The 23rd IEEJ Webinar for the World

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IEEJ Outlook 2027

The Expanding Dimensions of Energy Security and Emerging Challenges

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60th Anniversary

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Global Energy Outlook to 2050

Key Points:

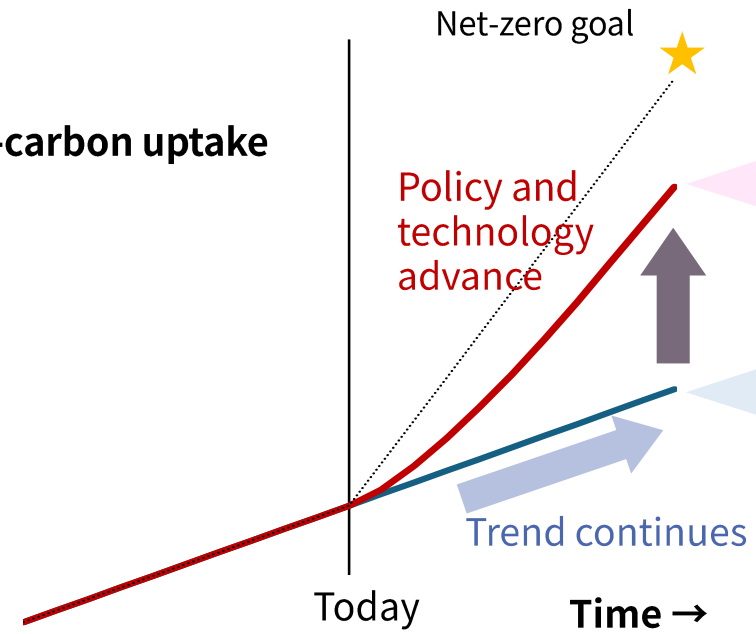
1. **Revisions to previous outlooks**
   (Hormuz effects over the medium and long term)
2. Electrification: energy-security benefits and limits
3. Fossil-fuel demand outlook

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Scenarios in IEEJ Outlook

- ✓ Global energy supply and demand projections through 2050.
- ✓ Two exploratory scenarios vary policy and technology progress.
  - ✓ Both are exploratory, rather than backcasting from emissions targets.

Scenarios



Advanced Technology [AdvTech.]
Strong security and climate policies speed feasible deployment.

Reference
Existing policies and trends continue.

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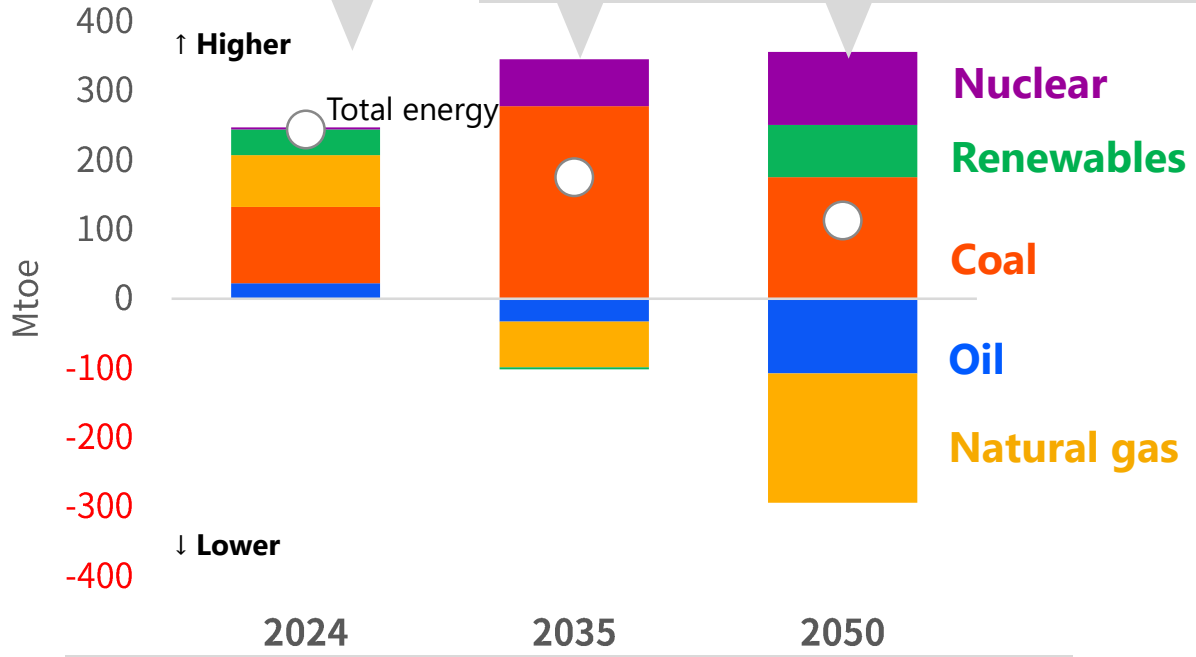
Coal rises near term, while clean energy increases by 2050

✓ Relative to the October 2025 Outlook, the revisions reflect:
(1) policy responses to the Strait of Hormuz disruption, (2) new energy and economic data, and
(3) updated policy and technology assumptions.

New statistics push up total primary energy demand from 2024.

Coal rises by 2035, while renewables and nuclear gain by 2050.

| Change vs. prior Outlook Primary energy (Mtoe)



| Drivers of revisions

New data raises demand across fuels

Policy response to Hormuz

Updated technology and policy

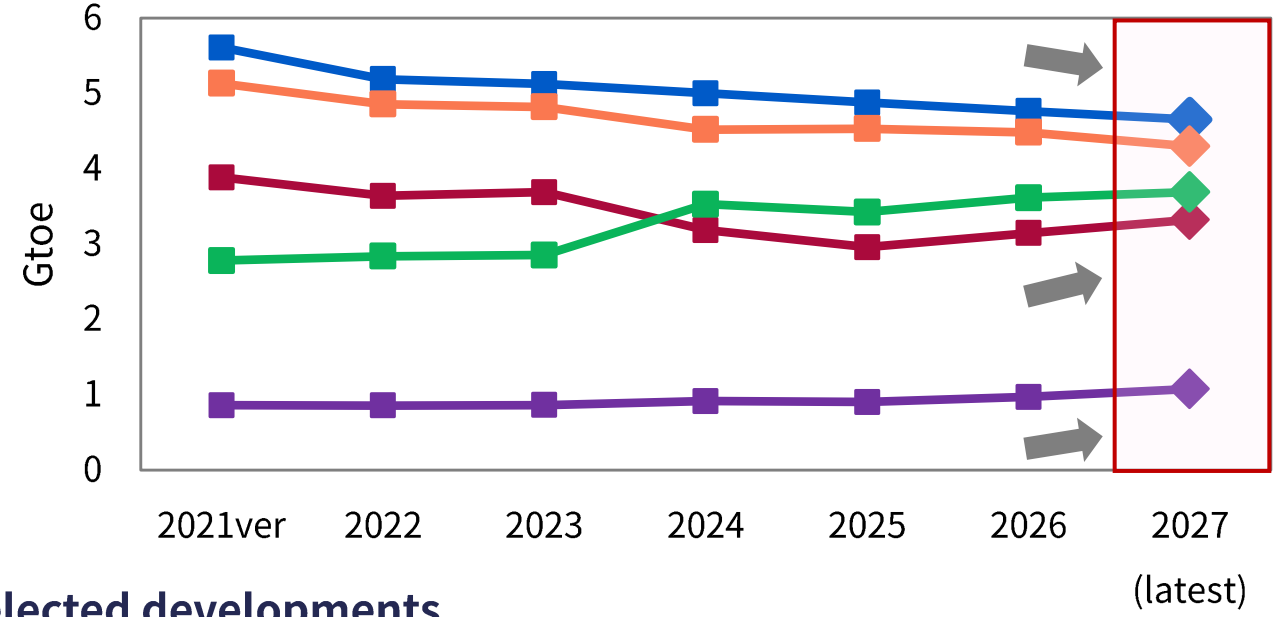
[1] IEA, World Energy Balances (July 2026). IEEJ Outlook 2027.

