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Global Energy Supply and Demand Outlook by 2050

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What is IEEJ Outlook 2023?

- Quantify the global energy supply and demand structure up to 2050
- Forecast-based outlook using econometric models and other tools

  The forecast type is a method of looking ahead to the future with various assumptions, starting from the present. On the other hand, the backcast type is a method of thinking about how to take measures from the present, setting goals for the future.

- Conduct scenario analyses of technological and policy developments and trends

Reference Scenario

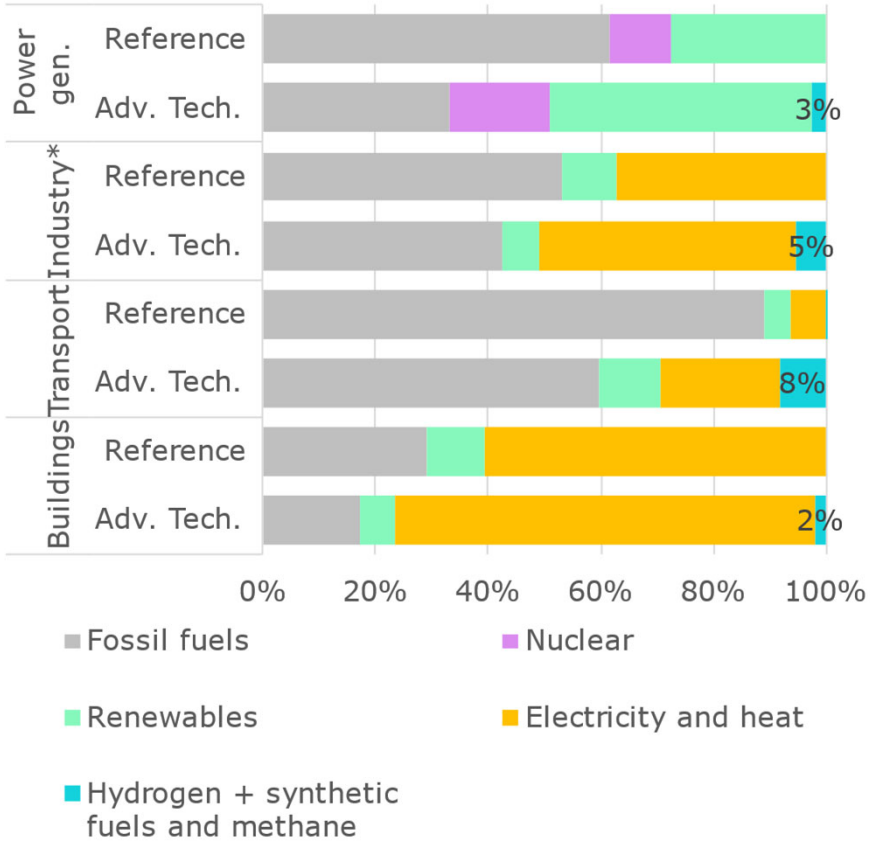
A scenario in which the prevailing changes will continue against the backdrop of current energy and environmental policies

Advanced Technologies Scenario

A scenario in which energy and environmental technologies are introduced to the maximum extent possible to ensure a stable supply of energy and strengthen measures against climate change

A part of last year's "Circular Carbon Economy/4Rs Scenario" is reflected.
- Hydrogen-fired power generation, hydrogen direct combustion, hydrogen reduction ironmaking, fuel cell vehicles, and synthetic fuel and synthetic methane technologies are assumed.
- Supply limited to blue hydrogen or green hydrogen.

