

(I am providing this as an additional contribution to the Nautilus East Asian Security Workshop. I know Dr. Tatsujiro Suzuki is the expert on this issue but I thought I might provide an additional perspective.)

AFTER FUKUSHIMA: WHERE IS JAPAN GOING? WHERE IT SHOULD GO TO.

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Where does the Japanese Government stands?

Five months after the Fukushima nuclear accident occurred former Prime Minister Naoto Kan expressed his conviction that Japan should move out of nuclear power generation. The statement ignited a considerable consternation among the political and economic circles in Japan and Mr. Kan had to retreat to say that his was a statement of his personal conviction and was not an official position of his Cabinet.

Prime Minister Yoshihiko Noda, who succeeded Kan as a fellow Democratic Party (DPJ) Prime Minister, stated that there would be no new construction of nuclear power reactor and no extension of the life span of the existing nuclear reactors. That meant he was amenable to restarting existing reactors after they underwent routine checkups and the safety stress tests.

Beyond that there has been no official policy statement about what Japan should be doing with its nuclear fuel cycle except for giving the general indication to separate nuclear safety branch of the government away from the Ministry of Economy, Trade and Industry (METI) when Prime Minister Noda gave the portfolio of the Minister in charge of the Fukushima accident to the Minister of Environment, Mr. Goshi Hosono. The METI that oversees both the Natural Resources and Energy Agency and the Nuclear and Industrial Safety Agency, did not dare to outline a new nuclear policy in its 2011 Energy White Paper issued on October 28.

Public Opinion

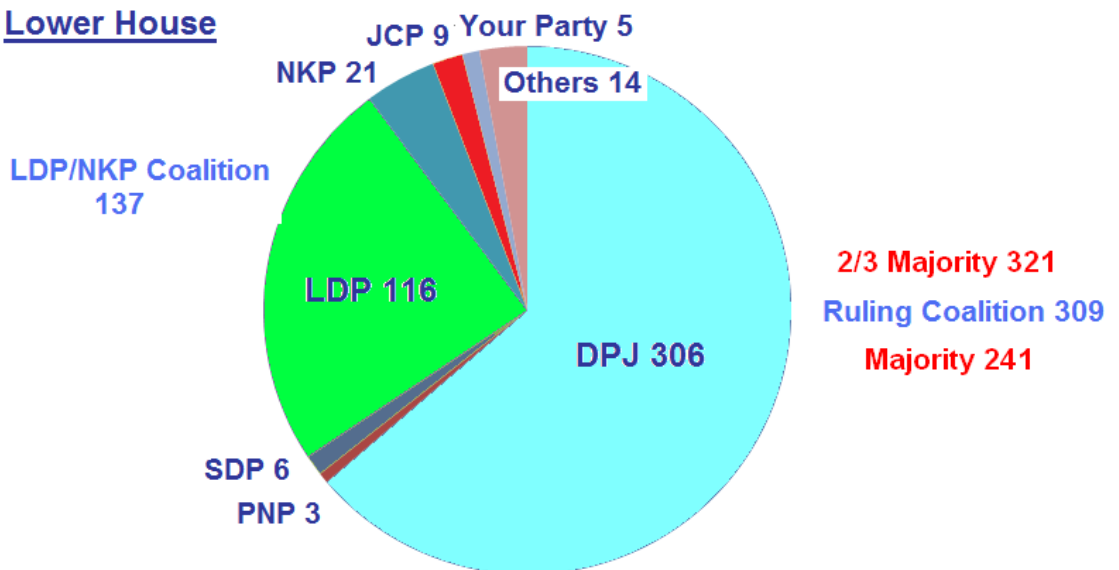
Op Eds and advocacies abound in newspapers, TV broadcast and internet about what to do with the nuclear power generation. As if it is a soup of numerous isotopic nuclear wastes, there have been all kinds of opinions, some good ones and some even poisonous ones. But, salient points being debated today include the following issues:

1. Should Japan terminate, scale down or expand its nuclear power generation?
2. Should Japan continue its fast breeder project, *Monju*, or give it up?
3. Should Japan continue its spent-fuel reprocessing project at Rokkasho and the promotion of MOX fuel burning in light water reactors?

