Response of Japanese energy providers – Japan tsunami 2011

> SAVING ELECTRICITY IN A HURRY Beijing, February 23, 2012

The Institute of Energy Economics, Japan (IEEJ) Ryosuke TAKAHASHI

All Rights reserved IEEJ



Outline

- 1. A lot of power supplies on the Pacific Ocean side dropped out due to a East Japan great earthquake on March 11, 2011. Therefore, the government and Tokyo Electric Power Company went to Rolling blackout to prevent the large power failure not anticipated. It brought a large, negative influence to the citizens life and industry.
- 2. The Rolling blackout was avoided based on the result at the demand season of summer, and the government and Tokyo Electric Power Company set the power saving target of 15% at the peak time.
- 3. Summer effort met the target but with big price. Therefore, the government decided to utilize set voluntary targets rather regulatory schemes. So far outcome of this winter is yet to come. But uncertainly about power supply remains.





(Source) The Federation of Electric Power of Japan web



1st phase: Rolling Blackouts

2011 Spring (14 March 2011 – 28 March 2011)

- On the Pacific Ocean side of Tohoku and Kanto areas an absolute supply capacity became insufficient because of the earthquake and the tsunami.
 - <Rolling Blackout> (14 March~28)
 ①The Tokyo Electric Power Company jurisdiction service area is divided into 5 regions.
 - (2) The power failure of about 3 hours in each area.
 - **③** Executed Tokyo's 23 wards and the stricken area.
 - Execution of the Rolling blackout was determined every morning.
 - Rolling blackout plan was announced everyday for the next day.
- It was not actually executed by Tohoku Electric Power Co., Inc. though execution was announced.

Confusion caused by Rolling blackouts

- The operation of the public transportation facility was very much disturbed at first because transportation such as railways was not assumed to be an exception, and a big obstacle was caused for commuting.
 - Because the fear of supply shortage even with Rolling blackouts was executed, the minister put out the emergency statement of the power saving request and the large power failure had been evaded(17 March).
- The customers happened to be in the same area as the blackout exempted facilities were automatically exempted. But this did not look good from the fairness perspective.
- The obstacle was caused in business regardless of whether or not Rolling Blackout took place. It was because the enterprise had to respond to it if there was a beforehand notice. This led to a big opportunity loss to the business sector.

Image of Supply Measure





(Source) TEPCO web



2nd phase: Restriction of

electricity use by law

2011 Summer (July 2011 – September 2011)

- It was assumed that the rolling blackout was not to be held in principle in summer when the electric power was expected to be insufficient again.
- It was because Rolling blackouts put a large load at the life of the people and the many damaged power were restored by then.
- Thus customers were asked to comply with 15% power saving.
- The electric power use limitation order based on Article 27 of Electricity Enterprises Law was used during the oil crisis. 2011 summer was the 1st time in 37 years, to utilize this article.
 - It obligates 15% reduction compared with the same day of 2010. The penalty was up to 100 thousands yen for every how the demand exceed.

Supply side: electricity interchange among utilities in the summer of 2011

Summer 2011, electricity interchange among different areas helped to ensure supply-demand balance.



Influence of electric power use Influence Infl

- The enterprise responds by the operation shift from daytime of the weekday to nighttime and holiday when the use limitation was done.
- Introduction of privately owned electrical power facilities.
- To avoid blackouts business sector took actions but they added big costs to their operations.
 - From the point of welfare consideration, shifting location time of work put extra stress to the families. Costs such as compensation salary for the night or capital investment costs.



Summer Electricity Saving Action Households (1)

Households

- (1) Request for electricity saving through media and various other means.
 - Advertisement in newspapers (four times) and TV CF (for four quarters)
- (2) Distribution of "Electricity-saving education" materials to elementary and junior high schools Distribution to about 4,300 schools (Tokyo and Tohoku areas)
- (3) Provision of "Home Electricity Saving Declaration," a participation-type
 - program for supporting electricity saving
 - About 150,000 people participated (Tokyo and Tohoku areas)

Summer Electricity Saving Action Households (2)



• Web site service "Home Electricity Saving Declaration,"

Share the new idea for energy saving activities



Checking their own peak-load in hour basis

8月28日(火) 14:15取用 電力使用状況 1988年5月8日 (米日本市市市市)(米市市市)





http://seikatsu.setsuden.go.jp/about/join

Summer Electricity Saving Action by Large-volume-electricity customers



Large-volume-electricity customers
 (Enterprises with contract for supply of 500kW or more)

(1)Voluntary formulation and implementation of plans for suppressing the power consumption in the peak time zone (adjustment and shift of operation and business hours etc.)

