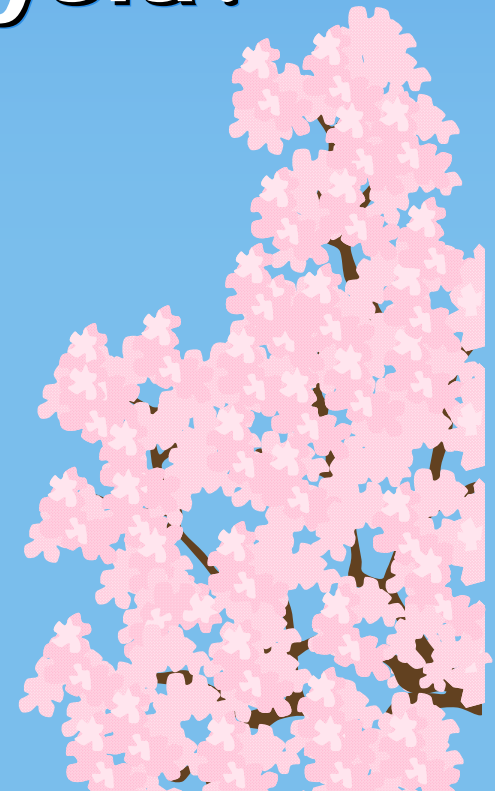
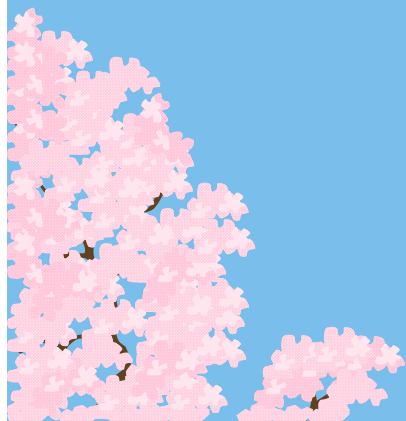


Malaysia – Japan Workshop on Energy Efficiency and Conservation

Energy Efficiency Policies in Japan and its Implication: Why Relevant to Malaysia?

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The Institute of Energy Economics, Japan (IEEJ)

1 March 2012 , Tokyo
Ministry of Economy, Trade and Industry, Japan



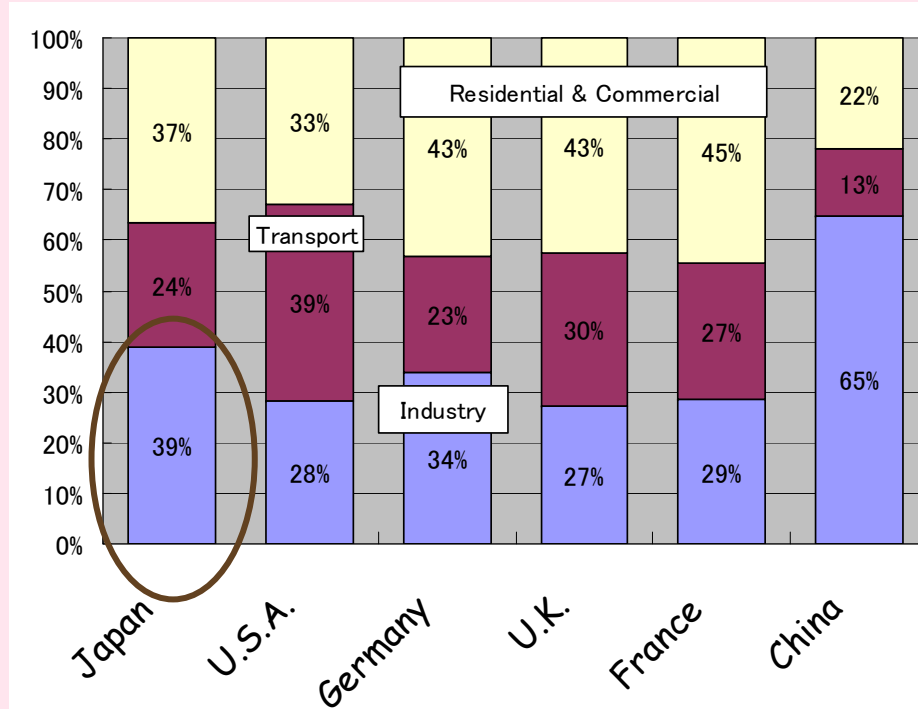
Overview

- ❖ Why EE&C in Japan?
- ❖ EE improvement for Japan:
Achievement and Way Forward
- ❖ Importance of EE&C for Malaysia
- ❖ Conclusion

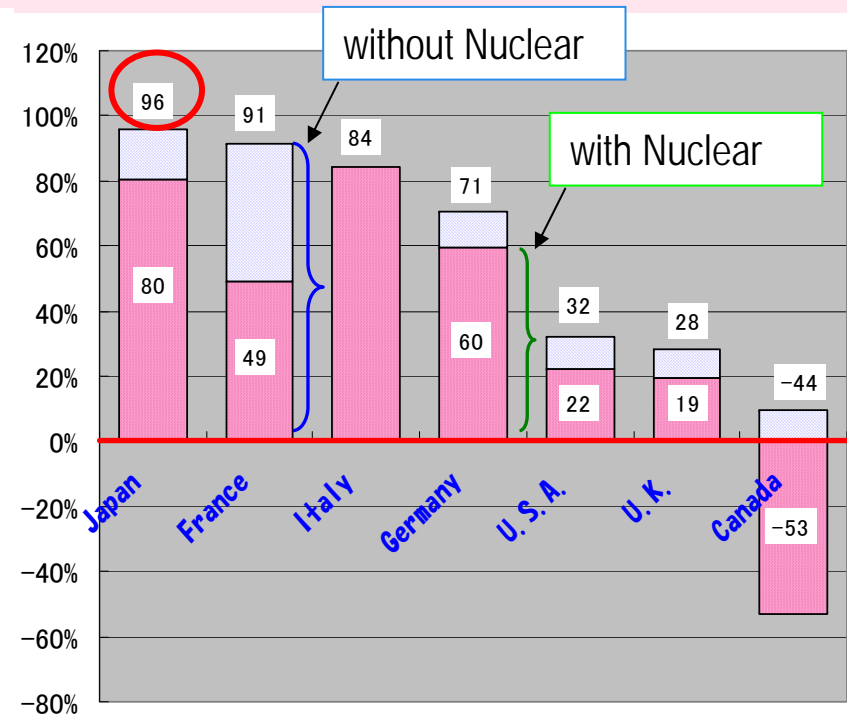
Why EE&C ?

