

Nordic/Baltic Regional ESTH Hub e-Letter

December, 2011

Welcome to the latest **e-Letter**, our *unclassified* electronic publication sharing regional information, news and events. We encourage you to visit the websites of our Embassies throughout the Hub. Feel free to disseminate to your contacts. At the very end of the e-Letter you will find our featured story, offering background on wind power.

Enjoy the read!
Ed Canuel
Bo Gregersen
Jasper Alblas
Ivan Kolev

AROUND THE REGION.....

DENMARK



New Danish – American Green Partnership. Ambassador Fulton hosted the signing ceremony to highlight a new Danish – American Green Partnership contributing to environmental sustainability. American environmental firm JMM Management Group and Danish software house Geokon signed an agreement to enter into a global partnership, combining Danish and American software to find solutions solving contaminated land challenges. The partnership promotes Geokon’s software application GeoEnviron through JMM’s Integrated Property Management System. Read more [here](#). (Picture:

Left to right: Jon M. Marinas, President and CEO of JMM Management Group, Ambassador Fulton and Geokon Director, Erik Kirsbo. *Photo: State Dept.*)

Danish company Grundfos opened Water Technology Center in California. Grundfos Chairman Niels Due Jensen unveiled Grundfos’ Water Technology Center in Fresno, California. The Center offers a space for government, academic institutions and start-ups to share and gather information on irrigation, water monitoring, wastewater treatment and other water technologies. To promote innovation in the water



industry, the Center will also partner with groups like the International Center for Water Technology at Fresno State University, Central Valley Business Incubator and companies such as Climate Minder and Aquacue. Read more [here](#).

Denmark Offers Vietnam Wind Power Assistance. At a workshop jointly held by the Ministry of Industry and Trade and Denmark's Embassy in Hanoi, Danish experts committed to help Vietnam build and operate wind farms in provinces and cities across the country. Read more [here](#). (Picture: Vietnam's first wind turbine group in Binh Thuan Province. *Vietnamnet.vn*)

Ethanol for cooking. Danish Novozymes, together with CleanStar Ventures, will build a small-scale ethanol plant in Mozambique. The produced ethanol will be sold as cooking fuel and thus replace charcoal, which is harmful to the environment and human health. The companies will work together with 3,000 small farms to help with a transition from slash-and-burn agriculture to sustainable farming. Crops will be used to produce a wide range of food products as well as the ethanol-based cooking fuel. Read more [here](#).

ESTONIA

Eesti Energia reduces environmental impact of oil production. The current oil-production chimney of Eesti Energia Oil & Gas was replaced and a new electrostatic precipitator was installed. According to the company, the amount of volatile particles in the air caused by oil production is significantly lower because of the innovations. Read more [here](#). (Picture: Oil production facility Eesti Energia, *Baltic-course.com*)

ABB chosen to build network of speed chargers. ABB AS was chosen by the Estonian government to build a network of speed charger systems for electric cars in the country. ABB will install around 200 speed chargers for €7.92 million. Read more [here](#). Picture: Electric chargers, *Baltic-course.com*



FINLAND

Waste and Industrial By-Products Upgraded to Butanol. Working within the Academy of Finland's research program Sustainable Energy, researchers achieved good results in using waste and other excess products from industry to develop new and innovative fuels. Researchers have studied the processing of both biobutanol and biogas into transport fuels. Biobutanol can be produced from food industry and pulp/paper industry byproducts, which makes it a suitable candidate for replacing petrol as a fuel. Read more [here](#).

GERMANY

Vattenfall plans to sue Germany over nuclear phase-out. Sweden's state-owned energy giant Vattenfall is planning to take the German government to the Washington-based International Centre for Settlement of Investment Disputes over the closure of its nuclear power plants. German energy companies E.ON and RWE have already filed legal complaints against the plans, but as a foreign company Vattenfall can invoke the Energy Charter Treaty (ECT), an international agreement that provides a multilateral framework for energy deals. Read more [here](#).

