

## The 8th IEEJ/CNPC Research Meeting

# Asia/World Energy Outlook 2014

- Analysis of low-growth scenarios for China and India  
and the climate change issue -

21<sup>st</sup> November 2014

Yukari Yamashita

Board Member, Director

The Institute of Energy Economics, Japan

# Scenarios

## Reference Scenario

A kind of BAU scenario. Existing trends in energy fundamentals are expected to continue, and no big policy and technology changes are incorporated.

## Advanced Technology Scenario

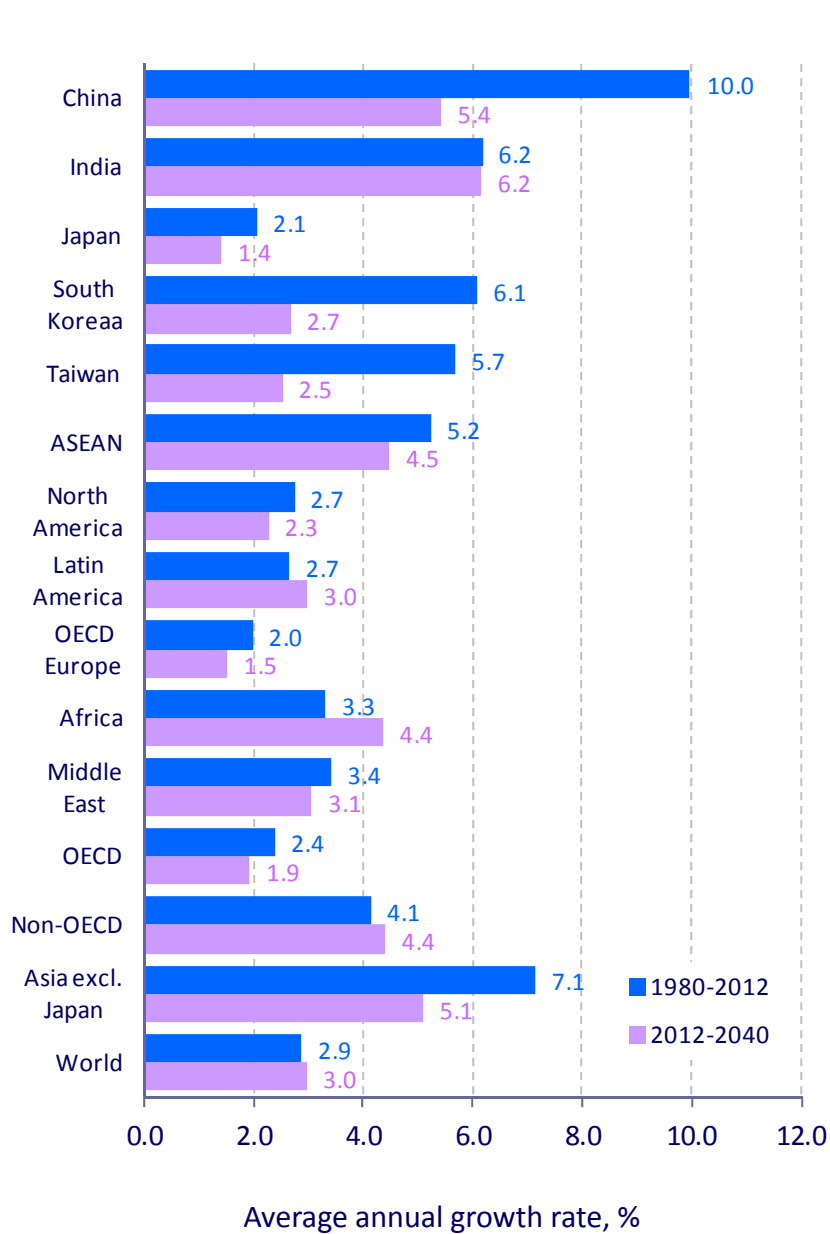
Advanced technologies of both energy supply and demand side are assumed to be promoted to a maximum possible extent in pursuit of enhanced energy security and climate policy.

## Low Growth Scenario (only for **China** and **India**)

This scenario assumes lower GDP growth rates for China and India, taking into account of the economic downside risks for the countries. In addition, a scenario of enhanced structural economic reforms and de-carbonization initiatives under low growth is prepared (Low Growth and Reform Scenario).

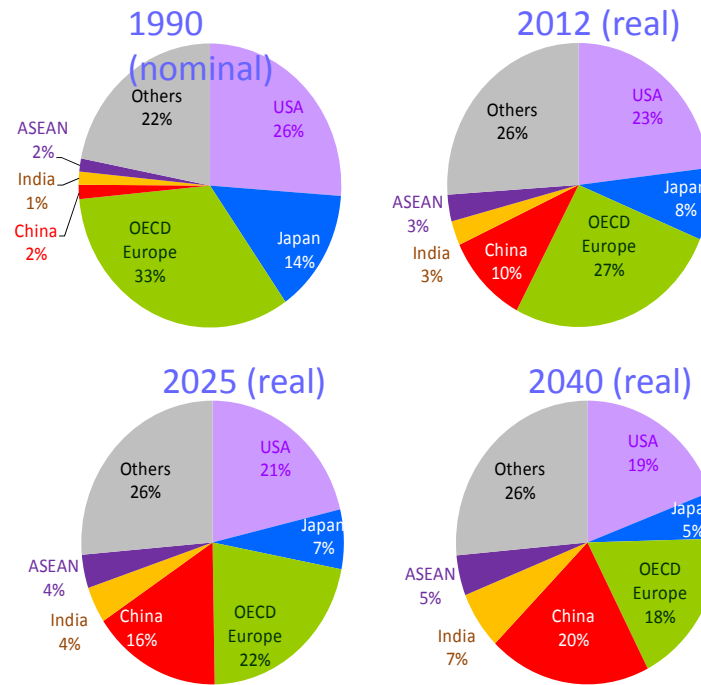
# Major Assumptions: Economic Growth (and Energy Prices)

Asia/World Energy Outlook 2014 IEEJ © 2014

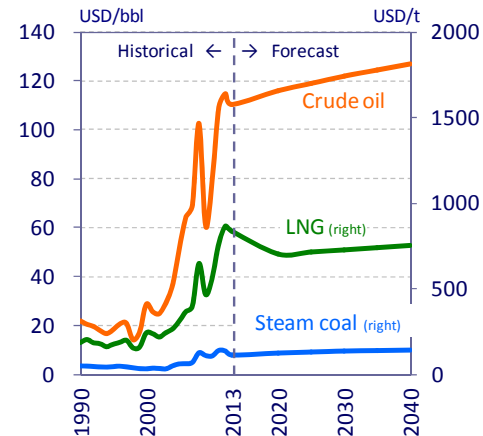


World GDP Share (%)

Note: Real values are in 2010 USD

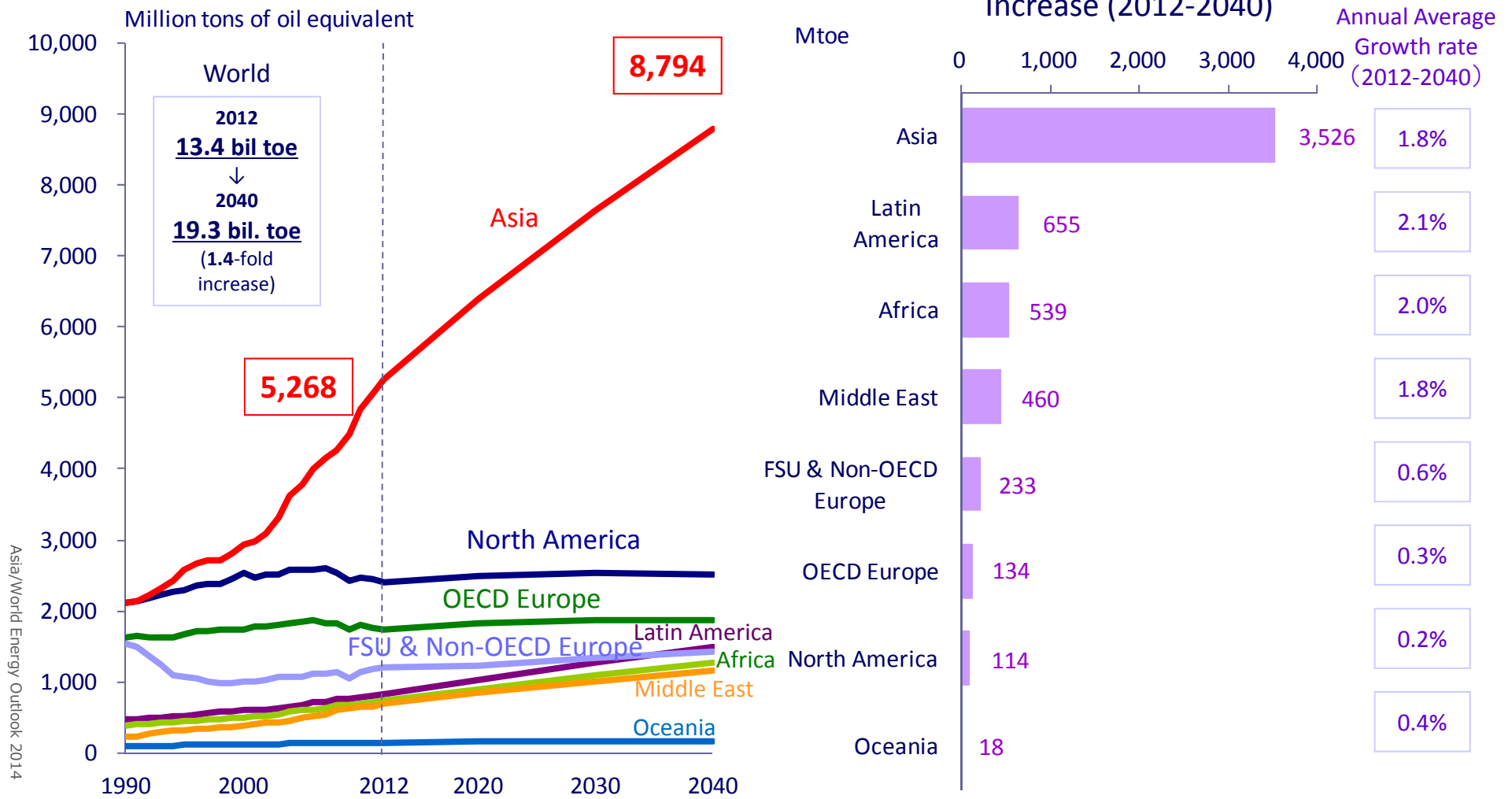


Energy Price Assumption (Japan CIF)