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Geopolitics and technology reshape the energy outlook

✓ The 2027 Outlook reflects the Hormuz disruption, building on earlier forecast shifts driven by geopolitics and technology.

2050 primary energy across Outlook editions



Oil and **gas**: revised down, yet remain the two largest energy sources.

Renewables: lower costs and import-diversification goals support growth.

Coal: security concerns reverse earlier declines in investment.

Nuclear: more countries pursue reliable, low-carbon power sources.

Selected developments

Policy	COVID-19 · Ukraine war ·	Trump 2.0	Hormuz disruption
Climate	Net-zero commitments ·		NDC 3.0
Tech	Solar/wind scale-up ·	Gen-AI uptake	

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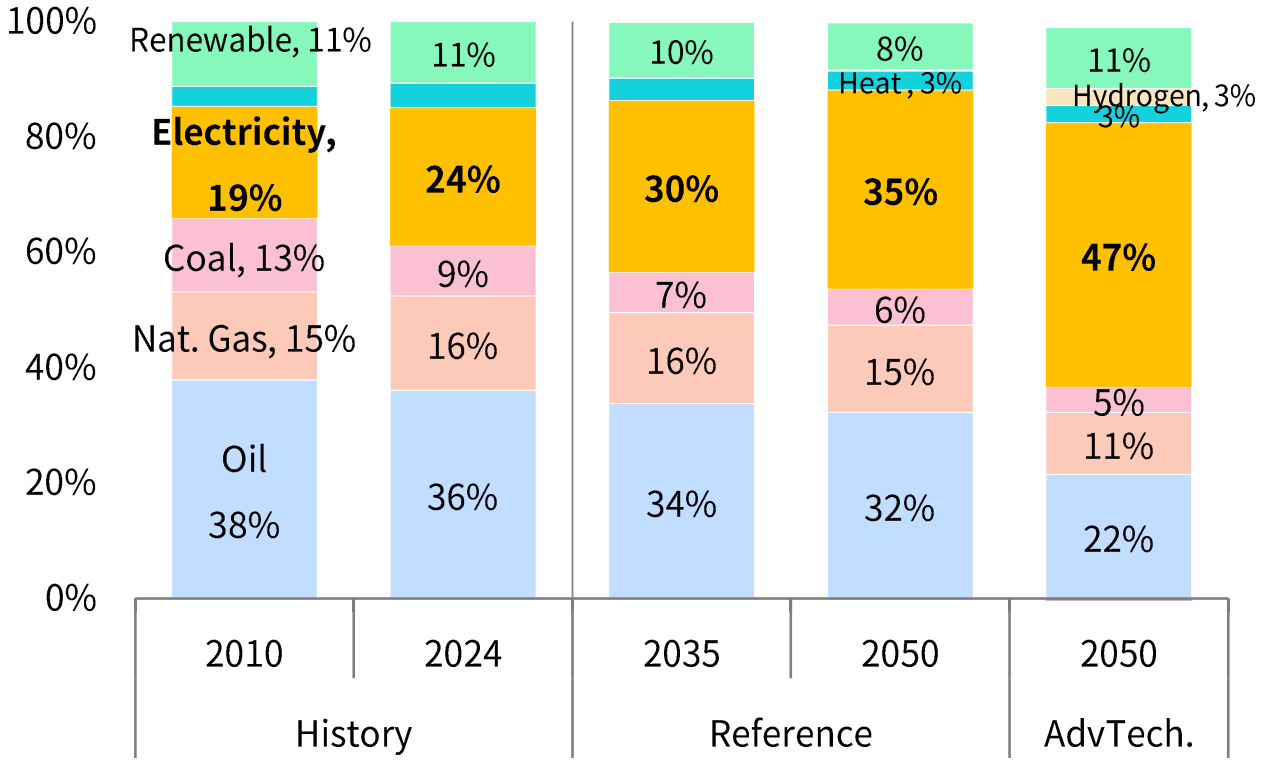
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Electrification improves energy security—but has limits

- ✓ Electricity's share of final energy rose about 5 percentage points in 2010–24.
- ✓ From 24% in 2024, it reaches 35% in the **Reference** case and 47% under **AdvTech.** by 2050.
  - EVs accelerate transport electrification, but hard-to-electrify uses retain oil and gas demand.

Global final energy consumption (by energy source)

Excludes non-energy use.
Historical renewables include biomass.

