



25th world gas conference  
"Gas: Sustaining Future Global Growth"

# *Energy Security & Sustainability for Asia in the 21<sup>st</sup> Century*

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Global Associate, IEEJ  
2012-6-7  
Kuala Lumpur:



Patron



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# A Time of Unprecedented Uncertainties.

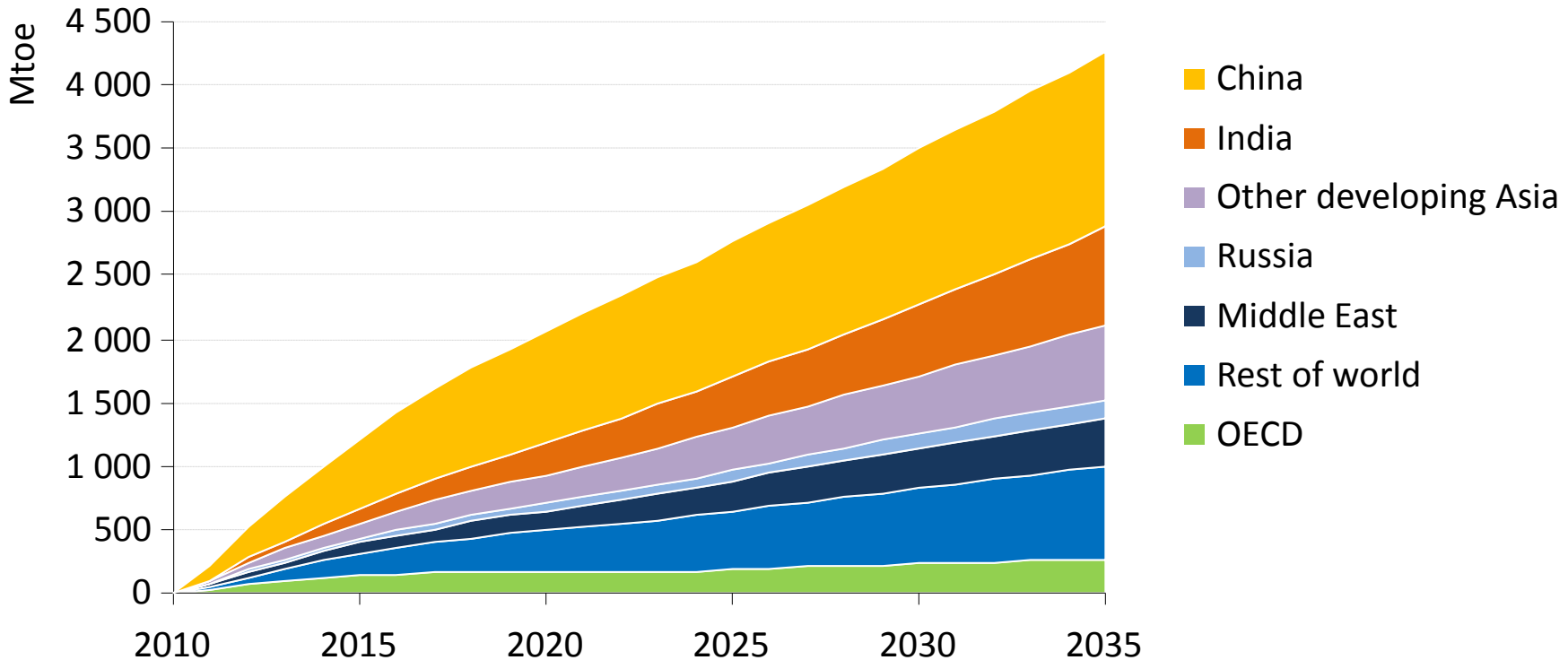
- Growing Asian economies will shape the global energy future – where will their policy decisions lead us ?



# China is already the largest consumer of energy and will be the largest oil consumer in 2035.

IEA WEO 2011

Growth in primary energy demand

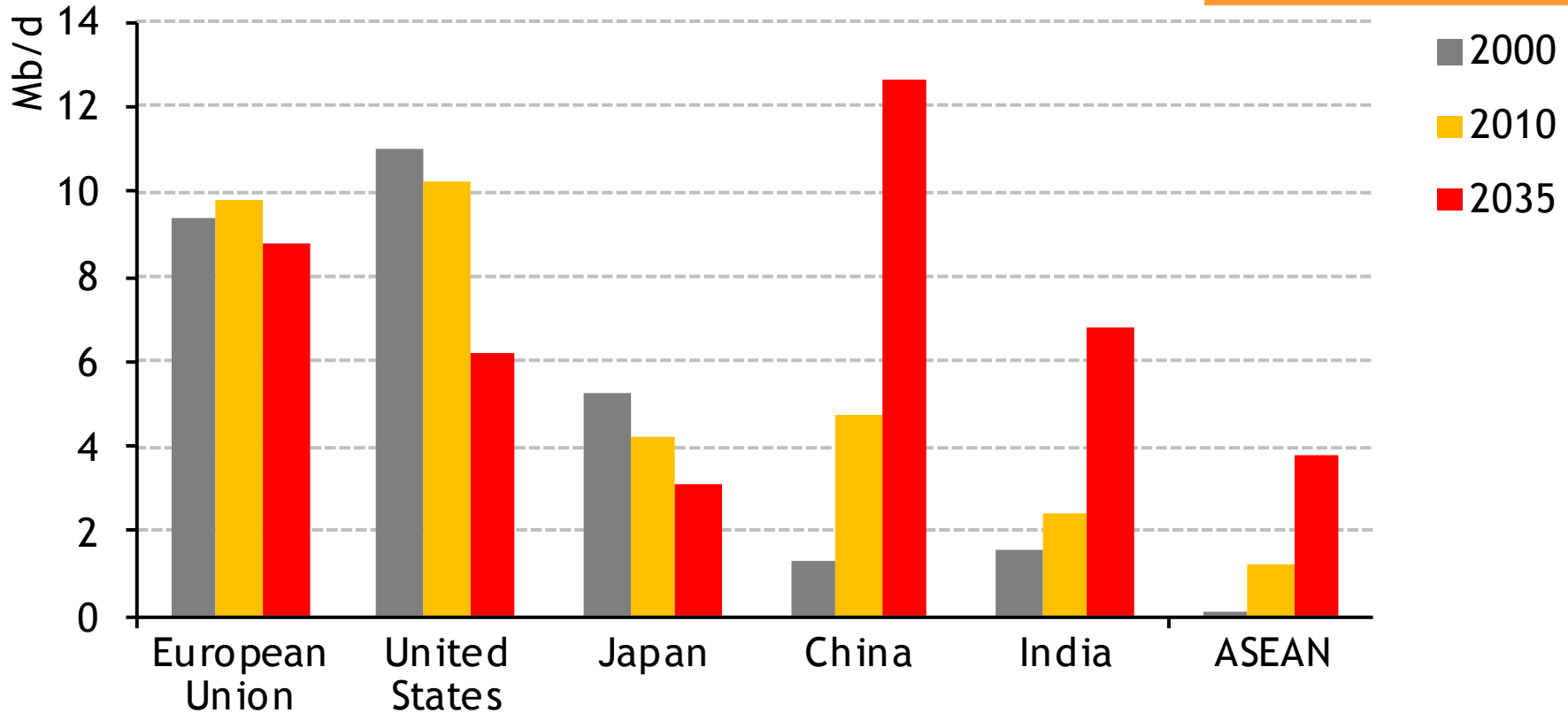


*Global energy demand increases by one-third from 2010 to 2035, with China, India and other Asia accounting for two thirds of the growth*