# Primary Energy Demand by Region

Reference Case



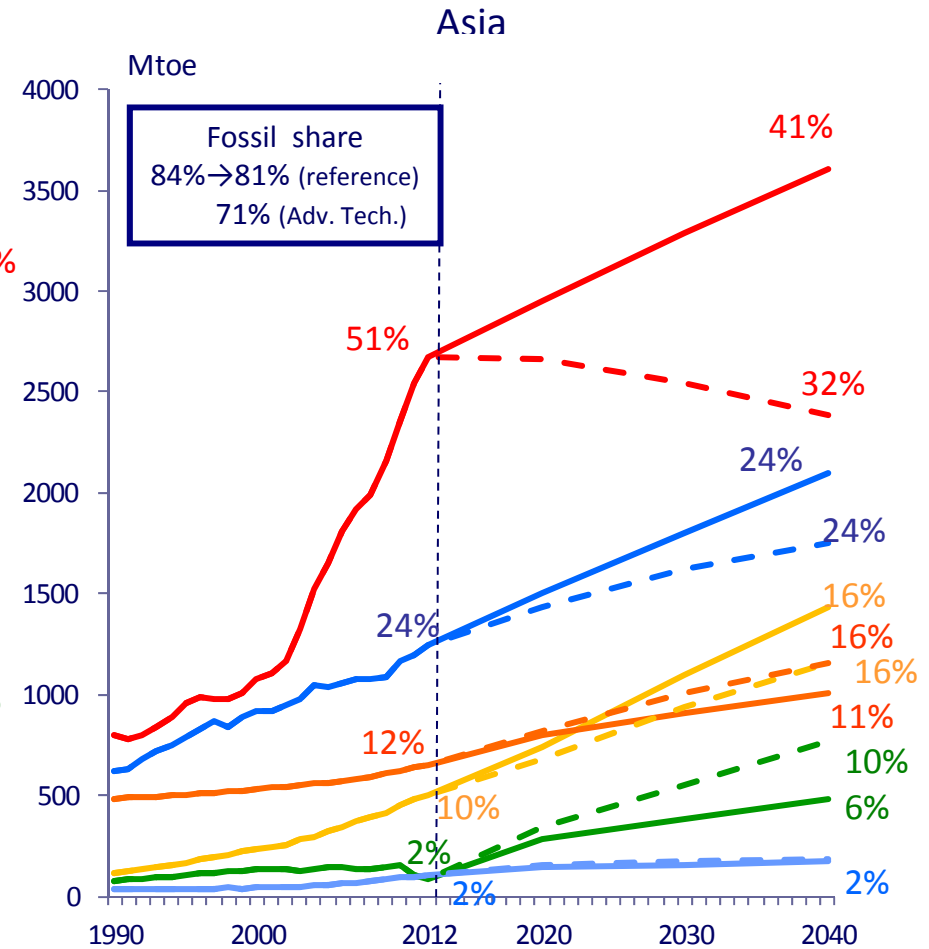
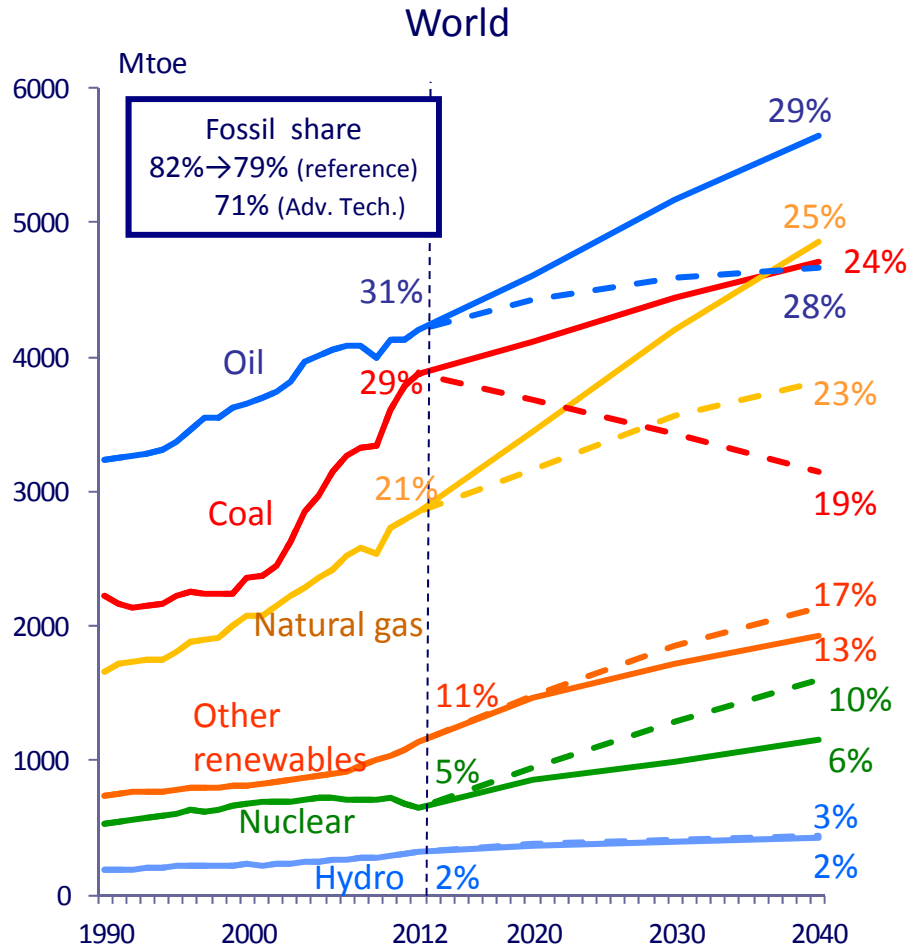
Asia/World Energy Outlook 2014 IEEJ © 2014

# Primary Energy Demand by Energy

Solid lines: Reference  
Dashed lines: Adv. Tech.

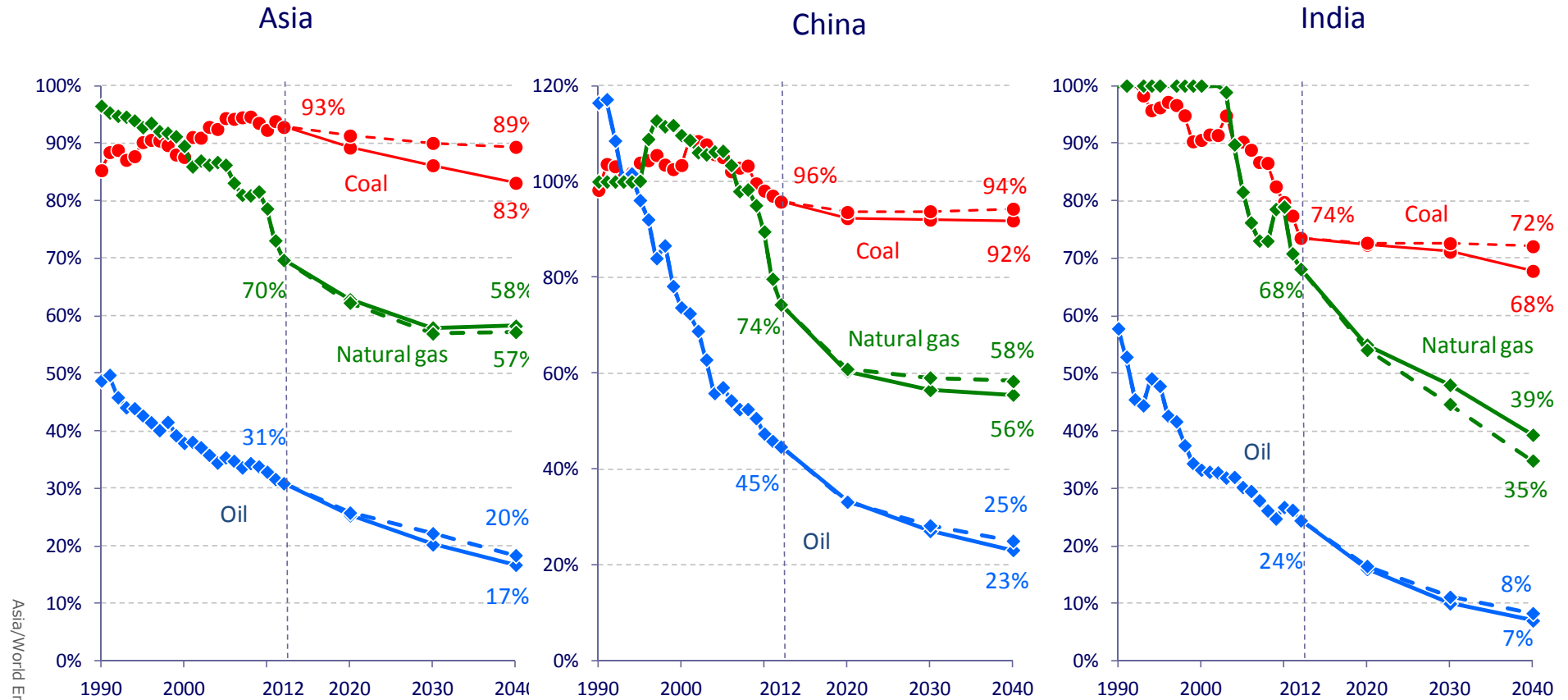


(%: Share in World or Asia Total)



# Energy self-sufficiency in Asia

Solid lines: Reference  
Dashed lines: Adv. Tech.

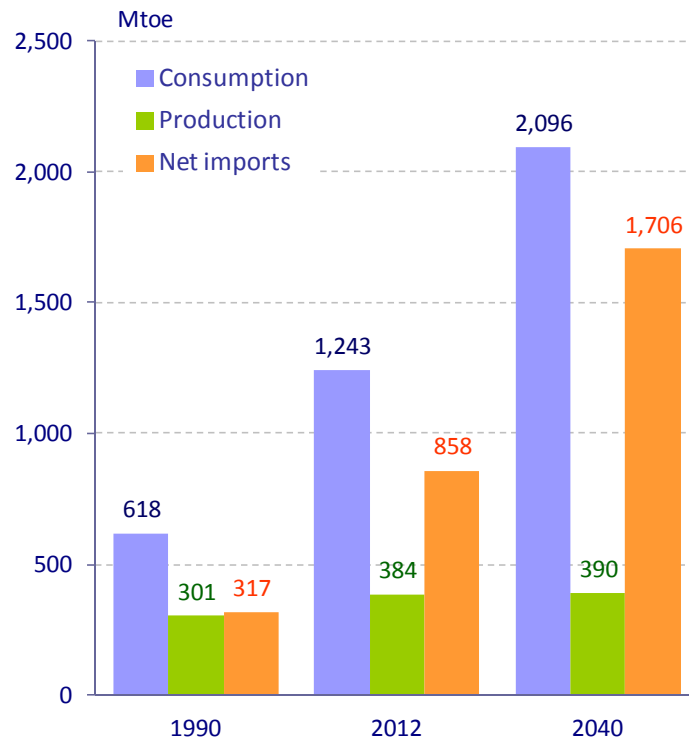


# Oil Supply/Demand for Asia

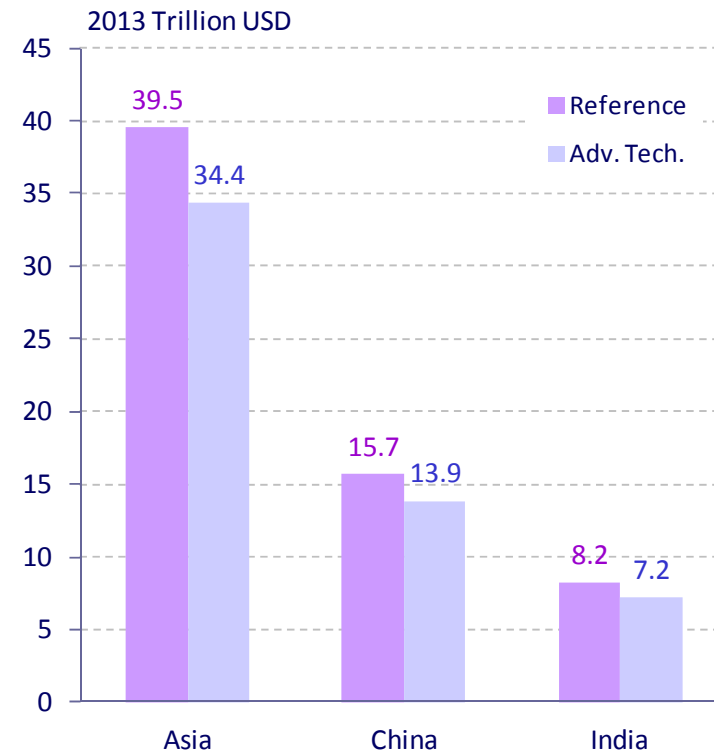
## Cumulative Fossil-Fuel Import Bills up to 2040



Oil supply and demand in Asia  
(Reference Scenario)

