
219	Environmental	20030718		7/18/2003	Lemgo Kreis Lippe, Westphalia	Germany	DeWind	Leak of 160 litres of hydraulic fluid into the surrounding ground. It ran down the mast and also to the end of each blade and so was distributed over a wide area. The area is a protected area used for drinking water supply.	Eyewitness, police and fire brigade reports	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
220	Miscellaneous	20030728		7/28/2003	Windpark Fiebig/Ostfriesland	Germany		80 tonne, 25m crane fell over during turbine assembly	Ostfriesische Nachrichten 1.8.2003	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
221	Human injury	20030730		7/30/2003	Castilla y León	Spain		Two workers badly burned following a fire in the windfarm control room. A 26 year old worker had first and second degree burns on 91% of his body - 30% on his face and nack. A second 30 year old worker suffered first and second degree burns on 60% of his body - 20% on his face and neck. The report says that the fire cause is unknown and that the second worker was burned trying to hekp the first.	Reported in Libertad Digital in January 2008	http://libertaddigital.com/index.php?action=desanoti&cpn=1275767476
222	Fire	20030814		8/14/2003	Feineburg bei St. Joost	Germany		Headline in newspaper reads "Fire at Wind Turbine". Fire reported at St Joost windpark, close to many hay bales. The fire brigade has to hose down the surrounding bales and ground to stop teh fire spreading.	Jeversches Wochenblatt vom 15.8.03	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
223	Fire	20030815.1	P	8/15/2003	Schwochel bei Ahrensbök im Kreis Ostholstein / Schleswig-Holstein	Germany	Vestas V52 850kW	Three mechanics were working on the turbine when they noticed a fire. They escaped but had to undergo hospital treatment for fume inhalation. An explosion followed which destroyed the turbine housing. This was later put down to brake failure (the turbine was spinning out of control).	Lübecker Nachrichten, 22.8.03. Also see http://members.aol.com/hieronymusbosch2/LuebeckerNachrichten2.GIF	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
224	Blade failure	20030823		8/23/2003	Opitzhöhe nahe Groß-Opitz bei Dresden / Sachsen, Saxony	Germany		Lightning damage to blade tip. Turbine safely shut down. Blade eventually replaced	Sächsische Zeitung, 29.8.03	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
225	Structural failure	20030911.1	P	9/11/2003	Miyakojima Island	Japan	Micon M750/400kW and Enercon E40/500kW	Six turbines wrecked in high winds from Typhoon Maemi. Two Micon M750/400kW turbines and one Enercon E40/500kW turbine completely collapsed. The other three turbines suffered broken blades and damaged nacelle covers.	"Damaged of wind turbines on Miyakojima Island by Typhoon Maemi in 2003" - report from Okinawa Electric Power Company R&D department	
226	Fatal	20030918.1		9/18/2003	Tres Vaqueros Wind Farm, Byron, Alamont Pass, CA	USA	Howden 330 kW, built in 1985	Marty Evans, 34. At the time of the accident the employee was performing a manual switching operation on a pad-mounted electrical transformer. An explosion occurred during the switching operation. The employee died the following day from injuries sustained in the explosion. The explosion ignited a fire at the base of the turbine, for which the California Department of Forestry (CDF) was immediately notified.	Kittitas County, Desert Claim Wind Power Project, Final EIS, Chapter 3, page 3-165. Also Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe	http://www.co.kittitas.wa.us/cds/feis/FEIS/Chapter3/3.8Health.pdf
227	Fatal	20031015.1		10/15/2003	Neuruppen, Brandenburg	Germany	Enercon E66	Un-named, 25-year old man, working on ladder rail, disconnected rail, fell 30m through platform, hit head on lower platform rail.	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe. Also Prinzitger Zeitung newspaper 16/10/2003, message broadcast 15/10/2003 and newspaper death notice	http://www.wind-works.org/articles/FallfromE66.html
228	Environmental	20031016.1	P	10/16/2003	Derrybrian, County Galway	Ireland		In October 2003, a major landslide involving more than a half million cubic metres of peat took place over a distance of two kilometres at Derrybrien, County Galway, damaging property and killing an estimated 50,000 fish. The landslide was caused by work on Ireland's largest wind-farm project. The EC are taking Ireland's government to the European Court of Justice over the incident, which the EC describes as an "environmental disaster" Ref EIHP 14-April 2005 - see http://www.eihp.hr/english/detaljnije.php?id=126	RTE News 17 Oct 2003. See: http://www.rte.ie/news/2003/1017/landslide.html. Also photos in North Atlantic news	http://www.monasette.com/archive/000252.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
229	Blade failure	20031101		11/1/2003	Wachusett Wind Site, Princeton, MA	USA	120 foot tower	All three blades disintegrated on existing wind tower generator. An anchoring pin gave way, allowing the tower to tilt forward until the rotating blades struck the tower. The blades disintegrated showering the area with debris - some up to 5 feet long. Date uncertain - simply refers to "November 2003"	Brief on the dangers of ice and structural failure at the proposed Wachusett reservation windfarm, presented to: The Joint Committee on Bonding, Capital Expenditures and State Assets at a public hearing on Bill S.40, Tuesday, July 5, 2005. With photos.	http://www.princetonwindfarm.com/Wachusett%20Mountain%20Wind%20Farm%20Danger%20Brief.pdf
230	Environmental	20031101		10/31/2003	Eastern US states (general)	USA		"Alarming Evidence of Bat Kills in Eastern US - serious levels of bat mortality at wind turbine sites". Scientists have called for the wind industry to help reduce serious bat mortality rates after it emerged that bat kills are a major and unexpected problem at wind turbine sites in Eastern US. Th issue came to a head after the death of what was described as an "alarming" number of bats at a single wind farm over a four week period.	Wind Power Monthly, October 2003.	
231	Fire	20031108		11/8/2003	Sitzerath bei Nonnweiler im Kreis St. Wendel / Saarland	Germany		Turbine fire at 80m height. Mechanical source quoted "probably the engine overheated" said police. Fire brigade could do nothing due to the height of the fire. Surrounding districts closed off until the fire burned itself out.	Saarbrücker Zeitung, 10.11.03	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
232	Blade failure	20031115.1	P	11/15/2003	Salles-Limousis, Aude	France	750kW	Three turbines with broken blades, 48m high, 43m diameter blades. 21.7m blade piece weighing 2 tonnes thrown. Smaller pieces thrown as far as 100m from turbine.	Midi Libre, Saturday 15 Nov 2003	http://ventdubocage.net/accident9.htm
233	Blade failure	20031215		12/15/2003	Windpark Klein-Wassens bei Jever, im Kreis Friesland / Niedersachsen, Lower Saxony	Germany	Vestas V80	Damage to rotor blade by lightning. Residents informed police. Turbine safely shut down with blade remaining attached.	Anzeiger für Harlingerland 16.12.2003 (front page) and Jeversches Wochenblatt 16.12.2003	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
234	Blade failure	20031216		12/16/2003	Windpark Grevenbroich bei Neuss, Westphalia	Germany		37m long blade section bent in storm. Turbine safely shut down. Blade did not fall off.	Rheinische Post and the Westdeutsche Zeitung, 17.12.2003	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
235	Blade failure	20031221		12/21/2003	Borkum offshore windpark	Holland		Navigation warning NR 94 210605UTC broadcast to warn shipping of four turbine blades which had been lost from the Borkum offshore windpark and were floating in the shipping lanes. Blades were 21 x of 1.5 meters; position 52-37.1N 003-17.5E - classified as dangerously for navigation	Emergency broadcast from Netherland Coastguard 21-12-2003	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
236	Fire	20031223.1	P	12/23/2003	Zobes, Gemeinde Neuensalz im Vogtlandkreis / Sachsen, Saxony	Germany	NED WIND 40m high	Lightning strike destroyed a blade and started a fire which destroyed part of the turbine housing. One blade badly bent, remained on the turbine. A second blade fell off. Constructed in 1994	"Freie Presse" and "Vogtlandanzeiger" from 27 and 28.12.2003. Photos.	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
237	Environmental	20031223.2		12/23/2003	Woolnorth Farm, Tasmania	Australia		"Bird death sparks Hydro Tas monitoring". An endangered wedge-tailed eagle was killed last week after colliding with a wind turbine. Site operators Hydro released a list of birds and bats killed since the turbines began operation in October 2002. In 14 months, 20 birds and 11 bats have died. The eagle killed last week was the only threatened species listed.	ABC News online, Tuesday Dec 23rd 2003	http://www.abc.net.au/news/newsitems/200312/s1015065.htm
238	Fire	20031226		12/26/2003	Bad Wünnenberg bei Paderborn, Westphalia	Germany	Enercon E66 1.8MW	Fire started in the turbine housing and eventually two blazing blades fell off. Burning debris reported to travel several hundred meters. Fire brigade could do nothing because of the height.	"Neue Westfälische", "Westfalenblatt" and other local media from 27 and 28.12.2003. Photos	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
239	Blade failure	20031229		12/29/2003	Windpark Boulogne-sur-Mer	France	Lagerwey 750kw	Blade parts weighing several tonnes fell onto an area used by local fishermen and walkers. "Pure luck" that no-one was injured. Area closed off to public. Boulogne prosecutors office undertaking investigation. Another French incidents which led to a formal investigation of wind turbine safety	Local newspapers in Boulogne-sur-Mer and internet site "www.eoliennes.net"	http://members.aol.com/fswemedien/ZZUnfalldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
240	Human injury	20031231		12/31/2003	Cabo Vilán windfarm, Galicia	Spain		Los parques eólicos se convierten en otro escenario de graves accidentes laborales (in spanish - trans. - Wind parks become another scene of serious labour accidents). The article reports serious injury to a windfarm worker in December 2003. The unnamed worker was hospitalised and returned there three times to undergo operations.	Reported in La Voz de Galicia on 5 February 2009	http://www.rojoynegro.info/2004/spip.php?article25628
241	Fire	20039999		2003	Nakskov	Denmark	Bonus Energy	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
242	Fire	20039999		2003	Silkeborg	Denmark	Bonus Energy	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
243	Fire	20039999		2003	Middelgrunden, Copenhagen	Denmark	Bonus Energy	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
244	Fire	20039999		2003	Silkeborg	Denmark	DMP Molleservice	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
245	Fire	20039999		2003	Tjaereborg, Esbjerg	Denmark	NEG Micon	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
246	Fire	20039999		2003	Gedser	Denmark	Bonus Energy	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
247	Fire	20039999		2003	Silkeborg	Denmark	Bonus Energy	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
248	Fire	20039999		2003	Nysted Havmollepark, Gedser	Denmark	Bonus Energy	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
249	Fire	20039999		2003	Hokkerup/Rinkenaes	Denmark	ESS	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
250	Ice throw	20039999		1990 to 2003		Germany		880 cases of reported icing events from 1990 to 2003, 33% on the coastline and lowlands, 67% in the mountains	"A Statistical Evaluation of Icing Failures in Germany's '250 MW Wind' Programme – Update 2003, M Durstwitz, BOREAS VI 9-11 April 2003 Pyhätunturi, Finland.	
251	Miscellaneous	20039999		2003	Middelgrunden, Copenhagen	Denmark	Bonus Energy	No details of incident. Provision of analysis and advice to corroded components on three wind turbines. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
252	Miscellaneous	20039999		2003	Bouin en Vendée	France	2MW	Turbine bases found to have cracks and breaks. Constructed in 2002, operational from June 2003.	Internet	
253	Structural failure	20040101.1	P	1/1/2004	Portal, Boulogne-sur-Mer	France	Lagerwey 750kw	30m turbine collapsed during a storm. Two blade first broke off (2 days earlier?), followed by collapse of the turbine mast. Total loss. The third of several such French incidents which led to a formal investigation of wind turbine safety. Local newspaper reports 80 tonnes fell to ground.	Windpower Monthly May 2004. Also Dunkerque - Voix de Nord 2/2/2004. Also *"Rapport sur la sécurité des installations éoliennes", Conseil général des Mines, N° 04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	http://www.espace-eolien.fr/lille/centrportel.htm
254	Blade failure	20040109		1/9/2004	Windpark Roderhöhe bei Eupen, East Belgium	Belgium	Vestas V80 2MW	Lightning strike led to exploding blade. Also lightning damage reported to generator	Grenz-Echo ("Border Echo" - German language Belgian newspaper), 27.1.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
255	Miscellaneous	20040115		1/15/2004	Windpark Oberstrahlbach	Austria	WEB Windenergie AG	25,000 euro damage reported after lighting damaged a turbine.	Web reference (on right)	http://www.igwindkraft.at/aktuell/a_archiv3.htm
256	Blade failure	20040115.1		1/15/2004	Windpark Sas, Wilhelminadorp in der Provinz Zeeland	Holland		Three blades lost after lightning strike. Akll three blades exploded due to the heat of the strike.	Zeeland Local Radio of 16/1/2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
257	Miscellaneous	20040206		2/6/2004	Haverlah - Samtgemeinde Schöppenstdt im Kreis Wolfenbüttel / Niedersachsen	Germany	Enercon	200,000 euro damage reported following failure of gondola turning mechanism on tower.	Reported in newspaper Salzgitter Zeitung from 13.2.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
258	Blade failure	20040209.1	P	2/9/2004	Oederquart bei Stade / Niedersachsen, Lower Saxony	Germany	Vestas V66	2 tonne piece of blade broke off and travelled 66m. Cause - pin breaking. Identical accident to one of 15/3/2001	Stader Tageblatt, 10.2.2004	http://members.aol.com/fswemedien/ZZUnfalldatei_00_02.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
259	Blade failure	20040209.1		2/9/2004	Groß Bieberau-Hippelsbach im Kreis Darmstadt-Dieburg / Hessen	Germany		Blades torn off during storm. Small 5kW turbine only, initially constructed as a pilot project in 1995	Darmstädter Echo, 10.2.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
260	Blade failure	20040222		2/22/2004	Puschwitz bei Bautzen / Sachsen, Saxony	Germany	Vestas V80	10m section of blade broken off by the wind, travelled 20m. A further 6m piece travelled 40m. Pieces confirmed to 200m from turbine. Constructed in 2001. A similar (almost identical) incident took place at the same site on 5/4/2004. Lightning damage in mid-February suspected to have weakened the blades.	Sächsische Zeitung, 24.2.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
261	Ice throw	20040226		2/26/2004	Lankern bei Dingden, nahe Hamminkeln Kreis Wesel, Westphalia	Germany		Four out of five turbines closed down because of danger to people from thrown ice. Up to 0.5m pieces reported but no distance data. Residents informed police who insisted on shutdown. Shutdown between 2 and 3 days	Bocholt-Borkener Volksblatt, 28.2.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
262	Structural failure	20040320.1	P	3/20/2004	Loon Plage, Port de Dunkerque	France	Lagerwey 300kw	30m high turbine collapsed during a storm on March 20. The third incident since the turbines were built in 1997. The turbines were later dismantled for safety reasons. Previous incidents include turbine collapse on January 1 and the breaking of a blade in February 2002 at Wormhout. Following this incident, the French carried out a formal investigation of wind turbine safety, published in July 2004	Windpower Monthly May 2004. Also Dunkerque - Voix de Nord 20/3/2004 and 21/3/2004. Also *Rapport sur la sécurité des installations éoliennes. Conseil général des Mines, N°04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	http://ventdubocage.net/accident5.htm
263	Blade failure	20040321		3/21/2004	Carolinensiel in Ostfriesland / Niedersachsen, Saxony	Germany	Tacke TW-600	Rotor blade bent during storm. Some pieces flew off. No further data.	Jeversches Wochenblatt 22.03.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
264	Blade failure	20040405		4/5/2004	Puschwitz bei Bautzen / Sachsen, Saxony	Germany	Vestas V80	10m section of blade broken off by the wind. TV pictures showed blade part hanging from the rotor. Constructed in 2001. Second such accident at the same site - previous one on 22/2/2004	MDR-Fernsehbericht with pictures from Tag, 6.4.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
265	Blade failure	20040501		5/1/2004	Bassen bei Oyten im Kreis Verden /Aller / Niedersachsen, Lower Saxony	Germany	Vestas V66	Lightning strike destroyed the blades, close to motorway A1.	Verdener Allerzeitung, 28.5.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
266	Blade failure	20040518		5/18/2004	Dautenheim bei Alzey im Kreis Alzey-Worms / Rheinland-Pfalz	Germany	54m rotor	Broken rotor reported. Turbines constructed in 2000.	Main-Rheiner from 18.6.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
267	Fire	20040609.1	P	6/9/2004	Wulfshagen/Tüttendorf im Kreis Rendsburg-Eckernförde / Schleswig-Holstein	Germany	NEC MICON 2MW	Lightning strike caused the Tuttendorf turbine fire, despite lightning "protection" fitted to turbine. At 64m high, the fire brigade could do nothing but seal the area and watch. Federal highway 73 was closed for some time. Photos clearly show burning debris being spread across the area.	Spiegel Online, www.tagesschau.de and others	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
268	Miscellaneous	20040617		6/17/2004	Horns Rev offshore wind park	Denmark	Vestas	Report that all 80 offshore turbines at Horns Rev need to be taken ashore for repair due to transformer and generator failure.	Die Zeit from 17.6.2004 (supplement)	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
269	Blade failure	20040628.1		6/28/2004	St. Thegonnec, Pleyber-Christ, Finistere, Brittany	France	300kW	Turbine blade bent and damaged its mast. First of two incidents in ten days. Safety concerns.	Ouest France, vendredi 9 juillet 2004. *Also: Rapport sur la sécurité des installations éoliennes. Conseil général des Mines, N°04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	http://ade62.net/breve.php3?id_breve=9
270	Miscellaneous	20040630.1		6/30/2004	Windy Hill wind farm, Ravenshoe, Cairns, Queensland	Australia	600kW Enercon, installed 1999-2000	Windy Hill Wind Farm turbines were found to have a type fault related to its main carrier bearing. The plant supplier replaced all affected parts and is working with Stanwell on a long-term solution to this issue. Date uncertain - sometime between July 2003 and June 2004	Stanwell Corporation 2004 Annual Report, July 2003-June 2004	http://www.stanwell.com/PDF/SCL_ANNUAL_REPORT_2004.pdf
271	Blade failure	20040708.1		7/8/2004	St. Thegonnec, Pleyber-Christ, Finistere, Brittany	France	300kW	Three pieces of blade from one of the five turbines were found in a field. Two pieces 2.5m long, the third piece 1.5m long. Second such incident in ten days. Safety concerns.	Ouest France, vendredi 9 juillet 2004. *Also: Rapport sur la sécurité des installations éoliennes. Conseil général des Mines, N°04-5. Ministere de l'economie des finances et de l'industrie, Republique Francaise, July 2004.*	http://ade62.net/breve.php3?id_breve=9

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
272	Fatal	20040716		7/16/2004	Wittmund in Ostfriesland / Niedersachsen, Lower Saxony	Germany	Enercon E66	34-year old Enercon service technician Alwin K. fell from the turbine to his death	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe. Updated May 2005. Also Death notice in Anzeiger für Harlingerland Wittmund and supplemental information	
273	Human injury	20040728		7/28/2004	Windpark Schwirzheim nahe Büdesheim bei Prüm im Kreis Bitburg-Prüm / Rheinland-Pfalz	Germany		Blade part fell from a crane, injuring a 42-year old worker. He was on a platform 12m up at the time - knocked down to a height of 4m during the accident. He had to be rescued by fire brigade, and later underwent emergency surgery at Trier.	Polizeiinspektion Prüm and Trierischer Volksfreund from 29.7.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
274	Fire	20040809.1		8/9/2004	Isselburg im Kreis Borken, Westphalia	Germany		Fire at 96m height in Isselburg. Cause unknown. Fire brigade could do nothing due to height. Surrounding area closed off until fire burned out. No injuries	Polizei Borken, Borkener Zeitung, Westdeutscher Rundfunk from 9.8.2004 and 10.8.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
275	Fire	20040810		8/10/2004	Borkum offshore windpark	Holland		Fire in ship "Kingfisher" reported while undertaking geological investigations for the Borkum offshore windpark. 35 crew members reported safe	Reported in Jeversches Wochenblatt http://www.jewo-online.de/ from 11.8.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
276	Blade failure	20040831.1		8/31/2004	Zeebrugge	Belgium		The three tonne propeller blade became detached and was blown 100 metres through the air. It landed not far from the nearby natural gas terminal. Date is of newspaper article	Het Gazet van Antwerpen 31 August 2004. Also Wind Farm Monthly, October 2004	http://www.expatica.com/source/site_article.asp?subchannel_id=48&story_id=11261
277	Blade failure	20040901		9/1/2004	Helmshagen bei Greifswald / Mecklenburg-Vorpommern	Germany	Vestas	Blade thrown from turbine. No further details	Ostsee-Zeitung Greifswald from 3.9.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
278	Fatal	20040914.1		14/09/2004	Meyersdale, Somerset, PA	USA	1.6MW, Vestas, FPL site	52 year old Dane Niels Otto Andersen Sjolander was killed after falling 60 feet to his death. He had completed maintenance on the turbine and was being lowered to the ground when the turbine started turning and broke the arm of the crane. He was knocked out of the basket and fell to his death. Date given is of Associated Press report (see "Phillyburbs" weblink)	Wind Energy -- The Breath of Life or the Kiss of Death: Contemporary Wind Mortality Rates, by Paul Gipe. Updated May 2005. Also Wind Power Monthly, October 2004. Also Associated Press report 14/9/2004	http://www.phillyburbs.com/pb-dyn/news/103-09142004-365282.html
279	Fire	20040926		26/09/2004	Klein Bennebeck, im Kreis Schleswig-Flensburg / Schleswig-Holstein	Germany		Fire during the night in rurbine atop a 70m tower. Due to height, fire crews could only watch it burn out.	Source is url (see right)	http://www.ffw-klein-bennebek.de/wbb2/thread.php?postid=201#post201
280	Ice throw	20041114		11/14/2004	Carzig im Kreis Märkisch Oderland / Brandenburg	Germany		30cm pieces of ice reported thrown 75m to nearby road. No injuries. Ice thrown at turbine start up following shut-down due to ice formation!	Märkische Oderzeitung, 17.11.04	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
281	Transport	20041125.1	P	11/25/2004	Niederkirchen bei St. Wendel / Saarland	Germany		45m turbine section rammed a house, causing significant damage. House had to be supported due to structural damage caused. Road closed for considerable time. Danish truck and driver.	Saarbrücker Zeitung-Ausgabe St. Wendeler Zeitung from 26.11.2004	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
282	Fire	20041207.1		12/7/2004	Schaller, near Storm Lake, IA	USA	MidAmerican Energy	Firemen climb 213 feet tower to rescue two electrical workers following a fire. Fire started following refit and testing of components	"Firemen climb 213-ft Tower In Rescue", Dec 7 2004, Zwire news	http://www.zwire.com/site/news.cfm?newsid=13505645&BRD=1304&PAG=461&dept_id=180485&rfi=6
283	Ice throw	20041212		12/12/2004	Rhede, Kreis Borken, Westphalia	Germany		30cm long and several cm thick pieces of ice reported thrown onto road and cycle tracks during weekend. Turbine shut down. Police report is available. No injuries	Borkener Zeitung, 14.12.2004. Also police report	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
284	Ice throw	20041212		12/12/2004	Lankern bei Dingden, nahe Hamminkeln Kreis Wesel, Westphalia	Germany		All five turbines on site reported to throw ice despite being fitted with ice sensors. Up to 50 pieces of ice found by reporter, to 100m from turbines and across the B473 road. Some sharp pieces of ice reported "rammed into the ground". What would it have done to a person?	Rheinische Post Wesel, 13.12.2004. Photos	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
285	Transport	20041218		12/18/2004	BAB A 5 bei Alsfeld, Vogelsbergkreis / Hessen	Germany		Turbine section fell of transporter and blocked motorway A5 for 14 hours in both driving directions. Accident put down to excessive speed. No-one hurt	Bild am Sonntag 19.12.2004, Frankfurter Neue Presse from 20.12.04 u.a. Zeitungen	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
286	Structural failure	20041222		12/22/2004	Friese Pingjum	Holland	Lagerwey LW 18/80	Rotor completely topped from tower.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
287	Blade failure	20041222.1	P	12/22/2004	Windparks Montjoyer/Rochefort-en-Valdaine	France		Three blades lost from turbine only 15 days after startup. Following maintenance, the turbine gave out more noise than normal and this got worse over several days. A fire then started. A blade came off approx 1 hour after that, then the second and third blades fell off. Police and fire brigade were called. No-one hurt. A brake fault has been acknowledged - turbine was turning at 50rpm (2 times normal speed).	La Tribune Montelimar 30 Dec 2004	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
288	Miscellaneous	20041230.1	P	12/30/2004	Pattensen bei Hannover / Niedersachsen, Lower Saxony	Germany	AT Bonus 1300	Rotor cap reported to fall off the turbine onto the surrounding ground sometime between 30 and 31 December	Allgemeinen Zeitung from 31.12.2004	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
289	Environmental	20049999		1/8/2004 to 13/9/2004	Charleston, WV	USA	Various	A study of wind farms in West Virginia and Pennsylvania estimates as many as 2,600 bats were killed by the whirling blades during a six-week period during 2004. Researchers estimate that between 13-hundred and nearly two-thousand bats were actually killed in that period at the Mountaineer Wind Energy site in Tucker County. The study estimates another 400 to 600 were killed at the Meyersdale Wind Energy Center in Pennsylvania. The site has 20 wind towers. Between August First and September 13th, 2004, researchers with the Bats and Wind Energy Cooperative found 765 dead bats on the ground at the Mountaineer site, which has 44 wind towers.	Eyewitness News, June 6 2005	http://www.wchstv.com/newsroom/wv/news11.shtml
290	Fatal	20049999		2004		Sweden	Vestas	"In 2004, Vestas Northern Europe experienced a fatal accident in Sweden. The cause of the incident has been investigated, and the investigation concluded that the wind turbine, the documentation of the working procedure and the training supplied were all in accordance with current demands. The accident occurred because safety regulations had been disregarded." Quote from Annual Report	Vestas 2004 Annual Report	http://www.vestas.com/pdf/miljoe/anlaegsomraader_uk/2004/48964%20VES%20Bla%20Videbaek%20UK.pdf
291	Fatal	20049999		2004	Hontalbilla de Almazán, Soria	Spain		Los parques eólicos se convierten en otro escenario de graves accidentes laborales (in spanish - trans. - Wind parks become another scene of serious labour accidents). The article reports the death of Pablo Reymúndez Arijón, a windfarm worker at Hontalbilla de Almazán, Soria in 2004. He worked for Gamesa. The company were later fined 30,000 euros for failing to provide appropriate supervision	Reported in La Voz de Galicia on 5 February 2009	http://www.rojoynegro.info/2004/spip.php?article25628
292	Fire	20049999		2004	Hovsore, Bovlingbjerg	Denmark	NEG Micon	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
293	Fire	20049999		2004	Brystrup	Denmark	NEG Micon	No details of incident. Provision of analysis, advice and restoration to fire and explosion damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
294	Fire	20049999		2004	Hedwigenkoog	Germany	Bonus Energy	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
295	Fire	20049999		2004	Silkeborg	Denmark	NEG Micon	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
296	Fire	20049999		2004	Hobro	Denmark	Vestas	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
297	Fire	20049999		2004	Skaerbaek	Denmark	Vestas	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
298	Fire	20049999		2004	Rosnaes	Denmark	Alternative Wind Technology	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
299	Fire	20049999		2004	Silkeborg	Denmark	Alternative Wind Technology	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
300	Fire	20049999		2004	Silkeborg	Denmark	Bonus Energy	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
301	Fire	20049999		2004	Silkeborg	Denmark	DMP Molleservice	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
302	Miscellaneous	20049999		2004	Aalborg	Denmark	Bonus Energy	No details of incident. Provision of analysis and advice on damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
303	Miscellaneous	20049999		2004	Horup	Germany	Bonus Energy	No details of incident. Provision of analysis, advice and restoration to short-circuited component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
304	Miscellaneous	20049999		2004	Meenycat	Ireland	Bonus Energy	No details of incident. Provision of analysis and advice on water damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
305	Structural failure	20050108		1/8/2005	Visafslag Lauwersoog	Holland	Lagerwey LW 15/75	Complete rotor collapse during storm	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
306	Environmental	20050117		1/17/2005	Schluechtern Hohenzell in the Main Kinzig circle/Hessen	Germany	3 x WindWorld 600kW	Loss of hydraulic fluid into surrounding ground. Serious concerns over environmental pollution from all three turbines - which have been in place since 1998. Local environmental regulator considering prosecution. (Outcome not known)	Detailed local reports and photos from adjoining owners	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
307	Blade failure	20050120.1	P	1/20/2005	Udby, north of Vordingborg	Denmark	100 foot turbine	Turbine running out of control (braking failure) – the three 30m blades broke off with pieces thrown over a large area. Residents evacuated from homes. Luckily no injuries or property damage.	Danish TV article - online report. Also second TV report online	http://www.tv2regionerne.dk/Default.asp?r=3&Id=225094
308	Structural failure	20050122		1/22/2005	Wijnaldum above Harlingen	Holland	Lagerwey LW 15/75	Complete rotor collapse during storm over night of Jan 21/22. A blade was thrown 200m.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
309	Ice throw	20050130		1/30/2005	Bölling bei Dahl, Stadtgebiet Hagen/Westf. im Kreis Hagen, Westphalia	Germany		Three members of the public heard four "bangs" from the Bölling turbines while walking near them. They also observed snow thrown up near them. Thinking gun shots, they informed the police. It was discovered to be ice thrown from the turbines. They were shut down.	Westfalenpost from 1 Feb 2005 and Hagener Stadtanzeiger from 2 Feb 2005.	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
310	Ice throw	20050201		2/1/2005	Schlüchtern-Hohenzell im Main-Kinzig-Kreis / Hessen	Germany	WindWorld 600kW	Ice throw on January 31st and February 1st. Pieces approx 1.5m x 0.45m thrown 140m. Landed on local road. Traffic now banned which means large detours and loss of amenity.	Report from city administration and report plus photos from neighbours	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
311	Miscellaneous	20050201		2/1/2005	Dorsten-Lembeck by Marl, Westfalia	Germany	GE 1.5 MW	Rotor damage and replacement after only 14 months of operation.	Detailed private report and photos.	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
312	Human injury	20050202		2/2/2005	Voigtstedt / Thüringen	Germany		30-year old mechanic from Helbra injured doing repair work. Injury crushed his foot, he then fell off the turbine top. His life was saved by a safety harness. Arterner fire brigade eventually retrieved him.	Thüringer Allgemeine from 3.2.2005	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
313	Miscellaneous	20050202		2/2/2005	Dorsten-Lembeck bei Marl, Westphalia	Germany	GE 1.5 MW	Complete rotor replacement following problems with Actuators. Turbine only 14 months old	Detailed operator reports plus reports and photos from neighbours	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
314	Structural failure	20050212		2/12/2005	Hornhuizen by Groninger Waddenkust	Holland	Vestas V29/225	Complete destruction of turbine in storm following brake failure	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
315	Miscellaneous	20050215		2/15/2005	Maasvlakte	Holland	Nedwind 62/1.00	Complete destruction of turbine following lightning strike.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
316	Blade failure	20050224		2/24/2005	Kamaishi, Iwate	Japan	Nagasaki Shipyard made, 68m tower, 29.5m blade	Turbine blades on three separate turbines snapped off in gale. Winds reached 31.7m/s, turbines and blades rated to 60m/s.	Mainichi Interactive – Top News, Feb 25 2005. Photo.	http://mdn.mainichi.co.jp/news/archive/20050225/p2a00m0dm002000c.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
317	Fire	20050226		2/26/2005	Friedrich-Wilhelm-Lübkekoog - Kreis Nordfriesland/Schleswig-Holstein	Germany	Enercon E66	Major fire with total loss. Pieces of burning blades scattered over wide area. Fire brigade told local residents to stay indoors and close windiows due to poisonous fumes. Fire brigade unable to fight fire due to height, so was allowed to burn out. Mechanics had been working on the turbine before the fire started.	Husumer Nachrichten + Nordwest-Zeitung from 28.2.2005 + Nordclick	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
318	Blade failure	20050310.1		3/10/2005	Gebbies Pass, Banks Peninsula, near Christchurch	New Zealand	Windflow Technologies prototype	Gearbox and main rotor assembly ripped from mountings during a storm. Total loss. Developers "thankful; none of our staff were injured". This is a test turbine for a proposed 104 turbine development. Two blades were first torn off - the rest followed.	Manawatu Standard, 11/3/2005 and New Zealand Herald, 12/3/2005	http://www.nzherald.co.nz/index.cfm?ObjectID=10114869
319	Blade failure	20050407.1	P	4/7/2005	Crystal Rig, Berwickshire, Scotland	UK	Nordex tower, 40m blade, 2.5MW	40m blade shattered – parts thrown hundreds of meters. Turbines only operational since August 2004.	BBC news online 14/4/05. Plus "The Berwickshire News" 14 April 2005. Photos on both.	http://www.berwickshiretoday.co.uk/ViewArticle2.aspx?sectionid=972&articleid=997456
320	Structural failure	20050506.1	P & V	5/6/2005	Weatherford, Oaklahoma	USA	GE Wind 1.5 MW	A 300-foot turbine snapped in half and collapsed at a wind farm in Weatherford on Friday. Video coverage reports very light winds at the time. There are 71 x 1.5MW turbines and was only declared operational on April 30 2005 - 6 days before the tower collapse.	Channel Oaklahoma News, 6 May 2005. With video.	http://www.channeloklahoma.com/news/4459503/detail.html
321	Fatal	20050507		5/7/2005	Marsberg-Erlingshausen - Hochsauerlandkreis, Westphalia	Germany		35 year-old male mechanic killed while fixing rotor transmission. He and a fellow worker secured the rotor and began working on it when the rotor turned. He was fatally injured and his colleague also injured. The Dortmund fire brigade rescue helicopter was used as they were at 65m height. The man killed was from Paderborn.	Westfalenpost from 9.5.2005	http://www.rp-online.de/public/article/nachrichten/journal/katastrophe/deutschland/nrw/88675
322	Fire	20050514		5/14/2005	Sörup bei Schleswig - Kreis Schleswig-Flensburg/Schleswig-Holstein	Germany		Fire-brigade unable to fight fire at wind turbine on Saturday evening - due to the height of the fire. The fire was allowed to burn out. The surrounding areas was sealed off to allow burning debris to fall to the ground. The cause of fire as well as the extent of the damage are still unknown.	NDR-Online from 15.5.2005	http://www1.ndr.de/ndr_pages_newsdetail/0,2984,NID20050515122053_NTBNDR_SPM870,00.html
323	Fire	20050516.1	P & V	5/16/2005	Wulfshagen/Tüttendorf im Kreis Rendsburg-Eckernförde / Schleswig-Holstein	Germany	NEC - Micon 2MW	A burning wind turbine caused two million Euro damage on Monday afternoon in Wulfshagen. The cause is not known. Nobody was hurt. The fire brigade could do nothing due to the height of the tower - they sealed the area off to allow burning debris to fall while the fire burned out. A lightning strike at the same site caused a similar fire last year (9.6.2004). Photos are available of both incidents	Kieler Nachrichten from 17.5.2005	http://www.kn-online.de/news/archiv/?id=1643325
324	Fatal	20050519		5/19/2005	Crosby County, TX	USA	Anemometer	Local newspaper reports death of crop dusting pilot who flew into an anemometer for a wind farm development. The 400 foot structure had only been recently installed (4 weeks old), and was not fitted with any warning devices. The plane hit a guy rope which sheard off a piece iof the wing. The pilot, 55 year old Bill Wade Tidewll, was pronounced dead at the scene. FAA is investigating.	Lubbock Avalanche-Journal, 20 May 2005 Also mentioned in the July/August "Agricultural Aviation" magazine	http://www.lubbockonline.com/stories/052005/reg_052005054.shtml
325	Blade failure	20050523		5/23/2005	Herzfelde im Kreis Märkisch-Oderland/ Brandenburg	Germany	Vestas	Article in Nordkurier showing Vestas workers at Maerkisch Oderland on a lifting platform at 70m height repairing small tears in rotor blades. The article says "They eliminate small tears in the rotor blades formed by weather effects" However - these tears are usually formed by production defects.	Nordkurier, 24.5.2005	http://members.aol.com/fswemedien/ZZUnfalldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
326	Environmental	20050602		6/2/2005	Beinhausen bei Kelburg im Kreis Daun, Rheinland-Pfalz	Germany	DeWind	Significant contamination of the site and surrounding ground from leaking oil. Transmission oil leak down the tower and also out across the blades - thrown over a wide area. Leak reported to be 160m from the tower - without taking the scattered oil from the blades into account.	Eifelzeitung Daun from 1 July 2005, with photos	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
327	Blade failure	20050604		6/4/2005	Eggstedt im Kreis Dithmarschen / Schleswig-Holstein	Germany	Jacobs 43/600kW	Turbine blade was broken off during a storm at Eggstedt. Further report will follow. One turbine only in place - operational since April 1998	Sylter Rundschau from 6.6.2005	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
328	Environmental	20050606		6/6/2005	Scroby Sands, Norfolk	UK		Staff at the wildlife hospital at Winterton, Norfolk, say hundreds of seals on Scroby Sands off Great Yarmouth have been so disturbed by the 300-foot turbines there that it is affecting their breeding. Many pups are born dead or abandoned by frightened mums. Jaime Allison, a biologist at the hospital, said: "A definite pattern is emerging. It's hard not to conclude the wind farm is responsible."	Daily Mirror, 6 June 2005	http://www.mirror.co.uk/news/tm_objectid=15595416&method=full&siteid=94762&headline=windfarm-seal-alert-name_page.html
329	Structural failure	20050620		6/20/2005	Saskatchewan	Canada		"Twister wrecks wind power equipment". Cranes and turbine blades damaged by storm at a site in Saskatchewan. The site is under construction and no turbines are yet erected. The Saskpower project is located about 25km south of Swift Current. A 350-tonne, 300 foot crane was toppled. The site was closed at the time of the storm - so no-one was hurt.	CBC Saskatchewan report, 20 June 2005. With photos and realplayer video	http://sask.cbc.ca/regional/servlet/View?filename=wind-power050620
330	Blade failure	20050630		6/30/2005	Cathedral Rocks Wind Farm, Port Lincoln, South Australia	Australia	60m towers	Lightning destroyed a blade on tower 6 in June 2005. Turbines still undergoing construction/commissioning. Construction started in February 2005 - a 33 turbine development. Date in June uncertain.	Port Lincoln Times, 23 August 2005	http://portlincoln.yourguide.com.au/detail.asp?class=news&subclass=local&category=general%20news&story_id=418188&y=2005&m=8
331	Blade failure	20050729		7/29/2005	Windy Hill wind farm, Ravenshoe, Cairns, Queensland	Australia	600kW Enercon, installed 1999-2000	"Wind power a lot of hot air". This week another problem came to light when Stanwell Corporation's Windy Hill wind farm had a nasty accident. Fortunately, no-one was injured when a massive 22m turbine blade on one of the 20 huge wind turbines spectacularly sheared off. But it must have been extraordinary to see a glass fibre reinforced epoxy blade perched 44m above the ground go for an excursion. Stanwell spokesman Anne Savage confirmed the incident, near Ravenshoe on the Atherton tableland south of Cairns, and said an investigation had been launched into what went wrong. Date is of newspaper article - the incident took place the week before.	Herald Sun, 29 July 2005	http://heraldsun.news.com.au/
332	Transport	20050825		8/25/2005	Portland, Oregon	USA	Vestas V80, 1.8MW	"Wind turbine still stuck in Portland, Ore tunnel". An 80-ton wind generator remained stuck Thursday in a heavily used freeway tunnel in North Portland, confounding worn-out work crews that suspended efforts to move it after more than 24 hours of trying. The tower slipped off a trailer late Wednesday afternoon as it was being trucked to a wind farm in Eastern Washington, blocking one lane in the tunnel that connects southbound Interstate 205 to eastbound Interstate 84. The tower was manufactured by Denmark's Vestas Wind Systems, which is assembling 83 wind towers on a farm at Hopkins Ridge in Eastern Washington.	The Oregonian, 26 August 2005	http://www.accessmylibrary.com/coms2/summary_0286-9571178_ITM

