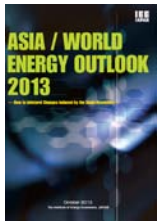
Prospects of Energy Efficiency in ASEAN and ASIA - Asia/World Energy Outlook 2013

Think Tank Roundtable A
Singapore International Energy Week
31st October 2013, Singapore

The Institute of Energy Economics, Japan
Yukari Yamashita

Asia/World Energy Outlook 2013

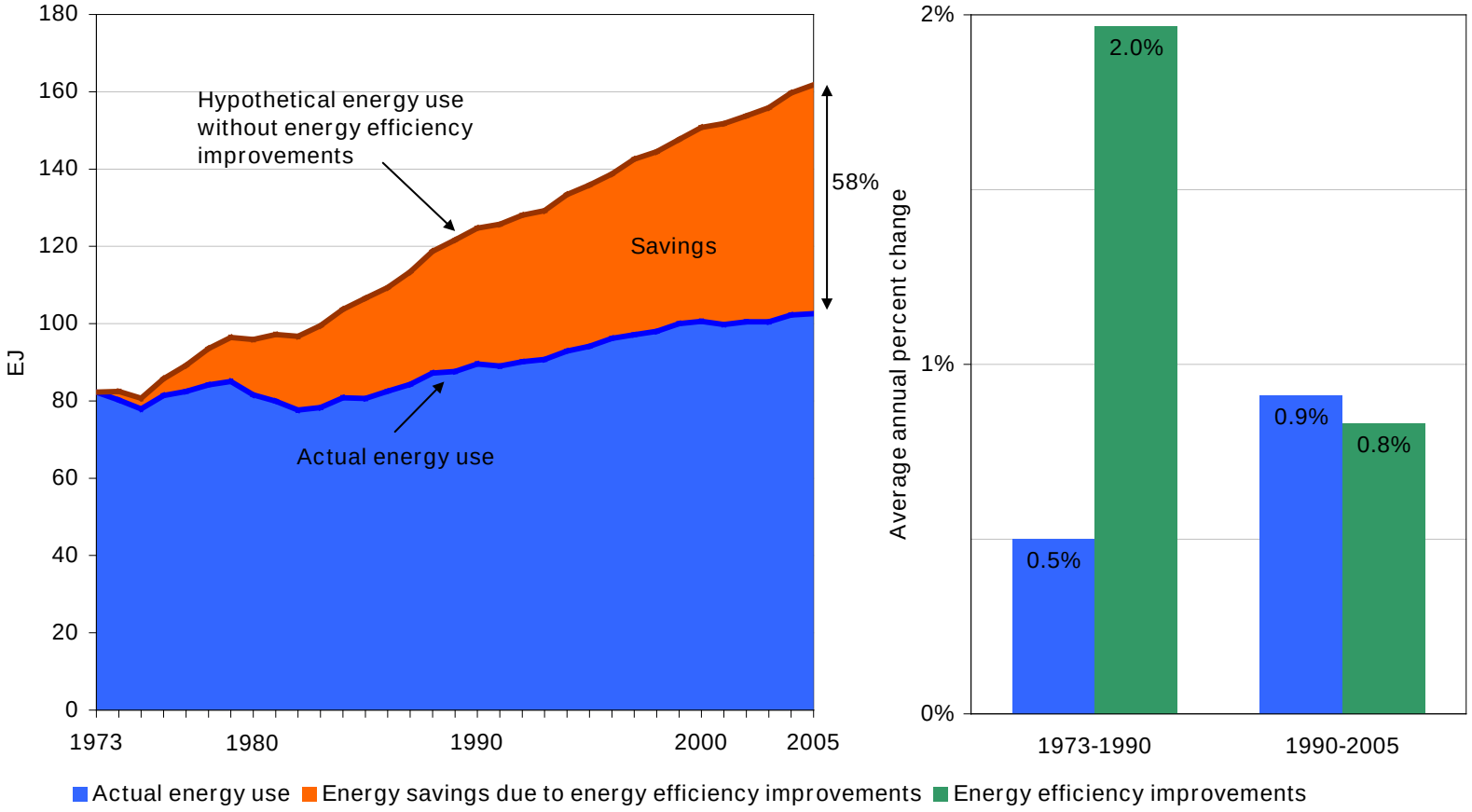
—How to Interpret Changes Induced by Shale Revolution —



Introduction

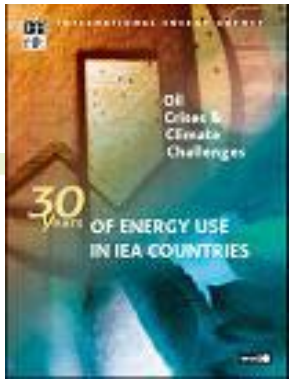
- Why Energy Efficiency matters?
- Results from IEEJ's Asia/ World Energy Outlook 2013
- What are Expected of Energy Efficiency?
- Way forward

OECD avoided 60% of energy increase by Energy Saving
(2005 estimates, IEA Report to G8 Summit in Toyako)



IEA, “Worldwide Trends in Energy Use and Efficiency” (2008)

Energy Saving of OECD Countries Slowed Down in late 1980's

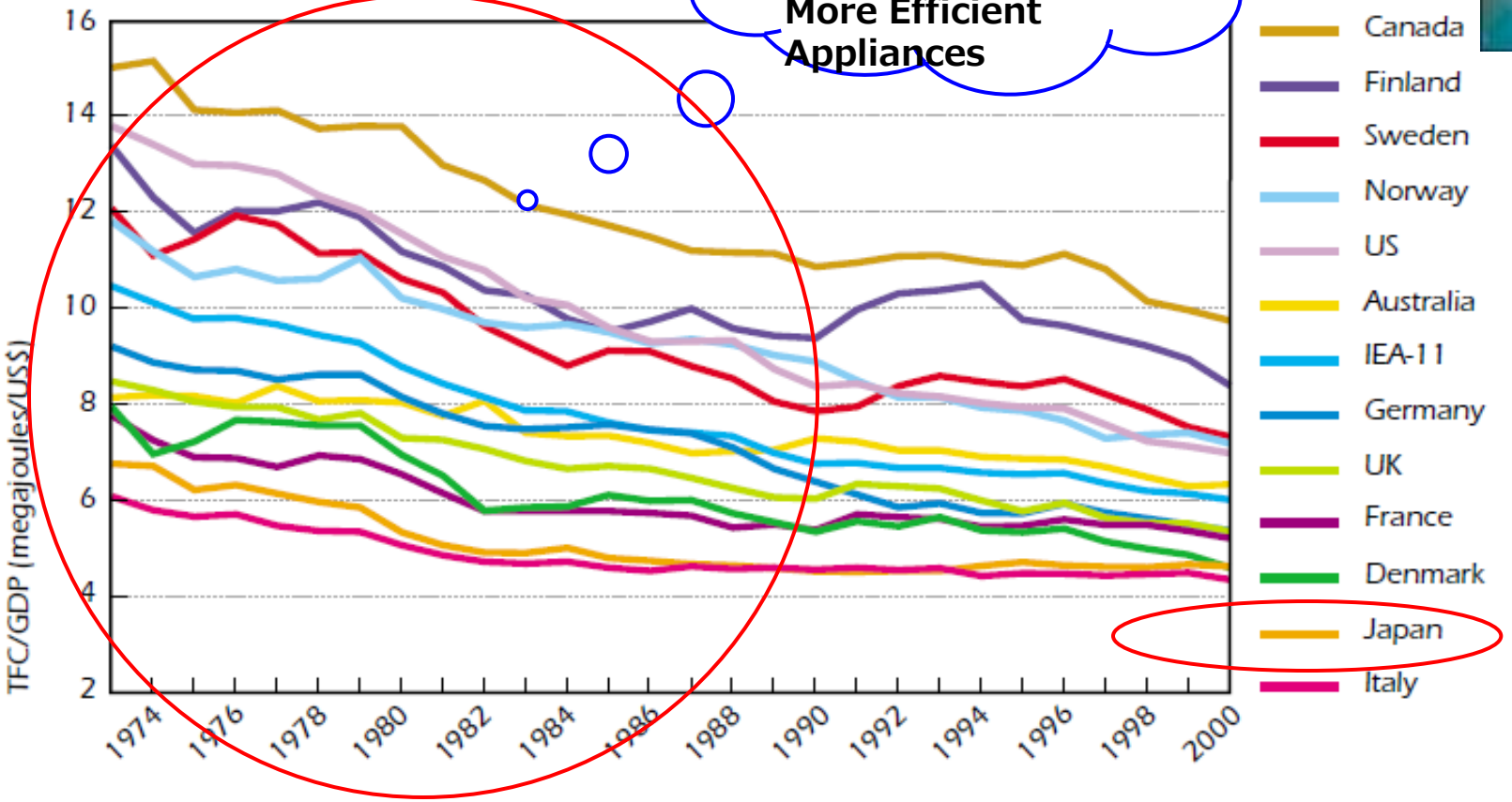


2004

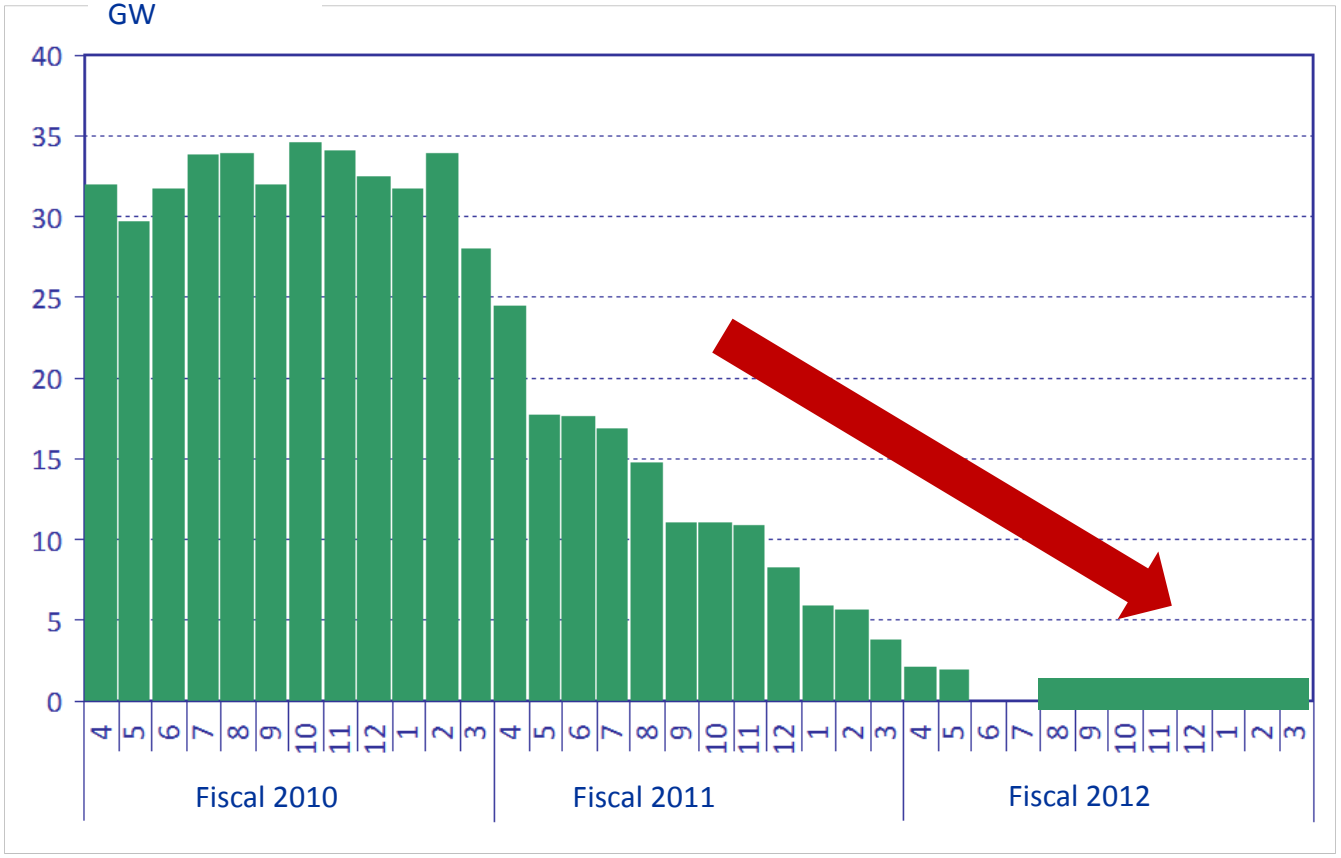
EE improvement in Energy-Intensive Industries, Structural Change, More Efficient Appliances