# Petroleum security is particularly the issue for Asia in the 21<sup>st</sup> Century.

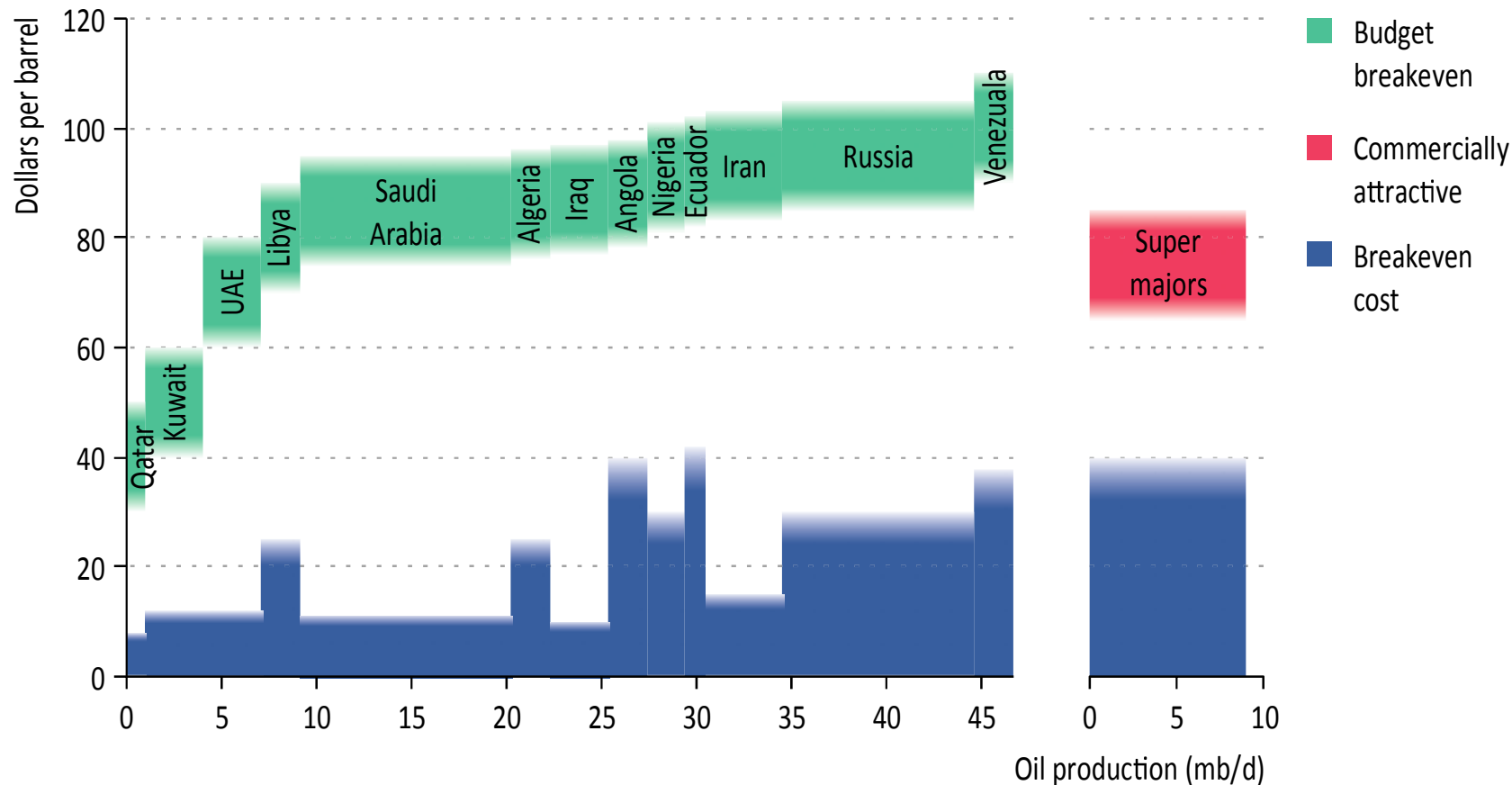
## Net imports of oil

IEA WEO 2011



*US oil imports drop due to rising domestic output & improved transport efficiency: EU imports overtake those of the US around 2015; China becomes the largest importer around 2020*

**Figure 3.21** • Breakeven costs, budget breakeven and commercially attractive prices for current oil production for selected producers, mid-2011



**‘Deferred Investment Case’ looks at near-term investment falling short by one-third. MENA output falls 3.4 mb/d by 2015 and Consumers face a near-term rise in oil prices to \$150/barrel.**

# Iran Crisis and Hormuz Strait



85% of Japanese oil import  
20% of Japanese LNG import  
**But if no nuclear reactors are running,,,,,?**

17 mbd of petroleum  
(20% of global demand )

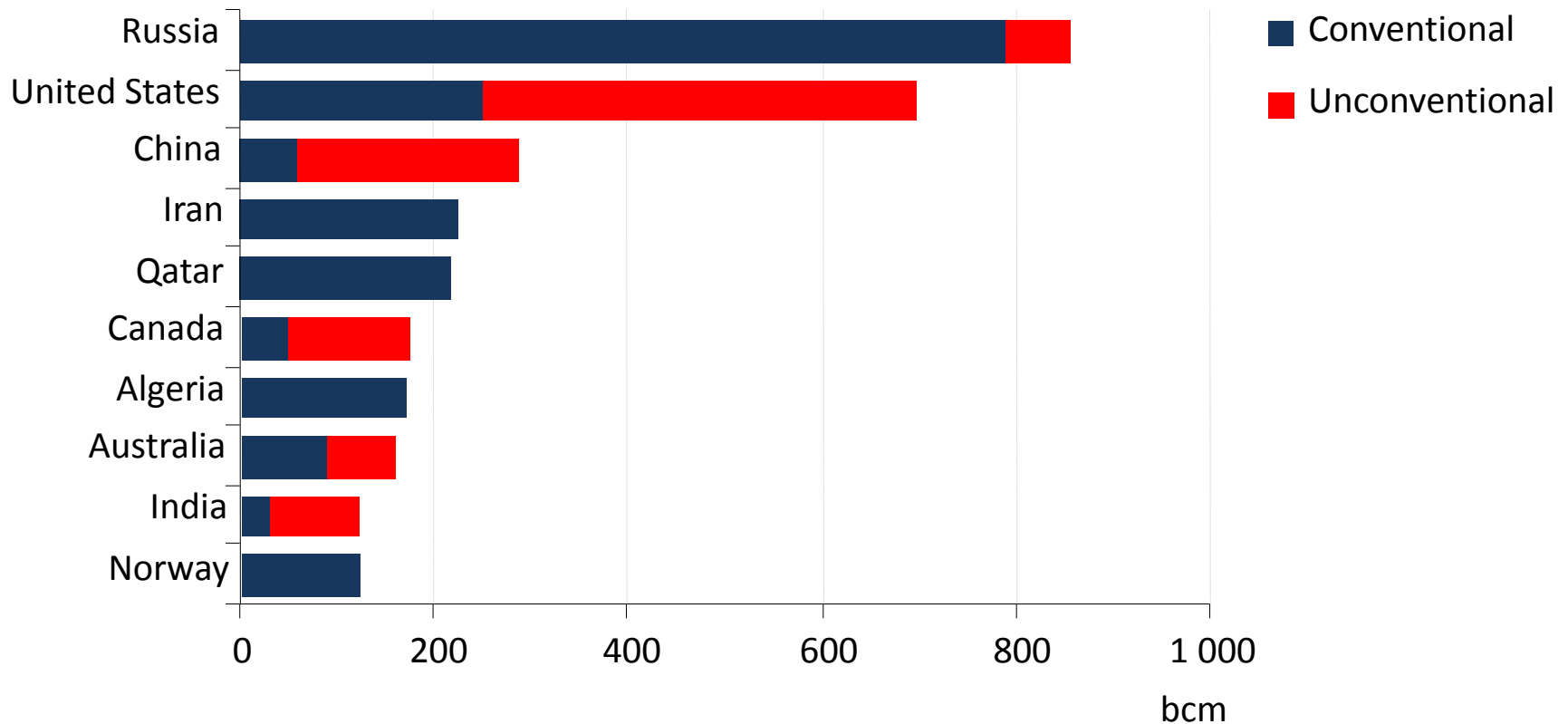
82 million tons of LNG pa  
(30% of global demand)



