

Energy Indicators and their Application to Sectoral Approach



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Paris, 22nd October 2008

Overview

Energy Indicators

- enable assessment of economy-wide **energy efficiency** and **carbon intensity**
- give **CO2 abatement potential**

With Energy Indicators derived from sufficiently specific data, policy makers can

- indentify **sectoral problems and solutions** for emission reduction
- share **concrete, efficient and global actions**

International Efforts

- Indicator work done for **G8 Gleneagles Action Plan** by IEA (2006-2008 July)
 - “Worldwide Trends In Energy Use and Efficiency”
 - “Energy Use in the New Millennium”
 - “Tracking Industrial Energy Efficiency and CO₂ Emissions”
 - “Energy Efficiency Indicators for Public Electricity Production from Fossil Fuels”

- Activities of international **industrial associations** (IAI, WBCSD, IISI, ICCA, etc.)

- **International cooperation** (APP, APEC, EAS)
 - Sharing Best Practices
 - Setting target, making Action Plans
 - Collecting process/product level energy/emission data (APP)

Afternoon session,
today

Room for improvement

The best indicators have direct link with “Best Practice”

- Iron & Steel / Cement; Penetration ratio of Best Available Technologies

Other indicators have some **room for improvement** to be linked with “Best Practice”

- Road Transport; Energy use per vehicle – This indicator includes country-size difference, which is out of scope of comparable efforts
- Such “noise” can be cleared by taking **a few steps further in data collection efforts.**

Iron & Steel / Cement

- Penetration ratios of Best Available Technologies have been measured.
- Each countries' potential can be estimated by summing up potentials of Best Available Technologies to be installed to production process

Figure 3.2 ► CO₂ Reduction Potentials in Iron and Steel in 2005, Based on Best Available Technology

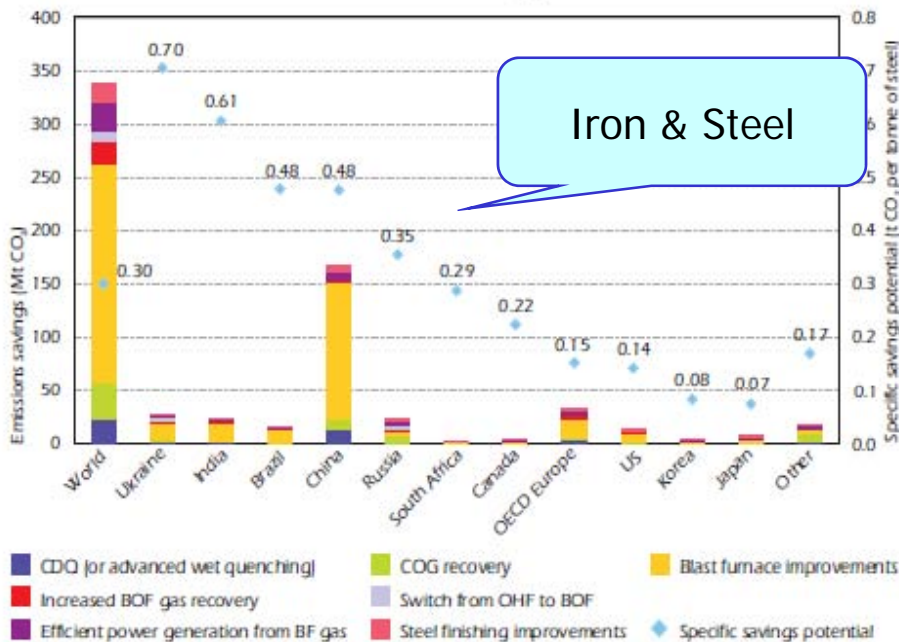
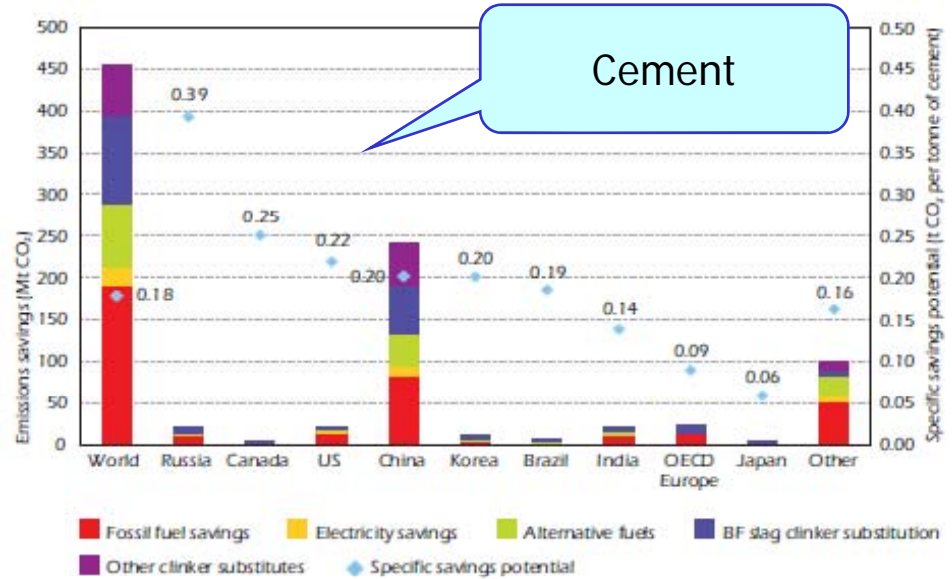


Figure 3.4 ► CO₂ Reduction Potentials in Cement in 2005, Based on Best Available Technology



Source: IEA analysis.

