Japan's GX Strategy
-Opportunities and Challenges-

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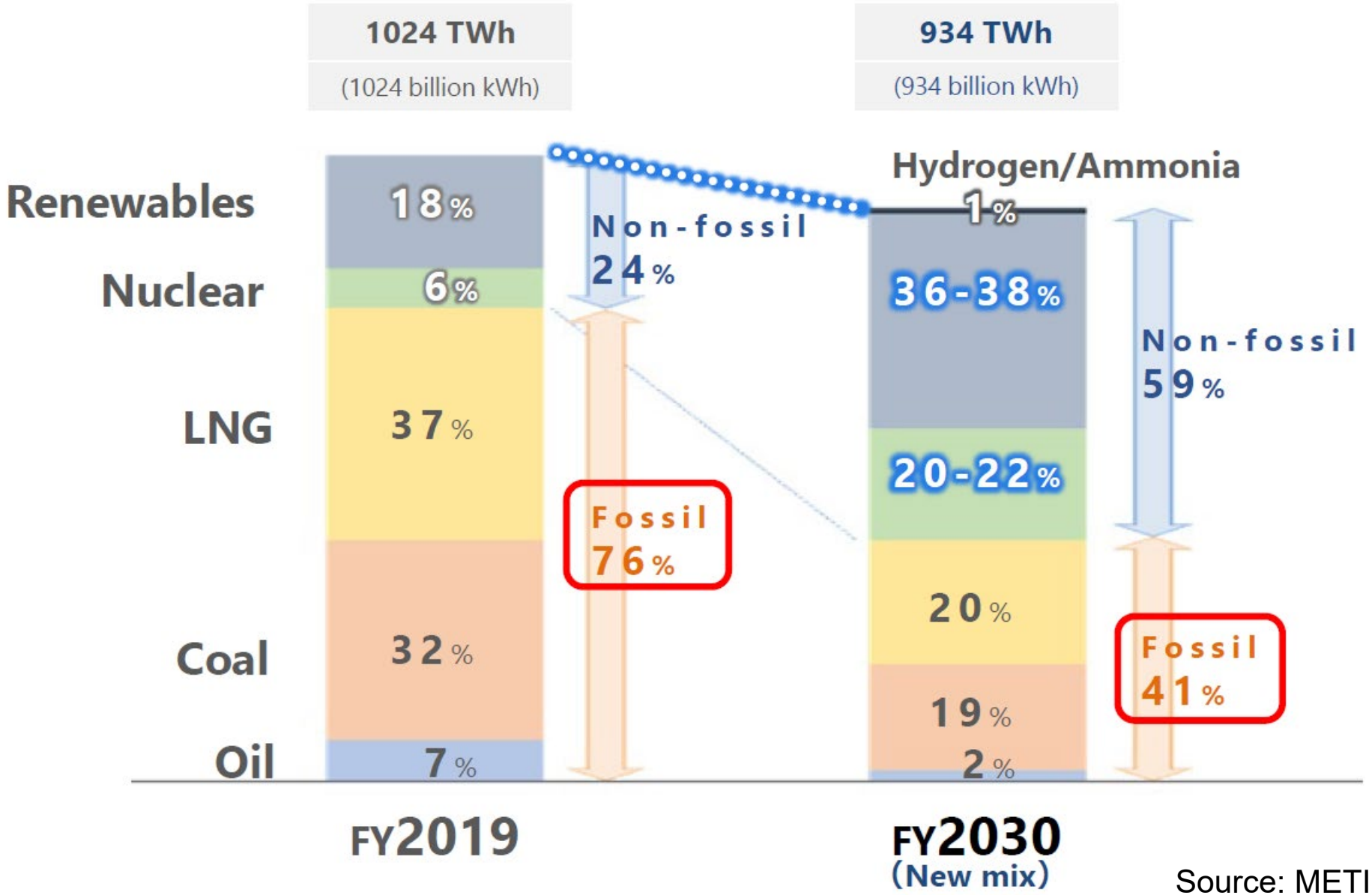
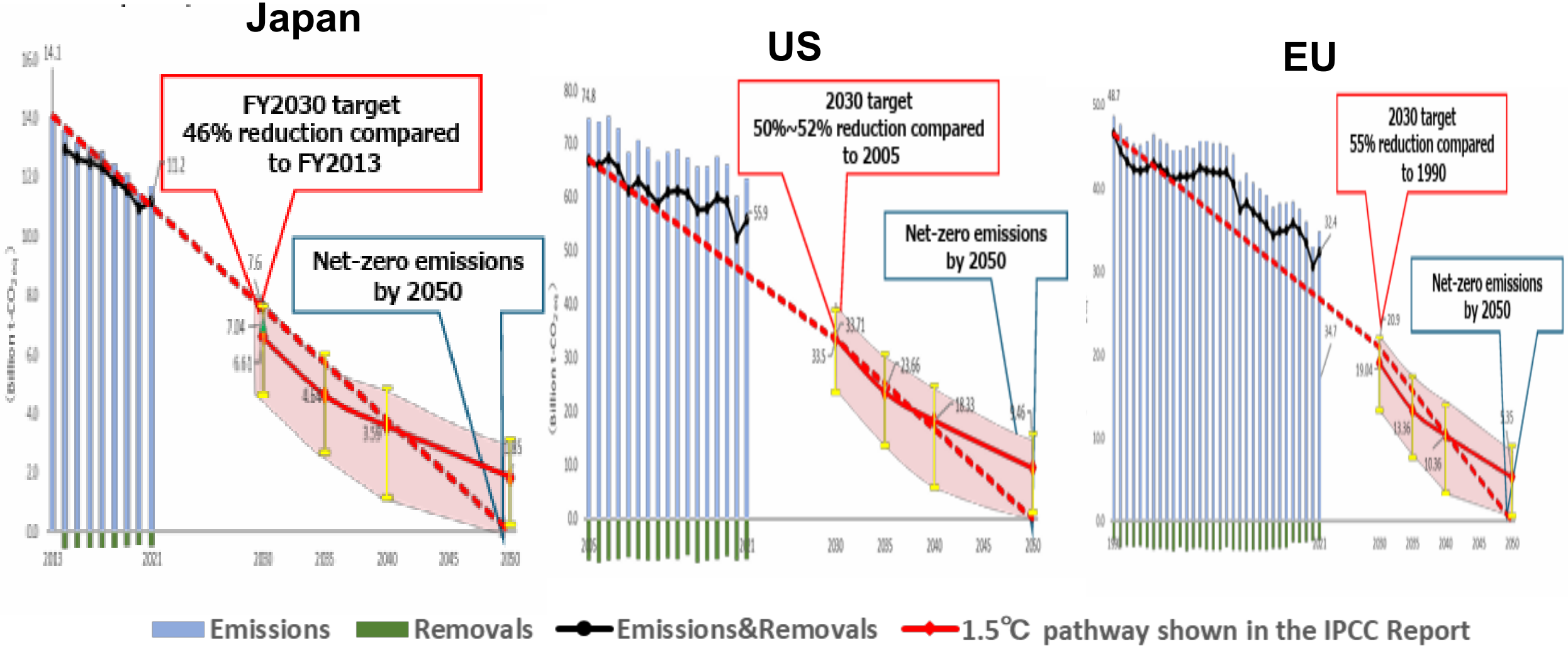
Power Generation Mix under the 6th Energy Plan



