

## An Emerging Fukushima Model? □ 福島モデル」の出現か

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After two years in which international attention focused on Fukushima as an emblem of disaster, Fukushima's plans for immense floating wind farm projects have begun to attract international attention. This April 15 article (<http://www.risingsun.jp/tohoku/fukushima-moves-forward-with-worlds-largest-floating-wind-farm>) "Fukushima Moves Forward With World's Largest Wind Farm" reminds us that the prefecture's projects are bold initiatives which could pioneer a new model of offshore and large-scale deployment. The article also lauds Fukushima's aim of getting 40% of its power from renewables by 2020, and then fully 100% by 2040.



Japan's Agency for Natural Resources and

Energy announced in Jan 2013 plans to build the world's largest offshore wind farm near Fukushima as part of plans to reconstruct the area stricken by nuclear disaster in 2011

Read more: Japan To Build World's Largest Offshore Wind Farm Near Fukushima | Inhabitat - Sustainable Design Innovation, Eco Architecture, Green Building (<http://inhabitat.com/japan-to-build-worlds-largest-offshore-wind-farm-near-fukushima/#ixzz2T7bi4F4l>)

At the same time, other observers express concern that Fukushima's wind-power initiatives are not sufficiently internationalized so as to draw fully on "lessons learned from the two existing full-scale floating offshore wind projects, located in Norway (from Statoil) and Portugal (Principle Power)." Johan Sandberg, head of the renewable energy department at DNV KEMA Energy & Sustainability, a consulting firm on floating offshore wind technology, warns ([http://www.nawindpower.com/e107\\_plugins/content/content.php?content.11350#.UWVZKrWkprA](http://www.nawindpower.com/e107_plugins/content/content.php?content.11350#.UWVZKrWkprA)) that failure at Fukushima could impair the prospects of offshore wind in general. But Fukushima itself appears to be reaching out to

the best in the business. For example, Fukushima called on US National Renewable Energy Laboratory (NREL) Director Dan Arvizu, who in late April met with the prefectural governor and headlined a major conference there. Two weeks later, Dr Arvizu lauded Fukushima's ambitions in a very inspiring May 3 keynote (<http://bceaconference.com>) at the 2013 conference on the Business of Clean Energy in Alaska. After presenting the good news on Fukushima's initiatives as well as the NREL's study that America could achieve over 80% renewable in its power mix by 2050, using technology already available, Arvizu made it very clear that the crucial element ([http://www.nrel.gov/analysis/re\\_futures/](http://www.nrel.gov/analysis/re_futures/)) is not technological breakthroughs, but rather political will.

I argue in detail below that if one looks closely at Fukushima, as well as Japan's subnational governments in general, one finds plenty of political will and concrete action. This comes as something of a surprise, to be frank, as the general narrative on Japan and its power holders has been that the dominance of the nuclear-favouring Abe regime means the decline of the pro-renewable and anti-nuclear movement spawned by Fukushima. The evidence suggests, however, that Japanese power policy and politics is becoming decentralized and distributed. An antipathetic, or merely incompetent, cabinet can surely slow down this shift away from

centralized and nuclear power toward decentralized renewables. But as we shall see, the momentum and scale of the shift suggest that it may be unstoppable.

### Fukushima and Power Politics

In addition to the projects noted above, there are several reasons that it is especially timely to turn our attention once again to Fukushima. For one thing, May 5 was the first anniversary of Japan's May 5, 2012 shutdown (for scheduled maintenance) of unit 3 at the Tomari nuclear plant in Hokkaido. That shutdown marked an unplanned pullout from nuclear power, as at the time Tomari was the last reactor running. Since then, there have only been two restarts, in July of 2012 at the Ohi plant in Fukui Prefecture, and these plants are scheduled to go offline again in September for maintenance. With only 2 of Japan's 50 usable reactors running, global attention - particularly investor interest - has focused on whether Japan's high price of LNG and other fossil fuels burned in place of nuclear power will lead to more restarts. PM Abe Shinzo and much of the big business community, especially the peak association Keidanren, want multiple restarts as soon as possible, but there are a host of political and regulatory barriers standing in the way.

Among these barriers are the new Nuclear Regulation Authority's (NRA) safety standards, due to be adopted in July. The NRA released a

3000-page draft of the new rules for public comment, giving the public a month to plow through the new regulations. This pro-forma consultation is suggestive of the pre-Fukushima favouritism of the nuclear industry. But the NRA is also constrained by the fact that it is a new institution that has to establish credibility in order to function. At the same time, the NRA's poor oversight of Tokyo Electric Power's (TEPCO) clean-up and decommissioning at Fukushima Daiichi keeps the accident in the news and on Japanese voters' minds. And faults continue to be found beneath reactors, including TEPCO's seven reactors at Kashiwazaki-Kariwa in Niigata.