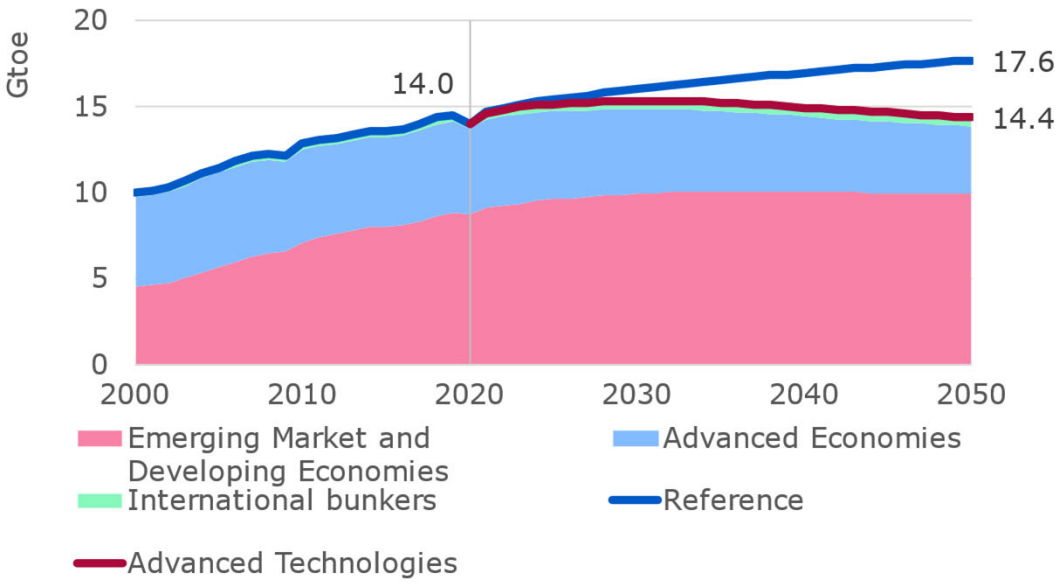
Energy consumption composition (2050)



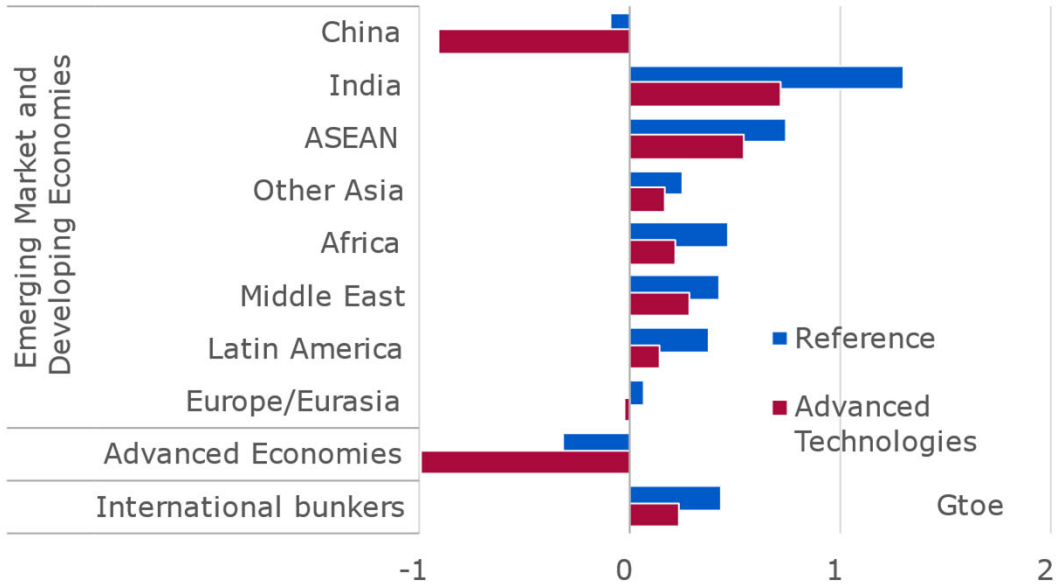
* Includes the steel blast furnace sector

Increase in energy demand centring on India and ASEAN

Primary energy demand outlook



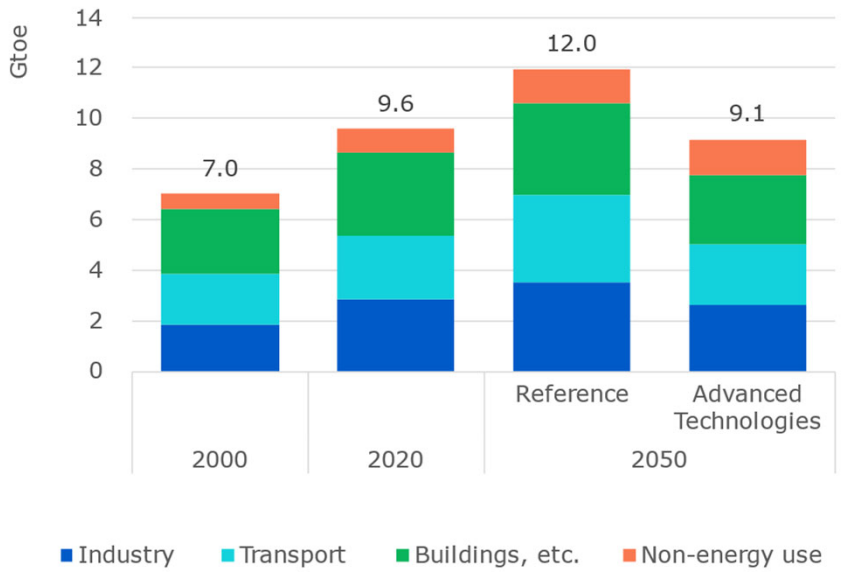
Changes in primary energy demand (2020-2050)