Source: METI, IEEJ

Progress to the NDCs

- While Japan is on the track to its NDC up to now, it cannot be guaranteed



Source: METI, IEEJ

Green Transformation Strategy (Feb 2023)

Promotion of Green Transformation (GX) with Energy Security as Prerequisite

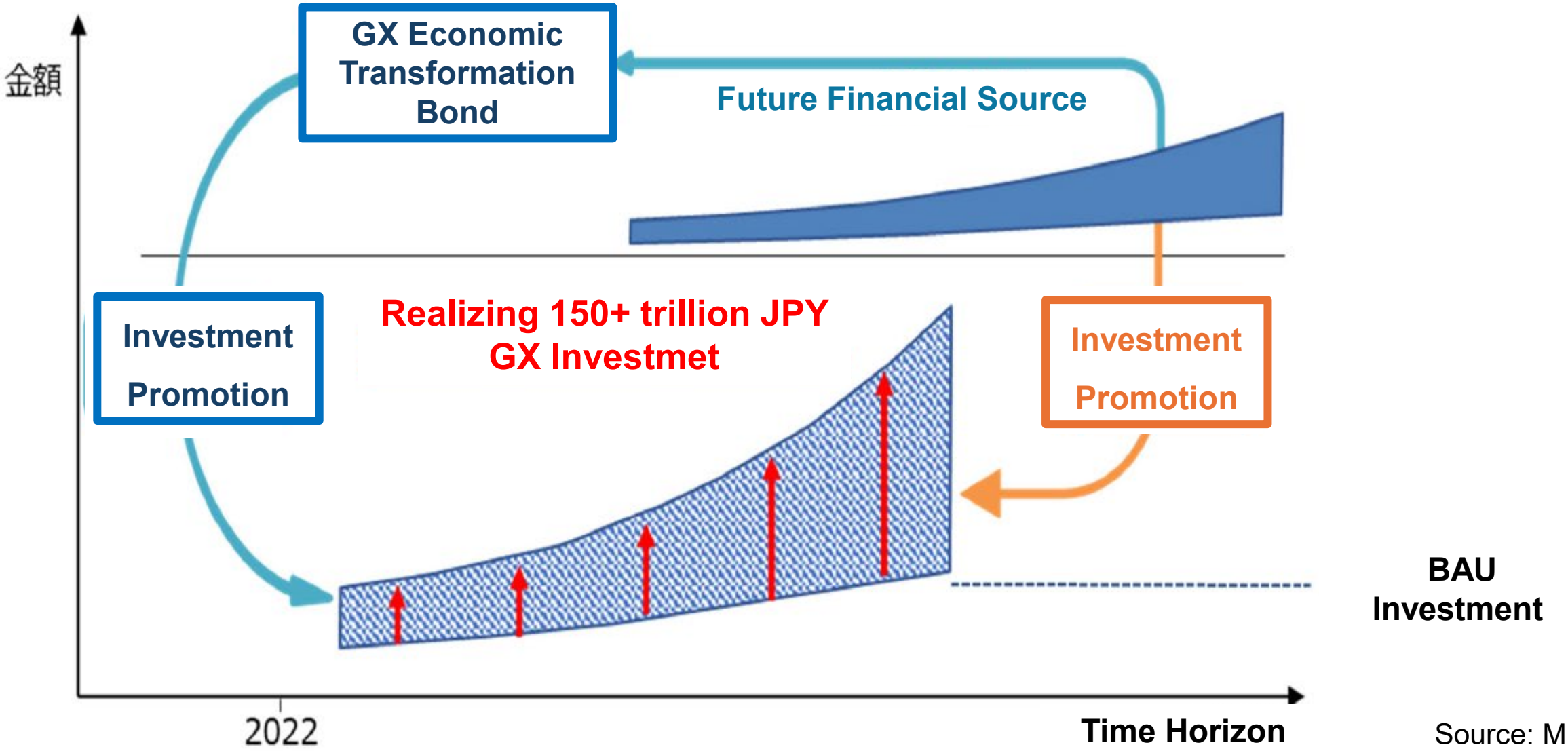
- **Maximum promotion of EE**
- **RE as Staple Power Source**
  - Perovskite PV
  - Floating Offshore Wind etc
- **Utilization of Nuclear**
  - Replacing decommissioning NPP with next generation reactors
  - Operation for more than 60 years under certain conditions
- **Promotion of H2 and Ammonia Bridging Cost Difference with Conventional Fuels**
- **R&D, Investment Support and Demand Creation (Methanation, SAF, Synthetic Fuel etc)**

Introduction of "Growth Oriented Carbon Pricing"

- **GX Bond for supporting 20 trillion JPY early investment in the next 10 years**
- **Incentivizing GX investment by growth oriented carbon pricing**
- **New Finance Measures**
- **International Strategy**
  - Creating green market
  - Asia Zero Emissions Community (AZEC)
- **GX under Just Transition**
  - Smooth labor Creating green market
  - Support GX in SME
  - Support decarbonization in the region and household

Source: METI

“Growth Oriented” Carbon Pricing



Source: METI

Government Support Stimulating Public/Private Investment

Government Support in the next 10 yrs
Approx 20 trillion JPY

• Promotion of Non-Fossil Energy	**6-8 trillion JPY**	• Expand H2 and ammonia demand • R&D of RE and other new technologies
• Industrial Structure Transformation integrating Supply and Demand • Promotion of Energy Efficiency	**9-12 trillion JPY**	• EE, and material/fuel switch in manufacturing industries • Nation-wide measures on domestic demand • R&D of new technologies
• Resource Recycling • Carbon Sequestration	**2-4 trillion JPY**	• R&D, social deployment of new technologies

