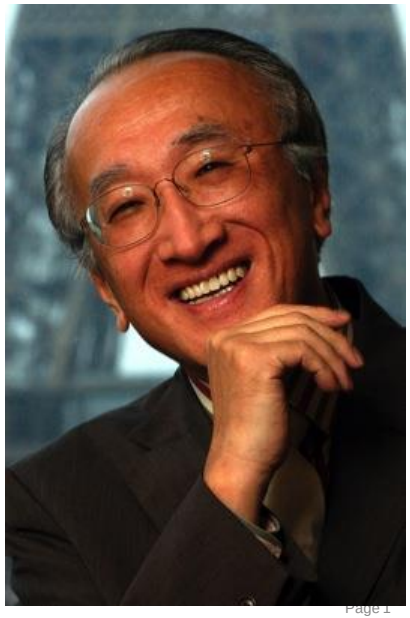
Global Energy and Climate Crises: Winners and losers

How can Japan and Korea make a winning team with the U.S.

2025-1-16 Alaska Arctic Symposium



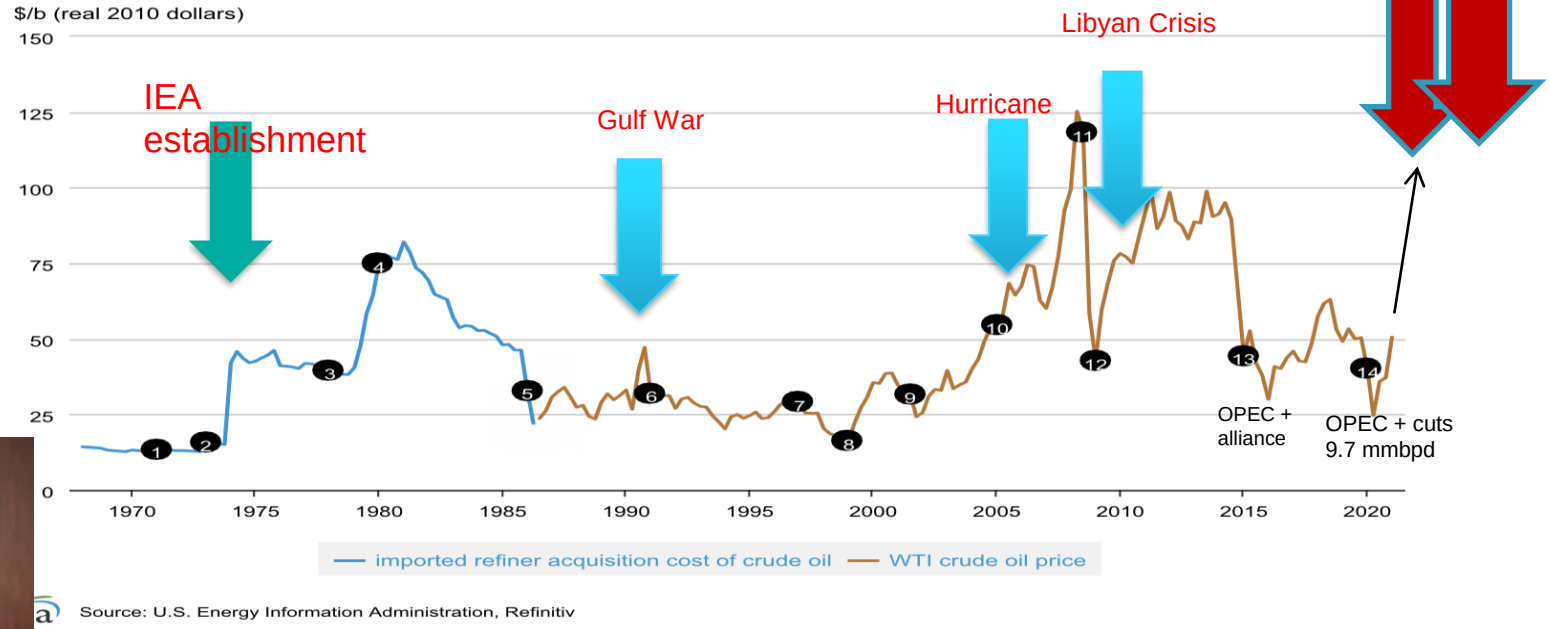
Nobuo TANAKA　**田中伸男**

Executive Director Emeritus, International Energy Agency (IEA)
Chair, Steering committee of Innovation for Cool Earth Forum (ICEF)

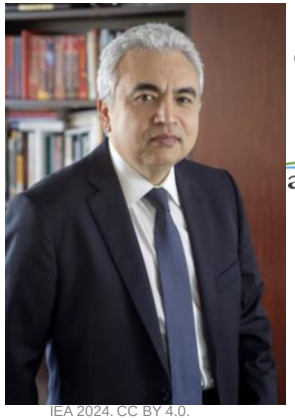
IEA was established for the 1973 Oil Shock

Ukraine I & II

IEA's mission is energy security : it released the Strategic Petroleum Reserve Five times.

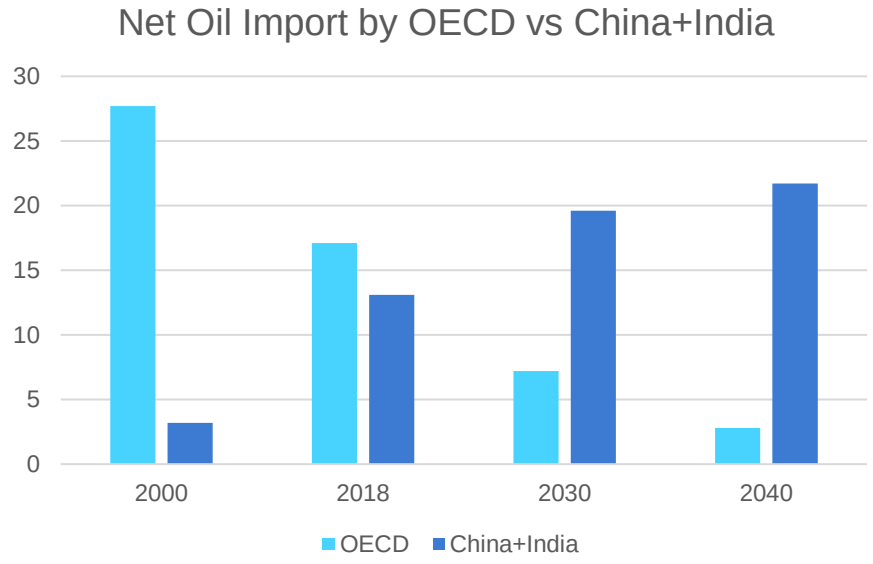


Source: U.S. Energy Information Administration, Refinitiv



Dr. Fatih Birol, Executive Director of IEA says that we are in the middle of the "first truly global energy crisis".

Net oil imports of selected countries in the Stated Policy Scenario (mb/d) WEO2019

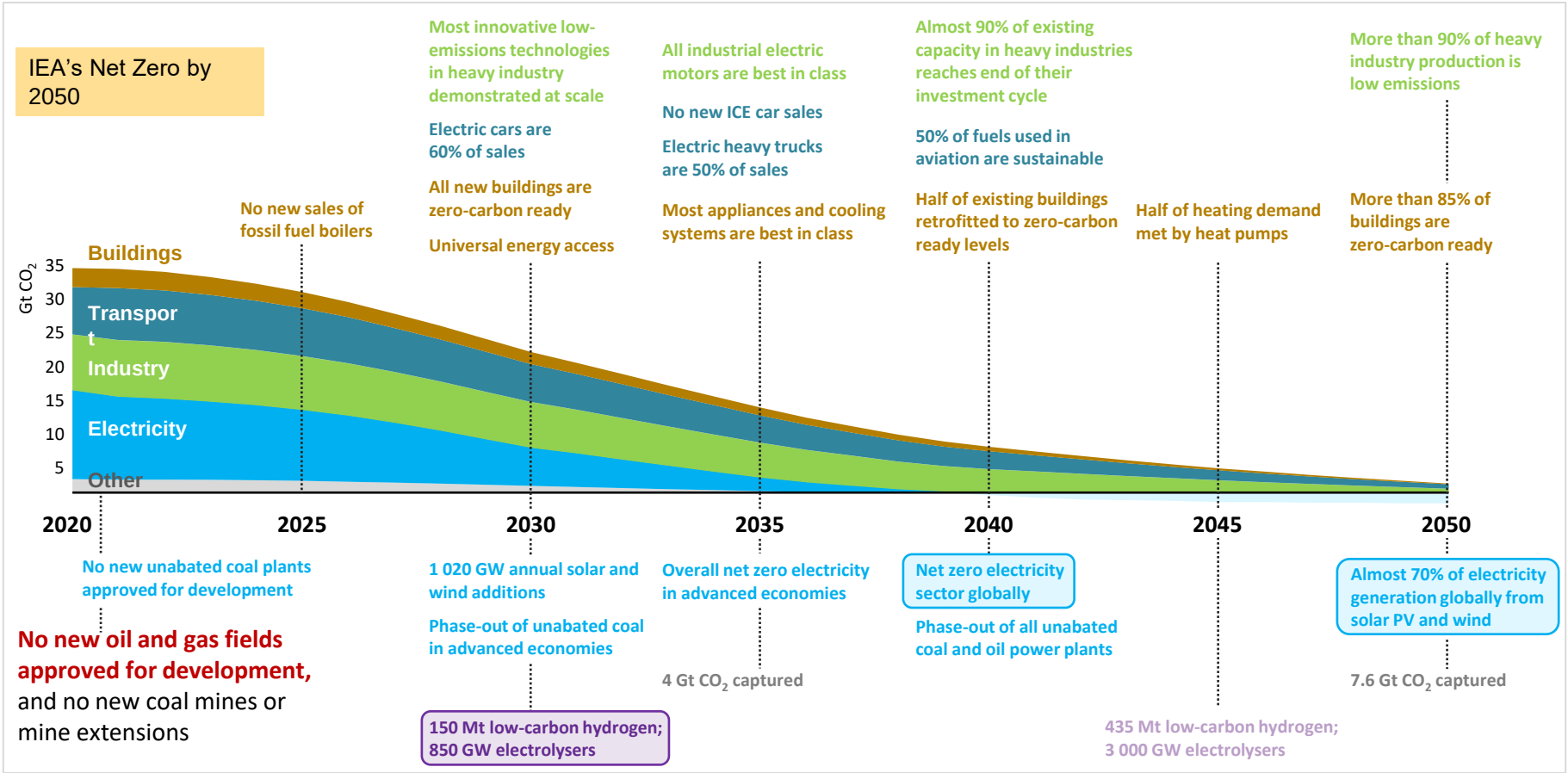


Asia becomes the unrivalled centre of the global oil trade as the region draws in a rising share of the available crude.

In 2023 India has officially requested to become a full member to the IEA.

Henry Kissinger's Advice: Get China and India in the IEA.

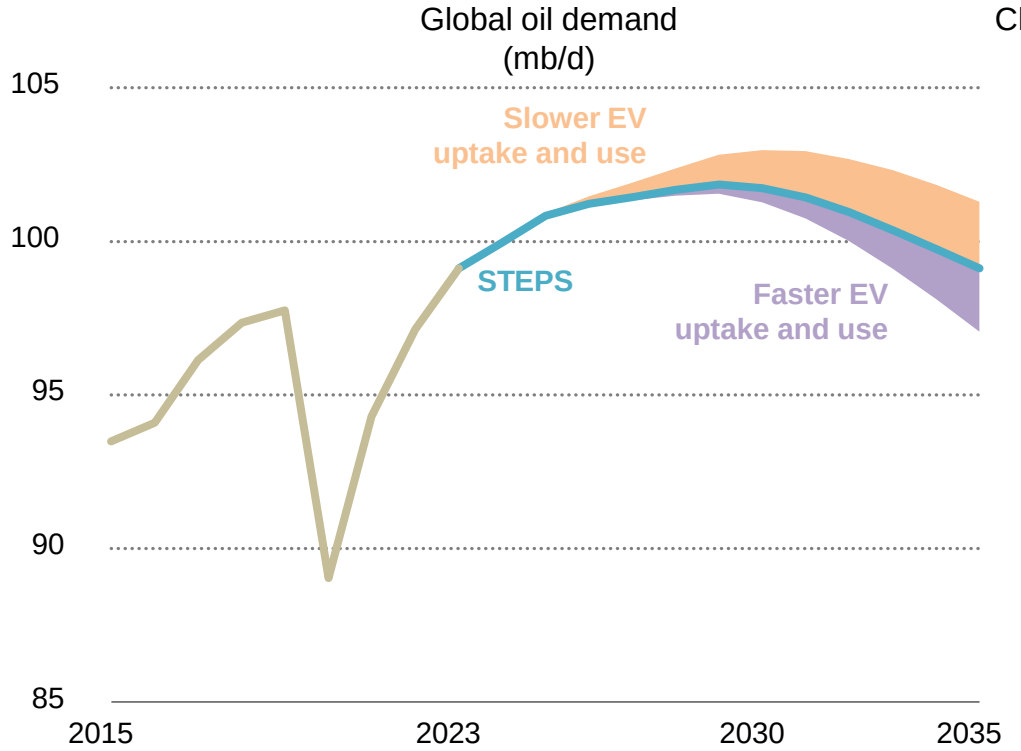
“Net Zero by 2050” surprised OPEC and Oil Majors: The IEA Shock!

