# Energy Security & Geopolitics

2019-2-27. GSDM international Conference

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Chairman, the Sasakawa Peace Foundation

Nobuo TANAKA


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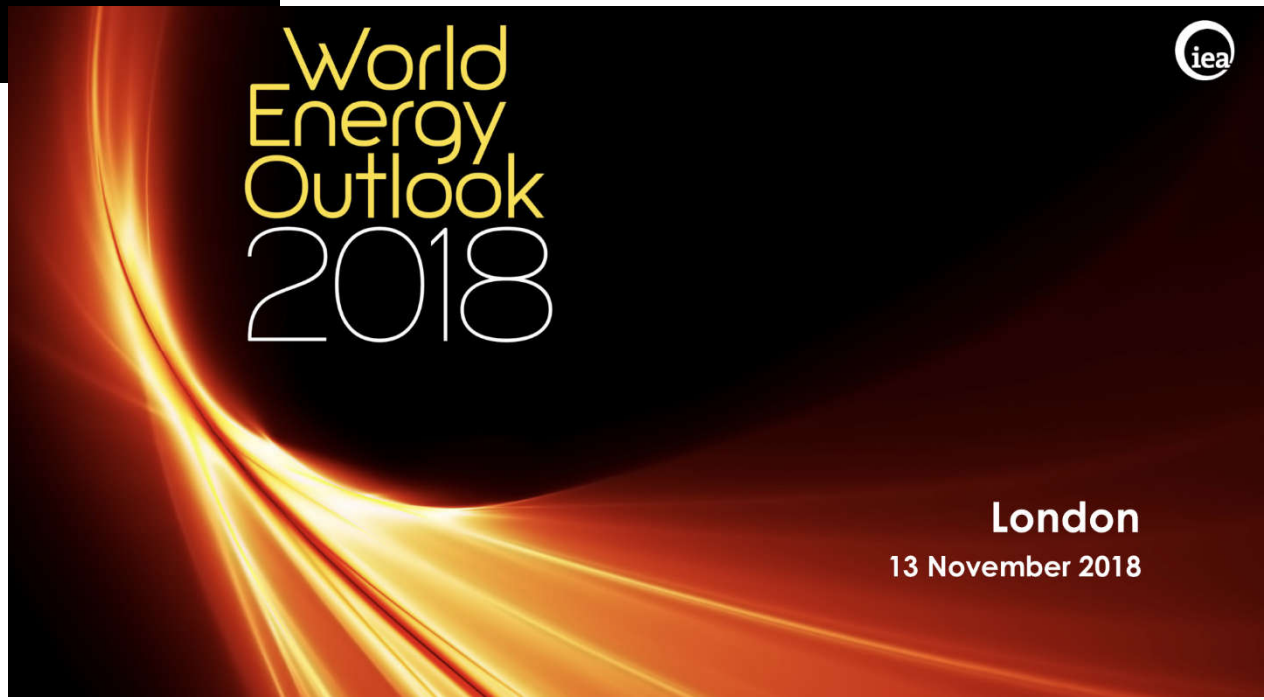


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# The *new* geography of energy

**Energy demand**

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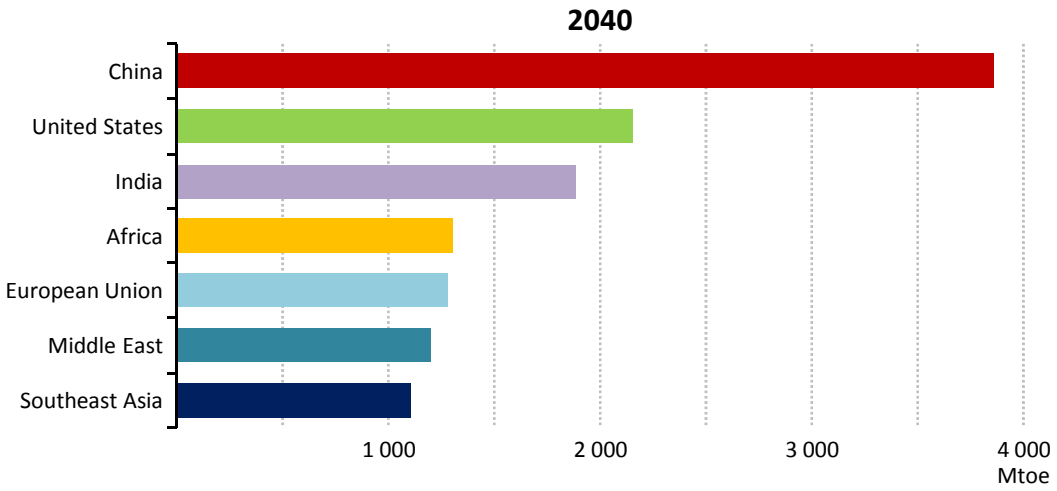
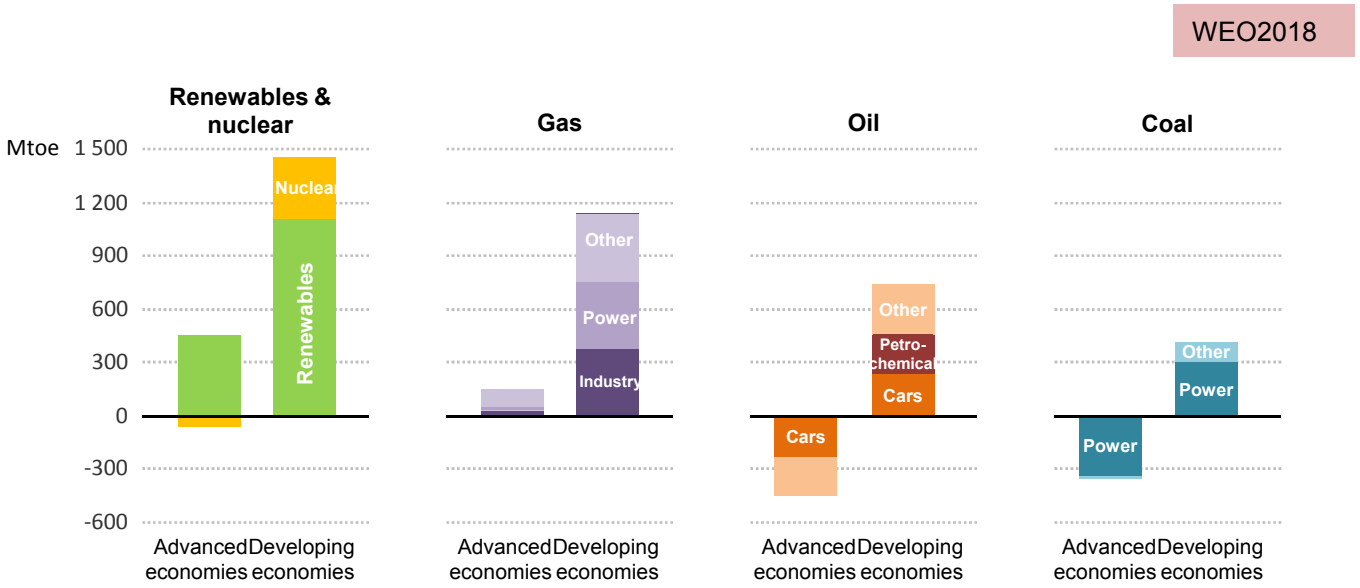



***In 2000, more than 40% of global demand was in Europe & North America and some 20% in developing economies in Asia.***

***By 2040, this situation is completely reversed.***

# Fuelling the demand for energy

## Change in global energy demand, 2017-2040




***The increase in demand would be twice as large without continued improvements in energy efficiency, a powerful tool to address energy security & sustainability concerns***

# Tipping the energy world off its axis

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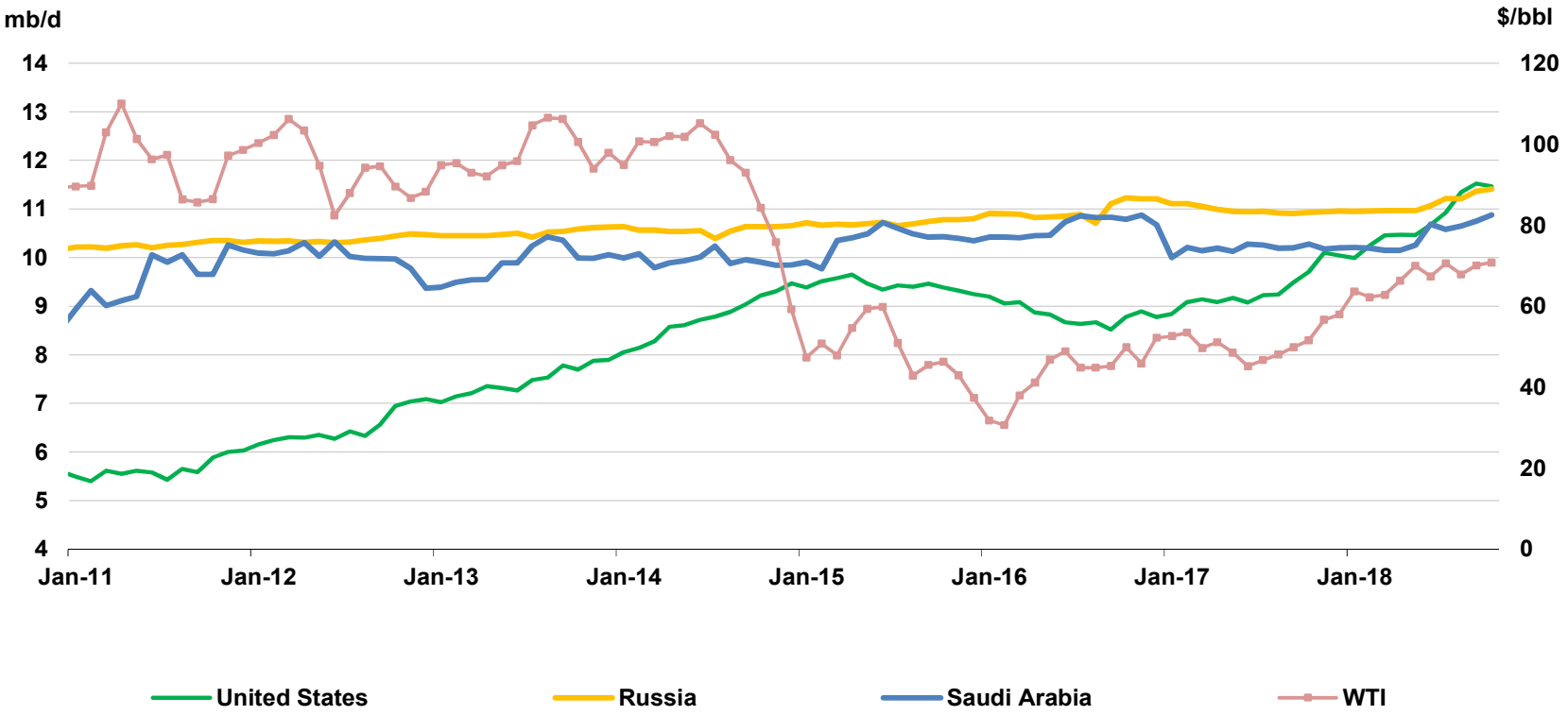
- Four large-scale upheavals/revolutions in global energy set the scene for the new *Outlook*:
  - The United States is turning into the undisputed global leader for oil & gas
  - Solar PV is on track to be the cheapest source of new electricity in many countries
  - China is switching to a new economic model & a cleaner energy mix
  - Electricity is broadening its horizon, spurred by cooling, electric vehicles & digitalisation

China

- These changes brighten the prospects for affordable, sustainable energy & require a **reappraisal of approaches to energy security.**
- There are many possible pathways ahead & many potential pitfalls if governments or industry misread the signs of change

# World's largest crude oil producers

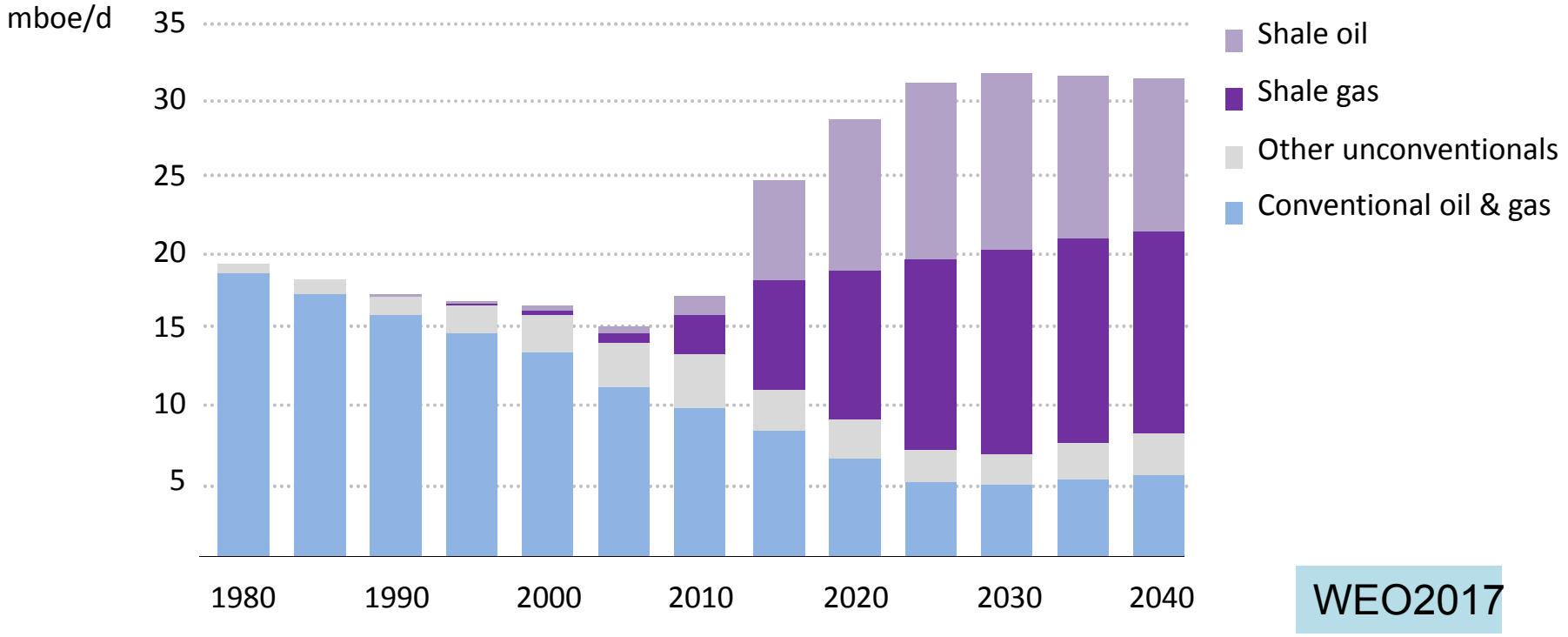



IEA data

**The US is now the world's largest crude oil producer ahead of Russia and Saudi Arabia.**
**It increased the total oil production by incredible 2.1 mb/d in 2018.**

# Shale makes US the undisputed leader for oil & gas

**Oil and gas production in the United States**

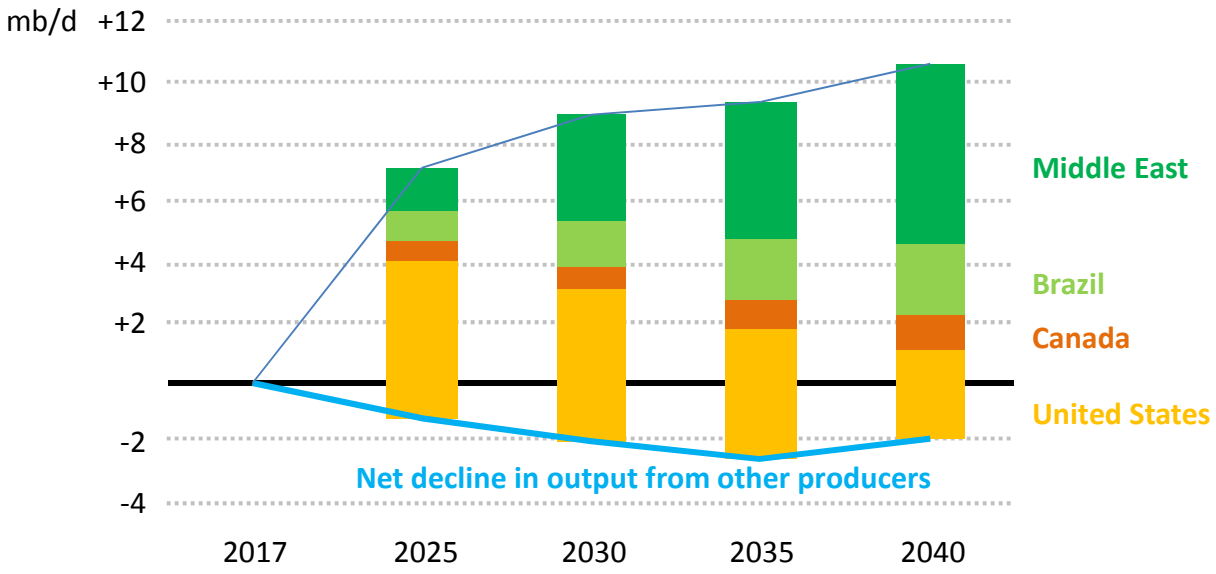



*The US is already switching to become a net exporter of gas & becomes a net exporter of oil in the 2020s, helped also by the demand-side impact of fuel efficiency & fuel switching*

