Challenges for global energy transition:

Based on the major findings from "IEEJ Outlook 2025"

Session 3 Long Term Perspectives

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Scenarios of IEEJ Outlook 2025

■ Regular scenarios

- Reference Scenario (RS): Business-as-usual future
- Advanced Technology Scenario (ATS): Maximum introduction of energy related technologies (Bottom-up approach)

■ Highlights of this year

1. Importance of LNG in energy transition
2. Risk Scenarios for Energy Security
3. Special Box Analysis

a. Vehicle Life Cycle Analysis
b. Importance of the “Stock effects” of energy efficiency improvement
c. Challenges for power demand increase for data center and AI
d. Remaining “Carbon Budget” and the issues related to “1.5℃ target”

Risk Scenarios for Energy Security

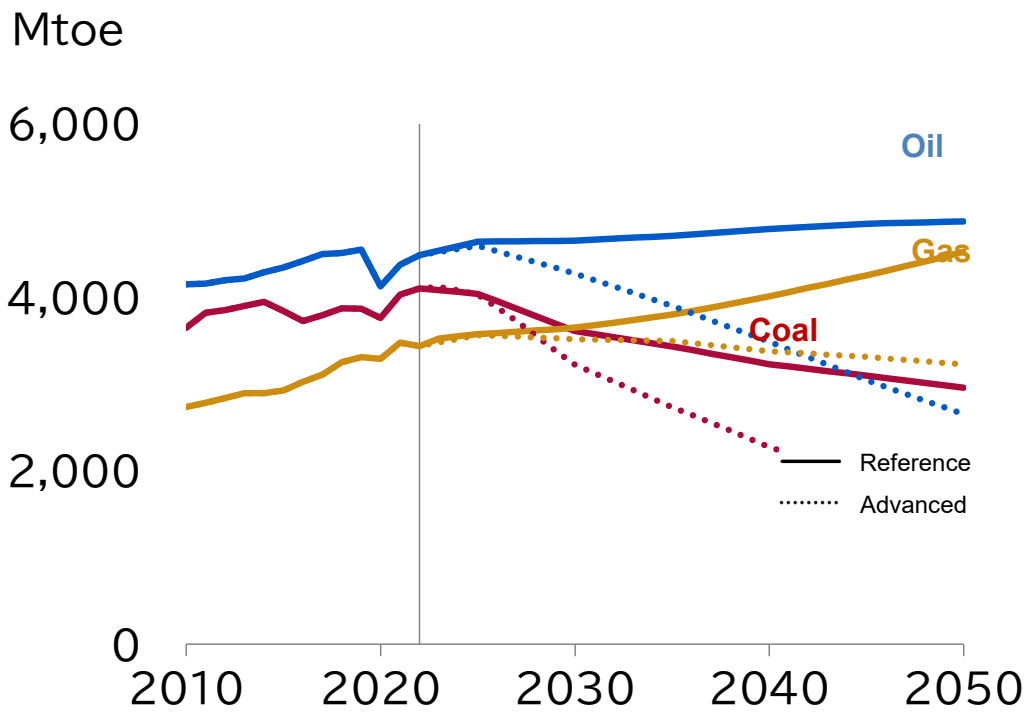
- Risks of Fossil Fuel Underinvestment
- More Serious and Complex Geopolitical Risks
- IT Revolution and Electricity Supply Security
- Critical Minerals and Clean Energy Investment Risks
- Cyberattacks and Energy Security

Source: IEEJ Outlook 2025 (IEEJ, October 2024)

