

Socio-Economic Research Center

Brief Overview

While changes in consumer behavior often lead to technological innovations and advances, the reverse is also true. Researchers in the electric power industry have to be mindful of the co-dependency that exists between consumer behavior, technological innovation and institutional changes. The Socio-Economic Research Center now covers various fields of expertise:

economics, business administration, jurisprudence, psychology, physics, urban engineering, electric and nuclear engineering. The Center carries out research based on its solid academic expertise as well as observation of the facts and practices of the electric power industry.

Achievements by Research Theme

Utility Management and Policy

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

- In order to reinforce LNG procurement, the factual state of affairs on the bargaining power of LNG was investigated based on interviewing practitioners from LNG trades. Major findings included that opportunities to negotiate price are limited solely to when LNG projects are launched. Therefore, strategic joint procurements up to the quantity justifying a production train may be effective (Table 1). (Y12006)
- Via questionnaire surveys conducted in August 2012 targeting the general public in the Tokyo

metropolitan area and academic professionals in biotechnology, nuclear energy technology and nanotechnology, which were then compared with a equivalent survey in 2009, we showed that risk perception of nuclear power generation has arisen not only amongst the public but also nuclear experts. The opinion of the public has changed to place more emphasis than before on the perspectives of 'a societal necessity' and 'possibility to prevent negative environmental impact' when they evaluate nuclear power generation. (Y12010).

Economic and Social Systems

We aim to provide useful information for the management planning of Japanese electric utilities by clarifying quantitatively and objectively the influences of conditions such as unstable electricity supply and increasing electricity generation costs on the Japanese economy, energy and electricity markets and utility companies management.

- We present an outlook for the Japanese industrial and energy structure up until 2030, following the report (Y12001) of an outlook for the Japanese macro economy. In the reference case based on the assumption of a moderately weak yen and stable overseas economy, the average annual growth rate of real GDP up until 2030 will be 1.1%. The total electricity demand will grow annually by 0.4% during the same period. In the "No-restart" case that the zero nuclear generation situation is maintained during the next two decades, the accumulated GDP loss amounts to 86 trillion yen toward 2030 (Fig. 1, 2). (Y12033)
- We measured the regional price elasticity of electric light and power demand within the regional jurisdictions of nine power companies, excluding Okinawa Electric Power Company. The price elasticity of electric power denotes the percentage change in power demand when the cost of electric power changes by 1%. An important issue for

electricity business management is to know how the demand for power will change when electricity costs are increased by electric power companies. The results of an empirical analysis reveal that the values for price elasticity of the electric light demand in each region are distributed between 0.856 (Hokkaido) and 1.563 (Hokuriku); therefore, it is clear that price elasticity significantly varies from zero in all regions. Furthermore, since the price elasticity values of the electric power demand are between 0.158 (Tokyo) and 0.551 (Hokuriku), it is apparent that these values also significantly vary from zero in all regions. Therefore, we can confirm that the impact electric price hikes on electric power demand due to is not minor. Furthermore, this study showed that if we grasped only the price elasticity across the country as in the past, we would not be able to cast exact demand outlooks in each region (Y12015).

Energy Technology Assessment

While rebuilding a new set of methodology of energy technology assessment in the new era after the Great East Japan Earthquake, the team strives to support a reliable electricity supply in a sustainable manner.

**Achievements
by Research
Theme**

- Based upon the experiences with the accident of Fukushima Daiichi Nuclear Power Station, a comprehensive review of nuclear emergency preparedness is ongoing. Focusing on the French cases where the Local Information Commissions (CLI) plays a critical role, we examined how to improve stakeholder involvement and thereby derived concrete lessons for Japan. (Y12013).
- Large-scale commercial solar photovoltaic (PV)

generation systems at 1, 2, 5 and 10 MWe to be built in Japan were assessed in terms of life-cycle CO₂ emission per kWh generated (LC-CO₂) by life-cycle assessment (LCA) method. As the main results, the LC-CO₂ of those grid-connected PV plants turned out in the range of 58~59g-CO₂/kWh, 52~55% higher than those of small scale residential systems at 38g-CO₂/kWh. (Y12031).

