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Bloomberg

http://www.bloomberg.com/news/2010-10-12/google-marubeni-to-lay-power-cables-off-eastern-coast-of-u-s-.html

Google, Marubeni to Lay Cables for U.S. Wind Farm Plan

By Young-Sam Cho and Simon Lomax - Oct 12, 2010

Google Inc. said it will invest in a $5 billion underwater transmission network that can harvest electricity from wind farms off the Mid-Atlantic coast and power 1.9 million homes across Virginia, New York and New Jersey.

Google will buy a 37.5 percent stake in the development stage of the Atlantic Wind Connection project, said Rick Needham, director of green business operations at the Mountain View, California-based Internet company. The new transmission line would form the "backbone" of a Mid-Atlantic offshore wind industry that could add 6,000 megawatts of capacity to the grid, Needham said.

The large-scale development of wind farms off the U.S. East Coast may create as many as 212,000 jobs, the project's developers, including Google, Trans-Elect Development Co., Good Energies Inc. and Tokyo-based Marubeni Corp., said in a statement.

The project, called the "Atlantic Wind Connection," is needed to lower the cost of sending electricity from offshore wind turbines to the power grid, Bob Mitchell, chief executive officer of Trans-Elect, told reporters.

"There will be no offshore wind industry in this country if we as a team are not successful," Mitchell said of the project.

The transmission line is to extend from New Jersey to Virginia, Mitchell said in a telephone interview.

More Financing

The first phase of the project, which the developers aim to complete by early 2016, would run about 150 miles and cost between $1.7 billion and $1.8 billion, he said. The second phase to complete the 350-mile line could be finished by 2020, Mitchell said.

Google and Good Energies will each have a 37.5 percent equity stake, he said. Japan's Marubeni Corp. will have a 15 percent stake. Atlantic Grid Development LLC, a company formed to develop the project whose shareholders include Trans-Elect, will have 10 percent.

Google is "only committing to provide equity for the critical early development stage of the project" in "the tens of millions" of dollars, with the larger project costs being shouldered through a separate financing which is expected to take place in 2013, Jamie Yood, a spokesman for Google, said in an e-mail.

The project will help spur the wind-energy industry in the U.S., which has lagged China in installing turbines, said Charlie Hodges, a wind industry analyst at Bloomberg New Energy Finance in London. Wind-power investment may reach $202 billion within two decades, according to estimates at industry group Global Wind Energy Council.

Equity Stake

"The North American wind industry hasn't had any players involved with the motivation and financial heft to really move this market forward," Hodges said. "Google could play that role."

The U.S. Department of Energy's National Renewable Energy Laboratory estimated last week in a report that the U.S.'s offshore wind resources total more than 4,000 gigawatts, or roughly four times the country's existing electric generation capacity.

China will on average install turbines each year from 2009 through 2013 with the capacity to generate 18.7 gigawatts of power from the wind, New Energy Finance estimates. That's more than double the 8.5 gigawatts annual average in the U.S.

"Each megawatt hour of offshore power carried down that interconnector has more chance of finding buyers, probably improving economics of offshore wind projects connected to it," Hodges said. "This cable opens up markets and improves the chances of finding a buyer of offshore wind electricity."

Globally, wind power is expected to account for 22 percent of the world's electricity generation within two decades, the Global Wind Energy Council said today.

Google, based in Mountain View, California, rose $5.02 to $543.86 at 1:21 p.m. New York Time on the Nasdaq Stock Market. Before today, the shares had dropped 13 percent this year.

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Google Bets on Underwater Transmission Line for Offshore Wind

http://www.theatlantic.com/technology/archive/2010/10/google-bets-on-underwater-transmission-line-for-offshore-wind/64439

Oct 12 2010, 3:36 PM ET By Alexis Madrigal 5

Google's long-time interest in clean energy technology took an interesting turn today as the company announced an investment in an underwater grid project off the east coast of the United States. The *New York Times* pegged the investment at up to $200 million.

While onshore wind farms have carpeted the midwest, offshore wind farms have had a difficult time getting permitted and built in this country. The attraction of offshore wind is that the winds (generally speaking) blow stronger and steadier. The floating turbines can also be much larger than their terrestrial cousins. The Department of Energy would like 10 gigawatts of offshore wind power to be installed along our coasts by the year 2020.

