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Japan: Building a Galapagos of Power?

Andrew DeWit

This article assesses the political economy risk of the return of Japan's nuclear village. The December 16 general election campaign and its aftermath may see the nuclear village and its allies seize even greater momentum in key central-government agencies. With a welter of parties and their confusing positions on energy policy, an election seems hardly likely to lead to coherence. The general political and policymaking chaos of the present indeed invites comparison with Japan's early postwar years. The upshot could lead to a gradual return to the concentration on nuclear power that was written into the June 2010 basic energy policy and remains the de jure energy policy, notwithstanding the March 11, 2011 Fukushima Shock and all that has happened since.

If this "back to the future" scenario eventuates, I argue that Japan risks building a "clean" Galapagos in its power economy, one relatively sterile in business potential, at a time when power is becoming perhaps the world's most dynamic sector. This risk also encompasses Japan's energy policy in general, since the innovative dynamism of the power economy is spreading to efficiency, fuels and other energy sources outside of the electricity sector per se.

If You Start Me Up...

As we know from Jeff Kingston's excellent work,[1] Japan's "nuclear village" is on the comeback trail within the central government's chaotic politics and policymaking. Key decisions on reactor restarts are being moved from the cabinet to the new Nuclear Regulatory Agency, which is clearly dominated by pro-nuclear interests. The public remains very skeptical about the merits of nuclear power, as are publics just about everywhere. That fact, and its impact on the power policy debate over the past year and a half, is clearly one reason that a host of decisions are being shifted to the new regulatory institution where the nuclear village holds sway.[2]

It is clear, that at the central government level, the nuclear village and much of the establishment's political and business actors insist that the power-policy status quo ante-Fukushima is the proper basis for weathering Japan's daunting total of eight major challenges and moving towards a sustainable recovery. These challenges include the world's most rapid rate of ageing, the weakening global economy, and the continuing nuclear crisis.[3] Looking at the bottom line on power prices, the Japanese establishment sees increased imports of gas and other fossil fuels as costing more than restarting the country's currently idle 48 out of 50 nuclear reactors.

Indeed, these direct pecuniary costs are not insignificant. Japanese utilities' fuel costs appear likely to double this fiscal year from 2 years ago. In the fiscal year ending March 2013, the 9 monopoly utilities, excluding Okinawa's monopoly, appear likely to pay about ¥6.8 trillion ($85.2 billion) for liquefied natural gas, coal and crude oil. By comparison, in the year before the Fukushima shock (the fiscal year ending in March 2011), the utilities imported ¥3.6 trillion worth of fuel. And last year, they imported ¥5.9 trillion worth of fuel. The utilities losses as a result of last year's costs and other factors totaled ¥1.6 trillion in 2012.[4] With Tokyo Electric Power (TEPCO) now asking the Japanese Government for more assistance to cope with Fukushima disaster costs of over ¥10 trillion, they are also pressing to have their massive nuclear capacity at Kashiwazaki-Kariwa and elsewhere restarted.[5]

Crass calculations play a significant role here. The peak business association, Keidanren, remains dominated by energy- and resource-intensive industries with significant ties to the nuclear village.[6] For the most part they are either not interested in the revolutionary "green growth" opportunities of our era, not aware of them, or believe they can have their nuclear cake and robust green growth as well. They look at power costs, ignoring the trillions of yen in Fukushima costs that will be passed on to taxpayers, repeat the slogans that Japan is the world's most efficient economy and that renewables are unreliable, and make their decisions accordingly.

And they are not simply being cynical: like all other observers of Japanese business, they see the sobering spectacle of such huge firms as Sharp on the edge of bankruptcy and Sony's debt downgraded to a notch above junk.[7] They are also poignantly aware that, in early November, the Japanese economy is entering its 5th recession in 15 years. They will find no relief in, for example, the 2013 Global Manufacturing Competiveness Index, compiled by Deloitte and the US Council on Competitiveness. Based on a variety of measures, the report places Japanese competitiveness at tenth, just behind Singapore, and sees it slipping to 12th in five years, beneath Indonesia and just above Mexico.[8] In short, Japanese business interests are quite reasonably worried about their capacity to survive in a very competitive and unstable global marketplace. Deeply risk-averse and perceiving risk largely in pecuniary terms, they are trapped in a tunnel vision.

