

Renewable Energy is the Key to Reconstruction of Japan after the Great East Japan Earthquake/Tsunami

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Present energy situation in Japan

The Great East Japan Earthquake/Tsunami on March 11 and the subsequent severe accident of Fukushima Nuclear Power Plant revealed the vulnerability of the present energy systems. Safe shutdown of the reactors and secure power supply during the summer peak season are the present major concern. To cope with the power shortage, the target of power use restriction has been decided to be set at 15% of last year's peak demand level. Households are requested to save as much power as possible.

Importance of renewable energy has increased

From medium- and long-term view points, the existing "Strategic Energy Plan of Japan" will be overhauled, since it strongly relies on much electricity supply by nuclear power plants. Although it is not an easy task to find a solution to the trilemma between energy supply, environmental protection and economic growth with less nuclear power than originally planned, at least we can say that introduction of renewable energy and clean distributed energy systems should be accelerated through R&D and policy measures. The increase of the share of renewable energy leads to diversification of the primary energy resources, resulting in not only CO₂ reduction but risk avoidance of the energy networks.

Affluent renewable energy and high heat demand in Northeast Japan

Resource potentials of various renewable energies are different from location to location as well as the energy demand. The optimum energy system should be constructed and operated depending on the available energy resources and energy service demand in each location. The disaster area, northeast Japan, is well known for abundant renewable energy resources such as wind, biomass and geo-thermal heat. Aomori Prefecture, the northern end of this area, for example, has more renewable energy potential than its energy demand. The area is also known as a cold and snowy region, and it has a lot of heat demand especially in winter time: 70 to 80 % share of the total energy consumption of households.

Compact city and national and global grids

Renewable heat (geothermal, solar and biomass) should be utilized as much as possible to meet the high heat demand in the region and to reduce the electric power consumption for heat generation. Fuel cell systems using bio-fuel are other options. So-called "Compact City" will be ideal for the effective use of energy, particularly heat. Its size should be decided from various points of view and the transportations between the compact cities should also be environmentally

friendly. If we could use renewable heat (geo-thermal, biomass and solar thermal) effectively in this area, more renewable electricity by PV and wind can be transmitted to the regions with higher electricity demand such as Tokyo. Much electric power transmission between different electric power companies will require reinforcement of the national power grid in future, which should be more efficient with HVDC transmission or superconducting transmission. The reinforced power grid can be connected to the future global super-grids. Smart management of integrated energy network including electricity, heat and gas is important as well. Renewable energy technology will play a key role in such future energy systems that it can activate the local industries. It is thus the key to reconstruction of Japan, particularly in the disaster area.