# The Golden Age for Natural Gas ?

IEA WEO 2011

Largest natural gas producers in 2035

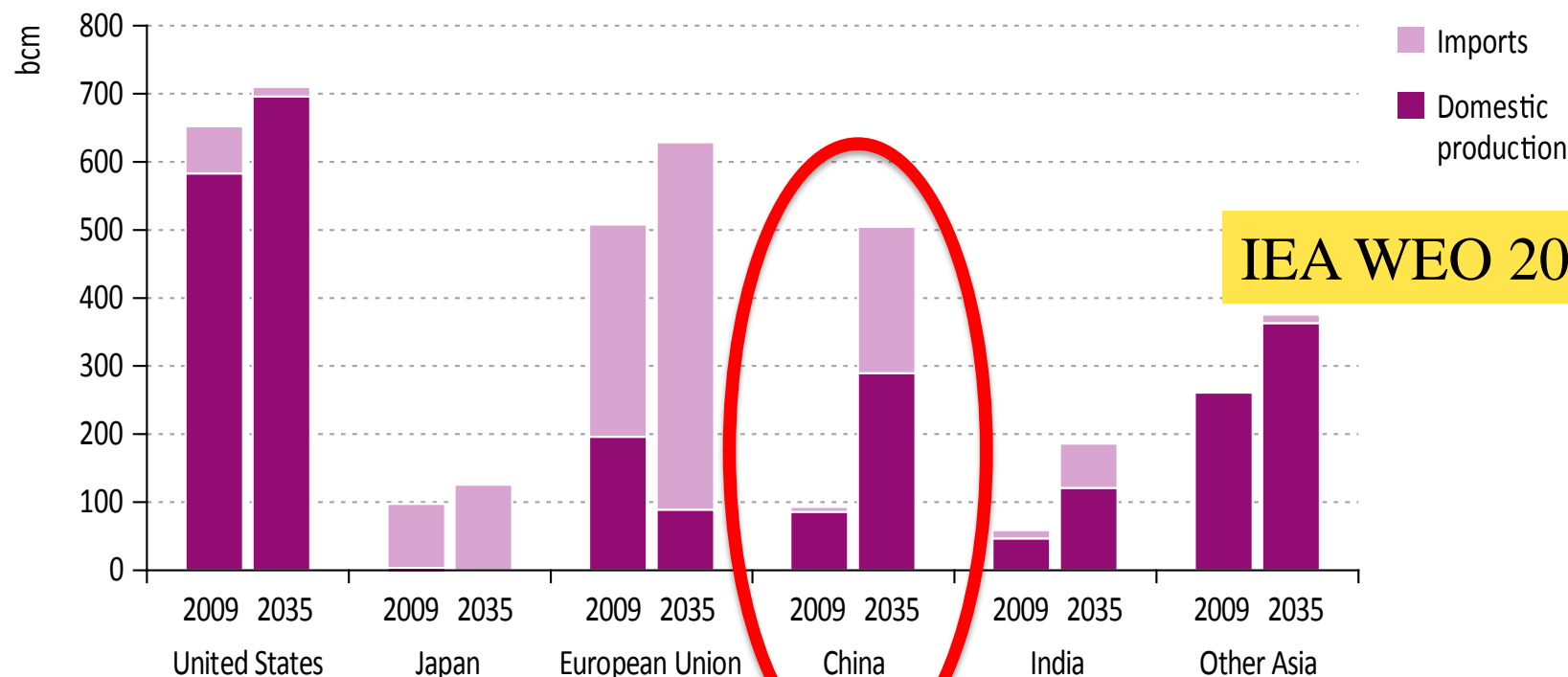


*Unconventional natural gas supplies 40% of the 1.7 tcm increase in global supply, but best practices are essential to successfully address environmental challenges*



# China's Gas demand grows fast by 5 times and its Import by 20 times by 2035

**Figure 2.18** • Natural gas demand and the share of imports by region in the New Policies Scenario, 2009 and 2035



Note: Other Asia had net natural gas exports of 56 bcm in 2009.

China's demand is 97 BCM in 2009, same as Germany,  
 In 2035 it grows to 502 BCM same as Europe as a whole in 2009



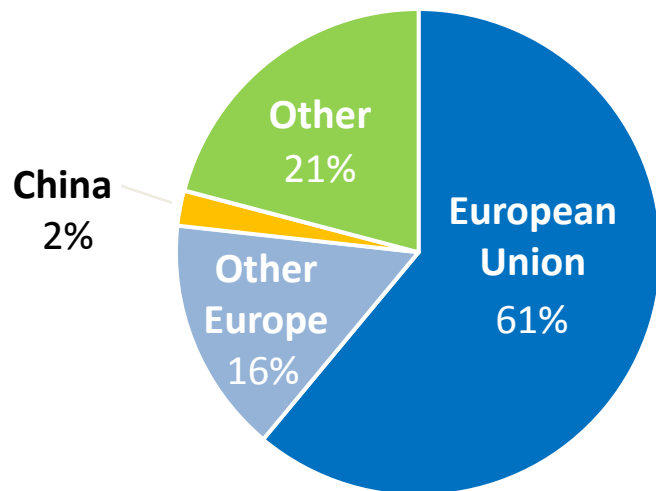
# Russia's focus will move to the East

IEA WEO 2011

## Russian revenue from fossil fuel exports

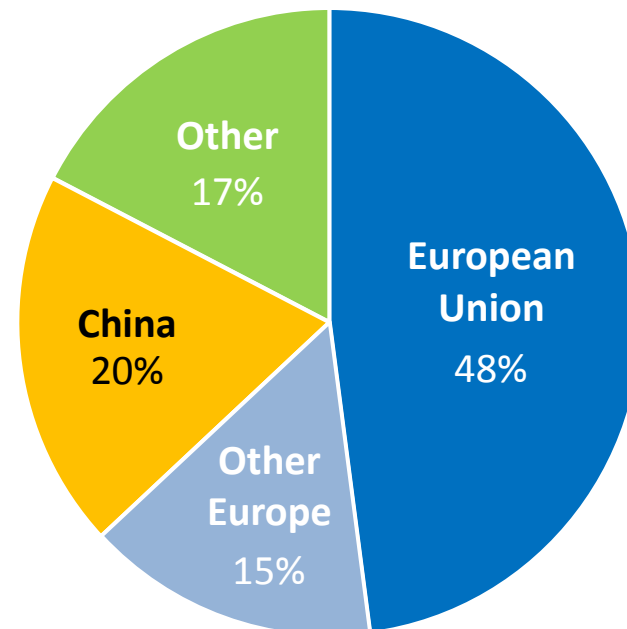
2010

\$255 billion



2035

\$420 billion



*An increasing share of Russian exports go eastwards to Asia, providing Russia with diversity of markets and revenues*

# Fukushima Accident and Low Nuclear Case

IEA WEO 2011



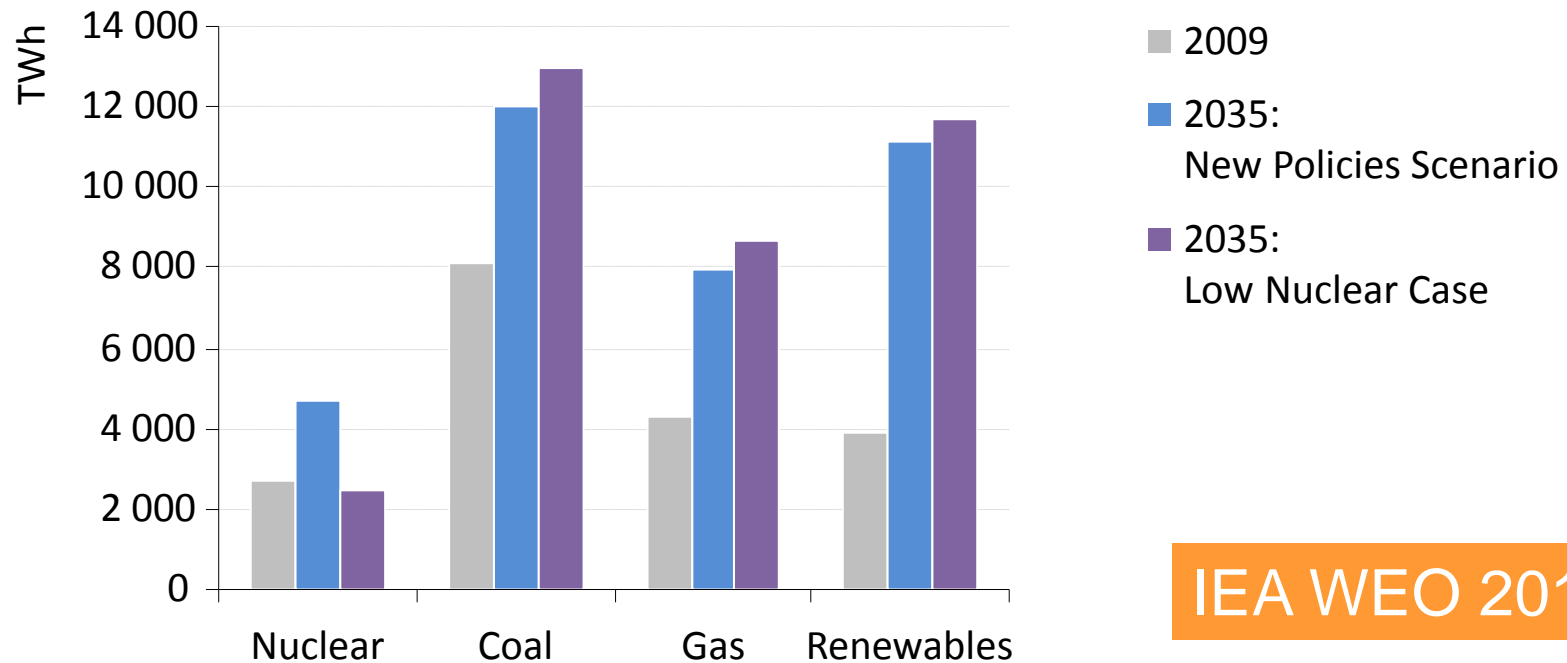
**Table 12.3** • Key projections for nuclear power in the New Policies Scenario and the Low Nuclear Case

	Low Nuclear Case			New Policies Scenario		
	OECD	Non-OECD	World	OECD	Non-OECD	World
Gross installed capacity (GW)						
in 2010	326	68	393	326	68	393
in 2035	171	164	335	380	252	633
Share in electricity generation						
in 2010	21%	4%	13%	21%	4%	13%
in 2035	9%	5%	7%	21%	8%	13%
Gross capacity under construction (GW)*	14	54	69	14	54	69
New additions in 2011-2035 (GW)**	6	84	91	111	167	277
Retirements in 2011-2035 (GW)	176	42	218	71	36	107

\*At the start of 2011. \*\*Includes new plants and uprates, but excludes capacity currently under construction.