Beyond the risk inherent in deploying a new major energy technology, the big offshore farms have faced protests from locals worried about their beach home views and marine birds.

Google's total project -- which is being developed by transmission builder Trans-Elect -- would run 350 miles from New Jersey to Virginia. It would supposedly allow turbines connected to it to be sited farther offshore, away from NIMBY complaints.

"This will serve as a clean-energy superhighway, with on-ramps for wind farms and the ability to be intelligently expanded," Rick Needham, Google's green business operations director, told a news conference, reported Reuters. "We can help kick-start an industry that can provide thousands of jobs."

Google's investment attempts to address another special American concern. The cost of wind is determined not just by the costs of building and operating wind machines, but by the ability to integrate them into the grid through transmission links. Onshore, building power lines is a complex process that, unlike natural gas pipelines, has to be negotiated on a state-by-state basis. One reason that Texas has been a leader in wind power is that the state contains both great wind resources in its western reaches and the ability to get transmission lines strung to the population centers of its east. The U.S., as a whole, has essentially the same need but a worse regulatory regime.

Offshore transmission is an even trickier business in some ways. Most submarine power cables use high-voltage direct current as opposed to the long-standard alternating current lines that constitute most of our grid. On the other hand, you're not trying to run a massive row of towers through anybody's ranch or past their exurban development.

The line could support up to six gigawatts of turbines, which would supply as much power as a few large coal plants, depending on how steadily the winds blow. While this is an exciting development, it's important to keep in mind the scale of the transition the country faces in decarbonizing the electric system. The Department of Energy's National Renewable Energy Laboratory estimates the U.S. has 54 gigawatts of offshore wind capacity. The U.S. has more than 1,400 coal power plants with a nominal capacity of 337 gigawatts.

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Alexis Madrigal is a senior editor covering technology for TheAtlantic.com. He's the author of a forthcoming book about the surprisingly long history of green technology, and the founder of 48 Hour Magazine, a high-speed media experiment that garnered attention from the New York Times, Wall Street Journal, and the BBC. While at Wired.com, he built Wired Science into one of the most popular blogs in the world. The site was nominated for best magazine blog by the MPA and best science website in the 2009 Webby Awards. He also cofounded Haiti ReWired, a groundbreaking community dedicated to the discussion of technology, infrastructure, and the future of Haiti.

Madrigal is a visiting scholar at University of California, Berkeley's Office for the History of Science and Technology. Born in Mexico City, he grew up in the exurbs north of Portland, Oregon, and now lives in San Francisco's Mission District.

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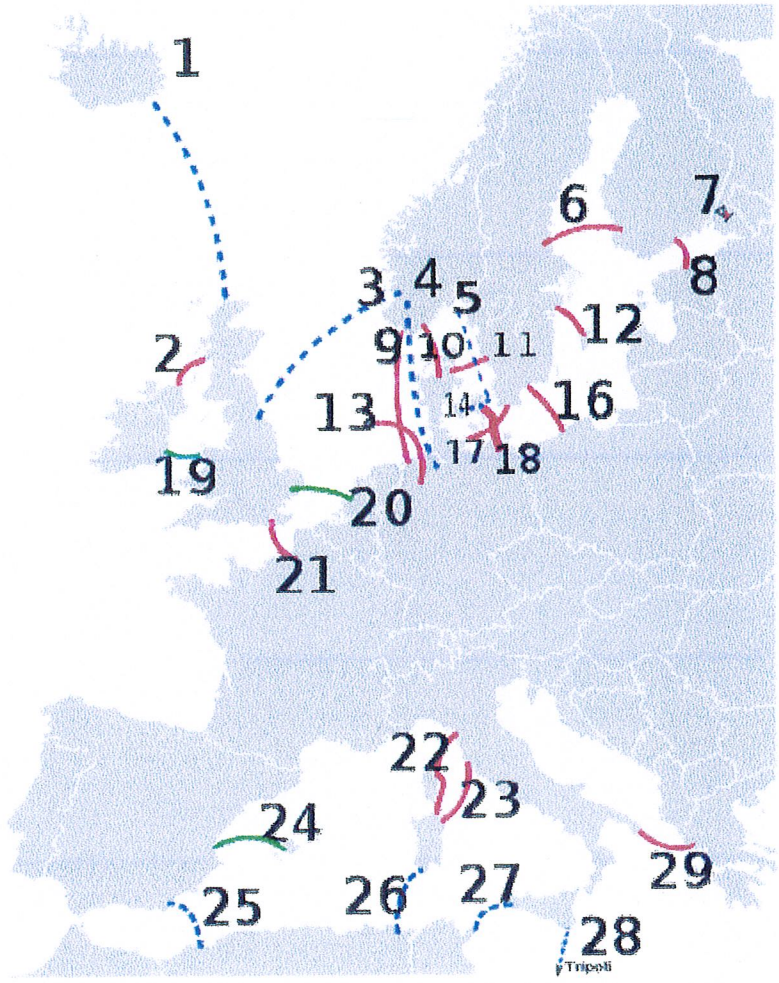
Medium to large HVDC interconnections in Western Europe.