Hamburg becomes the petri dish for Germany's clean energy culture. Crowned Europe's green capital by the European Commission, Hamburg has made great strides toward sustainability. Hamburg has been more able to chart its own course because it straddles the line between a city and a state. Hamburg offers lessons that can help cities reduce their energy use, increase efficiency and combat climate change. Read more [here](#).

ICELAND

Iceland to help France save trees from global warming. Iceland and France are looking into the possibility of taking French trees endangered by global warming and planting them in Iceland to safeguard them. The Icelandic Forestry Service is working with France's Office National des Forêts, and the aim of the collaboration is not to grow a new forest, but to preserve DNA resources of forests. With temperatures rising around the world due to climate change, Iceland's colder climate could preserve species from France once their habitat becomes too warm. Read more [here](#).

First Methanol Fueling Station in Iceland. The first methanol/gasoline fueling station recently opened in Reykjavik. The fuel blend is being produced by the American-Icelandic company Carbon Recycling International. The fuel is produced by converting carbon dioxide released from bore holes into methanol that is then blended with gasoline to produce a cleaner fueling agent. It is believed that this method of creating clean energy is the first of its kind.

LATVIA

Energy and transport sectors to be priorities for Latvia-Lithuania cooperation. Latvian Prime Minister Valdis Dombrovskis recently met with Lithuanian Ambassador Ričardas Degutis. The officials expressed satisfaction over the previous close relations between the two countries and assessed cooperation in joint projects, particularly in the area of energy and transport. One of the issues discussed was the joint Visagina Nuclear Power Plant project. Read more [here](#).

LITHUANIA

Lithuania invites companies to explore shale gas reserves. After investigating reserves, companies will be allowed to produce shale gas. Lithuania's shale gas reserves are located in the southwest of the country--and may cover the nation's domestic consumption needs for between 30 to 60 years. Read more [here](#).

NORWAY

Statoil buys U.S. shale gas oil firm. Norway's Statoil has announced it would buy U.S. company Brigham Exploration for \$4.7 billion, allowing the company to significantly expand its non-conventional oil and gas extraction activities in the United States. The purchase will give Statoil access to shale oil fields in the Bakken and Three Forks formations in North Dakota and Montana, which are among the largest oil accumulations in the United States. Read more [here](#) and [here](#). *(Picture: Gas processing plant Statoil, yahoo.com)*



Norway and the U.S. in Arctic teamwork. U.S. Interior Secretary Ken Salazar and Norwegian Oil & Energy Minister Ola Borten Moe have signed an agreement Norway and the U.S. to co-operate on sustainable exploitation of oil and gas resources in the Arctic. Furthermore, the agreement aims to promote joint research to develop "cutting-edge" technologies for exploration, development, safety and response, as well as renewable energy and fossil fuel technology. Read more [here](#).

Norway's energy minister sees progress in oil sands. Minister Moe noted oil sands industry moves to clean-up operations, but stopped short of pledging unqualified support for investments in the resource by the government-owned oil company, Statoil. Read more [here](#).

POLAND

Poland plans its first atomic power plant on Baltic. State-controlled energy group PGE announced that Poland's first nuclear power plant is set to be located near the Baltic Sea. The plant is due to come online by 2020 with two 3,000-megawatt reactors. The cost of the nuclear program is estimated at 100 billion zloty (22.1 billion euros, \$29.4 billion). Read more [here](#).

Biological diversity. An international conference "Planning for Biological Diversity" was held in Warsaw. Some of the Conference aims were to address the integration of protection and management plans, the construction of green infrastructure, the innovative methods of financing actions aimed at nature conservatio and the potential of spatial planning in marine areas. Read more [here](#).

6th Energy forum held in Poland. Poland's Eastern Institute held its 6th Energy Forum November 29-30 in Sopot, focusing on the impact of shale gas, nuclear power and the EU carbon emissions trading scheme on energy sector development in Central/Eastern Europe. Read the press release [here](#).

