

# Socio-economic Research Center

#### Brief Overview

Integrating academic expertise in economics, risk management, legal studies, energy system analyses, and environmental sciences, the Socio-economic Research Center develops viable options for the

sound management of electric utilities as well as energy and environmental policies and thereby addresses the challenges of the industry.

#### Achievements by Research Theme

#### Utility Management and Policy

Aiming at revealing desirable institutional designs for the electric utility industry beyond the ongoing utility reforms, the team attempts to develop analytic methodologies and presents implications in terms of management strategies, future growth opportunities, as well as the resources required for those changes.

■ After the monopolistic supply area is abolished through liberalization, the relationship will also change between incumbent power companies and local communities in the previous supply area. This study clarifies the factors which make the “community-based strategy” effectively function in the new business environment. The case study of SSE in the UK shows that the community-based strategy is a feasible option for a private company even in the competitive and demand-shrinking market. However, in the long-term, SSE envisages the strategy to be sustainable by continually providing innovative values to customers (Y14008).

■ It was found that some European energy suppliers provided a variety of tariffs after full liberalization of the retail electricity market in the UK and Germany (Table 1). Some customers switched their electricity tariffs while they didn't switch electricity suppliers. It was also found that some energy suppliers (such as Centrica in the UK) provided energy related services in addition to retail sales of electricity and gas, and acquired a significant number of customers for such services. Energy suppliers who provide a variety of services strive to develop face-to-face marketing channels and skilled human capital to provide such services (Y14023).

#### Economic and Social Systems

The team focuses on providing useful information on electricity demand forecasts and clarifying socio-economic risk factors for the electric power industry, by analyzing the impacts of population aging in Japan and economic trends in the world on Japan's economy and energy markets.

■ Forecasted results of the number of regional households by household types show that the share of the elderly single-person households over 65 will increase from 8-12% (2010) to 13-18% (2030). It was also demonstrated that, assuming constant electricity saving rates and electrification rates in the future, the change in household-types including an increase of single-person during 2010-2030 will decrease the average residential electricity demand per household by 0.04% per year in Japan, decreasing it in most regions (e.g. -0.10% in Shikoku), while increasing the average demand by 0.04% in the Tokyo Metropolitan

Area (TMA) (Fig. 1) (Y14009).

■ We attempt to make use of the data from “Energy Consumption Statistics by Prefecture” for economic analysis on electricity demand in industrial and commercial sectors. It was observed that electricity demand in the industrial sector declined in the Tokyo and Kansai regions. In contrast, the commercial sector is displaying nationwide growth. We also estimated electricity demand functions and found that falling electricity rates in the period of 1990-2010 have a relatively low impact on electricity demand growth in both the commercial and industrial sectors (Y14015).

#### Energy Technology Assessment

While rebuilding a new set of methodology of energy technology assessment, the team strives to tackle newly emerged institutional and technological challenges caused by the large-scale introduction of renewable sources of energy as well as the prolonged cease of nuclear power unit operation, and thereby support reliable energy and electricity supply in a sustainable manner.

■ We developed a method to analyze the power mix with thorough consideration of balancing necessities for load frequency as well as kWh under a large-scale introduction of intermittent renewable. The method

proved effective in the grasping of operational needs for conventional power units and curtailment of renewable generation, as well as their associated costs (Y14002).

**Achievements  
by Research  
Theme**

■ As a result of life-cycle analysis of CO<sub>2</sub> emission of wind farms, since the ‘floating offshore’ wind farm employs a large floating body which weighs 10 times larger than the wind turbine itself, the life-cycle CO<sub>2</sub> emissions per kWh generated (LC-CO<sub>2</sub> emissions)