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
333	Transport	20051018		10/18/2005	A' Chleit, Kintyre, Scotland	UK	Vestas	A serious accident was avoided last week when a section of wind turbine at least 50 feet long rolled off a lorry that was heading north on the A83 near A' Chleit on Kintyre's west coast. The incident happened as the driver in a convoy of two lorries under escort swerved to avoid an oncoming vehicle. Anti wind power campaigners say the incident is the worst in a series of mishaps involving lorries in the area and has highlighted local concerns about the transportation of huge sections of wind turbine from the Vestas factory in Campbeltown along Argyll's narrow roads.	Rural Community Gateway. Reported on Oct 18th - incident happened the previous week (actual date unknown).	http://www.ruralgateway.org.uk/cgi-bin/item.cgi?id=1069
334	Structural failure	20051031		10/31/2005	Zeeuwse Rilland, Kreekraksluizen	Holland	Nedwind 500kw, 41m diameter, 40m tower	Complete destruction of turbine reported	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
335	Environmental	20051101		11/1/2005	Near Aberystwyth, Wales	UK		Wind Turbine Kills Red Kite. Injured bird had been observed in the morning and handed in to vet in afternoon. Collision with turbine confirmed by vet.	The Welsh Red Kite Trust website	http://www.gigrin.co.uk/w/wind_turbine_kills_kite.html
336	Transport	20051105		11/5/2005	Wells Fargo, ND	USA	Xcel	A truck hauling a wind-turbine platform struck a power pole here, leaving 3,700 residents without electricity, most of them for about two hours. The accident happened after 7 a.m. Saturday Nov 5th at the intersection of Main Avenue and Ninth Street East, knocking out traffic signals at several intersections. Electrical lines were down on Main Avenue and Ninth Street, until a repair crew for Xcel Energy arrived, he said. No injuries were reported. The truck, from DMI Industries of West Fargo, was carrying a wind-turbine tower that protruded from the trailer, striking the utility pole as the truck turned west onto Main Avenue.	Grand Forks Herald, ND, November 7th 2005	
337	Fatal	20051111.1		11/11/2005	East Ridge Wind Farm, Chandler, Minnesota	USA	Suzlon	"Man Dies In Wind Tower Fire". Slayton, Minn. A South Dakota man died and two people were injured Friday in a wind tower fire in southwestern Minnesota. The Murray County sheriff's office received a call just before 10 a.m. reporting the fire at a wind tower east of Chandler, Minn., and that one person had fallen. Benjamin James Thovson, 26, of Sioux Falls, S.D., died at the scene. He fell about 210 feet, Deputy Randy Donahue said. The other two were able to climb down and escape, but were taken to a local hospital. When help arrived, Donahue said, "the wind generator was engulfed in flames." The tower is owned by Dean DeGreeff, of Chandler, who is part of an eight-person private ownership group called East Ridge Wind Farm. The three people on the tower Friday worked for Energy Maintenance Service LLC, based in Gary, S.D. They were installing a Suzlon Wind Energy Corp. wind turbine, the companies said in a statement. According to at least one report, they were replacing a bolt when the fire started The Daily Globe of Worthington said.Donahue told the newspape	WCCO-TV - Minnesota's Breaking News, 11 November, 2005	http://wcco.com/local/local_story_315152455.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
338	Transport	20051129		11/29/2005	A941 Elgin-Rothes road at Drumbain, less than a mile from Rothes, Moray, Scotland	UK	Olsen Renewables	A huge lorry carrying a section of turbine for a Moray windfarm shed its load in spectacular style. The metal section - around 100ft long and 15ft in diameter - fell from the lorry and rolled down an embankment and 200 yards into a field after the vehicle mounted the verge on the A941 Elgin-Rothes road at Drumbain, less than a mile from Rothes. The lorry toppled on to its side on the roadway, with part of the articulated bogie coming to rest upside down, 20ft down the embankment. The Danish lorry, which was accompanied by escort vehicles at the front and rear, was on its way to the site of a windfarm which is under development on Paul's Hill at Ballindalloch. The driver of the lorry, a Dane, escaped unhurt.	"Lorry Sheds 50-Tonne Load After Accident", Press and Journal, 30 November 2005. Photo.	
339	Fire	20051207.1		12/7/2005	Schaller, Iowa	USA		"Firemen climb 213-ft tower in rescue". Two electrical workers were treated and released at Buena Vista Regional Medical Center last week after they were rescued following a fire at one of the MidAmerican Energy turbines just south of Schaller.	Reported on December 7, 2005 in Storm Lake Pilot Tribune	http://www.zwire.com/site/news.cfm?newsid=13505645&BRD=1304&PAG=461&dept_id=180485&rfi=6
340	Blade failure	20051209		12/9/2005	Hundhammerfjellet, North of Trondheim	Norway		Blade reported to explode	Reported by Namdalsavisa, 3 November 2009	
341	Blade failure	20051216		12/16/2005	Sefferweich im Kreis Bitburg-Oprum, Rheinland-Pfalz	Germany	NORDEX N90 or N80	One of three blades broke off turbine following a minor storm. Blade travelled several meters only and landed close to the tower. Other turbines on site were shut down.	Trierischer Volksfreund from 19 December 2005	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
342	Fire	20051216		12/16/2005	Simonsberg bei Husum im Kreis Norfreisland, Schleswig-Holstein	Germany	Enercon, 40m hub	Turbine housing fire, 40m above ground. Completely burned out. 20m fell off. Reported to "rain blade pieces". Nine fire crews in attendance, but could do nothing at the height. Damage estimated at 0.5M euro	Sylter Rundschau from 17 December 2005. Also local news on line -see www.kn-online.de link (right).	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
343	Miscellaneous	20051216		12/16/2005	Gagzow bei Neuburg im Kreis Nordwestmecklenburg	Germany		Transformer exploded.	Ostsee-Zeitung online from 16 December 2005 (see online link right).	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
344	Structural failure	20051216		12/16/2005	Delmenhorst nahe Bremen, Niedersachen	Germany	Small private turbine, 15m high	Private turbine 15m high completely destroyed in storm. The turbine fell into the owner's garden. Rotor blades were torn off and "flew through the air". Parts pierced a garage droof and destroyed a car within. Another rotor blade ended in a neighbours garden. The turbine had been in place for 20 years.	Nonstop news von Borgmeier media from 16 December 2005 (see online link right), with photo	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
345	Ice throw	20051217.1	P	12/17/2005	Lankern bei Dingen, nahe Hamminkeln Kreis Wesel, Westfalia	Germany		Ice throw reported from each of the fuive turbines in the community windfarm Loikum at Lankern. This has happened each year of operation.	Rheinische Post Wesel plus local administration and statements from adjoining owners. Photos online (see link right). Photographed piece 38cm in length. Pieces reported to be thrown over 80m.	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
346	Human injury	20051222		12/22/2005	Woolnorth Windfarm, Tasmania	Australia		Two workers reported to be in hospital - injured but stable - following an accident at the Woolnorth Wind Farm, Tasmania, on Thursday Dec 22nd. Reported on Dec 24th. No circumstances of accident or details provided, other than that the two men were working on a wind monitoring tower when the accident happened.	ABC News online 24 December 2005	http://www.abc.net.au/news/newsitems/200512/s1537653.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
347	Fire	20051223.1	P	12/23/2005	Nissan Car Factory, Sunderland, Tyne and Wear, England	UK	Six x Vestas	Turbine fire adjacent to A19 and A1231 roads. 55m high turbine caught fire after work to investigate an oil leak. Both A19 and A1231 roads closed. Fears that the turbine would fall onto the road however luckily it fell into a nearby field. Locals reported to be "terrified" (27/12/05 report). All three blades burned and fell off. Fire reported in the national press with photos and video. Seven fire engines were in attendance. Operators Nissan quoted as saying *"as far as we're aware nothing like this has happened before"*. Construction started in September 2005 using second-hand Vestas turbines.	National ITV and BBC television and radio news. Also Sunderland Echo 24/12/05 and 27/12/2005	http://news.bbc.co.uk/1/hi/england/wear/4556640.stm
348	Fire	20051229		12/29/2005	Oldside, near Workington, Cumbria, England	UK	VESTAS V42, 600kW, 40m tower, 42m blade diameter	Safety experts were called in to assess damage to a wind turbine which caught fire this morning. The giant structure at Oldside, on the Workington coast, had to be deemed safe by construction specialists. The fire spread from a nearby car, a Ford Fiesta, which had been burnt out. It affected the base of the turbine. Owned and run by E.On.	News and Star, 29 December 2005. Also Western Morning News, 7 January 2006	http://www.newsandstar.co.uk/news/viewarticle.aspx?id=316168
349	Environmental	20059999		2005	Silkeborg	Denmark	Vestas	No details of incident. Provision of advice following contamination of hydraulic oil and damper liquid from the blades. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
350	Fire	20059999		2005	Donegal	Ireland	Siemens	No details of incident. Provision of analysis and advice on fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
351	Fire	20059999		2005	Tjaereborg, Esbjerg	Denmark	Vestas	No details of incident. Provision of analysis, advice and restoration to fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
352	Fire	20059999		2005	Windpark Olerese	Germany	Bonus	No details of incident. Provision of analysis and restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
353	Fire	20059999		2005	Silkeborg	Denmark	Vestas	No details of incident. Restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
354	Fire	20059999		2005	Brande	Denmark	Siemens	No details of incident. Restoration of fire damaged wind turbine from Japan. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
355	Fire	20059999		2005	Silkeborg	Denmark	Decowicon	No details of incident. Provision of advice and restoration of fire and lightning damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
356	Fire	20059999		2005	Thisted	Denmark	Ebbe Hvelpund Kloster	No details of incident. Provision of analysis and advice on of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
357	Miscellaneous	20059999		2005	Silkeborg	Denmark	Siemens	No details of incident. Restoration of water damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
358	Miscellaneous	20059999		2005	Silkeborg	Denmark	Vestas	No details of incident. Restoration of moisture damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
359	Miscellaneous	20059999		2005	Silkeborg	Denmark	Vestas	No details of incident. Restoration of moisture damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
360	Ice throw	20060108.1		1/8/2006	Filsumer Wind Park, Filsum bei Leer im Kreis Leer, Lower Saxony	Germany	Enercon E66/18.70, hub height 65 m	Ice thrown by turbines reported, pieces 20cm thick travelling across and beyond walkways. This was observed by someone who regularly walks in the area. Constructed 2002.	Newspaper: Ostfriesen Zeitung in Leer, 10.1.2006	http://members.aol.com/fswemedien/ZZUnfaldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
361	Fatal	20060110		1/10/2006	Bording and Karup	Denmark	NM52-900kW	Service engineer Brian Østrup Nielsen, 34, was killed during routine maintenance. The service technicians found that the internal crane used for lifting tools etc. was defective. The technicians chose to use the coupling between the gearbox and the generator as lifting device by fixing a rope to the coupling. The result was that Nielsen was killed on the spot.	Source: Danish Regional News websites and Paul Gipe's wind energy fatalities database	http://www.dr.dk/Regioner/Aarhus/Nyheder/Krimi/2006/01/11/111158.htm
362	Structural failure	20060110		1/10/2006	Eemmeerdijk, Zeewolde	Holland	Nedwind, 1MW, 55m diameter, 63m tower	Tower bent at angle approx 15m up. Crane removed gondola and all similar turbines shut down.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
363	Blade failure	20060113.1	P	1/13/2006	Cold Northcott, Cornwall, England	UK	WEG MS-3 300kw	"BIG CHUNK OF TURBINE BLADE SHEARS OFF". Part of a wind turbine blade weighing more than half a ton snapped off and crashed into a field during high winds. A chunk of the 18 metre long blade sheared off at the Cold Northcott windfarm on Bodmin Moor at about 9am yesterday. The 21 turbine development straddles a main road - luckily no-one was injured. Blade parts found over 100m away.	Western Morning News, 14 January 2006. Photos also available.	
364	Blade failure	20060114.1		1/14/2006	Wolverine Creek wind farm, Idaho Falls, ID	USA		"TWO TURBINE BLADES SNAP AT WIND FARM" Blades on two turbines at the Wolverine Creek wind farm have snapped, forcing crews to shut them down for repairs. The farm just went into operation a month ago. 122 foot blades. Run by Invenergy	Associated Press, 14 January 2006, 1814 local time. Also Local News 8, ABC (see hyperlink), Jan 15th	http://www.localnews8.com/home/2204517.html
365	Blade failure	20060120		1/20/2006	Hundhammerfjellet, North of Trondheim	Norway		All three blades reported to be ripped off a turbine - parts of which were found 1.3km away	Reported by Namdalsavisa, 3 November 2009	
366	Fire	20060122.1	P	1/22/2006	Lake Bonney wind farm, Tantanoola, South East Australia	Australia	Vestas	$3 million fire at the Lake Bonney wind farm. "Yesterday afternoon's blaze began in a turbine located near Tantanoola. While the flames were initially contained at the top of the structure, falling debris caused the fire to spread to the grass below." A subsequent investigation, Feb 12th "Wind farm fire caused blackout", reported that the fire was too high to fight (67m) despite 6 fire trucks in attendance. A lack of wind combined with a very hot spell resulted in power cuts to 63000 homes just when they needed it for their air conditioning. "The Border Match" reports that 80,000 hectares of the National Park were destroyed.	ABC website, plus the 4 pm news on 891 radio, with the addition of an short interview with spokesperson from Babcock & Brown. Follow up reported Feb 12 on http://theadvertiser.com.au. Also "The Border Match" Tues Jan 24 2006.	http://www.abc.net.au/news/items/200601/1553257.htm?southeastsa
367	Fatal	20060123		1/23/2006	Port Burwell, Ontario	Canada	Construction accident	Accident during transport/construction. Michael Hipson, 42, a crane operator, was drowned near Port Burwell when a road collapsed and the crane he was driving rolled into a ditch. Ontario's Labour Ministry has confirmed.	Local Union newspaper 703Operator, Issue 119, March 2006. Also Paul Gipe's wind turbine fatalities database. Details also available in "Embedding safety into Wind Projects Delivery Process", Mike Boyce, GE, BWEA H&S 07, 26 April 2007, Glasgow UK	http://www.iuoelocal793.org/Downloads/March2006Op.pdf
368	Fire	20060124.1	P	1/24/2006	Grömitz im Kreis Ostholstein, Schleswig-Holstein	Germany		Turbine caught fire and burned to the ground on Tuesday Jan 24. The turbine house of the 65 meters of high plant burned completely, and a rotor blade fell down. The fire-brigade had no choice but to let the turbine burn down (according to police data). The police estimate the damage to property is approx. two million euro. The cause of fire is unknown.	Lübeck Police Headquarters and Lübecker Nachrichten from 24.1.2006. The URL reference has photos.	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
369	Blade failure	20060217		2/17/2006	Searsburg, Bennington, VT	USA	11 x 550kW turbines	Half of one 63-foot blade lost during a storm. No comment on how far blade pieces travelled. Operational since 1997. A spokesperson for Green Mountain energy confirmed that "since 1997 lightning has destroyed at least one other blade". We know that 9 other blades have been replaced due to lightning damage - 8 during May 1998 and one damaged in January 2000.	"Turbine blade flies off the handle", Bennington Banner, Tuesday, Feb 21st 2006	http://www.benningtonbanner.com/localnews/ci_3530796

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
370	Human injury	20060218.1		2/18/2006	Buchbrunn, Würzburg, Bavaria	Germany	107 m height	A technician was badly injured on Feb 18th in an accident at the top of a turbine tower. Cause unknown. He had to be attended to in the tower then lowered 107m to the ground by the local Fire Brigade. The emergency services call was made at 1900. The rescue took over 2.5 hours. It was after 2100 when the injured man eventually reached the ground. He was then hospitalised.	"Mainpost Kitzingen" dated 20.2.2006	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
371	Structural failure	20060221.1	P	2/21/2006	Wachusett Wind Site, Princeton, MA	USA	120 foot tower	"Windmill topples on Wachusett Mountain - Remaining turbines to be removed" "I drove by Westminster Road and counted only six towers, so I walked up to the site to look and that's when I discovered one of the towers had fallen over and landed on our storage garage," said the man who found the accident. Previous topples reported in 2002 and 2003	Reported on March 30, 2006 by Phyllis Booth in The Landmark	http://www.thelandmark.com/news/2006/0302/Front_page/001.html
372	Structural failure	20060328		3/28/2006	Den Haag	Holland	Lagerwey LW 18/80, 31M tower	Complete collapse of turbine tower	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
373	Environmental	20060331		3/31/2006	Smola	Norway		"Concern Over Eagle Kills In Norway" - Discovery by British bird group. The discovery offour mangled white-tailed eagles over a four-month period at Norway's largest wind power station at Smola is causing international concern among bird protection groups worried about future wind power developments and the fate of sensitive bird populations.	Wind Power Monthly, March 2006	
374	Fire	20060410		4/10/2006	Galicia	Spain		"Fire destroys wind generator at A Capelada". (in Spanish)	La Voz de Galicia, 10 April 2006	http://www.lavozdegalicia.es/hemeroteca/2006/04/10/4680345.shtml
375	Fire	20060526.1		5/26/2006	Tehachapi, CA	USA		"Flames lap Creek Pass". The fire was caused by burning debris from a wind turbine that caught fire due to a malfunction. Flames that marched across the hills of Oak Creek Pass on May 26 brought firefighters from several jurisdictions to battle the area's first large-scale fire of the season. Theye fought the fire until May 28, when it was eventually defeated, destroying 787 acres.	Reported on June 3, 2006 in Tehachapi News	http://www.windaction.org/news/3306
376	Fatal	20060601		6/1/2006	Palm Springs, CA	USA		Operator/technician was found hanging inside the wind tower sometime during 2006 - before April 17th 2006 (Gipe database date). Apparent suicide. No further details.	Paul Gipe's wind industry deaths database	http://www.wind-works.org/articles/BreathLife.html
377	Fire	20060618		6/18/2006	Madurai, Chettikulam	India		"Fire in Chettikulam wind-power unit". A "big" fire broke out at a 2MW wind-power unit at Chettikulam in Tirunelveli district, reportedly the biggest in Asia. Police said the wind turbine generator of the unit exploded and caught fire. The splinters from the turbine, located a few kms from the Koodankulam Nuclear Power project site, spread over one sq km after the explosion.	Reported on June 19, 2006 in newKerala.com	http://www.windaction.org/news/3531
378	Blade failure	20060624		6/24/2006	Lake Benton, MN	USA		High winds caused the blade of a wind turbine to snap west of Lake Benton, Minn.	Rapid City Journal, dated weds June 26th 2006	http://www.rapidcityjournal.com/articles/2006/06/26/news/state/state04.tx

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
379	Blade failure	20060702.1	P	7/2/2006	Oldside, near Workington, Cumbria, England	UK		THE blade of a wind turbine disintegrated and fell 200ft after being struck by lightning near Workington. Police cordoned off the area after the incident amid fears that more debris could fall from the turbine at Oldside. A member of the public, who witnessed the spectacular lightning strike earlier this month, alerted police. Sgt Peter Garforth said: "The blade was made of fibre glass. If anyone had been underneath it, they could have been sliced into pieces. "There were some bits that fell off that were a couple of feet across. We put a cordon around to make sure no one walked under the turbine." The windfarm is on an isolated piece of ground often used by dog walkers during the day. The 21-metre long blade was struck at around 11pm on July 2.	Evening News & Star, 27 July 2006	http://www.newsandstar.co.uk/news/viewarticle.aspx?id=394062
380	Miscellaneous	20060706.1		7/6/2006	Flevoland	Holland	Nedwind	Complete destruction of turbine following lightning strike. The tower was fitted with a lightining conductor which did not work.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
381	Environmental	20060721		7/21/2006	Berkshire, MA	USA		"Wind project cited for erosion". The Berkshire Wind Power Project has been cited, but not fined, by the state Department of Environmental Protection for failure to maintain erosion controls at the project site.	July 21, 2006 by Shaw Israel Izikson, North Adams Transcript in Berkshire Eagle	http://www.berkshireeagle.com/localnews/ci_4077779
382	Environmental	20060801		8/1/2006	Woolnorth Farm, Tasmania	Australia		"Eagle put down after wind farm accident". A wedge-tailed eagle was put down after colliding with a wind turbine. Confirmed by the turbine owners "Roaring 40s", who also confirmed that this was the third endangered eagle this year to be killed by one of their turbines.	ABC News online, Tuesday Aug 15th 2006	
383	Fire	20060817		8/17/2006	Anorias in Pétrola, Albacete	Spain		"Eighty hectares burn". A wind turbine at Anorias in Pétrola began to burn at 4pm, causing a forest fire in the place known as the Cord. Apparently this is the second such incident.	August 17, 2006 in THE VERDAD/ALBACETE	http://www.laverdad.es/albacete/pg060813/prensa/noticias/Albacete/200608/13/ALB-REG-220.html
384	Human injury	20060825		8/25/2006	Beatrice Oil Field, Highlands, Scotland	UK	5MW prototype	"Windfarm project worker loses leg after accident". A British man in his 40's has had his leg amputated after suffering serious leg injuries in an accident on a barge towing a giant wind turbine to a North Sea oilfield on August 25. He was working on the Talisman/SSE project at the Beatrice field. Talisman is helping HSE with inquiries. The man was airlifted to Raigmore Hospital Inverness after the incident.	Press & Journal, 9 September 2006 and previously Press & Journal 26 August 2006.	
385	Blade failure	20060903.1		9/3/2006	Herzogenrath-Merkstein in Kreis Aachen, Aachen, NRW	Germany	Nordex N90, 2.3MW, 100m hub, 90m diam rotor, 145m total height	The original police message reported a loose turbine blade around 1520. The turbine is located very close to federal highway 221 between the villages of Alsdorf and Boscheln (Übach-Palenberg). The loose blade struck the tower, showering highway 221 with debris up to 100m. The road and area around the damaged turbine were closed. The operator did not shut down the turbine until 1700, after which the highway was cleared and reopened. Why the blade became lose remains unknown.	Original message from Aachen police. Also various local newspapers	http://members.aol.com/fswemedien/ZZUnfalldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
386	Transport	20060911		9/11/2006	Beatrice Oil Field, Highlands, Scotland	UK	5MW prototype	"Giant Turbine Blade Is Damaged". An accident involving a crane damaged the blade of one of the two giant turbines being asembled at Nigg in Easter Ross, Highland. A spokesman for Talisman Energy claimed that it was superficial damage only and that no delay to the project had occurred. Talisman also blamed the weather - a statement they later retracted as it occurred on a very calm day. To date (January 2007) the second turbine remains at Nigg, unoperational.	Press and Journal, 13 September 2006	http://www.pressandjournal.co.uk/displayNode.jsp?nodeId=149235&command=displayContent&sourceNode=149218&contentPK=15410477&moduleName=InternalSearch&formname=sidebarsearch
387	Fire	20060921.1		9/21/2006	Pedregal Hills, Esteiro, Muros, Galice	Spain		Turbine failure started a forest fire about 4pm. High winds resulted in destruction of between 80 and 100 hectares of scrub forest, oak and pine.	La Voz de Galicia, 21 September 2006. Also La Voz de Galicia, Friday, 27 October 2006	http://www.lavozdegalicia.es/se_galicia/noticia.jsp?CAT=102&TEXTO=5125652
388	Fire	20061003.1		10/3/2006	Wybelsum Polder by Emden in Ostfriesland/ Niedersachsen	Germany	Enercon E66, 1.5MW, 65m hub, 60m diam rotor	Fire fighters arrived at 230 am but could do nothing. Two of the blades fell burning to the ground. Fire brigade sealed off the site and allowed it to burn out.	Ostfriesen-Zeitung from 4 October 2006	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
389	Transport	20061006		10/6/2006	Scroby Sands, Norfolk, England	UK	Vestas	"Barge smashes into wind turbine". Vital maintenance work on Scroby Sands windfarm, off the Norfolk coast, has been interrupted after an accident involving the giant jack-up barge Sea Energy. While manoeuvring off the Yarmouth coast on Friday, one of the vessel's huge legs, which provides a stable working platform by anchoring itself to the seabed, clipped a blade on one of the 30 turbines. Windfarm owner E.ON UK and the Health and Safety Executive immediately launched a full investigation into the incident that has put the turbine out of action. Company spokesman Jamee Majid said: "It was only a light touch but about 20cm was broken off the tip of the 40m blade.	October 6, 2006 by Stephen Pullinger in EDP24	http://new.edp24.co.uk/content/news/story.aspx?brand=EDPOnline&category=News&tBrand=edponline&tCategory=news&itemid=NOED05%20Oct%202006%2019%3A24%3A09%3A423
390	Blade failure	20061006.1	P	10/6/2006	St. Thegonnec, Pleyber-Christ, Finistere, Brittany	France	300kW	Whole blade detached and fell in windless conditions between Friday night and Saturday morning. The third incident here - two previous incidents in 2004. Blade measures 10m and weighs 2-3 Tonnes. A second blade was damaged by the falling blade. The public prosecutor of the court of Morlaix, Laurent Fichot, has opened a criminal investigation for "endangering the lives of others".	Ouest France, 8 and 9 Oct 2006. Movie is also available online from FR3.	http://ventdubocage.net/accident.htm
391	Fire	20061016		10/16/2006	Hsinchu County, west cost of Taiwan.	Taiwan	Gamsea, 67m tower	"Taiwan Power Co seeks investigation of wind-turbine fire". The Taiwan Power Co (Taipower) has asked Spain's Gamesa to investigate the cause of a fire that destroyed a Gamesa-built wind turbine. " We have asked Gamesa to send technicians to Taiwan to investigate the cause of the fire," Chen Wu-hsiung, director of Taipower's Wind Power Department, told reporters after Monday's blaze. "Preliminary investigation points to the generator's overheating as the cause of the fire." Six turbines are located at the site - they were still undergoing commissioning.	German Press Agency, 17 October 2006.	http://www.wind-watch.org/news/2006/10/17/taiwan-power-co seeks-investigation-of-wind-turbine-fire/
392	Fatal	20061022		10/22/2006	Gemeinde Schlangen in Kreis Lippe, North Rhine/Westphalia	Germany		A mechanic died during maintenance. No further details known	Newspaper "Neue Westfalische" 23 October 2006	http://members.aol.com/fswemedien/ZZUnfaldatei.htm
393	Transport	20061026		10/26/2006	North Sea, off Scotland	UK	Parts for 3 x 1.3MW turbines	"Wind Turbine tower lost overboard". Parts of a tower were lost overboard from a ship in the North Sea, on its way from Denmark to Lewis on the German-registered "Lass Moon".	BBC News online 26/10/2006	http://news.bbc.co.uk/1/hi/scotland/highlands_and_islands/6083664.stm
394	Fire	20061031.1	P	10/31/2006	Wolf Windenergie, Heerenveen	Holland	Vestas NM 48/750	Turbine on fire photographed on 31 Oct 2006. Gondola completely burned out. Tower damaged.	Confirmed on Vestas WINDNIEUWS NEDERLAND - 2006 website. Photograph available via weblinks.	http://home.planet.nl/~windsh/N-06NL.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
395	Blade failure	20061101.1		11/1/2006	Aschenstedt in Landkreis Oldenburg/ Niedersachsen	Germany	Vestas	"Village of Aschenstedt in Oldenburg has a luck escape". During a storm a 10m long piece of rotor blade was torn off. The main piece of blade travelled approx 200m before landing in a field. Very lucky escape for the village. Vestas claim that the accident was "unexplainable" and the "first time". Photograph available online	Nordwest-Zeitung 4 November 2006	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
396	Blade failure	20061111		11/11/2006	Upper Ballinderry, Northern Ireland	UK	Chinese made	"Blades 'flew off' wind turbine" A farmer from Upper Ballinderry has told how the massive blades of a wind turbine installed on his land came loose and flew over his house before crashing to the ground. "It was three days after the turbine was installed that it happened," said Mr Hayes. "It was really the first day there had been any real wind since it had been set up. The wind got up and the rotors came off the tower." The blades, which have a diameter of 10m, flew off and the tail went spinning in the wind. "I was about 50m away when it came off and it flew right over the farmhouse," he said. "There were three blades in the rotor and they each went in different directions. "They travelled about 200m and for 10 minutes the tail of the turbine was spinning around on top of the tower. "I had no idea where it might have gone next but it just landed next to the tower. "I was shocked by the whole incident as I had been out in the yard shortly before one of the blades landed there." Mr Hayes said he has only gone public after 18 months because he does not feel the problem is bein	Reported in Belfast News Letter on 17 June 2008 and in Belfast Telegraph on 18 June 2008. Confirmed by private communications with reporter Linda McKee and with Ulster Farmers Union.	
397	Structural failure	20061120		11/20/2006	Black Mountain, Dresden, Washington County, NY	USA	Small turbine	"Toppled Turbine raises concerns". Hikers on Black Mountain reached the fire tower at the summit earlier this month to find a 60-foot wind turbine lying in the snow. The State Police own the turbine. Spokeswoman Maureen Tuffey said it fell because a guy wire gave way when a bolt sheered off. She said it might be spring before the turbine is fixed.	Reported in Times Union on Nov 20th 2006	http://timesunion.com/AspStories/story.asp?newsdate=11/20/2006&navigation=nextprior&category=REGIONOTHER&BCCode=LOCAL&storyID=537012
398	Human injury	20061127		11/27/2006	Scroby Sands, Norfolk, England	UK		Scroby Sands windfarm was shut down following electrocution of a worker. A spokesman for the East of England Ambulance Service said they were called to North Denes Road, Yarmouth, at 9.53am on Monday, November 27 after the 22-year-old engineer suffered an electric shock. He was taken to the James Paget University Hospital in Gorleston. The problem at Scroby is the latest setback to hit the £75m windfarm, which became one of the UK's first commercial offshore wind farms when it was built in 2004, but the government's first annual report painted a very different picture with the turbines generating only a fraction of the power they were meant to. The DTI report showed the wind farm was riddled with mechanical problems which lowered production.	Reported on December 9th by Norwich Evening News 24.	http://www.eveningnews24.co.uk/content/news/story.aspx?brand=ENOnline&category=News&tBrand=ENOnline&tCategory=news&itemid=NOED09%20Dec%202006%2011%3A40%3A08%3A107
399	Blade failure	20061201		12/1/2006	Pavillion, Genesee County, NY	USA	140 foot domestic tower	All three fibreglass blades ripped off by winds. Windspeed estimated to be 89mph. Officials reported that residential wind turbines are supposed to withstand winds up to 90 miles an hour, and speculated that Steve Rigoni's turbine blades might have had some kind of manufacturing defect. Blade pieces scattered well outside owner's property.	Confirmed on WIVB News 4 on December 4th, reported online on Dec 5th	http://www.wivb.com/Global/story.asp?S=5768221