RUSSIA

Russia unveils design for first-ever city with artificial climate. At the 2nd International Arctic Forum in Arkhangelsk in September, Russian architects presented plans for a “cryptoclimatic” city, which they proposed building on the remote island of Kotelny in the Novosibirsk archipelago. The area has been called one of the least hospitable regions on Earth, with summer temperatures rarely rising above freezing. Plans call for an initial population of 5,000, most of them scientists and workers in the oil and gas sector. Russian media noted the significant attention received by the plan in Europe, explaining the lack of Russian media coverage by noting that Russian journalists assume the project will never receive any funding. Russian experts also noted that any construction on Kotelny would require UN approval, as the island does not belong to Russia. Read more [here](#). *(Picture: Concept picture of city, [rt.com](#))*



Russia, Norway, Finland to cooperate on Arctic radiation safety. The Finnish Radiation and Nuclear Safety Authority (STUK), Norwegian Radiation Protection Authority (NRPA), Murmansk Marine Biology Institute (MMBI), Finnish Meteorological Institute, Pöyry Finland Oy and the Norwegian Meteorological Institute have launched a three-year program for environmental and radiation protection/research in the European Arctic. The program is aimed at strengthening cross-border cooperation and improving emergency preparedness capabilities and risk assessments for nuclear accidents in the region. Read more [here](#) and [here](#).

Russian-German Cooperation to restore Moscow Peatlands. A German delegation met with officials from the Russian Ministry of Natural Resources and Environment (MNRE) to discuss plans to restore peatlands in the Moscow region. Over the decades, Russia's peatlands were drained and dried, in order to extract peat for power production or other uses. This process led to biodiversity reduction, greenhouse gas emissions and wild fires. The meeting identified 5 hectares of the Moscow region's peatlands at fire risk. The plan is however to flood 30 hectares using German technology and joint engineering and scientific management. Read more [here](#) (in Russian).

Ministry of Energy Plans Alternative Energy Investment. The Ministry of Energy announced plans for increased investment in alternative energy—wind power and biomass in particular. The International Finance Corporation—a member of the World Bank Group that focuses on private sector investment in developing economies—is interested in investing around \$150 million into 30 pilot projects in conjunction with the Russian Energy Agency and RusHydro, the largest producer of hydroelectric power in Russia. Read more [here](#) (in Russian).

SWEDEN

Volvo reduced CO2 emissions the most in Europe in 2010. The Volvo Car Corporation is in the lead among European carmakers when it comes to reducing carbon dioxide emissions. This conclusion was reached in the sixth annual analysis conducted by the European Federation for Transport and Environment. While Europe's eight largest carmakers cut their CO2 emissions by an average of 2 to 6 percent in 2010, Volvo reached a reduction of 9 percent. Read more [here](#).

Swedish Bioenergy Association (SveBio) teams up with Biobusiness Alliance of Minnesota (BBAM). Svebio and BBAM will work together to jointly contribute to the increased use of bioenergy in the state. The project goal is to establish a series of biomass to energy installations in Minnesota. Read more [here](#).

Nobina's environmental focus gives Scania a market leadership. Nobina, the Nordic region's largest passenger traffic operator for buses, has placed a major order with Scania for 121 clean energy buses. The order strengthens Scania's leading position as a supplier of vehicles that can be run on the renewable fuels available today and represents a breakthrough for the new generation of gas engines introduced by Scania in 2010. Read more [here](#).

EUROPEAN UNION

Europe's first Galileo satellites lift off. The two Galileo satellites were launched by a Russian Soyuz rocket its new base in French Guiana. The European Commission (EC) is investing billions of Euros in its own version of the American GPS system. The EU expects Galileo to bring significant returns to EU nations in the form of new businesses that can exploit precise space-born timing and location data. Read more [here](#).

EU CO2 scheme seen costing airlines 2 billion euro by 2020. From Jan. 1 2012, about 4,000 airline operators will face emission limits on all flights into or out of the European Union regardless of nationality or operator. Airlines are likely to be out of pocket by around 2 billion euros (\$2.8 billion) in 2020 from taking part in the EU emissions trading scheme (ETS). Read more [here](#).

EU energy supply at risk after Fukushima. European Union governments must encourage investments of as much as 1.1 trillion euros (\$1.53 trillion) by 2020 to ensure the bloc's continued energy supply security. The impact of Japan's Fukushima nuclear disaster on certain EU states' energy mix has cast doubt on Europe's supply security, the outlook for power prices and efforts to fight global warming. Read more [here](#).