Energy Demand/Supply Structure of Japan

Big Manufacturing Energy use
2009

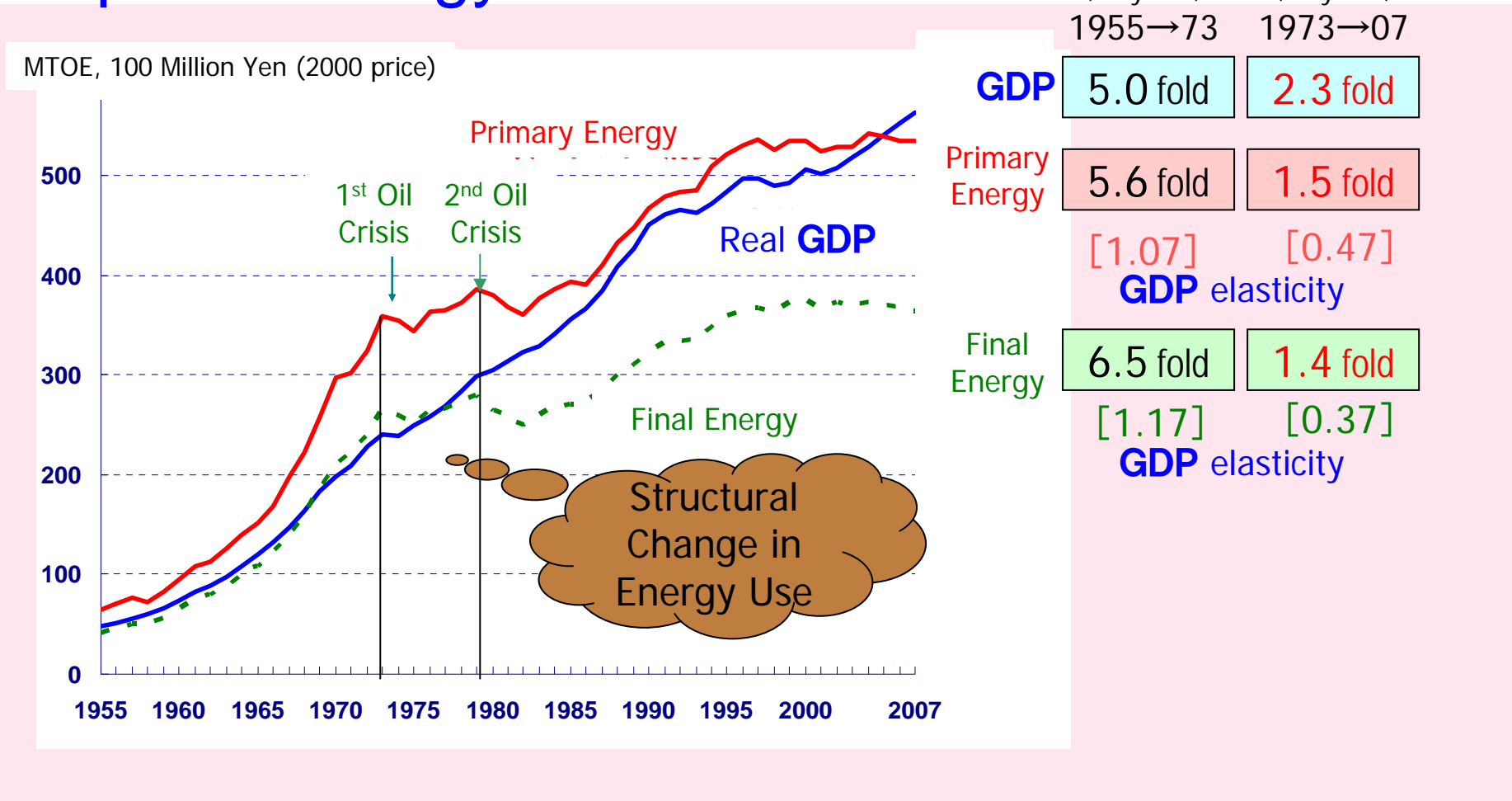


High Import Dependency
2009



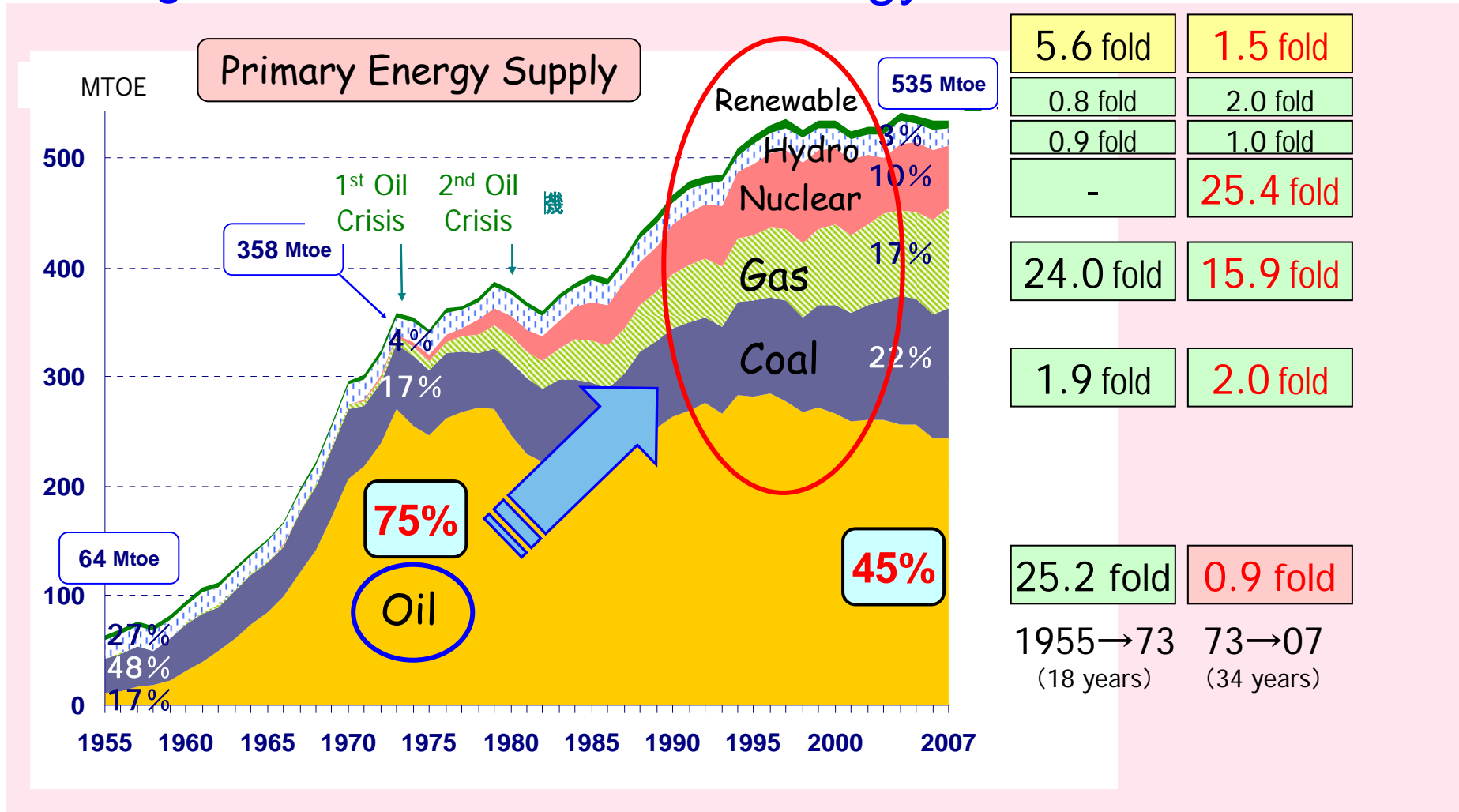
- Industry sector had over 60% share in 1971 down to 40%(2009)
- The share is down but still higher than other industrial countries.
- Japan's energy self sufficiency is one of the lowest among the OECD.

Japan's Energy Demand and GDP



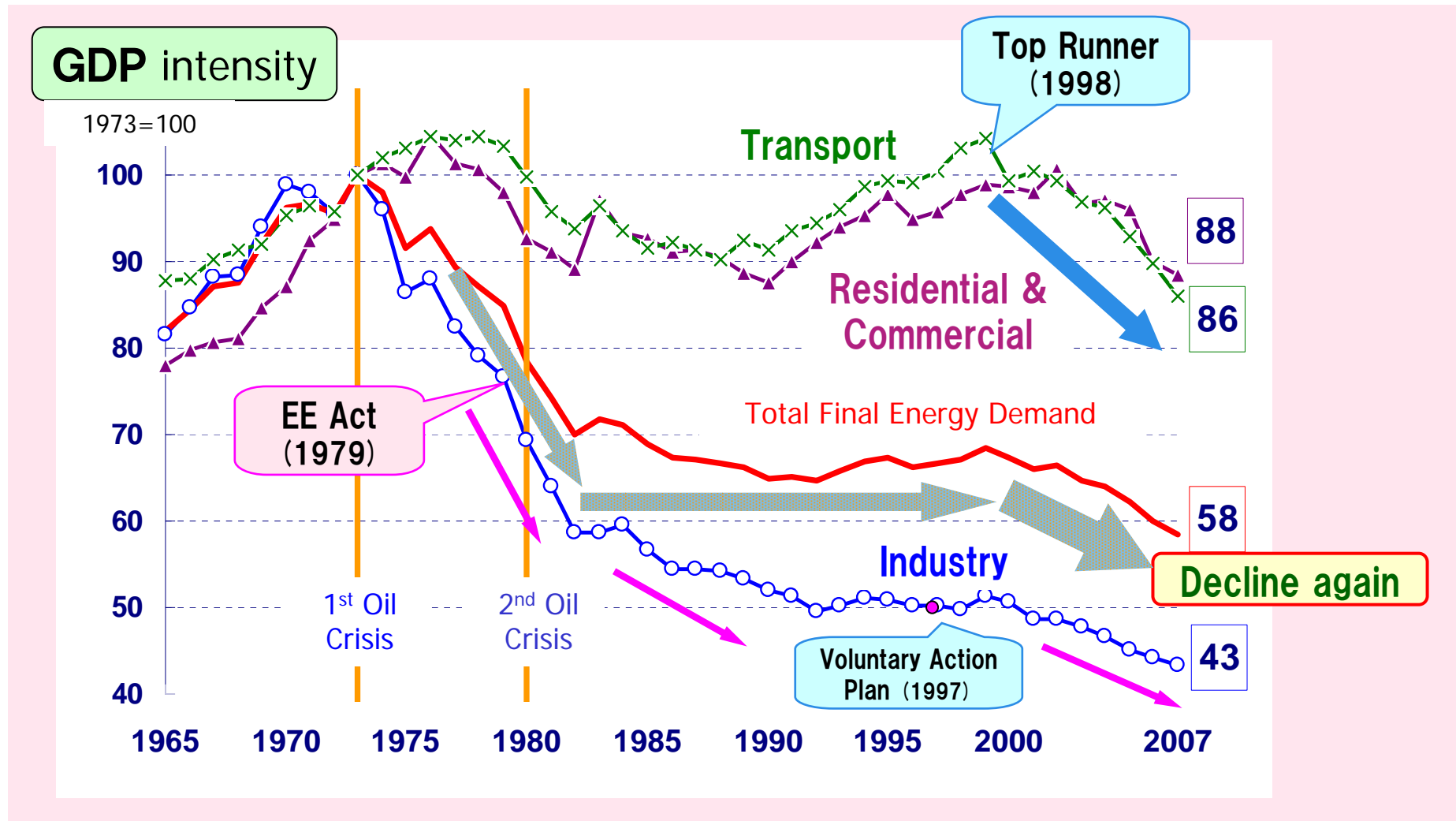
Final energy demand grew a little faster than economic growth during the period of rapid economic growth until the **trend changed drastically** after **2 oil crises**.
 Discrepancy between the primary energy and final energy is widening with growth in electricity demand (power generation loss).

Change 1: Diversification of Energy Sources



Oil dependency increased from 17% in 1955 to **75% in 1973**. **Diversification of energy sources** was encouraged after 2 oil crises with promotion of natural gas, nuclear and coal. The oil dependency dropped to **45% by 2007**.

