

ENERGY SITUATION IN JAPAN

Policy Change in Japan and the Asian Energy Trends

October 5 , 2015

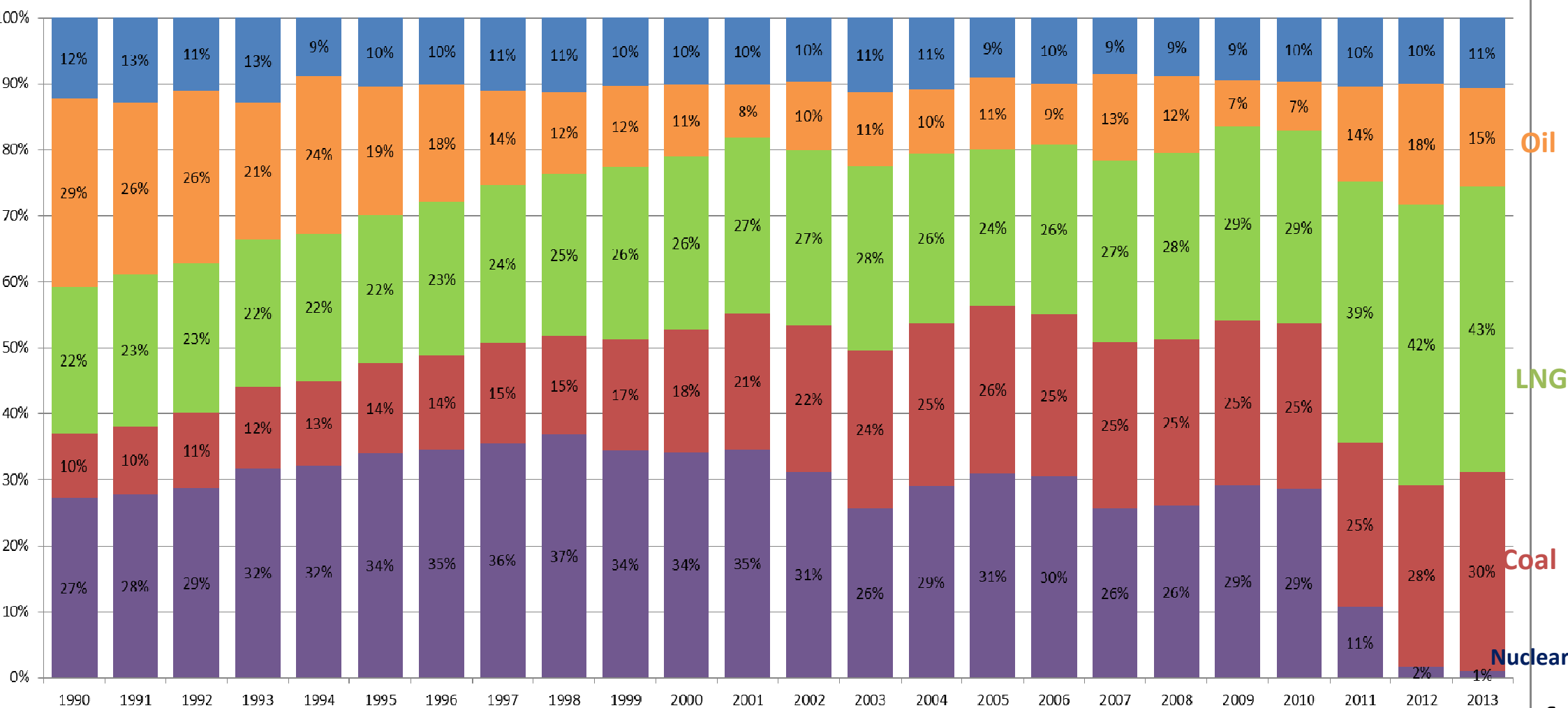
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High Dependency On Fossil Fuels For Power Generation

- The nuclear power ratio in domestic power generation has decreased after the Great East Japan Earthquake due to the long-term shutdown of nuclear power plants .
- On the other hand, the thermal power ratio has increased to 90%. Currently, LNG thermal power alone accounts for nearly 50% of domestic power generation.

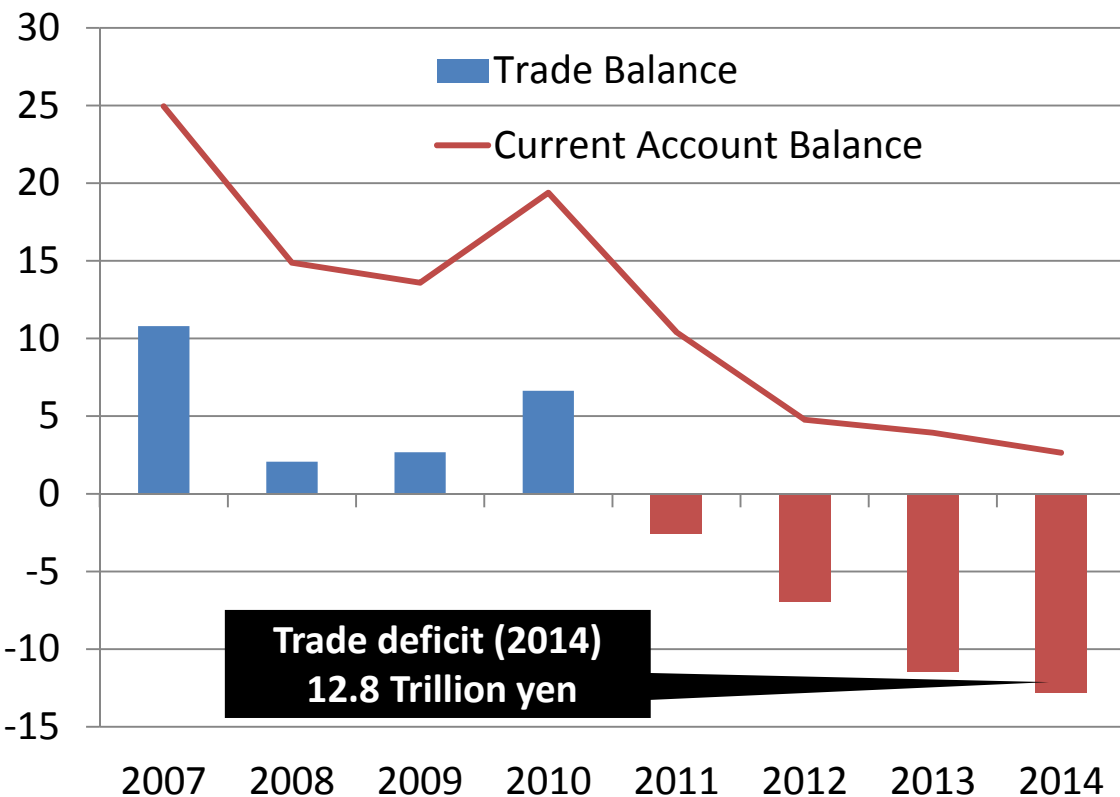
Trend in Domestic Power Generation Ratio



