Australia: Offshore Exploration and Production Profile

Total Offshore Production (2013): Approximately 300 thousand barrels (Mbbl)
Total Offshore Natural Gas Production (2013): Approximately 2,000 billion cubic feet (Bcf)

Australia's offshore production accounts for 69% of all crude oil, condensate and NGL production in the country and 92% of all gas production. Australia's liquid (crude oil, condensate and LPG) production has been in decline since it peaked in 2000 and is expected to stay in decline unless new reserves are discovered or if companies are able to tap into new deep water plays.[1] Most discoveries in Australia's offshore basins have been centralized in the North West Shelf and Bass Strait basins. Australia has also been exploring deep water in the Timor Sea and other deep water frontiers. Australia has both shallow and deep water conventional wells with fixed platforms, floating production storage and offloading (FPSO) vessels, subsea vessels. Australia had a maximum of 10 offshore rigs in 2014. Additionally, as of 2014 Australia had 2,252 abandoned offshore wells.[2]

Geology and Geophysics

The geological age of reservoirs in Australia ranges drastically including the Carboniferous, Early Cretaceous, Late Cretaceous, Cenozoic, Holocene, Middle Jurassic, Permian, Proterozoic, Turonian, and Triassic eras. In these fields, the water depth ranges from very shallow water up to 17,700 feet. Field data for geologic formations, water depths, porosity, permeability, and key seismic surveys are summarized for Australia by Geoscience Australia.[3]

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Companies operating in Australia have utilized a wide range of technologies in practice including but not limited to the following examples. Woodside Offshore Petroleum has utilized extended reach drilling from fixed platforms in the Northwest Shelf[4] as well as had subsea wells, manifolds and flowline systems tied back to an FPSO in the Enfield oil field.[5] In Western Australia in the Browse Basin, INPEX is installing flexible riser with dynamic umbilicals in the Ichthys field.[6] The first successful offshore horizontal well was drilled at the Equus gas project in the Northern Carnarvon Basin.[7]

Method of Offshore Tender

The petroleum industry in the Commonwealth of Australia has to pay a combination of corporate income taxes (CIT), petroleum resource rent taxes (PRRT) and royalty-based taxes. Corporations are subject to a 30% corporate income tax whether they are an Australian corporation or not. Furthermore, a petroleum resource rent tax is applied to the difference between assessable receipts and deductible expenditures. The PRRT structure is oftentimes applied instead of the royalty structure for offshore projects but depends on the state or mainland territories of the Commonwealth. Royalties typically vary between 10 to 12.5% on gross or net production. Some states have a scaled royalty structure where no royalties are collected in the first 5 years and increase to a maximum of 10% afterwards. [8]

Environmental Assessment

The Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (2009) as amended in 2014 require that an offshore project proposal and environmental plan be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). In addition to the project description, the plan must describe the existing environment detailing the area's sensitivity (world heritage values, national heritage values, existence of Ramsar wetlands, listed or endangered species, listed migratory species, etc.) and potential impacts on the environment.[9]

Environmental Resources and Sociological Issues

Natural resources:

The Department of Sustainability, Environment, Water, Population and Community is the agency responsible for the declaration and management of marine protected areas (MPAs) in the Commonwealth waters. Various state agencies are responsible for MPAs in state waters. They are broken up into six marine networks totaling 58 MPAs that circle the country, including Tasmania and other islands, and include about 1/3 of the country's waters. They generally extend from three nautical miles off the coast to the outer limit of Australia's Exclusive Economic Zone, about 200 miles.[10] Additionally much of the coast includes marine parks. For example, in South Australia there are 19 marine parks while Western Australia has 14. Marine species that are threatened include marine turtles, snubfin dolphins, dugongs, whales, albatrosses, corals, pelagic and reef shark, and tuna.

Archaeological, and Historical Resources:

The Australian National Shipwreck Database (ANSDB) includes all known shipwrecks in Australian waters. It also includes airplane wrecks. The Historic Shipwreck Act of 1976 protects all shipwrecks and associated relics that are 75 years old or more, regardless of whether or not their location is known. Some known wrecks lie in protected zones, which are concentrated on the east coast.[11] Coastal Southeast Queensland has been intensely studied, with 73 dated Aboriginal sites recorded. Evidence has shown that these sites date from the mid-Holocene and are generally found along the coast.[12] Coastal archaeological sites include the Kimberley, Widgingarri 1 and 2, Koolan Shelter 2, Mandu Mandu Creek Rock Shelter, Monte Bello Islands, Shark Bay, Allen's Cave, and Devil's Lair.[13]

Historic built coastal resources in Australia include early colonial houses and limestone coastal towns. In South Australia historic resources include several port towns. Most early buildings used shell in the mortar, which can be seen in the facades of older buildings in coastal and riverine New South Wales.[14] Significant World Heritage coastal sites include Australian Convict sites, which includes eleven penal sites from the 18th and 19th centuries located in Fremantle, Kingston, Arthur's Vale, areas around Sydney, and in Tasmania.[15]

Sociological/Tribal:

The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (ATSIHP) was enacted for the preservation and protection from injury or desecration of those areas and objects in Australia and in Australian waters that are of particular significance to Aboriginals in accordance with Aboriginal tradition. The Native Title Act 1993, amended in 2014, covers native titles in relation to

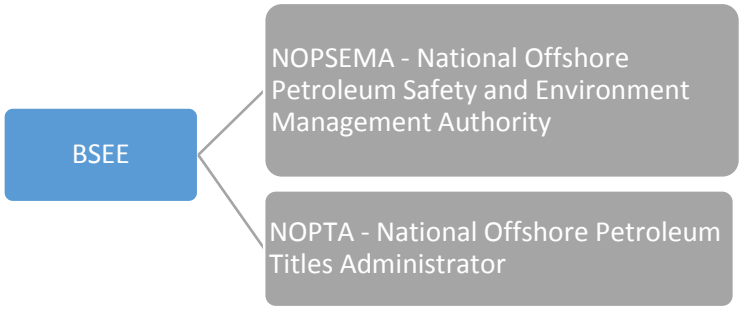
land and waters. It provides recognition and protection of native title, establishes ways in which future dealings affecting native title may proceed and sets standards for those dealings.[16]

Aboriginal groups have used the Native Title Act to challenge South Australia's government legislation on oil and gas licenses on constitutional and racial discrimination grounds in response to the state government's amendments to the Petroleum and Geothermal Energy Act, affecting exploration and production licenses. The Native Title Act gives Indigenous Australians the right to be consulted and participate as appropriate in decisions about activities proposed. Negotiations can include benefits for communities such as employment, heritage protection, compensation and royalty payments.[17]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency.

BSEE Equivalents



There are a couple of offshore regulatory bodies in Australia, each responsible for different aspects of offshore production. **The National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA)** is responsible for developing, and enforcing environmental management laws, and investigating accidents. NOPSEMA must assess offshore proposals, including environmental plans. Under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act), NOPSEMA must regulate health and safety, well integrity and environmental management in all offshore petroleum activities including production and exploration. NOPSEMA works with the Commonwealth Minister, and the appropriate State and/or Territorial Ministers when an incident occurs and provides recommendations for petroleum and greenhouse gas activities.[18] NOPSEMA is also responsible for contracts cost recovery basis for State/or Territorial Ministers and foreign governments.[19] The **National Offshore Petroleum Titles Administrator (NOPTA)** is responsible for assessments, advice and recommendations to members of Joint Authorities and Commonwealth Ministers for offshore activities within the Commonwealth waters. NOPTA also manages greenhouse gas storage titles and the release of well drilling, completion and survey data.[20]

Australia is a mix of states (e.g. New South Wales, Queensland) and territories (e.g. Northern). These designations have similar powers and legislatures, similar to the states in the USA. The

Federal Government, in the capital city of Canberra, is responsible for offshore oil & gas, via NOPSEMA. Originally, state/territory's had authority over minerals, including drilling, and pipelines, but after a series of Royal Commissions following major accidents, this authority was minimized. The US and Australian Federal-State systems are relatively pretty similar, but in Australia a landowner is not able to own anything below ground, whereas in the USA mineral rights of this nature are possible.

With regards to the financial aspects of offshore production, each state in Australia holds authority to determine its wellhead value using unique state-specific rules. However, a common rule to determine wellhead value includes subtracting deductible costs from the gross value of the petroleum recovered.[21]

Regulatory Contact Information

National Offshore Petroleum Safety and Environmental Management Authority

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PERTH WA 6001
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National Offshore Petroleum Titles Administrator

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58 Mounts Bay Road
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Perth WA 6850
Website: http://www.nopta.gov.au/about/index.html

Department of Environment, Water and Natural Resources of South Australia (DEWNR)

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Adelaide SA 5001
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Website: http://www.environment.sa.gov.au/about-us

Department of the Environment

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The Environmental Protection Authority of Western Australia

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Australian Environment Agency (AEA)

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95 Northbourne Avenue,
CANBERRA ACT 2600

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Website: http://www.epa.wa.gov.au/Pages/default.aspx

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Bahamas: Offshore Exploration and Production Profile

Offshore Oil Production (2014): None
Offshore Natural Gas Production (2014): None

Offshore oil exploration has occurred in and around the Commonwealth of The Bahamas from the mid-1940s to 1988. Early exploratory activities, including local gravity and magnetic surveys, were completed by companies including Gulf Oil, Standard Oil (Chevron), Superior Oil, and Shell in the mid-1940s. These basic surveys led to the first Bahamian onshore well being drilled - named Andros Island #1. During operations though, the well did not yield a significant amount of hydrocarbons. A second well, the Cay Sal, was drilled in 1956 that yielded a small amount of hydrocarbons, but not enough to be produced economically. Initially, there was little success after 1956, but in 1970 there was another joint test well drilled that detected the presence of hydrocarbons. Unfortunately again, there was not enough present to be considered economically viable. More surveys were done in the early 1980s, and in 1986 the deepest Bahamian well was drilled to approximately 21,740 feet.[1] Following exploration in the 80s, there was little activity for 20 years until the government banned offshore drilling in the wake of the BP Deepwater Horizon Oil Spill in 2010.[2] The ban's purpose was to allow the government and oil and gas exploration companies to reevaluate the regulations and safety requirements for offshore drilling. As of March 2013, the Bahamian government decided to allow exploration activities to occur pending a public referendum (a general vote) that would determine if offshore activities are to be allowed in Bahamian waters. In the meantime, companies like Bahamas Petroleum Company (BPC) have been evaluating seismic data, while waiting for the ban to be lifted.[3]

Geology and Geophysics

Companies operating in the Bahamas have completed a variety of surveys over the years including "seismic surveys, gravity and magnetic surveys, surface and subsea geochemical surveys, and geotechnical site surveys".[1] Although these surveys have detected hydrocarbons in pre-mid Cretaceous layers, initial exploratory wells have yet to produce significant enough quantities to justify production. These exploratory wells have been drilled from mid-1940s to 1986 with target reservoir depths ranging from 14,000 feet to over 21,000 feet. [1]

Special Operating Conditions and New Cutting-Edge Technologies Utilized

No new cutting-edge technologies have been implemented in the Bahamas, as no exploration wells for hydrocarbon exploration have been drilled since the 1980s.

Method of Offshore Tender

Although the Bahamas has postponed offshore drilling after the Deepwater Horizon Oil Spill in 2010, the government has lifted this ban to allow an exploratory well to be drilled, granted no oil and gas is produced at this time. The government has allowed the exploratory well to be drilled prior to a public referendum to determine if the Bahamas waters contain hydrocarbons in

economically producible quantities. Based on the results from the exploratory well, and the subsequent referendum, the government will have to determine a long-term policy on exploration, development and a tax regime to govern the sector.[4] Initial reports indicate at least a 25% hydrocarbon tax if companies like BPC can produce oil[5].

Environmental Assessment

In 1994, The Bahamas Environment, Science & Technology Commission (BEST) was established. The BEST Commission oversees the enactment of multilateral environmental agreements and reviews environmental management plans for all potential development projects and environmental impact assessments (EIAs) within The Bahamas. As of 2012, it was unknown if commercially exploitable hydrocarbons were present in Bahamas Petroleum Company blocks or other areas in the region. If reserves are discovered, the Bahamas Petroleum Company would be required to conduct an additional EIA prior to any future production activity.[6] As of 2013, a strategic environmental assessment (SEA) is not implemented in The Bahamas.[7]

Environmental Resources and Sociological Issues

Natural resources:

The Bahamas are a string of 700 islands to the northeast of Cuba. The islands are fringed by coral reefs on the windward sides and on the interiors of the banks and are scattered with large patches of seagrass beds. Most of the islands are covered in chaparral forest, rock outcrops, and wetlands.[8] The Bahamas support a variety of marine and coastal ecosystems, including the aforementioned coral reefs and seagrass meadows, as well as mangrove forests, seashores, and blueholes (underwater sinkholes).[9] The islands boast extensive coastlines and 900 square miles of reefs[10] that are connected, through ecological cycles with several islands throughout the Caribbean.[11] Of the 25 protected areas that make up The National Park System,[12] 4 of them are designated marine protected areas (MPAs) managed by the Department of Marine Resources (DMR).[13] In 2011, The Nature Conservancy and the Government of The Bahamas (GOB) commenced an aggressive project to build political support and inspire long-term financing for protected areas across the Caribbean, called the Caribbean Challenge. The goal is to protect 20% of the Caribbean's marine and coastal habitat by 2020. This translates to nearly 21 million acres of coral reefs, mangroves, seagrass meadows, and other notable habitat. Within the first year of the project, 6 MPAs were established to add to the preexisting 4. This increased MPA coverage across the Insular Caribbean from 7% to 10%.[14] There are 69 endangered species in The Bahamas, including 26 species of fish, 2 sea turtles, 13 species of corals, 3 marine mammals, ~3 sea birds, 1 crustacean, and 7 species of plants.[15] There are at least 2 species of endemic birds.[16]

Archaeological, and Historical Resources:

In 1998, The Bahamas established the Antiquities, Monuments and Museum Act, to provide protection, "preservation, conservation, restoration, documentation, study and presentation of sites and objects of historical, anthropological and archaeological" value.[17] Marine archaeological sites include several shipwrecks.[18] In 1992, an elephant tusk was recovered from The Beacon, a shipwreck circa 1543 off the great Bahama Bank.[19] Brown's Ruins, a potential underwater site 30 miles south of the Bahaman Island of Bimini, sits close to the edge of the Great Bahama Bank in 20 feet of water. Brown's Ruins is made up of thousands of stone blocks, rectilinear and columnar shaped that are spread out in a tear shape across the Caribbean.[20] There are 39

recorded prehistoric Lucayan (indigenous inhabitants of the island) settlement coastal sites located on San Salvador Island, Bahamas.[21] In March 2007, three prehistoric Lucayan-Tai'no burials were excavated from Preacher's Cave off the island of Eleuthera in the Bahama archipelago.[22] Historical landmarks include: Deveaux Mansion, ruins of a former 18th-century plantation;[23] Pompey Museum of Slavery & Emancipation, located in the historic 1784 Vendue House,[24] and Freetown, a mid-1800s black subsistence settlements developed after emancipation along the southern coastline of the Grand Bahamas.[25]

Sociological and Tribal:

In 2011, several Bahamian business leaders were pushing lawmakers for lighter oil and natural gas restrictions in hopes to reduce the nation's $4-billion-plus national debt.[26] If commercially exploitable hydrocarbons are found in the Bahamas, there is great prospective for economic growth. The birth of an oil industry would demand new petroleum infrastructure development (i.e. pipelines, local roads, and related support industries) which could potentially create job opportunities.[27] In 2013, the Bahama Petroleum Co. (BPC) had already invest upwards of $50 million in preliminary investigations into potential oil reserve and is optimistic that the Bahamian reserves will be able to produce one billion barrels. If commercial oil is found, the government of the Bahamas would receive 25 percent of the revenue.[28]

Regulatory Bodies

In the section below, a figure first identifies the regulatory body that has overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalent

The Bahamas **Ministry of Environment and Housing** is the government agency responsible for regulating upstream oil and natural gas operations in the country. There have been no offshore drilling operations in the Bahamas in the past 30 years, and the government is in the process of updating its petroleum regulations. The main current petroleum regulations in the Bahamas are the Petroleum Act of 1971 and the Petroleum Regulations of 1978 (both amended in 1987 and 1994)[29]. The Ministry of Environment and Housing is to release a new Petroleum act and a suite of new regulations to manage future oil exploration operations in the country[30]. The new Act and regulations will address permitting, as well as health, safety, and environment concerns associated with upstream hydrocarbon activities. The new regulations under review are: The Petroleum Bill 2014, which will define financial considerations (e.g. royalties, allowed partnerships) as well as establish legal ground for the Ministry of Environment and Housing to release regulations on hydrocarbon activities. According to a Ministry of Environment and

Housing, the Ministry will release three regulations: one dealing with general administrative matters, another dealing with health and safety matters, and a third dealing with environmental matters. The Bahamas Ministry of Environment and Housing indicates that its health and safety regulations will be modeled, in part, on the Health and Safety in Employment (Exploration and Production) Regulations of New Zealand, to become applicable once an operator is in the production phase. The current Bahamian Petroleum Regulations (supplementing the Bahamian Petroleum Act), cover applications for permits, licenses, and lease, assignment, competitive bidding, and division of exploration blocks, as well as permitting, leasing, and drilling and development operations.

Others

The Ministry of the Environment and Housing is responsible for the **Bahamas Environment, Science and Technology Commission (BEST)**, the **Department of Environmental Health Services and the Department of Housing**. The Environmental Health Services department of the Ministry of the Environment and Housing is in charge of expanding and improving services for Bahamians. They are also responsible for environmental control, waste collection and disposal, public sanitation and beaches.[31] BEST is responsible for environmental, scientific and technical matters, in addition to coordinating the conservation of environmental resources, developing environmental strategies and environmental legislation, and advising the government on environmental discussions. Lastly, BEST is responsible for site visits for undergoing environmental impact assessment (EIA) review.[32]

The **Ministry of Finance** is in charge of fiscal, tax, and economic policies to enable economic growth, while accounting for equity and social issues. The Ministry of Finance advises and prepares the annual budget and economic policy, conducts audits of Ministries and Departments, and is responsible for revenue collection to ensure compliance with established regulations.[33] The Ministry of Finance is also responsible for all licenses under the Business License Bill of 2010, which states that all companies must be licensed and registered.[34] Lastly, the Ministry of Health seeks to ensure and promote the health of residents, protect against current and emerging health risks, and by provide access to quality healthcare.[35]

Regulatory Contact Information

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The Ministry of Environment and Housing

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Ministry of Finance

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Brazil: Offshore Exploration and Production Profile

Offshore Oil Production (2013): 675 million barrels (MMbbl)
Offshore Natural Gas Production (2013): 729 billion cubic feet (Bcf)

Brazil is ranked 11th in total (onshore/offshore) oil production and 32nd in total natural gas production in the world[1]. Ninety (90) percent of total oil and 70% of natural gas are produced offshore[2], primarily in deep-water, at depths ranging from 1,800 ft. to about 20,000 ft.[3]. The majority of Brazil's proved reserves are located in the Campos and Santos basins, off the southeast coast of the country[4]. Petrobras, the state-owned petroleum company, held a monopoly on oil operations in Brazil until 1997, when the government opened the industry to competition. Several oil companies now participate in exploration and production activities, including Royal Dutch Shell, Chevron, BP, Repsol, Anadarko, and others[5]. The world's largest recent oil discoveries have come from Brazilian offshore, pre-salt basins. As opposed to traditional post-salt ("above salt") petroleum resources, pre-salt oil is a term used to describe hydrocarbon resources located under especially thick layers of rock and salt[6]. Pre-salt crude oil is produced from nine offshore platforms connected to 22 wells[7], and accounts for approximately 16% of the total offshore oil production in the country. Petrobras and foreign oil companies are active in developing Brazilian pre-salt fields, which cover a rectangular area approximately 500 mi. in length by 125 mi. in width[8]. As of February 2014, a total of 810 offshore oil/gas production wells were in operation in the country.[9]

Geology and Geophysics

Over 50% of produced oil and a large share of natural gas come from Brazil's Campos basin, located off the coast of Rio de Janeiro, on the southeastern portion of the country[10]. Of 96 total petroleum fields in the country, 52 are located within the Campos basin and 11 petroleum fields are located within the Santos basin[11]. Additional oil and gas production takes place in the Espirito Santo Basin, off the coast of the state of Espirito Santo, located approximately north of the Campos and Santos basins. According to the Brazilian National Petroleum Agency (2013), total respective proved oil and gas reserves in the Campos, Santos, and Espirito Santo Basins are 14 billion barrels and 13 trillion cubic feet (Tcf)[12]. In 2013, a total of 765 offshore oil/gas production wells were in operation in the country, 72 of which were completed that year. In 2013, nearly 21,300 mi. of 2-D seismic and 12,500 mi^2 of 3-D seismic data were collected in Brazil. The largest pre-salt discovery in Brazil is the Tupi field, located approximately 150 mi. southeast of Rio de Janeiro, at a water depth of approximately 7,000 ft. Oil deposits in this field lie underneath a layer of salt up to 6,000 ft. in thickness[13].

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Brazil's deep and ultra-deep water petroleum resources are known as some of the most challenging to develop in the world, requiring significant technical expertise[14]. Brazil's petroleum production from pre-salt formations is expected to grow significantly over the coming years[15]. Similar challenges faced in producing from deep-water/pre-salt deposits include corrosive gases, such hydrogen sulfide (H_2S) and carbon dioxide (CO_2) and difficult drilling conditions/low drilling penetration rates. In these deep-water environments, production is maximized using innovative completion techniques (e.g. muli-lateral and "smart" completion technologies), as well as improved flow assurance techniques such as down hole/mudline boosting and gas lifting. Subsea production technologies, including subsea boosting, water injection, and separation, are also actively used in the Brazil E&P industry. Flexible risers, which bend to withstand both horizontal and vertical movements experienced by floating production systems, are almost exclusively used in Brazil in deep water/high temperature environments.

