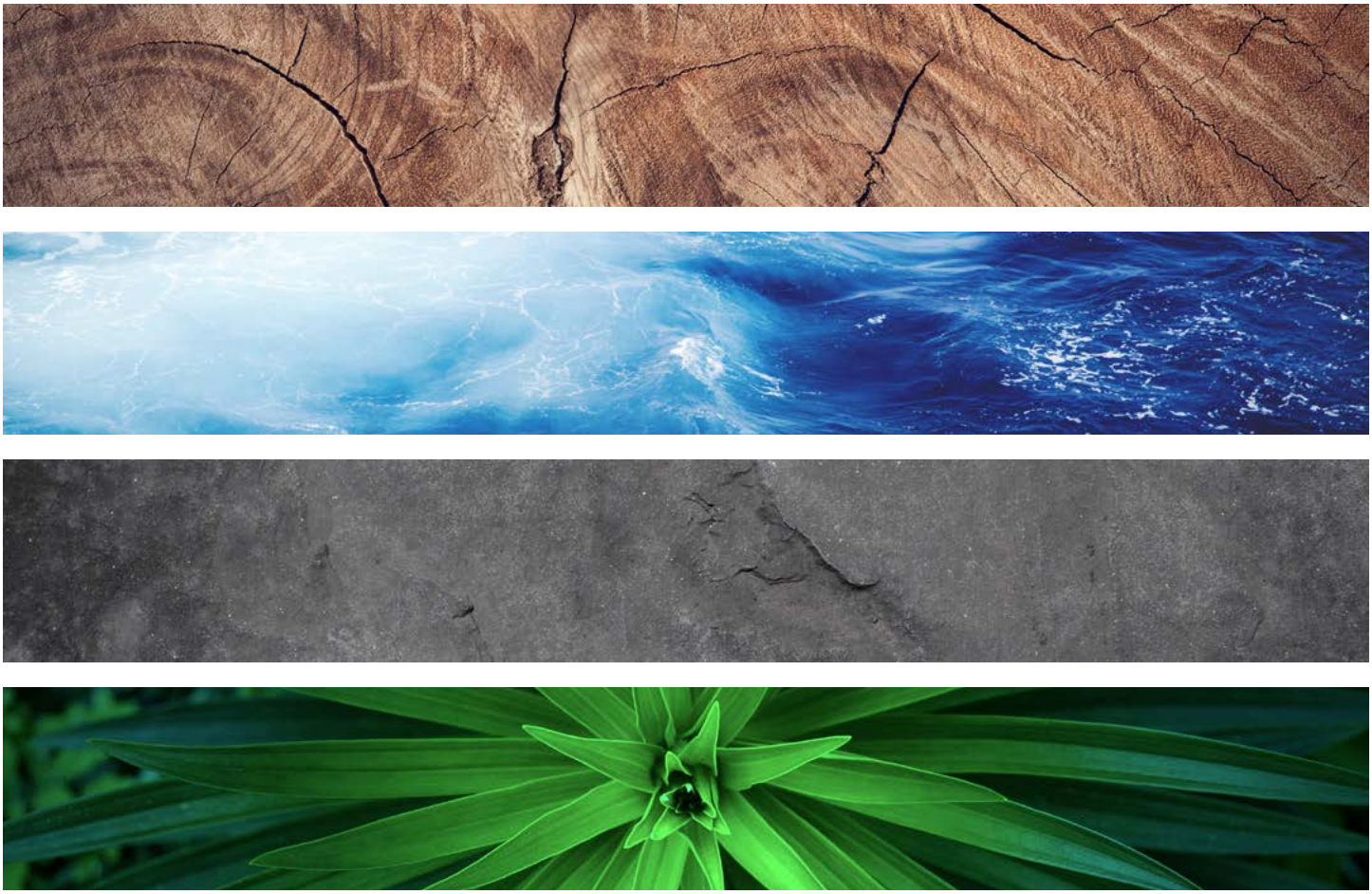
ENERGY PRODUCTION TRENDS

IN THE TOP 25 GREENHOUSE GAS EMITTING COUNTRIES



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Summary Report #3

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INTRODUCTION

Climate Scorecard's Country Report Summary #3 focuses on analyzing energy trends in the top 25 greenhouse gas emitting countries. The Report presents how each country's energy system is structured and the energy sources each nation uses to address the needs of consumers and industry. The Report also provides profiles of leading energy production companies for each country.

Country Summary Report #3 provides a landscape of the energy forces that countries are up against as they attempt to implement the Paris Agreement. For example, we see across almost all countries a history of the organization and production of nonrenewable energy sources like coal, oil, and natural gas. Most countries have gone on record in their Paris Agreement pledges to turn away from these nonrenewable sources and toward renewable energy sources, but these efforts are just beginning and need to be watched closely to see if they come to fruition. There also are interesting examples of countries like France and South Korea that are addressing the climate change issue by relying on nuclear energy.

Report #3 highlights the important role played by ministries of energy in affecting emission levels and hence climate change. While many advocacy organizations train their focus on ministries of environment, ministries of energy policies and plans would seem to be more relevant in relation to national efforts to implement the Paris Agreement.

Many countries (e.g. Nigeria and Indonesia) recently have moved to privatize large state-owned energy companies, though the state often maintains a large ownership stake in companies that have been privatized. In some countries, such as China, India, Thailand, and South Africa, the state continues to be the major if not the sole energy provider. In many countries (e.g. Canada and Germany) there is a mix of state-run and private energy companies. Countries like the United States allow citizens as shareholders to participate in the management of companies. Several countries (e.g. France and Poland) allow foreign companies to serve as energy producers and providers, while some countries, such as Japan and Ukraine, are largely dependent on the importation of energy resources from other counties. However, in almost all countries the state exerts overall control of the energy system through its ability to regulate companies and set standards for the ways in which they operate.

The largest energy companies, like PEMEX in Mexico and the Petroleum Authority of Thailand, have non-renewable energy production as their core business, but many are at least moving towards the exploration and production of renewable energy (ESKOM in South Africa and Pampa Energia in Argentina). There are a number of large companies such as ENGIE and Petrobas that operate regionally and globally and service the energy needs of many countries.

Table 1 below provides an overview of the different sources of energy currently being used by the top 25 greenhouse gas emitting countries.

Where data is available, the chart shows energy sources in different colors as a percentage of the total energy consumption against the grey rectangle representing 100%.

COAL OIL NATURAL GAS NUCLEAR HYDROELECTRIC RENEWABLE

Table 1: Energy Sources

ARGENTINA

Submitted by Climate Scorecard Country Manager
DUSTIN ROBERTSON

How The Energy System Is Structured

The Argentinian energy sector is passing through a dynamic and crucial phase. Energy is one of the top priorities of President Mauricio Macri and a new long-term policy to revitalize the energy sector was promised during his campaign. Some important changes have already taken place.

Energy (including hydrocarbons and electricity) and mining were formerly managed by different secretariats, but in 2015 the President elevated them to the level of ministry by creating the Ministry of Energy and Mining (Ministerio de Energía y Minería). The Ministry is charged with setting standards, developing policy and regulations, and making crucial improvements in the sector. One of President Macri's energy goals was to make the sector more market-friendly, and perhaps an indication of this is that former Shell Argentina Executive Juan José Aranguren was placed at the helm of the new Ministry. Since 1992, the generation and distribution activities have been open to the private sector. However, several nationalized companies are among the biggest in the country (i.e. YPF and Enarsa). Overall the market is relatively fragmented among more than ten large companies (private and nationalized).

Non-renewable

Energy from non-renewable sources is produced and provided by large companies (including both private and state-owned) in a largely liberalized competitive market. The future of non-renewable energy in Argentina hinges on a region called Vaca Muerta (literally 'dead cow' in Spanish). The area, located in Neuquén Province, was first developed by YPF and holds vast (among the world's largest) deposits of shale oil and shale gas. Top energy companies including YPF, Chevon, Petrobras, Total, ExxonMobil, etc. are now vying to access and profit from the relatively untapped resources of the region. Economists view Vaca Muerta as solution to fixing Argentina's energy deficit, allowing it to satisfy growing demands and regain its position as an oil and gas exporter.

Renewable

The market for renewable energy in Argentina is much newer and less developed than that for non-renewables, but there are some encouraging signs. In the past, the sector has struggled to attract investment. However, President Macri recently launched a decade-long plan to attract billions in investment and to boost the amount of electricity produced. The first step was an auction calling for companies to bid on contracts to produce 1,000 megawatts of power from renewable sources. According to President Macri, by increasing renewable energy output Argentina can save $300 million annually (reducing imports of natural gas and other fuels) and reduce greenhouse gas emissions by around 2 million tons a year.

Although they are not yet operating on the size and scale of non-renewables, renewable energy companies are seizing the moment and betting on Argentina's ability to improve its energy matrix. One fascinating case study involving someone with experience on both sides of the energy game is Doris Capurro, a former communications vice president of YPF who now heads Luft Energia, a renewable energy company. In a recent interview she told the Buenos Aires Herald that she was frustrated with YPFs failure to invest in renewables. Furthermore she said the current administration has taken many measures to make investors feel comfortable in Argentina. She hopes that Argentina can make significant improvements to its energy matrix in the coming years and wants her company to play an important role in this transition.

Sources of Energy

The country's energy matrix indicates heavy reliance on fossil fuels while renewable energy (with the possible exception of large hydropower) sources remain marginal. The current situation is critical as energy is the highest greenhouse gas emitting sector in Argentina.

Source	Percentage of Energy Generation
Natural gas	54%
Oil	33%
Hydropower	4%
Nuclear	2%
Others (including wind and solar)	7%

Source: Secretaría de Energía de la Nación, 2012

Profiles of Leading Energy Companies:

YPF: The largest energy company in Argentina is **YPF** (Yacimientos Petroliferos Fiscales), a vertically integrated billion dollar company engaged in producing and providing petroleum, natural gas and petrochemicals. YPF was founded in 1922 as a state enterprise, but in 1993 YPF was privatized and bought by Repsol SA (a Spanish energy firm). However, in 2012 the company was 're-nationalized' when the Argentinian government purchased the majority shares from Repsol. Today the company has operation sites across the country (e.g. Cuyana, Nequina, Golfo San Jorge, and Austral) and produces over 200 million barrels of oil equivalent annually. It is also operational in the neighboring countries of Brazil and Chile.

Pampa Energia: The second biggest company Argentinian energy scenario is **Pampa Energía**, a Buenos Aires based company founded in 2005 providing electricity to millions of Argentinians. Pampa is one of the major companies that may be shifting its focus towards renewable energy. Earlier this year Pampa bid to invest around $400 million dollars in renewable energy (mostly wind and solar). According to CEO Marcelo Mindlin, renewable energy is a 'hot sector' and his company wants to be a key player.

Learn More

'YPF should've pushed on with renewables'
New government set to introduce changes to energy sector
President Macri Launches Renewable Energy Plan 'RenovAr'

AUSTRALIA

Submitted by Climate Scorecard Country Manager
HANNAH CAMPI

How The Energy System Is Structured

The energy policy of Australia is subject to the regulatory and fiscal influence of all three levels of government in Australia, although only the State and Federal levels determine policy for primary industries such as coal.

As of 2016, Federal energy policies continue to support the coal mining and natural gas industries. Subsidies for exported fossil fuel use and production by those industries contribute significantly to the earnings of foreign exchange and government revenues.

Federal climate policy changed following the election of the Labor Rudd Government in December 2007. The new government committed to introduce an Emissions Trading Scheme in 2010, and to expand the mandatory renewable energy target to ensure that 20% of electricity supply in Australia was from renewable sources by 2020.

Sources of Energy

Using 2013-14 as a baseline year, 31.7% of Australia's electricity was generated by coal, 38.4% by oil, 24.0% by natural gas, and 5.9% by renewables.

Coal is the oldest export product of modern Australia and its second largest export. The nation's long history with coal and current heavy dependence on coal for energy make it more difficult to move to more sustainable energy sources.[1] Australia's first industrial town, Newcastle, was founded on coal. Sydney can also trace much of its development to being a supply port for coal to visiting ships.

	2013–14		Average annual growth	
	PJ	Share (per cent)	2013–14 (per cent)	10 years (per cent)
Coal	1 845.6	31.7	-5.0	- 2.2
Oil	2 237.8	38.4	-1.5	2.0
Gas	1 401.9	24.0	2.2	3.9
Renewables	345.7	5.9	4.0	2.4
Total	**5 831.1**	**100.0**	**-1.5**	**0.9**

Source: Department of Industry and Science (2015) *Australian Energy Statistics*, Table C.

Coal remained the second largest primary fuel consumed in 2013–14, but its share of Australian energy consumption has been falling since 2008–09 (Figure 3.2). In 2013–14 black and brown coal accounted for 32 per cent of total energy consumption, its lowest share since the early 1970s when the series began. Coal consumption fell by 5 per cent in 2013–14, underpinned by falling coal use in the electricity supply and iron and steel sectors. This reflects a decline in output in both these sectors and a shift away from use of black and brown coal in electricity generation.

While there are environmental and social pressures to move

1 http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/aes/2015-australian-energy-statistics.pdf

away from coal, there are economic, historical and political pressures competing against them. Australia has the fourth-largest proven coal reserves and the established infrastructure to continue producing and exporting coal for an estimated 110 years for black coal and 510 years for brown coal using current reserves. Although supply is ultimately limited, there is no imminent pressure from the supply side to move away from coal production. Some models predict production and exports of coal to increase through 2035 to maintain or increase Australia's global market share of coal.[2] However, while production is expected to increase or at least be maintained, there are efforts being made to increase the efficiency of coal-fired plants and reduce CO_2 emissions as well as research into carbon-capture and storage options. The focus of most major companies seems to be on expansion, not reduction, and given that coal provides roughly 75% of the nation's energy, companies focused on implementing renewable energy technologies such as solar and wind could have a very tough time breaking into the energy market.

Renewable energy commercialization in Australia is an area of growing activity. Australia's renewable energy industries are diverse, covering numerous energy sources and scales of operation, and currently contribute about 8–10% of Australia's total energy supply. The major area where renewable energy is growing is in electricity generation following the introduction of government Mandatory Renewable Energy Targets. The two most populous states, New South Wales and Victoria, have renewable energy targets of 20% and 25% respectively by 2020.

Profiles of Leading Energy Production Companies

Acconia Energy is a major producer of renewable energy, generating emissions-free electricity from large wind and solar farms and producing 8,600 MW of renewable energy worldwide.

Wind farms are the company's most common source of renewable energy in Australia with six farms currently operating in the country. It is a privately owned company that started in Australia and has since expanded globally, and it has built its own renewable energy plants and production sites as well as contracted through third parties.

ExxonMobil's Australian branch is privately owned and produces energy primarily through oil and gas. Exxon does not expect carbon emissions to peak until 2030, but to begin declining after that as a result of decreased carbon intensity of fossil fuels. However, they project energy demand to grow by about 65% by 2040 and plan to play a role in meeting that demand by increasing use of natural gas and working to improve the efficiency of existing technologies.

2 http://www.minerals.org.au/resources/coal/characteristics_of_the_australian_coal_industry

BRAZIL

Submitted by Climate Scorecard Staff Member

How The Energy System Is Structured

Brazil is the 10th largest energy consumer in the world and the largest in South America. At the same time, it is an important oil and gas producer in the region and the world's second largest ethanol fuel producer. The governmental agencies responsible for energy policy are the Ministry of Mines and Energy (MME), the National Council for Energy Policy (CNPE, in the Portuguese-language acronym), the National Agency of Petroleum, Natural Gas and Biofuels (ANP) and the National Agency of Electricity (ANEEL). The state-owned companies Petrobras and Eletrobrás are the major players in Brazil's energy sector, as well as Latin America's.

At the end of the 1990s and the beginning of the 2000s, Brazil's energy sector underwent market liberalization. In 1997, the Petroleum Investment Law was adopted, establishing a legal and regulatory framework, and liberalizing oil production. The key objectives of the law were the creation of the CNPE and the ANP, increased use of natural gas, increased competition in the energy market, and investments in power generation. The state monopoly of oil and gas exploration was ended, and energy subsidies were reduced. However, the government retained monopoly control of key energy complexes and administered the price of certain energy products.

The national energy system underwent a restructuring process during the end of the 20th century with the goals of establishing a regulated yet efficient structure for energy generation, transmission, and distribution. One of the main results of this reform was the establishment of the Sistema Interligado Nacional, or NIS, Portuguese for National Interconnected System, which is the name of the interlinked power grid that serves all Brazilian states and encompasses over 98% of all the energy produced in the country. Although the regulatory changes allowed for the private sector to take part in multiple aspects of the SIN, such as taking part in concession contracts to operate in multiple parts of the system, the new model still retained a number of crucial roles for government agencies, most of which are associated with the Brazilian Ministry of Mines and Energy.

Some of the main entities in charge of regulating and operating the national energy system include:

- National Electrical System Operator, or ONS: the organization responsible for operating and coordinating the energy generation and transmission systems of SIN
- Brazilian Electricity Regulatory Agency, or ANEEL: the government agency responsible for regulating the national energy matrix and related markets
- Chamber of Commercialization of Electrical Energy, or CCEE: the main operator of the electricity market in Brazil, responsible for monitoring the prices for energy distribution, advising on the activities of national power plants, and launching auctions for generation and distribution contracts

In general terms, the energy sector in Brazil can be considered highly centralized and firmly regulated by the state. Some examples of the state control include the requirement for private players to take part in auctions and concession agreements to enter the national market and price-fixing for the segments of transmission and distribution.

In 2014, the Swedish Agency for Growth Policy Analysis produced an overview of Brazil's energy sector. The Report notes that Brazil is endowed with abundant energy resources and is well-known for its unusually clean energy matrix. But with recent discoveries of large oil reserves offshore in the pre-salt layer, the long-term demand for oil is expected to increase. Other challenges to the current development model include growing internal energy demands, aging infrastructure, and the emerging impacts of climate change.

The renewable sector is expected to continue to grow and play a vital role in the county's energy mix. Currently, hydropower is well-developed, but faces challenges regarding its expansion regarding the environmental and social impacts of new dams in the Amazon. Onshore wind power capacity is expanding rapidly, particularly in the Northeast, and the plants are operating at high capacity levels. Bioenergy is already used extensively in the transport (ethanol and biodiesel) and industrial (sugarcane bagasse) sectors, and the country has developed advanced technologies and policies to incentivize the use of bioenergy–ethanol policies are not as prioritized in the energy sector agenda as they used to be. In addition, an increase in the use of biofuels for electricity generation (thermo power) could be expected for the mid- to long-term, but investment in R&D for second generation biofuels is lagging behind, even though there are recent government and industry efforts to reverse this trend.

Large investment in the oil and gas sector is planned, as Brazil seeks to become one of the largest oil producers in the world by 2021. Demand for fossil fuels is also expected to increase, not least because historically, part of the profit margin of the state-controlled company *Petrobras* (the national oil company) has been used to keep petrol prices in the domestic market low. Demand is then fuelled by the price incentive. The importance of natural gas in the country's overall energy mix is also growing, and there are signs of renewed interest in exploring Brazil's gas potential, including its unconventional gas resources–fracking is a possibility. Besides the use in industry, and because of shortages in rainfall, gas has increasingly been used to fire thermoelectric power plants. This trend is expected to continue.

The Brazilian energy sector faces a strategic moment, with a number of challenges and opportunities being presented to policy and decision makers. In the long run, a critical issue relates to the implementation of policies and strategies. Brazil has a well-developed regulatory and policy framework in place; however, increased political interference to achieve short-term goals, lack of strong implementation mechanisms, and other structural problems may hamper the implementation of such plans.

Leading Sources of Energy

What are Brazil's major sources of energy? The totality of Brazilian power consumption in 2015 show a wide variety of sources contribute to the nation's powerhouse:

- **Sugarcane biomass (16.9%)**

- **Hydraulic (11.3%)**
- **Firewood (8.2%)**
- **Lixivium and other renewable (4.7%)**
- **Oil and oil products (37.3%)**
- **Natural gas (13.7%)**
- **Coal (5.9%)**
- **Uranium (1.3%)**
- **Other non renewable (0.6%)**

Brazil is the world's 12th largest oil producer in the world. At the end of 2005, the proven reserves of Brazil's natural gas were 306 x 10^9 m^3, with possible reserves expected to be 15 times higher. The main reserves in use are located in Campos and Santos Basins. Brazil has total coal reserves of about 30 billion tons, but the deposits vary by the quality and quantity. Almost all of Brazil's coal output is steam coal, of which about 85% is fired in power stations.

Brazil has the world's second-largest known oil shale resources (the Irati shale and lacustrine deposits) and is the second largest shale oil producer after Estonia. Oil shale resources lie in São Mateus do Sul, Paraná, and in Vale do Paraíba. Brazil has developed the world's largest surface oil shale pyrolysis retort: Petrosix, operated by Petrobras. In 1999, it produced about 200,000 tons.

Brazil is the third largest hydroelectricity producer in the world after China and Canada. In 2007, hydropower accounted for 83% of Brazilian electricity production. The gross theoretical capability exceeds 3,000 TWh per annum, of which 800 TWh per annum is economically exploitable. In 2004, Brazil produced 321TWh of hydropower.

Brazil's gross wind resource potential is estimated to be about 140 GW, of which 30 GW could be effectively transformed into wind power projects.

The total installed photovoltaic power capacity in Brazil is estimated to be between 12 and 15 MWp, of which 50% is for telecommunications systems and 50% for rural energy systems. It is less than 0.01% of the energy in Brazil.

Due to its ethanol fuel production, Brazil has sometimes been described as a bio-energy superpower. Ethanol fuel in Brazil is produced from sugarcane. Brazil has the largest sugarcane crop in the world, and is the largest exporter of ethanol in the world.

Profiles of Leading Energy Production Companies

Petrobas

Petrobras is a semi-public Brazilian multinational corporation in the petroleum industry headquartered in Rio de Janeiro, Brazil. The company was ranked #58 in the most recent Fortune Global 500 list.
The Brazilian government directly owns 54% of Petrobras' common shares with voting rights, while the Brazilian Development Bank and Brazil's Sovereign Wealth Fund (Fundo Soberano) each control 5%,

bringing the State's direct and indirect ownership to 64%.