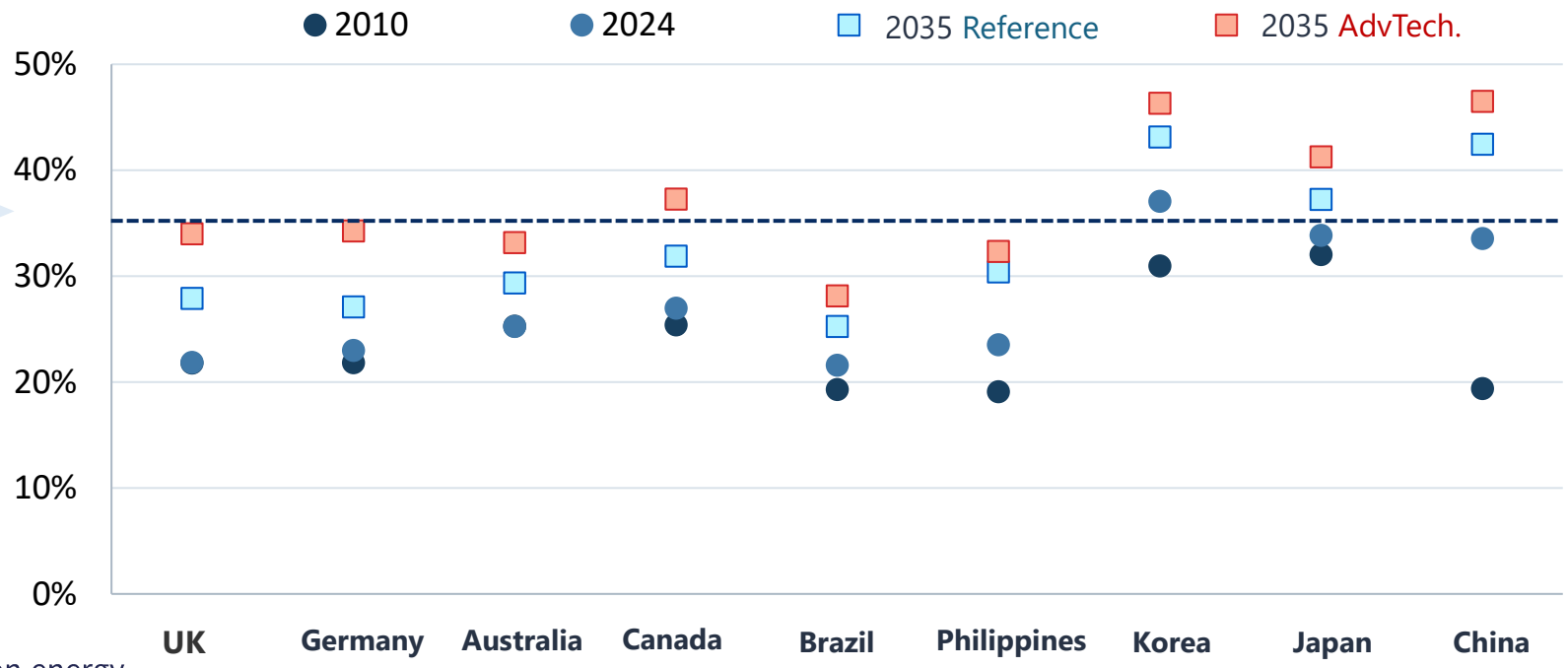


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35% electricity share by 2035 needs faster progress

- ✓ The European Commission, the UK, and South Korea are “Electrify Now” participants.
- ✓ Many countries need faster gains than in 2010–24 to reach 35% by 2035.
  - Some still miss 35% under **AdvTech.**

Electricity share*



*Share of final energy, excluding non-energy use and blast furnace/coke production.

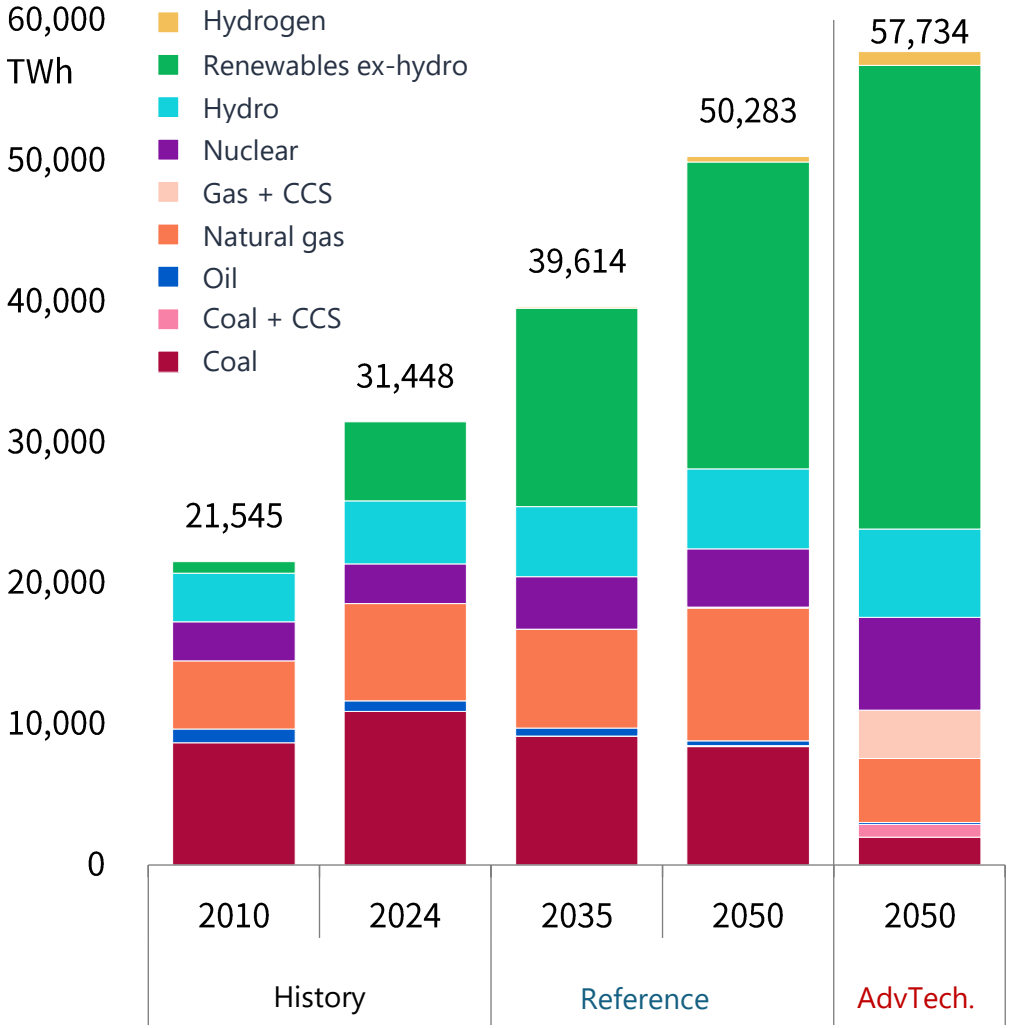
Selected “Electrify Now” participants

Illustrative

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Generation grows through 2050, led by renewables

Global electricity generation



- ✓ Global power generation rose 2.7% annually over 14 years, accelerating in 2024–25.[1]
- ✓ Data centers and air conditioners drive demand.
- ✓ By 2050, output reaches 1.6× 2024 levels in the **Reference** and 1.8× in **AdvTech.**

Renewables: grow largely as costs fall and energy security gains priority. Record solar additions pose challenges for grids and critical mineral supply.

Nuclear: as a reliable low-carbon supply, life extensions and new builds will be accelerated.

Coal and **gas** remain in the **Reference** case, backing up variable renewables.

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[1] Energy Institute, Statistical Review of World Energy (June 2026).

