Energy Security and Sustainability in N.E. Asia

November 20th, 2014
Asian Super Grid and RES Workshop at KPMG

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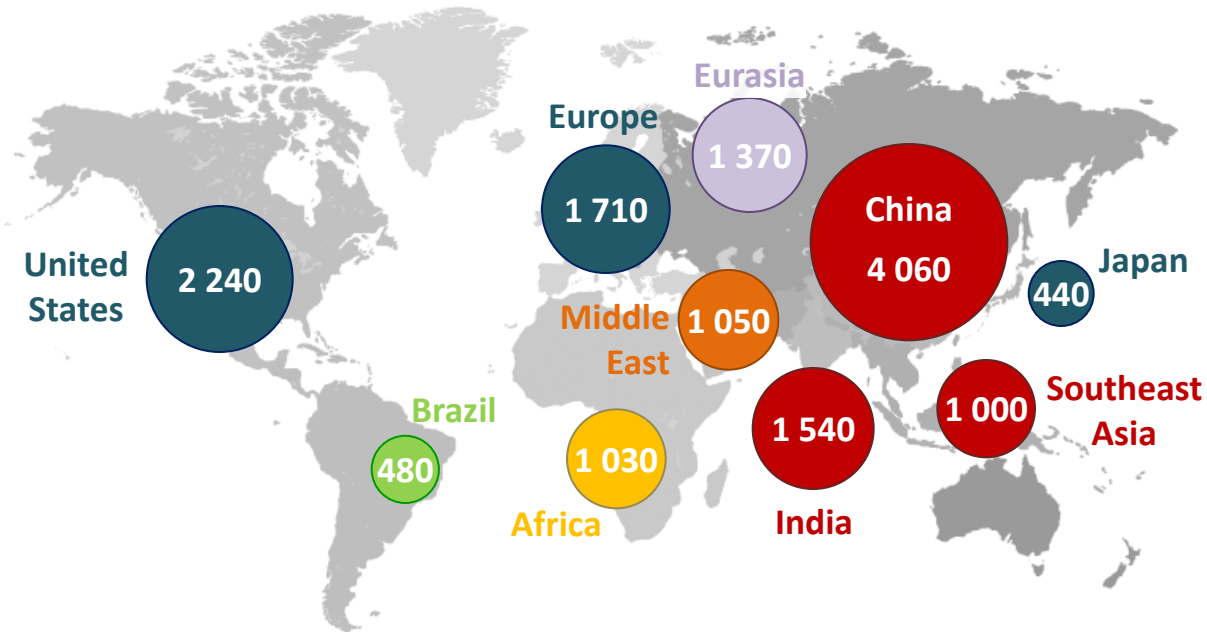
Asian Growth & Shale Revolution

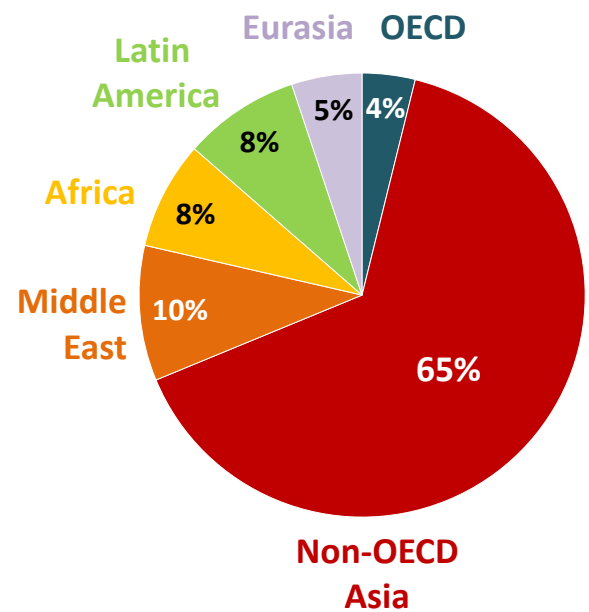
The engine of energy demand growth moves to Asia with resulting problems.

WEO 2013

Primary energy demand, 2035 (Mtoe)



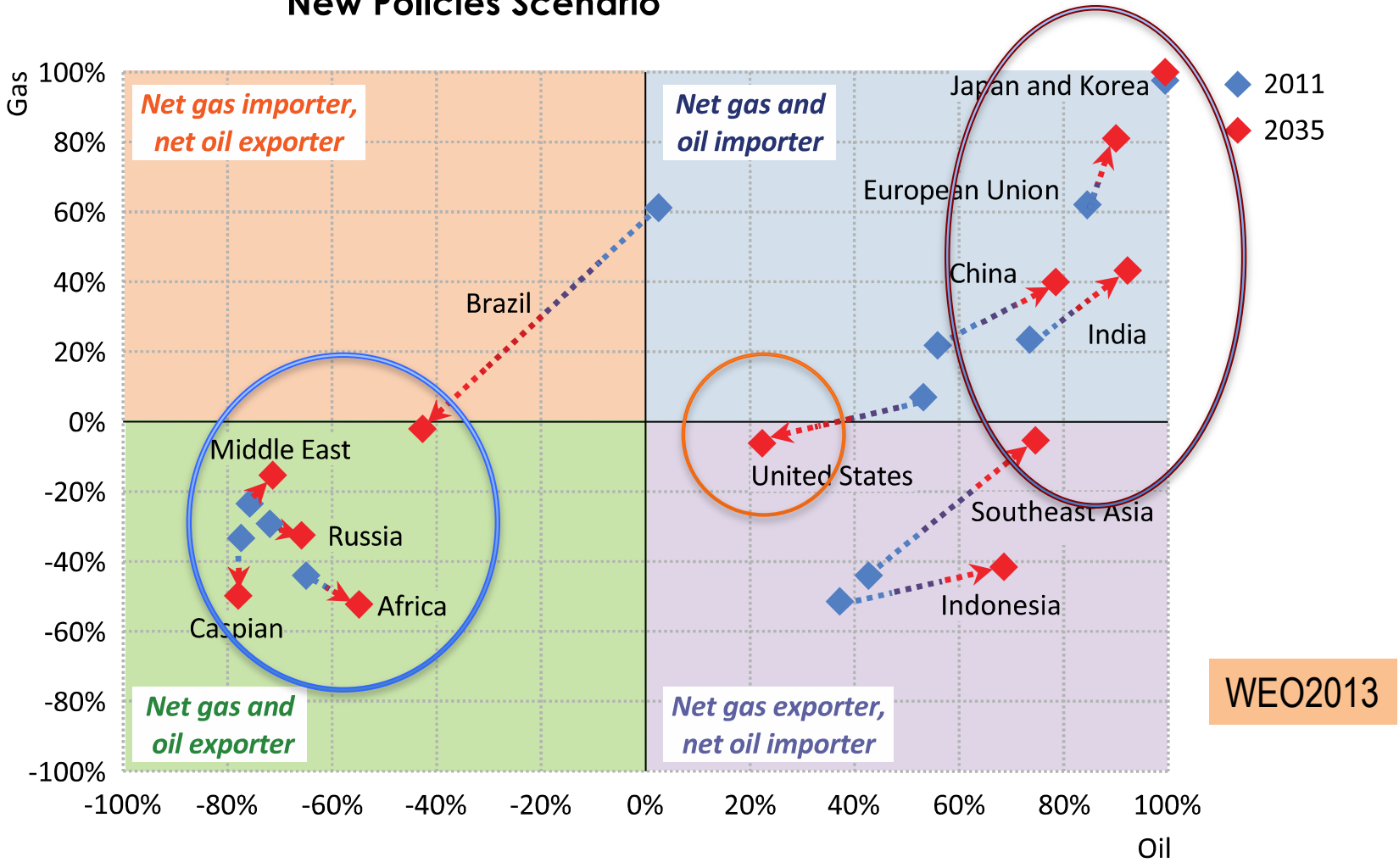
Share of global growth 2012-2035



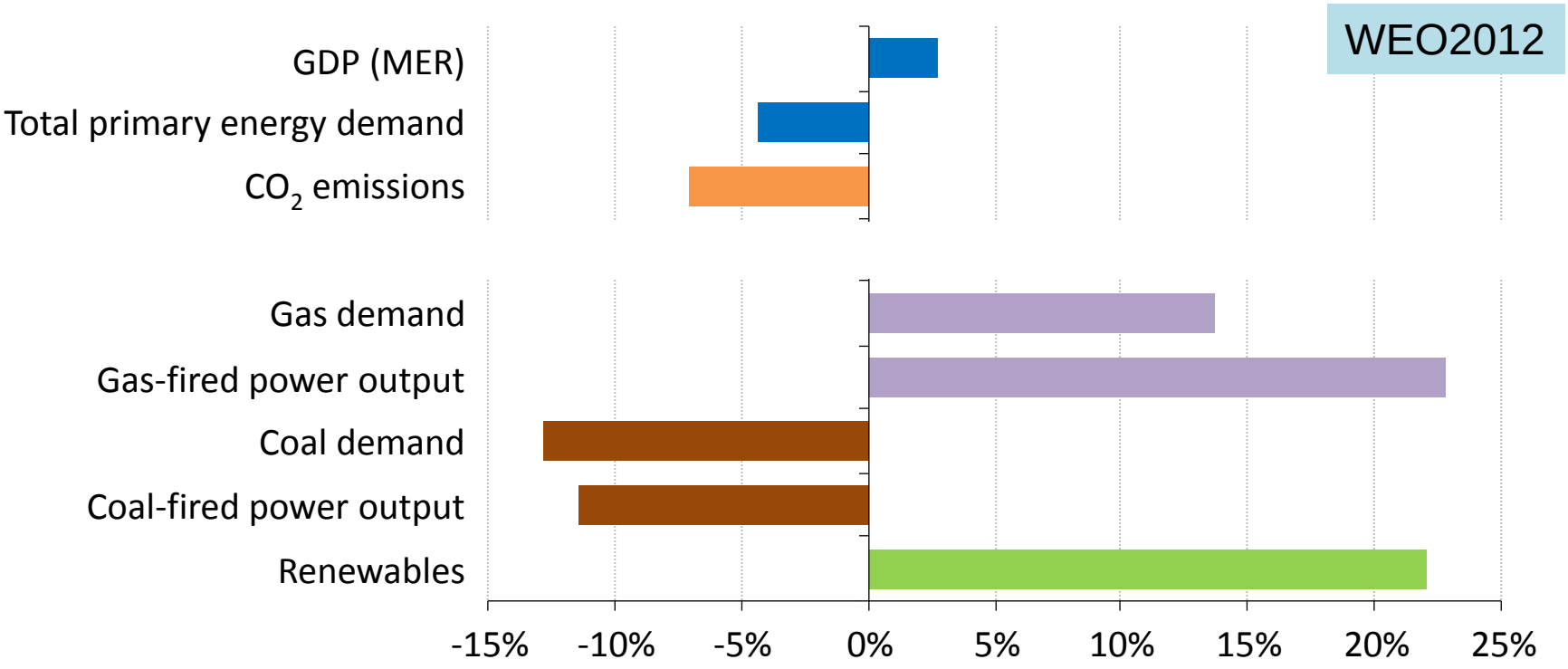
China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth

Shale Revolution and Geopolitics of Oil/Gas exporters and importers

Figure 2.12 ▷ Net oil and gas import/export shares in selected regions in the New Policies Scenario