(2) Application of Article 27 of the Electricity Business Act (Restriction on Use of Electricity) to secure effectiveness of demand suppression and fairness amon electricity customers

Summer Electricity Saving Action by Small-volume-electricity customers



- Small-volume-electricity customers (enterprises with contract for supply below 500 kW)
- (1) Presentation of examples of electricity-saving measures (e.g. Electricity saving with lamps, air conditioning, and OA equipment)



- (2) Encouragement of formulation and announcement of voluntary electricity saving action plans for achieving the target (format presentation)
 - Supporters visited about 150,000 offices and held explanation meetings about 10,000 times (Tokyo and Tohoku areas)
- (3) Electricity-saving supporters' visits to individual residences and holding meetings
 - Plans were formulated by about 100,000 offices (in Tokyo, Tohoku, andKansai areas)



Publicity on energy Saving



•Such a Publicity was mostly seen in East part of Japan

3rd phase: Calling for voluntary

power saving

2011 Winter (December 2011 – March 2012)

- It turns out an electric power use limitation limited to a big customer that the large encumbrance is generated in the whole society.
 - The electric power companies have advanced the recovery of the power supply damage and the installation of the urgent installation power supply. The re-operation after the scheduled check of nuclear plant has not advanced.
 - Therefore, there is fear of the electric power stringency in the Kansai area and the Kyushu area where the dependancy on nuclear power generation is high.
- The government, Kansai Electric Power Company, and Kyushu Electric Power Co., Inc. called for voluntary power saving actions with numerical



Flexibility between electric

power companies of emergency

- The new Oita power plant of Kyushu Electric Power Co., Inc. (thermal power, total output 2295MW) stopped outside the plan early morning, February 3.
 - Kyushu Electric Power Co., Inc. requested the power interchange to Electric Power System Council Japan, and requested power saving to the customers and made the supply and demand adjustment contract at once.

Because six electric power companies had accommodated 2400MW, the large power failure was prevented beforehand.

Urgent safety measures of **Electric power companies** In the first nuclear plant in Fukushima, because the cooling systems had not functioned by the tsunami, each electric power company set up the power source car and the pump in the height. In addition, the air-cooled emergency dynamo and the tide embankment are set up as mid/long-term measures.



-Image-of-Except-heat-function-



(Source) The Federation of Electric Power of Japan

Possible Electricity shortage

Outlook for the Operation of Nuclear Power Plants in Japan (worst-case scenario)



O In the worst-case scenario, supposing long delays in starting up nuclear power plants after scheduled outages, the gradual loss of generation capacity will make it difficult for the utilities to cope with peak electricity demand in the summer 2012, seriously affecting industrial 19 activity, etc.

Power shortage is not over



 \cdot In case of no-restart of nuclear power plant, Japan may fall into electricity supply shortage in 2011 Winter and 2012 Summer_

• If reserve capacity(5%) is taken into consideration, 3.1% <u>electricity saving</u> is required in 2011 Winter, and 12.4% in 2012 Summer.

 Comparison of Japan's total power generation capacity and peak demand (No-restart of nuclear scenario)



20

All Rights reserved IEEJ

Source: Actual data and estimates from IEEJ, excluding Okinawa Electric Power Co.



Conclusion

- It is necessary to avoid executing the Rolling blackout as much as possible because the adverse effect may spread widely even if the execution coverage is limited.
- Unexpected dropout of the large-scale power supply was surmountable in the cooperation of general electric utilities this time.
 - But If the situation in which nuclear power generation will not re-start, IEEJ estimation shows that, electricity saving is required by 12.4% in 2012 Summer. Power shortage is not over.



Thank you for your attention!