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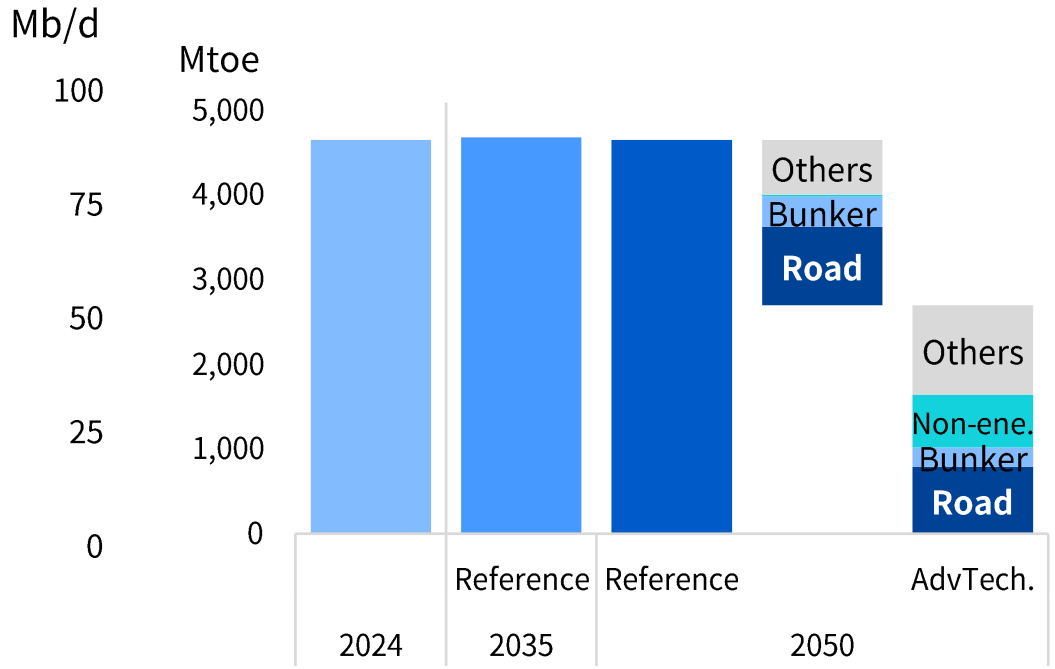
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3. **Fossil-fuel demand outlook**

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Oil use persists in chemicals as road demand declines

- ✓ By 2050, oil demand is broadly flat in **Reference** but 40% below 2024 levels under **AdvTech.**
- ✓ Road transport and international bunkers offer room to cut oil use, but chemical feedstocks are harder to replace.
- ✓ Refineries must adapt to shifting product demand, not just lower volumes.

Global primary oil consumption

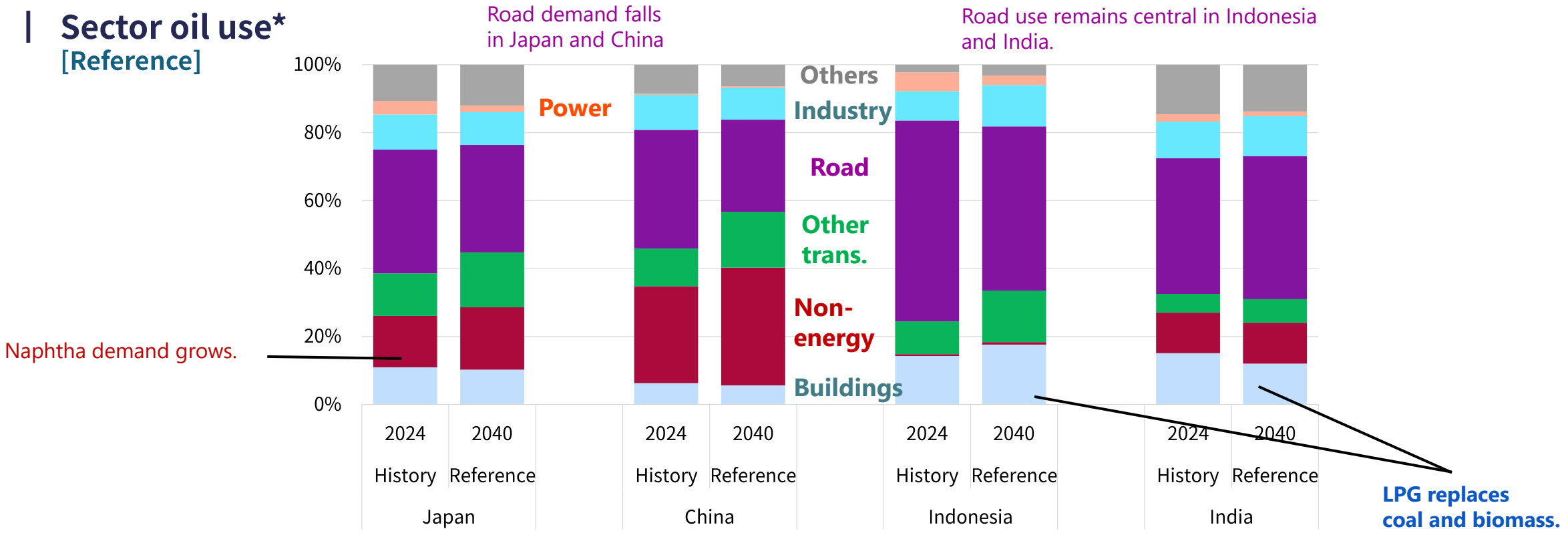


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Asia's oil demand diverges by country and end use

- ✓ **In advanced Asia and China**, oil shifts from roads to chemicals and other transport. Refineries need to produce more naphtha and middle distillates.
- ✓ **Emerging Asia**'s vehicle fleets expand, pushing up gasoline demand.

Sector oil use* [Reference]



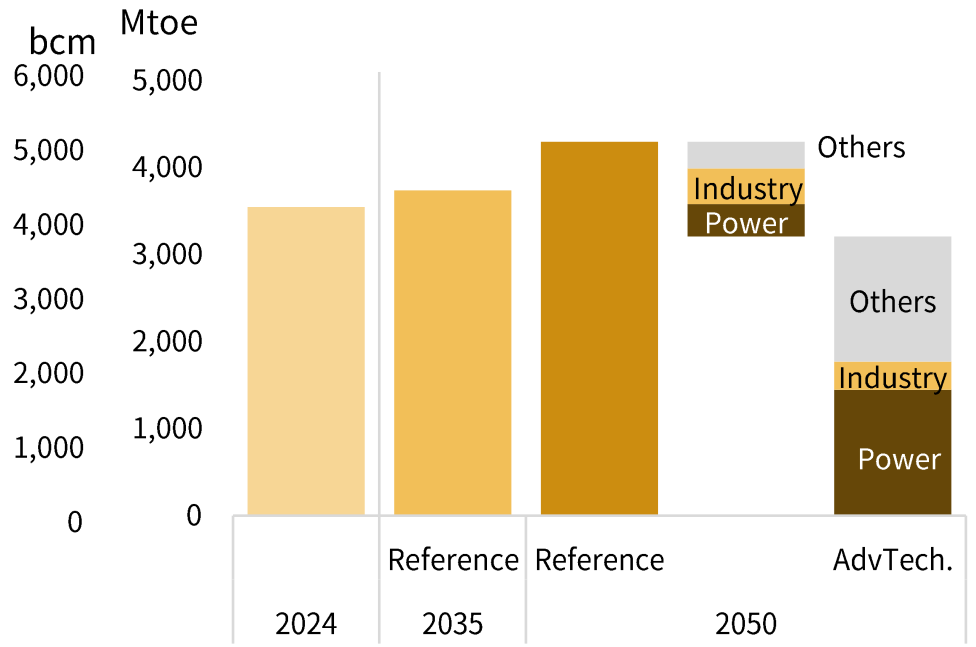
*Shares of final demand, power-sector inputs and international bunkers.