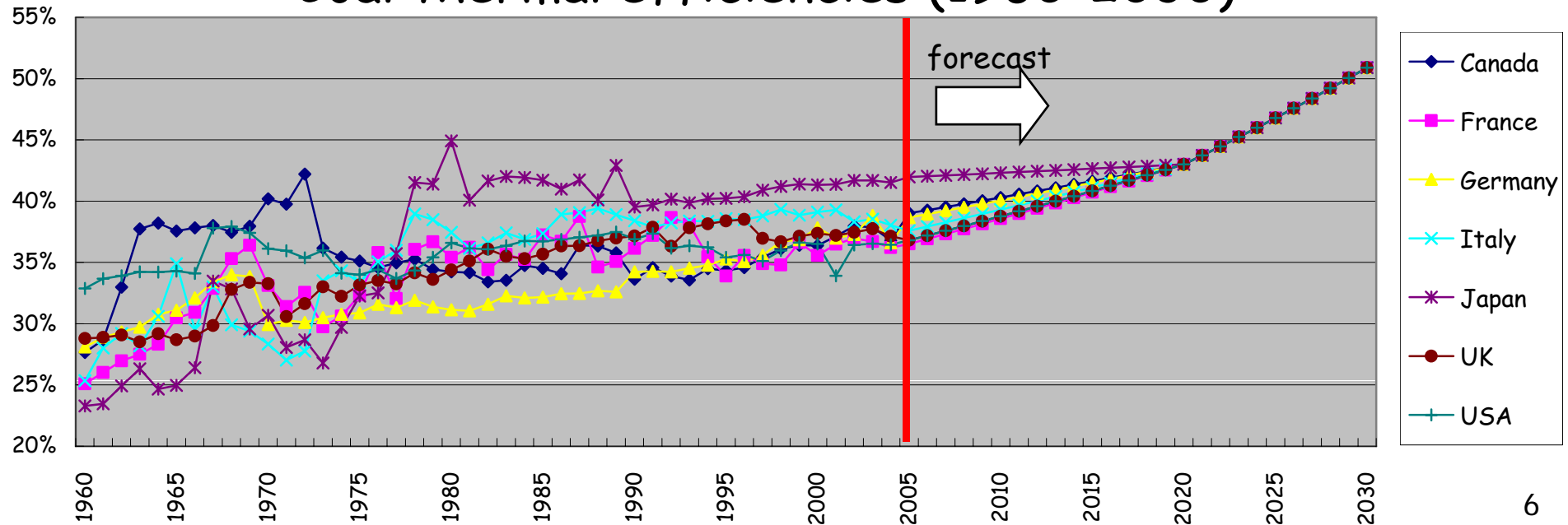
Source: IEA analysis.

Source: IEA, Worldwide Trends

Power Generation Sector

- Performed thermal efficiencies have been measured.
- In this presentation, proposed benchmark for 2030 is 50.9%, the efficiency of IGCC in ideal operation.
- However, thermal efficiencies are influenced by capacity factor of each plant.
- Removing this influence by data collection will make this indicator more comparable.

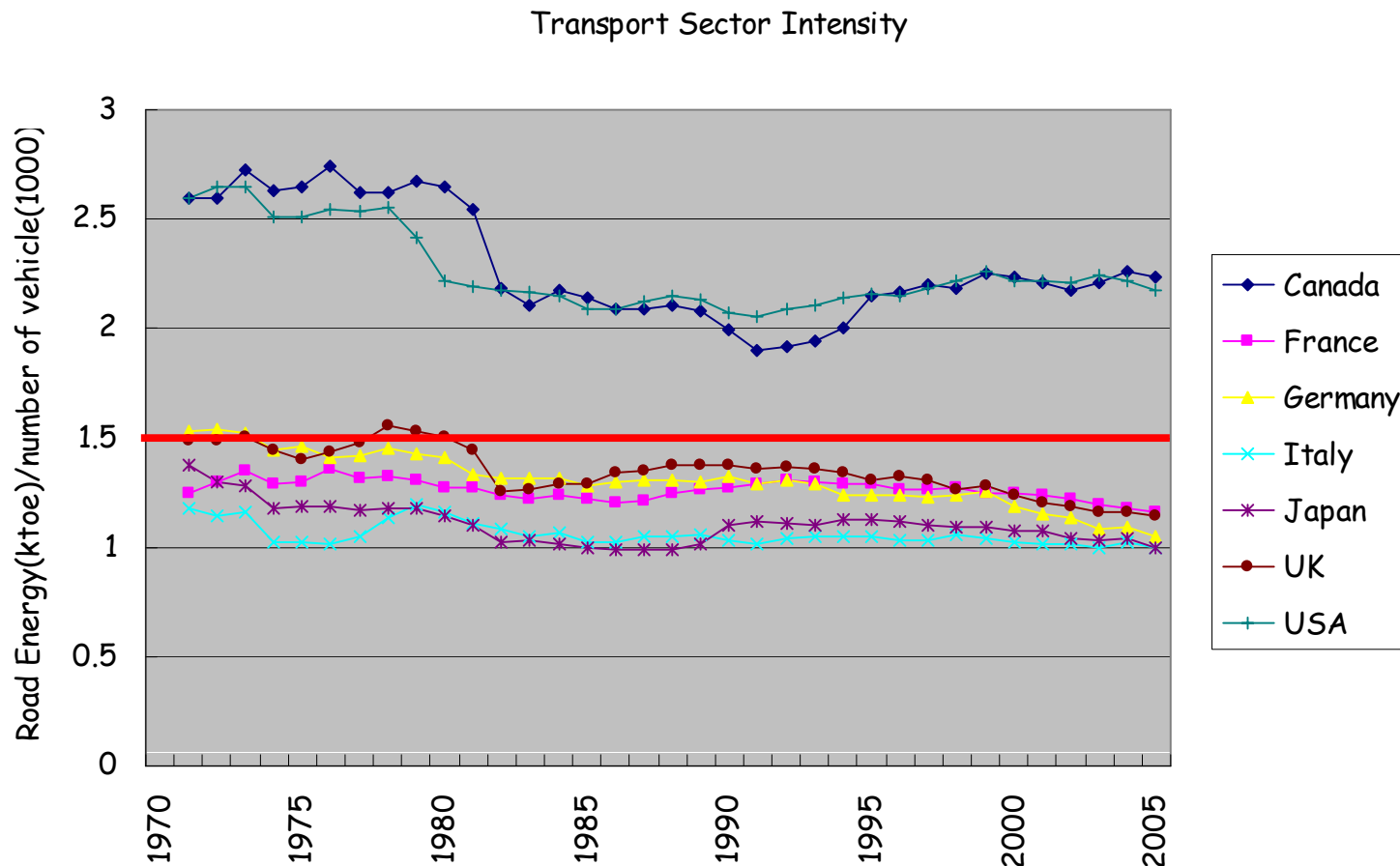
Coal thermal efficiencies (1960-2030)