The company's website tells us that Petrobas operates in 6 business areas, listed in order of revenues:

- *Refining, Transportation & Marketing* – refining, logistics, transportation, trading operations, oil products, crude oil exports and imports, and petrochemical investments in Brazil
- *Exploration and Production* – crude oil, NGL and natural gas exploration, development, and production in Brazil
- *Distribution* – distribution of oil products, ethanol, biodiesel, and natural gas to wholesalers and through the Petrobras Distribuidora S.A. retail network in Brazil
- *Gas & Power* – transportation and trading of natural gas and LNG, the generation and trading of electric power, and the fertilizer business
- *International* – exploration and production of oil and gas, refining, transportation, marketing, distribution, and gas and power operations outside of Brazil
- *Biofuels* – production of biodiesel and its co-products and ethanol-related activities such as equity investments, production and trading of ethanol, sugar, and the excess electricity generated from sugarcane bagasse

Petrobras controls significant oil and energy assets in 16 countries in Africa, North America, South America, Europe, and Asia. However, Brazil represented 92% of Petrobras' worldwide production in 2014 and accounted for 97% of Petrobras' worldwide reserves on 31 December 2014.

As of 31 December 2014, the company had 8,112.8 million barrels of oil equivalent (4.9633×10^{10} GJ) of proved developed reserves and 4,599.7 million barrels of oil equivalent (2.8140×10^{10} GJ) of proved undeveloped reserves in Brazil. Of these reserves, 62.7% were located in the offshore Campos Basin. The largest growth prospect for the company is the Lula oil field in the Santos Basin.

In 2015, the company produced 2.284 million barrels of oil equivalent (13,970,000 GJ) per day, of which 89% was petroleum and 11% was natural gas.

Electrobas

Eletrobras is a major Brazilian electric utilities company and Latin America's biggest power utility company, as well as the tenth largest in the world. It's also the fourth largest clean energy company in the world. The company website tells us that Eletrobras holds stakes in a number of Brazilian electric companies, generating about 40% and transmitting 69% of Brazil's electric supply. The company's generating capacity is about 43,000 MW, mostly in hydroelectric plants. The Brazilian federal government owns 52% stake in Eletrobras; the rest of the shares are traded on BM&F Bovespa. The stock is part of the Ibovespa index. It is also traded on the New York Stock Exchange and on the Madrid Stock Exchange. The company's headquarters are located in Brasília, but its main offices are located in Rio de Janeiro.

Eletrobras is an electric power holding company. It is the largest generation and transmission company in Brazil. Through its subsidiaries it owns about 40% of Brazil's generation capacities and controls 69%

of the National Interconnected System. Eletrobras also is the biggest company of the electric power sector in Latin America.

Learn More

Renewable Energy in Brazil
New Developments in Brazil's Solar Power Sector
www.petrobas.com
www.electrobas.com
Energy Policy in Brazil
The Brazilian Energy Distribution System
Balanço Energético Nacional

CANADA

Submitted by Climate Scorecard Country Manager
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How Energy Production is Structured

The federal government shares responsibility with the provinces for energy, environmental protection, and trade. The main federal energy regulatory agencies are the National Energy Board (NEB) and Canadian Nuclear Safety Commission. The NEB regulates hydrocarbons, pipelines and international power lines as well as exports of oil, gas, natural gas liquids and electricity, and imports of natural gas. The NEB also oversees approximately 100 pipeline companies in Canada. Intra-provincial pipelines (within a province) are regulated by each province and include smaller natural gas distribution lines which go directly to residences with natural gas furnaces or water heaters. Utility boards regulate transmission rates. Most provinces have a stake as operators in electrical markets. Utilities are Crown corporations operating as regulated monopolies. The Canadian Environmental Protection Act avoids duplication in regulatory activity. Ontario and Alberta deregulated their electric industry/markets over the last decade. A number of municipalities operate local distribution systems, such as EPCOR in Edmonton. Electricity reliability is coordinated at a North American level between provinces and the USA. Federal R&D energy technology priorities include: cleaner fossil fuels, clean electricity, and end use (industry, communities, etc.). Conventional gas production totals are set by the provinces and cannot exceed reserves.

Decision-making structure for energy policy in Canada – IEA, 2015, p23		
Federal responsibility	**Shared responsibility**	**Provincial responsibility**
International and interprovincial energy trade	Environmental regulation of energy projects	Ownership and management of energy resources
International and interprovincial energy infrastructure	Trade and investment	Royalty design and collection
Regulation of nuclear energy and uranium	Management of uranium mining safety	Uranium mining Electricity production, distribution and regulation
Energy resources on federal Crown land, offshore and North of 60º	Management of offshore under Accords	Land-use planning and allocation
Regulations and standards relating to energy efficiency	Energy efficiency and scientific research and development	Laws and regulations on exploration, development, conservation and energy use

Canadian electric utilities account for 92% of Canada's total production; the remaining 8% of production is by industry for their own use, primarily mining, metal-processing, and pulp and paper. Except in Alberta and PEI, provinces play the dominant role in generating capacity. Investor-owned utilities dominate Alberta and PEI, and they play a smaller but significant role in BC, Ontario, and Newfoundland. Municipal ownership is a minor element in BC, Quebec, and PEI but is significant in Alberta, Manitoba, and Ontario. Investor-owned utilities produce about 9.5%, municipalities 1.4%, and the two territories 0.2%. There are also about 364 smaller utilities; 87% are in Ontario, and most are owned by municipalities. Many don't own generating capacity, instead purchasing power from the major utility. Several small investor-owned utilities, though, have generating capacity.

Provincial/Territorial

In 2014, electric utilities and industry in Canada generated 639 terawatt hours. Canada is the second largest producer of hydroelectricity in the world. BC, Manitoba, and Quebec rely predominantly on hydropower, whereas Nova Scotia, Saskatchewan, and Alberta use mainly coal. BC, Manitoba, and Quebec generally have better hydropower resources than wind. Wind is also along the Great Lakes and coasts of Quebec and the Maritimes. Wind is becoming predominant as a renewable resource. Solar has increased, but remains relatively small as a market. No predefined set of conventional or emerging energy sources are used in a given region; it is based more on availability.

The most important electricity source in Canada is moving water. Some provinces have moved towards a more competitive generation system with the private sector playing an increasing role, giving rise to independent power producers. Fossil fuels are the second most important source, particularly in Alberta and Saskatchewan, where several power stations are built adjacent to large coal deposits. Fossil fuel generation is also important in the Atlantic Provinces, NWT, and Nunavut. Ontario used to rely heavily on coal-fired generation; however, in April 2014, the last coal-fired generating capacity was shut down. Nuclear power is the third most important source. There are eighteen operating installations in Ontario

and one in New Brunswick. Quebec shut down their plant. The industry is represented by the Canadian Electricity Association, independent power producers' societies, and various source-specific associations.

Sources of Energy

Natural Resources Canada (NRCan) reports that Canada, in 2014, was the world's fifth-largest oil producer and fourth-largest natural gas producer, with the third-largest oil reserves, surpassed only by Saudi Arabia and Venezuela. Canada produced nearly 3.8 million barrels/day (mb/d) of crude oil in 2014, of which 2.2 mb/d came from the oil sands and 1.6 mb/d from conventional, offshore, or tight oil production. Oil sand extraction creates large amounts of residual waste–tailings, a mix of water, clay, unrecovered bitumen, solvent, and dissolved chemicals, including some toxic organic compounds. Unconventional oil and gas production, such as the processing and upgrading of bitumen as petroleum products suitable for market, requires more energy and the CO2 concentration is higher. In 2013, 25% of Canada's GGE came from the oil and gas sectors.

Canada has 171 billion barrels of oil reserves (sufficient to maintain the 2014 production rate for 130 years), of which 166.3 billion barrels are in the form of oil sands. In 2014, Canada exported 2.85 mb/d of its crude oil (97% to USA and 3% to Europe and Asia). Alberta (77.4%), Saskatchewan (13.7%), and Newfoundland (5.7%) account for over 96% of Canadian oil production. Given Canada's vast geography, producers in the west export to the USA, whereas the east imports from the USA and overseas. By importing, Canada outsources emissions penalties from producing oil domestically. The David Suzuki Foundation declares that emissions from oil sands production nearly tripled from 1990 to 2006 and that natural gas emissions were over 110 gCO2e/MJ in production. The largest growth was fugitive emissions from unconventional gas due to its higher levels of CO2. In Canada, unconventional gas (shale and tight oil) development has strict regulatory frameworks. Growth requires estimating future demand, pricing, and the regulatory environment. Overall, Greenhouse Gas Emissions (GGE) increases result directly from production increases.

Canada's portfolio of energy resources involves both domestic consumption and exports. NRCan views Canada as an energy-intensive country, given its northern climate, vast territory, industrial base, and high standard of living. The provinces access different natural resources and rely on different sources of electricity generation. Quantity of consumption is based on economy, weather, geography, and geology. Canada produced 435.1 million tons of oil-equivalent (Mtoe) of energy in 2013. Fossil fuel energy production was 44.8% oil, 30% natural gas, and 8.1% coal. Renewables included hydro-electricity at 7.7%, biofuels and waste at 3%, and emerging forms (wind, tidal, solar) at 0.2%. Nuclear energy accounted for 6.2% (the primary source is uranium, of which Canada is the world's second-largest producer). Canada is well-positioned for global growth in nuclear demand.

Leading Energy Companies

NRCan affirmed this spring that Canadian energy companies continue to expand their assets. Of some 435 companies, 59 (14%) had assets in excess of $1 billion, 214 (49%) had interests outside of Canada in 75 countries, and 166 (38%) had assets in at least two countries. Total Canadian assets were $543 billion, of which $150 billion was outside Canada. In the USA, five large companies impacted that

value by $28.3 billion–Encana Corp., Enbridge Inc., Fortis Inc., Baytex Energy Corp., and TransCanada Corporation. Big oil refineries include Imperial Oil, Irving Oil, Syncrude, and Suncor. The top five utilities buying and producing clean power in 2013 were Hydro Quebec, BC Hydro, Ontario Power Generation, Manitoba Hydro, and Ontario Power Authority.

Two companies representative of Canada's energy production sector are Fortis Inc., which is just moving into renewables (on the east coast of Canada), and BC Hydro, which generates 98% of its electricity from renewables (on the west coast of Canada).

FORTIS INC.

Fortis is an international regulated electric (70%) and gas (26%) utility holding company. It also invests in non-regulated energy infrastructure (4%) in Canada (335 MW) and Belize (51 MW). Fortis has nine independent utility operations in Canada (five utilities–Fortis BC, Maritime Electric, Fortis Ontario, Fortis Alberta, and Newfoundland Power), the USA (two–UNS Energy and Central Hudson) and the Caribbean (two–Caribbean utilities and Fortis TCI). Energy sources include coal, oil, diesel, natural gas, and biofuel, with a strong emphasis on renewables in 2014.

Utility companies regulated by Fortis serve more than three million residential, commercial, and industrial customers across Canada, the USA, and the Caribbean.

Each operating subsidiary retains autonomy given its operations, jurisdiction, size, and regulatory environment. Canadian and Caribbean sites have IS0 14001 systems, and the USA utilities both have environmental protocols. During 2014, 10.3 million tons of CO2 were generated in production using fossil fuels and natural gas losses; 4.8 million tons were generated from energy purchases of $15.1 million. Future plans include energy efficiency (EE) programs, clean energy, and reduction of their reliance on coal.

Their 2015 environmental report highlights subsidiary initiatives and efforts to address emissions. During 2014, fossil fuels accounted for 86% of production and hydroelectricity accounted for 14%. Fortis' generating assets accounted for approximately 68% of the GGE; energy purchases accounted for the remaining 32%. A significant milestone in 2015 was a 335 MW Waneta hydroelectric generation expansion in BC to power 60,000 homes a year toward BC's Clean Energy Act. Central Hudson's relationship with the local solar industry made it one of the top regions in the USA in 2014. Fortis has a number of customer incentives underway, has new solar and hydroelectric power projects, and is preparing utility partners to connect to the grid.
Maritime Electric purchases all the energy supplied by PEI provincially owned wind farms, with wind energy exceeding 24% of their energy sold in 2014. Fortis has reduced fugitive emissions at compressor stations by 10% on the BC mainland and Vancouver Island, and has improved pneumatic device efficiencies, reducing 86T of vented GGE. Central Hudson is developing an aggressive gas infrastructure program to replace leak-prone pipes. Other Fortis programs include the use of biomethane, methane gas, and biodiesel fuel for fleets; water reuse; tree planting; sulphur hexafluoride management; and a broad array of EE initiatives.

BC HYDRO

BC Hydro is a Crown corporation, owned by BC's government and residents. The sole shareholder is the province. BC Hydro serves 95% of BC's population, delivering electricity to approximately 1.9 million residential, commercial, and industrial clients and 4 million people overall. BC Hydro became carbon neutral in its corporate operations in 2010, along with the BC public sector.

BC Hydro operates 31 hydroelectric facilities and 3 thermal generating plants, with the bulk of generation coming from dams on the Peace and Columbia Rivers. In 2015, it generated 98% of its electricity from renewable sources. Electricity is delivered to customers through over 78,000 km of transmission/distribution lines and connects to other systems in BC, Alberta, and Washington State. Independent Power Producers (IPPs)–hydroelectric, wind, gasification and biomass generating projects–account for 25% of BC Hydro's domestic supply. IPPs include power production companies, First Nations, municipalities, and customers that provide 19,290 GW/hr electricity/yr when BC Hydro faces a gap.

Conservation/efficiency, smart meters, maintaining and expanding generation and transmission assets, and adding supply through long-term IPP electricity purchase agreements all help to meet demand. BC Hydro has biogas, municipal solid waste, Resource Smart, and natural gas in its inventory. Options not yet in commercial use by BC Hydro are geothermal, pumped storage, wave, solar, and coal with carbon capture and sequestration.

BC Hydro is investing in the energy needs of 1.1 million more people in 20 years (4.6 to 5.7 million) and in the economic activity they will generate. Much of the assets that exist were built between 1940 and 1980. Upgrading assets includes high-voltage transmission lines, dams and power generating stations. A new project, the Site C Clean Energy Project, to finish in 2024, will provide 1,100 megawatts (MW) capacity, and 5,100 gigawatt hours (GW/hr) of electricity per year to power 450,000 homes. A second project, started in 2005, is the upgrade of flood discharge gate systems (spillway gates) and control systems at 22 facilities. BC Hydro owns and maintains 41 dam facilities in its system. Spillway gates control the water discharged from reservoirs during floods when high inflows exceed the ability of the generating units to use all the water.

Five measures categorize GGE reduction options: conservation and efficiency, fuel substitution, electrification, low carbon electricity, and offsets. BC Hydro has a range of conservation programs geared to the Greenhouse Gas Reduction Targets Act. A savings equal to the needs of 425,000 homes has already been achieved.

BC Hydro reports to the province through the Minister of Energy and Mines and the following legislation, policy, and instructions: The Hydro and Power Authority Act, The Utilities Commission Act (pricing), The BC Hydro Public Power Legacy and Heritage Contract Act, and the Province's Energy Plan. The Ministry requires a rigorous Integrated Resource Plan (IRP) submitted every five years (2013) to describe how customer needs are helping to achieve provincial GGE targets.

Learn More

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CHINA

Submitted by Climate Scorecard Staff

How The Energy System Is Structured

The energy policy of China is a policy decided on by the Central Government. Ensuring adequate energy supply to sustain economic growth has been a core concern of the Chinese government since 1949.

China has been taking action on climate change for some years; on June 4, 2007, China's first National Action Plan on Climate Change was published.
The National Action Plan includes increasing the proportion of electricity generated from renewable energy sources and from nuclear power, increasing the efficiency of coal-fired power stations, the use of cogeneration, and the development of coal-bed and coal-mine methane.

Since 2005, the Chinese government has intensified its efforts to privatize parts of the energy sector. Whereas the transmission and distribution of electricity remained under state control, the power generation market was partly opened to private and foreign investors. The main reason for this change in direction was the need to operate the system more cost-effectively and to attract clean technologies for power generation.

China currently lacks a national grid. There are currently 6 wide area synchronous grids. The lack of a single grid frequently creates power shortages.

Leading Sources of Energy

China's sources of energy include coal (69%), oil (18%), natural gas (4%), nuclear (1%), hydroelectric (6%), and renewable (wind, solar, etc.) (1%).

China has abundant energy with the world's third-largest coal reserves and massive hydroelectric resources. But there is a geographical mismatch between the location of the coal fields in the northeast (Heilongjiang, Jilin, and Liaoning) and the north (Shanxi, Shaanxi, and Henan); hydropower in the southwest (Sichuan, Yunnan, and Tibet); and the fast-growing industrial load centers of the east (Shanghai-Zhejiang) and south (Guangdong, Fujian).

In the industrial sector, six industries—electricity generation, steel, non-ferrous metals, construction materials, oil processing, and chemicals—account for nearly 70% of energy use.

International criticism regarding China's energy mix, with its heavy reliance on coal as main source for electricity generation, was joined by the populace's rising concerns over heavy CO2 and particle pollution measures. In 2015, China's leaders committed to seeing carbon emissions starting to peak at 2030, which requires adding as much as 1,000 gigawatts of capacity from low-carbon emitting energy sources.

In 2014 China led the world by adding 56 gigawatts of clean energy. Almost one out of every three wind turbines in the world and about 17% of the world's solar capacity is in China.

Apart from renewable energy sources, China has put a focus on the development of nuclear power over the past years. The Chinese government expects to reach 58 gigawatts of nuclear capacity by 2020. (Japan had about 50 gigawatts of nuclear capacity before the Fukushima accident.)

Profiles of Leading Energy Production Companies

China's biggest crude oil companies are state-owned energy conglomerates with sprawling international operations in oil and gas exploration and production; petroleum and chemical processing; storage and transportation; and many other energy production functions. Examples of such companies include the following:

China Petroleum and Chemical Company

China Petroleum and Chemical Company, known as Sinopec, is an oil, gas, and chemical giant with more than $440 billion in consolidated revenues. The company produced 361 million barrels of crude oil in 2014. Sinopec maintains vast operations along the full length of the oil supply chain, from exploration and drilling to retail sales at more than 30,000 gasoline stations.

China National Petroleum Corporation

China National Petroleum Corporation or CNPC is the second biggest Chinese crude oil producer. In 2014 the company reported more than $425 billion in consolidated revenue and production of nearly 1.2 billion barrels of crude oil. Like SINOPEC, CNPC operates businesses along the full length of the oil supply chain, from initial exploration to retail. Most CNPC operations are organized under a subsidiary company, PetroChina.

China National Offshore Oil Corporation

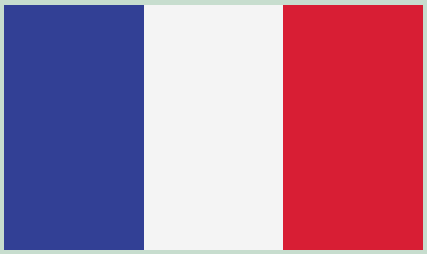
China National Offshore Oil Corporation, known as CNOOC, was established in 1982 to focus on oil and gas exploration and production in China's offshore waters. It has since developed into an international company with operations in more than 40 countries.

Learn More

The 5 Biggest China Oil Companies
By the Numbers, China's Clean Energy Investments Show Big Gains
China's Power Sector Statistics
Key China Energy Statistics
China's Energy Sector

FRANCE

Submitted by Climate Scorecard Country Manager
CHARLIN GAUDIN



How The Energy System Is Structured

In France, there are companies that produce and provide energy to consumers (e.g. ENGIE and EDF) and companies that are only providers but do not produce the energy (e.g. Planète Oui, which provides only renewable energy). As well, some companies are only dedicated to the production of renewable energy (e.g. JPee).

Despite the opening of the energy market in France in 2007, the two historical operators—EDF and ENGIE (ex-GDF), which were state-owned until 2006 (Law No 2006-1537 concerning the energy sector)—are still the main producers and providers of energy in France (EDF for nuclear energy and ENGIE for gas). Indeed, they both still represent 90% of market shares. The French government currently owns more than 30% of ENGIE's capital and 85.3% of EDF's capital.

Until 2016, if the renewable energy producers wanted access to state subsidies they needed to sell their electricity to EDF systematically. This was called the "purchase obligation" (*obligation d'achat*). Since the adoption of the Decree on additional remuneration (Décret n° 2016-682 du 27 mai 2016), it is possible for the producers to sell their renewable energy to other operators while at the same time preserving the possibility of receiving subsidies. This was an important step in giving other energy providers (like Planète OUI) the chance to more easily buy renewable energy from different sources. However, the bank guarantee has replaced the purchasing monopoly (i.e. *obligation d´achat)*. We can therefore say that the French government is still willing to leave the development of renewable energy to EDF, which is the most important nuclear energy producer in the world. There is a certain contradiction in leaving the development of green energy to a company producing nuclear energy as 78% of its energy mix (58 nuclear power plants). The costs for shutting down nuclear power plants make the promotion of renewable energy and the energy transition in France quite difficult.

Ségolène Royal, President of COP21, entrusted Pascal Canfin (former Minister, Managing Director of WWF France), Alain Grandjean (co-founder and partner of Carbone 4), and Gérard Mestrallet (Chair of ENGIE) with the mission of developing a report for enhancing carbon pricing across the world. At a French level, the report includes a proposal to introduce a floor price of €30/tCO2 for national electricity production. This measure would lead to the closure of almost all coal-fired and gas-fired power plants, significantly increasing the risk of blackouts on the French power grid. In order to replace coal-fired power production with gas-fired production, while securing supplies and reducing greenhouse gas emissions, the report proposes two options at a French level:

- Establishing a regulatory standard based on greenhouse gas emissions from power plants; establishing a differential tax, the level of which would take account of the yield from thermal power plants. The aim of this would be to improve the general energy efficiency of all thermal power plants.
- Establishing a differential tax, the level of which would take account of the yield from thermal power plants. The aim of this would be to improve the general energy efficiency of all thermal power plants.