Method of Offshore Tender

Offshore licensing/concessions, hydrocarbon royalties, and production sharing agreements (PSAs) all apply to Brazil's offshore petroleum contracts/tax structure. The National Petroleum Agency (Agência Nacional de Petróleo – ANP), under the Ministry of Mines and Energy (Ministério de Minas e Energia - MME), regulates the Brazilian petroleum industry. Until 2010, concessionary licenses and associated royalties (between 5-10 percent of oil and gas production) comprised offshore E&P contracts in Brazil. As a result of recent pre-salt oil discoveries and presence of significant pre-salt reserves, the Brazilian government enacted legislation in 2010 which established a new production sharing system for E&P activities in pre-salt fields. In contrast to traditional concessions-based agreements, Petrobras will hold at least 30% stake in all pre-salt projects. In the first pre-salt licensing round held by the National Petroleum Agency of Brazil in October 2013, Petrobras and four companies (Total, Royal Dutch Shell, China National Petroleum Corp. and China National Offshore Oil Corp.) won a 35-year production sharing contract for the Libra field[16].

Environmental Assessment

According to environmental laws administered and regulated by the Brazilian National Environmental Council (Conselho Nacional de Meio Ambiente – CONAMA), Environmental Impact Assessments (EIAs) are required for hydrocarbon E&P projects[17]. There is no legislation faregarding performance of Strategic Environmental Assessments (SEAs) in Brazil[18].

Natural Resources

The Brazilian legislation established environmental licensing as the mechanism to authorize any activity which potentially harms the environment. This licensing is under the jurisdiction of the Brazilian Institute for the Environment and Natural Renewable Resources (IBAMA). IBAMA administers federal actions related to the national environmental policy. This includes activities in the maritime areas. Conservation areas in Brazil are part of the National System of Nature Conservation Areas (SNUC) and include Integral Protection Areas where only indirect use of natural resources is allowed, and Sustainable Use Areas where resources used must be renewable. The SNUC Act established that oceanic and coastal islands are pre-destined for nature conservation.[19]

Brazil has a continuous Atlantic coastline of 4,660 miles. There are 336 protected areas, or 156,870 ha, of maritime conservation areas identified in Brazilian coastal and marine areas, the North Platform has the largest protected area. This includes the Brazilian Atlantic Islands preserve.[20]The ecosystem with the largest number of protected areas is the East Coast due to the prevalence of coral reefs. The marine portion of the East Coast and the South Platform has few protected areas. The coastal region is considered to be the region within 12 nautical miles of the coast.[21] In Brazil there are 78 listed endangered fish, several reptiles that may be coastal, and at least three marine mammals, including a dolphin and a manatee, and the Porites coral.[22]

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

Archaeological and Historical: Underwater archaeology is still in its infancy. There are thousands of shipwrecks off Brazil's coast dating as early as the 17th century Dutch Voetboog.[23] There are problems related to legislation and preservation of the underwater heritage. Instituto do Patrimonio Historico e Aristico Nacional (IPHAN) and the Navy Directorate of Historical and Cultural Heritage (DPHCM) have a mandate to inspect underwater cultural heritage exploration sites.[24] Sambaquis are huge shellmounds built along most of the coast between 8000 and 600 years ago and were noted in European accounts as early as the 16th century.[25] Additionally, Ilhabela, an island/archipelago four miles off the coast of Sao Paulo State has an important mortuary archaeological site, "Toca da Caviera".[26] IPHAM is the Brazilian government institution responsible for the administration and maintenance of Brazilian heritage including historical cities, city centers, buildings, and archaeological sites.[27] Historic built resources include Rio de Janero: Carioca Landscapes between the mountain and the sea; historic centers of Sao Luis and Olinda.[28]

Socio-economic and Tribal: The Brazilian government owns significant shares in Petrobras, a large oil company. Brazil has also implemented growth acceleration programs – Programa de Acelercao do Crescimento (PAC) – which are programs of thousands of major infrastructure projects paid for by industry profits. However, individuals are still skeptical on whether this has led to real improvement. The Associacao Homens e Mulheres do Mar (AHOMAR) is a union of fishermen that demonstrate against the environmental impacts caused by off-shore oil industry-related construction and the damage to their small fishing industry by occupying construction sites on land and sub-sea gas pipelines.[29]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency.

BSEE

Equivalents

Petrobras held a monopoly on all onshore and offshore petroleum activities in Brazil until 1997 when national law No.9478 mandated competition in the energy sector[30]. This law also created the **National Petroleum Agency (Agência Nacional de Petróleo – ANP)** of Brazil. The ANP, an agency of the **Brazilian Ministry of Mines and Energy (Ministério de Minas e Energia - MME)** is currently the main regulator of oil and natural gas activities in Brazil. Its responsibilities include administration of license and concessions bidding and agreements, issuance of rules regarding offshore oil and gas operational safety, and enforcement of regulatory standards.

Regarding offshore licensing and concessions, the ANP plays a role as a regulator and financial/economic entity. Financial responsibilities on the ANP include setting references prices for oil and gas in the determination of operator royalty payments as well as establishing the minimum one-time payments to the government in Production Sharing Agreements (PSAs)[31]. The ANP has released a Technical Rule for offshore operations which provides guidelines and instruction in 17 management practices, divided into three groupings: Leadership, Staff, and Management; Facilities and Technology; and Operating Practices[32]. The ANP's Offshore Technical Rule places significant responsibilities on operators for management of safety practices and general enforcement at an installation. A yearly report of safety/environmental incidents is due to the ANP, as well as descriptive documentation of drilling rigs and production facilities to be operated.

Regulatory bodies other than the ANP that also play a role in regulating the offshore industry include the National Energy Policy Council **(Consejo Nacional de Política Energética – CNPE)**,

Brazilian Institute of the Environment and Natural Resources (Instituto Brasileiro de Meio Ambiente e dos Recursos Naturais Renováveis - IBAMA), and the **Directory of Ports and Coasts (Diretoria de Portos e Costas)**. The CNPE, established by Law No. 9478 along with the ANP, is head by the MME. The council is responsible for working directly underneath the President on energy policy in the country. IBAMA is the national environmental regulator, responsible with state environmental agencies to permit offshore oil and gas operations. The DPC (Brazilian navy) plays a role in monitoring offshore vessels, including issuance of proper certification/documentation[33]. The ANP is granted primary authority of regulating the oil and gas industry in Brazil, with goals of maintaining strong domestic economic activity as well as engaging the country with foreign companies and markets. The agency cooperates with the CNPE in offshore licensing and bidding administration. Potential conflicts have been cited between federal and state agencies in streamlining administration of regulations[34].

Regulatory Contact Information

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Website (Portuguese): http://www.anp.gov.br

Brazilian Ministry of Mines and Energy (Ministério de Minas e Energía – MME)

Address:
Esplanada dos Ministérios Bloco "U", 5th floor; Zip code: 70.065-900
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Telephone: +61-2032-5258 or (5036)
Website (Portuguese): http://www.mme.gov.br/mme/
Email: ouvidoria.geral@mme.gov.br

Brazil National Energy Policy Council (Conselho Nacional de Política Energética – CNPE)

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Brasilia, Distrito Federal, Brazil
Telephone: +61-2032-5555
Website (Portuguese): www.mme.gov.br/mme/menu/conselhos_comite/cnpe.html
Email: ouvidoria.geral@mme.gov.br

Brazilian Institute of Environment and Renewable Natural Resources (Instituto Brasileiro de Meio Ambiente e dos Recursos Naturais - IBAMA)

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Setor de Clubes Esportivos Norte (SCEN), Trecho 02 Ed. Sede, PO Box No 09566, Zip Code: 70818-900, Brasília, Distrito Federal, Brazil
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Website (Portuguese): www.ibama.gov.br
Email: linhaverde.sede@ibama.gov.br

Brazilian Ministry of Mines and Energy (Ministério de Mins e Energía – MME)

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Website (Portuguese): https://www.dpc.mar.mil.br/
Email: faleconosco@dpc.mar.mil.br

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Canada: Offshore Exploration and Production Profile

Offshore Oil Production (2013):
84 million barrels (MMbbl)

Offshore Natural Gas Production (2013):
68 billion cubic feet (Bcf)

Canada is the fifth largest total producer of oil and natural gas in the world[1]. Most of its crude exports are delivered to U.S. refineries[2]. Offshore oil production comprises nearly 17% of total oil production in Canada, whereas offshore gas production makes up a small percentage (~1%)[3]. Offshore exploration and production is centralized in the Canadian Atlantic, off the coasts of the provinces of Newfoundland and Labrador and Nova Scotia. Major offshore energy projects include the Hibernia (operated by Exxon Mobil), Terra Nova (operated by Suncor), and White Rose (operated by Husky Energy) crude oil developments off the coast of Newfoundland and Labrador[4] and the Sable Offshore Energy project (majority stake belongs to Exxon Mobil) off the coast of Nova Scotia[5]. Encana recently developed another large natural gas project off the coast of Nova Scotia, the Deep Panuke project, designed to produce 300 MMcf/d (up to 892 Bcf over lifetime)[6]. A government-instated moratorium on drilling off the west coast of the country has been in place since the early 1970s. Exploration and production from Canadian arctic oil and gas reserves are considered the new frontier of hydrocarbon production and the most technically challenging resources to develop in the country. Prevention of offshore drilling in the artic is due to federal review, although oil companies including Imperial Oil, ExxonMobil, BP, and Chevron have invested to secure acreage in the Beaufort Sea, off the northwest coast of the country.

Geology and Geophysics

Offshore petroleum production takes place off the coasts of two Canadian provinces: Nova Scotia and Newfoundland and Labrador. Five offshore fields and associated platforms comprise the Scotian basin off the coast of Nova Scotia: Thebaud, Deep Panuke, Alma, North Triumph, Venture, and South Venture. The geology of the Scotian basin is described as a classic passive, mostly non-volcanic, conjugate margin which covers an area of approximately 280,000 km^2 and has a maximum sediment thickness of approximately 24 km[7]. Since 1959, a total of 201 wells (127 of which are exploratory) have been drilled off the coast of Nova Scotia in the Scotian basin[8]. To date, 400, 954 km of 2-D and 25,512 km^2 of 3-D seismic data have been acquired[9]. As of 2008, total offshore recoverable gas in Nova Scotia (including produced gas) was estimated at 35.3 Tcf and total discovered recoverable oil was estimated at 381 million barrels[10]. Digital offshore petroleum data (excluding non-exclusive seismic data) is publicly available through the Canada-Nova Scotia Offshore Petroleum Board's (CNOSPB's) digital Data Management Center[11]. Offshore production in Newfoundland Labrador comes mainly from the Hibernia, White Rose, and Terra Nova fields located in the Jeanne d'Arc Basin. A fourth field, named North Amethyst, began production in 2010[12]. Through 2013, a total of 716,850 km 2-D and 1,788,768 km^2 of 3-D offshore seismic data have been acquired from the Newfoundland Labrador province[13]. Summary records of 403 exploratory and developmental wells drilled in the Province are available online for review through the Canada- Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB).

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Canada's offshore oil and gas activities primarily take place in shallow water. The majority of wells located off the coast of Newfoundland and Labrador are drilled at water depths less than 150 meters[14]. Exploratory wells in Canada have been drilled to longer distances below the sea level. The Lona O-55 exploratory well is identified as the deepest offshore well drilled in Canada, at a subsea depth of 2,600 m. While this well was drilled, the C-NLOPB undertook special measurements, including tests of the blow out preventer, state of remote operating vehicles, and presence of CLNOPB personnel on the drilling vessel[15]. The potential for harsh environments, including icebergs, pack ice, wind, and heavy seas, is a primary special operating condition in Canada. Canadian offshore exploration and production infrastructure is designed to withstand harsh conditions. For example, the Hibernia platform's Gravity Base Structure (GBS) is designed to protect crude storage at the site and is cited as being able to withstand the impact of a one million tonne iceberg with no damage and the impact of a six million tonne iceberg without spillage[16]. With the maturation of offshore Canadian basins, subsea separation technology and tiebacks have been recently used to maintain production. Cutting edge technologies in deep water drilling and flow assurance will be critical to deep-water hydrocarbon production, such as in the Canadian Arctic.

Method of Offshore Tender

The Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and the Canada-Nova Scotia Offshore Petroleum Board are responsible for issuance and administration of offshore exploration and development rights in areas offshore of their provincial jurisdictions, in accordance with the Canada-Newfoundland Atlantic Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act (abbreviated the Accord Acts)[17]. In Newfoundland, the licensing process begins with a Ministerial review, after which the separate C-NLOPB initiates a call for bids. To the successful bidder, an exploration license is granted for a period of nine years which includes the rights to explore for, drill and test, and produce petroleum[18]. If a commercial discovery is declared, a production license is issued for a term of 25 years. A third type of license is called a significant discovery license, which grants the same rights as a production license. All production license holders pay royalties at prescribed rates. For example, Nova Scotia's royalty payment scheme is based on revenues and profits. According to the C-NOSPB, royalties are initially established at an increasing percentage of gross revenues, before the regime switches to an increasing percentage of net revenues[19].

Environmental Assessment

Environmental Assessments of offshore petroleum activities are regulated under provincial and federal law. The Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) are responsible for undertaking project-based environmental assessments for any offshore exploration and production projects not covered by the Canada Environmental Assessment Act of 2012[20]. Environmental Assessments (EAs) conducted by the two Canadian offshore petroleum boards are known as Accord Act EAs.[21]. The Canadian government has issued a Directive which provides guidelines for implementing the SEA process in Canada[22].

Natural Resources

The Canadian Council of Fisheries and Aquaculture Ministers established the *National Framework for Canada's Network of Marine Protected Areas (MPAa)*. The MPAs are primarily concentrated in the Atlantic Ocean with five of eight MPAs and seven of eight Areas of Interest.

Only one MPA is in the Arctic Sea.[23] The Canadian Aquatic Species at Risk Act (SARA) established the National Strategy for the Protection of Species at Risk. The Sara Public Registry lists over 600 Canadian animals and plants, and 104 marine species are either protected or under consideration for protection.

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

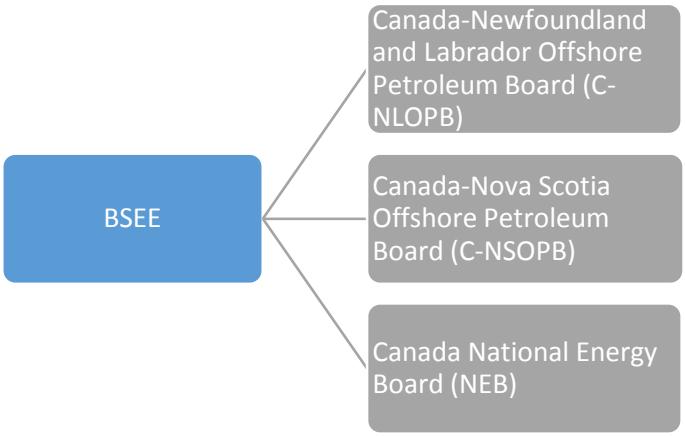
Archaeological: European exploration beginning in the 16th century has left behind ships attempting the Northwest Passage. The whaling industry has also left archaeological remains.[24] Likewise, aviation archaeology is also a concern in the Canadian waters.[25] Historic: National historic sites are places of profound importance to Canada. There are more than 950 national historic sites in Canada. Many are associated with the rich maritime history of Canada.[26] Additionally, the Heritage Lighthouse Protection Act is a law to protect and conserve lighthouses.[27]

Socio-economic and tribal: The Government of Canada formally endorsed the United Nations Declaration on the Rights of Indigenous Peoples in a manner fully consistent with Canada's Constitution and laws. Aboriginal and treaty rights are protected in Canada.[28] Canada has a duty to consult and accommodate First Nations when the Crown contemplates conduct that might adversely impact Aboriginal or Treaty rights.[29]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency.

BSEE Equivalents



The Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act and the Canada-Newfoundland Atlantic Accord Implementation Act (known collectively as the Accord Acts) are the main pieces of provincial legislation regarding current offshore oil and gas exploration and production activities in Canada. Each Accord Act is implemented by its respective Offshore Board: the **Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)** and the **Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB)**. The responsibilities of the offshore Boards mirror each other and include offshore worker health and safety regulation, environmental protection, management and conservation of petroleum

resources, and issuance of licenses for offshore E&P activities. Collaboration by the Offshore Boards is prevalent, and most recently, the two bodies are preparing to jointly revise published Drilling and Production guidelines[30]. In Newfoundland and Labrador, a C-NLOPB- appointed Chief Safety Officer and selected Safety Officers coordinate compliance and enforcement activities. Both the Chief Safety Officer and subordinate Safety Officers have the authority to shut down any offshore operation in whole or in part. More specific responsibilities of the Safety Officers include: performance of safety audits/inspections, incident investigation, and issuance of orders to comply or continue/cease operations under specified conditions. Similar compliance and monitoring activities are performed by the C-NSOPB and operators are required to provide daily/weekly reports on topics such as drilling and production activities. The individual Offshore Boards cooperate to produce guidelines/regulation for the offshore industry although each individual Board has the authority to issue individual guidelines/regulations in accordance with separate provincial regulations.

The **Canada National Energy Board (NEB)** is the regulatory body for offshore upstream hydrocarbon development in lands not regulated under joint/federal accords (e.g. Nova Scotia and Newfoundland and Labrador), including the Arctic and West Coast. NEB authorization is required, prior to initiation of any work in offshore areas under NEB jurisdiction.

Regulatory Contact Information

Canada National Energy Board (NEB)

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Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB)

Address:
8th Floor TD Centre, 1791 Barrington Street
Halifax, Nova Scotia B3J 3K9
Telephone (switchboard): 902.422.5588
Website: http://www.cnsopb.ns.ca/contact-us

Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)

Address:
5th Floor, TD Place
140 Water Street
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A1C 6H6
Telephone (main): (709) 778-1400
Website: http://www.cnlopb.ca/abt_contact.shtml
Email: www.cnlopb.ca

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Cuba: Offshore Exploration and Production Profile

Offshore Oil Production: 20,042 bbl/d

Offshore Gas production values not identified in public sources.

Cuba is ranked 63rd worldwide in total oil production at 50,800 barrels per day (bbl/d) and 62nd in natural gas production at approximately 35 billion cubic feet per year (Bcf/y)[1]. Cuba first allowed foreign oil companies to participate in oil/gas exploration and production activities in 1993[2]. No offshore production wells/systems are known to exist in Cuba, although Sherrit International (Canada), the largest independent oil operator in Cuba, uses extended reach drilling (a combination of horizontal and vertical drilling techniques) from onshore locations on Cuba's north coast to access subsea hydrocarbon reservoirs[3]. Although unviable, the first offshore well in Cuba was drilled in 2004 by Spanish oil company Repsol[4]. Prospective offshore deep-water oil/gas resources have attracted international operators to obtain rights to offshore exploration blocks in the country[5]. Recently in 2012 and 2013, three additional exploration wells were drilled in Cuba by Rosneft (Russia), Petronas (Malaysia) and Zarubezhneft (Russia). All efforts proved to be unsuccessful in identifying producible offshore hydrocarbon resources, prompting Repsol to terminate exploration activities in the country. In 2011, Petrobras (Brazil), a world leader in offshore hydrocarbon deep-water exploration and production, abandoned offshore exploration efforts in Cuba. In July 2014, two international oil companies, CNPC (China)[6] and Zarubezhneft (Russia)[7], both signed separate agreements with Cuba's national oil company CubaPetróleo (Cupet) for offshore exploration and development.

Geology and Geophysics

In a 2010 publication by the United States Geological Survey (USGS) entitled, "Geologic Assessment of Undiscovered Oil and Gas Reservoirs of the North Cuba Basin, Cuba," USGS comments on "significant potential" for undiscovered offshore oil and gas resources in the North Cuba basin. In the report, undiscovered hydrocarbon reserves were estimated to be 4.6 billion barrels of oil and around of 9.8 trillion cubic feet of gas[8]. The North Cuba basin consists of three unique geologic assessment units (AUs): the North Cuba Platform Margin Carbonate; North Cuba Foreland Basin, and the North Cuba Fold and Thrust Belt[9]. The USGS's assessment of the North Cuba basin includes marine areas off the north/northwestern coasts of the country. The extent of offshore seismic surveying in Cuba is unknown, and recent exploratory offshore drilling activities indicate successful areas for offshore production have not been identified[10]. Four identified exploration wells drilled between 2004-2012 by three companies (Petronas, Zarubezhneft, and Repsol – two wells) did not identify economically viable hydrocarbons reserves.

Special Operating Conditions and New Cutting-Edge Technologies Utilized

With only exploration wells having been drilled in Cuba, there are no currently operating offshore production wells/facilities. Cuba's offshore exploration operations are limited by a lack of technical expertise/technology utilization and experience by Cuba's national oil company, Cupet. A current U.S. embargo on Cuba mandates that any equipment exported or re-exported to Cuba be made from less than 10% of U.S.-made components/technology ("De Minimis Rule")[11]. This policy has

essentially excluded U.S. companies/companies operating in the U.S. offshore operations to participate in the offshore oil/gas industry in Cuba. Reportedly, the U.S. may be the only country that produces the necessary equipment for Cuban offshore development[12]. The situation may change given the recent developments regarding U.S. and Cuba's diplomatic relationship.

Canadian oil company Sheritt International is the largest independent oil producer in Cuba, accounting for 40% of the country's total production[13]. Onshore directional drilling from Cuban coastal areas is used by Sherritt to access offshore reservoirs at producing depths ranging from approximately 4,000 to 6,500 feet[14]. The company has reportedly drilled directional wells extending laterally up to nearly 15,000 from the surface well location.

Method of Offshore Tender

Subsoil hydrocarbons are the property of the Cuban government. Foreign participation in the oil/gas Cuban oil/gas sector is governed by terms of Production Sharing Agreements (PSAs) between the Cuba's national oil company, CubaPetróleo (Cupet), the government of Cuba, and the third party operator/contractor[15]. Cupet is responsible for negotiating the terms of the offshore agreement, with review/guidance from the Ministry of Energy and Mining, Cuba's main oil/gas regulatory body, and the Ministry of Foreign Trade and Foreign Investment. The terms of the contracts vary generally from 25 years (onshore and shallow water activities) to 30-35 years (offshore deep-water activities).