New safety standards for offshore oil and gas operations. The European Union unveiled draft plans to regulate offshore oil and gas across the bloc. The new EU regulation would require all 27 member countries to enforce stricter standards before awarding offshore operating licenses and would enforce a regime of independent checks. Companies would have to draw up detailed safety reports and emergency response plans. Read more [here](#). Find the proposal [here](#).



Nord Stream Pipeline opened. European leaders and Russia's president have opened the Nord Stream Pipeline, which connects Western Europe with Siberia's vast gas reserves. The 760-mile (1,200 kilometer) underwater pipeline ferries the gas from Vyborg, near St. Petersburg in Northern Russia, under the Baltic to Lubmin. A second pipeline will be expected to be ready next year. Read more [here](#). (Picture: Russian President and various European leaders, *Euronews.net*)

Waste control to boost GNG reduction targets in EU. GHG emissions from municipal waste in Europe could be reduced by 62 million tons by 2020 (or 1.23% of total emissions in 2008) if the diversion targets of the EU Landfill Directive are fully met. This could be largely achieved through reducing methane emissions from landfill and increased recycling levels. Read more [here](#).

New EU-U.S. Energy Council agreements. Led by US Secretary of State Clinton and US Secretary of Energy Chu, EU High Representative Ashton and EU Commissioner for Energy Oettinger the EU and the U.S. concluded negotiations for an agreement to develop common energy efficiency specifications for office equipment and the common use of the ENERGY STAR logo, under the USG Energy Star program. Participants also stated their intent to establish two Electric Vehicle-Power Grid Interoperability Centers, one at Argonne National Laboratory in the United States and one at JRC-Ispra in Italy to deepen joint work on electric vehicle interoperability with charging and smart grid equipment. Read more [here](#).

New €80bn 'Horizon 2020' program to focus on clean energy and sustainability. Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science unveiled the new €80bn 'Horizon 2020' program from which around €25bn will go towards climate-related work, including clean energy, greener transport, climate action and sustainable agriculture. At least €48bn will be channeled towards sustainable development as part of the program, which runs from 2014 to 2020. Read more [here](#).

UNITED STATES

U.S. to open new areas to offshore drilling. The Obama administration announced its proposed five-year plan for offshore oil drilling. The plan, which is subject to months of public hearings and possible revisions, expands the areas in the Gulf of Mexico that are now under development, including some near Florida that have been off limits. It will also make available broader parts of the Arctic Ocean off the North Slope of Alaska and in the Cook Inlet off the state's southern shore. But unlike an administration plan announced shortly before the lethal BP blowout and spill in April 2010, the government is withdrawing all of the Eastern Seaboard from leasing consideration. Read more [here](#).

House of Representatives passes bill defying EU's aircraft emissions rules. The House of Representatives approved legislation that would ban European countries from imposing emission trading requirements on U.S. airlines. The ETS will, starting next year, require airline companies to buy emission permits or reduce emissions. A majority of both Democratic and the Republican House members however do not consent to the extra-territorial plan. Read more [here](#).

General Electric picks Colorado to build biggest U.S. solar factory. The company will build the solar factory near Denver. GE is a leader in manufacturing natural gas turbines and wind turbines, but it had mostly stayed clear from solar until it acquired PrimeStar Solar, a small panel maker, earlier this year. Read more [here](#)

Wind, Solar farm finance at record in Q3. According to a report by research firm Bloomberg New Energy Finance, wind farm and solar park financing surged to a record \$41.8 billion in the third quarter, even though clean energy share prices and the European economy slumped. The increase in financing was mainly driven by offshore wind investment. Read more [here](#).

Plans to Speed Solar Development on Public Lands. The Interior Department issued a new plan for promoting large-scale solar development on public lands in the West. The plan would accelerate permit approvals in 17 zones (285,000 acres) in Arizona, California, Colorado, New Mexico, Utah and Nevada. Read more [here](#).