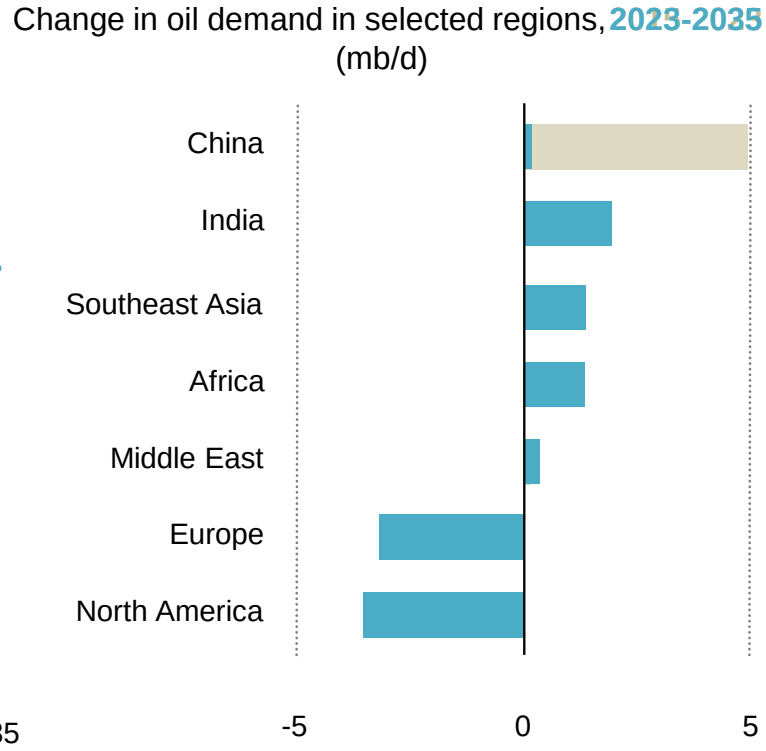


Net Zero by 2050 sets near-term milestones to get on track for long-term targets. (Back-casting)

Oil demand's engine is switching to electricity

IEA WEO 2024

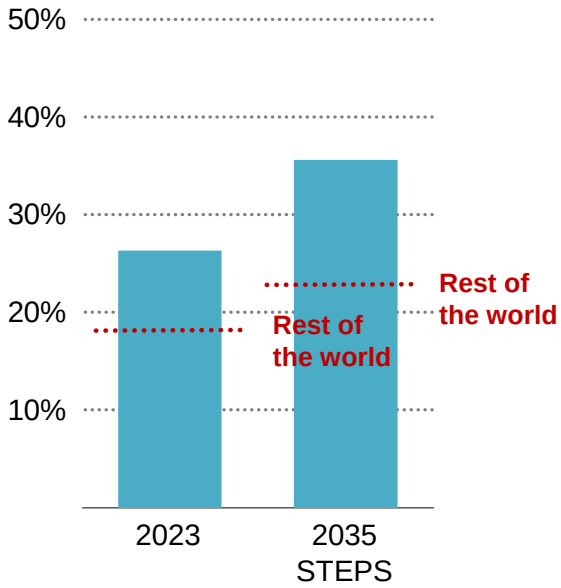




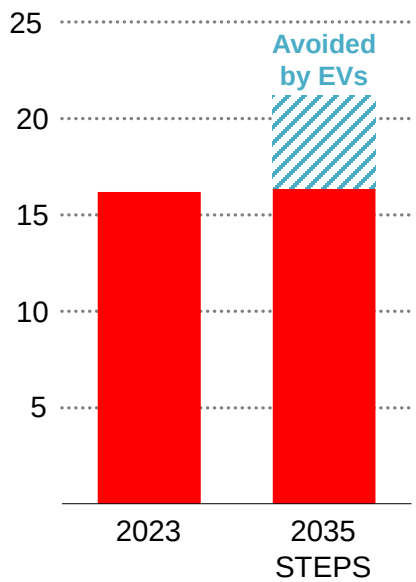
As China scales up electric mobility, India, Southeast Asia and Africa are the main sources of growth in oil use to 2035. Even if projected uptake of electric vehicles slows in key markets, a peak in oil demand remains on the horizon.

China’s electrification jolts energy markets, again

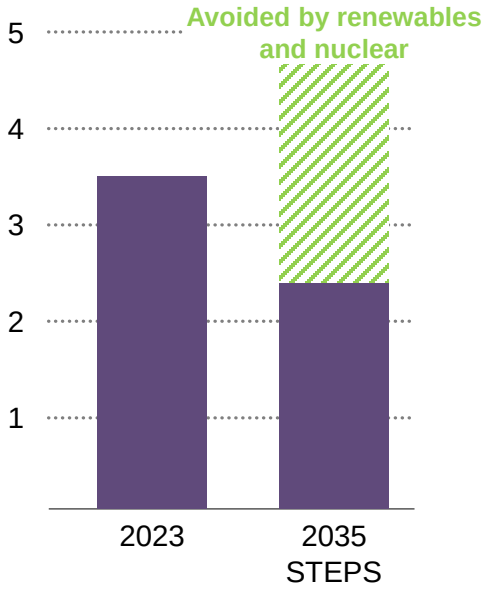
China electrification rate of final consumption



China oil demand (mb/d)



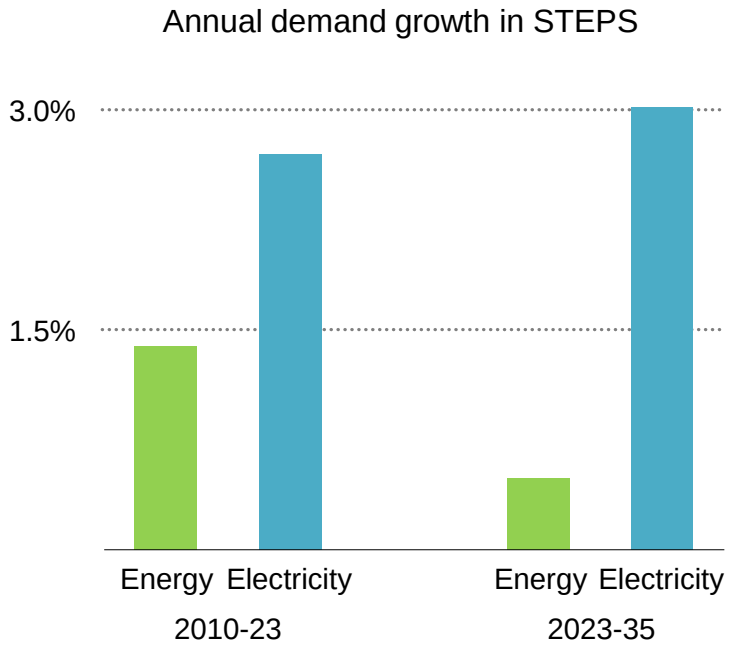
China coal demand (Thousand Mtce)

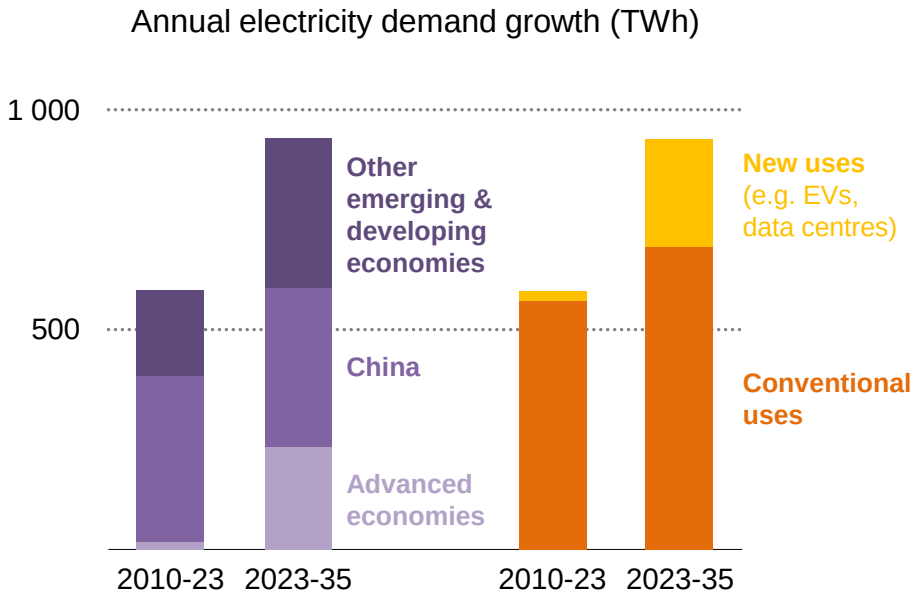


China’s extraordinary expansion of electrification, solar PV and other clean electricity sources is capping oil demand growth and cutting into coal fired power generation, with strong implications for Chinese and global trends.

Moving at speed into the Age of Electricity

IEA WEO 2024

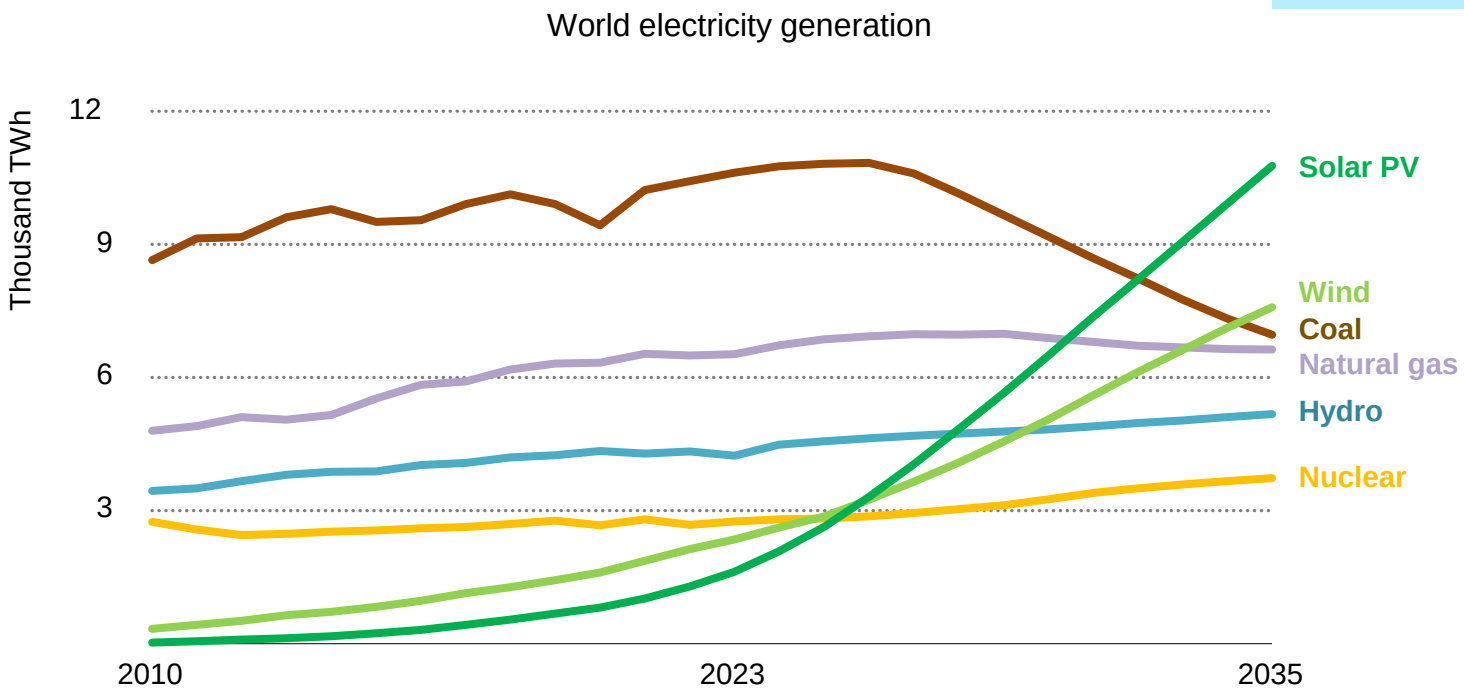




Electricity is growing faster than all other energy sources and it's growing across a wide range of economies, as conventional drivers of growth are supplemented by new ones like EVs, data centres and heat pumps.