Out of the Tunnel

Let's not share their tunnel vision. Rather, let us look instead at the rapidly changing global environment in which Japan has to find a new niche. The major opportunity for Japan is in the energy sector, and infrastructure related to it. This sector is at least 10% of the global economy.[9] Energy is not only the world's largest industry; it is also its most damaging via direct health costs[10] as well as being the source of over 80% of anthropogenic greenhouse gas emissions.[11]

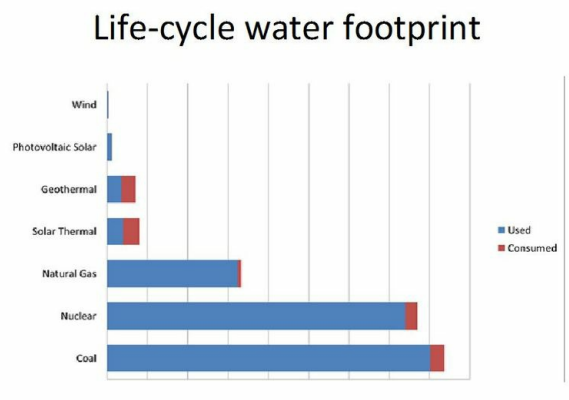
Japan's 8 demographic, economic and other crises are real. But deep, systemic crises are now humanity's common reality. Among the most evident of these systemic crises are long-term trends of population growth, economic development and urbanization that are driving resource constraints. By 2030, roughly 5 billion people or 2/3 of the global population are projected to live in cities, with massive and potentially catastrophic increases in energy demand. For example, the US Energy Information Agency's 2011 International Energy Outlook projects world power generation as increasing from 19.1 trillion kWh in 2008 to 25.5 trillion kWh in 2020 and 35.2 kWh by 2035. It also sees the bulk of power generation coming from conventional fuels, such as coal, natural gas and nuclear.[12] If this "business as usual" scenario on power generation eventuates, then the already escalating costs of fossil fuels will continue.[13] In addition, the October 29 shock of Hurricane Sandy's USD 50 billion destruction in New York and New Jersey will almost certainly become a mere foretaste of abrupt and truly devastating climate change.[14]

An additional and deeply troubling matter is the knock-on effects of these price increases on food supply. Post Carbon Institute Senior Fellow Richard Heinberg has for example shown that the intense role of oil (as fuel, input source for fertilizers, etc) in food production has led to a correspondence between rising oil prices and rising food prices.[15] Lester Brown includes other factors - such as population growth, changes in climatic patterns, the use of corn and other food crops in biofuels - and starkly details the risks in his new work Full Planet,

Empty Plates.[16] His work warns that food prices have climbed, roughly doubling, between 1990 and 2012 with devastating effects for the world's urban poor.

Rising resource and food costs add to the increasingly constraining effect the water-energy-food nexus exerts on our energy and other choices. Among other things, the water demands of conventional energy – including nuclear – threaten to overwhelm our capacity to cope with global population increases and urbanization. This risk is evident in so-called "water footprints," illustrated in the chart below, which displays the amount of water used, and then discharged,

or consumed (and then evaporated) for the various power generation sources, per unit of power produced. In the United States, roughly half of freshwater withdrawals are used in energy production, with varying amounts of the water released as heated water, as polluted water, and as vapour.[17] The reliance of conventional energy on water, whether in the exploitation stage or final cooling stages, is another salient problem that is overlooked by conventional projections of demand. That downplaying of risk is bizarre, because there is no substitute for water in these processes and there is now a significant body of research on the water-energy-food nexus.