Figure 3-8

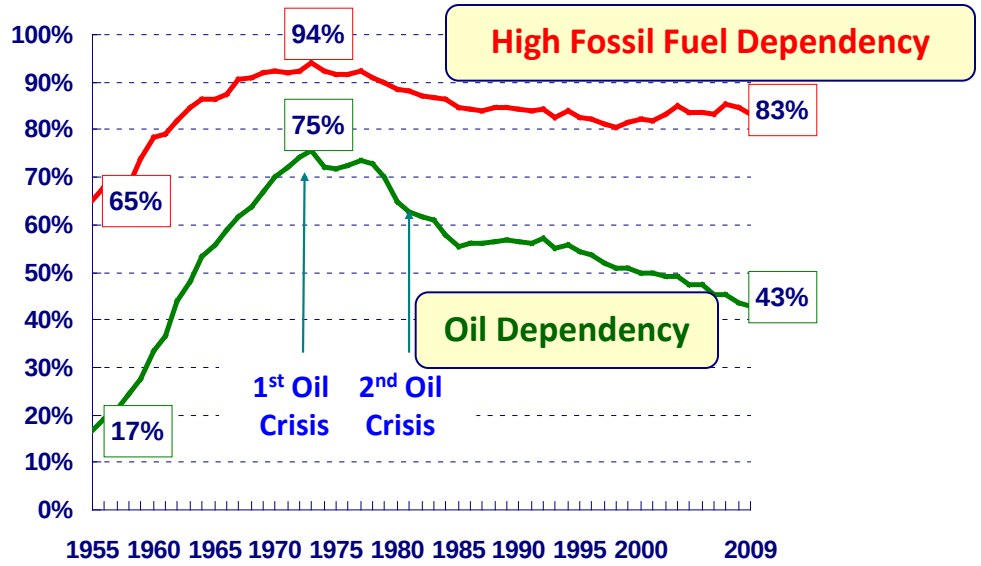
TFC per Unit of GDP

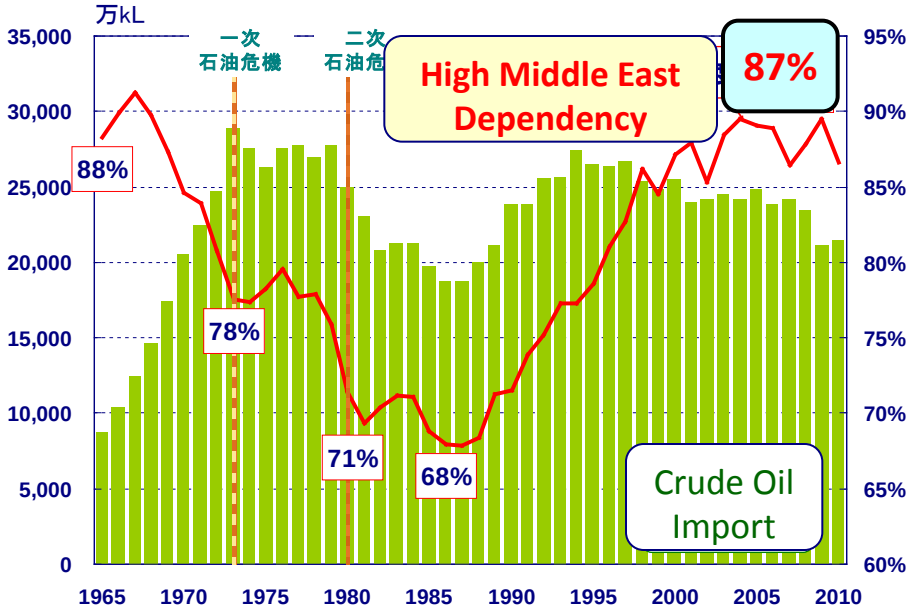


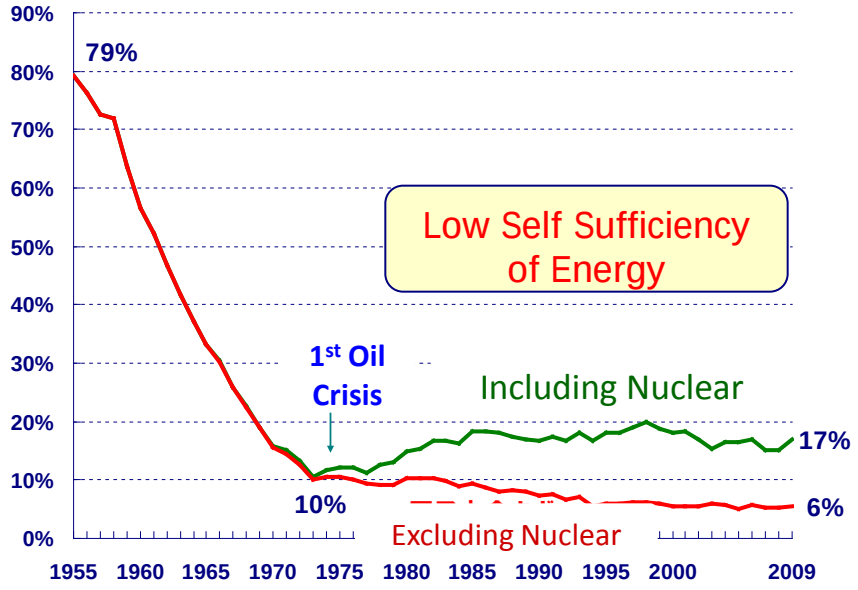
Nuclear Plants' Restart in FY2013 still Unknown

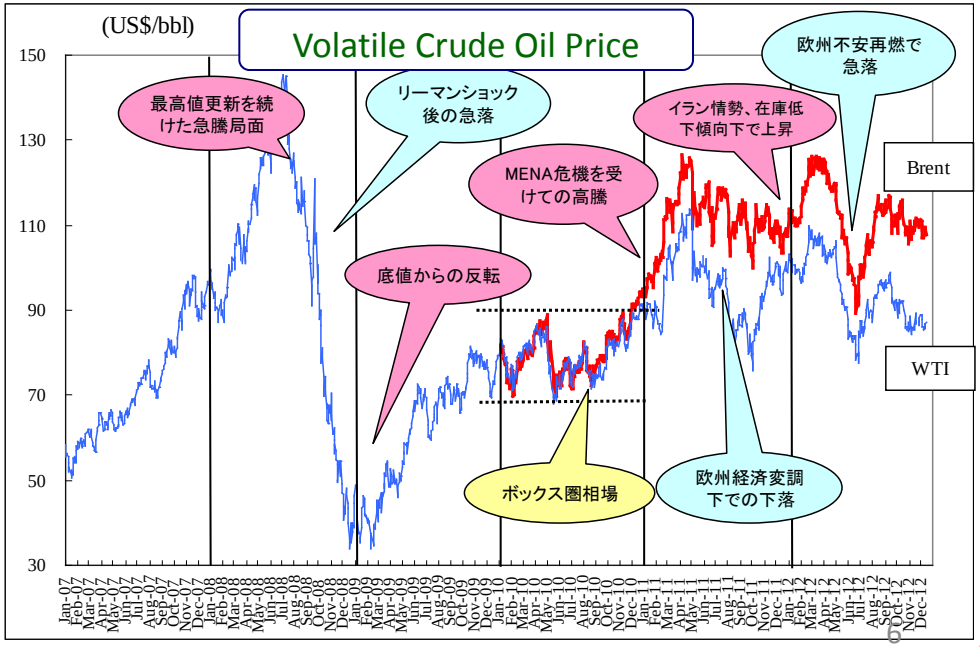


Weakness of Japan's Energy Security





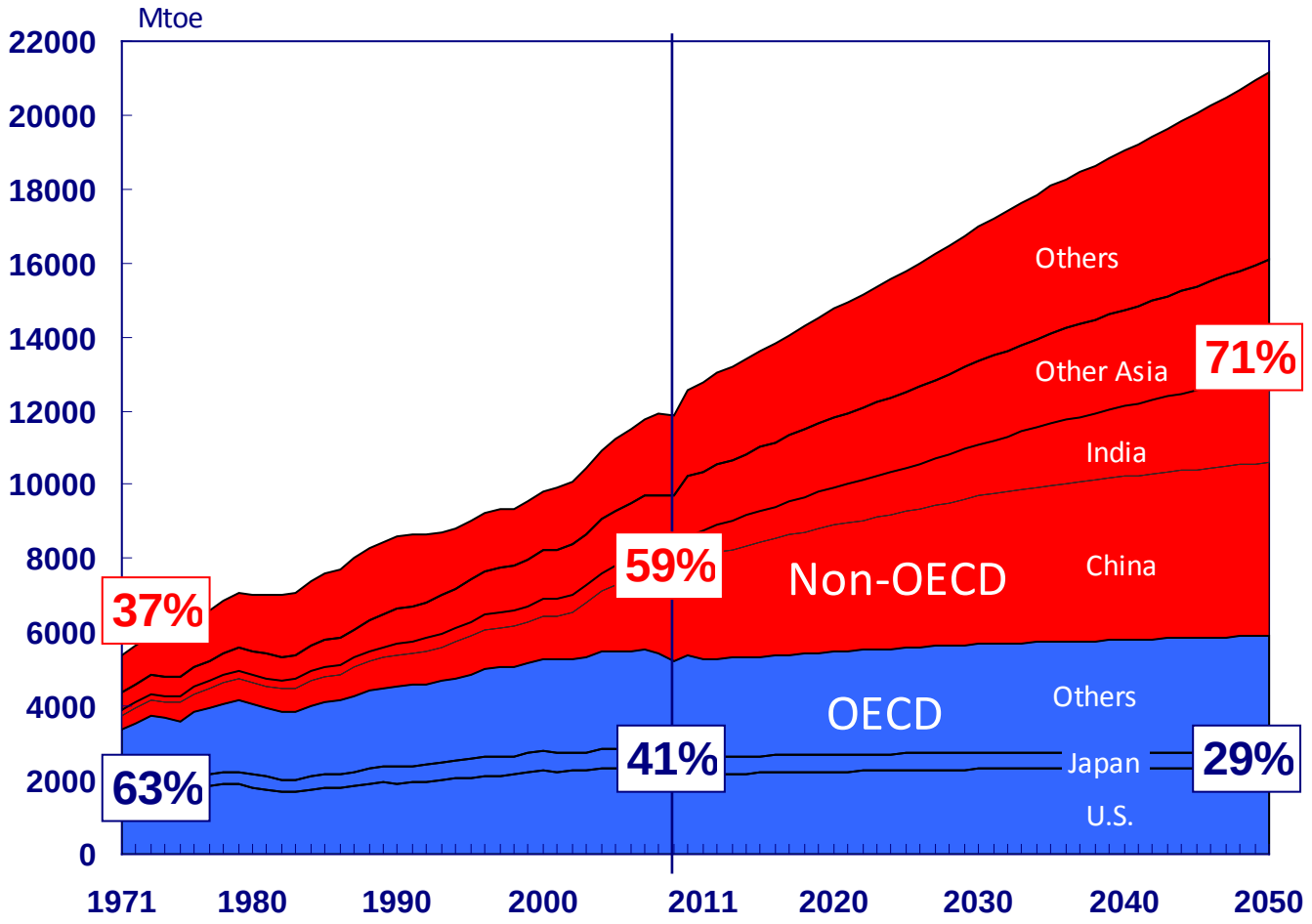




Source) IEEJ "EDMC Handbook of Energy & Economic Statistics", IEA, etc.