Environmental Assessment

Cuba's Law of the Environment (Article 24 of Law Number 81) requires that any human activity that may pose an adverse impact on the environment necessitates the granting of an environmental license by the Ministry of Science, Technology and the Environment. According to the Ministry of Science, Technology and the Environment, an environmental impact assessment (EIA) is mandatory for all projects that use natural resources or any source of energy, regardless if it's a new project, or an expansion or modification of an existing project.[16] There is no specific information found pertaining to a regulatory framework for a Strategic Environmental Assessment (SEA).

Natural Resources

Cuba is the largest island in the Caribbean and the most ecologically diverse, with over 3000 miles of coastline. Although Cuba is affected by an assortment of environmental problems on or near the coast, many of the coastlines continue to remain undeveloped.[17] In 1995, the Cuban Subsystem of Marine Protected Areas (SMPA) was validated as a sub-system within the National System of Protected Areas (SNAP). Cuba has proposed 103 marine protected areas (MPAs), comprising 24.58% of the Cuban continental shelf. [18] In addition, 106 MPAs have been approved or are in the process of approval.[19] Cuba has some of the most pristine reef systems in the world;[20] the most notable is the Gardens of the Queen (Jardines de la Reina) coral reef reserve, set aside by the Cuban Government in 1996 as a part of a planned island-wide system of protected areas. The Gardens of the Queen is the largest marine reserve in the Caribbean, encompassing 850 square miles.[21] Groupers, snappers, and several species of sharks,[22] among others marine species inhabit the mangrove-lined islets and keys.[23] The nearly untouched state of many of the coral formations in the coastal waters of Cuba have driven the national and international community to manage conservation areas in Cuba[24] with strict management policies.[25] This has spurred the establishment of sites with critical habitats to numerous significant species that hold ecological and economic importance. Other components that have been considered include

unique features such as blue holes (underwater sinkholes) and banks off the shelf.[26] There are 320 endangered species in Cuba, the majority of these species are plants, but also include 35 fish species, the West Indian manatee, 2 crustaceans, and at least 3 coastal birds.[27] In 2008, Cuba banned the harvesting of all marine turtle species and products from its coastal zones indefinitely, in a desperate attempt to increase the chances of survival for the critically endangered hawksbill turtle.[28]

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

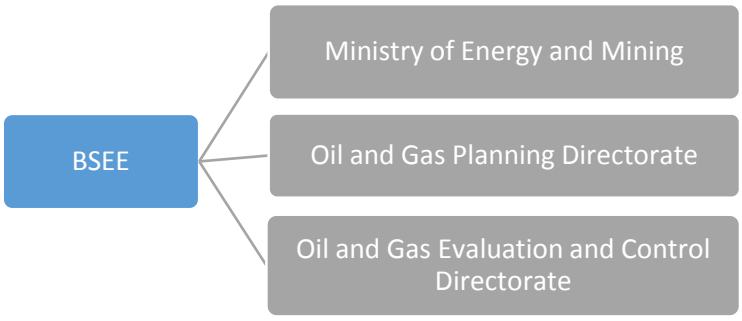
Archaeological and Historical: Cuba's Ley De Proteccion Al Patrimonio Cultural Law (Ley N° 1 de 1976), aims to regulate and protect cultural heritage relevant to archaeology, prehistory, and culture.[29] Marine archaeological resources include archival documentation of an approximate 3,000 shipwrecks off the coast of Cuba, of which only about a hundred have been located and 12 excavated. The most notable is The City of Alexandria steamship that transported people, mail, and merchandise between New York City and Havana from 1888 to 1893.[30] Off the north coast of Cuba, Los Buchillones, yields the remains of at least 40 Taíno (the Caribbean's Pre-Columbian inhabitants) houses, all of which stand on pilings above water across a two-mile stretch of beach [31] Taino sites including, La Campana, El Mango, Pueblo Viejo, and Chorro de Maíta, are located on the easternmost coast of Cuba.[32] Historic landmarks include Trinidad and the Valley de los Ingenious, a city that was the bridgehead for the conquest of the American continent located on the east coast; and Old Havana and its Fortification System, one of the Caribbean's main centers for ship building located on the north coast, built in the 16th century. San Pedro de la Roca Castle, Santiago de Cuba, built to protect the important port of Santiago in the 17th century, is located on the south coast.[33]

Socio-economic and Tribal: In 2014, international interest to continue additional offshore exploration in Cuba had declined, "delaying the Cuban dream of oil wealth that could inject vigor into its socialist revolution." In the quest for economic advancement from oil, Cuba has shifted its focus on renewable energy and improving output from onshore wells.[34] In August 2014, Russia President Vladimir Putin promised to help revive Cuba's offshore oil exploration and forgave 90 percent (almost $32 billion) of Cuba's debt. Putin pledged to reinvest $3.5 billion of Cuban debt with Russia into development projects on the island.[35]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalents



Cuba does not have significant experience in regulatory oversight/enforcement of offshore oil/gas environmental and safety procedures. The proximity of Cuba's offshore exploration blocks and operations to neighboring countries has drawn concern from these nearby nations, in particular the United States, especially following the Deep-water Horizon spill in 2010. Based on reports, a hypothetical oil spill in Cuban waters has the potential to impact U.S. marine and coastal resources[36]. In 2012, Cuba created the **Ministry of Energy and Mining** (Ministerio de Energía y Minas), replacing an older regulatory body called the Ministry of Basic Industry (MINBAS)[37]. The Ministry of Energy and Mining's publicly stated responsibilities include regulating, guiding, and controlling state and government policy in the country's energy sector in a sustainable manner in harmony with environment, in order to contribute to Cuba's energy security and economic and social progress[38]. The oil/gas arm of Ministry of Energy and Mining is composed of two subordinate bodies charged with planning and evaluation/control of oil and gas activities; the bodies are named accordingly; the **Oil and Gas Planning Directorate** (Dirección de Planificación de Petróleo y Gas) and the **Oil and Gas Evaluation and Control Directorate** (Dirección de Evaluación y Control del Petróleo y Gas)[39]. Collectively, these bodies are presumed to take over regulatory responsibilities of MINBAS as identified in recent regulations which included exploration permit review/approval and technical review of operators' exploration and production plans[40]. No new regulations regarding the responsibilities of the newly-created Ministry of Energy and Mining and related subordinate bodies has apparently been released by the Cuban government.

Others

The Cuban **Ministry of Science, Technology, and Environment** (Ministerio de Ciencia, Tecnología y Media Ambiente), is the environmental regulatory authority in the country, responsible for Environmental Impact Assessment (EIA) procedures in the oil/gas industry. Bodies responsible for worker industrial safety and health in Cuba include the **Ministry of Labor and Social Security** (Ministerio de Trabajo y Seguridad Social) and the **Workers' Central Union of Cuba** (Central de Trabajadores de Cuba) which includes representation from the Cuban **Syndicate of Chemical, Mining, and Energy Workers** (Sindicato Nacional de Trabajadores Químico, Minero, Energético). The Ministry of Energy and Mining, in coordination with Cuba's national oil company, **CubaPetróleo** (Cupet) and the **Ministry of Foreign Trade and Foreign Investment** (Ministerio del Comercio Exterior y la Inversión Extranjera) is also responsible for Cuban offshore oil and gas bidding procedures and contracts. Cupet is responsible for negotiating the terms of oil/gas production sharing agreements and exploration and production proposals with foreign oil companies, while the Ministry of Foreign Trade and Foreign Investment provides oversight of these proceedings, at the request of the Ministry of Energy and Mining.

Recently, Cuba has been active in pursuing opportunities to attract foreign exploration/investment in prospective offshore resource development. Foreign companies in Cuba are presumed to operate under some sort of common international standards (e.g. American Petroleum Institute - API) and/or company procedures. Prior to drilling an exploratory well in Cuba in 2012, Repsol was in communication with the U.S. government, and Repsol stated publicly that it would voluntarily adhere to U.S. regulations and industry standards when drilling the well[41].

Regulatory Contact Information

Ministry of Energy and Mining (Ministerio de Energía y Minas)

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Centro Habana. La Habana. Cuba.
Telephone: +53 (537) 878-7840
Email: Not identified in public sources
Website: Not identified in public sources

Ministry of Science, Technology, and Environment (Ministerio de Ciencia, Tecnología y Medio Ambiente)

Address:
Calle M No. 260 entre 21 y 19, Vedado,
Plaza de la Revolución, La Habana. Cuba
Telephone: +53 (537) 835-5566 ext. 71.
Email: comunicacion@citma.cu
Website: http://www.medioambiente.cu/

Ministry of Foreign Trade and Foreign Investment (Ministerio del Comercio Exterior y la Inversión Extranjera – MINICEX)

Address:
Infanta No. 16, Plaza de la Revolución.
La Habana. Cuba
Telephone: +53 (537) 838-0393/838-0423
Email: belsis.llorente@mincex.cu
Website: http://www.cubagob.cu/gobierno/fichas/fmincex.htm

La Unión Cuba-Petróleo (Cupet)

Address:
Oficios No. 154 e/Amargura y Teniente Rey.
Habana Vieja, Habana
Telephone: Not identified in public sources
Email: http://www.cupet.cu/contacto
Website: http://www.cupet.cu/

Ministry of Labor and Social Security (Ministerio de Trabajo y Seguridad Social)

Address:
Calle 23 e/O y P.Vedado, Plaza de la Revolución,
La Habana, Cuba.
Telephone: Not identified in public sources
Email: Not identified in public sources
Website: http://www.mtss.cu/

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Denmark (including Greenland): Offshore Exploration and Production Profile

Total Oil Production (2014):
76 million barrels (MMbbl)

Total Natural Gas Production (2014):
169 billion cubic feet (bcf)

Oil was first produced in Denmark from the Dan field in 1972. Since then, Denmark has been producing hydrocarbons from 19 fields in the Danish part of the North Sea. As of 2012, there was a total of 278 active production wells[1]. The total oil production in 2012 was 76 million barrels, while the total annual gas production was 169 billion cubic feet[1]. Even though natural gas production is anticipated to decline in the future, the Hejre oil and gas field located 186 miles from the Danish coast is expected to begin production in 2015. The four main operators in charge of oil and gas production in Denmark are: DONG E&P, Hess Denmark, Wintershall Noordzee, and Maersk Oil.

Drilling tests for hydrocarbons in Greenland first took place in the late 1970s, but they did not reveal hydrocarbons. In 2010, British oil company Cairn Energy discovered hydrocarbons for the first time in Baffin Bay, the sea between Greenland and Canada. Consequently, offshore oil and gas exploration licenses began being awarded to oil companies to further investigate the possibility of other hydrocarbons. For instance, Cairn has licenses in "eight offshore areas spanning more than 32,000 square miles and has budgeted $1 billion for its eight-well drilling campaign spread over 2010-11[2]." However, drilling results from recent exploration efforts have not yet yielded commercial amounts of hydrocarbons.

Geology and Geophysics

During recent years, there has been increased interest in the "sandstones of Late and Middle Jurassic age[3]" of the Danish Continental Shelf. Oil companies have also surveyed for hydrocarbons in Paleogene reservoirs and sandstones of the Neogene age throughout Denmark. In addition, the Jurassic turbidite sandstones are expected "to hold an unknown amount of hydrocarbons in the Danish Central Graben[3]."

Potential hydrocarbon resources exist in the basins offshore Northeast Greenland and the Greenland Sea (which borders Greenland to the west). Both areas are believed to be geologically comparable to the "basins offshore mid-Norway and on the Barents shelf[4]," which hold hydrocarbon reserves. The stratigraphy of Northwest Greenland is mostly Cretaceous and Cenozoic sediments, while the source rock in the Greenland Sea is believed to be "an almost complete Caledonian succession, stretching from the Devonian age to present[4]."

The Danish Energy Agency's website contains a substantial amount of offshore data. It includes a list of exploration, appraisal, and deep wells along the Danish Continental Shelf. In addition, the Geological Survey of Denmark and Greenland database has data for deep offshore wells, and includes information on geologic age, reservoir name, discovery year, and water and well depths.

The database also includes interactive maps with 2D and 3D seismic surveys. The Naalakkersuisut (Government of Greenland website) has a list of exploration wells in Greenland and additional information about the well license, operator, water depth, etc.[5].

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Given the fact that Greenland and Denmark are both in the Arctic region; offshore infrastructure must be able to tolerate extreme cold weather conditions. In addition, Denmark has high pressure high temperature (HPHT) environments (pressure exceeding 10,000 psi and temperature above 300° F). Maersk Oil has HPHT drilling programs in the Danish parts of the North Sea[6]. In 2012, DONG Energy and Bayerngas developed a HPHT "Hejre oil and gas field in the northern Danish Central Garben offshore Denmark[7]." Denmark also has subsea installations. The Stine segment 1 and 2 are subsea satellites to the Siri field, which is operated by DONG Energy and is located in the north-western section of the Danish North Sea[1]. Denmark also employs certain drilling technologies including managed pressure drilling, horizontal wells, and multilateral wells. In 2014, an international oil and gas company, Weatherford, describes an offshore well in Denmark drilled using managed pressure drilling[8]. According to Maersk Oil, horizontal wells first came into play in 1987 in the Dan field. Ever since then, horizontal drilling has been widely used to drill tight reservoirs[9]. In addition, most of Maersk's Oil wells in Denmark are dual-lateral[4].

Method of Offshore Tender

The Danish Energy Agency, which is the country's offshore licensing body, issues licenses to oil companies through both licensing rounds and the Open Door procedure. The licensing rounds include "all non-licensed areas west of 6°15' eastern longitude, which consists of areas in the Central Graben, where most of the oil discoveries have been made, and areas further to the east, where fields were discovered in Denmark's last licensing round." The 7th Danish Licensing round application period ended on October 20, 2014. Since 1984 six licensing rounds have been held in Denmark, with the first three licensing rounds comprising of all unlicensed areas in Danish territory. The three most recent licensing rounds - the 4th Round in 1995, the 5th in 1998 and the 6th in 2006 - comprised of the Central Graben with adjoining areas only[10].

The Open Door Procedure, on the other hand, offers licenses to non-licensed areas east of 6°15' eastern longitude, which includes offshore areas in the westernmost sector of the North Sea. Companies can apply for Open Door licenses any time between January 2nd and September 30th. In general, oil companies do not have to immediately undertake exploratory drilling when awarded an Open Door License[11]. The Danish Ministry of Taxation, Central Customs, and Tax Administration collect corporate income taxes and hydrocarbon taxes. Currently, the corporate income tax for oil and gas production is 24.5%, while the hydrocarbon tax is 52%[12]. While oil and gas production is subject to a corporate income tax, the hydrocarbon tax is applied to any activities related to hydrocarbon extraction such as "preliminary surveys, exploration and extraction of hydrocarbons, including construction, operation and maintenance of production facilities and pipelines[13]."

Offshore hydrocarbon exploration activities only take place in Greenland if "a prospective license, an exclusive license for exploration and exploitation of hydrocarbons, or a license for scientific surveys[14]" is awarded by the Mineral License and Safety Authority (previously known as the

Bureau of Minerals and Petroleum). In addition to having a license, the licensee must also acquire additional approval from the Mineral License and Safety Authority in order to undertake any offshore activities. Approval is only obtained if the licensee complies with the guidelines outlined in the Minerals Resource Act and the "provisions of the license under which the activity is applied for[13]." A list of active licenses and current applications are made publicly available on the Government of Greenland website[15]

Environmental Assessment

Greenland requires offshore oil exploration license applicants to submit an environmental impact assessment (EIA). Also in Greenland, prior to opening up new areas for hydrocarbon exploration and exploitation licensing rounds, a Strategic Environmental Impact Assessment (SEIA) has to be prepared.[16] When applying for permission to or approval of projects for extraction of hydrocarbons or installation of pipelines in the Danish territorial waters and continental shelf area, the applicant must prepare an EIA. An EIA report must be available before the Danish Energy Agency can grant permission to or approval of projects pursuant to several sections of the Subsoil Act, and section 4 of the Continental Shelf Act, and section 2 of the Executive Order on certain pipeline instillations for the transport of hydrocarbons in Danish Territorial Waters and Continental Shelf.[17]

Environmental Resources and Sociological Issues

Natural resources:

The area of Denmark along the Baltic Sea has a network of Baltic Sea Protected Areas (BSPA). There are 66 BSPAs in Denmark; the majority designated for their biological and marine values and as ecologically significant habitats.[18] The Wadden Sea is the largest unbroken system of intertidal sand and mud flats in the world, a portion of which is most of the Danish Wadden Sea maritime conservation area.[19] According to the Danish OSPAR Commission (a coalition of fifteen European west-coast governments together with the European Union to protect the marine environment of the North-East Atlantic) there are 34 OSPAR marine protected areas (MPAs) covering 12,472 ha, or about 17% of Danish waters.[20] In Greenland approximately 32% of territorial waters are MPAs.[21] There are 55 endangered species in Denmark; of these species, at least 24 are marine species, from plants to mammals. In Greenland there are 20 endangered species, the majority of which are marine or coastal.[22] The Danish Environmental Research Institute developed an Environmental Atlas of Greenland, Denmark and the Faroe Islands for the Kingdom of Demark. The atlas contains data on the physical environment and fjords and areas particularly vulnerable to oil spills and environmental protection preparedness in connection with oil exploration.[23]

Archaeological, and Historical Resources:

Large parts of the Stone Age hunting grounds and coastlines in Denmark are now covered by the sea, including sites from the Late Mesolithic Ertebølle Culture. These sites are found on the sea floor, at depths up to 16 ft. below present-day sea level.[24] Since the late 1970s hundreds of Upper Paleolithic, Mesolithic, and Neolithic sites have been found underwater amongst the islands of the Danish archipelago. These sites have been found in a depth of up to 98 ft. Artifacts have also been recovered as much as 6 miles off the Danish North Sea Coast.[25] The Kingdom of Denmark's Environmental Atlas also identifies archaeological sites particularly sensitive to oil spills.[26]

Historically significant shipwrecks and WWII airplanes are found throughout the North Sea.[27,28,29,30,31] Coastal archaeological sites, ruins and historic built resources can be found along the Greenland and Denmark coasts dating to Norse occupations as early as the 10th century.[32, 33] In Greenland, on the north shore of the Foulke Fjord, artifacts from the Arctic's oldest inhabitants provide information regarding how Paleoeskimos lived.[34]

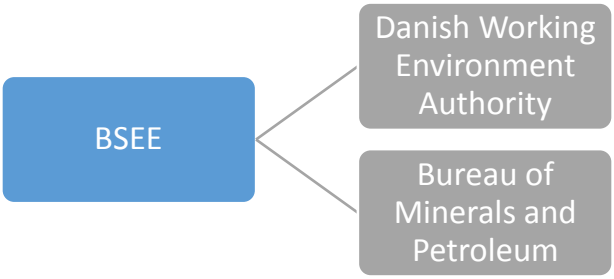
Socio-economic and Tribal:

The natural resources have shaped the development of Arctic fishing and hunting cultures and traditions, and the utilization of fish and marine mammals has always formed the bedrock of Arctic societies and economies. The exploitation of living marine resources is one of the essential economic factors in both Greenland and the Faroe Islands. Research findings are of practical use by Arctic peoples in supporting the rapid cultural, social, economic and industrial development that other peoples have had generations to adapt to. Denmark and Greenland have actively participated in negotiations on the UN Declaration on the Rights of Indigenous Peoples, adopted in 2007. The Declaration is an important starting point for future work in ensuring the rights of indigenous peoples and their survival through respect for their culture, language and way of life. [35] The Arctic Council guidelines make important cultural and geographic recommendations that are critical to gaining Inuit (group of culturally similar indigenous peoples inhabiting the Arctic regions of Greenland, Canada, and the U.S.) support: "measures should be taken to recognize and accommodate cultural heritage, values, practices, rights and resource use of indigenous residents." For Greenland, which is a leader among four Inuit Arctic nations on oil development, the guidelines have been followed in the granting 20 exploration licenses along its west coast.[36]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalents



The **Danish Environmental Protection Agency**, which is part of the **Ministry of the Environment**, cooperates with the Danish Offshore Operators to develop plans to protect the marine environment in the Danish sector of the North Sea. They are also responsible for discharge "to the sea from offshore installations and the use of environmentally friendly listed chemicals on offshore installations[37]." In addition, the Environmental Protection Agency is in charge of emergency guidelines for any spills from offshore infrastructure.

The **Danish Working Environment Agency** is responsible for offshore licensing by implementing the Subsoil Act, which is a set of guidelines for oil and gas exploration and production in Denmark. In addition, the Danish Energy Agency has authority over offshore process safety ("safety of the installations and equipment on them[38]") and occupational safety ("safety and the workplace and at work[16]"). The Danish Energy Agency also collaborates with the North Sea Offshore Authorities Forum (NSOAF) and the Offshore Mechanical Handling Equipment Committee (OMHEC). Representatives from the Danish Energy Agency also attend the International Regulators Forum, which is a global collaboration related to offshore health and safety. The Geological Survey of Denmark and Greenland is an important database that "handles the access to and sales of released well information and seismic data[16]" for Denmark and Greenland.