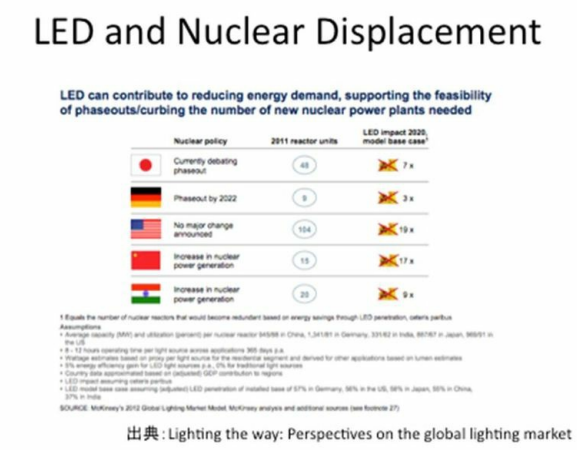
There is also a rapidly emerging investor risk, particularly in areas where climate change has altered historic rainfall patterns. Utilities, fuel producers, and other interests ignore the increasingly stark evidence of change. They tend to assume that water supplies will not be a problem, certainly not *their* problem, as has been the case in the past. But particularly in India and China, water stress is already becoming so significant that even the world's largest power-unit maker General Electric warns observers that projections of coal-fired power-generation are to a significant extent fanciful.[18]

But again, water stress is not only a problem for fossil-fuel generation. Nuclear power is also a very thirsty form of generation, as we see from the water footprint chart, and is increasingly running into unanticipated problems. The 2003 European heat wave that resulted in 35,000 deaths also had a deleterious impact on nuclear-power production, especially in France. In total, 17 French reactors had to reduce output or shutdown altogether, due to reliance on river water for cooling. In the United States in mid-August of 2012, a Waterford Connecticut Millstone reactor had to be shut down for 12 days, due to sea water being too warm for cooling, a fact which sent a shiver through the global nuclear village.[19]

What seems clear from observation, rather than fanciful projections, is that the more we grow conventional power, including nuclear, the more severe become our environmental, economic and even political costs. Researches indicate that we have evolved a resource-dependent and inequitable conventional growth model that is unsustainable. We have seen that it is unsustainable in terms of the toll it exacts on nature, particularly the knock-on effects through the water-energy-food nexus.

In other words, markets and nature seem to be driving development in a very different, direction with respect to sustainability. The best recent work on where we are and where we are being driven, if we want sustainability, is the 2012 Global Energy Assessment (GEA). The GEA is an initiative that included 300 specialist authors over five continents, and weighs in at 1865 pages. It is by far the most comprehensive study of energy options available, as it couches its analyses in terms of such interactive issues as water. It argues that, with aggressive efficiency, the global community can derive up to 75% of primary energy (meaning not just electricity) from renewables by 2050. It sees nuclear power as at best an option, and not a must like renewables and efficiency.

Is Radical Efficiency Possible?



One question that immediately arises in this context is whether aggressive efficiency is possible, especially in the Japanese case. In spite of the rhetoric, Japanese energy policymaking has long soft-pedaled the role of efficiency. The country has, however, significant scope for efficiency gains. Japan is far ahead of the United States, of course, which many commentators tend to use as the benchmark for just about anything concerning Japan. But as we saw in the July 2012 release of the authoritative study by the American Council for an Energy Efficient Economy (ACEEE), Japan is ranked fourth in efficiency, behind the UK, Germany, and Italy. The Americans lag at 11th, but simply being ahead of them is not in and of itself an achievement.[20]

And as to specific areas of efficiency that are not limited to Japan, note the gains we can expect from lighting. Lighting consumes about 20% of global electrical power production, and is responsible for about 20% of Japanese household power consumption.[21] The McKinsey consulting group's September 2012 second edition of their comprehensive analysis of the lighting industry, the "first to provide a comprehensive and holistic view" of this fragmented and very complex market, highlighted its dynamism and efficiency potential. As we see in the chart below, taken from the report, 100% diffusion of LEDs in Japan by 2020 has the potential to displace 7 nuclear reactors' worth of power demand (that is equivalent to about 7 gigawatts of power).[22] The McKinsey study, also projects savings of roughly 19 nuclear reactors' worth of power in the United States by 2020 through the use of LED lighting. LED lighting is also in a very disruptive phase, according to the report, with the evolution of new services, IT applications, and even organics. LED is one area where we clearly see that the global energy industry and energy applications are in the midst of an industrial revolution that melds energy, IT and biotechnology, well over 20% of GDP for an industrial economy like Japan's.

