

Energy Technology Strategy

Background and Objective

In order to tackle global warming and energy security issues, it is necessary to implement an energy policy effectively under a long-term strategy pertaining to technology research and development. To do so, in addition to technology perspectives, it is important to specify the social, economic, and political factors that inhibit or promote development and diffusion based on case studies, as well as to provide policy implications.

This research project aims to provide implications to contribute to building an energy technology development and dissemination strategy, by taking into account the recent situation of energy policy discussion after the 2011 Great East Japan Earthquake.

Main results

1 Questionnaire Study Regarding Household Energy Use in the Area Devastated by the Great East Japan Earthquake

This study analyzes household energy use in the affected areas, Iwate, Miyagi, and Fukushima, of the Great East Japan Earthquake. Regarding supply disruption and the rehabilitation of lifelines, propane gas showed the least damage among lifelines. The order of the recovery

of utility services was as following: electric power, propane gas, water, city gas, and kerosene gasoline (Fig. 1). Realizing a rational restructuring agroforestry community after the earthquake, we focused on the multi-functional roles of Japanese farmland and artificial forests.

2 Ex-post Analysis of Electricity Conservation in the Summer of 2011

We conducted interviews and a questionnaire survey of households in TEPCO's service area and analyzed the conservation rates (Fig. 2), motives, persistence, and the importance of information provision regarding peak electricity conservation (Y11014). We also conducted a questionnaire survey with industrial and commercial facilities

(Y12002), as well as a case study of the retail sector (Y11034). We showed that firms in the commercial sector successfully saved electricity by reducing lighting and air conditioning use, while those in the industrial sector had to take costly measures such as limiting operations (Fig. 3).

3 Domestic Policy of Energy Efficiency and Climate Change

The differences in the adoption rate of energy-efficient technologies between market segmentation as well as consumer attitudes are revealed based on a survey of residents living in houses built in 2010 (Y11015). Also, we discussed

the success factors of voluntary initiatives by industry, based on case studies including measures to reduce standby power consumption by consumer electronics manufacturers.

4 Research trends Regarding Geoengineering

In Europe and the U.S., simulation studies of geoengineering, which suppresses global warming artificially, is increasing, and the discussion of an international framework for

research and development is becoming active. By reviewing such status, research needs and challenges in Japan are discussed (Y11008).

5 Investigation of the International Aspects of Climate Policy and Energy Security

We analyze the emergence of emerging economies and the impacts on climate negotiations and conclude that it is highly difficult for countries to agree on a new legal framework applicable after 2020, while COP17 decided that they would adopt

such by 2015 (Y11028). We investigate Chinese efforts to acquire technologies necessary for shale gas development and show that China is accelerating its domestic technology development and technology transfers from abroad (Fig. 4) (Y11031).

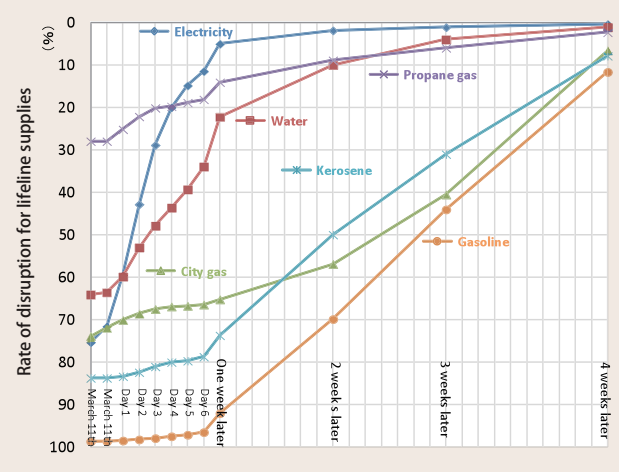


Fig. 1: Lifeline supply disruption rates from March 11, 2011 to four weeks later

The following is the order of the recovery of utility services: Electric power, propane gas, water, city gas, and kerosene gasoline.

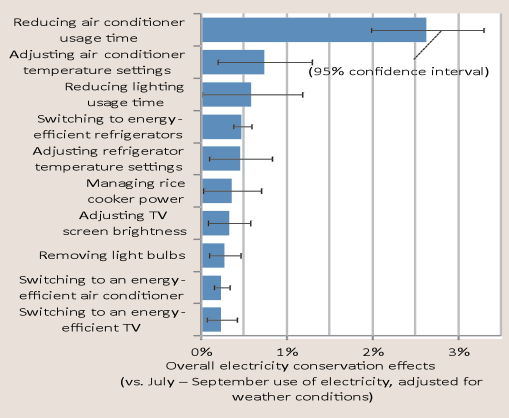


Fig. 2: Main electricity conservation measures with high overall effects in the residential sector in the Kanto region in the summer of 2011

After excluding the effects of weather conditions, the amount of electricity used in July through September 2011 decreased by 10% on average from the previous year. About 40% of the reduction in electricity use resulted from conservation of electricity used for air conditioning, with reductions in the time air conditioning was used accounting for just under 3% of the total energy savings during the studied period.

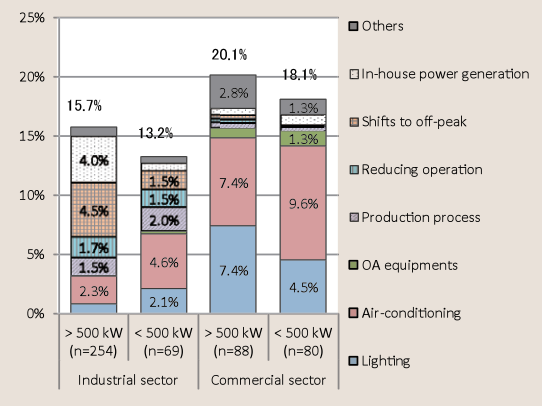


Fig. 3: Peak demand reduction by measures implemented in the industrial and commercial sector in eastern Japan in the summer of 2011

Major contribution in the commercial sector comes from lighting and air conditioning use, while major measures taken at industrial firms were shifting hours of operation to midnight and/or the early morning, increasing the capacity of in-house power generators, and limiting operations. The latter turned out to be costly and saw adverse effects on production activity.

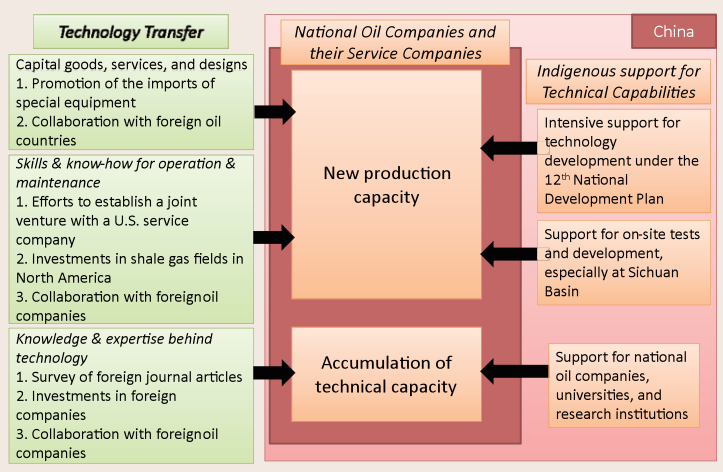


Fig. 4: Chinese efforts to acquire shale gas development technologies

Currently, Chinese national oil companies and their service companies seek to build production capacity and technical capacity for shale gas development through domestic technology development and international technology transfer. Although they make multi-pronged activities to acquire technologies, they may have difficulty absorbing tacit knowledge, since it requires time to accumulate necessary experience.