

Long term energy system analysis of Japan after March 11

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#### Overview

The great east Japan earthquake on March 11, 2011 have made significant impacts on Japanese economy as well as energy system. Its effects to electric power supply and demand will continue several decades, because part of the nuclear power capacity has been lost and nuclear issues are recognized as social problem. It is obvious that Japanese energy system is in the turning point. Therefore, Japanese energy supply and demand should be redesigned from the long term perspective.

Implications to Japanese energy system especially in terms of primary energy supply and power generation portfolio are discussed, using sensitivity analysis results by an optimization type energy model.

#### Methods

The authors have made new single region optimization energy system model based on TIMES modeling framework. We referred MARKAL-JAPAN framework for energy supply and conversion structure, and updated energy service demand estimate by up-to-date information. Time horizon of the model is 2050. It should be mentioned that one of the authors has assessed global energy system under nuclear and/or CO<sub>2</sub> constraints with different modeling framework [1][2].

We assume that nuclear and climate are the major policy constraints of energy system in Japan by the middle of the century. The nuclear position as power supply has been drastically changed by the direct damages by the tsunami, safety check requests and social problem especially for new installations. Climate policies aiming at drastic CO<sub>2</sub> reduction announced before March 11 includes expansion of nuclear capacity. It is obvious that energy system portfolio with CO<sub>2</sub> mitigation should be revised reflecting new situations.

Sensitivity analysis results including cases such as nuclear phase out, nuclear phase out with CO<sub>2</sub> constraints etc. will be presented.

#### Expected Results

Roles of various energy supply options including nuclear, fossil and renewable in the Japanese energy system, especially power supply system up to the middle of the century are discussed.

#### References

- [1] Kurosawa, A., Long Term Nuclear Power Role under CO<sub>2</sub> Emission Constraint, Progress in Nuclear Energy, Vol. 37, No. 1-4, pp101-106, 2000, Elsevier.
- [2] Kurosawa A., Carbon concentration target and technological choice, Energy Economics, Vol 26, Issue 4, pp.675-684, 2004, Elsevier.