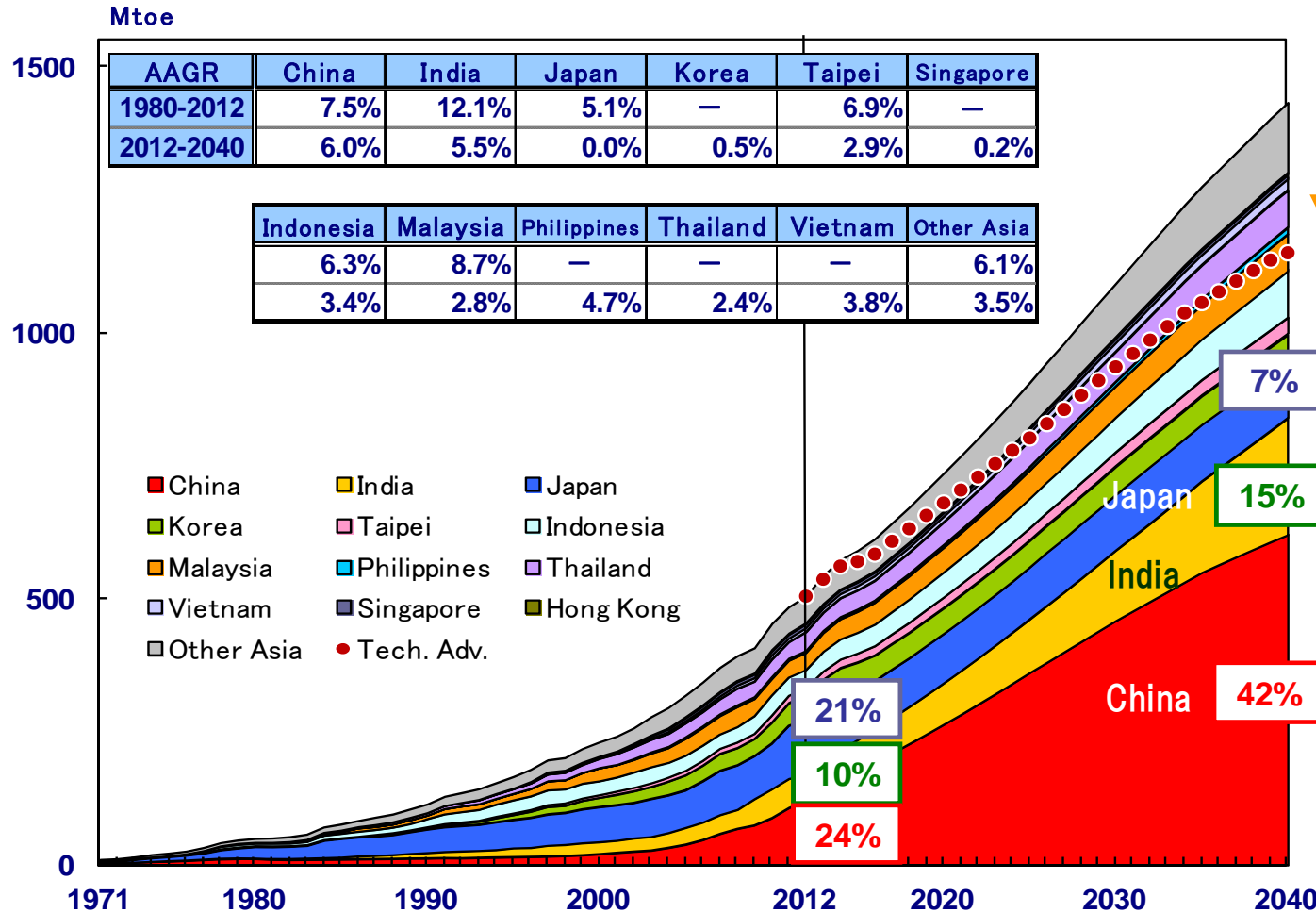


Fossil-fuel import bills  
up to 2040



# Natural Gas Demand by Country (Asia)

Reference  
Adv. Tech.



0.28 bil. toe  
(20%)  
Reduction

2012  
0.51 billion toe  
(613 billion m<sup>3</sup>)  
(0.41 bil. tons LNG)

↓

2040

Reference  
1.43 billion toe  
(1.74 trillion m<sup>3</sup>)  
(1.17 bil. tons LNG)

Adv. Tech.  
1.15 billion toe  
(1.40 trillion m<sup>3</sup>)  
(0.94 bil. tons LNG)

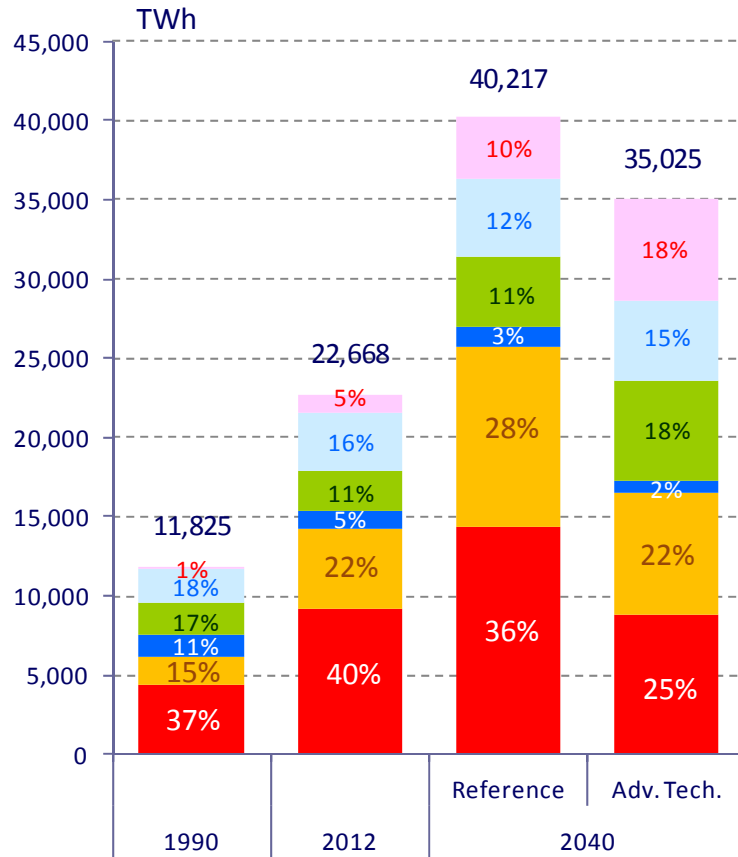


# Power generation mix in 2040

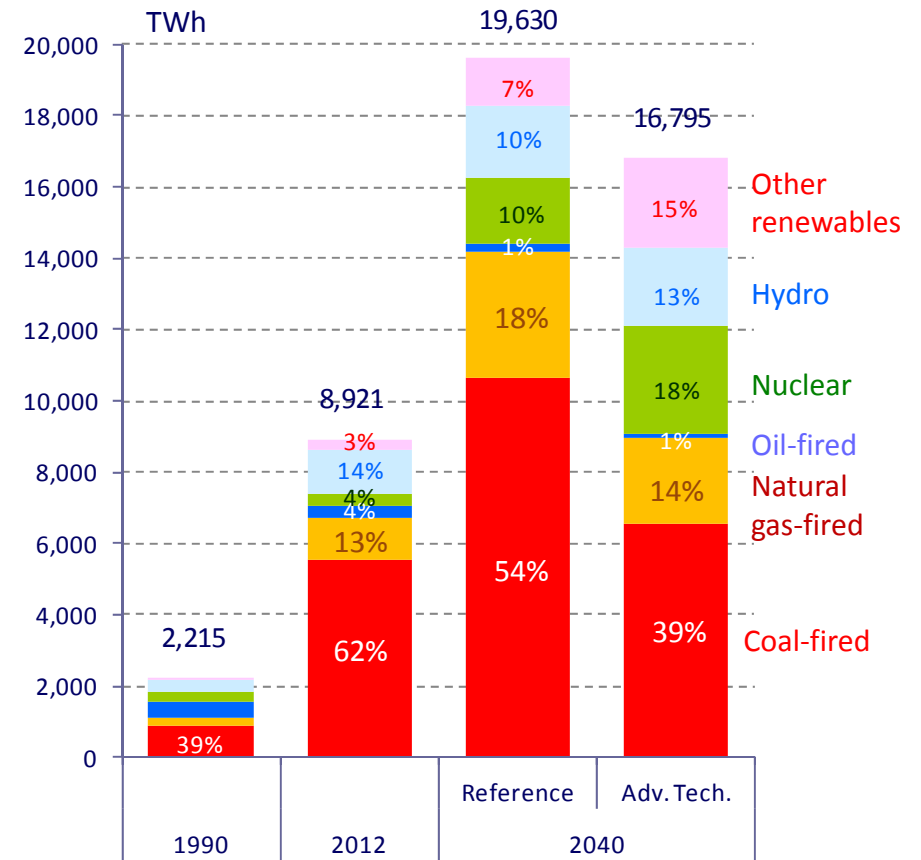
Reference  
Adv. Tech.



