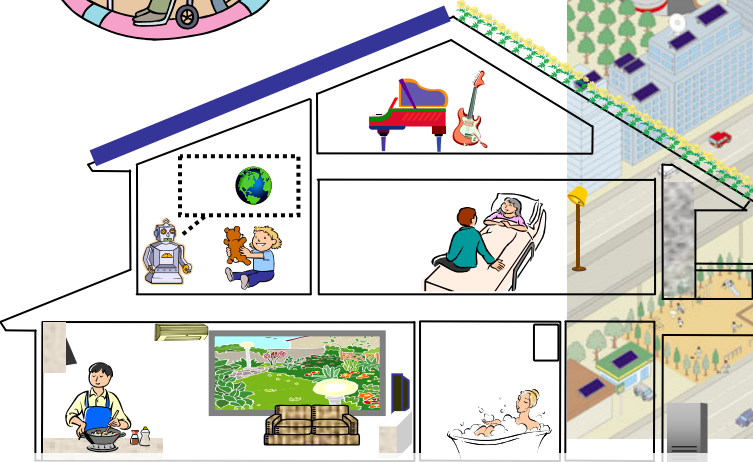
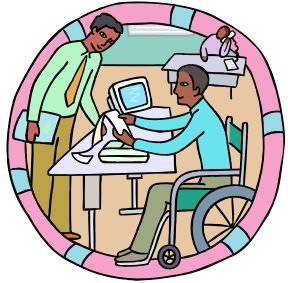


# Modeling LCS to Identify Trend-Breaking Options



Junichi Fujino (fuji@nies.go.jp)

NIES (National Institute for Environmental Studies)

COP12 and COP/MOP2 Side Event, "Global Challenges

Toward a Low-Carbon Society (LCS) Through Sustainable Development (SD)"