Japan Suffers Huge Trade Deficit

- The overall cost of LNG imports to Japan has increased from 3.5 trillion yen (2010) to around 8 trillion yen (2014).
- Japan recorded a trade deficit for the first time in 31 years in 2011. Trade deficit for 2014 was 12.8 trillion yen, which is not a sustainable level for Japan.

Changes in trade balance and current account balance (trillion yen)

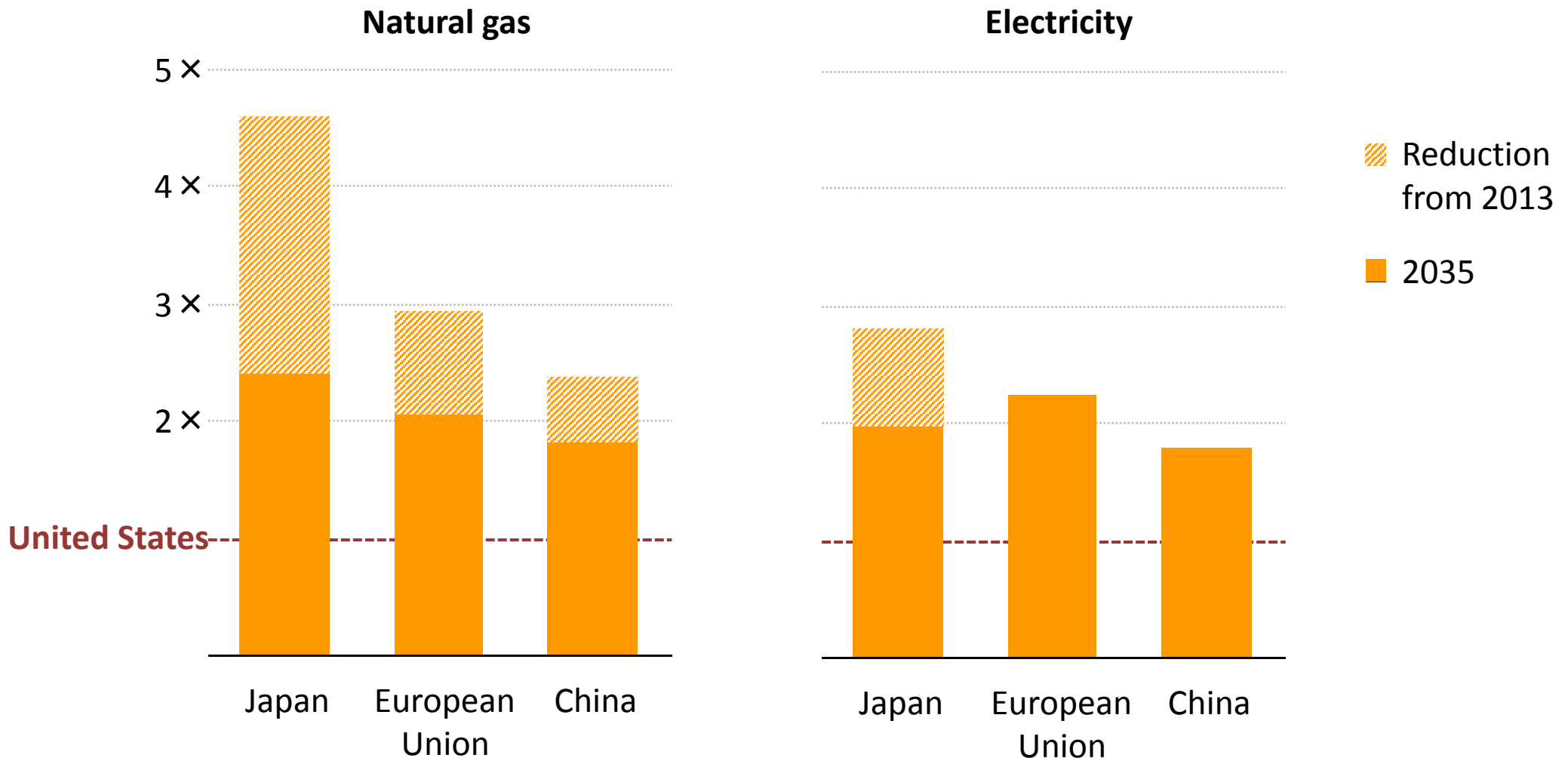


	2010	2014	Difference
Trade Balance	6.6	- 12.8	- 19.5
Net Import Costs			
LNG	3.5	7.9	+4.4
Crude Oil	9.4	13.9	+4.5
Petroleum Products	2.5	3.1	+0.7
Coal	2.1	2.1	-0.0

Reducing fuel procurement cost is an urgent issue

- High energy costs in Japan have negative impact on the competitiveness of energy intensive industries.

Ratio of industrial energy prices relative to the United States



Source: IEA

Diversification is the key in the Strategic Energy Plan

Principles of Energy Policy and Viewpoints for Reformation

1) Confirmation of basic viewpoint of energy policies (3E + S)

■ Stable Supply (E)nergy Security)

■ Cost Reduction (E)conomic Efficiency)

■ Environment

■ Safety

+

Global Viewpoint

- Developing energy policies with international movement appropriately
- Internationalizing energy industries by facilitating business overseas.

Economic Growth

- Contribution to reinforce Japan's locational competitiveness.
- Activating Japan's energy market through energy system reform.