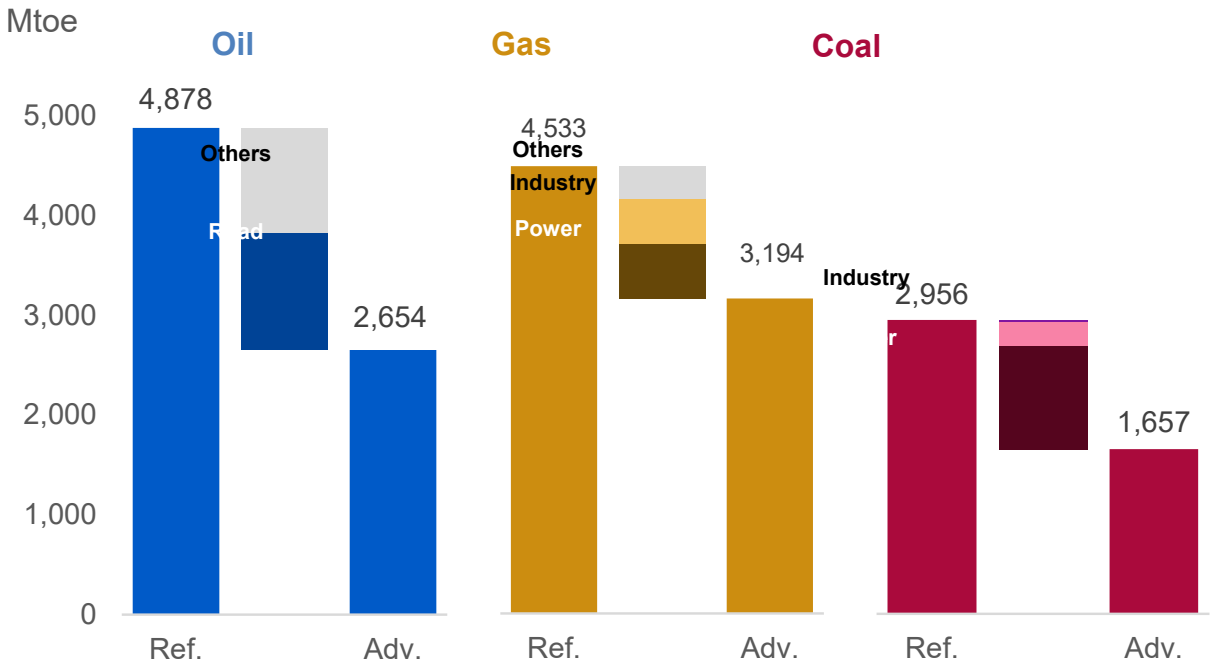
Fossil fuel demand varies substantially between Scenarios, but...

- Large divergence in fossil fuel demand between **RS** and **ATS**. But the fact is that security of fossil fuel supply remains necessary during the energy transition.

Global Fossil Fuel Demand Trajectory)