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Natural gas demand rises despite the Hormuz disruption

- ✓ Gas demand rises in the **Reference** case across power, industry, and buildings.
- ✓ **AdvTech.** reduces gas demand less than oil demand: gas still balances variable renewables and provides high-temperature heat.
- ✓ Supply security remains essential despite post-Hormuz policy shifts.

Global natural gas demand

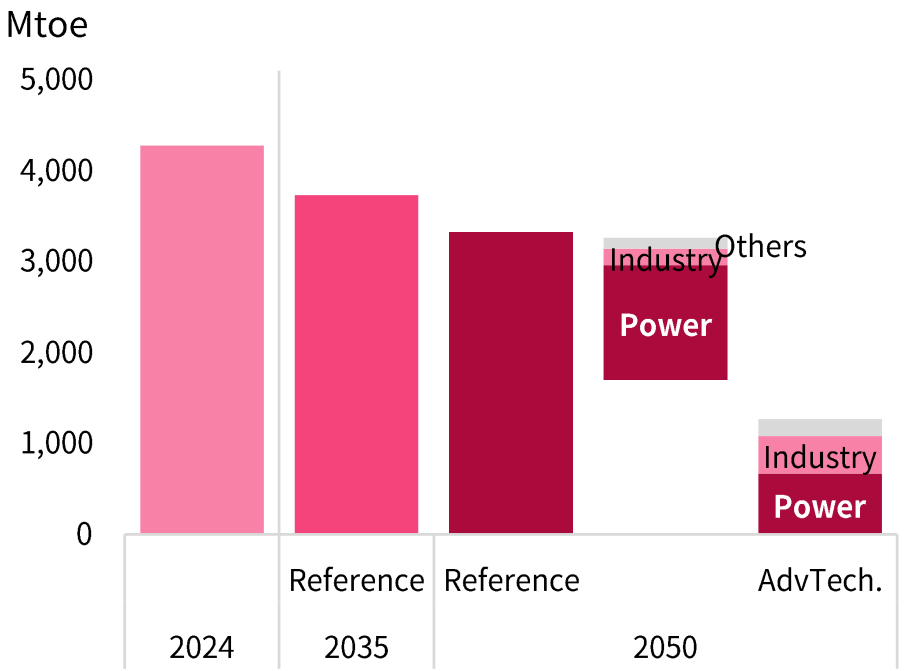


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Energy security reshapes coal's outlook

- ✓ Coal use falls in both scenarios.
- ✓ Power has the most scope to cut coal; steel has less.

Global primary coal use

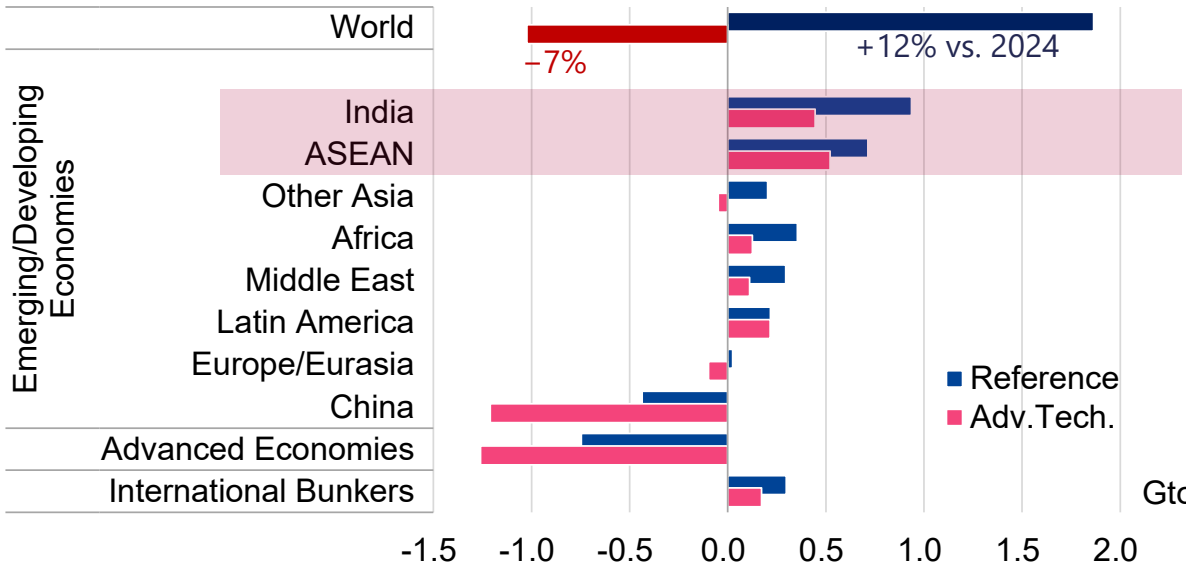


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India and ASEAN grow as China's energy demand falls