# Middle East remains central to oil market stability

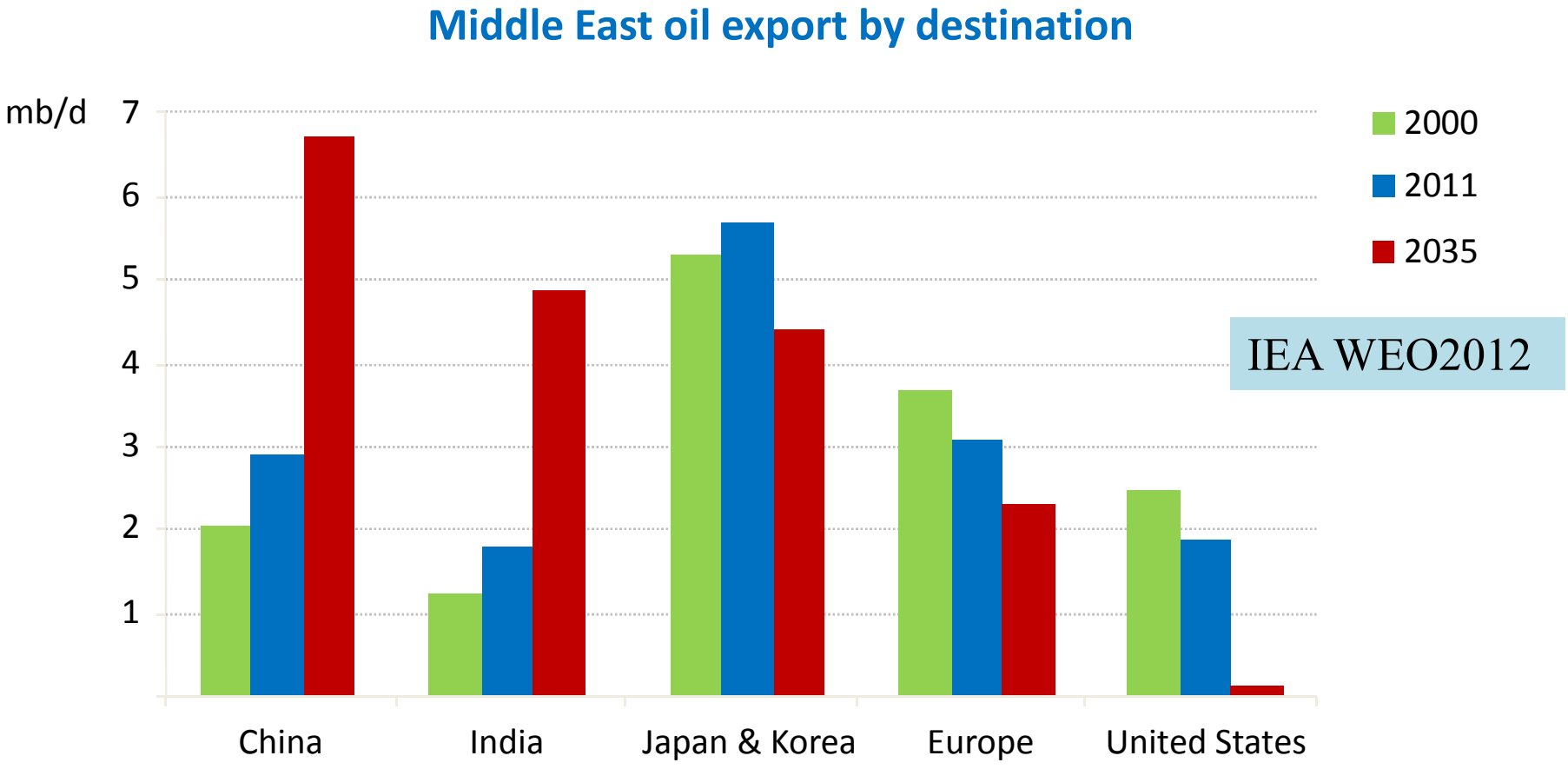
IEA data

**Oil production growth in United States, Canada, Brazil & the Middle East**



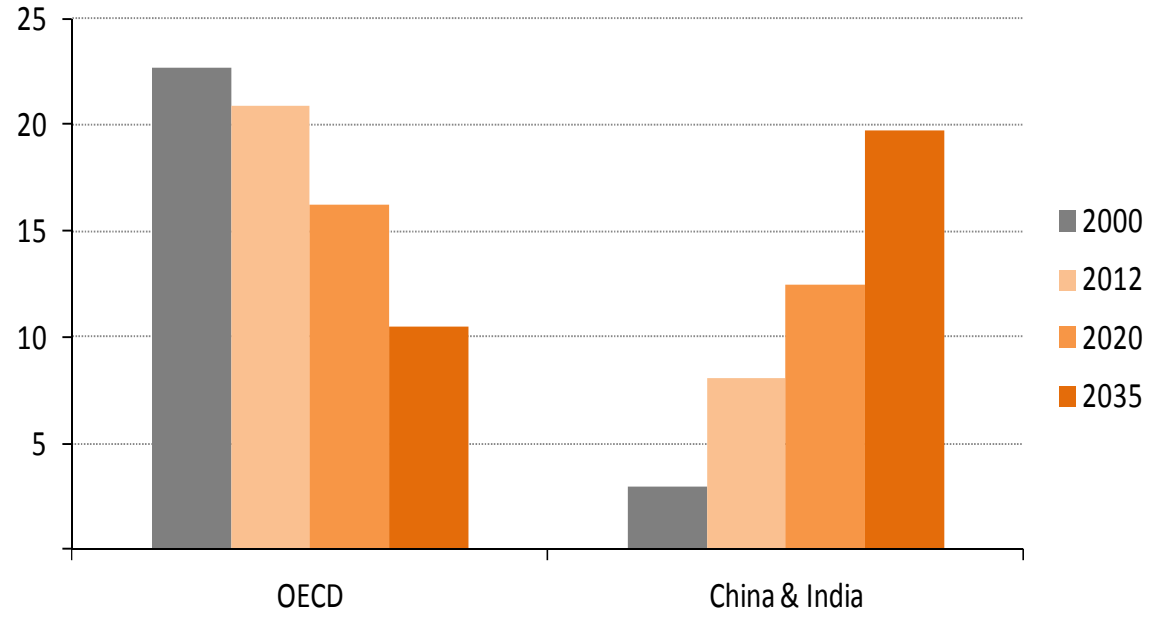

***The short-term picture of a well-supplied market should not obscure future risk as demand rises to 106 mb/d & reliance grows on Iraq & the rest of the Middle East***

# North American Energy Independence and Middle East Oil to Asia: a new Energy Geopolitics




***By 2035, almost 90% of Middle Eastern oil exports go to Asia; North America's emergence as a net exporter accelerates the eastward shift in trade***

## Net oil imports of selected countries in the New Policies Scenario (mb/d)




# Should China and India join the IEA?

***Asia becomes the unrivalled centre of the global oil trade as the region draws in a rising share of the available crude***

# The Choke Point: the Strait of Hormuz

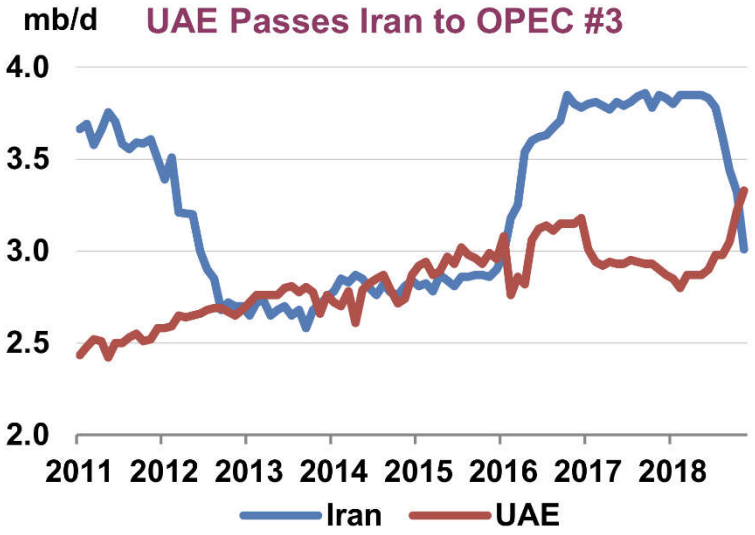

85% of Japanese oil import
20% of Japanese LNG import
Chubu Electric depends 40% of its power supply on one source: Qatar.

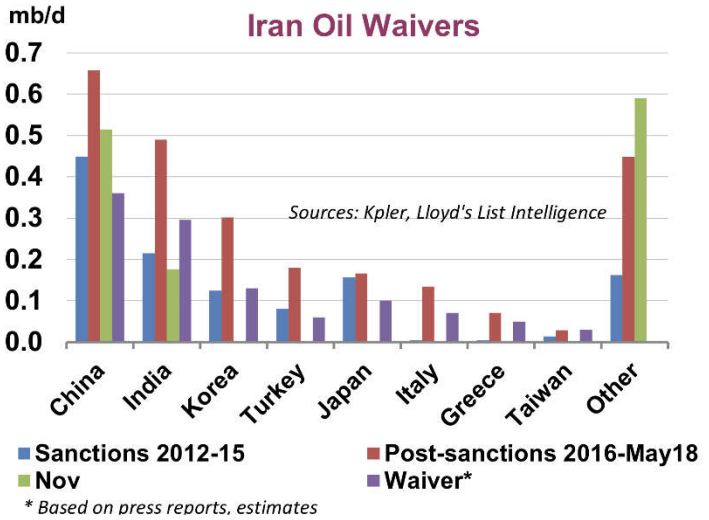
17 mbd of petroleum
(20% of global demand
& 42% of trade)

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

# Iran's Crude Oil supply and US sanction

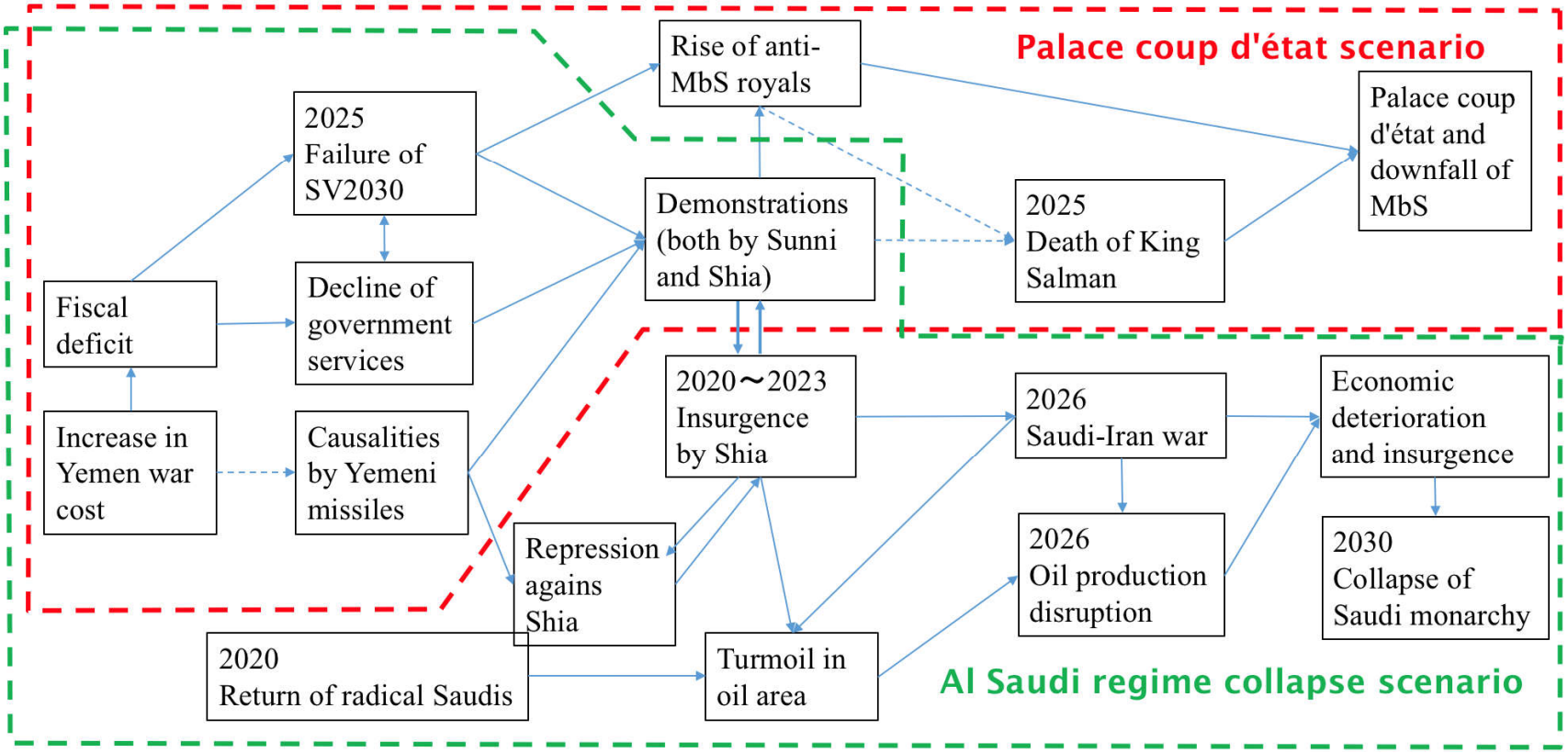
IEA OMR 2018-Dec



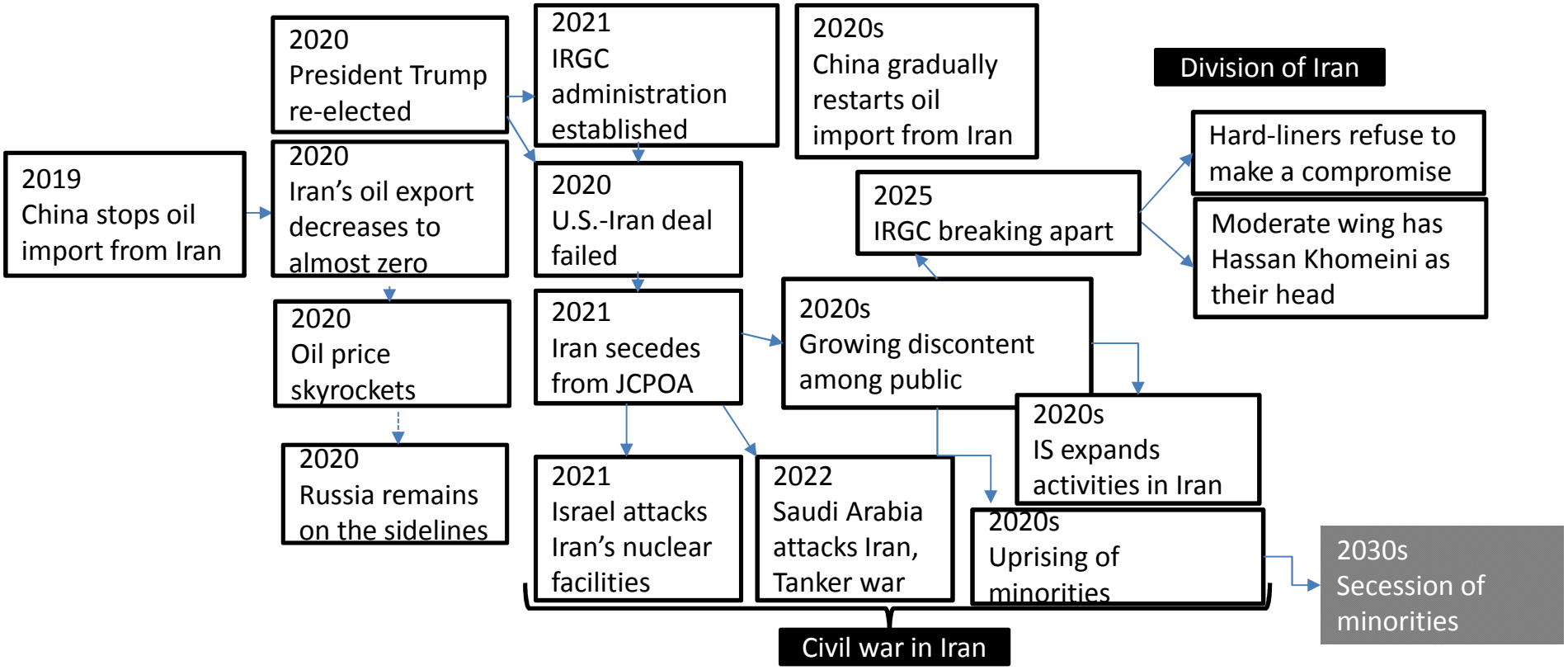




US withdrawal from JCPOA impacted on Iran's crude oil supply. Now US issued sanctions waivers for eight countries importing Iranian oil for the next 180 days. The countries – including India, China, Japan, South Korea, Taiwan, Greece, Italy and Turkey.

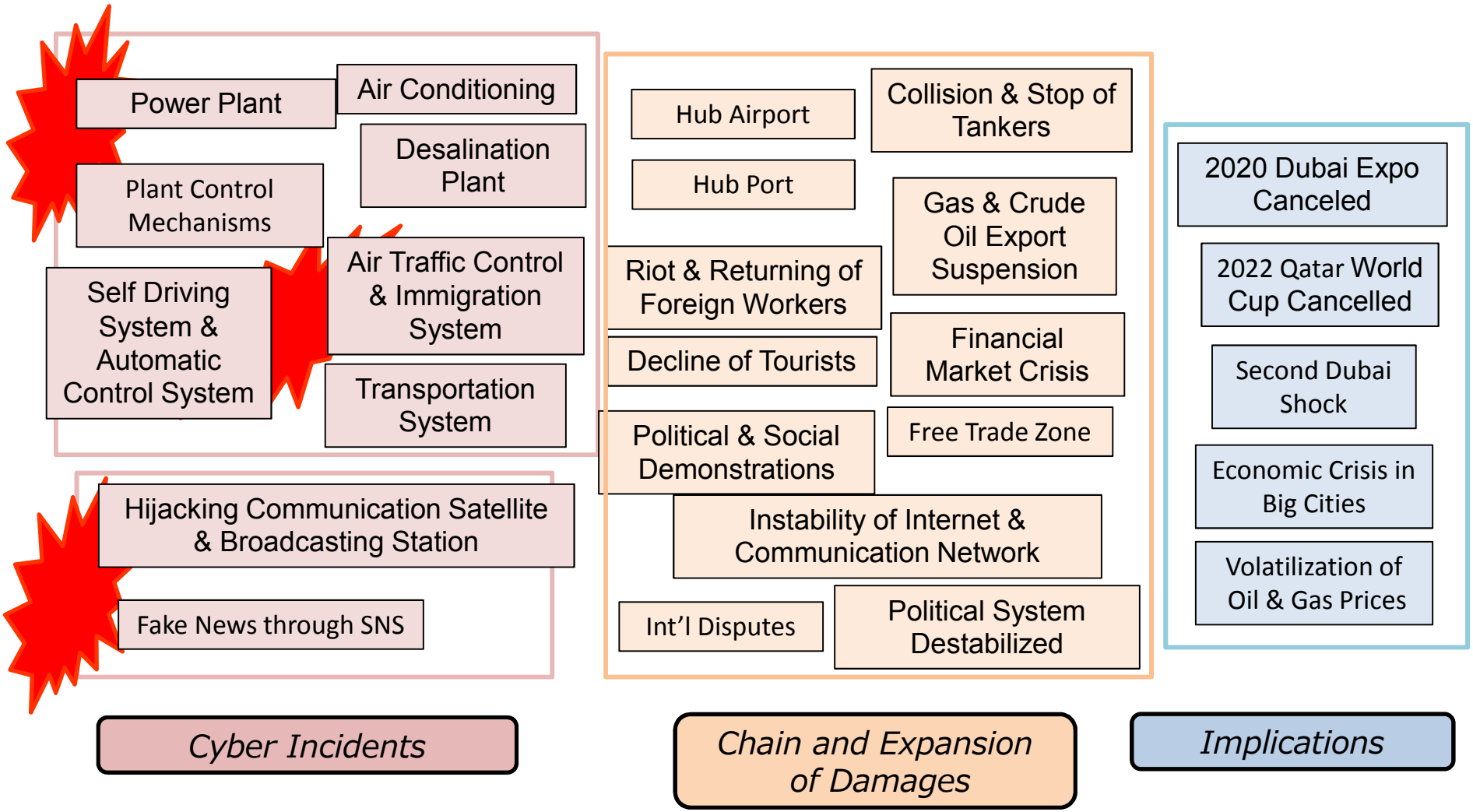
# Framework of Saudi Arabia crisis scenarios