Road Transport

- Energy per vehicle indicator have been derived from statistics.
- This indicator includes country-size difference.

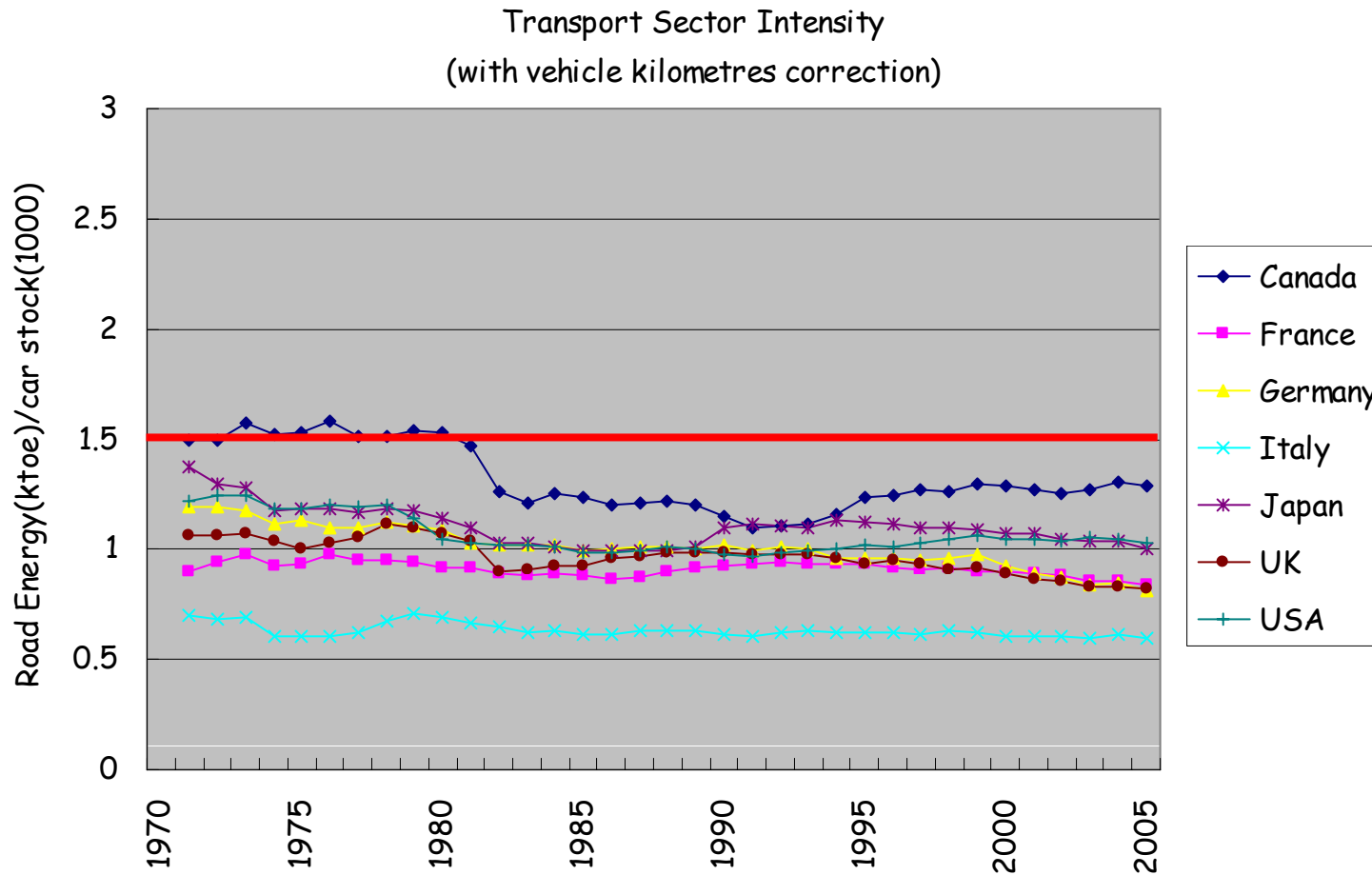
Energy per vehicle



Road Transport

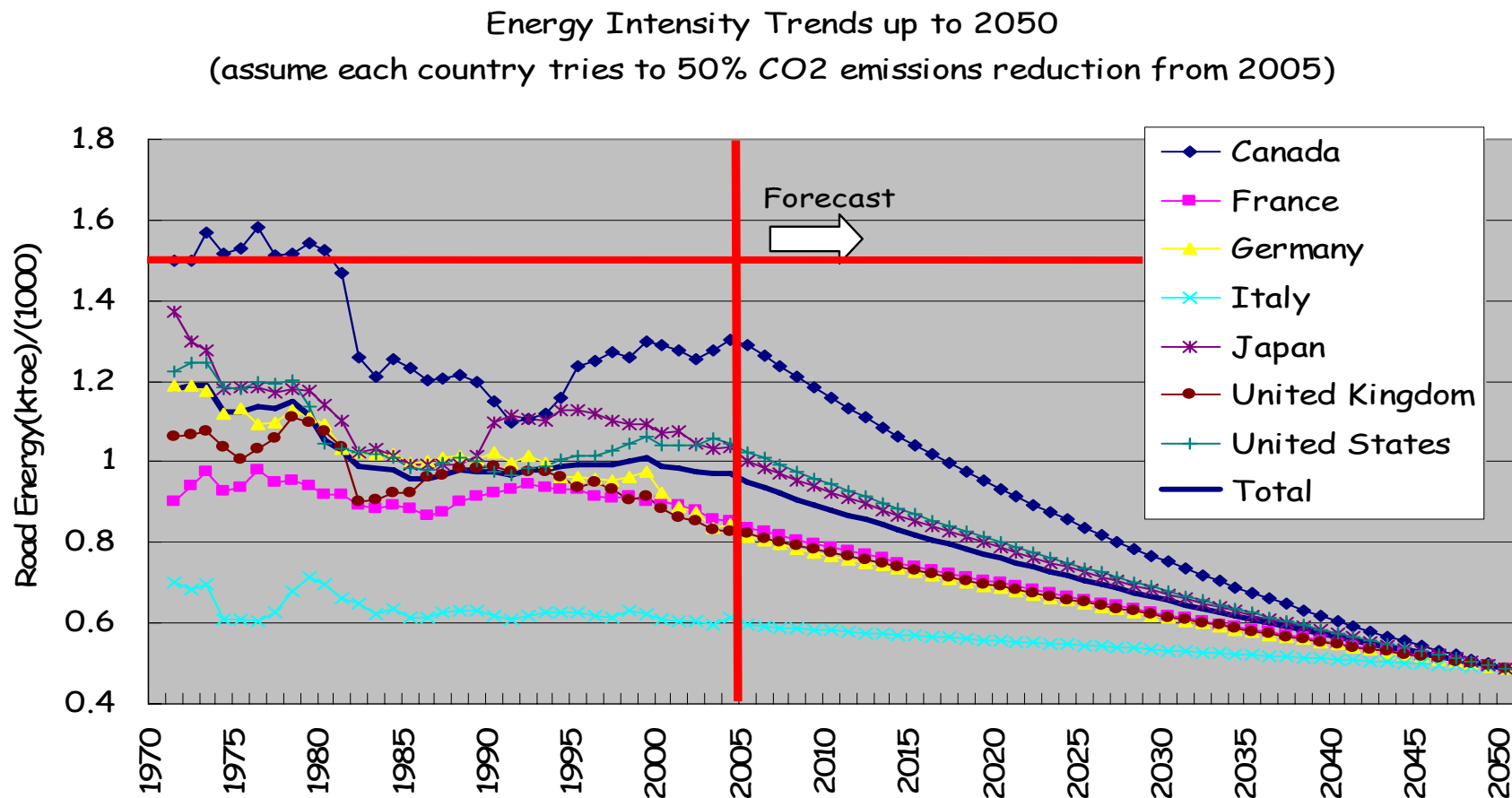
- Vehicle-km correction has improved this problem.
- Removing yet remaining factors will further improve comparability of cross-country indicators.