White House Releases New Climate Report. The new report outlines the Federal Government's progress in expanding and strengthening the Nation's capacity to better understand, prepare for, and respond to extreme events and other climate change impacts. The report provides an update on actions in key areas of Federal adaptation, including: building resilience in local communities, safeguarding critical natural resources such as freshwater, and providing accessible climate information and tools to help decision-makers manage climate risks. Read more [here](#). Find the report [here](#).

U.S. To Require Details of Fracking on Federal Land. The Interior Department plans to issue a proposal soon forcing companies to reveal the chemicals they use in the so-called fracking drilling process on federal lands, as the Obama administration responds to public safety concerns over the shale exploration boom. Read more [here](#).

NASA launches earth-observing satellite. After a five year delay, NASA has launched an earth-observing satellite to test new technologies aimed at improving weather forecasts and monitoring climate change. The satellite launch is part of the NPOESS Preparatory Project (NPP) project. NPP is the first satellite mission to address the challenge of acquiring a wide range of land, ocean, and atmospheric measurements for Earth system science while simultaneously preparing to address operational requirements for weather forecasting. Read more [here](#) and [here](#).

UN aviation body weighs in against EU carbon plan. The U.N.'s International Civil Aviation Organization has adopted a working paper urging the EU not to include non-EU carriers in its plan. The ICAO said the paper has been adopted by "a clear majority," although European countries have expressed strong reservations. China, the U.S. and 24 other nations backed a declaration urging that their airlines be exempted from the EU's Emission Trading System. Connie Hedegaard, the EU's top climate action official, has expressed disappointment. Read more [here](#).

Propane Substitutes for Water in Shale Fracking. Various state regulators in the United States have reviewed a new technology of using a flammable propane gel instead of water, chemicals and sand typically blasted into rock or tight sand formations to release trapped oil and gas. The gelled propane turns into a gas and exits the well with the natural gas or oil stream produced, eliminating the use of millions of gallons of water pumped into a well. Read more [here](#).

Air Force Puts Muscle Behind New Ultra-Efficient Lighting System. The U.S. Air Force is behind a new energy-efficient, high performance lighting system that also sets a high bar for its focus on lifecycle sustainability, from raw materials to recycling and disposal. The Air Force's move into sustainable lighting is a part of a broader green package that includes solar energy and electric vehicles at Air Force basis, biofuels and even green roofs. Read more [here](#).

US backs “green prosperity” with Indonesia aid. U.S. Secretary of State Hillary Clinton announced \$600 million in aid for Indonesia, most of it for "green prosperity" in the world's third-biggest greenhouse gas emitter. The financial aid will help provide viable renewable energy alternatives and help support natural resource management. Read more [here](#).

Walmart joins ECOtality's E.V. Project. Walmart Stores Inc. will install electric vehicle charging stations in select stores through a partnership with ECOtality Inc. The partnership is carried out under The E.V. Project- a public-private partnership, funded in part by the U.S. Department of Energy through a federal stimulus grant made possible by the American Recovery and Reinvestment Act (ARRA). Read more [here](#).

Biofuels Start to take off in the Airline Industry.

In early November, two U.S. airlines (United Continental and Alaska Airlines) flew passengers on flights powered by biofuels for the first time. The Continental flight used a biofuel blend made in part from algae. Alaska Airlines used a fuel made partly from cooking oil. Read more [here](#). *(Picture: Employees load bags onto a Boeing 737-800 running on algae-based biofuel in Houston. Npr.org)*



The U.S. grants \$112 million for energy-efficient transit. U.S. Transportation Secretary Ray LaHood announced 46 innovative transit projects chosen for their capacity to help cut the U.S.'s dependence on oil and create a marketplace for 21st century 'green' jobs. The projects will share \$112 million in funding from the Federal Transit Administration (FTA). Read more [here](#).

A massive military solar project in the works. SolarStrong, SolarCity's ambitious five-year plan to build more than \$1 billion in solar power projects for privatized U.S. military housing communities across the country, is ultimately expected to create up to 300 megawatts of solar generation capacity that could provide power to as many as 120,000 military housing units. The project will help achieve goals of deriving 25 percent of energy from renewable sources by 2025. Read more [here](#).