Others

The **Environmental Agency for the Mineral Resources Area** is the authority in Greenland responsible for protection of nature and the environment from any mineral resources activities, while the **Mineral License and Safety Authority** is in charge of offshore licensing as well as safety issues including supervisions and inspections related to offshore activities in Greenland[39]. In the Authority, the **Bureau of Minerals and Petroleum (BMP)** serves as the "one stop shop" for those seeking licenses for offshore hydrocarbon activity. BMP issues letters of invitation to potential licensees, publishes model licenses and guidelines for applicants, facilitates public hearings, publicizes EIA and SIA reports, and evaluates all information a licensee submits. The task of the Bureau of Minerals and Petroleum is to ensure the legal and political framework for reliable, environmentally sound and clean exploration and exploitation of petroleum and minerals resources in Greenland."[40]

Regulatory Contact Information

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The Danish Environmental Protection Agency

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The Danish Energy Agency

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The Geological Survey of Denmark and Greenland (De Nationale Geologiske Undersøgelser for Danmark og Grønland)

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The Danish North Sea Fund (Nordsøfonden)

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Email: apn@nanoq.gl

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Iceland: Offshore Exploration and Production Profile

Offshore Oil Production (2014): None
Offshore Natural Gas Production (2014): None

Although no deep exploration wells have been drilled and no offshore oil and gas production is currently taking place in the Icelandic continental shelf, a great deal of data (e.g. seismic) has been collected over the years. This data is made publicly available through the Iceland Continental Shelf Portal of Orkustofnun, Iceland's National Energy Authority[1]. The two areas in Iceland with potential hydrocarbon resources are Dreki and Gammur, northeast of Iceland and on the northern shelf of Iceland, respectively. Studies in the Dreki area indicate "the presence of thick continental crust[2]," suggesting the presence of Jurassic and/or Cretaceous source rocks with hydrocarbon accumulations. A Strategic Environmental Assessment (SEA) for the Dreki area has already been conducted, outlining potential resources in the area and environmental considerations. Gammur is a sediment basin with a "2.5 mile thick layer of sediments[2]," with some studies showing that there is gas (unspecified amount) being released. Surface pockmarks have also been discovered in the Gammur area, which corroborates the theory of gas being released from the seabed. However, an SEA for the Gammur area has not been completed yet. So far, Orkustofnun has granted three licenses for oil and gas exploration and production in the Dreki Area: License no.2014/01 owned by Eykon Energy (15%), CNOOC Iceland (60%), and Petoro Iceland AS (25%), License no. 2013/01 owned by Faroe Petroleum Norge AS (67.5%), Iceland Petroleum (7.5%), and Petoro Iceland (25%), and License no. 2013/02, owned by Ithaca Petroleum (56.25%), Kolvetni ehf (18.75%), and Petoro Iceland AS (25%)[3].

Geology and Geophysics

The geology of the Icelandic continental shelf is similar to that of other parts of the North Atlantic Margin, which extends from northern Norway to the southwest of Ireland. Sediment samples from the Dreki area indicate "active seepage of Jurassic oil[4]." The Iceland Continental Shelf Portal provides geophysical data and contains data on the geologic age, water depth, discovery year, porosity, and well depths of various wells drilled during the Ocean Drilling Program, which is an international scientific drilling program to "conduct research into the history of the ocean basins and the overall nature of the crust beneath the ocean floor using a scientific drill ship[5]" – a research vessel that was used to drill samples and gather measurements from beneath the seabed. The portal also contains data relating to licensing, satellite seep studies, surfaces samples, seismic reflections, and multibeam bathymetry (study of the depths of ocean floors). Several seismic reflection measurements as old as 1978 and as recent as 2008 (from the Dreki area) are also available on the portal[6].

Special Operating Conditions and New Cutting-Edge Technologies Utilized

No new cutting-edge technologies have been implemented in Iceland, as no deep exploration wells for hydrocarbon exploration have been drilled as of yet. However, when Iceland begins its exploration and production activities, O&G will need to take into account the arctic conditions of the country's climate. The hydrocarbon production facilities will need to be engineered to withstand and operate in the extreme cold.

Method of Offshore Tender

Iceland's offshore tendering method consists of a licensing program. Two types of hydrocarbon licenses are issued by Orkustofnun: prospecting (non-exclusive) licenses and exploration and production (exclusive) licenses. Prospecting licenses can be granted at any given time and they last for a maximum of three years. They give the licensee permission to use "geophysical techniques and geochemical methods[7]," but they do not authorize the licensee to drill for or produce hydrocarbons. Exploration and production licenses, on the other hand, are issued only during licensing rounds by following guidelines in Article 8(5) of the Hydrocarbons Act and Article 3(3) of EU Directive 94/22/EC. Exploration licenses usually last for 12 years and can be extended to 16 years. Once the exploration licensee meets certain specifications in the license, a production license for up to 30 years can be granted.

There are four different types of hydrocarbon taxes in Iceland. The general corporate income tax is presently 20% of the company's revenue. An area fee is charged for exploration and production licenses, based on the square kilometer of concession area. Specifically, for the first 6 years of the license, the licensee is required to pay an annual sum of $81 per square kilometer of concession area. After 6 years, the fee increases by $81 per square kilometer for each extra year. No area fees are charged for prospecting licenses. Production levies are based on the "market value of hydrocarbons processed from the resource[4]." In Iceland, the levy rate is 5%. The special hydrocarbon tax is a tax levied on profit related to hydrocarbon activities. This tax is calculated by determining the "ratio between the total income and the tax base[4]." For instance, if the special hydrocarbon tax is calculated as the profit ratio multiplied by 0.45, and the profit ratio is 40% of the tax levy, then the hydrocarbon tax is 18% (40 * 0.45).

Environmental Assessment

A group of supervising governmental authorities is responsible for licensing, prospecting, exploration, and production of hydrocarbons in Iceland. The group is led by the National Energy Authority of Iceland (Orkustofnun), which acts as a contact point for all inquiries regarding hydrocarbon activities. The National Energy Authority supervises licensees in accordance with the Hydrocarbon Act; prior to issuing a license, the National Energy Authority must obtain the opinion of the Ministry for the Environment and Natural Resources.[8] Skipulagsstofnum, the Icelandic National Planning Agency, is the state authority, under the Ministry for the Environment and Natural Resources, responsible for the administration and implementation of the Planning Act, the Environmental Impact Assessment (EIA) Act and the Strategic Environmental Assessment (SEA) Act. The agency determines whether a project is subject to EIA. In the SEA process, the agency participates in the scoping process and reviews environmental reports.[9]

Natural Resources

Iceland is a leading advocate of sustainable use of natural resources, including living marine resources, with the position that sustainable utilization of marine resources must be based on a comprehensive approach to the marine ecosystem as a whole.[10] About 150 species of fish of the approximately 270 species found in Icelandic water spawn there. There are almost 2000 species of benthic fauna. Two seal species give birth to their offspring there, and at least seven species of toothed whales and five species of baleen whale are found in Icelandic waters[11]; five are either endangered or vulnerable[12]. Nesting seabirds, wading birds, and water fowl can be found on Iceland's shores; Iceland is also an important stop-over for migrating species.[13] There are 29 marine protected areas (MPAs).[14] Iceland put forth a comprehensive policy on the oceans in 2004 and has been active in the protection of the marine environment through the United Nations Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.[15]

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

Archaeological and Historical:

Iceland archaeologists have not focused on searching for underwater resources.[16] Of six listed shipwrecks, four are considered historic.[17] Archaeologists have a precise method for dating the settlement of Iceland due to a volcano eruption in A.D. 870 that covered much of southwestern Iceland with ash. No sites have been discovered below the ash layer suggesting that settlement was Viking activity; there is no evidence of prior Celtic settlements.[18] Coastal archaeological and built historic resources include Kolkuós, an old harbor site of the old bishops settlement of Hólar[19]; Stóraborg, a farm mound, on the southern coast[20]; and Hofstaðir, a Viking settlement located in the northeast, where archaeological and oral history reports a pagan temple was located[21]. The Mosfell Archaeological Project unearthed a chieftain's establishment at Hrísbrú –including a longhouse, a church, a graveyard, and a cremation grave—and other sites in the Mosfell Valley including a stone ship setting and ship's landing.[22] Núpsstaður in Fljótshverfi is a farm situated in Southern Iceland on the strip of land between the Vatnajökull glacier and the North Atlantic.[23]

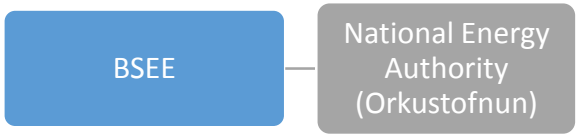
Socio-economic and Tribal:

Iceland is still recovering from the financial crisis of 2008-2009 and hopes to follow in neighboring Norway's footsteps and build a lucrative oil industry.[24] Despite this, the standard of living is on par with that of other European countries. Due to the dramatic natural landscape, tourism has become important to the national economy and has resulted in the expansion of tourist-related service jobs. The population of Iceland is extremely homogenous; there are no tribal issues.[25]

Regulatory Bodies

In the section below, a figure first identifies the regulatory body that has overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalent



The main offshore hydrocarbon regulatory body in Iceland is the **National Energy Authority (Orkustofnun)**, responsible for offshore licensing and in charge of "monitoring hydrocarbon prospecting, exploration, and production activities" and ensuring that data from these activities is kept up to date.

Others

The **Ministry of Finance and the Directorate of Internal Revenue** are responsible for implementing hydrocarbon tax regulation. Taxes under the Act on Taxation of Hydrocarbon Potential are evaluated by the Directorate of Internal Revenue in Reykjavík[26]. Other agencies such as the Protection of the Arctic Marine Environment Working Group (PAME), focus their efforts on the protection of the arctic environment.

Main environmental regulatory bodies in Iceland include the **Environment Agency of Iceland** and the **Ministry for the Environment and Natural Resources**. The goal of these agencies is to promote the sustainable use of resources and enforce "environmental monitoring and surveillance[27]." Skipulagsstofnun, or the **National Planning Agency**, is subordinate to the Ministry of Environment and Natural Resources and is charge of implementing the Environmental Impact Assessment Act (EIA) and the Strategic Environmental Assessment Act (SEA) in Iceland[28]. The main objective of these acts is to ensure that before permission "is granted for a project, an assessment of the environmental impact of the relevant project (in Icelandic territorial waters, air space, and within Iceland's pollution zone) is being carried out[29]." European Union legislation pertaining to offshore drilling has been incorporated into Icelandic law. Therefore, Iceland follows the safety of offshore oil and gas operation guidelines outlined in Directive 2013/30/EU of the European Parliament and of The Council of 12 June 2013[30].

Regulatory Contact Information

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Email: ust@ust.is

Ministry for the Environnent and Natural Resources

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Skipulagsstofnun (National Planning Agency)

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166, 105 Reykjavík
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Ministry of Finance

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Arnarhvoll vid Lindargotu
150 Reykjavik
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Directorate of Internal Revenue

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Jamaica: Offshore Exploration and Production Profile

Offshore Oil Production (2014): None
Offshore Natural Gas Production (2014): None

Jamaica has had offshore oil wells drilled in the past, and anticipates tapping into their offshore resources in the future, but up until 2014 Jamaica has had no offshore production. Jamaica drilled 7 exploratory wells (1 offshore well) between 1955 and 1973, and then another four (1 offshore) between 1980 and 1981.[1] After the wells were drilled in the early 80s, there has been very little exploration in Jamaica until recent years. Companies like Tullow, a British firm, have begun investing in preliminary exploration. Tullow is undergoing preliminary exploration in 10 blocks located within the Walton basin and Morant basin in shallow offshore waters south of Jamaica.[2]

Geology and Geophysics

Jamaica has some geologic survey data, but the quality and quantity is limited. For example, some sources have identified formations with geologic ages including the Eocene, Lower Cretaceous and Jurassic periods.[3] In all cases, the presence of hydrocarbons is unknown. In terms of well depths, Tullow is performing preliminary exploration in 10 of Jamaica's 31 blocks with depths ranging from 65 to over 3,000 feet. As part of its preliminary investigation, Tullow is performing 2-D seismic surveys.[4] Although Jamaica's offshore activity shows little current information with respect to geology and geophysics, one can expect this to improve as there is renewed interest offshore resources and the potential production of said resources.

Special Operating Conditions and New Cutting-Edge Technologies Utilized

With the lack of exploratory wells being drilled in Jamaica, no new cutting-edge technologies have been implemented for hydrocarbon exploration. Since the 1980s, only two offshore exploration wells have been drilled, with little justification to explore and invest in new technologies. If exploration activity is increased in Jamaica, one could expect that the latest technologies would be considered for drilling, with the hopes of producing economically viable hydrocarbons.

Method of Offshore Tender

Jamaica's offshore contracts typically operate under a Production Sharing Agreement (PSA) with the Petroleum Corporation of Jamaica (PCJ).[5] The PCJ, was established by the Ministry of Mining and Energy under the Petroleum Act of 1979, and has exclusive rights to explore for oil, develop, as well as rights to every other sector of the petroleum industry.[6] The PCJ, however, can work with contractors, typically through a PSA, but the PCJ is also open to discussing other fiscal regimes like concessions, service contracts, joint ventures and Technical Evaluation Agreements. While, the terms of the PSA are subject to negotiation, the terms typically follow an outline such as: First, a royalty of approximately 12.5% is collected on all production. Then the contractor's exploration and production costs are paid, with the remaining balance split according to the PSA

with the PCJ and the contractor. Furthermore, as part of the PSA, there is typically a tax stabilization clause in case the tax structure changes. [7]

Environmental Assessment

Prior to drilling a well, the contractor must undertake a 2-part environmental impact assessment (EIA) study. The first part consists of a baseline study and the second part involves an assessment of the effects of drilling.[8] In addition, The Government of Jamaica (GOJ) "ensures that all its policies, plans and programs geared towards national development, adequately consider potential environmental effects and impact, incorporate appropriate measures to reduce or eliminate these effects and impacts."[9] The Petroleum Corporation of Jamaica (PCJ) has the authority to suspend drilling operations if they (PCJ) suspect that the contractor's activities pose an adverse impact on the environment. Jamaica is currently in the process of implementing the Strategic Environmental Policy (SEA), as an accepted tool of environmental management.[10]

Environmental Resources and Sociological Issues

Natural resources:

The Natural Resources Conservation Authority, established by the Natural Resources Conservation Act of 1991, is responsible for ensuring the effective management of the physical environment of Jamaica and the management of marine parks and protected areas.[11] There are 74 nationally recognized protected areas in Jamaica, of which 12 are marine and coastal; a surface area of about 595 square miles. Apart from the 12 marine and coastal protected areas, 3 are Ramsar sites, or Wetlands of International Importance[12]. More than 75 percent of the coral reefs in the Atlantic region are at risk from local threats (i.e., coastal development, overfishing/destructive fishing, marine-based pollution, and/or watershed-based pollution). The insular Caribbean is particularly vulnerable; from Jamaica to the Lesser Antilles, more than 90 percent of all reefs are threatened, with nearly 70 percent classified as a high or very high threat.[13] Jamaica ranks fifth among the world's islands in terms of endemic plant life, and is home to numerous endemic reptiles and amphibians. Jamaica has over twenty species of endemic birds. The ecoregion comprises approximately 15 percent of the land area on the island and covers most of the dry forests near the coast.[14] A study conducted in 2010, illustrates that there has been an increased focus on improving environmental management in Jamaica. The report also indicates that the heightened focus has been achieved through the creation of new standards, policies and regulations (and, enforcing existing ones); increased environmental monitoring; and generating awareness among citizens and stakeholders.[15]

Archaeological, and Historical Resources:

The Jamaica National Heritage Trust (JNHT) established in 1985, gives the Jamaican government authority to enter a property or site to investigate the potential adverse impact on cultural properties. The JNHT may issue an emergency Preservation Order to protect sites that are deemed to have archaeological or cultural significance and value.[16] Marine archaeological resources include the catastrophic earthquake wreckage of Port Royal in 1692, of which 2/3 of the town was submerged in the Caribbean Sea.[17] Port Royal is considered one of the most

important underwater sites in the world due to the rich repository of historic shipwrecks.[18] Two additional noteworthy historic shipwrecks, The Texas (1942) and La Domicano (1951) are located in the South Kingston Channel and the Kingston Harbor, respectively.[19] Taino, Jamaica's first inhabitants, coastal sites are located on both the west and east side of the island, and date back to1200 AD.[20]. Artifacts such as, ceramics, shell, and stone tools have been recovered; as well as human burials.[21] On the north-central coast of Jamaica, pottery found at The Little River site, dating back to around 500 AD., are similar to the Cuevas-Ostinoes in Puerto Rico. The Little River site represents that the Jamaican saladoid inhabitants probably came from west islands such as Puerto Rico.[22] There are several historic forts, courthouses, and schoolhouses near and/or along the Jamaican coast.[23]

Socio-economic and Tribal:

As of 2014, Jamaica retains one of the highest energy intensity rates in Latin America and the Caribbean. The country is virtually dependent upon imported oil, accounting for over 90 percent of its total energy use. The rise of imported oil cost between 1998 and 2006 (from $334 million to approximately $1.84 billion) indisputably poses a threat to economic stability. This leads to the pursuit in finding greater energy efficiency and conservation opportunities in the residential, commercial, industrial and public sectors of the economy.[24] Petroleum Corporation of Jamaica (PCJ) 2014 annual report shows that Wigton Windfarm Limited continues to have a positive impact on the country's economy, environment, and oil dependency. Not only did the clean energy generated by Wigton reduce the country's carbon footprint, it lessened the consumption of imported fuel and subsequently lowered the national oil bill. In 2013-2014, oil consumption was reduced by 70,687 barrels which resulted in savings of $7 million US dollars.[25]

Regulatory Bodies

(No BSEE equivalent)

Jamaica does not have explicit offshore regulatory bodies due to the lack of activity in offshore exploration and production. The **PCJ**, a state corporation established by the **Ministry of Science, Technology, Energy and Mining (MSTEM)**, is responsible for the petroleum block leasing process, which starts with identifying an area of interest and evaluating the capital resources and credentials of the applicants. This is followed by negotiations on the objectives and obligations, and then finally a contract signing where both the PCJ and the contractor sign a production sharing agreement.[26] The energy division of the MSTEM is responsible for the energy sector, monitoring energy supplies, identifying alternative energy solutions, and energy conservation. The Mines and Geology division is accountable for supervising all prospecting and mining operations in Jamaica. The Science and Technology division is responsible for monitoring developments in the information and technology sectors.

The **Ministry of Finance** is in charge of developing Jamaica's fiscal policy, allocating public revenues, and creating an environment for economic growth. The Ministry of Finance also collects royalties or other concessions from offshore companies as determined under the PSA.[27] The Ministry of Water, Land, Environment and Climate Change is responsible for ensuring that all of Jamaica's natural resources are utilized sustainably.[28] The Water division owns legislation and monitoring all of Jamaica's water agencies while the Land division takes care of policy development for the divestment of Government lands and land administration. The Environmental

division is responsible for the management of hazardous waste, and managing the National Environmental & Planning Agency (NEPA). NEPA is in charge of proposing policy, legislation, and regulations in regards to the ecosystems, coastal and marine area management, pollution prevention and control, pollution monitoring and assessment, and hazardous waste.[29] Lastly, the Ministry of Health is an organization designed to ensure healthy lifestyles and environmental practices across Jamaica, focusing on practices that adversely affect the health of the people. The Ministry of Health's main focus is to ensure there is quality health care and individuals are informed to make healthy lifestyle decisions.[30]

It is important to note that many of Jamaica's regulatory bodies operate under several acts including The Beach Control Act, The Natural Resources Conservation Authority Act, and The Watersheds Protection Act.[31] The Natural Resources Order (1996) provides that the entire island of Jamaica is a prescribed area and lists specified categories of enterprise, construction or development that require a permit.[32] Through the Jamaica National Heritage Trust (JNHT) Act, the JNHT may enter a property or site to investigate impacts on cultural properties. They have the right to protect sites and may issue an emergency Preservation Order.[33]

Regulatory Contact Information

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Email: info@pcj.com
Website: www.pcj.com

Ministry for the Science, Technology, Energy and Mining in particular the Ministry of Mining and Energy (MSTEM)

Address:
36 Trafalgar Road
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Jamaica
Telephone: 1 876 929-8990 -9
Website: http://www.men.gov.jm/
Email: info@mem.gov.jm

Ministry of Finance and Planning

Address:
30 National Heroes Circle Kingston 4
Telephone: 1 876 922-8600
Website: http://www.mof.gov.jm/
Email: hmf@mof.gov.jm

Ministry of Water, Land, Environment and Climate Change

Telephone: 1 876 926-1590
Website: http://opm.gov.jm/ministries/water-land-environment-climate-change-2/www.mwh.gov.jm
Email: info@mwh.gov.jm

National Environment and Planning Agency (NEPA)

Address:
10 & 11 Caledonia Avenue, Kingston 5.
Telephone: 876 754-7540
Website: http://www.nepa.gov.jm/new/contact_us/contact.php
Email: pubed@nepa.gov.jm

Ministry of Health

Address:
2-4 King Street, Kingston 10, Kingston, Jamaica
Telephone: 876 967-1100
Website: http://www.moh.gov.jm/index.php?option=com_contact&view=contact&id=1&Itemid=59
Email: webmaster@moh.gov.jm

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Mexico: Offshore Exploration and Production Profile

Offshore Oil Production (2012): 691 million barrels
Offshore Natural Gas Production (2012): 508 billion cubic feet (bcf)

Mexico is the 9th largest total oil producer and 18th largest natural gas producer in the world, although the country's oil production has fallen by nearly 25% since reaching its peak (nearly 4 million bbl/d) in 2005.[1] In an effort to increase production, Mexico introduced drastic changes to its energy legislature in 2013, including opening the national oil/gas industry to compete/participate with Petróleos Mexicanos (PEMEX), the oil company of the Mexican state, who had previously held a 75-year monopoly in the sector. According to research, 75% of Mexico's oil and nearly 42% of natural gas is produced from offshore hydrocarbon installations, primarily from older, fixed platforms installed in shallow water[2]. Offshore oil production activities are concentrated in the Bay of Campeche, in the Gulf of Mexico, off the southeastern coast of the country. In 2009, Ku-Maloob-Zaap (KMZ) became the largest crude oil-producing project in Mexico, with a production capacity of 835,000 bbl/d from 24 marine platforms and 132 operating wells.[3] Currently, Mexico has no deep water hydrocarbon production, although, deep water reserves comprise more than 70% of potential reserves in Mexico (includes unconventional resources). Mexico's new legislation is aimed at further development of deep-water hydrocarbon exploration and eventual production. Under the new framework, PEMEX will likely retain its assets in producing fields and exploration rights to areas which it has invested in. The inaugural first round of bidding to include foreign oil companies is anticipated for 2016-2017[4].