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
400	Structural failure	20061204.1	P	12/4/2006	Bondues, Lille	France		Complete collapse of 30m high turbine tower in approx 90km/hr wind, luckily in a car park which was unoccupied at the time. This was in the industrial park of Bondues close to Lille in NW France. Photographs available online.	Confirmed on French television	http://ventdubocage.net/normandie12.htm
401	Blade failure	20061208		12/8/2006	Mehring in Kreis Trier-Saarburg, Rheinland-Pfalz	Germany	Enercon E70, 2.0MW, 113m high	Message: a 35m long piece of rotor blade broke in strong wind. Mehring circle and adjacent road was closed. The police communicated that the blade splintered into many parts, which were scattered over a wide area. Luckily no-one was hurt. A later message confirmed that a driver informed the police that the turbine had been turning very fast prior to the accident. Extent of property damage unknown.	Police broadcast message from SWR4 at 1100 on 8 Dec 2006	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
402	Structural failure	20061208		12/8/2006	Clarion, North Iowa	USA	School turbine 150kW	CLARION: The school's wind turbine collapsed December 8 about 7 a.m., knocking down a power line and causing school to be cancelled for the day. A school official said the likely cause was a broken brake which allowed the giant propeller to turn too fast. Then, a tip broke off one blade causing the generator to run out of balance. This stressed the tower and the structure eventually came down. No injuries. ''Even at 7 in the morning, we have a number of kids in school,'' said Robert Olson, superintendent for the Clarion-Goldfield Community School district. ''There were some students that were weight-lifting (and) they were close....''	Reported by Belmont Independent News, Dec 21st. Also the Fort Dodge Messenger	http://www.zwire.com/site/news.cfm?newsid=17616297&BRD=1907&PAG=461&dept_id=133418&rfi=6
403	Blade failure	20061210		12/10/2006	Deanburn Primary School, Bo'ness, West Lothian, Scotland	UK	15kW, Proven Energy light industrial turbine.	"Alert After Turbine Breakdown". Heavy Part drops from above school grounds. A Scots wind turbine firm has put out an alert after part of a turbine fell off at a school. Proven Energy has ordered the shutdown of 30 of its latest turbine type at locations as far afield as Italy and Orkney. Gordon Proven, managing director of the manufacturer in Stewarton, Ayreshire, says the action follows an incident at Deanburn Primary in Bo'ness. Last month the revolutionary eco-friendly school lost its green energy supply after a damper, used to control the blades, came off when bolts broke. The three-inch-square part, weighing several kilos, plunged to the ground, luckily outside school hours when there were no children around. The three bladed 15 kilowatt turbine is in use in various other places, around eight in Scotland. Locations include a school in Yorkshire, farmland in Orkney and Cornwall, and an estate in the Stranraer area. The actual event happened in November.	The Sunday Post, 10th December 2006	http://ventdubocage.net/ecosse5.htm
404	Fatal	20061213		12/13/2006	Falls Township, Bucks County, PA	USA		"Truck-loading accident costs worker his life" An Illinois man died Wednesday morning at a Trenton hospital after losing most of his left leg Monday during an industrial accident in Falls, officials said. Reginald Magelitz, 59, of Florence, Ill., was helping his partner of 15 years, William Fisher, 38, of White Hall, Ill., direct a tractor-trailer out of Gamesa Wind in the U.S. Steel complex when the 50-wheeled trailer severed Magelitz's left leg and crushed his right leg, according to police.	Reported in The Intelligencer on 14 December 2006	http://nl.newsbank.com/nl-search/we/Archives?p_product=BURB&p_multi=DPIB&p_theme=burb&p_action=search&p_maxdocs=200&p_topdoc=1&p_text_direct-0=1167334A1BED46D8&p_field_direct-0=document_id&p_perpage=10&p_sort=YMD_date:D&s_trackval=GooglePM

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
405	Miscellaneous	20061218.1		12/18/2006	Lee/LaSalle County windfarm, IL	USA	2MW Gamesa	"Crane crashlands at windfarm". A crane was lifting a turbine off a truck when the boom folded over. "It was an unfortunate accident," GSG Wind Energy vice president Bruce Papiech said. There were no injuries. Part of a 40-turbine, 80WM development.	Reported by NewsTribune online Dec 20th, and also by Industrial Wind Action Group Dec 21st	http://www.windaction.org/news/7030
406	Human injury	20061219.1	P	12/19/2006	Johnstown, Cambria County, PA	USA	Gamesa	"Man rescued from Cambria County Wind Turbine accident". Federal inspectors are to be in Cambria County Wednesday to investigate Tuesday's accident at a wind turbine farm. A worker was severly hurt at a Gamesa wind farm after being trapped more than 200 feet atop a wind turbine. Emergency officials said the employee was airlifted to Memorial Medical Center. A subsequent report "OSHA investigating construction accident" reported that construction worker Jeff Davis suffered a cut so severe that his ankle was dislocated. Officials said Davis is an employee of White Construction, a company hired by Gamesa to construct windmills. Another source says that the man's leg was severed from the knee down.	Industrial Wind Action Group Dec 19 and 20, plus WJAC TV. Additional source at http://www.wind-watch.org/news/2007/01/04/windmill-workers-leg-severed/	http://www.wjactv.com/news/10568105/detail.html
407	Ice throw	20061228		12/28/2006	Schauenburg-Martinhagen im Landkreis Kassel, Hessen, Lower Saxony	Germany		Ice throw reported from new turbines approx 100m hight. Ice sensors were not working properly, and pieces of ice 3-4cm in size were reported being thrown, distance not reported.	Source of information was the wind power station managing director, Hans Heinrich Berghofer. Report on Baunatal online, dated 30 Dec 2006.	http://www.hna.de/baunatalstart/00_20061229173018_Eisstuecke_fielen_von_Rotoren_ab.html
408	Miscellaneous	20061299		December 2006	Melancthon I wind project	Canada		Ice throw reported and the turbines closed for nine days as a result.	Reported in Orangeville Citizen on 3 March 2009	http://www.citizen.on.ca/news/2009/0305/regional_news/007.html
409	Fire	20069999		2006	Smola	Norway	Siemens	No details of incident. Provision of analysis, advice and restoration of fire damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
410	Fire	20069999		2006	Uruersthal	Austria	Vestas	No details of incident. Provision of analysis and advice on fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
411	Miscellaneous	20069999		2006	South Ayrshire, Scotland	UK	Siemens	No details of incident. Provision of analysis, advice and restoration of water damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
412	Miscellaneous	20069999		2006	Silkeborg	Denmark	Siemens	No details of incident. Provision of advice and restoration of coolant damaged component. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
413	Miscellaneous	20069999		2006	Store Brondum	Denmark	Vestas	No details of incident. Provision of advice and restoration of oil damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
414	Miscellaneous	20069999		2006	Silkeborg	Denmark	Wima Solus	No details of incident. Restoration of water damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
	Ice throw	20069999		2006	Gutsch Mountain test site	Switzerland	Enercon E-40	13 reported cases of ice throw during winter of 2006/07	Wind Turbine Ice Throw Studies In The Swiss Alps, Cattin et al, EWEC 2007, Milan, 8 May 2007	http://www.ewec2007proceedings.info/index2.php?page=info2&id=49&id2=272&ordre=192&tr=2&searchin=&what=&searchtext=&day=&top=&fil1 =&fil2=&fil2&ord1=&sess=#top
415	Fire	20070101.1	P	1/1/2007	Maple Ridge Wind Power Project, Albany, New York	Germany	Sudwind S-77, 1.5MW	A lightning strike caused a fire which completely destroyed the turbine and scattered burning debris over a wide area, causing secondary fires. These were reported by over 50 people. Fire fighters were not able to fight the fire due to the turbine height, so the area was sealed off to allow the fire to burn out. Police estimate damage at 1M Euro. A photo showing the scatter of burning debris is available via the url (right).	Reported in newspaper Neue Osnabrücker Zeitung 02.01.07. Also reported by police (Polizeikommissariat Melle)	http://members.aol.com/fswemedien/ZZUnfalldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
416	Structural failure	20070108.1	P	1/8/2007	Iwaya Wind Farm, Higashidori	Japan	Vestas	"Wind turbine topples over: Question is why?" HIGASHIDORI, Aomori Prefecture–The industry ministry Wednesday said it is trying to determine what caused a 68-meter-high wind turbine to collapse earlier this week since strong winds apparently were not blowing at the time. The incident at the Iwaya Wind Farm in the Iwaya district of Higashidori in this northern prefecture is thought to have occurred late Monday, according to officials of Eurus Energy Holdings Corp., which manages the wind farm. While no one was injured, the incident resulted in temporary power outages to homes in the area because power lines were severed.	Reported on January 11, 2007 in Herald Tribune/Asahi	http://www.asahi.com/english/Herald-asahi/TKY200701100418.html
417	Fire	20070109		1/9/2007	Ketin bei Falkenrehde im Landkreis Markisch Havelland, Brandenburg	Germany		Fire at Ketin I wind park. Cause unknown. Fire crew could not fight the fire due to the height, and sealed the area off. No one injured, wind tower destroyed.	Reported in newspaper Märkische Allgemeine, 10.1.2007	http://www.maerkischeallgemeine.de/cms/beitrag/10850427/61759/
418	Blade failure	20070111		1/11/2007	Walpole Cross Keys, Norfolk, England	UK	5 foot blade - small turbine	"Too windy for a turbine". Winds blew a wind turbine blade into the conservatory of a West Norfolk home on Thursday. Torrential rain storms and gale-force winds caused havoc across the country, but in Walpole Cross Keys one couple were stunned when a five-foot blade from a wind turbine smashed into their conservatory.	Reported in Kings Lynn Today News, January 12 2007	http://www.lynnnews.co.uk/ViewArticle2.aspx?SectionID=991&ArticleID=1968999
419	Structural failure	20070113		1/13/2007	Windpark Raden in Besdorf im Kreis Steinburg, Schleswig-Holstein	Germany	HSW 100	Police message reads: A 70m high wind turbine completely collapsed tonight (13.1.2007) in the Raaden windpark at 25584 Besdorf. A nocturnal storm may be to blame. The tower fell in a northeast direction. The turbine was completely destroyed. No-one was injured, but there was spillage of a large quantity of transmission oil, which had to be specially treated and cleaned up. The Besdorf fire-brigade and the Wilster police managed the incident. (Approx translation)	Information from police headquarters at Itzehoe.	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
420	Blade failure	20070119		1/19/2007	Sutton Elms, South Leicestershire, England	UK	3-blade turbine, 1.4m rotor diameter, 5m tower on top of 2m portacabin. Installed and operational from July 2006.	All three blades ripped from test turbine during storm. Pieces of turbine blade found 36m away. The turbine sits atop a portacabin-type office, which was hit by several pieces of turbine. "One fragment six inches long weighing about a pound had gone through the roof of our outside office - through the outer and inner aluminium skin (plates an eighth of an inch thick with honeycomb insulation between) and embedded itself in the wall (three-quarter inch ply). Imagine if the roof was plastic, with people sitting underneath. They would have had no chance. " Owners plan to install a new turbine in summer.	Information fromturbine owner's website, with photographs. Additional details from email with owner.	http://www.habitat21.co.uk/wind30.html
421	Blade failure	20070120		1/20/2007	Scheid bei Kronenburg im Kreis Daun, Rheinland-Pfalz	Germany		During a storm a rotor blade broke off. Parts were thrown about 100m. The turbine stands directly beside an access road used by walkers, the post office, milkman and garbage disposal.	Source is an eye witness account from two individual neighbours	http://members.aol.com/fswemedien/ZZUnfalldatei.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
422	Environmental	20070124		1/24/2007	Forss, Caithness, Scotland	UK	Bonus A/S 1MW	"Buzzard killed by wind-turbine blade" A busload of shocked nuclear workers witnessed the death of a buzzard after it flew into one of the wind turbines at Forss on Wednesday. The loss of the adult bird, which is a protected species, has been notified to the Royal Society for the Protection of Birds. The demise of the buzzard was seen by a group of workers travelling between New Park business park at Forss and the neighbouring site at Dounreay at lunchtime on Wednesday. The buzzard was one of a pair, with its local nest also including a nine-month-old fledgling. No-one from Renewable Energy Systems, which runs the Forss site, was available for comment.	Reported in John O'Groats Journal, 26th Jan 2007, plus the Aberdeen Press and Journal	http://www.johnogroat-journal.co.uk/news/fullstory.php/aid/1502/Buzzard_killed_by_wind-turbine_blade.html
423	Blade failure	20070128		1/28/2007	Testorf im Kreis Nordwestmecklenburg, Mecklenburg-Vorpommern	Germany	Enercon	Storm reported to have destroyed the three blades on one of the Luttuschka turbines. One of four installed and operational since 1998.	Reported in newspaper SVZ / Gadebusch-Renaher Zeitung, published 31.1.2007	http://www.svz.de/newsmv/lr/gad/31.01.07/23-15803495/23-15803495.html
424	Blade failure	20070128.1		1/28/2007	Fenner Wind Farm, Madison County, NY	USA	20 x GE Wind Energy 1.5MW turbines, operational from Nov 2001	Photograph only available (see url). The photo is taken at Fenner Wind Farm on Sunday, January 28th at 2 p.m, during snow. The tower was on the left side of Mile South (?) Road. Eyewitness account states *"Half the wind turbines were turning, the rest were not. The only thing that drew my attention to the site was the crane. As I looked closer, the blade at 6 o'clock is sheared off, what appears to be either material failure, lightening, I don't know. But I did a quick search on the web for any news on it and found none."*	Reported on Industrial Wind Action Group website, see url to right for reference.	http://www.windaction.org/articles/7709
425	Miscellaneous	20070129.1		1/29/2007	Herne Bay, Kent, England	UK	Vestas V90/3.0, 70m tower, 90m diam, operational since August 2005	"Gearbox fault halts wind turbines" Repair work is due to begin this week on a wind farm off the coast of Kent which has seen a third of its turbines grind to a halt since early December. Of the 36 turbines erected off Herne Bay - on the Kentish Flats - 12 have experienced gearbox problems. Four have been repaired but the others have been running at reduced efficiency pending a break in the weather. The Danish firm Vestas, which owns and maintains them, said the high failure rate was unusual.	Reported on BBC online 29 Jan 2007	http://news.bbc.co.uk/1/hi/england/kent/6309013.stm
426	Transport	20070221		2/21/2007	Erie County, PA	USA		"Windmill-hauling rig topples utility pole" For the second time in three days, a tractor-trailer hauling parts of a windmill tower from Ontario to Texas caused traffic problems in Erie County. This report refers to the first incident	Reported by Erie Times News (PA) on 23 February 2007	http://nl.newsbank.com/nl-search/we/Archives?p_product=ET&p_theme=et&p_action=search&p_maxdocs=200&p_topdoc=1&p_text_direct-0=1177A7CC8E0AECC8&p_field_direct-0=document_id&p_perpage=10&p_sort=YMD_date:D&s_trackval=GooglePM
427	Fire	20070223		2/23/2007	Dodge Center, Rochester, MN	USA	NEC Micon	"Lightning hits wind turbine, starts fire". A wind turbine near Dodge Center lost one of its blades Friday night when lightning struck it and started a fire. The Rochester Fire Deparment was called to the fire because it had the closest long-ladder truck. Its 100-foot ladder was used to help extinguish the fire at 11:15 p.m. One rotor blade was lost, but fire officials were uncertain if the fire reached the generator portion of the device, which could compound the loss.	Reported on postbulletin.com, 27 Feb 2007, 3:58pm	http://www.postbulletin.com/newsmanager/templates/localnews_story.asp?a=285716&z=2

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
428	Fire	20070223		2/23/2007	Sorne Hill, Buncrana, Inishowen, Donegal, Ireland	Ireland	2MW Enercon E77, 60m tower, 70m diam, operational since May 2006	"Wind turbine fire in Inishowen Feb 23, 5:29 am" The ESB says the destruction of one of its wind turbines in Buncrana over night was due to an overheating generator which caught fire. Emergency services attended the scene and put out the fire. No-one was injured as the windfarm was unmanned at the time of the blaze. The 10 turbine farm at Sorne Hill in Buncrana has been shut down for the time being.	Reported on Ireland's Highland Radio station, Feb 23rd 2007	http://www.highlandradio.com/news.php?articleid=000000138
429	Transport	20070223		2/23/2007	Erie County, PA	USA		"Windmill-hauling rig topples utility pole" For the second time in three days, a tractor-trailer hauling parts of a windmill tower from Ontario to Texas caused traffic problems in Erie County. A lone rig that was carrying a large cylindrical section of a windmill body toppled a utility pole in Wesleyville after it hit it while trying to turn south onto Station Road from the westbound lane of Buffalo Road.	Reported by Erie Times News (PA) on 23 February 2007	http://nl.newsbank.com/nl-search/we/Archives?p_product=ET&p_theme=et&p_action=search&p_maxdocs=200&p_topdoc=1&p_text_direct-0=1177A7CC8E0AECC8&p_field_direct-0=document_id&p_perpage=10&p_sort=YMD_date:D&s_trackval=GooglePM
430	Blade failure	20070225		2/25/2007	Parc Cynog, Llanmiloe, Carmarthen, Wales	UK	NEG Micon 720kW	"Wind farm shutdown as probe into accident is launched". An investigation has been launched after the blade of a wind turbine above Llanmiloe snapped. Fortunately, no-one was hurt in the incident at Parc Cynog at around 5pm on Sunday afternoon. Although the blade was still attached to the turbine, debris was strewn across a 10m radius around the column. The site has five turbines standing at more than 60m, with a blade diameter of 48m. Bosses at Nuon Renewables, which owns the site, have launched an investigation and shut down the remaining turbines.	Reported in Carmarthen Journal, 28 February 2007	http://www.wind-watch.org/news/2007/03/06/wind-farm-shutdown-as-probe-into-accident-is-launched/
431	Human injury	20070225		2/25/2007	Lake Bonney wind farm, Tantanoola, South East Australia	Australia	Vestas	"SA man gets electric shock at wind farm". A Mount Gambier man is in hospital after suffering an electric shock at a wind farm in the state's south-east. Police say the contractor had been working on a turbine at the Lake Bonney Wind Farm near Tantanoola when he was injured. A quick-thinking workmate activated a safety switch and performed CPR on the 27-year-old, before helping him back to ground level before ambulance crews arrived. SafeWork SA will investigate the incident tomorrow.	Reported on ABC News Online, Feb 25th 2007, 1145am	http://www.abc.net.au:80/news/newsitems/200702/s1856503.htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
432	Structural failure	20070308		3/8/2007	Fairfield, Herkiner County, New York	USA		Collapse of two anemometer masts: "Falling test towers leave residents concerned". A subject voiced at the March 8 Fairfield Town Council meeting was that a wind test tower located off Davis Road was beginning to fall apart, according to Jim Salamone, a resident living close by. Salamone said since the last meeting and within the last few days, another tower, which was put up about two years ago near Davis Road, also began to fall apart. A large portion of it is hanging by a mere cable, close to 100 feet above ground. "If that falls down when someone's over there," he said, "who's responsibility is it going to be? One of them is bent over like a pretzel - that stressing point must be weakening it. Those towers should be looked at structurally." Salamone called the town again on Wednesday and only received a response from the codes enforcer, who told him that the second tower's damage was the responsibility of the owner, Atlantic Renewable Energy Corporation. "If these test towers can't be maintained," Salamone said, "how are they going to maintain the wind Jan Johnson, spokeswoman and communica	Reported in The Evening Times, April 6th 2007	http://www.windaction.org/news/8827
433	Blade failure	20070331.1		3/31/2007	Allegheny Ridge Wind Farm, Cambria County, Pennsylvania	USA	Gamsea Eolica G87, 2MW, rotor diameter 87m, 67m-100m hub	"Problems at wind farm could delay acquisition". An Australian company that wants to buy a Cambria County wind farm might walk away if it's not determined what caused seven turbine blades to crack and large pieces of two blades to fly off. The problems at the Allegheny Ridge wind farm are a serious concern, said Neal Emmerton, regional asset manager for Sydney-based Babcock & Brown. The largest piece of fiberglass sheathing to fly off a blade was 143 feet long, according to Alberto Gros, manager of the Gamesa plant in Ebensburg. A full blade weighs 6.3 tons. The large piece, made of quarter-inch thick fiberglass, weighed far less than that, but it still required a crane to lift, he said. All of the pieces landed within a 300-foot safety zone around the turbines. No houses are close to the safety zone. Emmerton said the blades were turning at the time they cracked. All of the approximately 360 blades that were produced at the Ebensburg plant since it opened last summer are being checked for cracking, Emmerton and Gros said. Some have gone to wind farms in Texas, others to I	Reported in The Patroit-News, April 5th 2007. An earlier report in NEPA NEWS March 22nd reported cracks in the blades "Cracks discovered in Cambria wind farm turbine blades"	http://www.windaction.org/news/8818
434	Structural failure	20070416		4/16/2007	Dartmouth, Massachuchetts	USA	Home turbine, 35 feet high	"Dartmouth windmill toppled by storm" One of the many casualties of this weekend's storm was a windmill installed by former state Rep. Mark A. Howland. Arthur Larrivee paid Mr. Howland $16,000 for a windmill and solar panel system for his home at 620 Tucker Road and received everything he asked for: two windmills atop 35-foot-high poles, four solar panels and electrical equipment to convert the power generated into electricity. But on Monday morning, he woke to find that the steel poles of one windmill had snapped clean off about 4 feet above the ground, leaving the windmill lying on the ground. "I honestly couldn't believe it," said Mr. Larrivee.	Reported in South Coast Today, April 19th 2007 (with photo)	http://www.windaction.org/news/9037

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
435	Blade failure	20070426		4/26/2007	Erie Shores Wind Farm, near Port Burwell, Ontario	Canada	GE 1.5MW, 77m diameter, 80m tower	"Lightning damage to turbine covered". A lightning strike bent one of the blades of a turbine on April 26 at 11:30 p.m. The turbine is located south of Nova Scotia Line and west of Port Burwell. David Price of Clean Power Income Fund, which owns the wind farm, said the machines are designed to withstand lightning, but only to a certain extent. "If the lightning hits the machine itself, it's not a problem," he said. "If it hits the blade, it can't withstand that kind of energy." Parts of the blade fell from the damaged turbine as documented by the A Channel television news on April 30, 2007. Cost of replacement estimated at C$200,000.	Reported in the Tillsonburg News, May 4th 2007	http://www.windaction.org/news/9367
436	Structural failure	20070426		4/26/2007	Diss, Norfolk, England	UK	Swift roof top turbine, 2.1m diameter, 1.5kW	"Where have those turbines gone". Article in Diss Mercury highlighting that Tesco have removed 5 Swift turbines from their flagship Diss store. "Last week it emerged that the five turbines, used to great effect during recent power cuts in Diss when the rest of the town lost electricity, had been removed. A spokesman for Tesco said: “The turbines have been removed from the Diss store. Another customer with the same model of turbine, not Tesco, has reported a problem with one of the turbines. “I don't know what the problem was, but as a precaution we've removed all the turbines for health and safety reasons. We'll keep them down until they've found out the cause of the fault." She could not say when the turbines were removed, or when they are expected to be returned." Subsequent investigation found that a decision to remove the turbines was taken following a Swift turbine incident in Scotland where the turbine arms fell off during a storm. This incident remains unsubstantiated by any referable source.	Reported in Diss Mercury April 26th 2007	http://www.dissmercury.co.uk/content/dissmercury/news/story.aspx?brand=DMAOnline&category=news&tBrand=DMAonline&tCategory=news&itemid=NOED26%20Apr%202007%2018%3A45%3A16%3A947
437	Environmental	20070507		5/7/2007	Smola wind farm, Norway	Norway		"Sea eagles in collision with wind turbines at Smøla". Since Phase 2 of the Smøla Wind Farm opened in September 2005, nine sea eagles have died after colliding with turbine rotor blades. Confirmed through Statkraft (operators) website.	Reported on operators own website, May 7th 2007	http://www.statkraft.com/pub/wind_power/feature_articles/sea_eagles_in_collision_with_wind_turbines_at_smola.asp

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
438	Structural failure	20070511		5/11/2007	Voe, Shetland, Scotland	UK		"Wind test mast found in pieces on remote hill" A test mast designed to measure wind velocity for a proposed windfarm has blown down. The 40-metre mast on a hill north of Voe belongs to utilities giant Scottish and Southern Energy and is believed to have been installed on the top of Cunnigill Hill, between Swinning and Quhamm, at some point in the last two years. An SSE employee said that it looked like the mast had fallen over because one of the four guy wires holding it in place had corroded and that the top section of the mast had broken off and broken into pieces. The employee said that the structure was safe but said he had no knowledge of when the mast blew down. SSE is now considering relocating the mast on a different hill as planning permissions for test masts are only granted for temporary periods. A man who occasionally walks in the surrounding area said he saw that the mast was down at the beginning of last November.	Reported in The Shetland Times, May 11th 2007. Also Shetlandtoday.co.uk (see url - with photos)	http://www.wind-watch.org/news/2007/05/11/wind-test-mast-found-in-pieces-on-remote-hill/
439	Human injury	20070515		5/15/2007	Dalswinton, Dumfries and Galloway, Scotland	UK		"Wind farm accident victim rescued". A man was airlifted to hospital after a dumper truck overturned at a wind farm construction site in Dumfriesshire. Fire crews used hydraulic cutting equipment to free the casualty from the cab of the truck. He was transferred by air ambulance to Dumfries Infirmary. Yesterday (May 17th), the man, believed to be local but who has not been named, was said to be “stable with multiple fractures”. The accident happened around 4pm on Tuesday (May 15th) at the Dalswinton windfarm site near Auldgirth. A spokesman for Dalswinton project manager Airtricity said: “We can confirm there was an accident on site at Dalswinton involving a truck which is used by our contractor Carillion. “The driver was seriously injured and taken to Dumfries and Galloway Royal Infirmary.” A spokesman for Carillion said: “A dump truck veered off the road at speed but the vehicle remained upright. “The driver suffered chest, back and head injuries.”	Reported on BBC Scotland news May 15th 2007. Also in the "Dumfries & Galloway Standard", May 18th 2007.	http://news.bbc.co.uk/1/hi/scotland/south_of_scotland/6659159.stm
440	Fatal	20070521		5/21/2007	Kings Lynn, Norfolk, England	UK		"Farmer kills himself after opposition to wind turbines on his land". **The UK's first public fatality regarding wind turbines.** A farmer killed himself after facing bitter opposition from villagers over plans for a multi-million pound wind farm on his land, his family said. The body of Richard Herbert, a 47-year-old father of three, was found in a water-filled drain near his home at St John's Fen End, near King's Lynn, on Monday evening. Mr Herbert, who had been receiving treatment for mental health problems, had been a member of a consortium of Fenland farmers around the village of Marshland St James whose plans to build a £40 million wind farm with 26 huge turbines had created fury among locals. A fortnight ago, half of the 14 farmers abruptly dropped out of the scheme in the face of local opinion.	Reported in Telegraph Online May 24th 2007. Similar story in Norfolk Eastern Daily Press May 24th 2007.	http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2007/05/23/nwind123.xml

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
441	Fatal	20070522.1		5/22/2007	Earlsburn windfarm, Stirling, Scotland	UK	Nordex N80, 2.5Mw, rotor diameter 80m, hub height 70m	"Man dies after 100ft turbine fall". **The UK's first wind turbine operator fatality.** A 19-year-old construction worker was killed after falling down the shaft of a wind turbine. The man, thought to be Brazillian, was inside the turbine which was under construction at the Earlsburn windfarm in Touch Hills, near Stirling. The accident happened at about 1730 BST on Tuesday. It is understood he was killed instantly and firefighters later removed his body. The Health and Safety Executive are investigating. A spokesman said a report would be submitted to the procurator fiscal, who would decide whether a fatal accident inquiry or any criminal charges should follow.	Reported on the BBC News Scotland May 23rd 2007.	http://news.bbc.co.uk/1/hi/scotland/tayside_and_central/6685447.stm
442	Transport	20070524		5/24/2007	Menomonee Falls, Wausheka County, Wisconsin	USA		"Lost load snarls traffic in Falls". A 62-ton section of a wind turbine tower fell from a semitrailer truck that was turning west at Main St. and Appleton Ave. in Menomonee Falls on Thursday. The trailer was hauling the tower section to Joyce, Iowa, from Manitowoc. The accident closed the intersection all day; it was cleared around 9:25 p.m. This has prompted state officials to halt all such future shipments. No-one was injured.	Reported in Milwaukee Journal Sentinel, May 25th 2007	http://www.jsonline.com/story/index.aspx?id=610480
443	Blade failure	20070530		5/30/2007	Springview, Norfolk, Nebraska	USA	750kW, 79 feet long blades.	"Obsolescence of wind turbines worries Springview ". Report confirms blade cracking, though the turbines are still operating. "The turbines have been plagued with repair and maintenance issues". Report also mentions concerns regarding final decommissioning. The turbines are only 9 years old - less than half their expected operating age.	Reported in Norfolk Daily News, May 30th 2007.	http://www.norfolkdailynews.com/main.asp?SectionID=3&SubSectionID=104&ArticleID=4295
444	Environmental	20070530		5/30/2007	Maple Ridge Wind Power Project, Albany, New York	USA	Vestas 1.65MW, 80m tower, 83m blade diameter	"Study shows hundreds of dead birds, bats at wind turbines". A consultants' report for PPM Energy and Horizon Energy identified 123 birds, mostly night migrants, and 326 bats found dead over the course of five months last year beneath 50 wind turbines on the plateau between Lake Ontario and the western Adirondacks. "It's hard to justify this kind of bird and bat slaughter for the amount of electricity we're generating here," council spokesman John Sheehan said. "Ultimately we think there are good places to put windmills and wind turbines, but we need to do some study before we start putting them up, and that wasn't done here."	Reported in Associated Press, May 30th 2007. Actual report available via second url on the right.	http://www.newsday.com/news/local/wire/newyork/ny-bc-ny--windmillfallout0530may30,0,3816255.story?coll=ny-region-apnewyork
445	Environmental	20070607		6/7/2007	Barrow, Cumbria, England	UK	Swift roof top turbine, 2.1m diameter, 1.5kW	"Seagulls beware". Report confirmed seagull deaths at Tesco's Barrow store. Eyewitness splattered with remains of dead seagull after collision.	Reported in North West Evening Mail, June 7th 2007	http://www.nwemail.co.uk/news/viewarticle.aspx?id=506914
446	Blade failure	20070615		6/15/2007	Cham de Chamlonge (Saint Etienne de Lugdares), Ardèche	France	1.5MW turbine	Blade thrown from a turbine at Cham de Chamlonge (Saint Etienne de Lugdares) windfarm in the Ardèche. Announcement on local radio but no follow up in local papers. Locals suspect a cover up. Details from http://ventdubocage.net	Announcement on radio station France Bleue Ardèche, June 15th 2007	
447	Fire	20070623.1	V	6/23/2007	Palm Springs, California	USA		Eyewitness account from a driver in the I-10, with video posted to the internet.	Eyewitness account	http://www.noticias.info/video/video_play_ES.asp?id=4N4HQv-UyUo