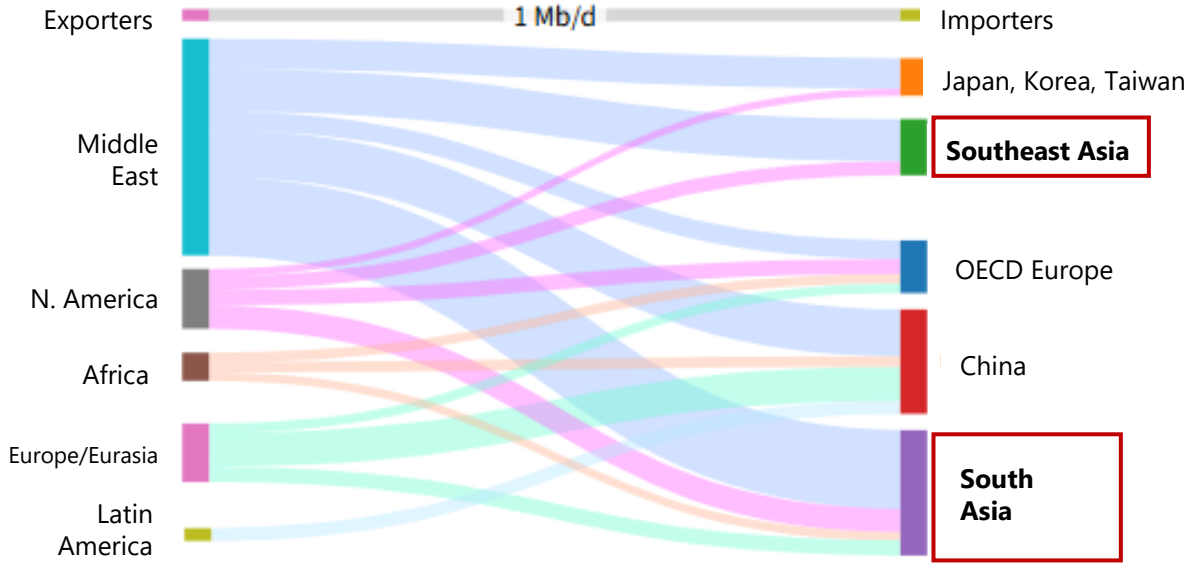
- ✓ Reference: global primary energy use keeps rising, while AdvTech. brings a peak around 2030.
- ✓ **China's energy demand declines from around 2030, while India and ASEAN drive growth.**
- ✓ By 2050, half of crude oil trade heads to South and Southeast Asia, raising the importance of refined-product trade and coordinated oil stocks.

Primary energy by region, 2024–50



*"ASEAN" excludes Timor-Leste.

Crude oil trade (Reference, 2050)



Flows of at least 0.5 Mb/d shown.

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Key takeaways

1. **Outlook revisions (Hormuz effects over the medium and long term)**
   Renewables and nuclear grow over time, yet oil and gas remain the two largest energy sources in 2050 (Reference). Stable supply remains essential.

2. **Electrification**
   Electrification lowers dependence on fossil fuels, but reaching a 35% electricity share by 2035 is challenging for many countries. Adoption must be matched by adequate power supply.

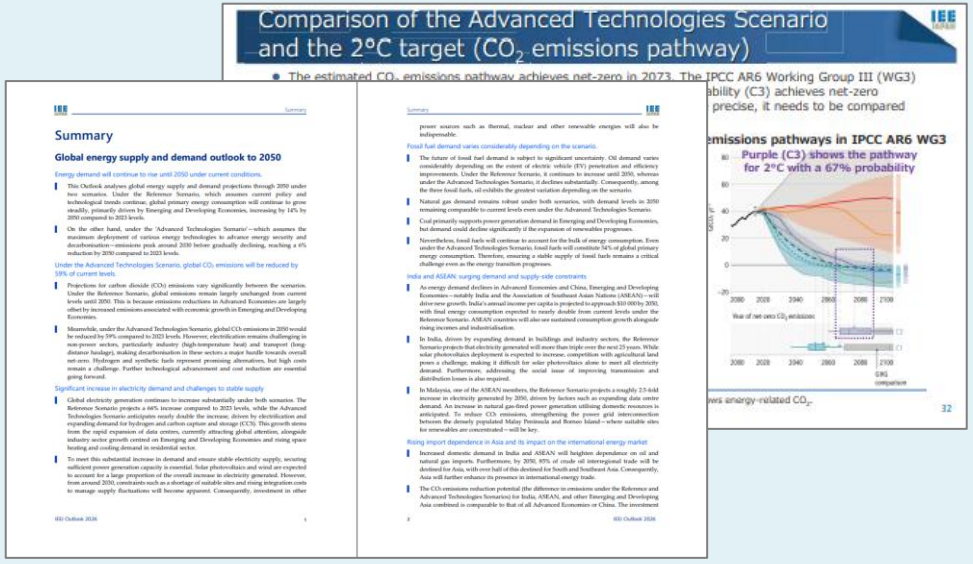
3. **Fossil-fuel demand**
   Power and road transport can cut fossil-fuel use; industry and chemical feedstocks are harder to decarbonize. Oil product shifts in demand-side require refinery adaptation and trade.

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Explore the full IEEJ Outlook 2027 online

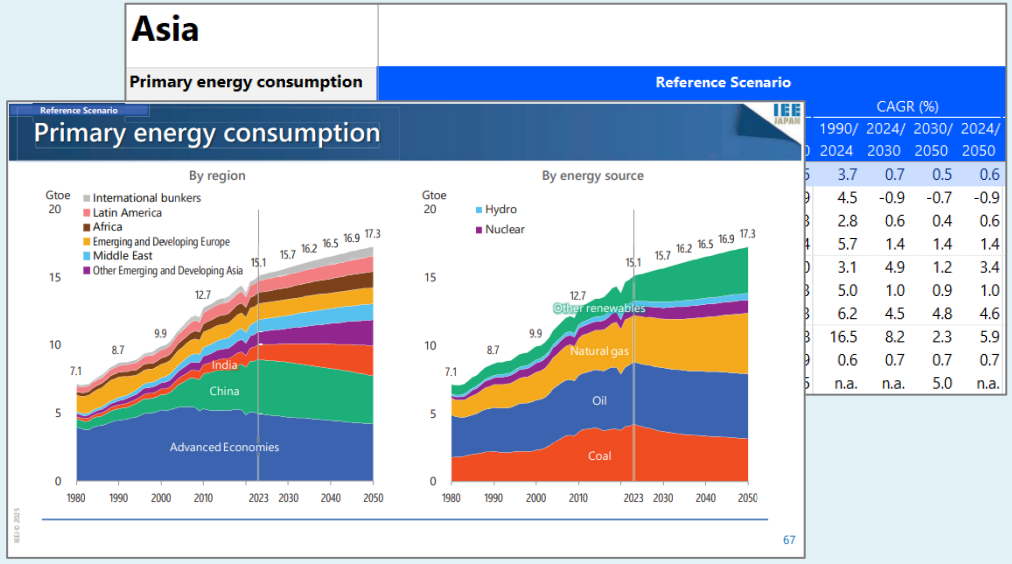
✓ Additional IEEJ Outlook 2027 resources are available at:
https://eneken.ieej.or.jp/en/whatsnew/454.html

IEEJ Outlook 2027 report
(Summary and slides)



✓ Part 1: Energy Outlook to 2050
✓ Part 2: Reconsider Energy Security

Data tables and charts



Regional and scenario data.
(e.g.) primary energy, power generation, CO_2 emissions and assumptions through 2050.