Geology and Geophysics

Mexico had 10 billion barrels of proved oil reserves in 2013, with the majority identified in South Mexico, particularly in the Campeche Basin[5]. Total natural gas reserves in Mexico have been estimated at 17 trillion cubic feet (Tcf). Current offshore production is centered in two production areas - Cantarell and KMZ, which had 0.4 and 0.9 million barrels of annual production [MMbl] in 2013. This accounted for over half of Mexico's total oil production[6]. The Cantarell field is considered to have reached peak production, as the field has declined in output by 80% since 2013. The Abkatun-Polc-Chuc and Litoral de Tabasco areas, each consisting of several small fields, are the third and fourth most productive offshore oil regions in Mexico, respectively, with a combined 2013 daily production of 593,000 bbl/d. Mexico is considered to have significant undeveloped hydrocarbon resources in the deep-water Gulf of Mexico. PEMEX began drilling deep-water exploratory wells in 2006, with its first significant find in the Perdido fold belt. As of 2013, PEMEX had acquired 60,273 mi. of two dimensional (2D) seismic data and 50,193 square miles of three dimensional (3D) seismic data across the prospective regions[7]. The Lakach gas field is PEMEX's first planned deep-water development, at a water depth of 3,241 feet. Production from seven subsea wells at this installation is expected to be 400 million cubic feet per day (MMcfd)[8].

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Mexico's current offshore production is primarily from fixed platforms installed in shallow water, not considered the most technically-challenging production environment/conditions. Mexico's future offshore oil/gas production will include deep-water hydrocarbon extraction, requiring new technical expertise and equipment. An example of an offshore technical accomplishment in Mexico is the development of the Cantarell oilfield, located 100 km off the coast of the Yucatan Peninsula in the Gulf of Mexico, which was the largest offshore oil development of its time when it was built in the early 1980s. Crude oil and produced gas are sent onshore, and if unused, produced gas is returned offshore for gas lift[9]. Decreased reservoir pressure has contributed to a drop in production from the mature Cantarell fields. To increase production, a nitrogen injection system began operation in 2000. The nitrogen is produced onshore from the world's largest nitrogen production plant, at a capacity of 1.2 trillion cubic feet per day (Tcf/d)[10]. Advances in drilling and production technology will be implemented as PEMEX and foreign operators explore deep-water resources under the new regulatory framework. As an example, a seven well subsea production system is planned for installation at PEMEX's first developed deep-water field (Lakach field) in 2016.

Method of Offshore Tender

Historically, Mexican oil/gas reserves were considered property of the state to be solely developed by the state oil company PEMEX. Foreign participation in the Mexican offshore oil/gas sector was limited to terms of service contracts, where companies were contracted by PEMEX to perform certain services but were not allowed hydrocarbon production shares or profits. Newly-passed Mexican legislation establishes allowance for new types of oil/gas production contracts, granting foreign operators the right to profit from extracted oil/gas. The new contract regime will include licenses/concessions and production sharing agreements. The terms of new contract models in Mexico will be developed in secondary legislation. Mexico's government plans to open bidding on oil/gas acreage to international firms in 2016-2017[11].

Environmental Assessment

The General Law of Ecological Balance and Environmental Protection (Ley General de Equilibrio Ecológico y de Protección al Ambiente/LGEEPA) and its Regulations on Environmental Impact Matters, provide a list of works and activities related to oil and gas, according to the specifications of a particular project, that require the submission of a federal environmental impact assessment (EIA) to the Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales/SEMARNAT) in order to secure project authorization. In addition, in specific activities that are of state jurisdiction – such as construction activities – EIAs are generally required for oil and gas projects.[12] Jurisdiction of the coastal zone is centralized and everything related to water is federally regulated. However, each state has its own environmental laws, as do some municipalities.[13]

Natural Resources

Mexico has a continental platform of 39,460,300 hectares (ha), of which some is estuarine or covered by coastal lagoons. The coast of Mexico is diverse in coastal and marine resources and ecosystems, including wetlands, mangrove forests, barrier islands, dunes, coral reefs, sea grass

meadows, and near shore islands. Four different seas – the Pacific Ocean, the Gulf of California, the Gulf of Mexico, and the Caribbean Sea abut Mexico's coastline.[14] The National Commission of Natural Protected Areas currently manages 61 marine preservation areas (MPAs), including marine and/or coastal preserves. Almost all coastal regions have marine and/or coastal preserves, from the Baja California Peninsula to the Yucatan and the Caribbean totaling approximately 13,336,390 ha.[1516] There are over one hundred endangered fish in Mexico, along with the northern fur seal, the North Pacific right whale, the sea otter, the West Indian manatee, several shore and sea birds, sea turtles, corals, and amphibians.[17]

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

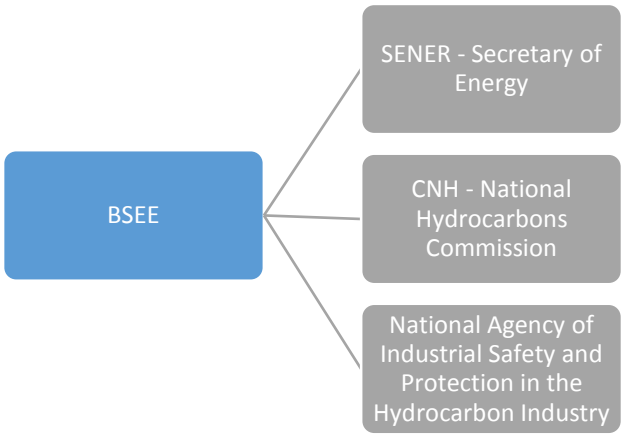
Archaeological and Historical: The Federal Law on Archaeological, Artistic, and Historic Monuments and Areas promotes the investigation, protection, conservation, restoration and recovery of cultural resources.[18] The National Institute of Anthropology and History (INAH) is responsible for more than 110,000 historical monuments and 29,000 archaeological zones.[19] Marine archaeological resources include at least 338 shipwrecks as early as the 16th century, of which 60 have been identified.[20] The Banco Chinchorro, a large coral reef atoll off Quintana Roo has yielded 68 maritime sites.[21] Tulum Ruins is the only known coastal Mayan archaeological site on the beaches of the Caribbean.[22] Pre-Hispanic coastal cities/sites/ruins include Chichen-Itza, El Tajin, Campeche, and Xcaret. Early Hispanic-era historic coastal cities include Campeche and Queretaro.

Socio-economic and Tribal: There are 166 municipalities along the 17 coastal states, which comprise about 14% of the country's population. Many of Mexico's coastal environment and communities have deteriorated due to population growth, by-products of industrial development, and lack of proper planning. Fisheries, which much of the coastal population depends on both economically and culturally, have been adversely impacted by this deterioration and loss of biodiversity.[23] Mexico's oil production had been diminishing by 25% over the last decade, further eroding the Mexican economy and putting many laborers out of work. Mexican President Enrique Pena Nieto introduced an energy reform proposal to open the state-run oil industry to foreign investors to boost oil production and build Mexico's economy.[24] The US Senate passed legislation to enact an international agreement to govern oil drilling in the Gulf of Mexico. This agreement is anticipated to boost Mexico's 3% growth economy by 1-2% in the coming years.[25]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalents



In 2013/2014 Mexico passed groundbreaking energy legislation that restructured the oil/gas regulation in the country to allow for more foreign competition. Historically, the main federal bodies responsible for regulation of Mexico's oil/gas operations were the **Secretary of Energy** (Secretaría de Energía – SENER) and the **National Hydrocarbons Commission** (Comisión Nacional de Hidrocarburos - CNH). These bodies played the role of setting federal guidance on safety in the oil/gas industry, as well as technical and administrative oversight of operations. PEMEX, a body of the Mexican state in the previous regulatory framework, played a significant role in the oil/gas sector by releasing technical standards (e.g. on decommissioning/abandonment procedures) as well being partially responsible for oversight in the industry through monitoring/enforcement of its standards.

Mexico's new reforms expand the regulatory authority of existing federal bodies SENER and CNH and create a new **National Agency of Industrial Safety and Protection in the Hydrocarbon Industry**, whose responsibilities include the supervision and enforcement of industrial and operational safety of hydrocarbon installations[26]. In the law establishing the National Agency of Industrial Safety and Protection, the Mexican state indicates that the new agency's creation was influenced by international countries such as Norway and the U.S., in the respect that these countries have regulatory bodies whose primary focus is environmental/operational regulation of hydrocarbon facilities[27].

Others

The main environmental regulatory body in Mexico is the **Secretariat of Environment and Natural Resources** (Secretaría de Medio Ambiente y Recursos Naturales – SEMARNAT). This agency is responsible for Environmental Impact Assessment (EIA) as well as issuing environmental protection standards in the oil/gas industry, including guidelines for the handling of hazardous waste. There is cooperation between offshore regulatory bodies in Mexico, which appears to be strengthened by new regulations. For example, the National Hydrocarbons Commission is the technical advisor to Ministry of Energy on oil/gas industry matters, and in the new regulatory framework both bodies actively participate in the offshore bidding process. The Secretary of Energy identifies locations up for bidding, while the National Hydrocarbons Commission oversees the bidding process. One potential source of conflict is in regards to historical self-regulation by PEMEX, in contrast with the new oil/gas regulatory structure. Under

the new system, PEMEX will no longer be the sole player in oil and gas exploration and production operations and is expected to be required to adhere to standards/monitoring guidelines prescribed by federal regulatory authorities, for example those set by the National Agency of Industrial Safety and Environmental Protection of the Hydrocarbon sector.

Regulatory Contact Information

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(http://www.chiapas.gob.mx/funcionarios/federal/ejecutivo/semarnat)

National Hydrocarbons Commission (Comisión Nacional de Hidrocarburos – CNH)

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Delegación Benito Juarez. C.P. 03200 México, D.F.
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Website: http://www.cnh.gob.mx/
Email: contacto@cnh.gob.mx

Secretary of Energy (Secretaría de Energía - SENER)

Address:
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Distrito Federal CP. 03100
Telephone: +52 (55) 5000-6000
Website: http://www.energia.gob.mx/
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National Agency of Industrial Safety and Environmental Protection in the Hydrocarbon Industry (Agencia Nacional de Seguridad Industrial y de Protección al Medio Ambiente del Sector Hidrocarburos)

Address (appears to share address with the Secretary of Energy):
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Distrito Federal CP. 03100
Telephone: +52 (55) 5000-6000 (Secretary of Energy)
Website: Not identified in public sources
Email: Not identified in public sources

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Netherlands: Offshore Exploration and Production Profile

Offshore Oil Production (2012): 6 million barrels
Offshore Natural Gas Production (2012): 632 billion ft^3

The Netherlands is one of the "largest importers and exporters of crude oil and petroleum products in the world and is the second-largest producer and exporter of natural gas in Europe[1]" after Norway[i]. The majority of the Netherland's natural gas reserves are in the North Sea, although Groningen, which contributes to 75% of the Netherlands' natural gas production, is onshore[1]. The Netherlands Oil and Gas Portal is a website governed by the Dutch Ministry of Economic Affairs and the TNO[ii] Geological Survey of the Netherlands[2]. This website offers public information regarding oil and gas exploration production in the Dutch region of the North Sea continental shelf. According to this portal, "the total continental shelf gas and oil production in 2012 was 600 billion cubic feet (17,900 million Sm^3) and 31 million cubic feet (884 thousand Sm^3) respectively[3]." As of January 2013, there were 11 producing oil accumulations and 152 producing gas accumulations in the Dutch continental shelf[4,5].

Geology and Geophysics

According to the Netherlands Oil and Gas Portal, an annual report is released after a period of 10 years after compilation. The first annual report that was released covered the year 2003 and included gas and oil production prognoses, pressure measurements before April 15, 2004, and well production numbers[6]. A similar report was prepared in 2004, but the data for that report is unavailable on the portal. The 2003 report, which is publicly available, contains field level information, including reservoir names and depths, reservoir pressures, and oil and gas annual production. Field level geologic information is only provided for the Groningen gas field. According to the Netherlands Oil and Gas Portal, the first gas in the field was formed "in the coal layers of the Carboniferous[7]." The gas then moved to the "sandstone and mudstones layers from the Rotliegendes[8]." The reservoir is "sealed at the top by the salt of the Zechstein Formation[9]." The portal also offers downloadable information for seismic surveys conducted in offshore Netherlands[10].

[i] Many countries like the Netherlands act as a business hub for oil & gas activities and can both be a significant importer and exporter.

[ii] Netherlands Organization for Applied Scientific Research

Special Operating Conditions and New Cutting-Edge Technologies Utilized

High pressure high temperature (HPHT) environments (pressure exceeding 10,000 psi and temperature above 300° F) are encountered in the North Sea. An example of HPHT in the Netherlands is the L5-12 exploration wells in the Sierra gas field discovered in 2010. The reservoir pressure and temperature were determined to be 14,837 psi and 361° F, respectively[11].

Innovative offshore technologies being used in the Netherlands include subsea installations, horizontal drilling, and dry trees. For example, the produced gas from the K5F gas field in block K5 of the Dutch part of the North Sea is sent through a subsea pipeline attached to a satellite platform[12]. Sub-horizontal drilling was used to drill the Rotliegend gas fields in the L13 block, central offshore Netherlands. The reservoirs in these areas are characterized as being "layered reservoirs, with poor vertical permeability[13]". Directional drilling was successful in increasing production rates from the reservoirs. In addition, GustoMSC (an engineering company with expertise in "offshore exploration, construction, and production[14]"), for example, states that dry trees through well caissons are used in their mobile offshore units in the Netherlands.

Method of Offshore Tender

Containing more detailed provisions, the Mining Act was first put into effect in 2003[iii] and outlines a licensing regime for both, onshore and offshore production[15]. Applications for exploration and production licenses are submitted to the Dutch Ministry of Economic Affairs. There are three different types of permits: exploration permits, production permits in "cases of application by the holder of the exploration permit[16]", and production permits for open areas. The Dutch Ministry of Economic Affairs accepts exploration permits throughout the year. Once an application for a particular exploration area is obtained, the Ministry of Economic Affairs announces the submission of the exploration permit in the Official Journal of the European Union and in *Staatscourant*, the Dutch Government Gazette, and asks other potential licensees to submit "counter-applications." Those interested in submitting a counter-application have "13 weeks from the date of publication in the Official Journals and/or Government Gazette[10]." After 13 weeks, the Ministry of Economic Affairs, in partnership with TNO - Built Environment and Geosciences, Energie Beheer Nederland (EBN which stands for the Netherlands Energy Management), and the Staatstoezicht op de Mijnen (State Supervision of Mines), decide to whom to award the permit. The aforementioned agencies have 6 months from the time that all counter-applications are submitted to make a decision (although the decision period can be extended once, by another six months). The process for production permits in open areas is the same as that for exploration permits.

If a licensee has already been awarded an exploration permit and seeks to apply for a production permit, counter-applications by other interested groups are not accepted. However, in order to obtain the production license, the holder of the exploration permit must "be able to demonstrate that the mineral or geothermal resources found in the permit area are economically viable[10]".

[iii] The previous legislative mining regime consisted of 4 individual mining acts: The Mining Act 1810, the Mining Act 1903, the Minerals Exploration Act (1976), and the Continental Shelf Mining Act (1965). These four contained both an offshore and onshore mining regime.

The petroleum fiscal regime in the Netherlands consists of a corporate income tax, a surface rental tax, a state profit share levy, and royalties. Royalties are between 0% and 7%. Resident and nonresident companies have to pay a corporate income tax. While resident companies are required to pay taxes on their global taxable income, nonresident companies only have to pay taxes on only certain sources of income. The surface rental for production areas is $2005 per miles squared or $669 to $2005 per miles squared for exploration areas[17].

Environmental Assessment

The Ministry of Infrastructure and Environment is the authority responsible for Environmental Impact Assessments (EIA). The Dutch knowledge center InfoMil, which is part of the Ministry, is the primary source of information and best practices for completing EIAs as well as other legislation and policies in the Netherlands. In the Environmental Management Act, the Environmental Impact Assessment Decree is used to determine if a plan or project is subject to the EIA procedure[18]. The European Commission proposed a new Offshore Directive in 2013 and requested comments from the EU nations, with the intent to have the directive become a law in 2015. The objective of this directive is to reduce as far as possible the occurrence of accidents related to offshore oil operations. Additionally, it contains requirements relating to licensing, environmental protection, emergency response and liability related to safety. Presently the Staatstoezicht op de Mijnen (SodM) oversees regulations related to offshore oil operations, focusing on health, safety, the environment, and effective extraction. The Netherlands expects the implementation of the Directive to have an impact on the organization of this supervision[19].

Environmental Resources and Sociological Issues

Natural resources:

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention) is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic which initially set a goal to create a network of Marine Protected Areas (MPA) by 2012. The Netherlands has five OSPAR MPAs which include approximately 8,320 km^2 (3,212 sq. miles) of territorial and Exclusive Economic Zones (EEZ); MPAs cover about 15% of their national waters. Three MPAs are in the Dutch territorial waters, including the Noordzeekustzone, the Voordelta and the Vlakte van de Raan. Two are in the EEZ: the Doggerbank and the Klaverbank. These were designated according to the Nature Conservation Act and the Flora and Fauna Act in 2010[20]. Endangered marine species include the Atlantic cod, the basking shark, the cape shark, the haddock, the liver-oil shark, the maraene, the beluga whale, and the narwhal[21].

The Nature Conservation Act protects the North Sea Coast, Voordelta and the Raan Flats. Additionally, the Wadden Sea landscapes and wildlife are protected and are considered a World Heritage Site. The dunes of Texel and Schiermonniloog are Naional Parks[22]. In the areas throughout the Netherlands that are natural coastlines, the most important form of coastal protection is the management of beach ridges, the outer row of dunes. The policy is that this be done by dynamic beach ridge management – letting nature develop the ridges by erosion – and letting inland dune flora naturally grow[23].

Archaeological, and Historical Resources:

The Monuments and Historic Buildings Act of 1988 defines how historic resources can be identified and protected. On behalf of the Ministry of Education, Culture, and Science, the Cultural Heritage Agency of the Netherlands (Rijksdienst voor Cultureel Erfgoed or RCE) is responsible for implementation of the act. The Archaeology Act was added to the Monuments act in 2007. Archaeological monument care and heritage preservation form an integral part of overall environmental planning practices[24]. The North Sea seabed and shoreline contain objects of archaeological value, including numerous shipwrecks and traces of human occupation from as far back as 8,000 BC. The Dutch government has an archaeological sensitivity map[25].

Built historic coastal resources include Dorestad, a medieval coastal trading village, harbor and cemetery in the delta region of the Rhine and Maas rivers, occupied from about 675 and 875 AD[26]. The Hague on the North Sea has several historic districts, monuments, and buildings[27].

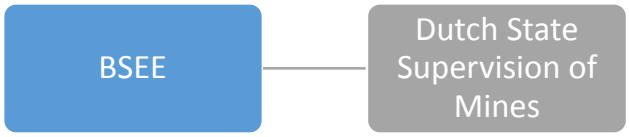
Sociological:

There are no indigenous peoples in the sense of first nations which have been displaced by colonization[28]. The Dutch off-shore oil industry has added considerable value to the Dutch economy and it is anticipated that it will generate strong economic growth. It is one of the largest growth generators of the maritime cluster. The sector is characterized by an overall increase in production value, added value, export value, and employment[29].

Regulatory Bodies

In the section below, a figure first identifies the regulatory body that has overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalent



The **State Supervision of Mines** (Staatstoezicht op de Mijnen) is responsible for ensuring that all activities related to "the detection and extraction of minerals[30]," including offshore oil and gas exploration and production, are carried out with appropriate safety and environmental standards.

Others

The **Ministry of Infrastructure and the Environment** is the main environmental body in the Netherlands, and is broadly responsible for devising and implementing policies to improve air quality[31].The **Netherlands Oil and Gas Exploration and Production Association (NOGEPA)** "represents the interests of businesses with licenses to explore for or produce oil and gas in the Netherlands[32]". The Netherlands Oil and Gas Portal contains information about oil and gas

exploration and production in the Dutch part of the North Sea. The **Ministry of Economic Affairs** is responsible for reviewing submitted exploration and production permits, while the Energie Beheer Nederland is in charge of "facilitating and stimulating operators in optimally exploiting gas fields[33]." Another agency **EBN (Energie Beheer Nederland)** that works closely with Dutch and international oil and gas companies, also invests in the exploration and production of oil and gas. Additionally, EBN acts as an advisor on mining climate and prospects for using Dutch subsurface for the government[34]. As a comparison, EBN is in charge of "facilitating and stimulating operators in optimally exploiting gas fields[34], while the Ministry of Economic Affairs is responsible for reviewing submitted exploration and production permits[35].

The Netherlands Oil and Gas Portal is a website governed by the Dutch Ministry of Economic Affairs and TNO, Geological Survey of the Netherlands (which is Netherland's "geoscientific information and research center"[36]), and contains information about oil and gas exploration and production in the Dutch part of the North Sea.

