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The Fukushima Impact: Japanese energy policy and its impact on the global energy landscape, European energy policy post-Fukushima

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After all is said and done, Japan's energy policy remains largely unchanged despite the Fukushima Daiichi nuclear disaster. The government will soon announce its new energy policy, in which nuclear power will continue to play a significant if diminished role in Japan's electricity supply. Most of the power units not sitting on live fault lines will come back online over the next few years, although some of the older units may be decommissioned because they may not be worth the cost of retrofitting to meet the new safety standards. Work will continue on at least one of the two power units that had already been under construction at the time of the disaster. The future of other units still in the planning stages is less certain, but over time forces will be at play that will visibly increase the likelihood that at least some of them will also reach fruition.

All this is good for the bottom line of the power companies, of course, but it is also very good for the Japanese economy, which is currently paying an extra 3.8 trillion yen or so on an annualized net basis for fossil fuels while the nuclear power plants are out of commission. That is roughly equal to 0.7% of Japan's gross domestic product, and ironically equal to the official development assistance target that Japan has long ceased to take seriously, if it ever did. From another perspective, it is almost half the extra revenue expected from the 3 percentage point hike of the Japanese version of the value-added tax that will be activated on April 1 next year. Not all of that money can be clawed back, of course, since we might end up losing half of the units to the original disaster, live faults, or simple economics, but it will certainly help nonetheless.

Note that the return of the units is less of an imperative for the proper functioning of the overall economy in the very short-term. Indeed, 18 power units shutting down immediately, and the other 44 units either remaining or going offline and remaining there had limited impact on economic activity. Although the first few weeks after the disaster brought planned rolling blackouts in the metropolitan Tokyo area and its environs that TEPCO served with its Fukushima power plants, the summer peak demand in 2012 was met with a mixture of well-organized conservation efforts, utilization of reserve capacity, and some wheeling from less affected regional monopolies. No blackouts. The subsequent summers have been even less eventful, the 2013 summer with no nuclear power, as the more visible effects of the conservation efforts—severely downgraded public transport schedules, hot, dark corridors and hallways—have disappeared or have been downgraded in their turn. How was the macroeconomic performance? GDP turned negative by a hair in the 1st quarter, when the disaster occurred and dipped 1.6% year-on-year in the second quarter, but had returned to plus 3.4% year-on-year by the 1st quarter of 2013 and had remained positive ever since. And industrial production returned to pre-disaster levels soon after the disaster.

Longer-term, it is a different economic story. Electricity is an important part of production costs, and Japanese electricity are already sky-high. If the full cost of the nuclear units shutdown is passed on, this will impact negatively on investment decisions. And of course, if Abenomics succeeds as advertised, at some point, lack of sufficient generation capacity will impose a physical constraint on economic activities. Of course the gap could be filled with more fossil fuel power plants, some of which could be set up quite quickly. But then the Japanese economy will be paying double for that additional electricity, when you take the write-off of the nuclear units into consideration.

The return of the nuclear power plants will also be good for the environment, since it does not emit carbon dioxide or other more toxic effluents during normal operation. Natural gas is more environment-friendly than coal or petroleum, but it's still a fossil fuel. Until cheap storage technology becomes available, hydropower and geothermal power will be the only commercially viable renewable energy source available that is appropriate for base load purposes. But hydropower is largely tapped out in Japan, while geothermal power is limited in scope. A full-lifecycle approach will show that nuclear power plants are not carbon emission-free. Still, they are a significant improvement on fossil fuels and inherently utile as base-load capacity.

The policy outlook is similar worldwide, with a few notable exceptions. Germany has reversed course and decided to phase out nuclear power after all, and Italy has rejected nuclear power outright. But this does not stop other European states such as Hungary and Finland to build new nuclear power plants and connect them to the broader continental grid. Electricity is fungible here, a luxury that Japan does not have. But more generally, we will see a remarkable surge of nuclear power in the developing countries and emerging economies in the next couple of decades that will dwarf any additional works completed in the OECD member countries during that period. And here, Japan's indigenous nuclear capacity matters. The more options the better for buyers, and an indigenous nuclear capacity provides an important basis for the design, construction, operation, maintenance, and yes, emergency response capacities to serve the customer. Yes, this conveniently dovetails with Japan's economic self-interest, but that is what the market economy is supposed to do: it's a win-win situation.

But why is this possible? Detractors of nuclear power ask: Have we not learned the lessons of Chernobyl and Fukushima? Twice chastened, do we think that we can be lucky the third time around? How can the authorities continue on a pro-nuclear path when a majority of the public, as in Japan, have a negative view on nuclear power?

The answer is that for all the displacement from evacuation, and headlines generated by the Fukushima disaster, necessary or by choice, nobody has died or has fallen ill from radiation exposure and there is no indication that there will be any long-term consequences on human health. True, there were dozens, possibly hundreds of premature deaths among the dislocated due to the mental and physical stress. But they do not loom large in the public mind since they were dwarfed by the massive dislocating effect of the earthquake and tsunami proper. Much of the Fukushima dislocation remains as a chronic pain, but for now, this is again dwarfed by the lingering effects of the broader disaster.

Now here is the thing: I believe that the public implicitly acknowledged this when it allowed units that were not shut down immediately as the consequence of the earthquake and tsunami were allowed to remain online until the time came for the next round of regular inspections. Two units were actually allowed to officially come back online on the grounds that permission had been granted before the earthquake. Indeed, in the 2012 lower house election, all important because it would determine whom the next the next prime minister would be, the electorate overwhelmingly opted for a decidedly more pro-nuclear part of the opposition, an opposition that it could have blamed for decades of a nuclear policy

that had culminated in the Fukushima disaster. And the only actively anti-nuclear political parties remained on the fringes.