Table 1: An Assessment of LNG buyers' bargaining power

On the buyers' side in the LNG trading, opportunities to negotiate price are limited practically to when LNG projects are launched. Despite this limited chance, LNG buyers can still reinforce bargaining power when they have acquired measures for substitutional supply of LNG or of other energy resources. While purchases in large quantities are not necessarily effective in LNG trading, it is advantageous for buyers to choose a volume to reinforce bargaining power in the most effective manner, such as a quantity which justifies launch of a unit of production.

		Buyers' price negotiability	
Timing of price negotiation	Launching of new LNG project	Good	
	Price review	Marginal	
	Short-term/spot trading	Marginal	

		Buyer's bargaining power	
Market	Stringent: seller's market	None	
	Easing: buyer's market	Substantive	
Diversification	Energy sources	Substantive (only applicable for power companies)	
	Suppliers	Conditional (only enforceable where multiple projects are running in parallel)	
	Price formula	Effective for acceptance of new price formula (No guarantee to lower the price)	

		Buyer's bargaining power	
Purchase volume	Quantities	Small quantities	Marginal
		Large quantities	Substantive, with contrasting opinion for volume: - Possible volume discount, and - Too large quantities may work
		Necessary quantity to launch new LNG project	Substantive
Joint Purchase	All-Japan' procurement	Unlikely to be effective	
	Alliance with partners who have a mutually complementary relationship	Substantive, regardless of nationalities.	
		Likely to be no relationship between purchase volume and bargaining power	
Upstream business	Small share	Marginal	
	Price discount for project owner	Unlikely to be available	
	Acquisition of project cost information	Effective, but only indirectly	
	Promoting development of LNG projects	Effective, but only indirectly	

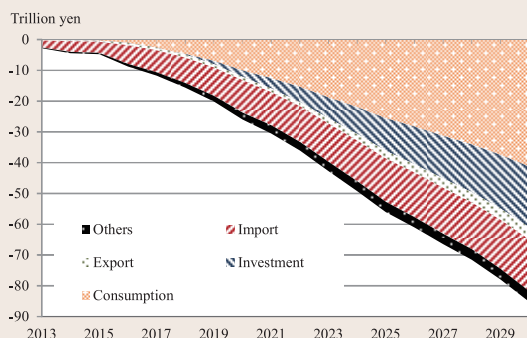


Fig. 1: Accumulated GDP loss in a "No-restart" case

In a "No-Restart" case, GDP will decrease 6 trillion yen in 2030 compared to the reference case and will reach 672 trillion yen. Accumulated loss of GDP amounts to 86 trillion yen beyond 2030.

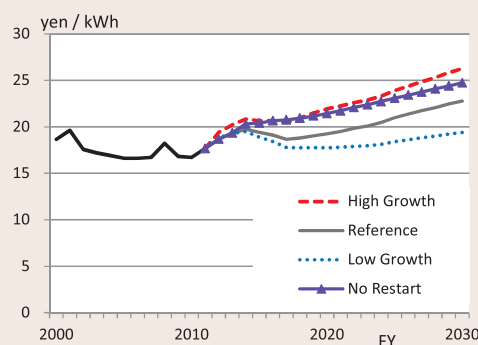


Fig. 2: Transition of electricity price

In a "No-Restart" case, nuclear power is assumed to be replaced with thermal power one by one alternating between LNG and coal. Our simulation does not include the effects of factors such as carbon constraints, location constraints and decommissioning costs. In our reference case, we assume that nuclear power stations will restart sequentially up until 2017, decreasing gradually along with the closure of old plants. Correspondingly, the impact on electricity price decreases gradually (the maximum difference is 2.3 yen per kWh, 11.5%) in a "No-Restart" case.