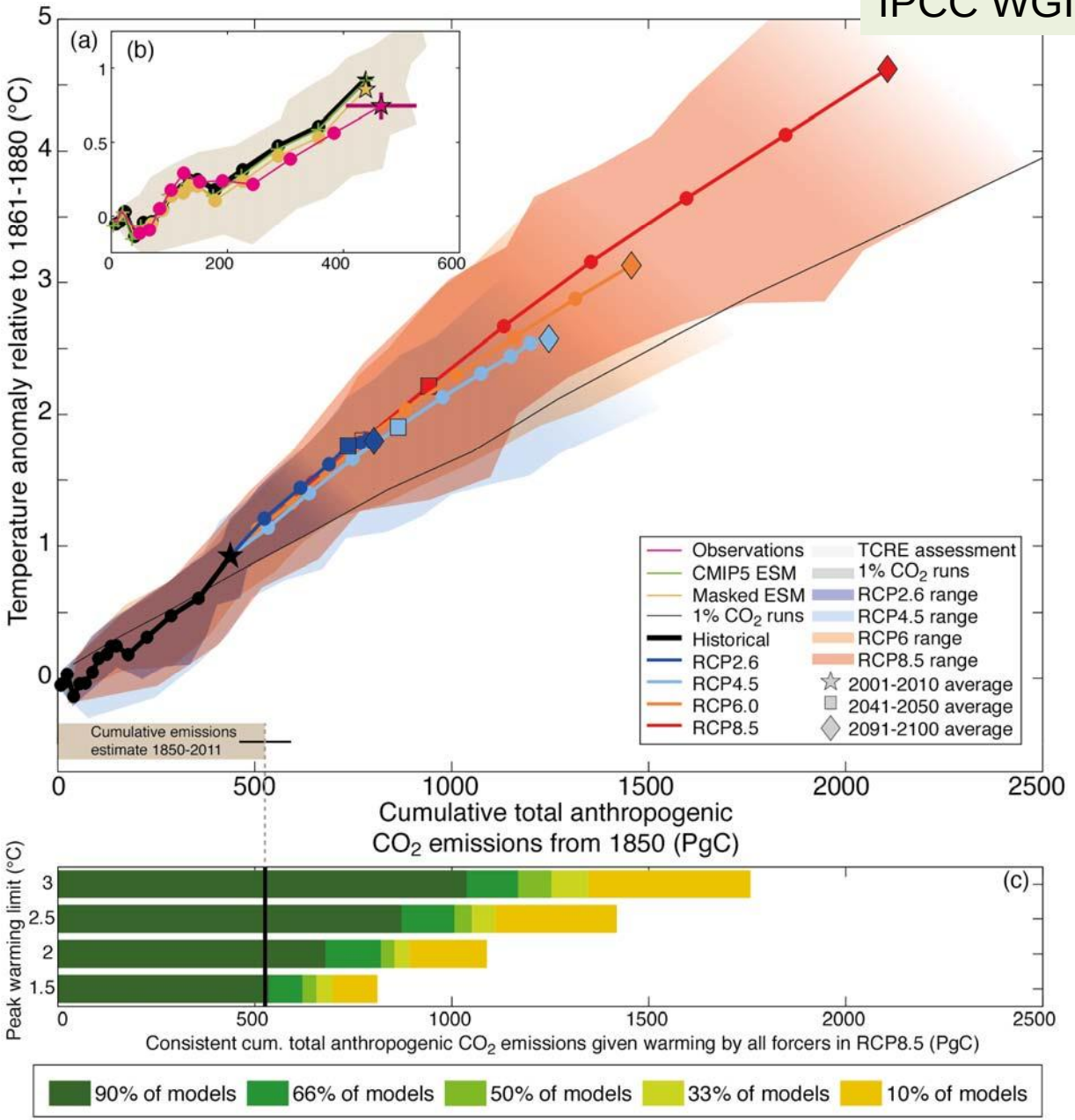
What has happened in the Shale revolution of the US: US aims to further reduce CO2 by 30% towards 2030 in the Power sector.



From 2006-2011, United States CO_2 emissions went down by 7% due to coal-to-gas fuel switching, power generation efficiency gains & increased renewables output

Cop21 in paris : Optimism (US China deal) and Pessimism (2° C ?)

IPCC WGI Fifth Assessment Report



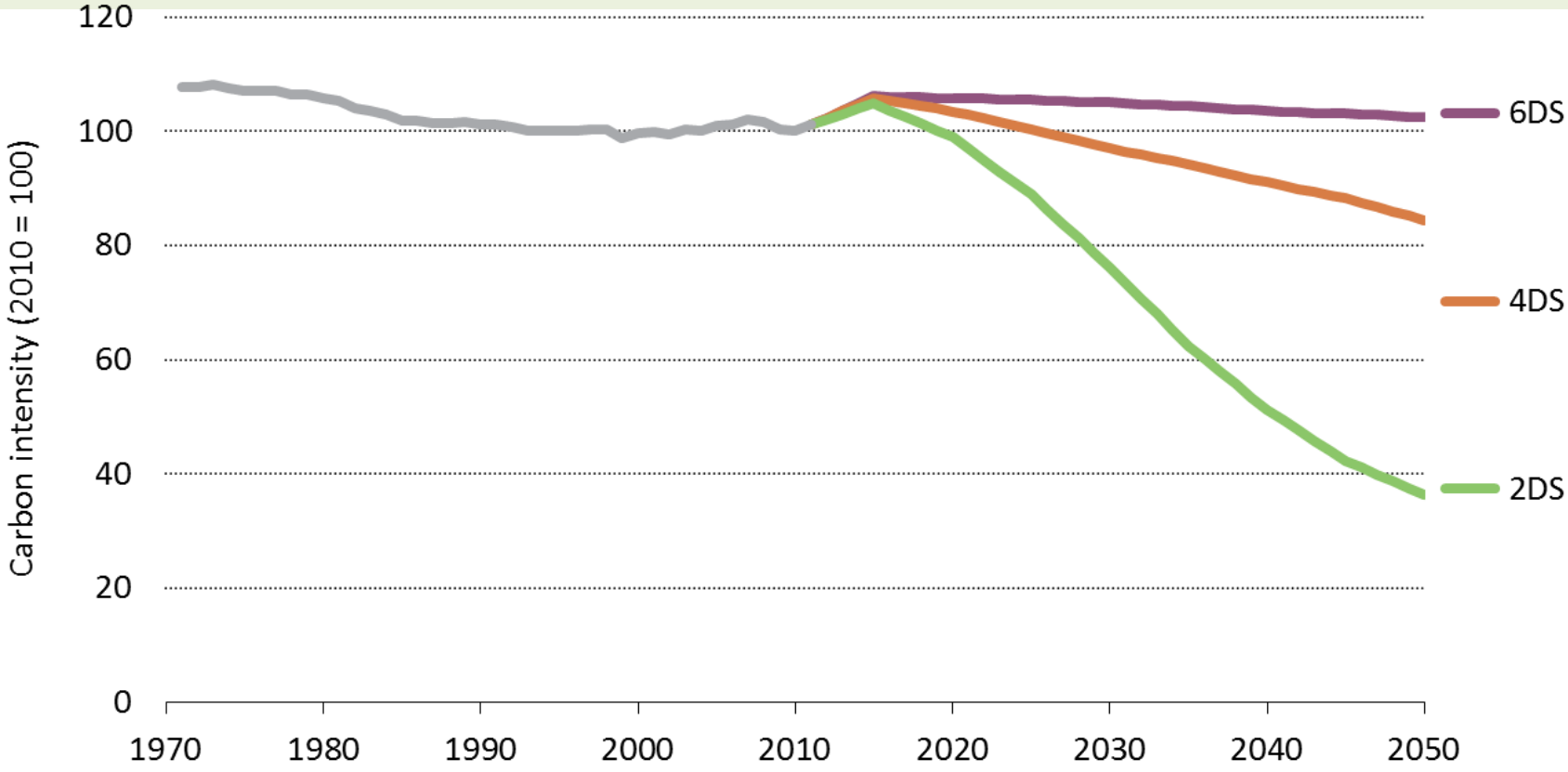
Carbon Budget

515Gt had been emitted by 2011. 2C scenario needs to stop at 790Gt.(66%). 790-515=275Gt budget left.

Annual 2012 =9.7Gt

275/9.7=Only 28 years to go!

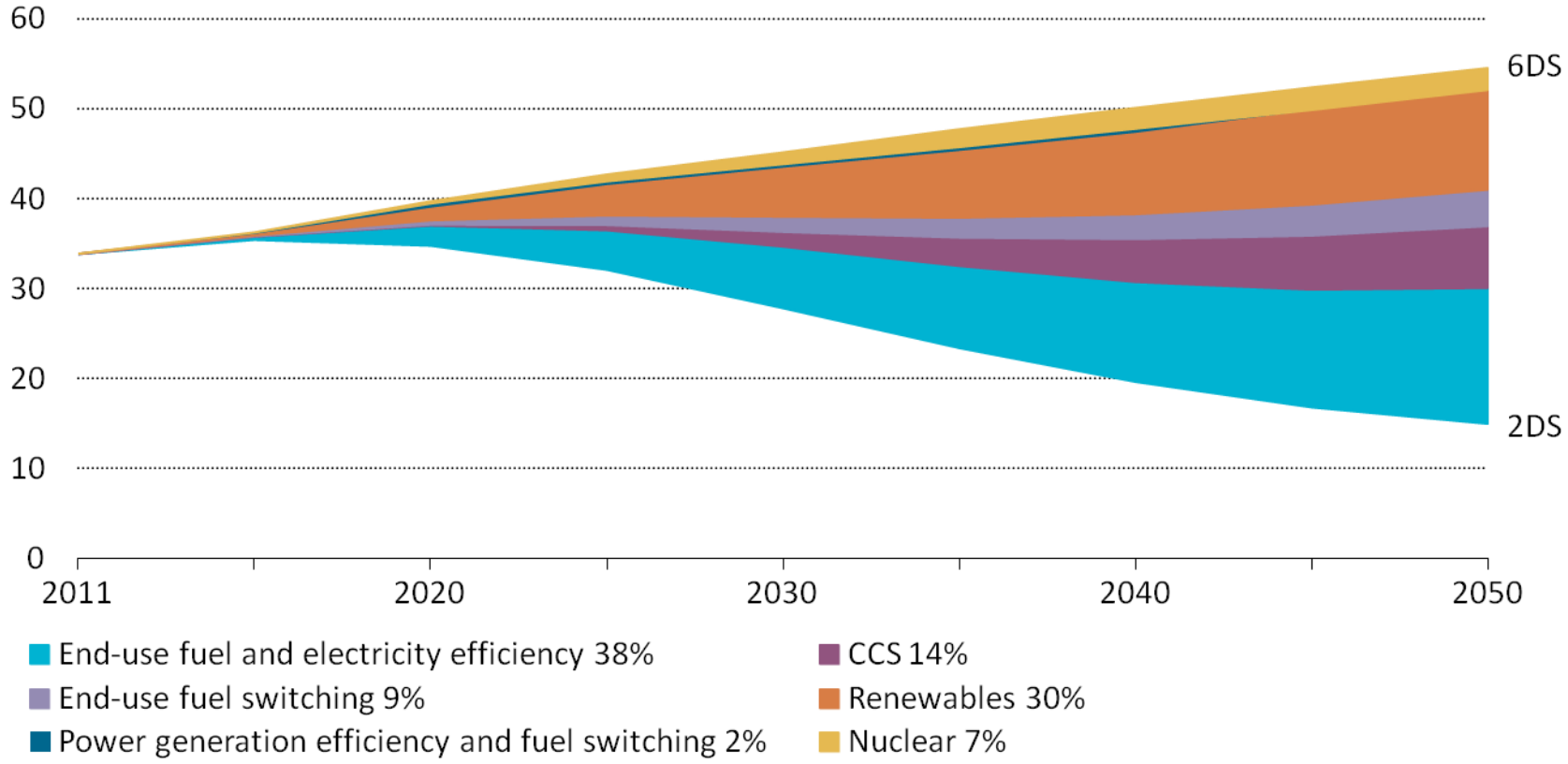
ETP 2014 Message
Carbon Intensity of supply is stuck



The political will to make meaningful progress at a global scale has yet to be demonstrated

ETP2014

A transformation is needed…

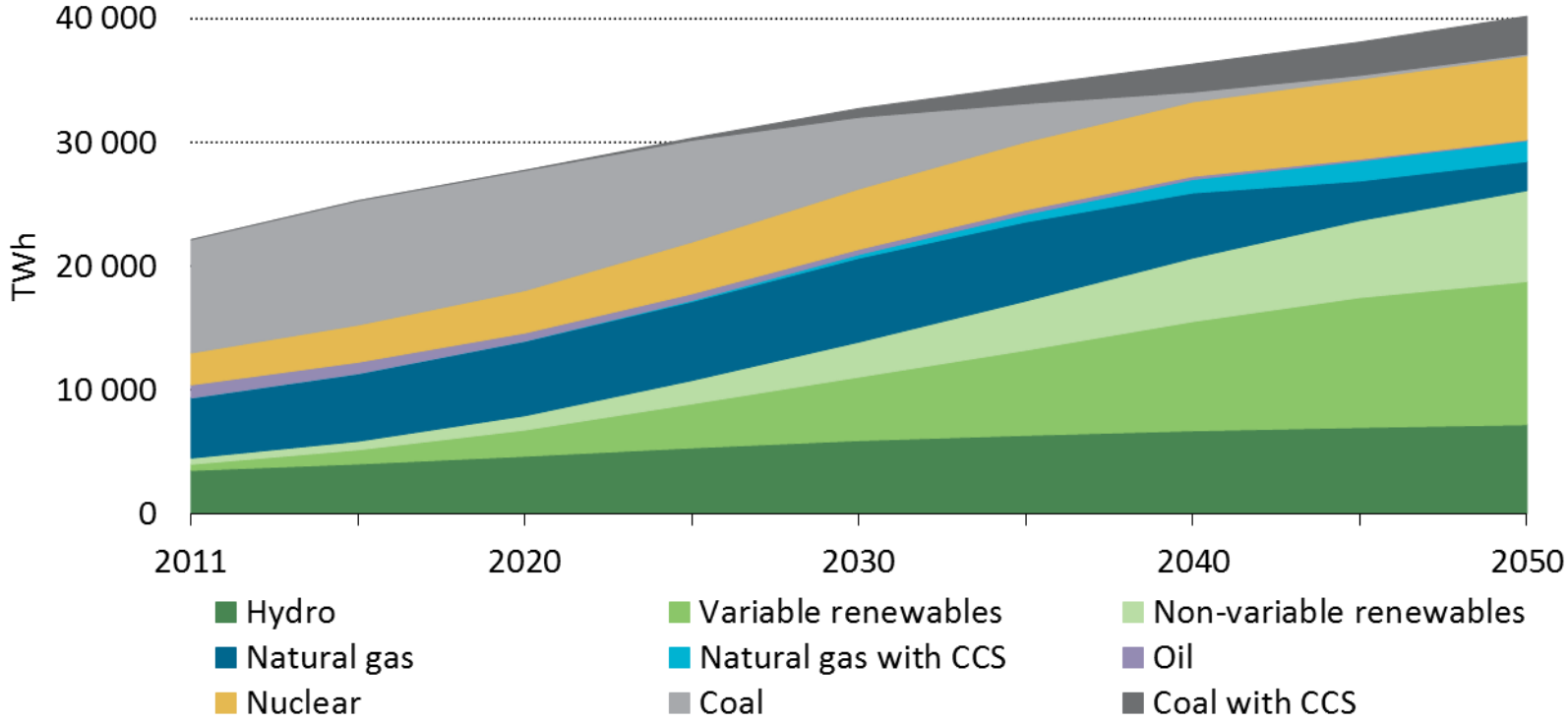


..and we to have the tools to develop a strategy and be proactive.