Energy per vehicle

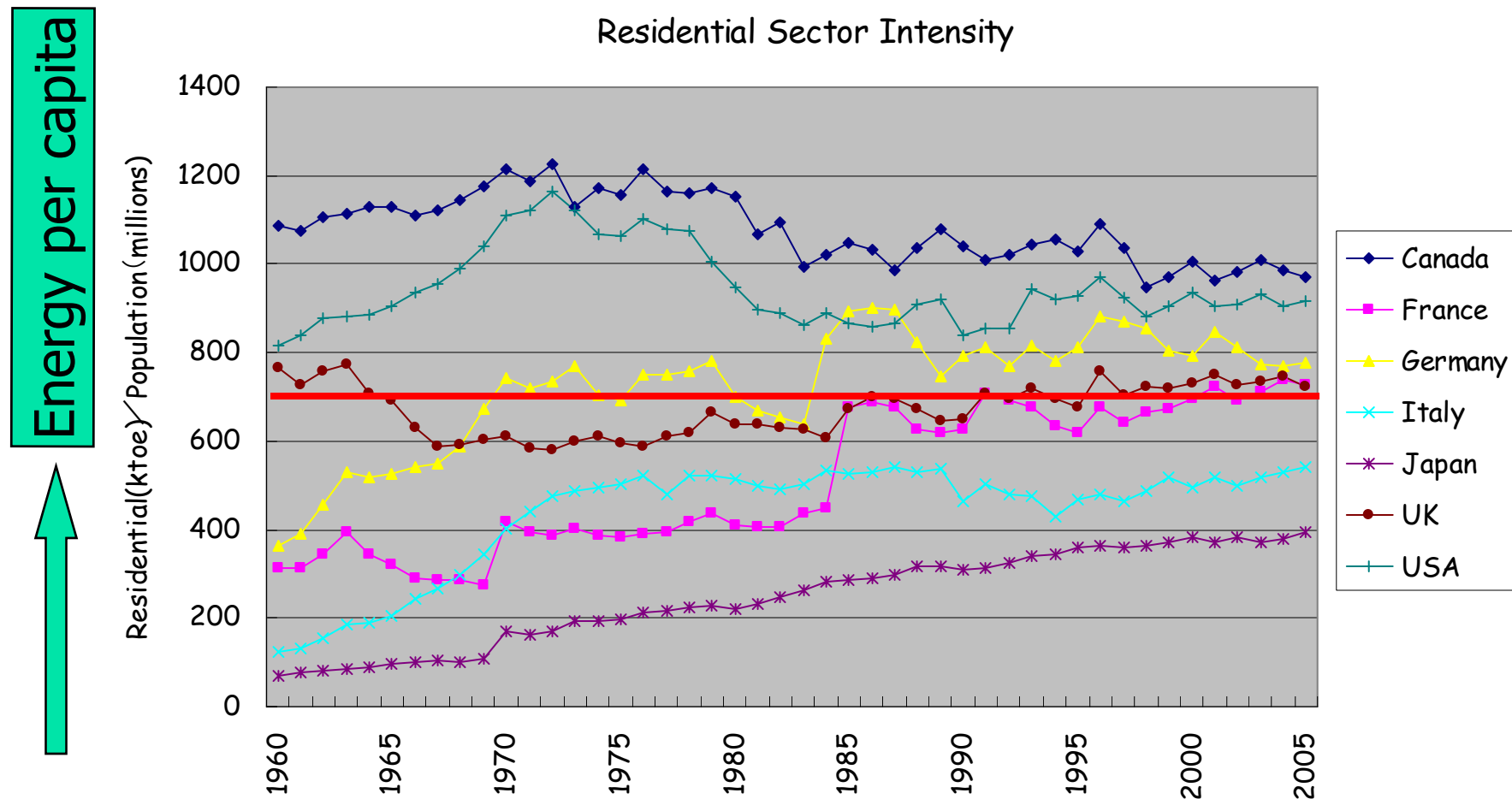
Transport Sector Intensity

- In this presentation, proposed benchmark for 2050 is set to lower the aggregate emission level of G7 below 50% of 2005 level.



Residential Sector