# Iran civil war scenario



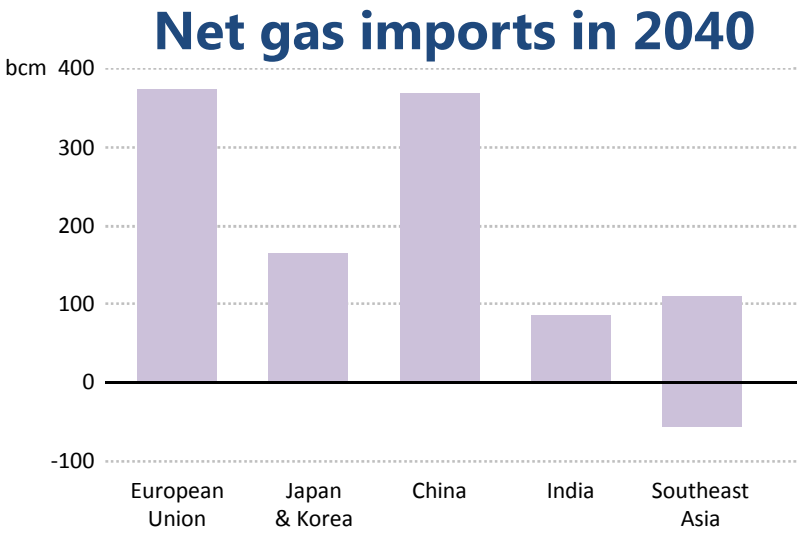
# Gulf Cyber Shock Scenarios

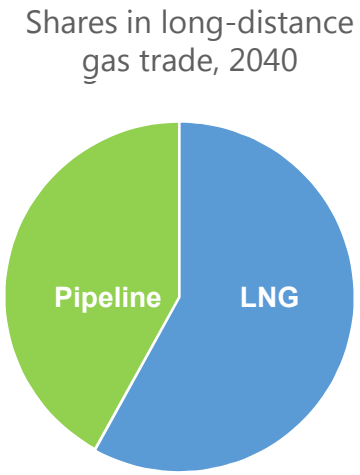


# L'Aquila G8 Summit, 2009


Geopolitical risk linkage: Libya to North Korea

# China – the emerging giant of gas demand




***Developing countries in Asia – led by China – dominate the rise in long-distance gas trade;***

***more than 80% of the growth to 2040 comes in the form of LNG***

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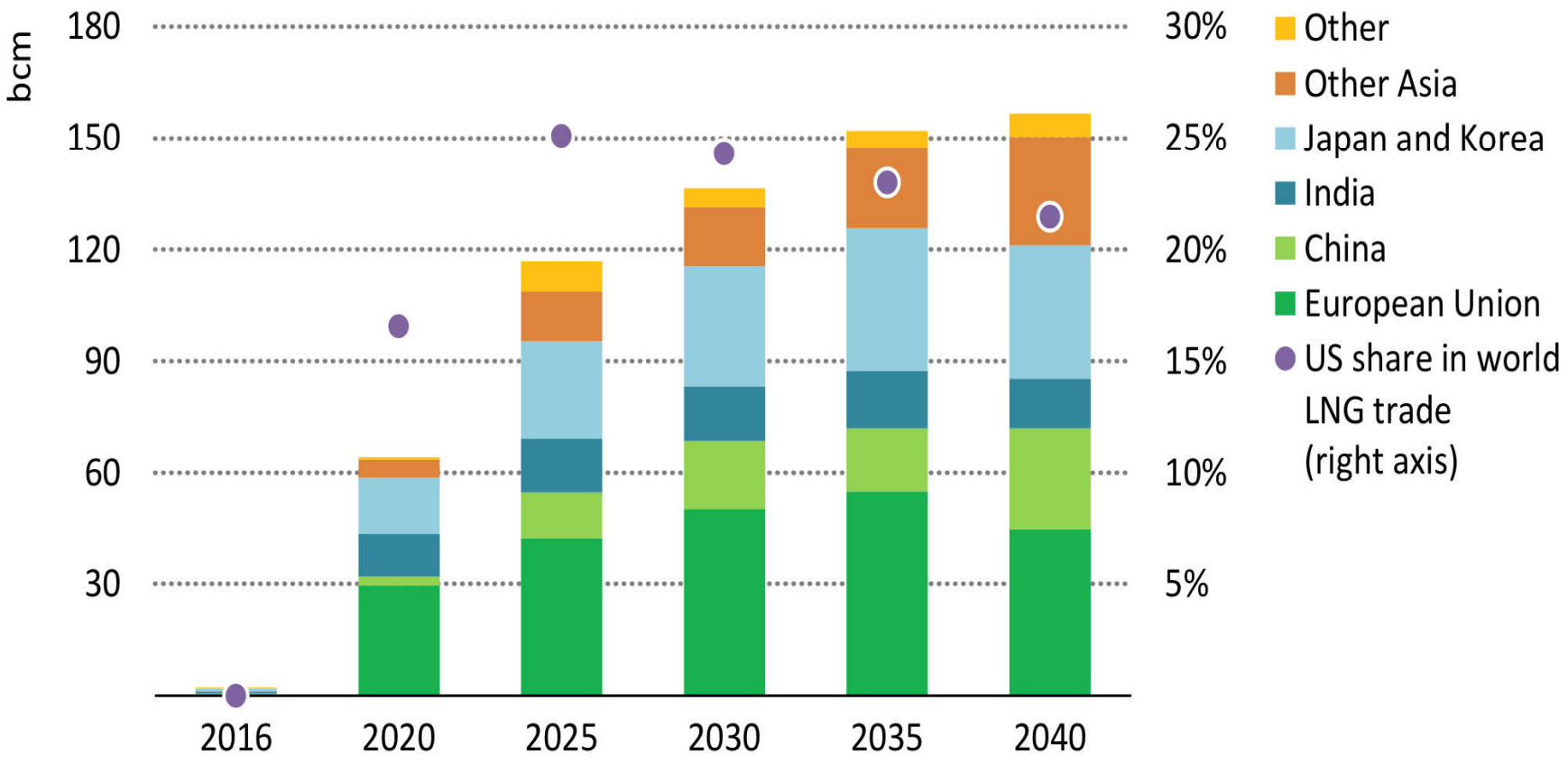
# American Gas Moves to Asia

**Figure 9.8 ▷ US LNG net exports by destination and market share in the global LNG trade in the New Policies Scenario**




*The United States becomes a heavyweight in the global LNG market, providing more than a fifth of traded volumes in the long term*

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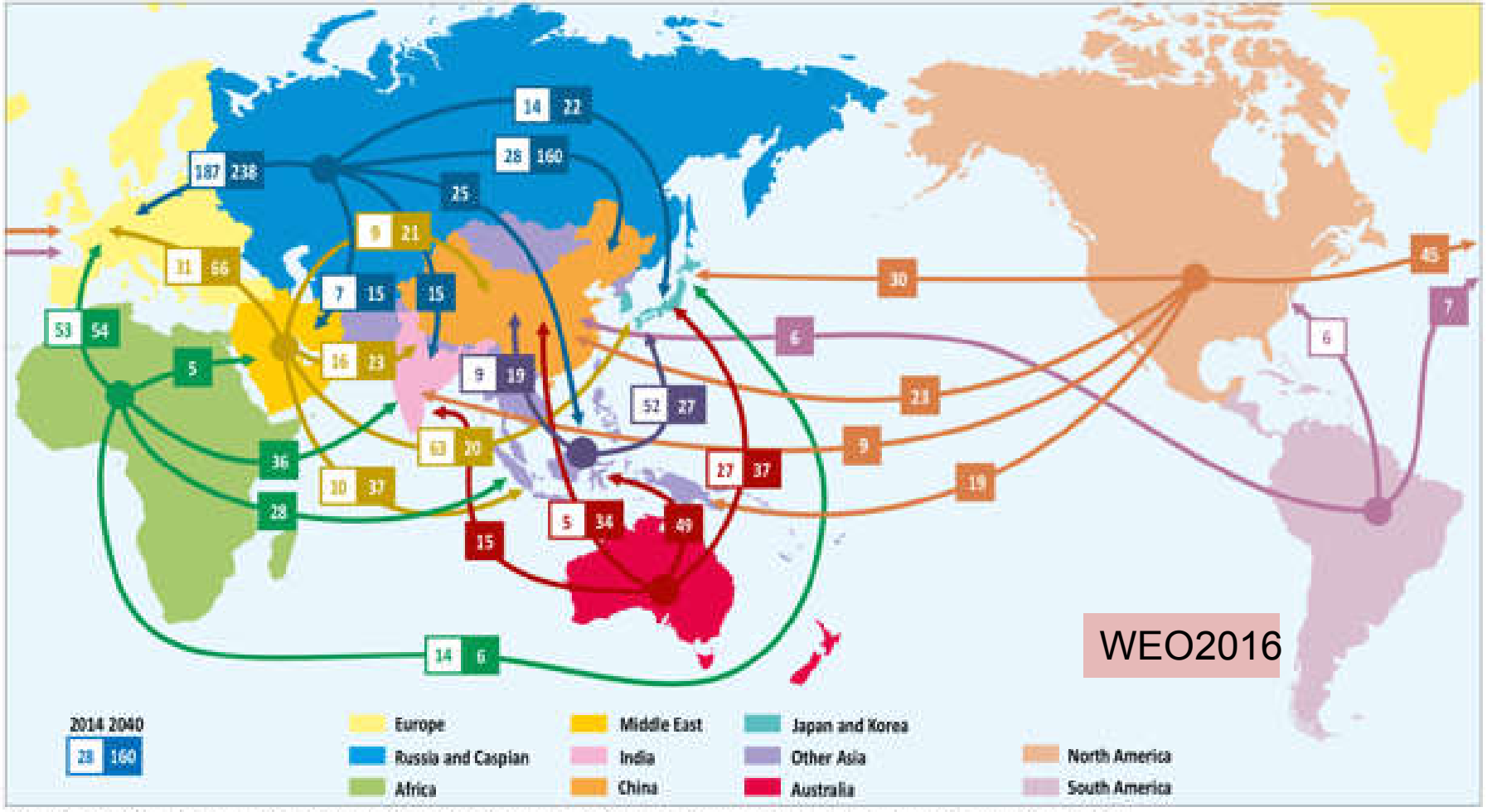
The concentration of import growth in Asia continues to redraw the inter-regional gas trade map, underpinning a fundamental shift in trade flows away from the Atlantic basin to the Asia-Pacific region

**Figure 4.17** ▷ **Selected global gas trade flows in the New Policies Scenario** (bcm)



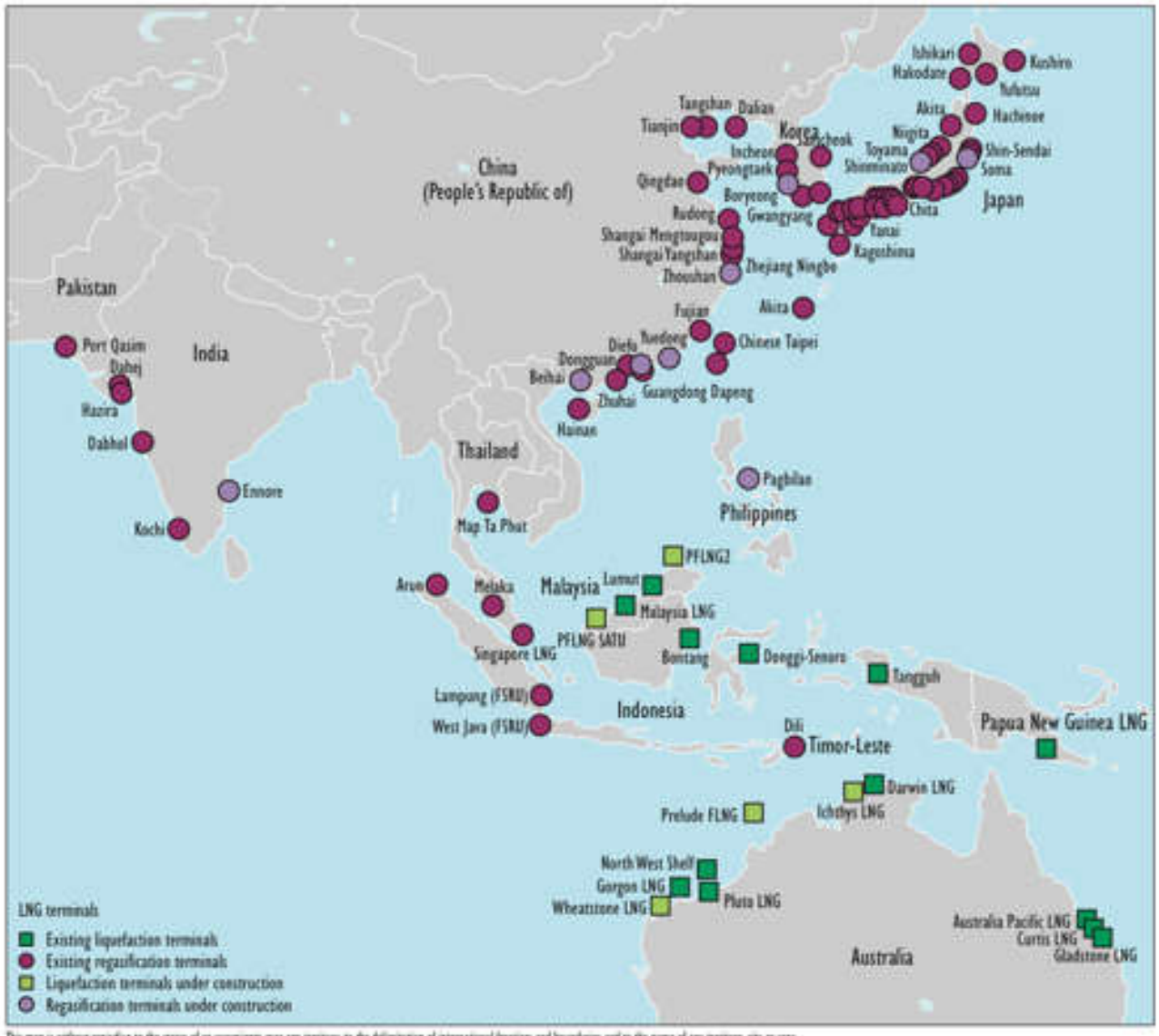

This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.



*The strong import growth in Asia underpins a fundamental shift in trade flows away from the Atlantic basin to the Asia-Pacific region*

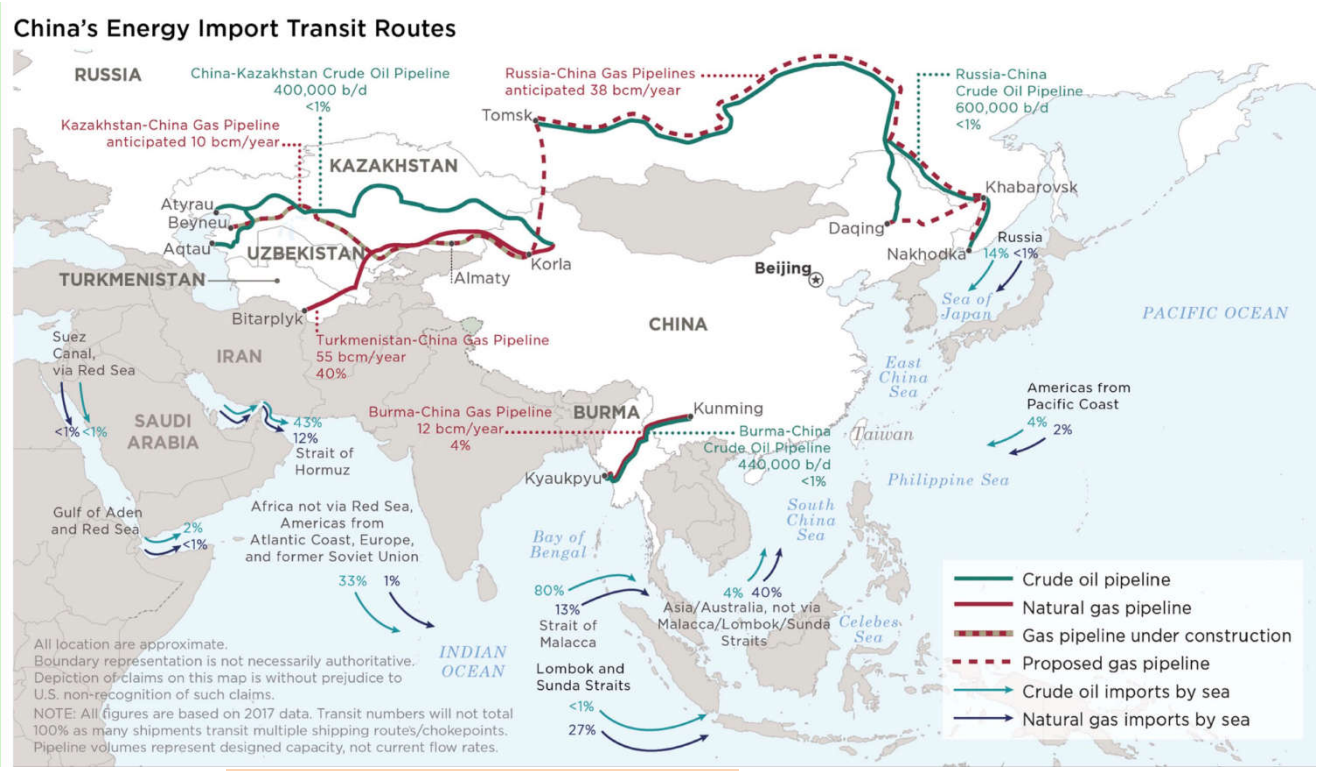
# East & South China Sea =LNG Sea Lane

**Map 3.1** Asia-Pacific LNG infrastructure



# China's Oil and Gas Import Transit Routes: Pipeline and Sea Lane Defense

## One Belt and One Road（一带一路）




USDOD China Report 2018

-China's interest in ensuring reliable, cost-effective, and diverse energy sources to support its economic growth drive its overseas energy investments.
-China hopes to diversify energy suppliers and transport options.

# Djibouti and Hambantota


sputniknews.com

China's Djibouti Naval Base a 'Laboratory' For Future Overseas ...

China Djibouti Military Base

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SOUTHCHINA MORNING POST

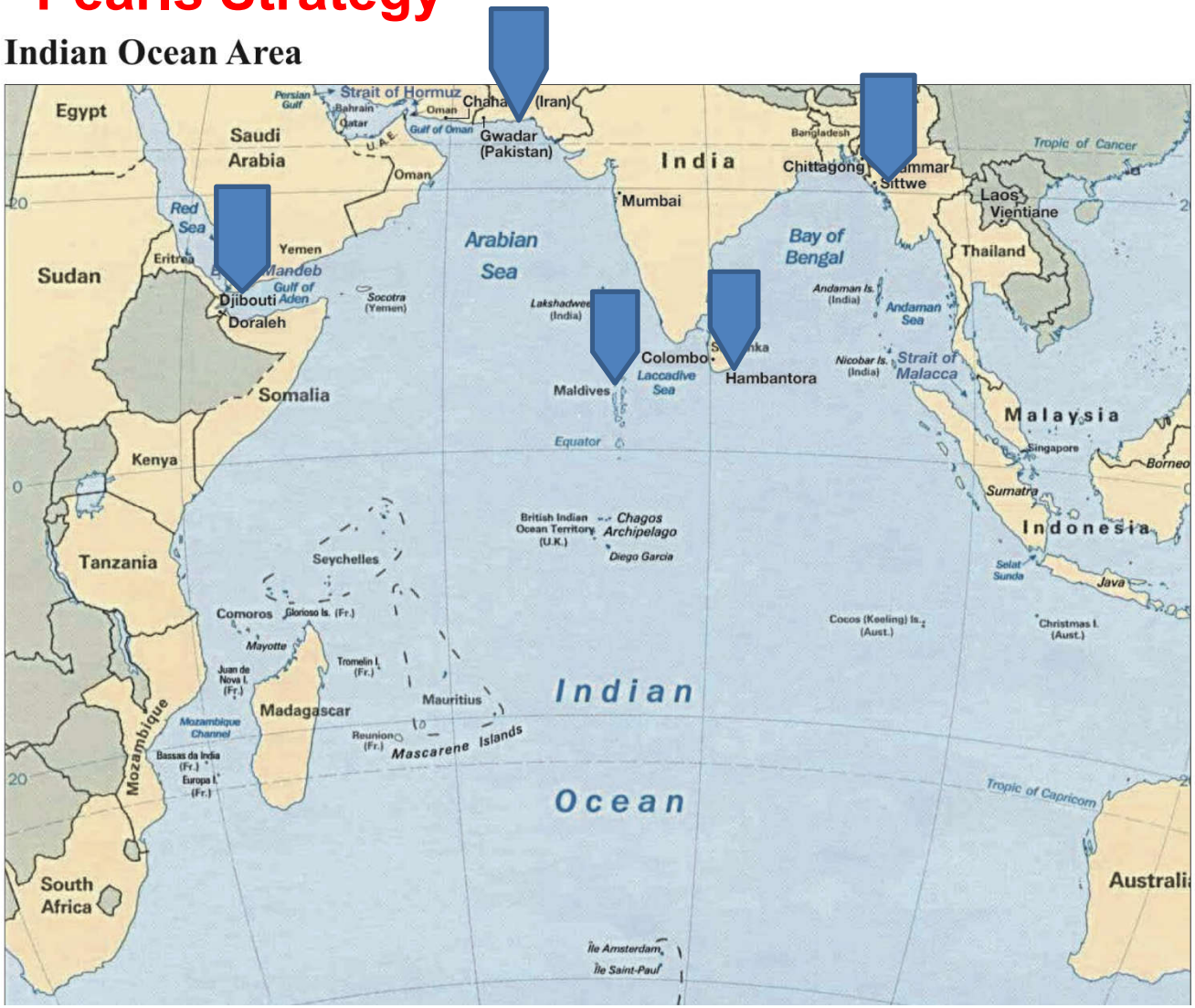
https://www.scmp.com/news/china/diplomacy/article/2173467/chinese-private-investment-belt-and-road-projects-may-be-losing