World

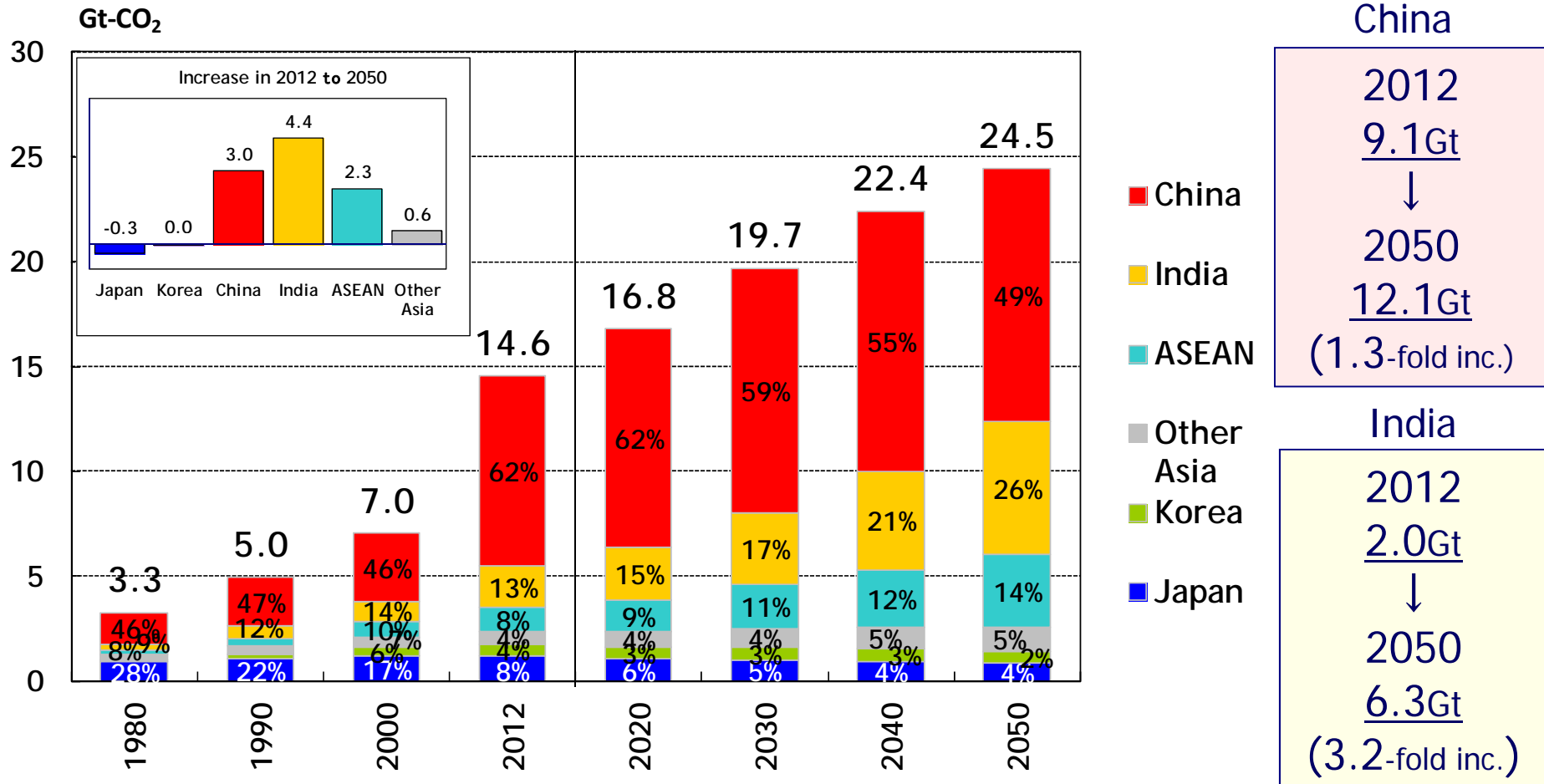


Asia



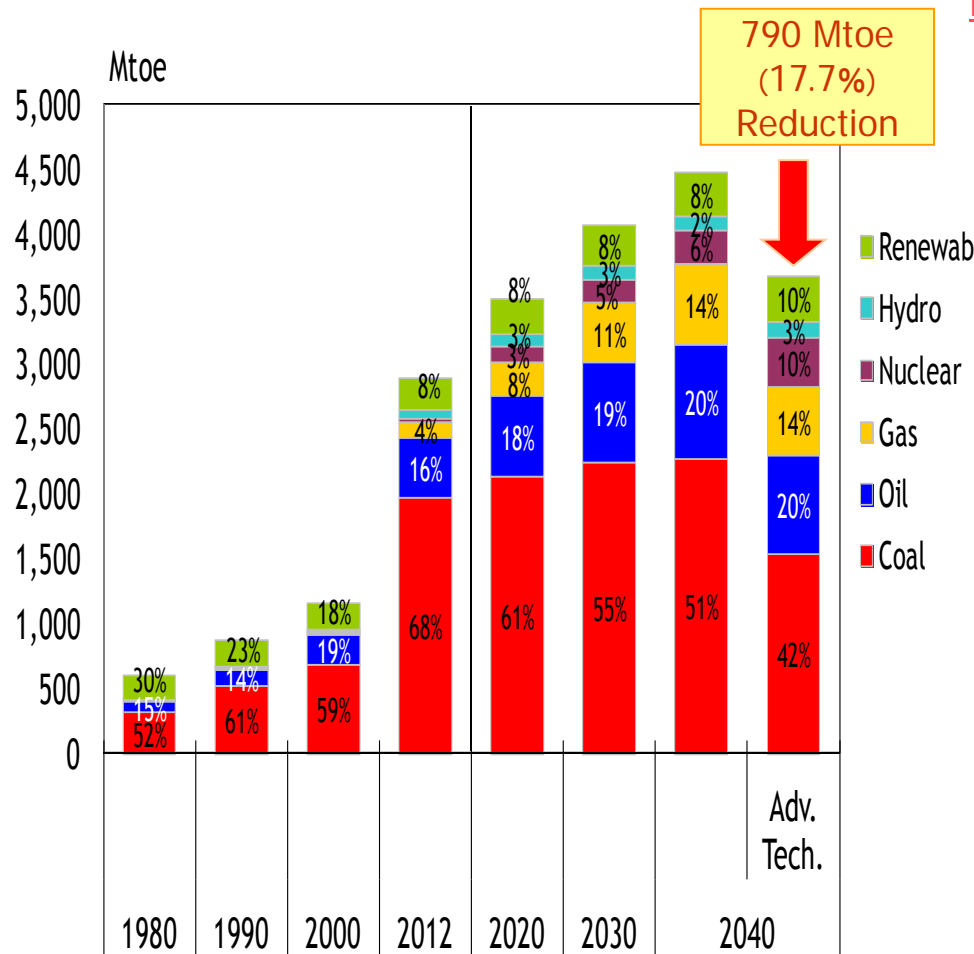
# CO<sub>2</sub> Emission by Region (Asia)

Reference

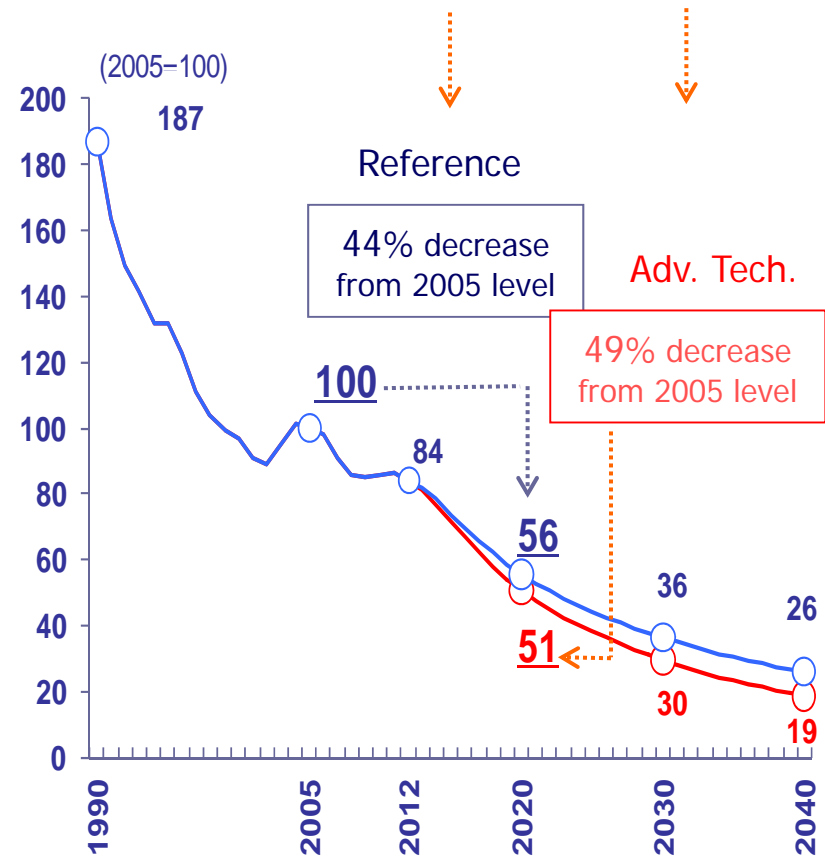


# Primary Energy Demand & CO2 Emission per GDP (China)

Reference  
Adv. Tech.

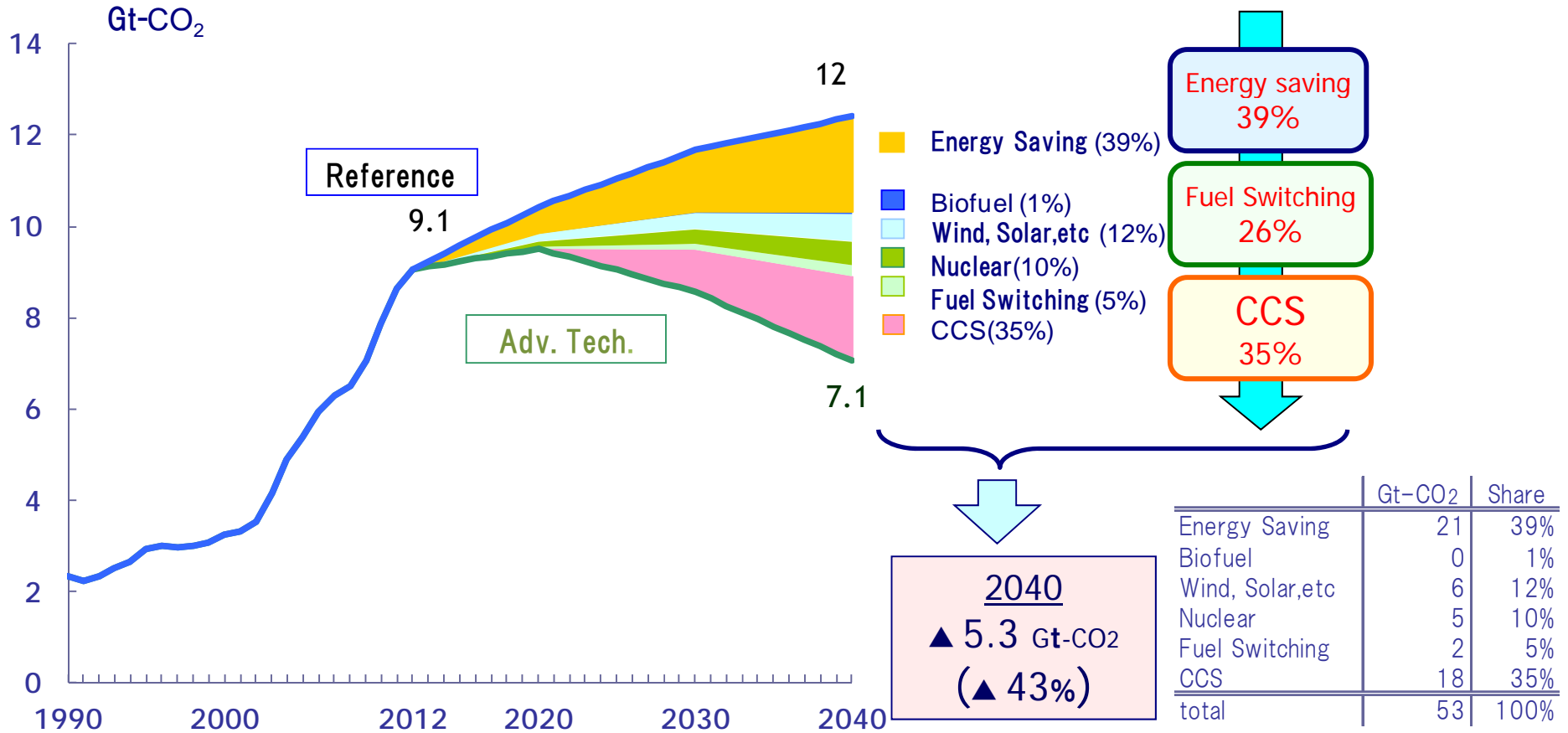


National Target : 40 to 45% reduction by 2020

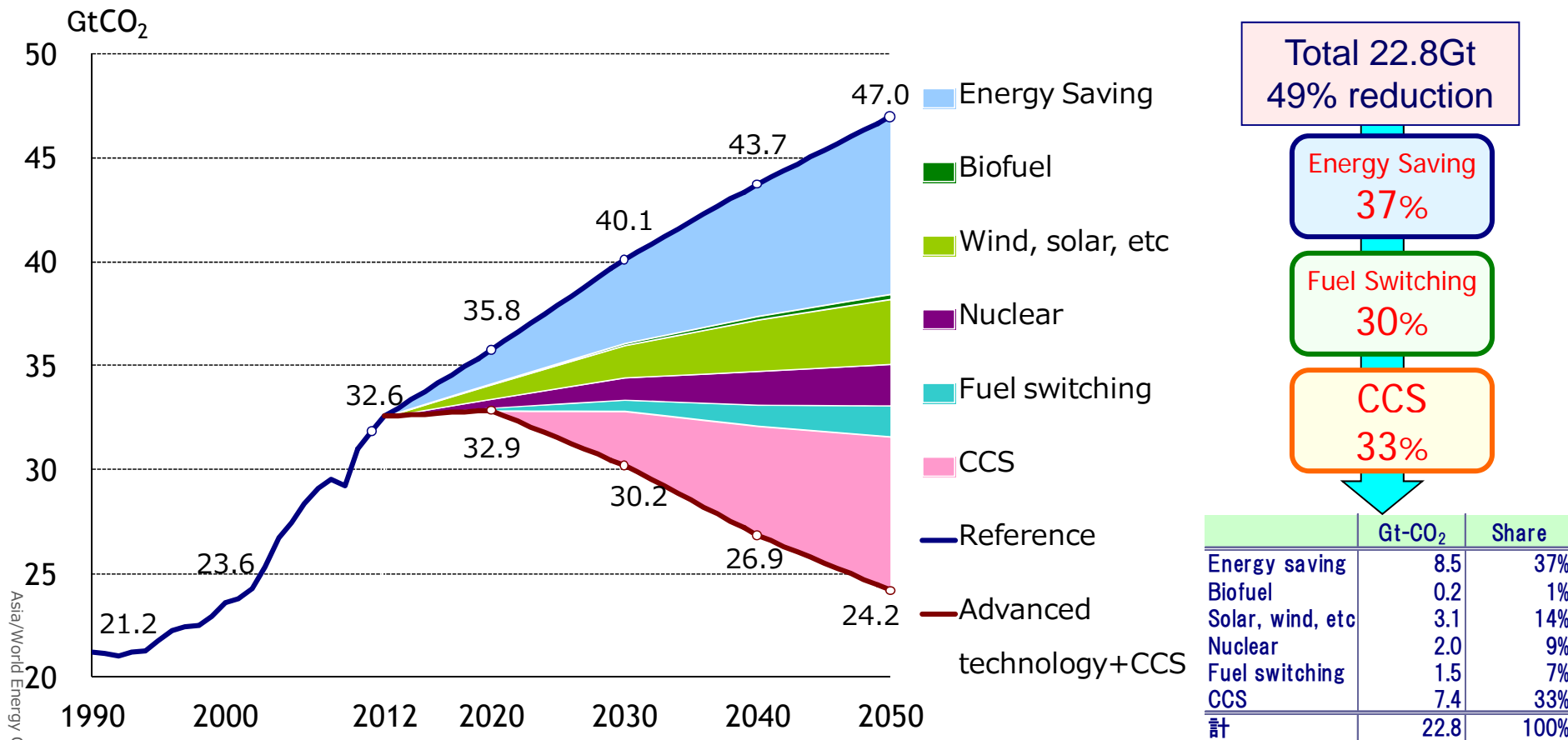


# CO<sub>2</sub> Emissions in China

Reference  
Adv. Tech.



