

Discussion points: Strategy to Low Carbon Society

Group 4: Barriers and Opportunities

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This is memo of discussion points on LCS with Barriers and opportunities for the sensitive sectors.

1. Basic Strategy

The basic strategy to Low Carbon Society in 2050 is to reduce energy demand to half of today's level by increasing energy efficiency twice and to increase renewable energy supply to nearly half of the energy demand. This will make the carbon emission to roughly one fourth ($1/2 * 1/2=1/4$).

The facts are as follows,

- 1) There are many energy efficient technologies which will drastically decrease energy consumption while keeping the same performance.
- 2) Some of the energy efficient technologies are expensive, but they will become economical because of higher oil price and peak oil predictions.
- 3) Some of the energy efficient technologies, such as compact fluorescent bulb, hybrid car and advance industrial furnace are already economical and save money today.
- 4) Renewable energy such as photovoltaics(PV) and wind power are increasing rapidly. As PV is expensive now but wind power is already cost effective. Diffusion of PV was supported by government subsidies and the cost of PV has been on the line of learning curve with progress ratio 82%(When cumulative production doubles, then the cost goes down to 82%)
- 5) It will take long time to introduce these new technologies, some political climate changes are necessary.

2. Barriers and Opportunities to Sensitive sectors in transition to LCS

There are sensitive sectors in the transition to LCS. Analysis of barriers and opportunities are shown as follows.

1) Basic Material Industries

Iron & Steel, Cement, Paper & Pulp industries are very energy intensive industries. They

use coal for their main material and energy sources. Some of coal consumption can be substituted with natural gas but they still remain using coal in 2050. One of the possibilities is to increase recycle of basic materials (steel and paper) and use waste in their production process. Today the blast furnaces in iron & steel industry use plastic waste as substitute of coal. Cement industry use waste materials as fuel.

Economists predict the production of iron & steel, and cement will go down to lower level in 2050. They suggest the transition to Post material society, Service based economy, and IT based industrial activities.

2) Transportation

Transportation sector mainly use portable liquid fuel, gasoline and diesel oil as they have largest energy intensity per weight and are relatively safe to convey. Internal combustion engine vehicles will be substituted with Electric vehicle and Hydrogen fuel cell in the long run. But weight of battery and hydrogen tank are still problems to be solved. There are redesign activities of internal combustion engine, and they will be more improved, 20% or more, than have been expected. Gasoline hybrid vehicles proved twice efficient compared with conventional gasoline cars and can be a good problem solving technology for the next decade. Efficient technologies should be introduced urgently before old inefficient vehicles will be massively produced.

3) Household and Commercial Buildings

There is revolution of lighting technologies. Compact fluorescent bulb can be use for frequent on/off purpose as it has now long life time of 30,000 times of 10 seconds on/off. 12W compact fluorescent bulb becomes economical within 1,000 hours when it is substituted with 60 W incandescent bulb. The light emitting diode (LED) is widely used for 20% of traffic signals as it saves the maintenance cost. The efficiency of LED will be better than fluorescent bulbs. It will be used for automobiles when it is produced massively with cost reduction and will be used widely for general lighting propose

The problems are the time for the turn- over of stock materials. Even compact fluorescent bulb,, passive solar house, well-insulated house and new refrigerator are energy efficient, consumer will buy new products only when they are broken. So it will take long time to improve energy efficiency in social scale. Some policy measures are necessary to promote the introduction of efficient technologies.