ETP2014

Three issues to achieve 450ppm:
no.1 How to use more Renewables

2DS of ETP 2014: Optimistic or Pessimistic?
It needs changing places of Fossil and Renewables

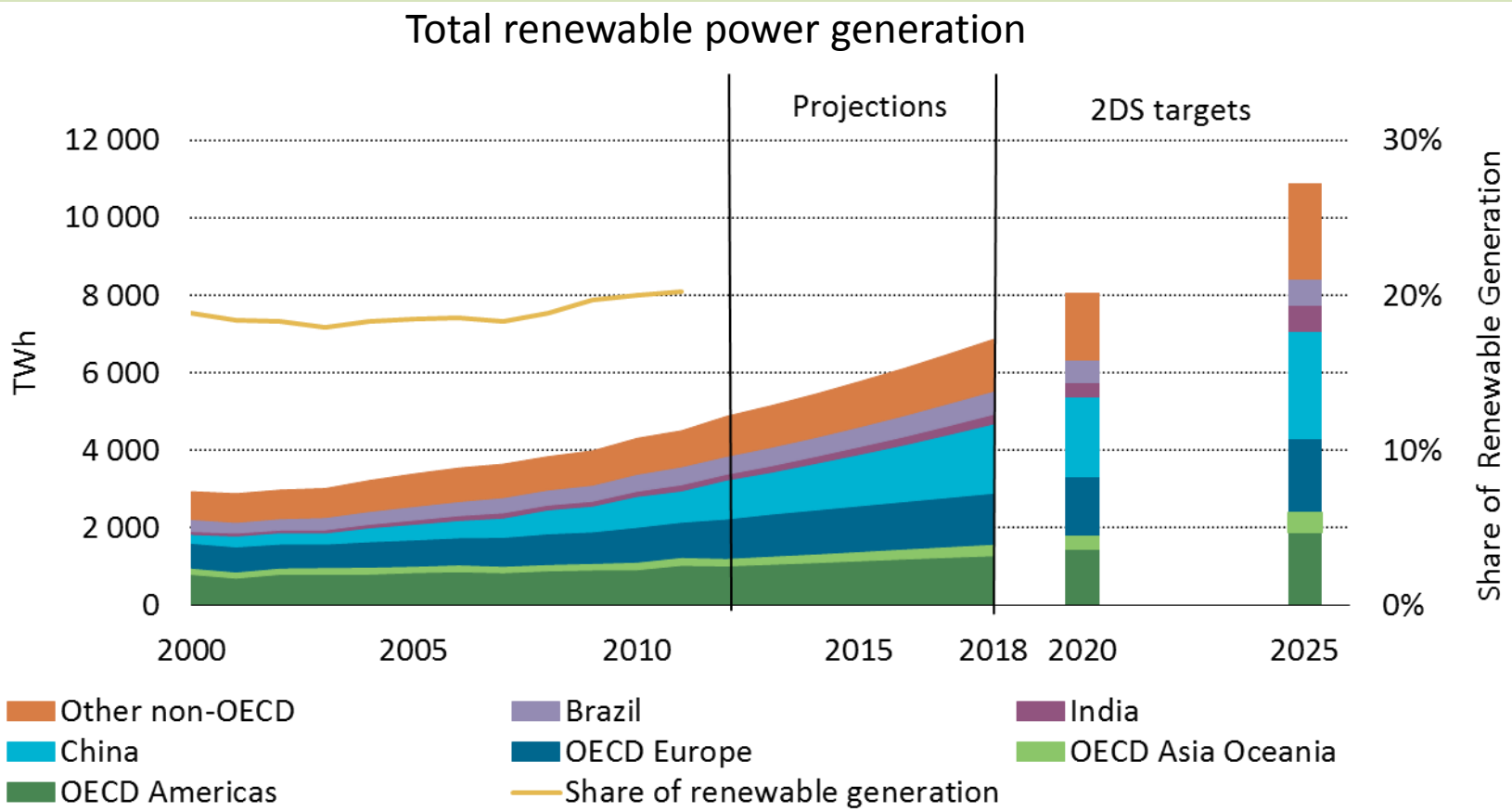


ETP2014

- Generation today:
  - Fossil fuels: 68%
  - Renewables: 20%

- Generation 2DS 2050:
  - Renewables: 65%
  - Fossil fuels: 20%

Still on track in Renewables…

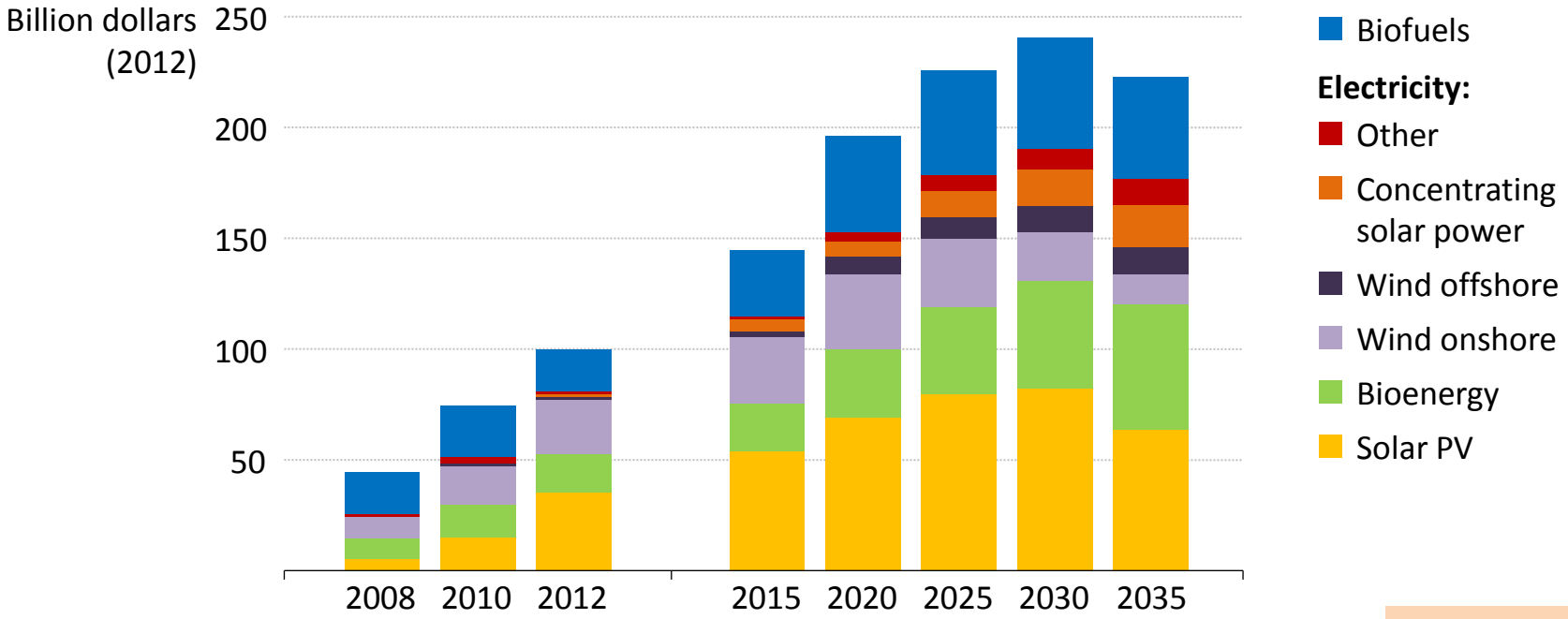


Emerging economies step up clean energy ambition, but momentum stalls in OECD countries

ETP2014

Increasing subsidies for increasing renewables

Global renewable energy subsidies by source

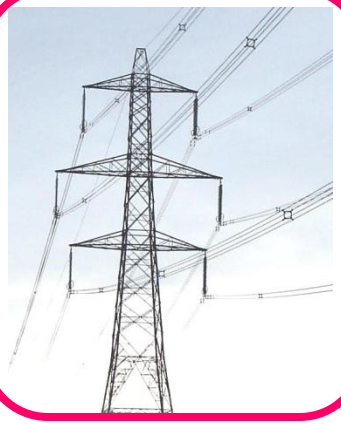


WEO2013

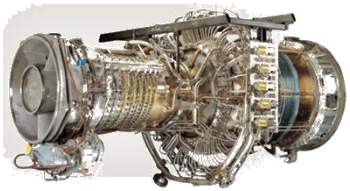
Almost half of the global electricity demand growth is met by renewables, pushed by growing subsidies that reach $223 billion in 2035 from $101 billion in 2012