World Energy Demand Will Grow

Reference



Source: IEEJ (Asia/World Energy Outlook 2013)

"Energy Mix" Debate in Japan : Relevance to ROW

1) Comprehensive Perspective

- No Perfect Energy exists for Japan without domestic energy resource
- 3E+S : Energy Security ＋Efficiency ＋Environment ＋ Safety
  - More Efficient Energy Use
  - Cleaner Use of Fossil Fuels + Safer Nuclear Energy Technology
  - Lower Cost Renewable Energy
- Increasing use of electricity requires:

➔ Well-balanced Mix of 4 power gen technologies in addition to enhanced energy efficiency is essential.

"Nuclear" : "Renewable" : "Thermal Power" : "Cogeneration"

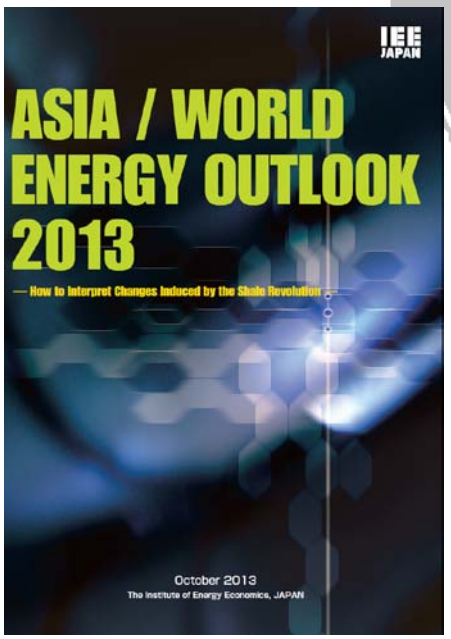
2) Long-term Perspective

3) International Perspective

➔ Japan's Energy Mix Debate has a relevance to the Rest of the World

Some Results from Asia/World Energy Outlook 2013

—How to Interpret Changes Induced by Shale Revolution —

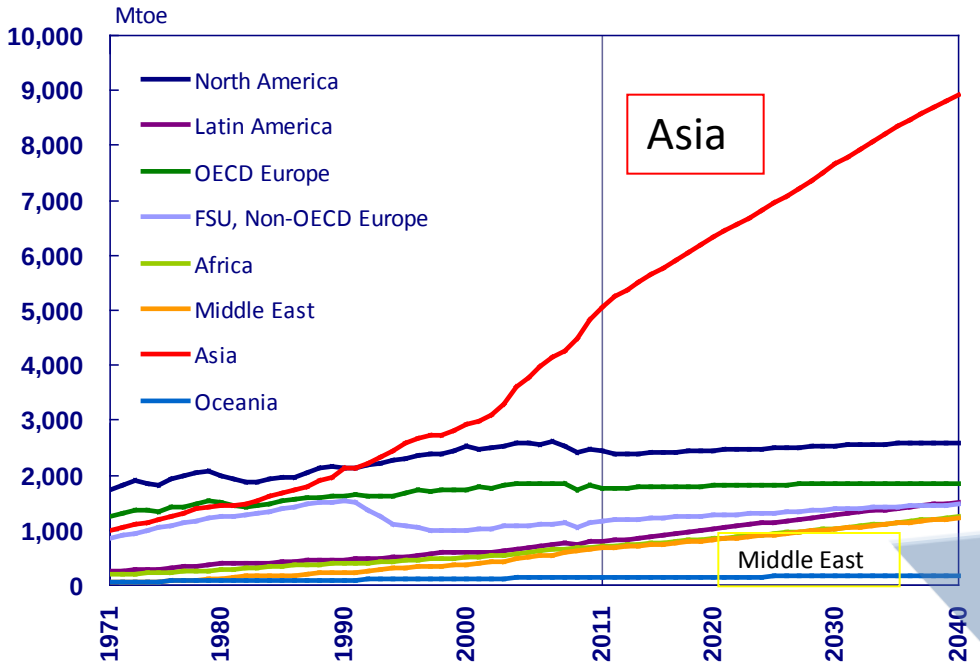


English version will also become available soon!

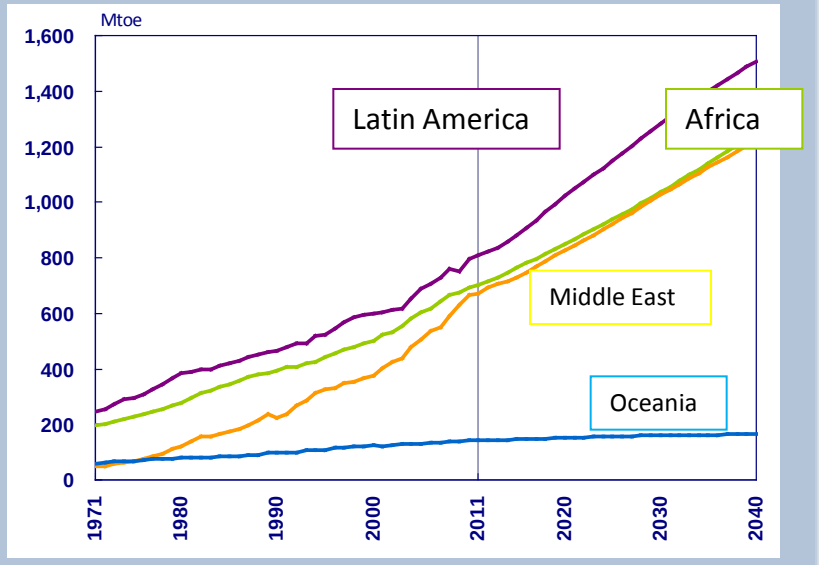
1: Energy Demand in Asia Will Continue to Grow

Reference

Outlook for Energy Demand by Region



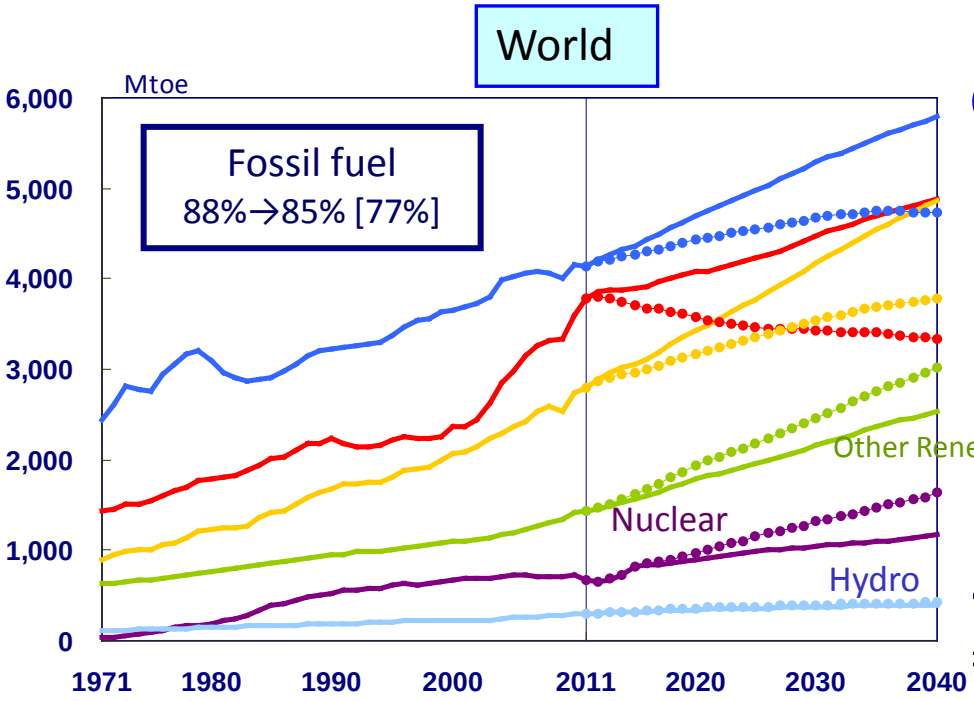
So is the case for the other regions!



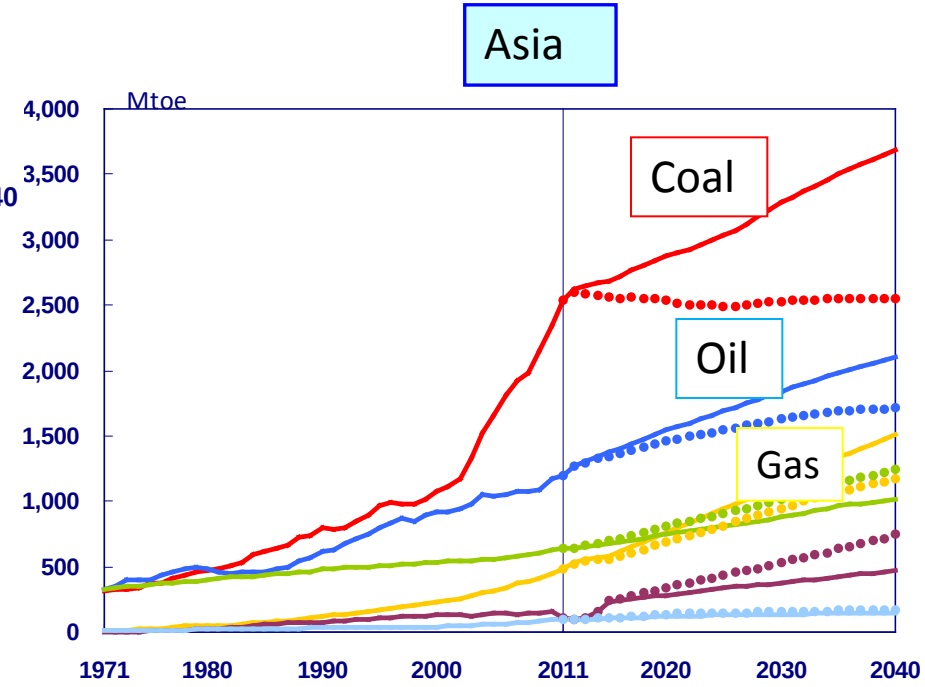
Source: IEEJ (Asia/World Energy Outlook 2013)

2: Fossil Fuels (Oil, Coal, Gas) Will Remain Key Energy

Reference
Adv. Tech.