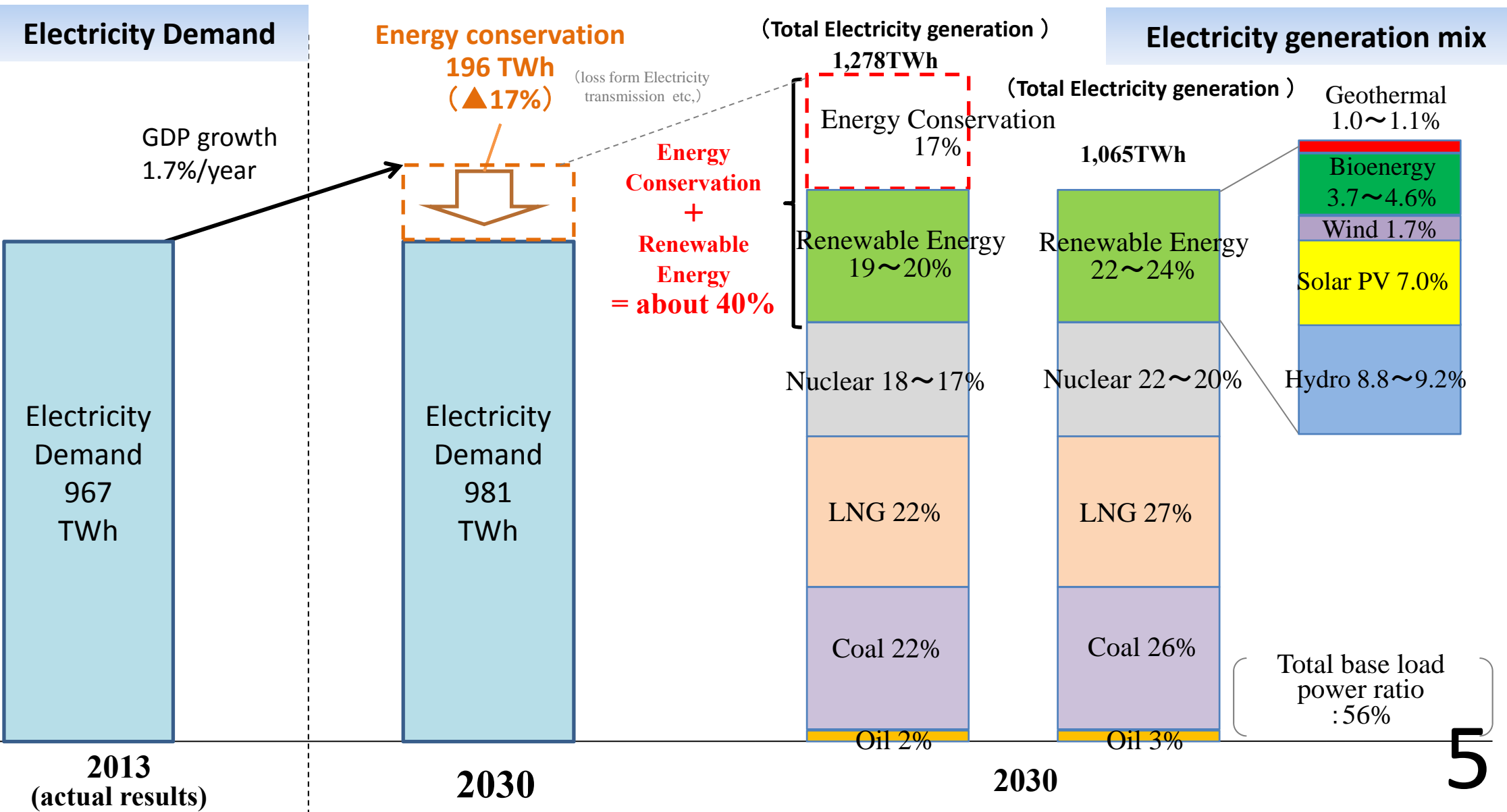
2) Building multilayered and diversified flexible energy demand-supply structure

- Establishing resilient, realistic and multi-layered energy supply structure, where each energy source can exert its advantage and complement others' drawbacks.
- Creating a flexible and efficient supply/demand structure where various players can participate and various alternatives are prepared by system reforms.
- Improving self-sufficiency ratio by developing and introducing domestic resources to minimize influence from overseas' situation.




New Energy Mix

➤ Basic Direction

- 1) To improve the self-sufficiency ratio to around 25% surpassing the level before the Earthquake.
- 2) To reduce the electricity costs lower than today.
- 3) To set a high-level GHG reduction goal compared with other developed countries to lead the world.