Combined with regulation

Public/Private Investment in the next 10 yrs
Approx 150 trillion JPY

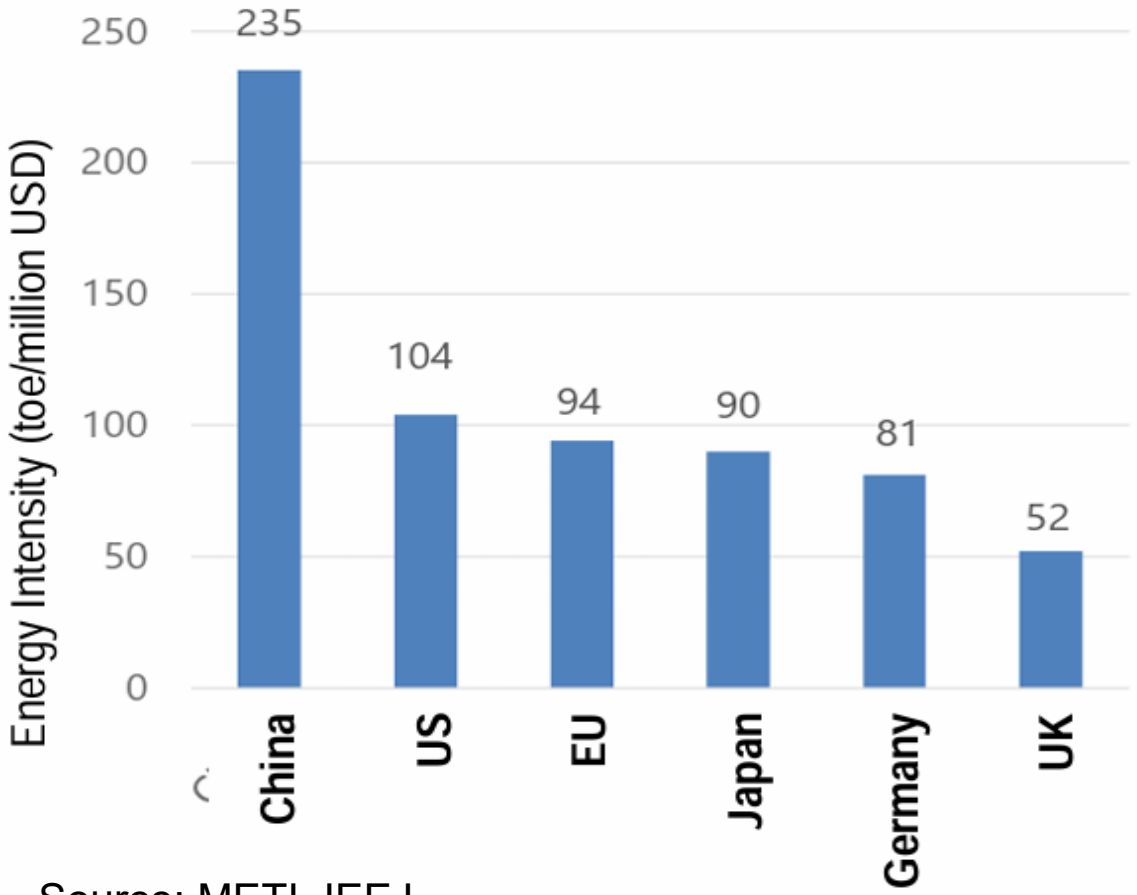
60 trillion JPY ～	• Massive introduction of RE • Nuclear (innovative reactor) • H2, ammonia
80 trillion JPY ～	• EE and material/fuel switch in manufacturing industries (steel, chemical, cement, paper etc) • Digital investment for decarbonization • Battery industries • Next generation vehicles • Houses and buildings
10 trillion JPY ～	• Resource recycling industries • Biomass manufacturing • CCS

Source: METI

Challenges: Highly Ambitious Energy Efficiency Goal

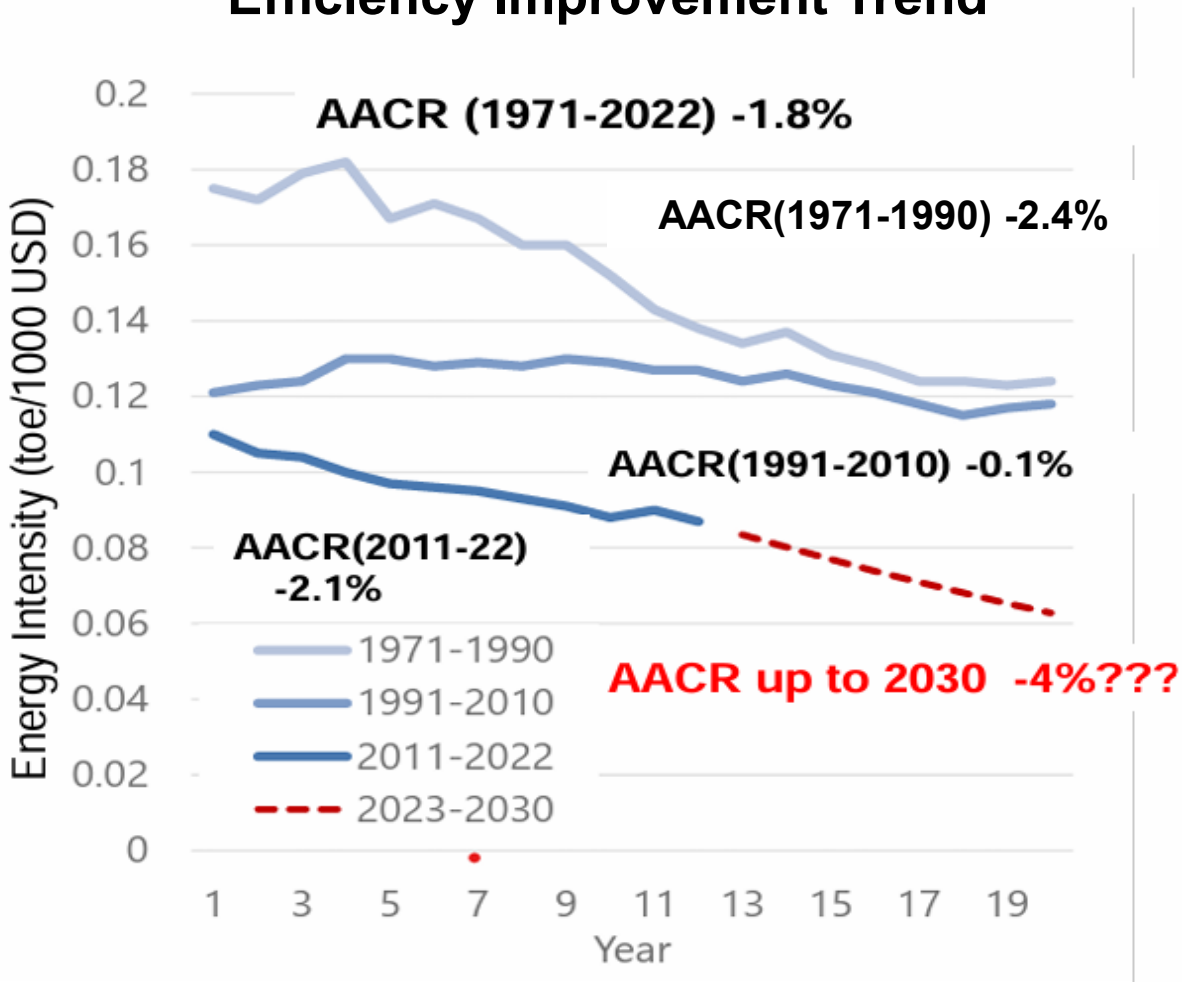
- Japan's energy efficiency level is already high
- Efficiency improvement much higher than 1971-90 period?