Other areas of efficiency potential include refitting housing stock. Consumption of energy in the housing and other building stock is roughly 40% of overall demand, and can be cut by 90% through the deployment of passive housing or zero net energy buildings.[23] The aforementioned ACEEE report notes that Japan's building codes remain voluntary, and the efficiency of its commercial building stock is relatively poor.

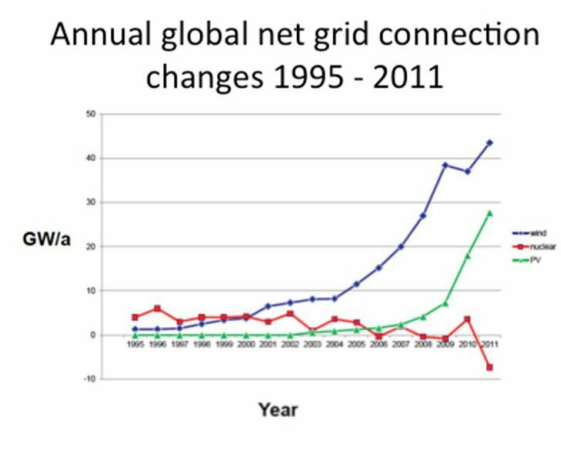
The GEA study also tells us that:

"The global electricity supply system is currently undergoing fundamental changes in its infrastructure, associated not just with the rapidly increasing amounts of renewable energy, but also with the development of new production and end-use technologies. One change is an increase in the large number of distributed production units that are significantly smaller than traditional thermal power plants. This development will include low-voltage connections from micro-distributed genera

tion/CHP [combined heat and power] plants in individual households. Another important development is active control of this low-voltage demand, introducing a new method of providing flexibility in power balancing.[24]

We see evidence of that change in the chart below, taken from the Global Energy Assessment, that tracks the relative amounts, in gigawatts per year, of new grid-connected power production globally. Whereas nuclear power has been flat or even in decline over the past few years, wind and solar have been undergoing exponential increases.

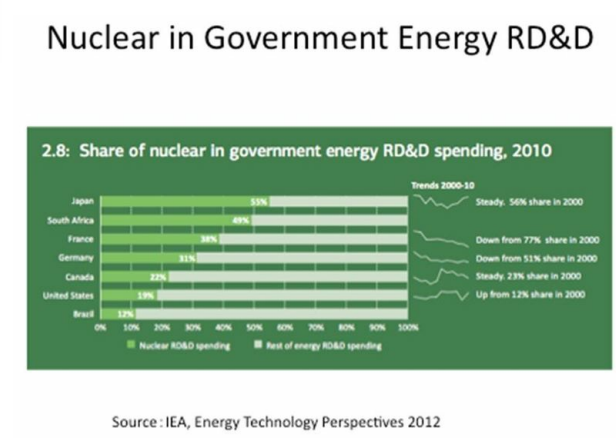
So the big question is whether Japan will be well positioned to take advantage of this shift to distributed and sustainable power as well as to achieve aggressive efficiencies. Fukushima opened a door to that transformative, sustainable direction. The Germans are on their way through it; but in Japan it seems the nuclear village and their allies may block the entrance. The return of the nuclear village and the restart of their assets may seem the economically



wise choice to get the economy up and running. But it has political economy costs that are being soft-pedaled or simply ignored.

Building a Power Galapagos

Trends in Japan certainly do not seem favourable. Again, it is important to keep in mind that Japan's nuclear village has the backing of Keidanren, whose resource-intensive industries like the status quo as the household sector subsidizes their power costs. And much of the central government's political and bureaucratic class back the nuclear village as well, at least on the issue of restarts. The village will almost certainly be further aided by even worse political confusion than we have at present. Former Tokyo Governor Ishihara Shintaro's unnecessary and costly provocation of the Chinese, especially over the Senkaku Islands issue, will likely help distract attention. LDP leader Abe Shinzo and his preoccupation with constitutional revision might pitch in as well. Chaotic party politics and distracted policymaking is a useful context for rolling back reform, coopting key elements of the pro-renewable coalition, and thus returning Japan to the direction it was headed before Fukushima.