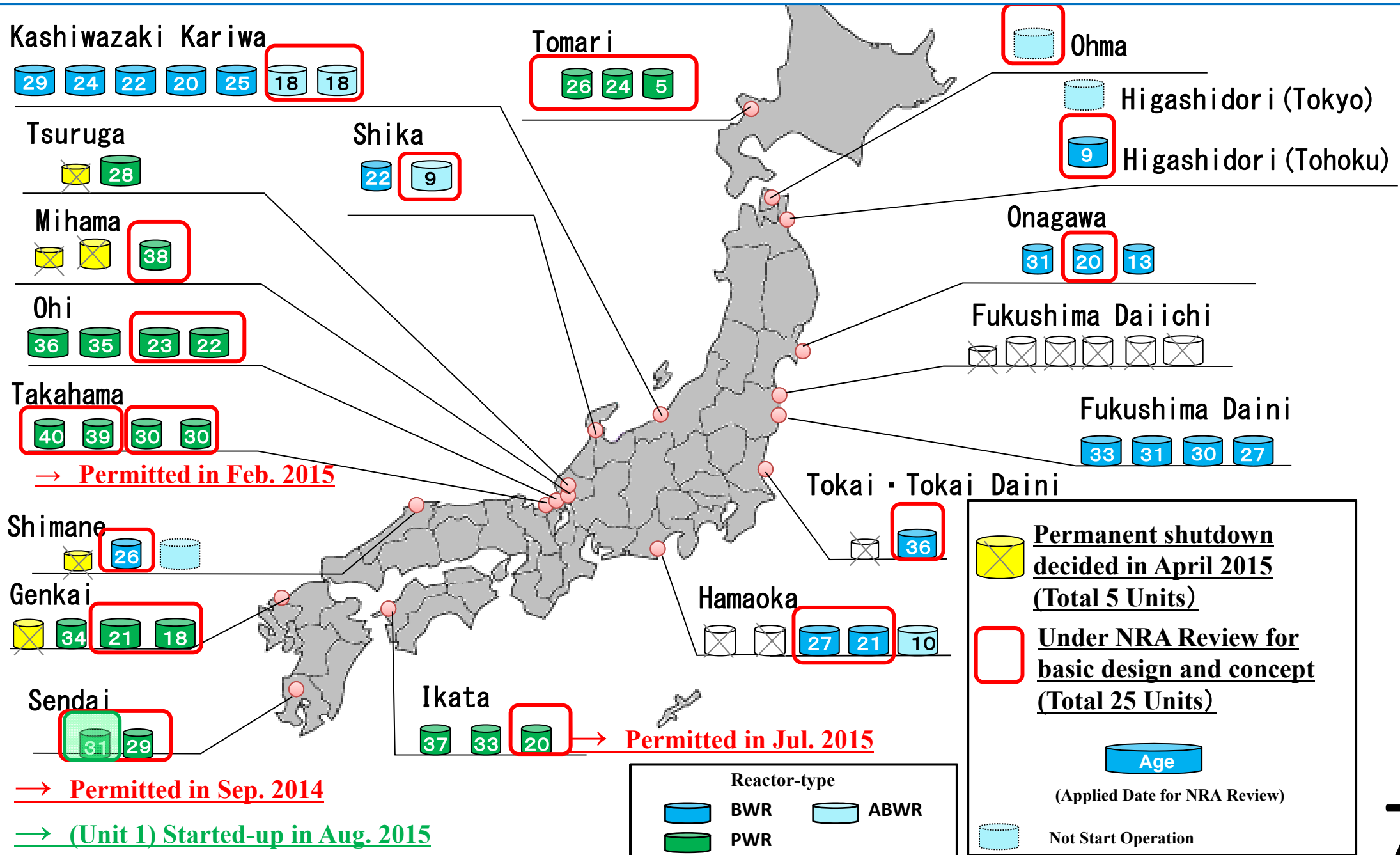
Comparison of INDCs by major countries

	Comparison with 1990	Comparison with 2005	Comparison with 2013
Japan 	▲ 18.0% (2030)	▲ 25.4% (2030)	▲ 26.0% (2030)
USA 	▲ 14~16% (2025)	▲ 26~28% (2025)	▲ 18~21% (2025)
EU 	▲ 40% (2030)	▲ 35% (2030)	▲ 24% (2030)

*INDCs: Intended Nationally Determined Contributions

Nuclear Electric Power Plants in Japan

25 units out of 15 plants are under review for restart by the Nuclear Regulation Authority (NRA) in accordance with its new safety regulations. Sendai power plant Unit 1 started up in Aug. 2015.



LNG Imports from the US

- Japan's claim from 5 LNG projects.
- 5 projects involving Japanese firms received export approval and FERC approval.
- Exports will start in 2016.

Japan related Major LNG projects in North America



- **Sabine Pass** (Cheniere Energy)
 - Capacity : 18 MTA
 - Start Operation: around 2016
 - Export license for Non-FTA: [Approved \(2011.5.20\)](#)
 - Sales: The media reports [Kansai Electric Power 0.4 MTA × 2 years](#), [Chubu Electric Power 0.35 MTA × 2 years](#)

- The first comprehensive electricity and gas market reform in 60 years.

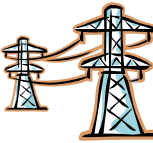
3 Objectives

- 1) Securing a stable supply of electricity and gas
- 2) Suppressing electricity and gas rates to the maximum extent possible
- 3) Expanding choices for consumers and business opportunities

Full liberalization of the retail energy market

Electricity *Law enacted in June 2014, to be implemented from 2016*

Gas *Law enacted in June 2015, to be implemented from 2017*



Legal unbundling of transmission/ distribution sector, and abolishing retail price regulations

Electricity *Law enacted in June 2015, to be implemented from 2020*

Gas *Law enacted in June 2015, to be implemented from 2022*

Status after the start of the Feed-in Tariff

- Since FIT start (July 2012), 14,931MW of renewable energy capacity has been deployed until the end of March 2015.
- 88% increase in the total RE capacity.

<Deployment of renewable energy (as of the end of March 2015) >

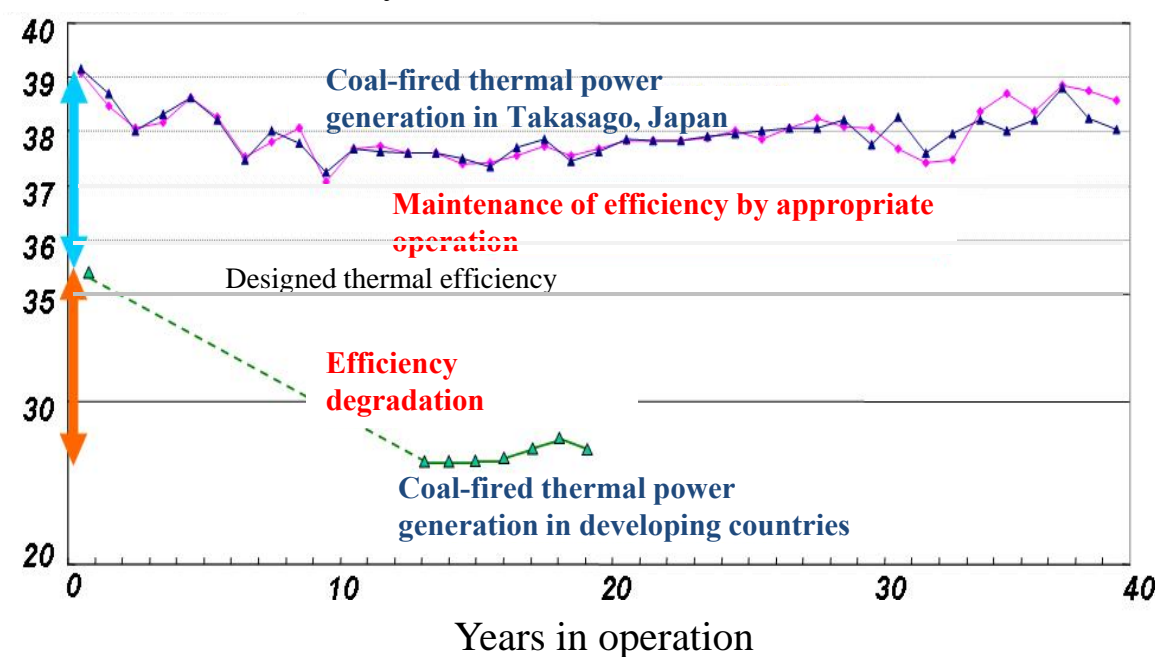
	Accumulated capacity before FIT started	Capacity of facilities that started operation since FIT start (July 2012)
Solar power (residential)	Approx. 4,700MW	3,097MW
Solar power (non-residential)	Approx. 900MW	15,011MW
Wind	Approx. 2,600MW	331MW
Mid- to small-sized hydraulic(Less than 30MW)	Approx. 9,600MW	89MW
Biomass	Approx. 2,300MW	224MW
Geothermal	Approx. 500MW	5MW
Total	Approx. 20,600MW	18,757MW

