

Strategy to Low Carbon Society Barriers and Opportunities

**The 3rd Japan-UK Joint Research Project
on Low-Carbon Society**

February 13-15, 2008, Tokyo

**Haruki Tsuchiya
Research Institute for Systems Technologies
Tokyo, Japan**

Summary

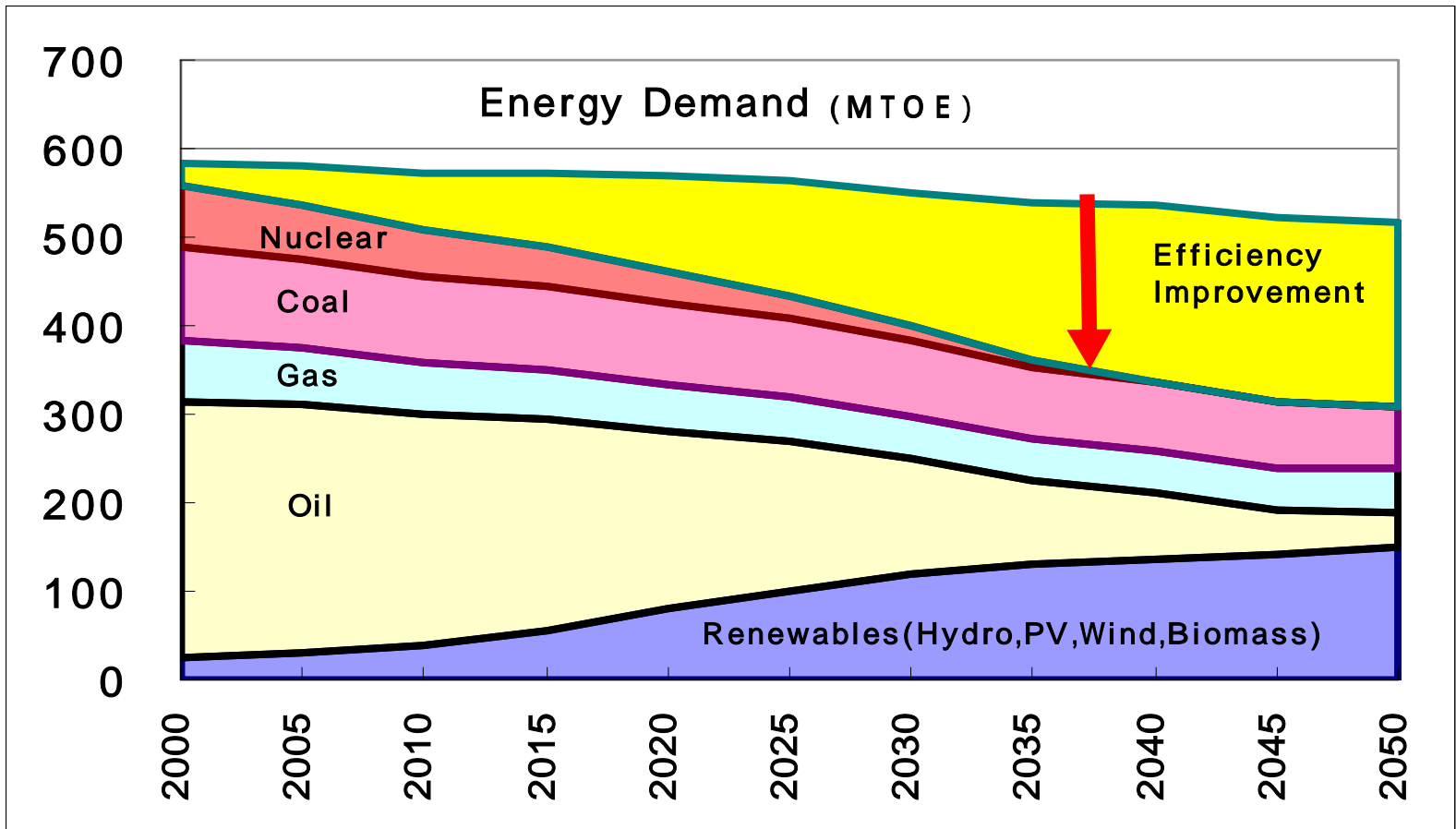
- 1. Energy Strategy to LCS**
- 2. Coal use in Energy intensive industry**
- 3. Hybrid car and Plug in Hybrid**
- 4. Photovoltaics on learning Curve**
- 5. Efficient light bulbs and LED**
- 6. Energy Policies toward LCS**