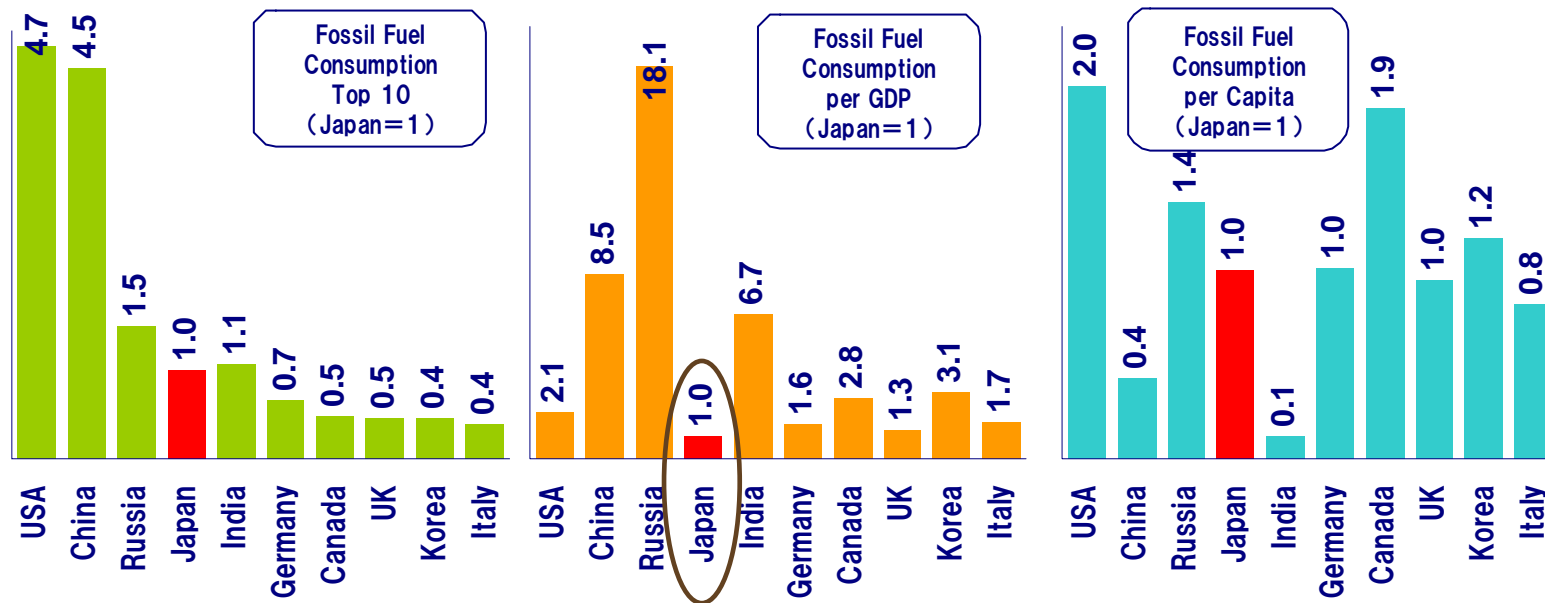
Change 2: Huge EE Improvement in Industry Sector



Energy Efficiency improved notably in the **industry sector** after the oil crises bringing energy intensity of GDP down by 40%. On the other hand, intensity of **Residential & Commercial** and **Transport** Sectors increased even after 1973. Thus the overall intensity did not improve much.

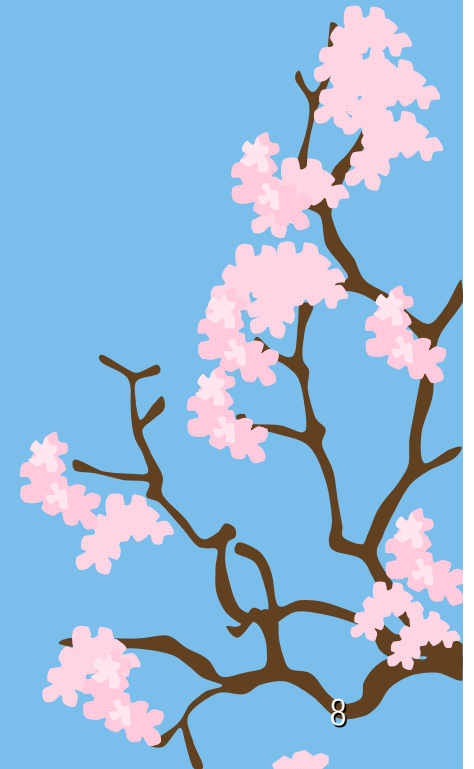
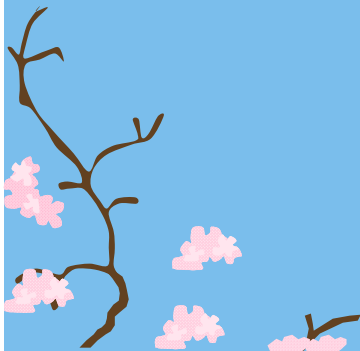
Japan in the World

Top 10 Energy Consuming Countries (2008)



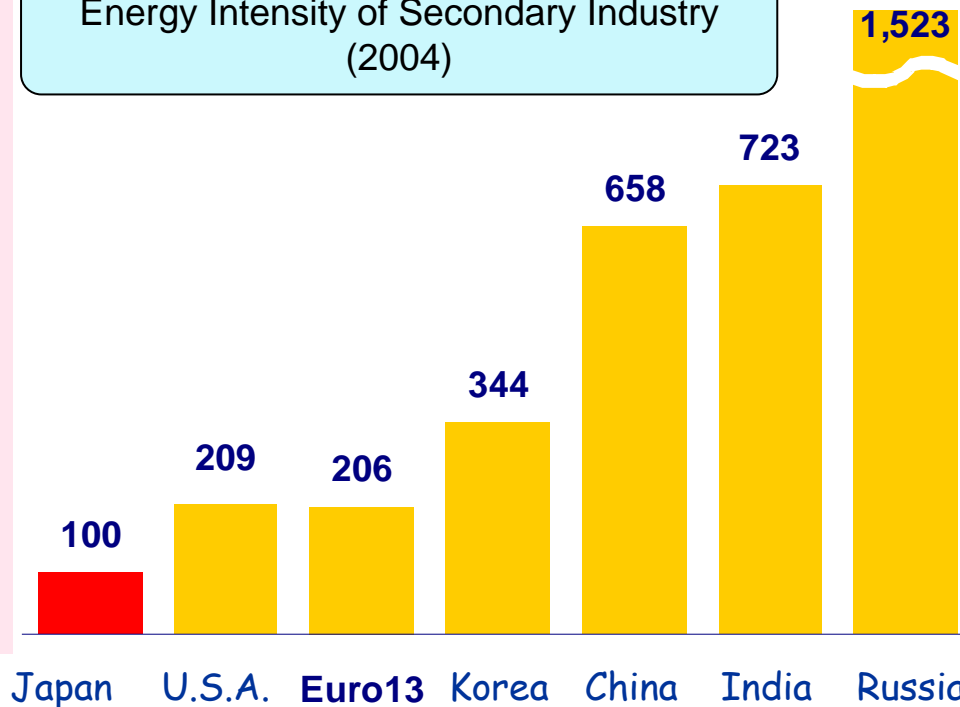
- ❖ Japan ranks 4th in the world for total energy consumption for the year 2008 but **Energy Intensity (=Energy/GDP)** is the **smallest** among 10 countries.

- ❖ Why energy conservation in Japan?
- ❖ EE improvement for Japan :
Achievement and Way Forward

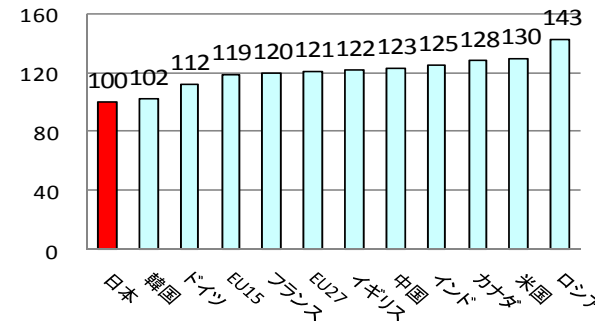


Japan's EE of Manufacturing is among the top

Energy Intensity of Secondary Industry (2004)

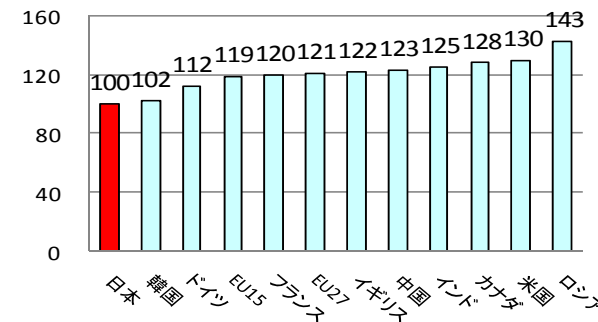


Index of Steel Production Energy Intensity



(Source: IEA「Energy Technology Perspectives 2008」)

Index of Clinker Production Energy Intensity



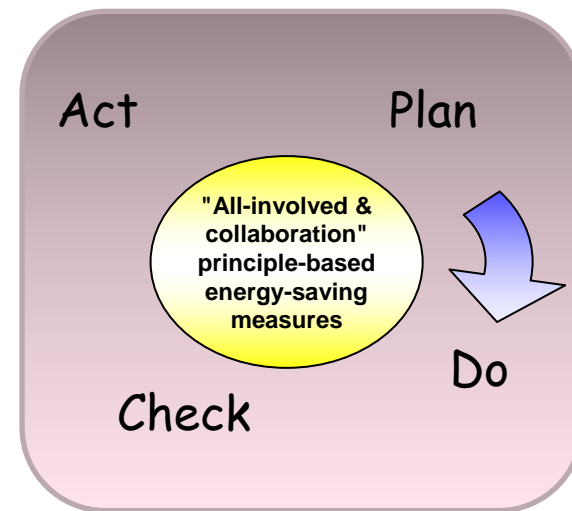
(注)クリンカ:セメントの製造過程でできる中間製品

(Source: Estimation based on RITE Model (2005))

Japan's manufacturing industries are among the top level of the world in Energy Efficiency.

