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With the price of oil skyrocketing to more than $100 a barrel, many nations including Japan and the United States, are looking to the nuclear power option among others. Is nuclear power a viable option in a world of expensive and polluting fossil fuels? Japan Focus, in the first of a series of articles on energy options centered on renewable options and the environmental costs of energy options, presents the case for nuclear power recently made by Endo Tetsuya and a critique of the nuclear option by Arjun Makhijani.

Atoms for the Sustainable Future: Utilization of Nuclear Energy as a Way to Cope with Energy and Environmental Challenges

Endo Tetsuya

Nuclear Renaissance

The world now faces two major challenges for the sustainability of growth: energy security and global warming.

According to an estimate by the International Energy Agency, world demand for primary energy will increase 53% by 2030. For example, it is predicted that meeting the demand for energy in Asia will pose serious challenges not only for individual countries -in particular, energy-hungry China and India- but also for the region as a whole. In Africa, the Middle East and elsewhere, plans for and expressions of interest in nuclear energy have been expanding. In the midst of rising oil prices, expectations are growing that nuclear energy will fill the gap between energy demand and supply.

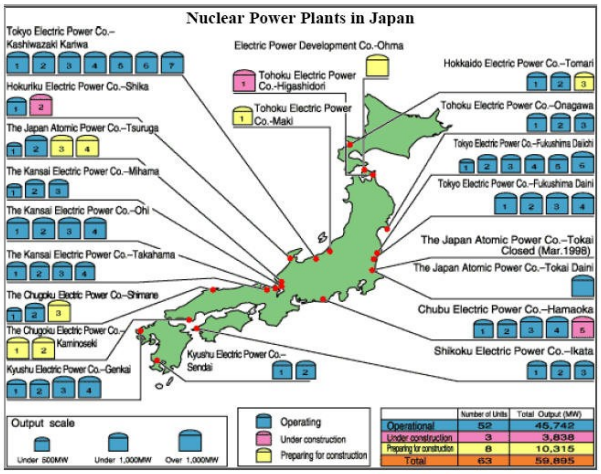
In the area of global warming, the Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) predicts that the global temperature will increase by 2.4 to 6.4 degrees Celsius by the end of the 21st century if fossil-fuel dependent economic growth is maintained. It is now universally recognized that the reduction of greenhouse gas (GHG) emissions is a matter of urgency, and necessitates seeking viable, reliable alternative sources of energy. In this sense, nuclear energy can be expected to contribute to global efforts to cope with the global warming problem as its carbon dioxide emissions are much smaller than those of fossil sources. Among major energy sources, nuclear power is one of the most effective in reducing GHG emissions.

Given these circumstances, there has been a resurgence in the worldwide need to promote nuclear energy that may be termed the "Nuclear Renaissance."

Opportunities and Risks

Nuclear energy has two facets. When it is used for peaceful purposes such as power generation, it can make a contribution to the betterment of the quality of life. However, it can also be used for military or criminal

purposes. There are both great opportunities and great risks in expanding the use of nuclear energy.



The world has had to live for more than sixty years with the serious threat of nuclear devastation, a threat that is the result of the huge number of nuclear weapons that could destroy the earth several times over. Even as this danger continues, we also face rising nuclear proliferation threats caused by the diversion of peaceful nuclear programs to military use and withdrawals from international non-proliferation treaties and agreements, as well as the threats of nuclear terrorism and thefts of or illicit trade in nuclear materials by non-state actors.

Steam billows from the Mihama nuclear power plant in a 2004 accident

Our principal challenge is to establish universal principles for the promotion of nuclear energy to contribute to sustainable growth in the global economy, to solve global warming problems, and to meet energy security needs, in balance with furthering efforts to reduce the risks posed by the threats of nuclear proliferation, nuclear terrorism, and existing nuclear weapons. We also need to remember that the safety of nuclear activities has become an increasingly important element in maintaining the credibility and sustainability of nuclear energy activities.

Based on such perceptions, a taskforce organized by the Japan Institute of International Affairs submitted on January 9 to Japanese Foreign Minister Komura Masahiko a policy report calling for a 'balanced approach' to nuclear energy, one that would promote nuclear energy while adequately and effectively addressing various nuclear risks. It is our hope that the Japanese government will take heed of our recommendations as it prepares energy and environmental policies for the G8 Summit that it will be hosting this summer in Toyako, Hokkaido. The policy report contains 13 recommendations, ranging from a proposal to reform financial mechanisms for nuclear

projects to disarmament measures. They all consider threat reductions and non-proliferation as indispensable. The rest of this essay addresses the recommendations concerning the peaceful use of nuclear energy, which, if handed wrongly, could undermine efforts to make the world safer from nuclear threats.

"Three S's" for the Peaceful and Environmentally-Friendly Use of Nuclear Energy

In promoting nuclear energy under the present circumstances, it is extremely important for states to take into account: a) security against terrorist activities; b) safe operation of nuclear energy facilities; c) safeguards against nuclear proliferation. We must take a balanced approach toward strengthening the "Three S's" (Safety, Security, and Safeguards) and promoting the peaceful use of nuclear energy in an appropriate, effective manner. The "Three S's" would provide a useful conceptual framework to comprehensively deal with nuclear risks while pursuing safe and secure nuclear activities.

In addition, nuclear disarmament should be further promoted. Promoting nuclear disarmament would strengthen the norms of the international non-proliferation regime, and thus it would encourage states to engage in global non-proliferation efforts. We believe that, in combination with strengthened transparency, respecting this "Three S's" concept and sincerely encouraging nuclear disarmament are essential in helping nuclear energy gain universal legitimacy and confidence.