Promoting highly efficient low emission coal power plants

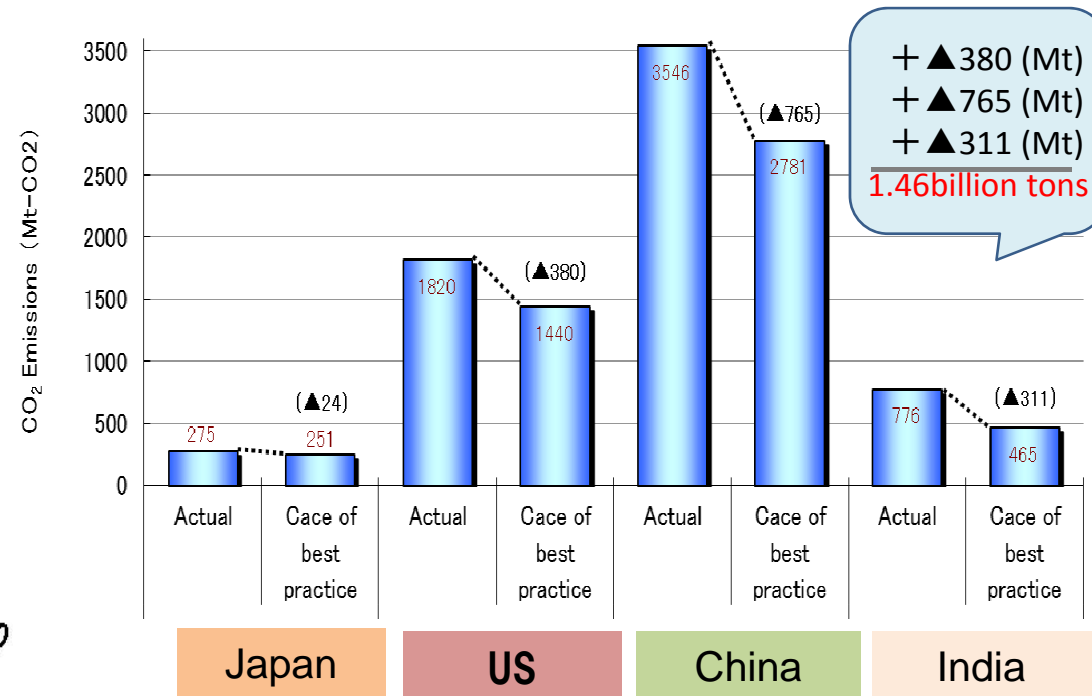
- Coal-fired thermal power generation in Japan achieved the highest level of efficiency in the world through utilization of efficient technology (Super Critical / Ultra Super Critical) and operation / management know-how. Its efficiency is maintained for long periods after operation.
- If the most advanced technology in operation in Japan is applied to coal-fired thermal power generation in the US, China and India, it is estimated that CO2 emission could be reduced by about 1.5 billion tons.

Change in efficiency across the ages

Gross thermal efficiency (% , HHV)



CO2 emission reduction by application of Japan's best practices



Promoting highly efficient low emission coal power plants

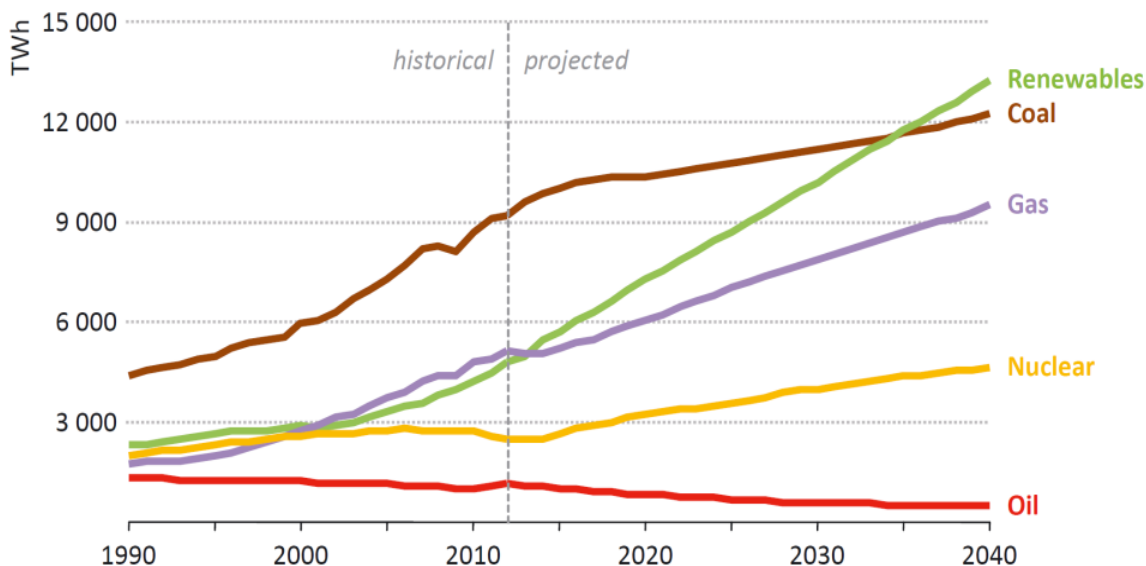
3Es of Coal

- Energy Security: global availability, geopolitical consideration
- Environment: Clean Coal Technology (NO_x, SO_x - equivalent to LNG PPs)
- Economy: affordable prices

