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[Briefing paper]

Nuclear shut-down does not justify Japan's weak target

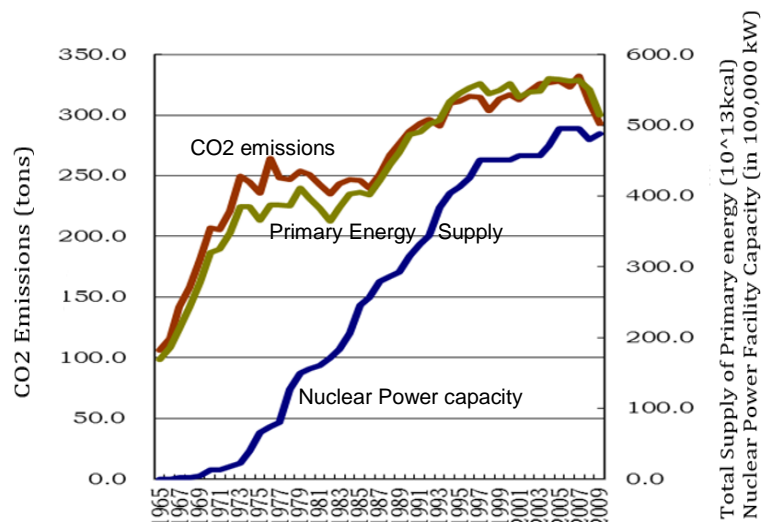
The accident at Fukushima Daiichi Power Station that followed the Great East Japan Earthquake in March of 2011 led to all 50 nuclear reactors in Japan to shut down. This shook Japan as 26% of electricity stems from nuclear power. Currently, safety inspections are still being conducted and all nuclear reactors are not in operation. As a result of this change, fossil fuel usage has risen and CO2 emissions have risen for both 2011 and 2012. However, this does not rationalize loosening the 2020 target. Key facts and findings are as explained below.

1. Japan is expected to fulfill the Kyoto Protocol's first commitment period target:

Japan's first commitment period target (2008-2012) was a cut in greenhouse gas emissions by 6% (compared to 1990 base year). Although this period includes the aftereffects of the Great East Japan Earthquake and Fukushima nuclear accidents in 2011 and 2012, Japan is likely to achieve the target by including the Kyoto Mechanisms and forest management activities. A 3.8% reduction (compared to 2005 levels) is a 3.1% increase compared to 1990 levels. In comparison to the Kyoto target, this is a 9.1% increase. With this huge increase, now Japan is moving in the opposite direction, abandoning climate change actions. No matter how one looks at it, this target cannot be defended.

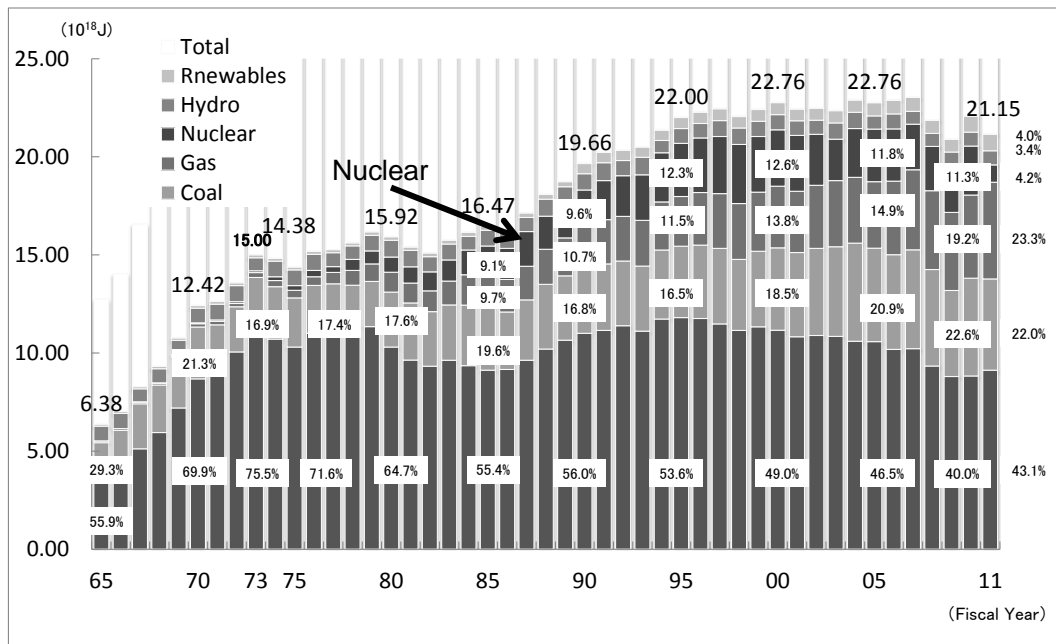
2. Until now, Japan's CO2 emissions have grown alongside the increase of nuclear power generation:

As nuclear policies have progressed in Japan, the increase of nuclear power generation has been paired with thermal power generation as a large, centralized energy system. The history of nuclear power generation has often overlapped with the rise in energy consumption as well as the rise in CO2 emissions.



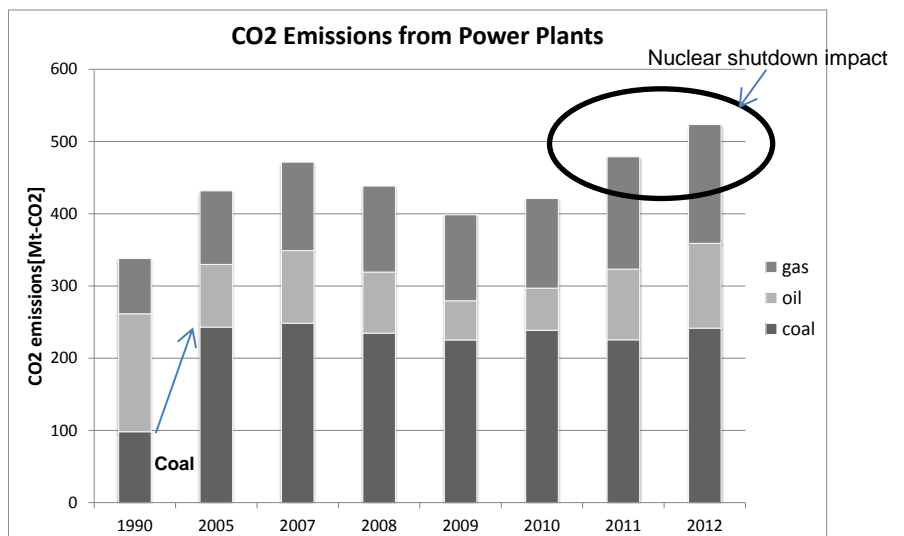
3. Japan's nuclear power is only 10% of primary energy supply:

As a climate change measure, domestic nuclear power usage is only 10% of energy supply as a whole (9.6% in 1990, 11.3% in 2010). (As a proportion of power generation, 27.3% in 1990, 28.6% in 2010.)



4. After 1990, nuclear power was promoted to fight climate change, but CO2 emissions didn't decrease:

After 1990, the government started to promote nuclear power as a key measure in combatting climate change. Even before the impact of the economic downturn in 2008, however, Japan made no progress in reducing CO2 emissions. The reason for this is because plans themselves were flawed and too ambitious to begin with. Fossil fuels were used to fill in the gap. CO2 emissions in the 1990s rose dramatically due to the increased use of coal as an energy source.



5. CO2 emissions have risen after the Fukushima accident, but Japan can recover and reduce emissions through energy efficiency and renewables within a few years