Energy Demand Oulook by Source

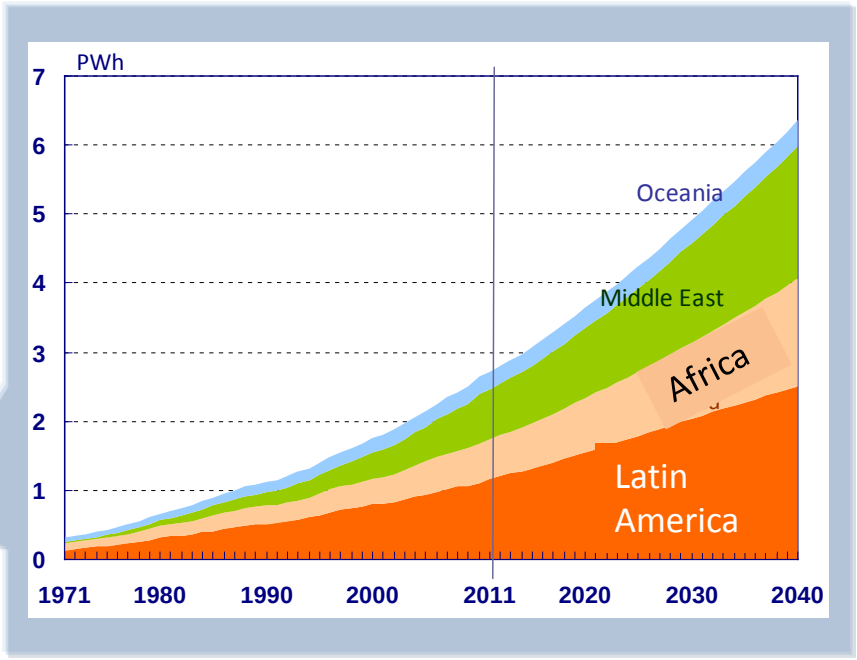


Source: IEEJ (Asia/World Energy Outlook 2013)

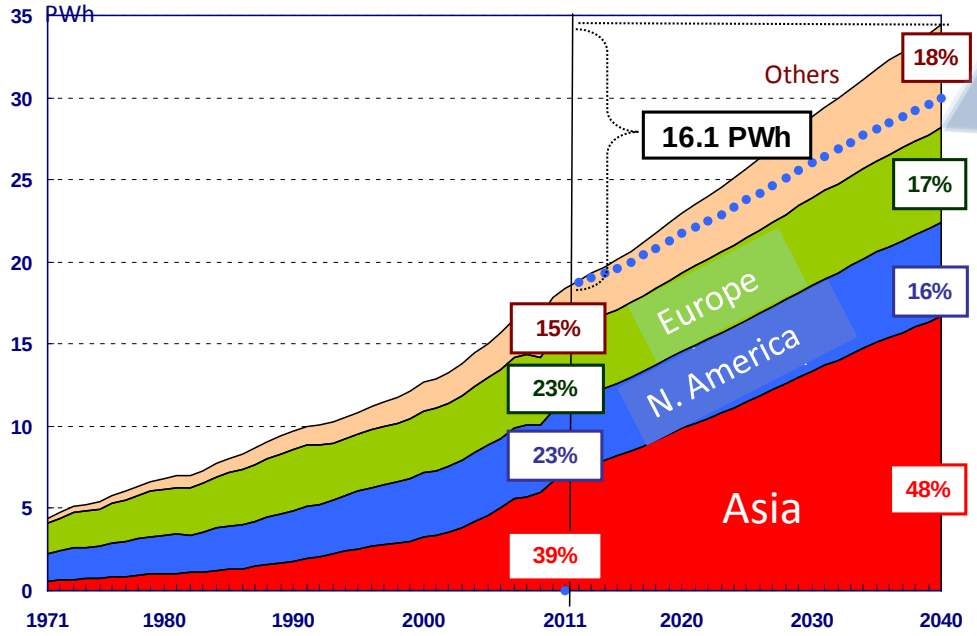
3: Robust Increase of Electricity

Reference

Outlook for Electricity Demand (ROW)



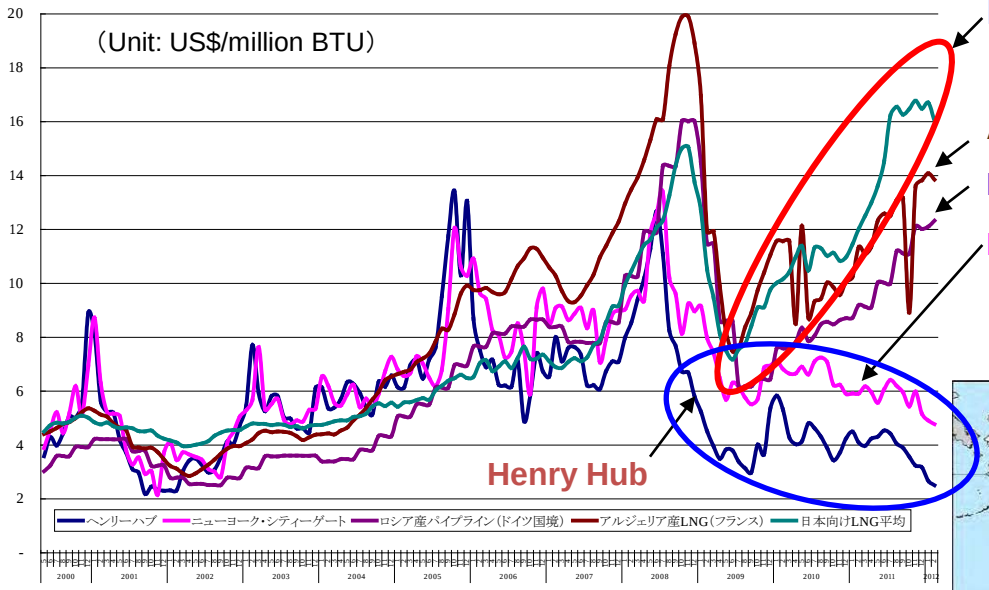
Outlook for Electricity Demand by Region



Source: IEEJ (Asia/World Energy Outlook 2013)

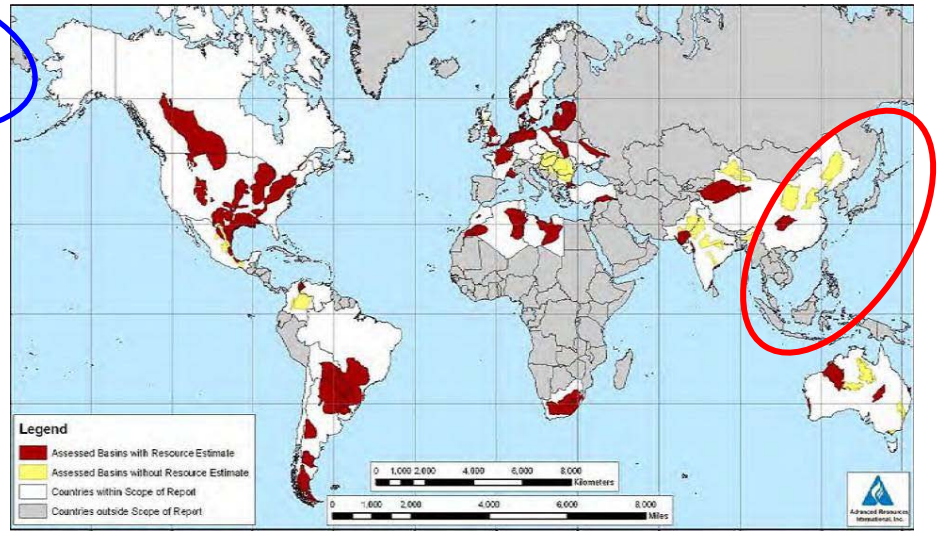
4: Facing Higher Gas Prices

Comparison of Regional Natural Gas Prices



（Source）Compiled from Trade Statistics (Japan), 、US/DOE、Energy Intelligence data

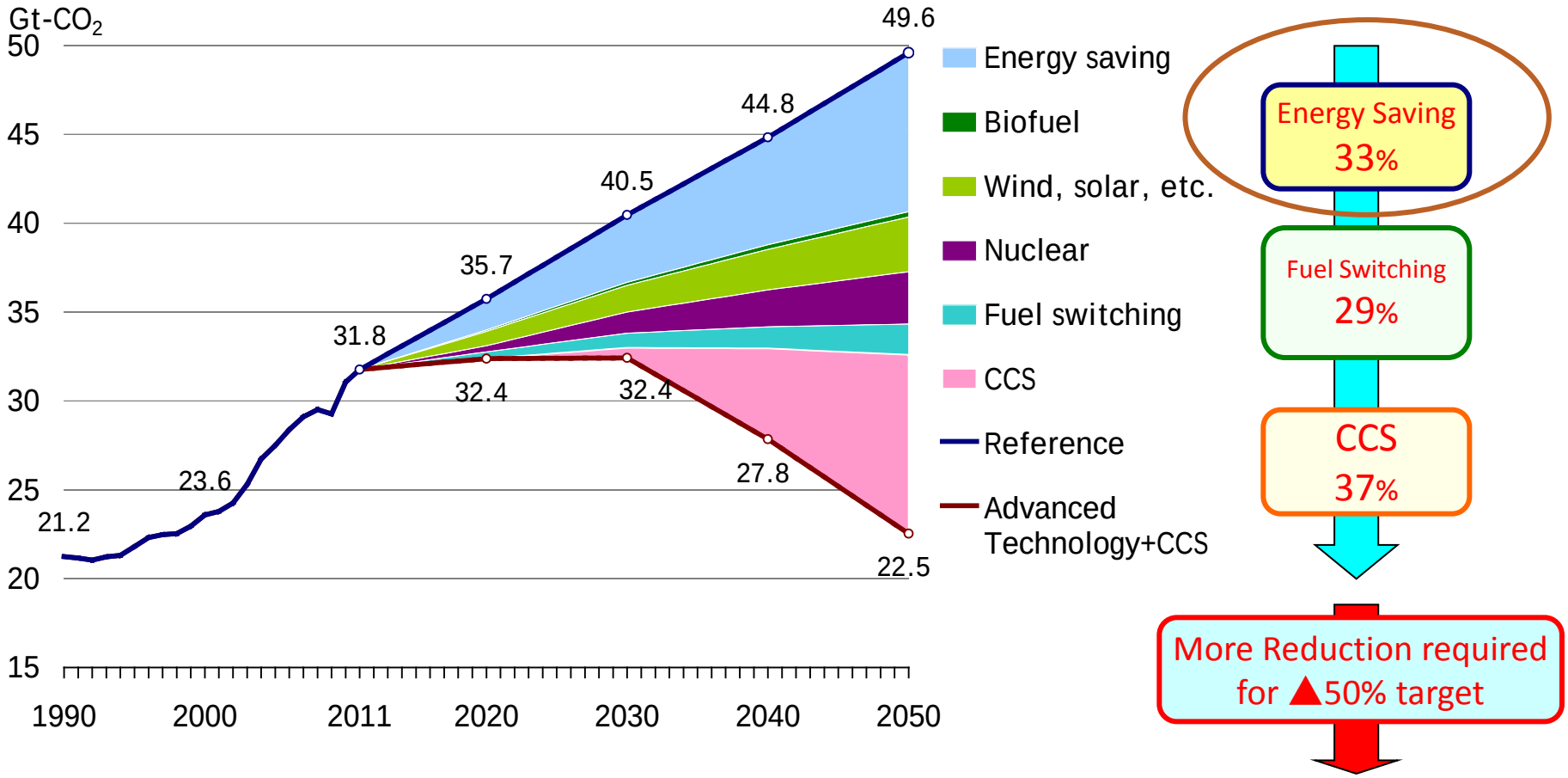
World Shale Gas Resources



（Source） US/DOE study, World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States, APRIL 2011, prepared by Advanced Resources International (ARI) for the United States' Energy Information Administration (EIA).

CO2 Emissions Reduction by Technology (World)

Reference
Tech. Adv.

