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Is Japan a Leader in Combating Global Warming? The Wind-Power Problem

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Japan is routinely depicted as a leader in addressing the global community's ominous energy and environmental challenges. A recent issue of Newsweek*, for example, incorrectly assumed that Japan had the "feed-in tariff" mechanism that Germany in particular has used to vault itself into global leadership in renewables. Japan's reputation as a leader is neither inexplicable nor, to be frank, entirely undeserved. Japan certainly responded adroitly to the oil shocks of the 1970s, instituting tight energy conservation goals and investing heavily in the promotion of renewable technology. And note that Japan's public transport systems rank among the world's best for widespread diffusion, low cost and reliability. This is true not only of Tokyo, Osaka and other major cities, but also of its national high speed rail network.*

One would expect Japan to lead on the new crop of environmental and climate challenges. Among a host of other advantages and incentives, Japan is rich, has a history of public-sector activism, has virtually no domestic conventional energy reserves, and faces daunting threats through the steadily rising wall of spillover effects from the oil age and climate change. But as this article shows, Japan is not leading on energy and climate change, notably in the race to develop renewables. One of the most important reasons for Japan's subpar performance is poor use of the public sector, as pointed out in the interview comments of Tetsunari Iida, executive director of the Tokyo-based Institute for Sustainable Energy. Japan's government, famed for its ability to mobilize the private sector, is now loath to set or enforce responsible goals on carbon emissions, or finance the new technology that could make this happen. Iida serves on the Tokyo Metro government special environmental board, and knows well what he is talking about when it comes to the political economy of Japan's surprisingly restricted energy and environmental policies.

In reading this article, please keep in mind that global investment in energy infrastructure is slated to run at about US$ 1 trillion per year between now and 2030. The UN-led Sustainable Finance Energy Initiative, in its REN21 2007 Global Status Report, indicates that investment in renewables (even excluding the increasingly dangerous biofuels boondoggle that has fueled skyrocketing global grain prices) already exceeds a tenth of this investment. The rapid scale of growth in renewables suggests that an industrial revolution is underway, driven by business opportunities as well as escalating fossil-fuel prices, concerns over energy security, evidence of impending tipping points in climate change, and so on.

This revolution was one that Japan was, only a few years ago, poised to lead. But as in so many areas of Japanese politics, vested interests in the electrical sector and nuclear industry (often one and the same, of course) have a lock-up on the fiscal and regulatory arms of the state. One measure of the opportunity costs of this parasitic political dominance is seen in Japan's Sekiyu Renmei (Oil Alliance) data. It shows that

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in 2006, with oil prices at an average of US$ 63.46 per barrel, the country's total import bill was US$ 97.7 billion dollars. Imagine how great this figure will be this year, and then pile on the similarly multiplying costs of natural gas and coal. Germany and other countries' big strides in reaching renewable targets (as a percentage of electrical power output) suggest that a Japan armed with smarter energy and environmental policies could readily shave 10 to 20% off this outflow of funds and use it instead to revitalize its local economies as well as its global role as an environmental leader (which stands to take another big downgrade at the Toyako G8 Summit in July).

And keep in mind as well that the article neglects to note that Japan has also fallen from its perch in solar energy as well. Japan's solar market "stagnated" in 2007 and a report in the most recent Japanese Economist (Ekonomisuto) notes that Japan's leading seller, Sharp, fell from the global first-rank perch it had held for the last 7 years. The same edition of the Ekonomisuto also highlights the rapid gains made by Chinese firms, which are poised to assume global leadership in the next few years. AD

In the country that hosted the Kyoto Protocol and wrote the book on solar policy, the wind-power industry has ground almost to a halt. Among the culprits: policy, cost and technology challenges.

Yokohama's wind turbine is one of the tallest in Japan. It was meant to symbolize a commitment to wind power, but now seems to represent more of a dream than a reality in a country where growth of the renewable has slowed dramatically.



Yokohama's wind turbine

On a windy day in Yokohama, 20 miles south of Tokyo, a lone wind turbine turns steadily against the sky. Flanked on one side by the U.S. Army base, and with an unobstructed view of the bay, the turbine is fenced off on a small perimeter of land on the edge of the water.

Built in 2007 with government aid and Vestas Wind Systems technology, the wind turbine stands 118 meters high and is one of the tallest in Japan. It was built to be a symbol of the port city's commitment to wind energy. But while the turbine keeps turning, the country's commitment has slowed.

In the country that hosted the Kyoto Protocol, wind power has ground to a stunning halt. According to the last assessment by the Brussels-based Global Wind Energy Council, Japan ranked a dismal 14th in terms of yearly growth in wind capacity, with newly installed wind power totaling only 139 megawatts in 2007. That compares with 5.2 gigawatts – 38 times the capacity – installed the same year in the United States, and lags even further behind other wind-power giants such as Denmark, Germany and Spain.

Toshio Hori, president of the Tokyo-based Green Power Investment Corp., has been

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affiliated with the wind-power industry in Japan for 20 years. He blames Japan's renewable-energy policy for the slow growth.

"Japan's windpower industry is not growing," he said. "The renewable targets the government has set for wind power are tiny in comparison to other countries. There are no incentives for companies to grow."

Japan's renewable targets have come under fire recently as the country has struggled to meet the requirements set by the Kyoto Protocol. Under the terms of the treaty, Japan is supposed to cut carbon-dioxide emissions by 6 percent from 1990 levels by 2010.

But due to commercial growth over the last decade, those levels have been rising instead of falling. As alternatives to coal, the country has looked mainly to nuclear power and, to a lesser extent, solar.