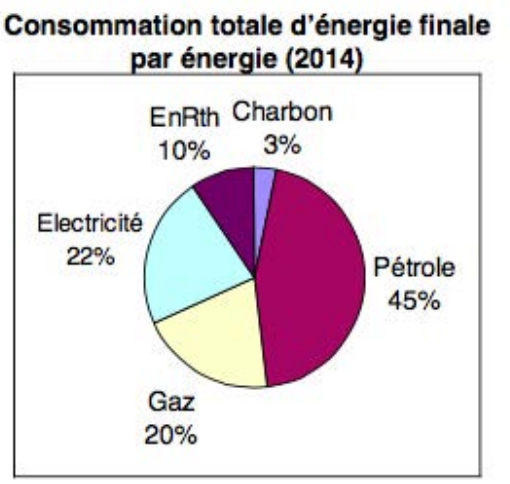
Sources of Energy

In 2014, the total consumption of primary energy in France was 257 Mtoe. This represents a reduction of 0.7% per year since 2005. Since 2000, the energy mix in France has been almost stable, with around 45% primary electricity (renewable and non-renewable), 47% fossil fuels (30% oil, 14% natural gas, and 4% coal), and 7% renewable thermal energy and recovered wastes. The total of renewable primary energy represents less than 10% of the energy mix with 24 Mtoe (seasonally adjusted data) (Source: *Bilan de l'énergie, CGDD/MEDDE*).

In France, after a drop of 3.8% in 2014, the consumption of primary energy increased by 1.6% in 2015 at 253.4 Mtoe. The main reason was the drop in temperature compared to 2014, a year with exceptionally mild temperatures. The national production of primary energy grew slightly to reach around 140 Mtoe. The balance was close to its 2015 level, but the energy bill reduced by 28% due to the drop of fossil energy prices. Below 40 billion euro, the energy bill reached its lowest level since

2004. In this context, the final energy consumption, seasonally adjusted, which dropped on average by 0.9% between 2008 and 2014, has been almost stable since 2015.

The figure below shows the total consumption in 2014 of final energy per energy type.



In 2012, nuclear power plants (58 in total) produced 75% of the net electricity production. The French electricity mix is made of 75% nuclear energy and only 15% renewable energy, and therefore 90% non-fossil, non-CO2-emitting energy. Thermal, fossil, and CO2-producing energy represents around 10% of the mix. However, if nuclear energy does not emit GHG, it raises other environmental issues and cannot be considered the only alternative to fossil energy. France being the second largest nuclear energy electricity producer in the world, the energy transition is very challenging in a country where the sector is highly subsidised.

The share of renewable energy in France in the final gross consumption of energy was 14.9% in 2015 and has been progressing regularly for the last 10 years. The important growth of renewable energy since 2005 (+48%) is mainly due to the development of biofuels, heat pumps and wind sector. The development of solar energy and solid biomass for heating also contributed to this growth, even if this practice was limited between 2014 and 2015 due to the extremely mild climate.

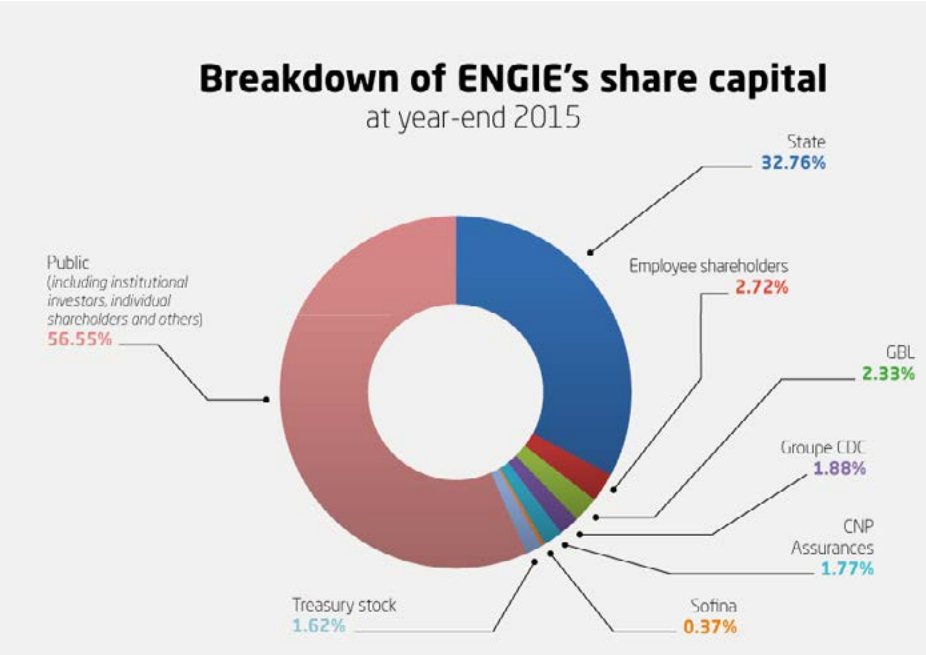
Currently, it seems very difficult for France to follow the targets adopted in the framework of the EU climate and energy package. France committed to having 23% of renewable energy in its final energy consumption in 2020, but currently it has only reached around 14% (14.9% in 2015). In the last European ranking established at the end of 2015 based on 2013 data, France ranked sixth, below the average of the 28 Member States (15%) and way behind the champions including Sweden (52.1%), Latvia (37.1%), Finland (36.8%), and Austria (32.6%). France has even dropped by three positions since 2010, surpassed by Italy and Greece.

Profiles of Leading Energy Companies

ENGIE: ENGIE is the first independent power producer in the world and operates in 70 countries. It has 117.1 gigawatts of installed power production capacity (2015). It has 228 urban networks for heating and cooling operating in 13 countries. The production-base energy sources are the following:

- 56.2% natural gas
- 18.3% renewable energy
- 12.8 % of coal energy
- 5.3 % of nuclear energy
- 7.4% other

As of December 31, 2015, the Company counted 2,435,285,011 shares with a par value of Euro 1. The figure below present the breakdown of ENGIE's share capital. Only 32.76% of its capital is state-owned.



ENGIE has a board of directors and an executive committee. The board of directors defines the strategic guidelines and directions of the business, and the executive committee implements group strategies to succeed in the energy challenges of tomorrow. The board of directors is supported and informed by four committees with complementary areas of expertise:

- The Audit Committee
- The Strategy, Investment and Technology Committee
- The Nomination and Compensation Committee
- The Committee for Ethics, the Environment and Sustainable Development

The members of the ENGIE50 Operational Management Committee are:

- The members of the General Management Committee
- The 24 Business Unit CEOs
- The Heads of the 5 *Métiers*
- The Heads of the main Functional Divisions

ENGIE indicated in front of the French National Assembly that it is well aware of the role it has to play in combating climate change and has set itself a series of ambitious targets. It is now working to go even further and achieve a 10% reduction in CO_2 emissions per kWh generated by 2020. It has also exceeded the goal it set itself by increasing our power generation capacity from renewables by

60% between 2009 and 2015, compared to its original target of 50%. ENGIE monitored the COP21 climate negotiations very closely, and has warmly welcomed the directions set in the Paris Agreement, especially the inclusion of a strong generalized carbon price signal as an encouragement to companies to invest in low-carbon technologies.

ENGIE made strong climate commitments, which include:

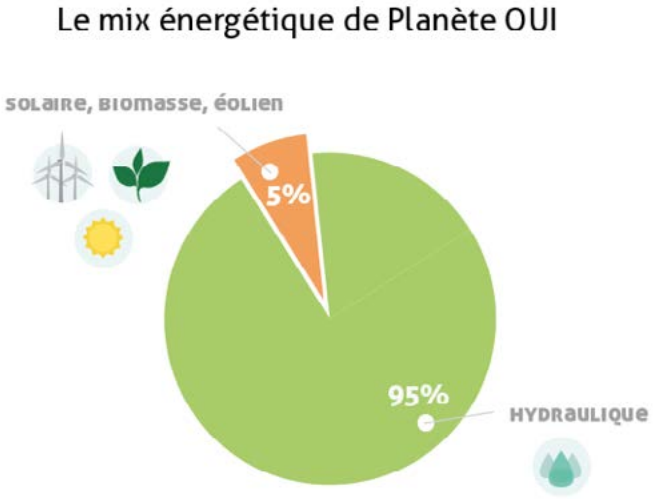
- The 2015 decision to halt all new coal-based projects
- The development of new offers tailored to the issues faced by individual regions
- The development of new gas solutions, such as biogas and the road and sea transportation of Green Natural Gas (GNG).

Aware of its responsibility and the major role it plays in the transition to a low-carbon economy, the Group has identified the actions needed to make the climate agreement targets a reality:

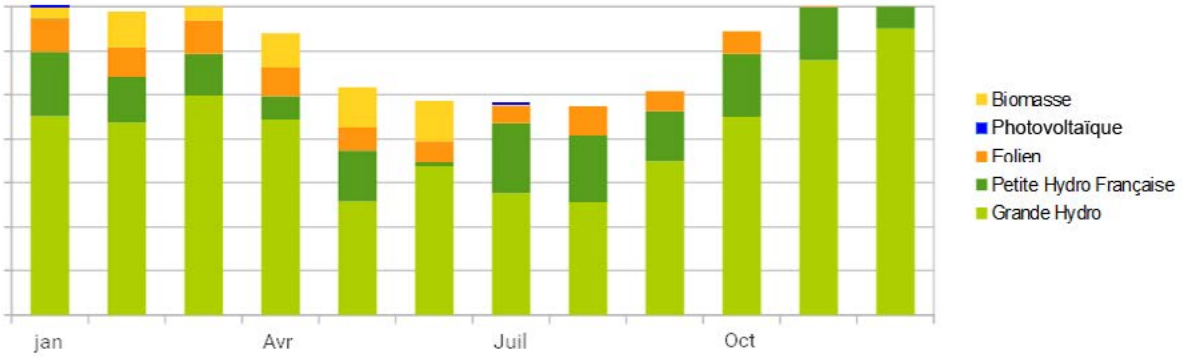
- Continuing to consolidate the key topics identified at COP21 and keep up the impetus on commitments (working alongside the World Bank, supporting European reforms, etc.)
- Strengthening initiatives to redirect funding towards investment that will deliver carbon reductions (Green Fund and access methods)
- Continuing to promote dialog between companies and governments, as is already the case with the Business Dialogue, in order to facilitate the introduction of a framework to encourage the rollout of low-carbon solutions
- Encouraging access to energy in developing countries–especially those in Africa–through the development of renewables

Planete Oui: Planete Oui was funded in 2007 when the energy market in France was liberalized. Planet OUI is currently the only French provider proposing an alternative solution for eco-labelled electricity. Since its creation, its objective for green growth fosters the reduction of energy consumption and supports the production of renewable energy. Planète OUI buys its electricity from different French and European renewable electricity producers. In order to guarantee the origin of its electricity, Planète OUI certifies its electricity procurements with origin guarantees issued by independent French or European producers which comply with the EU Directive 2009/28/CE. Currently, Planète OUI has around 30,000 clients. The policy of Planète OUI is to mobilize consumers who are often not sufficiently involved in the energy transition.

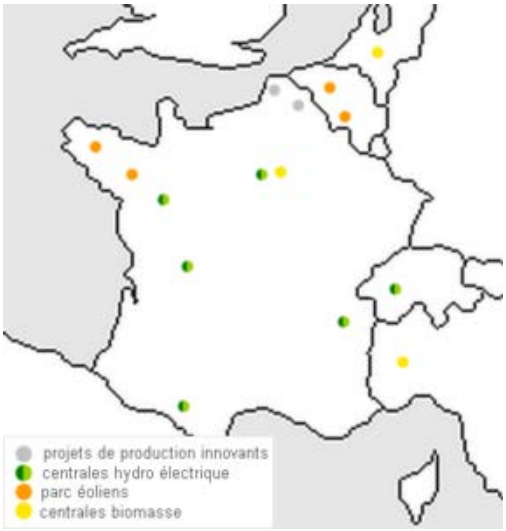
The figure to the right presents the energy mix of Planète Oui. The majority of the energy purchased by Planète OUI comes from hydraulic energy.



The graphic bellows shows the periodicity and the origin of Planète OUI's energy mix in 2015.



The map below presents the partner production sites of Planète OUI.



The objective of Planète OUI in future months is to insert within this sourcing new and innovative energy production (e.g. *hydroliennes bio mimétique* from the company EEL Energie in partnership with the French Institute for research IFREMER).

Planète OUI commits to maintaining prices that are below or equal to regulated prices. With the Law NOME (new organisation of electricity market) and the Code of Energy on renewable electricity providers, consumers can take ownership of the development of these production that they finance through the CSPE (tax appearing on the electricity bill of all French consumers). In this way, Planète OUI makes accessible to its consumers their right to consume what they financed themselves. The basic price per KWh is between 0.1564 euro (all taxes included) and 0.1462 euro.

Planète OUI policy is in line with the French objective to reach 20% of renewable energy by 2020. It proposes a reduction of 20% on registration thanks to its services *Electroécolo* and *Electréconso*. 20% of the investments of Planète OUI are directly engaged towards the production of alternative energy and/or the development of free services to support energy control and efficiency. By only providing renewable energy to its clients, Planète OUI contributes to a low carbon footprint. The other impact of Planète OUI on the reduction of GHG emission is to make an offer to its clients to reduce their energy consumption by becoming the owner of their electricity bill. However, the reduction of GHG emission that this will generate is not yet measurable.

Planète OUI faces the difficulty of accessing renewable energy production which remains mainly in EDF's hands, despite the opening of the market to competition and the end of the purchasing obligation.

Learn More

https://www.planete-oui.fr/?gclid=CMK62O_Wzc4CFWIW0wodmc4FZw
Interview with Nicolas Milko, Directeur and founder of Planète OUI.
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GERMANY

Submitted by Climate Scorecard Country Manager
ROLAND SELINGER

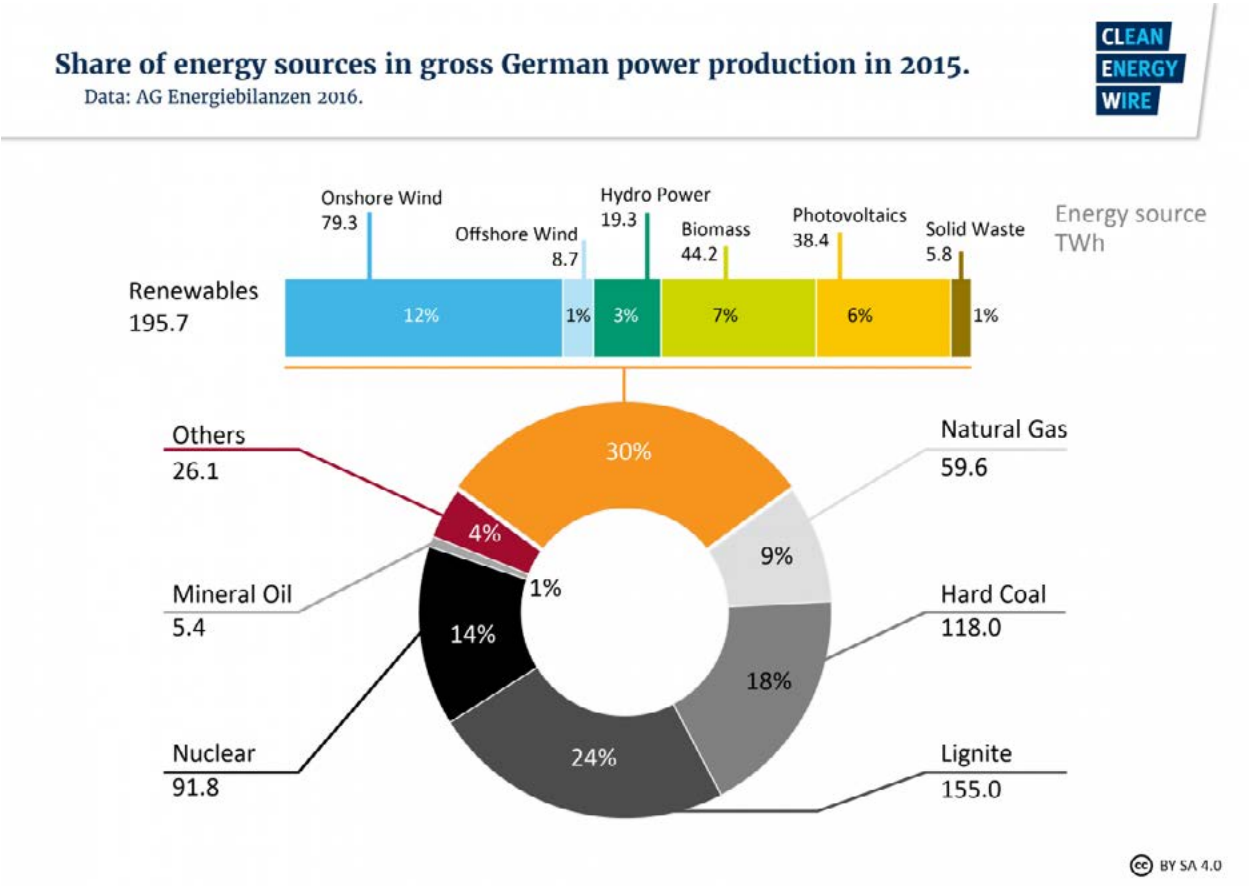
How The Energy System Is Structured

As one of Europe's most populous states and dominant economic players, Germany's energy demand is the largest in the region. It is also a net exporter of energy, mainly supplying energy to markets in Austria and the Netherlands. Energy policy is governed by the Federal Ministry of Economic Affairs and Energy, as well as the Federal Ministry for the Environment, Nature, Conservation, and Nuclear Safety. While the former includes two main bodies that manage the power sector, the latter leads climate and nuclear safety protection. Managing the power sector involves such things as regulating competition and overseeing energy networks, of which German states play a part as well.

Germany's transmission system is owned and run by four companies–Amprion, Transet BW, TenneT, and 50Hertz Transmission–who, by European law, are required to separate their electricity transmitting, generating, distributing, and supplying activities. Transmission or distribution companies may be owned by the state, by a foreign state, by an institution, privately-owned, or joint-shared. Companies that generate and distribute energy are able to supply individuals on the basis of long-term contracts with respective German municipalities. German individuals have been able to choose their energy supplier as of 1998, many of which have been opting for smaller-scale competitors of major companies. While supply companies must pay one-time fees, the final costs of grid use are borne by end-consumers. As such, the costs of expanding renewable grids within German territories–including PV solar, on-shore wind, and biomass–will be highest for those living in small rural areas.

Sources of Energy

Germany's energy was majorly comprised of non-renewables in 2015, with lignite consumption comprising 24% of all energy. However, renewables were responsible for 30% of energy consumption, with on and off-shore wind energy (17%) being a most popular source. Details can be found in the chart below:



Profiles of Leading Energy Companies

There are four major energy producers in Germany, jointly known as the "Big Four," which control most electricity distribution, generation, and retail supply in the country. These companies are RWE, E.ON, EnBW, and Vattenfall, all of whom operate under a vertically integrated corporate structure, meaning they are directly responsible for the production and supply of energy through privately-owned plants and grids. These companies are also undergoing major restructuring following Germany's *Climate Action Programme 2020*, which has an overall goal to reduce CO2 emissions by 2020 by 40% compared to 1990 levels. Additionally, Germany's *Energiewende*, a comprehensive national energy plan designed to transition the state to a low-carbon and affordable energy consumer, is being taken into consideration. At the forefront of this plan is the transition out of nuclear energy, a decision that was driven by public outcry, first after the Chernobyl accident of 1986 and then again after the Fukushima failure in 2011. Following the Paris Agreements, these companies have also taken certain measures (detailed below) to reduce non-renewable activities. However, as Germany's Minister for Economic Affairs and Energy has admitted, "exiting coal and nuclear power at the same time will not be possible."

RWE

RWE is based in the north-western state of Rhineland-Westphalia, with a total of 6.8 million energy consumers in Germany and over 20 million across Europe. Its primary energy source is lignite, for which it operates 5 major power plants and 3 opencast mines in western Germany. The company produced a total of 213 billion kilowatts per hour (KWh) of energy across all operations in 2015, 132.1 billion of which were produced in Germany alone, which translates into some total gross CO2 emissions of 109, one million tons in the same year, putting RWE among the top three CO2 emitters in the EU ETS. RWE also recorded €48.6 billion (approx. USD 51.3 billion) in revenue. Many targets under the *Energiewende* were opposed by RWE, largely because it would have forced them to close 17 of their 20 lignite operations, with lignite being their largest source of energy. Therefore, RWE is primarily restructuring its operations under Germany's 2020 Climate Action Programme, for which they are aiming to reduce their emissions by 0.62 million tons per megawatt per hour (MWh), or approximately 15% reduction from 2015 to 2020. During this time, RWE states that it is likely to expand its renewable energy production via wind and solar farms in countries such as Spain and Italy, although the company hasn't detailed what this would mean.

E.ON

E.ON, also based in Rhineland-Westphalia, is Germany's largest operator of electricity and gas distribution networks, controlling four major grid companies in Europe. Their customer base includes over 6 million people in Germany and over 33 million throughout Europe, surmounting to a total revenue of €116 billion (USD 122.5 billion) in 2015. The total amount of energy produced was 215.2 billion KWh in 2015, of which 61.2 billion were produced in Germany. This equivocated 20.3 million tons of CO2 emitted in Germany and over 200 million across all operations. Since 2016 E.ON has decided to undergo major corporate restructuring, expanding renewables exclusively under the E.ON name and transferring all non-renewable activities to joint company Uniper. Nuclear operations are also being phased out under joint company Preussen Elektra. This restructuring will involve investing €7 billion into expanding three offshore wind parks over the next 5 years, with an overall CO2 emissions reduction of 20% by 2020, relative to 2015 levels. The closure of nuclear operations–E.ON's largest

energy source—is an ongoing and prioritized effort by E.ON, under Germany's *Energiewende*, with one plant already shut down as of 2015 and 3 others expected to be closed by 2022.

EnBW

EnWB is a state-owned company located in Baden-Württemberg, with energy services to over 5.5 million consumers in Germany and total revenues over €21.1 million (USD 22.2 million). As of 2013 EnBW has been restructured under an integrated business model, which aims to increase their output accounted for by renewable energies from 19 percent to over 40 percent in 2020, based on 2012 figures. It is now responsible for supplying renewable energy to over 35% of households in the region. In 2015 it produced a total amount of 250.8 billion KWh of energy, most of which was traded on energy markets. This translated to a total level of 35.9 million tons of CO2 emissions, the same year which EnBW expanded to 47% renewables. EnBW aims to reduce their emissions by 40% by 2030, based on 2012 levels. The company's largest focus for renewable expansion is on off-shore wind farms in the Baltic Sea, which is projected to offset 167,000 tons of CO2. In the period between 2016 and 2018 EnBW will invest €1.6 billion (USD1.7 billion) in building new renewable energy projects, with a large focus on grid development.