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
448	Environmental	20070704		7/4/2007	Maple Ridge Wind Power Project, Albany, New York	USA		"Wind farm oil taints West Martinsburg well". A mineral oil spill caused by an Independence Day transformer explosion at the Maple Ridge Wind Farm has contaminated a residential well. The July 4 explosion at the wind farm substation up the hill from the hamlet on Rector Road – which caused a temporary shutdown of the facility – led to 491 gallons of oil leaking from the damaged transformer said DEC spokesman Steven W. Litwhiler.	Reported on December 29, 2007 by Steve Virkler in Watertown Daily Times	http://www.windaction.org/news/13367
449	Fatal	20070704		7/4/2007	Altamont Pass, Livermore, Alameda County, CA	USA		"Man electrocuted in wind turbine".A shirtless and shoeless man was found deceased inside a wind turbine along the Altamont Pass near Livermore early Wednesday. It appeared that he was electrocuted by 480 volts of power from one of the electrical component boxes, according to the Alameda County Sheriff's Department. Shortly after midnight Wednesday, the owner had been alerted when the windmill suddenly lost power. He and other personnel found the man while investigating the power outage, according to the sheriff's department. Deceased appears to be a member of the public.	Reported in San Jose Mercury News, July 4th 2007.	http://www.mercurynews.com/breakingnews/ci_6299696?nclick_check=1
450	Blade failure	20070706		7/6/2007	Wankum Kreis Kleve (Niederrhein), North Rhein/Westfalia	Germany		Eyewitness and photographer Ralf Handtke Rieso reported half a blade broken off a turbine at Wankum on 7/7/2007. It was photographed by Mr. Handtke Handtke-Rieso. Photographs show a blade half broken off, the broken off half lay completely destroyed below the hub. The ad-hoc-news reports that the police confirmed the accident, confirmed that no-one was hurt, and that the blade piece which fell was 20m in length.	Eyewitness report with photographs, backed up by article on July 8 in www.ad-hoc-news.de/Aktuelle-Nachrichten	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
451	Environmental	20070710		7/10/2007	Braes of Doune, Stirling, Scotland	UK	Vestas V80 2MW	"Rare bird killed by wide turbine" *(sic)*. A rare bird was been killed after getting hit by the blade of a wind turbine in Stirlingshire. The red kite, one of the rarest birds in the UK, was discovered at the Braes of Doune wind farm near Stirling. The 36 turbine wind farm had only been operational since February 2007.	Reported in Press & Journal, 10 July 2007	http://news.bbc.co.uk/1/hi/scotland/tayside_and_central/6287932.stm
452	Blade failure	20070730		7/30/2007	Uelvesbüll bei Husum, Landkreis Nordfriesland / Schleswig-Holstein	Germany	HSW 250 250kW	Rotor blade lost from a turbine in Nordfriesland. The most probable cause is a storm. The turbine was 17 years old. The blade was lost on the Monday morning (30 July) in Uelvesbuell following a loud cracking noise, as the police communicated. There were no injuries. The police closed off the approach road to the plant.	Reported by Husum Police and in Adhoc news.de of 31 August 2007	http://members.aol.com/fswemedien/ZZUnfalldatei.htm
453	Human injury	20070730		7/30/2007	Offshore	Holland		A worker was injured when a 60m high crane on an offshore work platform collapsed.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
454	Blade failure	20070824		8/24/2007	Aschenstedt in Landkreis Oldenburg/ Niedersachsen	Germany	Vestas	Results from investigation of a lost blade accident in November 2006 and a further incident led to the shut-down of four turbines on safety grounds. The expert evaluation discovered manufacturing defects and irregularities.	Reported on 24 August 2007 in Business Week	http://www.businessweek.com/globalbiz/content/aug2007/gb20070824_562452.htm?chan=globalbiz_europe+index+page_top+stories

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
455	Fatal	20070825.1	P	8/25/2007	Klondike III Wind Project, Wasco, Oregon	USA	Siemens 2.3MW	THE DALLES, Ore. (AP) - A wind turbine tower crashed to the ground at a wind farm east of The Dalles, killing one worker and injuring another, Sherman County authorities said. Sheriff's Deputy Geremy Shull said the collapse occurred Saturday afternoon. The deceased worker was later named as 35-year-old Chadd Mitchell of Goldendale, Washington. Shull said the cause of the collapse had not been determined. Officials from the Occupational Safety and Health Administration were investigating Sunday. Portland-based PPM Energy owns the wind farm, but Siemens manufactures and owns the wind turbine tower that collapsed. The turbine was undergoing 500 hour maintenance tests. It was later reported (February 2008) that Siemans were fined $10,000 for safety violations. Officials confirmed that the site was cited for two safety violations just a few months before the fatality.	Reported by Associated Press, 26th August 2007	http://www.oregonlive.com/newsflash/regional/index.ssf?/base/news-21/118817099111750.xml&storylist=orlocal
456	Fire	20070826		8/26/2007	Windpark Schütting, Gem. Butjadingen Kr. Wesermarsch/ Niedersachsen	Germany		At 1100 on the Sunday morning all 8 turbines came to a halt following a transformer fire. A "technical defect" is being blamed.	Reported at NWZ online (url to the right)	http://www.nwzonline.de/index_regionalausgaben_kreis_wesermarsch_butjadingen_artikel.php?id=1418019
457	Fire	20070909		9/9/2007	Forss, Caithness, Scotland	UK	Bonus A/S 1MW	Based on personal local account. The area had a power cut in good weather conditions early on Sunday morning. When I telephoned the hydro board to report the fault, I was told that there had been a fire at the Forss windfarm and that emergency services were on site. Several hours later I drove past. The access track had been reopened, but fire brigade and SSE personnel were still working - replacing a still smouldering telegraph pole. At this point four of the six turbines (the four new ones under Forss II) remained shut down.	Personal account, DR Craig, 9/9/07	
458	Fire	20070914		9/14/2007	Whitewater Canyon, CA	USA		"Whitewater Canyon blaze blamed on wind turbine". Firefighters have fully contained a 68-acre wildfire in the Whitewater Canyon area about 1.5 miles north of Interstate 10, according to CAL FIRE. Fire officials expect to have the blaze under control by 8 a.m. Saturday. Whitewater Canyon Road was closed but reopened to traffic. The fire was caused by an undetermined problem with a wind turbine, according to CAL FIRE. One inmate firefighter was taken to a local hospital for heat related injuries. Fifteen engines, four hand crews and four aircraft are battling the blaze.	Reported by The Desert Sun, 14 September 2007	http://www.wind-watch.org/news/2007/09/15/whitewater-canyon-blaze-blamed-on-windmill/

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
459	Miscellaneous	20070916.1		9/16/2007	Robin Rigg off-shore wind farm, Solway Firth, Dumfries & Galloway, Scotland	UK	420 foot high off-shore turbines	"Windfarm workers rescued from barge". 38 workers were rescued from a barge in the Solway Firth last night after it began to capsize. One of the biggest rescue operations ever in the area got under way just after 7.50pm when the Coastguard received a distress call saying the jack-up barge Lisa, working on the controversial Robin Rigg wind farm, developed a list of between 30 and 35 degrees. Two rescue helicopters from HMS Gannet at Prestwick in Ayrshire and RAF Boulmer in Northumberland were scrambled to the scene. Liverpool Coastguard said RNLI lifeboats from Workington and Silloth were also despatched to join two tugs that were working in the area to help evacuate all personnel on board. The Rotterdam-based barge arrived on the Solway last week. It was to install foundations for 60 420ft-high wind turbines. The spokesman said E.ON had told him that the legs of the jack-up barge appeared to have punctured the sea bed, causing them to bend and the vessel to list badly. A safety enquiry is under way and all work has halted.	Reported in The Herald, 17 September 2007	http://www.wind-watch.org/news/2007/09/17/wind-farm-workers-rescued-from-barge/
460	Transport	20070919		9/19/2007	A87 Kyle to Portree road, Skye, Highland, Scotland	UK	2.3MW	"LORRY BLOCKS SKYE ROAD". Skye's first windfarm caused serious disruption to traffic yesterday (19/9/07) when a lorry carrying part of a turbine tower left the road blocking a major route west. Chief Inspector Paul Eddington said the accident occurred north of Sligachan, on the A87 Kyle to Portree road, at about 11am. He added that the lorry had been transporting the extremely large bottom section of a tower and a heavy lift crane was needed to move it. The chief inspector last night said he expected the road to be blocked until about 1am today (20/9/07). In the meantime, motorists faced a lengthy diversion via the A863 through Dunvegan. The tower section had been on its way to Ben Aketil, where the first two of 10 turbines, each capable of generating 2.3MW, have been assembled on site.	Reported in the Press and Journal, 20th September 2007	http://www.thisisnorthscotland.co.uk/displayNode.jsp?nodeId=149235&command=displayContent&sourceNode=149218&contentPK=18442802&moduleName=InternalSearch&formname=sidebarsearch
461	Miscellaneous	20070925		9/25/2007	Various offshore locations	Various offshore locations	Vestas V90	"Vestas develops replacement for damaged offshore wind turbines". Danish wind turbine manufacturer Vestas Wind Systems AS is developing a new offshore wind turbine model following recent gear box problems at several of its currently operating turbines, Swedish magazine Ny Teknik said. 'We are working with a completely new model of the big offshore turbine V90 3 MW, but the details of the work are secret,' said Vestas spokesperson Peter Wenzel Kruse. At the same time, Vestas and Swedish subcontractor SKF AB are trying to determine the causes of the damage to gear boxes, which recently induced the Danish group to stop sales of the V90 3 MW windmill for offshore installations. The two companies are currently unsure of the reasons for the accidents, but Peter Wenzel Kruse said gear boxes are a problem for the entire wind power industry, because strains on the boxes increase as ever bigger windmills are built.	Reported by Thomson Financial, Copenhagen, 25 September 2007.	http://www.windaction.org/news/11929

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
462	Fire	20071003.1	P	10/3/2007	Hancock Wind Farm, Garner, Iowa	USA	Vestas V47	"Wind Turbine Burns Near Garner". A wind turbine south of Garner burned Wednesday morning. The large compartment holding the gear box and electric components more than than 200 feet above the ground burned and two of the three 77-foot blades broke off, falling to the ground. The incident was reported shortly after 8 a.m., a Hancock County Sheriff's dispatcher said. A third blade was left hanging straight down. The fire occurred in the turbine's motor housing. The motor housing was still smoking at 10:30 a.m. The turbines, part of an extensive wind farm in Hancock County, are owned by FPL Energy LLC of Juno Beach, Fla. They went into operation in 2002.	Reported in Globe Gazette, 3 October 2007.	http://www.windaction.org/news/12034
463	Transport	20071015		10/15/2007	Texas	USA		"Tractor Trailer Drops A Massive Load". A truck driver transporting the midsection of a huge wind energy turbine lost his load on the I-37 frontage road near Rand Morgan. It happened around 3:30 Tuesday afternoon. Police say the driver was supposed to be following a state ordered route, but that he got off track and tried to make a sharp turn.	Reported on KIII-TV3 on October 16th 2007	http://www.windaction.org/news/12238
464	Transport	20071016		10/16/2007	Ashurst	New Zealand		"Big crane runs off turbine site road". A 50-tonne crane ran off an access road and slipped down a bank on the Tararua Wind Farm yesterday, tipping on its side. The driver survived with moderate injuries. He was taken with a leg injury by ambulance to Palmerston North Hospital shortly after 10am. The damaged crane belongs to Verticon New Zealand, a maintenance subcontractor at the wind farm. Ashhurst Senior Constable Andy Nicholls said the accident could have been a lot worse as the crane could easily have gone over the bank and plunged towards the access road below.	Reported on October 17, 2007 by Grant Miller in Manawatu Standard	http://www.windaction.org/news/12234
465	Transport	20071017		10/17/2007	California	USA		"Pylon snarls Highway 113 Traffic". A 128,000-pound section of a pylon for a wind turbine shifted as the rig was headed south on Route 113 south of Dixon early Wednesday, triggering a 10-hour traffic nightmare. No injuries were reported. According to the California Highway Patrol, a section of the support pylon for a wind turbine destined for Montezuma Hills was being transported southbound on Highway 113 ...around 4 a.m. when a stabilizing bar on the 168-foot-long trailer carrying the pylon broke and allowed the cargo to shift.	Reported on October 18, 2007 by Kimberly K. Fu in The Reporter	http://www.windaction.org/news/12245

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
466	Transport	20071030		10/30/2007	Lacolle, Quebec, Montreal	Canada		"Truck carrying wind turbine strikes Highway 15 overpass" Highway 15 was closed in both directions near Lacolle, Que., after a truck carrying an oversize load struck an overpass. Police confirmed that the truck and wind turbine scraped the underside of the overpass while trying to pass through. The truck likely hit the overpass because the load was "too high," explained provincial police spokesman Ronald McKinnis. "We stopped [all] traffic because we don't know exactly the damage to the overpass." The accident happened early Tuesday afternoon near Saint-Mathieu, in Montérégie, about 38 km north of the U.S. border. Inspectors with Transport Quebec were dispatched to the crash site to test the overpass's safety. Both Highway 15 and the overpass will remain closed until further notice, MacKinnis said. Highway 15 is the most popular route to the Lacolle border, which connects Quebec to New York State.	Reported by CBS News, 30 October 2007	http://www.windaction.org/news/12436
467	Environmental	20071101		11/1/2007	Lough Lee, Northern Ireland	Ireland		"Pollution at Lough Lee: Wind farm under investigation as wild trout stocks disappear". Pollution during the construction of a wind farm is believed to be the source responsible for the wiping out of valuable vegetation and a colossal decrease in wild Brown Trout fish stocks in one of Tyrone's hidden beauty spots. ...One source described the fish caught as "feeble and malnourished" and indicated that the "damage to the rare genetic strain was irreparable." Lough Lee has long been considered by angling tourists as one of the most unique freshwater fishing sites in Ireland or Britain. ...problems arose during the construction of the 9MW wind farm by leading company Airtricity, who was given planning permission to position turbines on the slope of Bin Mountain facing and in close proximity to the Lough. The Ulster Herald has learned that earlier this year, while the Bin Mountain wind farm was under construction, such was the extent of the silt and clay run-off that the entire lough was severely polluted resulting in complete discolouration.	Reported in the Ulster Herald, November 1st 2007	http://www.windaction.org/news/12474
468	Transport	20071103		11/3/2007	Summit Mills, Pennsylvania	USA		"Police fine trucking company more than $84,000". Pennsylvania State Police stopped eight commercial vehicles hauling components for windmills that had improper special hauling permits. They issued 50 citations with fines totaling more than $84,000. ...“I contacted an individual at the site and issued a verbal warning,” Pivirotto said. “He assured me the complaints were not legitimate.” Calls to the wind farm site for comment were not returned. Casselman WindPower LLC of Richmond, Va., filed the plans to erect seven turbines in Summit and Black townships, according to the county planning commission. The project is being constructed by PPM Energy, Oregon.	Reported on November 3, 2007 by Vicki Rock in Daily American	http://www.windaction.org/news/12492

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
469	Transport	20071107		11/7/2007	Dumfries & Galloway, Scotland	UK		"Wind turbine trailer blocks road". A major road in south west Scotland has been blocked after a lorry carrying a 106-tonne wind turbine got stuck. Dumfries and Galloway Police warned that the A75 was likely to remain shut for some time after the incident which took place shortly before 1100 GMT. The road was blocked for over 10 hours, reopening at 2130.	Reported on BBC News November 7th 2007	http://news.bbc.co.uk/1/hi/scotland/south_of_scotland/7082830.stm
470	Transport	20071107		11/7/2007	Lincoln County, Kansas	USA		"Wind farm crane topples". A 320-foot crane used to construct turbines at the under-construction Smoky Hills Wind Farm fell Wednesday morning while it was being moved from one site to another, said Glenn Melski, vice president and manager of operations for Enel North America, one of the companies that's managing the project.	Reported on November 7, 2007 in Salina Journal	http://www.windaction.org/news/12575
471	Structural failure	20071108		11/8/2007	Wick, Caithness, Scotland	UK	Swift roof top turbine, 2.1m diameter, 1.5kW	"County battered by 90 mph storm". Article notes damage to Wick Tesco store's micro-wind turbines as well as loss of six solar panels. A large part of the store's car park had to be closed to the public.	Reported in John O'Groats Journal November 9th 2007	http://www.johnogroat-journal.co.uk/news/fullstory.php/aid/3387/County_battered_by_90_mph_storm.html
472	Structural failure	20071108.1	P	11/8/2007	Argyll, Scotland	UK	Vestas V47	"Alert After Turbine Collapses In High Winds". Three Scottish windfarms were "switched off" yesterday after a massive turbine collapsed in high winds. The machine, which stands more than 200ft tall at a windfarm in Argyll, apparently "bent in half" during the storm conditions that swept Scotland on Thursday. Operator Scottish Power stopped the 26-turbine facility ahead of a probe into the cause of the collapse. The energy giant also switched off two windfarms in the south of Scotland which use the same Vestas V47 turbines.	Reported on November 10, 2007 in The Press and Journal	http://www.windaction.org/news/12616
473	Structural failure	20071111		11/11/2007		New Zealand	10m high home turbine	"Too much spin for Green MP". Greens co-leader Jeanette Fitzsimons has given up on wind power after the turbine on her Coromandel farm fell off in a gale. Wires supporting a 10m pole holding up the turbine propeller have snapped several times in the past five years. During a heavy winter storm, the propeller toppled off. "I suppose technically, it could have hit a cow, but the cows got out of the way," says Fitzsimons, the government's energy efficiency spokeswoman.	Reported in Waikato Times Nov 11th 2007	http://www.stuff.co.nz/4269635a11.html
474	Blade failure	20071115.1	P	11/15/2007	Fenner Wind Farm, Madison County, NY	USA	GE Wind Energy 1.5MW	"Madison County Wind Turbine Bends; wind turbine fails". One of the turbines at the Fenner Wind Farm hasn't been spinning since Wednesday night, because one of its blades has been badly bent. ...A person who lives near the site says it sounded like a car crashing when the blade broke. There no word yet on when it'll be fixed. (Article includes photograph). This is the second blade failure at Fenner this year (previous one in Jan 2007)	Reported on WSYR9, 15 November 2007	http://www.windaction.org/news/12695

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
475	Blade failure	20071122.1		11/22/2007	Lowestoft, England	UK	120m turbine	"Gulliver shut down for safety precaution". A lightning strike on the Lowestoft wind turbine has resulted in it being out of action for the past four weeks, it emerged yesterday. Although it suffered damage in a storm during the summer it has now been discovered that it has suffered minor damage to one of the tips and has been shut down for safety reasons. The giant 120-metre landmark, known as Gulliver, was hit during the thunderstorm on June 8. Engineers had the blades spinning again the same day, but a maintenance inspection last month uncovered the problem. The turbine will remain closed until specialised equipment can be brought in to bring the blade down to ground level for repairs.	Reported in Lowestoft Journal 21 November 2007	http://www.windaction.org/news/12797
476	Fire	20071123		11/23/2007	Galicia	Spain		Lightning strike hits a substation at Boimente in Galicia, Spain. A transformer then went on fire, fueled by its own oil. The substation manages the output of 26 wind power stations. This is a loss of 865MW or 31% of Galicia's wind power. It is likely to be out for weeks.	Reported in La Voz de Galicia, 23 November 2007	http://www.lavozdegalicia.es/dinero/2007/11/23/0003_6342514.htm
477	Transport	20071123		11/23/2007	New York	USA		"Wind farm trucks contributing to road problems" The pavement on Brainardsville Road is cracked from hundreds of truck trips made to wind-farm projects in western Clinton and eastern Franklin counties. The damage is especially irritating in Franklin County because not only were the bridges replaced, but the entire length of Brainardsville Road from Malone to Ellenburg was widened and resurfaced as part of a $12 million state project in 2000 and 2001.	Reported in Press Republican 23 November 2007	http://www.windaction.org/news/12833
478	Transport	20071124		11/24/2007	West Fargo, North Dakota	USA		"Overpass damage near Casteton caused by wind tower". A wind tower column from DMI Industries in West Fargo that was being hauled on a semitrailer flatbed clipped the underside of an Interstate 94 overpass just east of this city, damaging it. No one was hurt, but traffic was disrupted while the mess was cleaned up, the Highway Patrol said. ...The impact about 9:30 a.m. Saturday in the westbound lanes scattered chunks of concrete across the road, damaging at least nine vehicles. The damage ranged from flat tires to punctured radiators, authorities said.	Reported in The Forum by Associated Press 24 November 2007	http://www.windaction.org/news/12847
479	Transport	20071202		12/2/2007	Pennsylvania	USA		"Turbine haulers spark complaints along Route 219". Small towns along Route 219 are complaining about recent "super-load hauling" of windmill pieces from Canada to Somerset County that has stalled traffic and damaged property. ..."every company that needs or requires an oversize or overweight load permit within any county or state is responsible for any damage done to the roadway or anything around it," adding that companies are subject to claims from the state, county or municipality". Carrolltown Borough police Chief Dave Murphy said that, while his borough has not seen any damage, traffic control has been an issue. "I don't understand why they're on Route 219," Murphy said. "I can't believe (PennDOT) gave a permit to allow these on the highways.	Reported in the Tribune-Democrat on December 2nd 2007	http://www.windaction.org/news/12982

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
480	Blade failure	20071203		12/3/2007	Waymart Wind Farm, Pennsylvania	USA	GE Wind Energy 1.5MW	"Wind Turbine Break 'Isolated Occurance'." No word yet on what caused a blade to break apart on a wind turbine at the Waymart Wind Farm, Monday afternoon. Two blades on the three-bladed rotor remained intact, but one delaminated, meaning its fiberglass layers came apart. "This is on private property. No one was injured," says Steve Stengel, a spokesperson for FPL Energy which owns the wind farm.	Reported on December 6th in The Wayne Independent	http://www.windaction.org/news/13050
481	Transport	20071204		12/4/2007	Wick, Caithness, Scotland	UK		"Turbine transport hits a snag at Wick junction". A plan to transport three wind turbine sections from Wick harbour fell to pieces after the lorry taking the longest section was unable to take a corner and had to reverse all the way back to the harbour. A Wick police spokesman said that steps were being taken to reroute the other shipments to avoid the same problem. Comment: A photograph clearly shows damage to the turbine along one side. Highland Council planners clearly had not properly assessed the route.	Reported in the Caithness Courier on Wednesday 5th December 2007.	
482	Miscellaneous	20071210		12/10/2007	Minnesota	USA	Vestas	"SMMPA seeks damages for alleged wind-turbine problems". A power agency claims it has suffered damages exceeding $7 million stemming from defects in four wind-energy generation turbines in the western Minnesota. Southern Minnesota Municipal Power Agency, based in Rochester, is asking a district court judge to order the defendant, Vestas American Wind Technology Inc. of California to resolve the dispute through arbitration. ...SMMPA alleges that the turbines have design and manufacturing defects. Duffy said Vestas has refused to address the defects. As a result, he says, SMMPA has lost revenue from down-time caused by system failures. In addition, the defects have accelerated the depreciation of the turbines and their components, there has been a loss of future revenue from the down-time, there have been increased costs, and there has damage to crops and long-term damage to cropland from ground compression due to crane movement.	Reported on December 10th 2007 in Post Bulletin	http://www.windaction.org/news/13113
483	Miscellaneous	20071211		12/11/2007	Lackawanna, NY	USA	Liberty 2.5MW	"Why Lackawanna Windmills Being Taken Apart?". For a couple months now, most of the windmills on the old Bethlehem Steel property haven't been turning at all. Norman Polanski, Lackawanna Mayor, "They're not turning plain and simple that's what everybody keeps callling me about, the windmills aren't turning." ... A Clipper Vice President tells me the plan now is for a crane to arrive next week to take all of the gear boxes down send them back to the factory in Iowa, and then replace them one by one throughout the winter. The towers will still stand but the blades will have to come off of all eight wind mills. It could be March or April before the job is finished. This is the first site to use the Liberty 2.5MW turbines.	Reported on December 11th 2007 by WIBV TV. With video footage and posted to YouTube	http://www.windaction.org/news/13133

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
484	Structural failure	20071221		12/21/2007	Somerset County, Pennsylvania	USA		"Gamesa tower knocked down in storm" The discovery wasn't pleasant, nor was it much of a surprise to some Shaffer Mountain residents. Neighbors found a 200-foot tower - erected to measure wind atop the ridge for the controversial 30-turbine farm - lying twisted on ice-packed ground this week. "This tower is aluminum. The turbine's blades are Fiberglas and could project further," said Karin Sedewar of Shaffer Mountain Road. "If it had been real turbines, it could have been a real danger." The fall of the Gamesa USA tower - which Karin and John Sedewar believe was a casualty of last week's ice storm - solidifies their concerns about windmills.	Reported on December 21st 2007 in the Tribune-Democrat	http://www.windaction.org/news/13283
485	Environmental	20071229		12/29/2007	Maple Ridge Wind Power Project, Albany, New York	USA		"Wind farm oil taints West Martinsburg well". A mineral oil spill caused by an Independence Day transformer explosion at the Maple Ridge Wind Farm has contaminated a residential well. The July 4 explosion at the wind farm substation up the hill from the hamlet on Rector Road – which caused a temporary shutdown of the facility – led to 491 gallons of oil leaking from the damaged transformer said DEC spokesman Steven W. Litwhiler.	Reported on December 29, 2007 by Steve Virkler in Watertown Daily Times	http://www.windaction.org/news/13367
486	Structural failure	20071231		12/31/2007	Iga, Mie Prefecture	Japan		A wind turbine set up in March 2006 was touted as the answer to energy problems in Iga, Mie Prefecture. But there was one problem. The wind turbine fell apart in less than two years. Malfunctions and accidents involving wind turbines have occurred repeatedly across the country, leading to suspended services and even the scrapping of one facility. In the Iga case, the small wind turbine on the Aoyama highland broke and fell off the top of the steel tower in December. The land ministry's office suspects the turbine broke because of insufficient welding.	Reported on 19 January 2008 in The Asahi Shimbun. Date taken as Dec 31st	http://www.windaction.org/news/13684
487	Blade failure	20079999		2007 (date unknown)	Twin Groves, McLean County, Illinois	USA		"Wind Out Of Their Sails" Fire - eleven of the 15 cases tracked by WindAction group list lightning or another ignition source as the cause of blazes that begin hundreds of feet in the air. One such event occurred last year at the Twin Groves wind farm operated by Horizon Wind Energy in eastern McLean County. Despite countermeasures such as lightning rods meant to divert a strike from the turbines, one tower had to be shut down because of lightning and a resulting fire.	Reported on 25 October 2008 in Journal Star. Date taken as Dec 31st.	http://www.windaction.org/news/18526
488	Fire	20079999		2007	Black Law, Lanarkshire, Scotland	UK	Siemens	No details of incident. Provision of analysis, advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
489	Fire	20079999		2007	Silkeborg	Denmark	AWT Alternative Wind Technology ApS	No details of incident. Restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
490	Fire	20079999		2007	Silkeborg	Denmark	AWT Alternative Wind Technology ApS	No details of incident. Restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
491	Fire	20079999		2007	Smola	Norway	Siemens	No details of incident. Provision of advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
492	Fire	20079999		2007	Smola	Norway	Siemens	No details of incident. Provision of advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
493	Fire	20079999		2007	Smola	Norway	Siemens	No details of incident. Provision of advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
494	Fire	20079999		2007	Branderup	Germany	Siemens	No details of incident. Provision of analysis, advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
495	Fire	20079999		2007	Smola	Norway	Siemens	No details of incident. Provision of advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
496	Fire	20079999		2007	Esbjerg	Denmark	Vestas	No details of incident. Provision of analysis, advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
497	Miscellaneous	20079999		2007	Smola	Norway	Siemens	No details of incident. Provision of advice and restoration of damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
498	Environmental	20080102		1/2/2008	Woolnorth wind farm, Tasmania	Australia		"Green Power Is Black Hole For Rare Eagles". Australia's biggest wind farm in north-west Tasmania has become a "black hole" for endangered wedge-tailed eagles. The 62-tower Woolnorth farm has killed up to 18 of the island's endangered subspecies of the wedge-tail in its giant rotor blades. Despite their acute vision, the eagles are failing to pick out turbine blades with tips that can rotate at 300 kmh, according to Eric Woehler, chairman of Birds Tasmania. "Eagles evolved in a landscape without wind farms," Dr Woehler said. "They just don't see the blades. The researchers there are finding that they are dying not only in the downsweep, but in the upsweep of the blades	Reported on January 2, 2008 by Andrew Darby in Sydney Morning Herald	http://www.windaction.org/news/13396
499	Structural failure	20080102.1	P	1/2/2008	Hesket Newmarket, Cumbria, England	UK	Vestas V25	"Probe Into Wind Turbine Collapse". Police have started an inquiry into the collapse of a 19-year-old wind turbine in Cumbria. The machine came down between December 29-30 in high winds, landing on a public road. Police and the turbine owners are looking into the collapse. It was later reported that collapse of the 11-tonne turbine would be subject to an inquiry.	Reported on BBC news 2 January 2008 and in the Cheshire Standard on 4 January 2008.	http://www.windaction.org/news/13409
500	Structural failure	20080108		1/8/2008	Baldinnie, Fife, Scotland	UK		"Turbine Fall is not an ill wind". A large domestic wind turbine which has featured on the skyline above Baldinnie in Fife for many years has collapsed in the storms that swept the country last Wednesday.	Reported in The Courier 14 January 2008.	http://www.thecourier.co.uk/output/2008/01/1
501	Miscellaneous	20080110		1/10/2008	Lackawanna, NY	USA	Clipper 2.5MW	"Clipper's 2.5-MW Liberty wind turbines malfunction". The largest wind turbine manufactured in the United States is running into some technical difficulty. Clipper Windpower Inc.'s 2.5-MW Liberty wind turbines at the 20-MW Steel Winds facility in Lackawanna, N.Y., are malfunctioning due to faulty gear sets. "Over the summer, a gear-timing issue in the drive train's secondary stage was detected in some of Clipper Windpower's Liberty wind turbines at the Steel Winds site. The cause was found to be a supplier quality deficiency in the drive train attributable to the suppliers' manufacturing process.	Reported on January 10, 2008 by Jennifer Zajac in SNL Financial	http://www.windaction.org/news/13518

