Energy Saving in Household Sector

By Nakagami Hidetoshi

Introduction

As the deadline for achieving goals set under the Kyoto Protocol agreement draws near, the public and private sectors alike are making all-out efforts to reduce greenhouse gas emissions. Compared with other sectors, the rise in energy consumption in the commercial / residential sector is remarkable, and has become an important issue for the Japanese government. Currently, the average Japanese consumer is doing far too little to prevent global warming. The matter appears to be something too far-fetched for consumers to take any specific action. Perhaps the phrase "global warming" does not sufficiently convey a sense of urgency. If, for example, words such as "global tropicalization" or "global catastrophe" had been used, consumers may have been a little more sensitive to the seriousness of the situation. Global warming is a problem that everyone of us has to tackle right now. The message needs to be driven home that if we fail to take action, the consequences will be irrevocable. For the purpose, dynamic measures should be taken.

1. Trends in Household Energy Consumption

Let us first look into the trends of energy consumption in the commercial / residential sector. In 2005, Japan's energy consumption in all sectors rose 16% from its 1990 level, representing an average annual growth of 1.0%. By sector, energy consumption grew 7.2% (0.5% per annum on average) in the industrial sector and 22.5% (1.4%) in the transportation sector. Meanwhile, the commercial / residential sector recorded a leap of 32.5% (1.9%), the largest among all sectors. The residential sector marked a surge of 30.5% (1.8%) while the commercial sector logged a jump of 34.8% (2.0%).

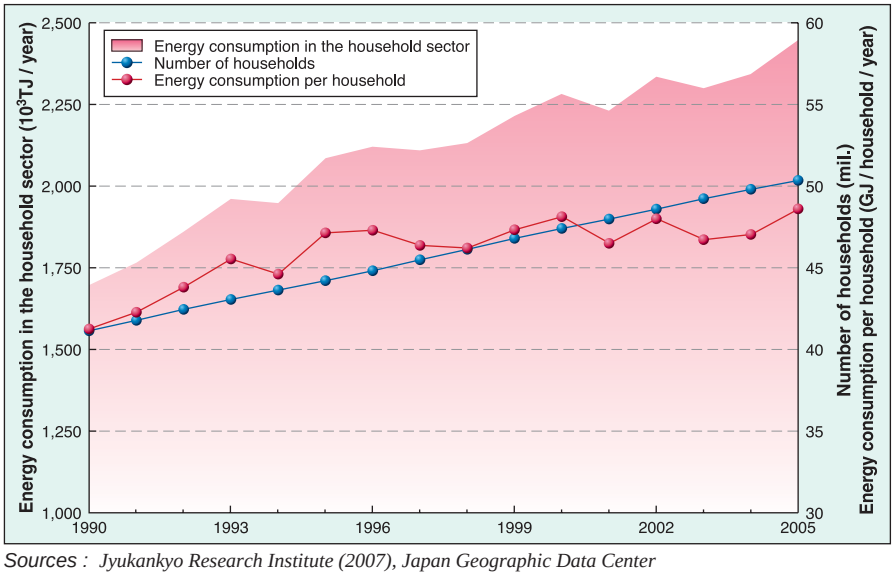
The growth in the household sector resulted from a combination of two factors – a rise in energy consumption per household (unit energy consumption) and an increase in the number of households. In the period from 1990 to 2005, the number of households grew 22.4% (1.4% per annum). Namely, energy consumption per household climbed 8.1% in the 15-year period to average out at 0.5% a year, meaning much the same growth in the industrial sector. *(Chart 1)*

In the 10-year period from 1995, the amount of energy consumption per household remained roughly the same, and it seems that the rise in energy use that had continued since the end of World War II had come to a halt. In 2005, energy consumption appears to have grown from the preceding year, but this was due to the particularly cold winter in 2005, which led to increased consumption for home heating. When figures are adjusted on the premise that temperatures in the winter of 2005 were at average winter levels, we find that energy consumption had fallen in fact. *(Chart 2* on the next page*)*

Annual energy consumption per household was 48.4 gigajoule (GJ) in 2005 (in terms of crude oil, it was 1.25 kl per household a year). Electricity was the largest type of energy consumed, making up 39% of the total, followed by gas at 25%, home-heating oil at 24% and LPG at 12%. In the last five years, the combined consumption of these various types of energy showed an average 0.3% gain per annum. While electricity recorded a 1.7% rise and gas a 0.4% increase in the same period, LPG and home-heating oil declined 2.8% and 0.3% respectively.

As for the purposes of energy use, 33% was for heating water, 31% for lighting and electrical appliances, 26% for heating rooms, 8% for cooking, and 2% for cooling. In the last five years, the amount of energy used for lighting and electrical appliances showed the only substantial increase of 2% on the annual average. In contrast, energy consumed for heating water / rooms and

Chart 1 Energy consumption per household and in the household sector



Sources : Jyukankyo Research Institute (2007), Japan Geographic Data Center

cooking stayed almost unchanged, while that for cooling fell 3%. (Figures for room heating and cooling were adjusted for variations in weather conditions.)