Source: IEA, Energy Technology Perspectives 2012

We have already seen that the nuclear village are returning, perhaps to dominate policymaking in a chaotic and gridlocked central government. As shown in the chart below, from the IEA's 2012 "Energy Technology Perspectives," Japan's nuclear village already dominates government energy RD&D budget, taking 55% percent of it in 2010 versus 49% in South Africa, 38% in France and even less elsewhere.

The nuclear village continues to argue that renewable energy is undesirable because of its cost, its variability due to changes in levels of sunshine, wind speed, and other factors. They were also not supportive of smart grids, because the interactive capacity of the smart grid allows the diffusion of renewables. That is why Japan is a laggard on the diffusion of smart meters and other core technologies. Where Sweden and Italy have 100% diffusion of smart meters already, Japan's Tokyo electric is aiming to get 80% diffusion by about 2017. In other words, it is clearly in no hurry. Even when Japan has sought to develop smart city, smart grid and other kinds of test projects, their innovative potential has been blunted by the potent role of vested interests in controlling their scope.[25]

Hence, the return to prominence of the nuclear village is almost certainly going to see it work hard to maintain the structure of centralized power generation. It may lead to maintenance of the nuclear-centred utilities' monopolies in power markets and their control over the grid, even though there is an official commitment to deregulation. The return of its nuclear-centred 2010 energy plan would almost certainly follow, as it deploys strategies that it and utilities elsewhere have used repeatedly to marginalize renewables. It is also proceeding with plans to further centralize generation capacity through the construction of several reactors that were already underway before the Fukushima crisis. The nuclear village's antipathy towards significant levels of distributed and renewable power seems unlikely to change, especially since it threatens its straitened income streams. Therefore Japan risks being put again out of step with what appear to be global trends in distributed power generation and the smart design of urban communities.

Japan, with its shrinking and increasingly less competitive economy, needs this spur to innovation. Power markets globally are in the midst of revolutionary changes that center on "smart cities" and the introduction of IT as well as renewable energy. Prior to Fukushima, Japan was handicapped from competing in these enormously lucrative markets, whose cumulative value to 2030 has been assessed by Nikkei BP as ¥4000 trillion. Keep in mind that Japan's IT makers, including iconic Sony, may be ready to go under. It is clearly a very bad time for Japan to let vested interests dictate the revision of rules and institutions in a core part of the economy.

It was no accident that the rebuild of Tohoku was originally to be centered on smart cities, smart grids and renewable energy. This path was in reaction to the nuclear meltdowns as well as the centralization of power generation and thus of economic opportunity. Centralization also undermined resilience by leaving local communities reliant on power supplies from concentrated and vulnerable generation.

For the nuclear village to regain dominance in policymaking and constrain the opportunity opened up by Fukushima would be a truly colossal, costly tragedy for Japan. It has ample renewable resources. It has 55% of global green patents. It has the human, financial, and other resources to use these advantages to its own and to global benefit. But it is increasingly risk averse and lacks good leadership at the critical central government level. It needs to grow sustainably, but risks growing into a power Galapagos.

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[1] Jeff Kingston "Power Politics: Japan's Resilient Nuclear Village," The Asia-Pacific Journal, Vol 10 Issue 43 No 1, October 29, 2012.

[2] The November 14 Asahi newspaper quotes METI Minister Edano Yukio in his recent claim that it is impossible to specify the level of reliance on nuclear power. He argues that "the cabinet has no idea of how many nuclear reactors will be working by any given year. The new nuclear regulatory agency will determine how many reactor restarts to authorize or not authorize, deciding this independently of the cabinet, and therefore we can't specify how many reactors will be running after how many years." See "Not Possible to Specify the Level of Nuclear in Basic Energy Plan: METI's Edano" (in Japanese) Asahi Shinbun, November 14.

[3] The eight major challenge are 1. Japan's declining population; 2. its aging population; 3. the slowness of the capacity to shift the industrial base; 4. the continuing deflation from the mid-1990s; 5. the damage from the earthquake and tsunami that devastated the Northeast region; 6. the nuclear crisis that ensued from the meltdown of reactors in Fukushima; 7. the high exchange value of the yen and the pain that it inflicts on Japan's export competitiveness; 8. the continuing instability of international markets due to the global financial crisis. On the challenges, see (in Japanese) p. 12 of the February 16, 2012 Ministry of Lands, Infrastructure and Transport "Recent Environmental and Energy policy Directions" briefing note.