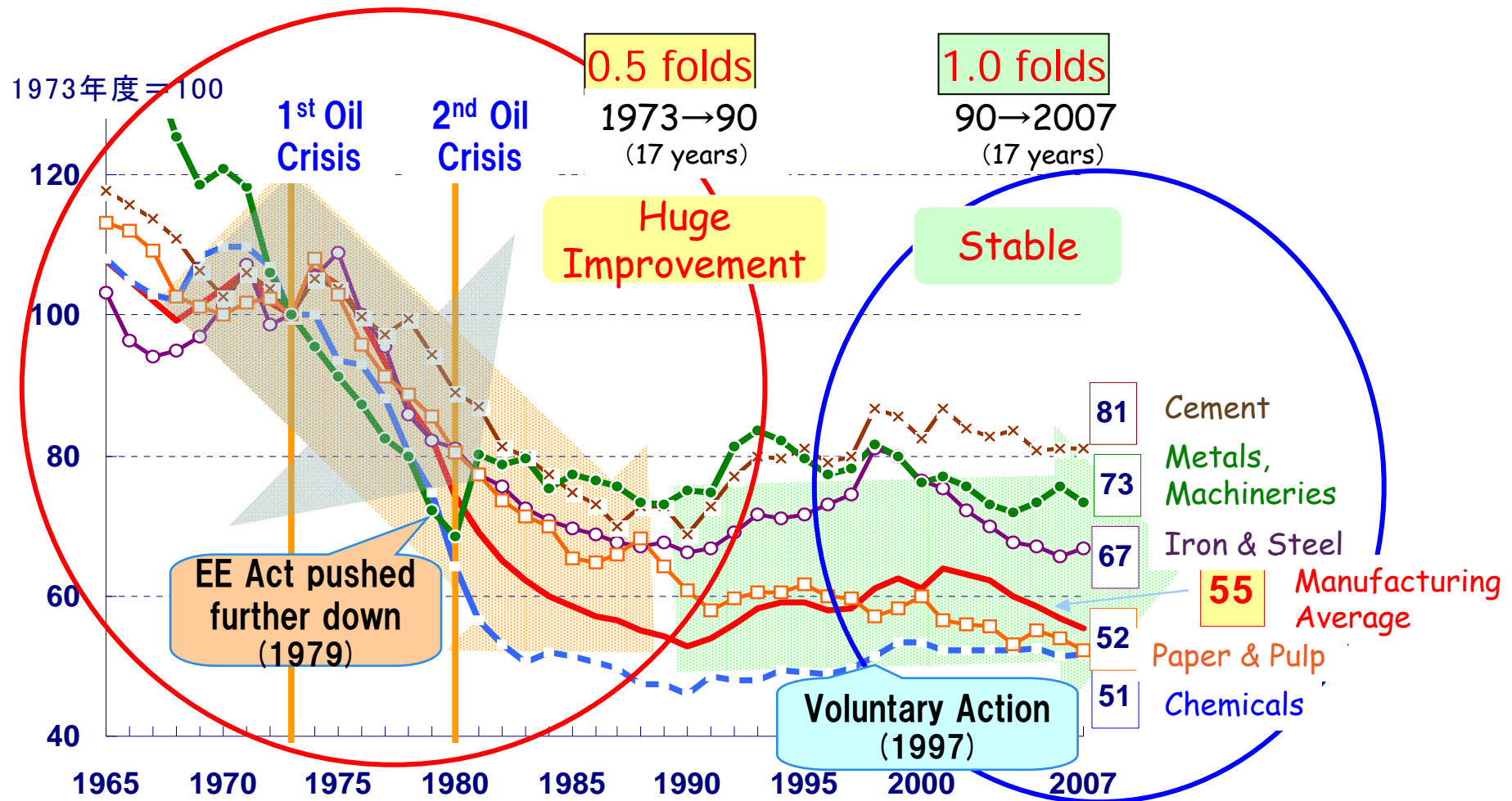
Spirit of Energy Conservation Act (ECA)

- ❖ Based on **Heat Management Act (1947)**
- ❖ To encourage “**autonomous effort**” of EE&C as “**cost effective**” measures.
- ❖ 2 important factors :
 - ❖ Prepare a **Energy Management (EM) system** within each industry which allows “Plan-Do-Check-Act” cycle to function to improve EE autonomously while maintaining productivity.
 - ❖ Set EE as the **basic rule of action** for corporate activities.
- ❖ 4 major tools prepared:
 1. **Energy Manager** as a **national certificate** scheme
 2. **Nomination** of “**energy managers**” within the factories and offices to conduct EM.
 3. Establishment of **EM system** to **monitor and report** on EE&C.
 4. Making Top Management responsible for EE&C.



現場力 on-site experts' wisdom and skills are the KEY

Energy Intensity Improved in 70's (Energy/IIP)



- Energy intensity (per production index) improved drastically between late 1970's to mid 1980's. But with low & stable energy prices, it remained unchanged and even worsen in 1990's.

Historical Development of EE Act

1947 Thermal Management Act

Industry 

Residential Commercial 

Transportation 

1979 Establishment
Designated Energy Management Factories
Guidance for Buildings and Appliances

- Heat Management
→ Heat & Power Management
- Industry → Commercial → Transport
- Energy Management
→ Appliances & Vehicles

1983 Amendment
Licensed energy manager system

1993 Amendment
Periodical reporting

1998 Amendment
Expand coverage of factories

1998 Amendment
Top Runner Program

2005 Amendment
Integration of Heat and Power Control

2002 Amendment
Energy Management of Office Buildings

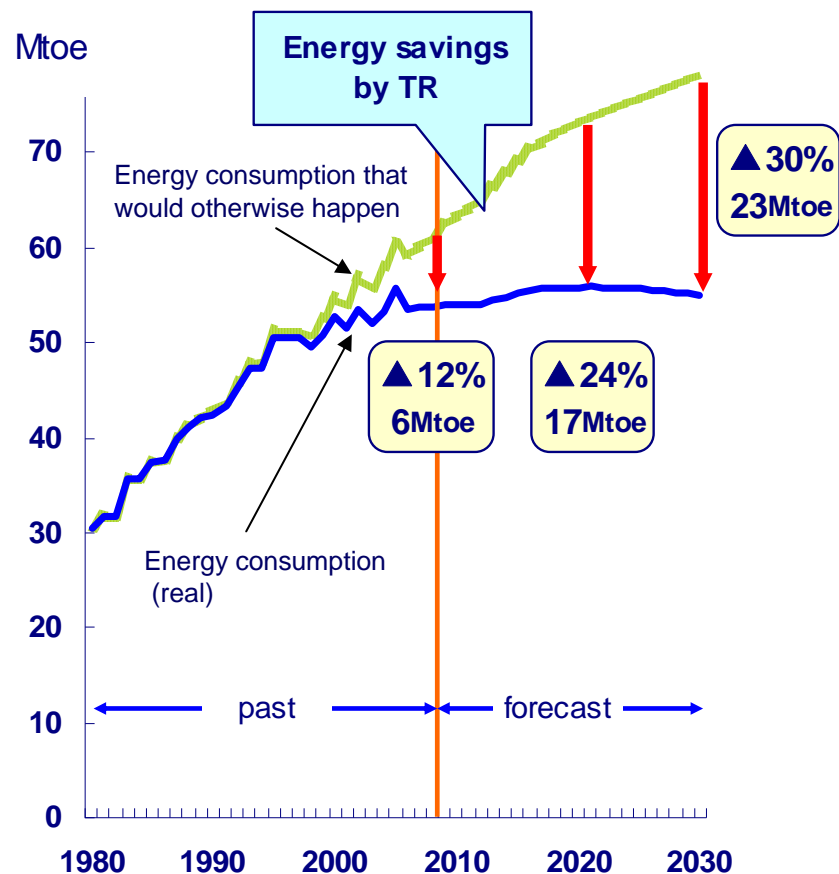
2005 Amendment
Reporting System on Energy by Carriers

2008 Amendment
Company based rather than plant based regulation, cooperative energy conservation, introduction of Bench Marking.

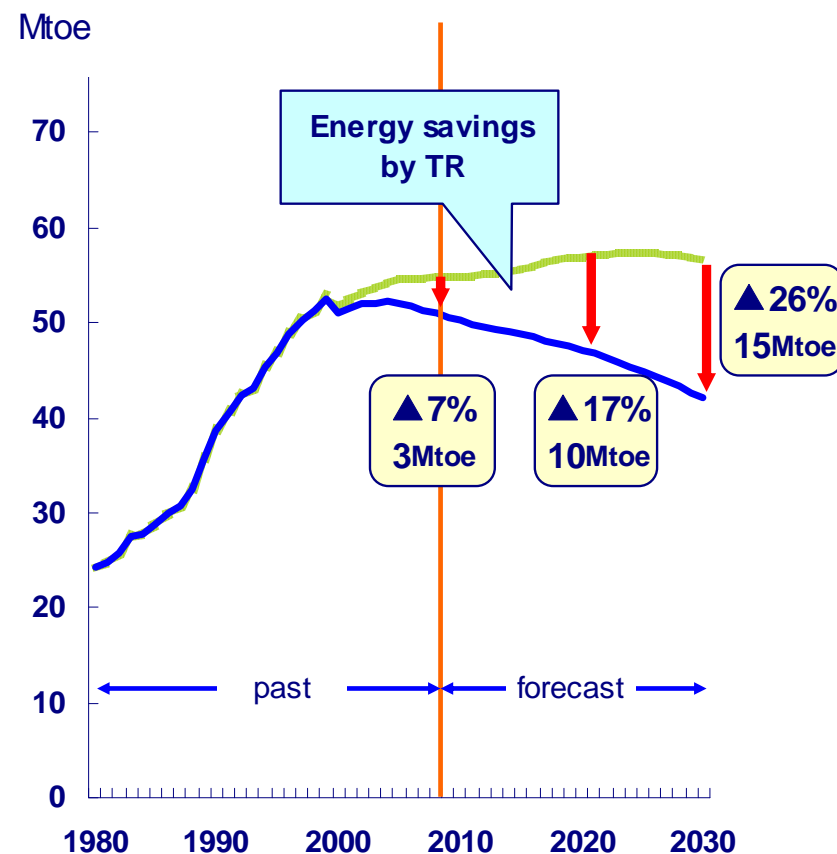
2008 Amendment :Data sharing with tenants by building owners, coverage broaden to include franchised chains, introduction of Bench Marking.