Vattenfall Deutschland (VD)

Vattenfall, the parent company of VD, is Europe's fifth largest energy producer, fully owned by the Swedish state, and among the top three CO2 emitters in the EU ETS. According to a 5-year study by *ekopolitician*, of the total 93 million tons of CO2 emitted in 2015 by Vattenfall, 99.5% were exclusively outside of Sweden. VD emitted 79 million tons in Germany alone, an increase from the previous year due to the controversial commissioning of a new power plant in Mooburg. The company is responsible for supplying energy to over three million consumers in Germany, 49% of which comes from non-renewable sources (primarily lignite). According to targets in the 2020 Climate Action Programme, the German lignite industry is supposed to cut emissions by 12.5 million tons of CO2, with lignite producers to be financially compensated for their loss of production. This will prove challenging for Vattenfall, which generated more than 56.2 terawatts per hour of electricity from its lignite-powered plants, from an annual total of 173.4 TWh. Seemingly more ambitious is their target of reducing emissions to 65 million tons of CO2 by 2020. In 2015 Vattenfall invested SEK 8.6 billion (USD 1 billion) in wind energy, focusing particularly on offshore development. VD is also preparing to sell many of its opencast mines. Although no buyers have been confirmed, amidst a failing market, only countries with lower environmental regulations set in place, such as in Eastern Europe, seem likely.

Renewable Energy Supply

In 2015, Germany produced a total of 237.5 TWh of renewable energy (wind, solar, biomass, and hydro), 46.25% of which was citizen-owned. This is largely possible due to energy collectives, comprised of citizens who collectively invest in or lease their own energy generators and grids, effectively decentralizing their energy consumption. In 2016, individuals being supplied renewable energy would pay 6.354 cents per kWh. Despite being the largest energy suppliers in Germany, the Big Four only operate around 6.5% of renewable energy production and supply. In 2014, Lower Saxony was the largest consumer of wind energy in Germany, while Bavaria was the largest consumer of solar energy.

Learn More

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INDIA

Submitted by Climate Scorecard Country Manager
HRIDAY SARMAZ

How India's Energy System Is Structured

India's energy policy-making is highly fragmented and decentralized, which is reflective of a tradition of federalism. The country's energy laws can be broadly placed under two categories, one dealing with laws relating to coal, petrol and gas, which are derived from minerals, and the other with laws relating to electricity. The federal government has control over mineral and oil resources, nuclear energy, and some taxes. States have jurisdiction over water and land rights, natural gas infrastructure, taxation of mineral rights, and the consumption and sale of electricity. In some of the other areas, such as electricity, forestry, and economic planning, the federal government and state governments share decision-making powers. There is no institutional body that has complete authority over a national energy policy.

Several ministries share power over various aspects of energy policy and energy infrastructure, which can result in fragmented decision-making. Similarly, the power sector in the country is placed under the dual responsibility of the states and the federal government. Power produced and sold in the same state is subject to the oversight of the State Electricity Board and the State Electricity Regulatory Commission, whereas power sold between states is subject to federal oversight and regulation. This division of decision making powers in the broad energy sector has at times been beneficial in certain ways, like the promotion of locally available energy sources, manpower expertise, local participation by state governments, etc., whereas at times this has also led to many problems, like overlap and contest in decision formulation, etc.

All of the major energy producers in India are primarily into fossil business, i.e. oil, gas and coal. The top seven among them are: Oil and Natural Gas Corporation of India, Reliance Industries, Indian Oil Corp,

NTPC, GAIL, Bharat Petroleum Corp, and Hindustan Petroleum Corp (which also stand among the top 250 global energy companies). Six out of the seven are state-owned or state-supported oil companies, which clearly implies that the state acts as the predominant actor in driving the energy dynamics in the country. Moreover, there are a number of local as well as international private players that are actively involved in the energy production sector, like Reliance Industries, which was ranked eighth among the top global oil companies in the survey 'Platts Top 250 Global Energy Company Rankings 2016'. The number of private players entering this sector is on a rapid rise.

Coal, which is one of the dirtiest of all energy sources, contributes to almost 58% of the power generation in India, and will continue to be a major source in its energy basket in the future as the government is promoting the harnessing of locally available coal. It recently allotted 16 coal blocks to state companies for commercial mining. On the whole, fossil fuels (i.e. coal, oil, and gas) together contribute 70% of India's electricity generation.

The current Indian government has rolled out a number of initiatives to decrease greenhouse gas emissions. **In the annual budget for financial year 2016-17, the country's Finance Minister Arun Jaitley announced that the clean energy tax on coal mined and imported in the country has been increased from Rs 200 ($2.94) to Rs 400 ($5.88) per ton. The** minister also stated that the revenue collected from this tax shall be put into the renamed Clean Environment Fund. Furthermore, India signed a series of bilateral clean energy and climate change agreements with the US when Prime Minister Modi visited the US in June this year.

There have also been non-governmental initiatives for measuring and scaling down levels of greenhouse gases, like India Greenhouse Gas Program (India GHG Program). It was a voluntary initiative launched in 2013 by World Resources Institute–India, The Energy and Resources Institute (TERI), and Confederation of Indian Industry (CII) that aims to standardize measurement and management of GHG emissions in India. The India GHG Program provides businesses with the wherewithal and technical knowhow to measure their emissions, identify reduction opportunities, establish short and long-term reduction goals. It also tracks their progress based on the GHG Protocol, the most widely used emissions accounting and reporting standard in the world.

Energy efficient activities are not the only emissions reduction measures that Indian companies are putting into action. **However, in the last few years Indian companies have made emission saving of over 70% that are from energy efficient activities.** Also, there are emission cuts happening through other activities like replacing traditional biomass with off-grid standalone systems, community solar programs, etc.

But the problem still remains as developing countries like India will need between USD 70 and USD 100 billion per year through 2050 to meet current and future climate adaptation needs as calculated by the World Bank. However, India is currently spending approximately USD 4.4 billion annually, which is far below the stipulated benchmark for realistic greenhouse gas mitigation activities.

Energy Sources

The country's energy basket has a mix of all the resources available including renewable, but is heavily tilted towards fossils. In the total energy basket mix, the share of oil and gas constitutes around 40%. The country is a net importer of crude oil, however it has become a net exporter of petroleum products by investing in refineries designed for export.

India has huge potential for renewable energy, with 45 GW of hydropower and 23 GW of wind power capacity, among other renewable sources. However, it has not yet been able to tap into its potential energy reserve. The present government is aiming high in this area, with a target to reach 175 GW of installed renewables capacity by 2022 (excluding large hydropower), which is a steep increase from today's level of 37 GW. Solar power, and to an extent wind, are key elements in driving the government's expansion plans.

Profiles of Leading Energy Companies

Coal India: Coal India Limited (CIL), a 90% state-owned enterprise, stands as the sixth-largest mining company in the world. The company produces 81% of the country's coal requirements from its 430 mines, of which 227 are underground mines, 175 opencast mines, and 28 mixed mines. Its target is a total output of 100 mt during 2020, which is up from 60 mt this year. This will be likely achieved by opening of 25 new mines, which entails a total investment outlay of 20,000 crore.

Companies Investing in Renewable Energy: Today, India's biggest energy companies are moving beyond their roots in fossil fuels to invest in renewables, backing Prime Minister Narendra Modi's goal of finding alternatives to fossil energy and promoting clean energy. Indian Oil Corp., a prominent refiner, along with Oil India Ltd., are working to build a 1-gigawatt solar farm in Madhya Pradesh. Tata Power, one of the country's large private power producers with 7.3 gigawatts of capacity, signed the biggest renewables agreement in India last month, acquiring 1.1 gigawatts of clean-energy capacity valued at USD 1.4 billion from Welspun Renewables Energy Pvt Ltd. Government-owned NTPC, India's largest power generator with a coal-based installed capacity of 35 gigawatts, intends to transform itself into the largest green power producer in coming years. Hence, at present the largest oil companies in the country are trying to join hands with the largest conventional electricity generators, like NTPC Ltd. and Tata Power Co., that are emerging as the biggest players in the country's clean energy sector.

Natural Energy Processing Company (NEPC), a public limited company, has been a pioneer in harnessing wind energy in India. The Khemka Group owns and promotes the company with the primary goal of promoting wind energy. The group has a multibillion turnover from diversified activities in the field of power generation from wind energy and manufacture and marketing of wind turbine generator (a renewable energy device). The company has so far installed over 1,600 WTGs of different capacities totaling to more than 450 MW in various states of India. It has also supplied more than 4,000 wind turbines across India, and has also setup demonstration wind farms in various wind-prone states in the country. Now, the company has diversified into manufacturing solar technology compatible power systems–Inverters/UPS of various capacities available with or without solar panels.

Learn More

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INDONESIA

Submitted by Climate Scorecard Country Manager
TRISTAN GRUPP

How the Energy System is Structured

Indonesia's electrical grid and distribution is owned and managed by Perusahaan Listrik Negara (PLN), which simply translates to 'State Electricity Company'. It is Indonesia's only fully-integrated power utility company. Until 2002, PLN held a monopoly on distribution, but Law No 20/2002 called for an end to the monopoly. This law was ruled unconstitutional in 2004 by the Constitutional Court. Despite this, a later 2009 law legislated an end to PLN's monopoly. Therefore, the electricity sector's legal status is uncertain.

The government is attempting to encourage the private sector to expand Indonesia's energy infrastructure and production, but foreign firms are slow to invest. Many problems remain due to delayed projects, regulatory difficulties, and legal questions. The government has encouraged electrical production growth through several measures. Ministerial Decree No. 2 of 2006 ordered PLN to purchase electricity from renewable energy providers with a capacity of up to 10 MW. This encourages the growth of renewable energy and the development of the private sector in that production. The Minister of Energy Regulation No. 31 of 2009 lays out Power Purchasing Agreements (PPA) between private power producers and PLN. Independent power producers (IPPS) can operate in areas not already designated as sites for PLN's electrification efforts. IPPs must build their own transmission grids to sell to their customers or go through PLN with a PPA. Since the 1999 Law on Local Government No. 22, local government has greater power in administering the energy sector. Local governments control the development of energy resources and the issuing of permit rights for infrastructure projects. This has created delays and problems for many energy projects, even ones that are essential to achieving national energy goals. However, this decentralization can help the development of independent power producers if they are able to secure a license. Local partnerships with foreign investors in the energy sector are encouraged in projects between 1 MW and 10MW. For projects greater than 10 MW, 95% ownership is possible. Energy production in Indonesia for domestic use is largely public, but the government is seeking to encourage private producers.

The Ministry of Energy and Mineral Resources (MEMR) governs energy in Indonesia. Its directorates cover the oil, gas, and renewable energy sectors. For example, one such directorate is the Directorate General of Minerals and Coal (DG Minerba) that does policy-making, licensing, and regulation of coal production and use. The Directorate General of Oil and Gas (DG Migas), the Directorate General of New and Renewable Energy and Energy Conservation (DG EBTKE), and the Directorate General of Electricity (DG Electricity) have similar responsibilities as DG Minerba does in those areas in their own energy sectors. The oil and gas sector is also overseen by the regulatory body called the Regulatory Agency for Upstream Oil and Gas (BPH Migas). MEMR also handles the state-owned enterprises and

researches the government's mandates for energy. Other institutions involved in the energy sector are the State Ministry of National Development Planning known as BAPPENAS, the Ministry of State-Owned Enterprises (MSOE), and the Ministry of Environment and Forestry (MOEF). The National Energy Council (DEN), BAPPENAS, CMEA (Coordinating Ministry of Economic Affairs), and the Ministries of Trade, Finance, Environment and Forestry, and Industry are involved with policy-making for all of the energy sectors, which includes: coal, oil and gas, new and renewable energy, and electricity. *For a more detailed breakdown of the government institutions and their jurisdictions in the energy sector, see the "Learn More" section below under "Energy Profile of Indonesia" on pages 10 and 11 of ADB's report*.

State-owned enterprises (SOEs) are major actors in Indonesia's energy sector. They operate as corporations and follow the government's energy goals. MSOE makes sure these enterprises function efficiently and are well-managed. Individual ministries ensure compliance with sectoral laws and regulations. For example, BAPPENAS oversees that SOEs follow its central planning. SOEs in the energy sector includes PLN in energy transmission and distribution, PT Pertamina in oil and natural gas, PT Perusahaan Gas Negara (PGN) in natural gas and coalbed methane, and PT Geo Dipa Energi (GDE) in geothermal energy. The previously mentioned 2009 end to the government monopoly on energy production will allow private power producers to grow in Indonesia. Additionally, the government mandated increases to electrical production rely heavily on investment funding from the private sector. Private energy production is slow to grow due to poor access to the grid and uncertainty over the fuel supply. There are many foreign energy producers of oil and gas. However, much of it is exported. The most notable include: Chevron, Total, ConocoPhillips, Exxon, and BP. Chevron produces more crude oil than Pertamina.

Sources of Energy

Fossil fuels dominate Indonesia's energy profile at more than 97% of the total: 41.1% from coal, 37.6% from oil, and 18.3% from natural gas. Most of Indonesia's renewable energy comes from hydropower (around 2%) and geothermal power (around 1%). The projections under the National Energy Policy (Kebijakan Energi Nasional or KEN) forecast a tripling in coal generation, a doubling in gas generation, and a greater than tenfold increase in renewable energy from 2011 to 2025. These projections are based on KEN's targets for Indonesia's energy mix.

Presidential Decree No 5./2006 on the National Energy Policy (Kebjiakan Energi Nasional or KEN) seeks to make Indonesia's energy use more environmentally stable and diverse and to increase domestic energy sources. The 2025 targets of KEN are as follows: 30% coal, 25% oil, 23% renewables, and 22% gas. The 2050 targets: 31% renewables, 25% coal, 24% gas, and 20% oil. One of the efforts to achieve these targets and expand access to electricity is the government's planned $93 billion expansion in infrastructure and energy generation, including 291 generation plants. PLN is taking on $50.5 billion of the project; the other $40.5 billion will be taken on by the private sector. The goal of the spending is to bring the population with access to electricity from 85% to 98% by 2022.

Indonesia has huge electricity generation capacity in geothermal, hydropower, solar power and biomass. Hydropower accounts for the largest source of potential energy at 76 GW, followed by biomass at 50 GW, geothermal at 28 GW, wind with 1 GW, and solar at 4.8 kWh/m2/day (Directorate General

for Electricity and Energy Utilization). However, Indonesia has been slow to take advantage of these sources. The Indonesian government is presenting investors with opportunities in both small and large scale power generation projects. Given the government's target for renewables to account for 15% (or 12.5 GW) of total domestic energy use by 2025 and a planned capacity increase of 55 GW to 2019, it is essential that energy generation production projects are implemented. "PLN estimates that the total investment required will be $96.2 billion USD of which it can provide up to $60.5 billion USD (PLN 2011-2020 Electricity Supply Plan). IPPs are therefore being encouraged to take on up to 43% of new electricity capacity with a target of 3% of the total being supplied by small scale projects." Land use permits for new sites are a major obstacle for hydropower, especially in protected forests. This was a major obstacle for geothermal energy permits as well, until a 2014 law removed geothermal energy's designation as a mining activity. (Quote from: http://www.gbgindonesia.com/en/energy/article/2012/indonesia_s_electricity_and_power_generation_sector.php)

Profiles of Leading Energy Companies

Perusahaan Listrik Negara: Perusahaan Listrik Negara (PLN): PLN accounts for 84% of total electricity transmission, while independent power producers make up 16%. PLN's peak load was 36,787 MW in 2015. The percent of households connected to the grid—the electrification ratio—is 84%. Of the 257.9 million people in Indonesia, 60.3 million are customers of PLN, by far largest provider of electricity in the country. The Indonesian government has charged PLN to help increase the national installed capacity of 50,000 MW by 35,000 MW over the next five years. PLN is accountable for achieving the government's accelerated generation targets. PLN intends to contribute 10,000 MW. The rest will come through the private sector. Additionally, the government's target for the electrification ratio is 99.4% by 2024. Given this government policy, it is unlikely that there will be any energy use reductions. However, the government is committed to expanding the renewable energy sector, especially in hydro and geothermal power. Currently, PLN's main sources of power come from fossil fuels. The government mandated fast tracking of power production (FTP-II), which planned for increases in hydro power (1,753 MW) and geothermal power (4,000 MW), but implementation has been slow. Indonesia has considerable hydro and geothermal potential. Implementation of these plans is key to combating greenhouse gas emissions and providing for the energy requirements of Indonesia's developing economy. Unfortunately, efforts to increase the scale of geothermal energy production, as well as gas production, have been difficult and slow. PLN expects increasing coal production to prop up domestic power production. This will make Indonesia's greenhouse gas emissions reduction commitments more difficult to attain. Making implementation of green energy easier, continuing to expand capacity, speeding up permitting at new sites, and increasing prices to competitive levels will spur the development of renewable energy production. PLN is prioritizing the development of renewable energy sources to supply local grids as the increases to the electrification ratio will put a lot of pressure on the grid.

Pertamina: Pertamina is also a state-owned enterprise and the second largest gas producer in the country, behind Chevron Pacific Indonesia. One of the arms of Pertamina is Pertamina Geothermal Energy, which has concessions for geothermal development across Indonesia. Indonesia has the third largest installed generating capacity in the world. 40% of the world's potential geothermal sources are in Indonesia, some 28,000 MW. Indonesia only has an installed capacity of 1,500 MW.

The government has awarded Pertamina geothermal work areas to expand the installed capacity. PLN will acquire a stake in Pertamina to accelerate the expansion of the geothermal energy supply. The government—through the 2014 geothermal law—will facilitate the adoption of geothermal energy by increasing the price ceiling range to between $0.12 and $0.30 per KWh, due to the high startup costs of geothermal energy. Geothermal activities under this law are no longer considered mining, which prevented companies in protected forests and conservation areas from making new geothermal plants. This measure might be problematic given the importance of Indonesia's forests as a carbon sink. The negative impact this will have on forests is yet to be seen. These measures will help PLN, Pertamina, and new foreign firms to transition to geothermal energy and help Indonesia achieve its emissions reductions targets.

Learn More

Energy profile of Indonesia: http://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf and http://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2016/bp-statistical-review-of-world-energy-2016-indonesia-insights.pdf
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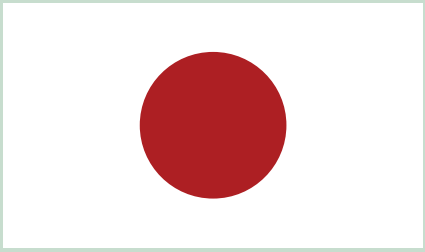
JAPAN

Submitted by Climate Scorecard Country Manager
KENTA MATSUMOTO



How The Energy System Is Structured

The key points of the current energy policy of the Japanese government are:

- to locate nuclear power on important base-load power sources, by introducing the government's new regulations, which are stronger than before
- to increase the renewable energies
- to promote technological development like low-carbon emission power plants

The basic viewpoint of the energy policy is "3E+S," which means Energy Security, Economic Efficiency, Environment, and Safety. Considering this viewpoint as a premise, the Japanese energy policy calls for the government to develop a "Basic Energy Plan" (BEP). The government is asked to formulate a Basic Energy Plan at least once every three years, and based on an evaluation of the effects of measures concerning energy, to make changes to the plan if necessary. (Basic Act on Energy Policy)

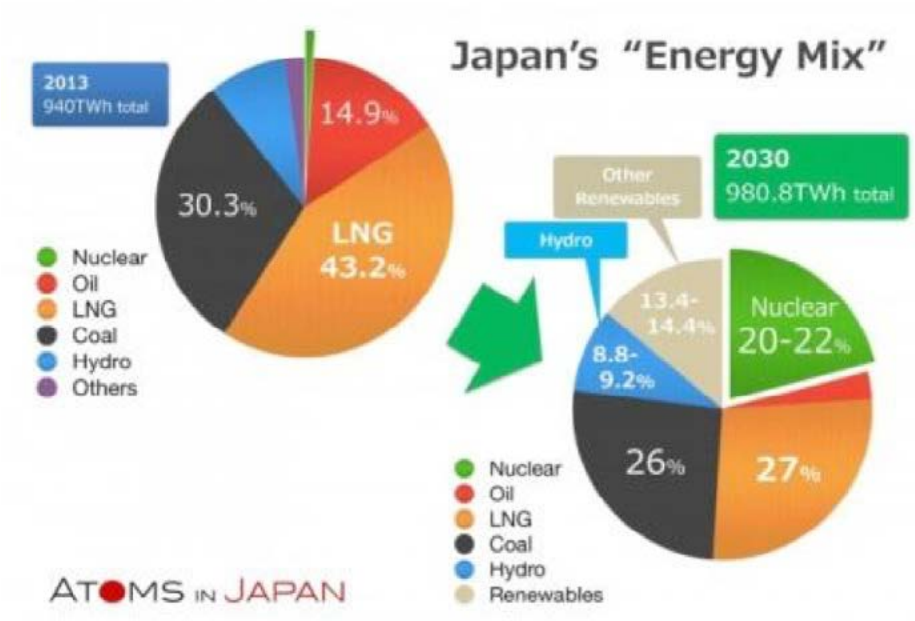
Japan's Ministry of Energy Trade and Industry (METI) published its fourth Basic Energy Plan in April 2014. In it, according to World Nuclear News, METI considered nuclear power to be a quasi-domestic source that gives stable power, operates inexpensively and has a low greenhouse gas profile. However, the ministry noted that it must be developed with safety as a priority and with constant work on preparedness for emergency.

A METI Report calls for nuclear energy to account for 20%-22% of power generation by 2030, with 22%-24% coming from renewable energy sources, while coal's share will be reduced to 26%, LNG's to 27%, and oil's to just 3%.

Sources of Energy

According to World Nuclear News, a plan setting a share of 20% to 22% for nuclear power in Japan's energy mix by 2030 has been approved by a consultative committee. While scaling back fossil fuel use, the plan also calls for an expansion of renewable energy sources.