Energy Strategy for Low Carbon Society in 2050, Japan

- 1. Decrease energy demand to half of today's level in 2050 by Efficiency Improvement, twice or more.**
- 2. Supply renewable energy to the half of the energy demand in 2050.**

The CO₂ emission will be nearly 1/4 of present level.

Low Carbon Society in 2050, Japan



Decrease fossil fuel consumption to half by efficiency improvement, and renewable energy will supply to the half of demand in 2050.

Coal use in energy intensive industry

- Barriers:

Coal is main fuel and raw material for Iron & Steel industry. Cement and Paper & Pulp industry use Coal for fuels. Coal is the cheapest fuel for production of basic materials.

- Opportunities:

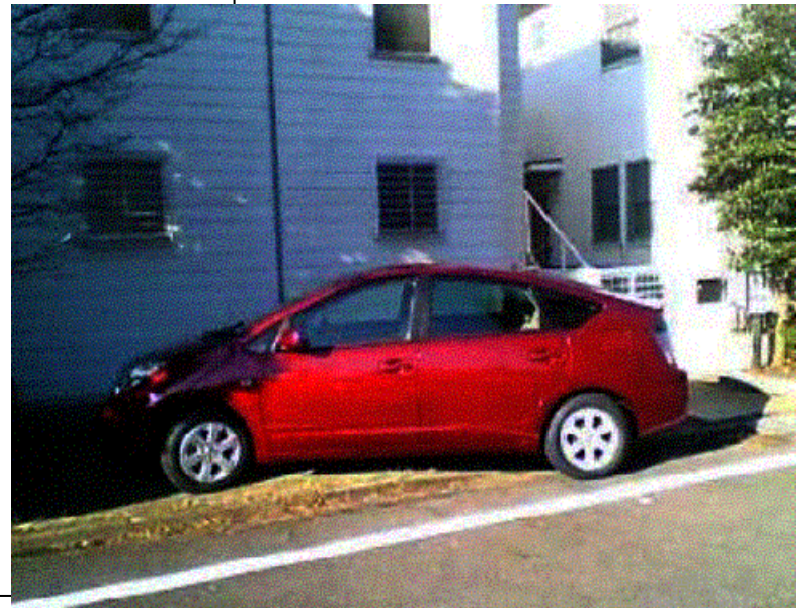
Society with less material use, Enhanced material recycle. Waste plastics are used as substitute fuels for blast furnace. Gas (and Hydrogen in the long run) will be used for iron production.

- If coal alternative be difficult, and coal will stay to play the same role (or with CCS) even after 2050, which means the production of basic materials are the last CO₂ emission industries.