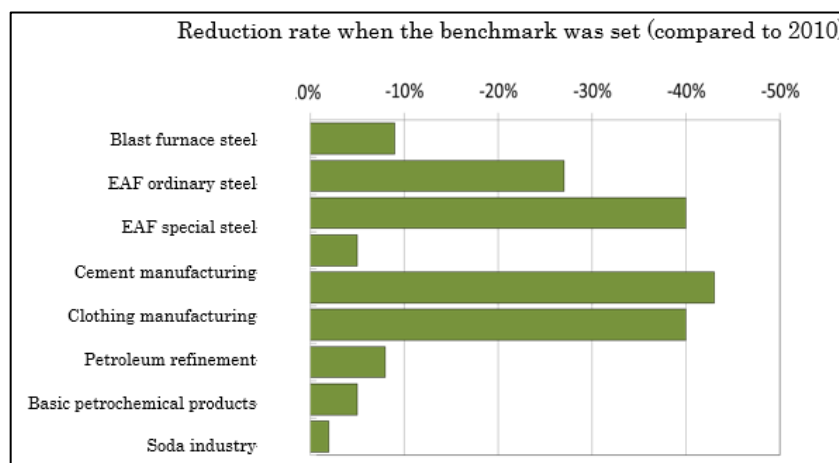
Energy related CO2 emissions have risen by 7.5% compared to the year 2010 (before the Fukushima accident). Currently less efficient small scale gas turbine and aging oil-fired thermal power plants are in operation to cover the power supply while coal usage still remains as high as it did even before the accident. But it is hard to imagine such inefficiency will continue until 2020. The government's new target seems to estimate that the current situation will continue to 2020, but it is clearly possible to make improvements before 2020. There are many measures that can be taken. With the measures as described below, Japan can reduce emissions further than pre-Fukushima CO2 levels and achieve a 25% reduction from 1990 by 2020.

(1) Reducing CO2 emissions by energy efficiency (by approximately 380 Mt-CO2 (compared to 2010)):

(Manufacturing: 60Mt-CO2, households: 30Mt-CO2, commercials: 60Mt-CO2, transportation: 70Mt-CO2)

a) The Benchmark under the Energy Conservation Law:

For the past ten years or so, the Japanese government has not fully considered the potential of additional reductions through energy efficiency and allowed industries to simply take actions voluntarily. According to the Energy Conservation Law, benchmark criteria have been set for major industries (using a deviation value of about 60, not BAT). On the surface, it appears that the government is supporting efficiency improvements but these measures are not mandatory and target years are unclear. If this benchmark is achieved, the emissions reductions as shown in the bar chart below can be achieved. The combined reductions with just 4 major industries through this benchmark will be 2.8Mt-CO2. However, the government doesn't include the potential reductions in their calculations. Furthermore, as the benchmark itself is not to the level of BAT, it is not difficult to reach this level before 2020.



b) Various ways to increase energy efficiency and energy conservation:

It is often said that Japan is the most energy efficient country. It is commonly believed that Japan has done all they can to reduce emissions. However, the examples below show that the additional developments in energy efficiency in last 20 years are dramatic. Unfortunately, these technologies have not yet been introduced to the industry and commercial sectors. If these technologies were to spread, emission reductions can be drastic, but these emission reduction potentials have not been fully explored by the government. Should these measures be taken, dramatic energy saving are made by 2020.

Electricity	➤ LNG Combined Cycle technology (40-50% efficiency) will result in a 25-30% reduction in fossil fuel usage.
Industry	<ul style="list-style-type: none"> ➤ Switch to electric furnaces ➤ Improve energy efficiency for equipment, cascade utilization of inverter technologies and exhaust heat recovery, insulation of steam systems ➤ Efficiency improvements of the entire system by controlling the amount of equipment and avoiding over-specification.
Industry/Business	<ul style="list-style-type: none"> ➤ Introduction of LED lighting ➤ Replace air-conditioners and refrigerators with more efficient models after the oil shock ➤ Efficiency improvement with adjustments in the range of temperature of clean rooms and data centres <p>(Combined reductions are approximately 30-40%)</p>
Household/Commercial	<ul style="list-style-type: none"> ➤ Building insulation, heat shield technology, improvement of energy information and supply & demand management through BEMS/HEMS/CEMS ➤ Switching to optimal equipment through commissioning
Transportation	➤ Promotion of hybrid cars, low fuel cars and electric cars

(2) Introduction of renewable energy (40Mt-CO2 reduction, compared to 2010):

With the establishment of the feed-in-tariff (FIT) system, Japan finally started to accelerate its promotion of renewable energy. Last year, the government put together their “Innovative Energy and Environment Strategy”; their goal was to produce 180 million MWh by 2020 (1.7 times of that of 2010) and 300 million MWh by 2030 (3 times

of that of 2010). Along with reducing energy demand by energy efficiency and energy conservation, share of renewable energy can be largely increased. Up until now, a scenario proposed by several NGOs showed that renewable share in electricity can be increased to 29-43% by 2020 and 52-63% by 2030. Thus, Japan is able to increase their renewable energy production dramatically by 2020 by supporting policies that include renewable energy.