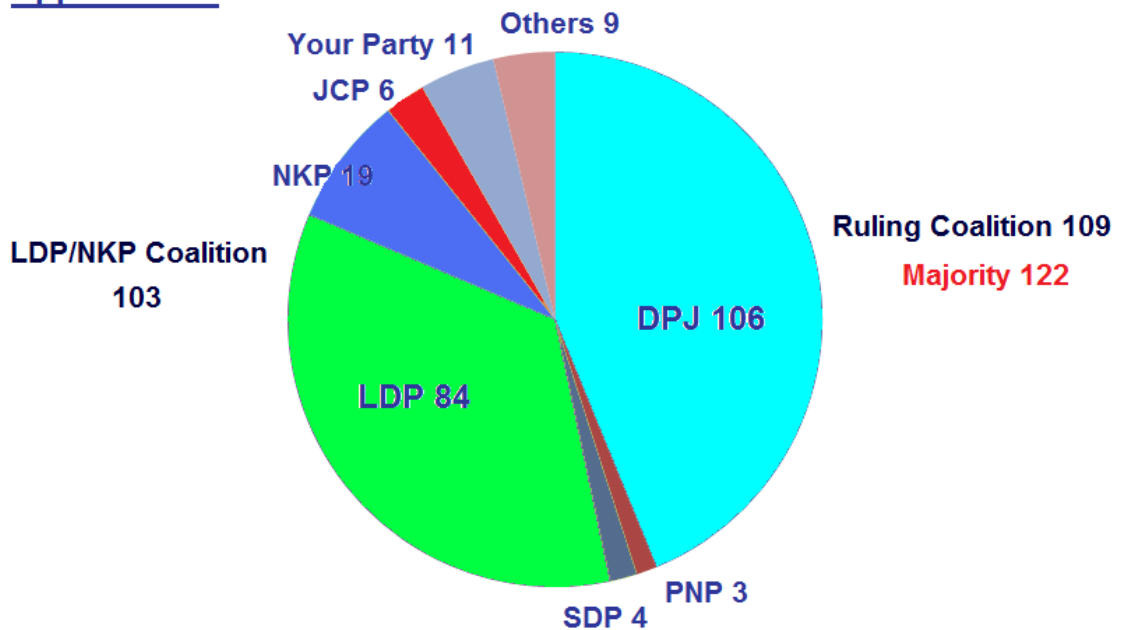
The ruling DPJ seems to be split within the party between the majority realists who support continuation of nuclear power generation and the minority leftists who support the termination of nuclear power generation. The coalition partner, People's New Party (PNP), supports the continuation. Among the oppositions, two splinter parties, Communists (JCP), Democratic Socialists (SDP) and the Your Party (Minna-no-To) support the termination. The Liberal-Democratic Party (LDP), the largest opposition, is overwhelmingly for continuation. The only exception may be the vocal maverick, Taro Kono. LDP's former coalition partner, New Komeito (NKP), perhaps is a reluctant supporter of the continuation.

[Party Line-ups in the Japanese Diet]

Lower House



Upper House



Overall trend in the Japanese Diet seems to be that the majority is in support of continuing nuclear power generation, at least for the immediate future. This makes a marked difference from the results of public opinion surveys that found something from 60 to 70% supporting phasing out nuclear power generation. This may reflect a gap between the strong emotional reaction of the general public that does not want to see such a horrible accident and its aftermath again and the realization that in order to maintain its economy running and to compete with foreign competitors it has no other way but to continue its nuclear power generation, at least for the time being.

[Public Opinion Survey]

	Yes.	No.
Q: Do you favor nuclear power generation?	37%	42%
Q: Do you favor restarting nuclear power stations after safety checks are done?	51%	35%
Q: Do you support phasing out nuclear reactors in future?	74%	14%
Q: Do you favor increasing natural energy even at a higher cost?	65%	19%

Survey conducted by the Asahi Shimbun June 11-12, 2011

Practically, it is very much likely that the government and the power companies have not much choice but to muddle through. In Japan the national

government alone cannot decide to continue nuclear power reactors running. For the construction of a new reactor and its operation the power companies have to secure consent of the local governments, i.e. cities, towns, villages and the Prefectures where reactors are located. Zoning regulations, construction permits, environmental assessments, use of port facilities, all the administrative details need permissions or cooperation of local governments. There may be legal arguments about the competence of local governments but the power companies, practically, do not dare to go over them. That is why some of the proponent governors, like the one in Saga Prefecture, tried to recruit sympathizers to public hearing to stage a favorable local scene. After the revelation of the rigging efforts he ran into a serious trouble and had to postpone the restarting of a reactor.