Public concern about Fukushima, and nuclear power in general, remains very deep, as was revealed in a poll of experts and lay persons undertaken in January and February by the Atomic Energy Society of Japan (AESJ), and released in early May. The AESJ is a core institution of Japan's so-called "nuclear village" of staunch advocates of atomic power, so its survey can hardly be dismissed as biased towards eliciting anti-nuclear sentiment. One part of the survey (<http://www.ponpo.jp/forum/pdf/2012metro.pdf>), which has been conducted annually since 2007, sampled opinion from 500 randomly selected Tokyo-area residents. The limitations of the poll are that it centres on Tokyo-area residents rather than nationwide. But a lot of

Japan is within the geographical ambit of the survey, and its results are generally consistent, concerning nuclear and renewables, with nationwide polls taken since the summer of 2011.

The results showed that fully 73.8% of the respondents were very or somewhat uncomfortable with nuclear power, while only 6% were not troubled. Moreover, 62.4% agreed that the Fukushima meltdowns were man-made disasters as opposed to natural disasters, with only 10% expressing support for the latter idea. As to safety issues, 65.4% remained concerned about radiation in their food and water; 77.4% expressed doubts that new safety standards would be adequate; 80.4% are unconvinced that safety standards, once adopted, will be followed; 94% agreed that more thought needs to be given to evacuation measures; 74.2% regarded having nuclear plants on earthquake-prone Japan as dangerous; and 74.4% believed that the increasing age of Japan's reactors (10 started operating more than 35 years ago) is eroding safety. Only 10.8% agreed that Japan should continue with nuclear power, with a clear majority of 51.6% in disagreement. As to alternatives, fully 45.6% believe that renewable energy will supply 30% or more of Japan's power needs 20 years hence, and 54.4% expressed willingness to pay extra on their power bills in order to eliminate nuclear.

On energy conservation, 28.8% said they had been making efforts prior to Fukushima, but a

striking 73% replied that their efforts began afterwards. And they show persistence: fully 49% described themselves as continuing with energy conservation, while only 5.6% said energy conservation was not part of their lifestyle.

These results are, in some respects, rather different from those in the same survey done in January of 2011 (<http://www.ponpo.jp/DMWG/pdf/2010metro.pdf>), before the Fukushima disaster. In that survey, 49.8% of respondents expressed anxiety about the use of nuclear power (compared to the 73.8% in the most recent survey). But even before Fukushima, there was a clear preference for renewables. Asked in January 2011 whether renewables, rather than nuclear power, should be the focus of energy research and development, 59% agreed and only 4.2% disagreed (the remainder were unable or unwilling to say). Indeed, asked what they most wanted from national energy policy, and given a multiplicity of possible responses as well as the ability to write their own, the top choice (78.6%) was diffusion of renewable energy, followed by action on global warming (60.0%) and promotion of energy conservation (59.6%).

Given this pre-existing support for renewable energy, plus the deep distrust of nuclear power and the authorities, it seems likely that the diffusion of the Fukushima model will continue. It may even accelerate, as the governing LDP has apparently, as of May 11, decided to put restarts

in its election manifesto for the July Upper House poll.

#### Actual, Not Aspirational, Targets

Indeed, another reason to pay close attention to Fukushima is that its ambitions are not merely aspirational. These ambitions may help shift the debate on the highly polarized choice of either enduring high power costs or restarting idled nuclear assets, no matter the safety implications. One item to note is the speed of Fukushima's renewable deployment. Even in the short run, up to 2015, Fukushima's "Action Plan" on energy and redevelopment aims to more than double its renewable supply, with the bulk of that additional capacity coming from solar. In 2011 Fukushima had just over 360,000 kilowatts (kW) of renewable generation capacity, with 66,000 of that total from solar, 65,000 from geothermal, and just under 144,000 from wind. The rest included a small amount of small hydro (just over 14,000 kW) and a good deal of biomass (just over 73,000 kW). Fukushima plans to raise this renewable generation capacity to just under 500,000 kW by 2013, with the greatest share of growth coming from solar. While the other renewable generation options remain relatively stable, solar is slated to more than double from 2011 levels to just over 183,000 kW. And that level is projected to increase further, to just under 450,000 kW by 2015. If this target is achieved, it would make solar more than half of the 805,000 kW of generation capacity projected for 2015. The share

for wind, in 2015, is estimated at just over 175,000 kW.