Regulatory Contact Information

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Website: http://www.cova.nl/?lang=en
Email: cova@cova.nl

Endnotes

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New Zealand: Offshore Exploration and Production Profile

Offshore Oil Production (2013):
11 million barrels (MMbbl)

Offshore Natural Gas Production (2013):
116 Billion cubic feet (Bcf)

New Zealand's offshore oil and gas production accounts for the majority of all oil and natural gas produced in the country. Currently, New Zealand's oil and gas production comes from the Taranaki region. This region contains five offshore oil and gas fields: Kupe, Maari-Manaia, Maui, Pohokura, and Tui. Since 2008, offshore oil production has declined 46% while offshore gas production has increased 13%. Currently, Maari-Manaia has five producing wells, Kupe has three, Tui has four and Pohokura has three extended reach wells. Information was not readily available on Maui. Overall New Zealand had up to 10 offshore rigs operating in 2014.[1]

Geology and Geophysics

All five of the mentioned offshore fields in the Taranaki region produce oil and three of them also produce gas. The geological age of these reservoirs include the Paleocene, Late Paleocene, Eocene, Middle Eocene, Late Eocene and Middle Micocene eras. In these fields, the water depth ranges from 115 feet to 358 feet, with reservoir depths between 3,900 feet to 12,000 feet. Field data for geologic formations, reservoir and water depths are summarized by New Zealand Petroleum & Materials (NZPAM).[1]

Special Operating Conditions and New Cutting-Edge Technologies Utilized

The Pohokura field in New Zealand utilizes three extended reach drilling wells.[2] The Tui development includes four horizontally drilled (2,700 to 6,100 ft horizontal length) and subsea completed wells. The subsea wells are tied back to a floating production storage and offloading (FPSO) vessel called the Umuroa.[3] The Maari field hosts New Zealand's longest extended reach well along with horizontal reservoir sections up to 6,600 feet long.[1]

Method of Offshore Tender

Companies owe royalties on all petroleum resources in New Zealand. Companies pay royalties for discovered or sold petroleum including what is used by the company in the production process. Petroleum that is flared or lost unavoidably, or returned to the natural reservoir is exempt from royalties. Furthermore, companies do not have to pay royalties on petroleum which they have previously paid royalties on and which is withdrawn later from a storage facility. The amount of royalties depends on when the permit for discovery was issued. Currently, any discoveries made after December 31, 2009 require a royalty payment equal to the larger of either 5% ad valorem royalty(AVR) (1% of the net sales revenue of gas and 5% of oil) or 20% of accounting profits royalty (APR).[4]

Environmental Assessment

The Resource Management Act 1991 (RMA) requires that regional and district councils administer the use, development or protection of natural and physical resources so they are sustainably managed. An assessment of environmental effects (AEE) must accompany each application for

a resource consent. New Zealand administers the sixth largest marine environment in the world – more than 4.4 million square kilometers. The Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (Act) assists with the sustainable management of natural resources. The Ministry of the Environment is responsible for the Act while the Environmental Protection Authority (EPA) makes decisions on marine consent applications and is responsible for monitoring and enforcement. The Crown Minerals Act 1991 and the Continental Shelf Act 1964 dictate the allocation of permits for prospecting, exploration and extraction of natural resources.[5] Six government agencies and 16 regional councils share the responsibility for managing activities in New Zealand's waters.[6]

Environmental Resources and Sociological Issues

Natural resources:

Marine reserves provide the highest level of marine protection. There are 44 marine reserves in New Zealand territorial waters, which are managed by the Department of Conservation (DOC) under the Marine Reserves Act (1971). Additionally, under the Marine Reserves Act, a broad range of activities can be managed, including "other extraction" which includes petroleum extraction. There are eight reserves that are marine only, and 36 with coastal components. Reserves are heavily concentrated in the Fiordland of the South Island.[7] There are 52 threatened marine fish, 270 threatened marine invertebrates and eight threatened marine mammals.[8] At least six marine reserves are specifically dedicated to marine mammals.

The Resource Management Act 1991 requires a New Zealand Coastal Policy Statement (NZCPS) to guide local authorities in their management of the coastal environment. The Minister of Conservation is responsible for preparing the NZCPS and ensuring that it promotes sustainable management of the natural and physical resources of the coastal environment.[9] There are 99 endangered birds in New Zealand, the majority of them are sea and shore birds.[10]

Archaeological, and Historical Resources:

The Historic Places Act of 1993 was written to "promote the identification, protection, preservation, and conservation of the historical and cultural heritage of New Zealand". The New Zealand Historic Places Trust administers and enforces the provisions of the act.[11] The Maritime Archaeological Association of New Zealand was established in 1989 as a result of the growing awareness of the need to control and direct maritime archaeology. There exist over 2,000 known shipwrecks, the first dating back to 1795. About 140 have been located.[12] There are also several significant wrecks of aircraft including two of the Royal New Zealand Air Force. Along the coast are submerged remains of jetties, wharves and other structures.[13] On the coast, archaeological research has identified more than 2,400 Maori sites in the Whangarei District, primarily relating to the pre-contact era.[14]

Coastal built historic resources include the Kerikeri Basin, which includes the oldest surviving European settlement in New Zealand, the Kerikeri Mission House, and the Waitangi Treaty Grounds.[15]

Sociological/Tribal:

The Maori interests are recognized and the Maori participate in the AEE process. Decision makers are required to consider Treaty settlements and customary marine title granted under the Marine and Coastal Area (Takkutai Moana) Act of 2011.[16] In January 2014, Te Runanga oNgai Tahu, a

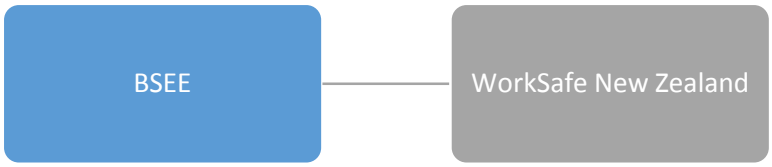
South Island Maori Tribe opposed any form of offshore exploration/drilling near their rohe (territory). Conversely, in the Taranaki Iwi area of interest, the Taranaki Trust is meeting with oil companies with current or prospective projects within their rohe, i.e. tribal territory The Tribe's hope is that they can make agreements that focus on early information sharing and principles of engagement.[17]

Ecotourism entrepreneurs and environmental activists state that looking for oil undermines New Zealand's work to conserve land and reduce carbon emissions, especially since the country has a low demand for oil and gas.[18]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalents



New Zealand Petroleum and Minerals (NZPAM) manages all of New Zealand's resources including oil and gas. They monitor prospective exploration permits, evaluating operator's capabilities, including their technical, financial and capabilities of meeting health, safety and environmental regulations. NZPAM is also responsible for collecting royalties, fees and levies from offshore production. [19]

Others

The **Ministry of the Environment** is responsible for developing energy policies within the Exclusive Economic Zone (EEZ) and the Continental Shelf (CS).[20] Regional councils are responsible for territorial waters (the first 12 nautical miles) of offshore activity. This includes managing resources and managing the environmental impacts of technologies used in offshore activities.[21] The Environmental Protection Authority (EPA) is responsible for exploration and drilling in the EEZ and the CS. The EEZ includes the area 12 to 200 nautical miles from the shore. The CS is the continental shelf, where the submerged landmass extends beyond the EEZ. The EPA makes rulings, processes marine consent applications, monitors compliance and carries out enforcement of relevant legislation ensuring companies adhere to permitted activities.[22] Maritime New Zealand is responsible for ensuring offshore petroleum facilities have

a method for managing waste and an emergency plan for spills or leaks.[23] Department of Conservation Te Papa Atawbai is responsible for protecting wildlife from seismic surveying assessments.[24] Work Safe New Zealand is responsible for inspections, assessments and enforcement of safe workplace practices at offshore petroleum facilities.[25]

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http://taranakiiwi.org.nz/

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http://online.wsj.com/articles/for-new-zealand-town-oil-brings-debate-over-economy-environment-1406516188

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http://www.localcouncils.govt.nz/

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http://www.doc.govt.nz/conservation/marine-and-coastal/

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http://www.business.govt.nz/worksafe/about/what-we-do/high-hazards/about-the-high-hazards-unit

Norway: Offshore Exploration and Production Profile

Total Oil Production (2014): 694 million oil barrels (billion bbl)
Total Natural Gas Production (2014): 4 trillion cubic feet (tcf)

Norway is Europe's largest holder in oil and natural gas reserves. All of Norway's oil reserves are in the Norwegian Continental Shelf (NCS), which is comprised of the North Sea, the Norwegian Sea, and the Barents Sea, with most of Norway's oil production taking place in the North Sea[1]. More than 50 companies have exploration and production activities in the shelf. The major energy company in Norway is Statoil ASA, which manages 70% of Norway's oil and gas production. Other international companies include ExxonMobil, Total, Shell, ConocoPhillips, and ENI[2]. 78 fields are currently in production in the Continental Shelf. The North Sea has 16 producing oil and gas fields, the Norwegian field has 16, while the Barents Sea has one[3]. According to the Norwegian Petroleum Directorate (NPD), the total petroleum production for the first 10 months of 2014 amounted to approximately 3.1 trillion cubic feet of gas (87.7 million standard cubic meters of oil equivalent) for sale and 2.5 trillion cubic feet of oil (71.1 million standard cubic meters of oil equivalent)[4].

Geology and Geophysics

According to the Norwegian Petroleum Directorate (NPD), petroleum in the Continental Shelf is contained in reservoir rocks in deltas of rivers from the Jurassic Age. Some of the largest fields in Norway are the Ekofisk, Statfjord, Oseberg, Gullfaks, and Troll fields. The reservoirs on the fields range from the Triassic Age to the Paleocene Age[5]. Publicly available field and well-level data for geologic ages, reservoir names, water depths, and discovery years are available on the NPD website[6]. In addition, both market available and not market available seismic surveys from the Norwegian shelf are also publicly accessible. The difference between market available and not market available surveys is the following: while market available surveys are released to the public after 10 years, non-market available surveys are released after two years or five years (depending on whether the seismic data is owned by general companies or by companies with ownership of production licenses). These surveys are available for download on the NPD website[7].

Special Operating Conditions and New Cutting-Edge Technologies Utilized

High pressure high temperature (HPHT) environments (pressure exceeding 10,000 psi and temperature above 300° F) are encountered in the North Sea. Examples of Norwegian fields with HPHT conditions include the Morvin oil and gas field 124 miles offshore as well as the Oseberg Sor field 71 miles offshore[8,9].

The Norwegian government permitted Arctic exploration in the Barents Sea in 1981. Statoil and other companies have drilled more than 80 exploration wells since exploration first started in the Barents Sea. In fact, Statoil's 2020 objective has been to "extract one million barrels of oil equivalent a day from new Arctic wells[10]".

Advanced offshore technologies are currently being employed in Norwegian offshore production including: subsea separation and pumping, multilateral completions, riserless well and rig based intervention. For instance, the Tordis oil field, which is located in the northern part of the North Sea, has a subsea separating, boosting and injection station that "separates the water from the wellstream which is reinjected to a nonhydrocarbon reservoir[11]". This subsea system increases recovery from the Tordis field by about 35 million barrels. The Tyrihans field uses subsea pumps to inject sea water to increase recovery, while the Draugen field has six subsea water injection wells and a subsea pump to increase oil recovery[12,13]. Multilateral completion technology has also been used in the Troll Field, Norway's largest gas field, since 2007. According to Norsk Hydro (a Norwegian aluminum and renewable energy company), "the multilateral wells on the Troll field have provided good economic figures relative to conventional drilling[14]". Furthermore, 89 wells have been completed in the Troll gas field since 2003, and 23 of those wells are multilateral wells[15]. According to Statoil, subsea well interventions have been implemented at the Statfjord North, Visund and Asgard fields, thereby decreasing intervention costs[16]. The company provides a list of technologically-advanced vessels on rigs that are between 20 and 60 percent more effective than traditional replacements, for instance, a new arctic drilling unit that has been recently developed [17].

Method of Offshore Tender

Norway's main offshore tendering method is production licenses. They are granted every other year in ordinary licensing rounds or every year in Awards in Predefined Areas (APA) rounds. APA rounds take place in mature parts of the Continental Shelf, in order to guarantee that areas in close proximity to already existing offshore infrastructure can be further explored. Ordinary licensing rounds consist of oil companies nominating blocks for licensing to the Ministry of Petroleum and Engineering (MPE). The MPE, in collaboration with the Norwegian Petroleum Directorate (NPD), and the fishery and environmental authorities, come up with a list of blocks to be included in the licensing round. After applications are received from various companies, the government awards production licenses to companies with the best "technical expertise, understanding of geology, financial strength and experience[18]". The exploration licenses entitle the awarded companies to ownership of a share of the produced petroleum and are effective for 4-6 years (although this period can be protracted up to 10 years). After the exploration period has come to an end, and the licensee has completed their work (e.g. seismic data, exploration drilling, etc.), they can apply for a production license that can last for up to 30 years. If there are no oil and gas finds during the exploration drilling period, the exploration license is renounced[19].

Environmental Assessment

Environmental impact assessments (EIA) are required by the Ministry of Petroleum and Energy to assess the impacts of a proposed project before production licenses can be awarded. The EIA must be submitted as part of the licensee's plan for development and operation (PDO) and plan for installation and operation (PIO). In order to obtain the best possible overview of environmental impacts, a regional impact assessment may be necessary. The Ministry of the Environment (MoE), along with the Ministry of Petroleum and Energy, must be notified in the early stage of planning a project that is subject to an EIA. This is the only time that the MoE is directly involved in the project. The notification must include a study program, which forms the basis for the EIA report. The study program is open for public consultation. Local, regional environmental authorities, non-government organizations, and the general public may participate in the process[20].

Strategic environmental assessments (SEA) are prepared to assess the possible environmental effects of a proposed plan or program. The Norwegian Pollution Control Authority (NPCA) has developed a SEA for a management program for the Barents Sea, a program that includes the petroleum industry[21].

Environmental Resources and Sociological Issues

Natural resources:

The Directorate for Nature Management (DNM) is a directorate under the MoE. Its main tasks are to serve as the national implementing authority in the fields of biodiversity, land use planning and management, wildlife and freshwater resources and outdoor recreation. The DNM may advise on the scope, relevance, and quality of EIAs[22].

The Norwegian Institute for Water Research (NIVA) is Norway's leading multidisciplinary research institute on the use and protection of water bodies and water quality, including marine areas. The NIVA is involved in EIAs and SEAs for offshore oil exploration and production. The Norwegian Institute for Nature Research (NINA) is the center of expertise regarding environmental consultancy for assessing project effects on the natural environment. The Institute of Marine Research (IMT) has advisory tasks regarding environmental monitoring and impact assessments related to oil extraction[23].

Coastal waters around mainland Norway cover an area of 90,000 km^2 (34,749 sq.miles), but only about 2,900 km^2 (11,197 sq.miles) are protected, designated as 204 marine protected areas (MPAs). A much higher proportion of Svalbard is protected, including large marine areas. National parks and nature preserves cover 65% of the islands and about 87% of the territorial waters out to the 12-mile territorial limit.[24] About 2,000 km^2 (772 sq.miles) of coral reefs are protected[25]. Eighteen fish and four marine/coastal mammals are listed as endangered, along with several birds, plants and one crustacean[26].

Archaeological, and Historical Resources:

The Directorate of Cultural Heritage (DCH) is the MoE's advisory and executive body for the management of archaeological and architectural monuments and sites, and cultural environments. Their responsibilities include advising the MoE on the implementation of an EIA in relation to heritage issues, to advise regional authorities on questions dealing with new projects, and produce guidelines concerning the use of EIAs in relation to cultural resources[27]. Throughout Norway there are over 200,000 registered monuments and sites. In addition, all cultural remains on and around Svalbard from before 1946 are automatically protected, including former whaling, hunting and trapping sites. Along the coast and underwater there are large numbers of many different types of cultural monuments and sites where there may be many undiscovered relics from practically all periods of Norway's history.[28] There are over 6,000 historic buildings that are protected by law. Many are coastal, such as the fishing village of Kjerringoy in Nordland.[29] Cultural environments are areas where monuments and objects form part of an integrated whole. There are nine such protected environments in Norway; protected coastal cultural environments include the pre-industrial village of Sogndalstrand in Rogaland.[30] The Conservation of Monuments and Sites along the Coast project was initiated and is in progress to protect a representative selection of ports, fishing villages, boat builders' yards, boathouses, quays and slipways.[31]

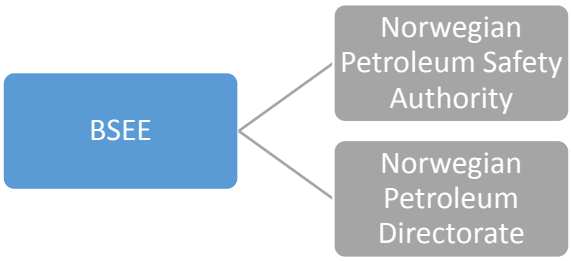
Sociological:

The Sami people are indigenous peoples inhabiting the Arctic area in far northern Norway and are protected under the international conventions of indigenous peoples. The Sami Parliament in Norway is the representative body for the Norwegian Sami and acts as an institution of cultural autonomy. This parliament has the power to protect Sami fishing rights and the natural environment in which they live from offshore drilling by oil companies.[32]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the agencies. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalents



The Ministry of Petroleum and Energy is responsible for "resource management and the energy sector[33]". The **Norwegian Petroleum Directorate** is subordinate to the Ministry of Petroleum and Energy and makes decisions related to exploration and production of petroleum products on the Continental shelf[34]. The Ministry of Labor and the Norway **Petroleum Safety Authority (PSA)** work together to ensure that both technical and operational safety is maintained in the petroleum industry[35].

Others

In general, the Storting (the Norwegian parliament) is responsible for deciding on offshore legislation. Various branches of the Norwegian government are then in charge of applying the country's petroleum legislation. Environmental regulatory bodies consist of the Ministry of Trade, Industry and Fisheries, the Norwegian Coastal Administration, the Ministry of Climate and Environment, and the Norwegian Environment Agency. These agencies are collectively responsible for protecting the environment and controlling pollution[36].

The Ministry of Climate and Environment protects and manages Norwegian external environment[37]. The largest agency under this Ministry is The Norwegian Environment Agency. It was founded in 2013 when the Norwegian Climate and Pollution Agency merged with the Norwegian Directorate for Nature Management. It manages nature, regulates pollution, and mitigates greenhouse gas emissions[38].

The Ministry of Petroleum and Energy (MPE) is principally accountable for accomplishing a coordinated and integrated energy policy in Norway[39].The Norwegian Petroleum Directorate is subordinate to the Ministry of Petroleum and Energy and one of the principal advisory bodies to the MPE. It makes decisions related to exploration for and production of petroleum products on the Continental shelf[40].

Financial regulatory bodies that are involved in the offshore regulating process in Norway include the Ministry of Finance, which manages petroleum revenues, and the Petroleum Tax Office, which is primarily responsible for "correctly assessing and collecting petroleum taxes and fees that have been determined by the political authorities[41,42]". The Ministry of Labor and the Norway Petroleum Safety Authority (PSA) work together to ensure that both technical and operational safety is maintained in the petroleum industry[43].

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Email: http://www.skatteetaten.no/en/About-Skatteetaten/Contact-us/e-mail/e-mail-us/

Endnotes

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Russia: Offshore Exploration and Production Profile

Offshore Oil Production (2012): 95 million barrels (MMbbl)

Offshore Natural Gas Production (2012): 2 trillion cubic feet (tcf)

Russia is the third largest total oil producer and the second largest natural gas producer in the world[1]. Offshore oil and gas production shares account for approximately 3% and 9% of total respective onshore/offshore production volumes. The main offshore hydrocarbon exploration and production (E&P) regions in Russia include eastern Russia in the Sea of Okhotsk (Sakhalin field developments), the Baltic Sea, the Barents and Kara Seas, and the Caspian Sea. State majority-owned energy company Rosneft is the largest oil producer in Russia, accounting for nearly 25% of production, followed by Lukoil, the largest private producer, with nearly 17% of production[2]. Gazprom is Russian's largest natural gas producer, accounting for 74% of total domestic production. The majority of Russia's offshore shelf is located in Arctic waters, considered some of the most technically challenging, cost intensive, and high risk resources to develop. Russian state-owned oil companies are actively exploring Russian arctic resources for production opportunities. The Prirazlomnoye oil field (production started in 2013), located in the Pechora Sea at water depths of approximately 20m., is the first developed Russian oilfield in the Arctic, and the world's first production project in the Arctic from a stationary platform[3]. In total, Prirazlomnoye field will consist of 36 wells (19 production; 16 injection; and one absorption well)[4]. The oil and gas industry in Russia is dominated by state-owned and several private Russian companies. Foreign companies operating in Russia include BP (which owns 19.75% of Rosneft), Shell, which operates in Western Siberia, and ExxonMobil, whose subsidiary, Exxon Neftegas Limited, operates the Sakhalin I development in Russia's Sea of Okhotsk.

Geology and Geophysics

The U.S. Geological Survey (USGS) has published geological assessments and estimated hydrocarbon reserves of several offshore petroleum basins in Russia, including the North Sakhalin, South Barents, Timan-Pechora, and North Caspian[5]. Ten major oil and gas provinces in Russia have proved reserves, the largest Arctic basins being the East Barents, South Kara, Laptev, East Siberian and Chukchi basin[6]. Spurred in part by significant proved reserves in the Russian Arctic, state oil companies and foreign stakeholders have been increasing exploration activities in these areas. The Russian Ministry of Natural Resources has announced that by 2023, 127 exploratory wells will be drilled on the Russian continental shelf. In 2013, Rosneft completed 21,700 linear miles of 2-D seismic exploration (92% of which occurred on the continental shelf) and 4,600 square miles of 3-D (21% performed on the continental shelf)[7]. Gazprom's recent operations have been focused on exploration within licensed blocks including the ones in the Taz Bay (Kara Sea), and on the Western Kamtchatka and Sakhalin shelves in the Sea of Okhotsk.

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Offshore development in Russia has occurred from fixed platforms in shallow/medium-depth waters (<500 ft.). Harsh operating conditions in Russia include intense cold (sub-zero temperatures), high winds, several tons of drifting pack ice, frozen waters, earthquake risks, as well as limited daylight. Several cutting edge technologies have been used in offshore Sakhalin

island fields (Sea of Okhotsk), including subsea production, and multilateral and extended reach drilling. The longest recorded extended reach well (Odoptu OP-11) has been drilled at the Sakhalin I development. This well has set world records in the total measured depth (7.67 mi. – 40,502 ft.) and horizontal reach (7.13 mi. – 37,648 ft.)[8].Subsea technology was used in Russia for the first time at the Sakhalin III development in 2012. The subsea manifold collects produced gas which is transported through a subsea pipeline to an onshore processing facility. The equipment at this installation is designed to withstand Magnitude 9 earthquakes[9]. Further subsea production development is planned for the Shtokman gas condensate field in the Barents Sea, identified as the 10th largest gas field in the world[10]. Production from this field is expected to take place at a water depth of nearly 1,000 feet from a floating production, storage and offloading (FPSO) platform. Condensate separation and gas processing will take place onboard the FPSO, and separate products will be transported through subsea pipelines connected to the platform by flexible risers.