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
502	Environmental	20080112		1/12/2008	Altamont Pass, Livermore, Alameda County, CA	USA		"Altamont Pass Is Still Killing Birds of Prey". Environmentally friendly efforts aren't so kind to each other in the rolling hills of the Altamont Pass. For years, whirling rotors on some of the 5,000-plus wind turbines that line the pass have minced and otherwise killed thousands of golden eagles, red-tailed hawks and other birds of prey at a rate alarming to groups on a mission to protect them. ...Now a year into the settlement agreement, there has been little progress in reducing bird deaths to levels called for in the settlement. The Golden Gate Audubon Society, a party to the lawsuit that triggered the settlement, backs scientists' recommendation that hundreds more turbines need to be relocated and the shutdown extended in order to reach the reduction mark.	Reported on January 12, 2008 by Jake Armstrong in Recordnet.com	http://www.windaction.org/news/13561
503	Fire	20080115		1/15/2008	West Virginia	USA		"Mt. Storm Turbine Catches Fire". According to NedPower Mount Storm spokesperson Tim O'Leary, a wind turbine in Mount Storm caught fire at approximately 5:15 p.m. on Tuesday afternoon. According to O'Leary, the fire occurred during routine maintenance and started in the nacelle of the wind turbine.	Reported on January 16, 2008 in Mineral Daily News-Tribune	http://www.windaction.org/news/13659
504	Miscellaneous	20080121		1/21/2008	Scroby Sands, Norfolk, England	UK		"Repair plan for offshore windfarm" A cable that brings power ashore from an offshore windfarm has failed and needs to be replaced in the spring. E.on, the firm that owns Scroby Sands windfarm two kilometres off the Norfolk coast at Caister, said one of its three high-voltage cables had failed. This means that if the wind turbines are working at full capacity only 66% of the power can be brought ashore. E.on's other off-shore windfarm at Blyth, Northumberland, is also awaiting repair after a sub-sea cable broke. ...	Reported in BBC News on 21 January 2008	http://www.windaction.org/news/13711
505	Miscellaneous	20080121		1/21/2008	Blyth, Northumberland, England	UK		"Repair plan for offshore windfarm" E.on's other off-shore windfarm at Blyth, Northumberland, is also awaiting repair after a sub-sea cable broke. ...	Reported in BBC News on 21 January 2008	http://www.windaction.org/news/13711
506	Blade failure	20080130		1/30/2008	Prince Wind Energy Project, Sault St. Marie, Ontario	Canada	GE Energy 1.5 MW	"Winds too much for turbine". One of the massive turbines at the sprawling Prince Wind Energy Project, immediately northwest of the city limits, was damaged during the Jan. 30 blizzard. An extensive investigation is underway to determine why the turbine sustained a damaged blade and has been inoperable for more than three weeks. "We believe the blade was damaged after the turbine shut itself down," said Jim Deluzio, general manager of Ontario Wind Operations with Brookfield Power Corp. "The investigation will look into the possibility of a defective blade. . . . Winds were high but the blade should not have been damaged."	Reported in the The Sault Star on February 22, 2008	http://www.windaction.org/news/14283

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
507	Environmental	20080202		2/2/2008	Altamont wind farms, CA	USA		"Despite efforts, Altamont bird toll rising" The Altamont wind farms saw an apparent increase in bird deaths last year in spite of efforts to reduce the bird kills, according to a new report. Bird-carcass surveys at about half of the nearly 5,000 Altamont wind turbines found a striking jump in deaths among many species in the year ending last September over the previous year. The number of bird deaths does not appear to be decreasing despite measures to reduce the deaths, the report said. Those efforts include shutting down all the turbines for two months in the winter and a not-yet fully-accomplished process of relocating or permanently shutting down the windmills suspected of causing the most deaths.	Reported in the San Francisco Chronicle, 2 Feb 2008	http://www.windaction.org/news/13926
508	Structural failure	20080202		2/2/2008	Nås, Gotland	Sweden	Vestas	Approximate date. Articles on Feb 22nd and Feb 25th reports Vestas wind turbine wrecked in Sweden 3 weeks before. A Vestas turbine at Nås in Gotland, Sweden, lost a blade in the same way as in Odsherred. In that case the blade flew 40 metres and hammered down in a field. No-one was hurt. A neighbour described the bang as “a sonic boom or a car accident”.	Reported in the Ingeniøren on 22nd February 2008 and in the Ingeniøren on Monday 25th February 2008	http://ing.dk/artikel/85905
509	Structural failure	20080207		2/7/2008	Island of Texel, North Holland	Holland		"Windmolen op Texel verliest wiek en kap" (In Dutch). Fallen turbine reported on Island of Texel, in North Holland	Reported in Noord Hollands Pagbad 7 February 2008 (with photograph)	
510	Fatal	20080208		2/8/2008	Grand Meadow, Minnesota	USA		Philip Ray Edgington, 54, died in a plane crash on 8/2/2009. Crash investigators concluded that he was flying near Grand Meadow when he encountered a wind farm with several 400 foot turbines. The plane attempted to manoeuver around the turbines then crashed in a field.	Reported in Post-Bulletin on 19 April 2009	http://www.windaction.org/news/20832
511	Human injury	20080209		2/9/2008	Taylor County, Texas	USA		"Man Electrocuted at the Windfarms". A man was rushed to hospital after he was electrocuted while he worked out on the windfarms. The accident happened 4 miles south of coronados camp off of highway 277. Officials at the scene say he was shocked with 690 volts. Taylor County Deputy Sheriff says the man is in stable condition and he did sustain burns.	Reported by KRBC on 9 Feb 2008	http://bigcountryhomepage.com/content/fulltext/?cid=5611
512	Blade failure	20080213		2/13/2008	Havøygavelen, Måsøy	Norway	Nordex Energy	"Vindmølle tålte ikke vind [Windmill couldn't take wind]" Report (with photo) of a blade destroyed by the wind at Havøygavelen in Måsøy commune. Local people have been asked to stay away and police have blocked off the area.	Reported by nordlys.no on 13 February 2008	http://www.wind-watch.org/news/2008/02/13/vindm%C3%B8lle-talte-ikke-vind-windmill-couldnt-take-wind/

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
513	Structural failure	20080222.1	V	2/22/2008	Hyacintvej, Hornslet, East Jutland	Denmark	Vestas (Nordtank NKT600 - 180/43)	"Captured on video - the day a wind turbine exploded..." The dramatic moment was captured by Danish news channel TV2, which claimed the turbine was in need of replacement. As the winds gathered pace, the speed control mechanism of the vanes ran out of control. The turbine, in Hornselt, Aarhus, then exploded into thousands of fragments, with even its mast snapping and falling to the ground. TV2's footage will spark concerns about the safety of wind farms, which are a growing alternative to fossil fuels. Local reports said that the braking system failed while 2 technicians worked in the turret in the top. They got out before the collapse. A 19 meter piece of the blade was thrown 20 metres. Smaller pieces were thrown more than 500 meters. The incident occurred three weeks after a Vestas wind turbine was wrecked in Sweden, slinging a blade 40 metres. Earlier, damage to wind turbines also occurred in Scotland and Northern England.	Posted on You Tube and Live Leak. Reported in the Ingeniøren on 22nd February 2008 and in the Daily Mail 25th February 2008	http://www.liveleak.com/view?i=cdd_1203701257
514	Blade failure	20080224		2/24/2008	Village of Sidinge, Odsherred	Denmark	Vestas V47 660kW	"Yet another Vestas wind turbine throws its blade 100 metres in the wind" On Sunday morning another wind turbine (manufactured by Vestas) was damaged. The event occurred at 06.30 hrs. outside the village of Sidinge on Odsherred. No-one was hurt when one of the heavy blades flew 100 metres through the air and crashed to the ground with a boom. Farmer Keld Boye, who lives in the village, has told TV2-News that he heard the bang and went onto the field to see what had happened. He and his family often stay in the same field, but fortunately not at the time of the accident. A ministerial investigation followed the 2 accidents over the weekend.	Translation of "Endnu en Vestas-mølle kastede vinge 100 meter væk i blæsten" published by Kent Krøyer in Ingeniøren on Monday 25th February 2008	http://ing.dk/artikel/85923
515	Structural failure	20080303		3/3/2008	Biddinghuizen	Holland	Lagerwey LW 18/80	Complete collapse of turbine tower	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
516	Blade failure	20080303.1		3/3/2008	(Generic)	USA		"Suzlon to replace defective equipment worth $25 million" In what implies a Rs.1 billion ($25 million) hit on its balance sheet for the current quarter, leading wind power equipment-maker Suzlon Energy will refit wind turbine blades for a project in the US, the company said Monday. "The company will do a retrofit programme to resolve blade-cracking issues discovered during the operations of some of its S88 turbines in the US," the company informed the Bombay Stock Exchange Monday.	Reported on 3 March 2008 in The Indian News and on 4 March in Business Standard	http://www.windaction.org/news/14456
517	Structural failure	20080304		3/4/2008	Monroe Township, Logan County, Ohio	USA		"Ice storm damages wind measurement tower" High winds and ice Tuesday are partially to blame for knocking an approximately 20-foot section from the top of a 160-foot Monroe Township meteorological tower, raising concerns among area residents about what could happen to a wind turbine in the event of a more serious ice storm. "Wind Truth Alliance questions why a wind company would erect a structure that cannot withstand Ohio weather," Linda Hughes of the organization wrote in a prepared statement. "If wind turbines are to be built in Logan County, what will protect residents from the impact of the recent ice storm and more severe ice storms, such as the one in 2005?"	Reported on 7 March 2008 in The Bellefontaine Examiner	http://www.windaction.org/news/14545

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
518	Blade failure	20080306		3/6/2008	Montepò, Scansano, Tuscany	Italy		"10-meter section of blade broke off and flew 200 meters" Reported blade section thrown in early February 2008.	Reported by National Wind Watch on 6 March 2008	http://www.wind-watch.org/news/2008/03/06/10-meter-section-of-blade-broke-off-and-flew-200-meters/
519	Environmental	20080306		3/6/2008	Altamont Pass, CA	USA		"Windmills increase raptor deaths; Eagles, owls, migratory songbirds caught in blades" Long before wind turbines sprouted on Altamont Pass, it was home to the highest density of golden eagles in the world and their major breeding area in the United States. Almost as soon as the first turbine started rotating, the bird carcasses started piling up: Golden eagles, burrowing owls, red tailed hawks, other raptors, western meadowlarks and migrating songbirds. ...On Feb. 12, an interim report on raptor mortality during 2005-2007 was released. Instead of a reduction in raptor mortality, the study found deaths had risen except for that among golden eagles, which had fallen to the sustainable level of 49 deaths per year. Burrowing owl mortality suffered the greatest increase - more than 300 percent - and the overall raptor deaths almost doubled.	Reported on 6 March 2008 in The Union	http://www.windaction.org/news/14529
520	Miscellaneous	20080309		3/9/2008	Askham & Ireleth wind farm, Furness, Cumbria, England	UK		"Exclusion zone around wind farm after gales" An exclusion zone is in place around a Furness wind farm after gale force winds battered Cumbria. Pencil Lane at Marton has been closed off since Monday evening as engineers work to fix a mechanical failure on a turbine at Askam and Ireleth Wind Farm. Power Company E.ON requested that police cordon off the area as a safety precaution before the predicted high winds arrived. Today a spokeswoman for E.ON said: "Because of the weather we are experiencing we have not been able to carry out the work."	Reported on 12 March in North-West Evening Mail	http://www.windaction.org/news/14635
521	Fire	20080309.1	P	3/9/2008	Bird's Landing, Solando County, CA	USA		"Fire ruins turbine at wind farm; Birds Landing blaze gutted 1 of 90" A wind turbine caught fire in Birds Landing early Monday, but investigators have yet to identify what caused the flames. The fire, on the top portion and on the blades of the 200-foot turbine, was discovered around 5:30 a.m. by employees of FPL Energy - High Winds. The turbine that caught fire was one of 90 the company maintains in the 6700 block of Birds Landing Road near Rio Vista. Van Culver, high winds plant leader for FPLE, said by early afternoon the company was still assessing the risk of climbing the tower to get a closer look. Local TV company KKKK have footage at http://www.kcra.com/news/15553196/detail.html#.	Reported on 11 March 2008 in the Reporter	http://www.windaction.org/news/14610
522	Miscellaneous	20080311		3/11/2008	Dinéault, Finistere	France		"Vent de folie à Dinéault [Crazy wind]". (Translated from French) Missing safety bolt caused turbine to continue turning at excessive speed while neighbouring turbines were shut down. The turbine was damaged.	Reported in Le Télégramme on March 13, 2008	http://www.wind-watch.org/news/2008/03/13/vent-de-folie-a-dineault-crazy-wind/

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
523	Fatal	20080318		3/18/2008	Cefn Croes, Wales	UK		"German killed in windfarm accident" A German national was killed in an industrial accident at the Cefn Croes wind farm, near Ponterwyd, last week. Waldemar Neumann, 41, of Bissendorf, Germany, who is believed to have been staying recently in an Aberystwyth hotel, died after he was struck by a lorry on the site of the windfarm at about 10.30pm on Tuesday 18 March. Ceredigion police and the Health and Safety Executive, Wales are investigating the incident. Ceredigion coroner Peter Brunton has opened an inquest into the death. After evidence of identification was received, the inquest was adjourned to a date to be arranged. The incident occurred some four miles off the A44 road, on a forestry track on the Cefn Croes site. Mid and West Wales Fire and Rescue Service also attended the scene.	Reported in Aberystwyth Today (Tindle Newspapers Ltd) 27 March 08	http://www.aberystwyth-today.co.uk/today/options/news/newsdetail.cfm
524	Miscellaneous	20080326		3/26/2008	Palm Springs, California	USA		"Palm Springs fire personnel rescue windmill worker". Firefighters rescued a windmill maintenance worker who was having chest pains as he worked more than 150 feet above the ground this afternoon. Palm Springs firefighters were called to the 5400 block of North Indian Canyon about noon regarding a man having chest pains, Battalion Chief Mark Avner said. They drove about a half mile west of the area where they found the 22-year-old worker suspended 157 feet above the ground. "It probably took us about an hour or so to get him down," Avner said. **NOTE: This rescue appears unrelated to wind energy, but raises the point that emergency teams will be called upon to service people on the large towers.**	Reported in Desert Sun 26 March 2008	http://www.windaction.org/news/14878
525	Fire	20080327.1	P	3/27/2008	Ewington Wind Farm, Minnesota	USA	Suzlon	"Turbine burns at Ewington wind farm" Smoke pours from the top and bottom of one of the wind turbines at the Ewington Wind Farm near the Heron Lake exit north of Interstate 90 Wednesday (Mar 26) morning. The Brewster and Okabena Fire Departments responded to the scene, but upon the advice of Suzlon Wind Energy officials, the fire was allowed to burn itself out. (with photo)	Reported in Worthington Daily Globe, March 28 2008	http://www.windaction.org/pictures/14894
526	Miscellaneous	20080327.2		3/27/2008	Parkhouse Farm, Lowca, Cumbria, England	UK		"Deadline for firm in wind turbine row" Energy company E.ON has been given 21 days to repair a broken wind turbine at Lowca in Cumbria or face enforcement action. Copeland Council says the firm has breached planning approval by leaving the turbine unrepaired. The wind turbine has not worked for 14 months and site operator E.On had agreed to repair it by the end of February. The energy company says the turbine has a fault in the gearbox that cannot be repaired on site. A planning condition for wind turbines ensures that turbines at the end of their working life must not be left to deteriorate and must be dismantled within six months of becoming inactive. *This failure has not been reported elsewhere on the database.*	Reported by Press Association Ltd in Wigan Today, 27 March 2008	http://www.wind-watch.org/news/2008/03/27/firm-told-to-repair-turbine/
527	Miscellaneous	20080330		3/30/2008	Growind park, Eemshaven	Holland		Toppling of 700 tonne crane during installation of Vestas V90 3MW turbines	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
528	Blade failure	20080401		4/1/2008	(Generic)	USA		"Rotor blade blues as yet another wind turbine manufacturer launches blade retrofit program" One of the wind industry's major turbine vendors has announced it is undertaking a major blade retrofit program . Over 1200 units, mostly in America, are expected to come down for repair after signs of weakness and cracking in some of the blades. The April issue of Windpower Monthly looks in detail at one vendor's blade blues but also paints the bigger picture. With this now the third major blade retrofit on US soil in the past year, tough questions are being asked. "	Reported in Windpower Monthly, April 2008	
529	Ice throw	20080404		4/4/2008	Mars Hill, Maine	USA		Sign photographed at Mars Hill site states "Warning. Falling ice and snow may be present. Keep clear"	Posted on www.windaction.org on 4 April 2008	http://www.windaction.org/pictures/15111
530	Blade failure	20080409.1		4/9/2008	Izuatagawa Wind Farm, Higashi-Izucho, Shizuoka Prefecture.	Japan		"Windmills lose blades in high winds". CEF Izuatagawa Wind Farm Co Turbines No. 4 and No. 5 each lost one of their three 37-meter-long blades following high winds.	Reported on April 9, 2008 in The Yomiuri Shimbun	http://www.windaction.org/news/15149
531	Human injury	20080416		4/16/2008	Abilene, Taylor County, Texas	USA		"Man injured after fall inside wind turbine". A 29-year-old contractor for Global Windpower Services fell 50 to 60 feet inside the shaft of a wind turbine on Wednesday, breaking ribs and a leg, rescue officials said. His fall was broken by a metal deck about 12 feet above the ground. The man was conscious when rescuers arrived.	Reported on April 17, 2008 in Abilene Reporter News	http://www.windaction.org/news/15338
532	Miscellaneous	20080430		4/30/2008	Fair Isle, Shetland	UK	100kw turbine	"Fair Isle gets back to full power". Gearbox failure reported in April 2008. Turbine being replaced in 2009	Reported in The Shetland News on 5 March 2009	http://www.shetland-news.co.uk/news_03_2009/Fair%20Isle%20gets%20back%20to%20full%20power.htm
533	Transport	20080503.1		5/3/2008	Early, Iowa	USA		"Truck sends utility pole into restaurant". Authorities say 38 year-old Glen Forbes was driving a trailer loaded with wind turbine blades when the rear steering malfunctioned. The trailer veered into a utility pole, throwing it across the road and into Mary's Dairy Restaurant. Luckily no one was injured, but flying debris caused damages to nearby cars and the restaurant adding up to nearly $11,000.	Reported on 3 May 2008 on ABC Channel 9	http://www.windaction.org/news/15624
534	Miscellaneous	20080506.1		5/6/2008	East Point Wind Plant, Elmira, Prince Edward Island	Canada	Vestas V90 3.0WM	"Wind turbines off-line for repair work". The East Point Wind Plant at Elmira has taken six of its 10 V90-3.0 MW wind turbines off-line to avoid further damage to the gearboxes after discovery of problems with them during routine inspections. Vestas-Canadian Wind Technology, Inc., supplier of the turbines, is in the process of delivering replacement gearboxes for the affected turbines to the wind plant.	Reported on 6 May 2008 in The Guardian and on CBS News	http://www.windaction.org/news/15678
535	Transport	20080508.1		5/8/2008	Springfield, Missouri	USA		A truck carrying part of a large wind turbine damaged the Highway 60 and 65 interchange around ten Friday morning.	Reported on 8 May 2008 in Ozarks First	http://www.windaction.org/news/15771
536	Fire	20080508.2		5/8/2008	Palm Springs, CA	USA		Windmill fire causes $750,000 in damage. Fire caused an estimated $750,000 in damage to a windmill on Thursday, the Palm Springs Fire Deparment said today. ...The top portion of the windmill was on fire and several small spot fires happened because of falling debris. The fire is under investigation.	Reported on 9 May 2008 in Desert Sun.	http://www.windaction.org/news/15766

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
537	Fatal	20080512	P	5/12/2008	Off US Delaware Coast	USA		"One dead, one rescued as research vessel sinks off Rehoboth". One crewman died today after gale force winds pounded a specialized research ship that was launched in March to study Delaware's offshore wind power resources, forcing the Coast Guard to pull two crewmen from the sinking vessel. Coast Guard Petty Officer Nick Cangemi said one of the two crew members of the RV Russell W. Peterson did not have any vital signs when a helicopter arrived on the scene this morning. "We took both people to the hospital in Maryland, where the hospital declared one of the gentlemen deceased," Cangemi said. They were taken to Peninsula Regional Medical Center in Salisbury, MD. The ship was left adrift and ran aground at Bethany Beach.	Reported on 12 May 2008 in The News Journal	http://www.delawareonline.com/apps/pbcs.dll/article?AID=/20080512/NEWS/80512037
538	Blade failure	20080514.1	P	5/14/2008	Schagen district of north west Holland	Holland	Vestas	"Wiek breekt af van windturbine" (Blade breaks off wind turbine). One of the blades of a Vestas turbine broke off close to Highway N245 between towns of Oudkarspel and Dirkshorn in the Schagen district of north west Holland. The blade part flew over the road but luckily landed on the verge. The blade piece was 23m long and weighed an estimated 3000 Kg. Luckily there were no injuries.	Reported on 15 May 2008 in Noordhollands Dagblad	http://www.noordhollandsdagblad.nl/nieuws/stadstreek/schagen/article3486413.ece
539	Fatal	20080517.1		5/17/2008	Atlantic City, NJ	USA		"Plane crash was second fatal accident in week related to wind-turbine research". The plane crash that killed two people and injured two more Saturday was the second fatal accident in less than a week involving researchers studying the effects that off-shore wind turbines might have on the environment. On May 12, a crewmember of a Flemington-based research vessel, studying the effects of a planned wind farm off the coast of Rehoboth Beach, Del., was killed when the vessel broke apart and washed ashore during a northeaster.	Reported on 21 May 2008 in Press of Atlantic City	http://www.windaction.org/news/15962
540	Fire	20080529		5/29/2008	Ewington Wind Farm, Minnesota	USA	Suzlon	"Turbine fire at Ewington wind farm". The wind turbine had a "ball of flame" on top when firefighters arrived at the scene. The fire was located at the six-turbine Ewington Wind Farm, the same site where a wind generator burned two months ago. This time, the propeller blades from the turbine came down in the fire, landing in the corn field below.	Reported on 30 May 2008 in Daily Globe	http://www.windaction.org/news/16099
541	Miscellaneous	20080529.1		5/29/2008	East Point, Prince Edward Island	Canada	Vestas	"Strong gusts slowing wind turbine repairs" High winds are making it difficult to repair wind turbines at East Point in Prince Edward Island. Six of 10 turbines on the site were shut down recently when problems developed in their gearboxes. One turbine has been repaired, but strong winds are making it difficult to work on the other five. The turbines are less than a year old.	Reported on 29 May 2008 in CBC News	http://www.windaction.org/news/16094

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
542	Blade failure	20080618.1		6/18/2008	Northern Ireland	UK		"Farmhouse horror as (16-ft) turbine blade smashes through roof" A farmer has described the shocking moment a 16-foot wind turbine blade smashed through the roof of his home as his family slept inside. "It was like a bomb hitting the roof of the house. It shattered the tiles and the blade disintegrated itself," David Campbell told the Belfast Telegraph. The turbine was one of a batch of 11 defective machines installed on farms in Northern Ireland with the help of European funding provided by the Department of Agriculture. *Reporter Linda McKee and the Ulster Farmers Union confirmed that 4 of the 11 turbines had thrown their blades, and the other 7 did not work.*	Reported on 18 June 2008 in Belfast Telegraph	http://www.windaction.org/news/16404
543	Environmental	20080621		6/21/2008	Judith Gap, Harlowton, Montana	USA		"At Montana's biggest wind farm, bat deaths surprise researchers". Turbine-related fatalities at Judith Gap Wind Energy Center near Harlowton were 1,206 bats and 406 birds, according to a 2007 preliminary study prepared by TRC Solutions' Laramie, Wyo. office. Roger Schoumacher, a biologist and consultant for TRC, said the bat fatality count is higher than what generally occurs in the West.	Reported on 21 June 2008 in New West Travels and Outdoors	http://www.windaction.org/news/16470
544	Blade failure	20080623		6/23/2008	Illinois	USA	Suzlon	"Wind farm hits standstill" Construction on the $300-million Big Sky wind farm in southeastern Lee and northern Bureau counties is on hold for at least 10 months, thanks to a problem its supplier is having with faulty turbine blades. The 13,000-acre, 114-turbine project near Ohio was slated to be online by the end of this year, but blades nearly the length of a football field started cracking on some U.S. wind farms early this year.	Reported on 23 June in Sauk Valley	http://www.saukvalley.com/articles/2008/06/24/news/local/6859cd4c479ef58eec16f4372fedb407.txt
545	Environmental	20080623		6/23/2008	Arrielo (Vilafranca) and Folch II (Castellfort)	Spain		"Renomar mantendrá en funcionamiento los 43 aerogeneradores pese a la orden de cierre" [In Spanish - Renomar keep 43 wind turbines in operation despite closure order]. Spanish operators Renomar refuse to close 43 turbines at Arrielo (Vilafranca) and Folch II (Castellfort), despite an order on 30 May 2008 from the Environment department. The turbines were ordered closed because of the high fatality rate on the local vulture population.	Reported on 23 June 2008 in Comunitat-Valenciana	http://www.wind-watch.org/news/2008/06/23/renomar-mantendra-en-funcionamiento-los-43-aerogeneradores-pese-a-la-orden-de-cierre-renomar-keep-43-wind-turbines-in-operation-despite-closure-order/
546	Fatal	20080624		6/24/2008	Osório wind farm	Brazil		"Worker falls from ladder and dies at wind farm" An employee of the German company Wobben Windpower, responsible for the maintenance service of the turbines of the Wind Farms of Osório, died after falling from a height of approximately 25 meters. According to the Civil Police, Claudemir Piccoli, 32, was working in the tower of one of the turbines, and down a ladder inside the structure when the safety belt of the worker broke.	Reported by LitoralMania on 24 June 2008	http://www.litoralmania.com.br/noticias.php?id=9260

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
547	Miscellaneous	20080624		6/24/2008	Various sites	Taiwan	GG, Harakosan and Gamsea	"Taipower's wind turbines dogged by malfunctions" Of the 82 wind turbines that make up Taiwan Power Co's wind-powered energy generation plans, as many as 51 turbines have at one time or another been inoperative. Taipower blames the high rate of malfunctioning on Taiwan's hot climate and lack of supporting equipment. The high rate of breakdown is a significant setback to the implementation of the government's renewable energy policy. Taipower said that, of the malfunctioning turbines, three were manufactured by GE, 22 by Harakosan and six by Gamesa. Most of the turbines are distributed along the western shoreline.	Reported on 24 June 2008 in Taipei Times	http://www.wind-watch.org/news/2008/06/24/taipowers-wind-turbines-dogged-by-malfunctions/
548	Blade failure	20080626.1	P	6/26/2008	Catcliffe, Sheffield	UK		"Wind turbine smashed... by wind" A giant wind turbine sparked major safety fears yesterday when it was smashed by . . . the WIND. A huge propeller broke off the 190ft turbine close to a busy motorway link road. The 30ft blade cracked when the turbine was hit by strong gusts just two months after it began operating. Dad-of-two Martin Oldfield, 46, who lives 600 yards from the turbines in Catcliffe, said: "It raises questions about how safe these things are. "This turbine is next to a busy roundabout and could have caused a serious accident. The wind was high but it gets stronger during winter gales. "It makes you wonder if they've built these things without thinking of the consequences."	Reported on 27 June in The Sun	http://www.thesun.co.uk/sol/homepage/news/article1352720.ece
549	Fire	20080627.1		6/27/2008	Maalaea on Maui, Hawaii	USA		"Maui wildfire burns approximately 95 acres" A fire that started in an area above the windmills near Maalaea on Maui had burned approximately 95 acres as of this morning, according to state Department of Forestry and Wildlife (DOFAW) officials. The fire burned portions of a threatened and endangered species habitat, but it is unknown if any species were affected. Wind farm workers used a 4,000-gallon water tanker to shuttle water to the scene. The cause of the fire is under investigation.	Reported in The Honolulu Advertiser on 27th June 2008	http://www.windaction.org/news/16559
550	Human injury	20080705		7/5/2008	Rossendale, Lancashire, England	UK		"Paraglider rescued after crashing at Rosendale windfarm". Mountain rescue teams were called out when a paraglider fell from the sky. The man landed on a hill in the middle of Scout Moor windfarm behind Fecit Farm in Turn Village, Edenfield. The man, who had avoided hitting the turbines' 40m blades was helped by Pendle and Rossendale Mountain Rescue who assisted paramedics on the scene. West Yorkshire Air Ambulance transported the man to hospital, suffering from suspected spinal injuries and damaged ribs at 5.30pm on Friday. This is a near miss rather than an "windfarm" accident.	Reported in Lancashire Telegraph on Sat 5th July 2008.	http://www.lancashiretelegraph.co.uk/news/

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
551	Transport	20080711		7/11/2008	Leon Springs, Texas	USA		"Ralph Fair Road bridge will have to be replaced" TexDOT says the Ralph Fair Road bridge over Interstate 10 is hopelessly damaged and will have to be demolished and replaced, a job which is expected to take several months. The bridge has been closed since late June after a truck hauling a propeller wing for a wind power turbine in west Texas slammed into one of the bridge abutments. Engineers say it will be impossible to repair the bridge. Demolition will begin on July 17.	Reported on News Radio 1200 on 11 July 2008	http://www.windaction.org/news/16777
552	Blade failure	20080712.1		7/12/2008	Gentry County wind farm, Missouri	USA	Suzlon	"Repair is in the air at Bluegrass Ridge; Wind turbine maker finds flaws in blades, calls for refurbishing". The Gentry County wind farm's turbines are undergoing refurbishment in a national retrofitting program initiated after manufacturer Suzlon Energy Limited found cracks in the blades of its S-88 wind turbines.	Reported in St. Joseph News-Press on 12th July 2008	http://www.windaction.org/news/16785
553	Miscellaneous	20080714		7/14/2008	Prince Edward Island, BC	Canada	Vestas	"Wind turbines still down". Gearboxes still not fixed in six vestas turbines which have been broken since at least march	Reported in CBC News on 14th July 2008	http://www.windaction.org/news/16840
554	Miscellaneous	20080715		7/15/2008	Providence Heights, IL	USA		"Bureau County to fine wind farm developer". The Bureau County Board voted in favor of penalizing a rural Tiskilwa wind farm for being in violation of building standards. The board voted 13 to 5 recently to fine Providence Heights wind farm for not maintaining a proper distance from property lines in setting up seven turbines	Reported in Peoria Journal Star on 16th July 2008	http://www.windaction.org/news/16857
555	Fire	20080719	V	7/19/2008	Caldas	Portugal		Fire reported on local TV - video on websites listed	Reported in local TV news	http://mx.truveo.com/incendio-en-un-aerogenerador/id/3194230329
556	Miscellaneous	20080719		7/19/2008	Maple Ridge Wind Power Project, Albany, New York	USA	Vestas 1.65MW, 80m tower, 83m blade diameter	"Turbine repairs at Maple Ridge" According to Tod Nash, operations manager for the Maple Ridge Wind Farm, shaft bearings for “only a select few [windmills] upon inspection,” will be needed in the coming months. Nash told the Journal the project will be “hopefully done by winter.” Nash said that the maintenance was not routine, but a warranty situation.	Reported in the Journal and Republican on 17 July 2008	http://www.wind-watch.org/news/2008/07/19/turbine-repairs-at-maple-ridge/
557	Environmental	20080720		7/20/2008	Judith Gap, Harlowton, Montana	USA		"Judith Gap Wind Farm taking toll on bats, birds" An estimated 1,200 bats, most of them probably just passing through Montana, were killed after striking wind turbines at the Judith Gap Wind Farm between July 2006 and May 2007, according to a post-construction bird and bat survey. The number surprised Invenergy, which owns the farm, as well as government and private wildlife experts. "It's killing 1,200 bats a year and that's a lot more than anybody anticipated," said Janet Ellis of Montana Audubon, a bird conservation group. ...The study estimates that 406 birds, or 4.52 birds per turbine, were killed during the study period.	Reported in Great Falls Tribune on 20th July 2008	http://www.windaction.org/news/16930
558	Miscellaneous	20080722		7/22/2008	Cumberland, Nova Scotia	Canada		"RCMP turbine on the fritz again" What was once fixed is now broken again. The RCMP multi-million-dollar wind turbine is on the fritz again after being repaired last fall. “There was a lightning strike that fried some components last year, but we believe this time it’s an electrical circuit inside the control room that blew out,” Const. Paul Calder of the Cumberland RCMP said recently.	Reported in Amhurst Daily News on 22 July 2008	http://www.wind-watch.org/news/2008/07/22/rcmp-turbine-on-the-fritz-again/

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
559	Environmental	20080723		7/23/2008	Altamont Pass, CA	USA		"New data shows bird kills up in Altamont" New data released this week shows the mortality rate increased 27 percent over two years among raptors targeted in an ongoing monitoring study, according to an executive summary of the data issued by Alameda County's Scientific Review Committee. The increase in the kills of the four targeted raptors - the golden eagle, red-tailed hawk, American kestrel and burrowing owl - is in comparison with a baseline study that took place between March 1998 and May 2003. The new data estimate a total of 2,236 birds from the four targeted species were killed annually.	Reported in The Oakland Tribune on 23rd July 2008	http://www.windaction.org/news/16997
560	Blade failure	20080728.1		7/28/2008	Sheffield, Yorkshire, England	UK		"Damaged wind turbine blades under repair" Repairs have started to a giant wind turbine between Sheffield and Rotherham after it was knocked out by a gale. A crack was spotted in the blades of one of two turbines yards from the Sheffield Parkway during high winds last month. A special failsafe device cut in to prevent further damage - and the crippled blades were allowed to fall to the ground. Since then, investigations have been going on into the damage at the Advanced Manufacturing Research Centre, where the University of Sheffield operate the two turbines.	Reported in The Star on 28 July 2008	http://www.windaction.org/news/17061
561	Miscellaneous	20080820		8/20/2008	Results of USA-wide survey of 75 wind farm operators	USA		"Maintaining the wind turbine revolution" In an informal survey of 75 wind farm operators in the United States conducted by Frontier Pro Services, many respondents indicated they had fallen behind on scheduled preventive maintenance such as oil changes and gearbox lubrication because of a shortage of qualified technicians. According to Frontier, the survey found many wind farm operations and maintenance teams are so resource-constrained that they can barely keep up with unscheduled breakdown repairs to wind turbines. ..."Damage caused by worn out or compromised gear oil can be irreparable," said Frontier Pro Services lead technical advisor Jack Wallace, who has been servicing wind turbines for more than 20 years. "You can really see that it makes no sense to put off needed oil changes."	Reported in Lube Report on 20 August 2008	http://www.windaction.org/news/17512
562	Environmental	20080825		8/25/2008	North Kerry	Ireland		"Investigations underway into cause of Kerry mudslide". A company which began work on a wind farm on a mountain bog in north Kerry two weeks ago tonight said an independent investigation was being launched into the cause of a massive landslide which killed thousands of wild salmon and trout. Tra Investments Limited in Tralee said geological experts would assess what led to a two kilometre long slick flowing off the Stacks Mountains polluting the most important water supplies. ...Eamon Cusack, chief executive of Shannon Regional Fisheries Board, said: "All I can say is that we're following every lead and we're obviously looking at the windfarm as a possible source of the start of the landslide."	Reported in the Irish Times on 25th August 2008	http://www.windaction.org/news/17620