The current mood is such that the power companies are now having difficulty restarting the construction projects after temporary suspensions following the Fukushima accident. Thus, it seems practically impossible to start a new construction project. As the Fukushima accident took place just after the life span extension of the reactor number 1 at Fukushima Daiichi was officially approved, there is a prevailing view that whatever the argument about the continuation, there should not be at least no extension of life span. So, Prime Minister Noda's statement, in a way, reflected what the government practically can do and cannot do today.

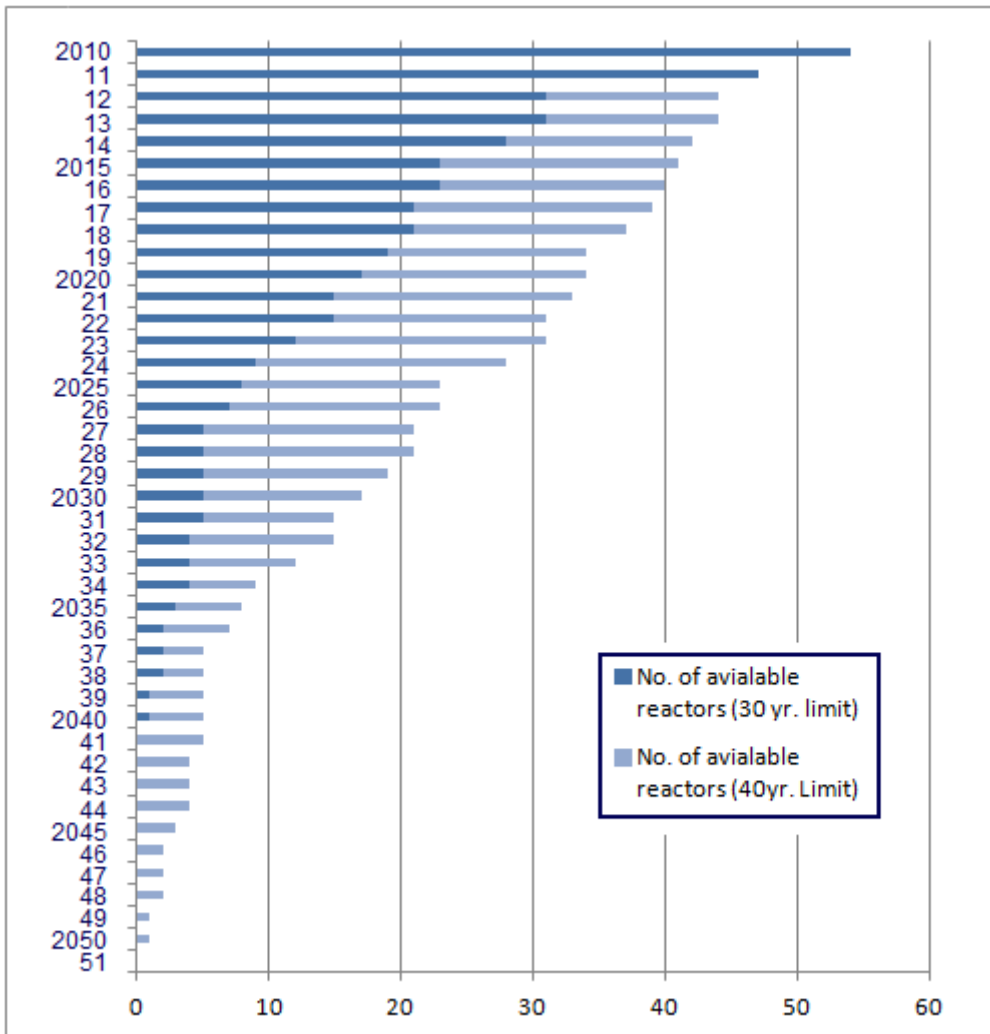
The power companies are today struggling to restart their nuclear reactors to secure enough power supply to avoid any blackouts. But, they are bound to take longer time to do so than any time before. Currently, there are only 10 reactors in operation out of 47 operable reactors (54 before Fukushima minus 4 that were destroyed in the accident and 3 at Hamaoka that former Prime Minister Kan requested to shut down as they sat on a major fault line and are regarded virtually impossible to restart even though legally Chubu Electric may be able to do so.) This is down further from 18 reactors last summer, when only Tepco and Tohoku Electric were forced to take a major electricity-saving campaign. Thus, they are predicting even tougher electricity-saving requirements across the country for the coming winter. The Japanese people is showing a remarkable resilience and compliance with the saving requirements but repetition of stringent electricity-saving campaign may gradually shift the anti-nuclear power sentiment among the public and, combined with the industry pressure, may enable the government to gradually expedite restart of power reactors.