http://en.wikipedia.org/wiki/List_of_HVDC_projects#Europe

Europe



Existing
Under construction
Options under consideration
Medium to large HVDC interconnections in western Europe.

1. Iceland – UK (option), 1.1 GW

2. Moyle: Auchencrosh, UK – Ballycronan More, Northern Ireland, UK
3. Norway – UK (option), 1.2 GW
4. Viking cable (option): Germany – Norway, 600 MW
5. Kattegat (option): Norway – Zealand Island, Denmark; or Norway – southern Sweden
6. Fenno-Skan: Rauma, Finland – Dannebo, Sweden
7. Vyborg
8. Estlink: Harku, Estonia – Espoo, Finland
9. NorNed: Feda, Norway – Eemshaven, Netherlands
10. Cross-Skagerak 1, 2, and 3: Tjele, Denmark – Kristiansand, Norway
11. Konti-Skan 1 and 2: VesterHassing, Denmark – Stenkullen, Sweden
12. Gotland: Västervik, Sweden – Yigne, Sweden
13. NordE.ON 1: Diele, Germany – Borkum 2 platform, Germany
14. StoreBaelt: Fyn Island, Sjælland, Denmark – Zealand Island, Denmark
15. (purposely left blank)
16. SwePol: Stärnö, Sweden – Słupsk, Poland
17. Baltic-Cable: Lübeck- Herrenwyk, Germany – Kruseberg, Sweden
18. Kontek: Bjaeverskov, Denmark – Bentwisch, Germany
19. East West Interconnector: Leinster, Ireland – Anglesey, Wales, UK. Expected completion 2012.
20. BritNed: UK – Netherlands. Expected completion 2010.
21. HVDC Cross-Channel: Les Mandarins, France – Sellindge, UK
22. HVDC Italy-Corsica-Sardinia: "SACOI" – Codrongianos, Sardinia, Italy – Lucciana, Corsica, France – Suvereto, Italy (mainland)
23. Sapei, Sardinia – Italian mainland
24. Cometa: Valencia, Spain – Mallorca, Spain

25 — 28 EuroMed options:

25. Algeria – Spain
26. Algeria – Sardinia
27. Tunis – Sicily
28. Tripoli – Sicily
29. HVDC Italy-Greece: Arachthos, Greece – Galatina, Italy

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Underwater Cable an Alternative to Electrical Towers

http://www.nytimes.com/2010/03/17/business/energy-environment/17power.html

Eric Harger/Pattern Energy

Laying line in San Francisco for the Trans Bay Cable project, which submerged 33 miles of cable.

Underwater Cable an Alternative to Electrical Towers

By MATTHEW L. WALD

Generating 20 percent of America's electricity with wind, as recent studies proposed, would require building up to 22,000 miles of new high-voltage transmission lines. But the huge towers and unsightly tree-cutting that these projects require have provoked intense public opposition.

Recently, though, some companies are finding a remarkably simple answer to that political problem. They are putting power lines under water, in a string of projects that has so far provoked only token opposition from environmentalists and virtually no reaction from the larger public.

"The fish don't vote," said Edward M. Stern, president of PowerBridge, a company that built a 65-mile offshore cable from New Jersey to Long Island and is working on two more.

The projects have even drawn cautious enthusiasm from some environmental groups that say the new power lines serve their goal of getting the United States to use more renewable power.

"Environmentalists need to be open-minded to technology improvements, and looking at the big picture," said Phillip Musegaas, program director for Riverkeeper, a New York environmental group focused on the Hudson River.