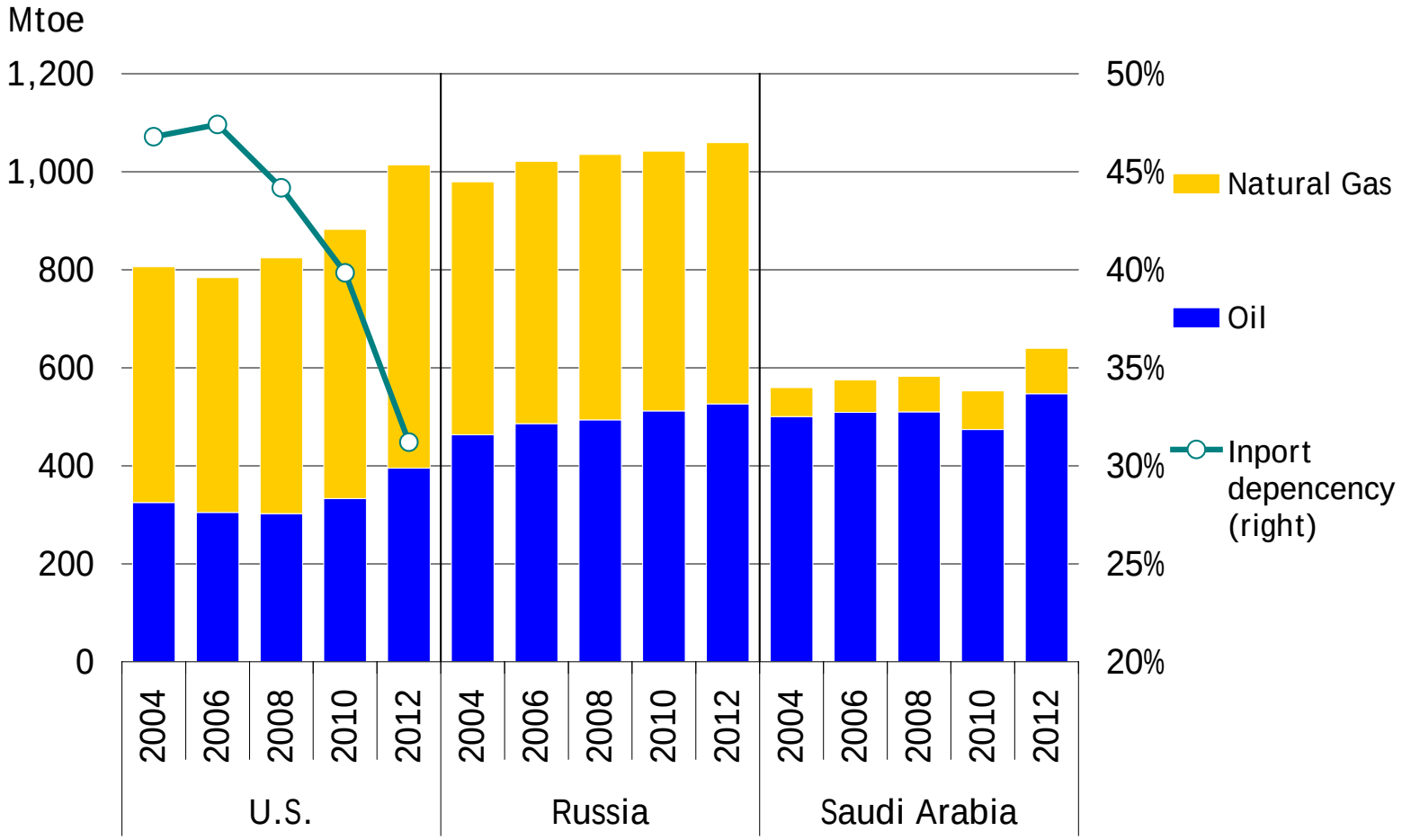


■ For 50% reduction of global CO2 emission, additional long-term measures are necessary and development of innovative technology is essential.

Source: IEEJ (Asia/World Energy Outlook 2013)

2. What about Shale Gas Revolution?

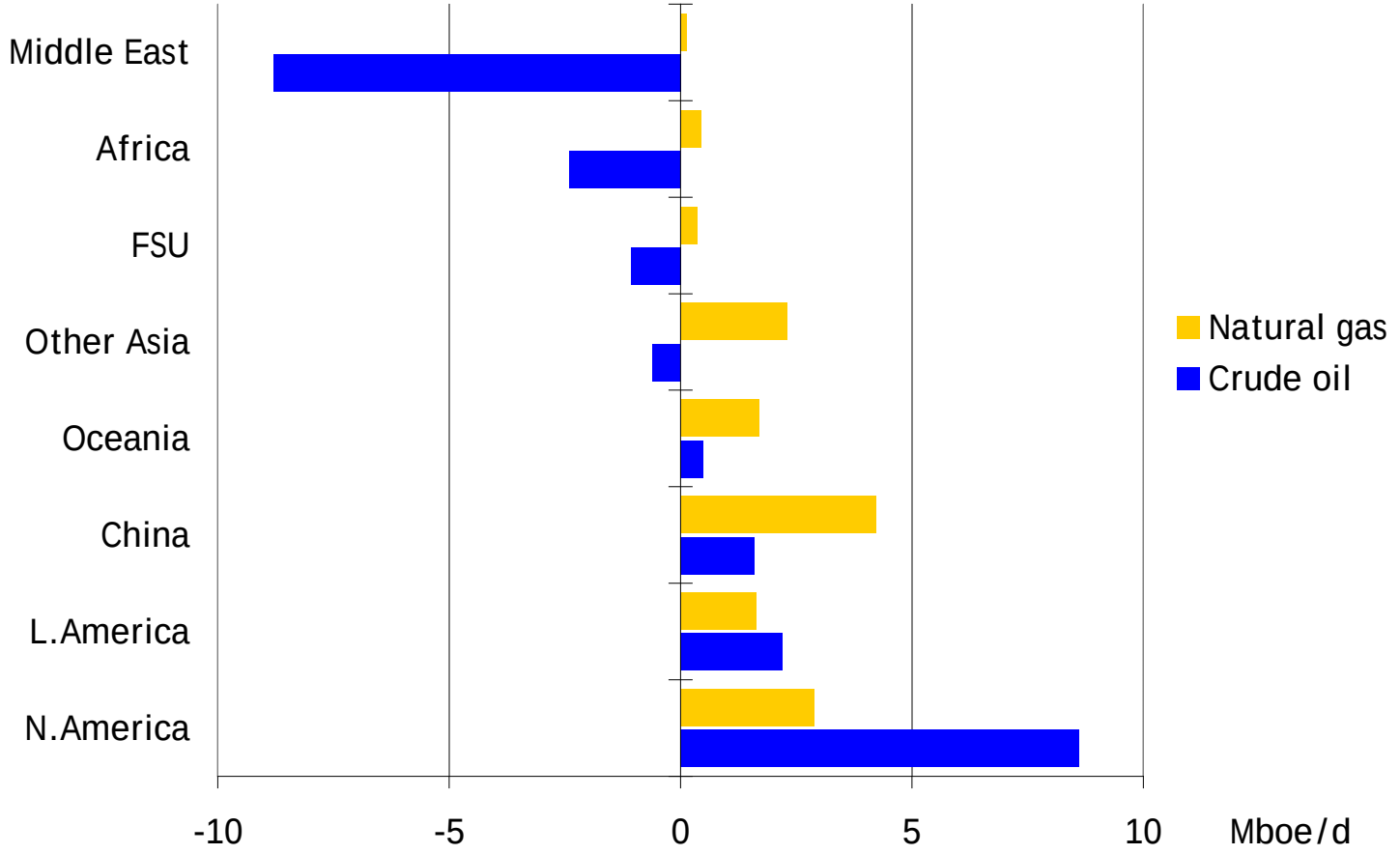
Production Trends of Big 3 for Oil & Gas



BP “Statistical Review of World Energy 2013”

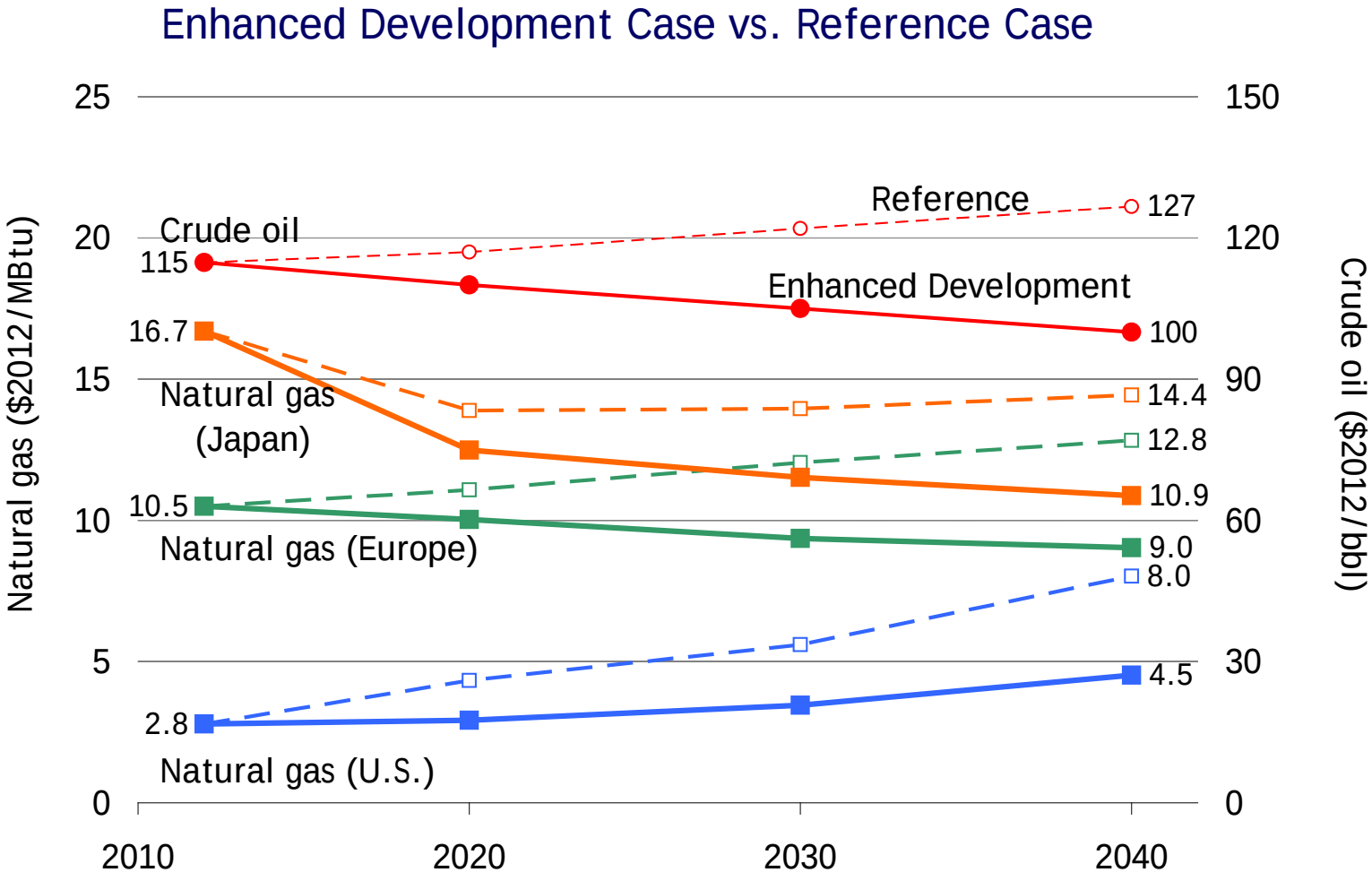
Shale Revolution Will Change Supply Picture for Oil and Gas