In addition to these plans for ramping up renewable power generation, Fukushima has an ambitious program for international networking as well as fostering human resources in the growing green industries. Its invitation to NREL director Arvizu was not mere showboating. By 2015, the prefecture aims at attracting at least 30 renewable energy-related firms into the prefecture. It will also develop at least six leading-edge cooperative endeavors between business, academe and the public sector in order to invigorate local industry as well as raise its technological level. It also plans to have installed at least one 2-megawatt floating offshore wind generation facility and two 7-megawatt facilities.

The prefecture is also aiming to set up its own power company, and use the proceeds from its business to finance renewable energy initiatives within the prefecture. In June of 2012, the prefecture set up a renewable energy-related business cluster promotion council with 24 business institutions and the governor as chair. It also aims to establish a research council on renewable energy related business in July, with 400 members including representation from business, academia and other organizations.

#### Beyond Fukushima

And these kinds of initiatives extend beyond Fukushima. Recent surveys

(<http://www.sss.fukushima-u.ac.jp/saiene/>) by Fukushima University's Renewable Energy Training Programme indicate that of the 41 cities and towns and villages that compose the Northeastern Region's (Tohoku) three prefectures, 23 now have renewable energy visions. Indeed, only one of the 41 communities is not actively involved in deploying renewable energy. Moreover, 15 of the 41 communities are deploying smart grids and other infrastructure of the smart city or "smart village" type. These deployments include small-scale and distributed power-generation systems.

In addition, 34 of the communities are putting significant amounts of solar generation on public buildings as well as incentivizing its diffusion in the larger community. Of these, 16 have large-scale mega-solar as a prominent element in their expanding energy portfolios. Next to solar, the most common renewable energy source under development is wind power, for 20 of the communities, small-scale hydro for 13 communities, and biomass for 11 of them. Offshore energy generation is being pursued by four communities, including Fukushima's attention-getting wind projects.

Moreover, systems that make use of renewables as heat, in heat-exchange technologies, are being developed by 11 of the communities. Of these, 8 are biomass heat and 3 are solar thermal. On top of that, 20 of the communities are pursuing some form of biomass heat either through biomass

cogeneration, biomass fuel, or biomass power generation.

These kinds of initiatives extend beyond Tohoku, are in fact nationwide. They start from Metropolitan Tokyo's "Smart Energy City" and 2020 Vision, through a swathe of Kanto-area governments, and from the tip of Hokkaido to islands well south of Okinawa. Japan has effectively become a test-bed for renewable, efficiency and conservation technologies, with budgets to deploy it mushrooming to hitherto unseen levels.

The incentives for Japan's local actors are clear: the Fukushima Shock surprised them by exposing their vulnerability to reliance on centralized power in general and nuclear in particular. Their fiscal outlays from last year showed evidence of seeking to get out of this dependence. But the deployment of fiscal resources was hindered by a number of factors, including uncertainty over the energy mix, political implications of the choices, and concerns about the reliability, cost and efficiency of renewables. In some respects, it simply took time to cut through a deeply embedded mythology that renewables are unsuited to Japan and that further efficiency gains would be uneconomical. But in the past year, outlays on renewable energy and conservation/efficiency have increased markedly, and often by many multiples. One outstanding case is the Tokyo "smart energy city" budget, which increased by well over 200 times

(not percent, but rather times) from YEN 40 million last year to YEN 10.3 billion. The outlay centres on home energy management and business energy management systems that greatly increase efficiency as well as help open up opportunity for renewable energy. And it is a core element of a larger package of energy and efficiency initiatives.

#### Investment by Central Agencies

Moreover, the local governments are not acting on their own in this. They are backed by massively increased program spending from many central agencies. Renewable and efficiency budgets have increased by several multiples, and there is generally good progress on deregulation to foster more diffusion.

Within central agencies such as METI, there is obviously a very conflicted perspective. Prior to the Fukushima Shock, Japanese central agencies in general were hindered from pursuing distributed and renewable generation by the dominance of the monopolized utilities and their nuclear assets. The dominance was institutionalized in the energy planning scenarios, which centered the expansion of power generation on nuclear and underplayed the potential for smart grids, solar, geothermal and other avenues of power generation, transmission and greatly enhanced efficiency. Some of METI's personnel and those of other agencies, such as Education, still appear

institutionally committed to getting restarts of nuclear and perhaps even going for new build. Over 50% of Japan's energy research and development budget is devoted to nuclear. And these interests seek to sell plant overseas (and on May 2 concluded a contract in Turkey) as well as seek to produce small-scale nuclear.