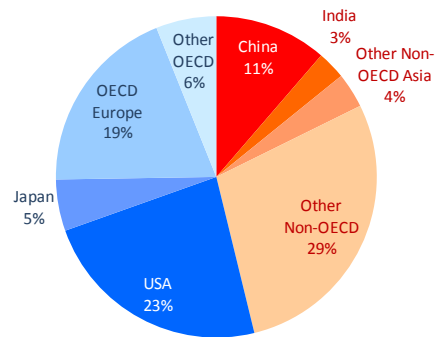
# CO<sub>2</sub> Emissions Reduction by Technology (World)



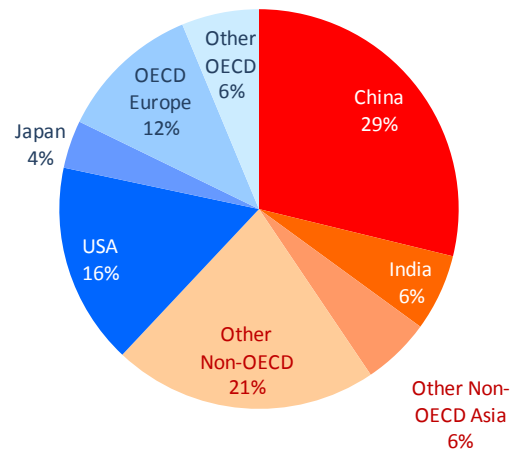
Asia/World Energy Outlook 2014 IEEJ © 2014

# Energy Related CO2 Emissions by Region (World)

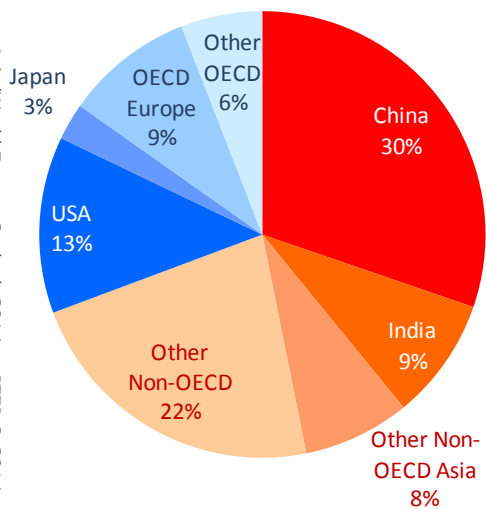
1990: 21.2Gt



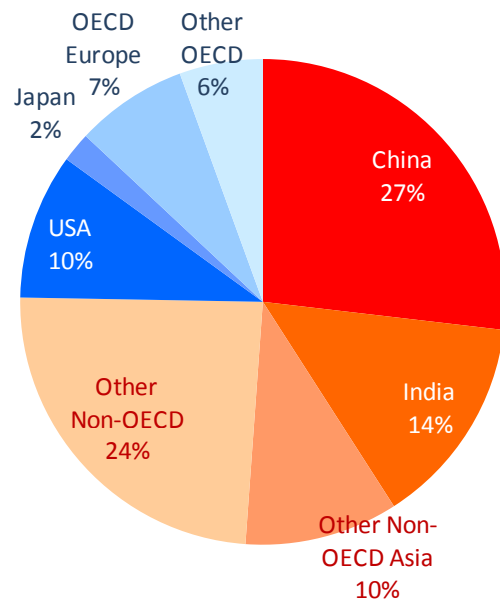
2012: 32.6Gt



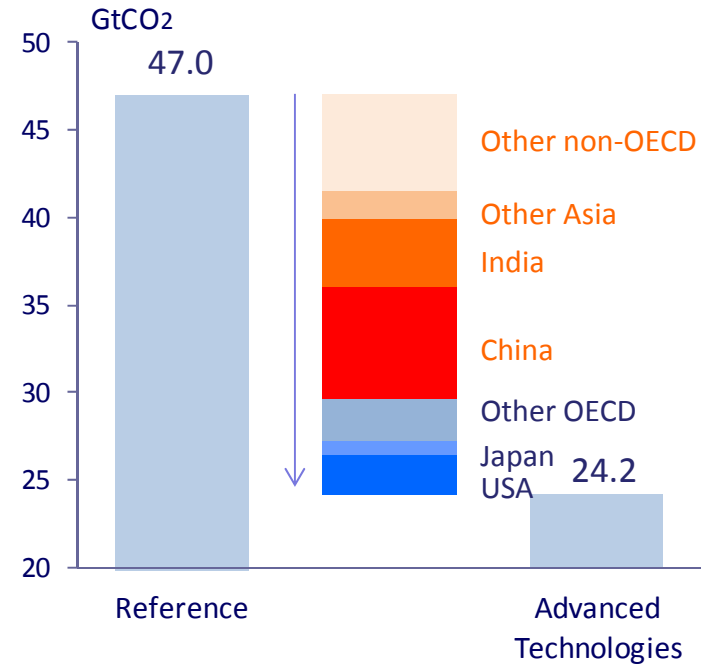
2030: 40.1Gt



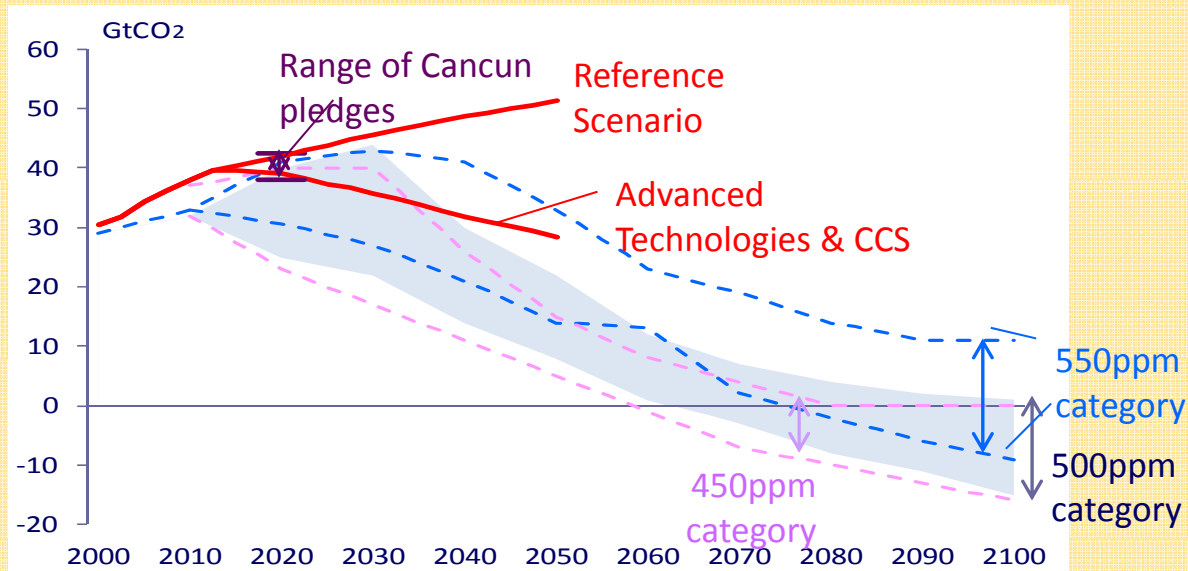
2050: 47.0Gt



CO<sub>2</sub> emissions reductions by region



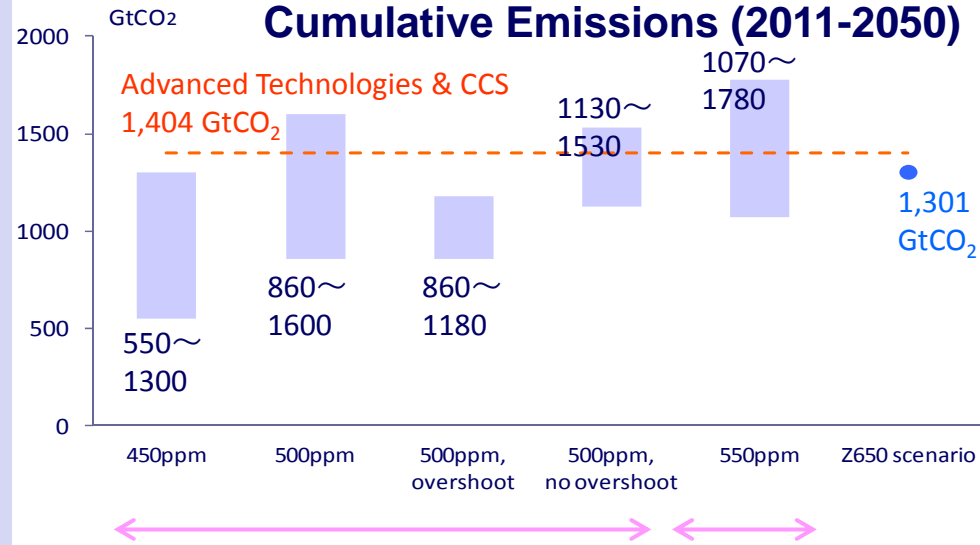
# Comparison of CO2 Emissions Pathways and IEEJ Scenarios



(Source)  
Compiled from IPCC,  
UNEP, The Emissions Gap  
Report 2013, etc.

※Range of Cancun  
pledges is 20~80% value,  
emission paths of 450·  
500·550ppm categories  
are 10~90% value.

## Cumulative Emissions (2011-2050)



Likely, more likely or about as likely as not  
to stay below 2C over the 21<sup>st</sup> century