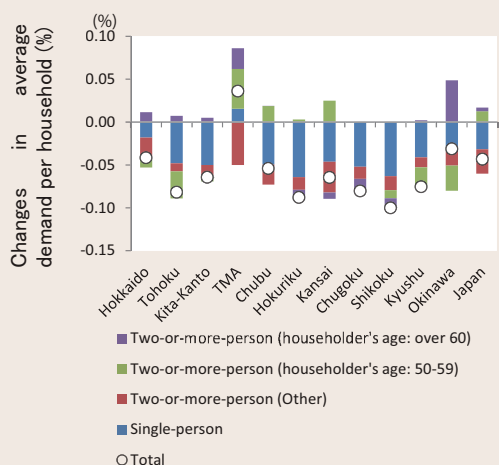
of the former were found to be 4 times greater than onshore and implanted offshore wind farms. These results concluded the LC-CO<sub>2</sub> emission assessment on the 2009 standard for all commercial generation technologies currently available (Y14018).

**Table 1: Electricity tariffs and services of major energy companies in the UK and Germany**

		UK				Germany	
		Centrica/British Gas	SSE	E.ON UK	EDF Energy	RWE	E.ON
Electricity tariff	Variable rate	○	○	○	○	○	○
	Fixed rate	○	○	○	○	○	○
	Dual fuel (electricity and gas)	○	○	○	○	×	×
	Green electricity tariff	×	×	×	×	△ (abeyance of application, Feb. 2015)	○
	Online account	○	○	○	○	○	○
Services (paid)	Water heating and room heating system	•Sales and installation •Maintenance	•Sales and installation •Maintenance	×	•Maintenance	×	×
	HEMS	•Controller of room heating	•Controller of room heating	×	•Controller of room heating	•HEMS (e.g. controller of air-conditioner and lighting)	×
	Other	•Maintenance of electric and gas appliances •Maintenance of drain •Charging system for EV etc.	•Care of electric wiring • Telecommunication services	×	×	•Energy consulting •Sales of energy efficient products •Charging system for EV, Home solar generation system Battery	•Charging system for EV, Home solar generation system

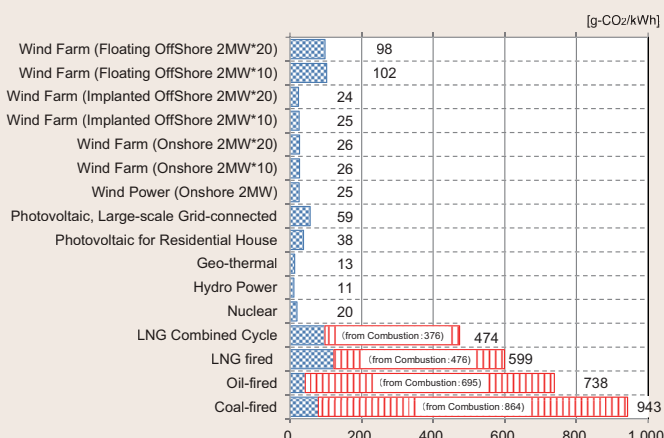
(Note) ○: provided, ×: not provided, △: provided but can't be applied during this investigation (Reference) Summarized by CRIEPI based on information available at energy companies websites

Some European energy suppliers provided a variety of tariffs and energy related services after full liberalization of the retail electricity market in the UK and Germany and, as a result, acquired a significant number of customers.



**Fig. 1: Changes in average residential electricity demand per household during 2010-2030 (%)**

Assuming constant electricity saving rates and electrification rates in the future, the change in household-types during 2010-2030 will decrease the average residential electricity demand per household by 0.04% per year in Japan, decreasing it in most regions (e.g. -0.10% in Shikoku), while increasing the average demand by 0.04% in the TMA.



**Fig. 2: The LC-CO<sub>2</sub> emission comparison on the 2009 standard**

Since the ‘floating offshore’ wind farm employs a large floating body, the LC-CO<sub>2</sub> emissions were found to be 4 times greater than onshore and implanted offshore wind farms. These results concluded the LC-CO<sub>2</sub> emission assessment on the 2009 standard for all commercial generation technologies currently available.