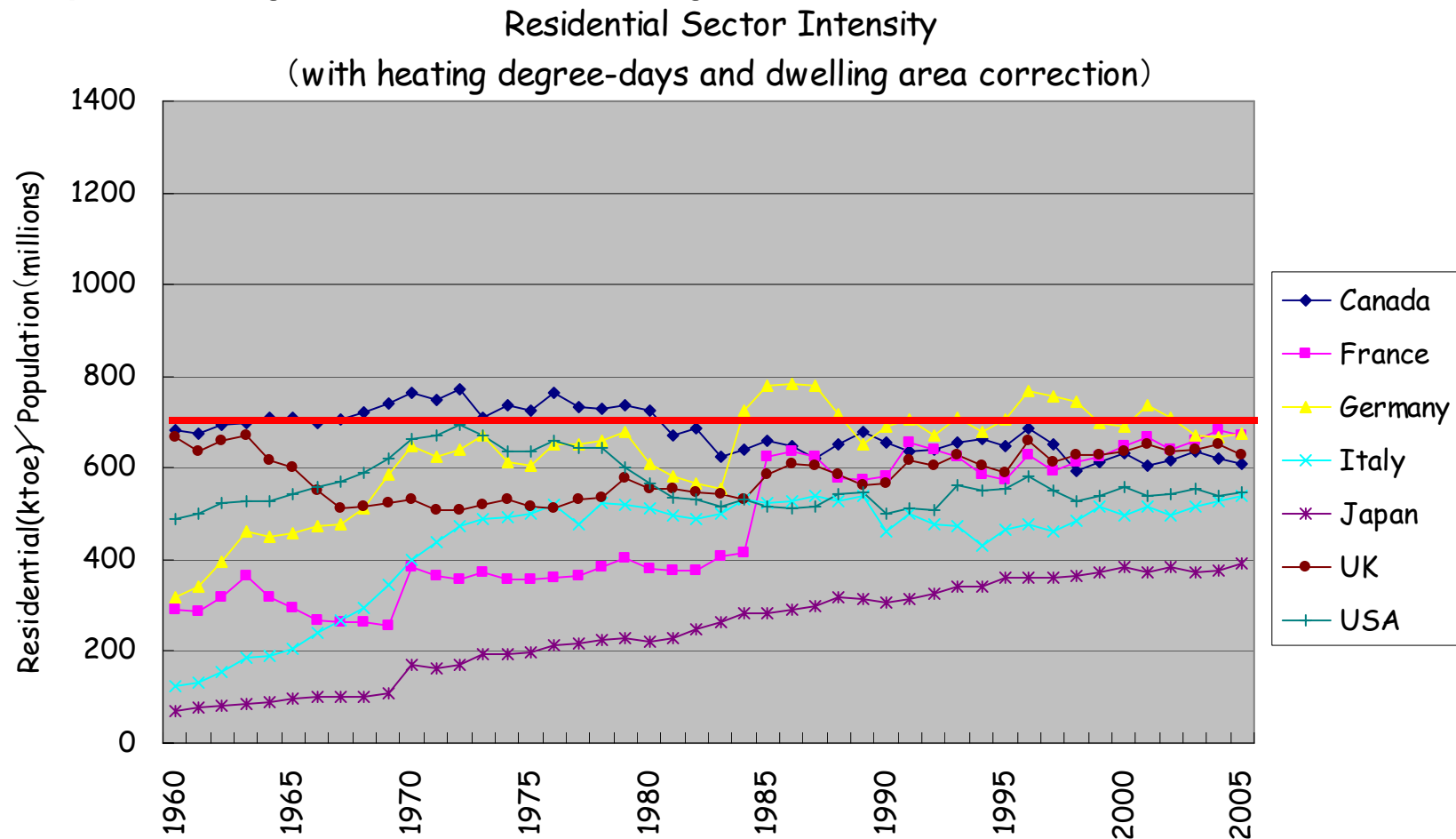
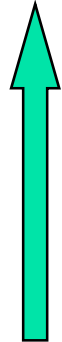
- Energy per capita indicator have been derived from statistics.
- This indicator includes diversity of climate and dwelling area size.