2040 Production (Enhanced Unconventional Resource Case vs Reference Case



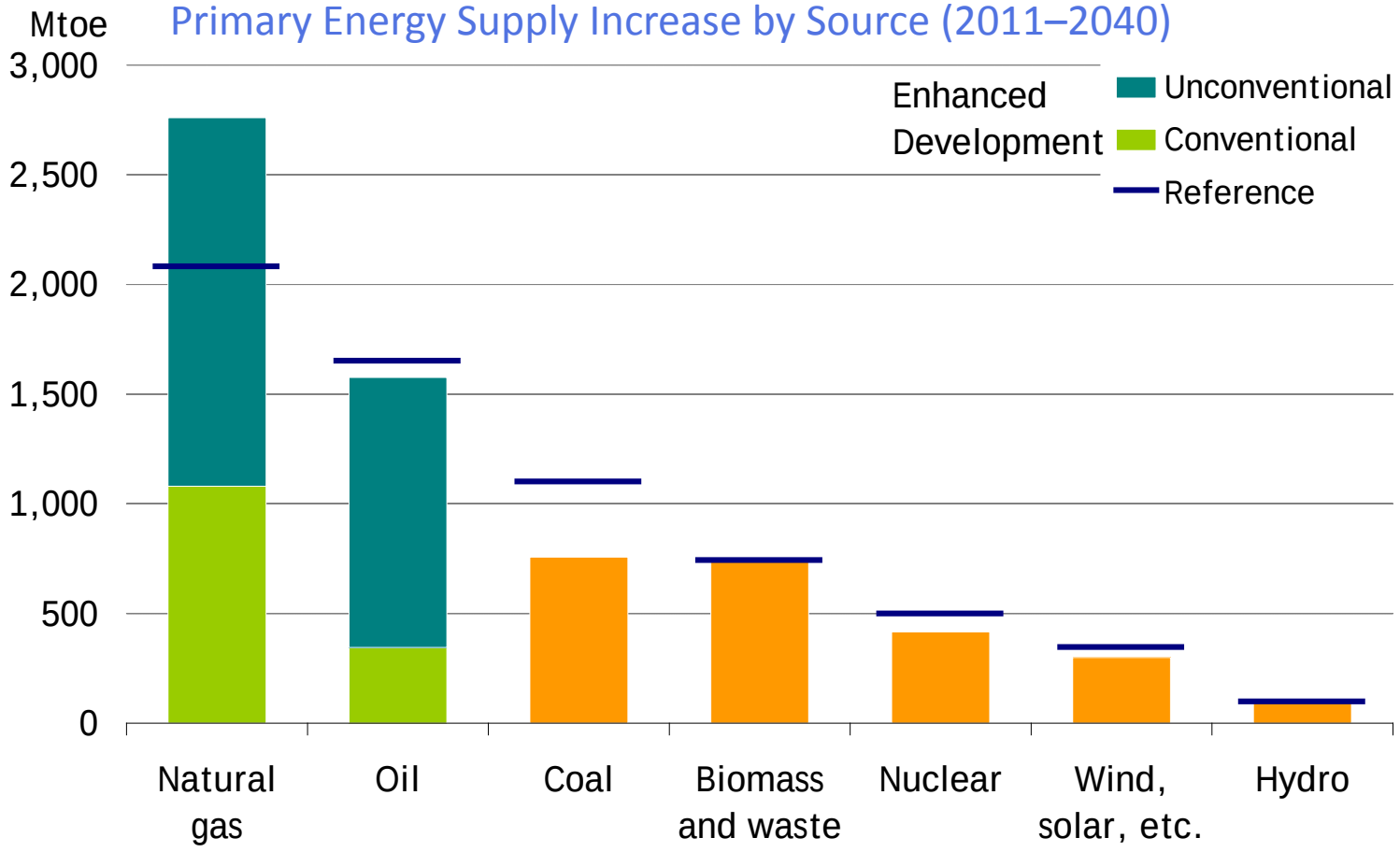
Source: IEEJ (Asia/World Energy Outlook 2013)

Crude oil and natural gas prices (2010-40)



Source: IEEJ (Asia/World Energy Outlook 2013)

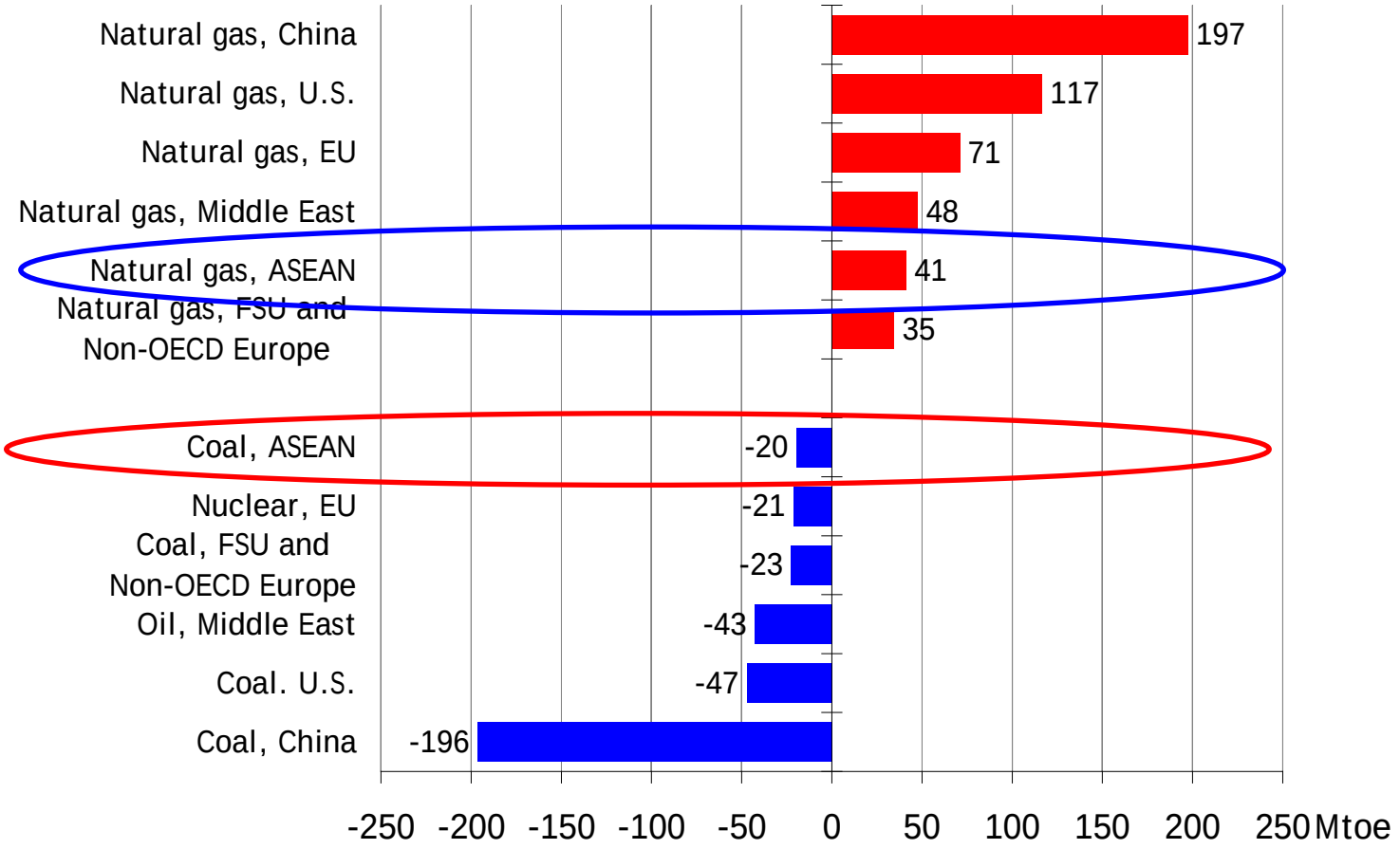
What Can be Expected IF Things Go Well for Unconventional Resources?



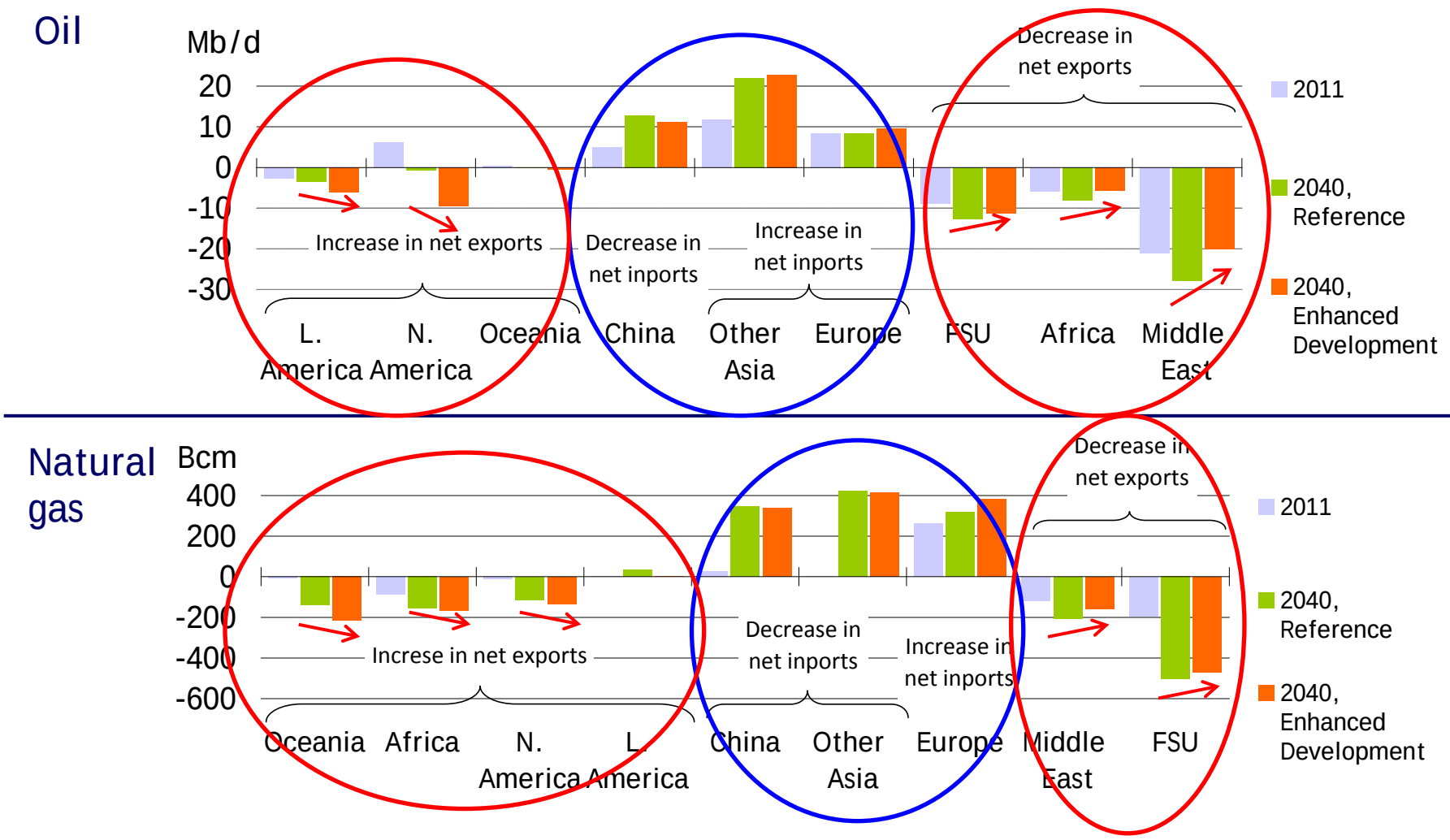
Source: IEEJ (Asia/World Energy Outlook 2013)