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
563	Environmental	20080825		8/25/2008	Pincher Creek, Alberta	Canada		"Wind Turbines to blame for bat deaths : study" Sudden air pressure changes around wind turbines is likely behind the large numbers of migratory bats found dead in southern Alberta, according to a new University of Calgary study. The two-year study found 90 per cent of the studied bats found dead below turbines near Pincher Creek suffered severe injuries to their respiratory systems consistent with a sudden drop in air pressure that occurs near the turbine blades.	Reported in Calgary Herald 25 August 2008	http://www.windaction.org/news/17624
564	Environmental	20080828		8/28/2008	Bluff Point, Woolnorth	New Zealand		"Windfarm collision kills eagles" A breeding pair of wedge-tailed eagles has been killed at Roaring 40s' Woolnorth Bluff Point windfarm in the state's north-west. The first eagle was killed on August 17 and a few days later its mate was also struck. The company said the deaths brought the total number to 12 since the windfarm was fully commissioned in 2004.	Reported in Mercury on 28 August 2008	http://www.windaction.org/news/17683
565	Environmental	20080903		9/3/2008		Germany		"German experts deem wind turbines lethal for bats" German animal campaigners are alarmed by the number of dead bats being found near wind turbines and have called for restrictions on generators in areas with high populations of the nocturnal mammal. "The bats are not only being clobbered to death by the turbines, but can also suffer from collapsed lungs due to the drastic change in air pressure," said Hermann Hoetker of the Michael Otto Institute for wildlife and the environment.	Reported in Reuters UK on 3 September 2008	http://www.windaction.org/news/17797
566	Environmental	20080904		9/4/2008	Gordonbush, Brora, Sutherland, Scotland	UK		"Wind farm plan in new storm over deer slaughter" Animal welfare activists were horrified to learn this week that a massive slaughter of deer is planned to take place as a result of the wind farm development. Around 80 per cent of the deer stock on the 13,354 acre estate are set to be culled, it has emerged. The animals are to be tempted by food into a enclosure and from there to a "culling station", according to a habitat management report which is not yet in the public domain.	Reported in The Northern Times 4 September 2008	http://www.windaction.org/news/17807
567	Fire	20080911		9/11/2008	Marquesado wind park, Andalucía	Spain		News report of a wind turbine at the Aeolian Park wind energy facility in Spain destroyed by fire. According to Iberdrola, the exact cause of the fire has not been determined, but is believed to be due to mechanical failure. Firemen, police and company personnel were on the scene. A 120 meter buffer around the turbine was established to ensure the safety of people and property near the fire	Reported via YouTube	http://www.windaction.org/videos/17958
568	Environmental	20080915		9/15/2008	General across UK and Ireland	UK and Ireland		"Windfarms pose major risks to bats" Windfarms are blamed for the deaths of large numbers of birds, including the threatened hen harrier, that crash into the spinning blades. But, what's now emerging is that bats are probably more at risk than birds. Up to now little has been known about the effects of windfarms on bats. In Ireland, the National Parks and Wildlife Service (NPWS) Action Plan for Bats 2008 also says the number of dead bats found under turbines is sometimes greater that the number of dead birds.	Reported in The Irish Examiner 15 September 2008	http://www.windaction.org/news/17993

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
569	Fatal	20080917		9/17/2008	St. Cloud, Minnesota	USA		Tragic crash. On Sept. 17, Shirlee Nelson of South Haven was killed and her husband, Millard, was injured when the minivan they were in was struck by a truck carrying wind turbine parts. The midday crash occurred at Minnesota Highway 15 and Second Street South in St. Cloud. The Nelsons were married 67 years and very active with many friends, said their son, Terry. The State Patrol is still investigating the cause of the crash. It was the first fatal crash in Minnesota involving a wind load. As a result, MnDOT is working to keep the wind loads out of metro areas such as St. Cloud as much as possible - even if that means the drivers must take a circuitous route, he said. "We can't continue to have an exposure to that kind of risk," Coulianos said. After the fatal crash, MnDOT began to route the oversized wind-turbine loads west to Sauk Centre instead of through the St. Cloud area.	Reported in St. Cloud Times on 12 November 2008	http://www.windaction.org/news/18755
570	Human injury	20080917		9/17/2008	St. Cloud, Minnesota	USA		As above crash recording injuries to the survivor.	Reported in St. Cloud Times on 12 November 2008	http://www.windaction.org/news/18755
571	Environmental	20080923		9/23/2008	Caddow County, Oklahoma	USA		"Wind turbines cause some Caddo County residents concern" Wind farm neighbors are worried about the safety of the turbines, which can leak chemicals if they aren't maintained properly. Those who live in the hills say it happens, and they are worried that the chemicals could leak into their watershed. Bill Cunningham says he has contacted Horizon Wind Energy, and they have been extremely cooperative. He says they hired a private research company to study the wind turbines, and found they indeed were leaking.	Reported by KWSO 7News on 23 September 2008	http://www.windaction.org/news/18073
572	Miscellaneous	20080925		9/25/2008	Aberdeen, North Dakota	USA		"Company 'concerned' about PSC complaint, possible fine" The North Dakota Public Service Commission has filed a complaint that Tatanka Wind Farm changed the location of some transmission towers without notifying the commission. A possible fine of up to $200,000 is by no means a certainty.	Reported in Aberdeen News on 25 September 2008	http://www.windaction.org/news/18113
573	Transport	20080925		9/25/2008	American Falls, Idaho	USA		"Idaho farmers fear road damage to impede harvest" On Sept. 25, a truck carrying the base for a large wind turbine failed to exit the U.S. Interstate 86 freeway, damaging the Exit 40 overchange bridge. Southeastern Idaho farmers fear the damage could impact the fall sugar beet harvest by forcing beet-laden trucks to take an inconvenient detour.	Reported in Idaho Statesman on 1 Oct 2008	http://www.windaction.org/news/18239
574	Environmental	20081002		10/2/2008	Wolfe Island, Kingston, Ontario	Canada		"Wind project ship spills fuel near Wolfe Island" About 10 households on an island near Kingston, Ont., have been told to drink only bottled water after a tugboat spilled about 1,500 litres of fuel near shore. The diesel fuel spilled into Lake Ontario near Wolfe Island around 9:30 a.m. Wednesday from a boat carrying equipment for a controversial wind turbine project. Residents have fought hard against the project, saying they are concerned about the environmental effects of installing 86 turbines on such a small island.	Reported in CBS News on 2 October 2008	http://www.windaction.org/news/18226

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
575	Fatal	20081009		10/9/2008	Barton Windmill Project, Worth County, Iowa	USA		A man was struck by a fork lift as he worked on the Barton Windmill Project, just North of Grafton in Worth County. The Worth County Sheriff's Office determined a fork lift ran over an employee of Wanzek Construction of Fargo, North Dakota. Dick Hamilton, 46 of Tishmingo, Oklahoma was hit when the driver of an all terrain, Caterpillar fork lift didn't see him on October 9. Hamilton died later from his injuries at a local hospital.	Reported on KIMT News 3 on 30 December 2008	http://www.windaction.org/news/19331
576	Environmental	20081016.1	P	10/16/2008	Searsburg, Vermont	USA		Turbine #10 at the Searsburg wind energy facility in Searsburg, Vermont experienced a catastrophic failure when one of the blades came in contact with the turbine's tower causing it to buckle during high winds. Approximately 20-gallons of heavy oil spilled from the unit when its fluid reservoirs were damaged.	Reported by Industrial Wind Action Group 16 October 2008. Follow up in Rutland Herald 17 October	http://www.windaction.org/releases/18394
577	Structural failure	20081016.1		10/16/2008	Searsburg, Vermont	USA		Turbine #10 at the Searsburg wind energy facility in Searsburg, Vermont experienced a catastrophic failure when one of the blades came in contact with the turbine's tower causing it to buckle during high winds. This turbine's 28-ton nacelle and 3-blade rotor assembly crashed to the ground scattering debris several hundred feet from the structure.	Reported by Industrial Wind Action Group 16 October 2008	http://www.windaction.org/releases/18394
578	Blade failure	20081018		10/18/2008	Taconite Ridge wind farm, Minnesota	USA		"Wind turbine repairs scheduled; Five of 10 machines turned off due to defects" After a recent routine maintenance check, it was found that five of the Taconite Ridge wind farm turbines had non-structural defects in some of the blades. The affected turbines were shut down and are awaiting repairs, which are expected to go through the end of the year, Amy Rutledge, Minnesota Power communications manager, said Friday.	Reported by Mesabi Daily News on 18 October 2008	http://www.windaction.org/news/18438
579	Environmental	20081022		10/22/2008	Shaffer Mountain Wind Project, Ogletown, PA	USA	Gamsea	"Wind farm violates law, environmental groups say" Three environmental groups said Wednesday afternoon that they have obtained federal government records that show that the proposed site of the Shaffer Mountain Wind Project outside Ogletown is indisputably occupied habitat of the endangered Indiana bat, and that habitat used by the species already has been illegally destroyed. The news release also said that in March 2007, Gamesa cut trees at the site although they were told by the FWS that they could do so only if surveys failed to locate any bats at the site.	Reported by The Tribune-Democrat on 22 October 2008	http://www.windaction.org/news/18496
580	Blade failure	20081022.1	P	10/22/2008	Bureau County, Illinois	USA		"Blade breaks off wind tower near Wyanet" A wind turbine blade came crashing to the ground Wednesday, halting energy production at a small-scale wind farm southwest of Wyanet because of what may be a defective design. In all, four turbines on Richard Shertz's property - all part of the AgriWind facility in central Bureau County - have stopped turning after a blade on top of one of the towers broke off about 9:30 a.m. It wasn't until about noon that Schertz went outside and saw that the blade on one of the turbines had broken off near its base. The blades are 140 feet long and 15 feet wide at their widest point.	Reported in Journal Star on 23 October 2008	http://www.windaction.org/news/18513

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
581	Structural failure	20081025		10/25/2008	Gruti Field hill, Voe, Shetland	UK		"Hurricane topples test mast" Winds gusting in excess of 110 miles per hour have toppled a test mast belonging to Viking Energy, the company that hopes to build a massive wind farm in Shetland. The 105 metre high anemometer mast on the 275 metre Gruti Field hill, halfway between Voe and Weisdale, was blown down in the hurricane that swept across the isles on 25 October.	Reported in Shetland News, 5 November 2008	
582	Blade failure	20081027		10/27/2008	Faribault County, Minnesota	USA		"Air Repair: Cracked blade replaced at Corn Plus" When it came time to start repairing a wind turbine at the ethanol plant on Oct. 15, the project had to be put on hold. ..."The blade has been cracked all summer. It's been frustrating," says Dan Moore, director of project development for Renewable Energy Solutions. When the broken blade was discovered, the turbine furthest from the ethanol plant had to be shut down. All three blades needed to be replaced, says Moore.	Reported by Faribault County Register on 27 October 2008	http://www.windaction.org/news/18553
583	Fatal	20081109.1		11/9/2008	Gulf Winds project, Kenedy County, Texas	USA		"Section of falling tower causes death; Wind farm work stops as officials investigate event" A falling section of a lattice tower used for wind measurements caused the death of a contract worker on Sunday at a Kenedy County wind farm, his employer said Tuesday. Matthew Peterson, a 25-year-old test technician, died while working at Babcock and Brown Ltd.'s Gulf Winds project ...The Kenedy County Sheriff's Office was called to the wind farm at about 6 p.m. on Sunday. Peterson, employed out of GEC's Seattle office, was working with another man when the injury occurred, Richardsen said.	Reported by Caller Times on 11 November 2008	http://www.windaction.org/news/18740
584	Transport	20081113		11/13/2008	Rhyl Flats offshore wind, North Wales	UK		"£50m windfarm barge sinks on way to North Wales" A barge worth £50 million toppled into the sea and sank as it was being towed to the site of an offshore North Wales windfarm. Work on the controversial Rhyl Flats windfarm will now be delayed as a result. The barge was carrying giant cranes set to carry out vital work at the windfarm when it was lost overboard and sank to the bottom of the Atlantic. There was reported to be no loss of life or injury to the crew during the incident at the end of October and the company say the barge is fully insured. Date is of news report.	Reported by Daily Post on 13 November 2008	http://www.windaction.org/news/18767
585	Transport	20081113		11/13/2008	Lincoln, Illinois	USA		"Turbine truck goes astray". Various stories reported of trucks carrying wind turbine parts going astray in Lincoln, Illinois. City weight limit 72,000 pounds, truck weigh 180,000 pounds. Damage to roads and police resources being stretched.	Reported by the Lincoln Courier on 17 November 2008	http://www.wind-watch.org/news/2008/11/17/turbine-truck-goes-astray/

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
586	Environmental	20081116		11/16/2008	Windsor, Colorado	USA		"Vestas cleans up flammable spill" A Sunday morning leak in a paint thinner pipe at the Vestas Blades paint building allowed about 20 to 30 gallons of the flammable material to be spilled. ...The spill is believed to be the first of its kind at the $60 million wind turbine blade manufacturing plant located on an 80-acre site in the Great Western Industrial Park. Officials do not know what caused the leak or how much it will cost to repair the pipe or pay for the cleanup. Belfor officials referred questions to Vestas Blades. Vestas officials did not respond to an e-mail request for comment Monday afternoon.	Reported by Windsor Beacon on 18 November 2008	http://www.windaction.org/news/18845
587	Environmental	20081118		11/18/2008	Dronten	Holland		Death of sea eagle reported. Protected species.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
588	Human injury	20081123		11/23/2008	Robin Rigg offshore windfarm, Solway Firth, Scotland	UK		"Wind farm worker hurt" A windfarm worker hacked off the top of his finger in a horror accident on Sunday afternoon. The 45-year-old commercial marine surveyor was working on the Robin Rigg offshore wind farm in the Solway Firth when the accident happened. Kirkcudbright Lifeboat and Coastguard were called to the scene and rushed the Portsmouth man – and the tip of his finger in a bag of ice – to the mainland, where he was treated at Dumfries and Galloway Royal Infirmary.	Reported by the Dumfries and Galloway Standard on 26 November 2008	http://www.wind-watch.org/news/2008/11/27/wind-farm-worker-hurt/
589	Human injury	20081123		11/23/2008	Winnebago County, Minnesota	USA		"Worker OK following wind farm accident" A wind farm worker is okay following a crane accident Sunday morning. A Winnebago County Sheriff's report confirms Billy Cody was trapped in a crane at the construction site located between Forest City and Thompson. A crane had tipped and Cody had to be extricated from the operator's compartment. The cab was about 10-to-12 feet in the air. A rescue squad member said that made getting Cody down a "long and difficult" operation. Cody was flown to Mercy Medical Center North Iowa. Cody was later treated and released.	Reported by KIMT News 3 on 25 November 2008	http://www.windaction.org/news/18957
590	Blade failure	20081201		12/1/2008	Tron Range Wind Farm, Minnesota	USA		"Windmills at Iron Range wind farm grind to a halt after defects found" Seven of the 10 wind turbines at Minnesota Power's Taconite Ridge wind farm are shut down for repairs. The $50 million project came fully online early this summer. But this fall, inspectors with the turbine manufacturer discovered defects in seven of the wind turbines' blades. Those turbines were shut down. Date is taken to be that of report	Reported by Duluth News Tribune on 1 December 2008	http://www.windaction.org/news/19036
591	Fire	20081201		12/1/2008	Elkhorn Ridge, Bloomfield, Nebraska	USA	Vestas	"3 workers injured in wind farm fire" An explosion and fire at a wind farm under construction in northeast Nebraska has injured three workers. One man, who was atop a tower when a turbine exploded, received first- and second-degree burns in the fire Tuesday morning. Two others, who were nearby, were treated for smoke inhalation and released.	Reported in Journal Star on 1 December 2008	http://www.windaction.org/news/19034

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
592	Human injury	20081201		12/1/2008	Elkhorn Ridge, Bloomfield, Nebraska	USA	Vestas	"3 workers injured in wind farm fire" An explosion and fire at a wind farm under construction in northeast Nebraska has injured three workers. One man, who was atop a tower when a turbine exploded, received first- and second-degree burns in the fire Tuesday morning. Two others, who were nearby, were treated for smoke inhalation and released.	Reported in Journal Star on 1 December 2008	http://www.windaction.org/news/19034
593	Ice throw	20081201.1	P	12/1/2008	King's Dyke, Whittlesey, Cambridgeshire	UK		"Wind turbine's deadly ice shower" Residents were left fearing for their safety after shards of melting ice fell on homes and gardens from the blades of a giant wind turbine. For about four hours people in King's Dyke, Whittlesey, had to take cover as huge lumps - some two feet long - showered them from the 80 metre high tower on Saturday morning. Resident Peter Randall, whose son's house lies a stone's throw away from the turbine, said: "Somebody is going to get killed. There was huge lumps of ice shooting off and landing everywhere."	Reported in The Evening Telegraph on 1 December 2008	http://www.windaction.org/news/19035
594	Transport	20081207		12/7/2008	Steuben County, NY	USA		"Wind farm developer to fix roads" It will cost energy developer First Wind more than $1.1 million to repair roads used in the construction of two wind farms in the hills surrounding the town of Cohocton. Seven miles of county Route 35, listed in fair condition before construction began, will need extensive repairs, including four miles of rebuilding.	Reported by Corning Leader on 7 December 2008	http://www.windaction.org/news/19097
595	Fatal	20081217		12/17/2008	Santa Clarita, Los Angeles, CA	USA		"Wind blows helicopter into mechanic, killing him" A man who was hit by a falling helicopter near Los Angeles has died. Authorities say a gust of wind caused the chopper to spiral out of control today in a canyon area north of Los Angeles. They say a blade hit an Edison power mechanic on the ground, killing him. The helicopter pilot suffered minor injuries, but refused to go to a hospital. The helicopter was being used in a project to string new transmission lines to bring in power from wind farms.	Reported by Associated Press on 18 December 2008	http://www.wind-watch.org/news/2008/12/18/wind-blows-helicopter-into-mechanic-killing-him/
596	Ice throw	20081217		12/17/2008	Eemshaven	Holland		Ice throw reported by drivers onto nearby roads. No damage reported.	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
597	Human injury	20081217.1		12/17/2008	Dexter, Mower County, MN	USA		"Man burned while working on wind turbine near Dexter" A 33-year-old man is recovering from a severe electric burn he sustained Tuesday afternoon while working on a wind turbine north of Dexter, the Mower County sheriff says. Eric Allen Chlan, of Otsego, Minn., was listed in fair condition Wednesday at Saint Marys Hospital in Rochester, according to a Mayo Clinic spokeswoman. Officials believe the turbine was electrically charged when Chlan was working on it, giving the worker an electrical burn on his left arm, Amazi said.	Reported by Austin Post-Bulletin on 17 December 2008	http://www.postbulletin.com/newsmanager/templates/localnews_story.asp?z=28&a=375852

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
598	Blade failure	20081222		12/22/2008	Norway Wind Park, Prince Edward Island	Canada	V-90	"Storm damages wind turbine" One of the blades of a Suez Energy North America V-90 wind turbine situated approximately 1,600 feet away from a resident's house, was damaged. Pieces were dangling from the blade and other pieces were strewn throughout a field, right up to her back door. ...A Suez Energy spokeperson reported that blades on two of the three turbines in Suez Renewable Energy North America's Norway wind park sustained some damage.	Reported by The Journal Pioneer on 26 December 2008	http://www.windaction.org/news/19296
599	Transport	20081715		7/15/2008	Town of Malone, NY	USA		"Heavy-truck traffic topic of public hearing; Town closing 4 roads to heavy rigs". Damage to roads and pavements reported. Also disturbance to neighbours.	Reported in The Press Republican 16th July 2008	http://www.wind-watch.org/news/2008/07/15/heavy-truck-traffic-topic-of-public-hearing-town-closing-4-roads-to-heavy-rigs/
600	Fire	20089999		2008	Offshore	Holland	Vestas	No details of incident. Provision of analysis and advice on fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
601	Fire	20089999		2008	Texas	USA	Siemens	No details of incident. Restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
602	Fire	20089999		2008	Nibe	Denmark	Vestas	No details of incident. Restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
603	Fire	20089999		2008	Viborg	Denmark	Vestas	No details of incident. Provision of analysis and advice on fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
604	Fire	20089999		2008	Aarhus Harbour	Denmark		No details of incident. Provision of analysis and advice on fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
605	Fire	20089999		2008	Ulfborg	Denmark	Tvindkraft	No details of incident. Provision of analysis, advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
606	Fire	20089999		2008	Horse Hollow Wind Farm, Texas	USA	Siemens	No details of incident. Provision of analysis, advice and restoration of damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
607	Lightning damage	20089999		2008	Grindsted	Denmark	Vestas	No details of incident. Restoration of lightning damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
608	Release of gas	20089999		2008	Lynn & Inner Dowsing Offshore Wind Farm	UK	Siemens	No details of incident. Provision of analysis, advice and restoration of fire damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
609	Salt water damage	20089999		2008	Texas	USA	Siemens	No details of incident. Restoration of 21 wind turbines damaged components. Location likely to be of AREPA's work	AREPA Group reference list of tasks regarding wind turbines	http://www.arepa.com/Products%20&%20Solutions/Wind%20turbines/index.html
610	Blade failure	20090104.1	P & V	1/4/2009	Conisholme wind farm, Lincolnshire, England	UK	Enercon E48	"UFO wind turbine 'broke due to mechanical failure not collision with flying object' ". The £1 million wind turbine destroyed after mysterious glowing orbs were spotted in the sky was not hit by a UFO after all but broke due to mechanical failure, investigators have disclosed. A 65 ft blade that flew off the turbine came loose after bolts attaching it to the hub failed, not because of a collision, examination of the components has revealed. A second blade was badly bent. Previously, damage had been attributed to collision with a UFO!	Reported on 10 February 2009 in The Telegraph. Previously reported on 5, 6 and 16 January 2009 in Louth Leader	http://www.windaction.org/news/19897
611	Environmental	20090107		1/7/2009		Japan		A total of 14 birds designated by the government as national treasures, including white-tailed sea eagles, reported to have died at different sites by flying into completed wind turbines. Some wind farm plans in areas where these species are found have been suspended.	Reported on 7 January 2009 in The Asahi Shimbun	http://www.windaction.org/news/19398
612	Fire	20090108		1/8/2009	Alcala, Cadiz province	Spain		Two electrical fires on the same day reported extinguished on a wind farm site in Spain.	Reported on 8 January 2009 by Redacción CÁDIZ	http://www.diariodecadiz.es/article/provincia/318696/extinguidos/alcala/dos/incendios/una/subestacion/energia/eolica.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
613	Ice throw	20090124		1/24/2009	King's Dyke, Whittlesey, Cambridgeshire	UK	Vestas V90	"Sensor fails to stop ice-terror wind turbine" A sensor which should switch off a wind turbine in icy conditions has failed - for the second time. As reported in The Evening Telegraph last week, a faulty sensor on the turbine in King's Dyke, Whittlesey, was blamed for huge shards of ice flying off its blades and crashing into homes and gardens in November. Chief executive of Cornwall Light and Power Neil Harris, said: "On the evening of January 22, we were alerted to the fact that our Whittlesey turbine was operating, despite the air temperature having dropped below 4C. (sensor cut out)	Reported in The Evening Telegraph on 24 January 2009	http://www.windaction.org/news/19646
614	Blade failure	20090128		1/28/2009	Netherland, Colorado	USA		US Forest Services wind turbine reported damaged by 100mph winds. One blade sheared off. One of two turbines at Netherland Work Center, CO. First strong winds since the tuirbines were installed on 20 January.	Reported in Longmont Times-Call on 29 January 2009	http://www.windaction.org/news/19737
615	Blade failure	20090130		1/30/2009		Portugal	Suzlon S88 V2	Business report on Suzlon Energy. Cracks detected in blades and blades replaced in USA (already reported in this database), Brazil and Portugal. Replacement in 2007 and 2008	Reported on 30 January 2009 in Business Standard	http://www.windaction.org/news/19734
616	Blade failure	20090130		1/30/2009		Brazil	Suzlon S88 V2	Business report on Suzlon Energy. Cracks detected in blades and blades replaced in USA (already reported in this database), Brazil and Portugal. Replacement in 2007 and 2008	Reported on 30 January 2009 in Business Standard	http://www.windaction.org/news/19734
617	Miscellaneous	20090130.1	P	1/30/2009	Robin Rigg, Irish Sea	UK		Offshore workers operating on a new UK wind farm development were forced to evacuate a construction barge in severe sea conditions after their vessel lost three anchor lines. 42 workers were rescued	Reported on 30 January 2009 in offshore247.com	http://www.offshore247.com/news/art.aspx?Id=12808#
618	Fire	20090202		2/2/2009	Cathedral Rocks Wind Farm, Port Lincoln, South Australia	Australia		"Cathedral Rocks Wind Farm turbine fire" A $6 million wind turbine has caught fire near Port Lincoln, starting blazes on the ground as embers fall. The fire, at the Cathedral Rocks Wind Farm about 30km southwest of the town, was first noticed by a boat about 1am. The turbine is alight halfway up its 60m structure, making it difficult for the 14 Country Fire Service firefighters trying to deal with it to extinguish the blaze.	Reported on 2 February 2009 in Adelaide Now	http://www.windaction.org/news/19796
619	Ice throw	20090202		2/2/2009	Melancthon wind farm, Shelburne, Ontario	Canada		Report of ice throw and turbine shut down. Comments to online article mention road signs on approach to Enbridge Ontario Wind Farm say “Caution – During Potential Icing Conditions Stay Back 305 Meters From Turbines”.	Reported in TheStar.com on 2 February 2009	http://www.thestar.com/article/580767
620	Fatal	20090204		2/4/2009	Pico de Meda wind farm, Galicia	Spain		Los parques eólicos se convierten en otro escenario de graves accidentes laborales (in spanish - trans. - Wind parks become another scene of serious labour accidents). The article reports the death of a windfarm worker on 4 February 2009 but provides little additional information on the accident. This happened in the same week as another accident where a worker suffered a fractured pelvis after a turbine blade fell on him.	Reported in La Voz de Galicia on 5 February 2009	http://www.rojoynegro.info/2004/spip.php?article25628

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
621	Human injury	20090204		2/4/2009	Pico de Meda wind farm, Galicia	Spain		Los parques eólicos se convierten en otro escenario de graves accidentes laborales (in spanish - trans. - Wind parks become another scene of serious labour accidents). Article reports turbine blade fell on a 38-year old worker, fracturing his pelvis. He was hospitalised as a result. This was within a week of a fatality on 4 February.	Reported in La Voz de Galicia on 5 February 2009	http://www.rojoynegro.info/2004/spip.php?article25628
622	Ice throw	20090204		2/4/2009	Eemshaven and Delfzijl	Holland		Ice throw reported. Turbines shut down. No damage reported	Reported in Wind Service Holland, Nieuws - Incidenten (in Dutch)	http://home.kpn.nl/windsh/N-incident.html
623	Blade failure	20090207		2/7/2009	Perkins High School Wind Turbine, Ohio	USA	ReDriven Power turbine, 20kw, 20 foot blades	"Perkins High School turbine falls apart" A wind turbine at Perkins High School fell apart Saturday. Part of a turbine blade flew off and landed in the student parking lot.Out of balance because of the missing blade, the turbine and its tower began shaking, the remaining two blades banging against 60-foot support pole -- and the 30-foot-wide windmill "just blew apart," Sharp said. Pieces reported to be thrown up to 40 yards away	Reported in Sandusky Register on 9 February 2009 (ref 1). Turbine details and distance thrown reported on 10 February 2009 in Morning Journal (ref 2)	http://www.windaction.org/news/19885
624	Blade failure	20090212		2/12/2009	Chatham Township, Ontario	Canada		"Turbine blade smashes into neighbouring home" 8-foot long blade piece crashed through roof of a neighbouring house. The blade came from a 60-foot high neighbour's turbine. No injuries.	Reported in The Daily News on 12 February 2009	http://www.windaction.org/news/19968
625	Miscellaneous	20090220	V	2/20/2009	Cannon II, Waverly, Iowa	USA	Waverly Light & Power	"SITE SAFELY EVACUATED AS CONSTRUCTION CREWS REPORT PROBLEM WITH WIND TURBINE" The construction company, ICS of North Dakota, lifted the wind turbine rotor assembly, to which the blades attach, 246 feet high into place late yesterday afternoon. After it was lifted it was discovered the blades were not 'feathered' or turned properly so they could not catch the wind. In the position the blades are in, the wind caught the blades causing them to spin. When this was discovered, the Bremer county sheriff's department was notified and all personnel were evacuated, including two homeowners who were outside of the recommended danger zone. Appears to be a brake system failure.	Press release by Waverly Light & Power on 21 February 2009	http://www.windaction.org/news/20119
626	Structural failure	20090221		2/21/2009	Cannon II, Waverly, Iowa	USA	Waverly Light & Power	"Part of wind turbine breaks and lands in open field" Part of a wind turbine under construction broke apart Saturday morning. The problem started Friday when construction crews were installing a second wind turbine for Waverly Light and Power. During the process, a construction error caused the rotor and blades to start moving in the wind prematurely - spinning uncontrollably and unable to stop until it broke. The broken piece weighing 50 tons fell 246 feet and missed nearby equipment and empty vehicles barricading off the site. No-one was injured	Reported by KWWL TV 7 on 21 February 2009	http://www.windaction.org/news/20132
627	Environmental	20090301		3/1/2009	Crescent Ridge Wind Farm, Bureau County, Illinois	USA		Reported death of 93 bats and 31 birds during 2008	Reported in Chicago Tribune on 1 March 2009	http://www.windaction.org/news/20230

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
628	Structural failure	20090306.1	P	3/6/2009	Altona, New York	USA		"Noble Environmental Power confirms Altona turbine collapse". Noble Environmental Power has confirmed that a turbine collapsed at its Altona, N.Y., wind park Friday morning, but said no one was injured in the collapse and ensuing fire. In a statement released by the company Friday, company spokeswoman Maggy Wisniewski confirmed one turbine had collapsed and that a small fire resulted, but she refused to speak on the record with a NewsChannel 5 reporter.	Reported in NewsChannel 5 on 6 March 2009	http://www.windaction.org/news/20297
629	Blade failure	20090318		3/18/2009	Corning, CA	USA	ReDriven	"ReDriven turbines continue to fall apart". Report details damage to turbine at organic fig farm packing operation (two weeks previously). One blade at least 100 yards away from the turbine, a second at the bottom of the tower, and a third still attached. Quote "it's a good thing the harvest was in, there is usually 20 people working around this windmill"	Reported by Windaction on 19 March 2009	http://www.windaction.org/news/20716
630	Blade failure	20090318		3/18/2009	Artios, CA	USA	ReDriven	"ReDriven turbines continue to fall apart". Report details turbine at an almond orchard which lost its blades, and another at Wheatland which had to be shut down as it was shaking badly.	Reported by Windaction on 19 March 2009	http://www.windaction.org/news/20716
631	Blade failure	20090326.1	P	3/26/2009	Grand Ridge wind farm, La Salle County, Illinois	USA	GE 1.5MW, 77m diameter, 80m tower	Blade failure photographed by local residents on or before 26 March 2009. No press coverage can be found	Reported at www.windaction.com on 26 March 2009	http://www.windaction.org/pictures/20476
632	Fire	20090401.1	P	4/1/2009	Zaragoza province	Spain		Fire at wind park between the towns of Ricla and Fuendetodos, in Zaragoza province.	Reported privately	http://noticiasdemedioambiente.blogspot.com/2009/04/los-aerogeneradores-se-incendian.html
633	Blade failure	20090418		4/18/2009	Turtle Plastics factory, Lorain, Ohio	USA	ReDriven Power turbines, 20kw, 6m blades on 11m tower	Blades replaced after blades were thrown off a similar turbine at Perkins High School in February	Reported in The Morning Journal on 18 April 2009	http://www.morningjournal.com/articles/2009/04/18/news/mj913904.txt
634	Miscellaneous	20090428		4/28/2009	Smoky Hills Wind Farm, Kansas	USA		Report of replacement for blown transformer which left "scores of wind turbines" idle for four months. Transformer blew approx December 2008. Date here is of news report of its replacement	Reported in Salina Journal on 28 April 2009	http://www.saljournal.com/news/story/smoky hills-4-27-2009
635	Structural failure	20090430		4/30/2009	North Palm Springs, CA	USA		200 foot tall wind turbine adjacent to Interstate 10 in North Palm Springs, came crashing to the ground. Investigation is underway	Reported in KPSP Local 2 News on 1 May 2009	http://www.kpsplocal2.com/Global/story.asp?S=10290223
636	Miscellaneous	20090503		5/3/2009	Tehachapi Wind Farm, CA	USA	Vestas	A wind turbine 1400 feet from Highway 58 suffered suspected brake failure, causing it to spin out of control. The Highway was closed to traffic indefinitely between Highways 202 and 14, causing a 25 mile, 2 hour delay for drivers.	Reported by Eyewitness News TV58 on 4 May 2009	http://www.windaction.org/news/21036
637	Blade failure	20090506		5/6/2009	10 turbines at various locations	USA	ReDriven	Blades replaced on ten turbines across various locations, following blades thrown at an Ohio High School, and at an organic fig site in California	Reported in Eastern Ontario Agribusiness on 6 May 2009	http://www.agrinewsinteractive.com/fullstory.htm?ArticleID=10072&ShowSection=News
638	Human injury	20090511		5/11/2009	Kern County, CA	USA		Article reports AES wind turbine worker suffered injuries atop a wind turbine "several weeks ago". Kern County Fire Department carried out a rescue operation that involved lowering him down the outside of the turbine. Actual date is not known - mid April 2009	Reported in Tehachapi News on 11 May 2009	http://www.tehachapinews.com/home/ViewPost/99979
639	Structural failure	20090511		5/11/2009	Tehachapi Wind Farm, CA	USA	Vestas	"Windmill disintegrates". The turbine close to Highway 58 which initially suffered brake failure disintegrated completely two or three days later.	Reported in Tehachapi News on 11 May 2009	http://www.tehachapinews.com/home/ViewPost/99979
640	Fire	20090513		5/13/2009	Locust Ridge I Wind Farm, Pennysylvania	USA	G87 turbine, installed March 2007	"Firefighters respond to wind turbine fire in Mahanoy Township". Fire reported at one of the 13 turbines at Locust Ridge I Wind Farm.	Reported in Republican Herald on 13 May 2009	http://www.windaction.org/news/21211
641	Environmental	20090518		5/18/2009	Goodnoe Hills Wind Project, WA	USA		"Washington wind turbines claim first known eagle victim". Report states that a Golden Eagle was killed in April.	Reported in The Columbian on 18 May 2009	http://www.columbian.com/article/20090519/NEWS02/705199958