Residential Sector

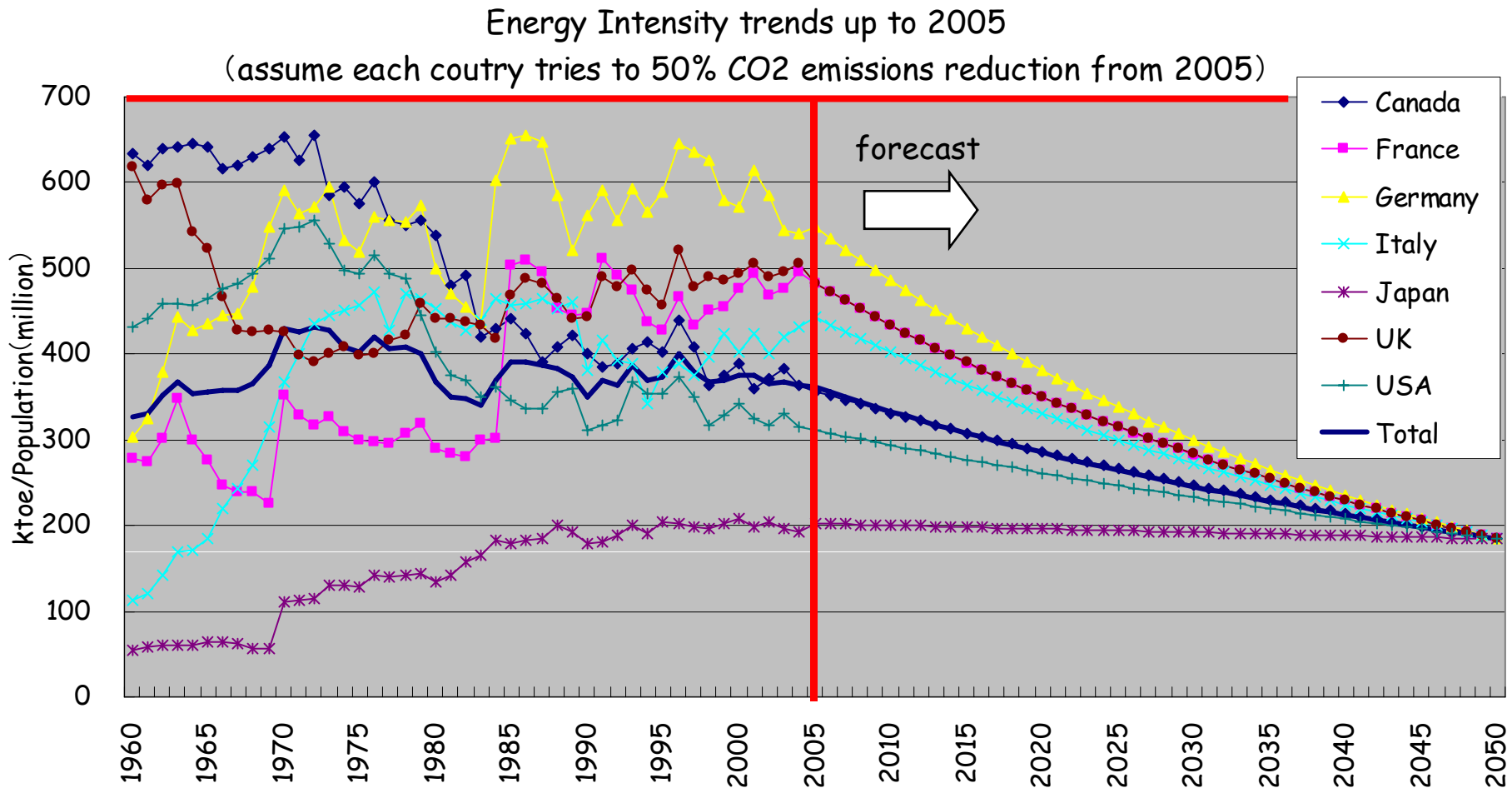
- Climate and dwelling area corrected
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Energy per capita