Mr. Musegaas's open-mindedness will soon be put to the test, because Transmission Developers, a Toronto company, is proposing to use the Hudson for the most ambitious underwater transmission project yet. Beginning north of the Canadian border, a 370-mile line would run along the bottom of Lake Champlain, down the bed of the Hudson all the way to New York City. It would continue under Long Island Sound to Connecticut.

The project sponsors have only recently begun seeking the numerous permits they need, but if built, it would be one of the longest submarine power cables in the world. It would bring hydroelectricity to the power-thirsty New York City market. It would also break a stalemate; New York has not had a major new overhead power line in 20 years.

If Transmission Developers succeeds with such an ambitious project, other transmission developers are likely to study the underwater strategy to figure out just how far they can take it. Would power lines crossing the Great Lakes make sense? Could underwater cables be used to move renewable power from the windy Great Plains to cities like Chicago?

The cost of putting a cable under water can be lower than burying cables on land, because workers can lay the cables from giant reels, allowing stretches of more than a mile with no splices. The strategy is limited, of course, by the availability of rivers and lakes — they do not go everywhere power developers would like to run new lines. In fact, many of the country's rivers run north or south, whereas much of the country's power must move east or west.

And underwater lines are still more expensive than lines on transmission towers. Mr. Stern's 65-mile cable cost about $600 million, and a 53-mile cable under San Francisco Bay cost about $505 million. Much of the cost in each case is to transform the electricity to direct current, a form that is easier to use in buried cables. Standard lines hung on towers run from $1 million to $4 million a mile, depending on terrain and other factors. If more underwater lines are built, the higher costs would have a small impact on electric bills.

Still, the underwater approach solves some intractable problems. In San Francisco, for example, old power plants that burn natural gas are about to be retired because a new transmission company has succeeded in running a line 33 miles across the San Francisco Bay.

Mr. Stern said his company's Neptune Cable, which runs from Sayreville, N.J., to Levittown, N.Y., on Long Island, now carries 22 percent of Long Island's electricity. His company is trying to complete a deal for a cable that would run from Ridgefield, N.J., to a Consolidated Edison substation on West 49th Street in Manhattan.

Those two cables were not motivated primarily by environmental goals — they are meant to connect cheap generation to areas where power prices are high. Mr. Stern's company, PowerBridge, is now considering two renewable energy projects, however. One cable would connect proposed wind farms on the Hawaiian islands of Molokai and Lanai to the urban center on Oahu, and another would bring wind power from Maine along the Atlantic coast to Boston.

Laying submarine cables can present some environmental problems, like stirring up industrial chemicals resting on the bottoms of lakes or rivers. The Champlain-Hudson cable would detour down a railroad right-of-way to avoid one particularly polluted stretch of the Hudson. And the cables must avoid spawning areas for some species of fish.

The New Jersey chapter of the Sierra Club opposed the cable that would cross the Hudson from northern New Jersey because, among other reasons, the club thought it would stimulate construction of traditional transmission lines farther west, to bring in power to make up for what was being exported to New York. And it does not like power from dams in Canada.

"Frankly, my dear, I don't want a dam," said Jeff Tittel, the chapter's director.

But the opposition was unsuccessful. In some cases, power developers are trying to enlist support from environmental groups in the early stages of their underwater projects.

Nearly all the submarine cables use direct current, a form of transmission favored by Thomas Edison but mostly rejected in the late 1800s in favor of alternating current, the kind of electricity now used to run most appliances. But alternating-current lines are hard to bury, because an interaction between the current and the cable casing drives up voltage to unwanted levels.

Direct-current transmission is also undergoing a modest revival on land, because over long distances, its line losses are smaller, and flows are easier to control. Two recent proposals for a centrally planned overhaul of the North American electric grid called for heavy use of direct current.

New technology offered by two European companies, Siemens and ABB, has lowered the cost for some direct current projects, and shrunk the size of the terminals where alternating current is converted to direct current and back, a crucial consideration in urban projects.

Developers and power companies are recognizing that the expense of underwater lines may be worth it if it helps them overcome political opposition.

Donald G. Jessome, the president of Transmission Developers, the company that wants to build the Hudson project, said of overhead power lines, "If you can't get them built, because the communities you want to serve don't want them, then in our opinion they are infinitely expensive."