Banning Export Credits Only in OECD Would Make Things Worse

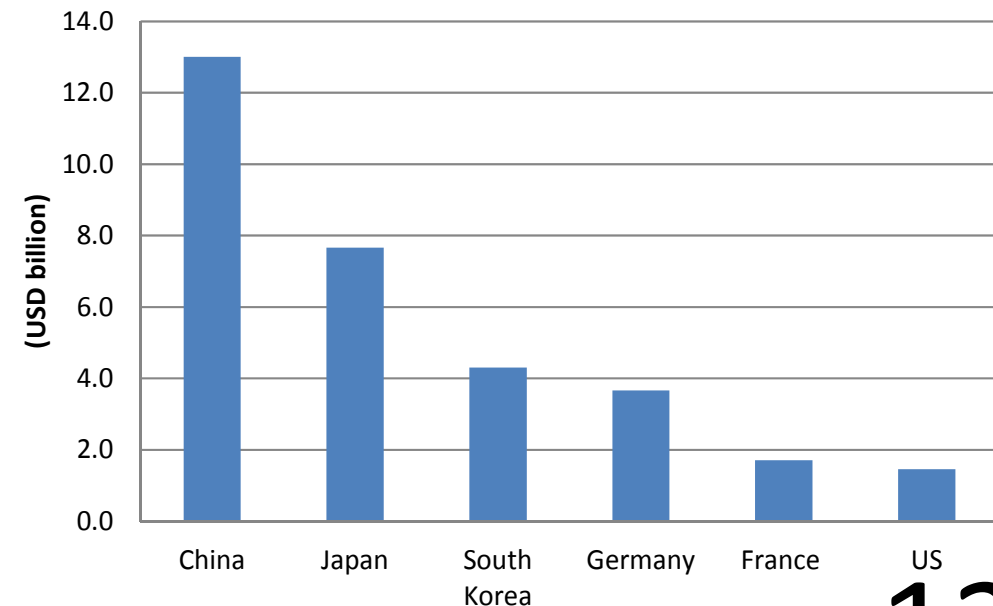
- Non-OECD countries would sell less-efficient CPPs worldwide.
- China is already the biggest source of export credits.
- China exports less-efficient CPPs.

World electricity generation by source (New Policies Scenario)



Source: IEA World Energy Outlook 2014

Comparison of public financing for foreign coal power plants between 2007 and 2013 among countries



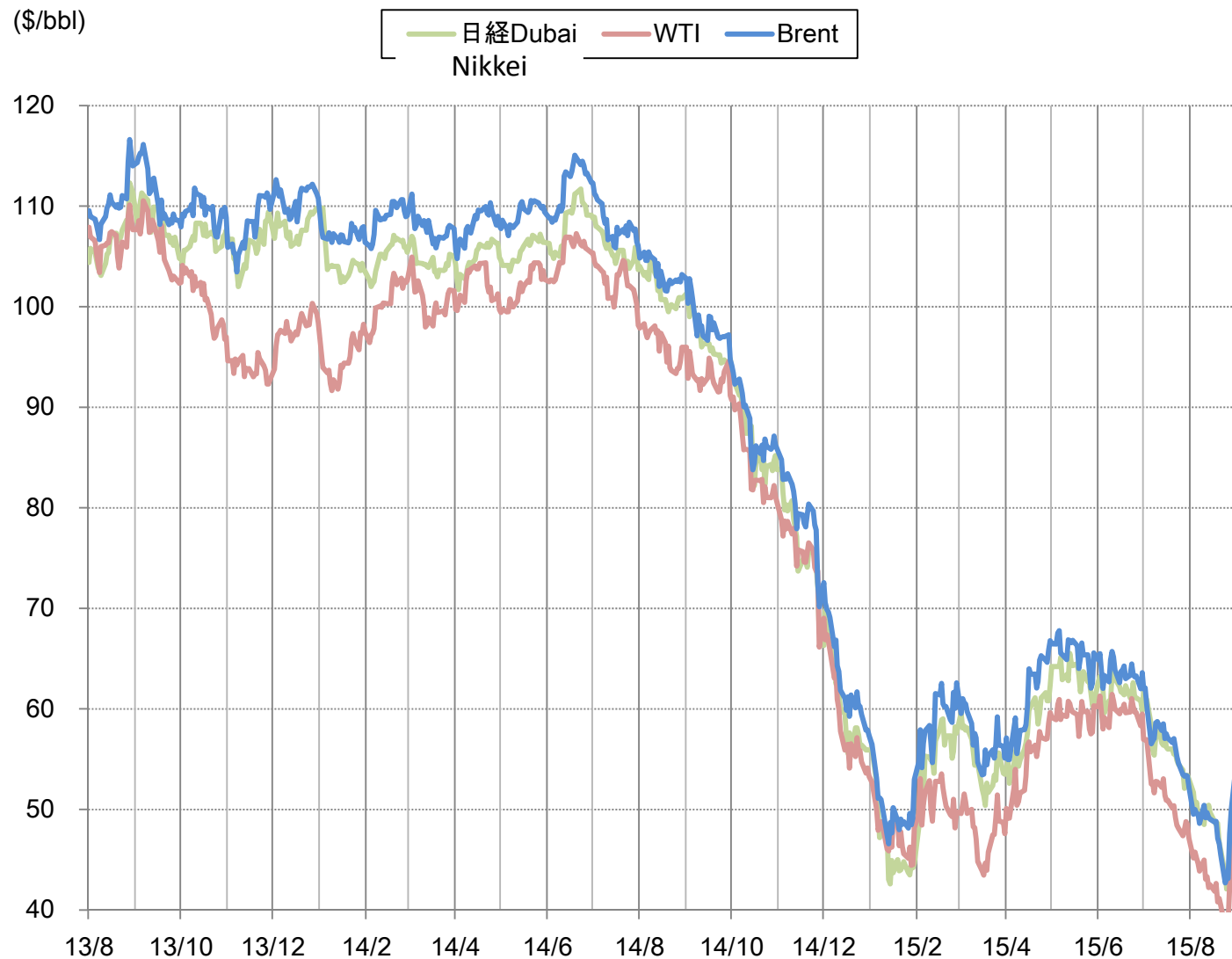
Source: Ueno, Yanagi and Nakano (2014):

<http://www.pp.u-tokyo.ac.jp/research/dp/index.htm>

Fall in crude oil prices

- With the sharp fall in crude oil prices from last year, price is now less than 50-dollar-per-barrel level.