Electricity use is growing fast, clean power is rising even faster

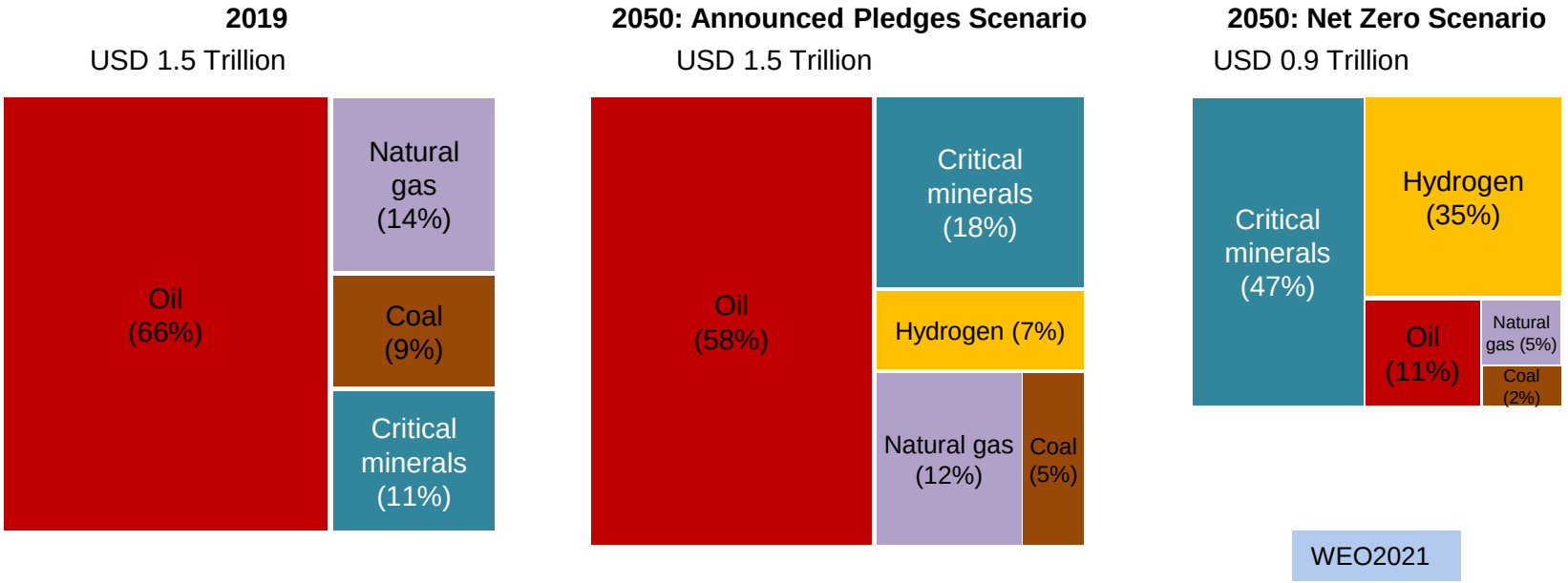
IEA WEO 2024



Solar PV and wind hit their stride and become the largest sources of electricity before 2035 in STEPS, complementing other clean sources like hydro and nuclear, and pushing coal into decline.

Energy Security in the net zero pathway: Critical minerals and hydrogen-based fuels are on the rise

Value of international energy-related resource trade

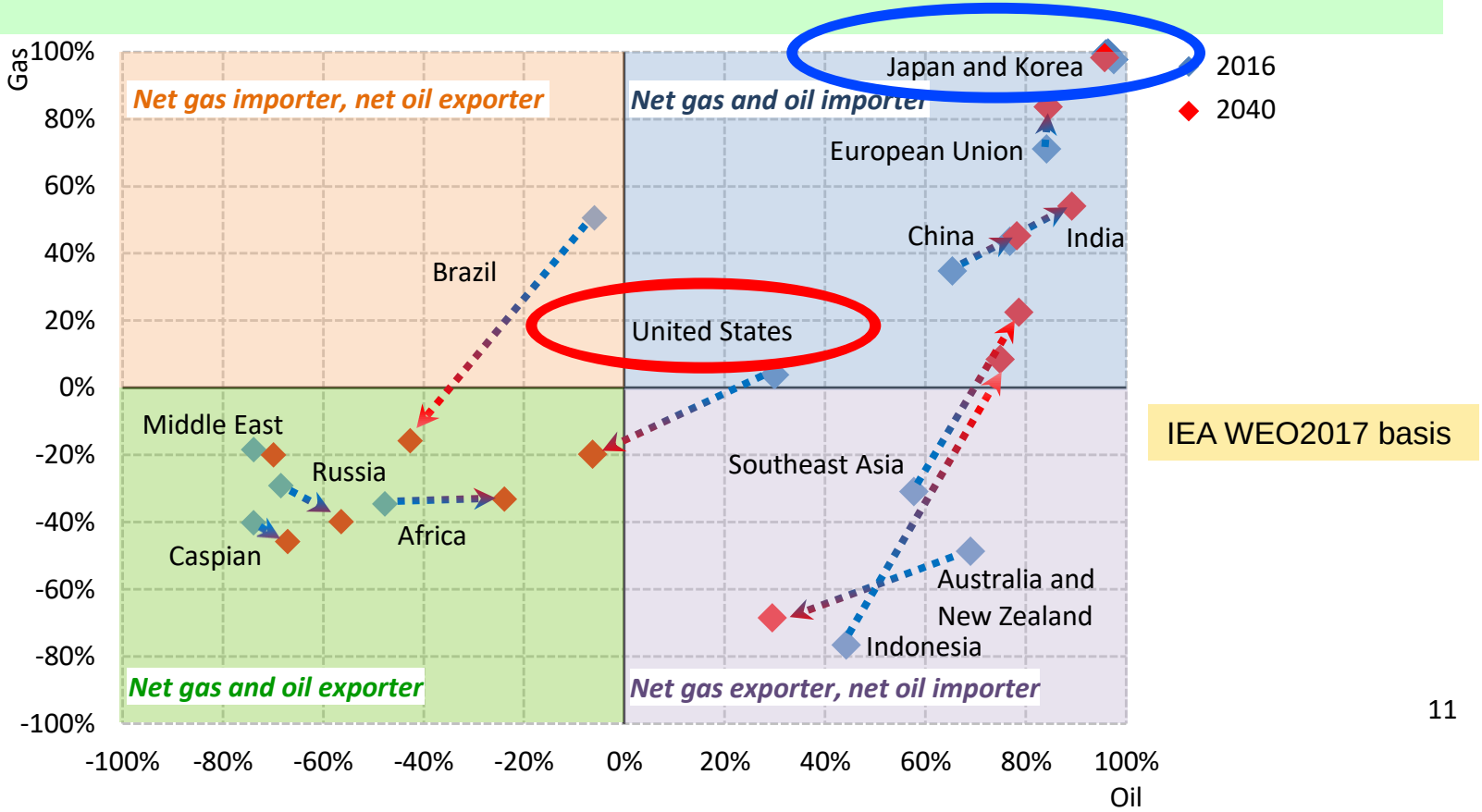


Hydrogen Stock Pile: MCH/LOHC may replace SPR in the Net Zero World

Winners and Losers of Energy & Climate Crises

Country	Short term	Long Term
Russia	- - Lost EU market, less revenue, more war expenses, Ukraine?	- - Loss of tech, investment, brain drain
EU	- Gas Shortage & high price. Ukraine?	++ RE Power EU and CBAM H2 pipeline
US (→Trump)	+ Energy Dominance by fossil fuel =MAGA	+MAGA = Out of ParisAccord. CCS, (EV?), H2? Megatech to lead RE100
China India	+ Cheap Russian gas & oil	++ RE super power, - risk of supply chain + H2 super power
Saudi Arabia	?Oil price	? Blue H2 CCS, Green H2 solar, Mid East Geopolitics
Japan/ Korea	- Oil and gas supply disruption	? Sustainable nuclear, Clean H2 supply chain
ASEAN	- high prices of LNG	? Renewables, Regional power grid connection

Energy Independence : Trump's US aims "Energy Dominance" by more oil and gas while China and Europe aim at Renewable Energy Independence. How can Japan and Korea survive?

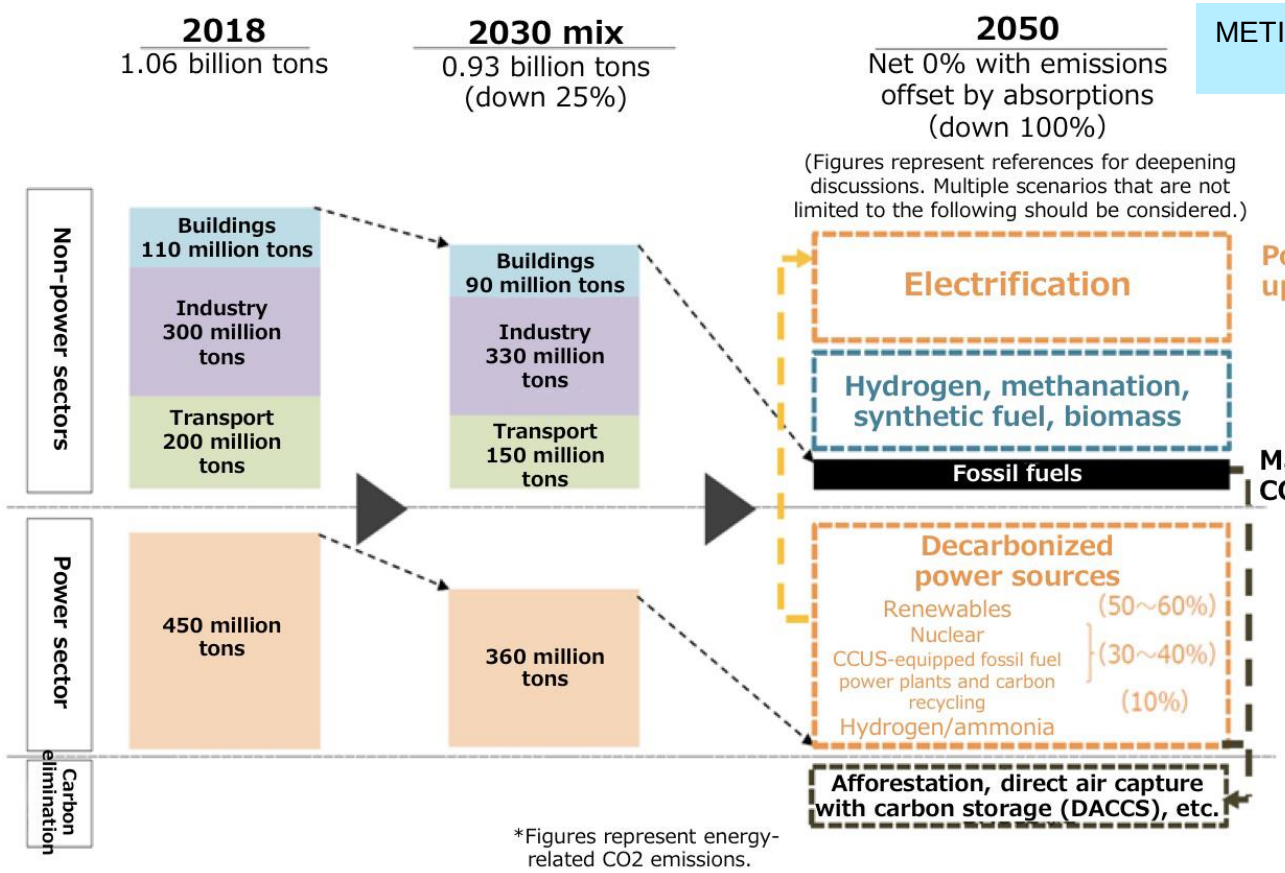


IEA WEO2017 basis

11

Japan's Energy Path to 2050 Carbon Neutrality

METI 2020-12-25



Energy Basic Plan for 2040

		(Previous plan for 2030)
Elec Demand	1.1-1.2Tkwh	
Renewables	40–50%	(36–38%)
H2, Ammonia		(1%)
Nuclear	20%	(20–22%)
LNG		(20%)
Coal	Thermal 30–40%	(19%)
Oil		(2%)
GHG cut	73%	(46%–50%)

