



Making Sure the New Basic Energy Plan Does Not Fizzle Out

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Introduction

The debate about the Basic Energy Plan—due for an update—has thus far focused on the retaining or the decommissioning of nuclear power stations. But one must take to heart the fact that Japan's energy plan is not merely a domestic issue but instead a perennial focus of international attention.

The present research paper concerns global energy trends and the energy policies of various countries. References include the BP Statistical Review by BP plc and the World Energy Outlook of the IEA, as well as other surveys and texts about energy. Japan is buffeted by global energy trends, and this paper compiles recommendations for drafting the new Basic Energy Plan so that Japan is not left behind.

Global energy trends in 2012

As the growth of global demand for energy slows (demand up only 1.8% over the previous year), the greatest topic of discussion is the USA's return as a significant producer in the energy market. With the development of unconventional oil and gas in the forms of shale oil and shale gas, the USA is predicted to be energy self-sufficient by 2035.

Considering the different types of energy, let us look at oil first: There were 86.15 million barrels/day (b/d) produced, 89.77 million b/d consumed, reserves (P/R, conventional only) were 54 years, and the overall fraction of all energy consumption was 33.1%. OECD members' proportion of worldwide consumption was only 50.2%, the lowest ever. Global conditions affected production: there were decreases in production in Iran—following an embargo—and in Sudan and South Sudan, as well as in Syria and elsewhere. However, increases in other countries' production covered the shortfall: Libya returned to production; there was a massive production increase in the USA; and there were also increases in countries such as Saudi Arabia, the UAE, Canada, and Russia.

Natural gas: There were 3,364 billion cubic meters (bcm) produced, 3,314 bcm consumed, reserves (conventional only) were 61 years, and the overall fraction of all energy consumption

was 23.9%. Worldwide natural gas consumption was up 2.2% compared to the previous year. The USA saw the greatest absolute consumption increase (+31.6 bcm); elsewhere, there were increases in China and Japan, and decreases of consumption in Europe and Russia. The USA also achieved the biggest production increase (+32.9 bcm) globally, thus maintaining its number-one place in worldwide production (Russia is second). Elsewhere, Norway, Qatar, and Saudi Arabia also saw significant production increases, while Russia had a massive decrease (down 14.7 bcm). Unlike oil, the transport of natural gas is inefficient, and thus regional price differences are widening, raising concerns about the effect on future consumption.

\$/MBtu

Coal: there were 3,845 million tons of oil equivalent (Mtoe) produced, 3,730 Mtoe consumed, reserves were 142 years, and the overall fraction of all energy consumed was 29.9%. The amount of electricity produced by nuclear power was, at 560 Mtoe, down 6.9% compared to the previous year, and its share of all energy, at 4.5%, was the lowest since 1984. Hydroelectric power increased to 831 Mtoe, with the biggest growth in China, and its share of energy consumption was the highest ever, at 6.7%. The energy share of renewables was 2.4%, with 237 Mtoe. Of renewables, wind and solar had the most growth, largely in the USA, Europe, and China. It is noteworthy that China—which has until now prioritized economic growth—is beginning to reap the rewards of its environmental initiatives.

The IEA World Energy Outlook 2013 (below, WEO-2013)

The IEA has produced three differing scenarios for energy and climate change trends up to 2035. The middle of these is the New Policies Scenario, which assumes that countries will carry out the self-imposed limits on emissions that they presented in the Copenhagen Accord (agreed to at the COP 15 meeting in December 2009). Under this scenario, the global temperature increase is forecasted to be 3.5°C. This diverges considerably from the predictions of the 450 Scenario (so-called because if the rise in global temperatures in 2100 is to be limited to 2°C above those before the Industrial Revolution, and the effect on the environment is to be minimized, then the concentration of greenhouse gases in the atmosphere must be limited to 450 ppm). Thus, it was understood that all countries would have to implement additional emission-reduction measures.

However, WEO-2013 notes that energy demand will continue to grow in the future, and thus, rather than even approaching the 450 Scenario, it is clear that the prospect of achieving it is becoming ever more distant. Therefore, the report indicates the necessity of even further emission-reduction measures and calls for more policies.

The importance of nuclear and renewable energies will increase, which is a positive

development, but the lion's share of energy demand will be from non-OECD countries. Therefore, it will be the case that many countries will not recognize the seriousness of environmental problems and will not decrease energy demand or deploy the newest technology in pursuit of environmentally friendly economic development.

Particularly in recent years, the "energy inequality" problem—giving all people around the globe access to energy—has been recognized. The harsh reality is that, in 2011, approximately 1.3 billion people worldwide still could not use electricity, and over 2.6 billion relied on traditional biomass for cooking. The have-nots cannot just be cast aside, and so eliminating these disparities is a crucial challenge.

When developing countries are growing, the most easily attainable and convenient source of energy is still fossil fuels such as oil. Even if making allowances for levels of industrial development, the importance of this fact is paramount. Therefore, developed countries can, through agreement among their citizens, debate the appropriate energy mix of all the available options, but they must also engage with the developing countries. If they do not, then the developing countries will end up using vast quantities of the most convenient forms of energy without any regard to the environmental consequences.