Change in International Crude Oil Prices



Government balanced budget

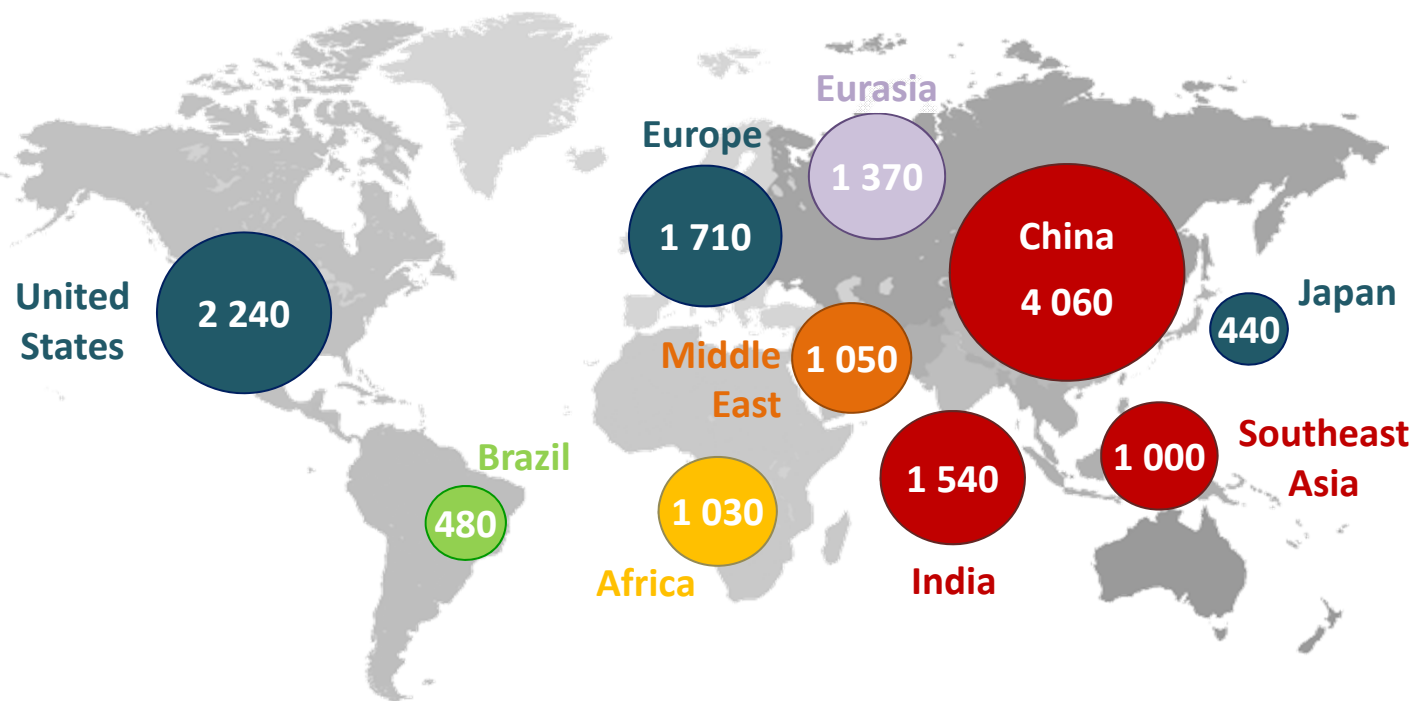
Oil-producing nations	Government balanced budget (dollars per barrel)
Kuwait	47.1
Iraq	70.9
UAE	73.1
Saudi Arabia	103.0
Iran	92.5
Libya	215
Russia	105.2
Venezuela	117.5

Source: Estimated by IMF, Deutsche Bank

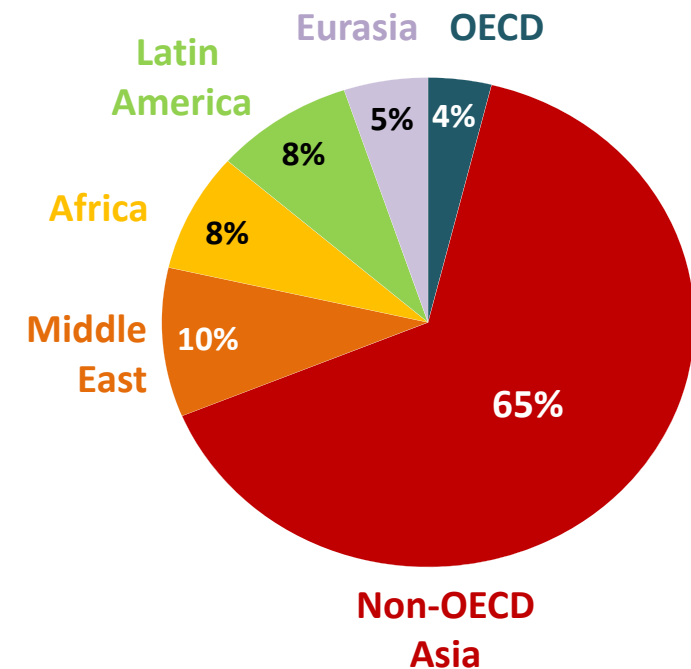
The Engine of Energy Demand Growth Moves to South Asia

➤ IEA analyzed Southeast Asia on World Energy Outlook 2013.

Primary energy demand, 2035 (Mtoe)