# Less nuclear means more of everything else

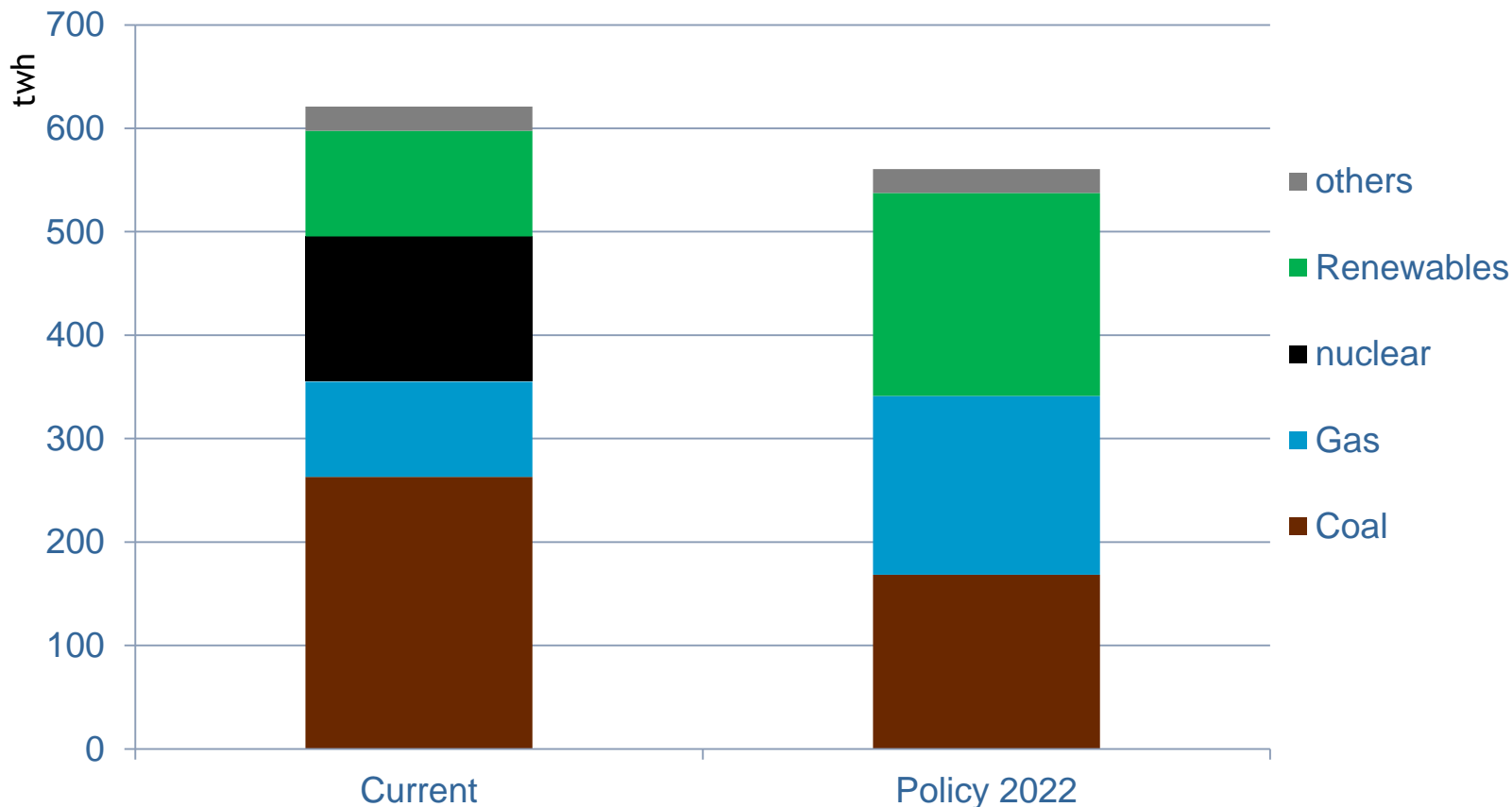
## Power generation by fuel in the New Policies Scenario and Low Nuclear Case



IEA WEO 2011

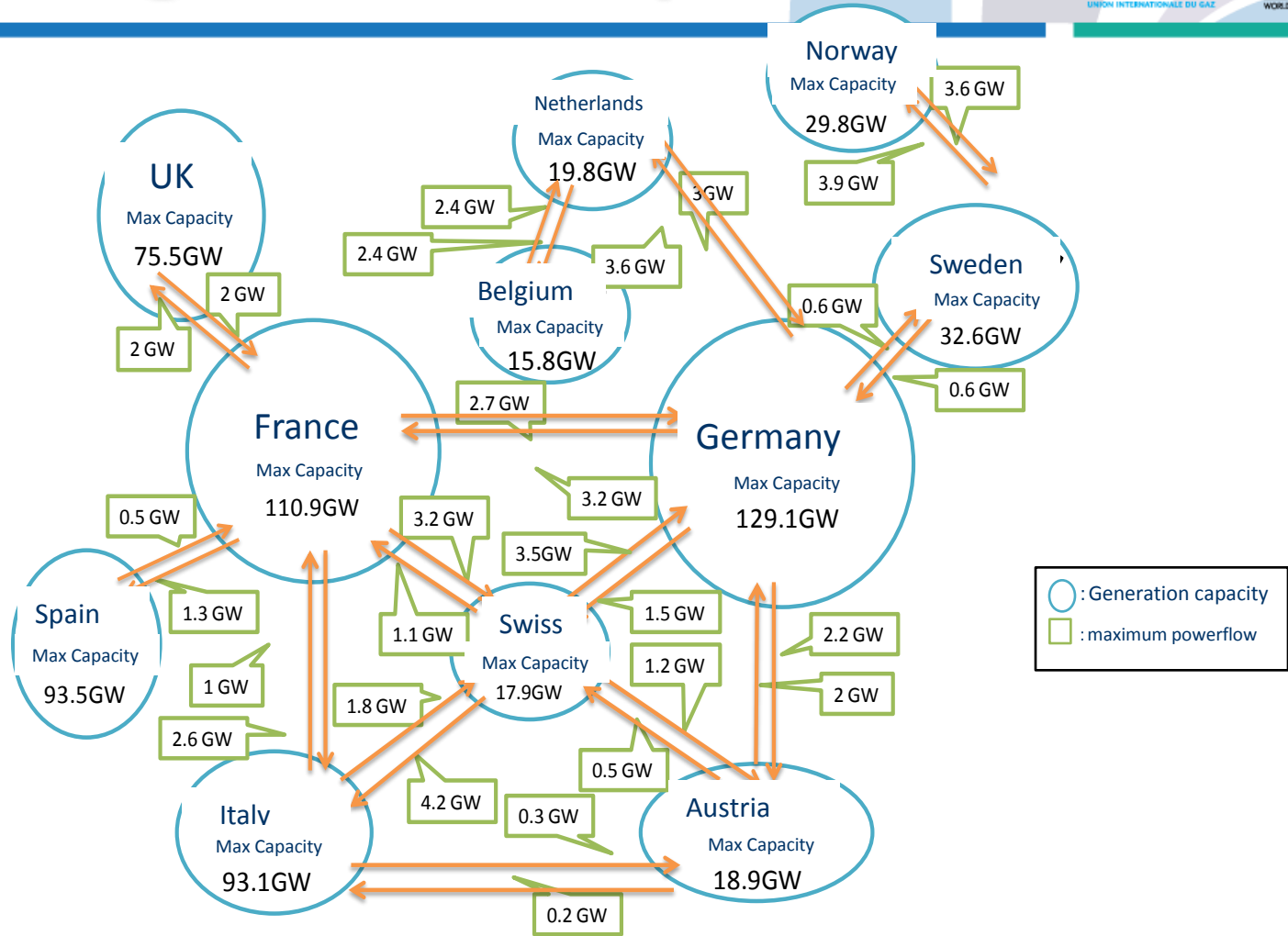
*The biggest chunk of the lost nuclear generation is replaced by power generation from gas and coal, leading to a 6% or 0.9 GT increase in CO<sub>2</sub> emissions in the power sector*