More likely than not to  
stay below 2.5C

Source: Compiled from  
IPCC AR5

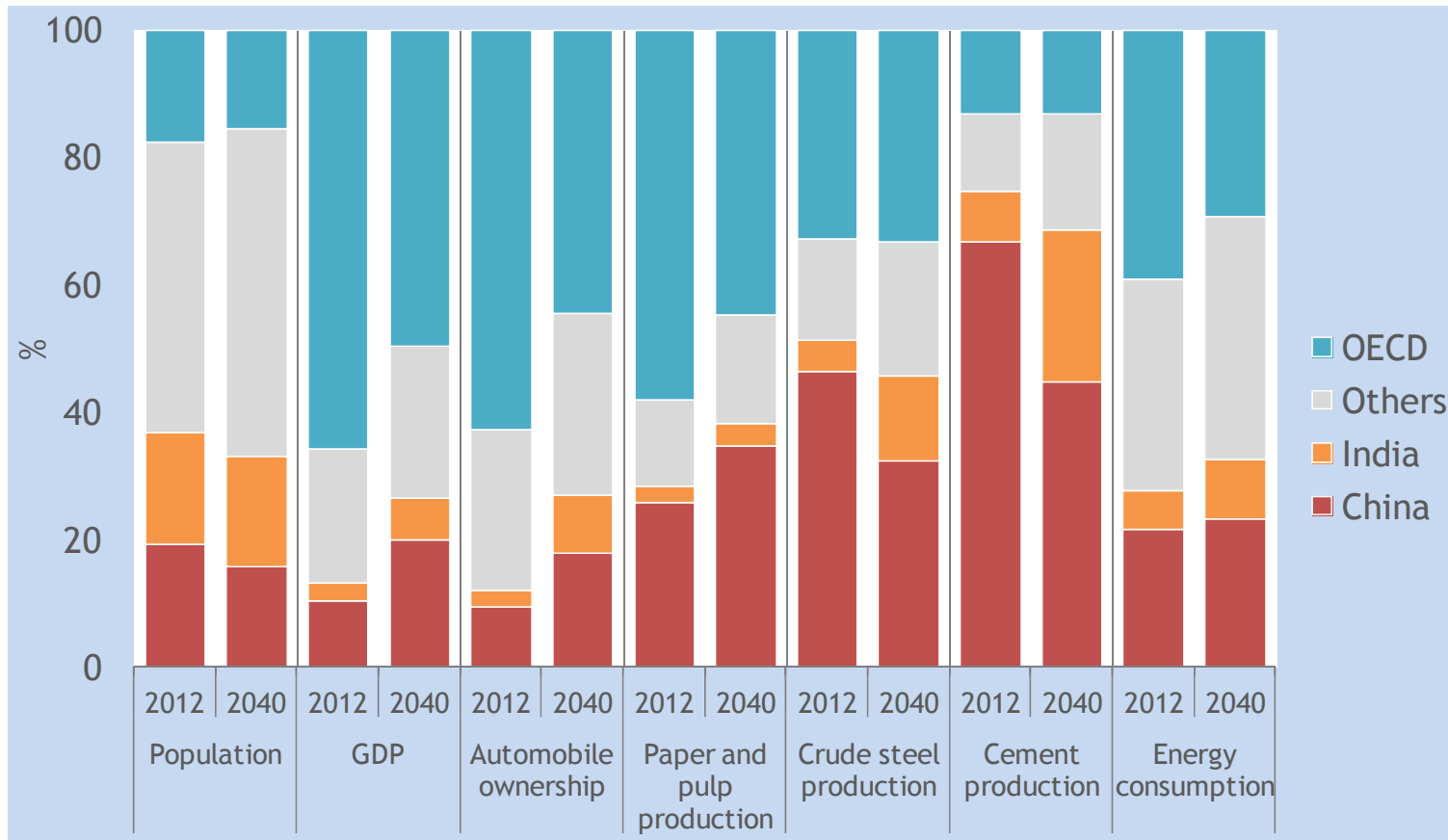
A light gray world map is centered in the background of the slide. The title 'Lower Growth Case for China & India' is overlaid on the map, specifically positioned over the Asian continent.

# Lower Growth Case for China & India



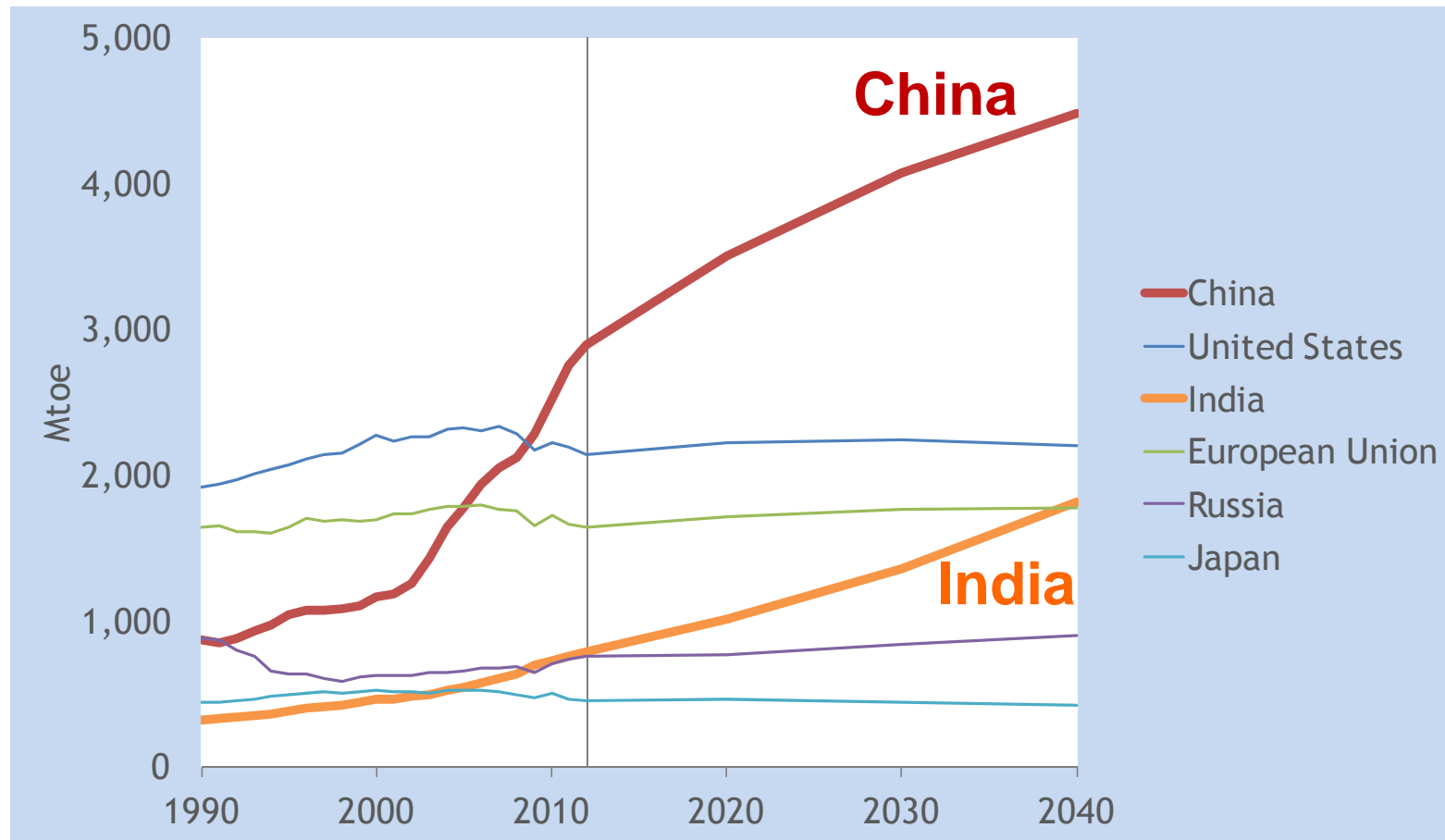
# China & India Increase Their Presence

❖ **China** • **India** Share in the World (Reference Case, %)



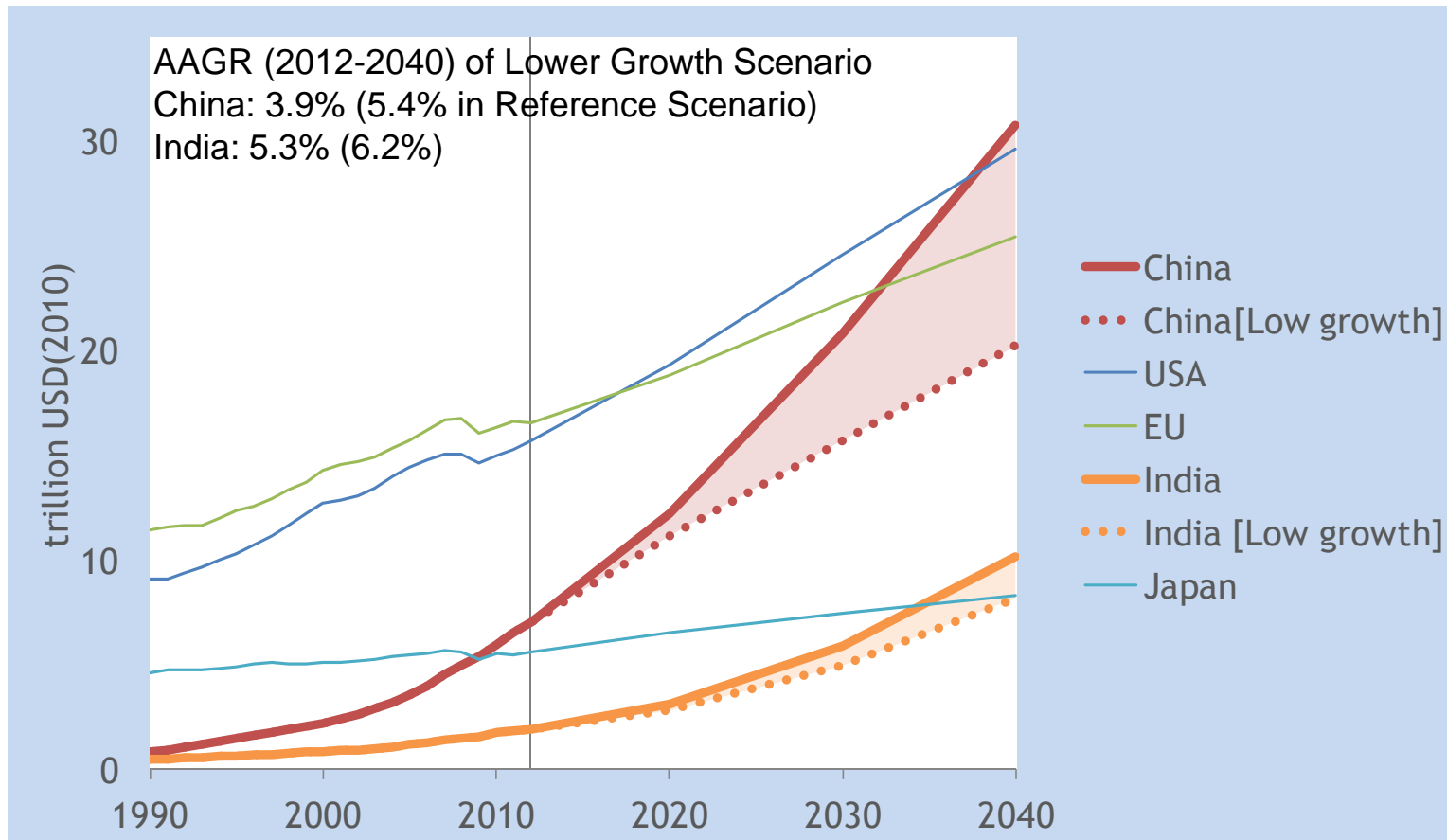
# China with Big Lead Followed Closely by India