Energy Saving by Top Runner Program

Residential Sector (appliances)



Transportation Sector (fuel efficiency)



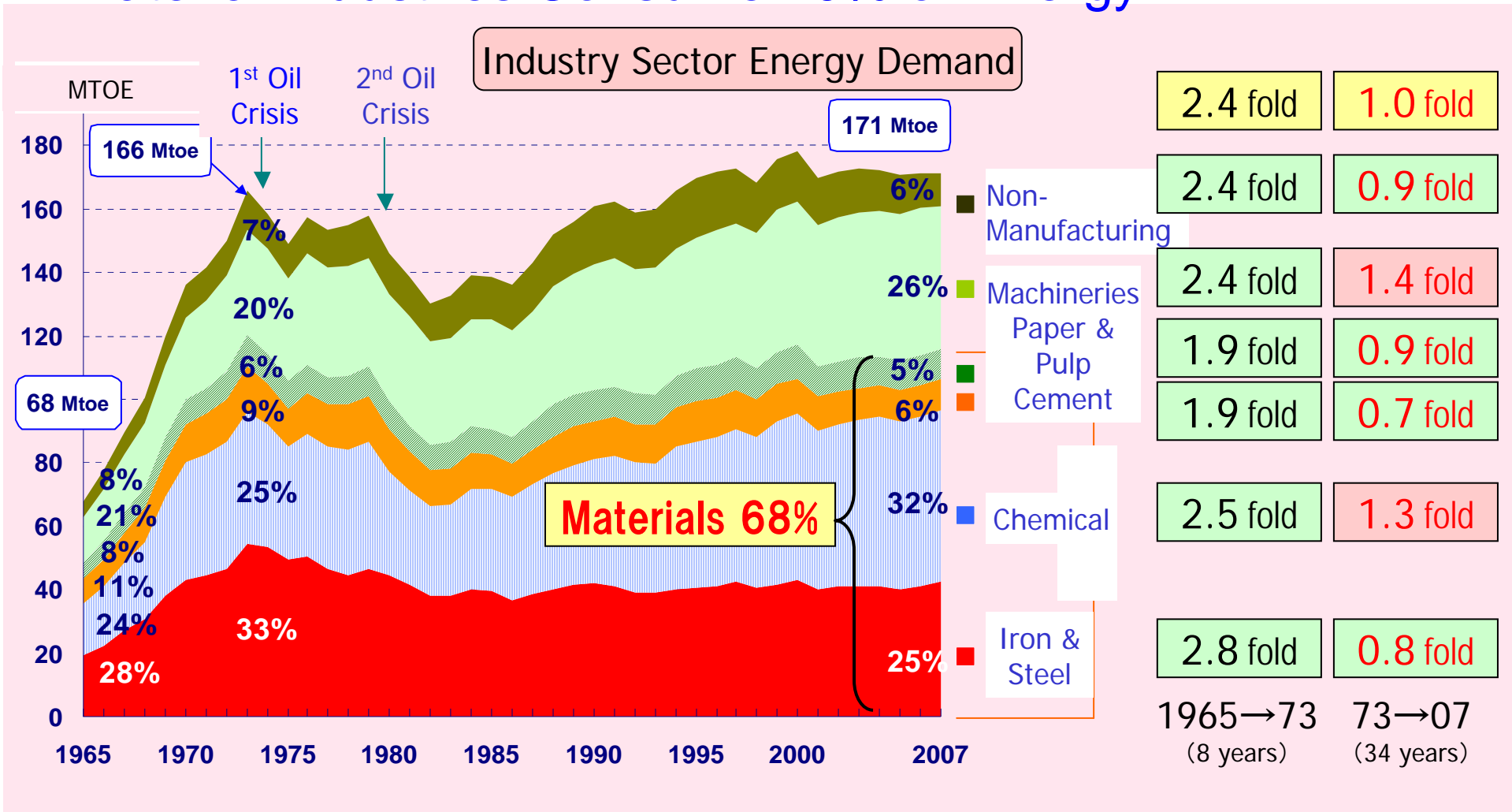
Source: "Energy Conservation in the last 30 years", Energy Conservation Center, Japan

Note : Estimated by Institute of Energy Economics, Japan

The Latest Change in EE Act (2010 April-)

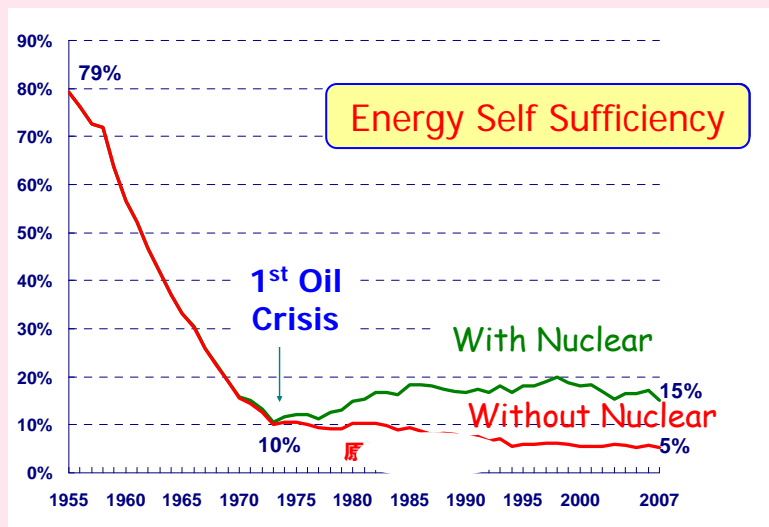
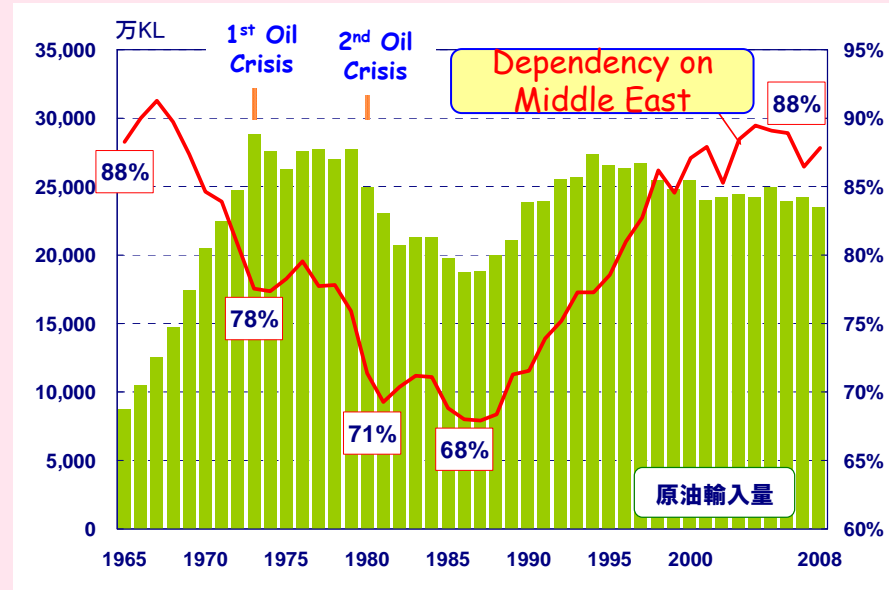
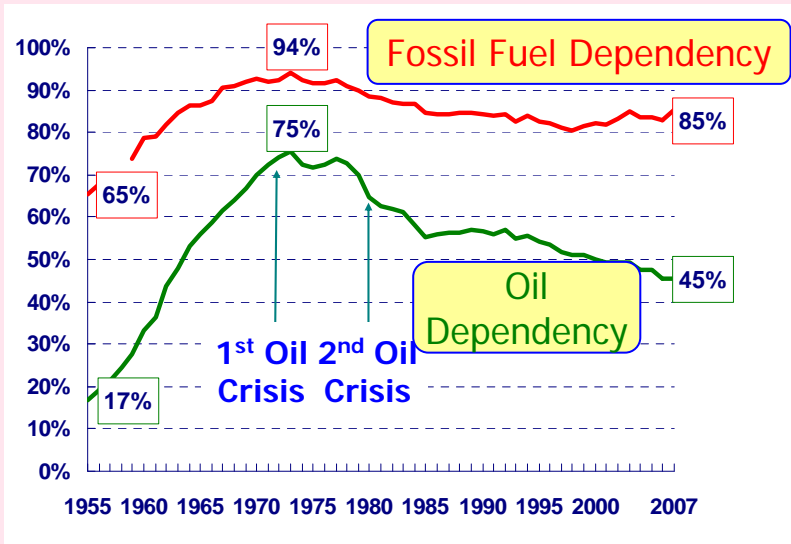
- Introduction of comprehensive EM by business enterprises → Wider coverage (headquarter office of manufacturing, branch offices, smaller factories, etc.)
- Continuing regulation for big users (factories that use more than a certain amount of energy) with new tool.
→ Introduction of Benchmark
- Each franchise chain in its entirety will be regulated as a single business. → Wider coverage (restaurants, convenience stores)
- Top management are made responsible to oversee EM.
→ Swift Decision Making and robust EM system

But EE improvement effort continues because (1): 4 Material Industries Consume 70% of Energy

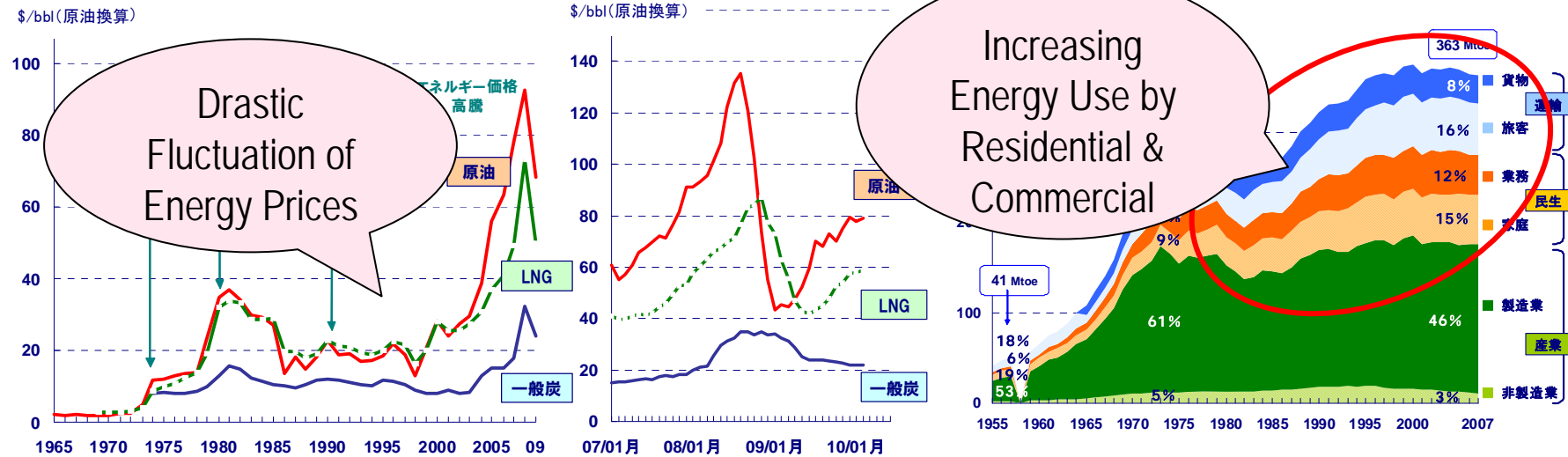


Energy Efficiency improved in the industry sector after the oil crises mainly in the energy intensive material manufacturing industries. Chemical industry started to increase again in 1980's while machinery industry has been steadily increasing.