WEO-2013 explains the strengths and weaknesses of various energy sources from a standpoint of maintaining the global environment; it presents perspectives and policies for overcoming these issues; and it suggests that international cooperation in developing and implementing the necessary technologies will be required.

Topics relating to world energy

In my present research activities, I have presented an overall view of the energy situation with a focus on renewable energy policy in Brazil. After the oil crises of the 1970s, Japan attempted to move away from oil, largely through the use of nuclear power. I made a comparison between the two countries.

Next, I reported on the integration of the power transmission industry and the effectiveness of the Renewable Energies Control Center in Spain, thus drawing lessons about the expected restructuring of electric power companies from that country's example.

I presented, by country, the stumbling blocks for the promotion of nuclear energy that have appeared following the Great East Japan Earthquake and particularly noted the case of the USA, which has decided to go forward with nuclear power. This presentation revealed the present state of affairs for the nuclear power industry, in which little progress is made even in cases in which it has been decided to proceed with atomic energy.

Considering energy in Japan going forward

- Now that Japan cannot maintain its presence in the world through its economic might alone, it would benefit by learning from the example of Europe concerning energy and environmental challenges and by striving to be a world leader with its policies.
- The USA and China have, until recently, been indecisive about emission reductions, but recent reports suggest that they are now taking a more active stance. Additionally, in January of this year, the EU—already a leader in environmental issues—announced that it was tasking its members with—by 2030—reducing their CO₂ emissions by 40% compared to 1990 and increasing their proportions of renewable energy to at least 27%. Achieving these steps is intended to put the EU countries on target to decrease emissions by 80%–95% by 2050, compared to 1990.
- In addition, the newly emerging countries—notably Brazil—have begun to discuss nuclear and renewable energy when considering their choices for the energy needed to power their growth, rather than simply choosing fossil fuels.

Based on circumstances in the world such as those just described, now is the time for Japan—as a technologically and environmentally advanced nation—to demonstrate a willingness to maintain and improve the Earth's environment of its own accord and then to take concrete action. The new Basic Energy Plan that will be drawn up soon should serve as an important signpost toward achieving this.

Specifically:

- (1) Japan should present numerical goals exceeding the greenhouse gas reduction targets for 2030 that the European Commission has announced, and Japan should submit specific details of its initiatives for reaching those goals. (The EU goals are a 40% reduction, compared to 1990.) Among other benefits, this would help show the world and all Japanese citizens that Japan is serious about combating global environmental problems.
- (2) Japan should establish specific numerical targets for uncompromising energy-saving initiatives and improvements to energy efficiency.
- (3) Nuclear power stations should be restarted, and aging equipment should be updated—conditional on receiving the agreement of the municipalities in which the plants are located, as well as on having confirmed the safety of the plants as a minimum requirement. This should also be conditional on selecting and deciding upon the final disposal site for nuclear waste, for which no conclusion has yet been reached. However, new construction should not be permitted. Nuclear fuel recycling initiatives should continue.
- (4) Renewable energy should be actively encouraged, making the best use of regional characteristics.

(5) Low-cost coal-based thermal power, the output of which is relatively simple to adjust, should be used to supplement the variable output of solar and wind power generation in (4). However, it is necessary to switch over to state-of-the-art equipment, or to that which is fitted for co-generation. Additionally, the use of CCS technology to deal with the emitted CO₂ is essential, and Japan should build partnerships with countries that have waste gas fields where the Earth's crust is stable (Indonesia, Australia, and the like) for the storage locations. Until it is possible to implement new technologies, including CCS, to make up for coal thermal power's environmental weaknesses, it will be necessary to reduce the use of such power.

(6) Even more easily adjustable than coal thermal power is hydroelectric power, the source for which it is the simplest to ramp up or throttle output to match demand, but it is difficult to build new facilities. Therefore, the existing equipment should be upgraded to the state-of-the-art; construction of small-scale hydroelectric equipment should be considered; and this source should otherwise be used, to the greatest possible extent, to complement output from renewables.

(7) Oil and natural gas will likely continue to be major sources of energy, largely as fuel. Therefore, Japan should actively encourage the diversification of supply sources. It is unavoidable that prices for natural gas will continue to be volatile, depending upon the region. Therefore, it will be crucial to build closer relationships with producer countries. The pipeline from Sakhalin that has already been proposed should probably be made a reality. However, the Japanese domestic pipeline network is divided into multiple parts, so this is strongly conditional on upgrades intended to make Japan a gas-centered society.

(8) The electric power industry will soon be restructured, dividing power generation and power transmission. Japan should learn from Spain's example in restructuring the power transmission industry by aggregating multiple providers together into a small number, thus making it possible to develop a power control system premised on the use of renewable energy.

(9) To ensure the stability of Japanese energy, I think that a nationally operated energy company will be absolutely necessary. Regardless of whether non-fossil fuel energy sources, such as those mentioned above, are used to their fullest potential, oil, gas, and coal combined will likely continue to constitute the majority of the energy supply. Thus, their robust presence will be absolutely necessary to ensure a supply of energy that will let Japan rank among the world's powerhouses.

