3 Ariz. J. Envtl. L. & Pol'y 1005

Arizona Journal of Environmental Law & Policy
October, 2012

Comment
Daxin Li[a1]

*1005 JAPAN'S SHIFT TOWARD RENEWABLE ENERGY IN RESPONSE TO THE FUKUSHIMA DAI-ICHI MELTDOWN

INTRODUCTION

Before the Great East Japan Earthquake of March 11, 2011 and the ensuing Fukushima Dai-ichi nuclear power plant meltdown, Japan ran fifty-four nuclear reactors and planned a future increase of thirty to fifty percent.[1] Almost one-third of the nation's electricity came from nuclear power,[2] but people thought little of the source. By March 2012, only two reactors were online[3] and all plans to build more were scrapped in response to massive public outcry over the safety of nuclear power.[4] In a country with no cross-border energy grid and almost no fossil fuels, the removal of nuclear power meant extensive fuel importation at high cost and dependence.[5] The only remaining alternative is domestically available renewable energy. Japan has enough renewables to meet all its energy needs, and experts anticipate that up to seventy percent can be from renewable sources by 2030.[6] The government and industries have invested heavily in nuclear energy and are resisting change, but the mob has spoken and the phasing-out of nuclear power is all but certain.

I. SHIFTS IN TECHNOLOGY

The Japanese government took a bold step towards renewables when it pledged to produce twenty percent of electricity from renewable sources by 2020, budgeted $7 billion this year for renewable energy and conservation projects, and passed new subsidies for green energy to encourage private investment.[7] Plans for a forty-megawatt (MW) solar project to be completed in 2014 are already being considered.[8] As of March, only two percent of ***1006** Japan's electricity was from renewables; thus Japan is firing up old fossil fuel power plants and promoting conservation and efficiency to ease the electricity shortage.[9] Despite this effort, there is still a ten percent gap between supply and demand.[10]

Plans are in place to build Japan's largest geothermal power plant in the Fukushima Prefecture.[11] When completed in 2020, it will produce twenty-five percent of a nuclear reactor's electricity--enough for 70,000 homes.[12] Japan's total geothermal energy potential is estimated to be third-largest in the world at 23.47 million kilowatts (kW), but currently only 540,000 kW is being produced.[13] One reason for the limited production was a restriction on drilling in national parks where most of the energy is located.[14] Regulators have relaxed such rules and now allow geothermal power plants in national parks.[15] In addition to providing clean power, the new plants will help communities recover by creating jobs and tourism.[16]

Another bold step in renewable energy is the planned construction of floating offshore wind farms. Japan's estimated total

potential wind power is more than 750,000 MW.[17] Floating wind farms are preferable since land construction is limited by the country's mountainous terrain, and the deep seafloor makes seafloor-mounted wind turbines difficult to build.[18] Floating wind farms circumvent these limitations, but present difficulties of their own, such as stability issues and transmission problems.[19] Despite these limitations, the first stage of the project starts this year.[20] A single, two-MW floating turbine will be completed offshore of Nagasaki by 2013.[21] Japanese companies will also begin construction on a pilot plant that will produce sixteen MW of electricity when completed in 2016.[22] Actual commercialization is expected by 2017.[23] A full-sized plant will be anchored off the coast of ***1007** Fukushima and produce up to 1000 MW of electricity.[24] Japan Wind Power Association has set a target for replacing all 49,000 MW of pre-tsunami nuclear power with renewable energy by 2051, with approximately half coming from offshore wind power.[25] Floating wind farms are far more expensive than conventional and other renewable electricity generation, in part because the technology is in its infancy. The cost for wind farms is approximately $1.7 million per MW produced on land, and $5.5 million per MW at sea.[26] However, a recently built two-MW Norwegian floating wind turbine cost $29 million per MW.[27] Partially offsetting the cost are the techniques, equipment, and experience Japanese industries will develop from this endeavor, giving them an edge in future contracts to build floating wind farms in other parts of the world.[28] Japan's production of and maintenance services for wind turbines are predicted to grow from $3.6 billion currently to $6 billion in 2030.[29]

II. SHIFTS IN TRADE REGULATION

Expanding renewable power comes with increased regulation. Wind and other renewable power generation will be subject to environmental assessment that can take up to four years and, depending on the number of wind turbines, cost $1.2 million to assess.[30] The government's wind-power pricing delays may also cause investors to hesitate, slowing the already-extended process of building wind farms.[31] Such setbacks can cause wind energy to miss the highest first years of feed-in tariffs (FITs), which guarantee above-market prices for renewable electricity.[32] To combat possible delays in renewable energy, the government plans deregulation.[33] Environmental assessment for wind farms and solar power has been expedited to prepare for FITs that will take effect in July.[34] The three-step environmental survey for wind farms will be shortened from a maximum of 270 days per step to thirty days per step.[35] Solar power plants may be exempt from regulation that requires factories to offset environmental impacts by planting greenery on at least a quarter of their site.[36] Geothermal may now be built inside national parks, where most generating potential exists.[37]