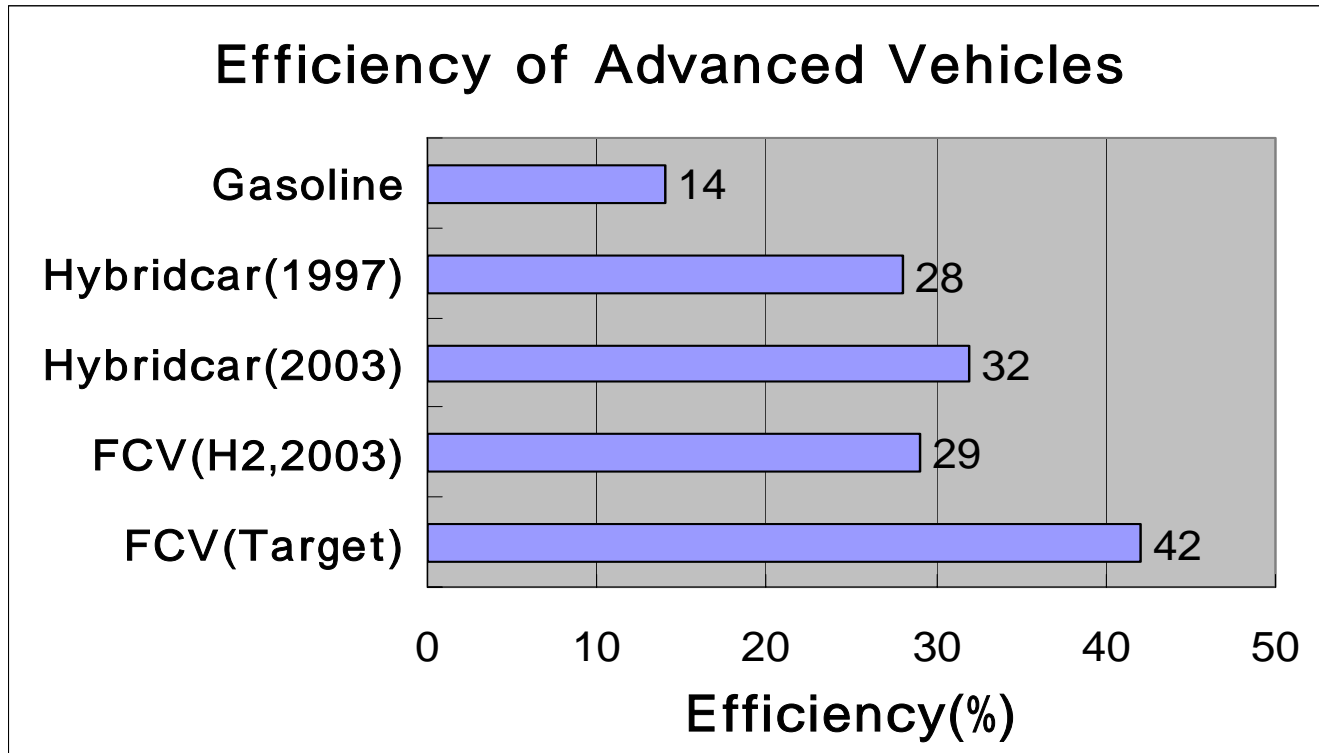
Opportunities: Hybrid Car and Plug-in Hybrid

1. Engine + Electric Motor + Battery
 2. 35km/gasL(Catalogue),
20-22km/gasL (Real), twice Efficient.
Ordinal car 10~12km/gasL(1500cc)
 3. New Infrastructure is not
necessary compared with H2.
Portable liquid fuel is excellent.
 4. Plug-in Hybrid is Emerging
(electricity supplied at home with
larger battery added)
- Barriers: So slow diffusion.
Feebate is necessary.

Toyota Prius: 670
thousands cars sold
world wide,
(1997~April,2007)