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
642	Blade failure	20090519		5/19/2009	Cohocton, NY	USA	Clipper turbines	Article reports cracked blades requiring replacement - 17 of 50 turbines shut down, and perhaps every blade needing replacement	Reported in The Evening Tribune on 19 May 2009	http://www.eveningtribune.com/news/x340408144/Cracked-blades-lead-to-likely-showdown-between-town-First-Wind
643	Environmental	20090519		5/19/2009	Big Horn Wind Energy Project, WA	USA		Report states that the Big Horn project killed 243 raptors in its first year of operation (2007), against a company estimate of 33 reptor deaths per year	Reported in The Columbian on 18 May 2009	http://www.columbian.com/article/20090519/NEWS02/705199958
644	Transport	20090519		5/19/2009	Cohocton, NY	USA		Article reports lawsuit between the town and wind turbine site operator, following damage to roads and out-of-hours truck transports which is a violation of agreements	Reported in The Evening Tribune on 19 May 2009	http://www.eveningtribune.com/news/x340408144/Cracked-blades-lead-to-likely-showdown-between-town-First-Wind
645	Environmental	20090521		5/21/2009	Penghu archipelago	Taiwan		"Wind farm kills Taiwanese goats". BBC article reports over 400 goats have died since 8 wind turbines were installed close to their grazings. The report suggests that they died of exhaustion from sleep deprivation caused by turbine noise.	Reported by BBC Asia-Pacific News on 21 May 2009	http://news.bbc.co.uk/1/hi/world/asia-pacific/8060969.stm
646	Structural failure	20090527.1	P	5/27/2009	Lelystad	Holland		Wind turbine blade falls off and thrown onto highway A6. One lane of the highway was closed - photos clearly show the blade lying across the highway. The police reported that it was "a miracle" there were no accidents.	Reported in De Telegraaf on 27 May 2009	http://www.wind-watch.org/news/2009/05/29/wiek-hindert-verkeer-a6-turbine-blade-falls-on-highway/
647	Structural failure	20090531		5/31/2009	Wilton, North Dakota	USA		"Wind farm blade bent". Turbine blade reported to be bent in half the previous Sunday morning. No explanation was offered.	Reported by KFYR-TV 5 on 3 June 2009	http://www.kfyrtv.com/News_Stories.asp?news=30794
648	Miscellaneous	20090604		6/4/2009	Libertyville, Illinois	USA		Judge orders shut down of turbine due to excessive noise	Reported in Lake County News Sun on 4 June 2009	http://www.suburbanchicagonews.com/newssun/news/1606314,5_1_WA04_TURBINE_S1-090604.article
649	Transport	20090607		6/7/2009	Kellog, Iowa	USA		"Attempt to move trailer backs up I-80". Traffic backed up for 10 miles after crews tried unsuccessfully to remove a turbine tower and trailer from a ditch. Some minor public accidents were also reported. The trailer had been in the ditch for a week.	Reported in Des Moines Register on 8 June 2009	http://www.desmoinesregister.com/article/20090608/NEWS/906080323/1001/
650	Blade failure	20090612.1		6/12/2009	Flat Ridge Wind Farm, Kansas	USA	Clipper	"Cracks appear in Flat Ridge turbines". Just 3 months after starting operation, blades at the Flat Ridge Wind Farm are developing cracks. These are Clipper turbines	Reported in The Pratt Tribune on 12 June 2009	http://www.pratttribune.com/homepage/x862905726
651	Transport	20090613		6/13/2009	Bangor, Maine	USA		"Turbine blade breaks Bangor traffic light". Blade being transported hit and broke a traffic light and pulled down wires.	Reported in Bangor Daily News on 15 June 2009	http://www.bangordailynews.com/detail/108425.html
652	Transport	20090615		6/15/2009	Charleston, Illinois	USA		"Semitruck collision with wind turbine ties up Illinois 130 traffic" Collision between semitrailer and blade trailer. No one injured	Reported in Herald and Review on 16 June 2009	http://www.herald-review.com/articles/2009/06/16/news/state/1041862.txt
653	Miscellaneous	20090617		6/17/2009	Vestas	UK		"Safety breaches cost blade manufacturer nearly £500,000". Breaches of HSE regulations during blade manufacture at their Isle of Wight works. Thirteen employees suffered ill-health effects.	Reported in Country Press on 17 June 2009	http://iwcp.co.uk/news/news/safety-breaches-cost-blade-company-nearly-500000-26759.aspx
654	Blade failure	20090623		6/23/2009	Kirkheaton, Northumberland	UK		"Faulty Northumberland wind turbines could be taken down" EDF said "some technical issues were uncovered with some of the blades". Two turbines have had their blades removed and have not worked since Autumn 2008. A planning condition is that if turbines are not in operation for more than six months, they should be removed.	Reported in The Journal on 23 June 2009	http://www.journallive.co.uk/north-east-news/todays-news/2009/06/23/faulty-northumberland-wind-turbines-could-be-taken-down-61634-23948025/
655	Miscellaneous	20090624		6/24/2009	Cape Breton, Nova Scotia	Canada		"Lightning zaps CB turbines". Seven wind turbines in Cape Breton at a standstill after being struck by lightning. Damage was reported and replacement parts are needed.	Reported in Chronicle Herald on 24 June 2009	http://thechronicleherald.ca/NovaScotia/1128813.html
656	Miscellaneous	20090628		6/28/2009	Libertyville, Illinois	USA		"Judge silences wind turbine for second time". Again due to noise and amenity issues	Reported by Windaction.org on 28 June 2009	http://www.windaction.org/news/21827

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
657	Blade failure	20090702.1	P	7/2/2009	Brieske	Germany	Vestas V80	Blade reported to have "exploded" following a lightning strike the previous day. Parts thrown 150m and landing within only 50m from federal highway 169. Blade parts thrown were up to 40m (translated). No-one injured.	Reported in Lausitzer Rundscau on 3 July 2009	http://www.lr-online.de/regionen/Senftenberg-Brieske-Schwarzheide-Windkraftanlage-Blitzeinschlag-Windrad;art1054,2590458
658	Environmental	20090705		7/5/2009		Japan		"Wind power has its own environmental problems". The death of 13 white tailed eagles, a rare and protected species, through collisions with wind turbines since 2003 is confirmed by the Ministry. Health effects on humans also reported.	Reported in Miami Herald on 5 July 2009 by Noriyuki Yoshida AND Koichi Yasuda	http://www.miamiherald.com/news/environment/story/1128001.html
659	Fatal (2 deaths)	20090721		7/21/2009	Wind farm construction site, Pictou County	Canada		"Two dead at Pictou County construction site" Canadian Police are ruling out foul play or suicide in the death of a young man and woman at a Pictou County wind turbine construction site. A 22-year-old man and 18-year-old woman were found dead Sunday evening in a shed at a wind turbine construction site near Mount Thom. RCMP spokesman Sgt. Phil Oliver tells CTV News their deaths may be related to a fuel-fired generator in the shed. "There is a possibility that carbon monoxide may be associated, or a factor involved in the death, but that is not confirmed," he said. The Herald reports investigators did find high levels of gas in the building. The young male victim was an employee at the site and the young woman was visiting him. Later reports confirmed the deaths to de due to carbon monoxide poisoning	Reported in The Herald, 21 July 2009 and online on CBS News and News 95_7	http://www.cbc.ca/canada/nova-scotia/story/2009/07/20/ns-carbon-monoxide-deaths.html
660	Mechanical failure	20090722		7/22/2009	East Point Wind Farm, Prince Edward Island	Canada	Vestas V90	"Eastern P.E.I. wind turbines break down again" Two of the turbines at P.E.I.'s $47-million wind farm in East Point are under repairs for the second time in just over a year. The V-90 turbines - named for their 90-metre blade span - are having problems with their gear boxes, the same thing that took them down last spring.	Reported by CBS News on 22 July 2009	http://www.cbc.ca/canada/prince-edward-island/story/2009/07/23/pei-wind-turbine-gearboxes.html
661	Blade failure	20090723		7/23/2009	Judith Gap, Harlowton, Montana	USA	1.5 MW turbines	"Lightning takes down 127-foot wind blade" Lightning knocked out two wind turbines and sent a massive tower blade crashing to the ground at the Judith Gap Wind Farm last month, the company said Wednesday. Repairs began earlier this month and will continue into September, said Susan Dennison, an Invenergy spokeswoman. No workers were on the site at the time of the accident, which occurred at 6:20 p.m.	Reported in Great Falls Tribune on 23 July 2009	http://www.windaction.org/news/22307
662	Transport	20090731		7/31/2009	Oxford, Southern Nebraska	USA		"Train collides with semi" A semi-trailer hauling the base of a wind turbine was crossing the railroad tracks when a train, going about 60 MPH, collided with the rear of the trailer. Both the train locomotive and semi-trailer were totalled in the accident, and the wind turbine base was also damaged. The accident happened just south of Oxford along Nebraska Highway 46 late Wednesday afternoon. Damages total an estimated $3 million, in an accident that could have been avoided.	Reported in New York Times and also Nebraska TV online on 30 July 2009	http://www.nebraska.tv/Global/story.asp?S=10815703&nav=menu605_2#

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
663	Fire	20090810.1	P	10/8/2009	Kent Hills wind farm, New Brunswick	Canada	Vestas V90	"Turbine catches fire" One of the 32 wind turbines operating at the Kent Hills wind farm caught fire over the weekend. A passer-by saw smoke and called the fire department. Officials haven't been able to confirm the cause of the fire yet. Vestas later claimed that the fire was "the first of its kind"	Reported by TransAlta Corporation on 8 August 2009 and by Times & Transcript on 10 August 2009	http://timestranscript.canadaeast.com/front/article/755765
664	Human injury (4 injured)	20090815		8/15/2009	Texas	USA		"No serious injuries in wind tower lightning strike". Four wind turbine workers taken to hospital after turbine was struck by lightning.	Reported by San Angelo Standard-Times on 15 August 2009	http://www.gosanangelo.com/news/2009/aug/14/wind-tower-crew-escapes-serious-injury-in-strike/
665	Miscellaneous	20090815		8/15/2009	Little Cheyne Court wind farm, Romney Marsh, Kent, England	UK		"Wind turbines stopped by power fault". A power fault has shut down nearly a quarter of the turbines at Little Cheyne Court on Romney Marsh - the biggest onshore wind farm in the south of England - just a month after it was officially opened. Seven out of the 26 wind turbines on the isolated land on the Kent-East Sussex border have been hit by technical problems.	Reported by Telegraph online on 15 August 2009	http://www.telegraph.co.uk/earth/energy/windpower/6031989/Wind-turbines-stopped-by-power-fault.html
666	Mechanical failure	20090825		8/25/2009	Various North American locations	Canada and USA		Report on mechanical problems in turbines produced by Entergrity. Over 50 require inspection and retrofitting, 25 remain shut down. Company close to bankrupcy and can't afford to undertake the retrofitting.	Reported by CBS on 25 August 2009	http://www.cbc.ca/canada/prince-edward-island/story/2009/08/25/pei-entegrity-retrofits.html
667	Fatal	20090829.1		8/29/2009	Iowa	USA		"Student succumbs during climb up turbine". A 60-year-old student lost consciousness during a wind turbine climb with his classmates at the Estherville campus of Iowa Lakes Community College Friday morning. The male student was transferred by ambulance to the hospital where he died.	Reported by Esterville Daily News on 29 August 2009	http://www.esthervilledailynews.com/page/content.detail/id/504281.html?nav=5003
668	Environmental	20090908		9/8/2009	Southern Spain	Spain		"Green energy threatens endanged vultures in southern Spain". Study confirms that wind turbines will make a significant contribution to the extinction of the Egypian vulture in Southern Spain.	Reported by Barcelona Reporter on 8 September 2009	http://www.barcelonareporter.com/index.php?/news/comments/green_energy_threatens_endangered_vultures_in_southern_spain/#
669	Fatal	20090916.1		9/16/2009	Causewaymire wind farm, Caithness, Scotland	UK		"Caithness man killed in accident at wind farm". A contractor who died while carrying out maintenance work on a turbine at a Caithness windfarm was named last night as 27-year-old Colin Sinclair. Fire brigade, ambulance and police attended the RWE npower renewables' 24-turbine windfarm on the Causewaymire after reports of an accident shortly after 9am yesterday. The Sea King helicopter from RAF Lossiemouth was also called out and a winchman was lowered with a stretcher to an access door at the top of the 200ft tower. Mr Sinclair died at the scene a short time later, despite efforts to revive him. A formal investigation is now underway.	Reported by the Scotsman on 16 September 2009 and by the Press and Journal on 17 September 2009	http://news.scotsman.com/latestnews/Maintenance-worker-dies-on-Caithness.5653094.jp
670	Miscellaneous	20090917		9/17/2009	Greater Gabbard offshore wind farm, England	UK		"Broken Wind". Plans for the world's biggest wind farm off Britain's coast have been blown off course - by faulty windmills built on the cheap in China. Serious welding faults were found in many of the structures shipped to a Dutch port. Thank goodness they were found before construction and operation.	Reported by The Sun on 17 September 2009	http://www.thesun.co.uk/sol/homepage/news/Green/2643141/Duff-turbines-eco-farm-blow.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
671	Transport	20090917		9/17/2009	New York	USA		"Stretch of Route 3 closed after turbine base detaches from rig". State police closed a portion of Route 3, from Bolton Road to Benton Road, for about three hours Wednesday after the base of a wind turbine and the trailer it was attached to became unlatched from the rig hauling the oversized load. Both the trailer and turbine overturned and rolled into a nearby cornfield, state police said. The highway was also damaged. No mention of injuries.	Reported by Watertown Daily News on 17 September 2009	http://www.watertowndailytimes.com/article/20090917/NEWS03/309179949
672	Transport	20090920		9/20/2009	Pennsylvania	USA		"Wide loads detour off Interstate 81, get stuck on the streets of Chambersburg, Waynesboro". Traffic reported to be held up for hours.	Reported by Public Opinion online on 20 September 2009	http://www.publicopiniononline.com/localnews/ci_13379884#
673	Environmental	20090922		9/22/2009	Altamont Pass, CA	USA		"Bird deaths soar at wind farms". The slaughter at Altamont Pass is being raised by avian scientists who say the drive among environmentalists to rapidly boost U.S. wind farm power 20 times could lead to massive bird losses and even extinctions. A report by scientists, wildlife agencies and turbine experts concluded that Protective measures put in place in an effort to reduce bird deaths by 50% failed. Deaths in fact soared for three of four bird species studied, said the Altamont Pass Wind Resource Area Bird Fatality Study.	Reported by Associated Press on 22 September 2009	http://www.tulsaworld.com/news/article.aspx?subjectid=298&articleid=20090921_298_0_Fryasu871005
674	Human injury	20090922.1		9/22/2009	Cohocton, New York	USA		"Crane collapse: Operator at wind farm escapes injury". Cohocton, N.Y. - A crane operator reportedly escaped any major injury late Monday morning when the crane he was using to maintain First Wind turbines collapsed. The operator - who was not identified - suffered minor injuries and was transported to a local hospital, according to troopers	Reported by Corning Leader on 22 September 2009	http://www.steubencourier.com/news/x1073704913/Crane-collapse-Operator-at-wind-farm-escapes-injury
675	Human injury	20090923		9/23/2009	North sea, off England	UK		"Injured wind farm worker is taken to hospital". An injured worker from the wind farms off Clacton has been taken to hospital after falling through a hatch on a tug boat. The 24-year-old German man was hurt while working aboard the vessel Arion which transports equipment out to the wind farms.	Reported by Evening Star 24 on 23 September 2009	http://www.eveningstar.co.uk/content/eveningstar/news/story.aspx?brand=ESTOnline&category=NewsRegional&tBrand=ESTOnline&tCategory=xDefault&itemid=IPED23%20Sep%202009%2006%3A51%3A57%3A817
676	Environmental	20090925		9/25/2009	Scotland	UK		'"Poorly positioned' wind farms reduce rare birds' breeding". RSPB Scotland study looked at 12 operating upland wind farms in the UK and found that numbers of several birds of high conservation concern are reduced close to the turbines. Affected birds include the hen harrier and golden plover, which are protected under European law, and the curlew, which is a high-priority species under the UK Biodiversity Action Plan. The study found that the population density of breeding birds is reduced by between 15 and 53 per cent when nests are within 500 metres of a turbine. The RSPB called for better planning when wind farms are being considered to take bird populations into account.	Reported by The Scotsman on 25 September 2009	http://news.scotsman.com/scotland/39Poorly-positioned39-wind-farms-.5681309.jp

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
677	Blade failure	20090926		9/26/2009	Kirkheaton, Northumberland, England	UK		"Faulty wind turbines could stay at Kirkheaton". Faulty wind turbines could remain at a Northumberland beauty spot for another year if a new planning application is approved. The three giant structures at Kirkheaton, north of Hexham, were put up almost 10 years ago by EDF Energy. But technical issues meant that two of the turbines had to have their blades removed, and only one of the three has been operating since last autumn. Cracks in blades are to blame. Previously there were gear box problems.	Reported by The Journal on 26 September 2009	http://www.journallive.co.uk/north-east-news/todays-news/2009/09/26/faulty-wind-turbines-could-stay-at-kirkheaton-61634-24784824/
678	Mechanical failure	20090927		9/27/2009	Hundhammerfjellet, North of Trondheim	Norway		Main bearing damaged, preventing the rotor mechanism from turning.	Reported by Namdalsavisa, 3 November 2009	
679	Miscellaneous	20091002		10/2/2009	FWEC, Brownsville, WI	USA		All 86 turbines reported to be closed down following high winds. Even though gusty winds howled through the area earlier this week, the 86 wind turbines on the Forward Wind Energy Center have remained still since Tuesday	Reported by Fond Du Lac Reporter on 2 Oct 2009	http://www.windaction.org/news/23401
680	Structural failure	20091006		10/6/2009	Flackwell Heath, Bucks, England	UK		"Part of wind turbine at Flackwell Heath school fell off" A wind turbine at a school in Flackwell Heath has been repaired after part of it fell off into the school playground. A panel fell off the back of the turbine at Carrington Junior School and the whole structure had to be taken down and repaired over the summer. ...Photographs and an anonymous letter were recieved by the Bucks Free Press saying: "If this can happen, the turbine is a danger and should not be installed anywhere near our children."	Reported by Bucks Free Press on 6 Oct 2009	http://www.bucksfreepress.co.uk/news/4666787.Part_of_wind_turbine_at_Flackwell_Heath_school_fell_off/
681	Blade failure	20091010		10/10/2009	Sheffield, Yorkshire, England	UK		"Wind turbine in Sheffield broken by wind for second time" Manufacturers of the 190ft high turbine, one of three owned by Sheffield University, are now investigating the damage at the site close to the city's Parkway link road to the M1. A blade on the same turbine was broken 15 months ago and residents who live close to the site at Catcliffe, near Rotherham, have expressed fears that they could pose a danger to local people.	Reported by Telegraph.co.uk on 10 October 2009	http://www.telegraph.co.uk/news/newstopics/howaboutthat/6284573/Wind-turbine-in-Sheffield-broken-by-wind-for-second-time.html
682	Environmental	20091013		10/13/2009	Wolf Ridge Wind Farm, Texas	USA		"Scientists study birds killed by wind turbines" When it comes to generating green energy from the wind, Texas leads the way. But in the pursuit of cleaner energy, there's also an environmental cost: Dead birds and bats killed by turbine blades. Among them are raptors, vultures, yellow-billed cuckoos, said Amanda Hale, TCU researcher. Birds killed by wind turbines pale in comparison to birds killed by cars, buildings and other animals.	Reported by WFAA-TV on 13 October 2009	http://www.windaction.org/news/23614
683	Fire	20091014.1		10/14/2009	Maple Ridge Wind Farm, New York	USA		"Wind farm substation is damaged by blaze" A transformer at the Maple Ridge Wind Farm's substation off Rector Road was destroyed by fire late Monday afternoon. Martinsburg firefighters were dispatched to the substation about 5 p.m. but had to wait until the facility was shut down before extinguishing the blaze, said Lewis County Fire Coordinator James M. Martin. ...The Columbus Day fire was the second transformer fire at the site, with a similar incident occurring July 4, 2007. In that case, 491 gallons of mineral oil leaked from the damaged transformer	Reported by Watertown Daily News on 14 October 2009	http://www.watertowndailytimes.com/article/20091014/NEWS04/310149949

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
684	Miscellaneous	20091016		10/16/2009	FWEC, Brownsville, WI	USA		"Rumors fly about offline wind turbines" As the blades of the 86 turbines on the Forward Wind Energy Center remain still, rumors have been circulating faster than the wind as to why the wind farm has been offline since Sept. 29. Invenergy LLC officials attributed the shutdown to scheduled maintenance of the wind farm's substation. However, the latest buzz that a major utility pulled out of its power purchase contract and has left Invenergy without a new customer to fill the void simply isn't true.	Reported by Fond Du Lac Reporter on 16 Oct 2009	http://www.wisinfo.com/apps/pbcs.dll/article?AID=2009910160375
685	Transport	20091016		10/16/2009	Princeton, Illinois	USA		"Details released on road dispute" An attorney representing the Bureau County Board has released details of a dispute over a road agreement the county claims a wind farm company has failed to honor. A civil engineering study assessed $1.9 million in road damage near Providence Heights wind farm.	Reported by Bureau County Republican on 16 October 2009	http://www.bcrnews.com/articles/2009/10/16/r_ixofhh1trro_v3az1wdyg/index.xml
686	Structural failure	20091019		10/19/2009	Various UK sites	UK		"Wind turbines suspended after flaw discovered" An entire fleet of around 100 'urban' wind turbines has been remotely shut down by manufacturer Quiet Revolution after the discovery of a design fault. The fleet of QR5 turbines was disabled after continual wind speeds of between 14 and 24 metres per second caused a turbine located on a sea wall in Blackpool to develop a mechanical error, the company said in a statement on Friday. The QR5s have been installed on 55 sites for clients including Network Rail, Sainsbury's and self-storage firm Big Yellow.	Reported by ZDNet UK on 19 October 2009	http://news.zdnet.co.uk/emergingtech/0,1000000183,39817119,00.htm
687	Miscellaneous	20091020		10/20/2009	Vermont Community Wind Farm, Clarendon, VT	USA		"Residents in challenge to wind tower placement" A wind measurement tower erected on Susie's Peak has local officials crying foul over its placement. The tower was not placed at the site approved by the state Public Service Board, according to Clarendon Select Board Chairman Michael Klopchin. A small group of concerned residents used global positioning satellite equipment to pinpoint the location of the VCWF tower, some 230m south of the approved location.	Reported by Rutland Herald on 20 October 2009	http://www.rutlandherald.com/article/20091020/NEWS01/910200359/1002/NEWS01
688	Structural failure	20091020		10/20/2009	Stoney Corners Wind Farm, Michigan	USA		"Wind turbine concerns lead to road closure " A road in Missaukee County was closed for several hours Sunday afternoon and three homes were evacuated as a safety precaution after construction workers became concerned about the stability of a newly-installed 400-foot wind turbine. ...[the homes] were still evacuated out of an abundance of caution in terms of possible flying debris.	Reported by Cadillac News on 20 October 2009	http://www.cadillacnews.com/story_news/?story_id=1175360&year=2009
689	Blade failure	20091021		10/21/2009	Akron, South Dakota	USA		"School's wind turbine's energy production on hold" Blades the length of almost two school buses from a wind turbine owned by Akron-Westfield School District rest on the ground while repairs are underway. The turbine's gearbox was also brought down using a tall crane to reach the top of the 11-year-old structure's 165-foot-tall tower. One of the turbine blades was splitting open.	Reported by Le Mars Daily Sentinel on 21 October 2009	http://www.lemarssentinel.com/story/1580586.html
690	Fire	20091022		10/22/2009	Froidfond, Vendée region, western France	France		"Froidfond: wind turbine damaged by fire" A wind turbine between Garnache and Froidfond caught fire on Wednesday evening, towards 20:30. The firemen of Challans, Saint-Etienne-of-Wood and Garnache intervened.	Reported by OuestFrance.fr on 22 October 2009	http://www.ouest-france.fr/ofdernmin_-Froidfond-une-eolienne-endommagee-par-un-incendie_-1123607_actu.Htm

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
691	Environmental	20091027		10/27/2009	Lendas	Crete		Vulture killed by wind turbine in Lendas, south Crete. Footage on YouTube	Reported on YouTube on 27 October 2009	http://www.youtube.com/watch?v=9srPoOU6_Z4&feature=autofb
692	Transport	20091027		10/27/2009	Danville, PA	USA		"Grounded load in Danville waits for parts" The wind turbine grounded Monday remained in town Tuesday, awaiting a part needed for repairs before it continues to West Virginia. Front Street remained closed from Route 54 to Mill Street, where the 150-foot-long, 100-ton windmill base sat on a trailer. The part for a damaged rear turning axle was ordered from Alabama and is expected to be delivered today, Danville Police Chief Eric Gill said.	Reported by The Daily Item on 27 October 2009	http://www.dailyitem.com/0100_news/local_story_300235148.html
693	Transport	20091027		10/27/2009	Aberdeenshire, Scotland	UK		"Delays as turbines transported; More of the parts will be arriving at Buchan port soon" Delays are expected for north-east motorists today as another delivery of huge wind turbine parts is transported from Peterhead harbour. Traffic in some parts of Buchan ground to a halt yesterday as sections of turbine were transported to Hill of Skelmonae, near Auchnagatt. Between now and December, turbines bound for Banff, Boyndie, St Fergus, Foveran, Cuminestown and Rothienorman will arrive at the Buchan port.	Reported by The Press & Journal on 27 October 2009	http://www.pressandjournal.co.uk/Article.aspx/1456449?UserKey=
694	Environmental	20091028		10/28/2009	Altamont Pass, CA	USA		"Altamont bird slaughter worsens" The dirty little secret about the windmill farm at Altamont Pass is that it slaughters thousands of birds every year while politicians turn a blind eye. Four years ago, environmental groups filed suit after the Alameda County Board of Supervisors effectively allowed the farm's several owners to keep killing birds despite evidence that the deaths could be greatly lessened.	Reported by East Bay Press on 28 Oct 2009	http://www.eastbayexpress.com/eastbay/altamont-bird-slaughter-worsens/Content?oid=1371371
695	Fire	20091031.1	P	10/31/2009	Ardeche, south France	France	Vestas	"Wind turbine destroyed by fire in Ardeche" One of five wind turbines at the Chabanet wind park near Freyssenet was detroyed by fire. Photos available. Vestas claimed this was a first for France less than two weeks after a similar incident in the Vendee Region of Western France	Reported by Article du Dauphiné Liberé on 31 October 2009	http://www.ledauphine.com/freyssenet-br/-une-eolienne-en-feu-sur-le-plateau-du-coiron-@/index.jspz?article=214826
696	Blade failure	20091101		11/1/2009	Hundhammerfjellet, North of Trondheim	Norway		Turbine blade broken - a piece weighing 10 tonnes and 45m long came offf. A local person reported "In the middle of the night we heard a large crash. We live 650m from the park and are seriously concerned. The last time there was an blade accident (20 Jan 2006) parts from the blade were thrown 1.3 km away"	Reported by Namdalsavisa, 3 November 2009	
697	Blade failure	20091103		11/3/2009	Oxhult Wind Park, Falkenberg	Sweden	Vestas V90	"Two wind turbines self-destruct in one week" Wind turbine blades rip loose near Esbjerg and southwestern Sweden, one landing on a hiking path. A malfunction on a Vestas wind turbine in the town of Falkenberg on Sweden's southwest coast could have resulted in tragedy, as one of the structure's large blades flew off and landed on a track used by hikers.	Reported by Copenhagen Post on 3 November 2009	http://www.cphpost.dk/business/119-business/47384-two-wind-turbines-self-destruct-in-one-week.html
698	Blade failure	20091103.1		11/3/2009	Esbjerg	Denmark	Vestas	"Two wind turbines self-destruct in one week" Yesterday's incident follows a similar one this weekend near Esbjerg, where a defective axel caused all of the blades on a 40m high turbine to rip loose, one of them hitting a power transformer. Since 2000, there have been 27 incidents in Denmark of turbine blades coming loose.	Reported by Copenhagen Post on 3 November 2009	http://www.cphpost.dk/business/119-business/47384-two-wind-turbines-self-destruct-in-one-week.html

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
699	Mechanical failure	20091105		11/5/2009	Wansbeck General Hospital, Ashington, Northumberland, England	UK		"Wansbeck General wind turbine produces no power for two years" A wind turbine at a North East hospital has produced no electricity since 2007, it emerged last night. The turbine at Wansbeck General Hospital, at Ashington, Northumberland has been out of service for two years because of a fault. The news comes on the back of previous stories highlighting faults with turbines at Blyth and Kirkheaton, which left them inactive for long periods. Critics of wind power last night said the new revelation is further proof turbines are an unreliable source of electricity.	Reported by JournalLive.co.uk on 5 November 2009	http://www.journallive.co.uk/north-east-news/todays-news/2009/11/05/wansbeck-general-wind-turbine-produces-no-power-for-two-years-61634-25095403/
700	Human Injury	20091107		11/7/2009	Thompson, Iowa	USA		"Man falls inside turbine" Despite a fall of between 20 and 30 feet, the man who lost his footing on a ladder inside a wind turbine on Friday apparently was not seriously injured. The man's name has not been released by the Winnebago County Sheriff's Department. ...the worker slipped off a ladder and, although tethered by a safety harness, the harness apparently failed, and the man fell. The worker suffered a broken arm and some lacerations.	Reported by Globe Gazette on 7 November 2009	http://www.globegazette.com/articles/2009/11/07/news/latest/doc4af606707453d772197262.txt#vmix_media_id=7180324
701	Mechanical failure	20091109		11/9/2009	Prince Edward Island, BC	Canada	Entegrity	"School windmill to be repaired", The P.E.I. government is stepping in to repair a wind turbine at a North Rustico school that hasn't worked for more than a year. The province paid $200,000 for the 30-metre turbine at Gulf Shore Consolidated School, with the village taking out a $40,000 loan to cover the rest of the cost. It came with a 10-year warranty but the company that built it, Entegrity Wind Systems, is in receivership. ...the turbine didn't work properly from day one.	Reported by CBS News on 9 November 2009	http://www.cbc.ca/canada/prince-edward-island/story/2009/11/09/pei-windmill-school-rink-entegrity-584.html
702	Structural failure	20091111.1		11/11/2009	Aibar wind park, Navarre	Spain	Acciona 1.5Mw turbine	"Wind turbine nacelle falls at Aibar" The nacelle, blades and rotor assembly of one of the 52 wind mills of the Aibar wind park fell to earth on Thursday evening. Reasons are being investigated.	Reported by www.diariodenavarra.es on 11 November 2009	http://www.diariodenavarra.es/20091111/otrascomarcas/cae-cabeza-molino-viento-aibar.html?not=20091111012959 18&idnot=20091111012959 18&dia=20091111&seccion=otrascomarcas&seccion2=otrascomarcas&chnl=10&ph=109
703	Mechanical failure	20091112		11/12/2009	Traverse City, Michigan	USA		"Light & Power windmill grinds to halt" A publicly owned wind turbine along M-72 in Leelanau County's Elmwood Township is out of commission. A generator bearing failed and the turbine ground to a halt, said Ed Rice, Traverse City Light & Power's executive director. The windmill has been broken for about six weeks.	Reported by Traverse City Record-Eagle on 12 November 2009	http://www.windaction.org/news/24050
704	Structural failure	20091121		11/21/2009	Raasay Primary School, Highland Region, Scotland	UK		"Wind blades fell in school yard" raasay children sent home after 50ft turbine collapsed. Children at an island primary were sent home after a newly-installed wind turbine next to their school collapsed, it emerged yesterday. Parents of youngsters at the 18-pupil Raasay Primary School were asked to collect their children following the incident on November 13. The 50ft turbine will "remain out of commission" until an investigation has been carried out. The 6KW machine was installed at the school earlier this month, but was soon the subject of complaints due to the noise it was making. The turbine then collapsed, landing in the school's playground, although no one was hurt.	Reported by The Press and Journal on 21 November 2009	http://www.pressandjournal.co.uk/Article.aspx/1492247?UserKey=