# Germany may needs much more Gas to phase out Nuclear by 2022



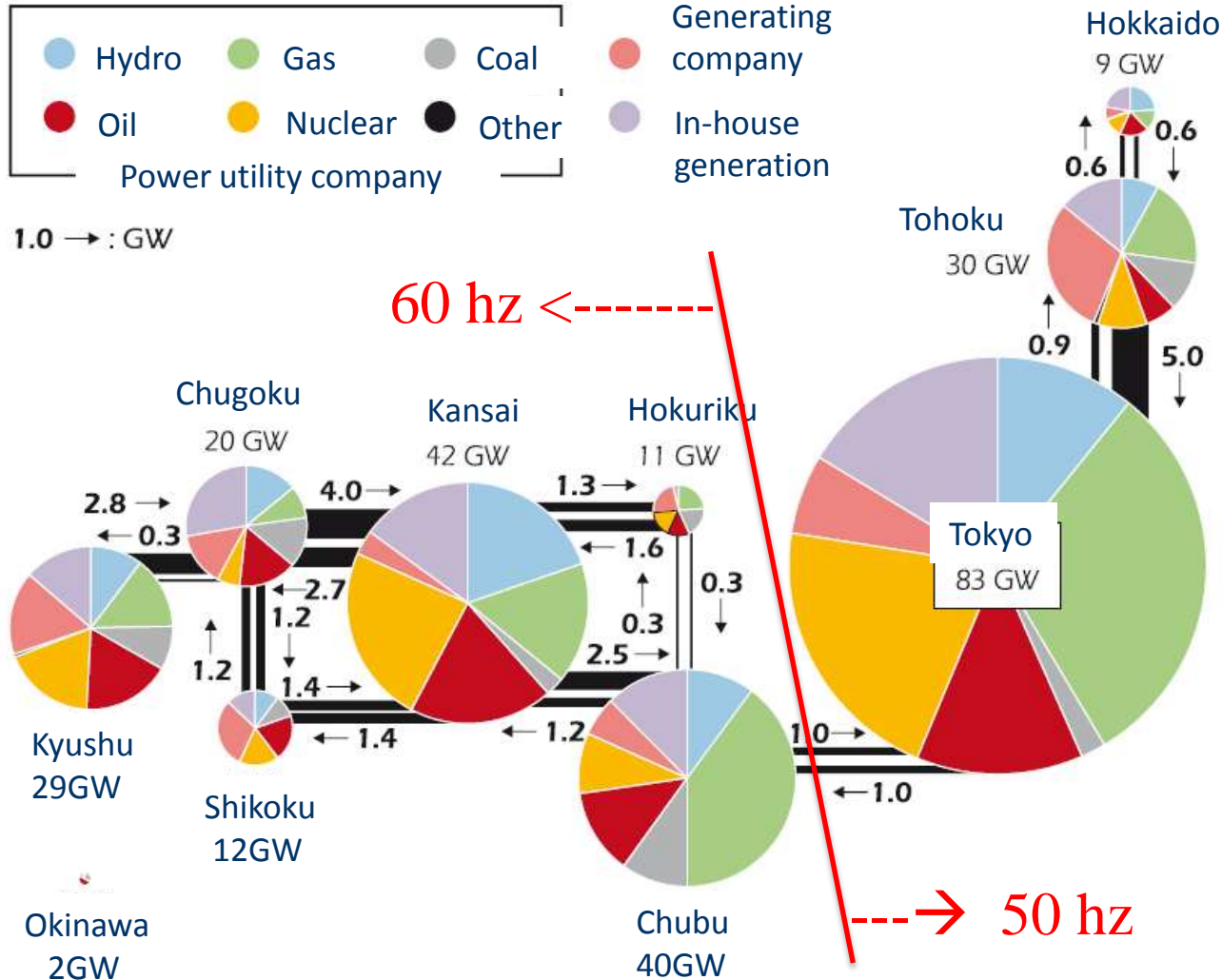
**Germany needs to import 16 BCM of gas to achieve electricity mix with 10% demand reduction, no nuclear, 35% renewables and CO2 at the target level**

# Power grid in Europe



Source: IEA 「Electricity Information 2010」  
Indicative value for Net Transfer Capacities (NTC) in Continental Europe

# Power grid in Japan



Source: Agency for Natural Resources and Energy, The Federation of Electric Power Companies of Japan, Electric Power System Council of Japan, The International Energy Agency

# Lessons from the Fukushima

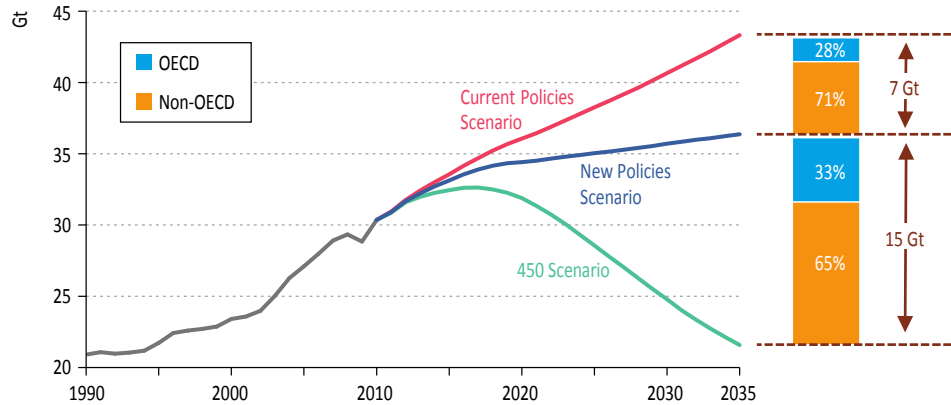
- Lessons to be Shared
  - Think about the unthinkable; Tsunami and Station Black Out. Large scale Blackout. Change total mind set for “Safety”.
  - Prepare for the severe accidents, common cause failure & compound disasters.
  - Clarify why it happened only to Fukushima Daiichi and NOT to Fukushima Daini, Onagawa nor Tokai daini.
- Safety Principles
  - Fukushima accident was caused by human error and should have been avoided. (Mr. Hatamura )
  - International Cooperation : A nuclear accident anywhere is an accident everywhere.
  - Independent Regulatory authority ; Transparency and Trust, “Back Fitting” of regulation
- Secured supply of Electricity
  - Power station location
  - Strengthened interconnection of grid lines
- Once disaster has happened, Recovery from disaster is at least as important as preparing for it.
  - FEMA like organization and training of the nuclear emergency staff including the self defense force ; integration of safety and security.



# What is Energy Security in the 21<sup>st</sup> Century?

# Climate Change Mitigation. 450 ppm Scenario is now almost impossible.

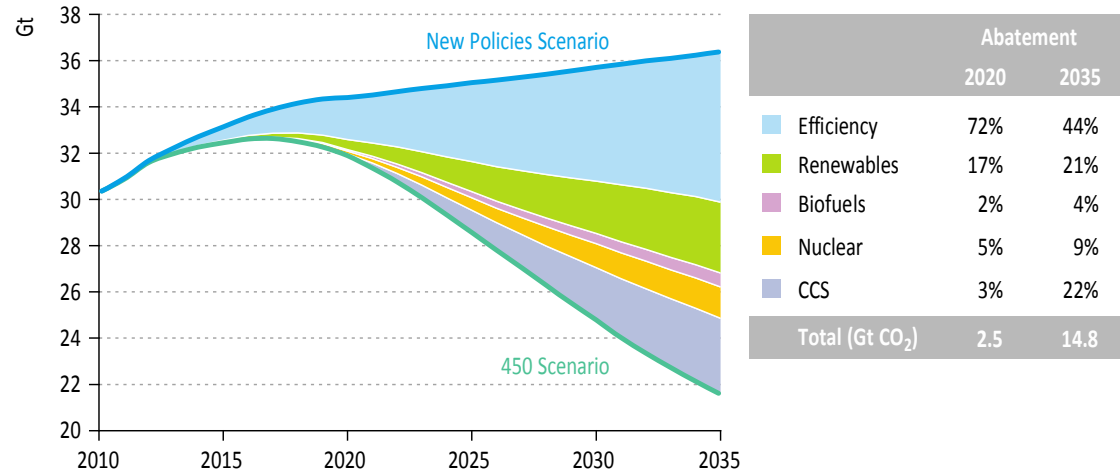
**Figure 6.2** • World energy-related CO<sub>2</sub> emissions by scenario<sup>2</sup>



IEA WEO 2011

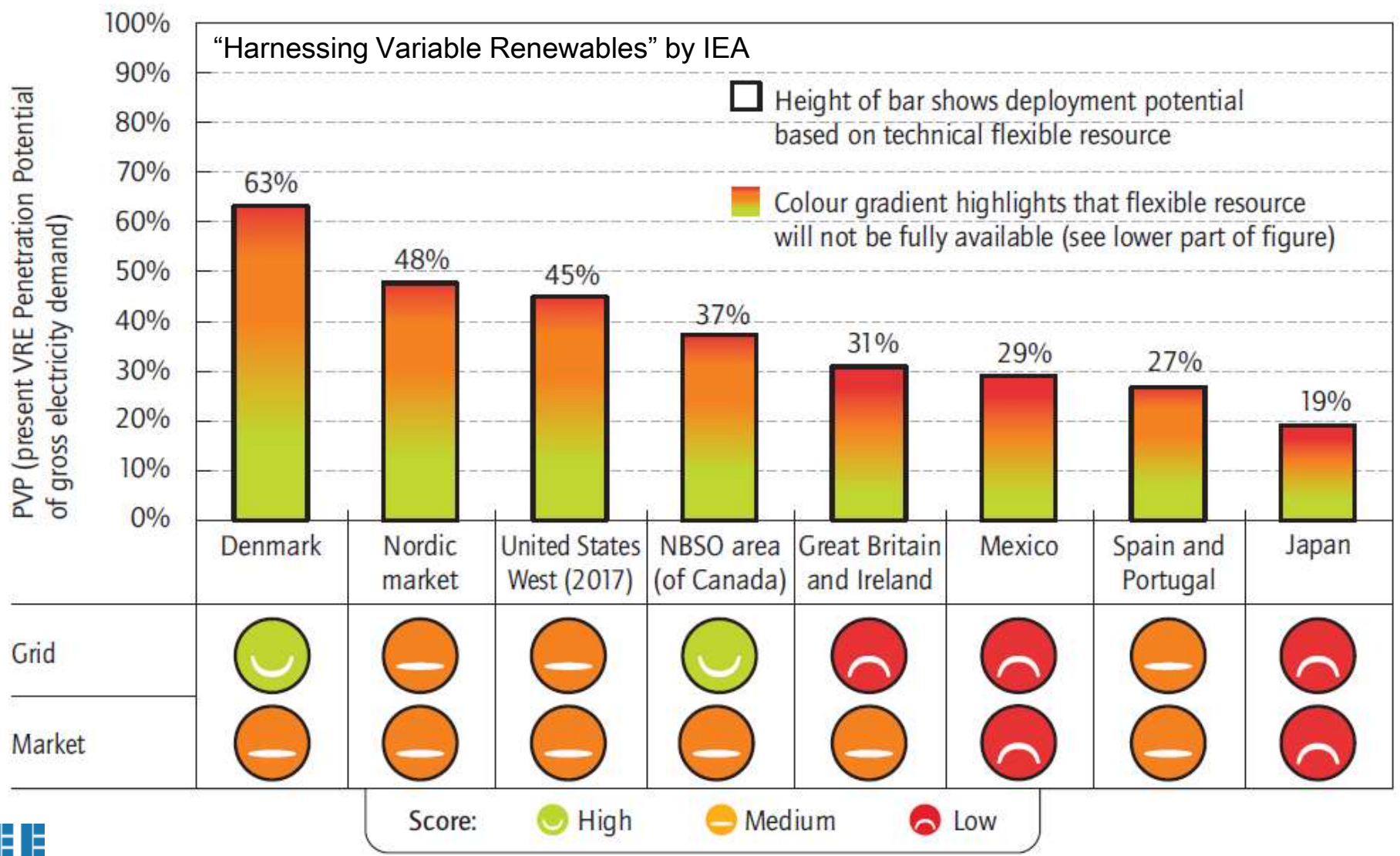
Note: There is also some abatement of inter-regional (bunker) emissions which, at less than 2% of the difference between scenarios, is not visible in the 2035 shares.