Ideally, the government should announce a long-term goal to expand the use of clean renewable energy such as solar, wind, hydro and geothermal. Subtract the amount of electricity thus generated from the total electricity requirement forecast and calculate how much is still need to be generated by nuclear. Then, set-up an independent government-parliamentary joint commission to rank all the remaining reactors from the safest to the least safe ones. The criteria should include safety assessment based on the reactor designs, the age of the reactors, their safety features and disaster-worthiness, their resilience aganst possible terrorist or saboteur attack (One facing open seas may be more vulnerable than those facing closed seas.) and the size of population within 50 and 100km radius (The ones that have big population within those ranges will have a major impact and evacuation crisis if a severe accident takes place.) Then designate reactors from the top of the list to secure enough electricity generating capacity allowing for the idling period for periodic maintenance services. This is something like what they did under the Base-Closing Act in the U.S. in the 1990s after the end of the Cold War. If one assumes the safety design and safety features are about equal, this means closing the reactors earlier than their life span expire from the oldest ones and closing the reactors closer to population centers.

In the Japanese political culture this will not be easy to do. Power companies will hate to be subjected to public assessment of their safety performances. Such a simple objective criteria as the ages of reactors may be something they may grudgingly accept with a government compensatory arrangement for early closure of reactors than their original life spans.

The chart below shows available nuclear reactors for power generation if no new reactor is built from now on and assuming 30 or 40 year-limit on the operation of reactors. Naturally, there will be no reactor remaining in 30-40 years' time. With 30 year limit the number of reactors will go below 20 in less than ten years. Even with 40-year limit, the number will go down below 20 well before twenty years from now.

Number of avaiable reactors assuming 30-40 year limits on operation



A decision to close the Japanese sodium-cooled fast breeder reactor, *Monju*, would require pushing against the “nuclear village” in Japan. For the Japan Atomic Energy Agency and its researchers this means the end of a major research project and their life as researchers. It would be a matter of prudence to continue a research on a source of energy that can last even after global uranium resource becomes depleted. The resistance from industry may be less in this case because from industry’s point of view to work on something that may become necessary in 80 years’ time (time estimated for the uranium resource to be depleted.) is something very remote.

Ideally, if Japan is so concerned about the future source of energy supply, it should devote as much efforts and resources to the research of clean environment-friendly source of energy. If it still has to depend on nuclear energy, it

should think about all the possible avenues of fission nuclear energy until the time when nuclear fusion energy becomes fully available. According to the Generation IV International Forum there are six major research areas for future generation nuclear fission reactors including high-temperature gas cooled reactor, Thorium-source reactor and lead-cooled fast breeder reactor. The kind of sodium-cooled fast breeder reactor as *Monju* is just one of the six kinds. If a major problem with sodium-cooled reactor is the volatility of sodium that quickly explodes when exposed to air or water, Japan may look at another kind of fast-breeder reactor cooled by lead that is a lot stabler than sodium. If Japan is concerned about proliferation resistance and the global reserve of the source material uranium, it may look at reactor using Thorium as fuel, which is said to be more abundant than uranium, and the reactor is more resistant to proliferation. Gas-cooled reactor may offer more efficient and safer reactor. One of the designs directly produces hydrogen rather than going through heat exchange, steam power generation and then electrolysis of water to produce hydrogen offers an attractive option for the future when hydrogen may become fuel for clean driving automobiles. Thus, it would be good for the future to look into many other variety of nuclear energy. But, power industry that was struck by the burden of the compensation scheme and faced with negative public perception against nuclear energy will even less inclined to support diversifying research areas to which they will be asked to make their share of financial contributions.

Alternatively, Japan may intensify its activities in the Generation IV future reactor design projects so that Japan may share technology in future.

Stopping the spent-fuel reprocessing project at Rokkasho may be even more difficult. More \$25 billion has been spent for the construction and the power companies have already made substantial contribution to the project. A private company funded by all the nuclear reactor operating power companies in Japan owns it. If the project is terminated, the companies will have to write off their investments as losses not to talk about the immediate lay-offs of executives, engineers and workers. If it was not a project already heavily invested, as a pure business decision once-through system that does not involve reprocessing but simply store spent fuel in dry casks is an attractive cheaper option for the industry. Absent a strong leadership, the project may have to continue vegetating without positive push to reinvigorate it or clear decision to terminate it.

An alternative is to make the Rokkasho subject to an international framework

under which other countries participate in the project and the use of the reprocessing facility placed under strict international supervision. This will also help dispel any proliferation concern about Rokkasho and Japan.

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