(3) Controlling coal usage and shifting towards natural gas (70Mt-CO₂ reduction, compared to 2010):

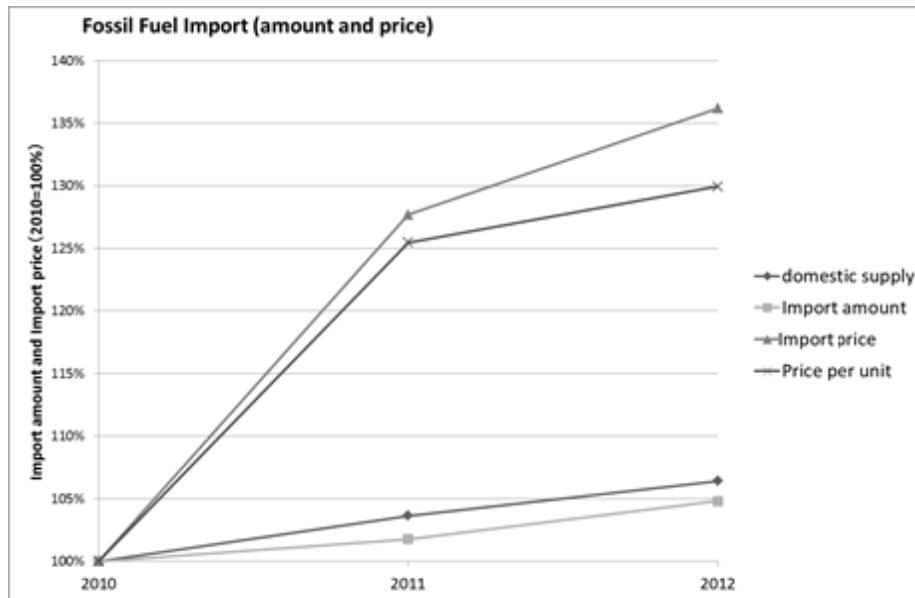
Japan has been promoting highly efficient coal-fired power plants as a climate mitigation measures. However, many coal-fired power plants in operation are aging facilities with varying efficiencies; this has a serious, negative effect on climate change. Cap-and-trade scheme or emissions standards for thermal power plants, which encourage fuel conservation and efficiency improvement, are not introduced in Japan. Through gradual phasing out of aging facilities and shifts to natural gas can lead drastic emission reductions.

6. People no longer support nuclear power, thus a plan to restart operations of nuclear power plants will most certainly fail:

The government believes that reducing emissions without the operation of nuclear power plants is difficult. Therefore, by restarting nuclear power plants, they estimate Japan can further reduce emissions. However, if the government incorporates the promotion of nuclear power into its policies, other policies such as EE and RE will only lag behind. Moreover, the public's mistrust and anxiety concerning nuclear energy grew after the Fukushima accident. Now more than ever, there is fear that plans to advance nuclear power generation as a means to tackle climate change, will fail before they get off the ground. Climate change measures that are based on such uncertainties are not appropriate.

7. The economic burden of not restarting nuclear plants is often emphasized, but the cause is largely rising fossil fuels price even though imports had no risen by much:

As the figure shows below, fossil fuel imports rose in 2011 and 2012 to some extent, but price has increased dramatically compared to the actual volume imported. This is a great economic burden for Japan. In other words, rather than being a trade-off of shutting down nuclear power plants, it is said that the unstable price of fossil fuels has become an economic risk itself. Therefore, to control the large amount money spent for fossil fuel imports, Japan must reduce its consumption of fossil fuels by accelerating the shift towards gas combined cycle and advance energy efficiency and energy conservation.



8. After 2020, Japan can take further measures. By 2050, it is possible to reduce emissions by 80% without relying on nuclear power:

(1) Shifting towards natural gas and increasing efficiency:

As stated above, in Japan the increased consumption of coal has raised CO₂ emissions. Hereafter, Japan can suppress the usage of inefficient thermal power plants by putting priority on shifting to highly efficient natural gas.