Energy Intensity of Major Countries



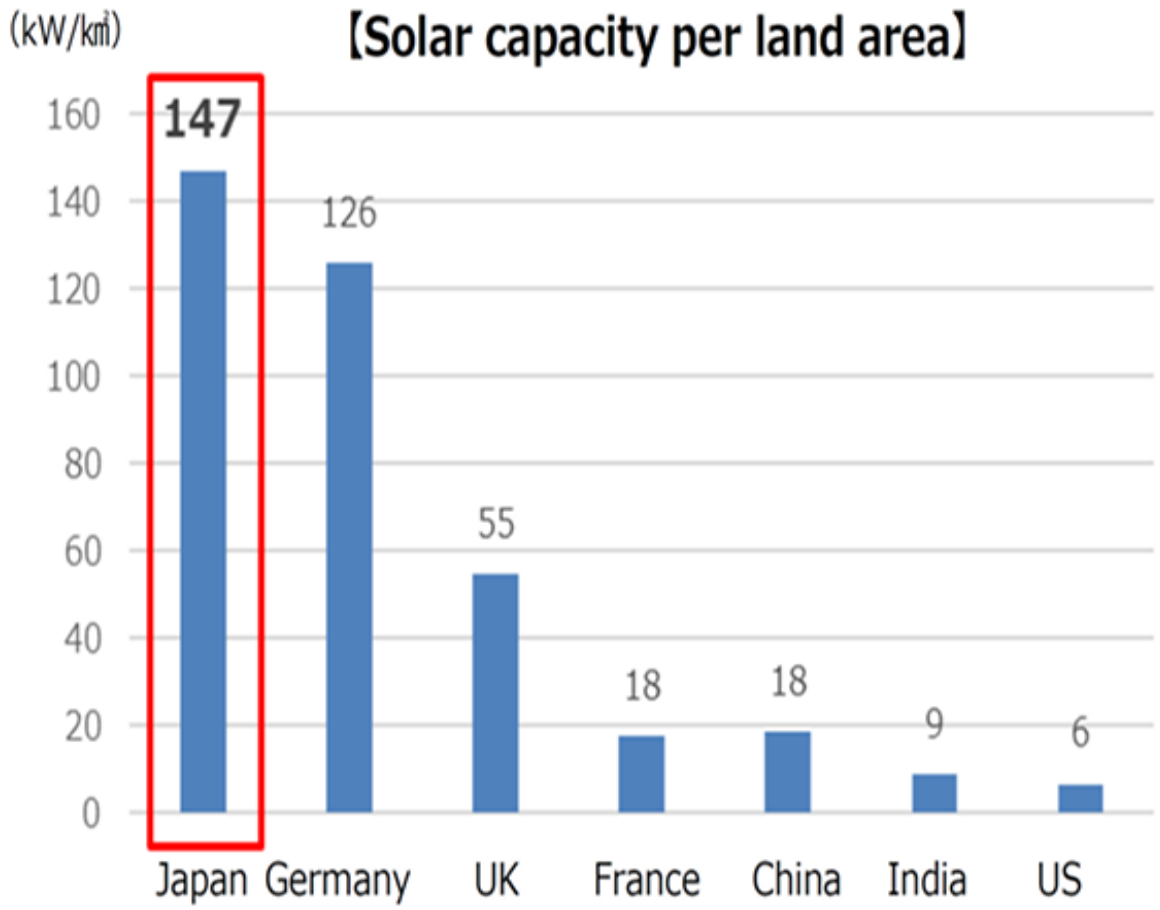
Source: METI, IEEJ

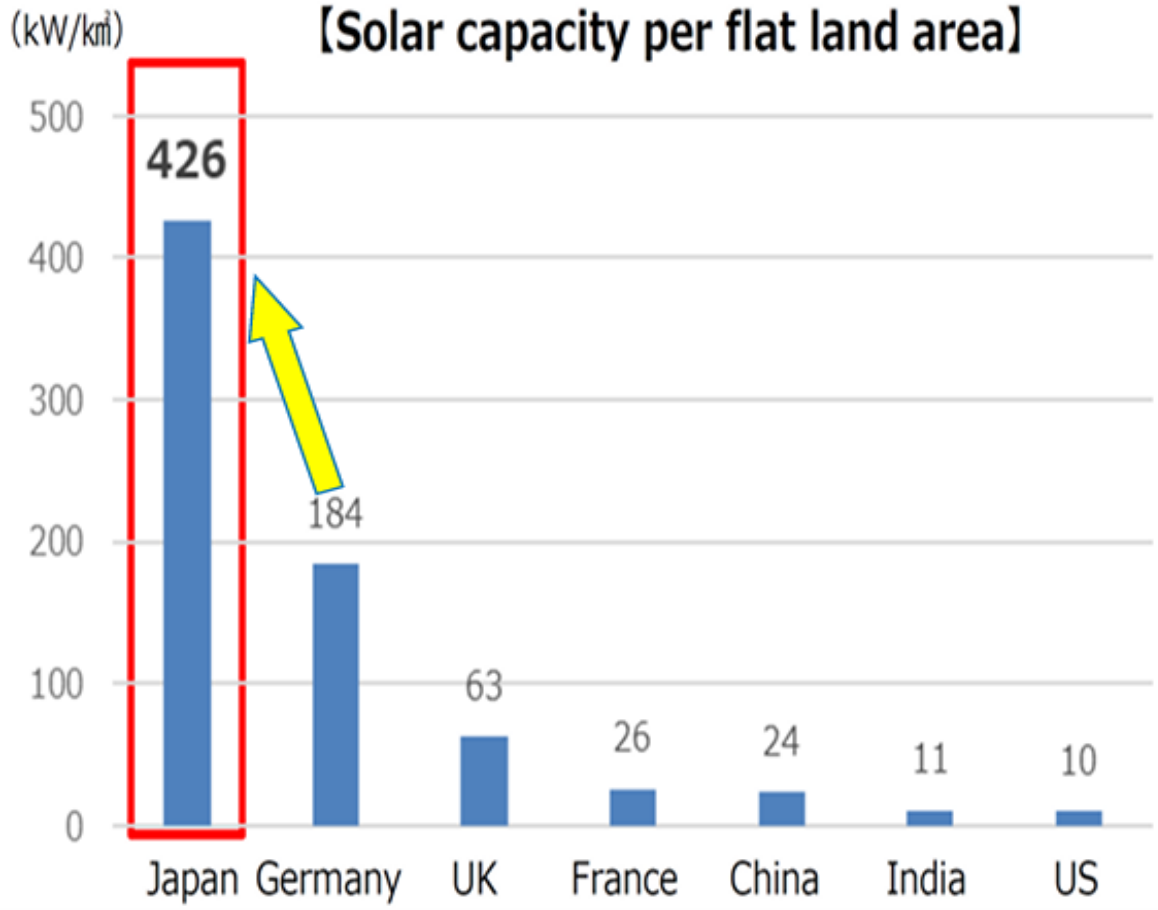
Efficiency Improvement Trend



Challenges: Already Very High Penetration of PV

- **Japan's installed capacity of solar PV per flat land area is the largest in the world and more than 2 times larger than that of Germany**