November 8, 2006 in Nairobi, Kenya

1978



1979



1998 **Himalayan Glaciers**

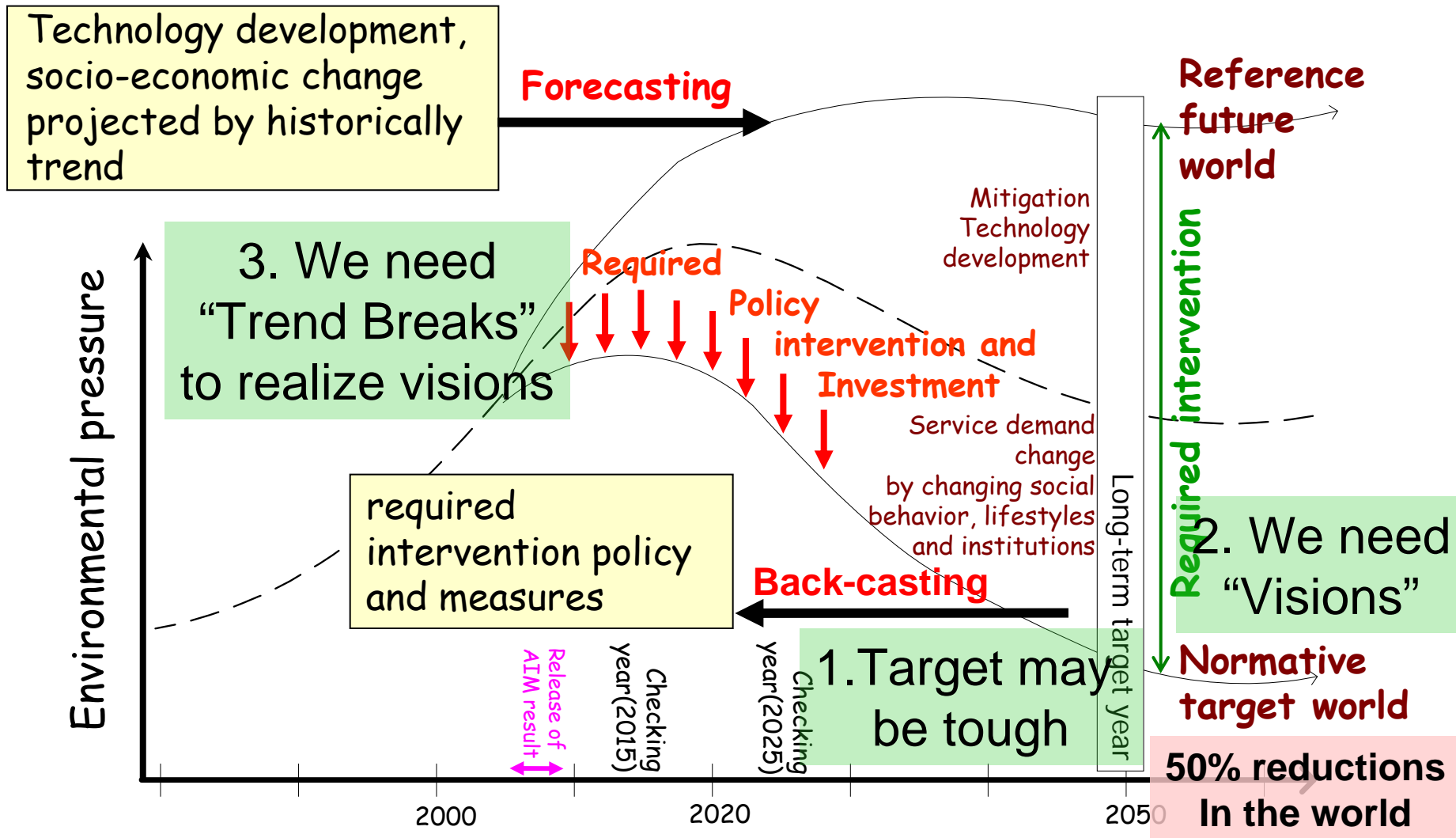


2003 North Pole Ice in Sep.


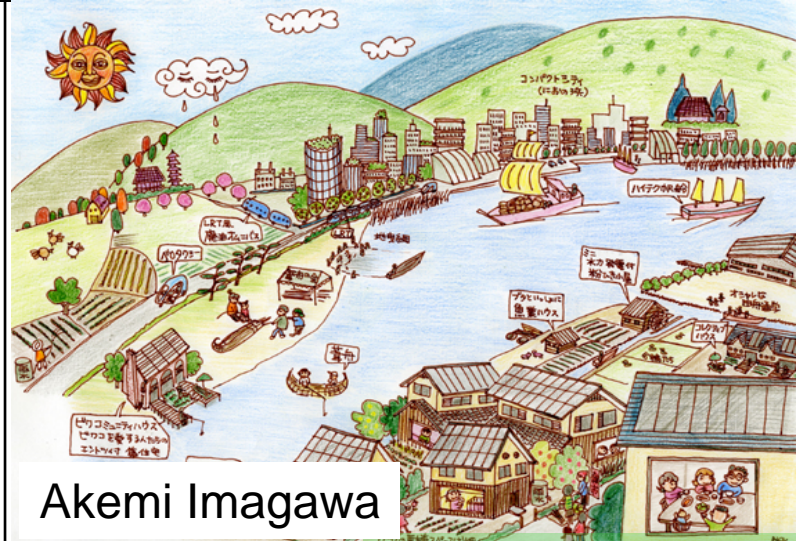


Source: NASA

# Back-casting from future target world

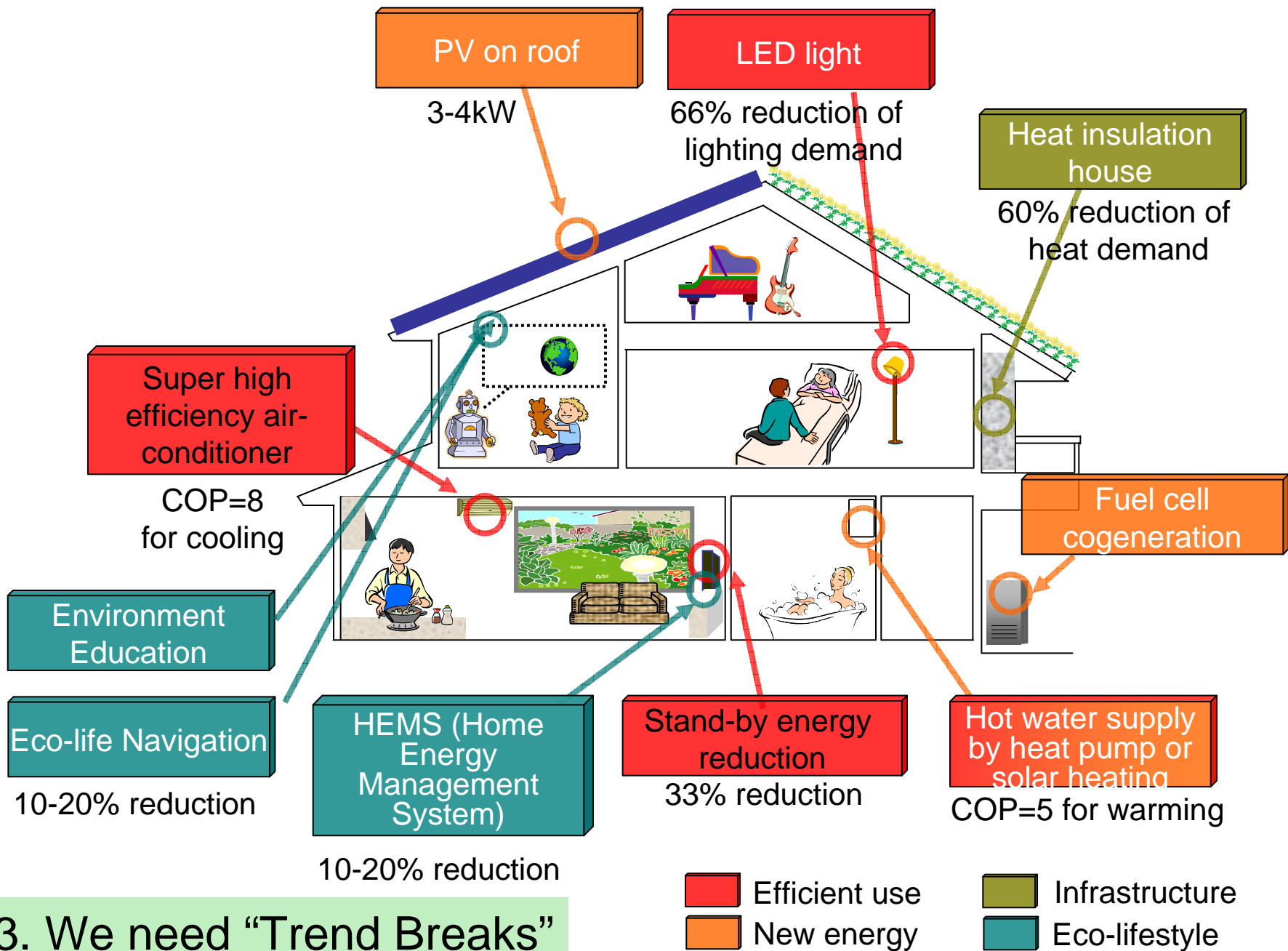


# As for LCS visions, we prepared two different but likely future societies

Vision A	Vision B