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Appendix

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Energy price assumptions

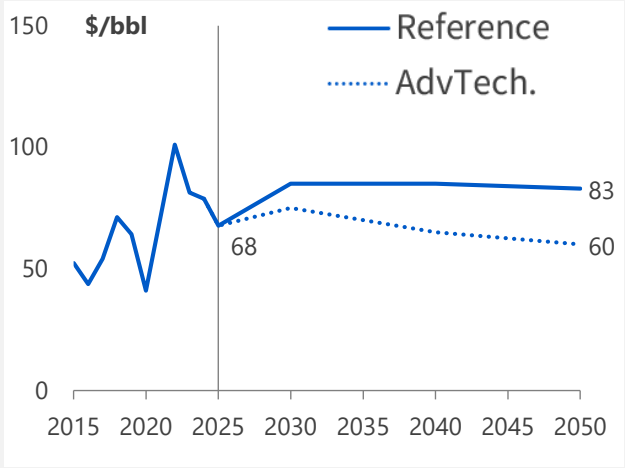
✓ Assumption: shipping constraints in the Strait of Hormuz and Bab el-Mandeb largely ease by around 2030.

Energy prices (nominal history; projections in constant 2025 USD)

Crude oil (Brent)

Reference: flat to 2040.

AdvTech.: earlier price declines as demand falls.

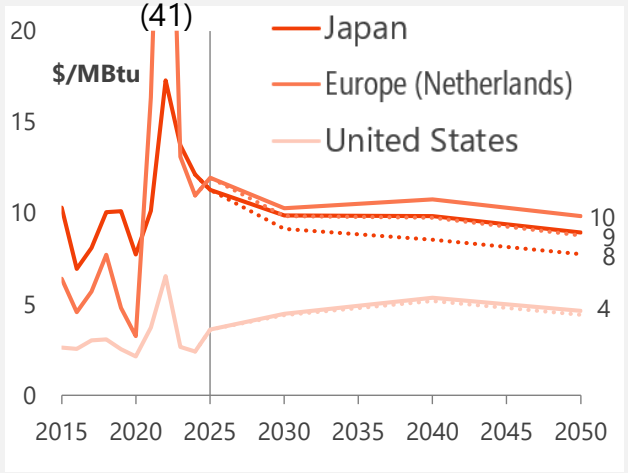


Natural gas

Japan: less oil-linked.

US: exports lift prices.

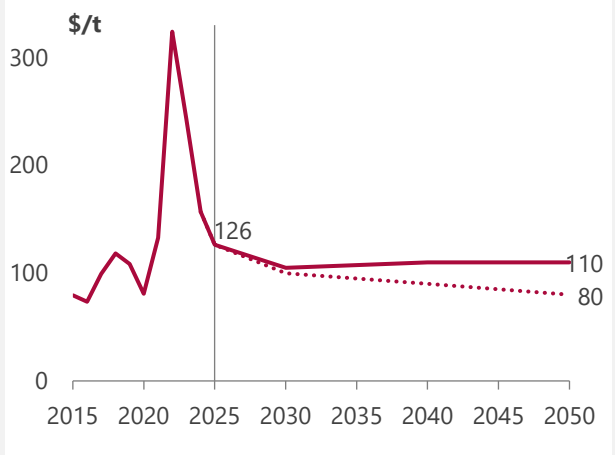
AdvTech.: weaker demand lowers prices.



Thermal coal

Reference: near $110/t, with slower investment.

AdvTech.: demand and prices fall.



Note: Values for 2030, 2040 and 2050 are scenario assumptions. Intermediate-year values are not forecasts.

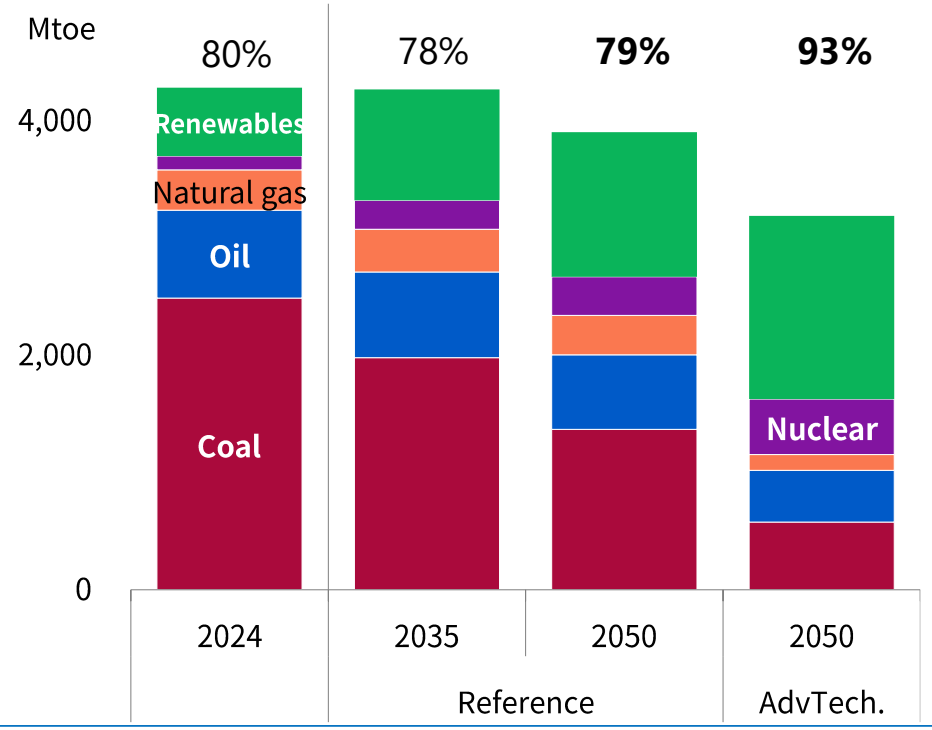
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Country review:

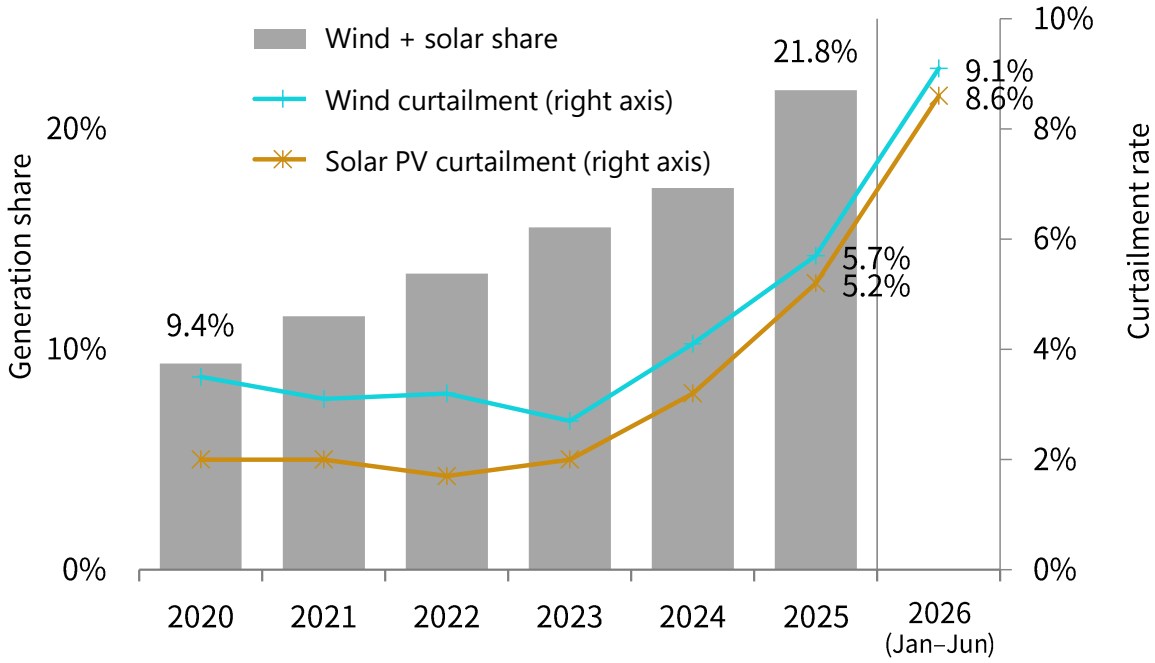
China: renewables and EVs boost self-sufficiency

- ✓ Cost-competitive renewables and EVs accelerate the energy transition.
- ✓ Oil and gas self-sufficiency falls, but overall self-sufficiency holds steady in the Reference case and rises under AdvTech.
- ✓ Wind and solar curtailment rates reached about 9% in January–June 2026.[1] Curtailment is the next challenge.

Primary energy (self-sufficiency)



Wind/solar and curtailment[1]



[1] China National Energy Administration (2021–26). Curtailment rate = unused output / potential output.

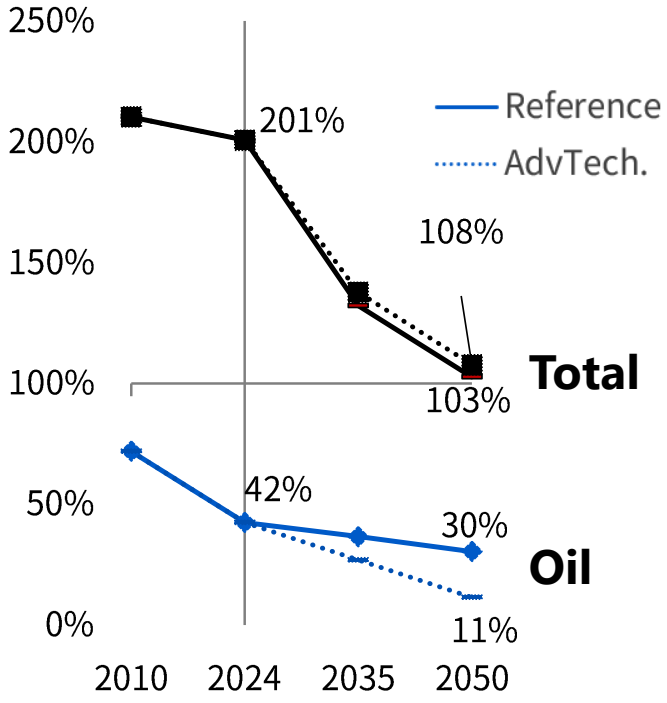
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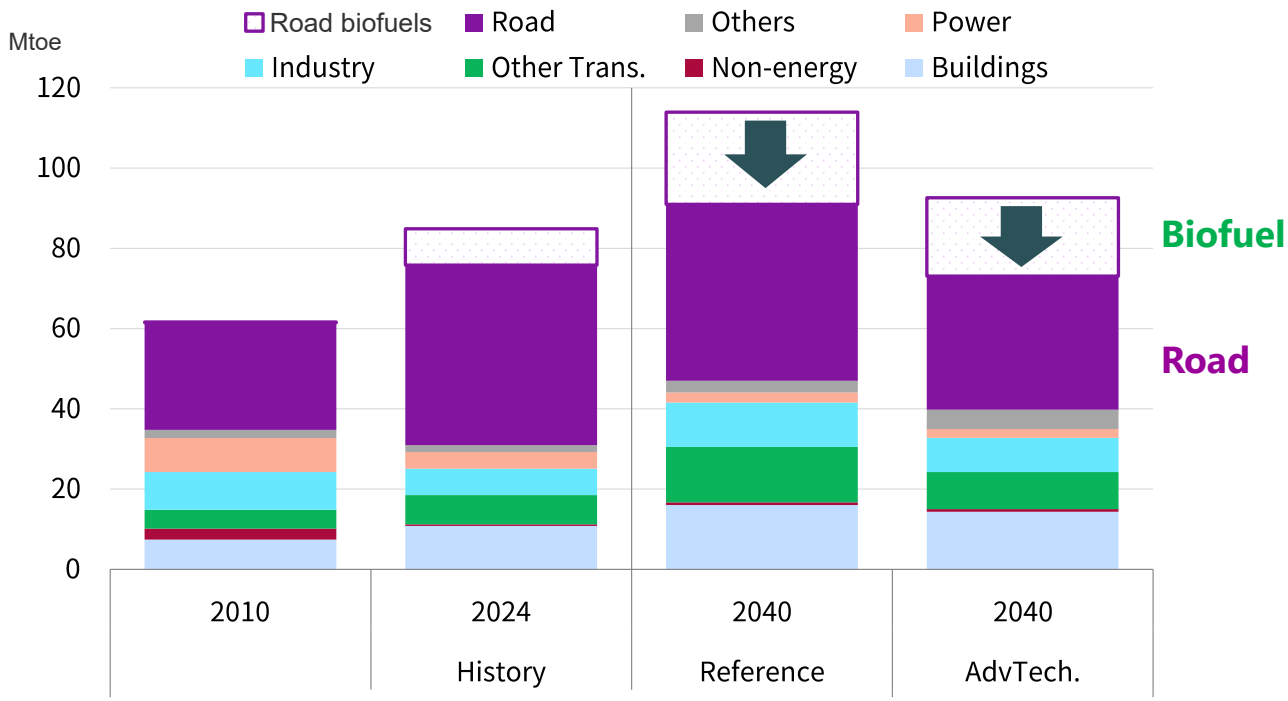
Indonesia: oil supply and refining lag rising demand

- ✓ Overall energy self-sufficiency exceeds 100%, while **oil production and refining capacity fall short** of domestic needs.
- ✓ Oil demand grows in road and other transport. Affordable gasoline and diesel supply is a priority.
- ✓ Electrification advances, but power supply remains constrained. Efficiency, biofuels and diversified imports remain essential.

Fuel self-sufficiency



Oil-product demand by sector



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