This public acceptance of nuclear power, however begrudging and however tacit, will only grow when units come back online without incident while others are decommissioned—voluntarily or involuntarily—under the new, more powerful safety standards. Over the long run, even new units, planned and currently unplanned, are conceivable, as existing units begin to reach the end of their commercial existence. For the ultimate decision individual power units is ultimately a local one: the prefecture, and the host communities. There is too much to resist in terms of fiscal and economic incentives for the hosts, who would otherwise have to bear the brunt of the demographic ravages of the periphery in a rapidly aging society.

The return of Japan's nuclear power will have positive global effects as well. The power of association alone will bring benefits; if nuclear power can continue to work in a crowded, geologically youthful Japan, surely it can thrive just about anywhere else? Continued nuclear power in Japan is a plus for Japanese industrial capacity, from planning, construction, operation, and, yes, through decommissioning. And a thriving nuclear industry in Japan means that much more choice for other countries with a pronuclear outlook; competition always benefits the consumer.

But all is not well for the long-term prospects of nuclear power in Japan. Most prominently, the decades-long troubles around the development of the fast breeder reactor threatens the nuclear fuel cycle. Likewise, the difficulties in finding a site for the final disposition of processed nuclear waste. I will skip the fast breeder issue, since it is essentially an engineering question. But the search for an appropriate depository is a sociopolitical issue; there are no massive engineering issues to be resolved. The sites for the existing nuclear power stations were selected in balmier days, when the public was more accepting of nuclear power. Even then, some communities were unwilling, and there is at least one case of a steadfastly anti-nuclear municipality who refused to host a nuclear power plant glaring at one in a rival municipality across a bay. But there are no local governments with a vested interest in hosting a final resting site for nuclear waste. This is the one that will be hard going in the aftermath of the disaster, if it wasn't already tough enough before.

My response to the final disposition conundrum is that Japan needs to look beyond its borders for the depositories. Most people currently find this unthinkable, or at least impractical. After all, exporting pollution is a practice

that is frowned upon, as Larry Summers found to his chagrin during his tenure at the World Bank. But the idea makes engineering, economic, and even some political sense. If Japan, geologically and demographically speaking, is one of the most challenging locations for nuclear power plants, it is not surprising that many people consider it even less amenable to deposits that will play themselves out hundreds of centuries into the future. It makes eminent sense from a human perspective to seek out sparsely populated locations with geologically stable bedrock formation and pay whatever the market bears. And it would be good for Japan, good for the host countries and communities, and good for the rest of the world, because this would expand the possibilities for nuclear power. Besides, unlike so much of industrial waste, there is no danger of surreptitious dumping at multiple, obscure and/or poorly regulated locations. The logic that lies behind the ban on transshipment of hazardous waste does not apply here.

This requires heavy lifting, at home and in the international community. But at some point, I believe that the issue must be broached; otherwise, nuclear power in Japan, and eventually in countries elsewhere, will hit a ceiling, at which point it will come to an abrupt stop. The sooner we face up to this issue the better.

(The following comments were skipped to make more time available for Q&A.)

[And since I have made a policy recommendation, let me touch on a subject that leads to another suggestion. One of the things that plagued the Japanese government's efforts during the initial response to the disaster was the charge that it was hiding information or worse. True, some of the information generated by government monitoring failed to make the rounds of the rest of the relevant authorities and, perhaps more significantly, the media. Actually, the overall government policy appears to have been quite to the contrary: an unfiltered stream of information and data, to be interpreted by whatever experts was out there. This was partly borne out of necessity; the authorities did not have enough resources to make real-time sense out of the continuous flow of information that was emanating from the disaster. But making sense out of it all was even harder for the media, with even fewer resources to devote to it. And that's just the Japanese media. Imagine the plight of the overseas media, whose mall number of correspondents there were ill-equipped to cover serious science and engineering subjects, let alone anything of this magnitude and complexity. Reinforcements were sent, but they tended to be either old Japan hands, lacking in the science and engineering, or science and engineering and/or disaster writers (or, in the case of tabloids, scaremongers) who lacked local familiarity. I strongly suspect that the turnaround in Germany and possibly in Italy against nuclear power was driven by just such reporting. It is not easy to imagine a way to get around this

problem. But the behavior of the Japanese media offers a hint at the solution. Specifically, coverage by the Japanese media improved significantly over the days and weeks following the earthquake. Their understanding of the science and engineering became more comprehensive, more coherent, and more consistent—and more accessible, for those that hadn't tuned out. How can we ameliorate, if not eliminate, the steep learning curve for all? For some day, we are more likely than not to need to face this challenge, simply because there will be so many states with varying levels of governance that will be introducing or increasing nuclear power. What I believe that the world needs now is a crowd-sourced information pyramid on nuclear power that provides easy access at multiple levels of sophistication, each building on a more sophisticated layer below, each laying out publicly prominent arguments on either side—for there will be another side at every point—so that the reporting will, like it or not, as comprehensive, coherent, and consistent as possible to the general public.

I would like to make another recommendation regarding the international response to another crisis, but that goes even further beyond purpose of this session. So I'll stop right here and wait for the Q&A, which is the most stimulating part from my past experience.]

Thank you.