

# Implications of the Changing Energy Map

Comments for  
IEA “WEO 2013” Symposium  
Tokyo

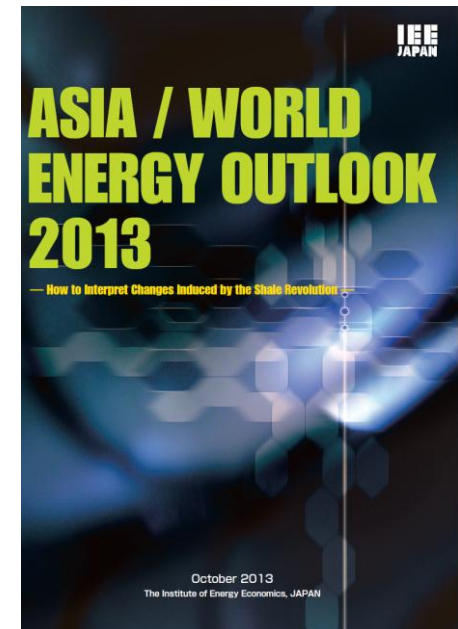
28 November, 2013

The Institute of Energy Economics, Japan

**Yukari Yamashita**

Board Member, Director

Energy Data and Modelling Center

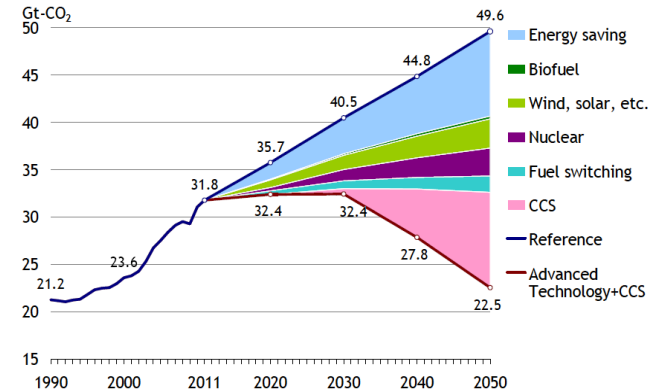


# Asia/World Energy Outlook 2013 : Summary

- World energy demand will continue to grow, mostly in Asia.**

- Energy conservation and climate change measures → Keys
- Diffusion of **existing technologies will not be enough** to achieve the target of “halving CO2 emissions by 2050.”
- **Innovative technologies must be developed & deployed** to limit the temperature rise to 2°C from pre-industrialization by the end of the 21st century.

Global CO<sub>2</sub> Emission Growth and Projected Reduction



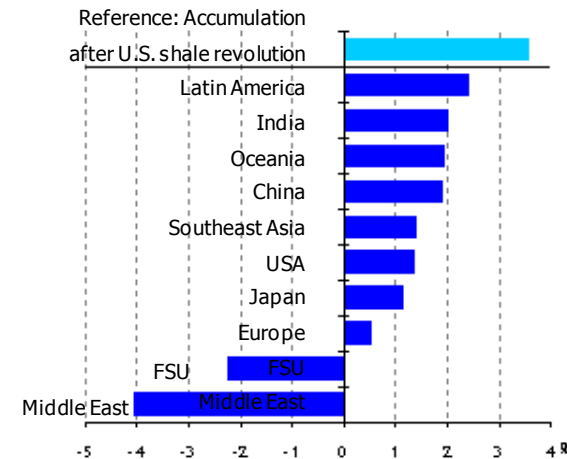
- Changes Induced by the Shale Revolution**

- Oil and gas prices will decline
- Lower gas price will prompt **fuel switching from coal to gas** → Change in the global primary energy structure

- Fossil fuel exports from **North America** and **Middle East & FSU**
- Economic impacts :
  - Positive for many countries (USA, Latin America, Oceania and Asia)
  - Negative for the Middle East and the FSU



Economic Impacts by 2040 of the Shale Revolution by Region (relative to the Reference Scenario)



# Warning for Japan

Nikkei (13 November 2013)