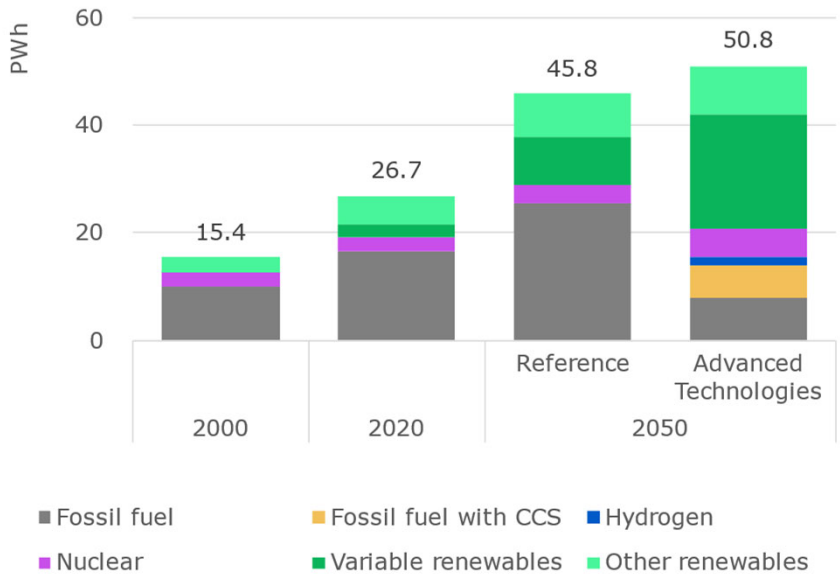
- (Reference) Primary energy demand will continue to grow, increasing 1.3-fold in 2050.
- (Advanced Technologies) After peaking in the early 2030s, it will gradually decrease. Emerging Market and Developing Economies remain largely unchanged after the 2030s.
- In both scenarios, demand growth is centred on India and ASEAN. China, which has been driving demand growth, will ~~also~~ peak by 2030 in the Reference Scenario.

Significant progress will be made in energy efficiency and low-carbon power generation (Advanced Technologies Scenario)