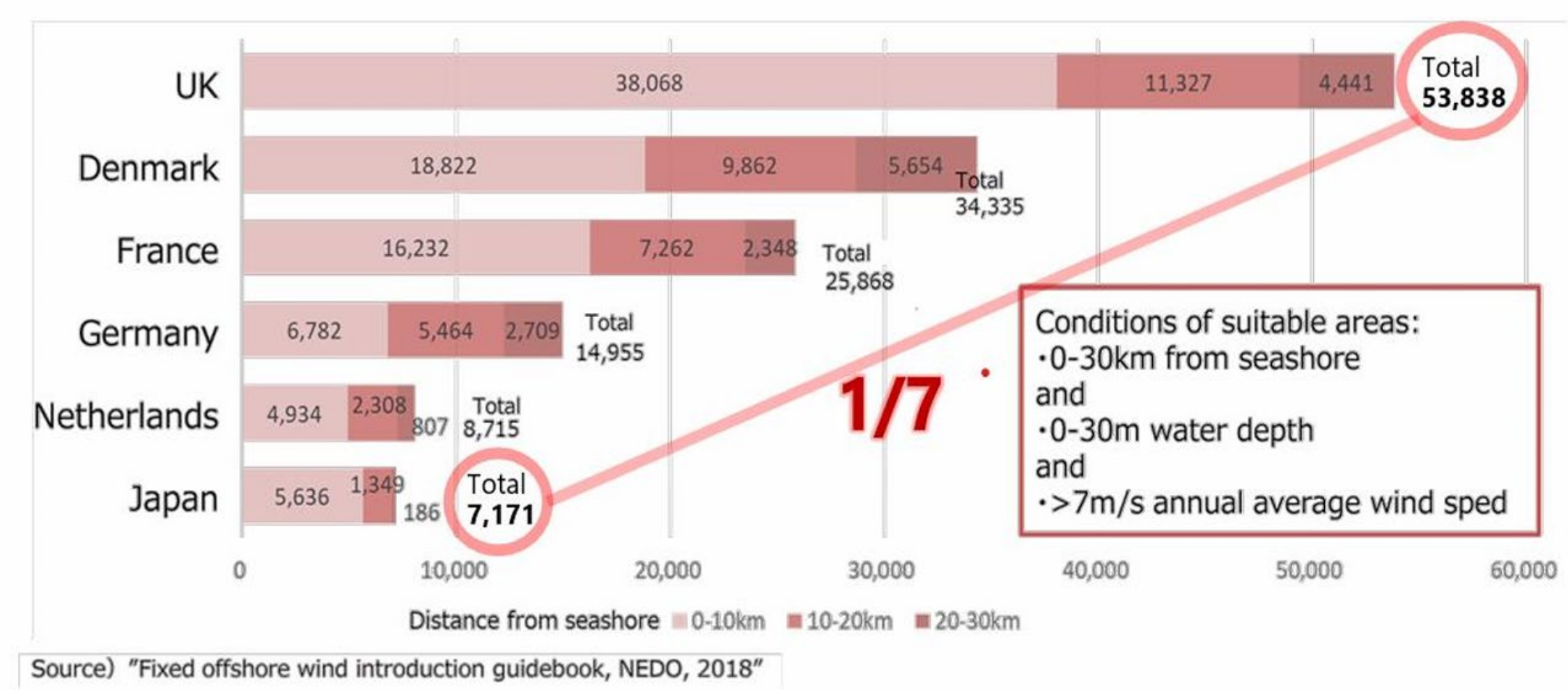




Source: METI, IEEJ

Challenges: Limited Potential of Fixated Offshore Wind

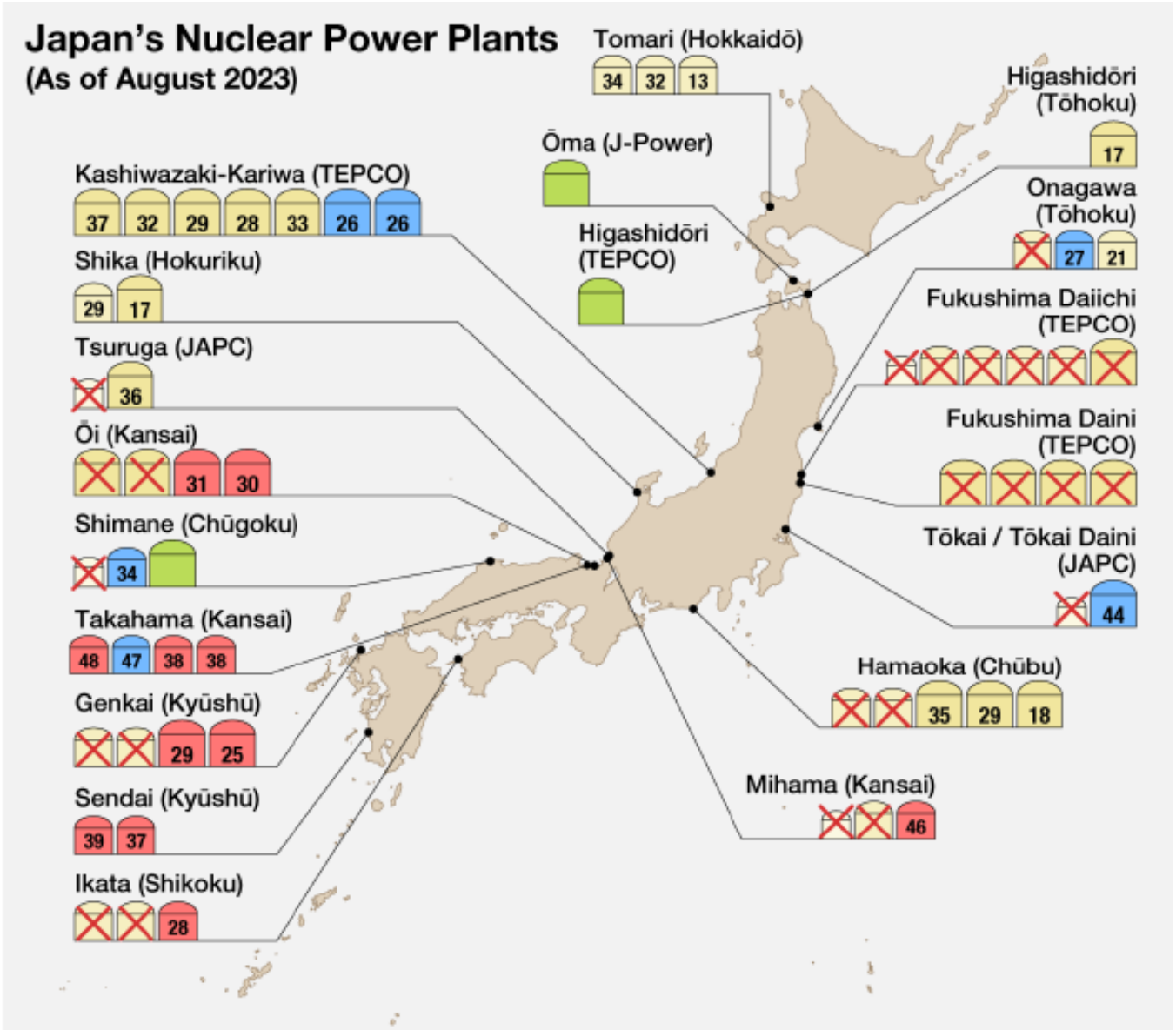
- **Areas suitable for fixated offshore wind in Japan far less than northern European countries (1/7 of UK, 1/5 of Denmark**