**Japan and EU will lose Export Share by 30%: IEA's Outlook for 2035**

**シェール革命 米に競争力**

**輸出品シェア 日欧3割減**

**IEA 35年見通し**

オイルの波及効果と、占めるシェアが大きい製鉄などのエネルギー供給体。欧州連合(EU)制などの改革の必要性が現状の36%から35年時点分析した。

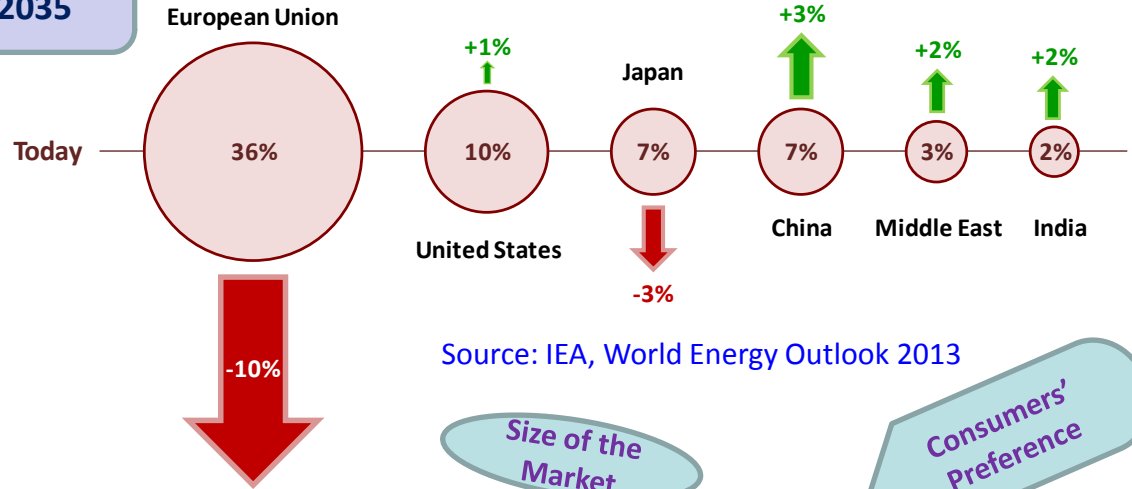
1 IEAは、米国の天然ガスが世界の1割の供給を占める中、日本は平均電力価格では米国の倍以上も高くなる見込み。日本などが格差を縮めたい。原油価格に連動して決まる液化天然ガス( LNG )の価格体系の改革や、鉄鋼、アルミ、銅、石油精製などの産業の格差が広がり、これの解消が世界の改革の鍵と見られる。

**ファンデルフーフェン事務局長に聞く**

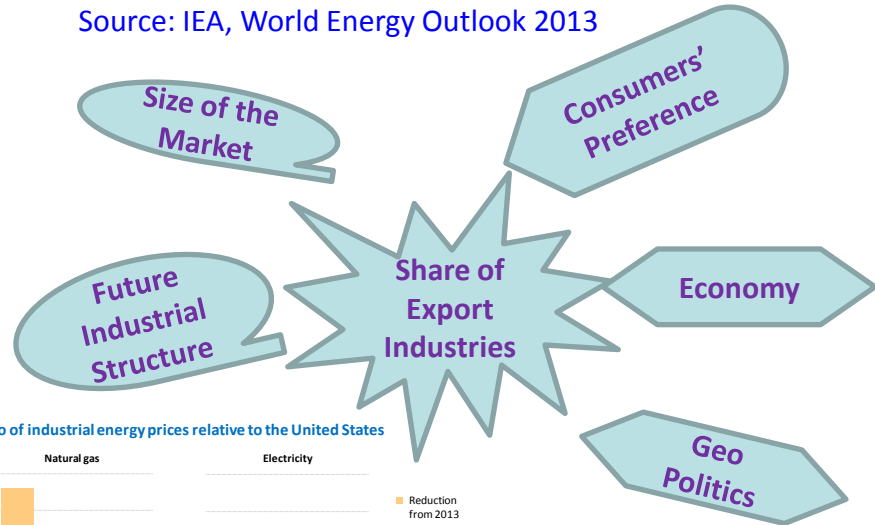
価格引き下げ 日本、2つの課題

国際エネルギー機関(IEA)の事務局長ファンデルフーフェン氏は、日本と欧州が競争力を維持するには、2013年の「世界エネルギー展望」で指摘したように、シェール革命の進展による天然ガス価格の低下を踏まえ、日本と欧州が競争力を維持するには、2つの課題がある。1つは、天然ガス価格の低下を踏まえ、日本と欧州が競争力を維持するには、2つの課題がある。1つは、天然ガス価格の低下を踏まえ、日本と欧州が競争力を維持するには、2つの課題がある。