Vivid, Technology-driven	Slow, Natural-oriented
Urban/Personal	Decentralized/Community
Technology breakthrough Centralized production /recycle	Self-sufficient Produce locally, consume locally
Comfortable and Convenient	Social and Cultural Values
	 <p>Akemi Imagawa</p>

2. We need "Visions"

# Depict Future Image: Residential sector in 2050

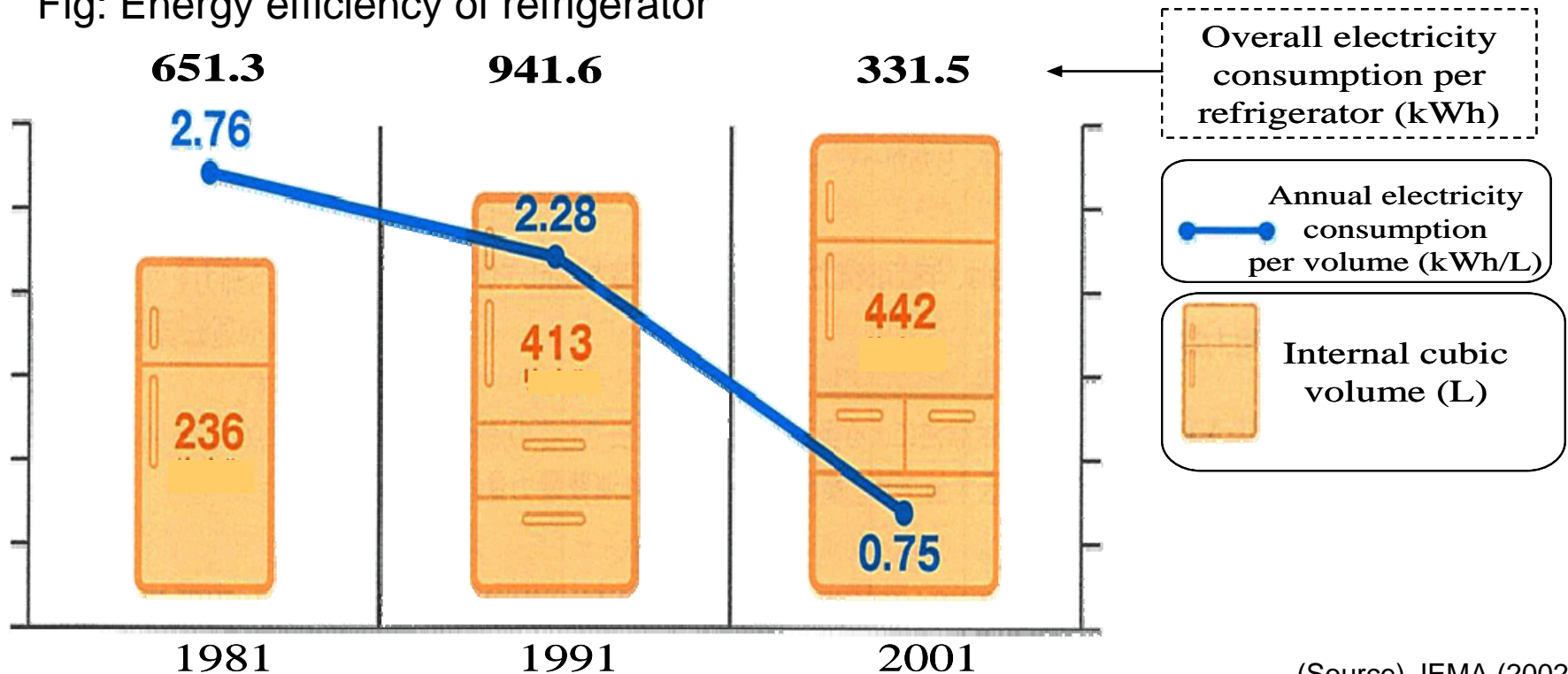


3. We need "Trend Breaks"

# Top Runner Program: Efficiency Improvement

- The “Top Runner Program” has
  - stimulated competition and innovation in the market,
  - diffused existing technologies, and
  - enhanced industrial competitiveness
- It created “win-win” situation and virtuous cycle.