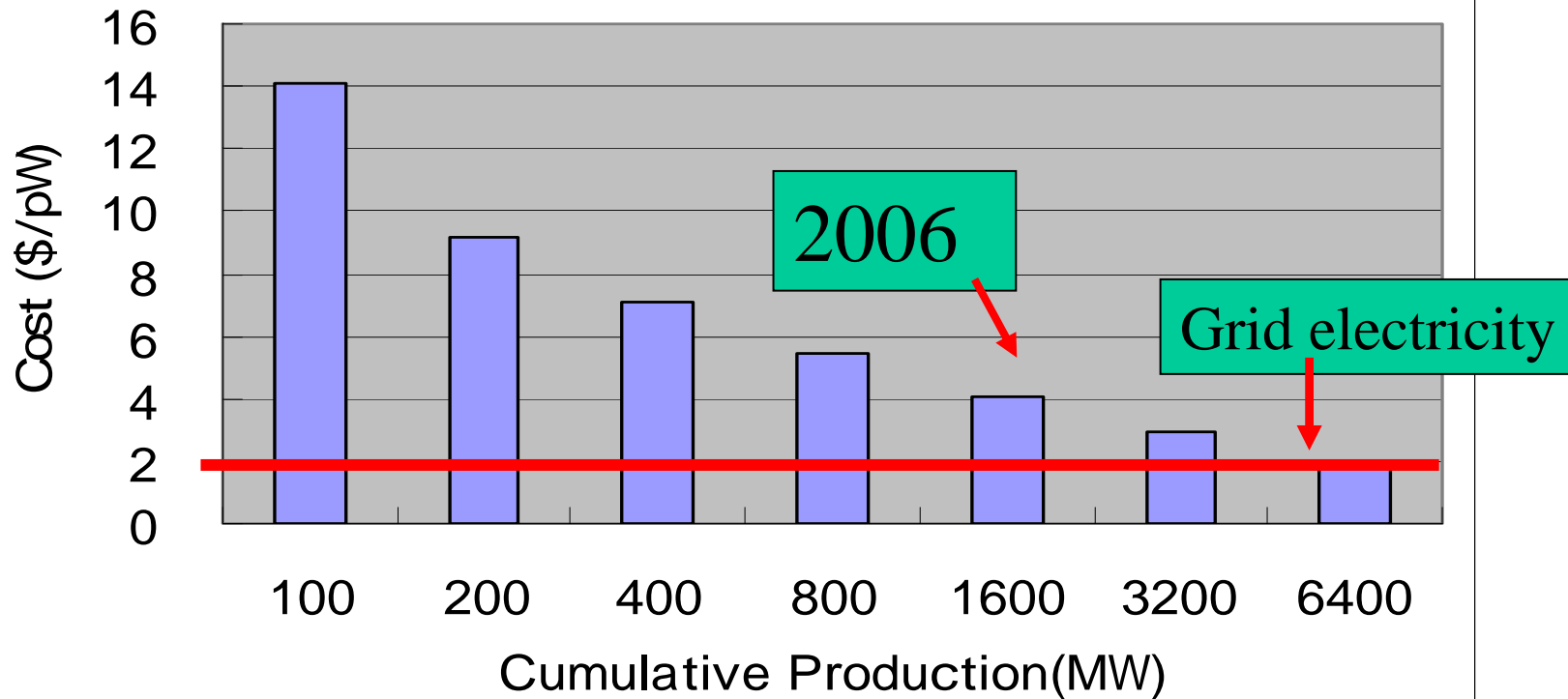


Comparison of Efficient Car



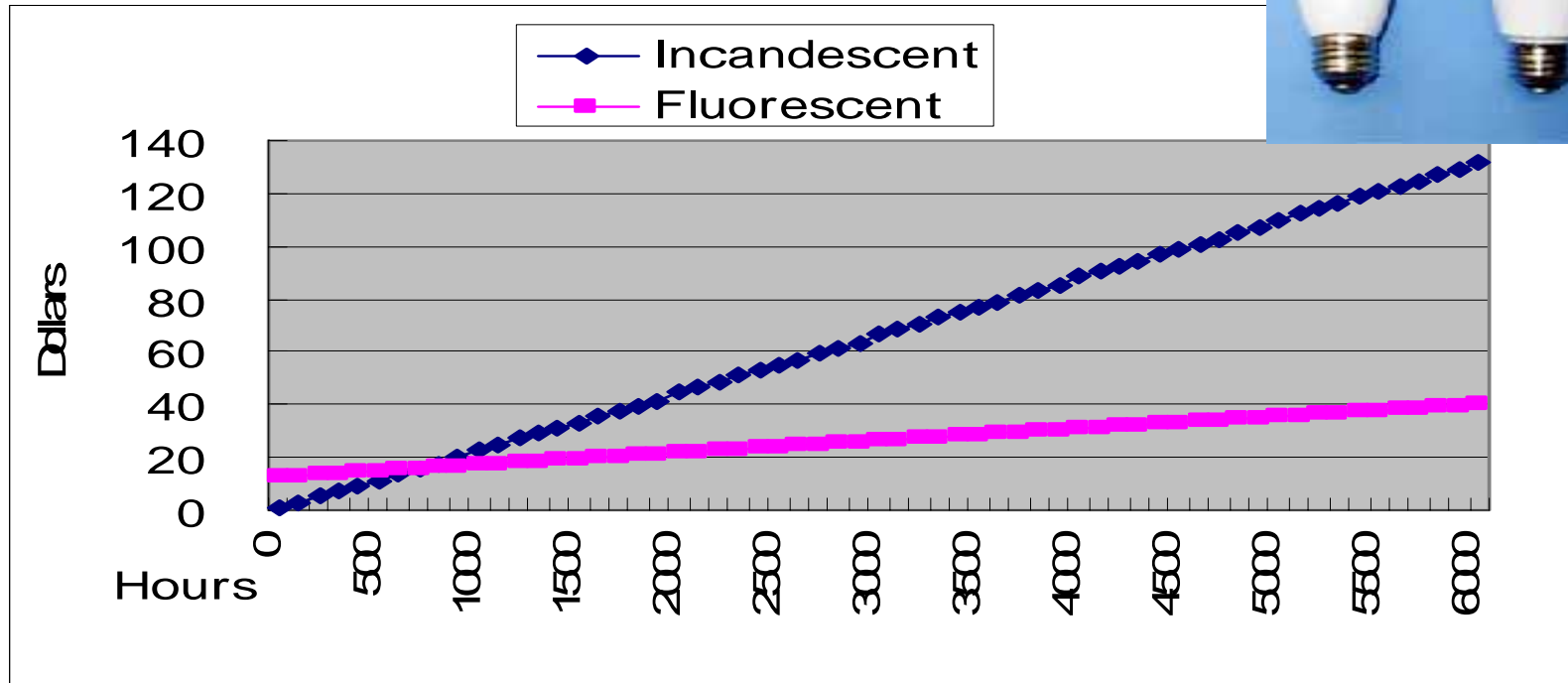
Efficiency of Hybrid car, Plug-in hybrid and Fuel Cell vehicle is twice or more than conventional gasoline engine vehicle.

Future Photovoltaics Cost



Cost of Photovoltaics reduced to 82 % each time when cumulative production doubled in 1979-2000. (Learning Curve)

