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Japan's Energy Policy Impasse 日本のエネルギー政策、行き詰まる

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Japan's energy policy regime appears dangerously adrift in the context of accelerating climate change. The core problem is agency. On the one hand, Japanese PM Abe Shinzo and the nuclear village appear obsessed with nuclear power restarts and 20th century paradigms of the power economy. On the other hand, Japan's anti-nuclear civil society lacks the political vehicle to force a combined nuclear pullout plus drastic reduction of greenhouse gas emissions. Some anti-nuclear forces do not yet understand the urgent need to reduce emissions, and are content to burn coal, despite of the patent threat of climate change. This is precisely what Japan has done in the wake of 3.11. The Abe cabinet is focused on getting restarts and a nuclear-based energy plan. Yet the scope for restarts is surprisingly limited and - incredible in this era of multiple crises and revolutions - the draft new energy plan lacks concrete numbers.[1] The country needs better leadership on smart growth, in the context of what McKinsey specialists refer to as a "resource revolution"[2] and MIT economists depict as "the second machine age."[3]

Nuclear Is Probably No Longer Baseload

All of Japan's 48 viable nuclear reactors are at present offline, and have been since September of 2013. The Abe cabinet is keen to restart as many of these as possible. But regulatory rules, public opinion and other factors constitute significant barriers to achieving even a third of Japan's pre-Fukushima 30% reliance on nuclear power. That will mean nuclear will no longer be a "baseload" source of electricity, capable of supplying a reliable load to the grid at all times.

Indeed, an Asahi Shimbun survey of the utilities themselves indicates that fully 60% of Japan's 48 viable nuclear reactors, meaning 30 reactors, are not as yet being considered for application to the Nuclear Regulation Agency (NRA) for restart. And of these 30 reactors, it appears that at least 13 are write-offs due to age, proximity to a seismic fault, and other factors that render them incapable of satisfying the new safety standards of the NRA.[4] For that reason, at present there are only 17 reactors for which restart applications have been filed.

Of these, it appears – even to Japanese supporters of nuclear power – that perhaps only 8 will finally get approval and be restarted. Highly regarded energy specialist Tom O'Sullivan, of Mathyos Japan, concludes this on the basis of a survey of "various established Japanese policy institutes that are close to Japan's industrial interests." O'Sullivan notes that "[t]his level of restarts would only amount to 56 TWh of power output or 6% of Japan's total power requirements and thus may not constitute a baseload power supply."[5]

Reuters conducted its own analysis, using a broader set of questionnaires and interviews of over a dozen experts, along with input from the 10 firms that operate nuclear capacity. One suspects these operators painted as optimistic a picture of their restart prospects as possible. Even so, the result of this survey led Reuters' expert journalists, Mari Saito, Aaron Sheldrick and Kentaro Hamada, to conclude that at best there will be 14 nuclear restarts at some point in time. They add that there is great uncertainty about the remaining 34 nuclear

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reactors. Their conclusion is that nuclear energy "will eventually make up less than 10 percent of Japan's power supply."[6]

Part of the reason nuclear appears not likely to recover its status as base-load power are the NRA's new safety rules, in tandem with maintenance schedules and other factors that make a very shrunken fleet unreliable. But another large reason for this likely outcome is the stubbornness of the opposition to nuclear power.

Sustained Public Opposition

The most recent Japanese opinion poll on nuclear restarts is the March 18 survey by the Asahi Shimbun. It indicates that 59% of the Japanese public oppose restarts of any nuclear capacity, whereas only 28% support restarts. The poll's results not only confirm that the opposition to nuclear is holding; it also shows a great sensitivity to risk. According to the poll, a mere 12% of the Japanese public have either no or only minimal concern regarding the risk of further nuclear accidents at facilities other than the infamous Fukushima Daiichi. By contrast, 50% have a fair degree of concern, and 36% have a very high degree of concern. In addition, the poll shows that only 4% of respondents regard the lack of nuclear waste disposal facilities as of no or only minimal concern. By contrast, 19% believe it is to some extent a problem. And a massive 76% regard it as a serious problem.[7]