## ❖ Primary Energy Demand [Reference Case]



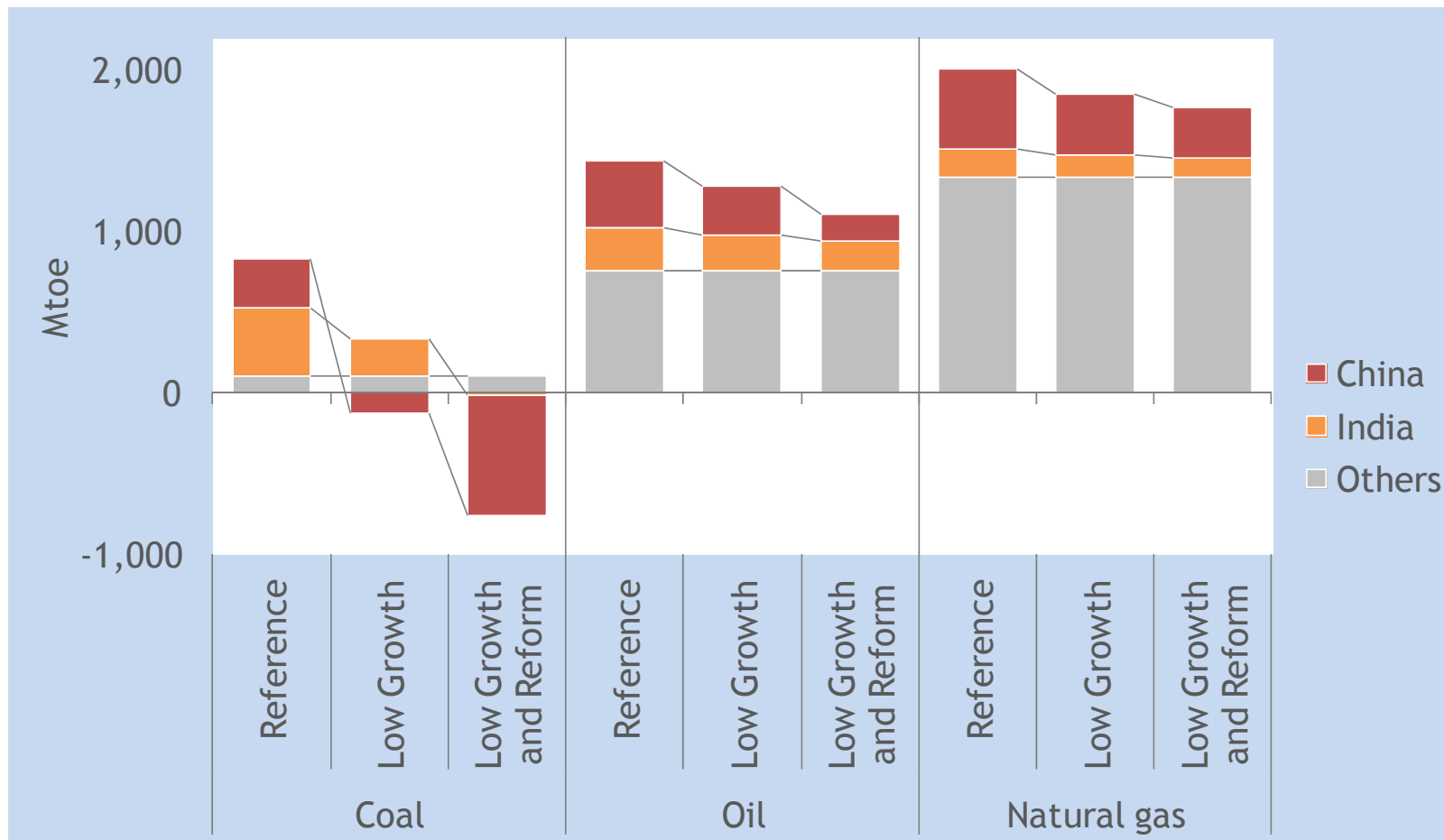
# Range of Growth and Magnitude

## ❖ Assumption of real GDP



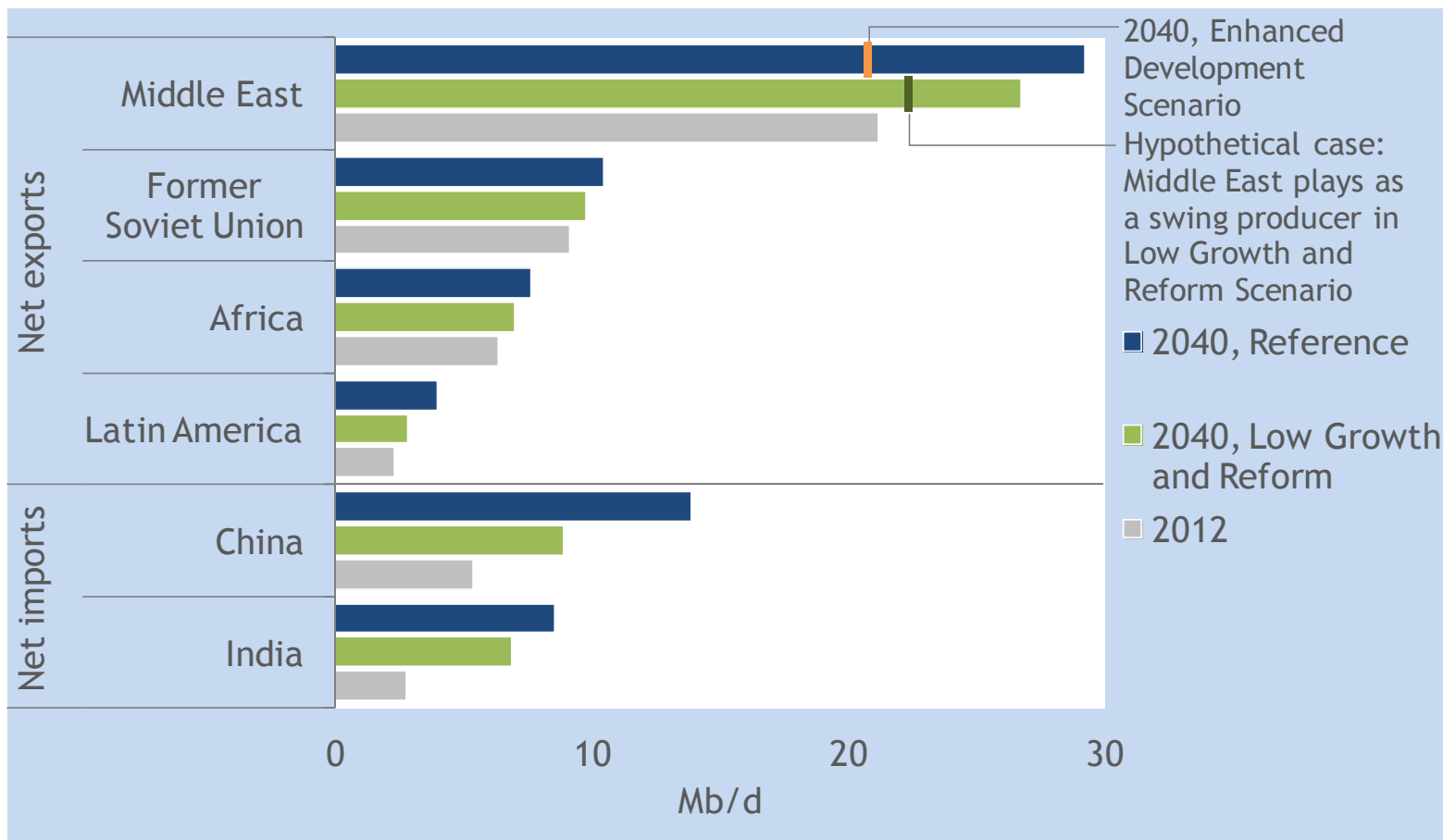
# China and India Affect World Future Energy Vision

## ❖ Decline in Energy Demand Growth (2012-2040)



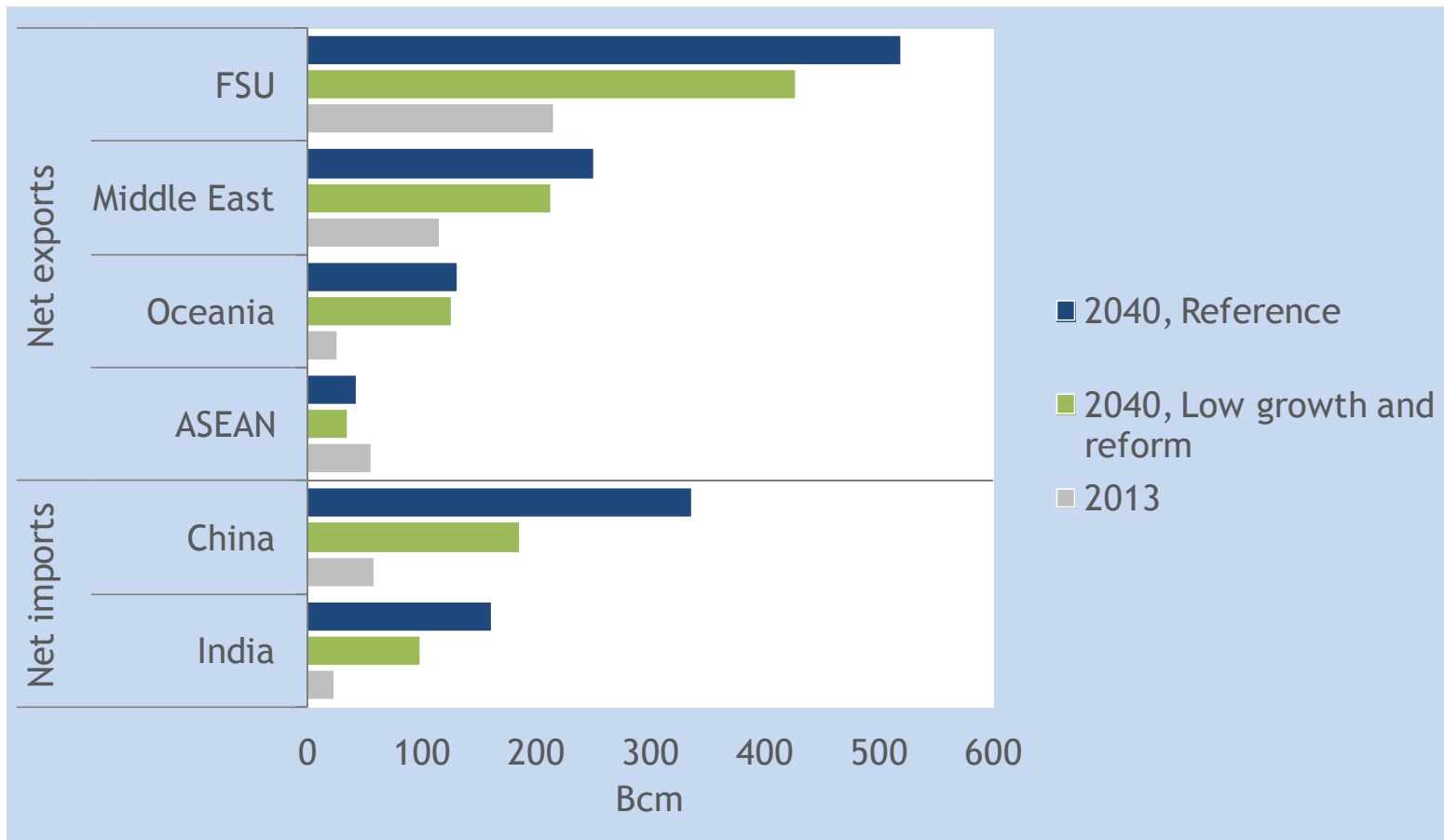
# Lower Oil Consumption Will Reduce Dependence on the Middle East

