

Aiming at a Low Carbon Society in Japan by 2050: Impact of the Fukushima Nuclear Accident and
CO2 Reduction Target

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EXECUTIVE SUMMARY

Since the Fukushima nuclear accident in 2011, Japan has been struggling with its energy and environmental policy, without a clear picture of the future for nuclear power. The Government of Japan released its latest Strategic Energy Plan in April 2014, and announced its CO2 emissions target (24% reduction by 2030 compared to 2005 levels) and “energy mix” (the desirable composition of power sources) in June 2015. The objective of this paper is to assess Japan’s energy mix and potential for CO2 reduction in the years to 2050, independently from such government policies, by analyzing changes in the energy demand and supply structure since the Fukushima accident. We find that Japan’s energy structure could change dramatically in the next thirty to fifty years. On the demand side, with the combination of population decline and economic structural change, and assuming constant fossil energy price increase through steady global demand, we estimate a 40% reduction in energy demand by 2050 relative to 2005. On the supply side, we believe zero-emission electricity is achievable from 2040 onward, assuming a significant increase in renewable energy share, the continued use of nuclear power and the introduction of Carbon Capture and Storage (CCS) from 2025. However, the total costs of carbon reduction do not differ substantially with or without nuclear power, and the contribution from CCS can be more significant than that from nuclear power. We found that a 30% CO2 reduction by 2030, and a 60% reduction by 2050 is achievable. To attain further reductions by 2050, assessment of emissions regulations and carbon pricing cannot be avoided. Our projections are based not only on the economic model, but also on interviews with leading experts from public/private/academic institutions, and thus should not be considered as “unrealistic” but rather as the “best case scenario,” applying the most advanced technologies and practices.