***1008** Former Prime Minister Naoto Kan was forced to resign over his handling of the disaster, but he set the passage of the FITs as a precondition of his resignation.[38] The electricity price set by the government is higher than production cost, thus guaranteeing profit from renewable electricity generation and promoting investment in renewables.[39] Effective on July 1, 2012, FITs will require electric utilities to buy electricity generated from renewable sources and at a higher price over a period of time determined by the national government.[40] The key to the program's success lies in the price set for renewable electricity. There is no incentive to invest if the price is set too low, and consumers will be overburdened if the price is too high.[41] The FIT rate currently discussed is approximately $0.50 per kilowatt hour (kWh) for solar generators, and $0.25 for other renewable generation.[42] The current grid price for commercial users is approximately $0.17 per kWh.[43] FITs will be reviewed every three years and slowly adjusted down to reflect cheaper and more numerous renewable generators in the future.[44] Germany and China have also implemented FITs and experienced growth in wind power generation.[45] Wind and solar equity returns in Japan are predicted to achieve 44% and 51%, respectively.[46]

Utility companies will be allowed to charge customers a surcharge according to the amount of electricity used, allowing companies to offset the higher cost of renewable electricity.[47] The surcharge is set at 0.5 yen for fiscal year 2020, which increases costs by 180 yen, or $1.94, per month for the average household.[48] Energy-intensive industries will be ***1009** given a discount.[49] Other discounts ending in March 2013 will apply to businesses and homes affected by the earthquake.[50]

CONCLUSION

Rikkyo University energy policy expert Andrew DeWit said in a recent interview, "[t]he greater the challenge, the more

painful the conditions are that you're confronting, the stronger are your incentives to innovate as rapidly as possible."[51] It cannot be said that gaining an independent and renewable electricity generation system is worth the immeasurable loss of life and property that Japan endured as a result of the 2011 tsunami, but it can be said that the new system will be safer, more diversified, and help Japan rebuild its economy by transforming it into a vanguard of sustainability.

Footnotes

[a1] Daxin Li is a second-year student of the University of Arizona James E. Rogers College of Law. He holds a bachelor's degree in Environmental Sciences from University of California at Riverside.

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[2] Sam Eaton, *A Year After Fukushima, Clean Energy Still Just a Promise in Japan*, PRI'S THE WORLD (Mar. 23, 2012), http:// www.theworld.org/2012/03/fukushima-japan-clean-energy/.

[3] *Id.*

[4] Jepson, *supra* note 1.

[5] *Id.*

[6] *Id.*

[7] Eaton, *supra* note 2.

[8] Chisaki Watanabe, *Eurus Energy Considering 40-Megawatt Solar Project in Japan*, BLOOMBERG NEWS (Mar. 23, 2012), http:// www.businessweek.com/news/2012-03-23/eurus-energy-considering-40-megawatt-solar-project-in-japan.

[9] Eaton, *supra* note 2.

[10] Jepson, *supra* note 1.

[11] Eric Watkins, *Nuclear Power Yields to Wind, Geothermal in Fukushima*, WATCHING WORLD ENERGY (Mar. 26, 2012), http:// www.watchingworldenergy.com/2012/03/26/watching-world-energy-6/.

[12] *Id.*

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18 *Id.*

19 *Id.*

20 Watkins, *supra* note 11.

21 Watanabe, *supra* note 17.

22 *Id.*

23 *Id.*

24 *Id.*

25 *Id.*

26 *Id.*

27 *Id.*

28 *Id.*

29 *Id.*

30 *Id.*

31 *Id.*

32 *Id.*

33 Watanabe, *supra* note 15.

34 *Id.*

35 *Id.*

36 *Id.*

37 *Id.*

38 Steve Leone, *Japan Approves National Feed-in Tariff*, RENEWABLEENERGYWORLD.COM (Aug. 26, 2011), http:// www.renewableenergyworld.com/rea/news/article/2011/08/japan-approves-national-feed-in-tariff.

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44 Edahiro, *supra* note 38.

45 Watanabe, *supra* note 17.

46 Kari Williamson, *Japan's New Feed-in Tariff Is Attractive for Solar and Wind*, RENEWABLE ENERGY FOCUS (Mar. 30, 2012), http:// www.renewableenergyfocus.com/view/24833/japans-new-feed-in-tariff-is-attractive-for-solar-and-wind/.

47 Edahiro, *supra* note 38.

48 *Id.*

49 *Id.*

50 *Id.*

51 Eaton, *supra* note 2.

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