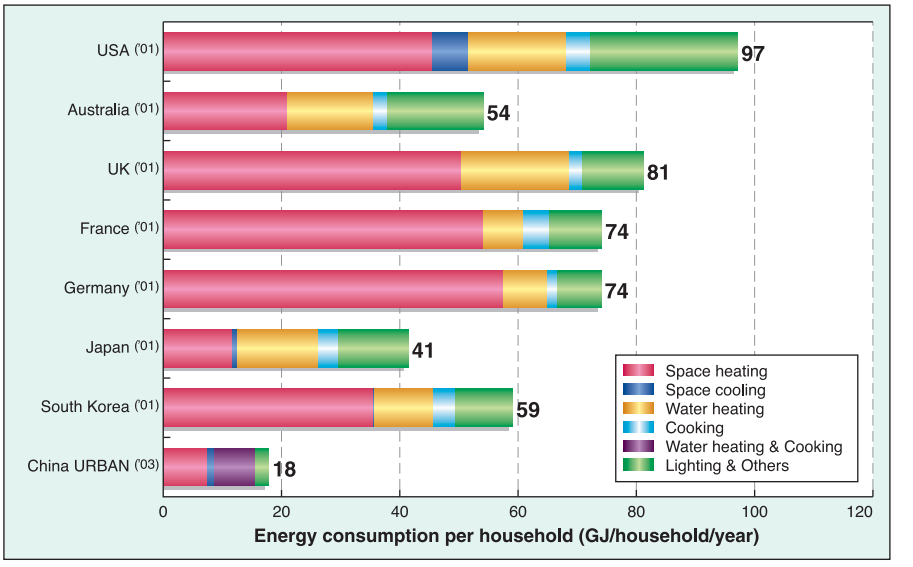
Energy consumption per household in Japan is small compared with that of the United States and European countries (except for the United States). Data in 2001 – though not very new – showed that energy consumption per household was 2.37 times more in the United States than in Japan, 1.98 times more in Britain, and 1.80 times more in France and Germany.

The gap appears to stem from differences in the pattern of energy usage. Taking Japan as a standard of 1, energy used for home heating was 3.8 in the United States, 4.2 in Britain, 4.5 in France and 4.8 in Germany. The comparative figures, larger than the total averages above, are thought to result from differences in home-heating levels during the winter. In these foreign countries, it is normal for all rooms in a house to be warmed 24 hours a day, but in Japan, heating is often limited to the living room and people usually turn off heating in vacant rooms and after going to bed.

On the other hand, energy consumed for electrical appliances was about 1.2 to 1.7 times larger in Japan than in other countries. The gap is believed to reflect the spread of far more various electrical appliances in Japanese households than in foreign homes. The data also showed that energy used for heating water was roughly 2 times more in Japan than in Germany and France. This appears to result from different energy consumption for hot water, mainly used for home bathing. Behind it is considered to be the difference in bathing customs. German and French people usually take showers only, while Japanese often immerse themselves in bathtub water in addition to taking showers. *(Chart 3)*

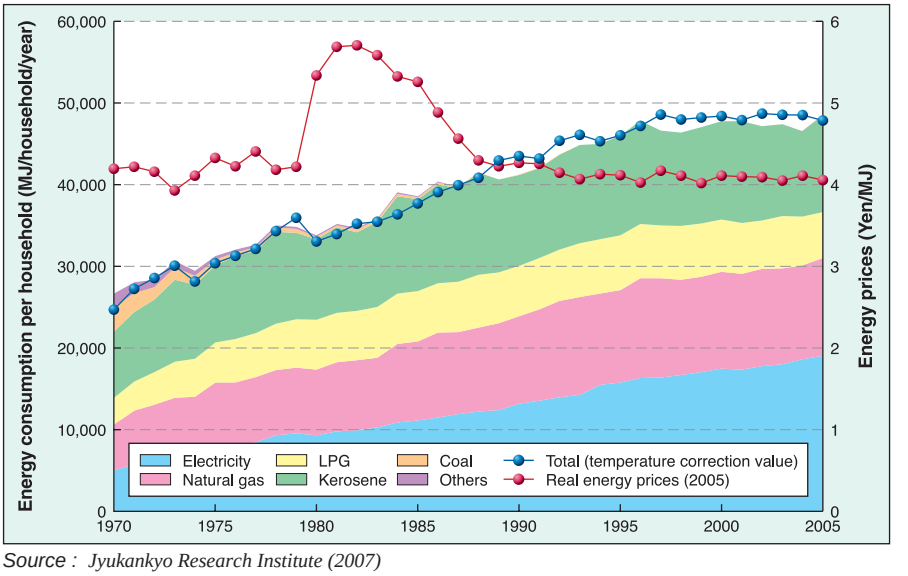
We can see from these figures that energy consumption differs from country to country, reflecting factors such as daily customs, housing conditions and the weather. In developing countries, economic and living standards are other factors that need to be taken into account. Incidentally, average energy consumption per household in Japan is 2.7 times larger than that in urban areas in China.