Chinese private investment in belt and road projects may be losing steam

PUBLISHED : Thursday, 15 November, 2018, 8:31pm

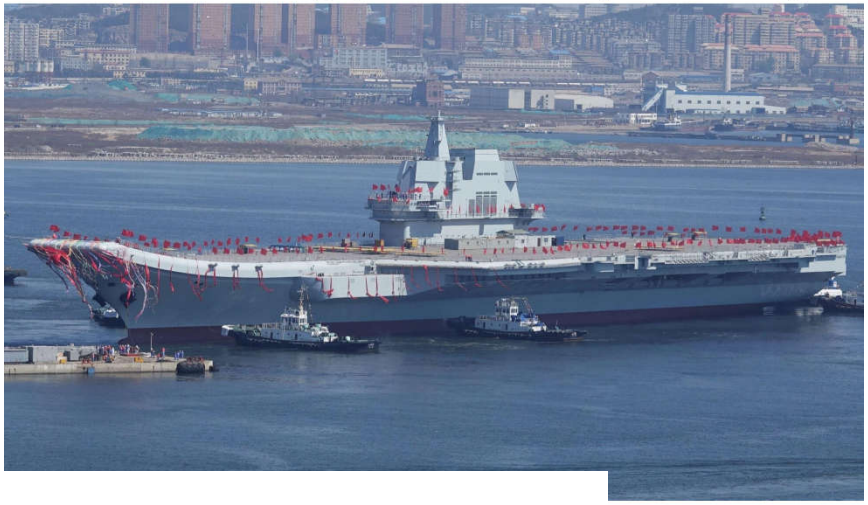
In one belt and road deal, Sri Lanka handed over Hambantota port to state-owned China Merchants Port Holdings on a 99-year lease last year. Photo: AFP

# China's BRI in Indian Ocean; String of Pearls Strategy



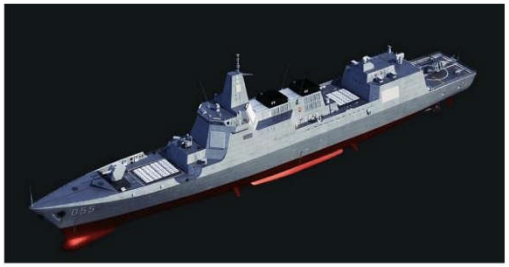
***CNS Liaoning* (CV-16) entering Hong Kong (July 2017)**

## Shandong (launched April 2017)



## The new Type 055 "Cruiser"

- Big…about 11,000 to 13,000 tons
- 122 VLS cells
- 4 under construction



***Types 903 and 901 AORs –sustaining ships on station***

- Estimated 2020 Inventory= 10

8

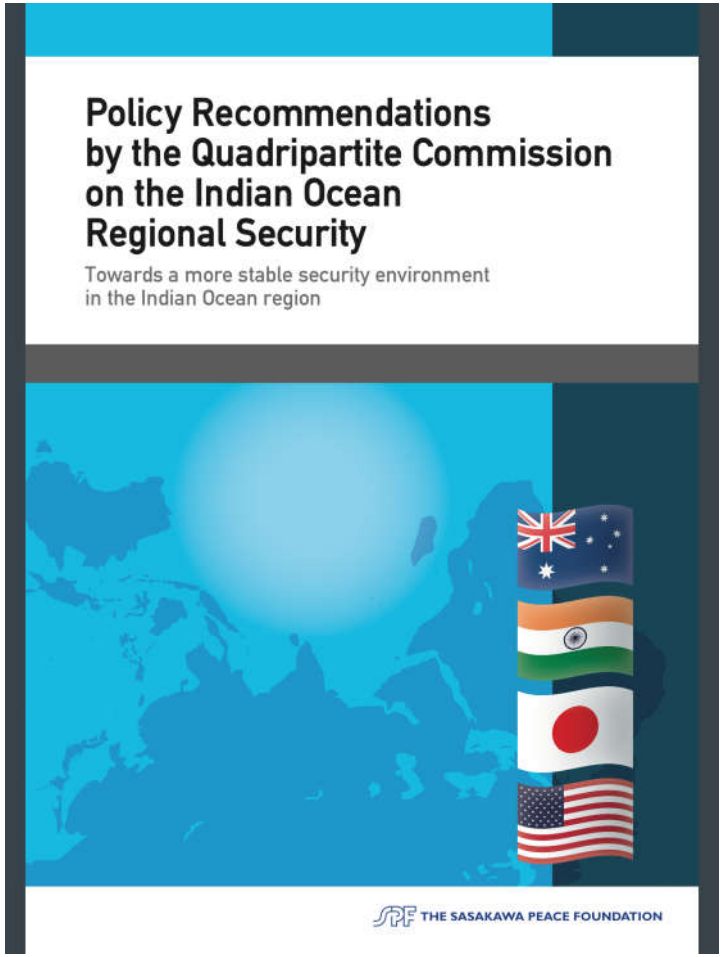
PLA Navy focus moves from ‘offshore waters defense' to the combination of “offshore waters defense” with ‘open seas protection‘

***Estimated PLAN “Far Seas” Navy v. other great navies: circa 2020. (This is not a complete order of battle, just a blue water capable comparison.)***

| | PLA Navy | UK | France | Japan | India | Russia |
|---|---|---|---|---|---|---|
| Carriers | 2 + 1 | 2 | 1 | 0 | 1+1 | 1 |
| Aegis like DDG | 25 | 6 | 2 | 6/4 | 12 | 0 |
| FFG | 32 | 1-2 | 1 | 4 | 10 | 9-11 |
| Large Amphib | 6 | 6 | 3 | 3 | 4 | 0 |
| AOR | 10 | 3 | 4 | 5 | 4 | 4 very old |
| SSN<br>SS(AIP) | 6-7<br>20 | 7 | 6 | 0<br>22 | 1<br>14 | 8-9 +6 SSGN<br>9-11 |
| Total | 101 | 25 | 17 | 44 | 46 | 28 |

5

# Policy Recommendations – Towards Construction of a Stable Security Environment and Peaceful Development in the Indian Ocean Region –




Recommendation 18:
Australia, India, Japan and the U.S. should enhance sea lane defense capabilities in the Indian Ocean. Each nation will need to make judgments about its capabilities based on its interests. For instance, naval fleets will need to evolve to allow increasingly long-range operations. This may require consideration in Japan of new options such as nuclear propulsion for its submarines.

Nobuo Tanaka, Chairman, The Sasakawa Peace Foundation (Chair)
Rory Medcalf, Head of College, National Security College, ANU
Kanwal Sibal, Member, VIF Advisory Council, VIF
Dennis Blair, Chairman, Sasakawa Peace Foundation USA

# Russian Gas Pipeline to the East + LNG through Arctic


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.

Source: IEA

Mid-Term Oil & Gas Market 2010, IEA

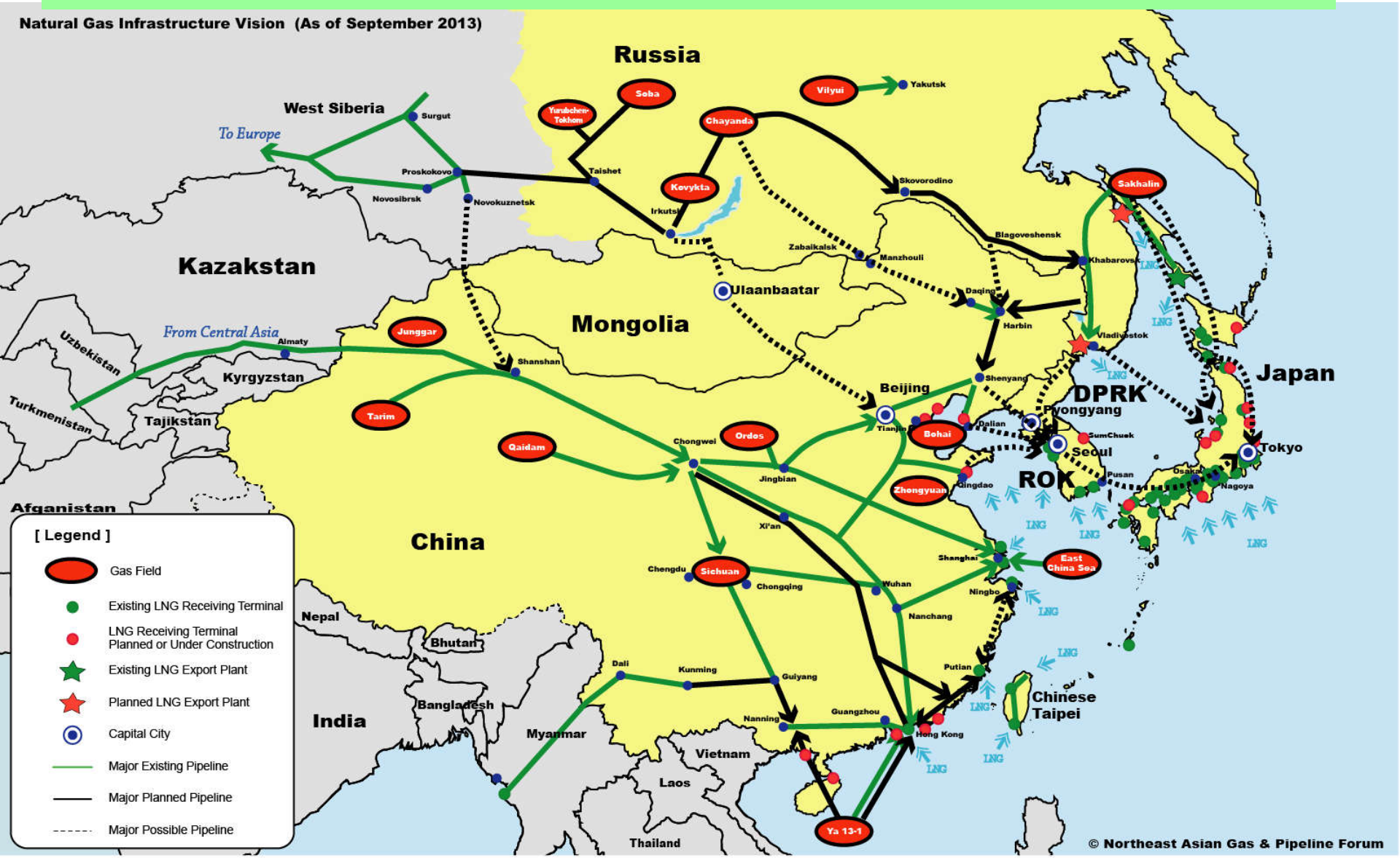
# Russia’s interest in Arctic sea lanes


Putin inaugurated the new Icebraker LNG tanker, “Christophe De Margerie” .

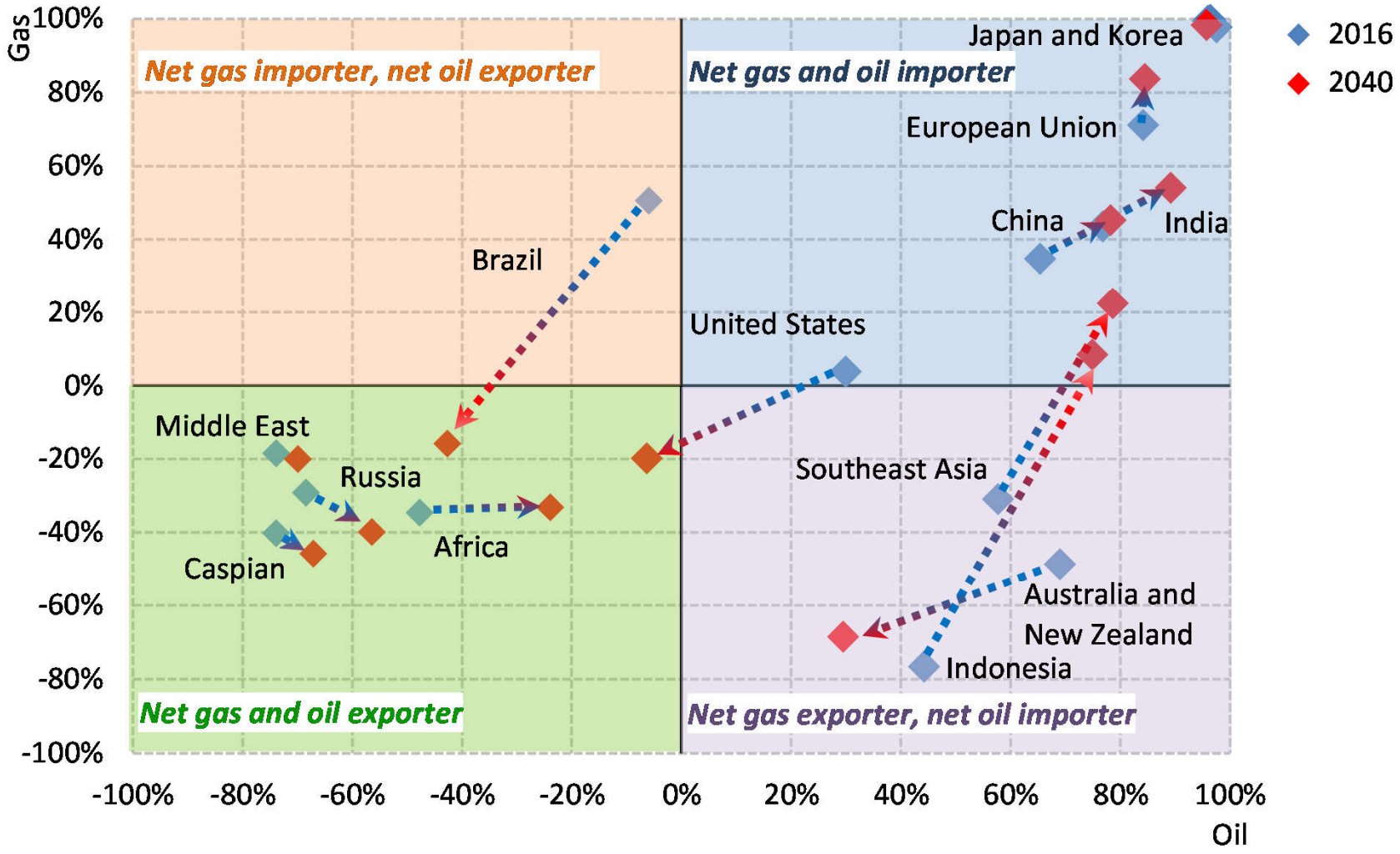
Nuclear Icebraker, ”Arktika”

# China to build "Polar Silk Road" in Arctic: whitepaper

# Blue Print for North East Asia Gas & Pipeline Infrastructure: Dr. Hirata's Concept



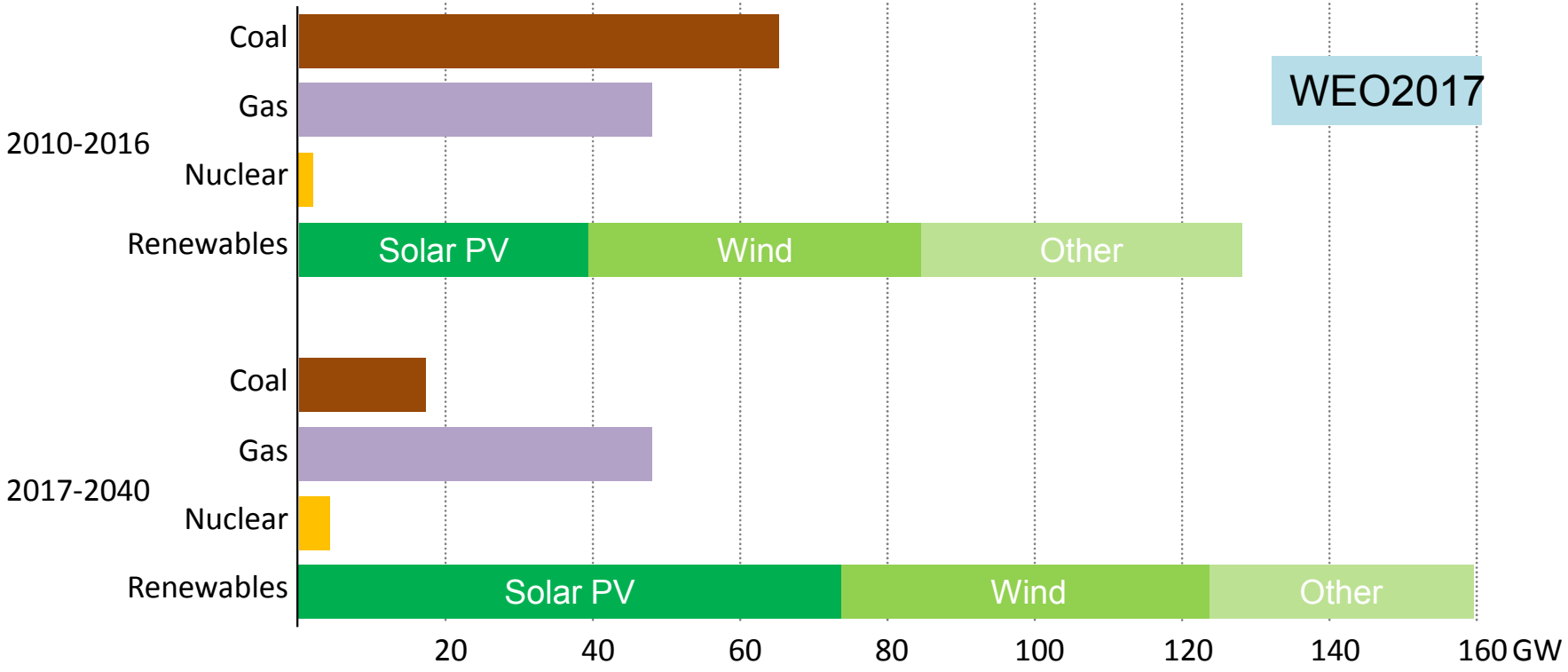
# Geopolitics of the Shale Revolution: Strategic Positioning of Oil/Gas exporters and importers