Power Sector needs Investment in additional flexibility

Four sources of flexibility …



Grid infrastructure



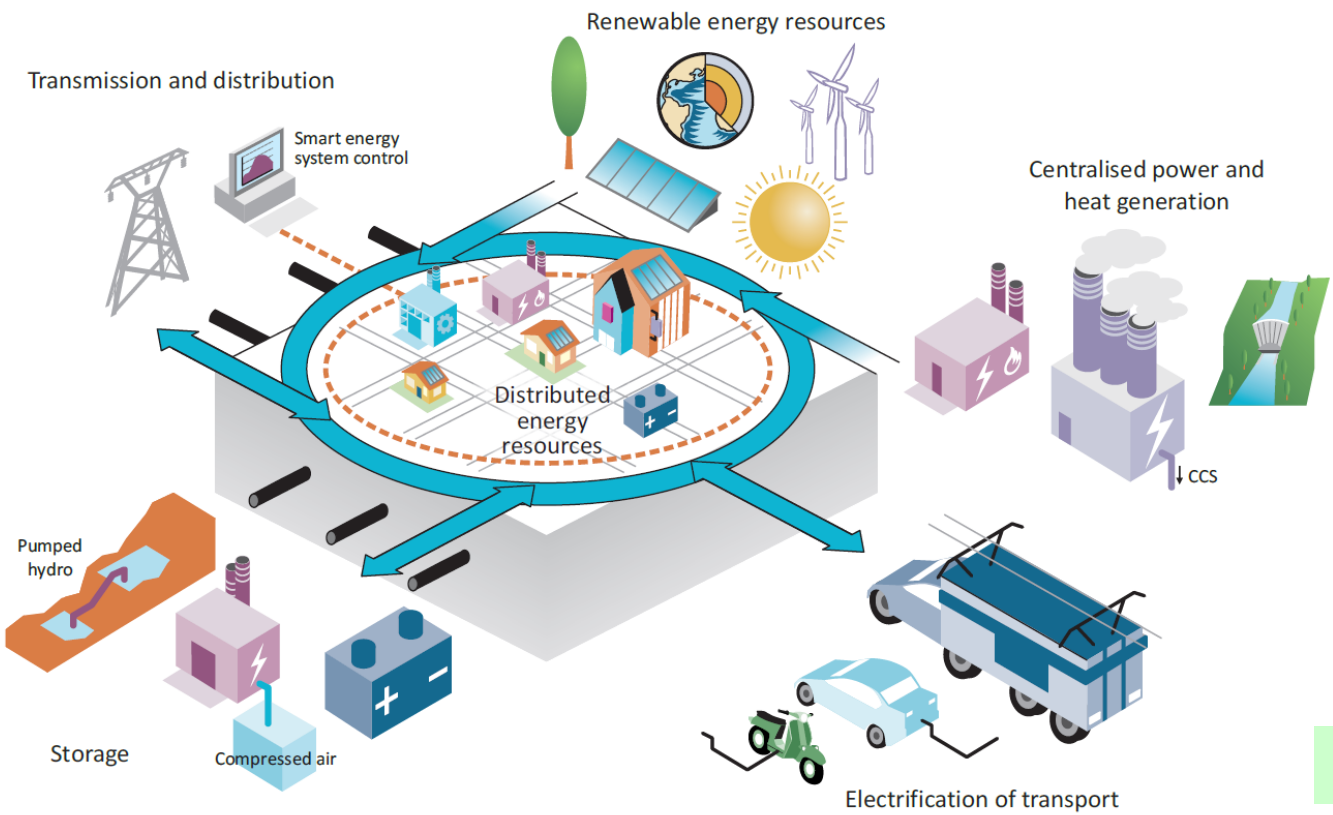
Dispatchable generation

Storage

Demand side integration

The Power of Transformation, 2014 by IEA

Systems thinking and integration

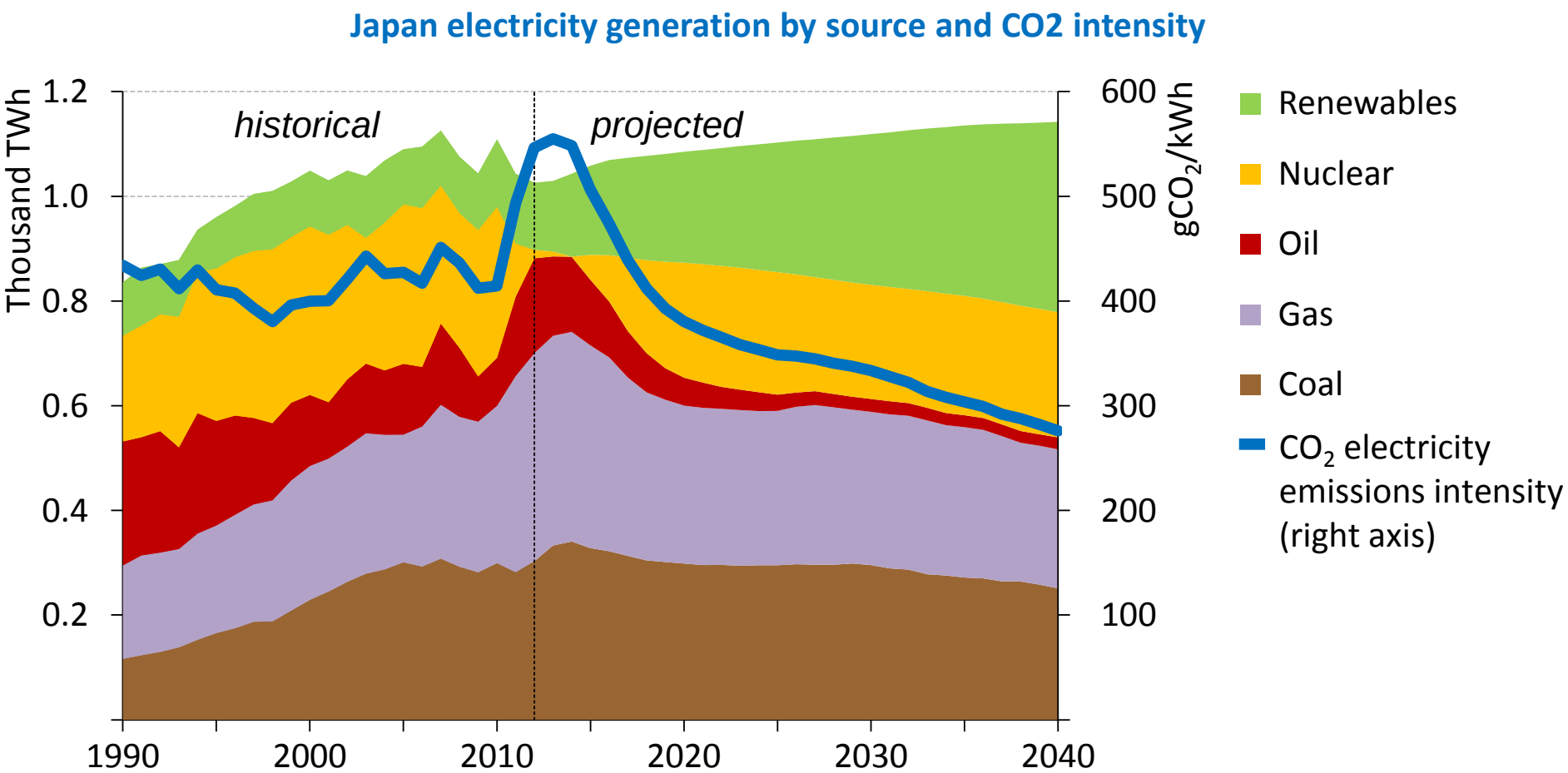


ETP2014

A sustainable electricity system is a smarter, multidirectional and integrated energy system that requires long-term planning for <u>services</u> delivery

Japan's Power Mix: Serious problem with nuclear shutdown

IEA WEO2014



Renewables, a continued high reliance on LNG imports & improvements in efficiency

The Economist

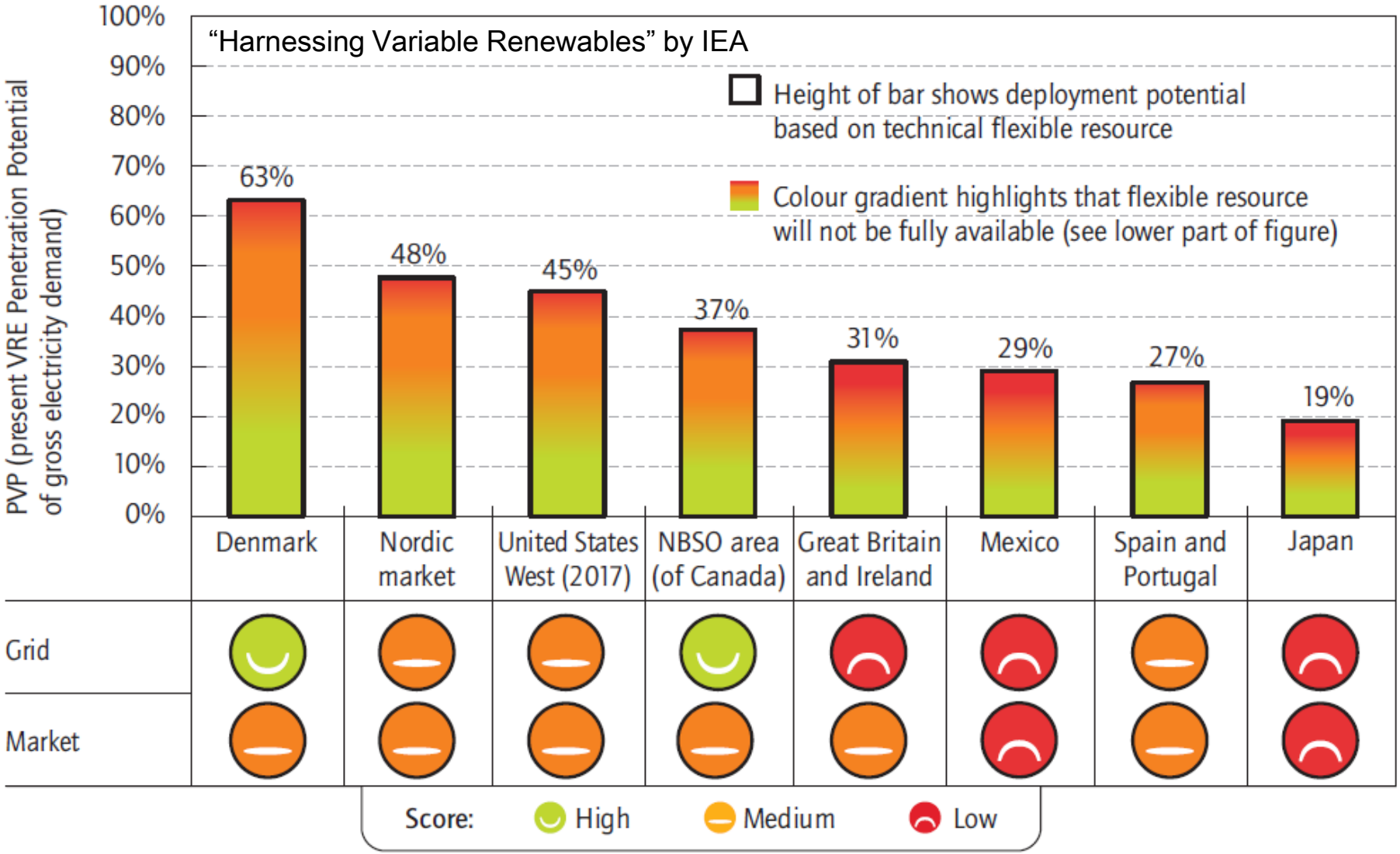
Reform in Japan

The third arrow

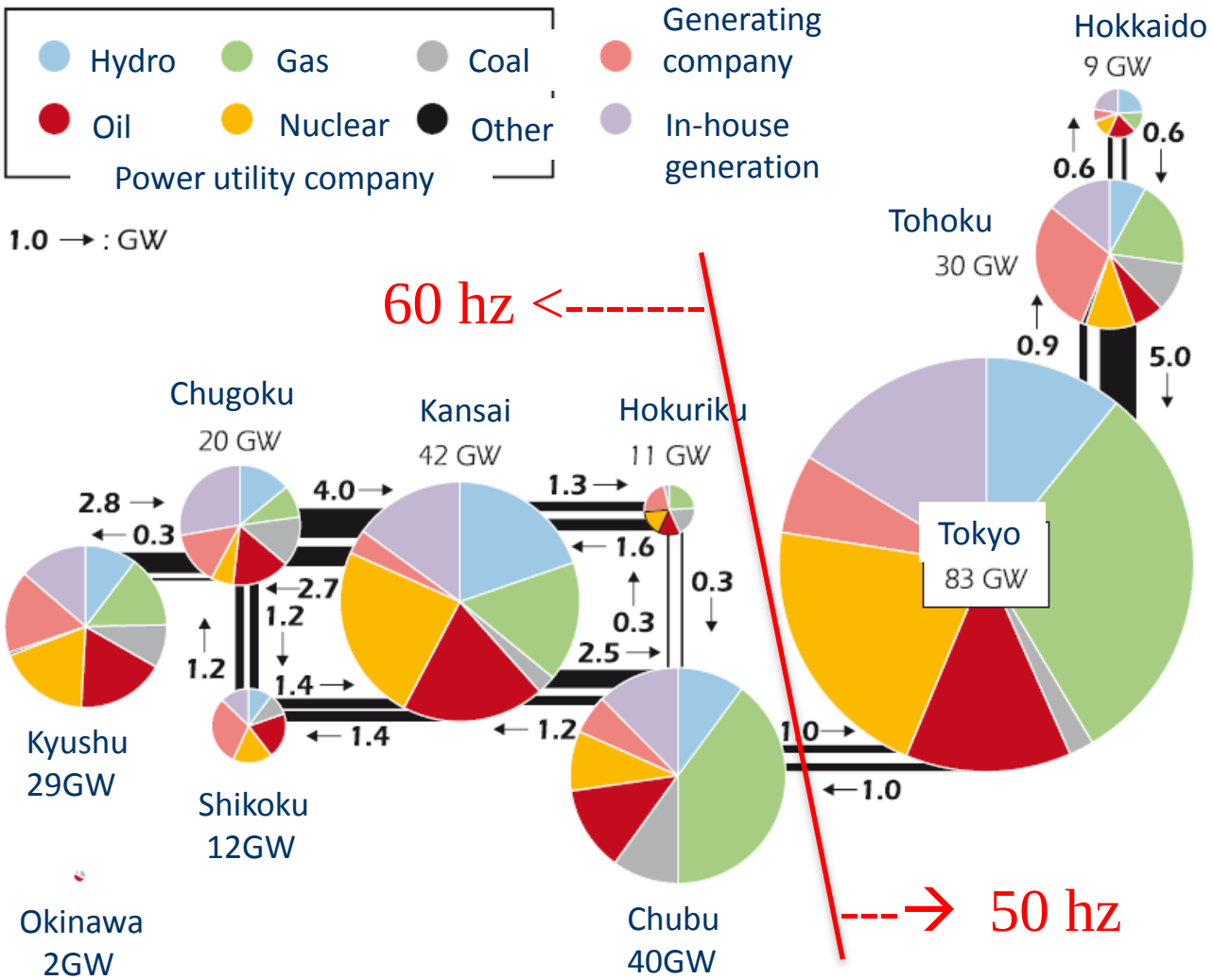
Shinzo Abe has the best chance in decades of changing Japan for the better. He seems poised to take it (June 28th 2014)

Not only Feed-in-tariffs but Grid integration !