Method of Offshore Tender

Two types of hydrocarbon contractual agreements, licensing/royalty payments and production sharing regimes, are established in the Russian law. According to the Russian Federal Law "On Subsoil Resources," offshore licenses are only granted to Russian legal entities with more than five years' experience conducting offshore operations and in which the state owns a majority stake in the project (greater than 50%)[11]. Exploration, production, and combined licenses are offered in Russia. The time period for a production license is generally five years, although this period can be extended for exploration within certain offshore regions. If oil is discovered, a production license is issued without tender/auction to the discoverer[12]. No set time periods for production and combined licenses are established, with the intent of full exploration and production of Russia's potential/discovered resources. Royalty payments and fees for license holders conducting E&P operations include regular payments for prospecting rights (50-150 Rubles/sq. km. [$3.9[1]-11.65/sq. mi.]) and use of subsurface resources (4,000-16,000 Rubles/sq. km.[$310-1,240/sq. mi.]), a mineral extraction tax (493 Rubles/tonne oil [$15/ton] and 622 Rubles per 1,000 m^3 natural gas [50¢/1,000 ft^3), and a one-time payment for the use of subsurface resources[13]. Guidelines for Production Sharing Agreements in the country are provided in the Federal Law "On Production Sharing Agreements [PSAs]," enacted December 20, 1995. Production sharing agreements are not common in Russia; currently only two offshore PSAs exist - for the development of the Sakhalin I and II fields[14].

Environmental Assessment

Under Federal Laws No. 7-FZ on "Environmental Protection" and No. 174-FZ on "Ecological Expertise", state environmental assessments (EAs) must be performed for all offshore E&P activities on the Russian continental shelf[15]. Environmental assessments are reviewed by the Ministry of Natural Resources and the Federal Environmental, Industrial, and Nuclear Supervision Service (Rostekhnadzor). The EIA Directive requires that the document "identify, describe, and assess in an appropriate manner… the direct and indirect effects of a project." Factors to be taken into account include humans, fauna and flora, soil, water, air, climate and landscape, material assets and cultural heritage.[16]

[1] Assuming a stable exchange rate of 0.03 US Dollar per Ruble.

Natural Resources

In June 2014 President Putin instructed the scientific and environmental non-governmental organizations to develop a pilot project for integrated management of natural resources use in the Arctic seas and to implement it in the Russian territory of the Barents Sea. Russia is 13-15 years behind developed countries in terms of marine resource management.[17] As of January 2014, Russia had 35 Ramsar-protected wetlands. [18] Russia has 61 marine protected areas (MPAs), which total about 140,306 km^2 (1,510 bln. sq.ft.) or just under 10.81% of the Russian Seas.[19] These include 10 marine nature reserves, 2 national parks, and 10 wildlife refuges.[20] Under the Russian legislation the internal marine waters, the territorial sea, the exclusive economic zone, and the continental shelf are all under federal jurisdiction. Zapovedniks are strictly protected reserves. The total of offshore zones in the Arctic Ocean, including the Bering Sea, amounts to 95,583 km^2 (1,029 bln. sq. ft.) or about 2% of Russia's Arctic Seas. Types of regional coastal specially protected natural areas (SPNA) vary and the approaches to managing these areas differ considerably nationwide. Most regional protected areas have no funding or enforcement staff[21].

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

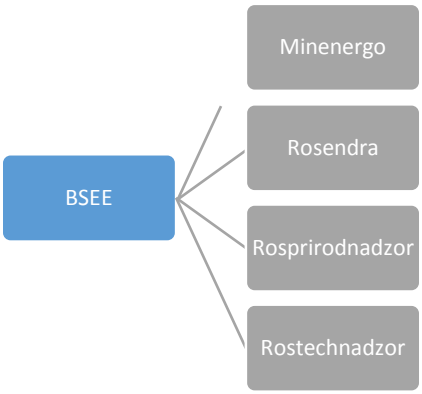
Archaeological and Historical: North-western Russia has been included in cultural processes in the Baltic region since the Viking Age, around the middle of the 8th century. Because of this long maritime history, the Russian seas are rich with sunken ships. Additionally, there are known submerged Neolithic sites. The Institute of the History of Material Culture of the Russian Academy of Sciences started an underwater archaeology program in the 1980s. The Legislation on objects of Cultural Heritage of the Peoples of the Russian Federation was established in 2002. However, there are no mechanisms of protection of submerged historical objects.[22] Along the coastline of the Black Sea and the Sea of Azov are many ancient Greek sites.[23] The Curonian Spit, a peninsula that separates the Baltic Sea and the Curonian Lagoon was a prehistoric habitation site.[24] Built historic resources include the Citadel of Derbent on the Caspian Sea, the Struve Arc which runs from Norway to the Black Sea, and the Solovetsky archipelago which comprises six islands in the White Sea that have been inhabited since the 5th century BC.[25]

Socio-economic and Tribal: There are 41 ethnic groups identified as indigenous, small-numbered peoples of the North, Siberia and of the Far East. These include the Evenks, the Saami, the Yupiq and the Nenets. Traditionally hunters, gatherers, fishermen, and reindeer breeders, these remain the lifeways of many of these people. Their territories are rich in natural resources and they have been affected by pipelines. The Center for Support of Indigenous Peoples of the North identifies 70 places of potential conflict between industry and indigenous people's territories. The small-numbered indigenous people are protected by Article 69 of the Russian Constitution and three federal laws that establish their cultural, territorial and political rights. However, changes to laws on natural resources, including sustainable development, may eventually impact these people.[26]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency.

BSEE Equivalents



Main offshore regulatory bodies in Russia include the Ministry of Natural Resources and Environment, the Ministry of Energy (Minenergo), the Federal Subsoil Resources Management Agency (Rosnedra), the Federal Supervisory Natural Resources Management Service (Rosprirodnadzor), and the Federal Environmental, Industrial, and Nuclear Supervision Service (Rostechnadzor). For oil and gas E&P operations, industrial safety/design and operations are governed by three regulations: the Law of the Russian Federation No. 2391-1 “On the Subsoil” dated February 21, 1992, Federal Law No. 116-FZ “On the Industrial Safety of Hazardous Production Facilities” dated July 21, 1997, and Federal Law No. 187-FZ “On the Continental Shelf of the Russian Federation” dated November 30, 1995.

The Ministry of Natural Resources and Environment is responsible for conceptualizing the public policy framework and regulation for exploring, utilizing, renewing, and conserving natural resources. The Ministry harmonizes and oversees offshore activities of The Federal Supervisory Natural Resources Management Service and the Federal Subsoil Resources Management Agency[27]. On the other hand, the Ministry of Energy is accountable for developing and executing the state policy and regulating the energy industry, including but not limited to oil and gas sectors[28].

The Federal Subsoil Resource Management Agency (Rosdnedra) and the Federal Supervisory Natural Resources Management Service (Rosprirodnadzor) are Russian government agencies subordinate to the Ministry of Natural Resources and Environment. Responsibilities of the Federal Subsoil Resource Management Agency include management of geological studies and approval/issuance of petroleum E&P licenses. Duties of the Federal Supervisory Natural Resources Management Service include protection of the use of water bodies and “observance of legislation of the Russian Federation and international rules and standards concerning the marine environment and the natural resources of internal seas, territorial seas, and exclusive economic zones[29]”. The Federal Environmental, Industrial, and Nuclear Supervision Service reports directly to the Russian government and is responsible for industrial safety related to subsoil use.

Regulatory Contact Information

Ministry of Natural Resources and the Environment

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Telephone: +7 (495) 254-48-00
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Email: admin@cbi-mpr.ru

Ministry of Energy (Minenergo)

Address:
42 Shepkina Street
Moscow, Russia 107996
Telephone (International Affairs Department): +7 (495) 631-91-35
Website: http://minenergo.gov.ru/en/
Email: minenergo@minenergo.gov.ru

Federal Subsoil Resources Management Agency (Rosnedra)

Address:
4/6, Bolshaya Gruzinskaya Str.
Moscow, Russia
Telephone: +7 (499) 766-26-69; +7 (499)254-09-55
Website: http://www.rosnedra.gov.ru/
Email: rosnedra@rosnedra.gov.ru

Federal Supervisory Natural Resources Management Service (Rosprirodnadzor)

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4/6, Bolshaya Gruzinskaya Str.
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Federal Environmental, Industrial, and Nuclear Supervision Service (Rostekhnadzor)

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Website: http://en.gosnadzor.ru/
Email: int_dep@gosnadzor.ru

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Trinidad & Tobago: Offshore Exploration and Production Profile

Total Oil Production (2013): 43 million oil barrels (MMbbl)
Total Natural Gas Production (2013): 1,428 billion cubic feet (bcf)

Trinidad and Tobago is the largest oil and natural gas producer in the Caribbean[1]. Since the early 1990s, Trinidad and Tobago has had a natural gas dominant industry and also holds one of the largest natural gas processing facilities in the Western Hemisphere: the Phoenix Park Gas Processors Limited natural gas liquids complex. While its onshore basins are mostly oil producing, its offshore basins are predominantly gas producing.

As of 2014, Trinidad and Tobago had 13.1 trillion cubic feet (Tcf) of natural gas reserves. In 2013, the country produced approximately 1.5 Tcf of natural gas[1]. Two major companies, namely BP Trinidad and Tobago and British Gas Trinidad and Tobago, are responsible for more than 75% of the natural gas production in the country.

Geology and Geophysics

Trinidad and Tobago can be divided into five major geological provinces with different producing formations: Southern Basin, Central Range, Northern Basin, North Coast Marine Area, and the Columbus Basin[2]. In general, the main source rocks in the Trinidad and Tobago basins are "mudstones of the Miocene Lower Cruse Formation, although source rocks in the Upper Cretaceous are also speculated to be present[3]." The maturation of the Upper Cretaceous source rocks most likely started in the Miocene, while maturation of the Miocene most probably originated in the Pliocene and Pleistocene. The reservoir rocks are mostly "deltaic sandstones of the Miocene and Pliocene[3]," although reservoir rocks may also potentially exist in the Upper Cretaceous and Lower Tertiary section.

Field level geologic and seismic information is provided by the Trinidad and Tobago Ministry of Energy and Energy Affairs, an agency responsible for all oil and gas activities. However, this information is not made publicly available, but it can be purchased by the general public for fees ranging from $6,000 to $12,000 per well. Typically, this data is purchased by potential licensees.

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Trinidad and Tobago operates in both deepwater and high pressure-high temperature environments for offshore production. In 2014 BP PLC "farmed out its two deepwater blocks (TTDAA* 14 and 23a) offshore the east coast of Trinidad and Tobago to BHP Billiton Ltd., Melbourne[4]." This marked the first time in history that Trinidad and Tobago's deepwater basins

* Trinidad and Tobago Deep Atlantic Area.

were being explored. Block 23(a) has an area of 1000 square miles, while Block TTDDA 14 covers an area of 386 square miles. Both blocks have water depths averaging 1.2 miles[5].

Trinidad and Tobago also employs subsea production systems, which generally consist of offshore wells with flowlines connected to fixed platforms, floating vessels, or some other kinds of onshore installations. An example of a field with a subsea installation is the Starfish field, discovered in 1998, which "straddles Block 5(a) and Block E, and forms part of the East Coast Marine Area[6]." The East Coast Marine Area is approximately 50 miles offshore the eastern coast of the country and consists of blocks 5(a), 6, and E. Production from the Starfish field started on December 6, 2014 and is expected to produce a maximum of 200 MMscfd. The Starfish development consists of four subsea wells and a 6 mile subsea tieback to the Dolphin A platform.

Other offshore technologies utilized in Trinidad and Tobago include fixed platforms, surface BOP drilling, flexible risers, and multilateral completions. An example of a multilateral completion is a well drilled in 2004 in the "759 area of the northern Soldado Field, offshore Trinidad in approximately 60 feet of water[7]." A multilateral completion was chosen in this case instead of conventional completion techniques in order to "horizontally access heavy-oil reserves in the Forest 4B and 4C sands, located at vertical depths of 2850 and 4000 feet, respectively[6]."

Method of Offshore Tender

Offshore tendering methods in Trinidad and Tobago include Exploration and Production Licenses (E&Ps) and Production Sharing Agreements (PSAs). Before the 1990's, the E&P arrangement, also referred to as "tax/royalty regime or concessionary arrangement,[8]" was commonly used. Under this arrangement, companies pay a royalty that is specified in the license as well as a Petroleum Impost or levy to the Ministry of Energy and Energy Affairs that goes towards paying any administrative expenses. Royalty rates for crude oil range from 10% to 12.5% of Field Storage Values, which are "determined using international market prices of crudes[7]." For natural gas, royalty rates vary from 0% to 15% of natural gas values.

PSAs first came into play in the 1980s, giving the Trinidad and Tobago government a portion of production profit. An evaluation of the fiscal regime in 2005, however, brought about a new type of PSA named a "taxable PSA." Under this new type of production sharing contract, the government receives "a share of profit petroleum in lieu of some taxes such as the Supplemental Petroleum Tax, Royalty, Petroleum Impost and Petroleum Levy[7]." So, while the contractors are not required to pay the taxes outlined above, they are required to pay other taxes, namely the Petroleum Profits Tax, Unemployment Levy, Green Fund Levy, and Withholding Tax to the Ministry of Finance. In addition, the taxable PSA includes a "windfall profits feature" to reap greater cuts of profit petroleum as petroleum prices increase. The third feature of the taxable PSA is that it permits "multi-block development and facilitated investment by industry consortia[7]."

Environmental Assessment

In 2001, the Certificate of Environmental Clearance (CEC) was established in Trinidad and Tobago as subsidiary legislation under the Environmental Management (EM) Act of 2000, implemented by the Environmental Management Authority (EMA). The primary goal of the CEC legislation is to ensure that environmental concerns are addressed in the country's infrastructure

development, including the oil and gas sector. The CEC incorporates the environmental impact assessment (EIA) process to identify and assess the environmental impacts of the energy sector. The CEC process does not strictly enforce all development projects to conduct an EIA; however, major activities undertaken by the oil and gas industry are usually required to have an EIA. Prior to 2000, environmental impacts within the oil and gas industry were not addressed in a legislative measure, but instead at the Ministry of Energy and Energy Affairs (MEEA) or at the company's discretion. As of 2011, strategic environmental assessment (SEA) is not explicitly included in the CEC legislation and is not currently conducted for any sector.[9]

Environmental Resources and Sociological Issues

Natural resources:

There are 65 nationally recognized protected areas in Trinidad and Tobago. Out of the 65 protected areas, 13 are marine and coastal, which translates to a surface area of approximately 17 square miles. Apart from the 13 marine and coastal protected areas, 3 are Ramsar sites, or Wetlands of International Importance.[10] There are 21 Marine Protected Areas (MPAs)[11] and 66 endangered species representing both marine and terrestrial.[12] A 2011 EIA for exploratory drilling of three off-shore wells off the east coast of Trinidad identified sixty-seven species of seabirds, of which two have been classified as endangered internationally- the Eskimo Curlew and the Black-capped Petrel. In 2006, The Nariva Swamp (the largest freshwater wetland in Trinidad and Tobago) was designated an Environmentally Sensitive Area (ESA). Threatened species inhabiting the Navira Swamp include the Manatee (a designated Environmentally Sensitive Species), the Three-toed Anteater, Howler Monkey, White Fronted Capuchin, Tree Porcupine, Water Opossum, Twa Twa, Bullfinch, uncommon Red-bellied Macaw, Moriche Oriole, and Black-bellied Whistling Duck. The Nariva Swamp is also home to the West Indian Manatee, the only species of Sirenian within the Caribbean.[13]

Archaeological, and Historical Resources:

The National Protected Areas Policy established in 2011, under the National Heritage Trust Act, recognizes that areas primarily designated for the management of historical and archaeological heritage will be designated and managed through the National Trust.[14] Marine archaeological resources include at least 20 Dutch ships in Scarborough harbour, Tobago, the repercussions of a deadly sea battle in 1677.[15] The Protection of Wrecks Act of 1994 secures the protection of wrecks in the Territorial Waters of Trinidad and Tobago and prohibits the interference of sites from unauthorized persons.[16] One of the oldest Pre-Columbian shell midden sites in the Caribbean Islands, Banwari Trace, is located in southern Trinidad. The oldest human remains (4,000 B.C.) discovered in the Caribbean were recovered at Banwari Trace .[17] The 2011 EIA for exploratory drilling off the east coast Trinidad documented 24 archaeological sites, of which 6 had been classified as very important.[18] Historic properties of great cultural significance include: Mount St. Benedict Abbey, the oldest monastery in the Caribbean, built by Brazilian monks in 1912;[19] Fort George, built in 1804 to provide protection for the Port of Spain in the event of an invasion, and Fort King George, built in 1777.[20]

Socio-economic and Tribal:

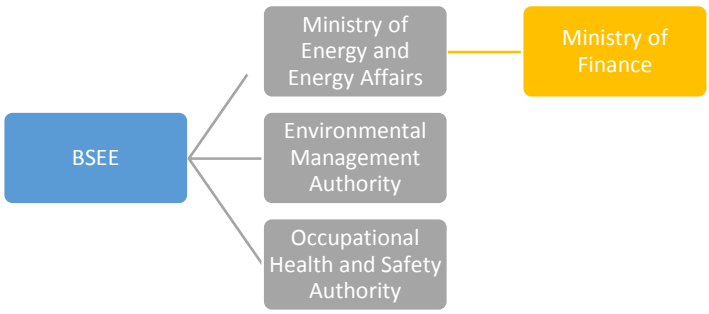
Trinidad and Tobago economy relies greatly on mineral extraction, agriculture, manufacturing, and tourism, but it is driven by a single commodity – hydrocarbons – which was first discovered

in 1866.[21] The success of the oil industry in Trinidad and Tobago has transformed the nation from an agrarian economy to the first industrialized state in the English speaking Caribbean. The majority of commercial oil production in Trinidad and Tobago in the past 100 years has been located in South Trinidad. Many individuals living in fence-line communities (neighborhoods that are adjacent to an industrial property, which are directly affected by its noise, emissions, traffic, etc.) in the South of Trinidad rely heavily on the oil industry and agriculture for economic survival. Despite the economic advantages and opportunities derived from the oil industry, Trinidad and Tobago is faced with an environmental legacy that must be assessed if significant restoration and remediation are to take place.[22] Subsequently, as a result from the rise in the eco-tourism industry, Trinidad and Tobago has been putting greater emphasis on the tourism industry.[23]

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency.

BSEE Equivalents



The offshore licensing body in Trinidad and Tobago is the Ministry of Energy and Energy Affairs. It is responsible for regulation and administration of all oil and gas development and licensing. It collaborates with the Ministry of Finance to collect petroleum revenues and taxes accruing to the State. Explicitly, the Ministry of Energy and Energy Affairs is responsible for determining which areas should be offered during licensing rounds for potential petroleum exploration and production. Additionally, it is responsible for regulating oil and gas development activities, licensing hydrocarbon areas, and collaborating with the Ministry of Finance to collect petroleum revenues and taxes[24]. The Inland Revenue is the specific division within the Ministry of Finance that is in charge of developing broad policies and programs for the management of tax laws and regulations including petroleum taxes[25].

The Environmental Management Authority is in charge of ensuring that environmental policies such as the Environmental Management Act and the Certificate of Environmental Clearance are followed through. The objective of the Environmental Management Act is to safeguard the "protection, conservation, enhancement and wise use of the environment of Trinidad and Tobago[26]." The Certificate of Environmental Clearance Order outlines 44 activities, including offshore activities, which require an environmental clearance before they can be carried out. If the environmental clearance assessment reveals that the offshore activities have potential environmental and human health effects, then the company/licensee may be required by the Environmental Management to conduct an Environmental Impact Assessment[26].

The Occupational Health and Safety Authority has a small role in offshore regulations. This agency has formulated a set of regulations, namely The Occupational Safety and Health Act that outlines the safety procedures that should be followed on various premises, including “offshore installations and any other installation, whether floating or resting on the seabed[27].”

Regulatory Contact Information

The Ministry of Energy and Energy Affairs

Address:
Levels 15 & 22-26, Energy Tower,
International Waterfront Centre
#1 Wrightson Road
Port of Spain
Trinidad and Tobago
Telephone: 868 626-6334/868 623-6708
Website: http://www.energy.gov.tt/
Email: info@energy.gov.tt

The Environmental Management Authority

Address:
#8 Elizabeth Street
St. Clair
Port of Spain
Trinidad and Tobago
Telephone: 868 628-8042 / 8044-5
Website: http://www.ema.co.tt/new/
Email: ema@ema.co.tt

The Ministry of Finance and the Economy

Address:
Eric Williams Finance Building
Independence Square
Port of Spain
Trinidad and Tobago
Telephone: 868 627-9700 ext: 2805-9
Website: http://www.ema.co.tt/new/
Email: comm.finance@gov.tt

The Inland Revenue Division

Address:
Trinidad House
St Vincent Street
Port of Spain
Trinidad and Tobago
Telephone: 623 1211-14/7104-8/2981-9
Website: http://www.ird.gov.tt/
Email: support@ird.gov.tt

The Occupational Health and Safety Authority

Address:
Ministry of Labour and Small and Micro Enterprise Development
Head Office
Level 5 & 6
Tower C
International Waterfront Centre
#1 Wrightson Road
Port of Spain
Trinidad and Tobago
Telephone: 868 625-8478
Website: http://molsmed.gov.tt/Services/Agencies/OSHADivision/tabid/259/Default.aspx
Email: communicationsmolsmed@gov.tt

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United Kingdom: Offshore Exploration and Production Profile

Offshore Oil Production (2013): 281 million barrels (MMbbl)

Offshore Natural Gas Production (2013): 1,344 Billion cubic feet (Bcf)

The **United Kingdom** is the largest producer of oil and second largest producer of natural gas in the European Union[1], though oil and natural gas production has declined steadily by nearly 40% since 2009. Offshore oil and gas production accounts for the majority of all oil and natural gas produced in the country. As of 2010, more than 4,100 wells had been drilled in the United Kingdom Continental Shelf (UKCS)[2]. Continued decline of oil production in the UKCS is projected through 2015 due to the overall maturity of its oil fields, aging infrastructure, and increases in taxes, although exploration continues to be attractive due to its proximity to consuming markets[3]. Companies operating in some of the largest offshore fields in the country include British Petroleum (BP), Nexen Petroleum UK, Suncor UK, BG Group, Apache, Chevron, Enquest, and Canadian Natural Resources (CNR), among others.