- **Floating offshore wind is much more expensive than fixated offshore wind**



Source) "Fixed offshore wind introduction guidebook, NEDO, 2018"

Challenges: Slow Pace of Nuclear Restarting

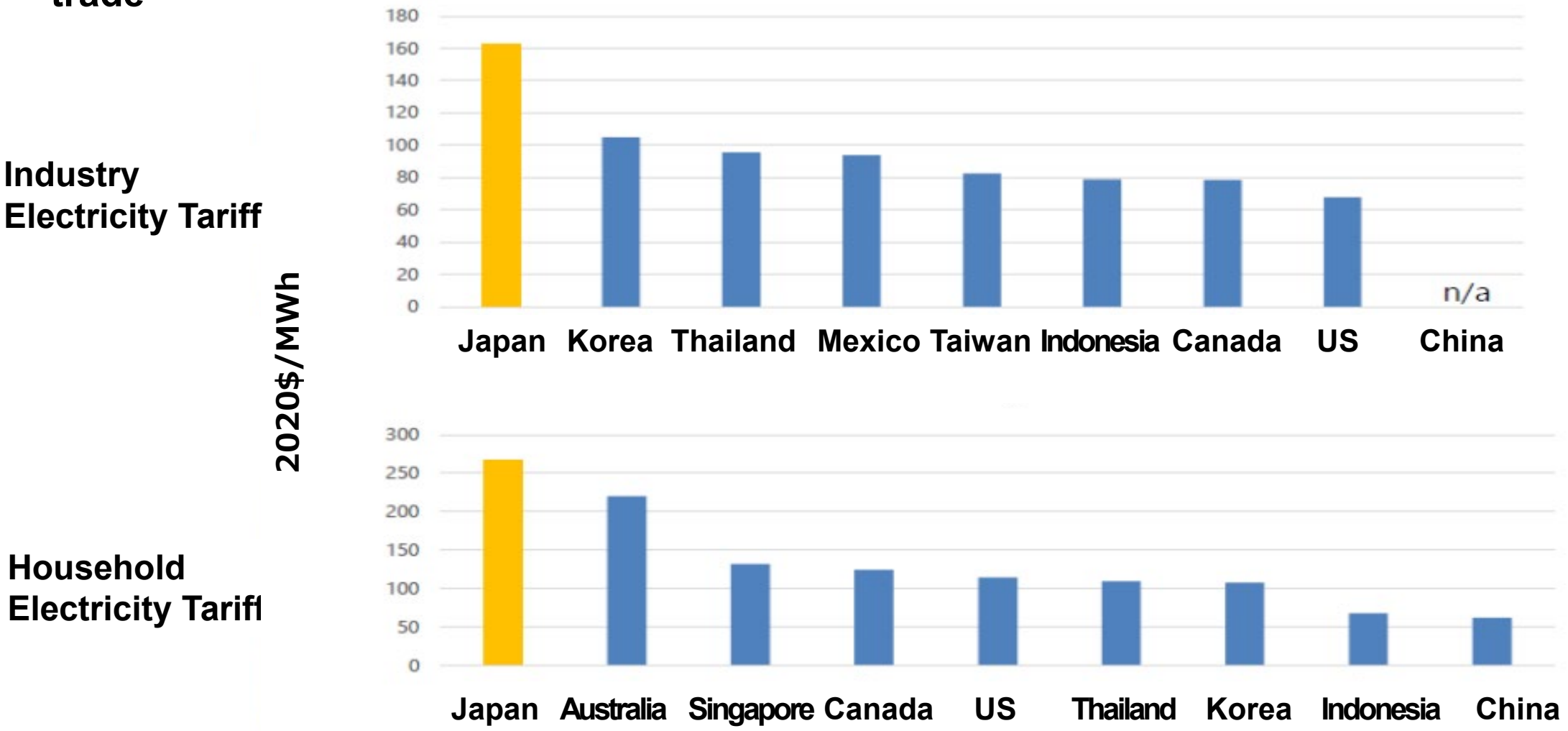
- 46% goal calls for restarting of 27 NPPs (12 restarted, 5 passed, 10 under review)