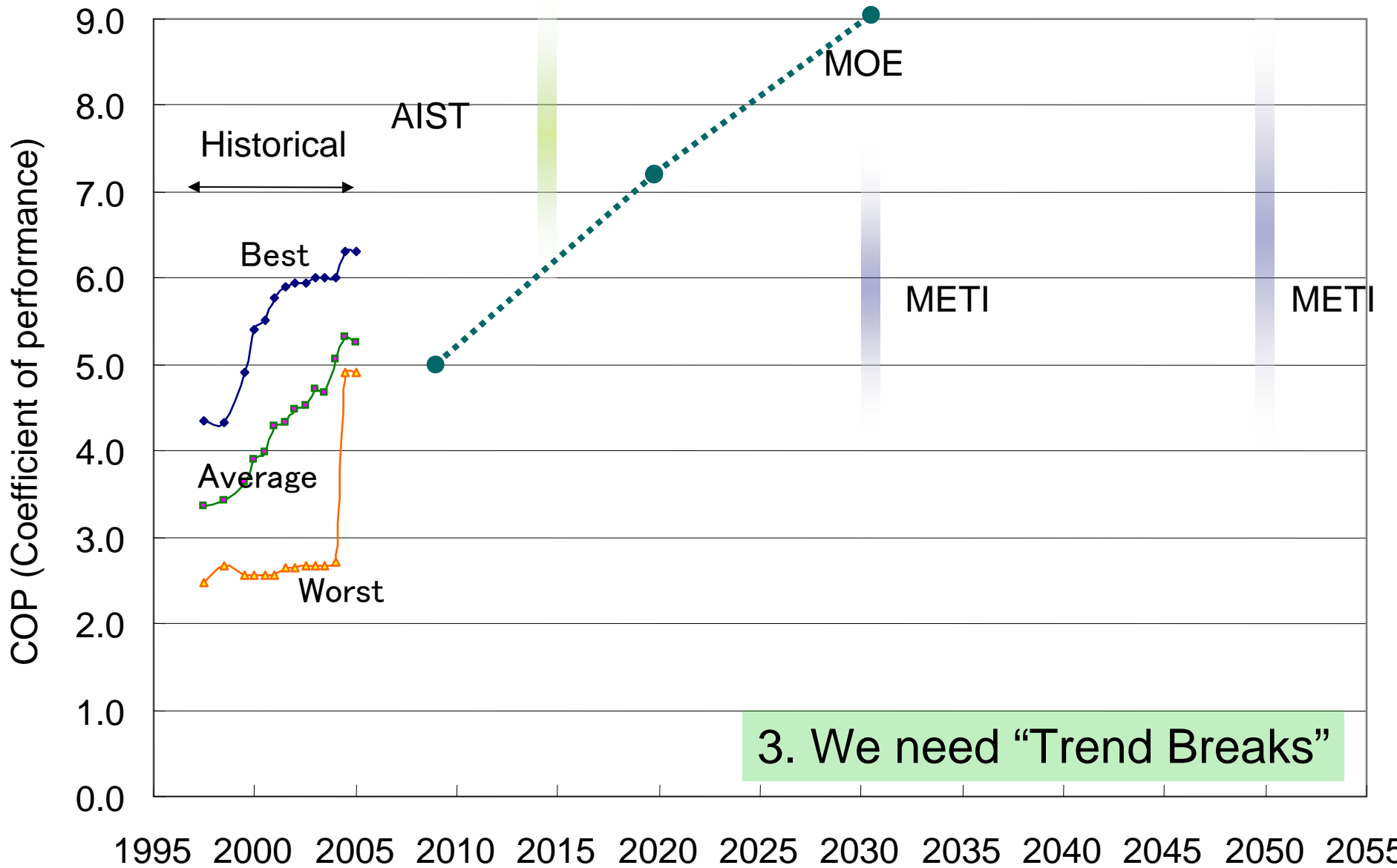
Fig: Energy efficiency of refrigerator

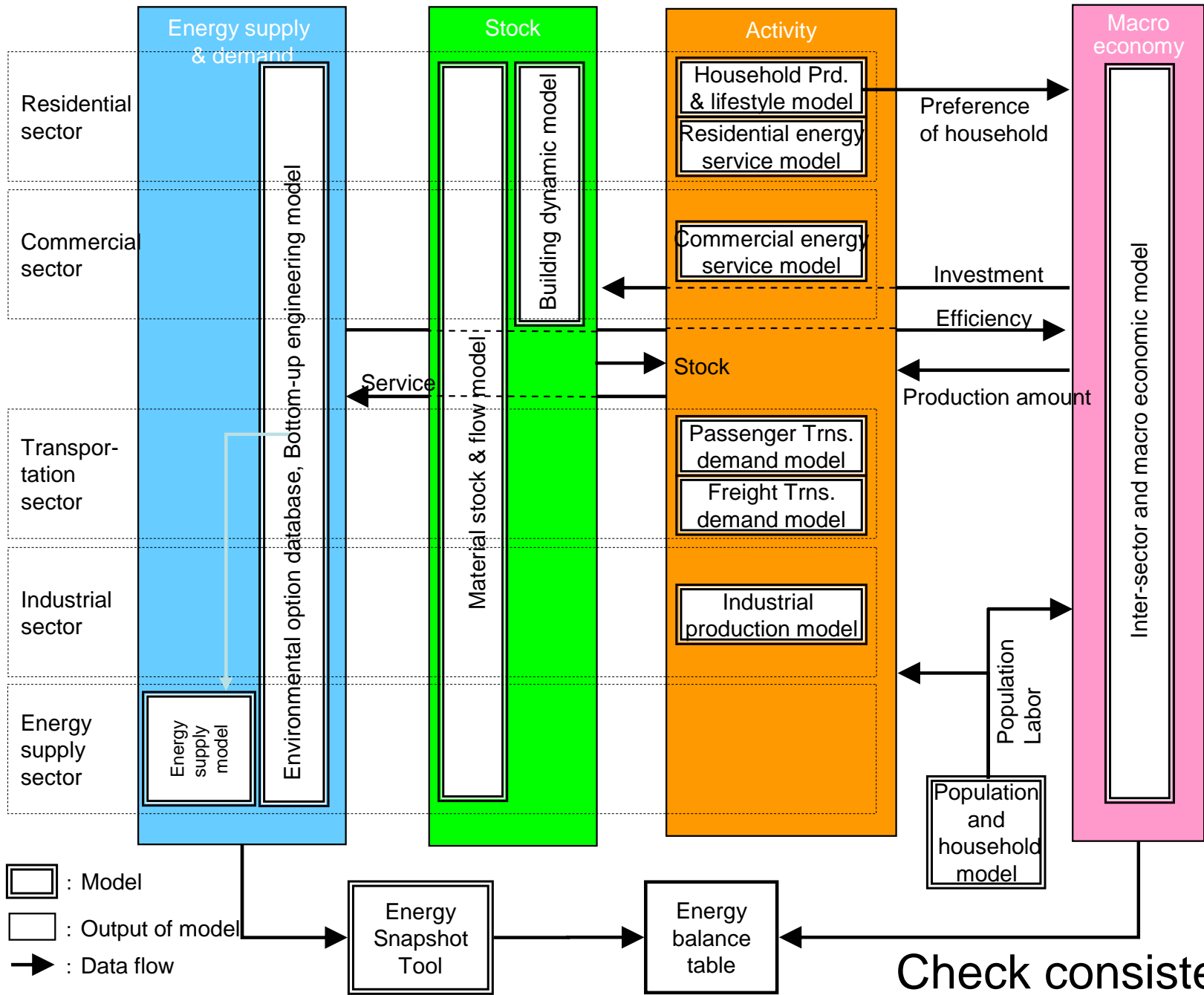


(Source) JEMA (2002)