**Figure 6.4** • World energy-related CO<sub>2</sub> emissions abatement in the 450 Scenario relative to the New Policies Scenario

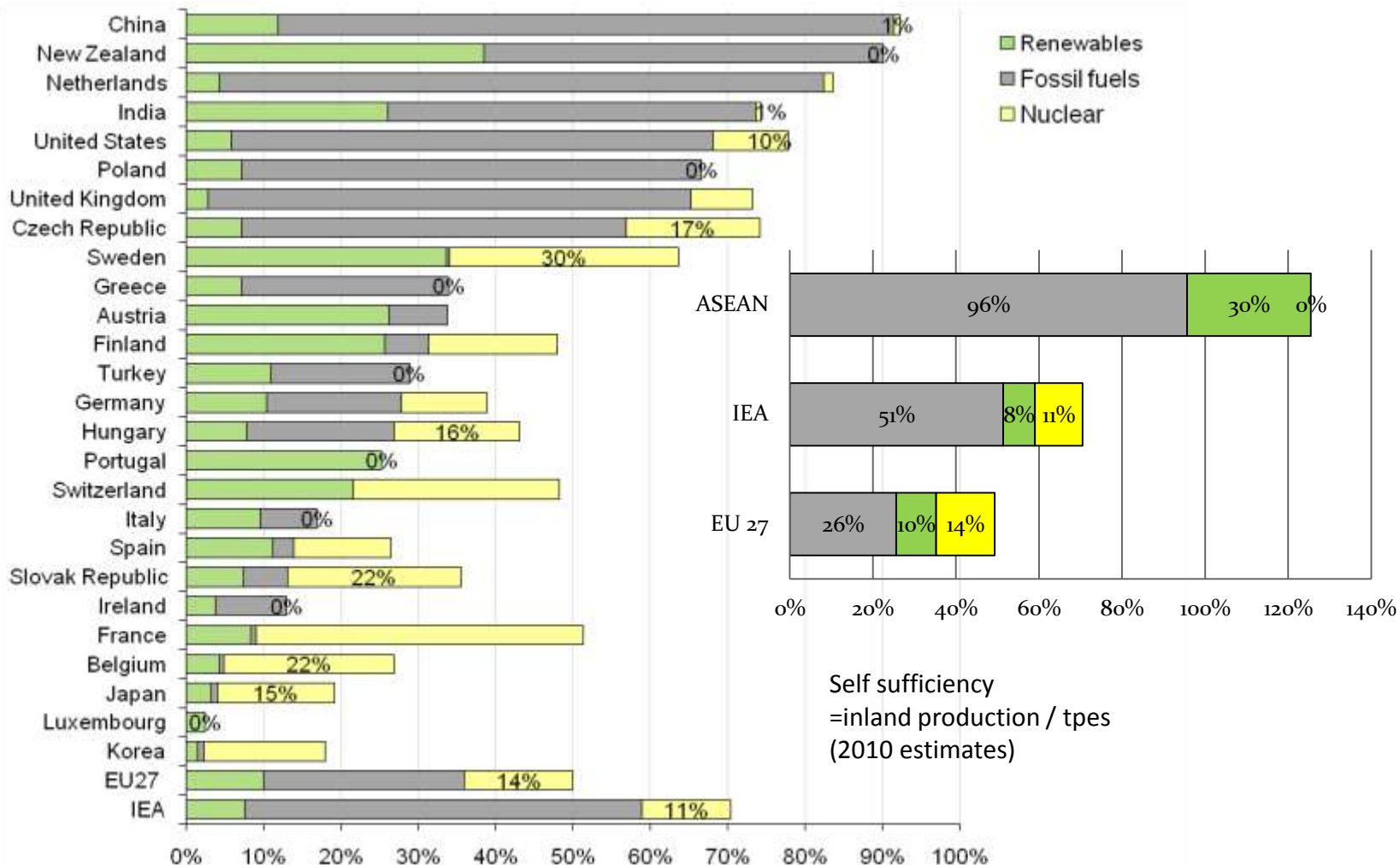


# Not only Feed-in-tariffs but Grid integration!

## Snapshot of present penetration potentials



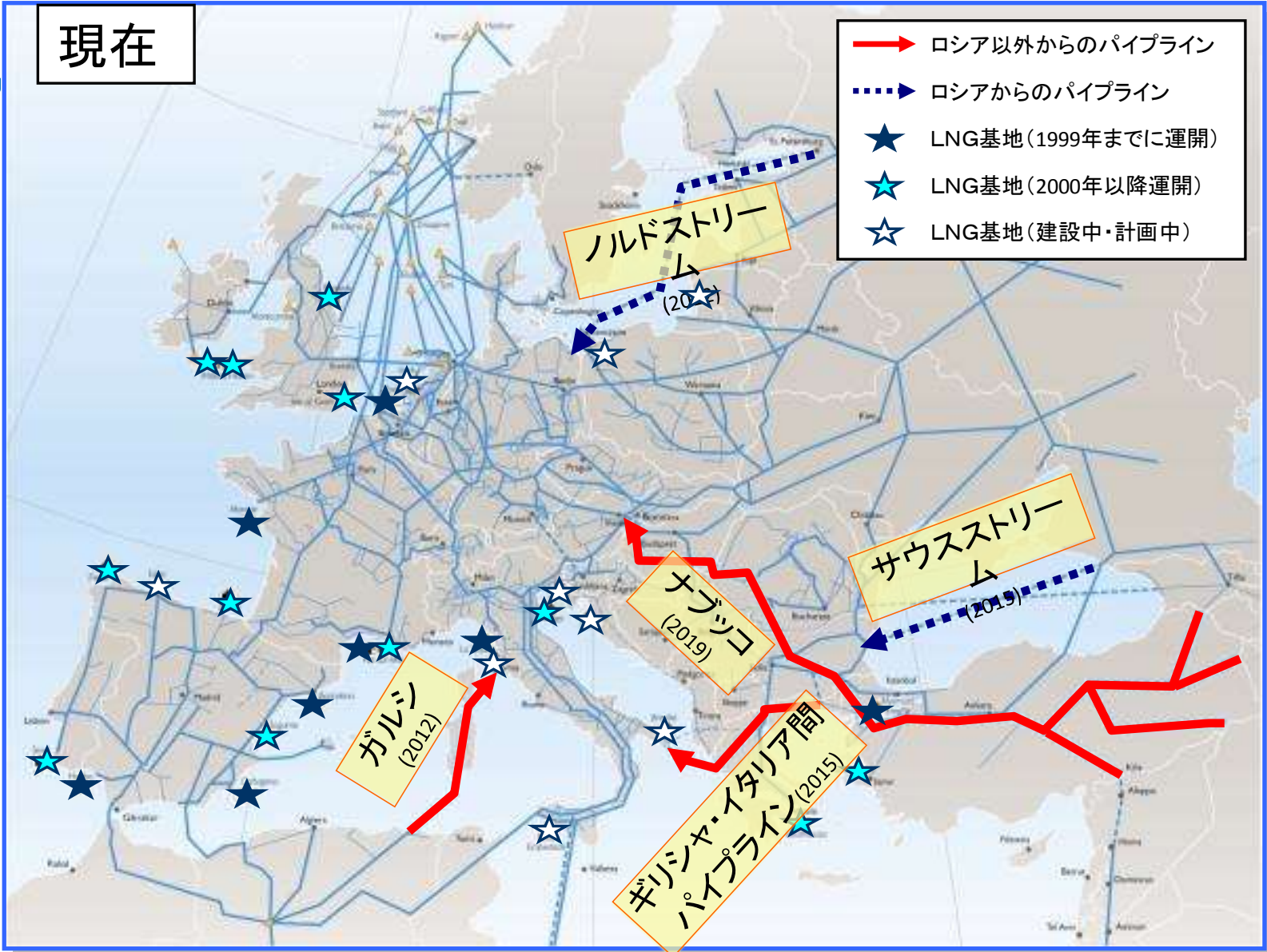
# Diversity : Energy mix as Energy Security Mix