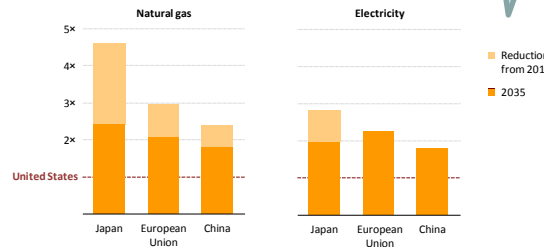
## Share of global export market for energy-intensive goods



Source: IEA, World Energy Outlook 2013



Ratio of industrial energy prices relative to the United States



Regional differences in natural gas prices narrow from today's very high levels but remain large through to 2035; electricity price differentials also persist

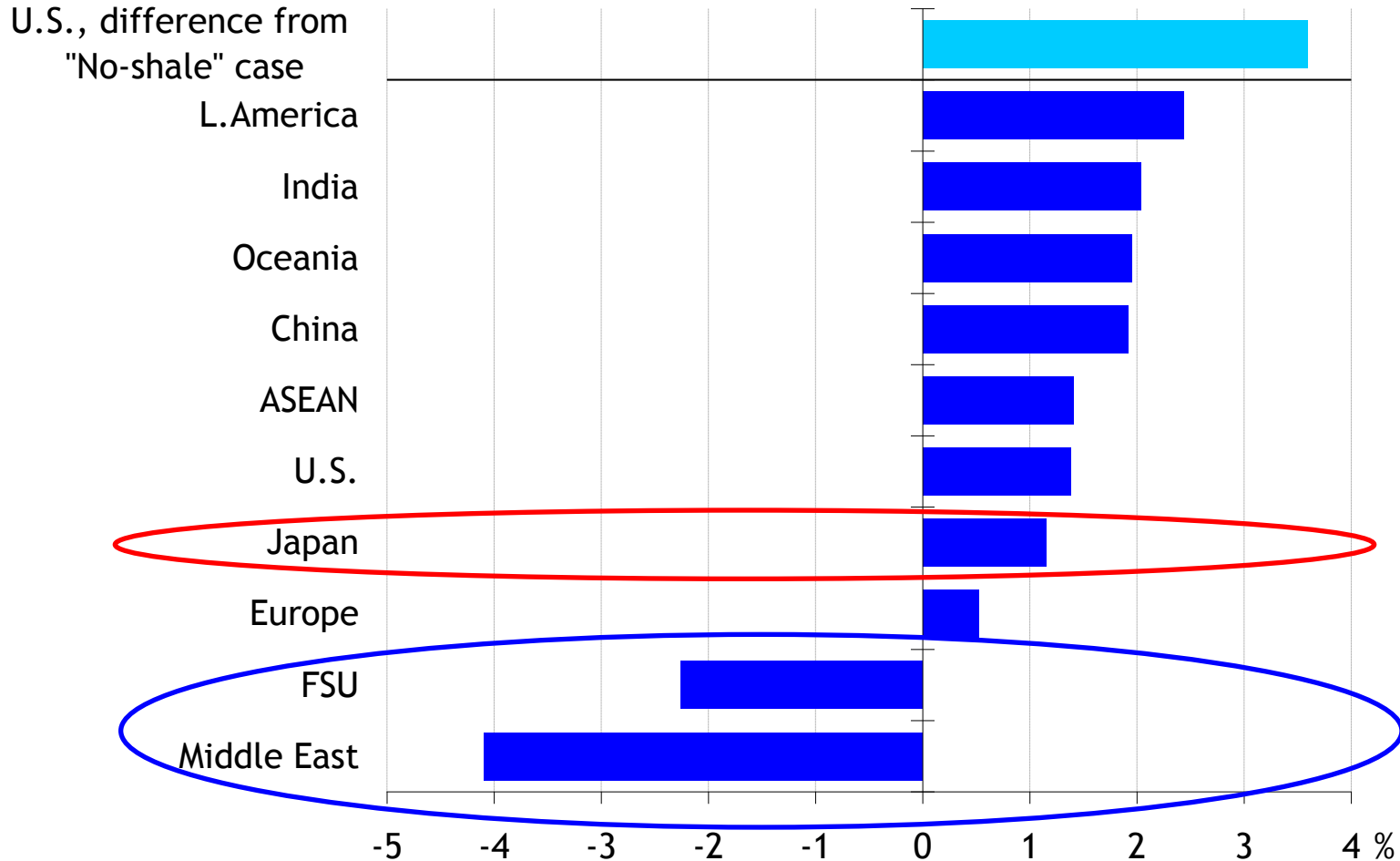
Source: IEA, World Energy Outlook 2013

**Japan faces Two Challenges (Interview with Mme. van der Hoeven )**

# Economy of Energy Importers will Also Benefit

Enhanced  