The long-term energy supply and demand outlook subcommittee of the Advisory Committee on Energy and Natural Resources approved the draft report on 1 June. The report, by the Ministry of Economy, Trade and Industry (METI), says that total energy demand in Japan will increase from 940 TWh in 2013 to 980.8 TWh in 2030. In 2013, LNG accounted for 43.2% of Japan's power generation, with 30.3% coming from coal and 14.9% from oil. Nuclear accounted for just 1.7%, with the remainder coming from renewable sources, according to figures from the Japan Atomic Industrial Forum (JAIF).



Japan looks to transform its energy mix by 2030 (Image: JAIF)

Leading Energy Production Companies

We interviewed J-POWER, a non-renewable energy company which emitted 0.51 million tons of CO2 in 2015. The spokesman said that this coal-fired power still plays an important role in the stability of energy supply in Japan. He also pointed out, in the recent low carbon movement, his company should contribute to CO2 emission reduction by strengthening the effort to diffuse its advanced technologies such as high efficiency coal-fired, hydroelectric, wind, and geothermal power plants. J-POWER is a member of "The Electric Power Council for a Low Carbon Society (ELCS)", which is composed of 36 Japanese energy companies. In order to achieve the CO2 reduction target of ELCS, it follows the PDCA cycle and make efforts to reduce CO2 emission.

Also, we were able to interview a new Japanese renewable energy company, called SB energy. It started generating solar power and wind power in 2012 when FIT (Feed-in Tariff) policies were enforced. Its generation capacity is approximately 500 MW, which is expected to be our new option. The interviewee stated that although the business itself contributes to CO2 emission reduction, it has not adopted any rule to reduce CO2 emission. FIT considerably affected this company, he said. FIT was aimed to promote new entry of renewable energy companies by forcing electricity companies to purchase renewable energy at a certain price. Initially, there were fewer renewable energy companies compared to Western countries; however, FIT is changing this situation.

Learn More

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Japan Energy Report, 2013

MEXICO

Submitted by Climate Scorecard Country Manager
RAIZA PILATOWSKY

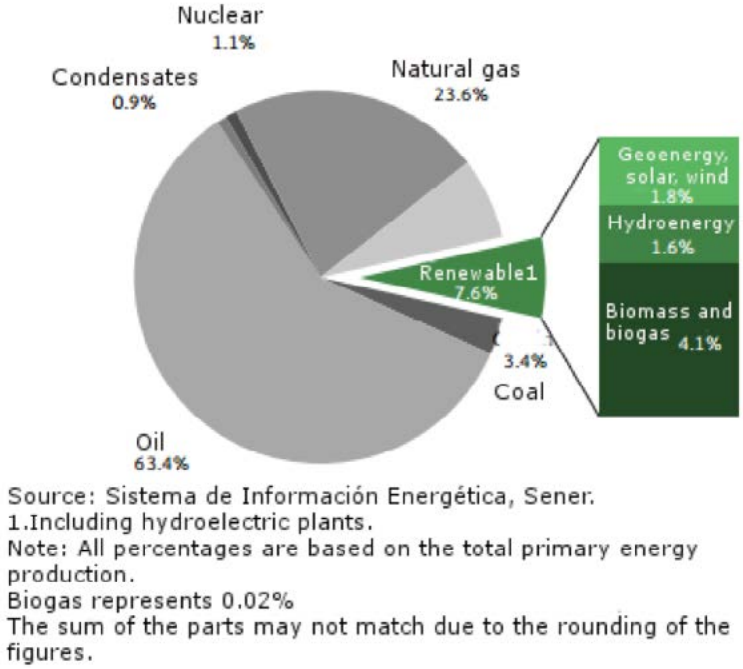
How The Energy System Is Structured

The energy sector in Mexico is managed by the Ministry of Energy. It is divided in two subsectors: hydrocarbons and electricity. Both are operated through the whole productive chain by two state-owned companies, called "productive state enterprises." PEMEX (Mexican Petroleum) is in charge of the hydrocarbons; electricity is mainly handled by the Federal Commission of Electricity (CFE) (1 & 2). These institutions are financially autonomous as well as independently managed from the Federal Government. They are allowed to associate with private producers, as well as to import or export energy from/to other countries (2). The Government has established several agencies in order to regulate different parts of the energy sector. Some examples are: National Commission of Hydrocarbons; Energy Regulation Commission; National Center of Energy Control; National Center of Natural Gas; Safety, Energy and Environment Agency; National Commission of Nuclear Safety and Security; Mexican Institute of Petroleum; National Institute of Nuclear Research; Institute of Electrical Research; and National Commission for the Efficient Use of Energy (1).

Policies in Mexico demonstrate strong contradictions inside the government concerning energy production and climate change mitigation and reduction. On the one hand, it keeps promoting the production and use of non-renewable energies, through laws such as the Law of Mexican Petroleum, the Industrial Energy Law, or the Law for the Exploitation of Renewable Energies and Funding for the Energetic Transition. This last law works under a regime where the CFE is compelled to acquire the cheapest option of electric energy on the market, which is not renewable (3). Many other examples present in those laws are inconsistent with Mexico's INDCs, and are bound to slow our advance on the reduction of greenhouse gas emissions related to the energy sector.

Source of Energy

According to the Ministry of Energy of Mexico, by 2014, roughly 92.4% of the energy produced in Mexico came from non-renewable sources, and only 7.6% from renewable (4), as shown in Figure 1. By 2015, the percentage of energy from renewable sources increased to 13.7% (5). Although most official statements indicate that by 2015 the percentage of renewables in Mexico was about 25%, further reading demonstrates that that is the effective generation capacity, not the net produce of energy (5 & 6).



Source: Sistema de Información Energética, Sener.
1.Including hydroelectric plants.
Note: All percentages are based on the total primary energy production.
Biogas represents 0.02%
The sum of the parts may not match due to the rounding of the figures.

Figure 1. Primary Energy Production 2014.

Profiles of Leading Energy Companies

PEMEX: In Mexico, the leading company in non-renewable energy is PEMEX, which is one of the few companies of the world that runs through the whole productive chain: exploration, production, transformation, logistics, and commercialization. It produces about 2.436 million barrels per day and more than 6 billion cubic feet of natural gas (7 & 8). The size of its operations has made it one of the biggest contributors to the country's economy, since it accounts for one third of the income of the public sector and it contributed to 6% of the GDP in 2013 (9).

Founded in 1938 by president Lázaro Cárdenas through the nationalization of petroleum from all the private companies, it remained under the same corporate structure until 2013, when president Enrique Peña Nieto promoted the Energetic Reform (10). Since then, new laws and the amendment of existing ones have allowed PEMEX to incorporate third parties and private investors (11), with the creation of seven subsidiaries: Pemex Exploration and Production, Pemex Industrial Transformation, Pemex Drilling and Services, Pemex Logistics, Pemex Cogeneration and Services, Pemex Fertilizers, and Pemex Ethylene.

Since 1980, PEMEX has seen a decline in production and consequently, in income. The Government expects that for the next year, production will fall below 2 million barrels per day (12). This trend is negatively impacting both the company and its clients. Businesses in the north of Mexico with intensive use of electrical energy have opted out of developing their own electricity production projects in the face of the volatile costs of state produced energy, while the income from gasoline sales, PEMEX's main revenue, has dropped by 29% compared to 2014 (12 & 13).

The new corporate scheme of PEMEX reflects the concern over declining production of the company, and establishes a political agenda that looks to increase the production and use of oil and gas, with a goal of 3 million barrels a day of crude oil by 2020 (5).

Iberdola: Iberdola is the leading company in renewable energy production in Mexico. A private corporation from Spain, Iberdrola's main client is Mexico's CFE (14), the public sector institution in charge of providing electricity to the country (15). According to Iberdrola's CEO in Mexico, they produce 15% of the energy of the country, with an installed capacity of 15,000 MW in wind farms (other sources indicate a capacity of 5,082 MW between co-generation and mixed cycles (16)). Besides the CFE, Iberdrola also acts as a supplier of 100 private clients, which in total brings them an income of $1.5 billion a year (14). Iberdrola's investments in Mexico will continually increase for the next 5 years. However, they will be focusing on the conventional energy branch, with the renewable part receiving only 10% of the financial input (14).

Learn More

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(2) http://www.wecmex.org.mx/perfilEnergetico.php
(3) http://repositorio.cepal.org/bitstream/handle/11362/37134/2/1420489_es.pdf
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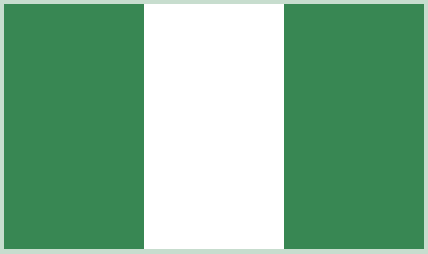
NIGERIA

Submitted by Climate Scorecard Country Manager
CHIUDO EHRIM



How the Energy System Is Structured

The development of the energy sector in Nigeria is currently based on/guided by several national policies, programmes and initiatives, and these govern the generation and distribution practices of energy companies. The relevant policies and programmes include (GOPA International Energy Consultants, 2014):

- National Electric Power Policy (NEPP), 2001–guides changes to ownership, administration and regulation of the power sector, including privatization;
- National Energy Policy (NEP), 2003–covers the development, production and supply of all energy resources including energy utilisation, efficiency and conservation;
- National Economic Empowerment and Development Strategy (NEDS), 2004–Provides the basis for sustainable poverty reduction, employment generation, wealth creation, and value reorientation. It also makes recommendations for increasing the share of renewable energy in the country's total energy mix;
- National Power Sector Reform Act (EPSRA), 2005–provides legal and regulatory structure for unbundling the national electricity power generation and distribution company;
- Renewable Electricity Policy Guidelines (REPG), 2006–stipulates the intention of the government to expand the renewable energy market;
- Renewable Electricity Action Programme (REAP), 2006–lays down the actions to be taken in order to increase the contribution of renewable energy to the total energy mix;
- National Biofuel Policy and Incentives, 2007–aims to support the development of biofuels technology and production of biofuels;

- Visio 20:2020, 2010–programme with the objective of positioning Nigeria among the top 20 economies in the world by 2020. It identifies key barriers to national development and includes reliable energy provision as a necessary component for economic growth;

- Renewable Energy Master Plan, 2005 and 2012–a series of steps to be taken so as to improve energy production from renewable energy;

- National Renewable Energy and Energy Efficiency Policy (NREEEP), 2014–makes recommendations for an integrated renewable energy and energy efficiency model that ensures sustainable development;

- Draft Rural Electrification Strategy and Implementation Plan (RESIP), 2014–aims to increase access to electricity including at the rural level and supports the utilisation of both on-grid and off-grid energy; and

- National Policy on Climate Change, 2015–guides the implementation of actions on climate change adaptation activities in the country (News Express, 2015).

Sources of Energy

Natural gas and hydro power are the major sources of electricity in Nigeria. According to the International Energy Agency, in 2013, Nigeria produced 23,635 GWh (81.61%) and 5,326 GWh (18.39%) of electricity and heat from natural gas and hydro respectively (IEA, 2016). However, the share of electricity and heat in final energy use in the country is less than 2% (GOPA International Energy Consultants, 2014). More than 80% [99,305 kilotonne of oil equivalent (ktoe)] of total consumed energy (114,294 ktoe) comes from biomass and waste, while natural gas, re-imported oil products, and coal account for about 13% (see **Table 1**).

Table 1: Energy and Electricity Consumption in Nigeria

S/N	Energy Source	Total Energy Use (Ktoe in 2012)	Percentage of Total (%)
1	Coal	30	0.03
2	Crude oil	0	0.00
3	Oil products	11,860	10.4
4	Natural gas	3,099	2.71
5	Nuclear	0	0.00
6	Hydro	0	0.00
7	Geothermal, solar, tidal, and wind	0	0.00
8	Biofuels and waste	99,305	86.9
Total		**114,294**	**100**
Source: GOPA International Energy Consultants, 2014			

Electricity			
S/N	**Energy Source**	**Total Energy Use (GWh in 2013)**	**Percentage of Total (%)**
1	Hydro	5,326	18.39
2	Natural gas	23,635	81.61
Total		**28,961**	100
Source: IEA, 2016			

The use of biomass in the form of fuel wood is a major contributor to loss of vegetation cover and increase in desertification in the country (GOPA International Energy Consultants, 2014). Nigeria has strong renewable energy potentials from solar and wind energy; however, their development is currently at infancy.

Profiles of Leading Energy Producers

The Federal Government of Nigeria (FGN), in a bid to improve electricity generation and supply in the country, recently unbundled the national power generation and distribution company, Power Holding Company of Nigeria (PHCN), and opened up the energy sector for the participation of private firms. In collaboration with the United States Government's Power Africa project, FGN has approved a number of renewable and non-renewable energy production companies (see **Table 2**) including successor companies of PHCN, Azura-Edo Energy and JBS Wind Power (USAID, 2015).

Table 2: Two Power Africa Projects in Nigeria

S/N	Company	Type of energy produced	Amount of energy produced (Mega Watts)	Estimated cost (USD)	Key Target consumers
1	Azura-Edo Energy	Non-renewable (natural gas)	450 MW	1 Billion	Residential and industry
2	JBS Wind Power	Renewable (wind)	100 MW	300 Million	Residential and industry

Source: USAID, 2015

The operation of the power production plants is expected to have an impact on environmental resources and greenhouse gas (GHG) emissions. Natural gas power plants are estimated to produce carbon emissions within the range of 300 – 700 gCO_2eq/kWh. The carbon emissions are estimated at 3 – 45 gCO_2eq/kWh from onshore wind farms and 7 – 23g CO_2eq/kWh from offshore wind farms (Thomson and Harrison, 2015). Any measures by the companies to curtail GHG emissions will be known as the plants are completed and become operational.

Azura is a developer, financier, acquirer and operator of Independent Power Plants (IPPs) and power related assets in West Africa. Its Azura-Edo IPP is a 450MW open cycle gas turbine power station and the first phase of a 2,000MW power plant facility near Benin City, in Edo State, Nigeria. The project reached financial close on 28 December 2015 and construction started on 5 January 2016 (Azura, 2012).

JBS Wind Power Ltd is a renewable power generation company developing a 100MW wind power plant in Jos, Plateau State, Nigeria. The project consists of 50 x 2MW Wind Turbine Generators (WTG)

with a nameplate capacity rating of 100MW that generate approximately 342,000MWH of electricity per year. The economic lifetime of the project is 20 to 30 years (JBS Wind Power Limited, n.d.).

Learn More

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POLAND

Submitted by Climate Scorecard Country Manager
KATHLEEN GORMAN

How the Energy System is Structured

The Ministry of Economy is responsible for formulating energy policy in Poland. It recently released its energy policy for 2030 which states that Poland is oriented to the fulfillment of EU-climate energy policy. Its top priority is energy efficiency improvement. It seeks to "achieve further development of the Polish economy without an increase in primary energy density and a decrease in the energy intensity of the economy to the level of EU-15."

As energy security is a high policy priority, Poland is enhancing gas supply security by building an LNG terminal, expanding underground storage capacity, and increasing domestic gas production. Polish plans for developing electricity and gas cross-border links will also contribute to the regional security of supply. In addition, the government has announced an ambitious nuclear programme by 2030, envisaging the first unit to enter operation by 2022. Other goals include an increased share of renewables and a stronger focus on energy research and development (R&D).

In 2015, the ruling Law and Justice (PiS) Party announced a new Law on Renewable Energy Sources ("RES Law"), and have repeatedly released revisions. The most recent version from earlier this year, signed by President Andrzej Duda, imposes additional requirements that limit the available space that can be used for wind farms. These new regulations now limit where new wind turbines can be built (specific distances away from national parks and residential areas), and now require certain permits that have to be regularly renewed. This is just another case of the PiS's preferential treatment toward the coal industry, through attempts at limiting their clean competition and hindering their ability to fully commit to clean energy and the Paris Agreement.

Sources of Energy

Poland sources around 90% of its electricity from fossil fuels. The country's energy sector is responsible for the vast majority of GHG emissions. Of the electricity Poland used in 2013, coal was used to make up a 55% majority, followed by oil (26%), natural gas (15%), and finally biomass and other renewable energy sources (4%).

Profiles of Leading Energy Companies

Polska Grupa Energetyczna (PGE): The Polish Energy Group (Polska Grupa Energetyczna, PGE) is one of the largest power companies in Poland. The company is state-owned, with the its biggest shareholder being the Polish State Treasury, which controls almost 60% of the company (58.39% to be exact). PGE produces, sells, and delivers almost 40% of the electricity on the Polish market through a vast vertical network that includes coal mines for fuel resources, power-generating plants, and

distribution networks. In 2015, they supplied 55.58 TWh of electricity to an estimated 5.26 million consumers through 49.40 million tons of lignite alone. Hard coal, in addition to lignite, makes up 91% of PGE's fuel to generate its electricity, while gas makes up 4% and renewables make up 5%.

Since the early 2000s, many of Poland's coal-powered power plants have incorporated "renewable energy" practices into their coal usage through biomass co-firing. This is the method of incorporating biomass, usually in the form of imported wood, straw, and peanut shells, to burn with coal, making the process "greener". Biomass is (as of 2014) the dominate renewable energy source in Poland, with 85% of electricity generated by renewable sources coming from it (compared to the EU's 43.8% average). PGE has stated that they are open to the potential growth this method has, if there are renewable energy source support systems to help encourage it.

PGE's practices' projected impact on greenhouse gas emissions is dependent on government legislation. Currently, the government is investing into coal industries to revamp and modernize Soviet-era power plants. Beyond 2020, PGE will be implementing a new investment program, dependent on selected strategic options (developing modern coal-fired power generation, off-shore wind farms or a nuclear power plant). The choice will be determined by the external factors, among others: European Union's climate and energy policy, the power system's needs, or market model.

That being said, it is clear that PGE is waiting for the political seas to calm before they announce official plans for future investment, or a decision to reduce their greenhouse gas emissions. Any future investment will follow the new Law and Justice Party's (PiS) right-wing agenda and government funding, which, as of now, is going into coal and co-firing subsidies. It is also worth noting that PGE's mission statement guarantees energy security, a sentiment that has been repeatedly mirrored by President Andrzej Duda (PiS), among other government officials, as a priority for the country.

PGE's practices' projected impact, if it continues down this energy path, will be detrimental to Poland's natural resources and the environment. Mining companies have been accused of polluting or draining lakes and wetlands, resulting in major problems for the local citizens and the country's strong agricultural industries. Additionally, **the World Health Organization estimates that of the EU's 50 most-polluted cities, two-thirds of them are in Poland, largely thanks to the country's coal industry.**

Senvion: Although biomass is the leading RES, wind power is the fastest growing. Statistics from 2014 show that it generates just over 8% of Poland's clean energy, up from 6.3% the year before. Senvion, a German-based, international manufacturing company, is taking advantage of the growing interest in wind energy. As a global leader in wind turbines, they pride themselves on being involved in every step of the process from planning, to installation, to future maintenance. An early version of their company even installed Poland's first wind farm, and now has starting construction on one of Poland's biggest wind farms, which has the capacity to generate 73.1 MW, enough to power over 92,000 Polish homes. Overall, Senvion Polska Sp. (Senvion's current Poland-specific branch) installed almost 200 turbines, enough to generate 350 MW of electricity for Poland, and has cited independent reports, such as International Renewable Energy Agency's (IRENA) 2015 report, REmap 2030 Renewable Energy Prospects for Poland, that estimate that **Poland's clean energy sector has the potential**

to power more than one-fourth of Poland's total energy usage by 2030, given the right investment. IRENA's report also goes on to state that a **reducing fossil fuel dependence would save the country $2 billion each year in costs associated with the environment and health benefits.**

Unfortunately, this continual growth isn't guaranteed and these figures haven't caught up to the recent political shift that has happened in the country since the PiS Party came into power. Like many other companies that make up Poland's renewable energy industry, Senvion is a German company controlled by foreign capital, with the majority of shares held by an American-based private investment firm. Poland has had other foreign wind energy companies, such as Danish DONG Energy and Spanish Iberdrola Renewables, withdraw from Poland, and sell off their assets in the country because of the unpredictable legal environment that threatens RES investment.

Learn More

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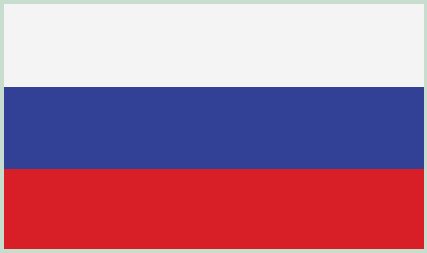
"Energy Policy 2030," by Zbigniew Kamienski, Ministry of Energy, http://www.mos.gov.pl

RUSSIA

Submitted by Climate Scorecard Country Manager
DR. ELENA ZAIKA



How The Energy System Is Structured

Since the early 1990s, the power sector in Russia has undergone significant changes to its structure, priorities, and generation capacities. In 1992, the power industry was reorganized into the 50% state-owned company RAO UES, the largest electric power holding company. Privatization and further restructuring of the power sector took place between 2006 and 2008. At present, there are several large and many small companies on the market with different types of ownership, including state-owned and private companies.

Almost all grids in Russia are connected to one Unified Energy System (UES) consisting of seven regional systems based on their geographical location. They are interconnected with high-voltage grids and synchronized with each other. There are around 700 power stations with an installed capacity of over 5 MW in Russia. By the beginning of 2016, the overall installed capacity of the Russian UES was equal to 235.30 GW.

The majority of the energy market is shared between the large holding companies described below in the section *Profiles of Leading Energy Companies*. Many large companies with thermal generation capacities have strategic goals for GHG emission reduction that are supposed to be reached by the following approaches:

- Coal to gas conversion,
- Use of co-generation (heat and electricity, allowing for about 90% efficiency of fuel use),
- Increase of generation efficiency via equipment modernization and BAT application,
- Cuts of losses in grids,
- Introduction of renewable energy: small-scale hydro, solar, wind, geothermal, biomass energy generation, and
- Increase in energy efficiency by producers (own needs) and consumers (through awareness).

Development of renewable energy is promoted by the state and by interested international companies. The use of renewable energy is also a necessity in the distant regions of Russia where the UES grids are not accessible.

In terms of international support, there are several renewable projects throughout Russia. For example, the construction of the largest wind energy park in the Far East was supported by the Japanese company NEDO, which donated the generation equipment for the park. As another example, on the 2nd of September, 2016, Mitsui, JBIC, and RusHydro signed a memorandum of understanding to support energy generation capacity development in the Russian Far East, emphasizing the development of renewable energy, including geothermal sources.