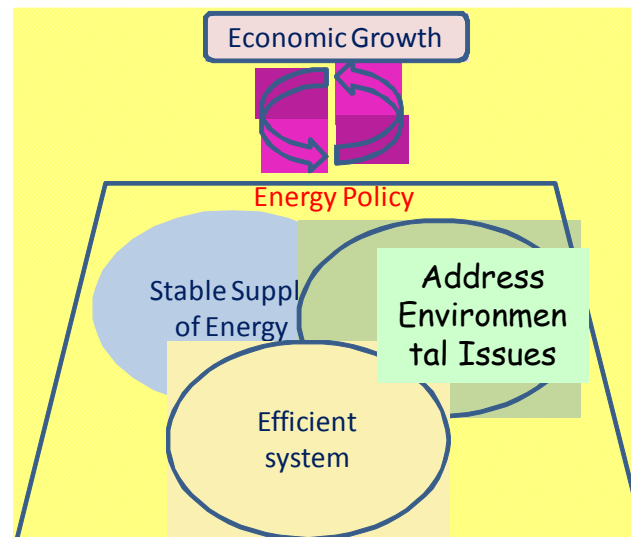
But EE improvement effort continues because (2): Energy Supply Security is **Never ENOUGH**



- **Oil dependency** declined but is still about **50%**. Dependency on **fossil fuels** is more than **80%**.
- Japan used to supply 80% of energy use with domestic coal and hydro power in 1950's. With shift towards imported oil and closure of domestic coal mines, **self sufficiency** dropped rapidly. It remains low at **5%**.
- Dependency on **middle east oil** started to increase again after mid 80's and it is close to **90%**.



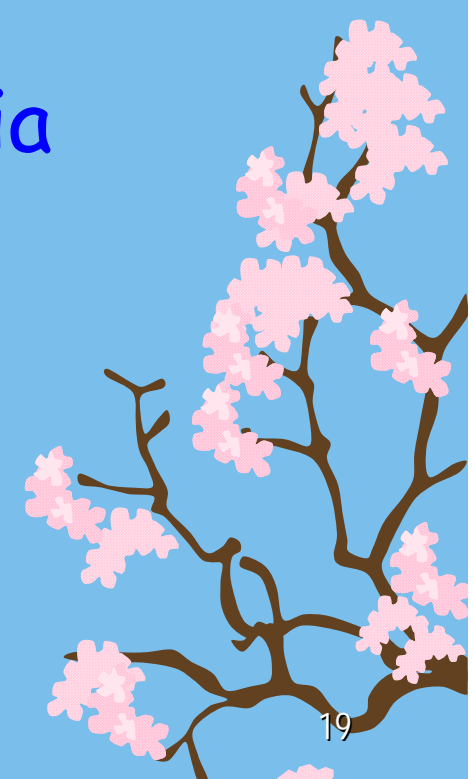
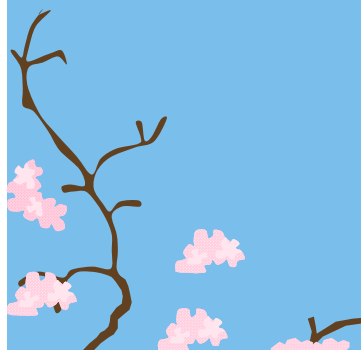
Energy Efficiency Remains Key to Energy Policy of Japan



Way Forward for Japan

- ❖ New EE **technology R&D** for new **social infrastructure** and **systems**
- ❖ Development of EE policies and tools and information/ best practice sharing, technology transfer and **international collaboration**.
- ❖ **EE achievement as a system**
 - ❖ **Smart Grid**, Smart Energy Network, Zero Energy Building (ZEB), EE and renewable energy technology imbedded **building materials**, **motor system**, electric vehicles, fuel cell vehicles and power/hydrogen SS infrastructure, eco-town/city...
- ❖ Importance of **Inter-Ministry** collaboration, **Public-Private Partnership**, foundation of **Consortium of industries** and collaboration among them
- ❖ **Increase** in **power usage** and prospect of ITC
 - ❖ HEMS, BEMS, Energy Management, Smart Meters
- ❖ **Combined usage** of both **EE** and **non-fossil energy** technology is required to obtain **Zero Emission** options (e.g. ZEB)
- ❖ Active employment of **reuse**, **recycle**, **natural light & heat (passive E)**
- ❖ **Integrated policy challenges**, National issues, international cooperation
 - ❖ Environment (air, water) issues, EE, energy poverty & aging society (in both developed & developing countries), **sustainable growth** and creation of new employment.

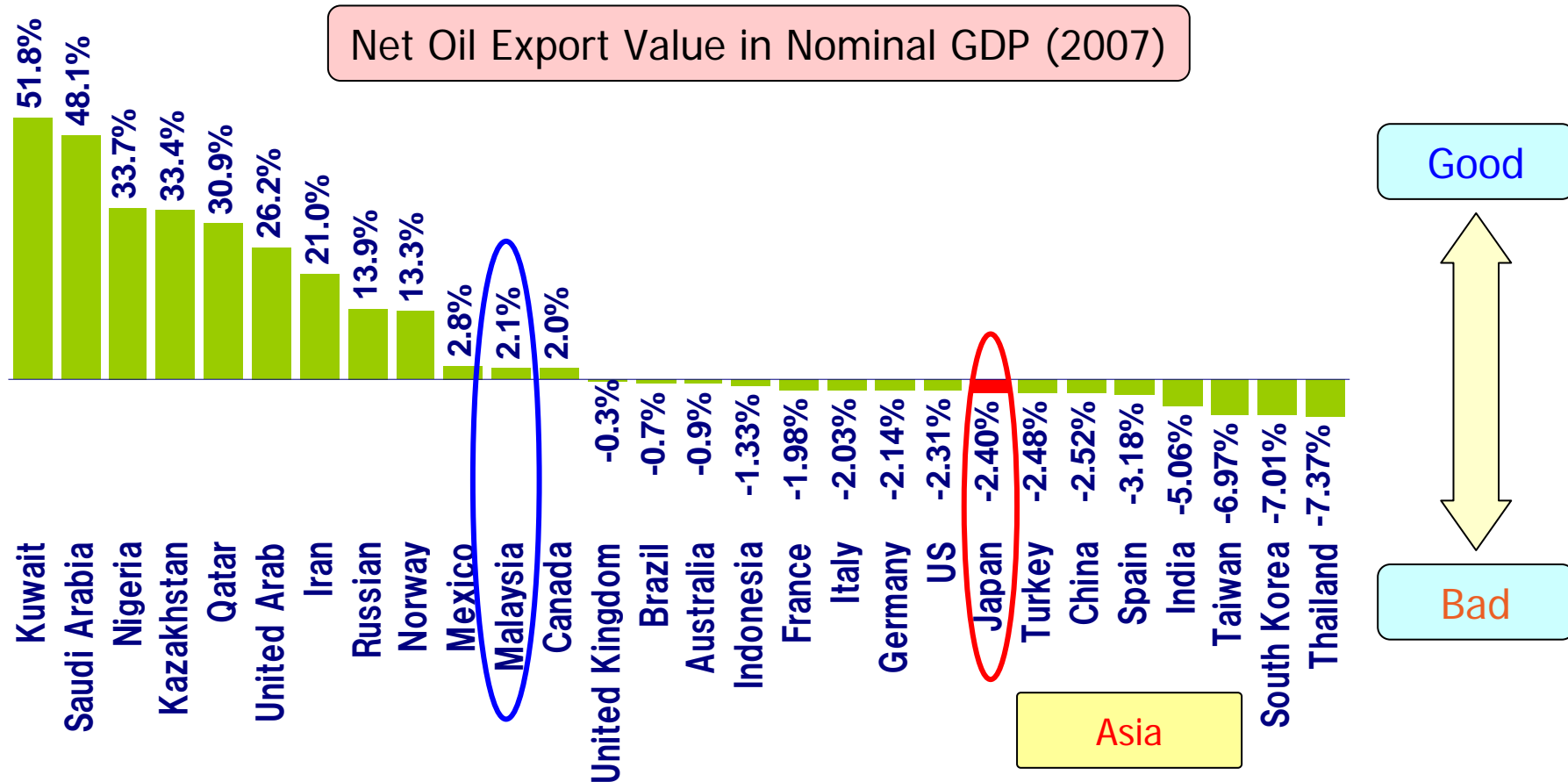
- ❖ Why energy conservation in Japan?
- ❖ System and tools for EE improvement
- ❖
- ❖ **Importance of EE&C for Malaysia**
- ❖



Common Advantage of Energy Efficiency

- Readily available cost effective measures (e.g. marginal cost comparison of technologies) are applicable widely.
- Governments are facing budget deficit with many complex social/economic issues while industries are facing increasing regulations/ higher costs/ lack of skilled labor, etc. Therefore, autonomous EE improvement benefits both.
- Resource-rich countries are also striving to save energy to retain their national resources. (e.g. Saudi Arabia, Russia, Brunei, South Africa and many others)
- Energy shift from coal → oil → gas → electricity. Power generation needs to become more efficient while saving electricity usage to make the power intensive society affordable.
- Generating own power using renewable alone will not make houses/ buildings “net-zero energy/ emission” to realize Low Carbon Society. Energy efficiency improvement is essential.