More Americans Believe in Global Warming. The percentage of Americans who say there is solid evidence of global warming has increased modestly over the past two years. Currently, 63% say there is solid evidence that the earth's average temperature has been getting warmer over the past few decades. The percentage of people who call global warming a "very serious" problem is also rising. Read more [here](#).

\$4 billion program towards energy-efficient buildings. President Obama announced a partnership with private companies to invest \$4 billion towards making 1.6 billion square feet of

federal government and commercial office buildings more energy-efficient. The program is part of a Better Buildings Initiative to increase the energy efficiency in commercial buildings by 20 percent by 2020. Read more [here](#).

EPA Unveils Revised Air Pollution Rules for Industrial Boilers. The EPA proposed revised air pollution regulations for industrial boilers and incinerators that offer industry more flexibility. The new regulations would require facilities to install technology to reduce harmful air pollutants like mercury and soot. The so-called “maximum achievable control technology” standards will offer major public health benefits. Read more [here](#).

U.S. Navy Orders Largest Purchase of Biofuel in Government History. Dynamic Fuels, a joint venture between Tyson Foods and Syntroleum Corporation, has been awarded a contract to supply the U.S. Navy with 450,000 gallons of renewable fuels. This agreement builds off of a recent partnership between the Navy and the Departments of Energy and Agriculture to [invest up to \\$510 million](#) to produce advanced biofuels for military and commercial transportation. The fuel will be used as part of the Navy’s efforts to develop a “Green Strike Group” composed of vessels and ships powered entirely by biofuel by 2016. Read more [here](#).

EVENTS

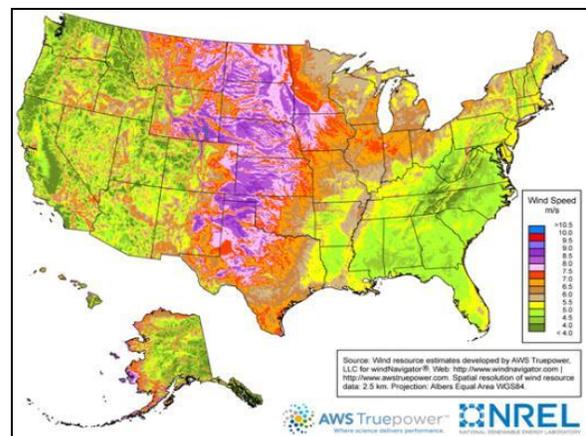
April 17 – 28, 2012. University of California Merced, Yosemite NP. Third National Parks Institute Executive Leadership Seminar. Scholarships are available. Read more [here](#).

FEATURED STORY: WIND POWER

Wind Power Basics

Wind energy is a clean, renewable resource that can assist the United States overcome its energy, environmental and economic challenges. Wind turbines are reliable producers of electricity without emitting carbon dioxide. In addition, turbines generate clean-tech jobs.

Wind turbines produce electricity by using the wind’s kinetic energy to turn the rotor of a turbine. The rotor is connected to a main shaft that spins a generator, causing electricity production.



The cumulative installed capacity of wind power in the United States is 41,400 megawatts (MW), placing it second in the world behind China. In 2010, 2.3% of the total electricity generated in the U.S. originated from wind energy. From all the states, Texas takes the lead in capacity, with a total

of 9,728 MW. Texas also houses the largest wind farm in the world, the Roscoe Wind Farm. Currently, U.S. wind power projects under construction will yield 5,600 MW. The U.S. provides a federal production tax credit (PTC) of \$21 per MW-h generated in the first ten years of operation.