But elements of those same central agencies clearly understand that there is an enormous wave of investment and interest in distributed and renewable generation and the infrastructure associated with it. For example, the Pew Research Centre's April release of its report "Who's Winning the Clean Energy Race 2012" points out that "Japan reemerged as a top destination for clean energy investment as national efforts to develop alternatives to nuclear energy gained momentum after the Fukushima Daiichi nuclear disaster in 2011. In response, clean energy investment increased (<http://www.pewenvironment.org/uploadedFiles/cle-G20-report-overview.pdf>) 75% in 2012 to USD 16.3 billion."

Moreover, on April 22, Bloomberg New Energy Finance released research which suggests that about 70% of power generation investment of 2030 will be renewable. That would lead to renewable energy investment of USD 630 billion per year.

And those assessments do not include the smart grid and other infrastructure spending that

comprise the smart community model unfolding in Japan. One example (<http://www.japantimes.co.jp/news/2013/04/19/business/worlds-biggest-cell-to-store-renewable-energy-in-hokkaido/#.UZEvR4IWFn4>) is seen in the fact that METI decided in April to install the world's largest battery, with a storage capacity of 60,000 kwh, in Hokkaido.

The "local production-local consumption" boom, high power prices and other incentives that drive these deployments are helping Japan get its engines of innovation over the so-called valley of death. As to innovation, on April 26 the Japan Patent Office of the METI released a survey (<http://www.meti.go.jp/press/2013/04/20130426009/20130426009.pdf>) that suggests that Japan is establishing a very strong lead in green technologies. The survey of patent applications for 2012 covered such areas as solar, smart grids and other energy-related technologies. The results suggested that the Japan is a strong innovator in energy and related technologies. The survey also showed that Korean and other East Asian competitors are moving up fast in such critical fields as LED lighting and lithium-ion batteries.

Japan was first rank in the number of patent applications for solar panels with 32.7%, followed by the United States at 20%, and the EU at 19%. In lithium batteries, Japan applied for 53% of patents, followed by Korea and China.

And as to high-efficiency lighting such as LEDs, Japan accounted for 24% of patent applications, and 64% of applications in the overall field of Electroluminescence Lighting (EOL). Even more impressive was Japan's performance in management and operations technologies related to the implementation of the smart grid. Japan accounted for 45% of patent applications in this field, followed by the US and the EU. Among the individual firms applying for patents, the top 10 included no fewer than eight Japanese firms.

#### Back to the Future?

At the same time, the nuclear-centred energy plan is back on the drawing board. The emergence of the Abe regime last year saw anti-nuclear voices removed from most major committees, especially the energy policy committee. However, it seems futile to dump the critical voices from the committees and thereby create the context in the LDP can hammer together a new energy basic law that legitimates as much as possible of the old status quo. This is because the situation has changed and continues to do so. Energy policy and energy markets in Japan include an increasing number of players and an increasingly diverse mix of technologies, whose price structures and other factors are shifting far too rapidly to be summarized by the kind of policymaking process that the old guard are at present undertaking. In other words, they seem likely to be in the midst of generating a document that will be meaningless even before

they get it printed and bound.

Moreover, Japan's energy policy and planning authority itself has effectively become distributed. Tokyo, Osaka, Yokohama and most other big subnational governments, as well as numerous smaller ones, are now acting to maximize their and their regions' opportunities in what is clearly a rapidly evolving environment of plunging costs and increasing opportunities for renewables and other green tech. They aren't waiting for restarts or new build.

Indeed, Japan's recognition of the green-growth opportunity includes an increasingly expanding coalition of local governments, central agencies, big and small businesses, citizens groups, and other interests. They do not all share the anti-nuclear sentiment, but they are all largely on the same page because of the evident unwillingness of society (especially women with children) to accept a return to the status quo pre-Fukushima. That politics has liberated these actors to deploy fiscal and regulatory means to accelerate the growth of green industries. They are using Japan's robust feed-in tariff, the very high cost of natural gas-generated power, the high cost structure (and intense dislike) of the monopoly utilities, and other factors as means to encourage ambitious gains in efficiency and conservation as well as accelerate diffusion of renewable power generation.

Japan clearly bears watching, as the entire



country rapidly evolves along with Fukushima.

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*Recommended citation: Andrew DeWit, "An Emerging Fukushima Model?", The Asia-Pacific Journal, Vol 11 Issue 19, No. 1, May 13, 2013.*

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