Impact of Higher Oil Price to the Economy

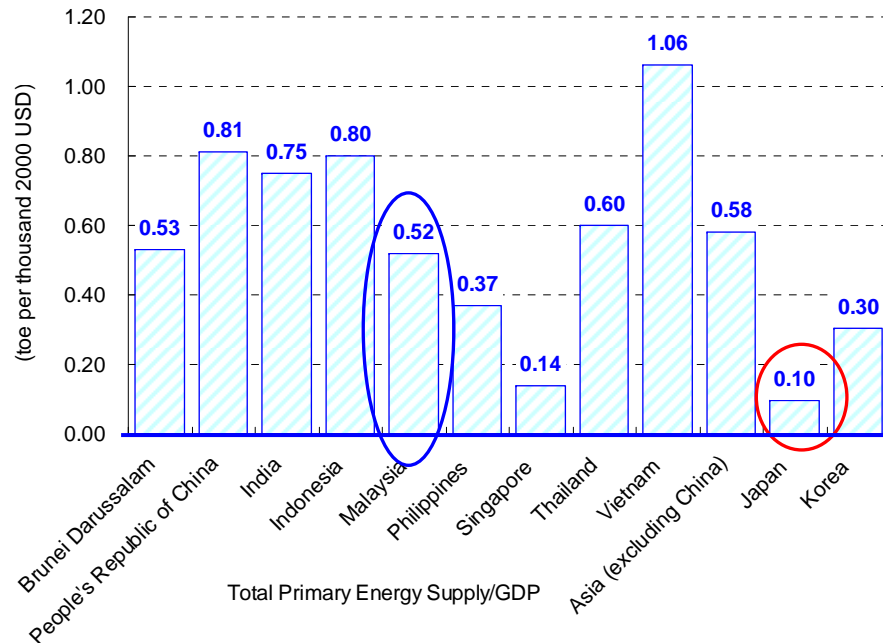


Economy of the countries with bigger share of oil import value in the GDP suffers when the oil price goes up. Those countries which export benefits from bigger revenue.

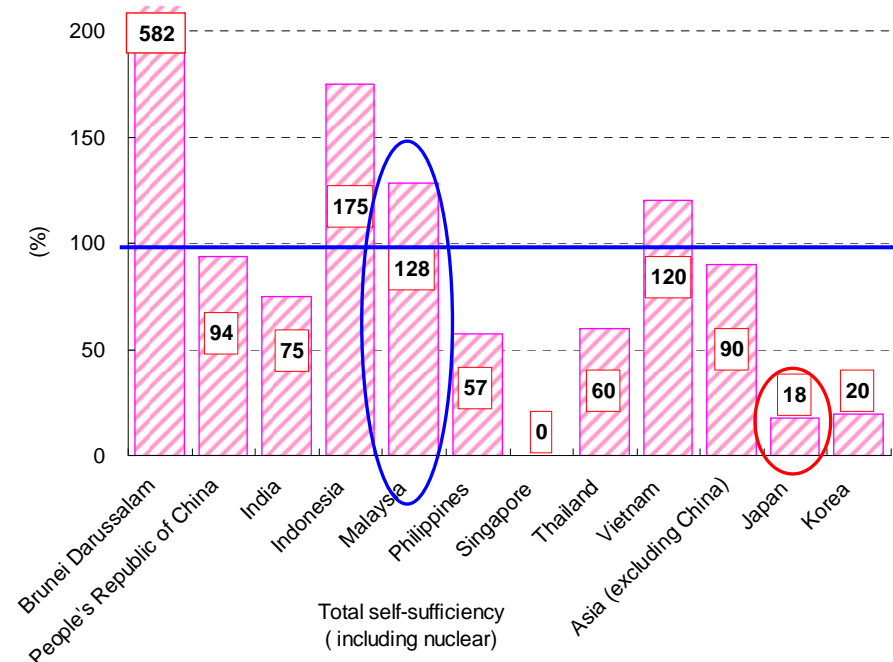
Relevance of EE&C for Malaysia



Energy efficiency (2008)



Self-sufficiency (2008)



Source: IEA, Energy balances of OECD countries, Energy balances of non-OECD countries

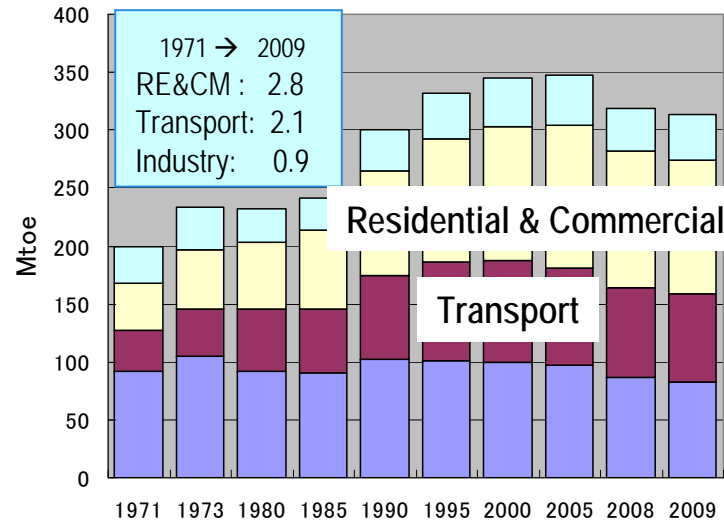
- Big room for energy efficiency improvement.
- More efficient energy use will reduce costs of imported energy or save national resources.
- Area for cooperation and sharing best practices

Which Demand Sector is Growing?



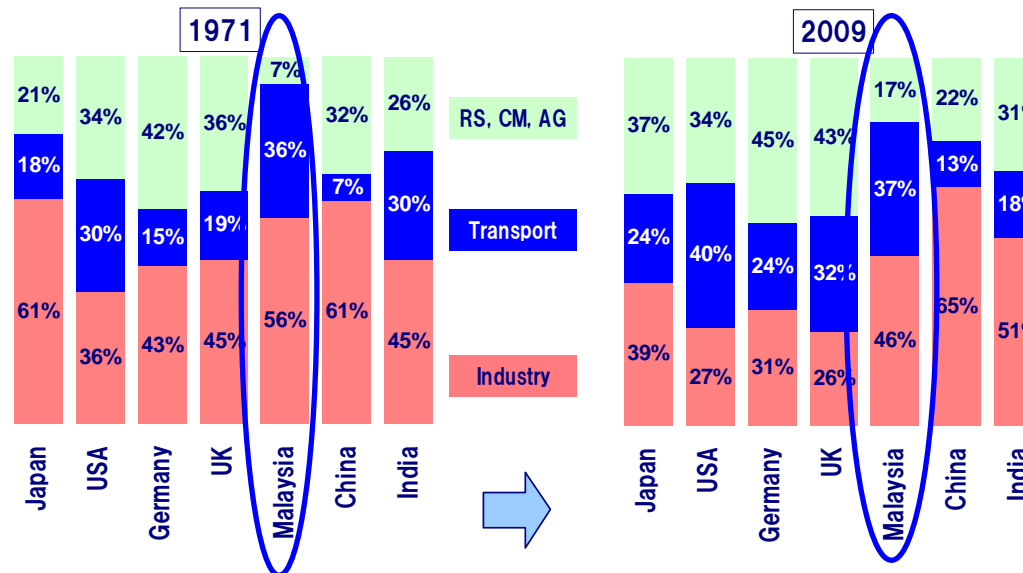
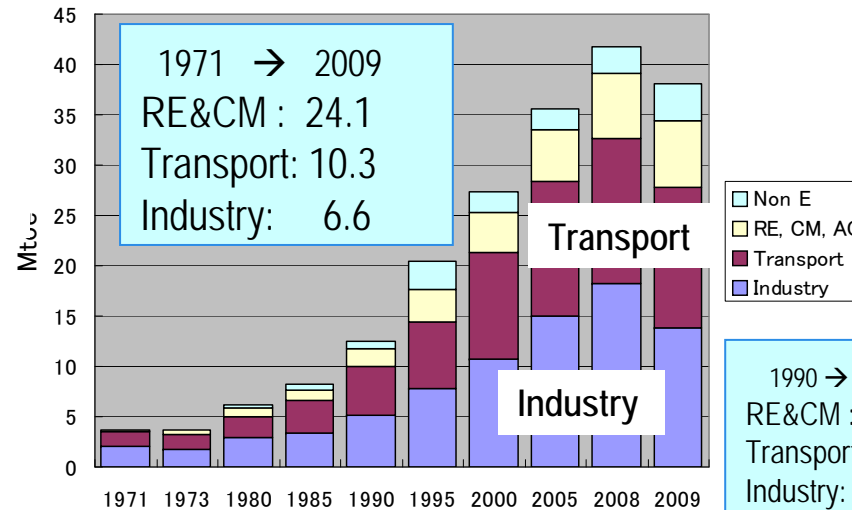
Japan:

Residential & Commercial Sector



Malaysia:

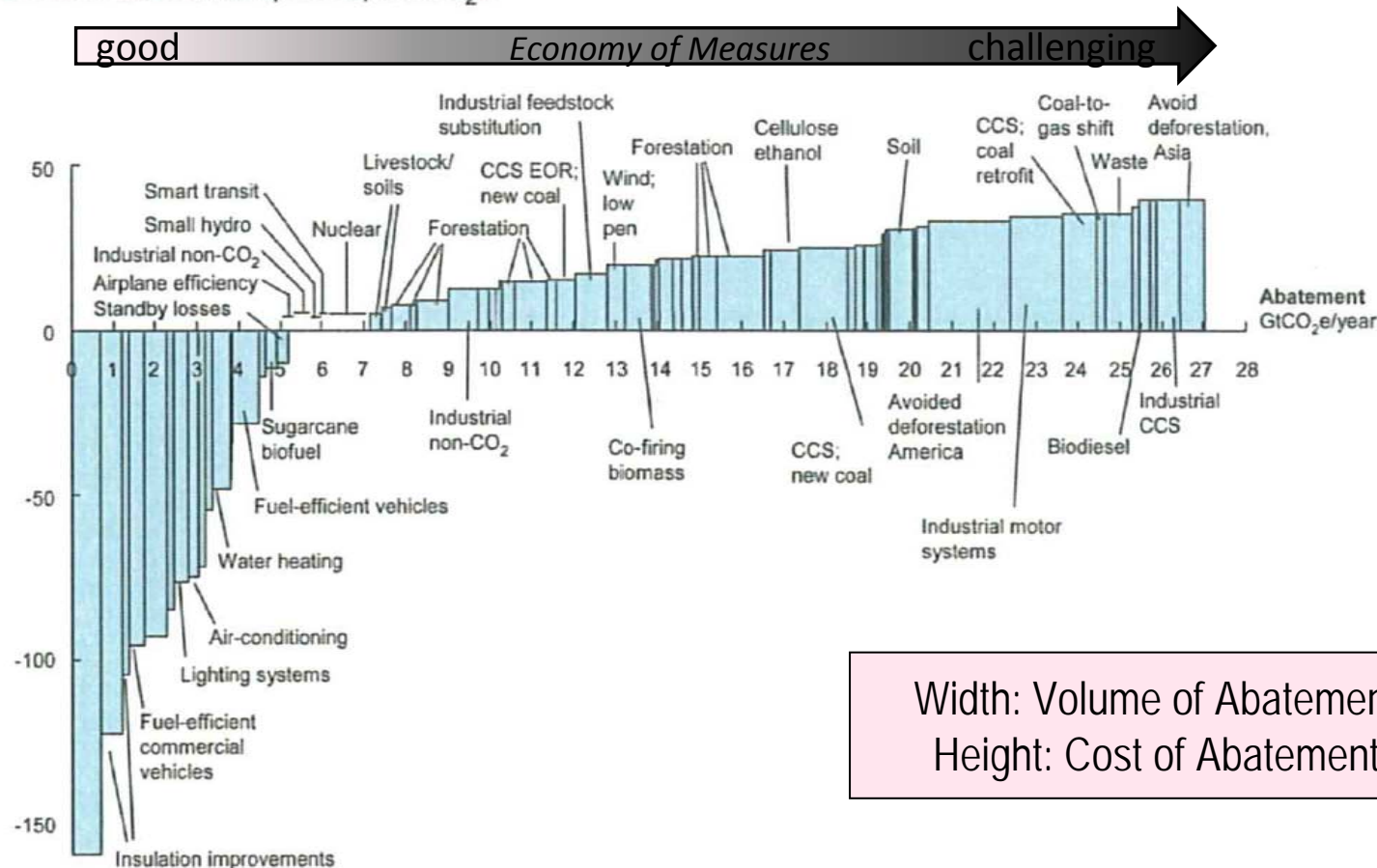
RE&CM Sector, Transport Sector



Which Measures are Cost Effective?

THE COST CURVE PROVIDES A “MAP” OF ABATEMENT OPPORTUNITIES

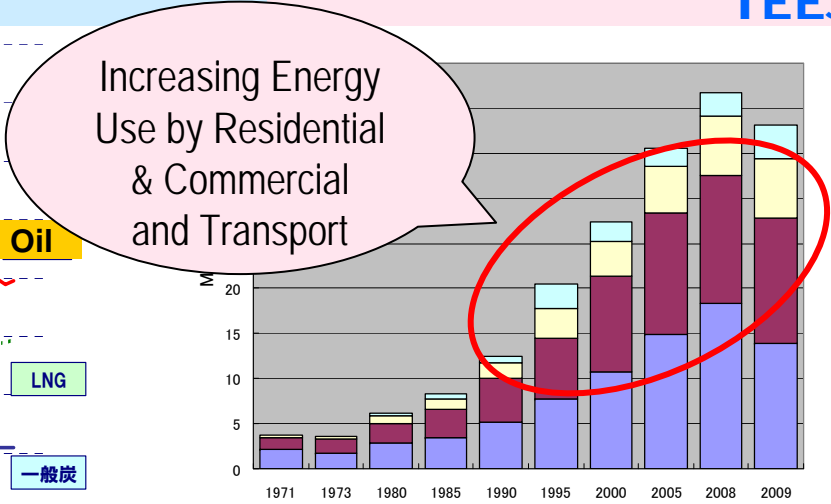
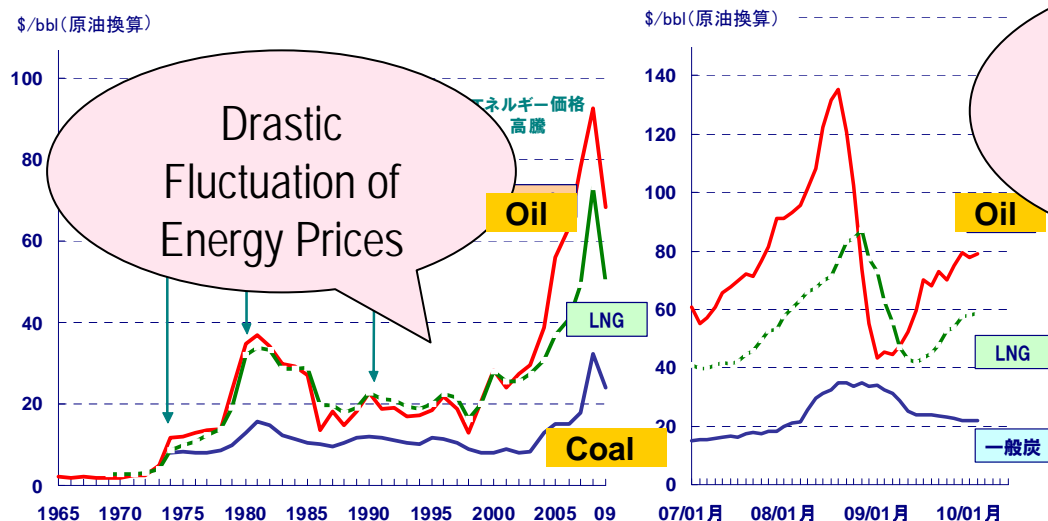
Cost of abatement, 2030, €/tCO₂e*



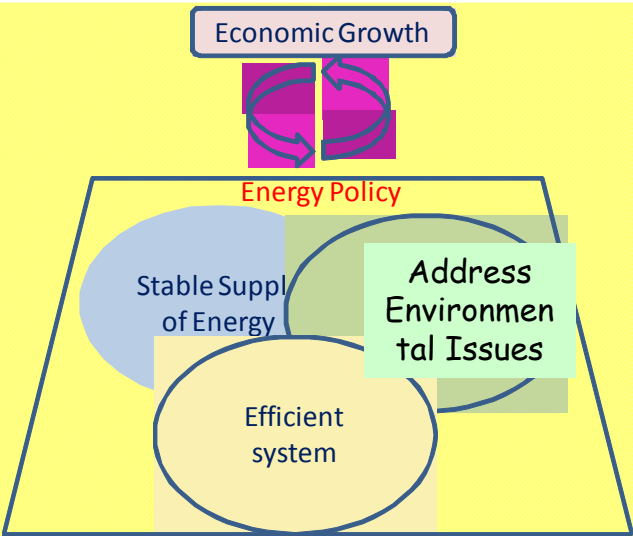
* Tons of carbon equivalents.

Source: McKinsey and Vattenfall analysis

Source: McKinsey Global institute, The Carbon Productivity Challenge June 2008



Energy Efficiency has become a Key to Energy Policies in the World



International Cooperation in EE&C

A Boom!

- ❖ **IEA 25 Policy Recommendations** on EE&C
 - ❖ 25 sector-wise and cross-cutting policy recommendations for EE&C
 - ❖ IEA member countries are subject to scoring (scoreboard, report to the Ministers)
- ❖ **IPEEC** (International Partnership for Energy Efficiency Cooperation) / **CEM** (Clean Energy Ministerial)
 - ❖ Over 10 initiatives led by member countries. Several initiatives are under the 2 frameworks.
 - ❖ Industrial energy management, appliance S&L (standard & labeling)
 - ❖ Building, power generation, capacity building,
- ❖ **Bi-lateral, Regional, International Cooperation** on Energy Efficiency
 - ❖ Many International fora are collaborating under the same/similar initiatives
 - ❖ Policy system framework transfer
 - ❖ Training and Capacity Building, Seminars and Workshops
 - ❖ Public-Private Forum on Clean Energy Cooperation
 - ❖ Model Projects
- ❖ **Standardization** of Energy Management (ISO50001, benchmark)
- ❖ **Low-Carbon City, smart community, smart town, etc.**

Why? Sharing good practices is the **proven short-cut**
 EE&C policies and measures are increasingly becoming **complex**
 Speedy implementation of EE&C is considered as **essential** for many reasons

- ❖ Energy security, to address climate change, job/industry creation, cost effectiveness, new business chances, etc.

Conclusion

Energy Efficiency & Conservation is a “powerful tool”.

- ❖ The recent experience of power shortage in greater Tokyo Area proved that individual companies and factories could **move fast** and **adjust** daily operation with **flexibility** based on well **informed** knowledge of **daily EM**.
- ❖ More **targeted policy making** is required as potential for EE improvement gets exhausted. → SMEs & “peak cut”

Targeting sectors with priorities is a “Key”.

- ❖ To **exhaust** the most of **EE&C** potential in the country **with speed** and **volume**.
- ❖ To aim at co-benefits from the **EE&C** policies and measures
→ job creation, new green industries, technological innovation, smart***.

Collaboration among the Ministries & industries across the country and cooperation in the world is “essential”.

- ❖ **Wider collaboration** is required **across** the country and **beyond** industrial **boundaries** to further utilize EE potential.
- ❖ Sharing **best practices** **domestically** and **internationally** can **speed up** and **strengthen** the efforts **globally**.

The End

Thank you for your attention.

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