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
705	Structural failure	20091201.1	P	12/1/2009	Fakenham High School	UK		"Wind turbine topples over on high school field" Stunned students watched as a 40ft wind turbine crashed to earth during its installation on Fakenham High School playing field this lunchtime. The field was evacuated after the giant turbine toppled over, crushing a contractor's van.	Reported by EDP 24 on 1 December 2009	http://www.edp24.co.uk/content/edp24/news/story.aspx?brand=EDPOnline&category=News&tBrand=EDPOnline&tCategory=xDefault&itemid=NOED01%20Dec%202009%2017:53:31:767
706	Fire	20091202.1		12/2/2009	Praia Formosa wind farm, Ceará state	Brazil	Suzlon	"Suzlon turbine spins apart in Brazil" A 2.1MW Suzlon wind turbine at a Siif Energies project in the state of Ceará collapsed in a blaze last month, the developer has confirmed. The 21 November incident occurred 200 metres from a residential community and prompted an official inquiry by the local authorities.	Reported by New Energy Finance on 2 December 2009	http://www.windaction.org/news/24458
707	Fire	20091203.1		12/3/2009	Uelzen, Hamburg	Germany		"Accident in Uelzen" Wind-power plant on fire at height of 130m. The fire-brigade closed the area off and let the fire burn out. The fire was to be seen kilometres away. The fire-brigade could not fight the fire at that height and had no other choice.	Reported by Hamburger Abendblatt on 3 December 2009	http://www.abendblatt.de/region/norddeutschland/article1293547/Windkraftanlage-defekt-Leuchtfeuer-in-130-Meter-Hoehe.html
708	Lightning damage	20091208		12/8/2009	Campo Indian Reservation turbines, California	USA		"Lightning damages East County wind turbines" Lightning struck most of the wind turbines along Interstate 8 on the Campo Indian Reservation Monday night, causing severe damage to at least two of them, an official said. It's unclear how much damage the lighting strikes caused the other turbines, said Neal Emmerton, regional asset manager.	Reported by San Diego Union-Tribune on 8 December 2009	http://www.signonsandiego.com/news/2009/dec/08/lighting-strikes-damage-wind-turbines/
709	Environmental	20091209		12/9/2009	Greenbrier County, West Virginia	USA		"Federal court rules massive wind energy project in violation of Endangered Species Act" Federal district court Judge Roger Titus of the U.S. District Court for the District of Maryland has issued a comprehensive ruling that an industrial wind energy facility in Greenbrier County, West Virginia will kill and injure endangered Indiana bats, in violation of the Endangered Species Act (ESA). The court concluded that "the development of wind energy can and should be encouraged, but wind turbines must be good neighbors."	Reported by Windaction.org on 9 December 2009	http://www.awionline.org/ht/d/sp/i/16983/pid/16983
710	Blade failure	20091215		12/15/2009	Kansas	USA		"Sunflower Wind is suing turbine blade supplier" Sunflower Wind's suit claims Arlwin manufactured blades for three tublines, two of which were installed in Lane County and the third in Smith County. On Nov. 4, the suit alleges, Sunflower Wind removed the blades from one turbine in Lane County and learned the blades were "severely cracked".	Reported by Hutch News on 15 December 2009	http://www.hutchnews.com/Newsbriefs/wind2009-12-14T20-58-58
711	Blade failure	20091217		12/17/2009	Unalaska, Alaska	USA		"Wind turbines damaged in storm" The other Helix turbine was located on Nirvana Hill. Its lower blades were damaged but it still operates.	Reported by KUCB News on 17 December 2009	http://www.publicbroadcasting.net/kial/news.newsmain?action=article&ARTICLE_ID=1590399
712	Structural failure	20091217		12/17/2009	Unalaska, Alaska	USA		"Wind turbines damaged in storm" The wind storm that knocked over the crane had similar negative effects on the local residential wind-powered electric generators. The storm, which blew at least 125 miles per hour, completely dislodged the helix shaped turbine that was installed on Haystack hill. The blades and shaft blew away and were later located by divers. The tower stayed up.	Reported by KUCB News on 17 December 2009	http://www.publicbroadcasting.net/kial/news.newsmain?action=article&ARTICLE_ID=1590399

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
713	Mechanical failure	20091227		12/27/2009	Geneseo, Illinois	USA		"Geneseo wind turbine temporarily down" One of Geneseo's two recently installed wind turbines is down temporarily due to what is believed to be a faulty generator. Lewis Opsal, Geneseo electric superintendent, said the turbine should be up and running again by the end of January or early February. He said representatives from Vensys, the German manufacturer of the two 300-foot turbines, was in Geneseo recently to check on a vibration inside the turbine.	Reported by Dispatch-Argus on 27 December 2009	http://www.qconline.com/archives/qco/display.php?id=472822
714	Structural failure	20091227		12/27/2009	Fenner, New York	USA	GE 1.5MW	"Officials investigating why 187 ton windmill collapsed in Fenner" Marvin DeKing already was up and awake between 3 and 4 a.m. when he heard a loud bang. "It sounded like thunder and lightning," said DeKing, of 5206 Buyea Road in this rural town east of Cazenovia. But it wasn't until daylight that DeKing learned what had caused the noise: The 187 ton windmill across the road from his house had fallen over and lay sprawled in the cornfield in which it stood.	Reported by The Post-Standard on 27 December 2009	http://www.syracuse.com/news/index.ssf/2009/12/officials_hope_to_learn_why_wi.html
715	Structural failure	20091228		12/28/2009	Fairfield	USA		Wind measurement mast reported to have collapsed by Fairfield resident Jim Salamone. He says the meteorological tower that used to be right across from his home already collapsed because of wind and ice. Salamone says the meteorological tower that collapsed near his home was the third one to do so in as many years.	Reported by NBC-WKTV News Channel 2 on 28 December 2009	http://www.wind-watch.org/news/2009/12/28/turbine-collapse-draws-concern-from-other-proposed-project-areas/
716	Miscellaneous	20100112		12/1/2010	Traverse City Light & Power turbine, Elmwood Township, Leelanau County, Michian	USA	gmonths. 180 feet high	idled turbine's costs could soar". Traverse City Light & Power's towering wind turbine along M-72 in Leelanau County's Elmwood Township has been idle for more than three Officials oriinall said a failed gy generator bearing would cost between $15,000 and $20,000 to repair. Further damage to the generator bearing has also been discovered.	Reported by Record-Eagle on 12 Jan 2010	http://www.windaction.org/news/25079
717	Blade failure	20100113		1/13/2010	Kumeyaay Wind project, Campo Indian Reservation, San Diego, CA	USA	Gamesa 2MW	"A damaging blow; Wind farm making inspections, repairs after storm". Workers are inspecting and repairing 75 wind turbine blades at a wind farm some 60 miles east of San Diego after a storm a month ago caused catastrophic damage to some of them. Blades cracked during the storm on all 25 turbines in a 70mph wind.	Reported by Union-Tribune on 13 Jan 2010	http://www.windaction.org/news/25095
718	Blade failure	20100118		1/18/2010	Ocean View Farm, Nantucket, Massachusetts	USA	WES, 145 feet high	"Bartlett's wind turbine breaks blade" A 20-foot-plus piece of one of the blades on Bartlett's Ocean View Farm's wind turbine snapped off and landed 175 feet away in winds less than 51mph. The turbine was approx 10 months old. Later reports mention the same type of turbine at the University of Sheffield, UK, breaking a blade on 2 occasions during 2008. Makers WES may be sued.	Reported by Nantucket Independent on 19 Jan 2010	http://www.windaction.org/news/25196
719	Miscellaneous	20109999			Wayne State College of Engineering, Michigan	USA	VBINE Energy	"Wind turbine still not functioning" Nearly a year after its assembly, Wayne State's Franklin Vertical Axis Wind Turbine is still waiting to generate power. A series of turbine problems have been blamed.	Reported by The South End on 25 Jan 2010	http://www.windaction.org/news/25315

	Accident type	Case		Date	Site/area	State/Country	Turbine type	Details	Info source	Web reference/link
720	Environmental	20100127		1/27/2010	Burgenland, Weiden am See in Neusiedl district	Austria		"Eagle might have been chopped up by wind farm rotor blade" Viennese wild animal experts are investigating after an imperial eagle was discovered cut to pieces close to wind turbines in Burgenland last weekend. Experts suspect it got into a rotor blade at the wind turbine as its body was cut into two parts in one clear cut.	Reported by Austrian Independent on 27 Jan 2010	http://www.windaction.org/news/25331
721	Miscellaneous	20100304		4/3/2010	Various cities, Minnesota	USA	160kW turbines	"Calif. turbines frozen in Minn. Wind" Eleven refurbished, 115-foot turbines failing to operate in colder conditions. They had previously operated in California	Reported by Star Tribune on 4 February 2010	http://www.windaction.org/news/25439
722	Environmental	20100209		9/2/2010	Kumeyaay Wind project, Campo Indian Reservation, San Diego, CA	USA	Gamesa 2MW	"What happened at the wind farm?" Formal health and safety investigation into blade failure (reported above 13 Jan 2010) reports "substantial oil leakage from machinery down the length of the massive tower"	Reported by East County Magazine on 9 February 2010	http://www.windaction.org/news/25552
723	Blade failure	20100210		10/2/2010	Provincetown, Massachusetts	USA	Waterline vertical axis turbine, 30 feet tall	"Wind turbine removed from Provincetown" Wind turbine removed from Provincetown harbour after 6 months, following blade failure. Blades had to be repaired and turbine reported to be "noisy"	Reported by Cape Cod Times on 10 February 2010	http://www.windaction.org/news/25539
724	Fire	20100215		2/15/2010	Cumberland, Nova Scotia	Canada		"RCMP turbine idle again" Following a second electrical fire. Previously there was an electrical panel fire in 2008 and failure after a storm in 2007. It was the same electrical panel which went on fire both times.	Reported by Amherst Daily News on 15 February 2010	http://www.windaction.org/news/25660
725	Environmental	20100215		2/15/2010	Fowler Ridge Wind Farm, Lafayette, Indiana	USA		"Wind farm kills endangered bat". First time that a federally endangered bat has been reported among the many dead bats found around the windfarm. The Indiana bat is in danger of becoming extinct.	Reported by The Star Press on 15 February 2010	http://www.windaction.org/news/25673
726	Miscellaneous	20100301		1/3/2010	Union City, Indiana	USA	Indian turbine	"Wind turbine comes down, officials meet" Union city's wind turbine experienced a failure of one of its rotor blade's braking mechanisms during commissioning and testing of the unit on February 16. The damaged turbine remained high in the air with the dangling tip for a week.	Reported by Winchester News-Gazette on 1 March 2010	http://www.windaction.org/news/25893
727	Blade failure	20100314		3/14/2010	Marston Mills, Barnstable, Cape Cod, Massachusetts	USA	Aircon-10, 10kW, 100 feet from base to blade tip	"Blades blow off Marstons Mills turbine" Around 12 p.m. Sunday, two blades of a wind turbine were blown off a 60 foot hih g Cape Cod turbine and landed 100 feet from the turbine. Turbine erected in 2009.	Reported by Cape Cod Today on 14 March 2010	http://www.windaction.org/news/26178
728	Blade failure	20100319		3/19/2010	Whitelee wind farm, East Renfrewshire, Scotland	UK	2.3MW Siemens	"Blade snaps off huge wind turbine" An investigation is under way at Europe's largest onshore wind farm in East Renfrewshire after a 1 50ft blade snapped off a turbine. The incident, at about 0200 GMT on Friday 19 March, led to all 140 turbines at Whitelee wind farm, near Eaglesham, being temporarily shut down.	Reported by BBC News on 23 March 2010	

APPENDIX C2: Photo Collection from Database

- ***35 to a Page for easy selection***

Section following gives 6 to a page for clearer viewing


C19949999.2.jpg


C19949999.2a.jpg


C19971224.1.bmp


C19980201.1.jpg


C19980609.1.bmp


C19980609.1a.bmp


C19990205.1.jpg


C19990412.1.bmp


C19991212.1.bmp


C20000120.1.bmp


C20000129.1.bmp


C20000210.1.bmp


C20000210.1a.bmp


C20000528.1.bmp


C20001209.1.bmp


C20010315.1.jpg


C20020122.1.jpg


C20020122.1a.jpg


C20020128.1.bmp


C20020128.2.jpg


C20020219.1.jpg


C20020219.1a.jpg


C20020219.1b.jpg


C20020219.1c.jpg


C20020219.1d .jpg


C20020223.1.JPG


C20020223.2.jpg

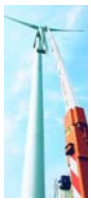

C20020223.2a .jpg


C20020223.2b.jpg


C20020319.1.jpg


Windrad hat Feuer gefangen

C20020319.1a.jpg


C20020408.1.jpg


C20020420.1.bmp


C20020515.1.jpg


August 4, 2002: Fire

VESTAS V80, 2 MW
Year of construction: 2002
Location: Katzenberg near Meißen

C20020804.1.bmp


C20020804.1.jpg


C20021003.1.jpg


C20021027.1.bmp


C20021027.1a.jpg


C20021115.1.jpg


C20021208.1.jpg


C20021208.1a.jpg


C20021208.1b.jpg


C20021208.1c.jpg


C20021208.1d.jpg


C20021208.1e.jpg


C20021208.1f.jpg


C20021208.1g.jpg


C20021208.1h.jpg


C20021208.1i.jpg


c20021208.1j.jpg

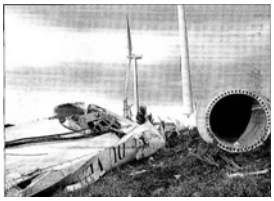

C20021208.1k.jpg


C20021208.1l.jpg


C20021208.1m.jpg


C20021208.1n.jpg


c20021218.1.bmp


C20021228.1.jpg

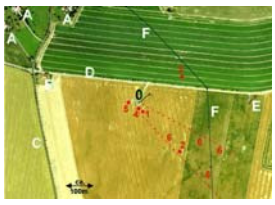

C20030301.1.bmp


C20030405.1 .jpg


C20030405.1a.jpg


C20030405.1b.jpg


C20030405.1c.jpg


C20030405.1d.jpg


C20030405.1e.jpg

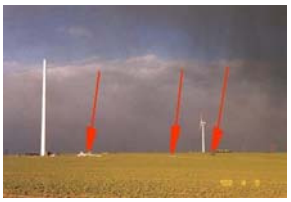

C20030405.1f.jpg


C20030405.1g.jpg


C20030405.1h.jpg


C20030405.1i.jpg


C20030405.1j.jpg


C20030405.1k.jpg


C20030615.1.jpg

C20030815.1.jpg


C20030911.1.jpg


C20030911.1a .jpg


C20030911.1b .jpg


C20030911.1c .jpg


C20030911.1d .jpg


C20030911.1e.jpg


C20031016.1.jpg


C20031016.1a.jpg

C20031016.1b.jpg


C20031016.1c.jpg


C20031016.1d.jpg

C20031016.1e.jpg


C20031016.1f.jpg


C20031016.1g.jpg


C20031115.1.jpg


C20031115.1a.jpg


C20031115.1b.jpg


C20031115.1c.jpg


C20031115.1d1.jpg

C20031115.1d.jpg


C20031115.1e.jpg


C20031115.1f.jpg


C20031223.1.jpg


C20040101.1.jpg


C20040101.1a.jpg


C20040101.1b.jpg


C20040101.1c.jpg


C20040101.1d.jpg


C20040209.1.jpg


C20040209.1a.jpg


C20040209.1b.jpg


C20040209.1c.jpg


C20040209.1d.jpg


C20040209.1e.jpg


C20040320.1.bmp


C20040320.1.jpg


C20040320.1a.jpg


Fire caused by a short circuit, frictional overheating or lightning in 2004 in a Germany. Source: Der Spiegel, DPA.

C20040609.1.bmp


C20040609.1.jpg


Saarbrücker Zeitung
St. Wendeler Zeitung
26.Nov. 2004
45-Meter-Mast rammt Haus

C20041125.1.jpg


C20041125.1a.jpg


St. Wendeler Zeitung
45-Meter-Mast rammt Haus
45-Meter-Mast rammt Haus

C20041125.1c.jpg

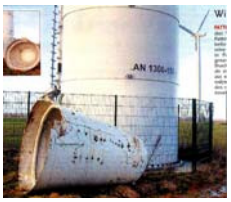

La Tribune
Une éolienne perd ses pales

C20041222.1.bmp


C20041222.1a.bmp


C20041222.1b.jpg


C20041222.1c.jpg


C20041230.1.jpg


C20050120.1.jpg


C20050226.1.jpg


C20050407.1.jpg


c20050506.1.jpg


C20050506.1a.bmp


C20050516.1.jpg


C20050516.1a.jpg


C20050516.1b.jpg


C20050516.1c.jpg


c20050516.c.jpg


Eiswurf
in Lankern,
Lammersbege
17.12.05

C20051217.1.bmp


c20051223.1.bmp


C20051223.1.jpg


c20060113.1.jpg


Scorched out

C20060122.1.jpg


The Border Watch
Heat wave
fuels havoc

C20060122.1a.jpg


Battle weary firies

C20060122.b.jpg


C20060124.1.jpe


c20060221.1.jpg


C20060702.1.jpeg


C20061006.1.jpg


C20061031.1.bmp


c20061031.1.jpg


C20061031.1a.bmp


C20061204.1.JPG


C20061219.1.bmp


C20070101.1 .jpe


C20070101.2.bmp


C20070108.1.bmp


C20070623.1.jpg


C20070825.1.bmp


C20070825.1a.bmp


c20071003.1.jpg


C20071108.1.bmp


C20071115.1.bmp

C20071115.1.jpg


C20080102.1.jpg


C20080102.1a.jpg


C20080310.1.jpg


C20080327.1.bmp


C20080512.1.jpg

C20080514.1.jpg


C20080626.1.bmp


C20080719.1a.jpg


C20080719.1b.jpg


C20080719.1c.jpg


C20081016.1.jpg


C20081022.1.jpg


C20081201.1.bmp


C20090104.1.bmp


C20090104.1a.bmp


C20090104.1b.jpg


C20090104.1c.jpg


C20090104.1d.jpg


C20090104.1e.jpg


C20090104.1f.jpg

C20090130.1.bmp

c20090220.1.bmp

C20090306.1.jpg

C20090306.1a.jpg

C20090306.1b.jpg

C20090326.1.JPG

C20090401.1.jpg

C20090527.1.bmp

C20090527.1A.jpg

C20090702.1.jpg

C20090702.1a.bmp

C20090810.1.bmp

C20091031.1.bmp

C20091201.1.bmp

C20091202.1.jpg

C20091203.1.jpg

- ***6 to a Page for clearer viewing***

C19949999.2.jpg

C19949999.2a.jpg

C19971224.1.bmp

C19980201.1.jpg

C19980609.1.bmp

C19980609.1a.bmp

C19990205.1.jpg

C19990412.1.jpg

C19991212.1.bmp

C20000120.1.bmp

C20000129.1.bmp

C20000210.1.bmp

C20000210.1a.bmp

C20000528.1.bmp

C20001209.1.bmp

C20010315.1.jpg

C20020122.1.jpg

C20020122.1a.jpg

C20020128.1.bmp

C20020128.2.jpg

C20020219.1.jpg

C20020219.1a.jpg

C20020219.1b.jpg

C20020219.1c.jpg

C20020219.1d .jpg

C20020223.1.JPG

C20020223.2.jpg

C20020223.2a .jpg

C20020223.2b.jpg

C20020319.1.jpg

Mi. 20.3.2002

Seite 5 DÖBELNER ANZEIGER

Windrad hat Feuer gefangen

C20020319.1a.jpg

C20020408.1.jpg

April 20, 2002: Fire
VESTAS 1.5 MW
Total height: 108 m
Year of construction: 2000
Location: Bad Wünnen-berg-Haaren near Paderborn

C20020420.1.bmp

C20020515.1.jpg

August 4, 2002: Fire

VESTAS V80, 2 MW
Year of construction: 2002
Location: Katzenberg near Meißen

C20020804.1.bmp

C20020804.1.jpg

C20021003.1.jpg

C20021027.1.bmp

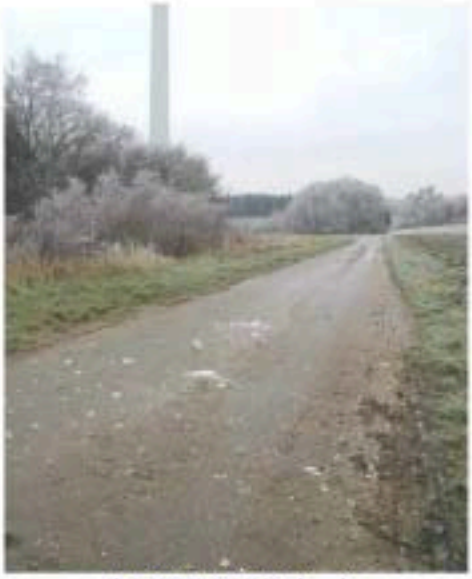
C20021027.1a.jpg

C20021115.1.jpg

C20021208.1.jpg

C20021208.1a.jpg

C20021208.1b.jpg



C20021208.1c.jpg

C20021208.1d.jpg

C20021208.1e.jpg

C20021208.1f.jpg

C20021208.1g.jpg

C20021208.1h.jpg

C20021208.1i.jpg

c20021208.1j.jpg

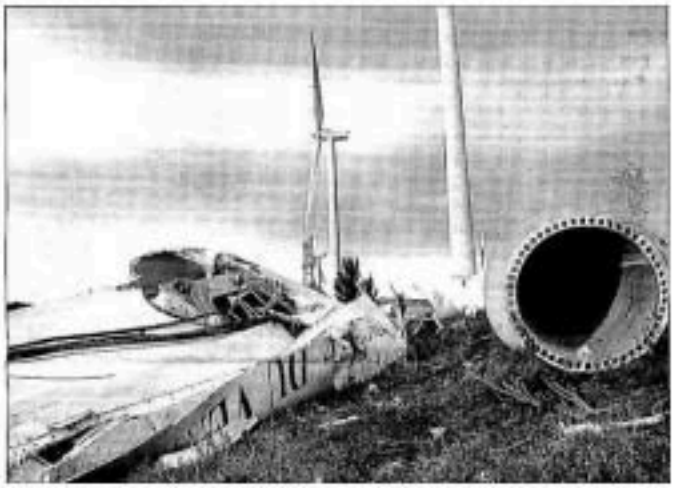
C20021208.1k.jpg

C20021208.1l.jpg

C20021208.1m.jpg

C20021208.1n.jpg

c20021218.1.bmp



C20021228.1.jpg

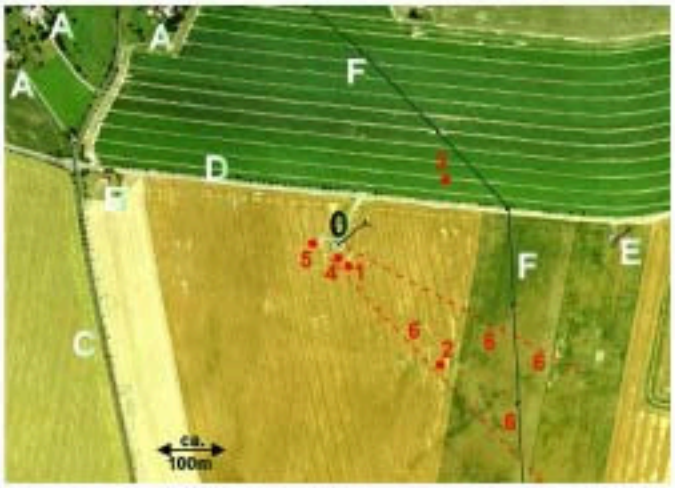
C20030301.1.bmp

C20030405.1 .jpg

C20030405.1a.jpg

C20030405.1b.jpg

C20030405.1c.jpg



C20030405.1d.jpg

C20030405.1e.jpg

C20030405.1f.jpg

C20030405.1g.jpg

C20030405.1h.jpg

C20030405.1i.jpg

C20030405.1j.jpg

C20030405.1k.jpg

C20030615.1.jpg

C20030815.1.jpg

C20030911.1.jpg

C20030911.1a .jpg

C20030911.1b .jpg

C20030911.1c .jpg

C20030911.1d .jpg

C20030911.1e.jpg

Fig. 1 Buckling Failure of a Wind Turbine Due to Typhoon

C20030911.1f.psd

C20031016.1.jpg

C20031016.1a.jpg

C20031016.1b.jpg

C20031016.1c.jpg

C20031016.1d.jpg

C20031016.1e.jpg

C20031016.1f.jpg

C20031016.1g.jpg

C20031115.1.jpg

C20031115.1a.jpg

C20031115.1b.jpg

C20031115.1c.jpg

Les éoliennes de Sallèles perdent leurs pales

Des dégâts sur trois éoliennes du site de Sallèles-Limousis

C20031115.1d.jpg

C20031115.1d1.jpg

C20031115.1e.jpg

C20031115.1f.jpg

C20031223.1.jpg

C20040101.1.jpg

C20040101.1a.jpg

C20040101.1b.jpg

C20040101.1c.jpg

C20040101.1d.jpg

C20040209.1.jpg

C20040209.1a.jpg

C20040209.1b.jpg

C20040209.1c.jpg

C20040209.1d.jpg

C20040209.1e.jpg

Hautes de 33 mètres, neuf avaient été installées le long du port en 1997

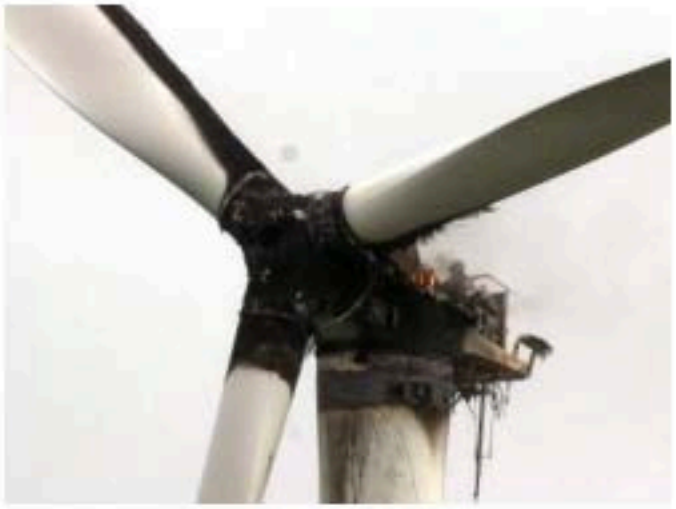
C20040320.1.bmp

C20040320.1.jpg

C20040320.1a.jpg

Fire caused by a short circuit, frictional overheating or lightning in 2004 in a Germany. Source: Der Spiegel, DPA.

C20040609.1.bmp



C20040609.1.jpg

Saarbrücker Zeitung
St. Wendeler Zeitung
26.Nov. 2004

45-Meter-Mast rammt Haus

C20041125.1.jpg

C20041125.1a.jpg


St. Wendeler Zeitung

45-Meter-Mast rammt Haus

45-Meter-Mast rammt Haus

C20041125.1c.jpg


La Tribune

Parc éolien /

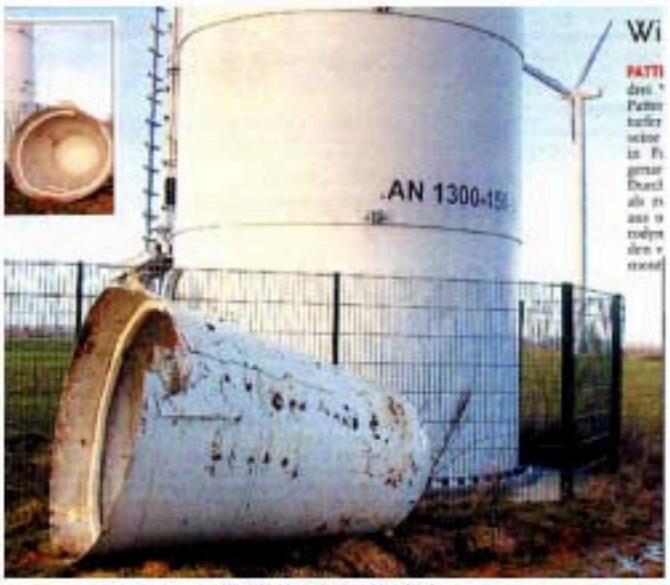
Une éolienne perd ses pales

C20041222.1.bmp

C20041222.1a.bmp

C20041222.1b.jpg

C20041222.1c.jpg



C20041230.1.jpg

C20050120.1.jpg

C20050226.1.jpg

C20050407.1.jpg

c20050506.1.jpg

C20050506.1a.bmp

C20050516.1.jpg

C20050516.1a.jpg

C20050516.1b.jpg

C20050516.1c.jpg

c20050516.c.jpg

C20051217.1.bmp

c20051223.1.bmp

C20051223.1.jpg

c20060113.1.jpg

EXCLUSIVE: What happened at an SA wind farm when we needed its power during the heatwave ...

Scorched out

C20060122.1.jpg

The Border Watch

Heat wave fuels havoc

C20060122.1a.jpg

Battle weary firies

Blaze destroys 80,000ha of scrub, farming land

Turbine destroyed

C20060122.b.jpg

C20060124.1.jpe

c20060221.1.jpg

C20060702.1.jpeg

14 actualités — Faits divers

Vent de révolte autour d'une éolienne

La chute de l'une des pales des cinq éoliennes de Pleyber-Christ apporte de l'eau au moulin de riverains en colère.

C20061006.1.jpg

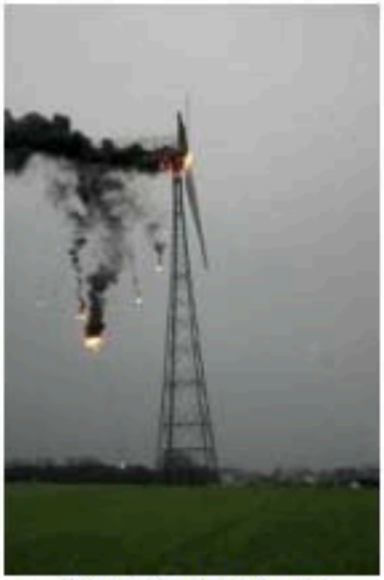
C20061031.1.bmp

c20061031.1.jpg

C20061031.1a.bmp

C20061204.1.JPG

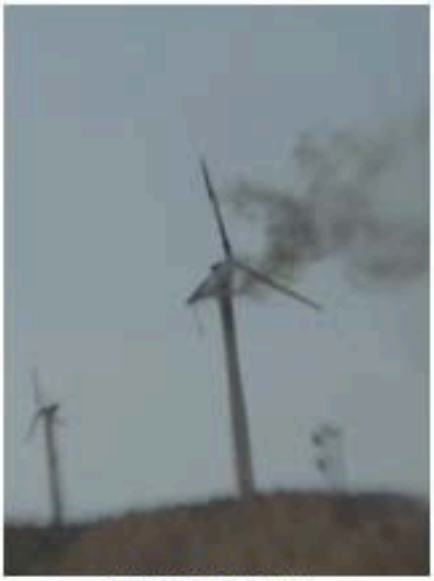
C20061219.1.bmp



C20070101.1 .jpe

C20070101.2.bmp

C20070108.1.bmp



C20070623.1.jpg

C20070825.1.bmp

C20070825.1a.bmp

c20071003.1.jpg

C20071108.1.bmp

C20071115.1.bmp

C20071115.1.jpg

C20080102.1.jpg

C20080102.1a.jpg

C20080310.1.jpg

C20080327.1.bmp

C20080512.1.jpg

C20080514.1.jpg

C20080626.1.bmp

C20080719.1a.jpg

C20080719.1b.jpg

C20080719.1c.jpg

C20081016.1.jpg

C20081022.1.jpg

C20081201.1.bmp

C20090104.1.bmp

C20090104.1a.bmp

C20090104.1b.jpg

C20090104.1c.jpg

C20090104.1d.jpg

C20090104.1e.jpg

C20090104.1f.jpg

C20090130.1.bmp

c20090220.1.bmp

C20090306.1.jpg

C20090306.1a.jpg

C20090306.1b.jpg

C20090326.1.JPG

C20090401.1.jpg

C20090527.1.bmp

C20090527.1A.jpg

C20090702.1.jpg

C20090702.1a.bmp

C20090810.1.bmp

C20091031.1.bmp

C20091201.1.bmp

C20091202.1.jpg

C20091203.1.jpg

Offshore: Risk & Technology Consulting Inc.

CORPORATE HEADQUARTERS

506 Nottingham Oaks Trail, Suite 200,

Houston, Texas 77079

Tel: 713-922-8170 Fax: 281-840-5691

Principal: Malcolm Sharples, B.E.Sc, Ph.D., FSNAME, P.E.

MINERALS MANAGEMENT SERVICE CONTRACT

Damage and Critical Analysis of Wind Farm Accidents