Snapshot of present penetration potentials

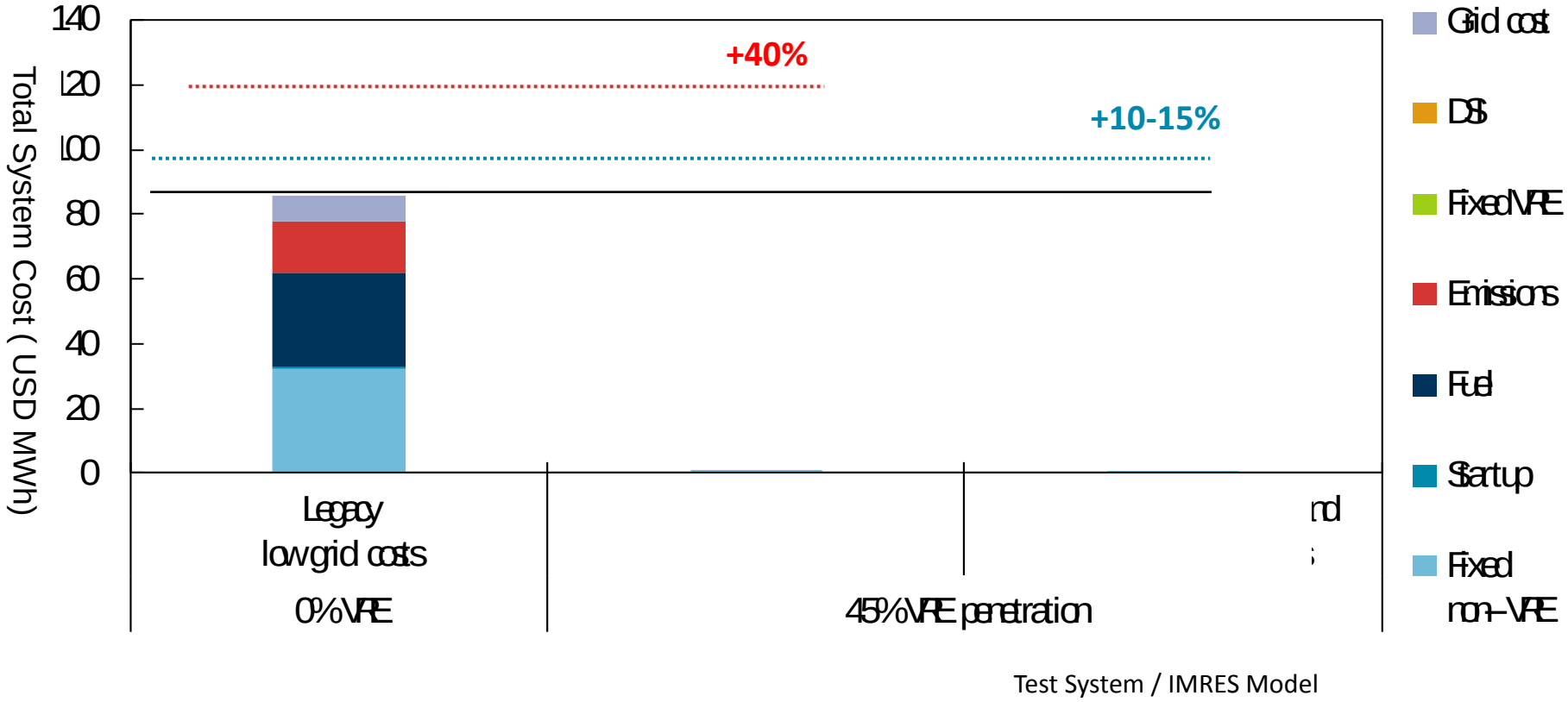


Power grid in Japan



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

Japan's Case Study: Cost-effective integration means transformation of power system

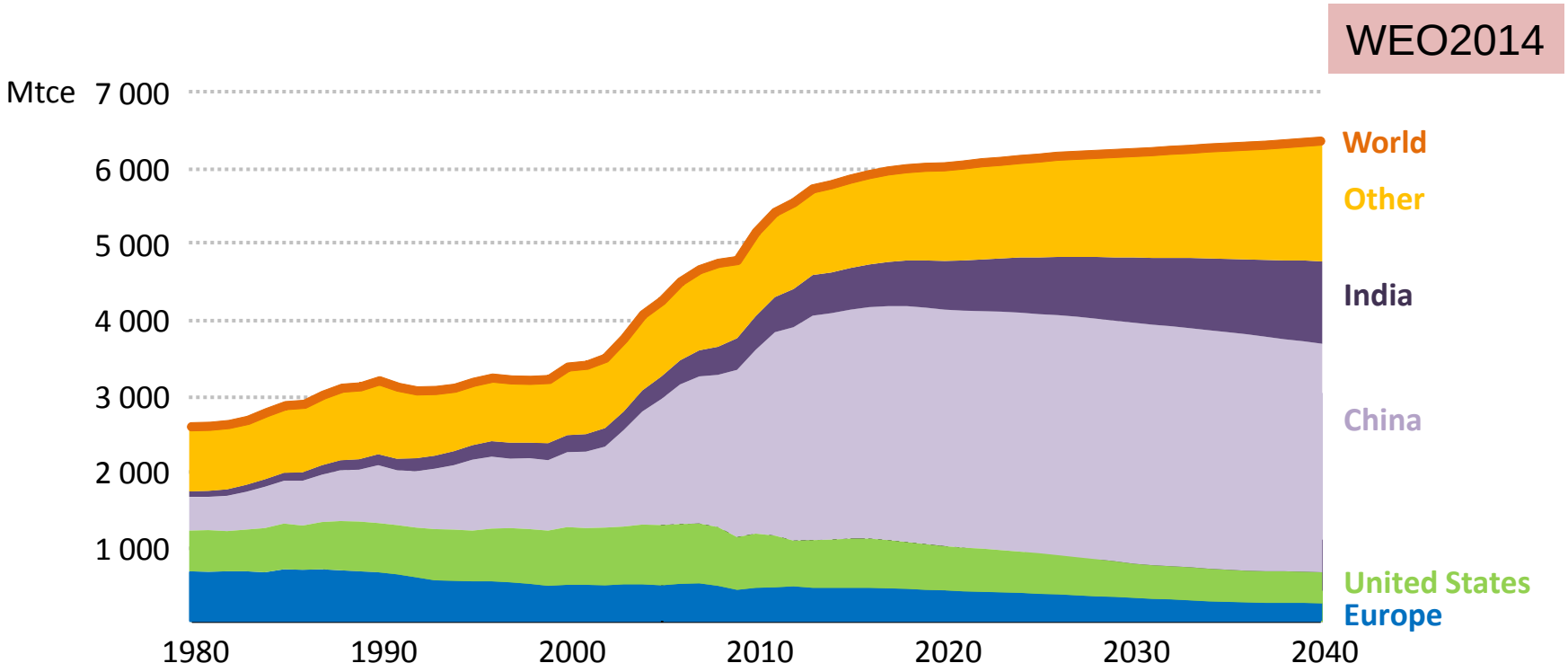


- **Large shares of VRE can be integrated cost-effectively**
- **But adding VRE rapidly without adapting the system is bound to increase costs**

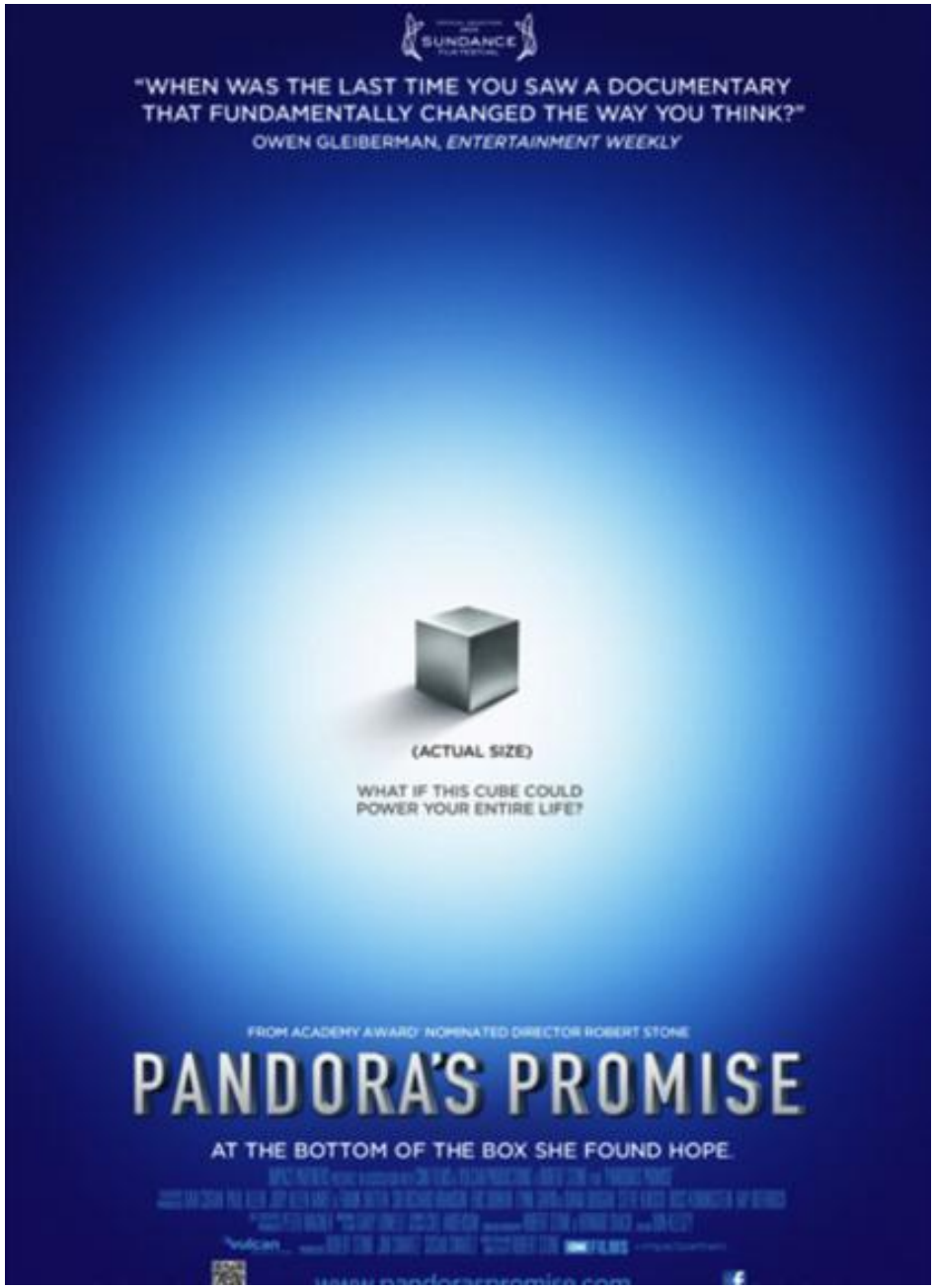
The Power of Transformation, 2014 by IEA

Issue No.2: Coal use will continue.
Global coal demand levels off but needs CCS

Global coal demand by key region



Global coal demand growth slows rapidly due to more stringent environmental policies, underlining the importance of high-efficiency plant & CCS to coal's future