IEA WEO2017 basis

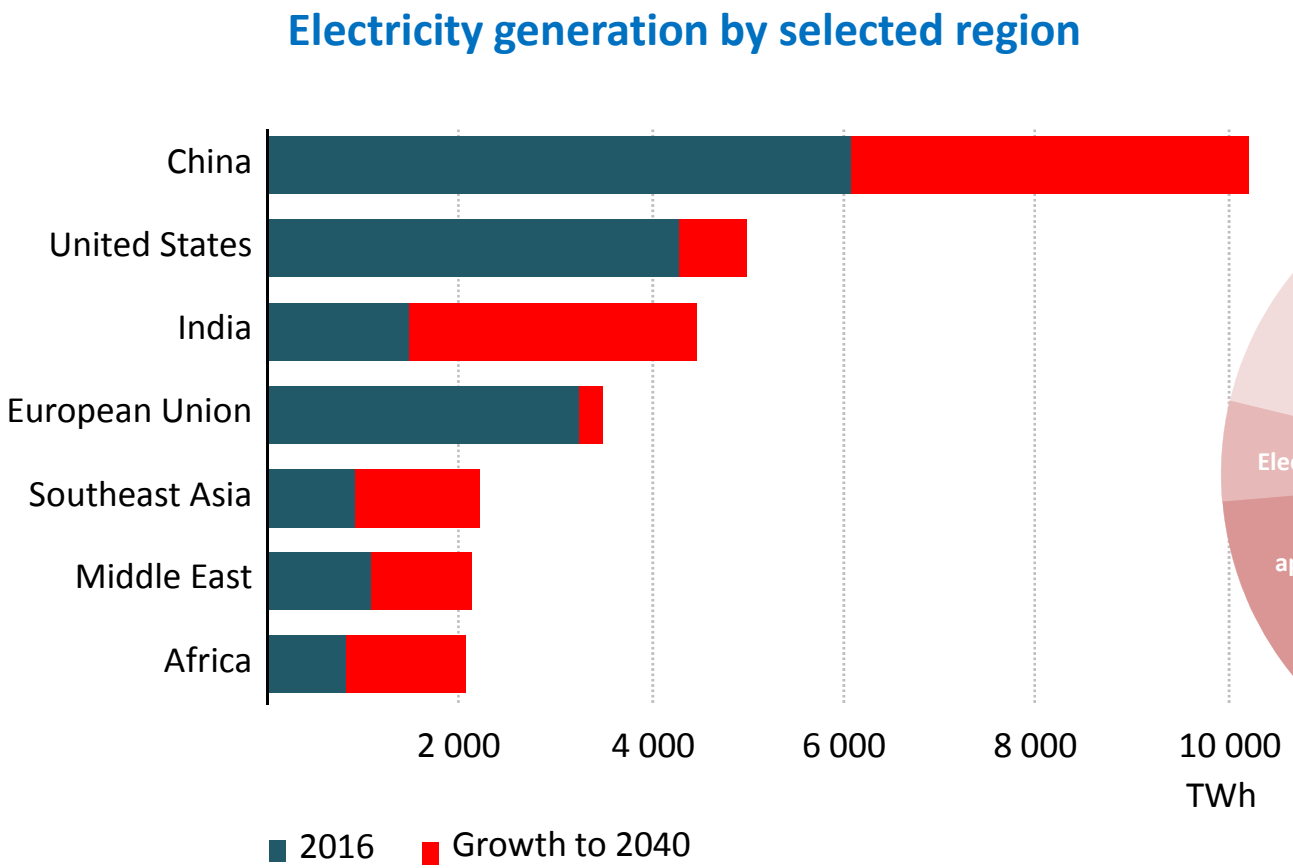
# Solar PV forges ahead in the global power mix

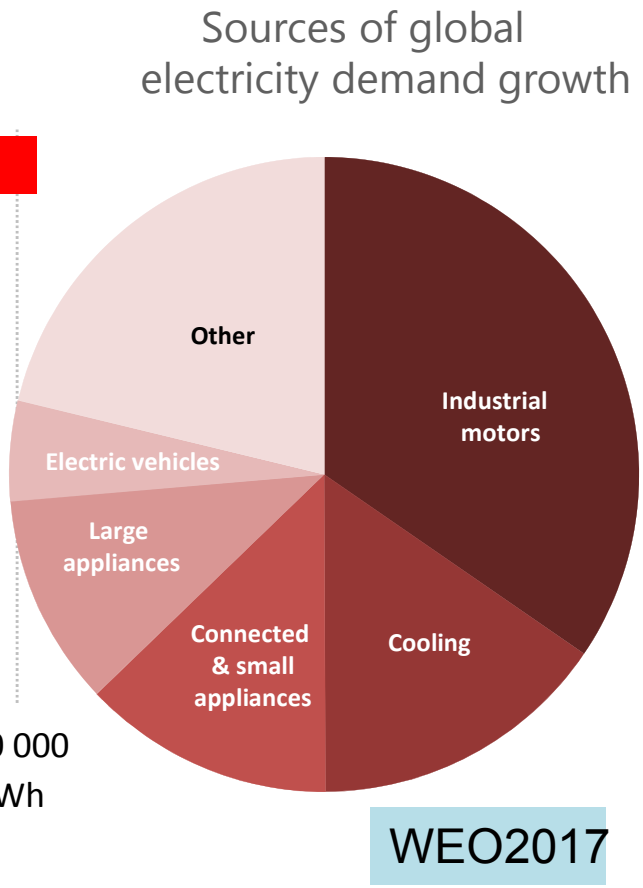
**Global average annual net capacity additions by type**




***China, India & the US lead the charge for solar PV, while the EU is a frontrunner for onshore & offshore wind: rising shares of solar & wind require more flexibility to match power demand & supply***

# The future is electrifying




*India adds the equivalent of today's European Union to its electricity generation by 2040, while China adds the equivalent of today's United States*

# Renewables will dominate power capacity additions

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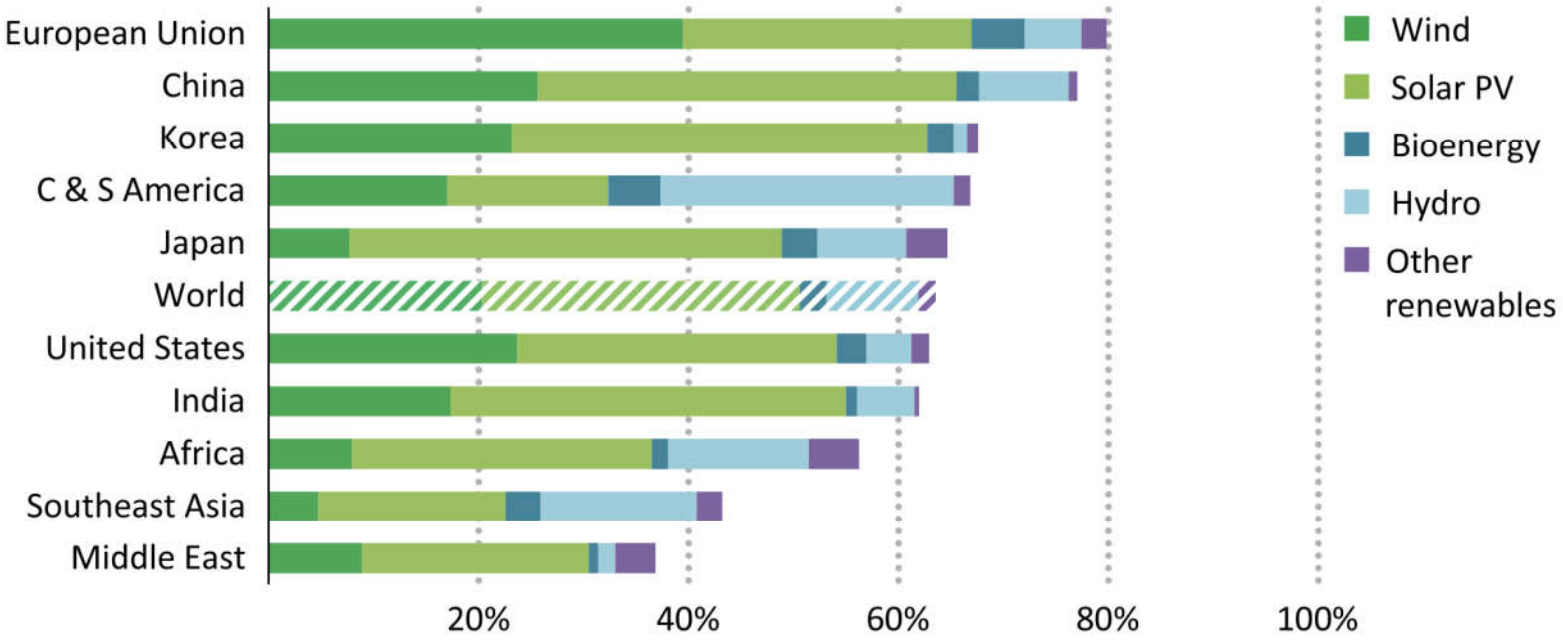
**Figure 8.14 ▷ Share of renewables in total gross capacity additions by region in the New Policies Scenario, 2018-2040**

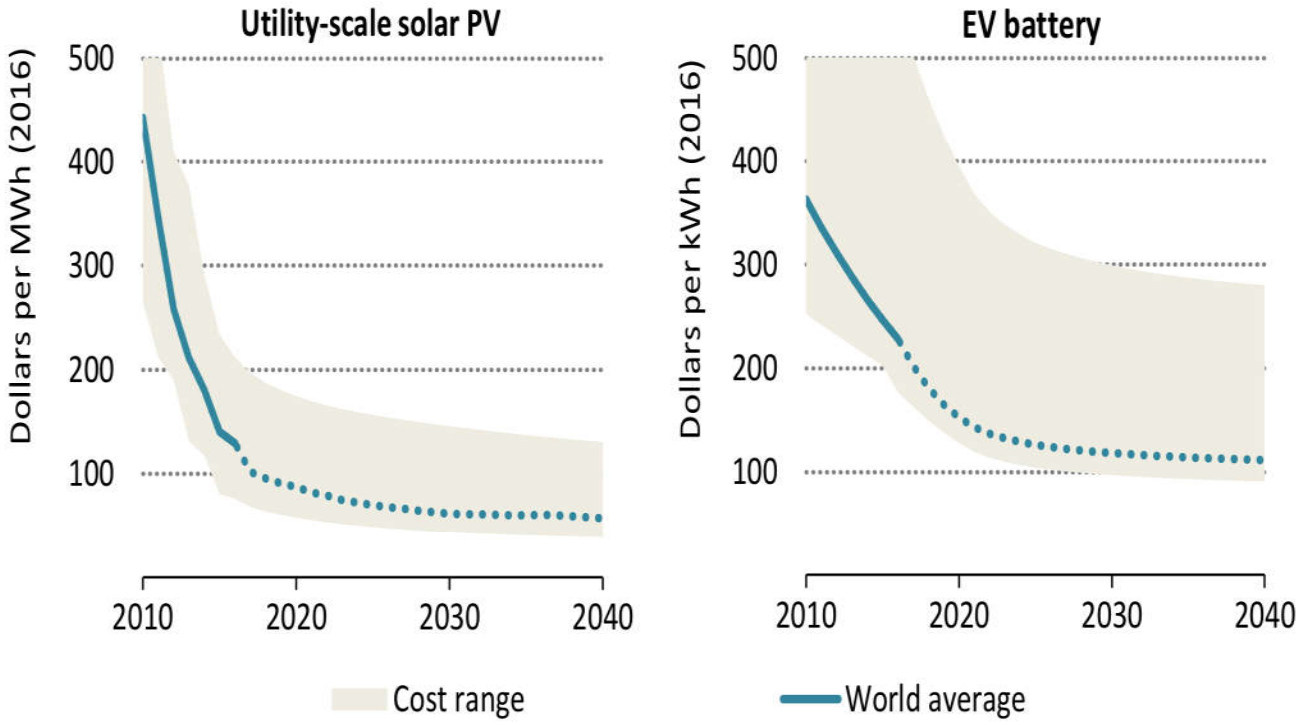



*Renewables dominate capacity additions in most regions of the world, propelled by new solar PV and wind power installations*

Note: C & S America = Central and South America.

# Cost of Solar PV and EV battery

**Figure 1.8 ▷** Evolution of global average cost for selected technologies in the New Policies Scenario




*Reductions in costs of key technologies continue to give strong impetus to the energy transition*

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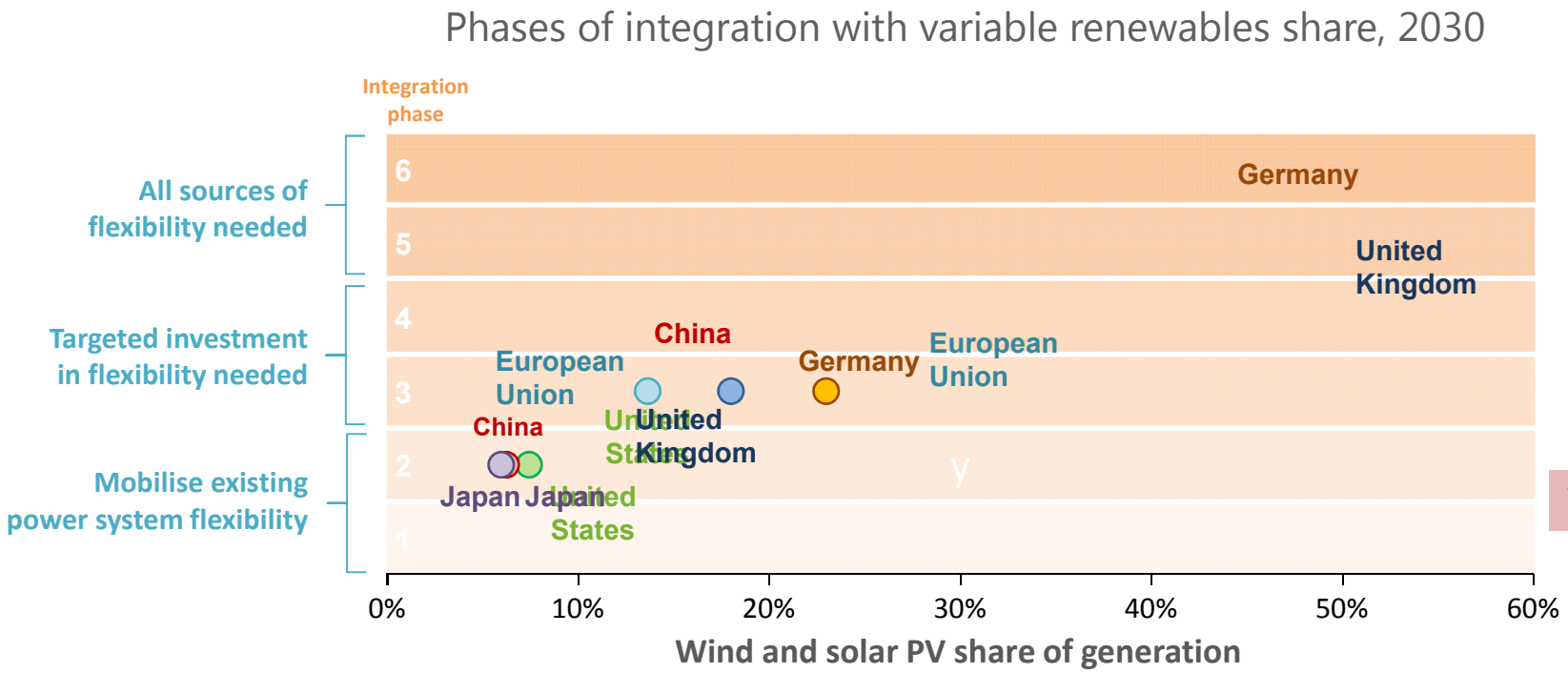
# Flexibility: the cornerstone of tomorrow's power systems

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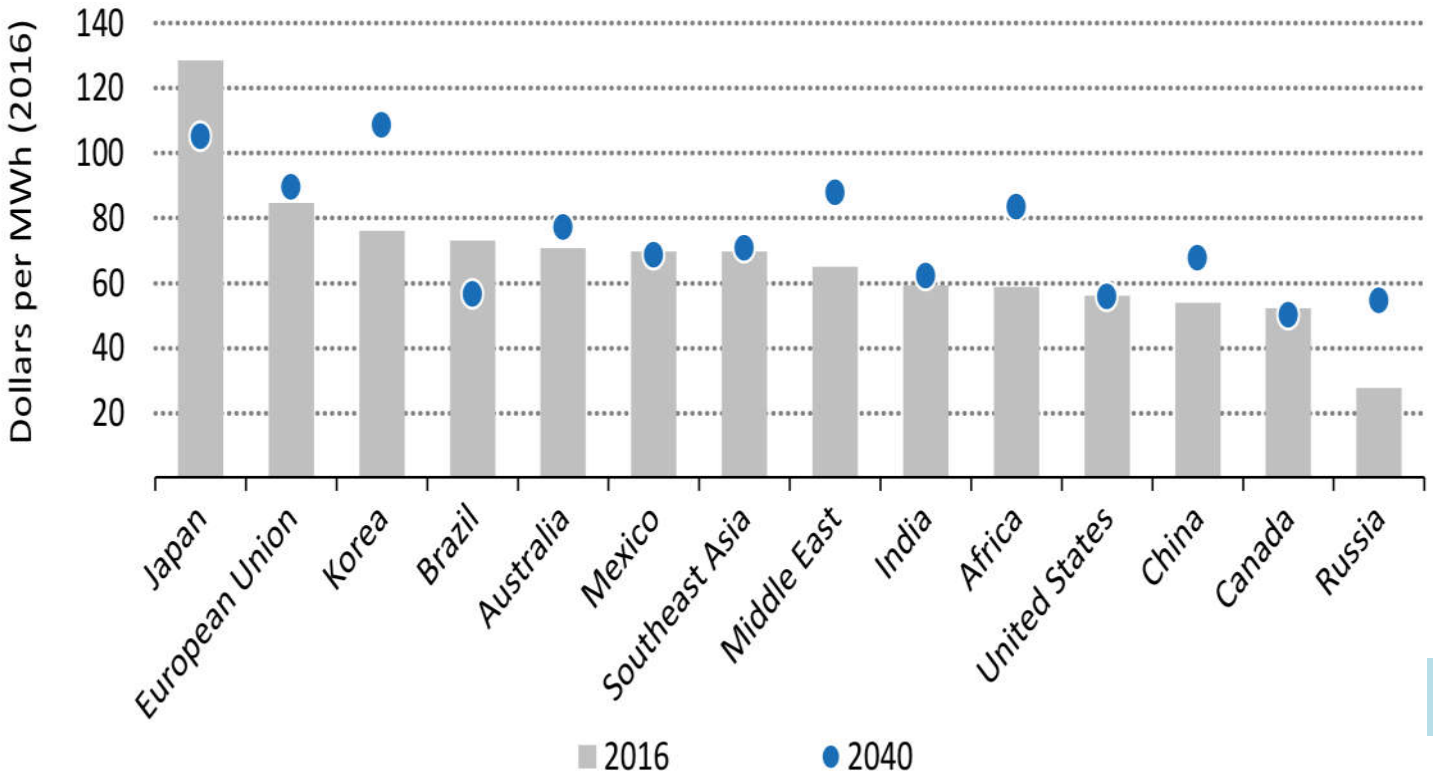
***Higher shares of variable renewables raise flexibility needs and call for reforms to deliver investment in power plants, grids & energy storage, and unlock demand-side response***