Final energy consumption outlook



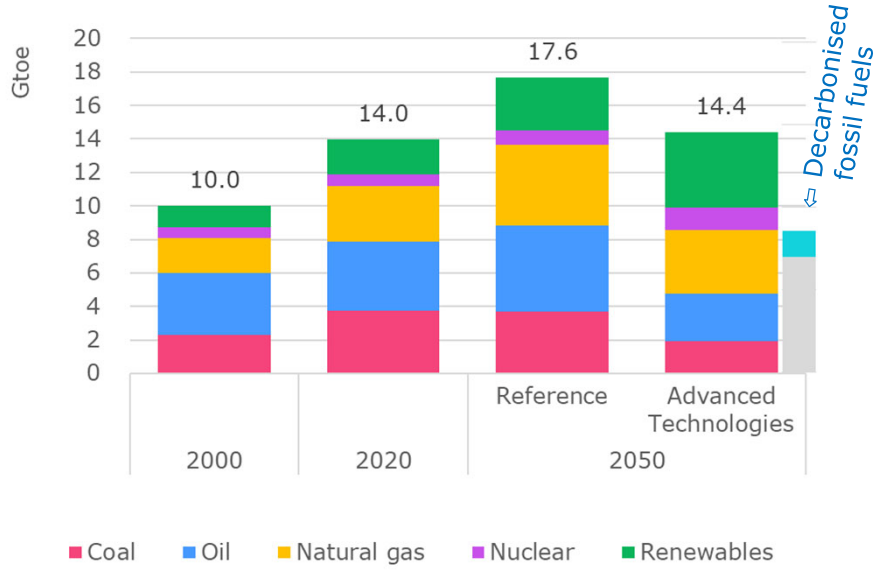
Electricity generated outlook



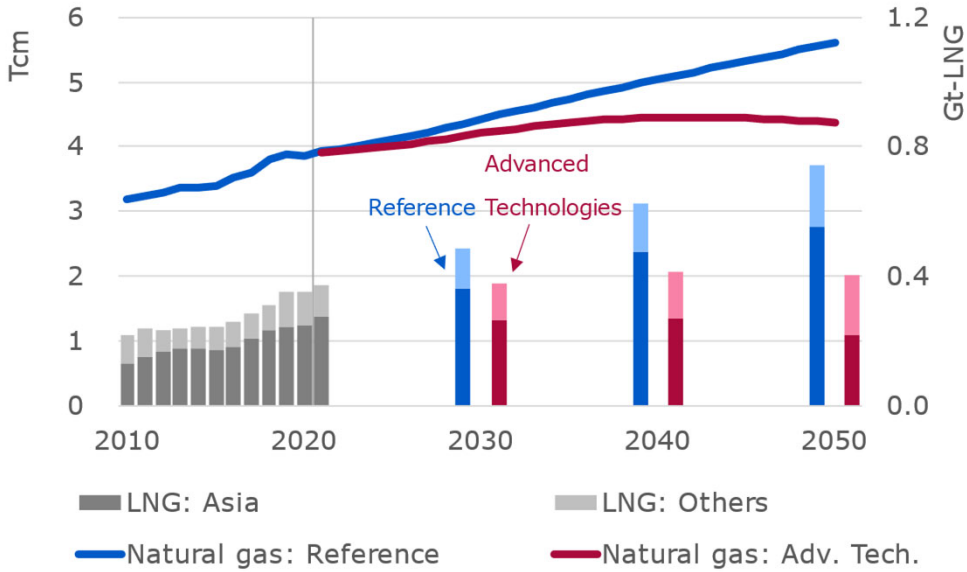
- (Reference) Final consumption increases 1.2-fold. More than 40% of the increase will come from transportation, and more than 60% from electricity.
- (Advanced Technologies) Energy savings of 23% relative to the Reference Scenario. The electrification of consumption is increasing. The share of electricity will rise to 39% (from 20% in 2020).
- Electricity demand will increase significantly in both scenarios. In the Reference Scenario, fossil fuel-fired as well as renewables will meet the increased demand. In the Advanced Technologies Scenario, the share of renewables will rise to 60%. The zero-emission power source, including thermal with CCS, exceeds 80%.