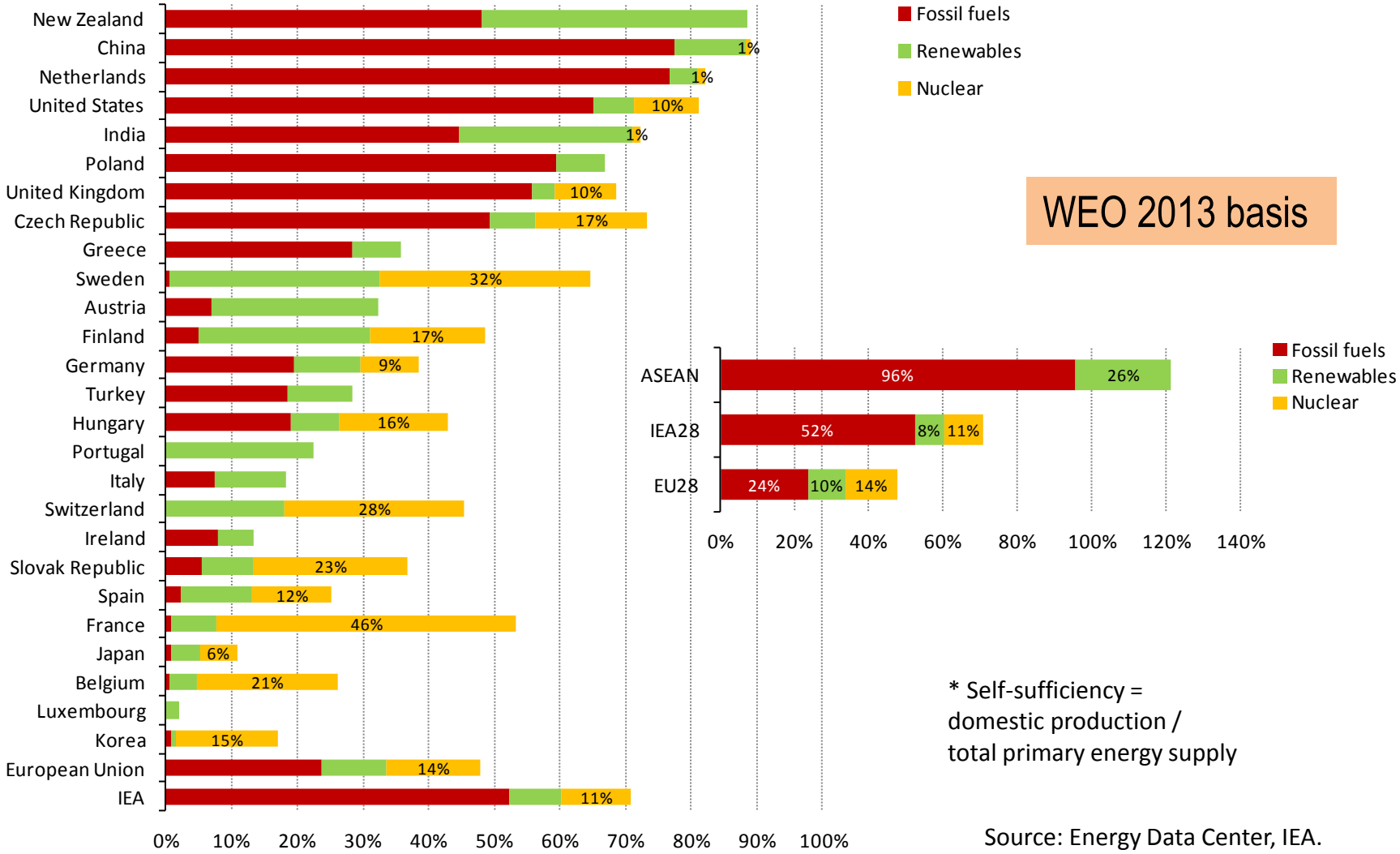
Issue No.3 : Nuclear power after the Fukushima

"Pandora's Promise", a movie directed by Robert Stone, is a documentary of some environmentalists who changed their views about Nuclear Power.

Eu model as Collective Energy security and sustainability

Collective Energy Security and Sustainability by Diversity, Connectivity and Nuclear: European Model can be applied to Asia?

Energy self-sufficiency* by fuel in 2011



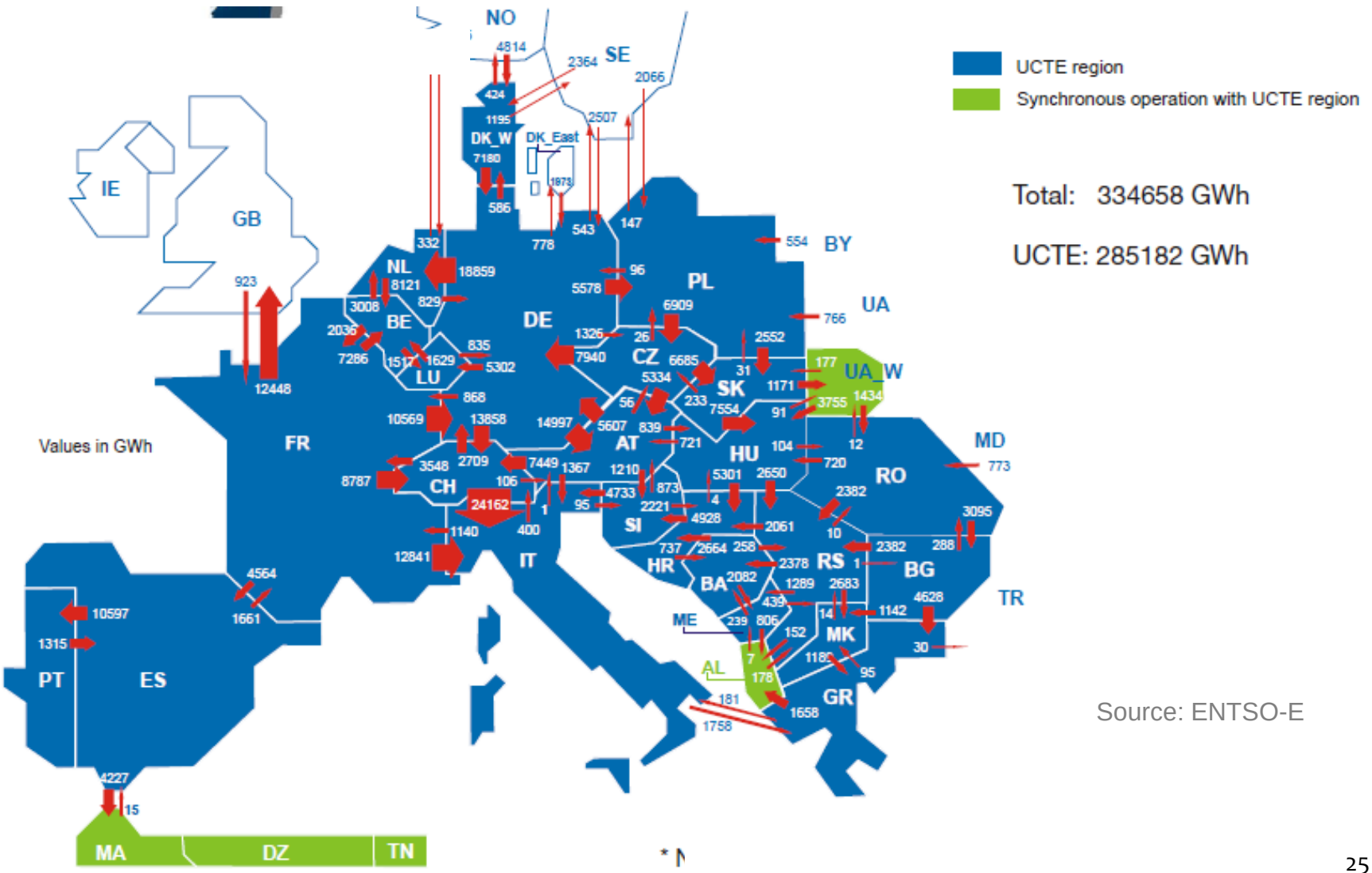
* Self-sufficiency = domestic production / total primary energy supply

Source: Energy Data Center, IEA.

Note: Does not include fuels not in the fossil fuels, renewables and nuclear categories.

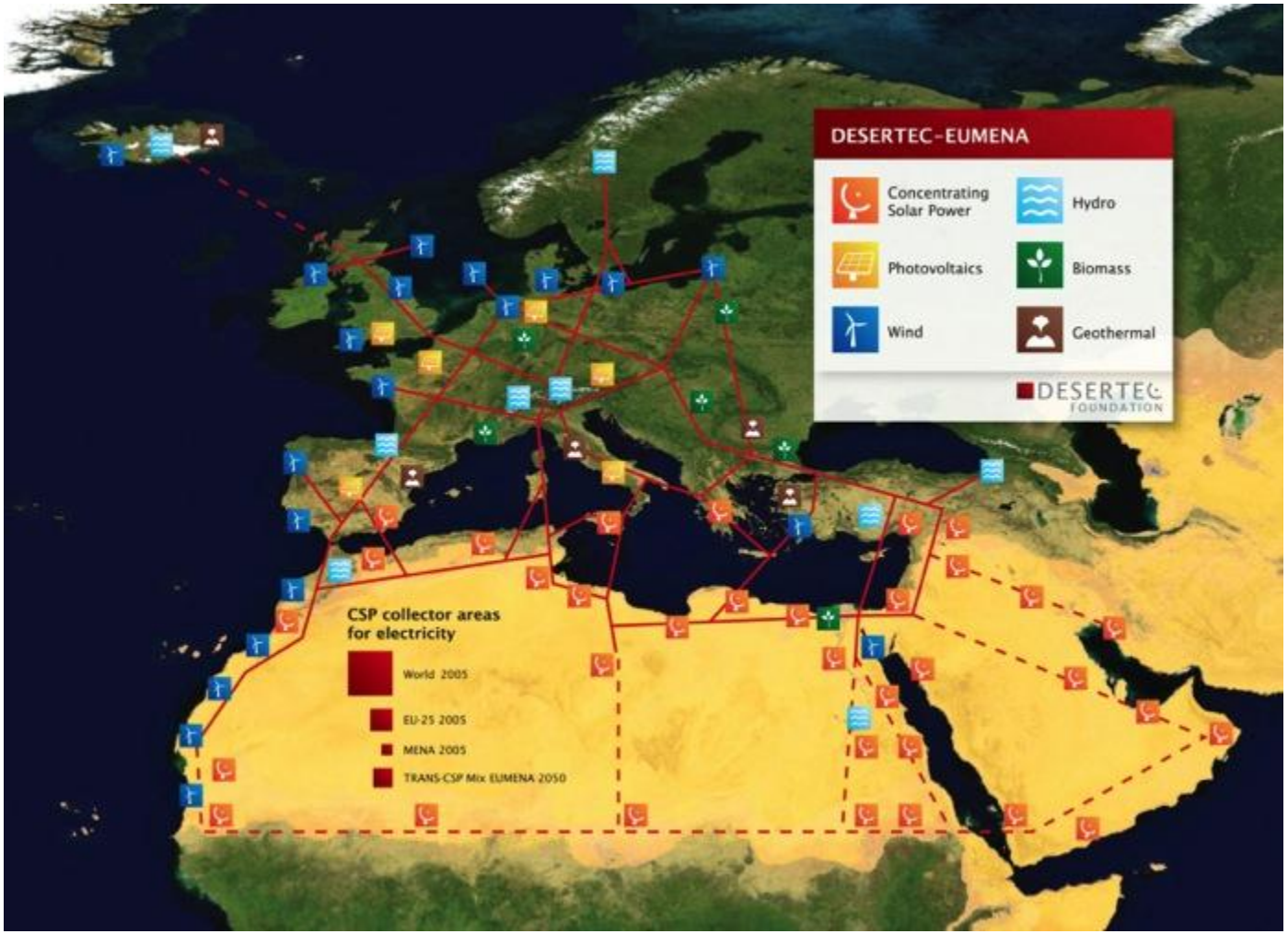
Power Grid Connection in Europe

Physical energy flows between European countries, 2008 (GWh)



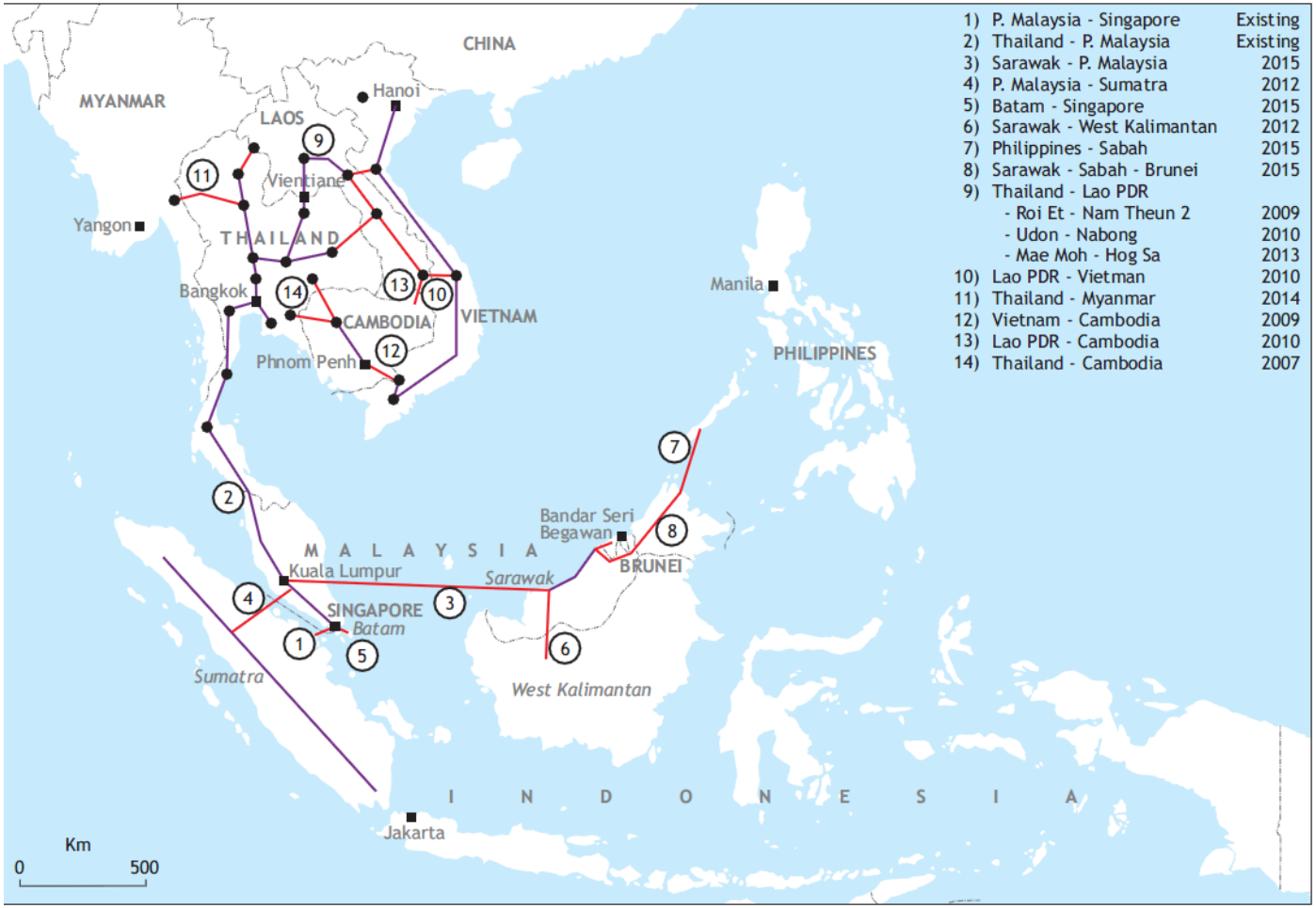
Source: ENTSO-E

Connecting MENA and Europe: " Desertec" as visionary “Energy for Peace"