Chart 3 Internationally compared energy usage per household



Source : *Jyukankyo Research Institute (2006)*

Chart 2 Consumption per household of different types of energy



Source : *Jyukankyo Research Institute (2007)*

2. Energy-saving Measures in Households

The Japanese government's "Top Runner Program," which has laid down energy conservation standards for energy-guzzling products, may be called the most successful measure in the world in reducing household energy consumption. The standards apply to products specified by the energy conservation law among household electrical appliances, automobiles, and gas and oil apparatus. In making these "specified products," manufacturers must ensure that they have not less than the best energy efficiency levels achieved by similar products already on the market.

Before the top runner system was established, I participated in committee meetings on setting standards for efficiency levels and I recall how standards were then decided. The method was to

set standards at levels higher than the average efficiency levels of already commercialized products; discussions focused on by what percentage the standards should be set above the average levels. Usually, when standards were strengthened in this way, there already were products with efficiency levels exceeding the standards. I remember discussing the need to set standards based on the best efficiency levels already available from the outset. There was strong resistance to such an idea at first from manufacturers' organizations, but after a while, they began efforts to develop products with maximum efficiency, leading up to the practice today.

To become a "specified product," the following requirements must be met:

1. The product is used massively in Japan.
2. The product consumes a considerable amount of energy.
3. There is particular need for the product's energy sufficiency level to be improved (for example, there is room for technical improvement or there is such demand in society.)

As of July 2007, there are 21 specified products, including 14 household appliances such as air conditioners, refrigerators and gas-fueled water heaters. Manufacturers are required to meet the efficiency standards, and if they fail to do so, the authorities take the following measures: admonishment, public announcement, order, and a fine of up to ¥1 million.

Chart 4 A five-star label for energy-saving products

Source : Ministry of Economy, Trade & Industry

The top runner system has helped to greatly enhance the energy efficiency of products, and the efficiency levels of all specified products have been improving in excess of the targets. Each time an improvement is made, another product with better efficiency is put on the market, creating the impetus for more efforts for an even better product. Meanwhile, there has been marked progress in technological innovation for household appliances. For example, TVs with cathode-ray tubes are quickly being replaced by LCD and plasma-display TVs. The list of specified products inevitably needs to be updated in line with technological advancement and the spread of new types of products.

To make it easier for consumers to understand the improvements being made in energy efficiency, a labeling system has been set up. Initially, the labels simply showed whether or not a product had achieved the top runner standard, but since October 2006, an Australian system of labeling has been adopted, whereby energy efficiency is shown by stars on a scale of 5 *(Chart 4)*.

Retailers, who are the point of contact between manufacturers and consumers, play an important role in spreading the use of energy-saving products. In fiscal 2003, a system was launched to commend retailers that actively promote energy-saving products or provide consumers with adequate information on energy conservation. Subject to the system are retailers whose sales of energy-saving home appliances comprise 50% or more of their total sales. Every fiscal year, "commendable retailers" and their national rankings are made public. Since fiscal 2004, several prizes have been introduced, including the Economy, Trade and Industry Minister Award and the Environment Minister Award. Small retailers have also become eligible for such awards since fiscal 2005. Awardee retailers can display a logo symbolizing the qualification *(Chart 5)*.

In fiscal 2006, the number of retailers who applied for the awarding system was 469, up from 409 in fiscal 2005. Because prices of highly energy-saving products are generally higher than those of less energy-efficient products, consumers tend to shy away from high-efficiency appliances. However, consumers can be persuaded to buy energy-efficient products if given adequate information. For example, retailers can promote sales of such products by explaining about their life spans and how energy-efficient products are more economical in the long run, and how they cause less harm to the natural environment. Since sales of higher-priced products lead to better profits, the awarding system seems to have been well-received by retailers.

Chart 5 A logo for a "commendable retailer" promoting energy-saving products

Source : Ministry of Economy, Trade & Industry

I would also like to note that following the revisions made to standards on house insulation after the two oil crises, a third revision was made to further hold down energy consumption for home heating, bringing the standards close to those in North America and Europe. Moreover, measures are under study to set up comprehensive energy efficiency standards for not only house insulation, but for equipment such as air conditioners and water heaters. I would like to touch on these matters on another occasion if I given an opportunity.

In this article I have outlined the energy consumption trends at Japanese homes and some of the country's main energy conservation policies. At this moment, we are only in the initial stages of tackling the global warming issue. I sincerely hope that the all-out efforts currently being made to achieve the targets set under the Kyoto Protocol will be given added momentum in the future. JS

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