

From 2011 Emergency Power Savings to 2012 Sustainable Power Savings

Yumiko Iwafune

Associate Professor, Institute of Industrial Science, the University of Tokyo



Emergency power savings in 2011

It has been some time since I started studying the energy supply problems in Japan from the standpoint of the consumer-side and I have never been so busy than in the last year. In April 2011, after the Great East Japan Earthquake, I set up a website called “Power Savings in an Emergency” with other volunteers in order to organize and provide information on power savings. Subsequently many people have accessed it.

The “emergency power savings” that we were required to achieve last summer, in an effort to avoid power cuts, meant a cutback in electric power consumption specifically aimed at reducing the peaks when demand is extremely high. This was different from the power savings for “energy conservation and CO2 reduction”. For example, oil and gas were substituted for electricity, the peak demand periods were distributed through the off-peak hours such as weekends, holidays or mornings and evenings. Some measures that had a possibility of increasing in energy consumption and CO2 emission were necessary. After the quake, it was expected that the electricity demand would be the highest during the summer. But there was not enough time to implement large-scale countermeasures to set up the necessary facilities for alternative energy. In that sense, it was truly “emergency” power savings.

Rather than taking extreme countermeasures, we suggested minimizing the impact on economic activities by establishing the power-saving actions as early as April or May and incorporating them in the supply and demand plan. Although there was no organized power cuts, unfortunately our suggestion did not become reality. In East Japan, the restriction on the amount of power used by large-scale users was declared in accordance with Article 27 of the Electricity Business Act. Consequently, in the case of Tokyo Electric Power, the large-scale users reduced their power usage in peak demand by 29% (the small-scale users: 19%, households: 6%, total: 18%). Tohoku Electric Power also aimed at 15% reduction by its large-scale users and they actually achieved greater than the 15% reduction.

The study conducted afterwards showed that these reductions in power usage were made by production adjustments, shifting operation hours to weekends and holidays, and private power generation, subsequently creating a powerful effect on production and industrial activities. It has also been reported that the costs of implementing these measures were significant (ranging from several hundred million yen to several billion yen). For the development of new policies, the following has been suggested. “The policies should indicate the idea that it may be necessary to request the service sector to play a major role in reducing power consumption since the economic impact on this sector, due to power consumption cutbacks, is considered to be relatively small. This would minimize the impact on economic activities as a whole. However, the whole idea should not be mandatory, but rather should be a request, which will be followed by a careful power-saving plan [trans.] ”.

The peak demand problem is a yes or no problem. If there were enough electricity supply people would no longer be interested in it. After all, there was enough supply last summer and this winter. Looking back at the government policy on the power-saving issues it is easy to criticize saying that “It might have been an over reaction to force even family households into power savings”. However, as of May last year, there was no concrete understanding of how much of the power output could be extended. So there was no choice but to implement enforcement measures including the measure of reducing power consumption by 15% across the board.

By the time of the enforcement, which started on 1st of July, Tokyo Electric Power had put forward an extra 1.8 million kW, which was equivalent to 3.3% in spare capacity. This included the power generation from Hirono Fossil-fuel Power Station that restored much faster than expected. At that point, like many others, I thought that the enforcement measures were no longer needed. Presumably, implementation of law is more complex and it cannot so easily be modified. In the end, this enforcement

lasted until early September. As a consequence, a massive power saving in the peak demand period was achieved. Incidentally, the amount of saving was significantly more than required and this was done at the expense of imposing a tremendous burden on the economy and the Japanese people.

Power supply issues for 2012

Based on the experience from last year, we should consider power saving methods without implementing other enforcement measures with a view to minimize the damage to the manufacturing industry. The focus should be on the service sector and households exploring methods that only ask for cutbacks during the necessary time period.

If nuclear power plants could not resume their operations Kansai Electric Power would suffer most from that consequence. Although there has been a lot of talks on the prospects of Kansai Electric Power, it is understandable that they cannot make a supply and demand plan expecting to rely on other electricity companies from the start. That being said, this is the situation naturally expected and I would say that there should have been more effort to create spare capacity in supply. Nonetheless, I expect that the peak demand for this summer will be met.