Source: DESRETEC Foundation

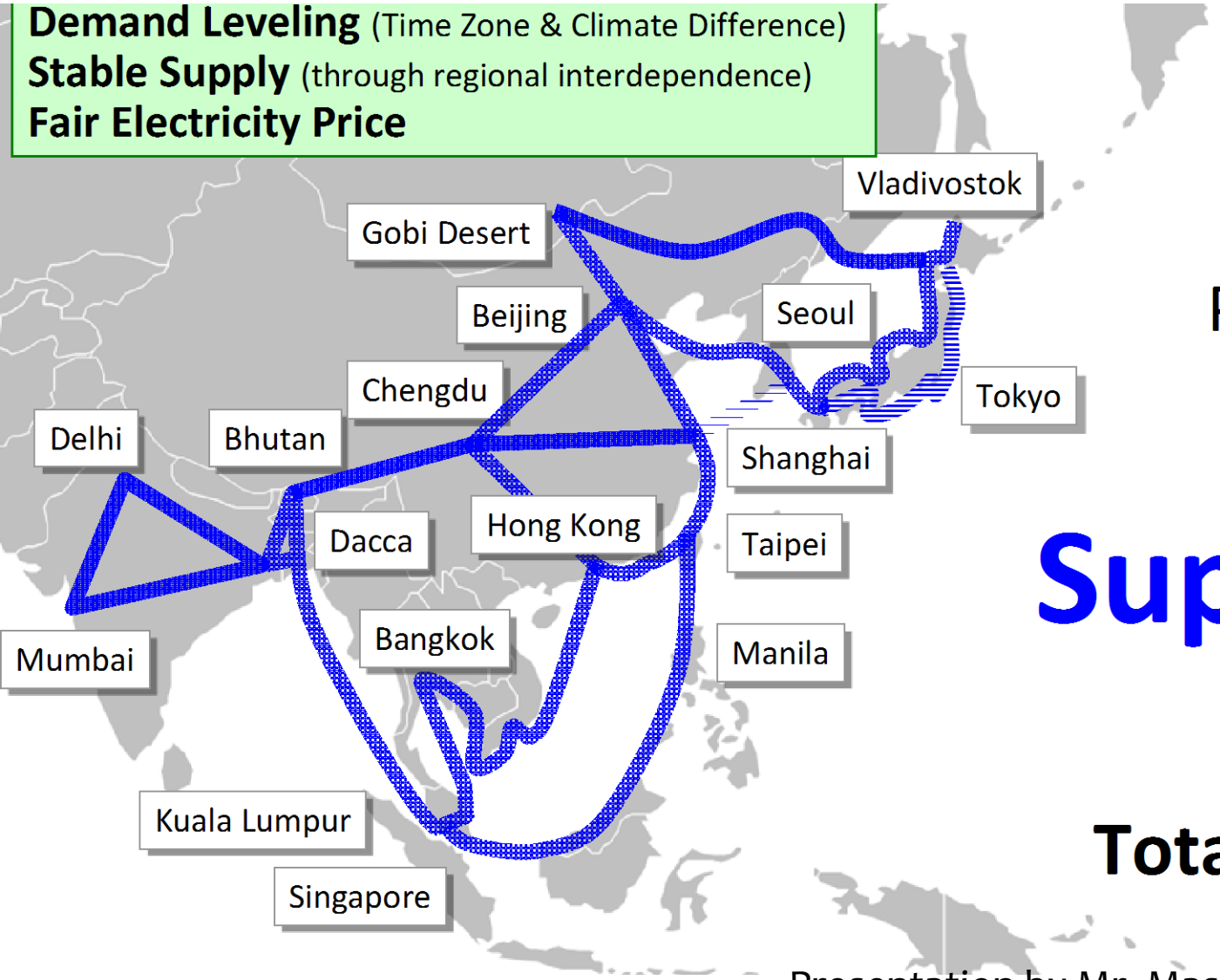
ASEAN power grid connection



The boundaries and names shown and the designations used on maps included in this publication do not imply official endorsement or acceptance by the IEA.

"Energy for Peace in Asia" New Vision?

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



Phase 3

Asia Super Grid

Total 36,000km

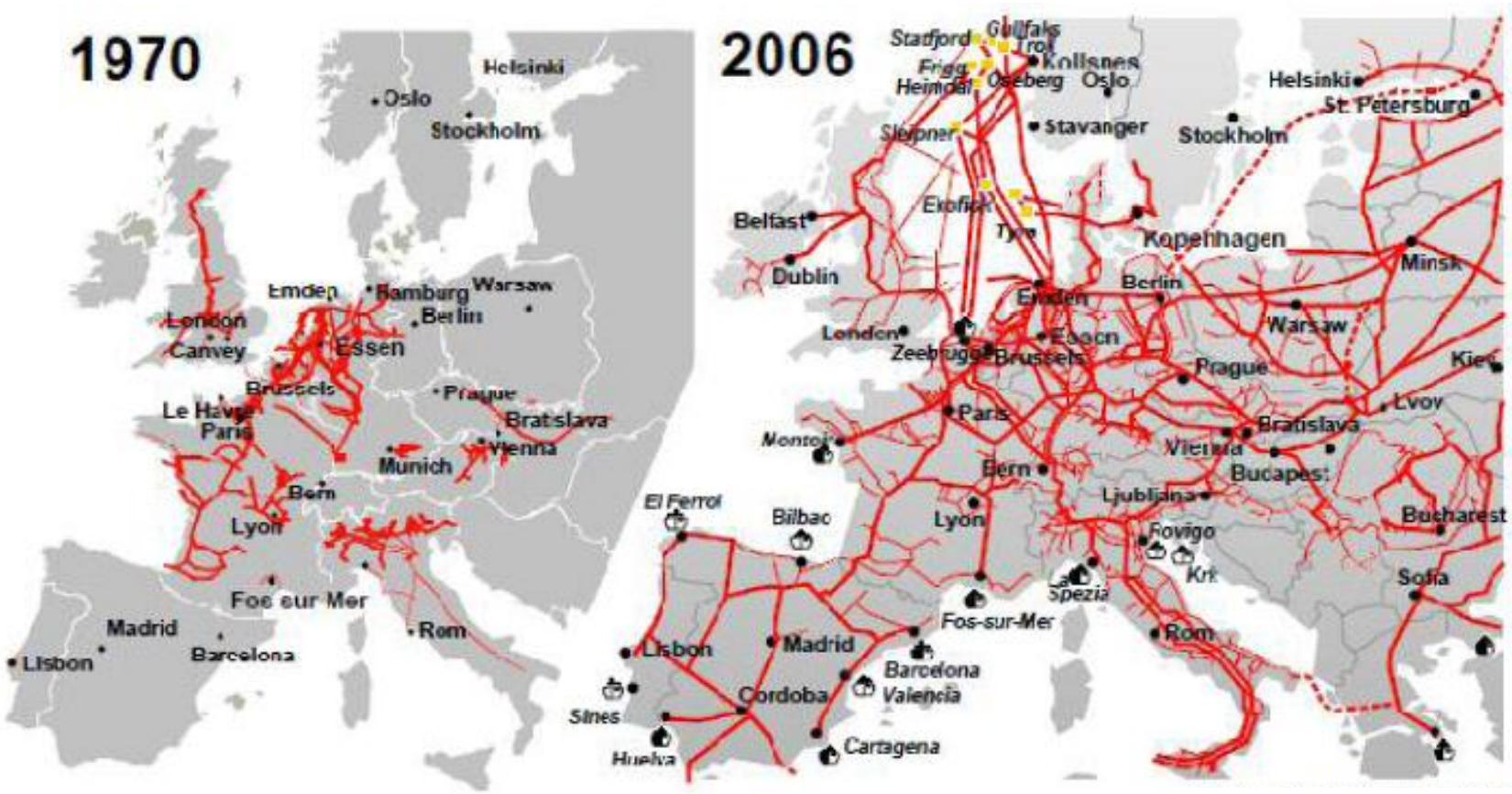
Presentation by Mr. Masayoshi SON

Development of Natural Gas Pipelines in Europe

**Europe has begun upgrading its natural gas transmission pipeline in the wake of domestic gas fields development between 1940 and 1960.*

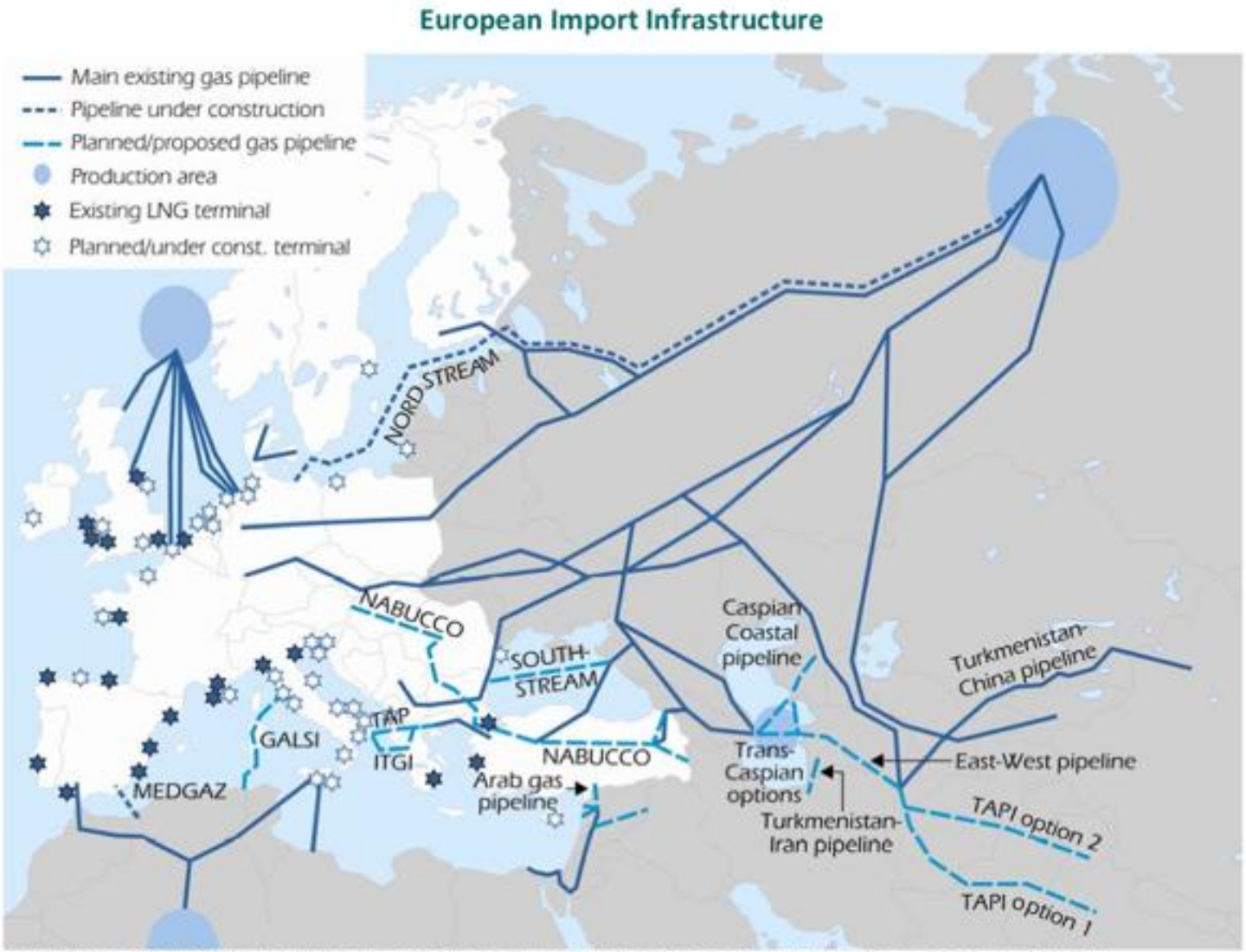
**Cross border gas pipelines have been built along with gas imports from Russia.*

**In order to promote the security by diversification of supply sources, on the occasion of the supply dispute between Russia and Ukraine in 2006 was arose, gas import pipelines which won't depend on Russian Supply has begun building new international pipeline systems.*



Source : OG・May 25, 2009

Natural Gas Import Infrastructure in Europe



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Source: IEA.