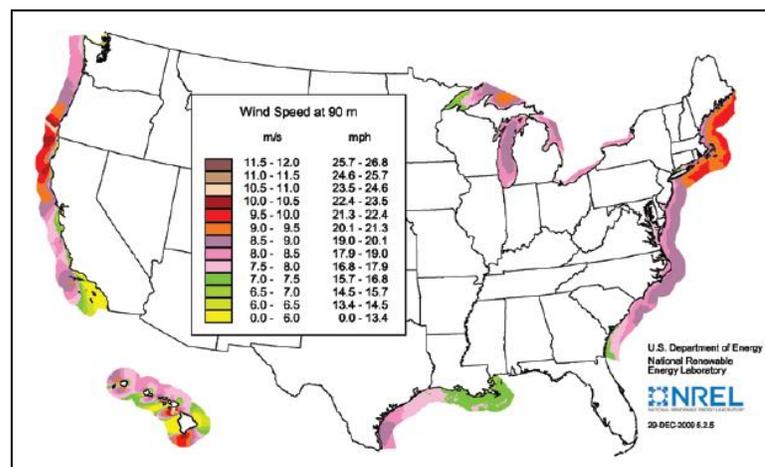
Wind Power Potential

Wind power is growing rapidly within the U.S., with capacity doubling in the past three years. Figure 1, above, shows the wind speed at 80 meter height (assuming a turbine's average 80 meter height) in different parts of the U.S. Since higher wind speeds mean more power generation, the highest potential lies in the Great Plains. A significant wind power potential exists offshore due to strong consistent winds off the lengthy U.S. coastline. The U.S. Department of Energy's (DOE's) 2008 report, *20% Wind Energy by 2030*, envisioned a scenario in which wind energy would supply 20% of all U.S. electricity. Of that, offshore wind power could provide 54 GW of generating capacity and 4% of the nation's total electricity (Figure 1. Wind Power Potential in the U.S. <http://windpowerinamerica.com>).

Federal Support

The DOE's Wind and Water Power Program leads the nation's efforts to improve the performance, lower the costs, and accelerate the deployment of wind and water power technologies.

Wind power investments from the American Reinvestment and Recovery Act have significant impacts on the industry. Examples include a three-year extension of the production tax credit, alternatives to tax credits for renewable energy systems and a 30% investment credit. The Recovery Act also supports wind energy through research and development projects. (Figure 2. Wind Power Potential U.S., <http://www.windandwater.energy.gov>).



Barriers

According to DOE's wind and water power program, the major barriers to employment of offshore wind power are the high costs of offshore wind facilities, technical challenges and long/uncertain permitting processes governing deployment. The Wind and Water Power Program is coordinating with federal and state agencies, industry, academia, the public and other stakeholders to develop a strategy to reduce offshore wind energy costs and reduce timelines and uncertainties associated with the development.

Regional developments

In the Nordic/Baltic region, wind power is already highly developed. In Denmark, wind power generates some 20 percent of the domestically used electricity. A notable example is the Danish island Samsø, where 100 percent of the electricity is produced by wind power. In Germany, wind power generates around 7% of the electricity, with Germany being the third highest country globally in total capacity. The EU set a target to produce 20 percent of the total energy by renewable sources by 2020. This incentivizes all member states to consider wind energy. Lithuania, for example, plans to follow Denmark's domestic production targets. Sweden aims to produce 50 percent of its energy through renewable energy sources by 2020, with 2000 new wind turbines planned. In the EU as a whole, the European Wind Energy Association (EWEA) predicts that wind energy will more than triple its power output by 2020.

Technological developments

In addition to the constantly-increasing sizes of wind turbines, there are also other technology innovations with wind power. Norway's Statoil for example, is testing its Hywind pilot, which is the first full-scale floating wind turbine. This allows turbines placement even in deep sea environments.

California's Institute of Technology is experimenting with vertical-axis wind turbines (VAWTs) in northern Los Angeles County. These turbines can be placed very close to each other, which let them capture nearly all of the wind's energy. According to researchers, this means much higher wattage of power per square meter as compared with conventional wind farms. (Figure 3. Vertical-axis wind turbines, <http://www.scienceagogo.com>).



Further Reading

Read more information [here](#) about DOE's Wind and Water Power Program.

The "20 percent Wind Energy by 2030" report can be found [here](#).

For information about DOE's Office of Energy Efficiency and Renewable Energy, see [here](#)

For information about wind power in Denmark, read [here](#).

For more information about Statoil's Hywind pilot, see [here](#).

For more information about the VAWTs, see [here](#).

Read more about the island of Samsø [here](#).