Residential Sector Intensity

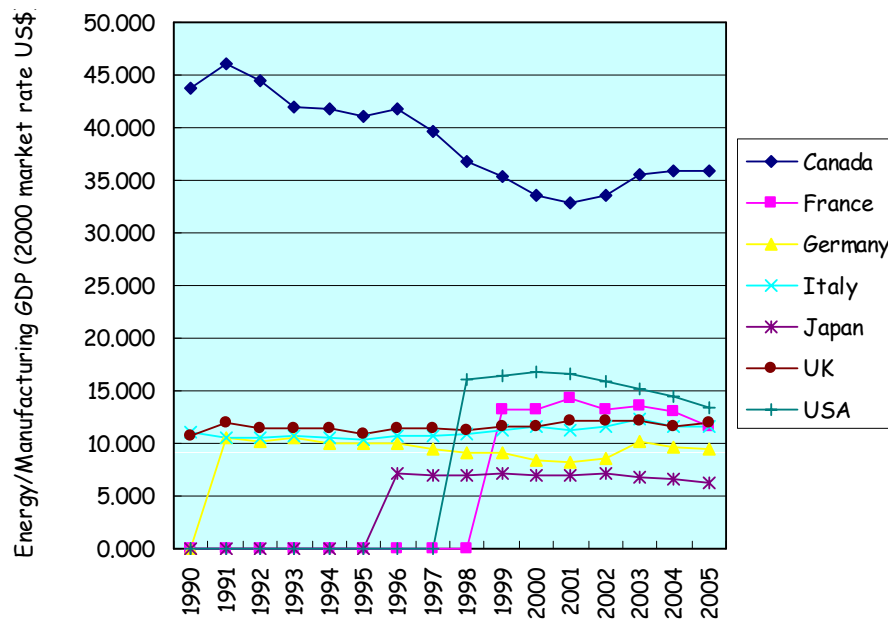
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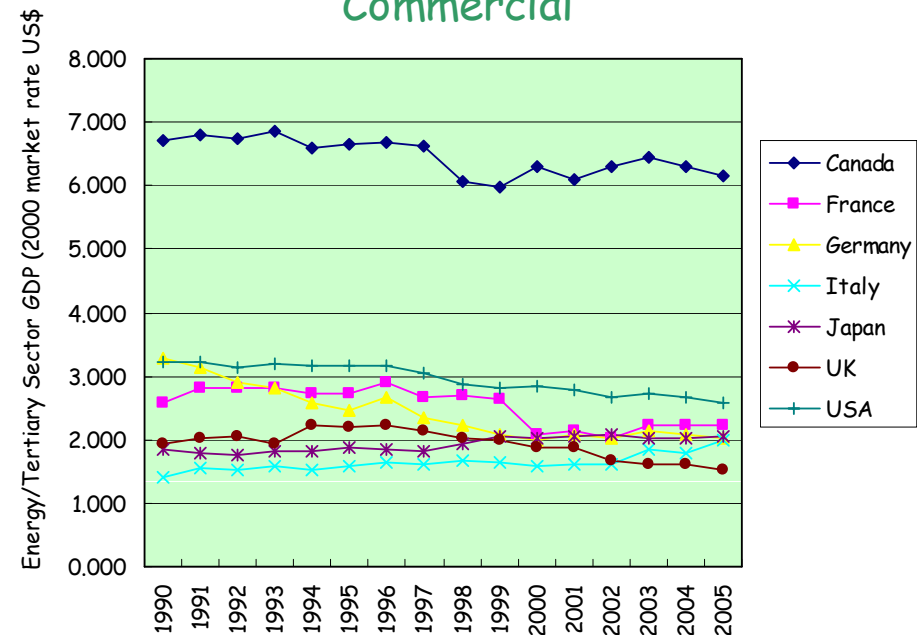
Commercial & Other Manufacturing

- Energy per sector GDP indicator have been derived from statistics.
- Room for further refinement with more information/data which are domestically available

Other Industries



Commercial



Conclusions

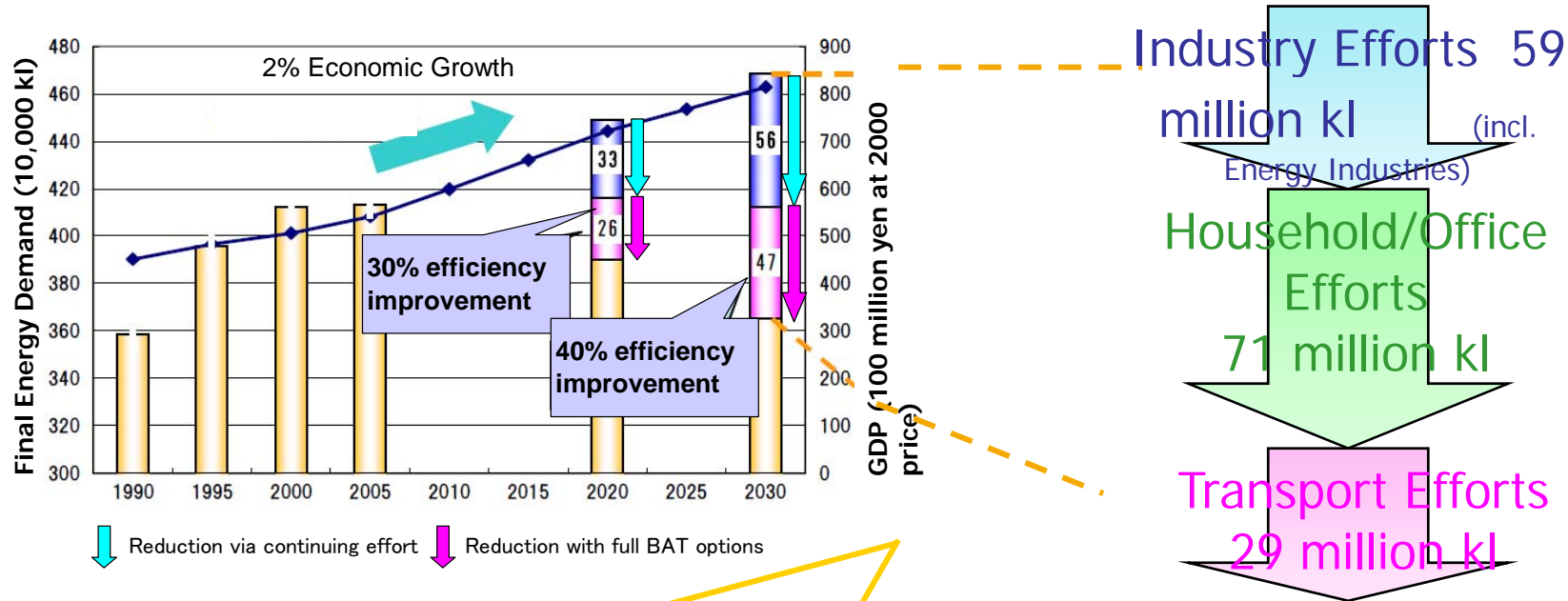
- Some indicators successfully show “opportunity for emission reduction” to be realized by sharing Best Practice.
- Other indicators need some improvement in statistics to better illustrate relation with Best practice.
- This can be improved by taking a few steps further in data collection efforts.
- **Data collection** as below would be a great step forward:
 - **Manufacturing**: production index (e.g. IIP)
 - **Power**: capacity factor
 - **Transport**: historical vehicle km
 - **Residential**: number of household
 - **Commercial**: floor space