Projects for renewable energy also are being supported supported by the state. Federal Law #35-FZ of 26.03.2003 and a number of other normative acts establish a special procedure for the sale and pricing for renewable energy. The RF Government Decree #1-p of 08.01.2009 established the gradual targets and indicators for renewable energy development by 2024. The final targets for 2024 are the following:

Renewable energy	Wind	Solar	Small-scale hydro	Other
Target capacity by 2024, MW	3,600	1,520	751	5,871

Sources of Energy

The structure of the different energy sources used for power generation in Russia (for 2013–the latest full data available) is presented in the table below.

Production from	Electricity, GWh	Heat, TJ	Total, TJ	Percentage, %
Gas	161876	1117345	1700098,6	18,43
Oil	8706	287361	318702,6	3,45
Coal	529974	3560536	5468442,4	59,27
Biofuels	37	32097	32230,2	0,35
Waste	2888	77490	87886,8	0,95
Nuclear	172508	15136	636164,8	6,90
Hydro	182654	0	657554,4	7,13
Geothermal	444	1481	3079,4	0,03
Solar PV	0	0	0	0,00
Solar thermal	0	0	0	0,00
Wind	5	0	18	0,00
Tide	0	0	0	0,00
Other sources	0	321571	321571	3,49

In 2015, the total electricity generated within the UES of Russia was produced from the following sources:

- Thermal power generation–160,233.28 MW (68.1%)
- Hydropower generation–47,855.18 MW (20.34%)
- Nuclear power generation–27,146 MW (11.53%)
- Solar energy–60.2 MW (0.03%)
- Wind energy–10.9 MW (0.005%)

Profiles of Leading Energy Companies

The largest energy producers are:

- Rosenergoatom Concern JSC (state-run company; all nuclear power)
- RusHydro PJSC (state-run company; hydro, small hydro, thermal, geothermal, solar, and wind power)
- Gazprom Energoholding LLC (subsidiary of state-run company; thermal power)
- Unipro PJSC (E.ON Russia JSC until June 2016, private; thermal power)
- PJSC Enel Russia (private; thermal power)

The renewable projects in Russia are managed either by large energy companies or small-scale private companies. There are several examples of successful implementation in the framework of the state support mechanism. The first solar energy project constructed in the framework of the state support mechanism, with the installed capacity of 5MW, was commissioned in the Orenburg regions in May 2015. In October 2015, the first units of solar project with the overall capacity of 10MW were commissioned in the Republic of Bashkortostan. Seventy percent of its equipment was produced in Russia. One of the largest solar power stations in Russia, located in Orsk, has a current capacity of 25 MW with a potential increase of up to 40 MW. It is constructed on a brownfield site previously used as a coal power station landfill.

In September 2015, the wind power complex, consisting of 3 wind power units, was opened in the Russian Far East. Its current capacity is 900 kW and it is expected to produce 2 GWh annually. This complex will be expanded with seven more units by the total capacity of 3 MW.

During 2014 and 2015, planned growth slowed because the overall economic situation prevented faster development of renewable projects. Other reasons were the overall excess of generation capacities in the power sector, easy access to and relatively low price of fossil fuels, and a lack of reliable medium-term and long-term forecasts for energy demand and price. However, there are many opportunities for further development of renewable energy projects in Russia.

Learn More

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http://enel.ru/

SOUTH AFRICA

Submitted by Climate Scorecard Country Manager
MONIQUE CLASSEN

How The Energy System Is Structured

The South Africa Department of Energy (DOE) and the National Energy Regulator (NERSA) are the two leading agencies that help frame and implement government energy policy.
The Department of Energy (DoE) is mandated to ensure the secure and sustainable provision of energy for socioeconomic development. The Department produces an integrated energy plan, regulates the energy industries, and promotes investment in accordance with the integrated resource plan. The Department's strategic goals are to:

- ensure that energy supply is secure and demand is well managed;
- facilitate an efficient, competitive, and responsive energy infrastructure network;

- ensure that there is improved energy regulation and competition;
- ensure that there is an efficient and diverse energy mix for universal access within a transformed energy sector;
- ensure that environmental assets and natural resources are protected and continually enhanced by cleaner energy technologies;
- implement policies that adapt to and mitigate the effects of climate change; and
- implement good corporate governance for effective and efficient service delivery.

The DoE places emphasis on broadening electricity supply technologies to include gas and imports, as well as nuclear, biomass and renewable energy resources (wind, solar, and hydro), to meet the country's future electricity needs and reduce its carbon dioxide emissions.

Goals beyond 2020 include contracting more than 20,000 megawatts (MW) of renewable energy, including an increasing share from regional hydro-electricity.

The National Energy Regulator (NERSA) is mandated to regulate the electricity, piped-gas, and petroleum pipeline industries. NERSA's responsibilities include:

- issuing licences and setting pertinent conditions;
- setting and/or approving tariffs and prices;
- monitoring and enforcing compliance with licence conditions;
- dispute resolution such as mediation, arbitration, and the handling of complaints;
- gathering, storing, and disseminating industry information;
- setting rules, guidelines, and codes for the regulation of the three industries;
- determination of conditions of supply and applicable standards; and
- the registration of import and production activities.

The National Strategic Fuels Stock Policy sets the framework for the storage of fuel stock by the government and by industry. It aims to ensure an uninterrupted supply of petroleum products throughout South Africa by providing adequate strategic stocks and infrastructure, such as storage facilities and pipeline capacity. Strategic stocks are to be used during declared emergencies. The Minister of Energy has the power to decide when a shortage of fuel and oil warrants an emergency.

The National Development Plan (NDP) envisages that by 2030, South Africa will have an adequate enough supply of electricity and liquid fuels to ensure that economic activity and welfare are not disrupted and that at least 95% of the population will have access to grid or off-grid electricity.

The plan proposes that gas and other renewable resources like wind, solar, and hydro-electricity will be viable alternatives to coal and will supply at least 20,000 MW of the additional 29,000 MW of electricity needed by 2030.

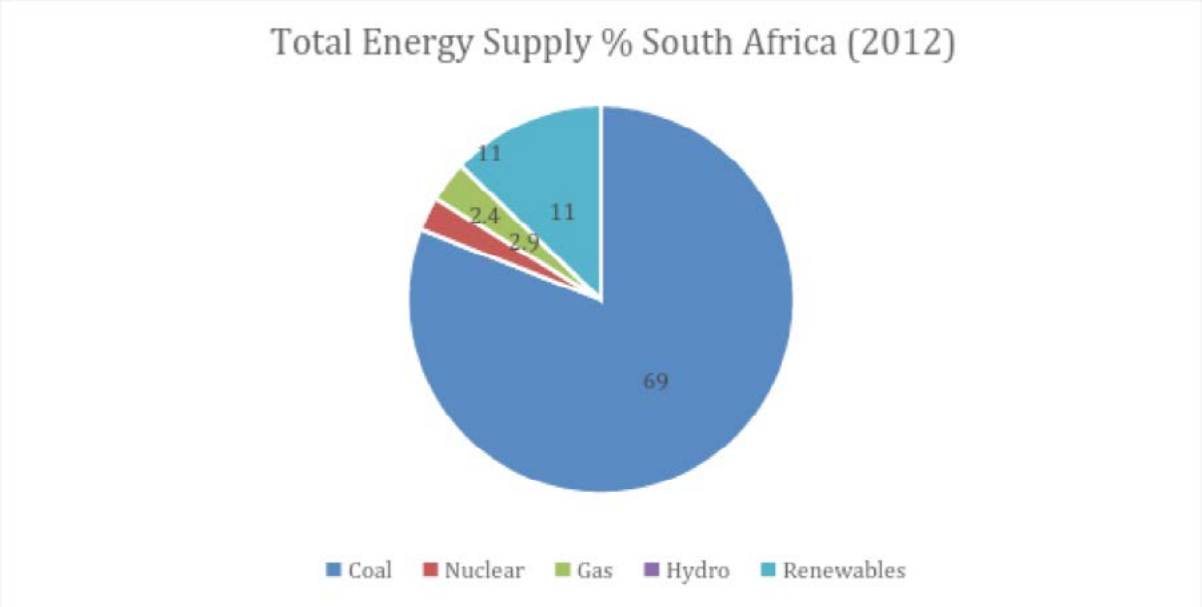
Other recommendations in the plan include diversifying power sources and ownership in the electricity sector, supporting cleaner coal technologies, and investing in human and physical capital in the 12 largest electricity distributors.

Sources of Energy

With abundant coal supplies, South Africa meets around 74% of its energy needs through coal. While it is largely used to generate electricity, a significant amount is channelled to synthetic fuel and petrochemical operations. Around 28% of coal production is exported.

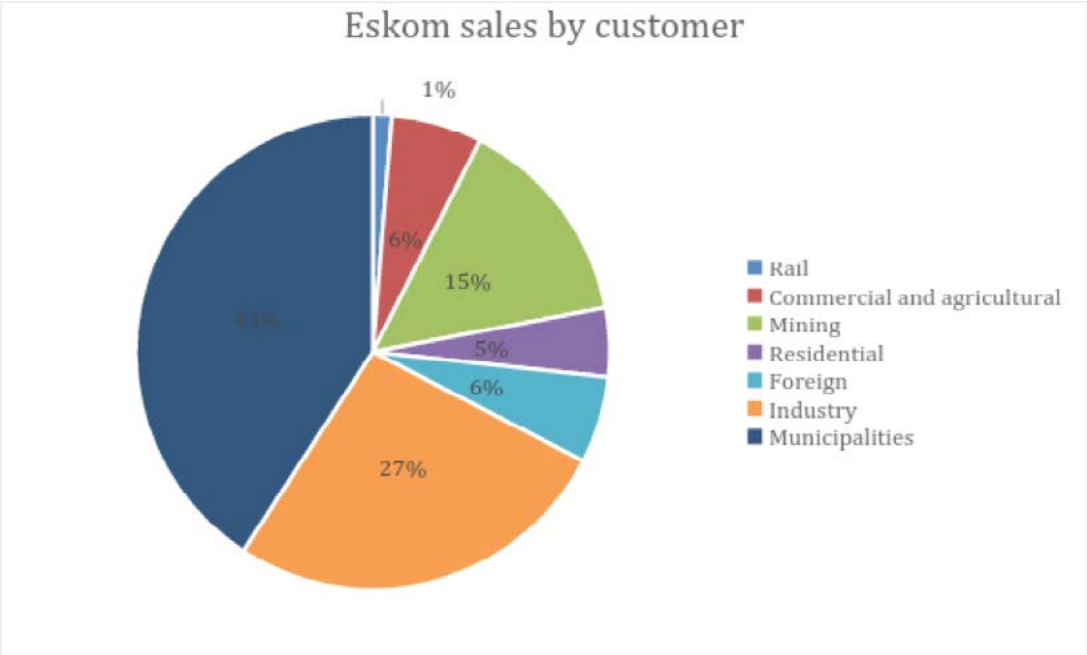
South Africa supplies two-thirds of Africa's electricity and is one of the four cheapest electricity producers in the world. Almost 90% of South Africa's electricity is generated in coal-fired power stations. Koeberg, a large nuclear station near Cape Town, provides about 5% of capacity. A further 5% is provided by hydroelectric and pumped storage schemes. In South Africa there are few, if any, new economic hydro sites that could be developed to deliver significant amounts of power.

According to *Natural resource accounts: Energy accounts for South Africa, 1995-2001,* the total primary energy supply for year 2000 was 74.8% coal; 3.2% nuclear; 1.3% gas; 9.0% oil; 0.1% hydro; and 11.6% renewables. In 2010, according to the U.S Energy Information Administration, coal was 67%; nuclear 2%; gas 2%; oil 19%; hydro less than 1%; and renewable 10%. However, the most recent data (2012) places coal at 69%; nuclear 2.4 %; gas 2.9%; hydro 0.1%; and renewable energy 11%.



Profiles of Leading Energy Companies

ESKOM: Almost 90% of South Africa's electricity is generated within coal-fired power stations. Generation is dominated by Eskom, the national, wholly state-owned utility which supplies approximately 95% of the country's electricity. Eskom produces electricity from a variety of sources, including coal, hydro, nuclear, solar, wave, wind power, and pumped storage. Coal dominates the energy supply, covering approximately 77% of the country's energy needs. The utility generates, transmits, and distributes electricity to industrial, mining, commercial, agricultural, and residential customers and redistributors. According to the 2011 report The Eskom Factor, municipalities and industry dominate Eskom's sales to customers.



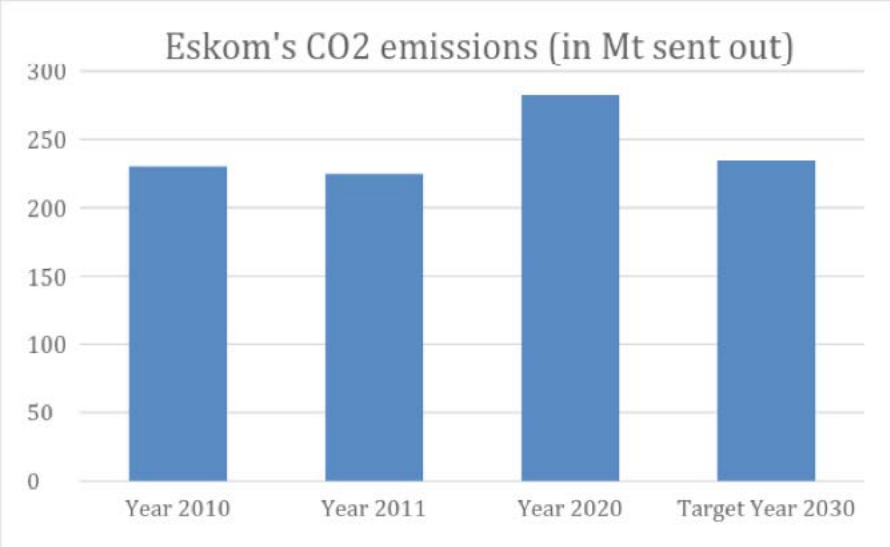
The organizational structure is currently in the process of being revised to incorporate recent appointments and changes. Its generation division maintains a varied portfolio of plants, open cycle gas turbines, hydroelectric, pumped storage, wind, and nuclear units, along with coal-fired plants. Below is its current generation division portfolio.

Current (2016)	
Coal-fired (Operational)	11
Coal-fired (Return-to-service)	3
Nuclear	1
Hydro-electric	2
Pumped storage scheme	2
Gas turbine	4
Wind Facility	1
New Build	
Coal-fired	2
Pumped storage scheme	1
Wind facility	1
Concentrating Solar Power (CSP)	1

As 93% of Eskom's electricity is generated from coal-fired stations, it has a large environmental footprint, with its most topical being its carbon footprint. In 2011, the utility's CO2 emissions were 230.3Mt, an increase of 2.5% on the previous year's 224.7Mt. However, Eskom is committed to reducing its footprint by 2030. Despite a potential peak of 283Mt in 2022, it is working towards a reduction to 235Mt by 2030.

Eskom will contribute to this reduction through a comprehensive six step approach that includes supply measures and demand-side interventions.

Eskom's climate change commitment, the six-point plan, which came out of the 17th United Nations Conference on Climate Change, Durban, South Africa, in 2011:



1. Diversification of the generation mix to lower-carbon-emitting technologies: Eskom states that although the tons of CO2 they emit will increase in the short- to medium-term, they are committed to assessing options to slow the rate of increase, and ultimately to begin decreasing it by reducing the coal energy mix they use (Eskom News Journey: COP17-CMP7, 2011). According to Eskom, their goal is to reduce coal from 88% to 70% by 2025 by increasing nuclear gas, renewables, and hydro components in the energy mix. Plans include increasing the nuclear component by up to 20,000 MW by 2025, and an increase in the renewable component to at least 1,600 MW by 2025.
2. Energy efficiency measures to reduce demand and greenhouse gas and other emissions: Eskom has established an internal energy efficiency program, which seeks to save a billion kilowatt-hours and includes working with consumers to reduce their demand. The short-term target is to save 3,000MW over the next six years and 8,000 by 2025, which equates to about two six-pack coal-fired power stations.
3. Adaptation to negative impacts of climate change: Short-term adaptation measures include the consideration of dry-cooling at power stations, reducing water consumption by approximately 90%. Medium- to long-term considerations include improving the resilience of infrastructure and staff by incorporating adaptation issues into long-term planning and risk mitigation strategies.
4. Innovation through research, demonstration, and development: At present, Eskom has a number of pilot projects which include an underground coal gasification, a System Johansson Gasifier biomass pilot for small-scale applications, the pebble-bed modular reactor, and a 100MW solar thermal plant (Eskom COP 17, 2011).
5. Investment through carbon market mechanism: Eskom participates in and supports the Clean Development Mechanism (CDM), using a shadow price for carbon to evaluate all investment decisions and to level the playing field across a variety of technologies.
6. Progress through advocacy, partnerships, and collaboration: Eskom is an active member of the National Committee on Climate Change and also participates in the Long-term Mitigation Scenario process.

Renewable Energy Utilities: Biotherm Energy & Solar Capital

According to the 2014 *Climatescope Report*, South Africa has the 3rd most attractive renewable energy

market in the developing world. BioTherm Energy is Africa's leading Independent Power Producer (IPP) under the First Round of the South African Renewable Energy Independent Power Producers Programme (REIPPP). Solar Capital (a subsidiary of the Phelan Energy Group) won an award in 2013 for the best renewable energy company in Africa.

Biotherm Energy: The African-born utility focuses on wind and solar project development, and currently has four operational projects: (1) Aries Solar PV project; (2) the Konkoosies Solar PV project; (3) the PetroSA Biogas Project; and (4) the Klipheuwel wind project.

Solar Capital: The subsidiary delivers efficient, renewable solar energy projects. Currently, it has two operational projects customered by Eskom: De Aar project 1 and De Aar 3 project 2. Its pipeline projects within the country are Aggenys, Ritchie, Loreisfontein, and De Aar 2.

Learn More

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SOUTH KOREA

Submitted by Climate Scorecard Country Manager
KATRINA PELLEGRINO

How The Energy System Is Structured

South Korea's electricity sector is not fully privatized as is the case in many other countries. The Korea Electric Power Corporation (KEPCO) is the monopoly that controls electricity retail sales, transmission, and distribution. Its shareholder composition is as follows: Korea Finance Corporation holds 32.90%, the Korean government 18.20%, foreigners 31.32%, the National Pension Service 7.07%, and others 10.51%. This means that KEPCO is de facto state-owned.[1]

The power generation industry in Korea is liberalized. In order to increase electricity production through renewable energy, the Korean government encourages private investment and seeks to make the investment environment more market-friendly. However, as long as the electricity market is monopolized, the entrance of new renewable energy producers will be limited.

Minister Yoo Il-ho, Deputy Prime Minister for Economic Affairs and Finance, reported a governmental plan for the reform of major public institutions related to energy and the environment at the 2016 workshop for the heads of state-run enterprises on June 14, 2016. According to his briefing, the electricity sales market and the gas import and sales market, which have been monopolized by state-run companies, i.e. KEPCO and KOGAS, will be gradually privatized.

Sources of Energy

In terms of energy consumption, Korea spent $214.9 million total in 2014; 48.2% of the total energy consumption was from oil, 19.2% from electricity, 17.1% from coal, 10.8% from city gas, and 4.6% from miscellaneous sources including renewable energy.[2]

Due to heavy dependence on hydrocarbon energy sources, Korea marked itself as the thirteenth largest GHG emitter in the world; Korea's overall GHG emissions (excluding Land Use, Land-Use Change, and Forestry, or LULUCF) were 688.4 MtCO2e in 2012, representing a 1.4% share in global GHG emissions. [3] According to the Intended Nationally Determined Contribution (INDC) submitted by Korea to the United Nations Framework Convention on Climate Change (UNFCCC), [4] Korea aims to reduce its GHG emissions by 37% from the business-as-usual (BAU, 850.6 MtCO2e) levels by 2030 in all economic sectors, which is equivalent to a 22% reduction from its emissions level in 2012.

This objective poses significant challenges, mainly due to the following reasons as indicated by the Korean governments in its INDC submission. First, Korea's economy is heavily dependent on manufacturing that requires oil or coal as input materials. Energy consumption by the industrial sector occupies approximately 64% of the country's total energy consumption, which results in significant

GHG emissions. Second, the level of energy efficiency in major industries is already very high in Korea, limiting the country's potential to further mitigate its GHG emissions. The Korean government assigned less than 12% of GHG reduction from the current BAU level to the industrial sector,[5] which implies that the reduction burden on the electricity sector will be greater. In order to meet the goal, the reductions should be made mainly in the electricity sector, which is the leading energy producer in Korea.

Total energy production in Korea was 4.5 million tons in 2014. 72.6% of the total energy production was from nuclear energy whereas 21.3% was from renewable energy, 3.6% from hydropower, 1.7% from coal, and 0.7% from LNG in the same year.[6]

Nuclear energy represents a major part of energy produced in Korea and is regarded as the most reliable alternative energy to better deal with Korea's pledge at the Paris Agreement.

Profiles of Leading Energy Companies

KEPCO split its generation business into six separate subsidiary power generation companies in 2001, including Korea Hydro & Nuclear Power (KHNP), Korea South-East Power, Korea Midland Power, Korea Southern Power, Korea Western Power, and Korea East-West Power, while maintaining a monopoly in electricity retail sales, transmission, and distribution.