Gas will replace Coal, Oil and Others

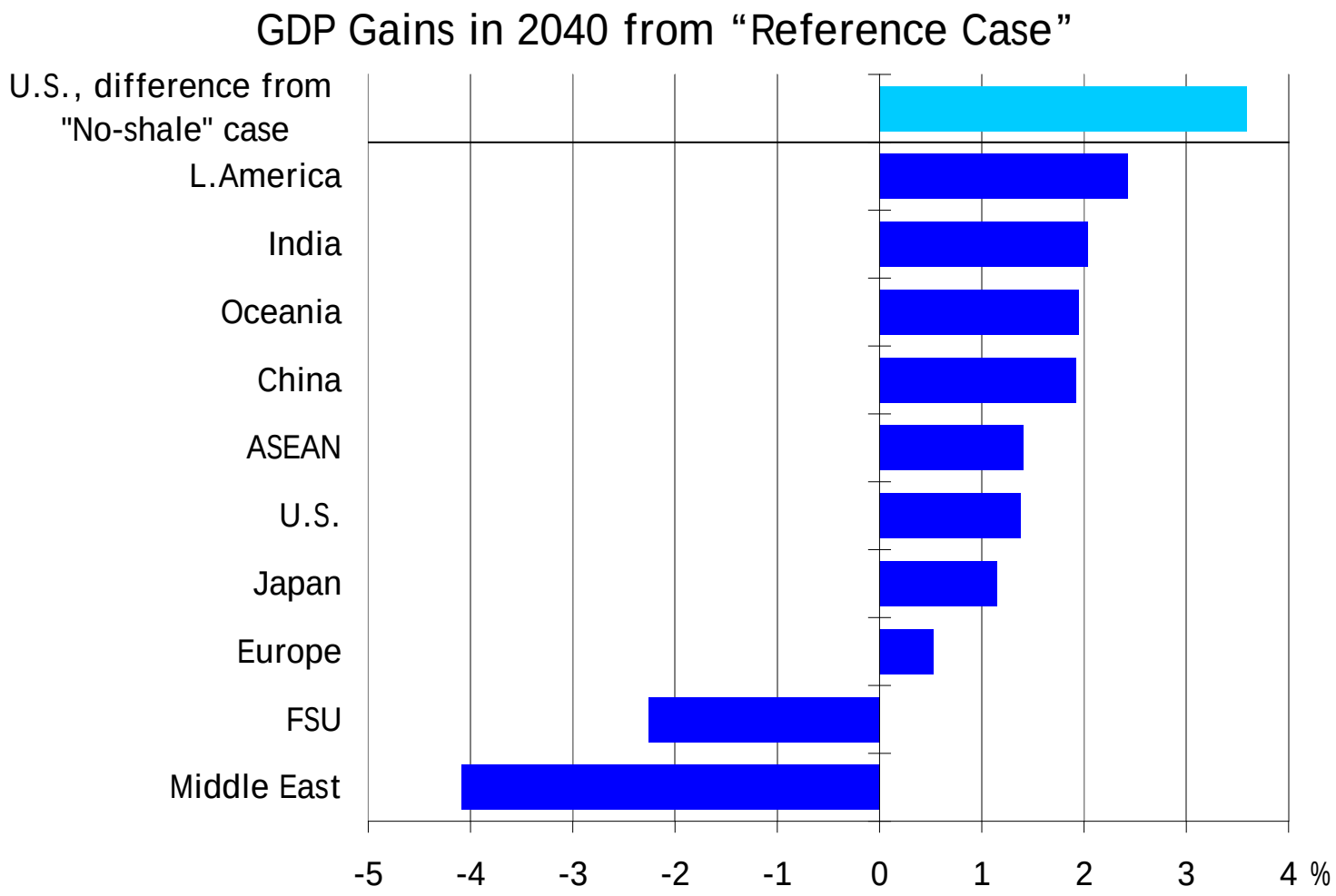
Primary Energy Consumption Difference in 2040
(Enhanced Unconventional Resource Case vs Reference Case)



Oil and Gas Supply Picture will Change

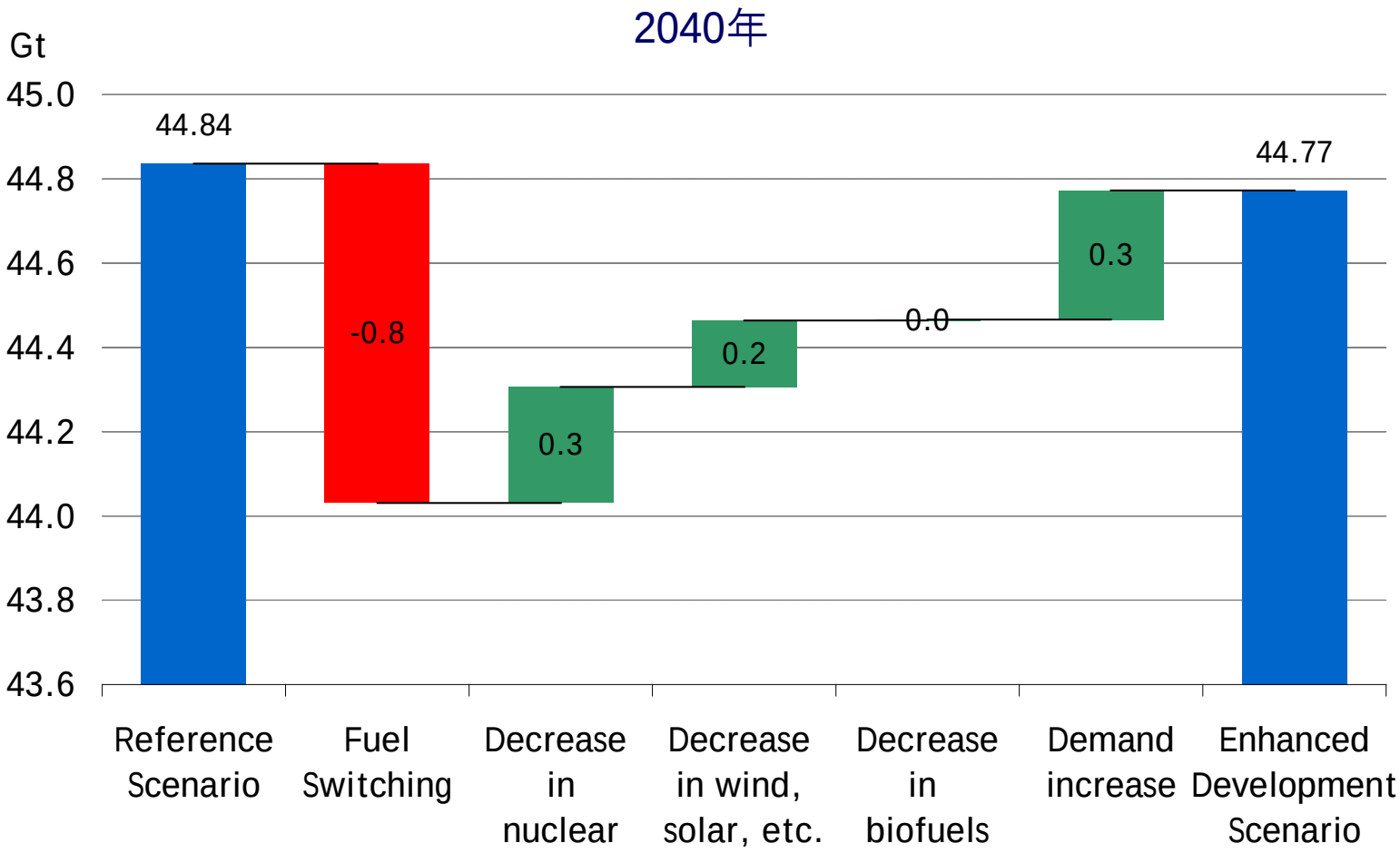


Importers Will Benefit From Lower Prices

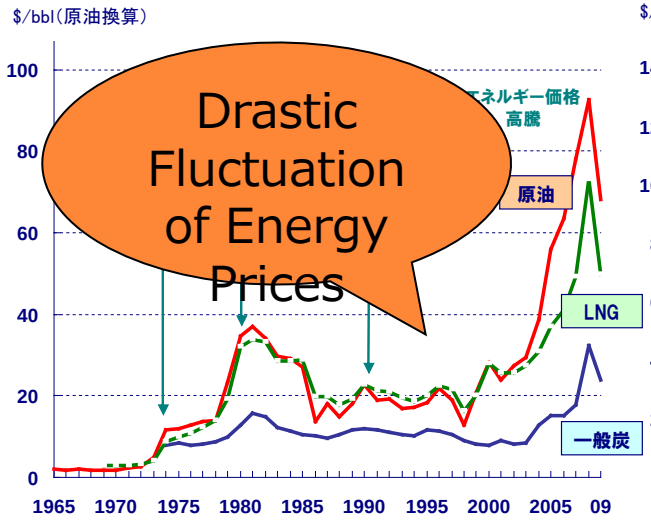


注: レファレンスケースから開発促進ケースへの移行による影響分

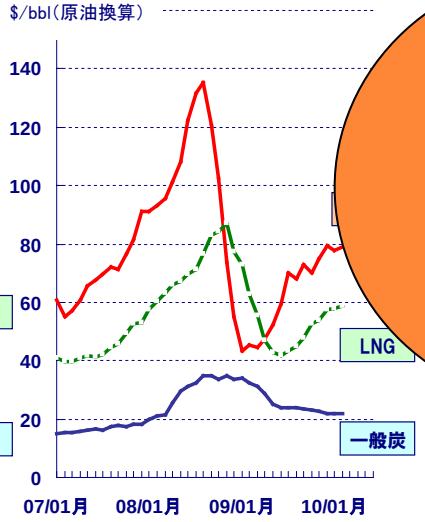
CO_2 Emission from Energy Use will not Change



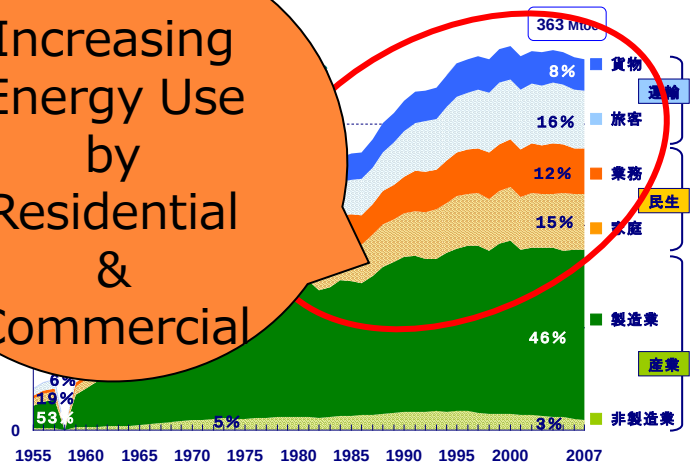
- 2040年の排出はレファレンスケース比で世界0.1%減とほぼ変わらず。石炭代替効果が効くアジアは1.1%減と若干減少。
- 天然ガスへのシフト(燃料転換)が排出減に寄与する一方で、エネルギー価格の低下による省エネルギー、原子力、再生可能エネルギーの停滞が排出増に寄与。



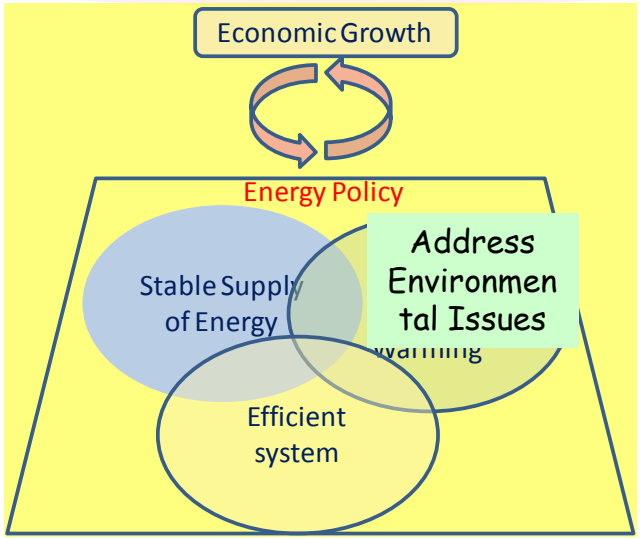
Drastic Fluctuation of Energy Prices



Increasing Energy Use by Residential & Commercial



Energy Efficiency Remains Key to **Energy Policy**



2. What are Expected of Energy Efficiency and Conservation (EE&G)?

New Challenges 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

Challenges Common with ROW

- **Increase** in power usage to be addressed by ITC
  - ⇒ HEMS,BEMS, Energy Management, Smart Meters
- Combined usage of both **EE** and **non-fossil energy** to achieve Zero Emission options (e.g. ZEB)
- Active employment of reuse, recycle, natural light & heat (passive E)
- **Integrated policy challenges** to be addressed
  - Environment (air, water) issues, EE, energy poverty & aging society (in both developed & developing countries), **sustainable growth**・and creation of new employment.