Unconventional Resource  
Development Scenario

GDP Gains in 2040 from "Reference Case"



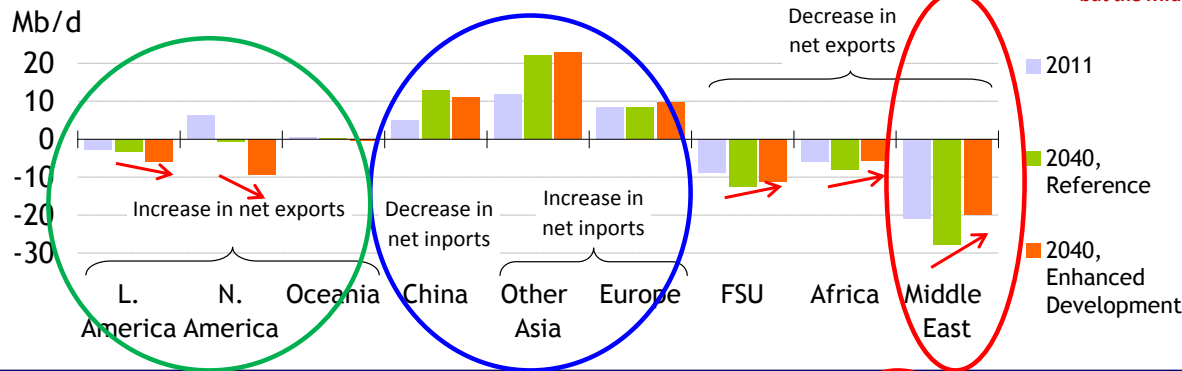
N.B.: Difference between "Unconventional Energy Revolution Scenario" & "Reference" case.

Source: IEEJ (Asia/World Energy Outlook 2013)

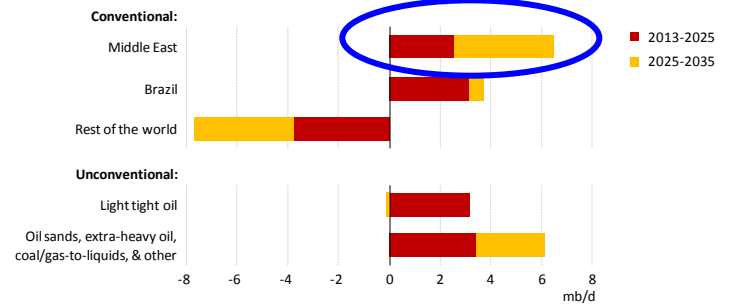
# Asia and Middle East: Interdependency will continue

## Oil and Gas Supply Picture will Change

Oil



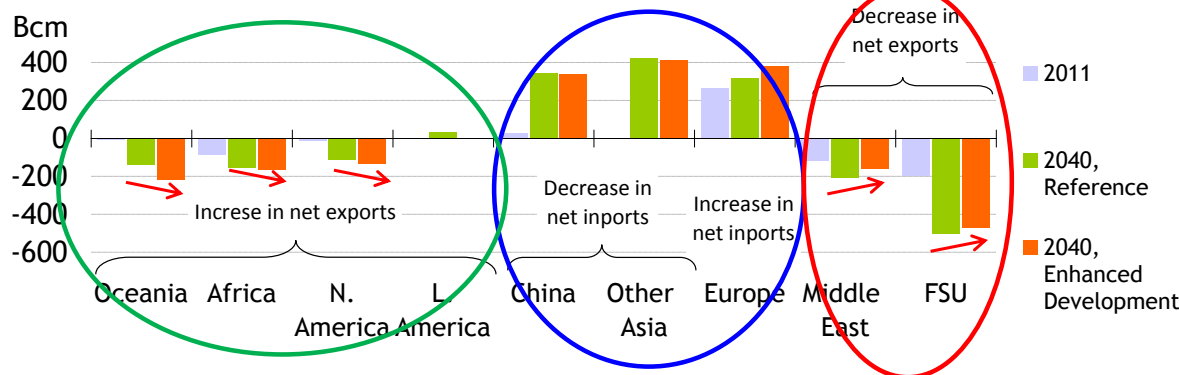
Contributions to global oil production growth