3. We need “Trend Breaks”

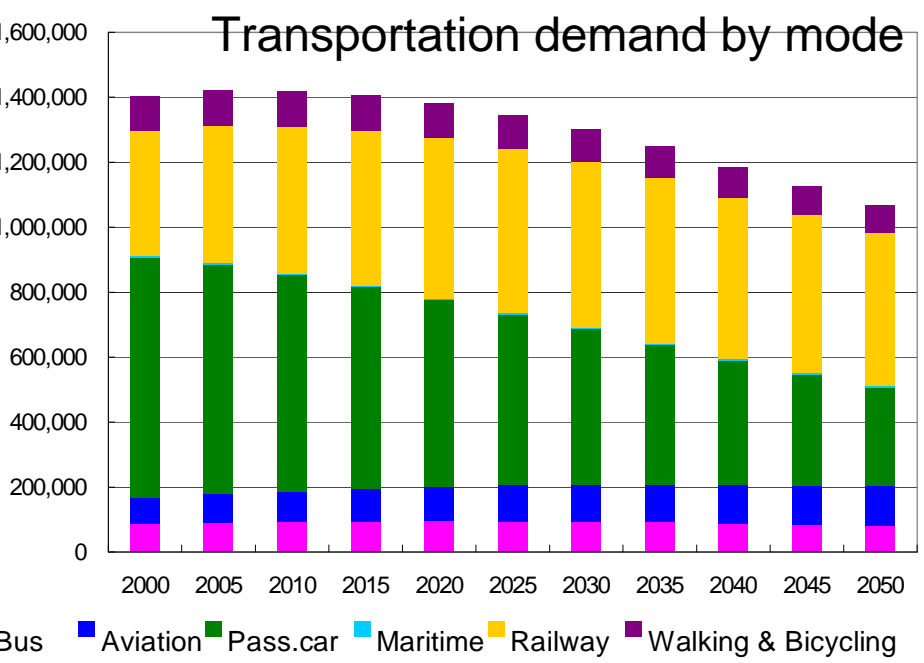
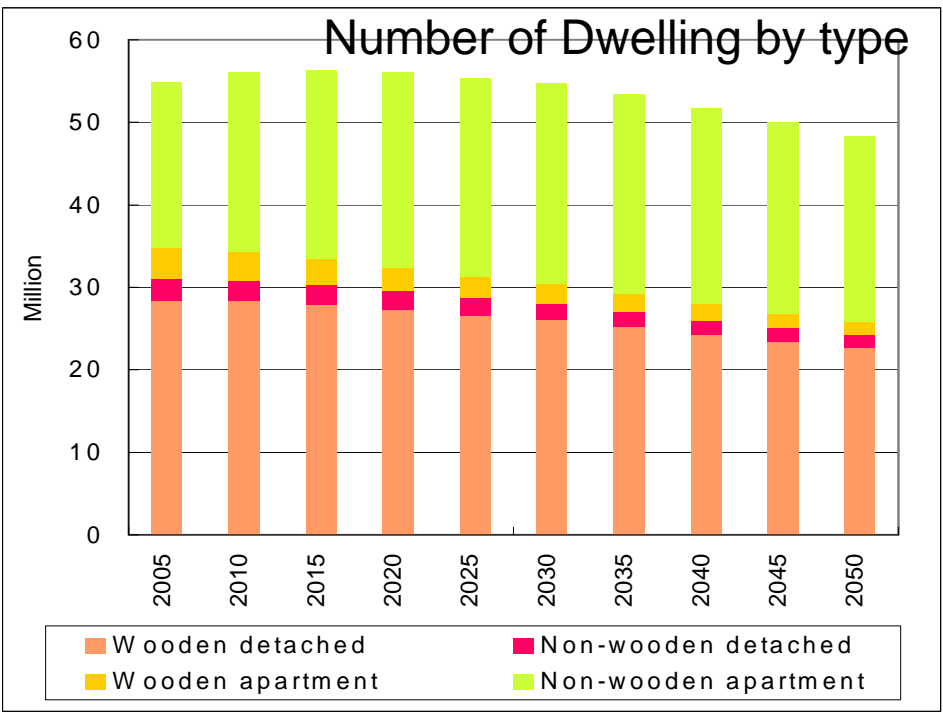
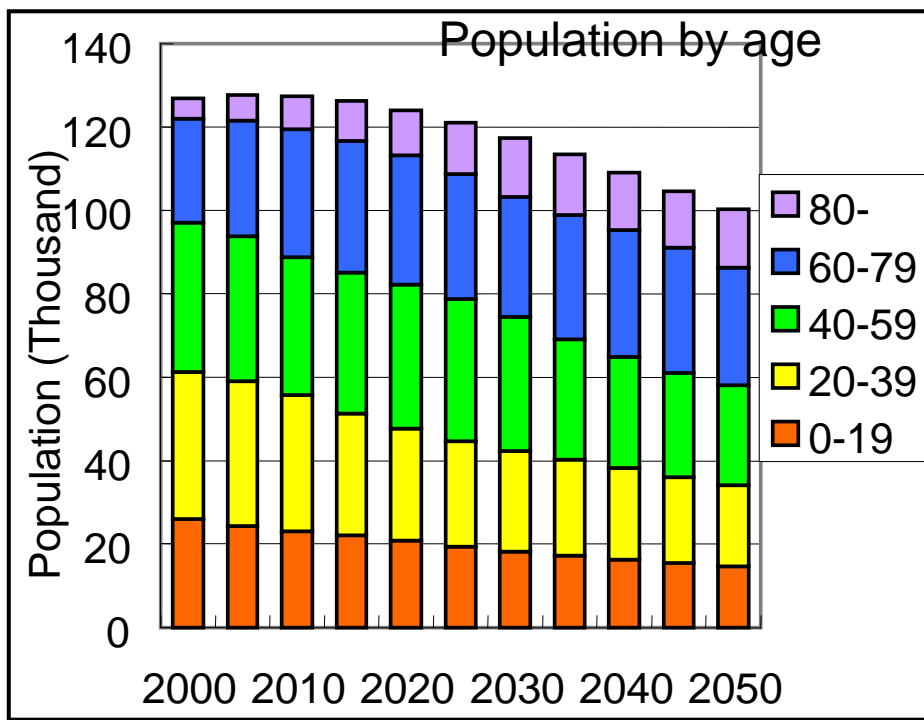
# Projected energy efficiency improvement: Air-conditioners for cooling and heating