Dependence on fossil fuels continues

Primary energy demand outlook



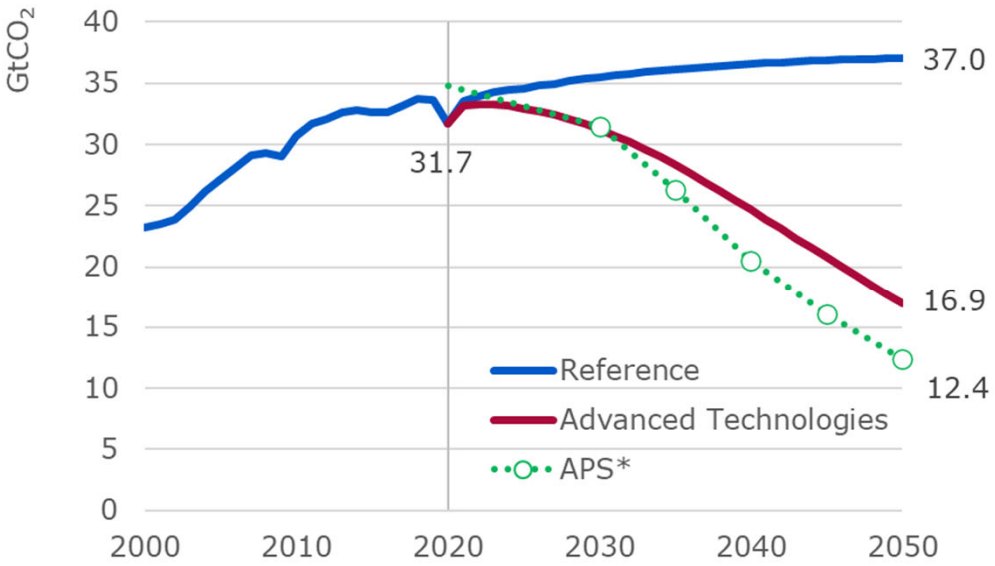
Natural gas and LNG demand outlook



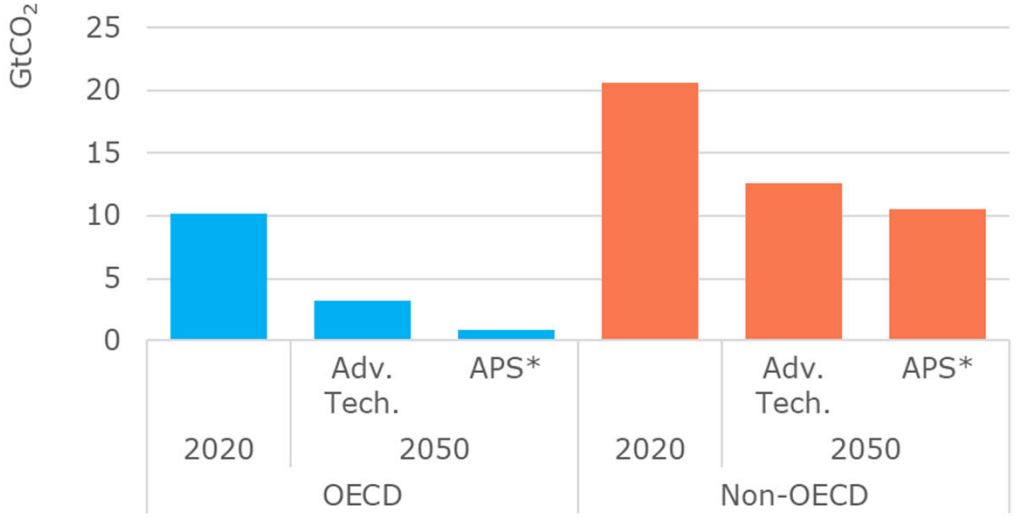
- (Reference) Oil will continue to increase slightly, natural gas will increase 1.5 times, and coal will decline after peaking around 2030. Demand for natural gas, mainly for power generation, grows, while LNG demand doubles. Asian demand, in particular, will be the driving force.
- (Advanced Technologies) Oil and coal will decline in the 2020s, while natural gas will be the only fossil fuel to grow more than it is today. LNG demand remains around 400 million tonnes. Nuclear and renewables will each double, but the share of non-fossil fuels as of 2050 is around 40%. However, about 20% of fossil fuels are decarbonised (by CCS).

Emerging Market and Developing Economies key to achieving carbon neutrality

Energy-related CO_2 emissions outlook



CO_2 emissions outlook by region



- Energy-related CO_2 emissions under the Reference Scenario continue to increase. On the other hand, under the Advanced Technologies Scenario, it will peak in the first half of the 2020s and decrease to 17 $GtCO_2$ by 2050. It would be a path slightly above the APS*, which incorporates countries' carbon neutral declarations.
- In both the Advanced Technologies Scenario and the APS*, overall non-OECD emissions are only about 40-50% lower. Reducing emissions in developing countries is key to achieving global carbon neutrality. It will also be necessary to keep an eye on whether developed countries can follow through on the declaration.

*APS: Announced Pledges Scenario, estimates when countries' stated policy goals are realised. Includes industrial processes. IEA "World Energy Outlook 2022" (October 2022).

Conclusion

- Energy demand in China, which has been until recently driving global demand growth, will peak and decline by around 2030. Instead, India and ASEAN will be the focus of increased demand.

- Electricity demand will increase significantly in both the status quo world (Reference Scenario) and the decarbonising world (Advanced Technologies Scenario). Stable power supply and security will become more important in the future.

- Dependence on fossil fuels will continue. Fossil fuels accounts for 80% in 2050 under the Reference Scenario and 60% in the Advanced Technologies Scenario (about 20% of which is decarbonised). Stable supply of fossil fuels remains a key issue.

- Even the Advanced Technologies Scenario is far from achieving global carbon neutrality in 2050. In particular, further promotion of energy conservation and decarbonisation in developing countries will be key to the progress of global decarbonisation.

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