The case of wind in Japan is instructive, as it shows how renewable energy can stumble without proper government intervention. It's especially significant given that Japan previously had been a green policy leader.

Japan invented the solar incentives used as a model for similar programs in Germany and in other countries, and its strength in the solar industry often is cited as an example of a key policy success.



A solar power generation facility

In contrast with its history of policy leadership, Japan's renewable targets look almost embarrassingly small compared to other countries' policies. The targets, set by the country's Ministry of Economy, Trade and Industry, stipulate that 1.35 percent of Japan's total energy supply must come from renewables, such as wind, solar, and biofuels, by 2010. The target inches up to 1.63 percent by 2014.

Denmark, the most advanced country in terms of wind-power capacity and support policies, generates 20 percent of its energy from wind. The Danes accomplished this goal through heavy government subsidies and tax breaks over the last 20 years.

Germany, the second-largest country in terms of installed capacity, generates 6.3 percent of its energy from wind power. The Germans have set their target for renewable energy at 12.5 percent by 2010. Spain has also strongly backed wind energy with a goal of 20 gigawatts by 2010.

With global energy prices skyrocketing, a policy that leaves out a potentially huge resource deserves attention. Japan is especially vulnerable as they import a large percentage of their energy supplies. By ignoring wind, Japan

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is missing out on what could be a significant solution to rising energy costs.

Utilities' Resistance

Iida Tetsunari, executive director of the Tokyo-based Institute for Sustainable Energy, believes Japan's dominant electric companies are preventing the growth of wind power. The country's 10 electric companies are formidable regional monopolies. The largest dominate the areas of Tokyo, Chiba and Kansai, and they leverage significant political clout.

"They act as regional monopolies, functional monopolies, and political monopolies," Iida said. "They are the rule makers and they make an effort to exclude wind power from their grid."

According to him, utilities limit wind energy to just 2 to 3 percent of the electricity flowing on the grid – and the low renewable standards aren't requiring them to take more.

Wind farms make their money by selling energy contracts to electric companies. When the regional utilities don't agree to buy the full amount of the electricity they generate, developers are left in a bind.

But utilities don't view wind as the perfect power. After all, the electricity that wind-power projects supply fluctuates depending on the wind's strength, setting up a risk for power surges and outages. To neutralize this problem, utility companies have asked developers to store the energy created from wind power in batteries that can be tapped when needed, rather than to channel the energy directly to the grid.

Imperfect Solutions

In an effort to appease utilities, wind developers have begun to do just that. Japan Wind Development Co. and battery maker NGK Insulators have partnered to install battery accumulators at a wind-power site in the Aomori Prefecture this year (see Batteries for the Grid). NGK's sodium-sulfur batteries store energy created when the wind blows and dispatch the smooth energy to the grid during peak demand periods.

Still, batteries are not ready for wide-scale adoption, mainly because of their price. They can double the cost of a project, and it is unlikely project developers will be able to pass these costs to the utilities.

Offshore wind developments are another attractive, and possibly less costly, option.

It is both more powerful and more predictable than land-based wind power, two factors that may help allay utility concerns about power surges and capacity, and also can be located closer to main city centers, where the electricity is used. Most wind farms in Japan today are located in the far north or south, where land is cheaper and less inhabited, and none are near Tokyo.

European countries have been looking to the sea for years. Japan too has experimented. Two turbines have been in operation in the northern island of Hokkaido – less than 1 kilometer off the coast – since 2003, and the University of Tokyo and Tokyo Electric are investigating the possibility of an off-shore wind farm near Tokyo.

But Japan's geography complicates such projects. The country is surrounded by deep water, and deep-water wind-farm technology is still in its infancy. Last year, Scotland installed two 87-meter-high wind turbines 25 kilometers off its coast. The installation is the biggest project of its kind in the world and still in the trial stages.

Mr. Iida said similar plans for Japan may be years off if they happen at all. Aside from the expense (off-shore wind farms can cost two to three times onshore projects), it must contend

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with opposition from the politically powerful fishing industry.

Looking Overseas

Japanese wind companies have been quick to adjust to these challenges by expanding overseas. While growth in Japan has been slow, global wind energy grew by 30 percent in 2007. Tokyo-based Eurus Energy has 80 percent of its capacity outside Japan, with only 304 megawatts of its total 1,385 megawatts installed in its domestic market.

Tokyo-based Mitsubishi Heavy Industries, the largest domestic manufacturer of wind turbines, also is targeting international markets, with U.S. sales far outstripping its business in Japan.



Mitsubishi wind turbine in Okinawa

In May, the company received orders for 1.36 gigawatts worth of wind turbines from five U.S. companies, including Eurus Energy's U.S. subsidiary, Eurus Energy America, to be completed by 2009. That is nearly equal to Japan's total installed wind capacity of 1.49 gigawatts.

Foreign Pressure

Meanwhile, the G-8 Summit will convene this July in Japan, and carbon-dioxide-emission targets for 2020 are likely to be on the agenda. Environmentalists and renewable-energy companies no doubt hope international pressure will convince the country to raise its targets.

But even if the targets are revisited, wind power might not benefit. After all, the country has so far favored nuclear and solar power. The government has heavily subsidized nuclear plants, which generate as much as 30 to 40 percent of the country's power, while the country's solar polices have helped it install the second-largest amount of photovoltaic capacity in the world (after Germany).

Some industry insiders believe it may continue to rely on those sources to meet emissions targets, rather than on wind power.

"I hope that the [policy] changes," said Hori, who like many market participants is unsure of the future of wind power in Japan.

Until that happens, the lone wind turbine in Yokahama will continue to turn over Tokyo Bay, even as the air grows stale around the country's renewables policies.

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