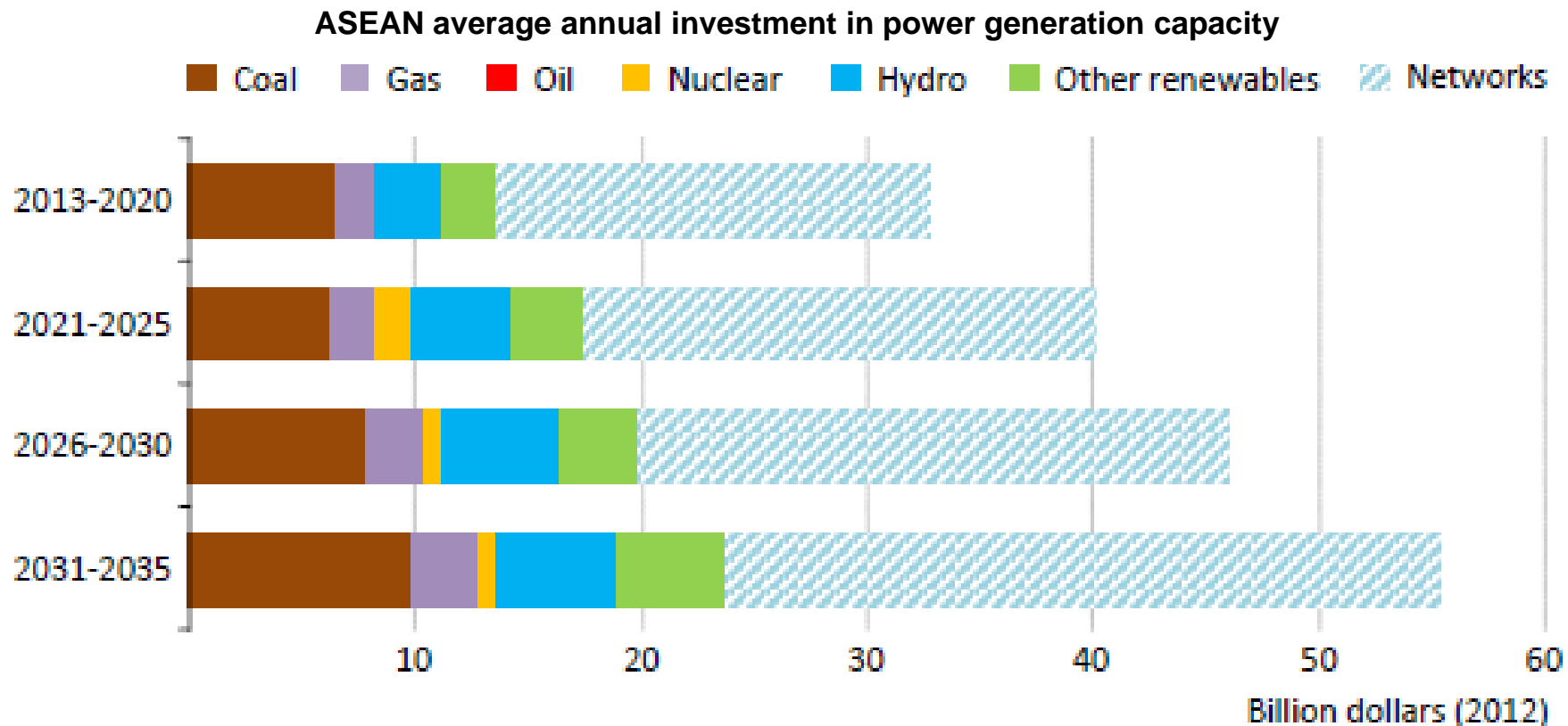
Share of global growth 2012-2035



China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth

Energy Situation in ASEAN

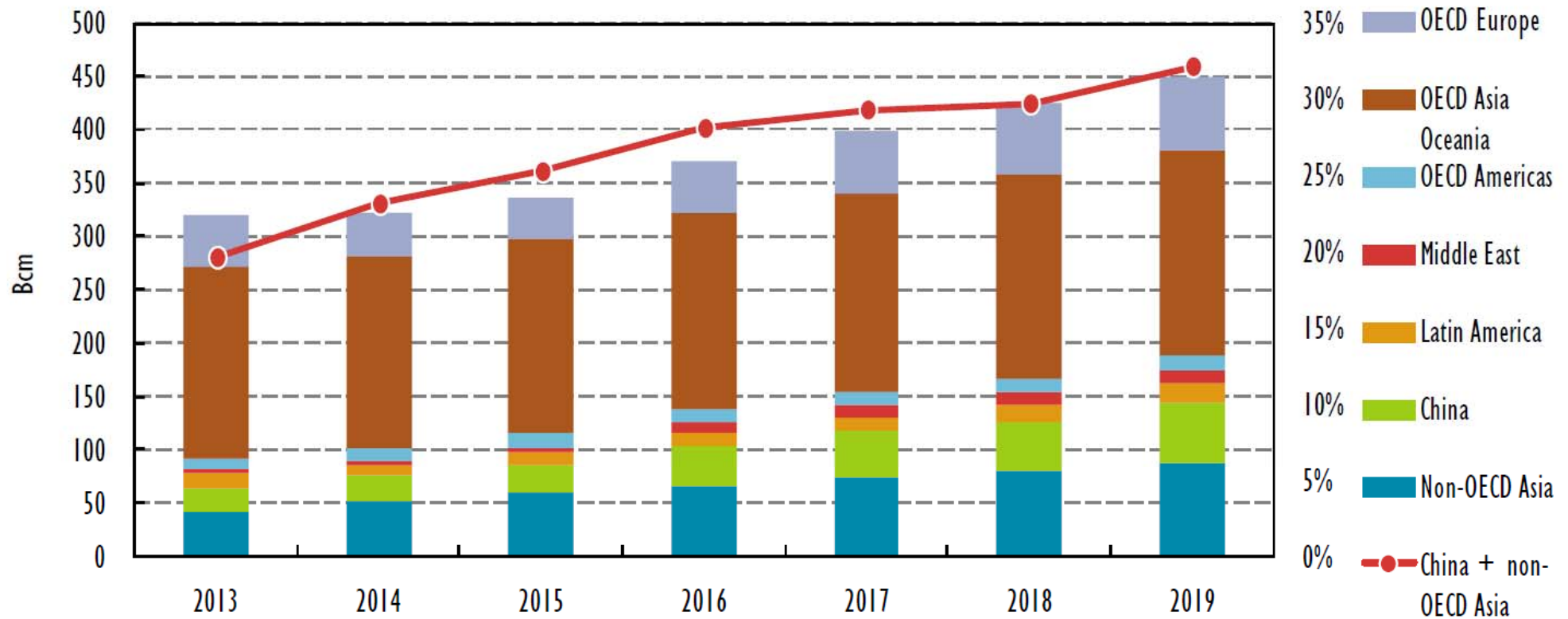
- Energy demand in ASEAN region will be increasing in mid-long term and fossil fuels take a major role in energy mix.
- Electricity demand in South-East Asia will increase to about 140% by 2035 and cumulative investment of 990 Billion dollars will be required.(IEA)



(source: IEA Southeast Asia Energy Outlook (2013))

The Engine of Energy Demand Growth Moves to South Asia

➤ IEA launched “The Asian Quest for LNG in a Globalising Market” on 2014.



- Global LNG trade is set to expand by one-third to 450bcm by 2019 and likely to increase further.
- Increase of global LNG trade will be supported by Asia, mostly by strong demand from China and non-OECD Asia.