Nationwide, there are 135 local communities that lie within 30 kilometers of a reactor, and 21 prefectures that are host to one or more reactors. The news service Kyodo Tsushin surveyed these 156 local governments in mid- to late-February of 2014, and found that only 13 were ready to agree to restarts without conditions. A further 24 would agree to restarts, but with conditions. Of the remainder, 32 declared their opposition to restarts, 66 replied that they could not decide, and 21 offered no reply at all.[8] The NRA decided on March 13 to prioritize Kyushu Electric's Sendai rectors 1 and 2 (in Kagoshima Prefecture) for restart.[9] But that decision itself came under criticism, due to perceptions of undue haste amid suggestions that seismically active zones are nearby.[10]

Hard-Pressed Utilities

As for the utilities themselves, Tepco is not viable in its current form, having lost a stunning 81.2% of its market capitalization between March 10 of 2011 and April 2 of 2014. It was nationalized in June 2012 via a YEN 1 trillion injection of public capital, "the biggest state intervention into a private non-bank asset since America's 2009 bail-out of General Motors (Economist, 2012). Resolving pressing matters such as the Fukushima and area clean-up and compensation, the decomissioning of ruined assets and the like are well beyond Tepco's means. Some specialists question whether the other nuclear-dependent utilities are viable as well (Kaneko, 2013), and in early April of 2014 Kyushu Electric and Hokkaido Electric were revealed to be in discussion with the public sector Development Bank of Japan for bailouts (Financial Times, April 2, 2014). Kyushu Electric's reliance on nuclear power is 42% of generating assets and Hokkaido Electric's reliance is 30%. Their respective losses of market capitalization are 38.9% and 58.2%.[11]

The Japanese public sector has thus long been in a powerful position vis-à-vis the utilities, enabling it to press for reform. But this authority was used sparingly by the central government, even under the previous Democratic Party administration. The Tepco bailout was notable for protracted negotiations between Tepco and its politico-bureaucratic allies and state officials. They were not bargaining about weighty matters such as ownership of the power grid, but rather salaries and the size of increases on rate-

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payers. Outsiders regarded it as "bewildering" to see such minor items on the table. The Financial Times' Jonathan Soble, also a close follower of Japan's post-Fukushima power crisis and politics, argued that it "underscored the depth and resilience of Tepco's resilience, and that of the 'nuclear village' of utility executives, bureaucrats and lawmakers that built Japan's atomic power industry."[12]

But now Tepco's siblings are lining up for bailout, and this seems unlikely to end. Like big utilities in Europe and North America, Japanese utilities face the existential challenge of the ICT, renewable and efficiency-driven "electricity revolution" summarized nicely by Brookings energy security specialists Charles Ebinger and John Banks.[13] A recent very detailed article in Scientific American shows how America's 3000-plus utilities are fighting a losing battle against solar power and smart grids.[14] Centralized power and monopolized conventional-grid ownership are confronting a far larger tsunami than the mobile phone shock to land-line telephony. But Japan's monopolized and nuclear-reliant utilities have the added conundrum of nuclear power's delegitimation in a very seismically sensitive country.

After Fukushima, the Japanese public debate received a very accelerated course of instruction on how various political economies were responding to the risks of resource price increases as well as climate change and the opportunities of developing new industries in renewable energy and related fields. The public debate also became apprised of just how far behind Japan was in its deployment of energy alternatives such as solar and wind. Moreover, the old arguments that these forms of power generation were not suited to Japan, because of "unique" winds and lack of space, lost their credibility.