***Nuclear is an important option for countries with limited indigenous energy resources (low energy sustainability).***

# Gas Pipelines in Europe

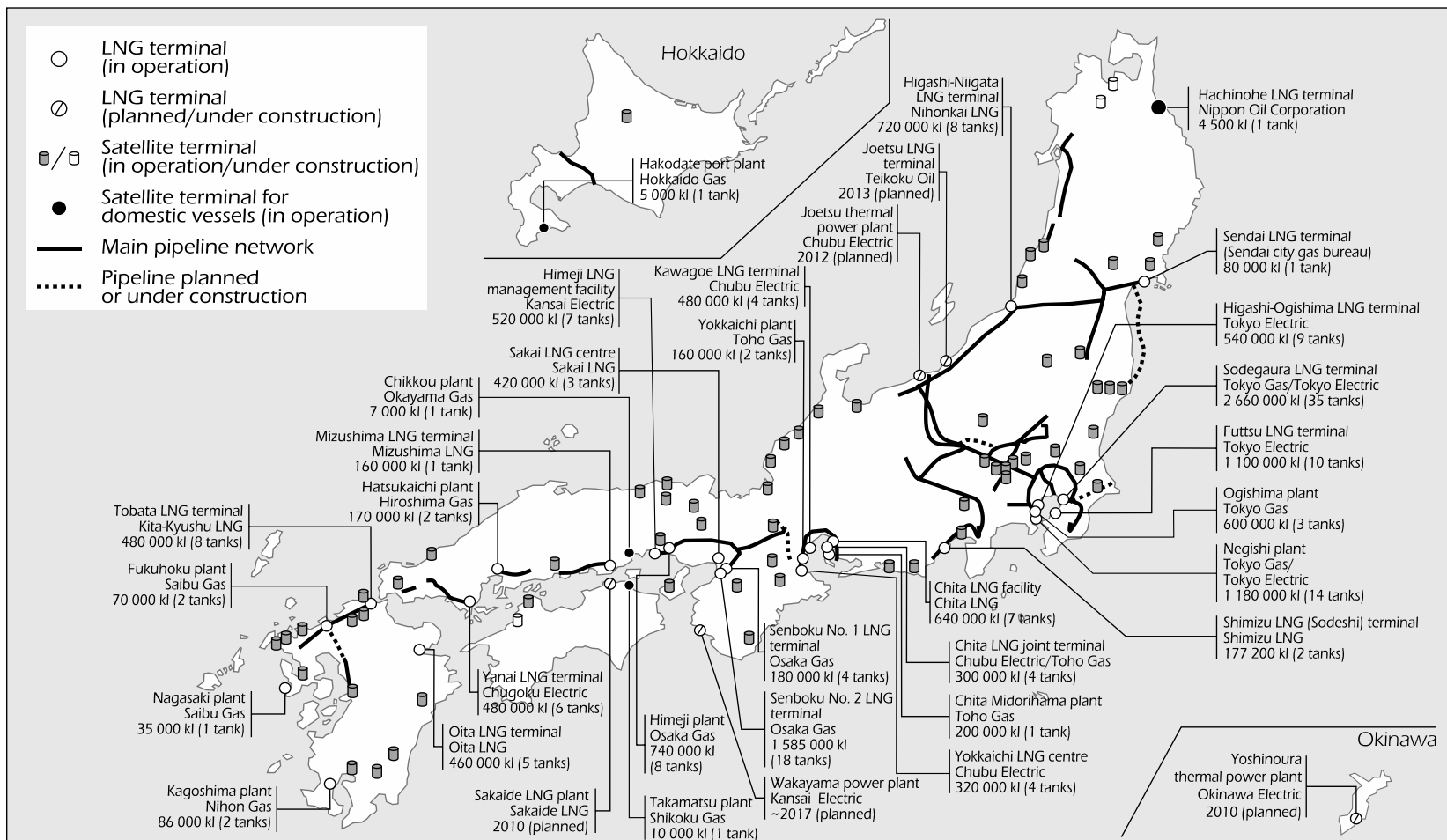
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# Gas Pipelines in Japan

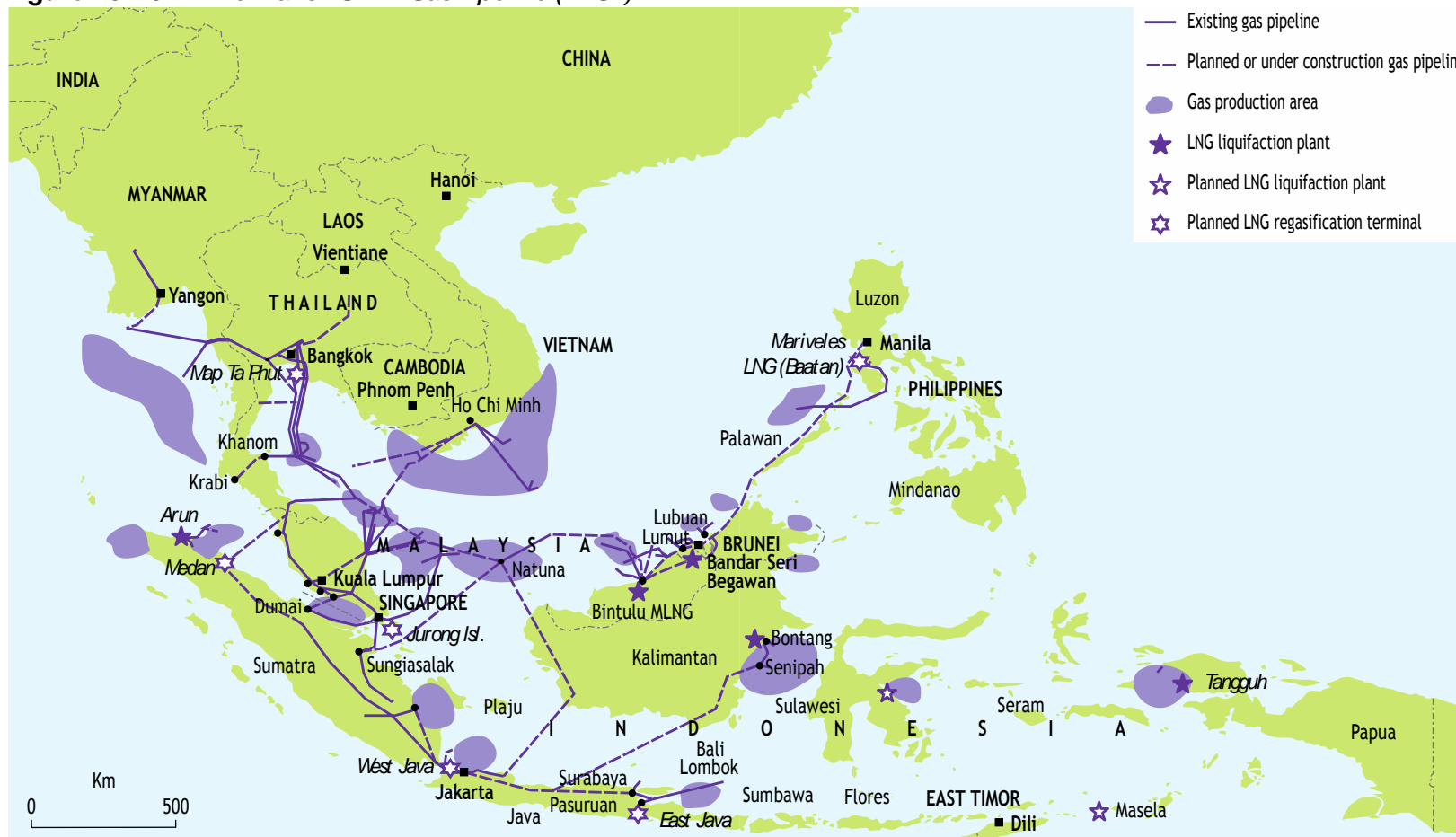
Map of the Japanese Gas Grid



Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the IEA.  
Source: Country submission (compiled by ANRE from data provided by relevant companies).