## ❖ Crude Oil Net Export and Import



# Exports of Natural Gas from the Former Soviet Union Will be Most Significantly Affected

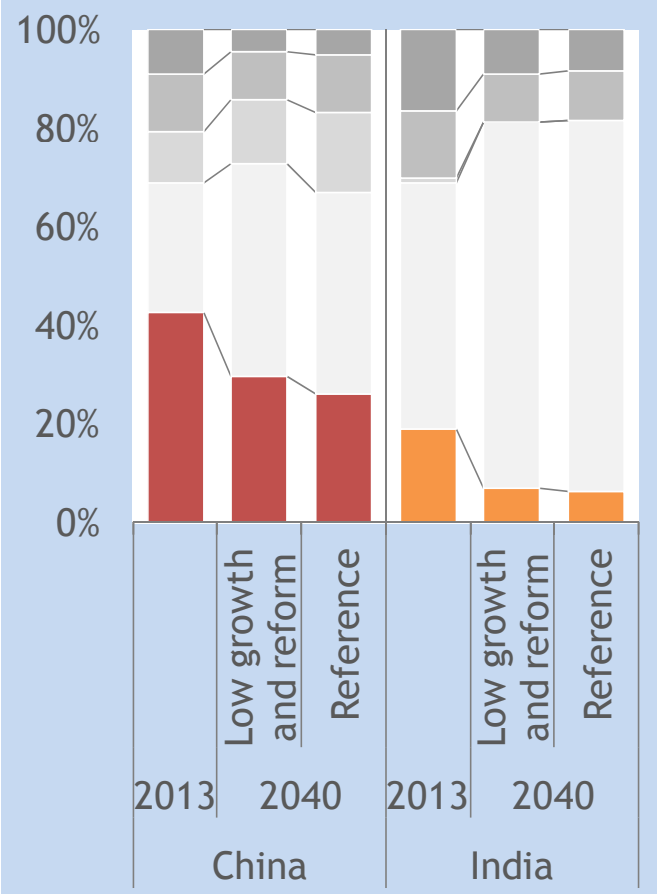
## ❖ Natural Gas Net Export and Import



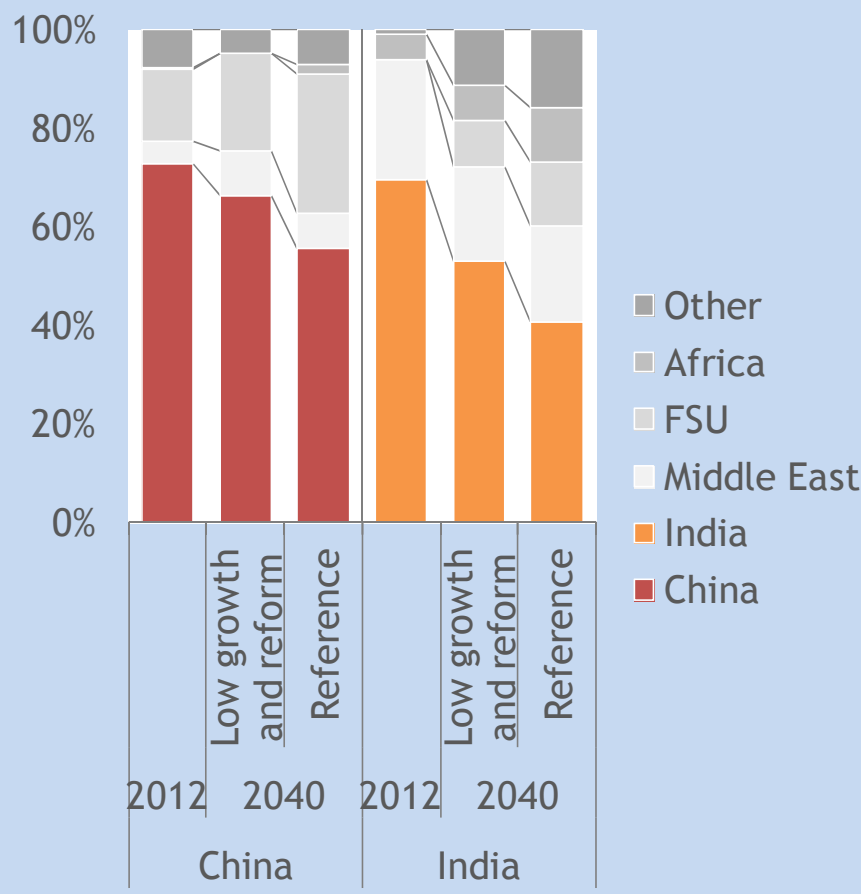
# Less Imports ▶ Improve Self-Sufficiency ▶ Increase Energy Security

❖ Crude oil·natural gas supply structure: self sufficiency rate and major import source

Crude Oil



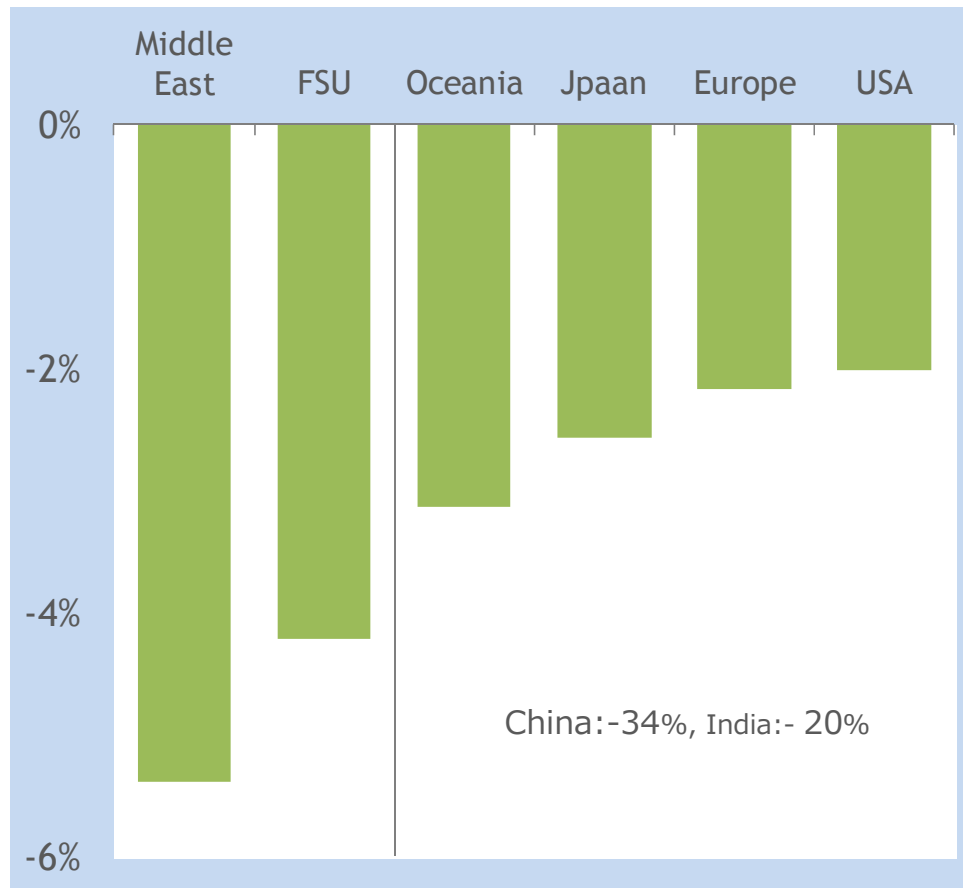
Natural gas



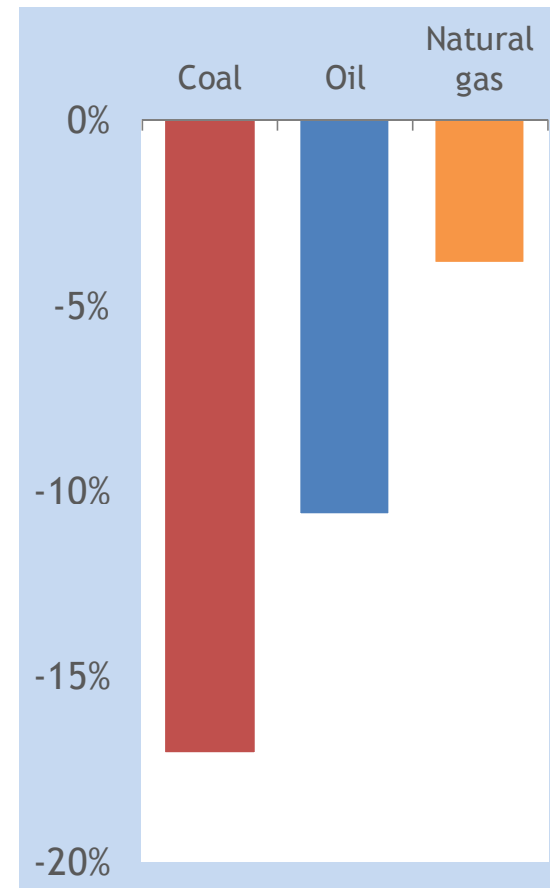
# Low Growth and Reform Spills Over World Economy

- ❖ Impacts on international economy and market [Low growth and reform, 2040] (relative to the reference)

Real GDP



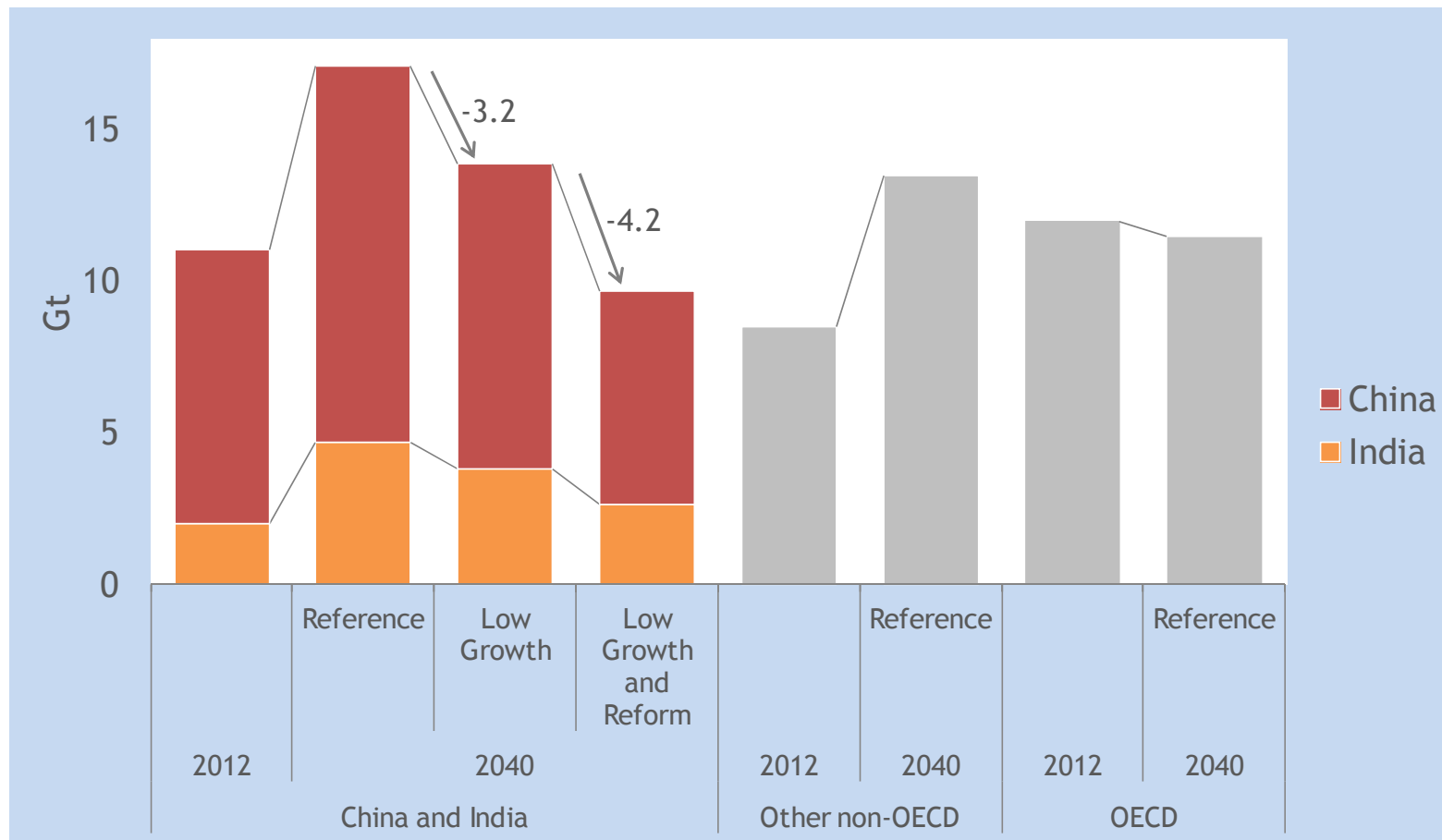
International Energy Price





# Reform Contributes to Environment More than Low Growth

## ❖ Energy-related CO2 Emission



# Summary and Implication

## ❖ Only “low growth” or “low growth and reform”?

- If China and India face a decline in economic growth, the anticipated increase in energy consumption is curbed significantly. However, slower economic growth without a change in current economic structure will make the issues worse and remain unsolved.
- For a different economic growth path, if the reform proceeds in the social and energy field, there is a possibility to have a way to a better system in terms of social, resource, and environment securing an employment opportunity under low growth.
- In the reference case, the increase in energy consumption in China and India in 2040 exceeds current energy consumption of United States and Japan. The increase slows to 70% in the *low growth and reform case*.
- Coal is the most affected energy source. Consumption in the world is lower than the current level. The increase for oil becomes half and that of natural gas decreases to less than two-thirds.

## ❖ Effects on world economy and energy supply

- A lower energy consumption in China and India contributes to a more relaxed international energy market. There are also considerable environmental merits at a global and local level.
- A lower economic growth for both countries would spill over the world economy. Through international trade and investment, many countries • regions would also face lower their economic growth. Other countries need to take actions in accordance with the change of these countries.
- In particular, the Middle East, Russia, and Australia which would decrease energy exports would be affected significantly. To reduce their risk, these countries would need to diversify their export destination and advance their economy towards more value added activities

# Thank you very much for your attention!

## 非常感谢!

Summary and PPT available on IEEJ website!

[http://eneken.ieej.or.jp/whatsnew\\_op/141022teireiken.html](http://eneken.ieej.or.jp/whatsnew_op/141022teireiken.html)

<http://eneken.ieej.or.jp/data/5746.pdf> (簡体中文版)

<http://eneken.ieej.or.jp/data/5748.pdf> (繁体中文版)

<http://eneken.ieej.or.jp/data/5752.pdf> (English)

## Asia / World Energy Outlook 2014