The Push for Local Resilience

In addition, local governments exhibit increasing efforts to seize opportunity in the emergence of alternatives to highly centralized and concentrated nuclear power. Centralized power, such as Tepco's nuclear reactors, led to concentrated economic benefits for a few communities whereas the risks of accident were distributed among a much broader range of communities. Fukushima Prefecture's post-3-11 commitment to 100% renewable energy by 2040 encouraged other prefectures and cities, including Tokyo, Kyoto, and Osaka, to adopt ambitious targets.[15]

Moreover, at the end of 2013, Japan's 16 trillion yen power market featured 192 independent power producers, including such new entrants as Toyota. That number was 79 at the end of 2012, and there has thus been a 240% increase in the number of firms.[16] Japan's "feed in tariff" policy support for diffusing renewables, effective from July of 2012, saw over four gigawatts (roughly four large nuclear reactors worth) of new renewable capacity deployed in the initial year. Japanese domestic shipments of solar cells and modules during July-September of 2013 leapt to 2.075 gigawatts, over triple the 627 megawatt level of a year earlier.[17] The Pew Research April 3, 2014 publication of "Who's Winning the Clean Energy Race? 2013" argues that China remains the leader, at USD 54.2 billion, but that "Japan experienced the fastest investment growth in the world, increasing 80 percent, to almost $29 billion."[18]

Since Japan's public debate on energy is so polarized between Team Abe and the majority, it seems useful to examine which of the two idealized options – nuclear or green - offers the better return. Table 1 is an aid to this objective by its highlighting of the profoundly skewed energy R&D priorities of all the IEA countries. Over two-thirds of the 1980 peak in energy R&D expenditures by all IEA members was devoted to nuclear fission and fossil fuels. By contrast, only 12.3% was invested in renewables and only 6.4% in efficiency. Yet

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according to the IEA Energy Efficiency Market Report of 2013, global energy efficiency investment in 2011 was worth roughly USD 300 billion, “a similar scale to renewable energy and fossil fuel power investments.”[19] Directly comparative data on nuclear power investments appear not to be available. But Mycle Schneider, and Antony Froggatt’s authoritative “The World Nuclear Industry Status Report 2013” reveals that the 2013 global total of 427 reactors with an installed capacity of 364 GWe was considerably lower than the 2010 peak of 444 reactors with an installed capacity of 375 GWe.[20]

Table 1 Energy R&D Expenditures by IEA Countries, 1975-2005(2005 USD million)

Year	1975	1980	1985	1990	1995	2000	2005
Efficiency	587	955	725	510	1240	1497	1075
Fossil Fuels	587	2564	1510	1793	1050	612	1997
Renewable	208	1914	843	563	809	773	1113
Nuclear Fission	4808	6794	6575	4199	3616	3406	3168
Total Energy R&D	7563	15034	12186	9394	9483	9070	9586
Total: Japan	1508	3438	3738	3452	3672	3721	3905
Total: Excluding Japan	6055	11596	8448	5842	5811	5349	5681

Source: WNA, 2013[21]

Moreover, the IEA Energy Efficiency Market Report 2013 also stresses how potent efficiency has become in an era of high energy prices. Its analysis indicates that efficiency has led to avoided energy use for 2010 in 11 IEA member countries[22] that greatly exceeds even the consumption of oil. And the IEA itself stresses that there is much more efficiency potential to be exploited.

Smart Cities

Amazingly, a smart and green, ICT-centred growth strategy was approved by the Abe Cabinet on June 14 of 2013. The growth strategy is also very powerfully informed by the disruptive potential opened up by the rebuild of the devastated regions on the basis of renewable and distributed energy.[23] But it also has a larger purchase in the political economy debate because – as with ICT-centered "industrial Internet," "machine to machine," "big data," and related emergent paradigms – it is aimed at a profound restructuring of the energy economy as well as much of the rest of the infrastructures that make up the modern urban community and the exchange of resources and information among citizens, businesses and their governments. This emergent paradigm is not peculiar to Japan. The smart city model began to take shape in the early 2000s. But from the beginning of the 2010s, worsening resource, economic, and climate crises were paralleled by such technical advances as the diffusion of “big data” analytics via the cheapening and miniaturization of sensors.[24] These and other developments increasingly point to the disruption not just of centralized power generation and transmission but also of a resource-intensive growth dynamic that has characterized the developed economies over the past six decades.[25]