Appendix

Japan's example

Improve efficiencies of appliances/facilities to the theoretical limit of technologies and introducing them as replacement whenever applicable.



Picture with full introduction of the World Best Available Energy Technologies

Industry Effort: 59 million kl

- (incl. Energy industry)
- Energy intensive industries (Iron & Steel, Chemical, Cement, Paper & Pulp) introduce **world BAT** when replacement takes place.
- **3% improvement of thermal efficiency** introducing innovative power generation technology.

Household/Office Effort: 71 mil kl

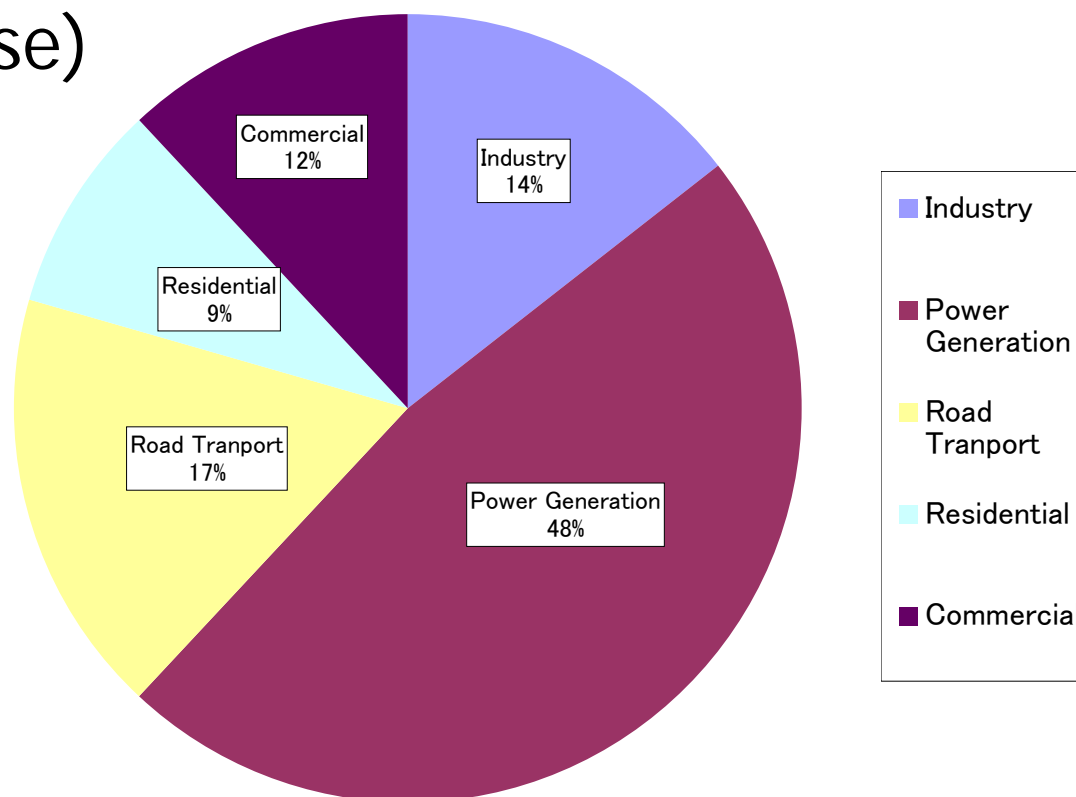
- **Display for TV, etc.**
All replaced by LC, PDP, OLED
- **Server, storage, network appliances**
All appliances will be the most efficient models
- Efficient Water Heater
0.7 mil units (2005) → 34 mil units (2030)
- Improvement of lamps/FL & LED/EL promotion
- Further improvement of building/house insulation

Transport Effort: 29 mil kl

- **Further improvement of fuel efficiency of automobiles (stock base)**
3% improvement (1990-2005)
→ 25% improvement (2005-2030)
- **Faster penetration of Next Generation Vehicles (new car sales share)**
2% (2005) → 70% (2030)

Emissions by sector in 2020

G8 countries' emissions by sector in 2020
(reference case)



- Emission share of Industry, power and road-transport sectors is forecasted to be 79% in 2020.