*The United States (light tight oil) & Brazil (deepwater) step up until the mid-2020s, but the Middle East is critical to the longer-term oil outlook*

Source: IEA, World Energy Outlook 2013

Natural gas

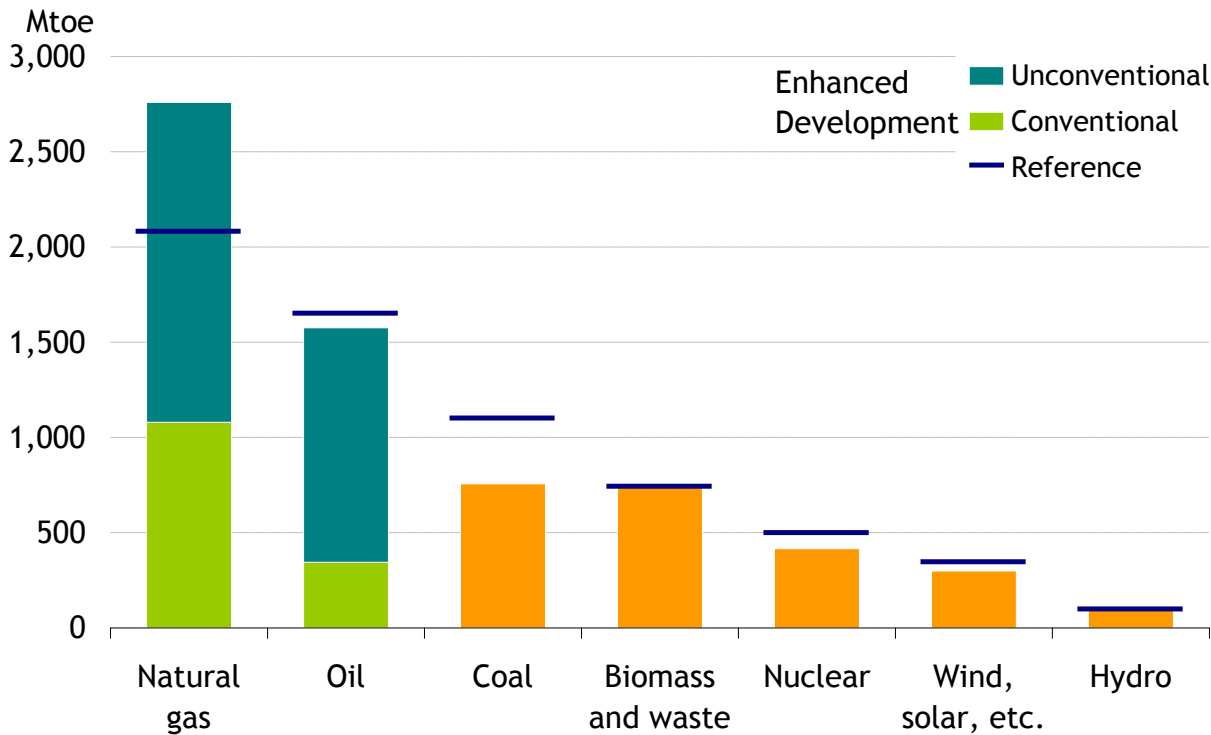


Source: IEEJ (Asia/World Energy Outlook 2013)

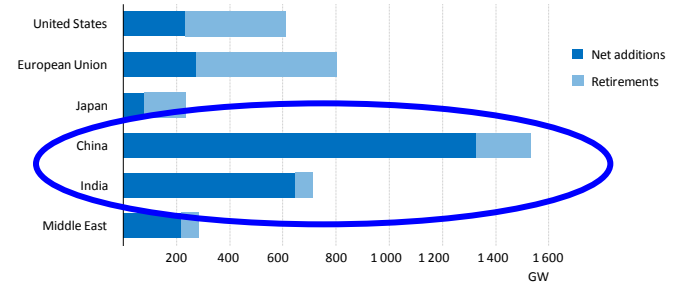
# Unconventional Gas Boom will Replace Coal