(Source) Secretariat of the Committee on the Growth Strategy, Cabinet Secretariat "Green Growth Strategy through Achieving Carbon Neutrality" (Document 1) p.6, for the sixth meeting of the Committee on the Growth Strategy, December 25, 2020

A Golden Age of Natural Gas

North America's Shale Gas revolution + Japan & Korea contribute by LNG trade.
Golden Age of Gas is closing, but continues for LNG.
Japanese Government decided LNG is one of the critical material.

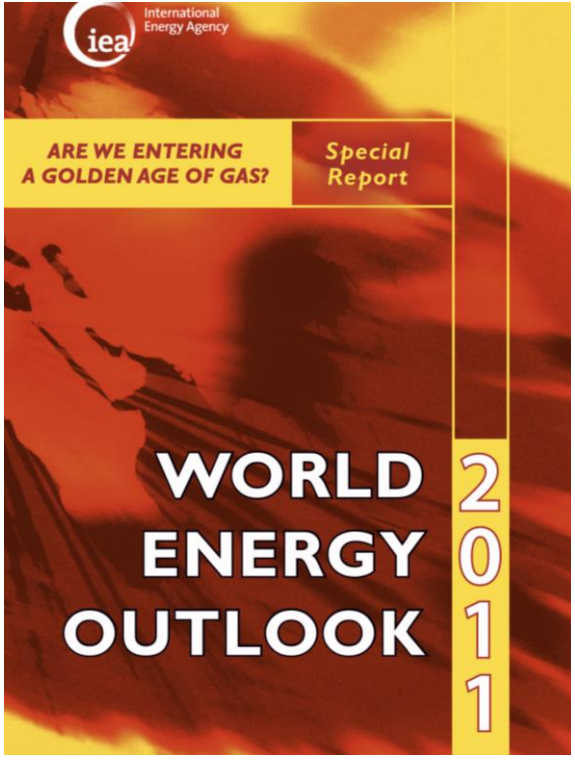
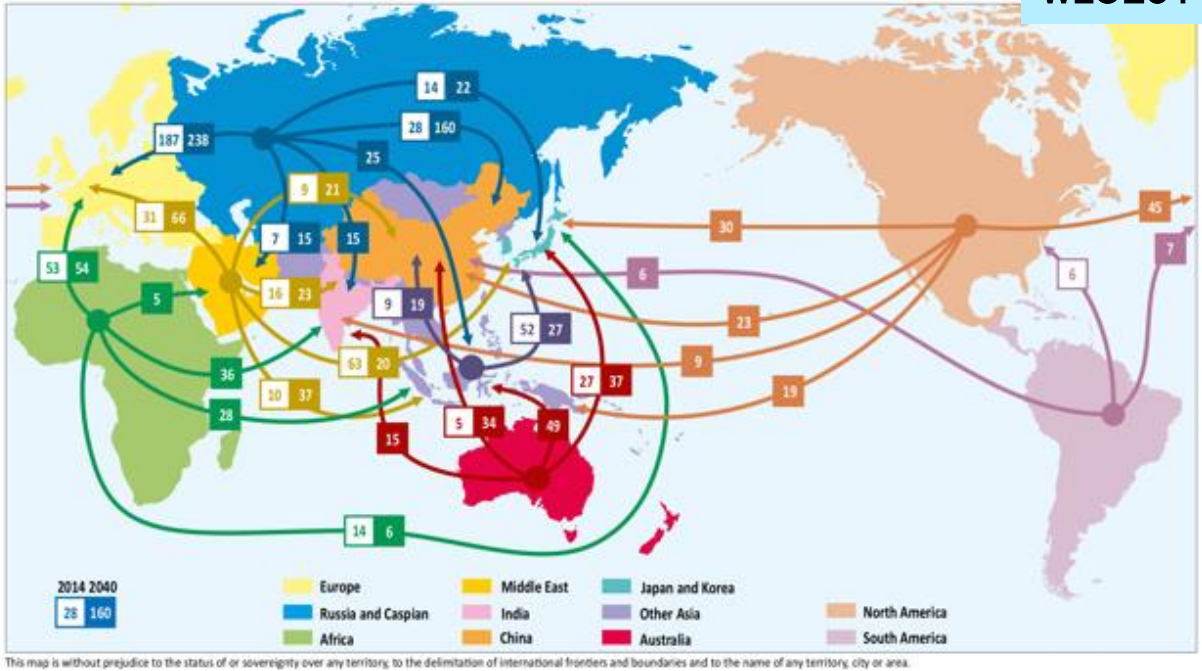


Figure 4.17 ▷ Selected global gas trade flows in the New Policies Scenario (bcm)

WEO2011

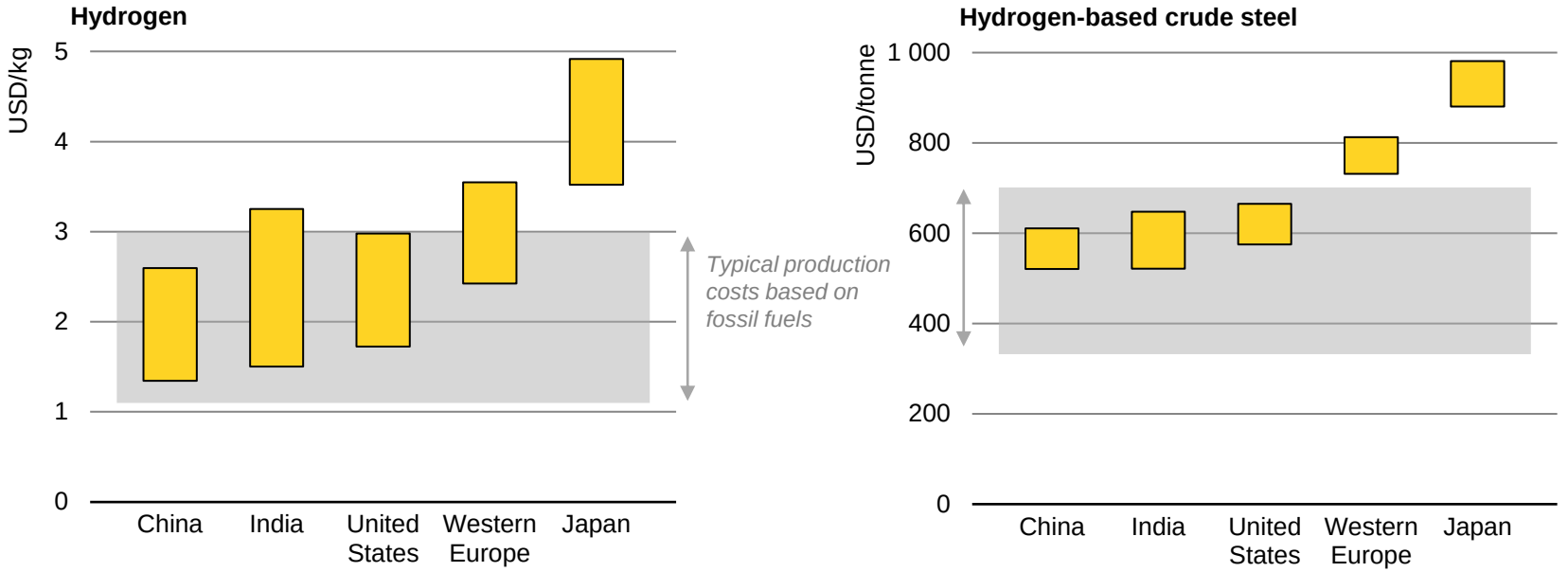


This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

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

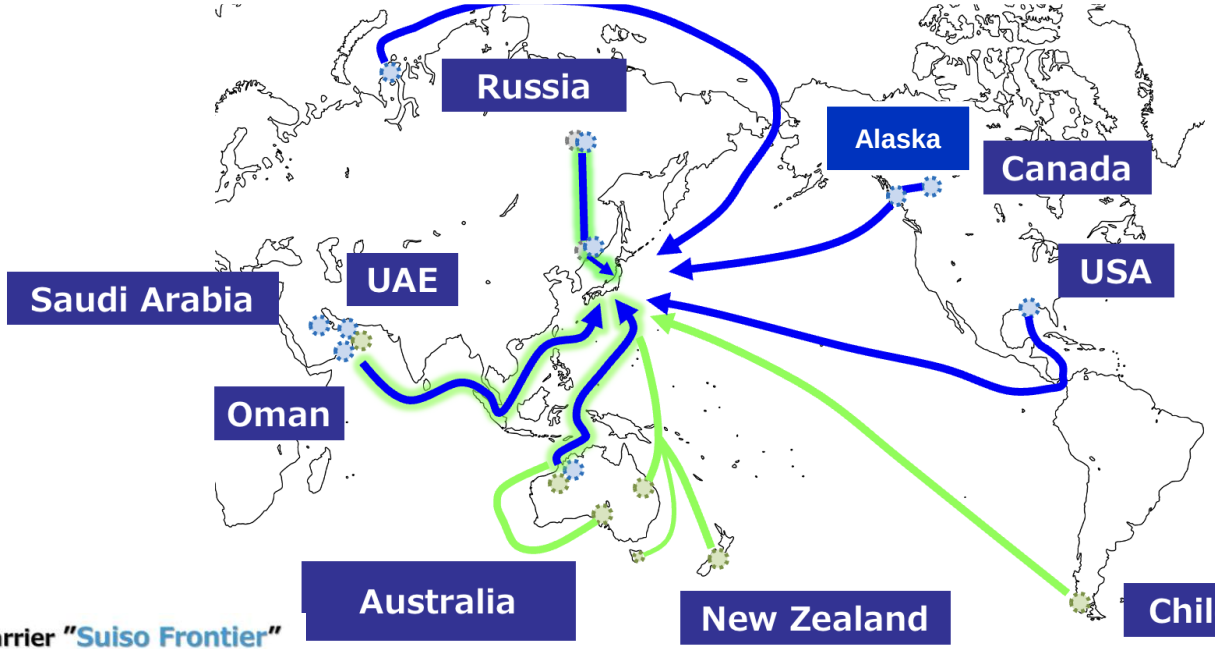
Competitiveness is a key consideration for industrial strategies

Production costs using electrolysis and variable renewables under announced climate pledges, 2030



Climate goals and innovation policy are driving new project announcements for energy intensive commodities, but persistent cost competitiveness gaps indicate the need for strategic partnerships and international collaboration.

A Golden Age of Hydrogen is coming?