[4] On this see, Tsuyoshi Inajima "Japan Utilities Fuel Costs Set to Double Since Fukushima Crisis," Bloomberg, October 24, 2012.

[5] Indeed, the company's nationalization on July 31 of 2012, Japan's largest non-bank nationalization ever, was premised on restarts. See "TEPCO says it will see no profit without nuke plant restarts," The Asahi Shimbun, November 10, 2012.

[6] For a timely account of these ties and the risks Keidanren is willing to overlook, see Roger Pulvers, "So, fat cats and a blue caterpillar will save Japan from nuclear hell. OK." Japan Times, October 21, 2012.

[7] Roger Cheng, "The Era of Japanese Consumer Electronics Giants is Dead," CNET, November 9, 2012.

[8] As with any assessment, this one has its problems. One is the large role of CEOs' subjective appraisals. But the report also relies heavily on a number of reasonably objective measures, and therefore has relevance for the debate on policy options. In addition, it will have an influence simply because it will help shape the perceptions of people making investment decisions. The report is available here.

[9] The Energy Watch Group undertook a 2010 analysis of global fuel and electricity costs, and determined them to be somewhere between USD 5.5 trillion and 7.5 trillion in 2008. See Energy Watch Group, "Worldwide Estimated Yearly Energy Costs," March 24, 2008.

[10] The Worldwatch Institute summarizes the health costs in its "Fossil Fuel and Renewable Energy Subsidies on the Rise."

[11] This figure is calculated for Annex 1 countries in the UN Framework Convention on Climate Change (link). See p. 18 of IEA "CO2 Emissions from Fuel Combustion: Highlights," 2011 edition. Carbon Dioxide emission alone totaled 31.78 billion megatons in 2010, see here.

[12] See the report's section on electricity here.

[13] On prices, see the IEA's 2011 publication "Key World Energy Statistics."

[14] Though disasters are always tragedies, it is fortunate that the shock was delivered to the megacity that is yet the centre of the global economy and whose Mayor Michael Bloomberg's leadership on climate change via chairmanship of the C40 Cities (link) has been one of the inspirations of recent years. On the impact of Sandy on the US economy and climate-change debate, see Dorsi Diaz, "President Obama addresses climate change in acceptance speech," Examiner, November 7, 2012.

[15] See Richard Heinberg "Soaring Oil and Food Prices Threaten Affordable Food Supply," Post Carbon Institute, December 14, 2011.

[16] See the book's first chapter.

[17] See, Wendy Wilson, Travis Leipzig and Bevan Griffiths-Sattenspiel, Burning Our Rivers: The Water Footprint of Electricity, A River Network Report, April 2012. See also United States Geological Survey, "Summary of Estimated Water Use in the United States in 2005," October 2009 Fact Sheet.

[18] Natalie Obiko Pearson "Asia Risks Water Scarcity Amid Coal-Fired Power Embrace," Bloomberg, September 11, 2012.

[19] On these matters, see Joe Eaton "Record Heat, Drought Pose Problems for US Electric Power," National Geographic, August 17, 2012.

[20] See "ACEEE: United Kingdom Tops in Energy Efficiency, US Lags in 9th Place"

[21] On this, see the date table on p 12 the Ministry of Environment Building working group paper of March 23, 2012.

[22] A summary and downloand link for the report, "Lighting the Way: Perspectives on the Global Lighting Market (Second Edition, 2012)," is available here.

[23] The opportunities are so obvious that even the US military is emphasizing them. On this see, Michael Douroux "4,700 Military Homes to Receive Solar Energy Systems," Business Insider, November 14, 2012.

[24] See Global Energy Assessment: Towards a Sustainable Future. Cambridge: 2012, p. 1155.

[25] On this, see for example Scott Victor Valentine, "A STEP toward understanding wind power development policy barriers in advanced economies," Renewable and Sustainable Energy Reviews 14 (2010).