Enhanced  
Unconventional Resource  
Development Scenario

## Primary Energy Supply Increase by Source (2011–2040)



Power generation capacity additions and retirements, 2013-2035



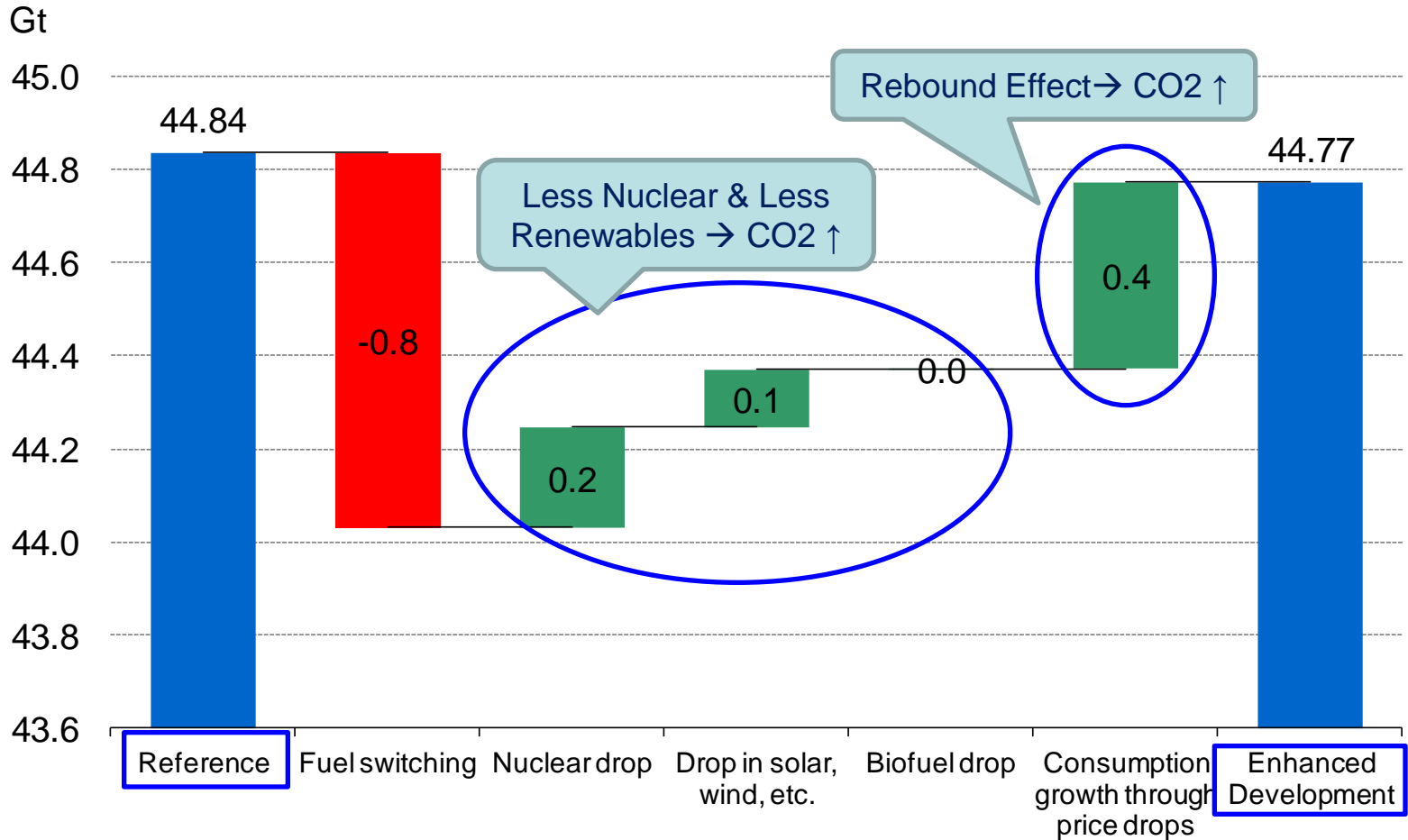
*China & India together build almost 40% of the world's new capacity;  
60% of capacity additions in the OECD replace retired plants*