In the meantime, it is also important to develop mechanisms for assisting the development of nuclear power projects. Currently, there is no incentive or mechanism to facilitate the utilization of nuclear energy for environmental purposes, even though nuclear energy is quite effective in terms of reducing CO2 emissions. Such discrimination against nuclear energy might undermine international efforts to cope with global warming. We urge the international community to acknowledge that nuclear energy would be an effective way to help contain the increase of CO2 emissions. We back the creation of a policy mechanism to systematically incorporate the promotion of nuclear energy in the efforts to tackle global warming in the new round of negotiations.

Nuclear power generation also needs large initial capital investments and requires long payback periods. Developing countries need to attract international capital for their nuclear programs. Therefore, the international community should offer innovative financial mechanisms that would facilitate private and public investment for the construction of nuclear reactors. Other existing financial mechanisms such as World Bank loans and OECD guidelines for export credit, which currently discriminate against nuclear projects, should be made available for nuclear power projects. It may also be worth examining the linking of financial support through the mechanisms mentioned above with the fulfillment of the "Three S's" guidelines since this would contribute to enhancing the safety and security of nuclear activities as well as non-proliferation.

Conclusion

As mentioned at the outset of this essay, we are facing serious, imminent challenges in energy security and global warming. Nuclear energy has great potential in coping with such challenges if it is properly introduced and operated. In particular, heightened risks of nuclear plant accidents, nuclear terrorism, and nuclear proliferation should not be tolerated in exchange for dealing with global warming and energy security concerns.

Although it is extremely difficult to discover a

panacea that addresses all of these concerns, we believe that it is not impossible, and we have to strive for such a solution for the sake of all future generations. That is the very purpose of the upcoming G8 Summit.

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Endo Tetsuya served as Chairman of the Taskforce on Atoms for the Sustainable Future organized by The Japan Institute of International Affairs. This commentary is an abbreviated version of the recommendations issued by the taskforce in January 2008.

The Unacceptable Cost of the Nuclear Power Option for Japan

Arjun Makhijani

Mr. Endo, like many in the nuclear industry, is championing nuclear power as a solution to the severe problem of climate change and the concomitant task we face of reducing carbon dioxide emissions from the energy sector. Before jumping to nuclear, a cost comparison is needed. We then must also consider other downsides of nuclear energy including the links to nuclear weapons and the insoluble problem of waste disposal. This comment centers on the first two.

Nuclear power capital cost estimates were $2,000 to $2,500 per kilowatt, just a couple of years ago. Last October, a Florida Power and Light estimated them at $5,400 to over $8,000 per kilowatt. Progress Energy is estimating the cost of energy produced by its reactors at $7,000 per kilowatt, exclusive of transmission lines. The cost of electricity at such plants would be in the vicinity of 12 to 16 cents per kilowatt hour, if there were no delays and the plant operated nearly perfectly for decades. This is higher than the cost of wind-generated electricity in good locations of 8 to 12 cents per kilowatt-hour. Even solar thermal power is 14 cents per kilowatt hours today, including some storage of heat for generation after sundown; it promises to go down to about 10 cents as the industry matures in the next decade and becomes of a similar size to wind energy.

Mr. Endo is quite wrong about the proliferation risk of nuclear power. We need look no farther than the debate in Japan itself as to whether it should become a nuclear weapon state. In 2002, Ozawa Ichiro, the head of the Liberal Party suggested that if China became too powerful, Japan should consider making thousands of nuclear weapons using its civilian materials.

The proliferation potential of nuclear power was recognized as long ago as 1946 by none other than J. Robert Oppenheimer, the Scientific Director of the Manhattan Project. He suggested hiding nuclear weapons intent under cover of nuclear power plants in the event that the U.S. signed a nuclear weapons convention:

> "We know very well what we would do if we signed such a [nuclear weapons] convention: we would not make atomic weapons, at least not to start with, but we would build enormous plants, and we would call them power plants - maybe they would produce power: we would design these plants in such a way that they could be converted with the maximum ease and the minimum time delay to the production of atomic weapons, saying, this is just in case somebody two-times us; we would stockpile uranium; we would keep as many of our developments secret as possible; we would locate our plants, not where they would

> do the most good for the production of power, but where they would do the most good for protection against enemy attack."

[J. Robert Oppenheimer, "International Control of Atomic Energy," in Morton Grodzins and Eugene Rabinowitch, eds., The Atomic Age: Scientists in National and World Affairs, (New York: Basic Books, 1963), p. 55.]

I know that renewable energy would be more difficult for Japan than many other countries with more land area, including the United States. But rushing deeper into costly nuclear power, pretending it does not have proliferation potential is a risky exercise in self-deception. Japan imports its uranium now, as well as its oil. Plutonium is a really undesirable and costly fuel that is a huge proliferation risk. It is time for Japan to leave twentieth century energy notions behind and get serious about a 21st century renewable energy sector. Some energy will have to be imported, most likely, but that would be nothing new.

The world has plenty of sources of low or zero-CO_2 energy, like wind and solar energy. Wind-generated electricity is already more economical than nuclear, whose costs have been skyrocketing even as U.S. utilities get set to order them.

Arjun Makhijani, President of the Institute for Energy and Environmental Research, holds a Ph.D. in engineering (specialization: nuclear fusion) from the University of California at Berkeley. He has produced many studies and articles on nuclear fuel cycle related issues, including weapons production, testing, and nuclear waste, over the past fifteen years. He is the principal author of the first study ever done (completed in 1971) on energy conservation potential in the U.S. economy. His most recent book is Carbon-Free and Nuclear-Free: A Roadmap for U.S. Energy Policy .

He wrote this commentary for Japan Focus. Posted March 13, 2008.

See also, Gavan McCormack, Japan as a Plutonium Superpower