# Average Costs of Power Generation

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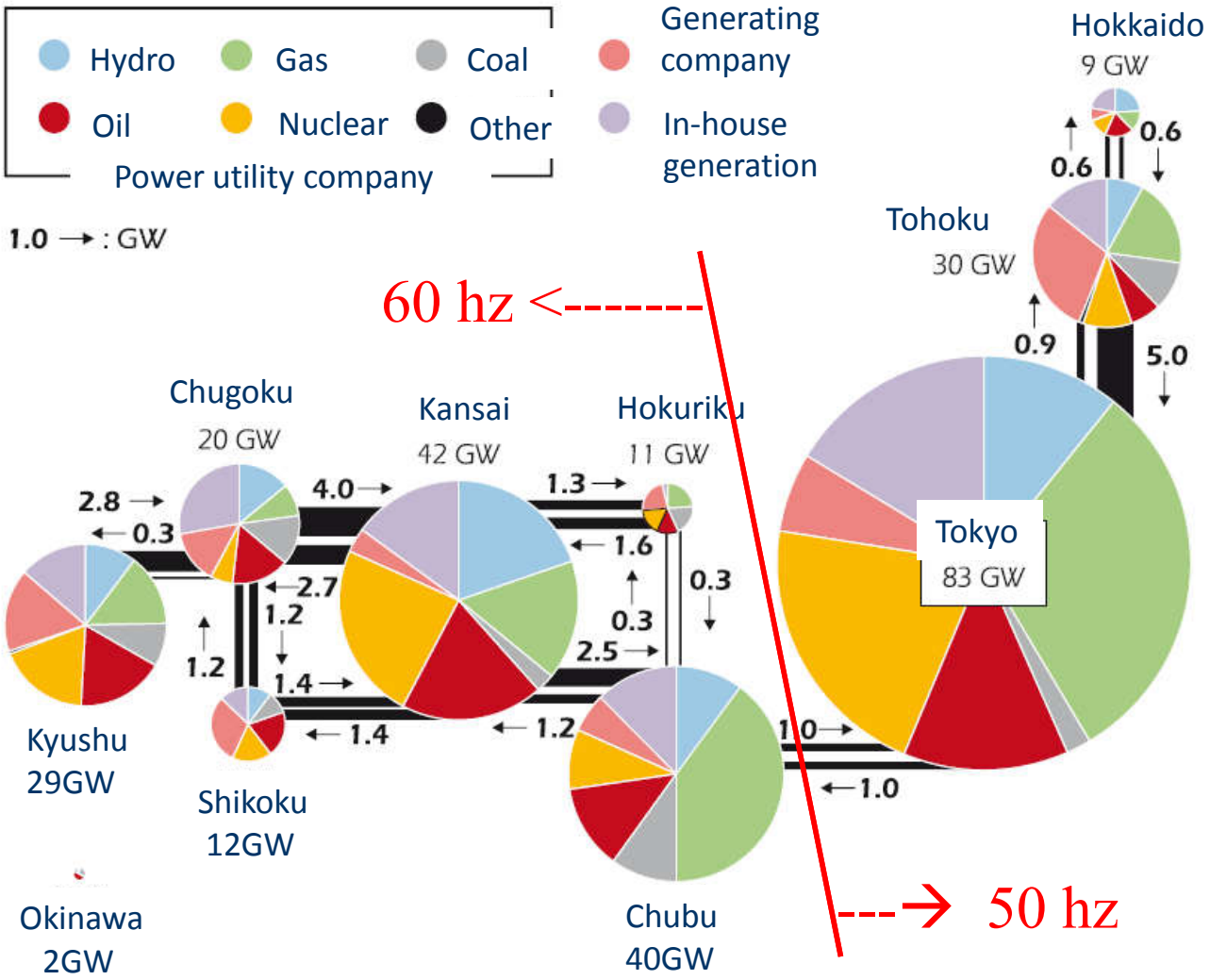
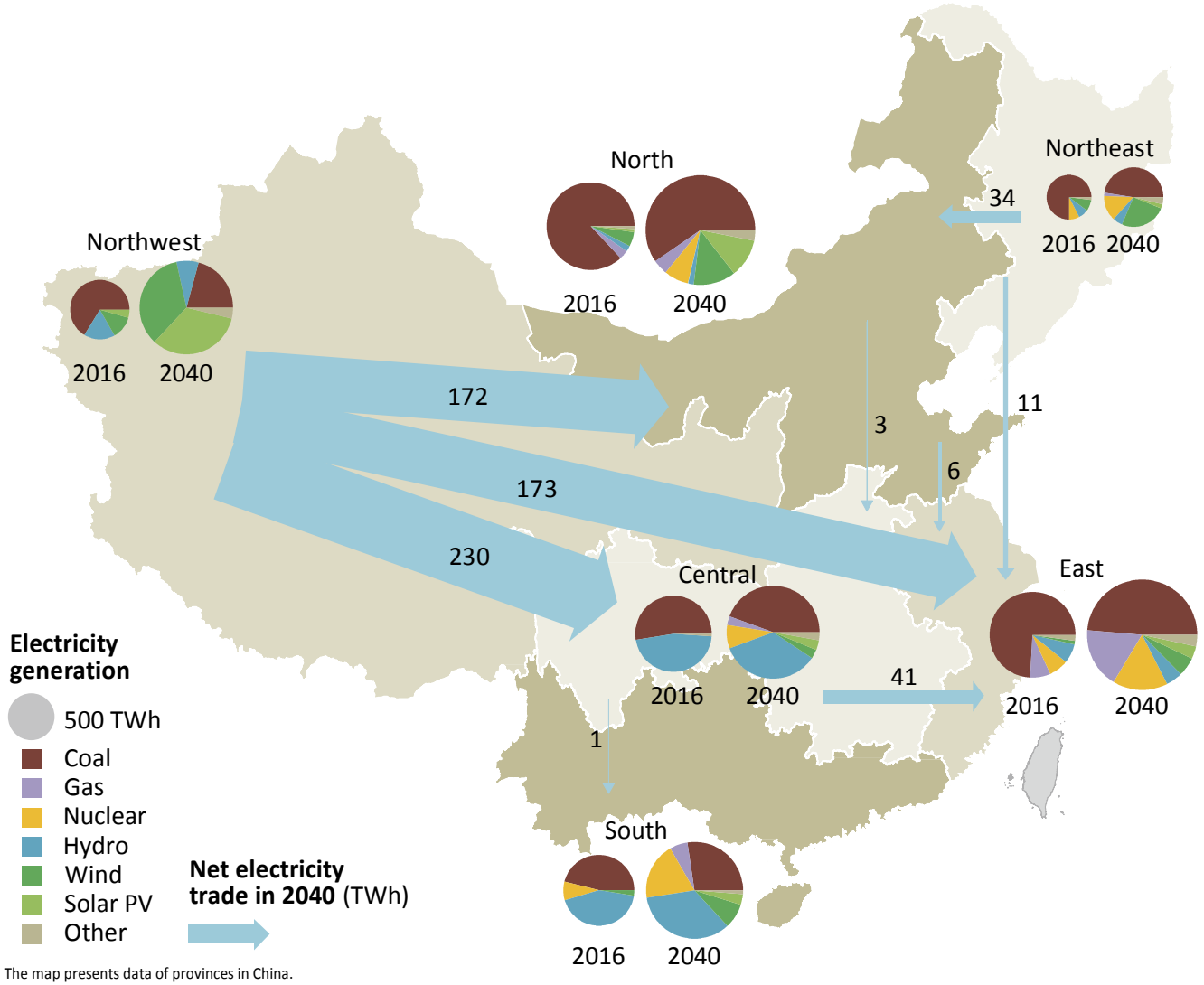
*Average power generation costs are $50-80/MWh in most regions today, and most increase over time in the New Policies Scenario*

# Lack of Grid connectivity 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

## Figure 13.23 ▯ China electricity generation mix by region and net electricity trade flows in the New Policies Scenario




The map presents data of provinces in China.
This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

*The Northwest and Northeast regions become the major exporters of electricity, supplying a mix of renewables-based and fossil-fuelled generation to the East and Central regions*

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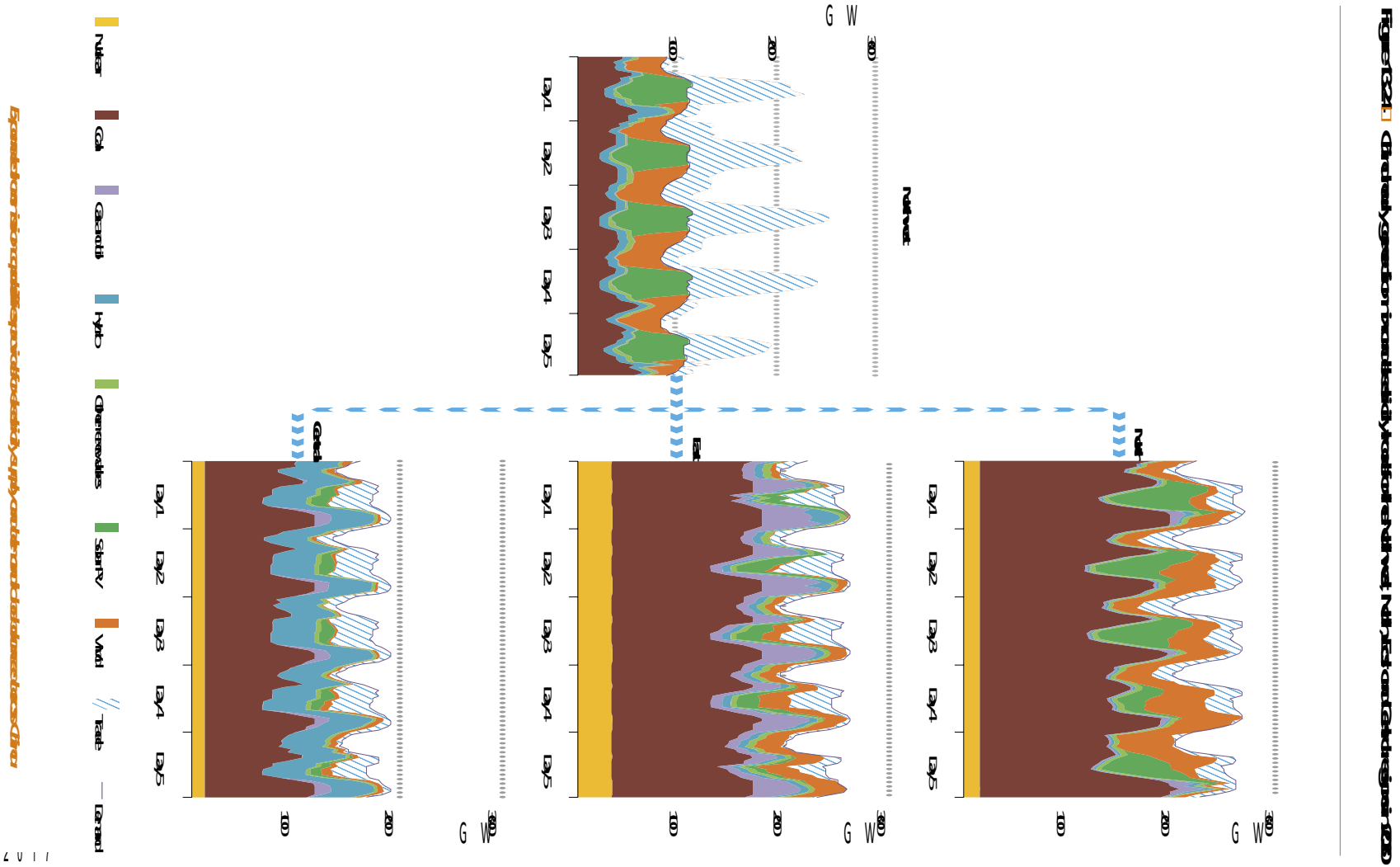
# Balancing Power Supply and Demand in China





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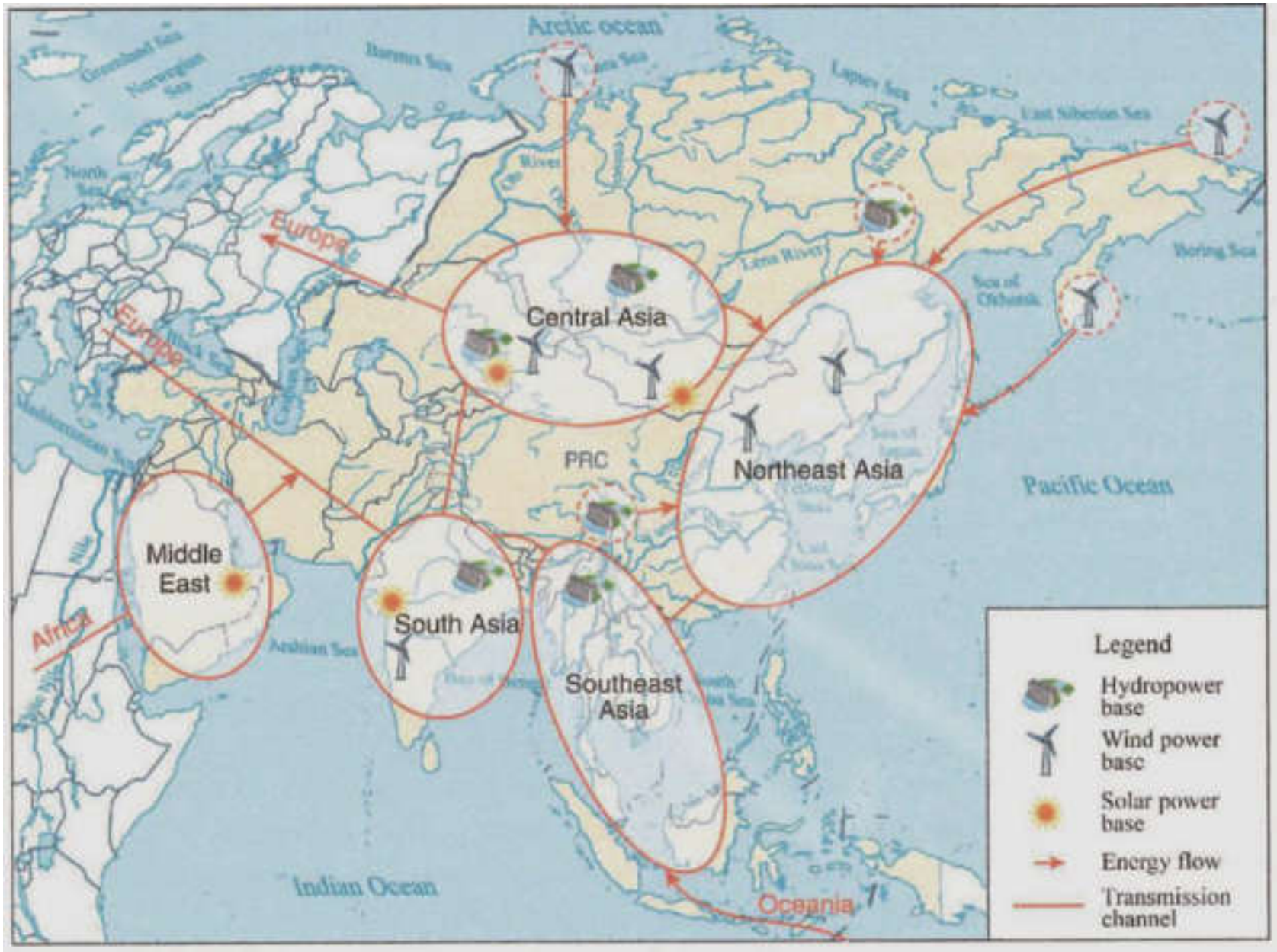
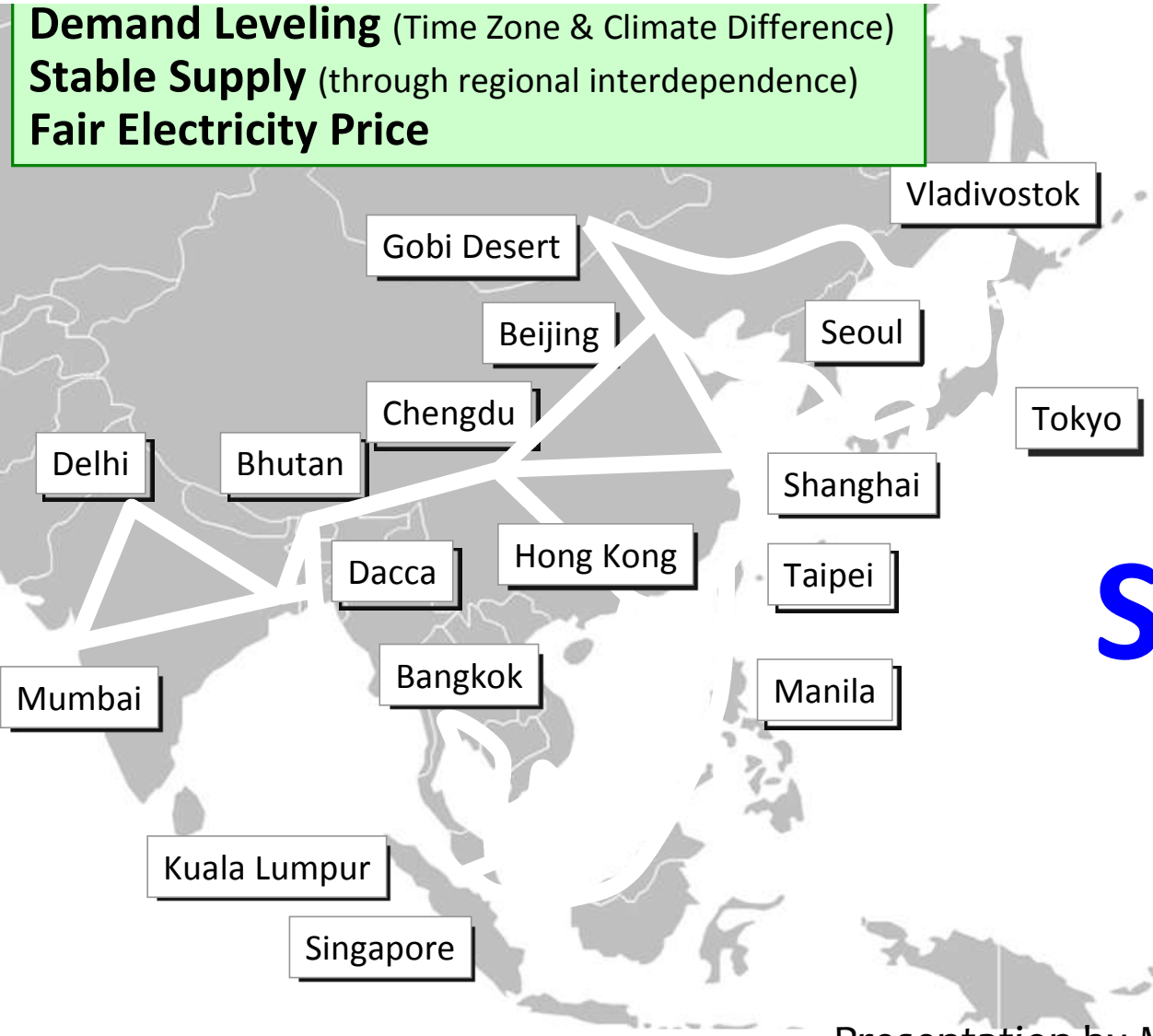
# Global Energy Interconnection/ GEIDCO by State Gri