**AIM (Asia-Pacific Integrated Model) for Japan LCS scenarios**



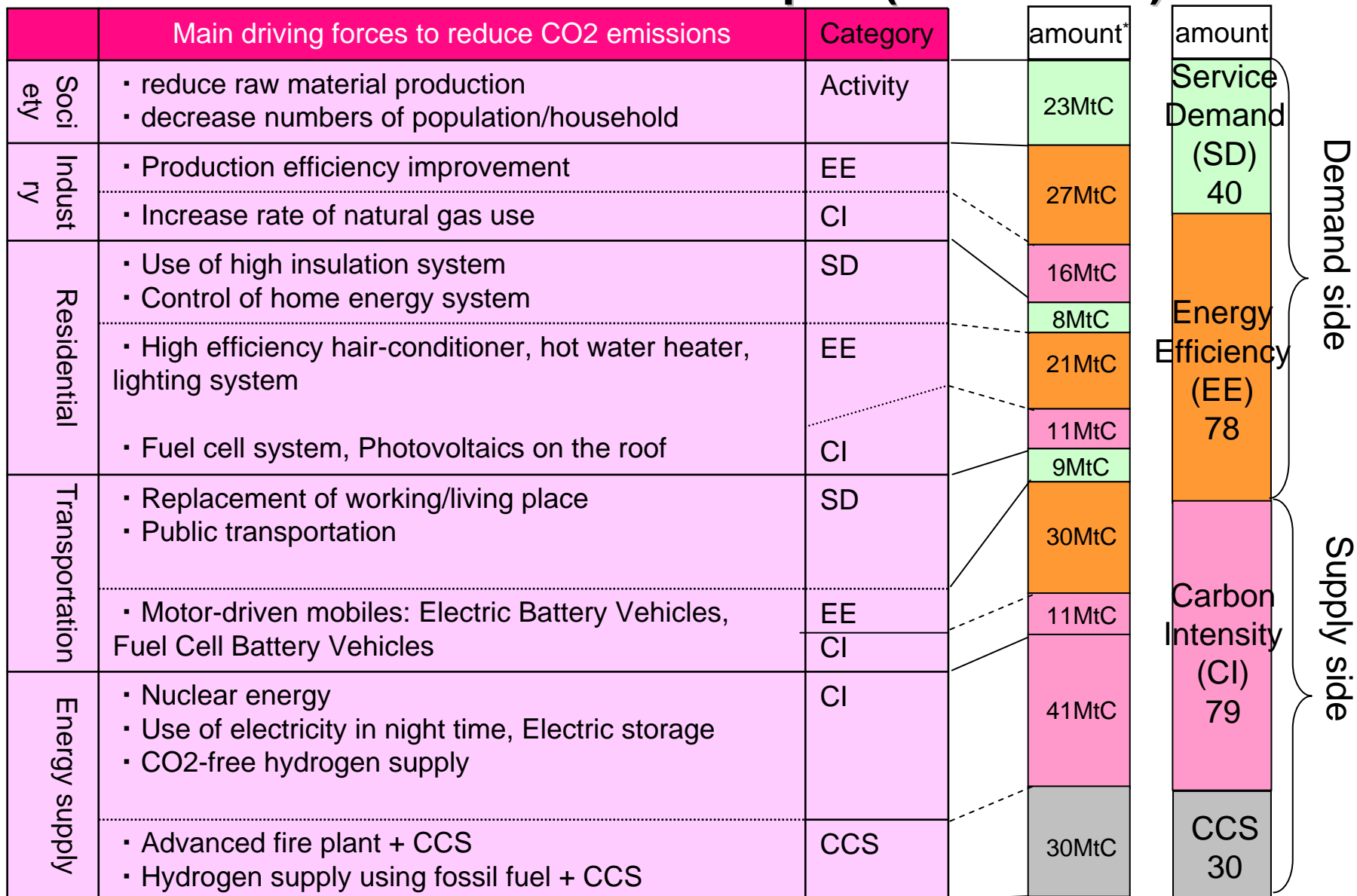


The screenshot shows the Microsoft Access interface for an 'Activity' table. The table contains the following data:

No.	Scenario	2000	2010	2020	2030	2040	2050
1	SP	0	0	0	0	0	0
2	CH1	0	0	0	0	0	0
3	CH2	0	2,000	4,000	6,000	8,000	10,000

Below the table is a diagram showing transitions between vehicle types: a red car to a green bus, and a red car to a blue bus. The interface also includes fields for 'Sector' (TR: Transportation sector), 'Env. Issue' (CC: Climate Change), and 'Activity Line' (Form).

# Possible trend-breaking options to achieve 70% reductions toward 2050 in Japan (Scenario A)



\* CO2 reduction amount compared with the emissions in 2000

# Factor decomposition of CO2 emission reduction in 2050 Japan using Kaya Identity

$$C = D \times \frac{E}{D} \times \frac{C'}{E} \times \frac{C}{C'}$$

C : CO2 emissions  
 D : Activity  
 E : Energy demand  
 C' : CO2 emissions (excluding energy conversion sector)

$$\frac{\Delta C}{C} = \frac{\Delta D}{D} + \frac{\Delta(E/D)}{(E/D)} + \frac{\Delta(C'/E)}{(C'/E)} + \frac{\Delta(C/C')}{(C/C')} + \text{Cross}$$