Source: METI

Challenges: Already High Energy Cost

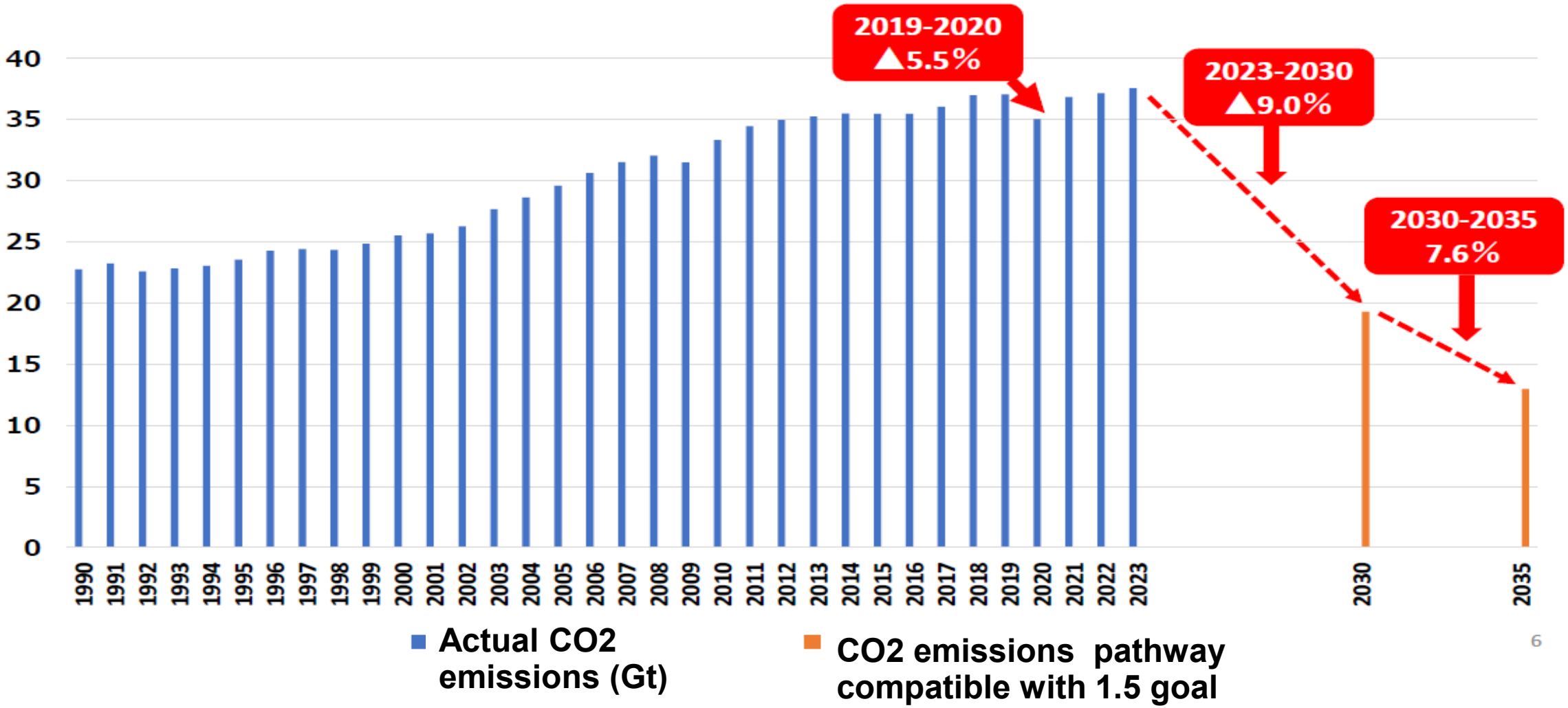
- **Japan's electricity tariff is the highest in Asia Pacific Region comprising 80% of Japan's trade**



Source: METI, IEEJ

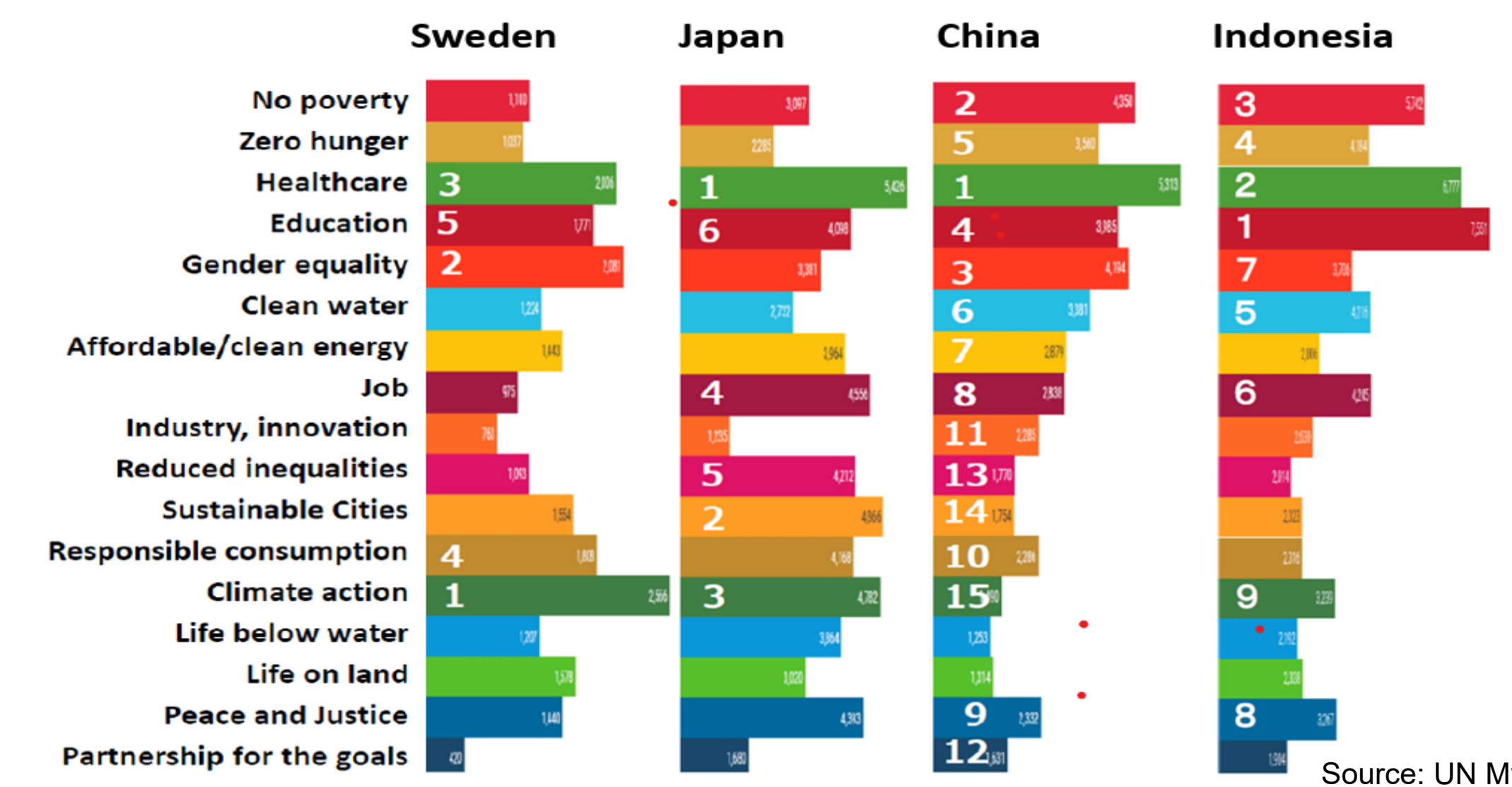
Global Challenges: Unrealistic Pathway for 1.5 Compatibility