KHNP is the nuclear operator in Korea, fielding 24 nuclear reactors in the country (the total installed capacity equals 21,716 MW), while the other five power utilities are in charge of operating coal-burning and gas-burning thermal power plants. Therefore, KHNP, together with the Korean government, intends to increase nuclear power capacity even further; currently six more reactors are under construction and four more reactors are under preparation. However, as the level of public acceptance significantly decreases, especially after the Fukushima nuclear accidents, some efforts to site new nuclear power plants encountered strong local resistance and ended in failure. Interestingly, KHNP is the largest renewable energy producer as well. It runs 35 hydro power units (the total installed capacity equals 606.7 MW), 16 pumped-storage power units (4,700 MW), five solar power plants (56.25 MW), one fuel cell plant (58.8 MW), and one wind power plant (0.75 MW).[7]

[1] KEPCO homepage
[2] Korea Energy Management Corporation (KEMC), "2015 Korea Energy Handbook"
[3] International Carbon Action Partnership ETS Detailed Information, "Korea Emissions Trading Scheme" (Last Update: 12 August 2016)
[4] Intended Nationally Determined Contribution (INDC) Submission by the Republic of Korea (Submitted on June 30, 2015)
[5] Won, Dong-kyu, "Special Report - Paris Agreement and Major Issues for Electricity Sector," KEMRI Electricity Economy Review
[6] KEMC, "2015 Korea Energy Handbook"
[7] KHNP homepage

SPAIN

Submitted by Climate Scorecard Country Manager
ANDREA DELMAR SENTIES

How The Energy System Is Structured

The National Energy Commission is partially responsible for regulating the energy industry in Spain. The National Energy Commission (or Comisión Nacional de Energía) is a part of the Ministry of Industry, Energy, and Tourism. It is meant to aide in the regulation of the energy industry, but does not function as an independent government agency. However, it mostly provides consultation since it has no legislative power. This means that any legislation regarding the Spanish energy sector is left to the Central Government. If a new energy policy will affect current legislation in Spain, the Parliament must vote on whether or not to enact the policy. Once the legislation is enacted, the National Energy Commission then oversees its execution.

Source: https://www.edp.pt/en/aedp/sectordeenergia/regulacaoetarifas/Pages/RegElectES.aspx

In Spain, the energy industry is privately owned. Only 1% of oil and gas is domestically produced in Spain, meaning that the vast majority of its fossil fuels must be imported. Gas Natural is the clear dominator of the oil and gas industry, and even owns Union Fenosa, an electricity supply company. Because Spain is home to many windy plains, it is a large producer of wind energy. Other large players in the electricity sector include Iberdrola, Endesa, and Red Eléctrica de España (REE), of which the government owns a 20% stake. The benefits of wind energy are many for Spain since it means less reliance on other countries to import fossil fuels, and of course it is a clean energy that would help Spain lower its greenhouse gas emissions

Energy Sources

Overall, fossil fuels account for the majority of energy production in Spain. However, these numbers can be slightly misleading since, despite the setbacks in the renewable energy sector as a result of an economic crisis, renewable and "alternative" energies still make up 22.6% of total energy use. Furthermore, renewable energies have a firm place in the production of electricity. Recent data shows wind power accounting for 21% of electricity production, and hydropower accounting for up to 19%.[1] While Spain still has a ways to go in order to meet its environmental health targets, it appears to be on the right track.

Source: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-market-reform-spain.pdf

Figure 1. Primary energy consumption in 2012 (127 Mtoe)[2]

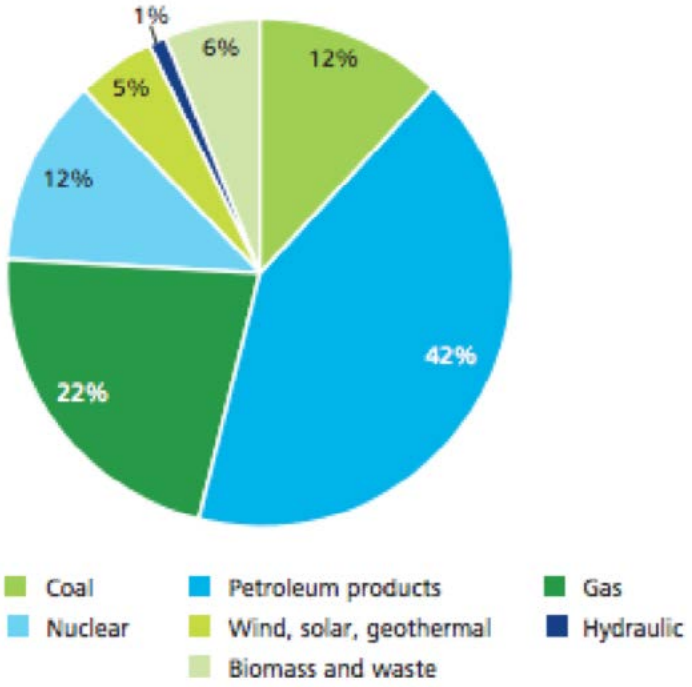


Figure 4. Electricity capacity – 108 MW (2013)[3]

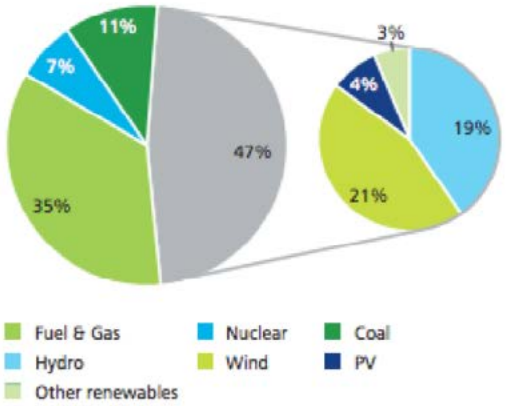
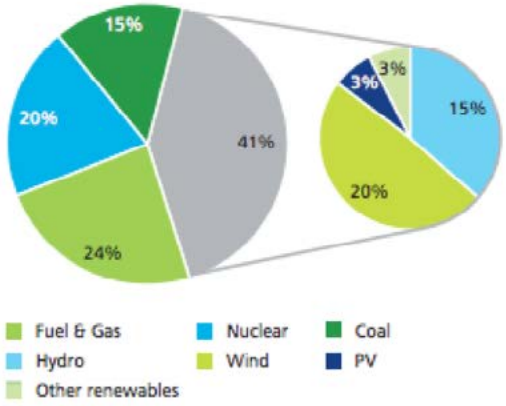


Figure 5. Net generation – 274 GWh (2013)[3]



Profiles of Leading Energy Companies

Grupo DISA: A relatively "up and coming" company, Grupo DISA (Distribuidora Industrial SA) provides gas for automobiles, as well as propane and butane for home and business use. Originally a company that was meant to provide development to the Canary Islands, Grupo DISA surprised the country when they purchased over 300 Shell gas stations in Spain in 2004.[2] This purchase more than doubled their properties and solidified Grupo DISA's presence as a frontrunner in the industry. Grupo DISA is also responsible for pioneering the concept of the residential propane tank in Spain. Largely used for cooking, prices for 35 kg tanks of propane are currently at 59.80 Euros, and prices for 11 kg tanks are at 9.54.[3] In 2015, Grupo DISA began to expand into renewable energies, although natural gas and propane remain its biggest assets. The company bought a solar panel production plant, which

now makes it the biggest producer of solar panels in the Canary Islands.[4] Grupo DISA serves several thousands of automobile owners, homeowners, and now those interested in solar panels. It appears as though Grupo DISA has set itself up for continued success and expansion in the future. The terms of the Paris Agreement and their effect on Grupo DISA, however, remain to be seen, since this company would continue to elevate Spain's greenhouse gas emissions over the next five to ten years.

Grupo DISA is taking certain measures to try to reduce its greenhouse gas emissions. First, the purchase of a solar panel production plant is a clear move toward renewable energies. Second, Grupo DISA is working on the development of a biofuel made from the jatropha plant, which is readily available in the Canary Islands. The efforts made in relation to natural gas and propane are less clear: Grupo DISA claims it sells "autogas," a cleaner burning fuel. Finally, the company states that it has an integrated policy for Security, Health, & the Environment. [6]

Grupo DISA has a lot to lose with Spain's efforts to reduce its greenhouse gas emissions. First, the burning of fossil fuels would only further distance Spain from its target emission levels. Second, much of Grupo DISA's business is selling fuel for cars and transportation. The transportation sector is Spain's biggest emitter of greenhouse gases and efforts are being taken to reduce consumption in this area, which would mean less business for Grupo DISA. Furthermore, Spain has recently implemented the Efficient Vehicle Incentive Program and the Energy Efficiency Action Plan, which encourages the use of vehicles that are more energy efficient.

Gamesa: Gamesa is a wind energy company with a worldwide presence. Having capitalized on the windy plains of Andalucía, Gamesa has installed up to 263 wind farms worldwide with an annual production of 7,460 MW.[5] Wind energy has a very clear presence in Spain, especially in electricity production. As a result, Gamesa should benefit from the terms of the Paris Agreement, and continue to grow since, being a clean energy source, Gamesa would help Spain lower its greenhouse gas emissions over the next five to ten years.

Gamesa suffered as a result of recent budget cuts to the renewable energy industry. However, moving forward, policies relating to the Paris Agreement should benefit Gamesa because it offers an energy source that would greatly reduce Spain's greenhouse gas emissions.

Learn More

[1] Deloitte. "European Energy Market Reform," 2015.
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[4] Grupo DISA. "DISA adquiere una planta fotovoltaica," 2015.
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THAILAND

Submitted by Climate Scorecard Country Manager
NEEBIR BANERJEE

How Thailand's Energy System Is Structured

The national energy and environmental policies are government-level policies that are adopted for implementing environmental and energy-related objectives in Thailand. Thailand's energy policies, which include electric power and renewable energy policies, are drafted and created by the Ministry of Energy (MoE). Similarly, energy policies that include electric power and natural gas transmission are regulated by the Energy Regulatory Commission (ERC).

The ERC is a governmental organization chaired by the Prime Minister. The overall management of the energy sector is the responsibility of the National Energy Policy Council and the Energy Policy Committee, two organizations established to work in conjunction to manage the sector. The Department of Energy Business is responsible for regulating the quality of service provided by the various companies and organizations operating in the energy sector.

The Energy Policy and Planning Office (EPPO), which is under Thailand's Ministry of Energy, oversees all aspects of Thailand's energy policies, which includes oil, natural gas, and power sectors. The National Economic and Social Development Board of Thailand oversee large energy infrastructure projects and contribute to the policy planning process. Similarly, the National Energy Policy Council (NEPC) approves all energy-related plans. Finally, the Department of Mineral Fuels regulates the upstream sector of Thailand's hydrocarbons. Its main function is to promote oil and gas exploration and development, including licensing rounds.

Thailand's Ministry of Energy also looks into the management of Thailand's Oil Stabilization Fund, which regulates and, in effect, subsidizes retail and wholesale petroleum product prices. The government of Thailand is attempting to limit the subsidies for LPG and diesel, and the government's pricing reforms are caught between the dual pressures of protecting consumers and industry against inflation and the fund's depletion. As a first step, the government's goal is to raise LPG prices, at least for industrial and petrochemical consumers, as part of government's pricing reforms.

There are various organizations (i.e., state-run/government, public companies, and independent companies), which are responsible for providing energy in Thailand. These organizations include:

- Office of the Minister – responsible for coordination with the Cabinet, the parliament, and the general public
- Office of the Permanent Secretary – establishes strategies, translates policies of the ministry into action plans, and coordinates international energy cooperation
- Department of Alternative Energy Development and Efficiency (DEDE) – promotes the efficient

use of energy, monitors energy conservation activities, explores alternative energy sources, and disseminates energy-related technologies
- Department of Energy Business – regulates energy quality and safety standards, environment and security, and improves standards to protect consumers' interests
- Department of Mineral Fuels – facilitates energy resource exploration and development
- Energy Policy and Planning Office (EPPO) – recommends economy-wide energy policies and planning
- Electricity Generating Authority of Thailand – the state generation enterprise
- Petroleum Authority of Thailand (PTT) Exploration and Production (E&P) Public Company Limited and the Bangchak Petroleum Public Company Limited – two autonomous public companies
- Energy Fund Administration Institute – a public organization
- Energy Regulatory Commission and the Nuclear Power Program Development Office – two independent organizations

On June 28, 2010, the National Energy Policy Commission (NEPC) passed a resolution to reduce the Adder rate for solar projects and to establish a new committee to oversee policy formulation and regulation of renewable energy policy. The Managing Committee on Power Generation from Renewable Energy Promotion (hereafter, the "Managing Committee") was appointed to coordinate, follow-up, and ensure that the implementation and establishment of measures promoting power generation from renewable energy is in compliance with policy.

The national energy/environmental policy of the Thailand government favors the regulatory frameworks dealing with the growth and expansion of renewable energy within the country. In terms of specific measures for promoting renewable energy in electricity production, Thailand enacted a Small and Very Small Power Purchase Agreements act, which regulates the connection of small producers to the electricity grid and the sale of their electricity. This framework also serves as a base for the feed-in tariff for solar, wind, waste, biomass, biogas, and mini and macro hydro power, which was passed in 2007 and amended in 2009. The law for a premium feed-in tariff regulates the payment of technology specific premiums on top of a regular electricity tariff. This policy awards power producers with an extra "adder" for systems installed in three provinces in Southern Thailand as well as for systems generating Renewable Energy (RE) electricity, replacing diesel in the Provincial Electricity Authority (PEA) system.

Finally, the regulatory framework also includes the new Thailand Power Development Plan 2015 - 2036, which was created by the government of Thailand in 2015. This plan states that the Thai government has a growing interest in attracting foreign investments in the renewable energy sector, particularly in solar photovoltaic projects. In this regard, the national energy/environmental policy enables renewable energy producing companies to receive government fundings, subsidies, and grants in order to promote the growth of renewable energy. Renewable energy producing companies like SPCG will thus benefit from these regulatory frameworks in place, in terms of enhanced production activities and practices.

Energy Sources

The Ministry of Energy's 2012 data reveals the percentage of Thailand's energy use that is provided by fossil fuels. Around 10% of Thailand's energy consumption was from coal and coal-related products. Petroleum products comprised majority of Thailand's energy consumption at 47%. Natural gas provided around 6% of Thailand's energy consumption. Thailand's traditional renewable energy, which is composed of biomass, provided 12% of energy in 2012, whereas renewable energy comprised of wind, solar, hydro, and geothermal, provided 6% of energy. Thailand's energy use with respect to nuclear power is still on hold. There are plans to add 2 GW of nuclear power that have been on hold since 2007, and the Fukushima nuclear plant accident in Japan has driven Thailand's specific investment costs for nuclear to unfeasible levels.

Thailand is increasingly dependent on energy imports, which are expected to grow from 42% in 2013 to 78% in 2040. The share of natural gas imports will almost double due to declining domestic production and the high demand for power generation. To limit energy imports, the national power plan (AEDP 2015-2036) foresees that by 2040, biomass will have the largest share of Thailand's energy at 13% (11 GW), followed by PV at 9% (8 GW), wind at 6% (5 GW) and hydropower at 5% (4 GW).

Profiles of Leading Energy Companies

Petroleum Authority of Thailand (PTT) or PTT Public Co. Ltd.: PTT Public Co. Ltd was established on December 29, 1978, and its primary mission was to procure adequate oil for domestic consumption. Following the privatization of the state enterprise Petroleum Authority of Thailand, PTT Public Co. Ltd, or PTT, was registered on October 1, 2001, under Corporatization Act B.E 2542 (A.D. 1999). PTT inherited from its predecessor business operations, rights, debts, liabilities, and assets. PTT has an initial registered capital of Baht 20,000 million (10 Baht/share). PTT also has a very strong link with the government of Thailand as the Ministry of Finance has 51.1% ownership in the company. The ministry thus has considerable influence on PTT's policies and direction through strong representation on the company's board. Finally, the government-supported equity fund Vayupak also owns 15.3% of PTT, thus the total government ownership in PTT is at 66.4%.

SPCC Public Co Ltd: SPCG Public Co. Ltd is a company which began developing and operating mega-solar facilities in Thailand in 2010. SPCG is a pioneer in solar farm and solar roof development in Thailand and Asean. SPCG has developed 36 solar farm projects in Thailand totalling about 260 Mw in 10 provinces throughout the Northeast of Thailand and Lopburi, with a total land area of about 5000 rais (2000 Acres). SPCG is a pioneer in the solar roof business in Thailand. Solar Power Company Limited (SPC) is a subsidiary of SPCG that holds 34 licenses to develop solar farms, with a connected output of 200 mWp.

PTT Public Co. Ltd: PTT Public Co Ltd produces non-renewable energy from petroleum, natural gas and oil products. A newspaper report stated that the PTT board approved investments in floating liquid natural gas storage facilities located at Map Ta Phut, in Rayong province, where Thailand's largest petrochemical complex is located. PTT is currently expanding the Map Ta Phut Terminal to accommodate 10 million metric tons of Liquefied Natural Gas (LNG) per annum by 2017. The Chairman

of PTT Piyasvasti Amranand stated that "the company's capacity to accommodate Liquefied Natural Gas would eventually reach 20 million in the near future.". PTT's cost of energy, which they provide to consumers, is expected to increase over the next five years as its rate of production and distribution will increase proportionally. PTT mostly serves individual consumers and large numbers of customers in the industrial sectors.

PTT's long-term goal is to reduce greenhouse gas (GHG) emissions by 15% by 2020 against the business as usual projection. The target has been designed to be in line with the shared vision of the global community and international scientific research in order to prevent the global average temperature increase to below 2 degrees Celsius.

PTT Public Co. Ltd is committed to reducing GHG emissions both in scope one and scope two from its operations. Increasing energy efficiency, changing fuel types, generating power from co-generation power plant, and utilizing waste heat are some of the measures PTT introduced for reducing GHG emissions. In addition, PTT aims to reduce GHG emissions from scope three activities by offering low-carbon products. In 2012, PTT conducted a comprehensive review of its GHG emission management. Based on the results of the study, the CCC introduced carbon intensity index to measure the organization's effectiveness in reducing GHG emission. PTT conducted a pilot project to determine the ratio of GHG emission per unit of product or ton of carbon dioxide equivalent per barrel of oil equivalent (tCO2/BOE). The short-term target will be based on the average carbon intensity in the past. Long-term targets will be set to support carbon intensity index reduction in order to reflect PTT's GHG management efforts. Additional analysis of GHG emission will be conducted by PTT to determine appropriate indicators for setting the company's carbon intensity goal.

SPCG Public Co Ltd: SPCG Public Co. Ltd produces renewable energy and its source is from solar power. SPCG has a combined output capacity of 36 facilities, which it operates across the country. In recent years, SPCG's combined output capacity has reached at 260 megawatts which provides around one-fifth of Thailand's total solar-generated electricity. SPCG's CEO Wandee Khunchomyakong stated that the "company aims to double the solar power generation capacity to a total of 500 MW by 2020." SPCG launched two solar farms in Surin Province in June 2014 with an output capacity of 7,460 KW each. Tens of thousands of solar panels are lined up in an agricultural district in the northeastern province. Electricity generated in this region is sold solely to Thailand's Provincial Electricity Authority, which brings revenue of 240 million baht ($6.92 million) annually to the power plant operator. Finally, SPCG's stable, efficient power generation has been highly appreciated in the market. Its consolidated revenue boosted to roughly 4.4 billion baht, and the net profits to 1.7 billion baht, for the period that ended December 2014. SPCG has broad range of customers, which includes individual consumers, private firms and government agencies.

In 2014, SPCG Public Co. Ltd implemented the construction of 36 PV solar farms in northeast Thailand, which accounted for 250 MW of installed capacity. This made possible potential savings of 200,000 tons of CO2 equivalent per year compared to Thailand's fossil-fuel driven electricity generation.

SPCG Public Co. Ltd installed solar farms, which provide potential savings of 200,000 tonnes of CO2 equivalent per year. The Korat 2 and Loei 1 solar farms of SPCG will provide clean and renewable energy

for the local population in future time. These two solar farms have replaced some of the electricity produced from fossil fuel generation thus improving local air quality and helping mitigate the effects of climate change. SPCG is playing a key role in placing Thailand on a low-carbon growth path and reducing its reliance on imported energy, and at the same time enhancing economic growth in some of the most impoverished regions of Thailand. SPCG's financing granted by the Clean Technology Fund (CTF) will also be significant in reducing greenhouse gas emissions. The CTF, which is a multi-donor facility administered by the World Bank, will assist SPCG through scaled-up financing for demonstration, deployment, and transfer of low-carbon technologies, with significant potential for long-term savings in greenhouse-gas emissions.

Learn More

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TURKEY

Submitted by Climate Scorecard Country Manager
OZLEM DUYAN

How the Energy System Is Structured

The government of Turkey aims to privatize public power plants, including hydro and thermal power plants. EÜAŞ, the largest electric power company in Turkey, was founded by the Turkish government in 2001 and has 72 hydroelectric power plants and 10 thermic power plants. Privatization will demolish the public monopoly and cause competition. Some private groups control 30% of distribution and their share in power generation is rapidly increasing. Some want to control distribution, wholesale, retail sale and generation at the same time. Currently, two private groups control more than 50% of the electricity distribution market.

Renewable energy power plants are installed by private companies. According to the target capacities in the 2019 Strategic Document and the 2023 National Renewable Action Plan, an increase in renewable energy installed capacity is expected. However, a review of the status of licensed investment projects and the energy sources of projects seeking licensing implies that these targets are not realistic.

The renewable energy installed capacity will increase in the next five years, which will decrease Turkey's greenhouse gas emissions. However, higher energy demand and the use of coal resources should not raise high expectations.

Table 2: Turkey Energy Producers

Organization Type	kWh Percentage (%)
Private sector	478 714 830 61.46
Build - operate	128 754 000 16.53
EÜAŞ	120 801 120 15.51
Build - operate - transfer	35 257 340 4.53
Transfer of operating rights	15 351 210 1.97
Autoproducer	0 0.00

Sources of Energy

Among OECD countries, Turkey has the highest growth rate on energy demand, which attracts attention as Turkey is largely dependent on energy imports. For example, Turkey's oil import dependency ratio is 93.6%, and the rate of dependence on imports of natural gas is 99.2%. The government has several action plans against this level of energy dependency. However, the drop in oil prices in 2015 reduced Turkey's oil and natural gas import cost and caused a slight increase in the fossil fuel use and dependency on external energy sources.

The percentage of Turkey's energy use for the past year that is provided by (a) fossil fuels (b) and renewable energy can be seen on the table below.

Turkey Energy production companies/organization types and their energy production percentage during 2015 can be seen on the table below.

Table 1: Turkey Energy Source

Energy Source	MWh Percentage (%)
Natural Gas	93 844 074 34.56
Hydraulic	67 216 416 24.75
Import Coal	43 311 707 15.59
Coal and lignite	39 257 964 14.46
Wind	14 024 627 5.16
Geothermal	3 941 180 1.45
Other thermic	3 352 088 1.23
Biogas	1 788 017 0.66
Import	4 825 408 1.78

Profiles of Leading Energy Companies

Calik Enerji: Çalik Enerji is a Turkish energy company of the Çalık Holding, which was established in 1998. The main areas of operations include:

- oil and gas exploration, production, transportation, and distribution;
- power generation, transmission, and distribution;
- power design and engineering; and
- telecommunications services.