The "dematerialization" of the economy has been an aim in Japan and Germany since the 1980s, with an increasing sophistication of policies and programs for reducing resource waste through greater efficiency and recycling, development and deployment of more sustainable practices, and the other initiatives. But these initiatives were generally seen as more or less costly interventions in the mainstream economy to reformat and reduce its throughputs and polluting outputs. The ICT strategy, through its deployment of sensors that monitor a multitude of aspects of the ambient environment as well as system parameters, is already working to accelerate this transformation of the conventional economy through increasing the payback from new processes.

In this respect, it is very ironic but telling that some of the most aggressive deployment of ICT is evident in conventional energy. The mining

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firm Rio Tinto, for example, revealed in early 2014 that its initial deployment of "big data" ICT to enhance efficiencies saved it USD 80 million over 2013.[26] The oil industry's use of "big data" in what it refers to as the "digital oil field" is another example. Their per-barrel price for oil exploration and production has roughly quintupled over the past decade, to over USD 100/barrel. Their aggressive of ICT shows what very hard-pressed actors can do in the face of rapidly rising costs.[27]

Team Abe might want to learn a lesson from this, and stress the ICT-centred renewable and radical efficiency policies they have already passed. The same goes for the simplistic anti-nuclear critics who would be satisfied with continuing to burn more coal.

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Notes

[1] See "Ruling parties agree on draft energy policy after revisions," Mainichi Newspaper, April 4, 2014.

[2] Stephan Heck and Matt Rogers, "Are you ready for the resource revolution?" McKinsey Quarterly, March 2014.

[3] Erik Brynjolfsson and Andrew McAfee, The Second Machine Age. W.W. Norton, 2014.

[4] See (in Japanese) "60% of reactors do not meet inspection standards," Asahi Shimbun, March 12.

[5] Tom O'Sullivan's survey of various "established Japanese policy institutes that are close to Japan's industrial interests" (March 20, 2014 e-mail from Tom O'Sullivan, Mathyos Japan).

[6] See Mari Saito, Aaron Sheldrick and Kentaro Hamada, "Japan may only be able to restart one-third of its nuclear reactors," Reuters, April 1, 2014.

[7] See (in Japanese) "59% oppose nuclear restarts, Asahi Shimbun opinion poll," Asahi Shimbun, March 18, 2014.

[8] See (in Japanese) "20% of communities within 30 kilometers agree to restarts,

[9] See (in Japanese) "Sendai plant is given priority, with NRA suggesting restart perhaps by summer," Nikkei Shimbun, March 13, 2014.

[10] On this, see (in Japanese) "Editorial: The Sendai plant prioritization does not meet conditions for restart," Okinawa Times, March 17, 2014.

[11] My gratitude to Tom O'Sullivan of Mathyos Japan for the data on Japan's utilities and their finances.

[12] Jonathan Soble, "Executive dealing with a corporate meltdown," Financial Times, October 21, 2012.

[13] See Ebinger, Charles K and John P. Banks, "The Electricity Revolution," Brookings Research Reports, November 8, 2013.

[14] David Biello, "Fight over Rooftop Solar Forecasts a Bright Future for Clean Energy," Scientific American, March 25.

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[19] An overview of the report can be accessed at IEA, "From higgen fuel to world's first fuel?" October 16, 2013.

[20] Mycle Schneider and Antony Froggatt, "The World Nuclear Industry Status Report 2013," July 30, 2013.

[21] WNA World Nuclear Association (2013). "Nuclear Power in Japan," October 28, 2013.

[22] The countries are Australia, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States.

[23] Andrew DeWit, "Just Gas? Smart Power and Koizumi's Anti-Nuclear Challenge," The Asia-Pacific Journal, Volume 11, Issue 50, No.3, December 16, 2013.

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