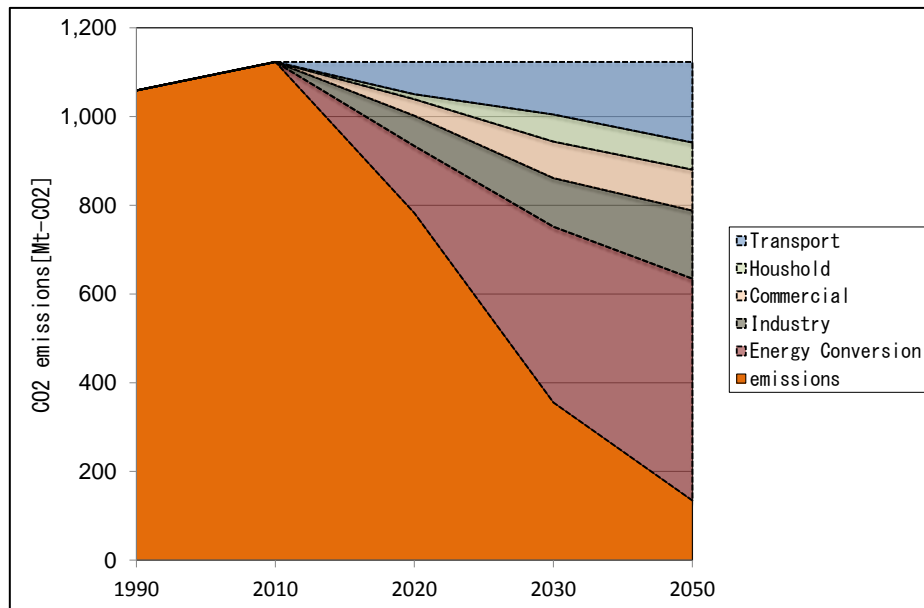
(2) Phasing-out coal:

Even with ultra-supercritical pressure (USC) technology (considered to be the world's best coal technology), CO₂ emissions per unit are approximately 800g/kWh. With Integrated Gasification Combined Cycle (IGCC) technology, emissions per unit are still about 710g/kWh. No matter how efficient the technology, coal-fired thermal energy power plants emit emissions equivalent to the average oil-fired power plant, emit twice as much emissions as natural gas power plants and have substantial, adverse effects on the environment. US's Environmental Protection Agency (EPA) announced last September that new coal-fired power plants must meet the CO₂ emissions standard of 1100 pounds/MWh (or 500g/kWh). This new standard indicates that new coal power plant with the most advanced technology cannot be built without CCS. In Japan, inefficient coal-fired power plants should be shut down gradually. Large reductions in emissions can be made by shifting to the decentralized energy system mainly through renewable energy from current centralized energy system.

(3) Large reductions in emissions through energy efficiency and renewable energy:

In a climate and energy scenario proposed by several NGOs (WWF Japan, Greenpeace

Japan, CASA, Kiko Network, ISEP), reductions in CO2 can be achieved through energy efficiency and renewable energy without the relying on nuclear power generation. These scenarios show that, a steady, large increase in cuts can be made and that will help Japan fulfill its international responsibility and that has economic gains as well. Scenario of Kiko Network shows that CO2 emissions of 26% by 2020, 66% by 2030, and 87% of 2050 can be made.



(Kiko Network scenario)

In summary, it is totally unrealistic for Japan to expect to continue promoting nuclear power generation. Even if Japan does continue to promote nuclear power, history shows that it will have no effect on CO2 reductions.

From this point forward, Japan has to stop its dependency on nuclear power as a climate change mitigation measure and instead it should focus on energy efficiency and renewables and introduce policies to incentivize. Using that as a foundation, Japan has to re-examine the newly announced 2020 target. Furthermore, Japan has to consider to strengthen policies, such as ending its reliance on the industry's voluntary actions, imposing carbon cap by introducing a cap-and-trade system, suppressing the usage of coal, introducing systems that effectively uses a benchmark. And, the Japanese government has to re-start preparing for even more ambitious targets beyond 2020.

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