# “Energy for Peace in Asia” New Vision?

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



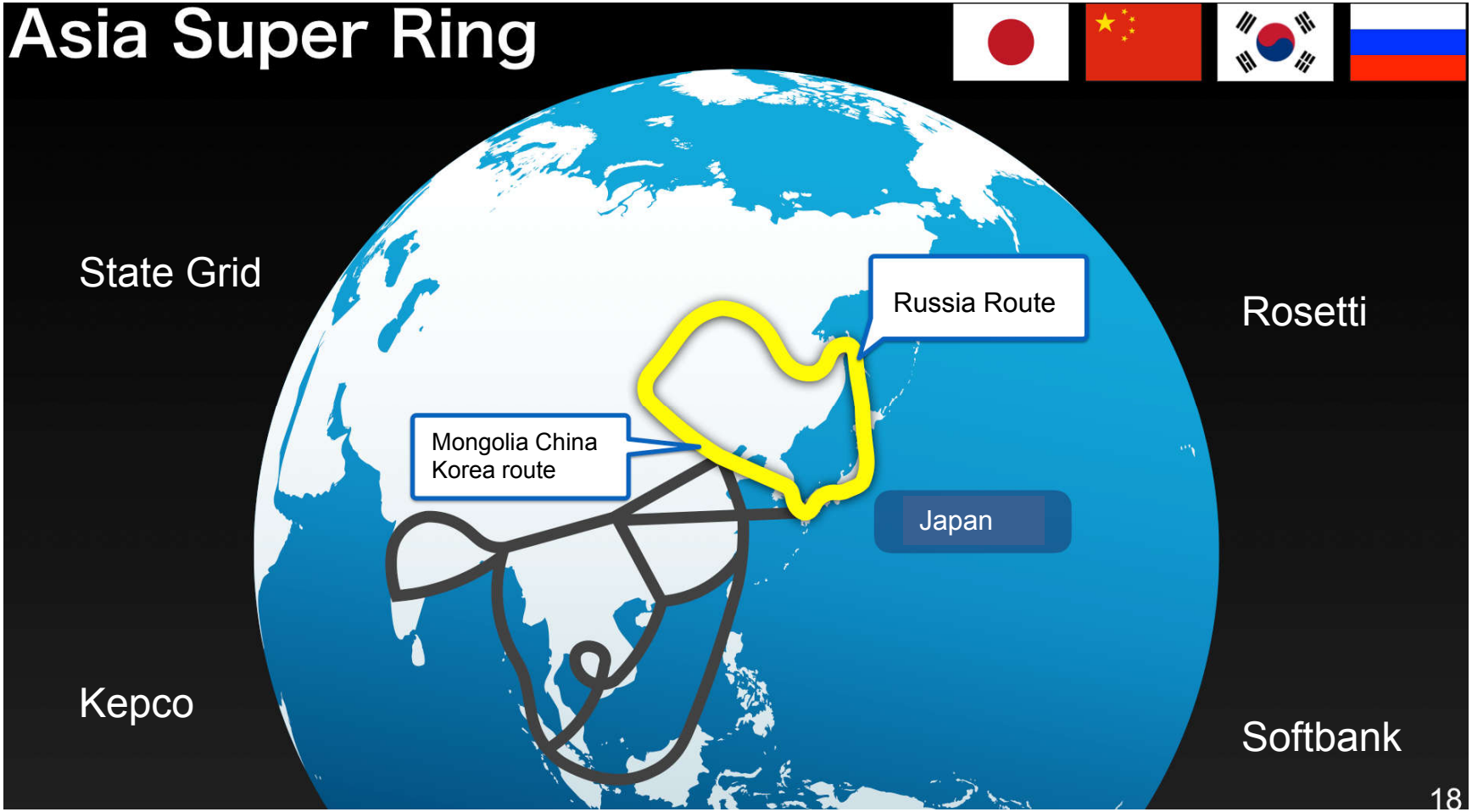

Phase 3

## Asia Super Grid

**Total 36,000km**

Presentation by Mr. Masayoshi SON

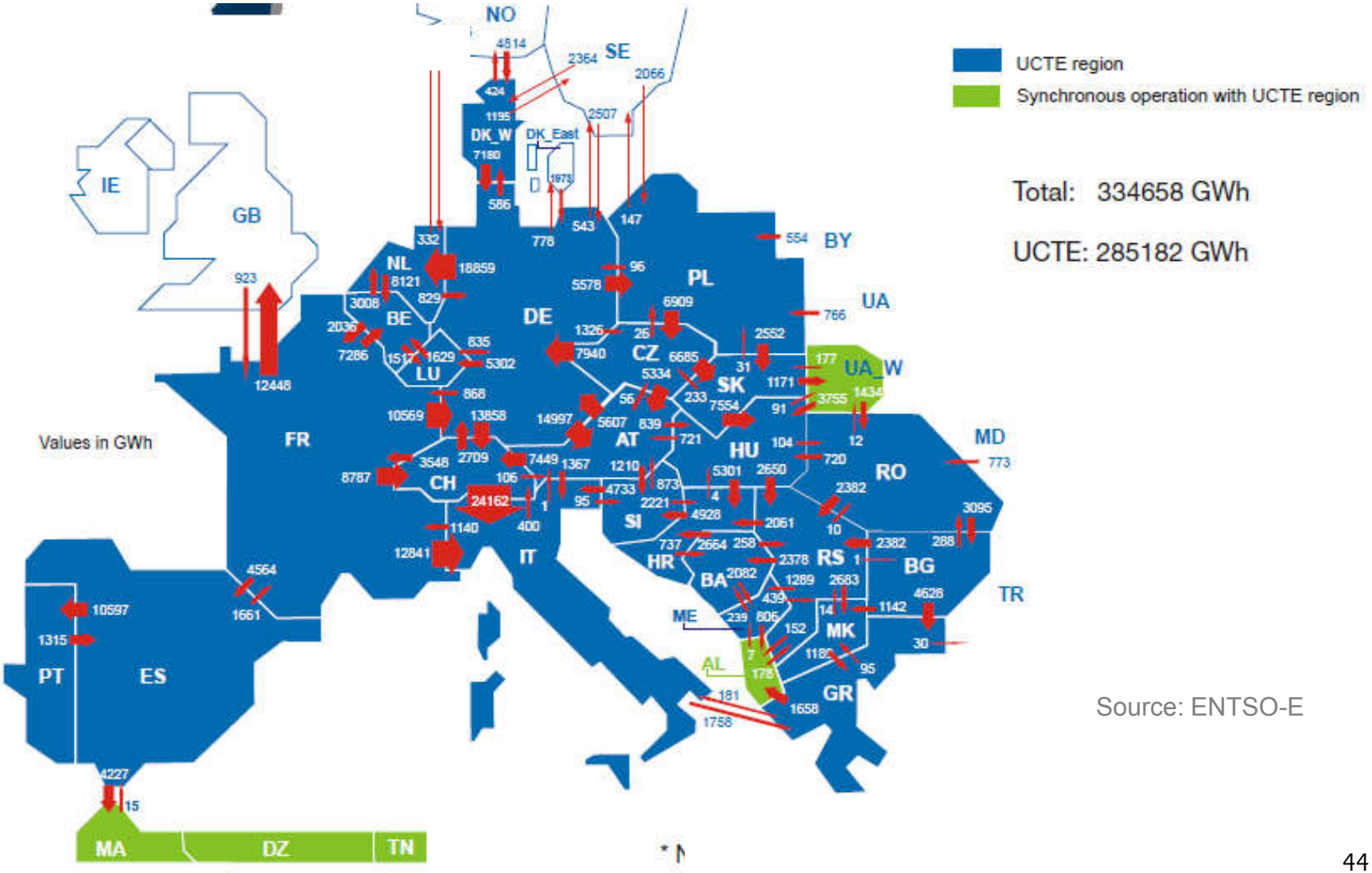
# Asia Super Ring



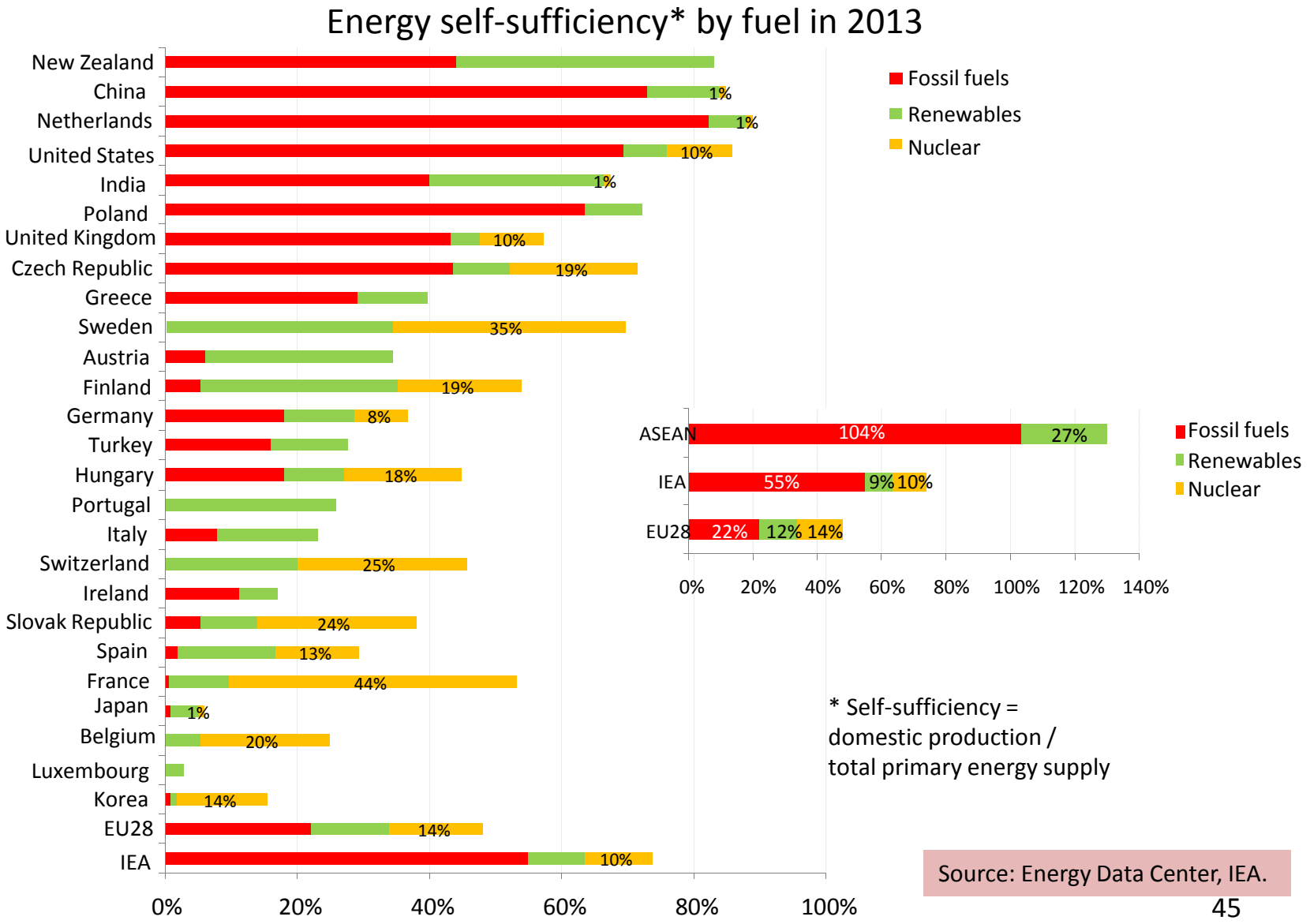

Masayoshi SON's proposal

# Power Grid Connection in Europe: Collective Energy Security and Sustainability

**Physical energy flows between European countries, 2008 (GWh)**



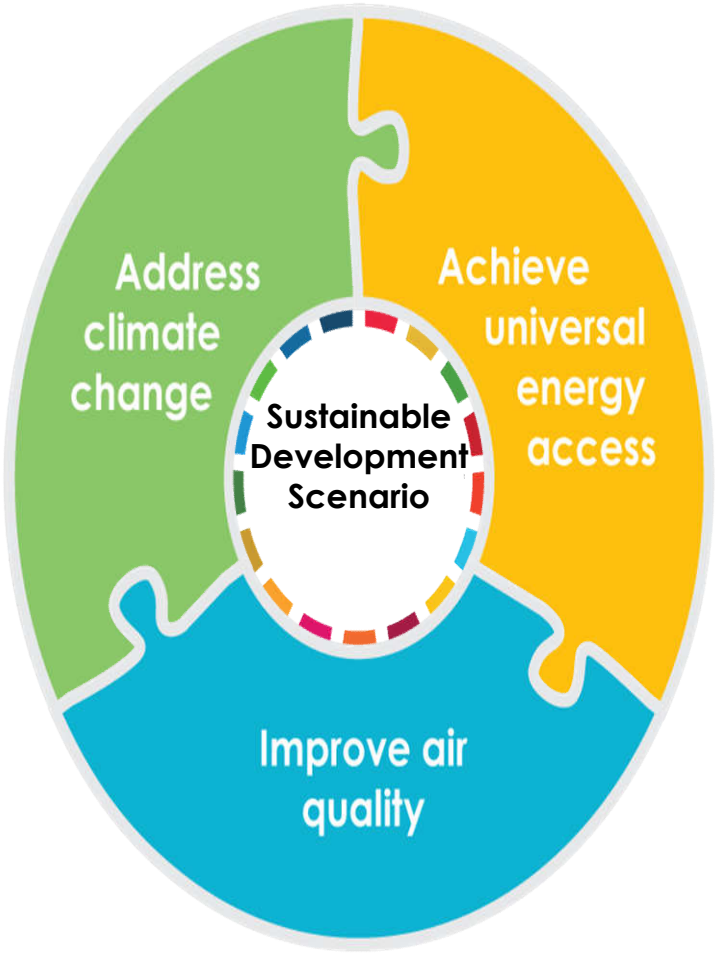
# Collective Energy Security and Sustainability by Diversity, Connectivity and Nuclear

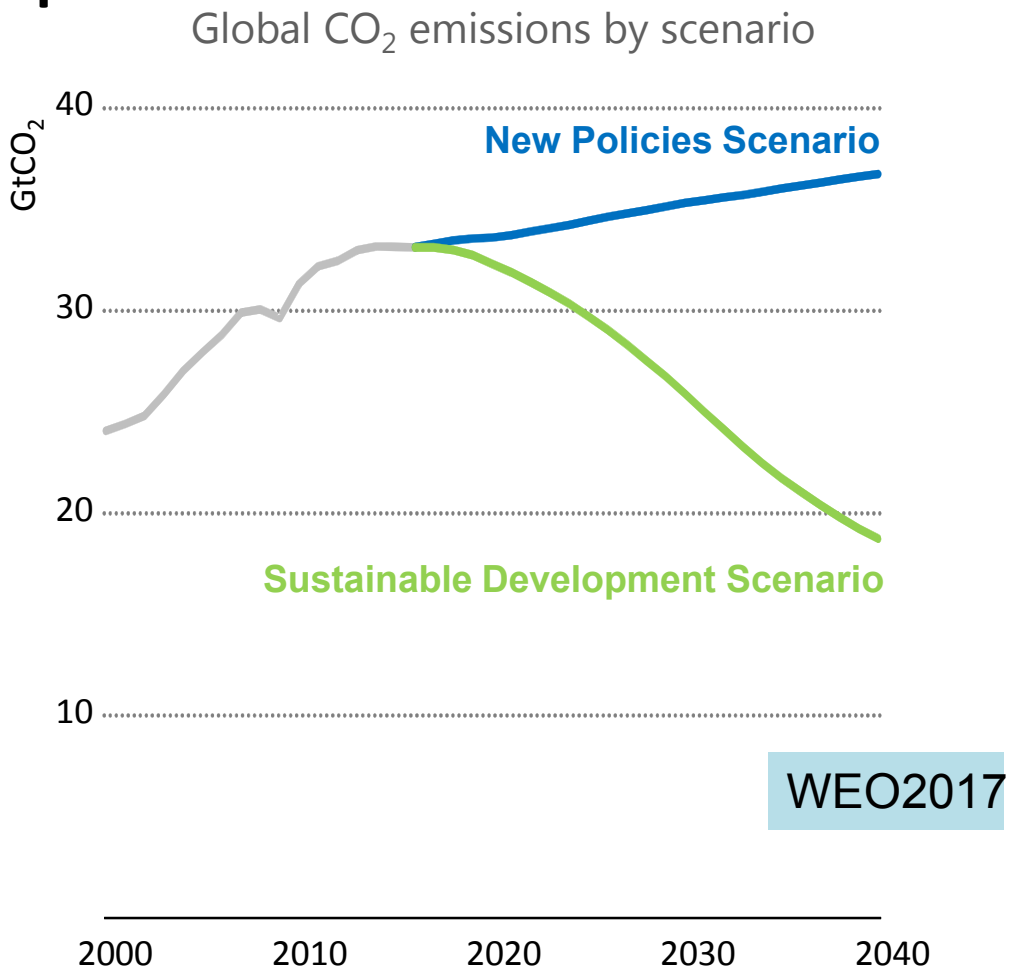



Source: Energy Data Center, IEA.

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

# A new strategy for energy & sustainable development




*The Sustainable Development Scenario reduces $CO_2$ emissions in line with the objectives of the Paris Agreement, while also tackling air pollution and achieving universal energy access. It needs doubling the level of energy efficiency, 900 million EVs, 3250 GW of solar PV.*

# RE100 Corporations

156 RE100 companies have made a commitment to go '100% renewable'.

**Finance(40):** Swiss Re Group, alstria, Amalgamated Bank, Aviva, AXA, Bank of America, Bankia, BBVA, British Land, CaixaBank, Canary Wharf Group, Capital One, Citi, Commerzbank, Credit Agricole, Danske Bank, DBS Bank Ltd, DNB, Equinix, Fifth Third Bancorp, Fuyo General Lease Co., Ltd., Goldman Sachs, Helvetia, HSBC, ING Group, Iron Mountain Incorporated, Johnan Shinkin Bank, JPMorgan Chase & Co., Jupiter Asset Management, Land Securities, Mace, Morgan Stanley, Nordea, Prudential plc, RBS group, Schroders, TD Bank, UBS, Voya Financial, Wells Fargo

**Durable Goods and Services (32):**IKEA Group, AEON Co., Ltd, **BMW**, Burberry, Coop Sapporo, Crown Estate, Daiwa House Group, Decathlon, Dentsu Aegis Network, Etsy, FIA Formula E, **General Motors**, Gürmen Group, H&M, Interface, Kingspan, LEGO Group, Mahindra Holidays & Resorts India, Marks & Spencer, Marui Group, Nike, Inc., Pearson, PVH, Sekisui House, Signify, Sky, Starbucks, Tata Motors Limited, Vail Resorts, VF Corporation, Watami Co., Ltd., YOOX Group

**Non-Durables and Services (24):** Anheuser-Busch InBev, Califia Farms, Carlsberg Group, Clif Bar & Company, Coca-Cola Enterprises, Colruyt Group, Danone, Diageo, Estée Lauder Companies, Grupo Bimbo, Hatsun Agro Products Ltd, International Flavors and Fragrances Inc., Kellogg, L'OCCITANE Group, Mars, Incorporated, Nestle, Organic Valley, Procter & Gamble, Reckitt Benckiser (RB), TCI Co., Ltd, Tesco, TRIDL, Unilever, Walmart

**Technology(21):** Adobe, **Apple**, Autodesk, eBay, **Facebook**, Fujitsu, **Google**, Hewlett Packard Enterprise, HP, Inc., Infosys, Lyft, **Microsoft**, Rackspace, RICOH Company, Ltd., Salesforce, SAP, **Sony Corporation** , Visa, VMWare, WeWork, Workday

**Other Services(17)** ASKUL Corporation, Bloomberg, BROAD Group, ENVIPRO HOLDINGS Inc., Gatwick Airport Limited, Heathrow Airport, IHS Markit, La Poste, McKinsey & Company, PwC, RELX Group, SAVE S.p.A Group, Schneider Electric, SGS, Steelcase, Swiss Post, Vaisala