Liquefied Hydrogen Carrier "Suiso Frontier"

Launch ceremony (11 December 2019) at KHI Kobe Shipyard

Cargo Tank Installation (7 March 2020) at KHI Harima Works

AHEAD Advanced Hydrogen Energy Chain Association for Technology Development

CHIYODA CORPORATION · Mitsubishi Corporation · MITSUI & CO. · NYK LINE

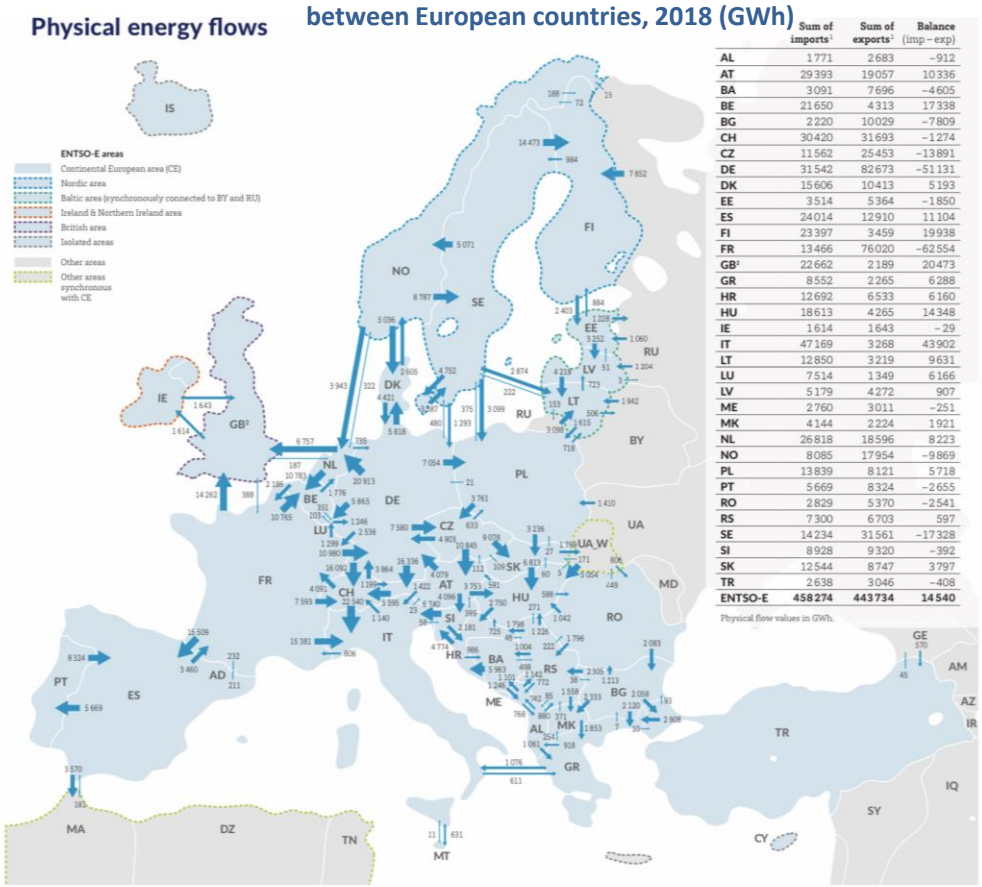
Natural Gas (Blue)

Renewables (Green)

CLEAN FUEL AMMONIA ASSOCIATION

Grid Connectivity: European Energy Security & Sustainability

Physical energy flows between European countries, 2018 (GWh)



	Sum of imports[1]	Sum of exports[1]	Balance (imp – exp)
AL	1 771	2 683	−912
AT	29 393	19 057	10 336
BA	3 091	7 696	−4 605
BE	21 650	4 313	17 338
BG	2 220	10 029	−7 809
CH	30 420	31 693	−1 274
CZ	11 562	25 453	−13 891
DE	31 542	82 673	−51 131
DK	15 606	10 413	5 193
EE	3 514	5 364	−1 850
ES	24 014	12 910	11 104
FI	23 397	3 459	19 938
FR	13 466	76 020	−62 554
GB[2]	22 662	2 189	20 473
GR	8 552	2 265	6 288
HR	12 692	6 533	6 160
HU	18 613	4 265	14 348
IE	1 614	1 643	−29
IT	47 169	3 268	43 902
LT	12 850	3 219	9 631
LU	7 514	1 349	6 166
LV	5 179	4 272	907
ME	2 760	3 011	−251
MK	4 144	2 224	1 921
NL	26 818	18 596	8 223
NO	8 085	17 954	−9 869
PL	13 839	8 121	5 718
PT	5 669	8 324	−2 655
RO	2 829	5 370	−2 541
RS	7 300	6 703	597
SE	14 234	31 561	−17 328
SI	8 928	9 320	−392
SK	12 544	8 747	3 797
TR	2 638	3 046	−408
ENTSO-E	458 274	443 734	14 540

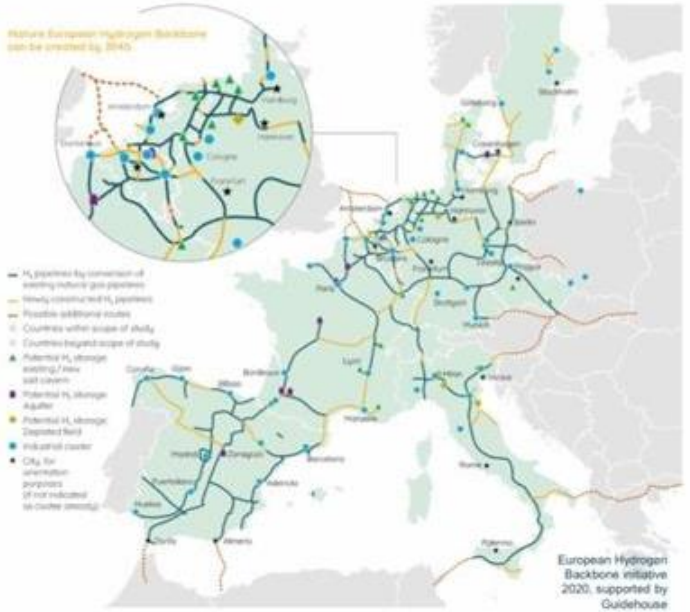
Physical flow values in GWh.

[1] Consolidated yearly values might differ from detailed flow data from the ENTSO-E database due to ex-post consolidation taking into account national statistical resources.

[2] All data with the country code GB represents monthly statistical data as sum of England, Northern Ireland, Scotland and Wales.

Source: Statistical Factsheet 2018 by ENTSO-E

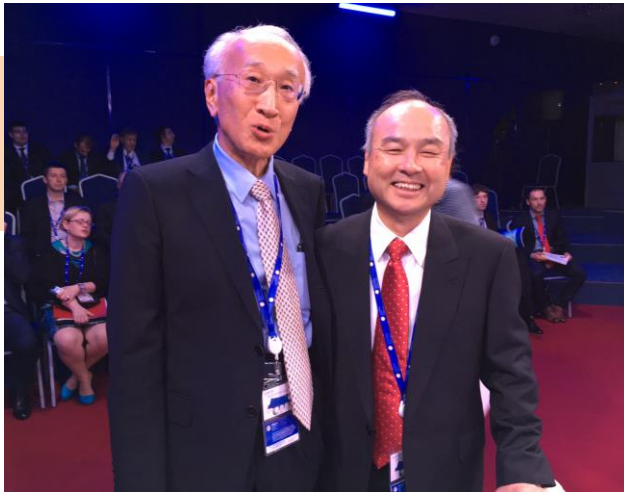
Hydrogen pipeline :European Backbone for 2050