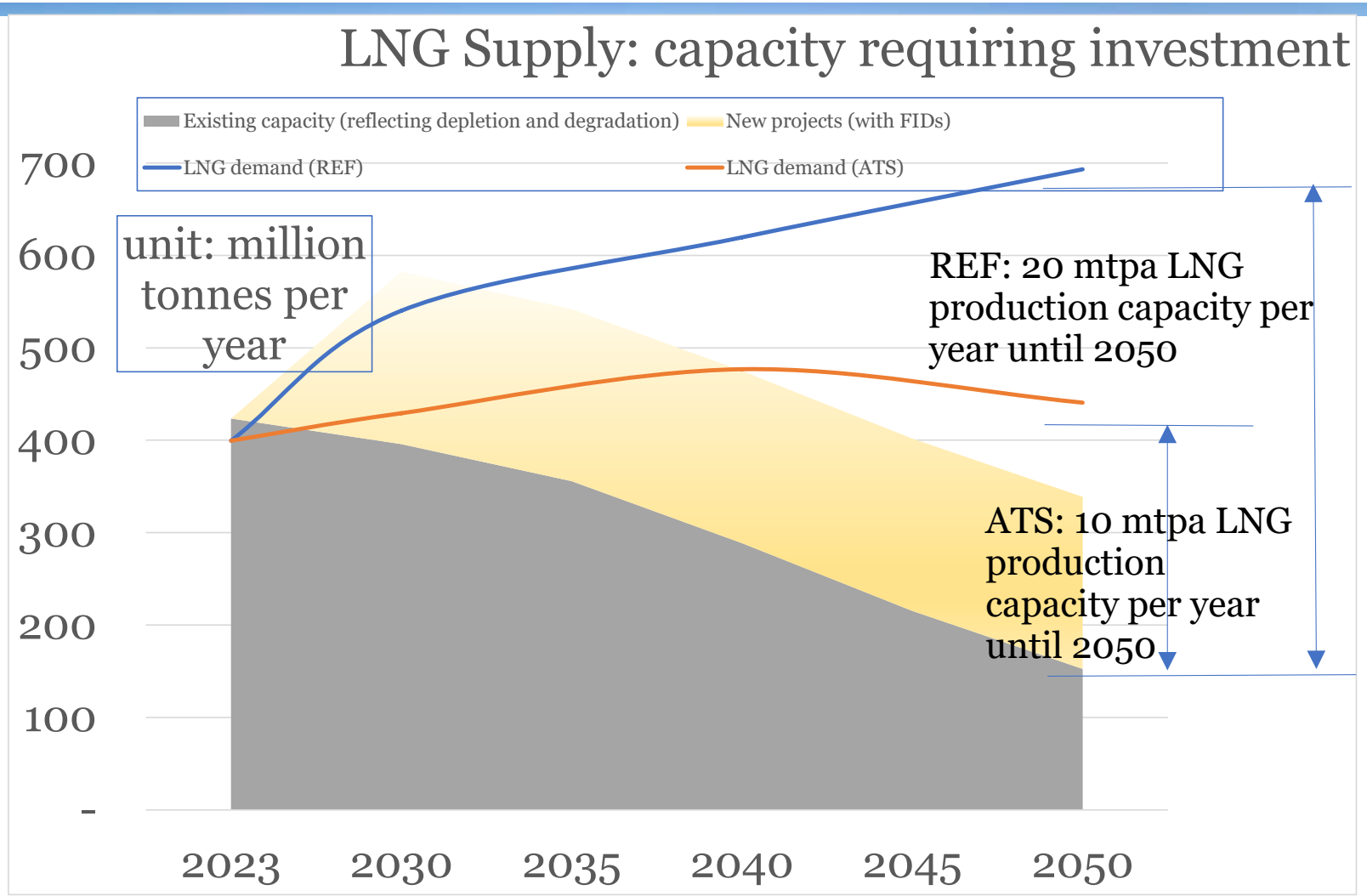


Factors behind the Differnece



Source: IEEJ Outlook 2025 (IEEJ, October 2024)

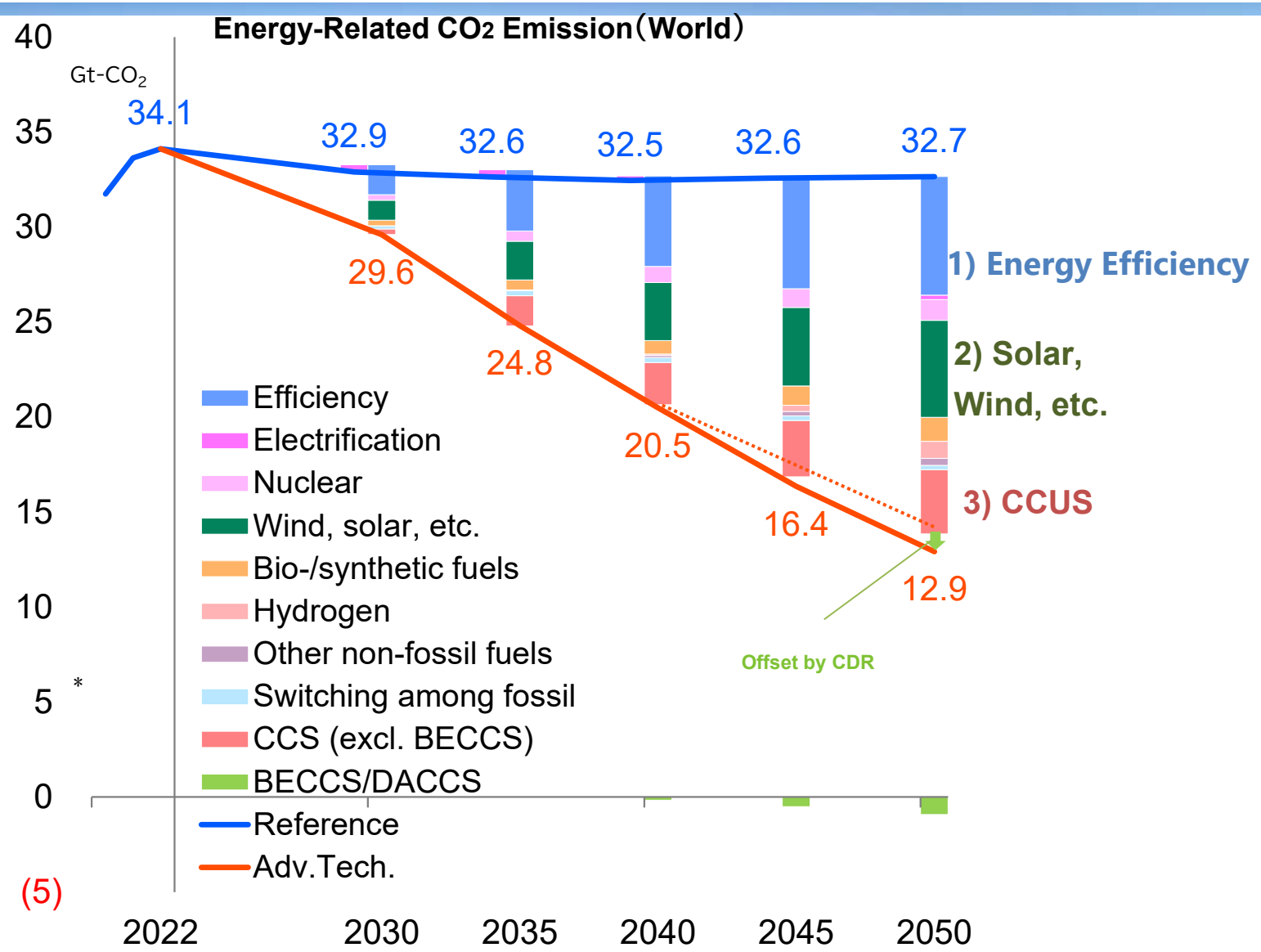
Long-term LNG Investment needed



- Investment is needed in 10-20 mtpa LNG production capacity per year until 2050

Source: IEEJ Outlook 2025 (IEEJ, October 2024)