- Japan's NDC and LTS assumes global endeavor towards 1.5 degree and 2050 CN.
- Global emissions is not at all on the track to 1.5 degree pathway



Global Challenges: Different Priority between North and South

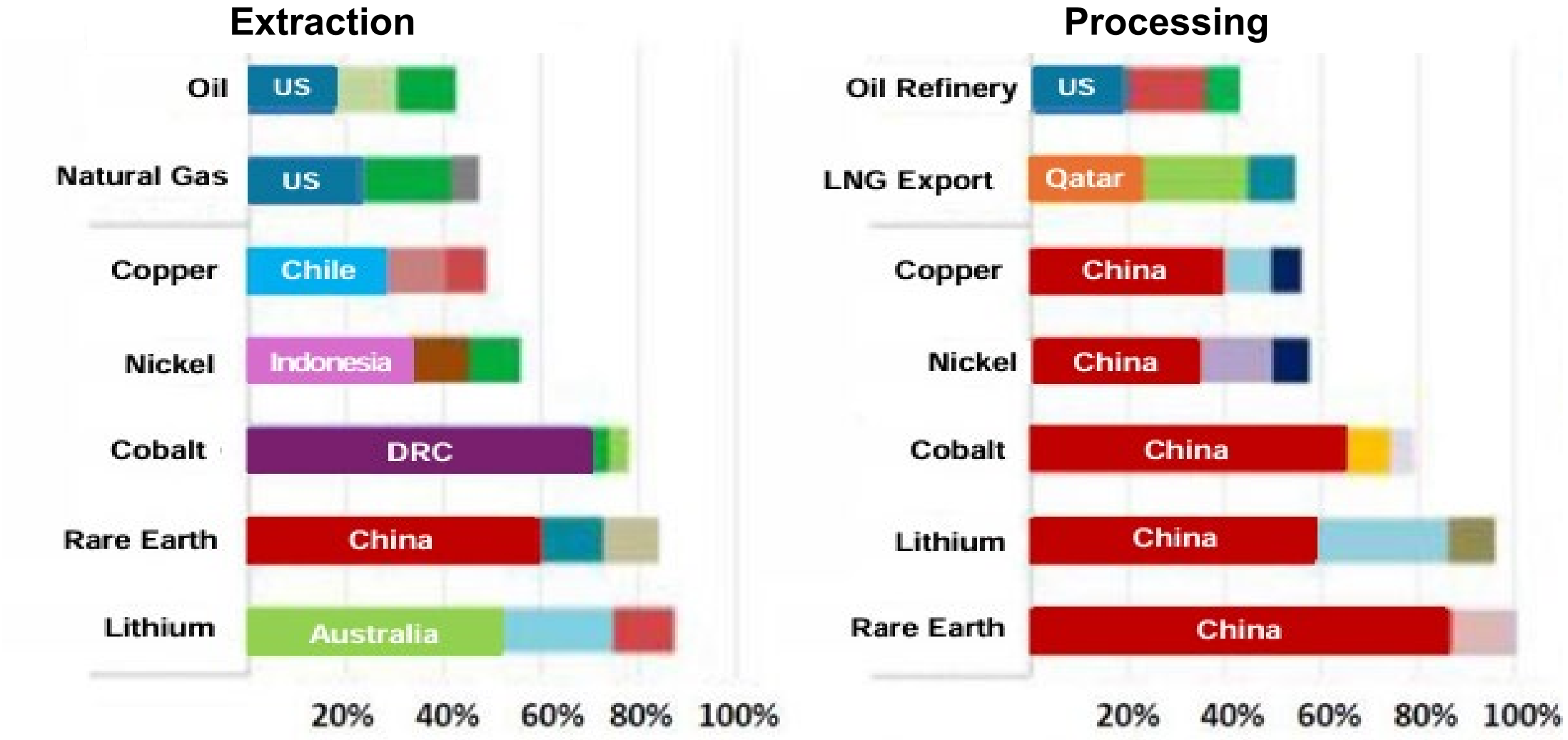
- Global North and Global South are not on the same page in their priority on SDG13



Source: UN My World 2030

Global Challenges: Supply Security of Critical Minerals

Share of Top 3 Countries in Resource Extraction and Processing



Source: IEA

Daniel Yeargin's Views on Energy Transformation

- **Technology and economic advantage drove earlier energy transition**

  🡐 🡒 Public policy is now the driver.

- **Previous energy transitions unfolded over the course of a century or more, and they did not wholly displace the incumbent technologies 🡐 🡒 Today's transition is intended to unfold in little more than a quarter-century and not be additive**

- **Four major hurdles for energy transition**

  - **Owing largely to the disruptions caused by Russia's war in Ukraine, energy security has become a top priority again**
  - **Today's world economy depends on hydrocarbons for over 80% of its energy. Four essential "pillars of modern civilization"- are cement, steel, plastics, and ammonia (for fertilizer), each of which is heavily dependent on the existing energy system.**
  - **Priority on climate action and definition of "energy transition" is different between Global North and Global South**
  - **Supply-demand crunch of critical minerals**