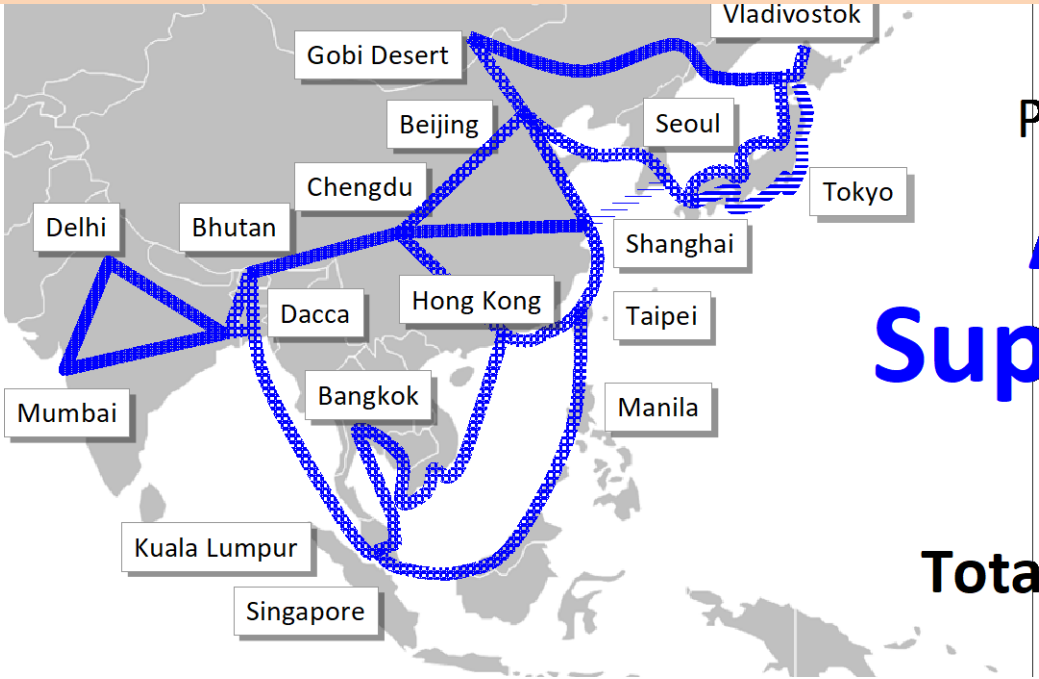


Guidehouse

1. Preliminary estimation, the actual capacity of the meshed grid requires more detailed analysis

“Energy for Peace in Asia”
New Vision by Masayoshi SON of SoftBank





Phase 3

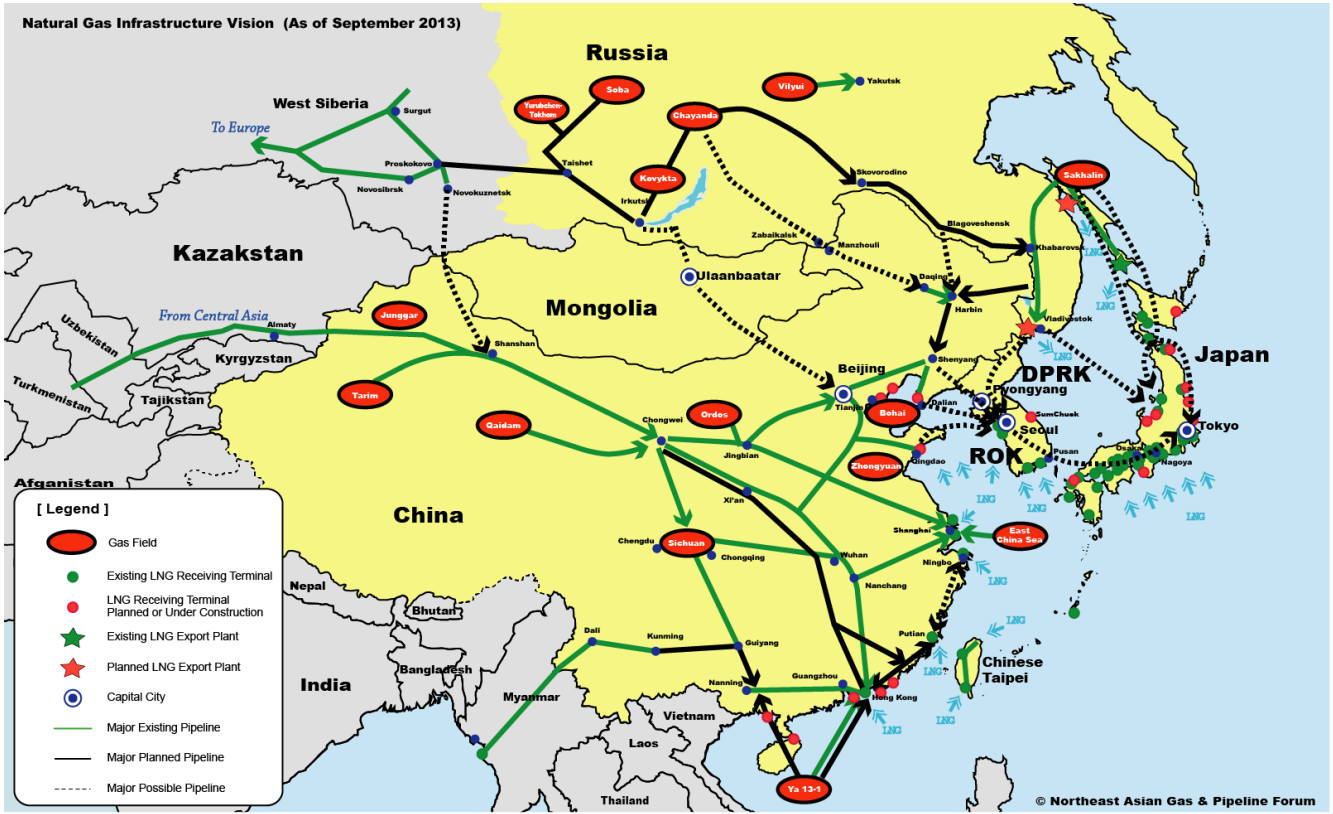
Asia Super Grid

Total 36,000km

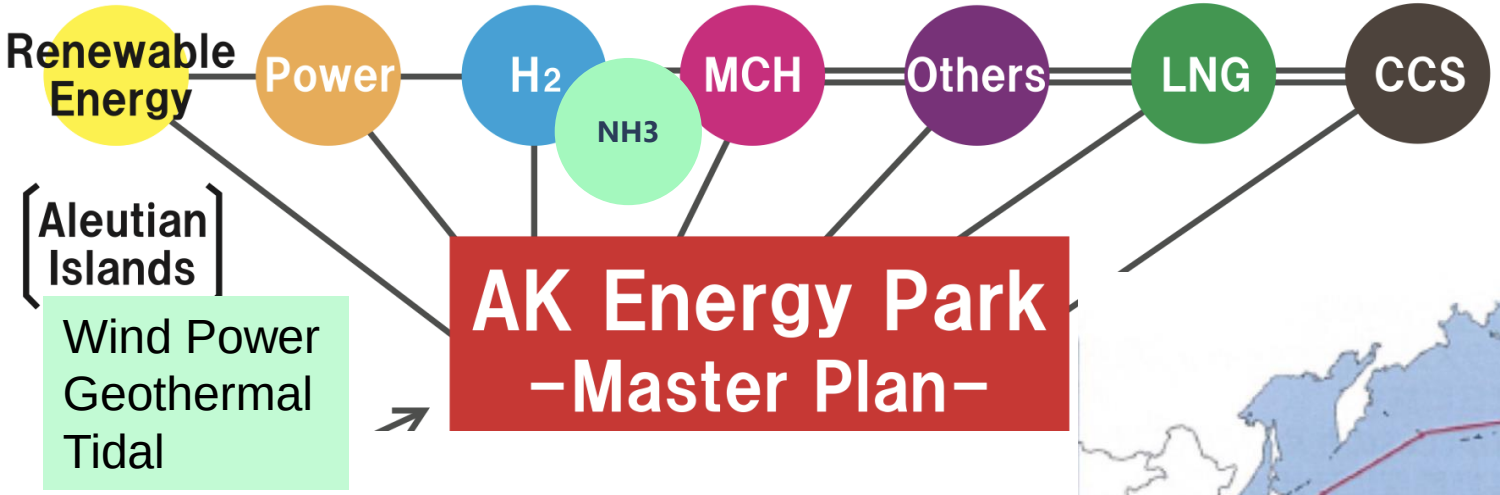
17

Presentation by Mr. Masayoshi SON

Dr. Masaru HIRATA's North East Asia Gas Pipeline Infrastructure Forum (NAGPF)



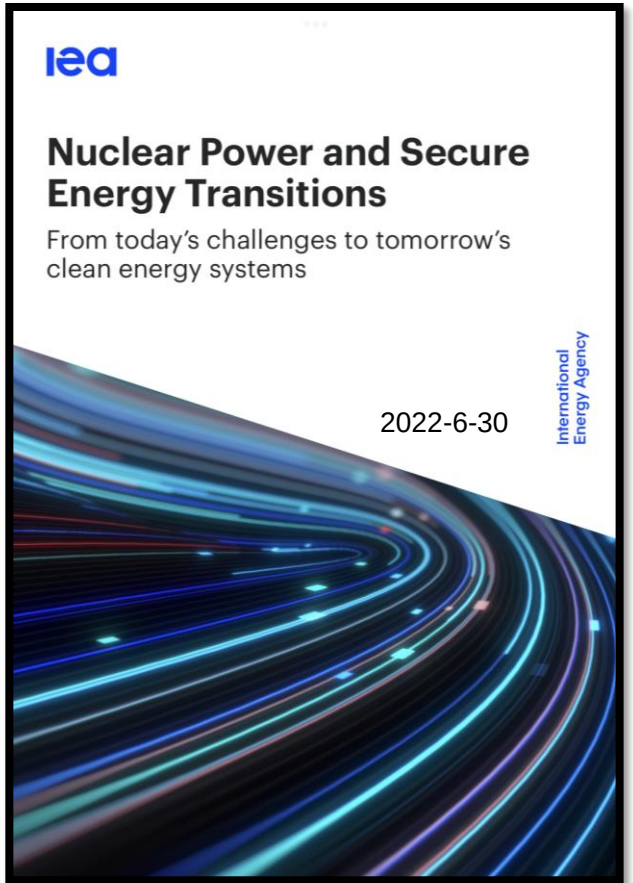
NAGPF should aim at Northeast Asia Clean Energy Platform (NACEP) including Grid Connection and Hydrogen Pipeline



Alaska Energy Park

Alaska-Tokyo 6200km=10 days by ship
Attu Island to Hokkaido=2200km

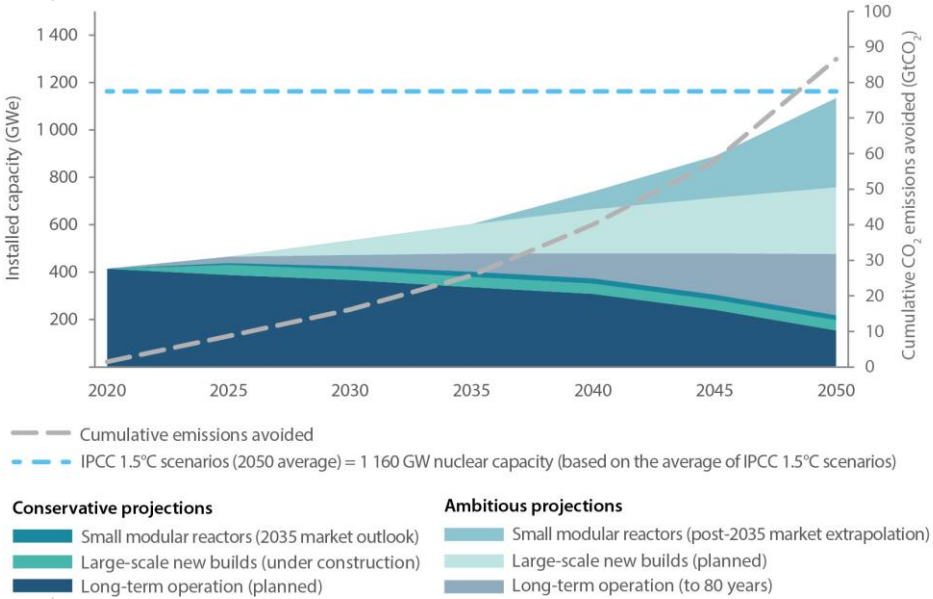
Nuclear energy could play an important role in ensuring rapid and secure energy transitions.



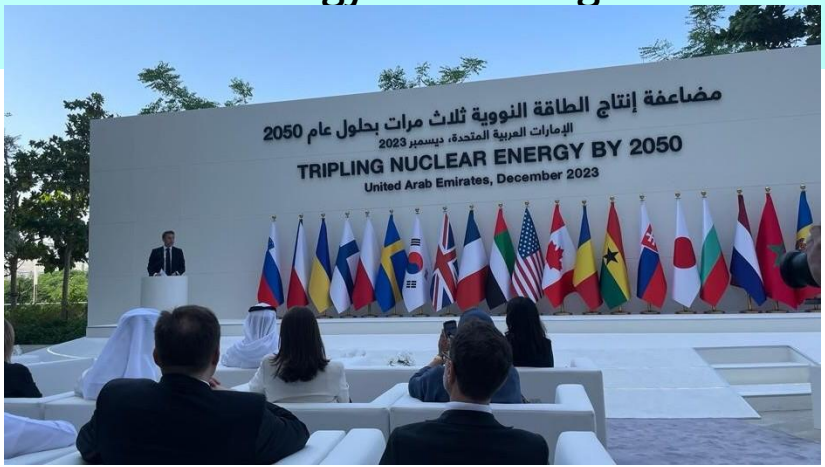
- Russia's invasion of Ukraine and disruptions in global energy supply have made governments rethink their energy security strategies, targeting diverse and domestic supplies
- Governments in over 70 countries have committed to achieving net zero emissions, covering three-quarters of global emissions and economic activity
- Peaking CO_2 emissions this decade and starting a long-term decline is essential to keep the door open to limiting climate change to 1.5 °C
- The policy landscape is changing, opening up opportunities for nuclear to make a comeback

"NuclearPower and Secure Energy Transition" by IEA 2022-6-30

At COP28, Countries Launch Declaration to Triple Nuclear Energy Capacity by 2050, Recognizing the Key Role of Nuclear Energy in Reaching Net Zero



Nuclear Energy Agency (NEA)



- President of the French Republic Emmanuel Macron and United States Special Presidential Envoy for Climate John Kerry announced that 20 countries have launched the 'Declaration to Triple Nuclear Energy by 2050' at the 28th United Nations Climate Change Conference or Conference of the Parties of the UNFCCC (COP28).
- Endorsing countries include the United States, Bulgaria, Canada, Czech Republic, Finland, France, Ghana, Hungary, Japan, Republic of Korea, Moldova, Mongolia, Morocco, Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden, Ukraine, United Arab Emirates, and United Kingdom.
- Those countries that choose this option will need to work in concert to address issues such as affordable financing, enhanced supply chains and the need for a skilled workforce if success is to be in reach.

Nuclear is a “Successful Failure” (Vaclav Smil)

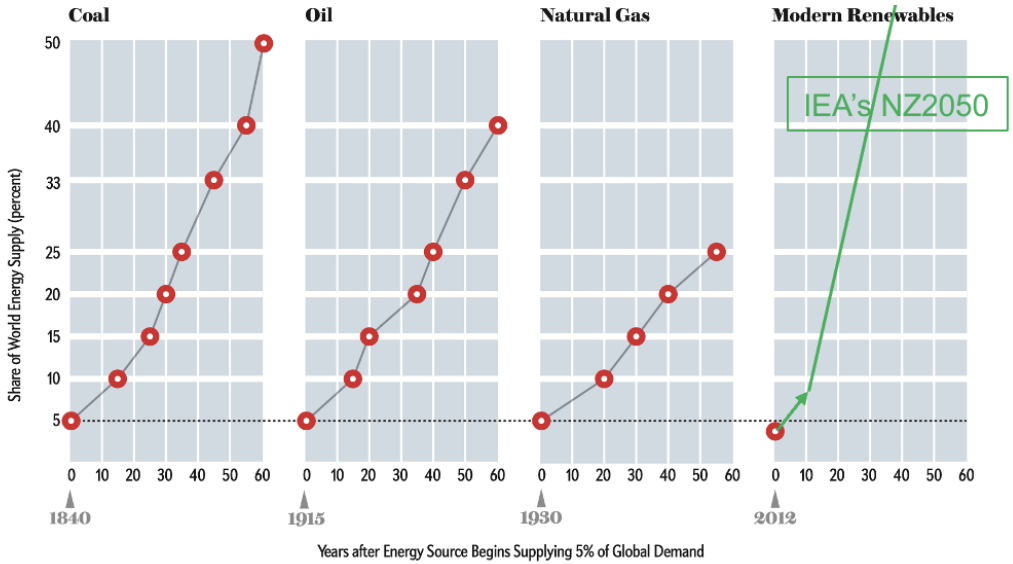
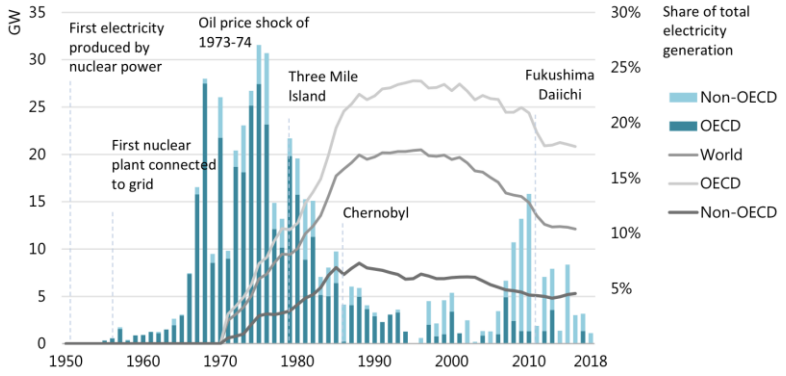


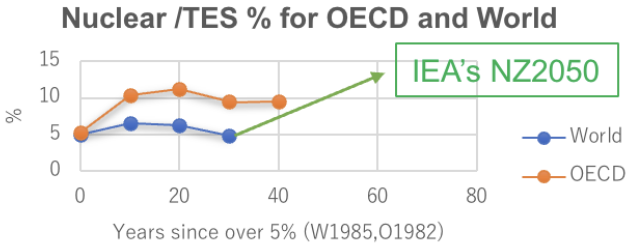
Figure 5. Reactor construction starts and share of nuclear power in total electricity generation



Note: OECD = Organisation for Economic Co-operation and Development.