Opportunities: Compact Fluorescent Bulb



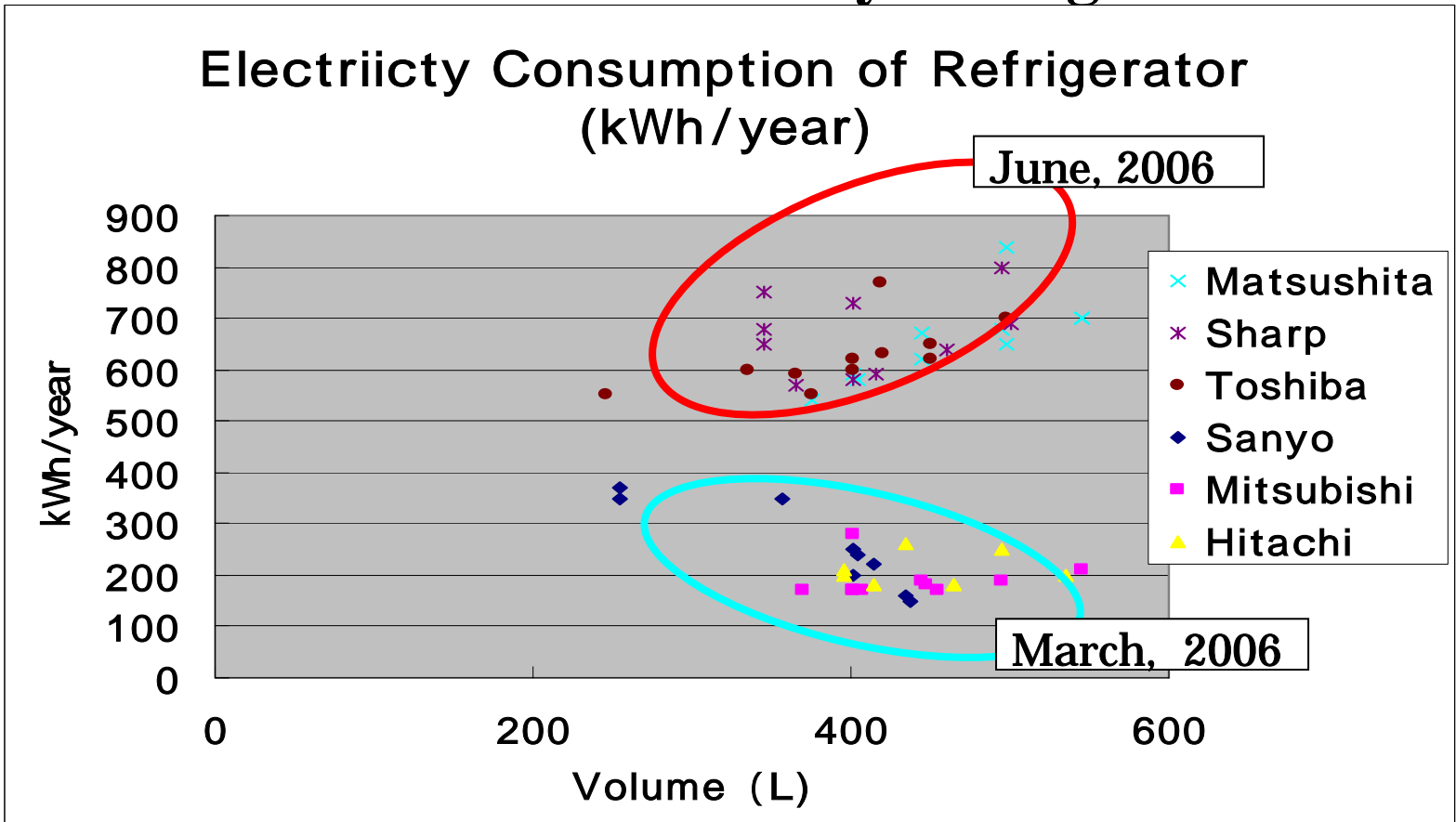
Compact fluorescent bulb has 10 times initial cost compared with incandescent bulb, but economical for $\frac{1}{4}$ electricity consumption and 6 times long life time. But it takes several ten seconds to give lumen rated. The diffusion is not so fast.

Opportunities: Light Emitting Diode (LED)

1. High Luminosity
2. Possibility of Higher Efficiency
3. End Use Today
 - 1) Emergency Exit Light
 - 2) Traffic Signal
(20% substituted of one million units,
80W incandescent =>20W LED)
 - 3) Industrial Use (Image Processing, Ve
4. Application to General Lighting when massively produced.



Barriers: Refrigerators have been measured by method established 30 years ago.



Measuring method of electricity consumption of Refrigerator is updated May 2006 as it measures by unrealistic operating conditions

Energy Policies

Toward Low Carbon Society

1. Promote energy efficiency improvement by carbon tax, feebate, regulation, and subsidies to R&D. Measuring method should be reexamined.
2. Accelerated development and diffusion of renewable energy by purchasing policy with higher price, green electricity and subsidies.
3. Encourage less use of basic material to decrease coal consumption in heavy industries.
4. Start early as it will take long time.