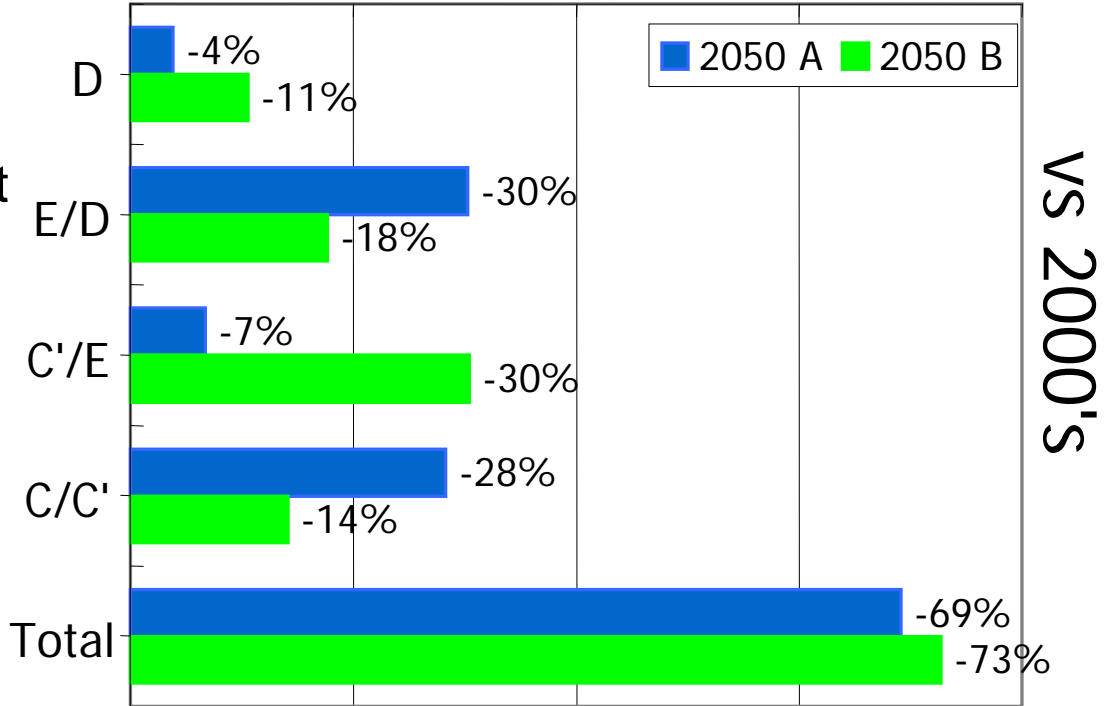
0%                      -20%                      -40%                      -60%                      -80%

Service demand improvement

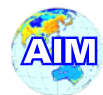
Energy efficiency improvement in end-use sectors

Fuel mix change in end-use sectors

Fuel mix change in Energy conversion



VS 2000'S



# We support country-wise LCS modeling through SD for Asia-Pacific and the world

- We have continued AIM Training Workshops since 1995 -

16-20 Oct 2006 at NIES



India



China



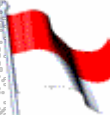
Thailand



Korea



Malaysia



Indonesia



Brazil



Russia



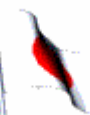
South Africa



Taiwan, China

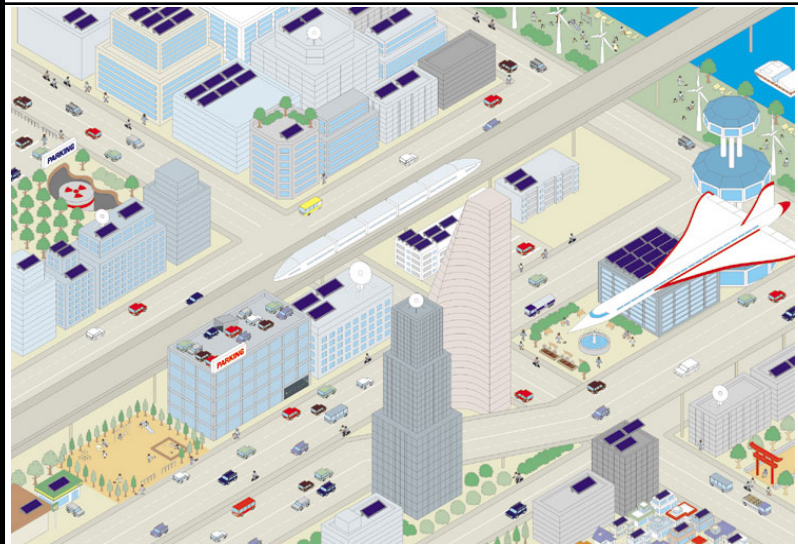
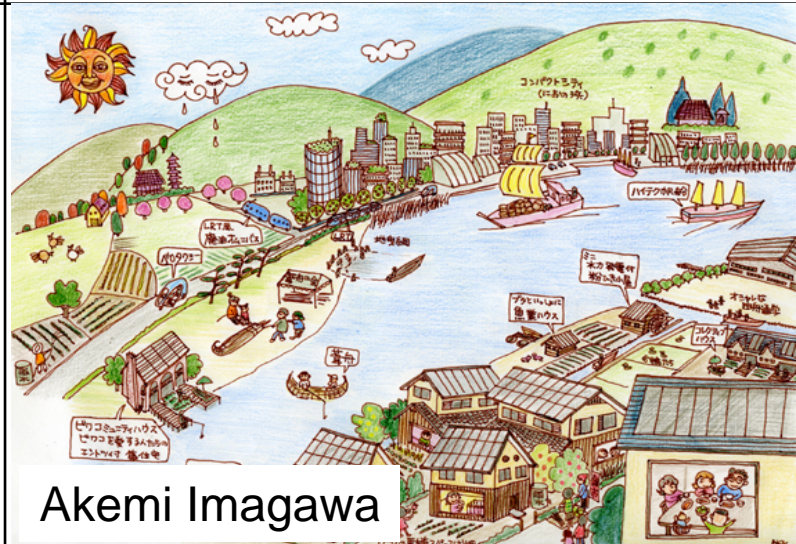


USA



Japan

# We qualify and quantify possible future LCS visions using AIM models

Vision A	Vision B
Vivid, Technology-driven	Slow, Natural-oriented
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