Geology and Geophysics

The main sedimentary basins comprising the United Kingdom Continental Shelf (UKCS) can be broadly divided into 4 separate provinces, based on petroleum geology and position; these include the North Sea Oil Province, the North Sea Gas Province, the Irish Sea, and the Atlantic Margin. The North Sea Oil Province is one of the major oil producing regions in the world. Syn-rift, organic-rich mudstones (Kimmeridge Clay Formation) comprise the source rocks for the majority of the North Sea's petroleum fields[4]. Field and well-level data for geologic ages, reservoir and water depths and pressures are reported to the UK and available for public review[5]. Since oil/gas production began in 1966, 365 fields have been identified (50 of which have been abandoned) [6]. Geophysical evaluation of the UKCS consists of speculative and proprietary seismic surveys which are subject to different agreements on release of this information.

Special Operating Conditions and New Cutting-Edge Technologies Utilized

High pressure high temperature (HPHT) environments (pressure exceeding 10,000 psi and temperature above 300° F) are encountered in the North Sea. To minimize risk and prevent accidents in these environments, the UK Health and Safety Executive has commissioned research into the HPHT developments in the UKCS[7]. Mature reservoirs and aging infrastructure in the UK North Sea will result in operators looking for newer technologies in all phases of offshore E&P. In 2010, the UK government formed a group named PILOT (formerly the Oil and Gas Taskforce), assigned to facilitate the partnership between the UK oil and gas industry and the government. PILOT's work involves study of how to improve overall offshore reservoir recovery rates in the North Sea, including through improved production efficiency (e.g. subsea tiebacks to existing infrastructure) and enhanced oil recovery (EOR) implementation[8]. Several newer E&P technologies used offshore in the UK include flexible risers, subsea tiebacks, and rig-less well intervention systems such as coiled tubing and vessel-based intervention.

Method of Offshore Tender

Under the Petroleum Act of 1998, the Crown holds all rights to the UK's onshore and offshore petroleum resources[9]. The Crown grants licenses to parties, conferring exclusive rights to "search and bore for and get" petroleum. The licenses are issued by the UK Department of Energy and Climate Change and are allocated through competitive licensing rounds, which typically take place every year and are initiated by the Secretary of State towards the objective to optimize the exploitation of the UK's petroleum reserves. Each company on a license shares joint and several liability for conducted operations. An annual charge ("rental") is collected for each license "at an escalating rate on each square km. the license covers at that date." Licenses are valid for three period sequences, or terms, which are designed to make up a typical field lifecycle: Exploration, Appraisal and Development, and Production. For example, roughly 4 years is typically assigned for exploration as well as appraisal and development, and 18-20 years (depending on type of permit) is assigned for the production period[10].

Environmental Assessment

An Environmental Statement (ES), Environmental Impact Assessment (EIA), and Strategic Environmental Assessment (SEA) are all used to investigate potential environmental impacts of offshore E&P projects. An EIA is prepared according to guidelines outlined in several European Union EIA Directives (85/337/EEC, 97/11/EC, and 2003/35/EC.). The UK government requires that findings from mandatory EIAs be submitted as an ES. Regarding offshore activities, per the European Union Council Directive on the Assessment of the Effects of Certain Public and Private Activities on the Environment (85/337/EEC), the UK requires preparation of an ES for "developments which [will] produce 500 tonnes (approximately 3,750 bb) or more per day of oil or 500,000 cubic meters or more per day of gas (not including well testing) [11]." In the UK, an ES is also prepared for "the granting and renewal of production consents for field development, the drilling of wells (deep boring), and the construction and installation of production facilities and pipelines in the United Kingdom Territorial Sea and on the United Kingdom Continental Shelf (UKCS)[12]". Strategic EAs also play a role in offshore environmental risk assessment in the UK[13]. SEA reports are prepared by the UK Department of the Energy and Climate Change in order to help Ministerial decisions through consideration of environmental impacts of offshore development[14].

Environmental Resources and Sociological Issues

According to the DECC, it is the oil and gas operators' responsibility to identify environmental sensitivities relevant to the areas where they intend to conduct any activities or develop a field, at the earliest opportunity, and to then include any potentially interested parties in the stakeholder consultation processes[15].

Natural resources: Special Areas of Conservation (SACs) with marine components are areas with qualifying marine habitats or species[16].There are currently 108 SACs with marine components, covering 7.6% of the UK sea area: 88 are in inshore waters and 16 are completely in offshore waters, with four sites with parts in both inshore and offshore waters. Sensitive coastal natural resources are identified as Strictly Protected Sites (SPAs). In the UK there are 108 SPAs with marine components. In addition there are 30 Nature Conservation Marine Protected Areas (MPAs) which equate to 16% of UK waters within the MPAs[17].

Archaeological, and Historical Resources: The United Kingdom is rich in sensitive submerged archaeological resources, and coastal archaeological and built prehistoric and historical

resources. There are 43 designated Heritage Coasts in England and Wales. 31% of the English coast and 42% of the Welsh coast are protected under this heritage coast scheme[18]. Submerged prehistoric archaeology has the potential to be present across wide areas of the UK continental shelf (UKCS) and non-submerged coastline. This includes prehistoric cultural landscapes, boats and ships, and aviation crash sites. Prehistoric and historic built resources may be visually affected by offshore infrastructure development. These include Neolithic sites to towns, industrial and defensive resources.

Sociological: The restoration and adaptive reuse of buildings in coastal towns have helped to revitalize the local economies as both domestic and foreign tourist destinations[23]. In all, there are approximately 121 seaside towns and resorts in England and Wales that are economically supported by the tourist industry[24].

Regulatory Bodies

In the section below, a figure first identifies the regulatory bodies that have overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the each agency.

BSEE Equivalents

The main offshore regulatory bodies in the UK are the **Department of Energy and Climate Change (DECC)** and the **Health and Safety Executive (HSE)**. Within the DECC, the **Offshore Environment Unit (OEU)** (which forms a part of the Offshore Environment and Decommissioning Unit (OED)) is the body whose responsibilities include "developing the environmental regulatory framework for offshore oil and gas exploration and production, offshore gas unloading and storage and offshore carbon dioxide storage on the UK Continental Shelf (UKCS), and for administering and ensuring compliance within the regulatory regime[25]". The OEU comprises three teams: The Environmental Policy team, The Environmental Management Team (EMT), and the Offshore Environmental Inspectorate Team (OEIT). The Environmental Policy Team, as suggested by the name, is responsible for developing policies to ensure oil and gas activities are performed with minimal impact on the environment. The EMT assesses and approves offshore oil and gas E&P, and the OEIT is responsible for regulating activities once offshore operations commence. Powers granted to inspectors within the OEIT include boarding any offshore installation, taking any measurements and samples, and examining and taking any copies of records considered necessary[26]. The OEIT indicates that inspection priorities are determined on an annual basis using a risk-based approach which takes into account factors such as the installation location/age, time period since last inspection, and quantity of permitted discharge/emissions. The UK HSE

also plays a major role in regulating the UK offshore industry. Its responsibilities include reviewing safety assessments submitted prior to the start of offshore operations, and ensuring that underlying causes of failure of risk management are identified and addressed[27]. The DECC and the HSE collaborate under the jointly created Offshore Safety Directive Regulator (OSDR) which is responsible for implementing the requirements of the EU Directive regarding offshore oil and gas operations safety (Directive 2013/30/EU)[28].

Regulatory Contact Information

Department of Energy and Climate Change (DECC):

Aberdeen Office
Energy Development Unit
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR
Telephone: 01224254000

London Headquarters
3 Whitehall Place
London
SW1A 2AW
Telephone

Website: https://www.gov.uk/government/organisations/department-of-energy-climate-change
Email: correspondence@decc.gsi.gov.uk

Offshore Environmental Unit (OEU); Environmental Management Team, Offshore Environmental Inspectorate Team (OEIT), and the Environmental Policy Team (further information available at the links below):

https://www.gov.uk/government/policies/providing-regulation-and-licensing-of-energy-industries-and-infrastructure/supporting-pages/environmental-regulation-of-offshore-oil-gas-and-carbon-dioxide-storage-activities

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Health and Safety Executive

Head Office
Redgrave Court
Merton Road
Bootle
Merseyside
L20 7 HS
Website: http://www.hse.gov.uk/offshore/

Offshore Safety Directive Regulator (OSDR)

Website: http://www.hse.gov.uk/osdr/index.htm

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http://ec.europa.eu/energy/oil/offshore/standards_en.htm

Venezuela: Offshore Exploration and Production Profile

Offshore Oil Production (2010): 225 million barrels
Offshore Natural Gas Production:803 billion cubic feet

Venezuela is the 13th largest total oil producer and 27th largest natural gas producer in the world. In the past five years, the country's oil production has declined by roughly 6% while natural gas production has risen nearly 40%.[1] Venezuela's offshore hydrocarbon production is centered in the Lake Maracaibo basin, on the northwestern portion of the country. Since 2003, 40% of natural gas produced in Venezuela has been used to improve oil recovery from heavy oil reservoirs[2]. Venezuela's recent offshore projects are aimed at non-associated gas production. The first offshore Venezuelan natural gas project is the Mariscal Sucre development, located off the Paria Peninsula off the northeastern coast of the country. The development consists of four fields: Dragon, Patao, Mejillones, and Rio Caribe, at water depths ranging between 328-427 feet[3]. Expected daily production at full capacity is 1.2 billion cubic feet of natural gas and 20,000 barrels of condensate[4]. The most significant recent offshore discovery in Venezuela is the Perla gas field, located in shallow water (approx. 200 ft), in the Gulf of Venezuela, off the country's northwestern coast, adjacent to Lake Maracaibo. This field will be developed by Venezuela's national oil company, Petróleos de Venezuela, S.A., as well as Italy and Spain's respective oil companies, Eni and Repsol. The completed development will consist of five wells connected to onshore processing facilities through subsea pipelines[5]. Venezuela's oil exploration and production sectors are dominated by PDVSA. International operators in the country with large natural gas assets include Repsol-TYPG, Chevron, and Statoil[6]. Venezuela is also a founding member of the Organization of Petroleum Exporting Countries (OPEC).

Geology and Geophysics

At nearly 298 billion barrels, Venezuela has the largest proven crude oil total (onshore and offshore) reserves of any country in the world and also the 8th largest proven total reserves of natural gas (197 trillion cubic feet)[7]. Venezuela's Ministry of Petroleum and Mining's most recent estimates indicate that offshore resources account for approximately 13% of natural gas reserves, while offshore resources are less than one percent of crude oil reserves[8]. The Perla gas field, located in the Gulf of Venezuela at a depth of 197 feet, is considered Latin American's largest offshore natural gas discovery with 17 trillion cubic feet (Tcf) of reserves[9]. PVDSA has recently undertaken several new offshore exploration projects in Venezuela, with project end dates in 2021.These include: drilling of 49 exploration wells in the Venezuelan Caribbean Shelf and the collection of 35,263 km of 2-D seismic and 5,442 km^2 of 3-D seismic data from 2008 to 2021; drilling of 18 exploration wells in the Gulf of Venezuela and the collection of 5,911 km of 2-D and 5,911 km^2 of 3-D seismic data from 2010 to 2021.

Special Operating Conditions and New Cutting-Edge Technologies Utilized

Venezuela's offshore production activities are concentrated in Lake Maracaibo, where water depths are generally 100 feet or less. The Lake Maracaibo basin is a heavy oil reservoir, and automated gas lift technology has been utilized to boost oil recovery[10]. Apart from operations in Lake Maracaibo, Venezuela's offshore exploration and production experience is limited. In the past several years, PDVSA and international partners have begun to explore offshore areas in the Venezuelan Caribbean Sea, off the north coast of the country and in the Gulf of Venezuela, located on the northwestern portion of the country. In 2010, the semi-submersible Aban Pearl drilling platform sank in shallow waters while performing exploratory drilling at the Mariscal Sucre offshore area (off the coast of the Venezuelan State of Sucre), the location of Venezuela's first anticipated offshore natural gas project[11]. Increased use of newer offshore technologies is expected as Venezuela gains more expertise and experience in offshore operations. Development of the Mariscal Sucre Dragon field involves the installation of a subsea pipeline to carrying produced gas onshore for processing, as well as a subsea tieback from the adjacent Patao natural gas field (also within the Mariscal Sucre development)[12].

Method of Offshore Tender

Upstream oil activities in Venezuela can be performed only by the Venezuelan state or companies which the state holds a majority share (greater than 50%). Exploration and production of non-associated gas can be performed by either private or state/state-owned entities[13]. Exploration and production licenses are granted by the President of the Republic for terms of 25 years, subject to extensions of 15 years[14].Venezuelan royalty fees are equal to 30% of extracted oil, though this percentage may be reduced to 20% for an oil field deemed to be uneconomic[15].

Environmental Assessment

In Venezuela, The Ministerio del Proder Popular para el Ambiente (MINAMB) requires all oil and gas companies to conduct an Environmental Impact Assessment (EIA) for the exploration and production of oil and gas. In general, there are three compliant stages of the EIA: the preparation of the requirements needed by the promoter to obtain the EIA; the filing of the requirements before the MINAMB, and the approval of the EIA for which the MINAMB has 45 calendar days to decide whether or not it approves the EIA.[16] Additionally, the MINAMB require a Strategic Environmental Assessment (SEA) for all policies, plans, and programs.[17]

Natural Resources

Venezuela is among the top ten countries with the highest biodiversity (typically measured by evaluating the diversity in flora and fauna within a country) in the world, and is estimated hold a considerable underwater oil reserve by many geologists.[18] The Nature Conservancy's Venezuela Team found that the areas with the highest need of protection were embedded in one of the world's richest marine oil reserve locations. They partnered with the Institute of Technology and Marine Science (INTECMAR) of Simón Bolívar University and the state-owned oil company, Petróleos de Venezuela S.A. (PDVSA), to collaborate on the implementation of sustainable business practices in the oil industry.[19] This region supports numerous marine and coastal ecosystems such as sandy beaches, rocky shores, seagrass habitats, coral reefs, soft bottom communities, and mangrove forests. Venezuela has a coastline that stretches 2,463 miles, 68% of it faces the Caribbean Sea and 21%, the Atlantic Ocean. The remaining 12% belongs to a network of over 300 islands and keys.[20] About 9% of the world's reefs are found along the Central American coast and Caribbean Islands[21], and 98% of the coral species found in the Atlantic live in Venezuelan waters[22]. There are 23 marine protected areas (MPAs) in Venezuela, which

translates to 15.33% of the country's total marine area.[23] A Presidential Decree established in 1974, protects the abundance of mangrove forests from direct destruction and activities that could pose potential threat. In 1991 a second Presidential Decree was passed that allows the destruction of mangroves in economically depressed areas, which is almost the entire Venezuelan coast. Fortunately, Venezuela's extensive network of protected areas encompasses many of the mangrove stands. An estimated 35 endangered species are native to Venezuela, including 8 bird species, the spectacled caiman[24], and the leatherback sea turtle[25], as well as several endemic species.[26]

Archaeological, Historical, Socioeconomic and Tribal Issues/Resources

Archaeological and Historical:

In 1999, Venezuela's New Constitution Referendum Article 99, "guarantees the protection and preservation, enrichment, conservation and restoration of the cultural heritage, tangible and intangible, and the historical memory of the Nation."[27] In addition, the 1993 Law of Protection and Defense of the Cultural Heritage protect archaeological sites, including those with rock art.[28] Marine archaeological resources include rare 17th century French and pirate shipwrecks near the coral reefs of Venezuela's Las Aves archipelago.[29] Coastal archaeological resources include, Taima-taima, a mastodon kill/butchering site near the western coast that has yielded archaeological evidence of humans in northern South America during the Pleistocene—early Holocene periods (14,000-10,000 B.P.),[30] and Cubagua, a 9-square-mile island off of Venezuela's northern Caribbean coast, reflects the passage of paleo-indigenous groups, nomads, and explorers dating from 3,000 to 3,500 B.P.[31] There are several petroglyphs along the northern coast, especially from Falcón to Miranda and the central coastal range (Carabobo, Aragua, Vargas, Miranda).[32] Historical coastal properties include: La Guaira, established as Venezuela's main port in 1589, exhibits colonial architecture made of traditional building materials, such as adobe and tapia;[33] Coro and its Port, the only surviving example of local traditions fused with the Spanish Mudéjar and Dutch architectural technique, and the Ciudad Universitaria de Caracas, built between 1940 and 1960, depicts the Modern Movement in architecture.[34]

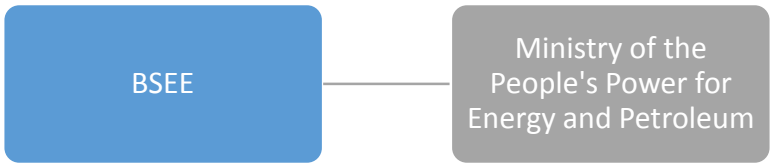
Socio-economic and Tribal:

Venezuela's most lucrative export item is oil. As a result, the oil revenue helped propel the development of a large middle class in the twentieth century. Until 1970, Venezuela was the largest oil exporter in the world, differentiating its economic success from other South American countries.[35] In 2013, Venezuela was the world's 9th largest exporter and 12th largest producer of petroleum.[36] In 2014, Pedro Pereira, who once headed the Petróleos de Venezuela (PDVSA), said that he is seeing a "second wave" of emigration from oil-industry professionals with up to 5 to 6 years of experience in Venezuela moving to Cartgena, Colombia in pursuit of a more lucrative salary. According to a ranking published by Hays Oil and Gas (a recruitment agency), an average annual salary for oil-industry professionals in Venezuela is about $50,000 compared to $100,300.[37] There is also great concern regarding the adverse impact the oil industry has had on the Karinas and Warao indigenous population in northeastern Venezuela. The Karinas land has been overtaken by oil companies,[38] and the Warao are deeply concerned about the effects intensive oil drilling could have on their habitat and way of life in the Orinoco delta.[39]

Regulatory Bodies

In the section below, a figure first identifies the regulatory body that has overlapping functions with BSEE, followed by more detailed information about the roles and responsibilities of the agency. Agencies that do not have direct overlapping functions with BSEE are grouped under the 'others' heading.

BSEE Equivalent



The main overarching federal body responsible for regulating offshore exploration and production in Venezuela is the **Ministry of the People's Power for Energy and Petroleum (Ministerio del Poder Popular para la Energía y Petróleo– MENPET)**. Venezuela's national oil company, Petróleos de Venezuela S.A. (PDVSA) is well represented within MENPET; as the current and past heads of MENPET were executives within PDVSA. MENPET's overall stated responsibilities are outlined in the Venezuelan Law of the Ministry of Energy and Petroleum (2005). MENPET's outlined responsibilities include to formulate policies/strategies for economic energy/hydrocarbon resource development, evaluate compliance with established policies, ensure sustainable development and proper use of energy resources, and control financing of hydrocarbon/energy exploration and production activities[40]. The Deputy Ministry of Hydrocarbons (Viceministro de Hidrocarburos) is the oil/gas branch within MENPET, composed of subordinate offices including the General Directorate of Exploration, Reserves, and Land (Dirección General de Exploración, Reserva y Tierra), General Directorate of Industrialization, Trade and Supply (Dirección General de Industrialización, Comercio y Suministro), and the General Directorate of Auditing and Inspection (Dirección General de Fiscalización y Inspección) .

Responsibilities of the Deputy Minister of Hydrocarbons are identified as regulating, formulating and monitoring policy and implementation of activities of the Ministry in hydrocarbon matters, and preventing environmental contamination from hydrocarbons. The General Directorate of Exploration, Reserves and Land's authority includes serving as a technical advisor on hydrocarbon development (review/approval of exploration and development plans, e.g.) and monitoring compliance with country's hydrocarbon laws/standards. Functions of the General Directorate of Industrialization, Trade, and Supply include coordinating permit and authorization in the hydrocarbon industry (e.g. storage and transport), formulating pricing/supply guidelines to comply with international supply contracts, as well as formatting/revising/assessing oil/gas contracts and agreements. The overall function of the General Directorate of Auditing and Inspection includes directing, coordinating, and supervising hydrocarbon upstream and downstream activities.

An example of inter-agency cooperation in Venezuela includes MENPET's General Directive on Hydrocarbon Exploration and Production which prescribes cooperation between MENPET and MINAMB on environmental matters and the sustainable use of natural resources. An example of cooperation between industry and government is a recent roundtable discussion between

MENPET and PDVSA to discuss potential environmental hazards and solutions regarding offshore oil/gas exploration and production activities in Venezuela's Caribbean Sea. There has been recent conflict in Venezuela over differing political views between MENPET's former Minister, Rafael Ramirez, and Venezuela's President Nicholas Maduro. Reports indicate Ramirez pushed for more of a free-market tendering procedure in the country, which was in disagreement with views of the Venezuelan socialist model[41].

Others

Other regulatory bodies include the Ministry of the People's Power for the Environmental (Ministerio del Poder Popular para el Ambiente – MINAMB), responsible national environmental policy, including environmental assessment of oil/gas operations and the Ministry for the People's Power for Labor and Social Security (Ministerio del Poder Popular para Trabajo y Seguridad Social - MINPPTRASS), responsible for issuing labor regulations and protection of workers' safety/labor rights.

The protection of archaeological sites is mandated by the Law of Protection and Defense of the Cultural Heritage (Gaceta Oficial #4.623:1993).[42] The Ministry of Culture appears to be the responsible agency ensuring this law is followed.[43]

Regulatory Contact Information

Ministry of the People's Power for Environment (Ministerio del Poder Popular para el Ambiente – MINAMB)

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Website: http://www.minamb.gob.ve/

Ministry of the People's Power for Energy and Petroleum (Ministerio del Poder Popular para la Energía y Petróleo– MENPET)

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Telephone: +58 (212) 709-9560/9561
Website: http://www.mpetromin.gob.ve/portalmenpet/index2.php

Ministry of the People's Power for Labor and Social Security (Ministerio del Poder Popular para Trabajo y Seguridad Social – MINPPTRASS)

Address:
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Telephone: +58 (0212) 408-4320
Website: http://registronacional.com/venezuela/minpptrass-ministerio-del-poder-popular-para-el-trabajo-y-seguridad-social-de-venezuela.htm

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