# ASEAN Gas Pipeline

Figure 15.16 • The Trans-ASEAN Gas Pipeline (TAGP)



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Source: ASCOPE Secretariat



# Gas Supply Security and Russian Gas Pipelines

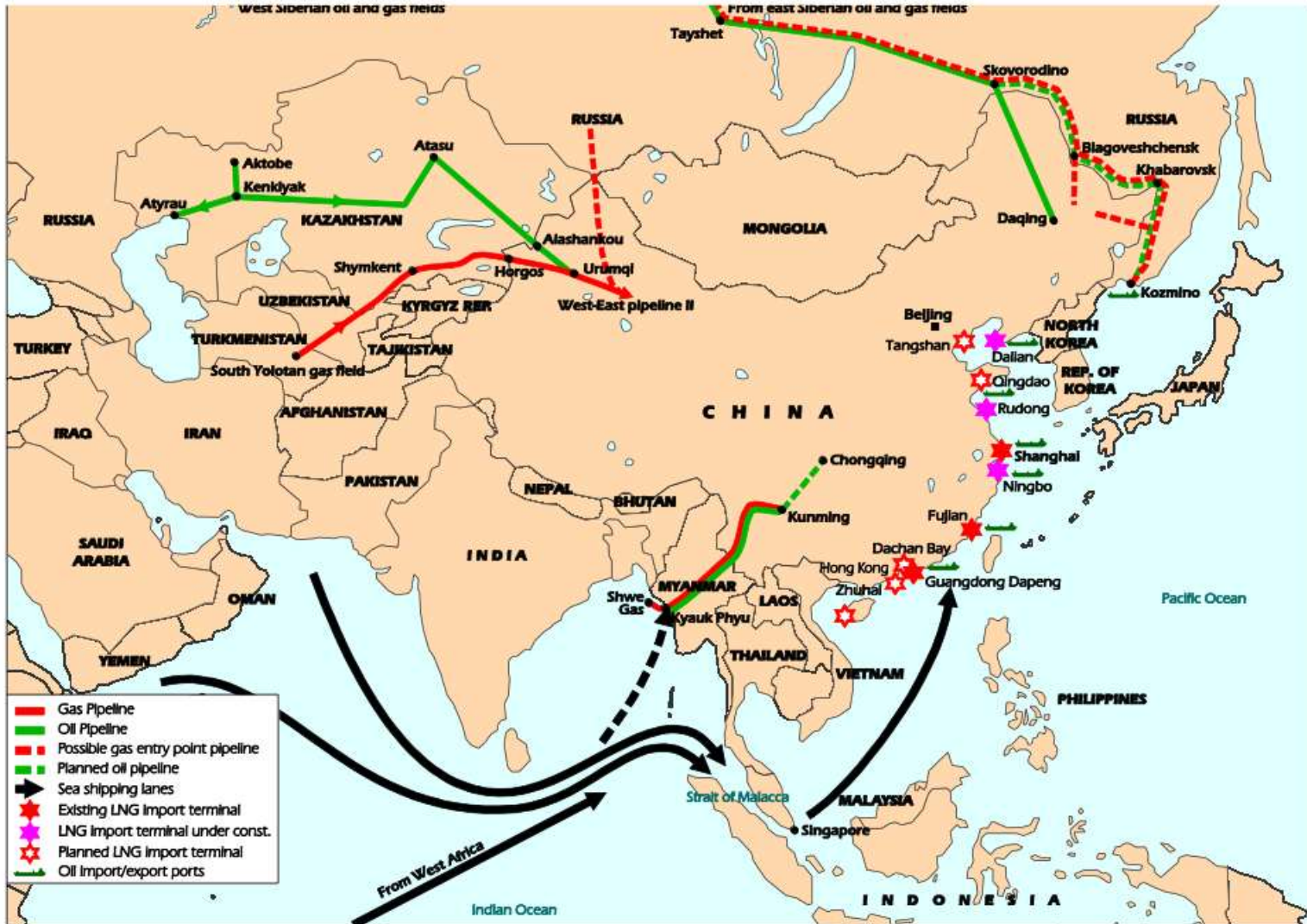
IEA WEO 2011

Figure 8.15 • Major gas fields and supply infrastructure in Russia



This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

# Current and Future routes of China's Importation of Oil and Gas



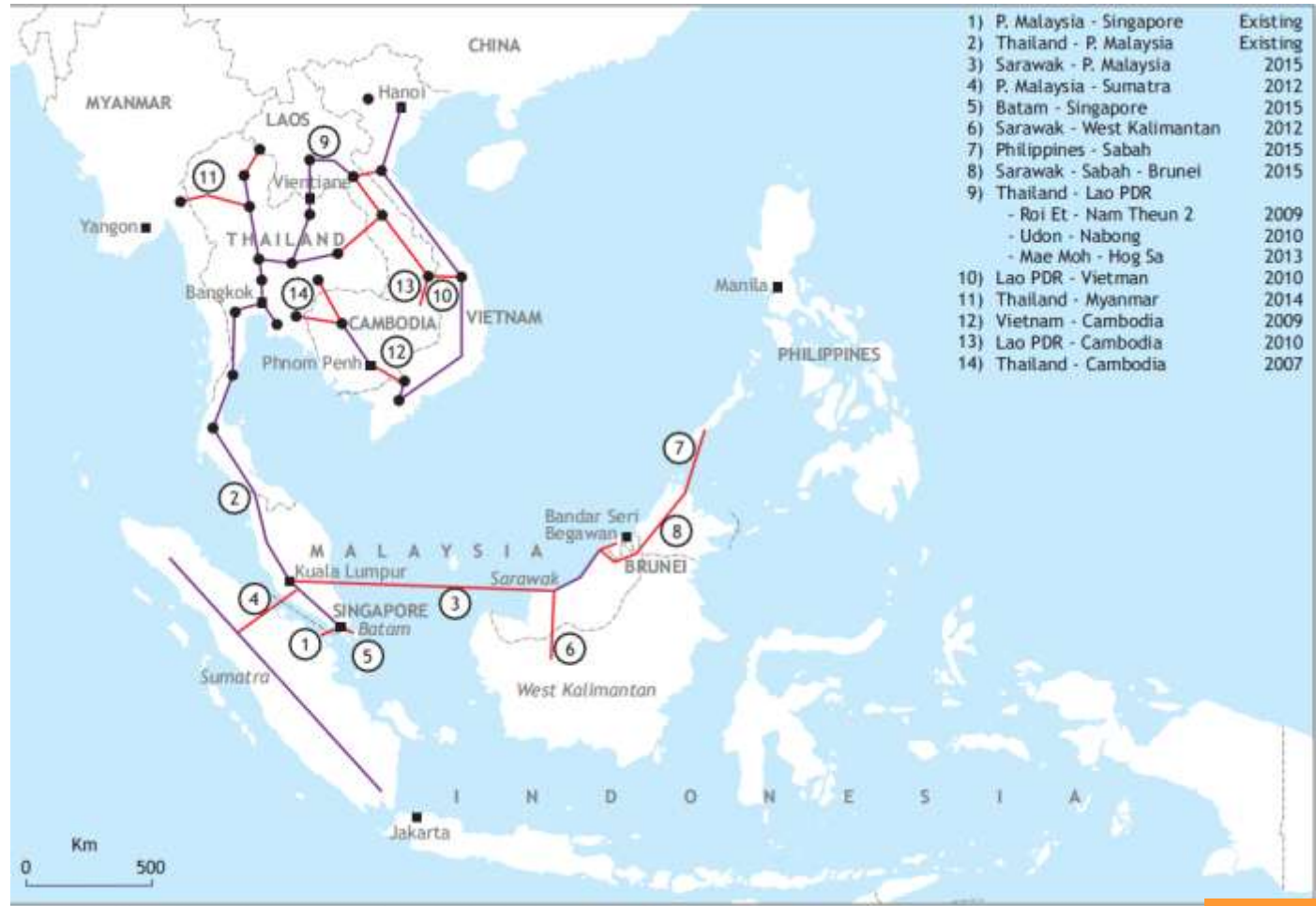
Overseas Investments by Chinese National Oil Companies: Assessing the Drivers and Impacts

# Connecting MENA and Europe: " Desertec" as "Energy for Peace"





# Existing and proposed ASEAN Power Grid Interconnections



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# Energy for Peace in Asia ? A New Vision

**Demand Leveling** (Time Zone & Climate Difference)  
**Stable Supply** (through regional interdependence)  
**Fair Electricity Price**



Phase 3  
**Asia  
Super Grid**

**Total 36,000km**

Presentation by Mr. Masayoshi SON

# One cannot enhance energy security by risking someone else 's.

- Lesson of the Quake and Tsunami : Disruption of **supply chain** damages regional and global economy. Think about the unthinkable.
- Energy Security for the 21st Century must be **Comprehensive Electricity Supply Security** under sustainability constraints.
- EU Model** of Collective Energy Security be applied to the growing Asia.
  - ⑩ Develop **Regional Power Grid interconnection & Gas Pipelines** including Russia.
- Innovation in Power supply: **Efficiency**, decentralized Renewables, EVs, Smart Grids, Storage, etc.
- New **technologies** help; hydrogen economy, Methane-hydrate , 4G Nuclear power, Super-conductivity grid, CCS.
- Develop **gas** resources and infrastructure. Diversify supply and demand. Russia remains as a key player.
- For coal to remain the backbone of power supply, **CCS** readiness & highly efficient power plants are needed.
- Japan' s role after Fukushima: Share the lessons learned for **safer Nuclear** Power deployment in Asia and elsewhere.