**Material(8):** AkzoNobel, Corbion, Dalmia Cement, Elion Resources Group, Elopak, Givaudan, Royal DSM, Tetra Pak

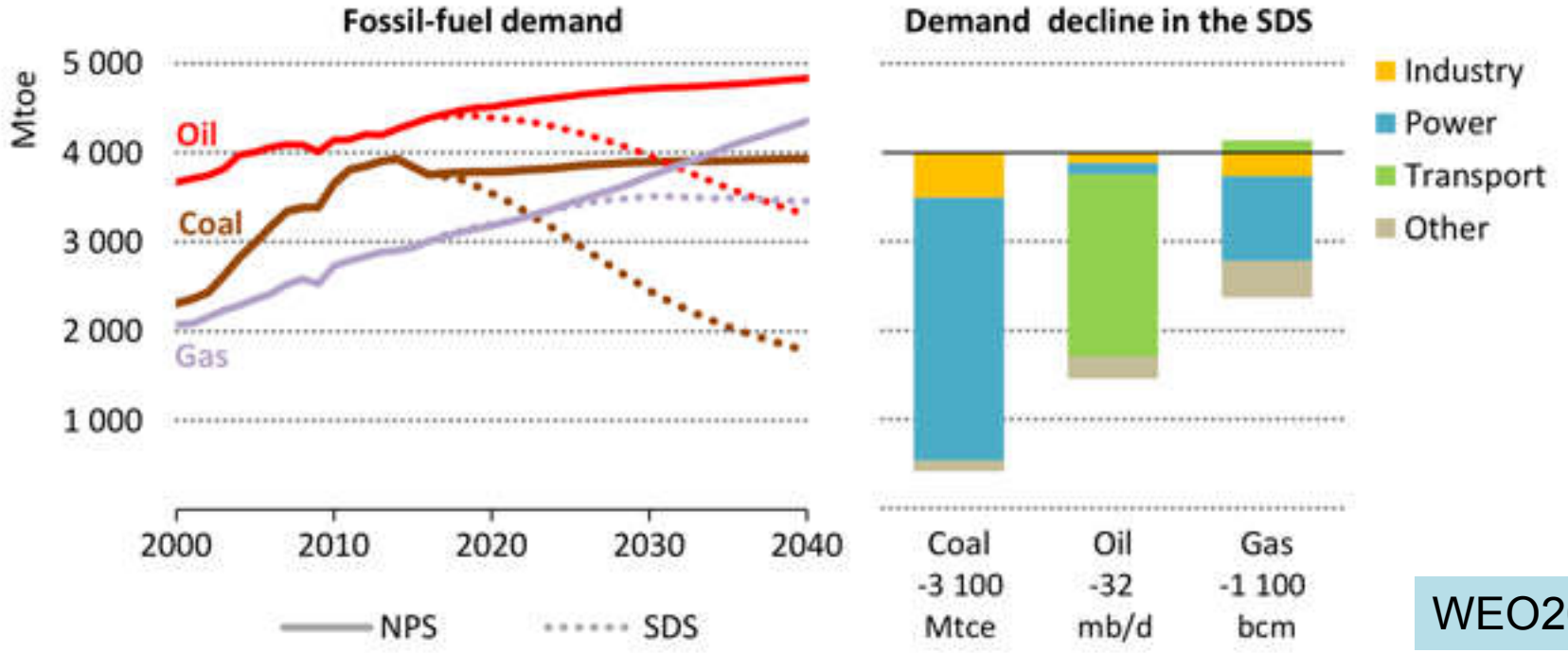
**Telecom Services(6)**: BT Group, KPN, Proximus, Telefonica S.A., T-Mobile US, Inc., Vodafone Group

Health care(5): AstraZeneca, Biogen, Johnson & Johnson, Novo Nordisk, Royal Philips

**Energy(1)**: Vestas

# Saudi Aramco is worrying about Peak Demand of Oil by EV.

**Figure 3.18** ▷ **Fossil-fuel demand by scenario and decline by sector in the Sustainable Development Scenario relative to the New Policies Scenario, 2040**

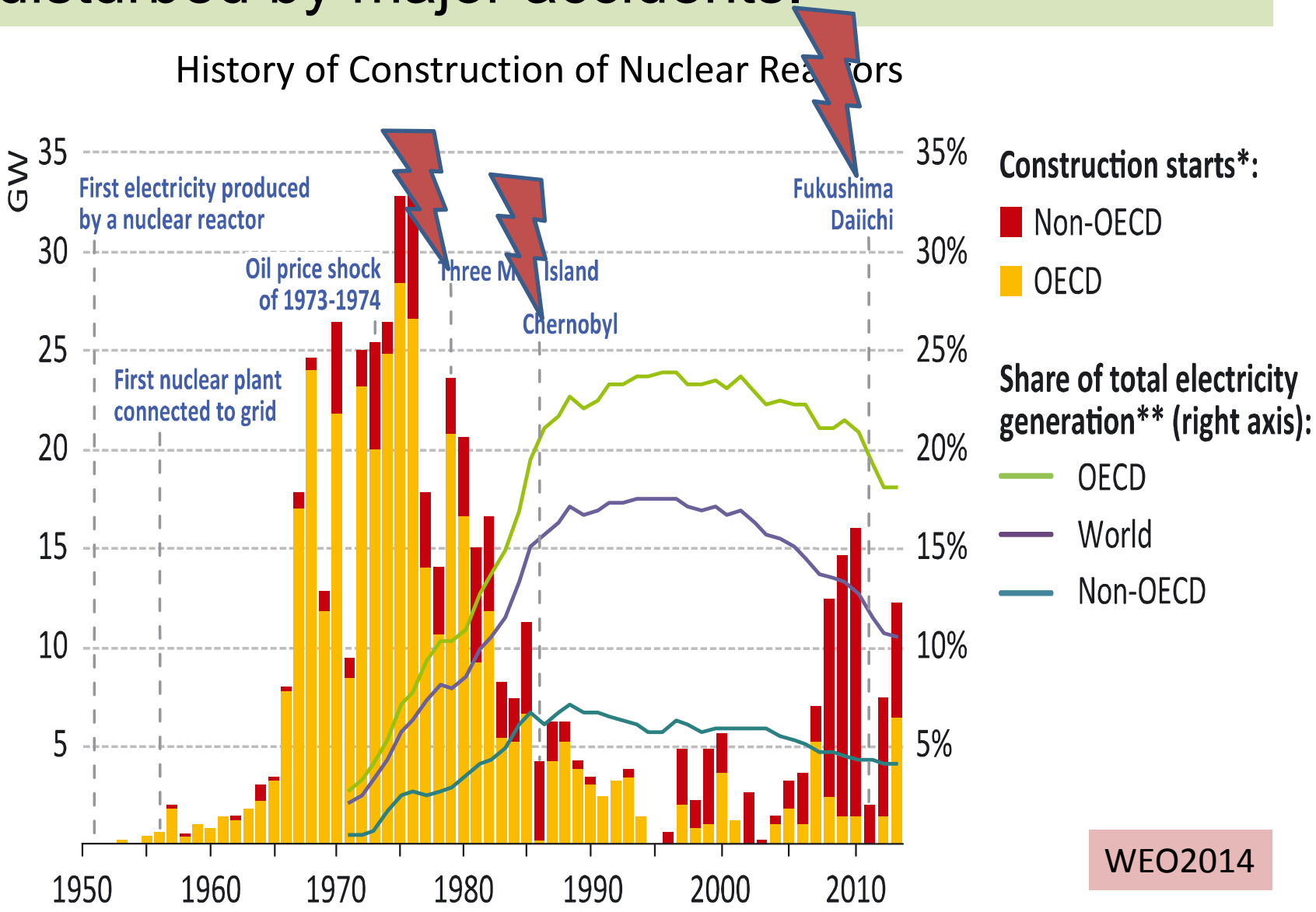



WEO2017

**The Stone Age didn't end because we ran out of stones.**

# PEACEFUL NUCLEAR POWER

# Nuclear Power development has been disturbed by major accidents.




WEO2014

# Does Japan desire to continue to be a tier-one nation, or is she content to drift into tier-two status?

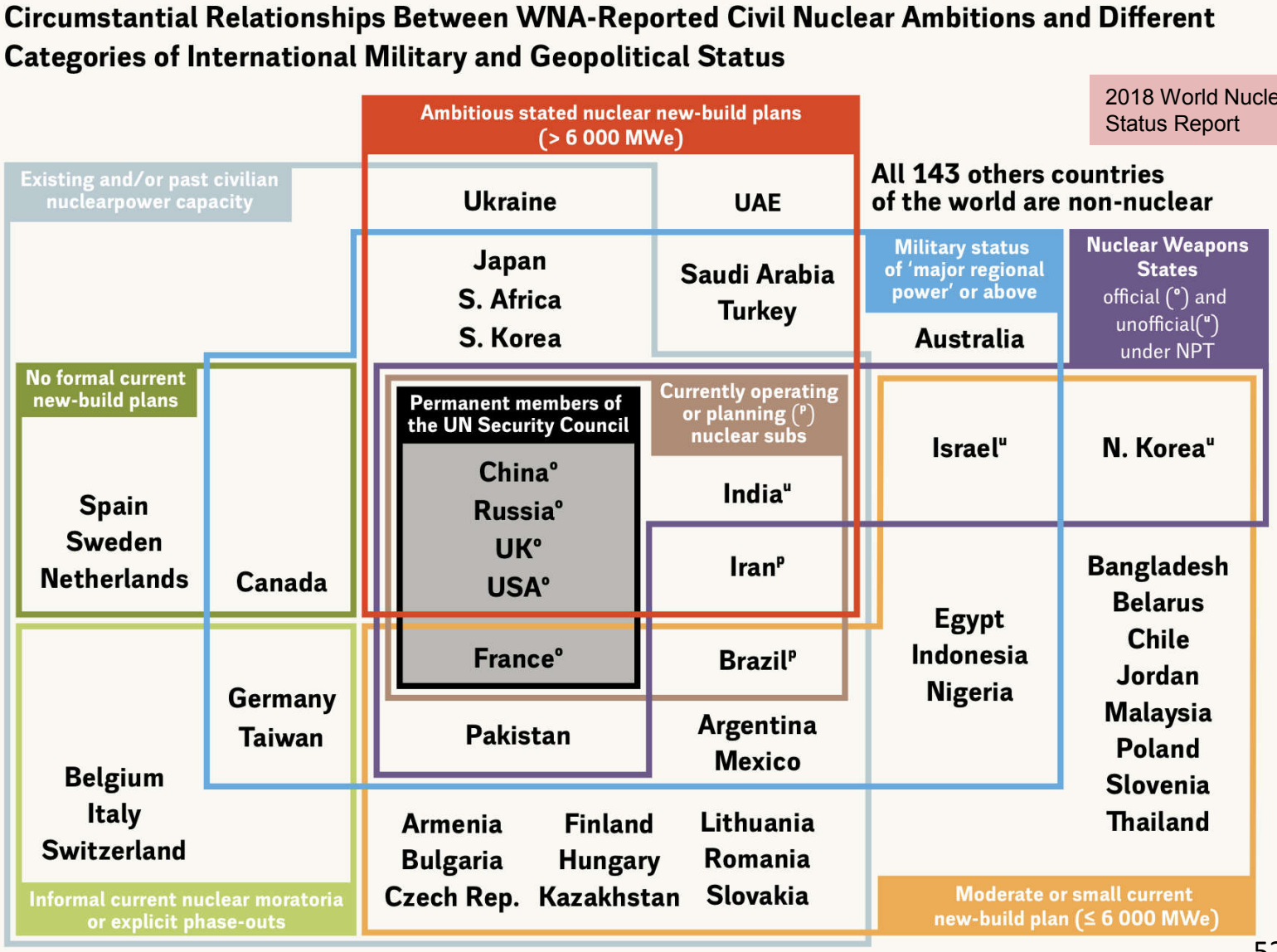
U.S.-Japan Alliance Report by Nye & Armitage (2012/8/10)

For such an alliance to exist, the United States and Japan will need to come to it from the perspective, and as the embodiment, of tier-one nations. In our view, tier-one nations have significant economic weight, capable military forces, global vision, and demonstrated leadership on international concerns. Although there are areas in which the United States can better support the alliance, we have no doubt of the United States' continuing tier-one status. For Japan, however, there is a decision to be made. Does Japan desire to continue to be a tier-one nation, or is she content to drift into tier-two status?

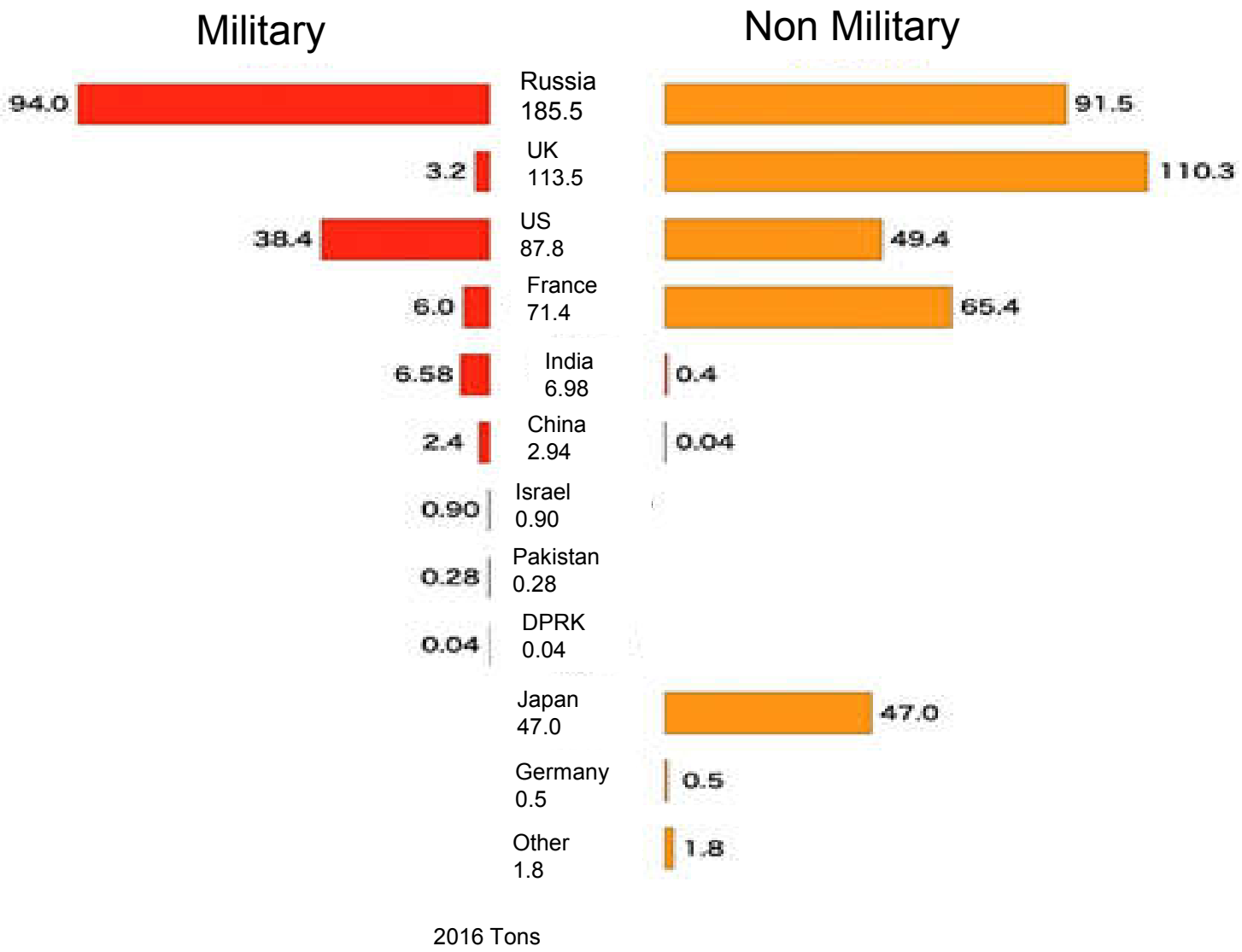
Energy Security

(Nuclear) Understandably, the Fukushima nuclear disaster dealt a major setback to nuclear power. The setback reverberated not only throughout Japan, but also around the world. Japan has made tremendous progress in boosting energy efficiency and is a world leader in energy research and development. While the people of Japan have demonstrated remarkable national unity in reducing energy consumption and setting the world's highest standards for energy efficiency, a lack of nuclear energy in the near term will have serious repercussions for Japan.

**Figure 32** | Circumstantial Relationships Between Reported Civil Nuclear Ambitions and Different Categories of International Military and Geopolitical Status (civil nuclear plans are based on WNA data)[715]



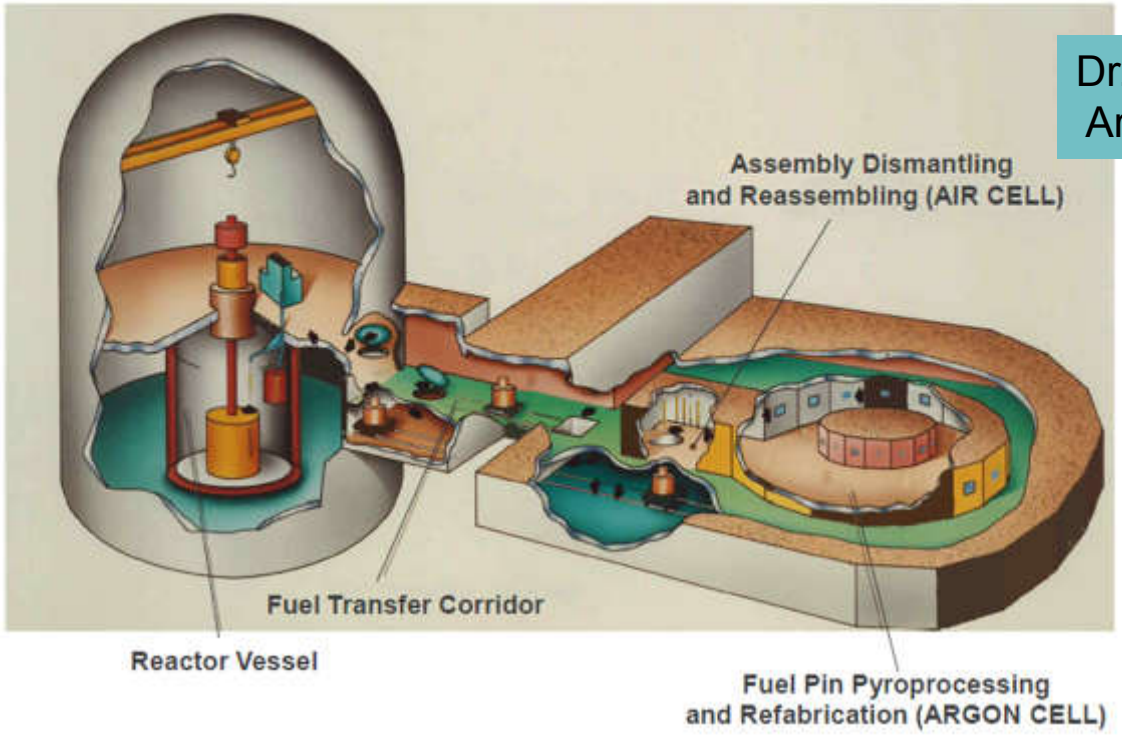
# Plutonium in the World




世界の分離プルトニウム保有量（長崎大学核兵器廃絶研究センターデータ）

# Time for Safer, Proliferation resistant and Easier Waste Management Paradigm: Integral Fast Reactor and Pyroprocessing

## Pyroprocessing was used to demonstrate the EBR-II fuel cycle closure during 1964-69




Dr. YOON IL CHANG
Argonne National Laboratory

IFR has features as Inexhaustible Energy Supply ,Inherent Passive Safety ,Long-term Waste Management Solution , Proliferation-Resistance , Economic Fuel Cycle Closure.
High level waste reduces radioactivity in 300 years while LWR spent fuel takes 100,000 years.

# Legend of Admiral Rickover: Success of LWR for nuclear submarine has crowded out Fast Reactors

# Statement by Dr. Takashi NAGAI after Nagasaki atomic bomb. "How to turn the devil to the fortune."

Dr. Takashi Nagai, a Professor at Nagasaki University in 1945 when the atomic bomb was dropped, exemplifies the resilience, courage and believe in science of the Japanese people. Despite having a severed temporal artery as a result of the bomb, he went to help the victims even before going home. Once he got home, he found his house destroyed and his wife dead. He spent weeks in the hospital where he nearly died from his injuries. But just months after the atom bomb dropped, he said:

"Everything was finished. Our mother land was defeated. Our university had collapsed and classrooms were reduced to ashes. We, one by one, were wounded and fell. The houses we lived in were burned down, the clothes we wore were blown up, and our families were either dead or injured. What are we going to say? We only wish to never repeat this tragedy with the human race. We should utilize the principle of the atomic bomb. Go forward in the research of atomic energy contributing to the progress of civilization. Devil will then be transformed to fortune.( Wazawai tenjite Fukutonasu) The world civilization will change with the utilization of atomic energy. If a new and fortunate world can be made, the souls of so many victims will rest in peace."