Source: IEA, World Energy Outlook 2013

# CO<sub>2</sub> Emissions : Unchanged despite Fuel Switching

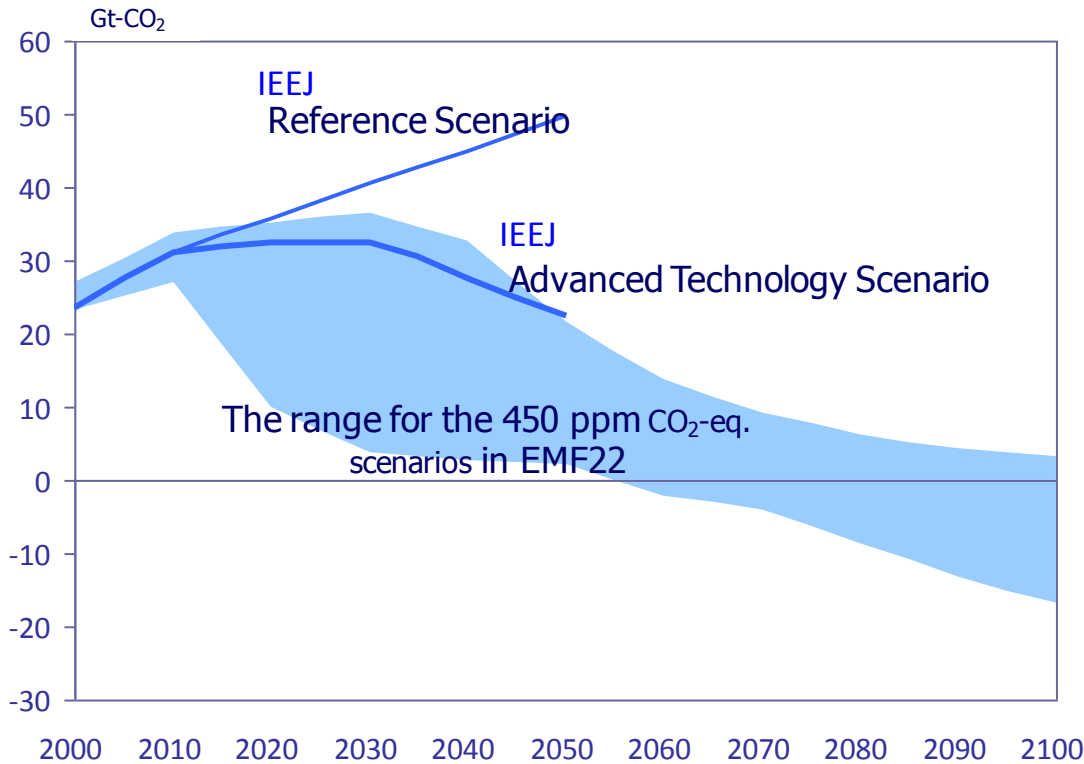
Enhanced  
Unconventional Resource  
Development Scenario

## Energy-related CO<sub>2</sub> Emissions in 2040



# Tackling Climate Change: Need to Speed Up!

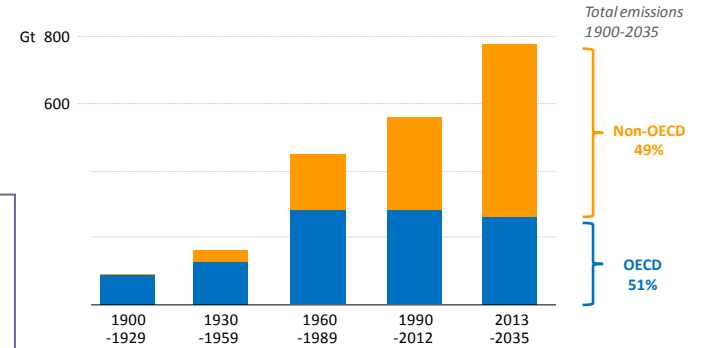
### CO2 Emission Pathways for the Overshoot Scenario



(Source)

Clarke et al. (2009), "International climate policy architectures: Overview of the EMF 22 International Scenarios", *Energy Economics*, vol. 31, pp. 64-81.

### Cumulative energy-related CO<sub>2</sub> emissions



Source: IEA, World Energy Outlook 2013





For more advanced research and detailed modelling.

Please contact IEEJ: [otoiawase@tky.ieej.or.jp](mailto:otoiawase@tky.ieej.or.jp)

**Thank you for your attention!**