The Latest Change in Japan's EE Act (2013 May)

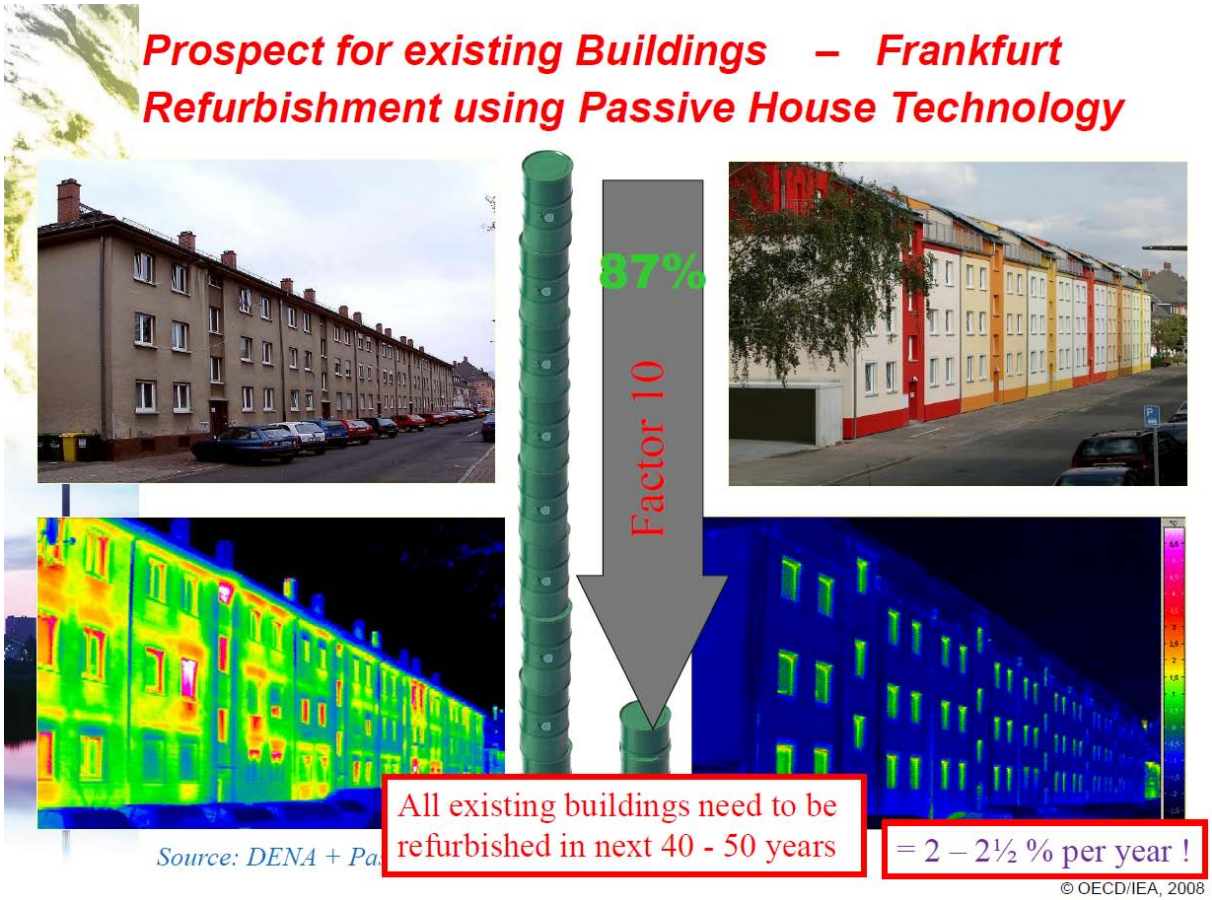
○ Inclusion of building materials (insulation & windows) into "Top Runner Program" ➔ Wider coverage

○ "Peak Shift" as additional means to appeal in annual reports on energy efficiency improvement and conservation.
➔ Introduction of Electricity peak demand cut/shift

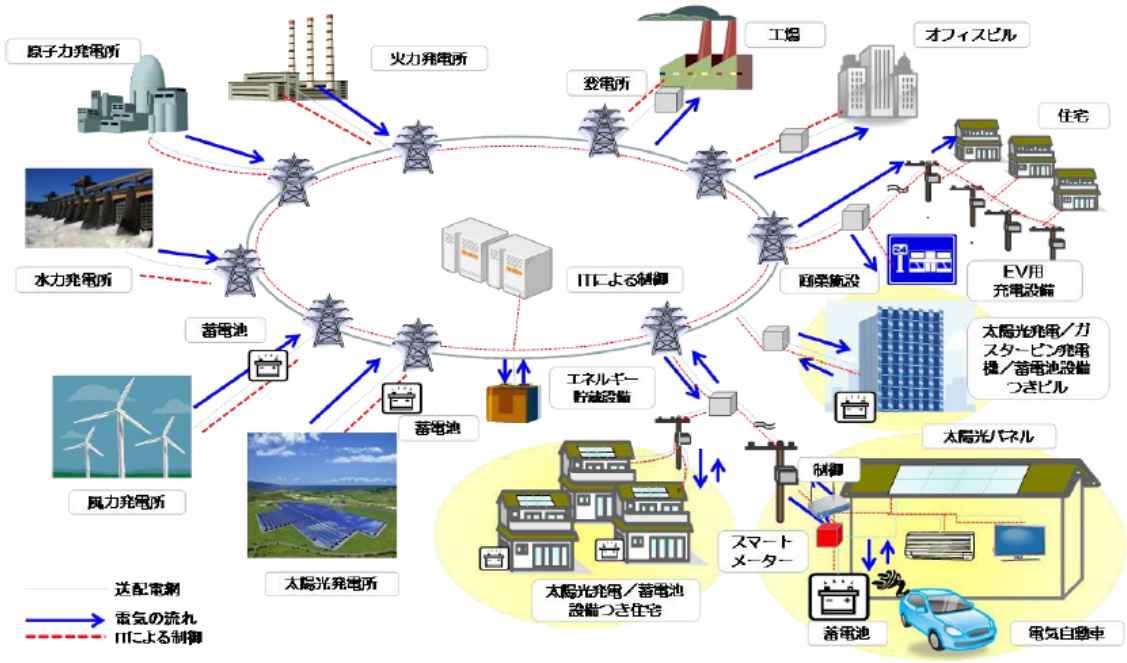
Detailed rules for regulation are currently under discussion

Building EE Improvement: Passive House, Zero Energy Building

Refurbishment dramatically increased insulation to save heat usage in Frankfurt



Next Generation Energy Use : Embodied into a Social System and Infrastructure (Smart Grid +)



- Cross-cutting collaboration across industries and Ministries is required for strategic actions.
- Maximum utilization of renewable energy will be integrated.
- IT driven energy savings based on data and information.

Common Advantage of Energy Efficiency (1)

➢ Readily available cost effective measures 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.

⇒ 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)

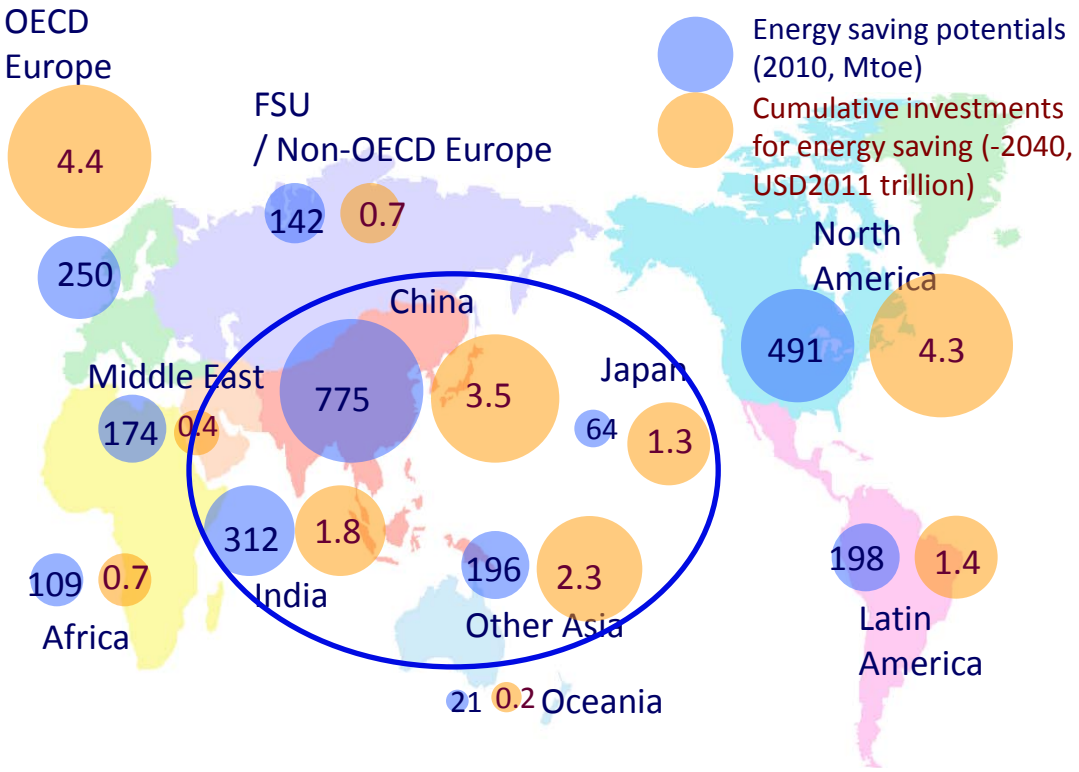
Common Advantage of Energy Efficiency (2)

- Energy shift from coal → oil → gas → electricity.
  - Power generation needs to become more efficient while saving electricity usage and "peak shift " is effective to make the power intensive society affordable.

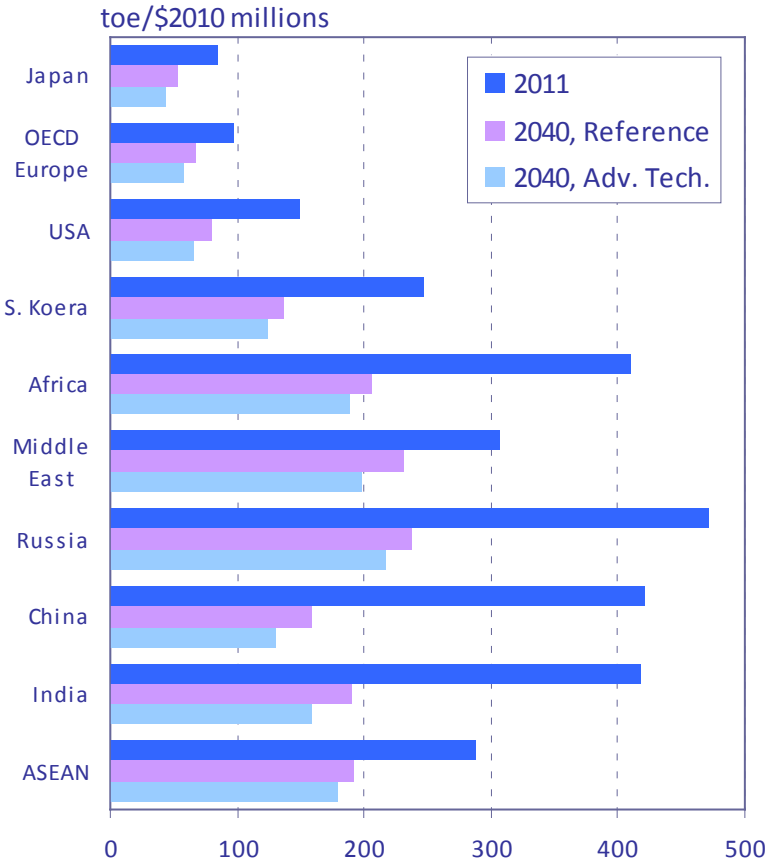
- Generating own power using renewable alone will not make houses/ buildings "net-zero energy/ emission" to realize Low Carbon Society. Energy efficiency improvement is essential.

Energy Saving Potential is Big for Growing Asia

Energy saving potentials and cumulative investments by region



Primary energy consumption per unit of GDP



※ Difference between the Reference and Advanced Technology Scenarios

※ 省エネポテンシャルは、2040年における技術進展ケースとレファレンスケースの一次エネルギー消費量の差。投資額は、2040年までの両ケースにおける省エネ投資の差額。

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.

Thank you very much for your attention!

For more advanced analyses, please contact IEEJ at report@tky.ieej.or.jp