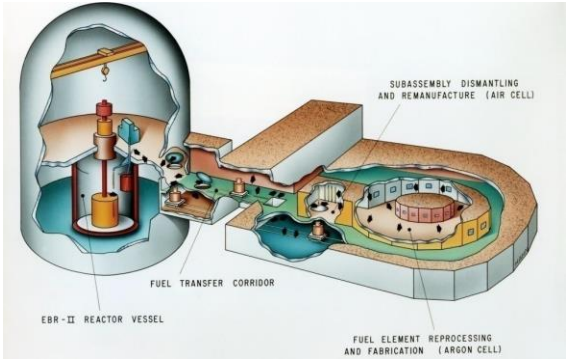
Sources: IAEA (2019), Power Reactor Information System (PRIS) (database); IEA (2018a), Electricity Information 2018 (database).

Most of the nuclear reactors in operation today in advanced economies were built before 1990.

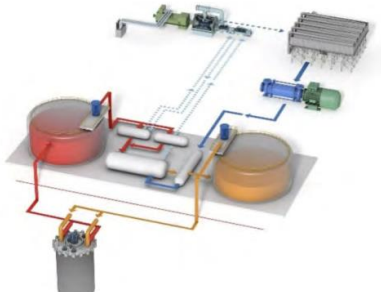


Vaclav Smil vs IEA’s Net Zero by 2050

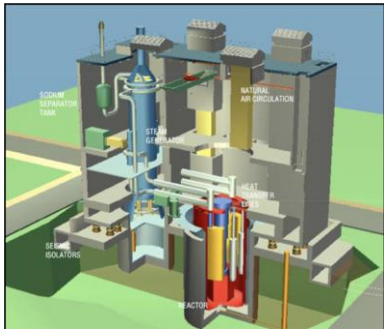
Sustainable Nuclear Models?



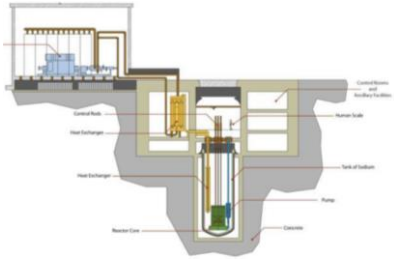
Integral Fast Reactor



Terra Power's Natrium



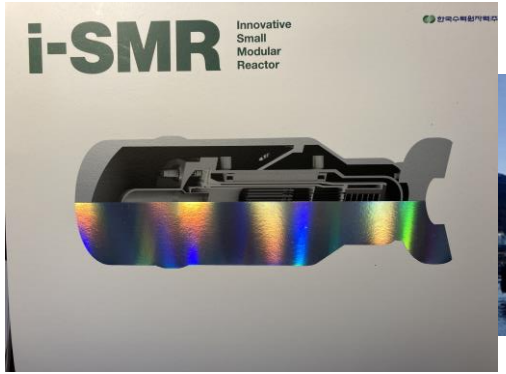
GE-Hitachi's PRISM



ARC 100

OKLO's Aurora reactor

Dow Chemical and X-energy

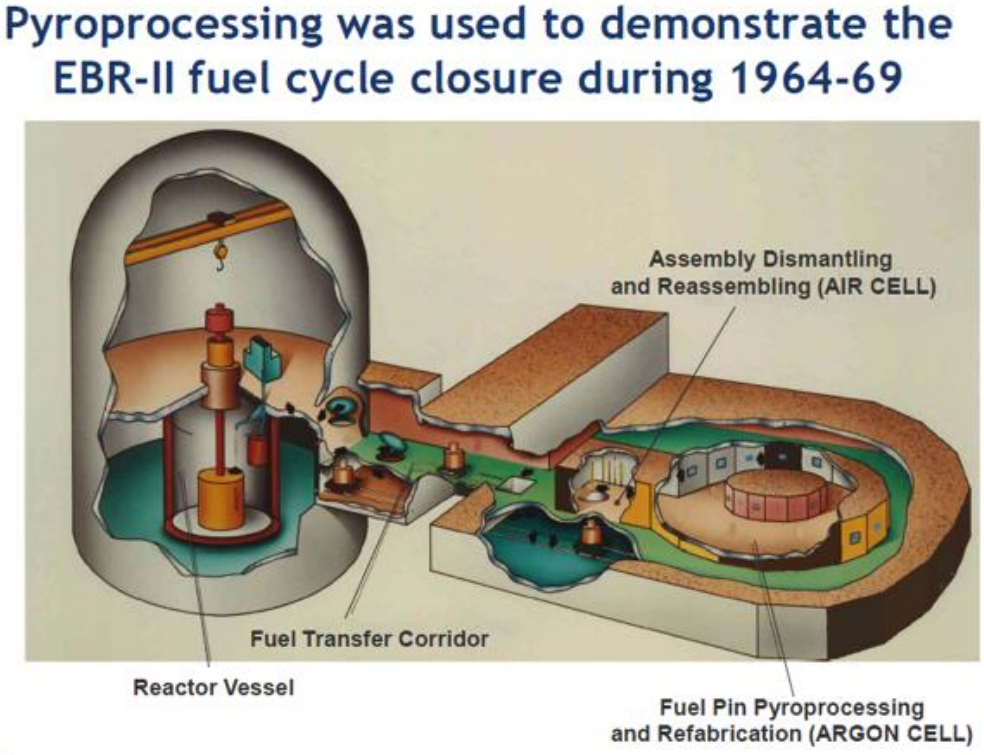


Korean i-SMR

Akademik Lomonosov

23

Time for Safer, Proliferation resistant and Easier Waste Management Paradigm: Integral Fast Reactor (Metallic fuel, Close cycle Fast Reactor) and Pyroprocessing



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.

Dr. YOON IL CHANG
Argonne National Laboratory

US envoy Kerry launches international Nuclear Fusion plan at COP28

- DUBAI, Dec 5 (Reuters) - U.S. special climate envoy John Kerry on Tuesday launched an international engagement plan to boost nuclear fusion, saying the emissions-free technology could become a vital tool in the fight against climate change.

- Kerry said the plan involved 35 nations and would focus on research and development, supply chain issues, and regulation, and safety.

- "There is potential in fusion to revolutionize our world," Kerry told the COP28 climate summit in Dubai.

Global Energy Forum at COP 28 - Day 1

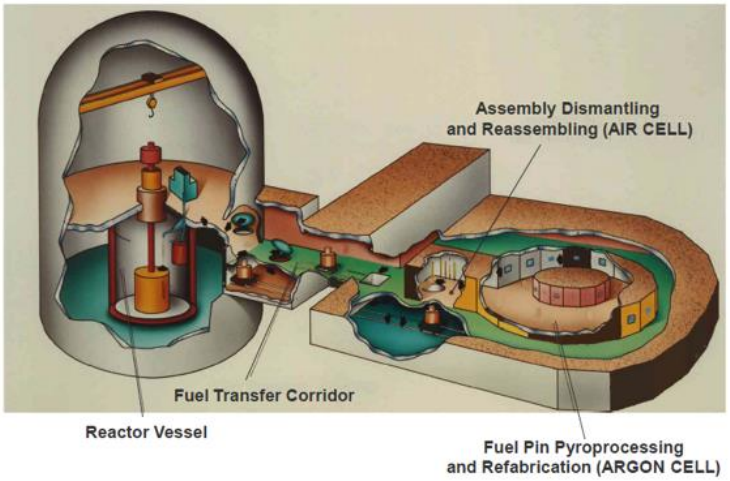
Trilateral Alliance for Survival

Japan-Korea-US Trilateral Collaboration on Nuclear (JAKUS)

- Integral Fast Reactor, Submarine and North Korean Denuclearization.
- Korea gets OK for Pyro-Processing (Plutonium use).
- Japan gets support for Fukushima debris solution. Rokkasho Reprocessing Plant be put under Multirateral Framework. Excess Plutonium is put under IAEA custody.
- Japan and Korea join the Treaty on the Prohibition of Nuclear Weapons, while US continues to offer extended Nuclear Deterrence.
- Japan seeks Permanent seat for UN Security Council as G4. Ask India to give up nuclear weapon.
- Korea joins G7.

US-Japan-Korea Cooperation on Integral Fast Reactor and Pyroprocessing

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

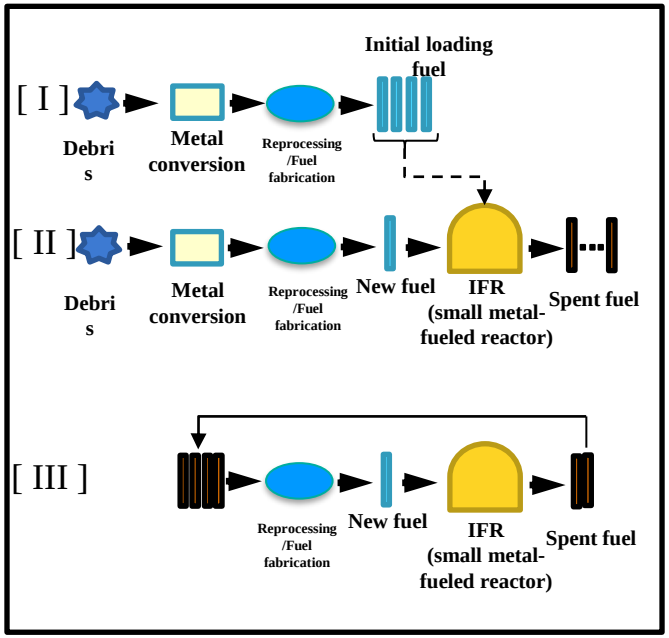


Japan's JAEA has a new MOU with Idaho National Laboratory.
Korea's KAERI worked with INL.
Further collaboration with US-Japan-Korea be applied for Fukushima Debris separation using IFR.
As a first step, application of Pyro-processing to the Debris of TMI be examined at INR.