Kansai Electric Power will need to rely heavily on good luck (i.e. It will be a cool summer. If their peak demand does not fall onto other company's peak demand it may be possible for them to secure necessary amounts from other company's extra capacities. Providing nothing goes wrong at their fossil-fuel power plants.). Ultimately, however, the Kansai Electric Power's predicament can be overcome with supply from other company's spare capacities and help from the power-saving actions. If we were to include unreasonable power-saving measures that would drop the GDP figure, then they should most certainly be able to manage this summer. On the other hand, Tokyo Electric Power did not depend on nuclear power generation from the beginning, and it looks as if they are building up for an ability to create a healthy spare capacity for this summer.

However, managing the peak demand does not mean we have solved Japan's fundamental energy problems. The real issue for today's Japan is the cost of fuel in the long run and the true solution to this problem will be for us to deal with power savings that lead to energy conservation (i.e. the meaningful reduction in power consumption). Right now we are substituting nuclear power generation with fossil-fuel power generation and I hope the public is well aware of the fact that the fuel cost for fossil fuel is steadily increasing.

With this current situation, even if the electricity companies cut labor costs significantly and close all unnecessary subsidiary companies, the rate hike will be unavoidable as long as people consume electricity. Under these circumstances managing peak demand would be meaningless without consideration to energy conservation. For that matter, we will not need to resume inefficient private power generation nor will we need an unreasonable fuel shift, other than Kansai Electric Power without the resumption of Ōi Nuclear Power Plant.

We must start saving power that leads to conservation of energy. I am not suggesting the energy conservation that would bear hardship but we must deliver power-saving measures that are high in efficiency and sustainability. This should go without saying, but the efficiency must be balanced with effort. Please refer to the website "Power Savings in an Emergency (Only in Japanese)" for power saving tips around you. There are a lot of forward thinking tips such as no ironing for husband's shirts. For the service sector we may need a bold investment, though there should still be a lot of things that can be done, especially for small to medium size companies, to explore energy conservation and power saving methods that are highly cost efficient.

Critical issues for energy systems

The peak demand problem is a serious problem and we made a big fuss about it last year. However, when we consider energy supply and demand issues with a long-term standpoint the peak demand problem is not a fundamental one. The most critical issue is how we can obtain the necessary goods and services that make our lives comfortable with the minimum Energy-Return-on-Investment (EROI). We must also comply with the rules and regulations about goods and services economically, credibly, environmentally and safely.

Alternative energy will be able to reduce EROI. But it would make no sense if we installed a solar power generator to the house that has no proper insulation. And we would be missing the whole point of the smart grid technology if it had to coordinate such a wasteful demand. Have we examined well enough to the question of what the purpose is to become the

“smart city” and to become self-sufficient locally on energy generation and consumption? The bigger the power station the better the efficiency. The bigger power stations have the advantage of delivering electricity to distant places at an instant. Batteries have a good potential, though, at the current stage, 20% of electricity is lost during the process of discharging and charging from AC to AC. A large-scale power generation system will be the most efficient way to combat the fluctuations in solar power supply. In terms of energy efficiency, without a good heat transfer, the distributed generation system cannot surpass the centralized generation system. It is critical to optimize the system as a whole.

In closing

I have recently started twittering and there is my favorite message from BOT of a citizen scientist, Mr. Jinzaburo Takagi. It says that “Nuclear energy is not reliable as an alternative energy source”, or “It is not a substitute for oil”. We cannot solve the energy problem with these comments. What we need to do is to debate how we should deal with the energy issues in order to create a society that is not destructive or repressive.

A lot of people seem to hourly quote this statement of the deceased, and I get the same message sent quite often. This repeatedly appearing message are like warnings constantly reminding me to think about better energy systems for such a non-destructive and non-repressive society, so I cannot stop following it on Twitter.

How are we going to perform on the power savings for the 2012 summer? Right now some say there will be enough supply and some say there won't be. But if Ōi Nuclear Power Plant would start operating, then the public interest on the power-saving issues would fade. Nevertheless, I trust that a lot of people realized last year, the fact that energy is a limited commodity. I hope that many of them remember lessons they learnt last year. For many years to come, a country like Japan with no natural resources has to deal with the energy problems that directly or indirectly affect our lives.

“Power Savings in an Emergency” (only in Japanese) website is no longer updated.

Yumiko Iwafune:

Associate Professor of Collaborative Research Center for Energy Engineering, Institute of Industrial Science, the University of Tokyo. After working for a think tank, she then assumed the present position. Research Interests: Sustainable energy supply and demand systems in private households and the service sector. Energy management system.

(First appeared on April 23th in [Japanese](#))