CO2 Reduction lead by EE, RE and CCUS

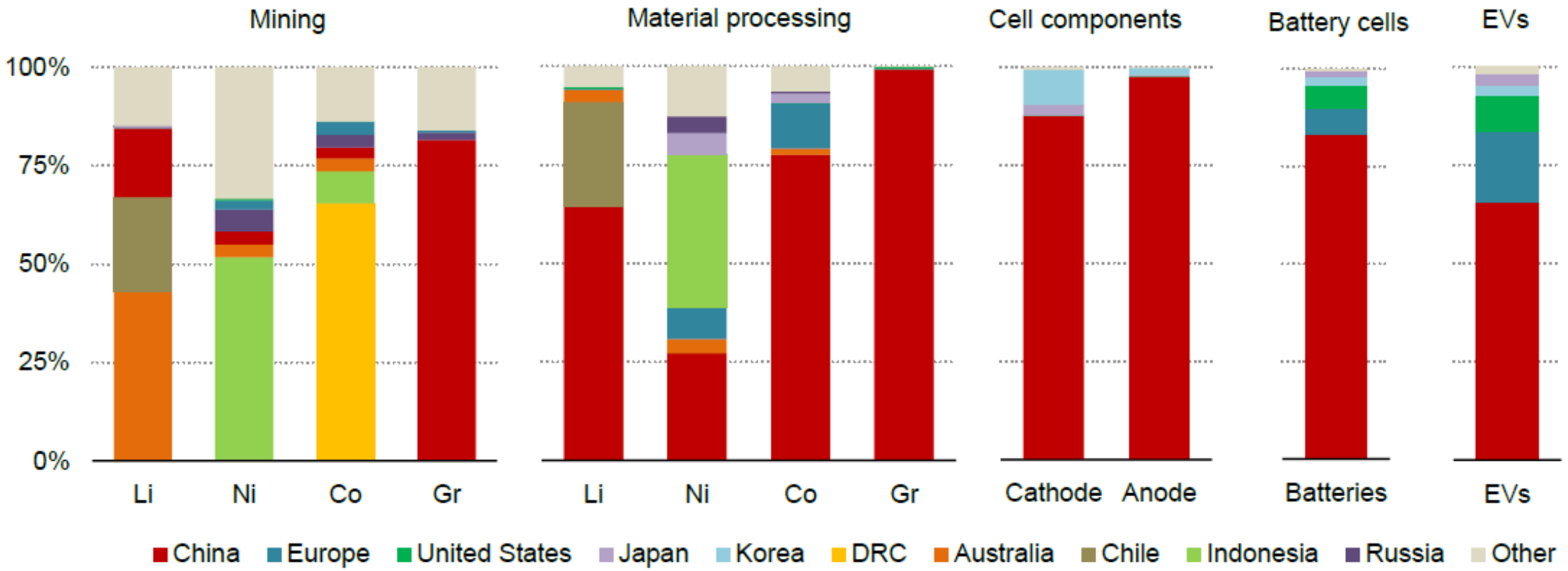


*Although not originally applicable to energy-related CO2, the offsetting effect is included for reference.

Source: IEEJ Outlook 2025 (IEEJ, October 2024)

Risks of concentration in clean energy supply chain

Concentrated Shares in on-board battery supply chain



Li = lithium, Ni = nickel, Co = cobalt, Gr = graphite
Source: IEA (2024) "Global Critical Minerals Outlook 2024"

- **High market concentration observed in some clean technology production and in the supply of critical minerals.**
- **Demand for critical minerals is expected to increase substantially in the future.**

Source: IEEJ Outlook 2025 (IEEJ, October 2024)

Conclusion

- Our energy future is full of uncertainty and unpredictability
- Energy security emerged as a top priority
- Decarbonization needs to be pursued as a global common interest
- Simultaneous pursuit of energy security and decarbonization is essential with emphasis put on minimizing cost
- Geopolitical tensions and divide of the world
- Gap is widening between “Ideal” and “Reality”
- International cooperation and inclusive/pragmatic approach needed