The company's website tells us that Çalik Enerji has oil and gas exploration and production activities in Turkey, Iraq, Afghanistan, Azerbaijan, and Turkmenistan (notably in the Ýolöten Gas Field). Along with the Italian company Eni, it is constructing the Samsun-Ceyhan Pipeline to transport crude oil from the Black Sea to the Mediterranean Sea. It also operates power plants in Turkey and Turkmenistan. In 2015, Mitsubishi Corporation announced a strategic alliance with Çalık Enerji to develop infrastructure projects in Turkey and Northern Africa.

Gama Enerji A.S. GAMA Enerji A.Ş. is a Turkish company founded in 2002 that engages in building, financing, and investing in energy and water utility infrastructure. While the development, construction, and operation of power plants are its main focuses, power generation and trading are also a part of its activities.

The total power generation capacity of the GAMA Enerji is 1,715.80 MW, including two CCGT power plants in Galway, Ireland, and Kirikkale, Turkey. GAMA Enerji also owns Disi Mudawara, the Amman water conveyance project by the Ministry of Water of Jordan. Despite the headquarters location in Ankara, the company is active in energy trading business with its affiliate GATES Enerjiin Istanbul.

General Electric Energy Financial Services (GE EFS) acquired 50% of the shares of GAMA Enerji in 2007 and held its position as a shareholder until 2015. In 2015, International Finance Corporation (IFC), a member of the World Bank Group, and a fund managed by IFC acquired 27% of the company's shares. In late 2015, Malaysia's state electricity utility, Tenaga Nasional (TNB) bought a 30% stake in GAMA Enerji.

RES Anatolia: RES Anatolia is a leading renewable energy developer, dedicated to the delivery of wind and solar power projects. With a portfolio of over 8,000 MW of renewable energy capacity constructed worldwide, the RES Group has been playing a leading role in the renewable energy industry for almost 30 years.

RES Anatolia is fully owned by RES Mediterranean, the southern European division of the RES Group. It specialises in the design, development, financing, construction, and operation of renewable energy power plants (wind and photovoltaic) across the Mediterranean basin and the Middle East. Working alone or with strategic partners, RES has the capability to bring forward projects that will contribute to the sustainable future of Turkey. With decades of experience in the renewable energy and construction industries, RES has the technical, engineering, and construction expertise needed to develop projects of outstanding quality.

RES Anatolia can deploy the significant capabilities of specialist staff from other parts of the group as required. These include centers of excellence for wind resource assessment, wind turbine procurement, turbine technology assessment, network analysis, and connection design.

Learn More

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UKRAINE

Submitted by Climate Scorecard Country Manager
DIANA SENTJUROVA

How The Energy System Is Structured

Ukraine is the fourth largest coal producer in Europe (after Russia, Germany, and Poland), contributing 4% of global output; until now, however, all the fuel consumed in the Ukrainian power industry has come from domestic production. As a result of the conflict in the Donbas, Ukraine will be forced to import large quantities of coal, especially the high-grade coal consumed in thermal power plants. Due to the growing coal deficit, Ukraine has increased electricity production in its nuclear power plants to the maximum possible, significantly reduced energy exports, and significantly reduced supplies to Crimea. However, these measures cannot compensate for the declining energy production in heating plants. Therefore, as there is no chance that supplies from mines in the Donbas will be resumed in the following months, the deficit in the Ukrainian coal power plants will be a minimum of 4 million tons by the end of this year and about 2.8 million tons per month in 2015.

Ukraine is currently in a renewable energy crisis, with the country's energy sector dominated by large, mostly state-owned, non-renewable power producing companies. Currently only 13 of the 51 generators of electricity produce solar, hydro, or any other type of "green" energy, forming about 9% of Ukraine's total power production. Unfortunately, the political crisis of the past couple of years had lead to a decrease in clean energy investments.

Currently, the government is heavily investing in "green" energy in order to both decrease the amount of greenhouse gases in the environment and Ukraine's need for Russian gas imports. In addition to feed-in- tariffs, the Ukrainian government also offers clean energy investors VAT exemptions and import duties that expire in 2019. All these measures are meant to increase the share of renewable energy to 11% of the total energy balance by 2020.

Unlike non-renewable power, the "green" energy market is largely dominated by local producers with separate rates for companies and households. The price also depends on the type of clean energy

produced. For example, the rate for solar energy (the most popular renewable energy option in Ukraine) is 0.16€ KWh for business consumers.

The solar energy sector especially is struggling to recover its pre-2014 rates of energy production. The political crisis resulted in the feed-in-tariff being reduced by almost eight times and also lead to the abandonment of many of the country's solar energy projects. One of the companies that went out of business was Active Solar – the biggest producer of solar energy in Ukraine, which filed for insolvency after Crimea, when several of its massive power plants were annexed by Russia in 2014. The government has implemented numerous measures such as feed-in premium rules for domestic producers and FIT compensation rules that are designed to fight this ongoing decrease in renewable power production rates, but none of the recent clean energy projects are comparable in scope to Active Solar's over-100-MW-large solar farms.

The political crisis has also influenced the country's coal production companies. Most of the Ukraine's coal resources are located in the Donbass region, where all the energy production was halted due to the destruction of transport links during the conflict.

Political turmoil is definitely of the main reasons why non-renewable energy imports play a very important part in the Ukraine's power sector. Ironically, most of the energy imports come from Russia. Natural gas imports from Russia contribute about 57.2% of all energy imports to Ukraine. Nuclear fuel is also mostly imported. About 92% of these imports also used to come from Russia, but since 2015, over 30% of nuclear energy is imported from Westinghouse.

In 2016, Ukraine decreased the amount of natural gas imports by 2.4 times to 2.892 billion cubic meters. Nuclear power production, on the other hand, seems to be steadily rising. In 2015 alone, the share of thermal energy in Ukraine's total power production fell from 41% to 35%, whereas nuclear energy share increased from 49% to 56%.

Profiles of Leading Energy Companies

Ukrenergo: Most of the domestic thermal energy is produced by the state-owned company Ukrenergo, which since May 1, 2016, offers the same rate for business and private consumers – UAH 6,879 ($272.7) per 1,000 cubic meters of natural gas.

Ukrenergo also has a number of environmental projects underway that are meant to reduce the amount of greenhouse emissions in the environment. Most of them are implemented in order to reduce Ukraine's energy intensity. The project aims to increase the efficiency of energy production and thus decrease the amount of greenhouse gases produced by replacing high-voltage equipment, upgrading existing transmission lines (so that less energy would be lost during transport) and improving the infrastructure for implementing energy regulations across the country.

These measures seem to be successful, as thermal energy production fell by 20% this year. However, there is still much to be done in order to decrease Ukraine's dependence on non-renewable energy sources.

Energoatom: All four nuclear power generators in Ukraine also belong to a state-owned company, Energoatom, which since March 2016 has had all its assets and bank accounts frozen by the Ukrainian courts over allegedly unpaid debts. The timing is very unfortunate as in 2011 the company began a project with a target completion date of 2017 that was supposed to bring Ukrainian nuclear power production into line with international standards.

Learn More

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UNITED KINGDOM

Submitted by Climate Scorecard Country Manager
FRIDAH SIYANGA-TEMBO

How The Energy System Is Structured

There are several authorities in the UK that are responsible for regulating the energy sector. One of these is The Office of Gas and Electricity Markets, also known as OfGem. It operates as a non-ministerial government department and its main responsibility is to protect the consumer. It is also responsible for rolling out various government initiatives and regulations into the industry. OfGem is governed by The Gas and Electricity Markets Authority (GEMA), an independent regulator. its main function is to regulate the energy sector in the UK. The Health and Safety Executive is an independent national regulator that is responsible for regulating and enforcing health and safety in the workplace in Great Britain.

The Office for Nuclear Regulation (ONR), an agency of the HSE, has the responsibility of regulating the nuclear energy sector. Finally, the Environmental Agency is responsible for maintaining the integrity of the environment as well as encouraging sustainable development in England. Before Brexit, the government's role in the energy sector with regards energy regulation was to make decisions, set policy and implement legislation affecting the sector. This was done through the Secretary of State who headed the Department of Energy and Climate Change (DECC), now the Department for Business, Energy and Industrial Strategy (BEIS).

Sources of Energy

Energy used in the UK is generated from a number of different sources including fossil fuels, nuclear and renewable energy sources. In 2013, most of the energy used came from fossil fuels with 86%, and of these, coal contributed the largest with 34%. This was followed by nuclear energy which was 19% and the least energy source used came from hydro with under 1%.

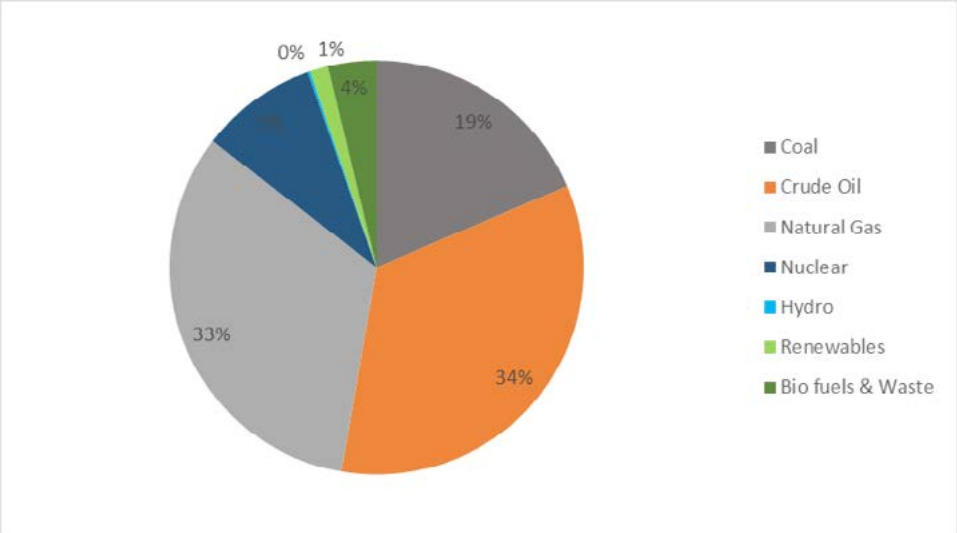

Figure 1: Primary energy supply for UK 2013 (in Ktoe). Data from IEA

Profiles of Leading Energy Companies

Until the 1980's, the UK's energy sector (electricity and gas) was government owned and controlled. Reforms introduced during the 1980's saw the initial privatisation of British Gas, while the privatisation and liberalisation of the electricity sector started in the 1990s. The energy sector is currently private owned.

The energy industry in the UK is complex with different companies playing different roles from production to distribution. For instance, energy generators may not be the same as the energy suppliers or distributors. However, the largest energy suppliers in the UK, also known as the Big Six, are sometimes involved in two or all three of these activities even though they are more involved in energy supply. The Big Six include British Gas, EDF, E. ON, npower, Scottish Power and SSE.

Even though British Gas is the largest supplier of energy in the UK supplying over 11 million homes with gas and 6 million with electricity, EDF (Electricity of France) is the largest electricity generator in the UK with eight nuclear power stations. It produces 20% of UK's energy (electricity) and it is also the largest producer of low carbon energy. EDF Energy is a subsidiary of EDF Group, one of Europe's largest energy groups. It is exclusively owned by French national provider EDF S.A., and it supplies power to over 5 million homes and businesses. Apart from low carbon energy, EDF also produces energy from coal and gas.

SSE formerly Scottish and Southern Energy, is a Scottish registered company and is a major producer of wind and hydro energy. It is also the largest producer of renewable energy and the second largest energy supplier in the UK supplying almost 9 million customers which include residential and business customers. SSE was formed in 1998 when Scottish Hydro Electric and Southern Electric merged. Like EDF, SSE's energy portfolio includes non-renewable energy; coal and gas.

In view of the strong stand that the UK has taken on climate change and against reducing greenhouse gas emissions, energy producing companies have also welcomed this move and are working towards reducing their carbon emissions. For instance, EDF aims to reduce the intensity of carbon emissions from its power (electricity) production to less than a 100g of carbon dioxide per kWh by 2030. The most recent information on carbon emissions from electricity generation for the year 2015 was that EDF produced 203g of carbon dioxide per kWh. It plans to make this reduction by investing in nuclear energy technologies and encouraging its customers to use energy from these sources. SSE on the other hand is working on reducing its greenhouse gas emissions by investing in renewable energy and associated products that it is also encouraging its customers to use.

The UK has in its efforts to decarbonise come up with a number of policies including subsidies to encourage production of renewable and low carbon energy. These have played a part in the kind of investments that energy generators have made. For EDF, subsidy called the 'Contract for Difference' has enabled them to be able to be able to be on the brink of embarking on constructing a new nuclear power plant which is expected to power about 6 million homes. This will be the first power station to be built in the UK for over two decades. A decision is yet to be made on whether or not to go ahead with construction and this project has been criticised and deemed unnecessary by some.

On the other hand, SSE scrapped off its plans to invest in four major offshore wind projects worth £20 billion pounds and questioned the viability of the offshore wind sector two years ago. The reasons stated were the high building costs and limited subsidies. However, recently when the government suspended their subsidies on onshore wind farms, SSE declared offshore wind "back on its agenda". The government also announced that they had secured funding for three further rounds of subsidy contracts. This has put onshore wind projects, some of which were already in motion at a disadvantage. It, however is a positive thing for offshore wind sector. This shows how policies can impact on the type of investment decisions that energy companies make.

Learn More

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UNITED STATES

Submitted by Climate Scorecard Country Manager
BEN CARVER

How the Energy System Is Structured

The Federal Energy Regulatory Commission (FERC) is the United States federal agency that regulates the transmission and wholesale sale of electricity and natural gas in interstate commerce, and regulates the transportation of oil by pipeline in interstate commerce. FERC also reviews proposals to build interstate natural gas pipelines, natural gas storage projects, and liquefied natural gas (LNG) terminals, and FERC licenses non-federal hydropower projects.

The top priorities of FERC include:

- promoting reliable, efficient, and sustainable energy for consumers;
- ensuring just and reasonable rates, terms, and conditions;
- promoting safe, reliable, secure, and efficient infrastructure; and
- enforcing compliance with FERC rules and federal law by detecting and deterring energy market manipulation

A FERC Energy Primer provides a vivid description of the US energy system. Much of the wholesale natural gas and electric power industry in the United States trades competitively; some markets are established through administrative processes based on the cost of providing service. In competitive markets, prices are largely driven by the economic concepts of supply and demand. Underlying the supply and demand for energy are physical fundamentals – the physical realities of how markets produce and deliver energy to consumers and how they form prices.

Wholesale natural gas and electricity markets differ from other competitive markets, however, in critical ways. Demand is ultimately determined at the retail level. Retail use is relatively inelastic in the short-term, although this may be less so with some larger customers. Retail use of natural gas or electricity exhibits some unique characteristics: because consumers have limited ability to reduce demand, supply must match demand instantaneously, in all locations.

For natural gas, this means production, pipelines, and storage need to be sized to meet the greatest potential demand, and deliveries need to move up and down to match changes in consumption. Natural gas has underground and aboveground storage options and linepack, which involves raising the pressure in a pipeline to pack more molecules into the same space. Natural gas flows through a pipeline at velocities averaging 25 mph, depending on the pipeline and the configuration of related facilities, so new supply can take hours or days to reach its destination. That increases the value of market-area storage, which vastly reduces the distance and time needed for gas to reach consumers.

For electricity, storage is more limited, although technologies such as batteries and flywheels are being developed. Hydroelectric pumped storage is available in a few locations; this involves pumping water to high reservoirs during times of slack electricity demand, then letting the water flow downhill through electricity-generating turbines when demand for power rises. Generating plants, transmission and distribution lines, substations, and other equipment must be sized to meet the maximum amount needed by consumers at any time, in all locations. For all practical purposes, electricity use is contemporaneous with electricity generation; the power to run a light bulb is produced at the moment of illumination.

Energy Sources

As of April 2016, coal provides 33% of the energy produced in the United States, natural gas provides 33%, nuclear provides 20%, hydropower and other renewables provide 13%, and the reamaing 1% comes from other gases and petroleum

Profiles of Leading Energy Companies

Duke Energy is one of the largest utilities, providing over 52,000 MW to over 7 million customers. Within the customer base, 6 million Duke Energy customers are residential consumers (over 24 million people), who are charged a higher rate per kWh than industrial, transportation, and commercial energy consumers. Duke is a publicly traded company on the Fortune 125 list. 95% of Duke energy production comes from nuclear and coal, with less than 2% coming from hydropower and renewables. Duke has made significant pledges to increase solar energy production in the future, alongside cleaning up coal

production. However, in North Carolina where Duke is headquartered, third party electricity generation, such as installing residential solar panels, is illegal, leaving consumers the option of paying Duke the same kWh rate and bearing installation costs or registering as a public utility. This leaves little incentive for consumers to install renewable generators like solar or wind, rendering Duke a statewide energy monopoly. Further, Duke operates primarily in the South and Midwest region of the United States, where many states have not set standards and goals for renewable energy production.
Source: https://www.duke-energy.com/north-carolina/nc-rate-case/our-energy-mix.asp

Pacific Gas and Electric Company: States in other regions serviced by large utilities have set standards and goals for renewable energy production, such as in California where Pacific Gas and Electric Company (PG&E) operates. PG&E is a subsidiary of Pacific Gas and Electric Corporation, a publicly traded holding company. With over 5 million customers, PG&E provides over a third of its energy from renewable resources and hydropower and 23% from non-emitting nuclear. A quarter comes from combined coal, natural gas, and oil production. As a company, PG&E appears committed to policy infrastructure for energy production that does not exacerbate climate change. They left the US Chamber of Commerce in 2009 when the lobbying organization opposed climate legislation, and publicly cut ties to the American Legislative Exchange Council (ALEC), a corporate lobbying organization that actively engages in underwriting climate denialist bills and opposes the US Clean Power Plan.
http://www.pg&ecorps.com

PG&E has taken advantage of many of the tax incentives for developing renewable energy production and infrastructure resulting from the 2009 US Climate Action Plan, as have many smaller independent energy companies. The 2015 Clean Power Plan would provide greater incentives for established and new energy companies to invest in renewable and clean energy production, but is currently under review, facing opposition from lobbying organization like ALEC, to which Duke Energy is a contributor. Despite stalling at the federal level, many states have taken action to establish renewable energy standards and offer incentives to companies towards those goals, primarily outside of the South. Some start up renewable energy companies have seen staggering growth up to 5000%. Wind power is slated by the US EIA to have the greatest increase in the future.

Learn More

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ABOUT

Climate Scorecard is a participatory, transparent, and open data effort to engage all concerned citizens in supporting the implementation of the new 2015 Global Climate Agreement.

Background

Over 190 countries endorsed a new global climate agreement in December 2015 at a United Nations meeting in Paris (known as COP21). The Paris Agreement is designed to stabilize the earth's climate and prevent our atmosphere from heating-up above a global warming tipping point of 2 degrees Celsius, beyond which scientists warn extreme ecological disasters will occur. The success of the new agreement is contingent on the efforts all countries, as well as non-state actors, must make to increase and honor their commitments to reduce greenhouse gas emissions.

In 2015, in preparation for COP 21, most countries submitted pledges, also known as Intended Nationally Determined Contributions (INDCs), to reduce their greenhouse gas emissions by 2030 or earlier. The Paris Agreement recognizes that these pledges, while good starting points, are insufficient to avoid having the planet warm beyond 2 degrees Celsius. Therefore, all countries are encouraged to revisit and strengthen their pledges before the agreement goes into effect in 2020.

Climate Scorecard is a mechanism for supporting efforts needed to implement the new Paris Agreement. Such efforts include encouraging countries to increase their emission reduction pledges, tracking efforts to strengthen pre-Paris INDCs, making sure that countries put in place policies and programs to achieve their reduction targets, and holding nation-states accountable for fulfilling the promise of the Paris Agreement.

HOW IT WORKS

The Climate Scorecard team has established a website - www.climatescorecard.org - where everyone – citizens, organizations, businesses, researchers, members of governments, journalists – can share information related to emission reduction efforts in the top 25 greenhouse gas-emitting countries. Each of the 25 top greenhouse gas emitting countries has a page on our website where concerned stakeholders can post information related to the status of their country's pledge. Climate Scorecard's website also provides a set of 6 targeted results (see below) that we believe each country needs to achieve by 2020 in order to successfully implement the new Paris Agreement. These results are based on recommendations from the agreement itself, benchmark country emission reduction pledges, and our own research that has identified goals that all countries need to reach. Our targeted results provide a framework for tracking progress made by the top 25 greenhouse gas-emitting countries.

Results for the Top 25 Greenhouse Gas-Emitting Countries to Achieve by 2020

- Strengthens its 2015 agreement pledge, or adheres to a pledge that meets Result 3 in the Framework
- Agrees and implements measures to reach the target of 20% unconditional emission reduction by 2020
- Agrees and implements measures to reach the target of 30% unconditional emission reduction by 2025
- Adopts the UN suggested baseline year of 2010 from which to calculate future reductions
- Agrees to and implements policies that achieve 100% renewable energy by 2050
- Make all aspects of its emission reduction process, including policy development and implementation, transparent and inclusive

WHO WE ARE

An outstanding team of organizations and individuals is implementing Climate Scorecard. Coordination of our effort is through a partnership between The Global Citizens' Initiative (TGCI) and EarthAction- non-profit organizations with missions focused on environmental protection and citizen engagement. TGCI and EarthAction worked together to successfully implement last year's Citizens' Campaign for a 2015 Global Climate Agreement (www.climateagreementcampaign.org).

TGCI and Earth Action have recruited a team of 25 environmental graduate students and young professionals who serve as Country Managers, building and supporting networks of organizations and people to contribute and share information related to the post-Paris progress of each of the top 25 greenhouse gas-emitting countries.

In addition, university-based experts provide quality control and address technical questions related to documents that are proposed for posting on the Climate Scorecard website.

For further information about Climate Scorecard please contact Ron Israel, Executive Director, The Global Citizens' Initiative (roncisrael@gmail.com) or Lois Barber, Executive Director, EarthAction (lois@earthaction.org).