IEA Medium Term Oil and Gas Markets 2010

Russian Gas Pipelines Will Extend to the East: Recent China Deal

Russian Gas Infrastructure

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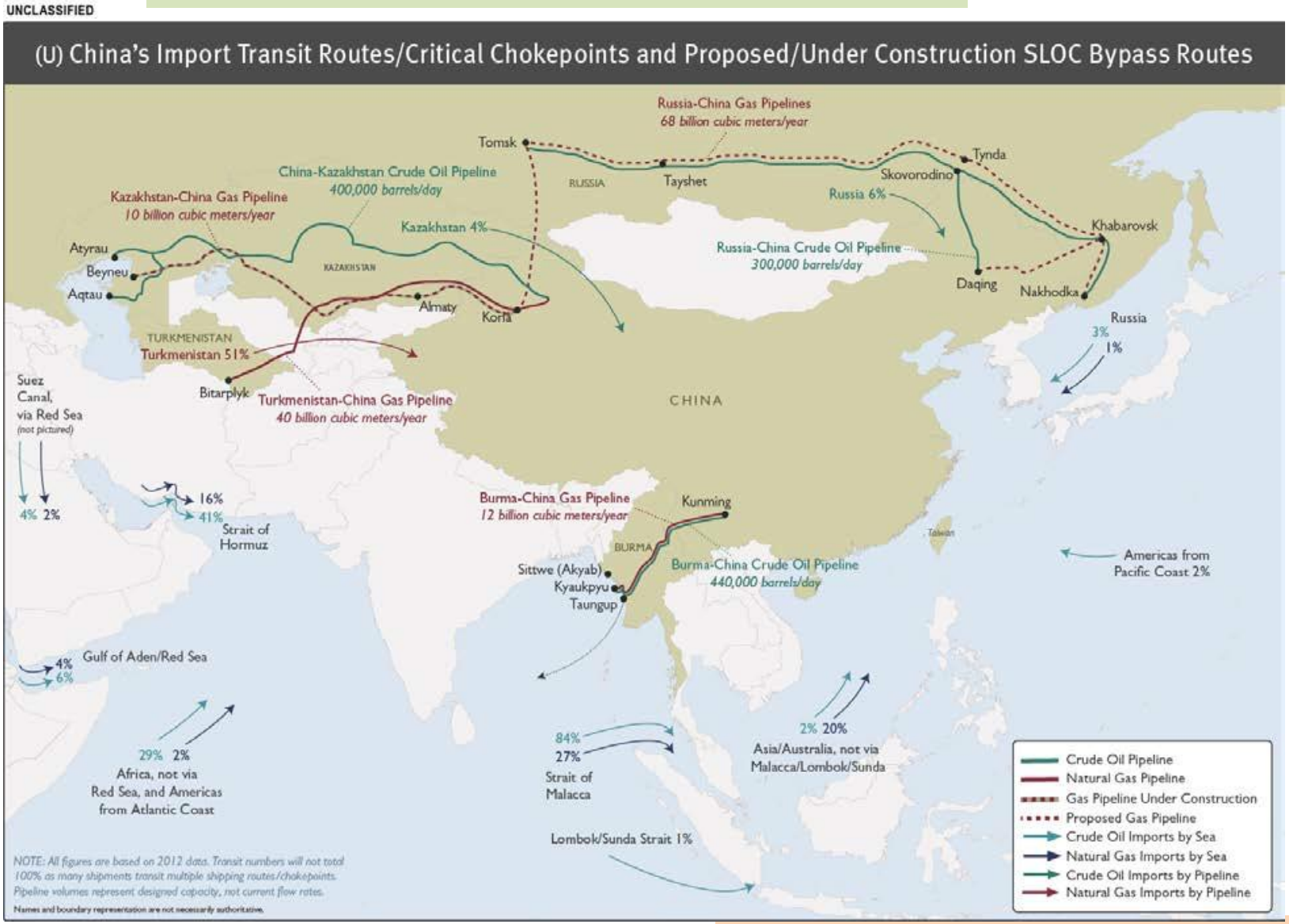
Source: IEA

Mid-Term Oil & Gas Market 2010, IEA

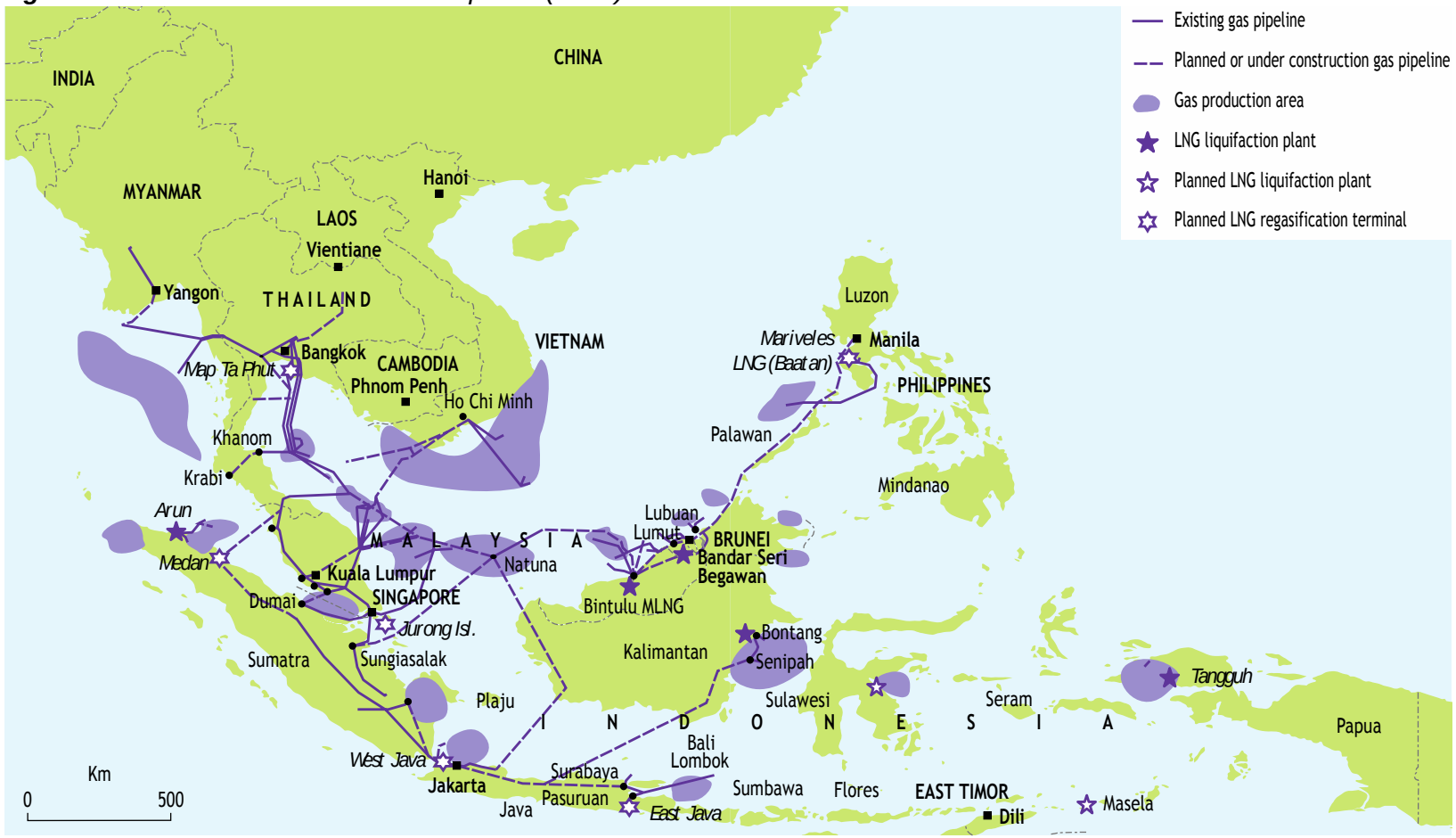
China's Oil and Gas Import Transit Routes



USDOD China Report 2014

ASEAN is working on Gas Pipeline System.

Figure 15.16 ● *The Trans-ASEAN Gas Pipeline (TAGP)*



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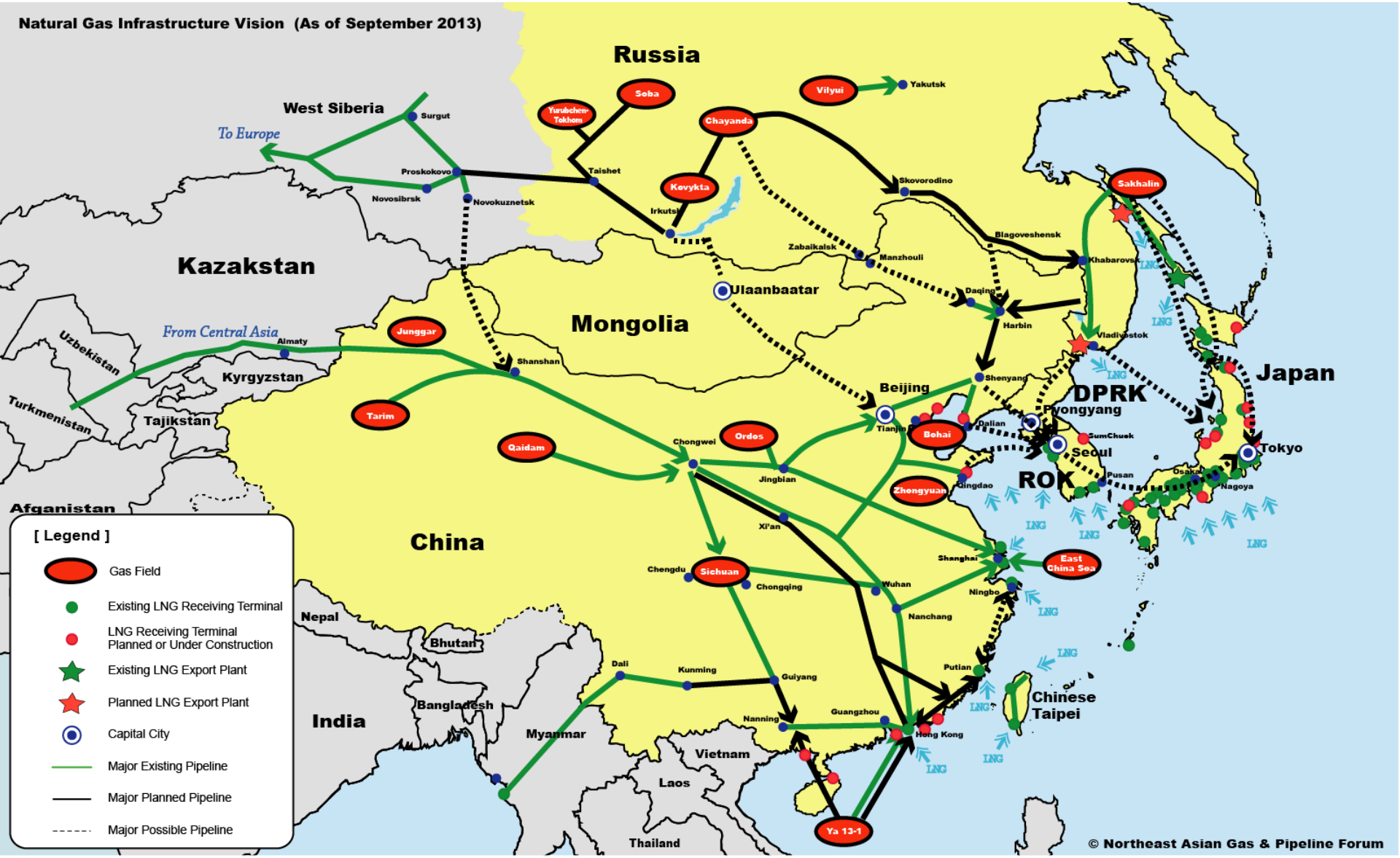
Source: ASCOPE Secretariat

Blue Print for North East Asia Gas & Pipeline Infrastructure



Role of the Energy Charter Treaty:
Ukraine Gas Disruption could have been avoided.