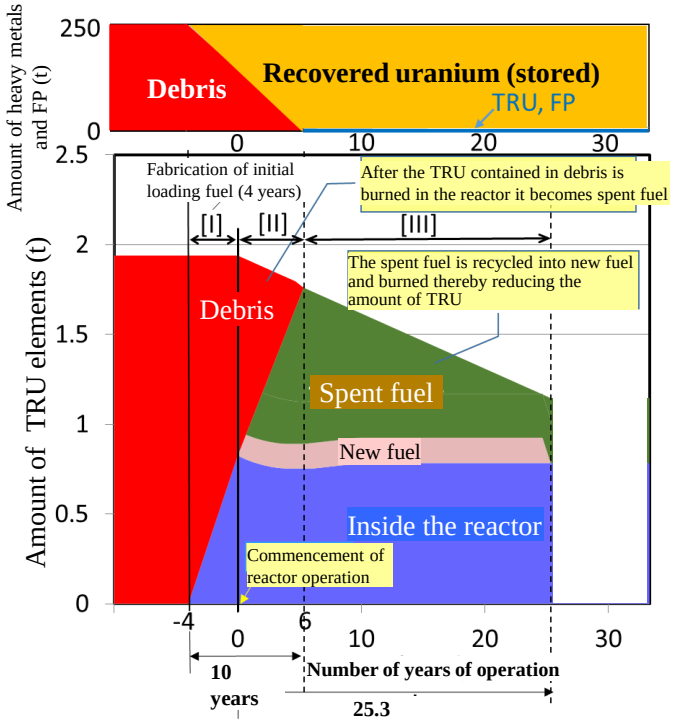
IFR can be a global model of "Sustainable Nuclear Power"

Debris Processing Scheme and TRU Reductions

- An assessment of TRU burn-up performances showed the originally estimated debris processing period of 15 years could be shortened to 10 years.
- The 1.9 tons of TRU present in the debris will be reduced to a total of 1.2 tons in 25 years after the launching the IFR including that remaining in the reactor and that existing in the spent fuel. Since the amount of TRU required to constantly fabricate fuel after this point will be insufficient, it will be necessary to procure TRU from external sources in order to continue continuous operation of the reactor.



Concept diagram of debris processing scheme



IFR operation and TRU

Japan, Korea and the US should develop JAKUS; N.East Asian AUKUS

Japan, the US and Korea should consider introducing nuclear propulsion submarine facing the geopolitical change in the Indo- Pacific.

Visit to USS Illinois SSN786 at Yokosuka.

U.S. to Share Nuclear Submarine Technology With Australia in New Pact

A new defense partnership between the U.S., the U.K. and Australia forms to focus on security

Japan, Korea and the US should work together for the complete Denuclearization of North Korea

Japan should engage to the denuclearization process of North Korea by offering to buy their Plutonium (40kg) and burn in the Nuclear Power Plant at Kashiwazaki-Kariwa, Niigata.
S. Korea can dilute HEU for LWRs.
Japan and Korea should join the Treaty on the Prohibition of Nuclear Weapons

日刊工業新聞. 2019-12-2

笹川平和財団会長

田中 伸男

たなか・のぶお　東大経卒、通商産業省（現経済産業省）入省。通商政策局総務課長、経済協力開発機構（OECD）科学技術産業局長などを経て07年に欧州出身者以外で国際エネルギー機関（IEA）事務局長に就任。16年から現職。69歳。

北朝鮮のプルトニウム買い取りを

核不拡散技術、日米韓で主導

講壇

トランプ米大統領と金正恩北朝鮮総書記の電撃的なシンガポール会談以来、朝鮮半島非核化が進みかけている。わが国はこのプロセスに何らかの形で積極的に関与することが必要である。

受け身では対話には参加できないばかりか、気がついたら米朝の間で大陸間弾道ミサイルの撤廃だけでディールが出来上がってしまうかもしれない。私はその切り札が北朝鮮の持つプルトニウム約40㌧を買い取り、日本のプルサーマル計画の中で消化しましょうと北朝鮮に提案することだと考えている。

日本が現在持つプルトニウム在庫47㌧を消化することを考えれば40㌧の追加は何ら難しくない。新潟県の柏崎刈羽原子力発電所のプルサーマル計画で消化できれば新潟県出身の拉致家族を取り返す一助ともなろう。

笹川平和財団では5月、鈴木達治郎座長の下で「プルトニウム国際管理に関する日本政府への提言」をまとめた。「余剰」なプルトニウムを国際原子力機関（IAEA）の管理下に置くプルトニウム国際貯蔵を提案した。北朝鮮が保有する日本に虎の子のプルトニウムを簡単に渡すとは思わないが、プルトニウムが「国際管理下に置かれる」と言えば北朝鮮を説得する理屈になる。米国も賛同するはずだ。

米国には現在プルトニウムを焼却する炉はない。以前ロシアとの合意で解体した爆弾用のプルトニウムを在庫はサバンナリバー国立研究所に貯蔵保管されている。少量といえども米軍が解体した爆弾のプルトニウムも、日本が軽水炉でともに消化するなら感謝されるだろう。

韓国はプルトニウム処理を米国から許されておらず、そのための施設はないが、ウラン型原爆の原料である高濃縮ウランを希釈し軽水炉で消化できる。米国が解体した核爆弾の材料を日韓が協力して消化するという「日米韓プロジェクト」だ。日韓が北朝鮮の非核化検証のために人材を提供することもできる。

日米韓はもう一つ、原子力平和利用で協力できる。米国はアイダホ国立研究所で、安全で兵器転用しにくい先端原子炉を開発してきた。統合型高速炉（IFR）と乾式再処理（パイロプロセシング）技術だ。この実験炉建設に日米政府間でこの5月に覚書が調印され共同研究が始まった。韓国も2020年を目指して乾式再処理技術の共同研究を米国とアイダホで行っている。日米韓が3カ国協力で核不拡散型原子力システムのモデルをつくる道が見えている。

この炉は福島の原発事故のデブリ処理に応用できる。核不拡散性だけでなく受動的安全性、廃棄物処理に優れた画期的な技術だ。最終的に出てくる高レベル廃棄物が天然ウラン並みに毒性が低減するので使用済み燃料なら300年かかるところ、これなら300年で済む。

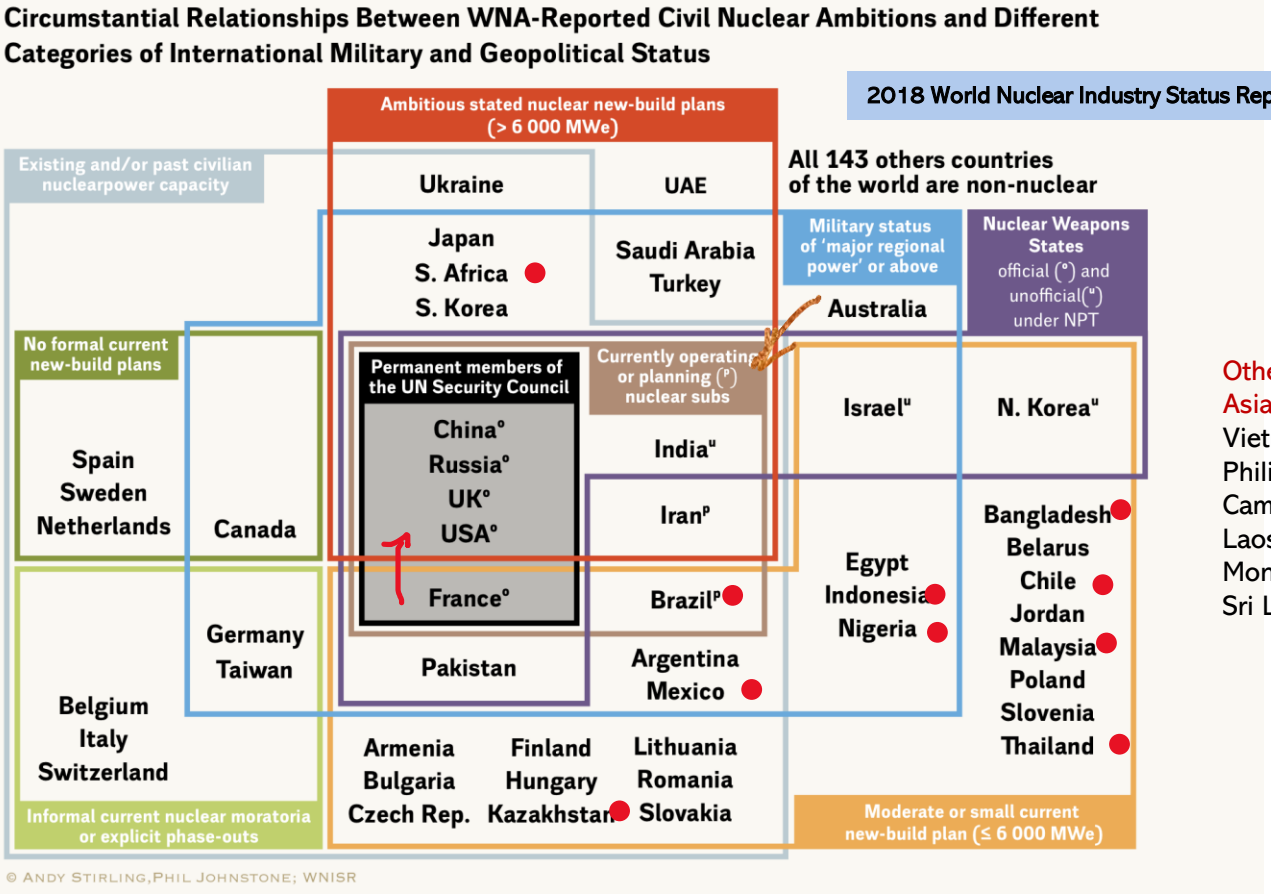
ゴミの最終処分場はほるかに見つけやすくなるはずだ。日本もそうだが平和利用の権利はどの国にも認められている。核拡散防止条約（NPT）体制は、核兵器保有国が非保有国にいろいろ注文をつけて核拡散を防ぐためにできたが、その不平等性から非保有国の不満や反発を招き、不拡散の実を上げることはできなかった。日本と韓国がリーダーシップをとって米国の協力のもとで、核不拡散型の技術開発を主導したらどうだろう。

（次回はMedical EXcellence JAPAN理事長の近藤達也氏です）

各国のプルトニウム保有量（トン）

長崎大学核兵器廃絶研究センターのデータを基に作成

There are 50 potential nuclear weapon states in the world today. Nine have weapons, while Ten sign in the Nuclear Weapon Ban Treaty.



● Member or Signatory to the Treaty on the Prohibition of Nuclear Weapons (93 Signatories, 70 states parties)

Other ● AsianSignatories
Vietnam
Philippines
Cambodia
Laos
Mongolia
Sri Lanka

Charles, a grand-son of Robert Oppenheimer

Putin's Mistake

Since his invasion of Ukraine, President Putin has continuously threatened Ukraine & NATO with possible nuclear attack.

Putin says Russia has tested next-generation nuclear weapon

Reuters

October 6, 2023 1:13 AM GMT+9 · Updated 3 days ago

Russian President Vladimir Putin delivers a speech at the 20th Annual Meeting of the Valdai Discussion Club in Sochi, Russia, October 5, 2023. Sputnik/Grigory Sysoyev/Pool via REUTERS *Acquire Licensing Rights*

President Obama's Mistake: he destabilized MENA by his Arab Spring initiatives and intervention to Lybia

Obama at the L'Aquila G8 Summit, 2009

President Trump's Mistake: he penalized Iran while embracing N.Korea.

Trump delivers a statement saying the US is withdrawing from the Iran nuclear deal, May 8, 2018, in Washington, DC [File: Evan Vucci/AP Photo]

The Iran Deal was one of the worst and most one-sided transactions the United States has ever entered into. (Donald Trump)

The two leaders shake hands again before their one-on-one meeting. In brief remarks to reporters, Trump expressed hope that the meeting would be "tremendously successful" and said, "We will have a terrific relationship ahead." Kim told reporters that there were many "obstacles" to the meeting, but "we overcame all of them and we are here today." *Evan Vucci/AP*

The 2018 North Korea–United States Singapore Summit, commonly known as the Singapore Summit, was a summit meeting between North Korean Chairman Kim Jong Un and U.S. President Donald Trump, held at the Capella Hotel, Sentosa, Singapore, on June 12, 2018

Geopolitical Mistake of not using Nuclear

Chancellor Merkel's Mistake

She said, " I am a scientist and know what is nuclear. But to do nuclear here give me votes." After the Fukushima accident, she decided to phase out nuclear power by 2022. To reduce coal, she needed to rely too much on Russian gas, which invited the worst geopolitical crisis after the WW2.

Abendessen mit der Bundeskanzlerin am 29. September 2008 im Bundeskanzleramt