



Electricity Grids and Secure Energy Transitions:

エネルギー転換を支える電力網

Enhancing the foundations of resilient, sustainable and affordable power systems

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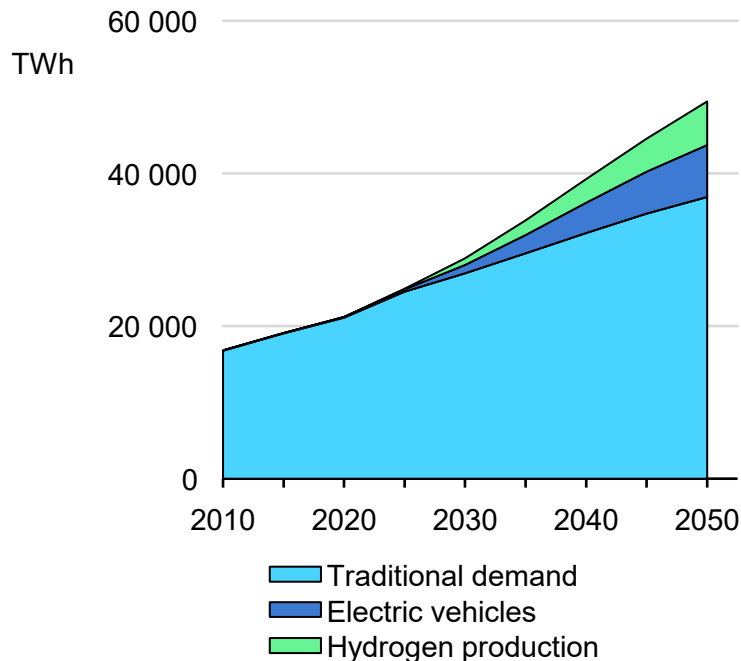
IEEJ Webinar

22 November 2023

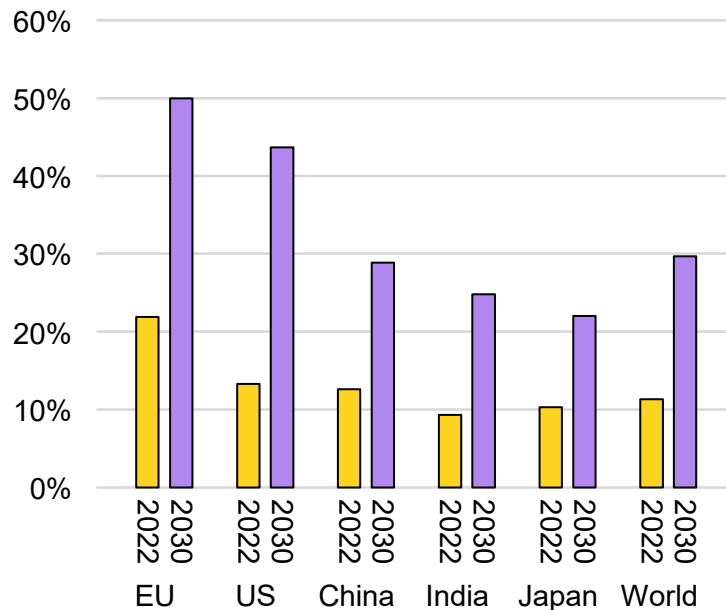
The nature of electricity systems is changing

電力システムの変化

Electricity demand



Wind and solar PV share of electricity supply



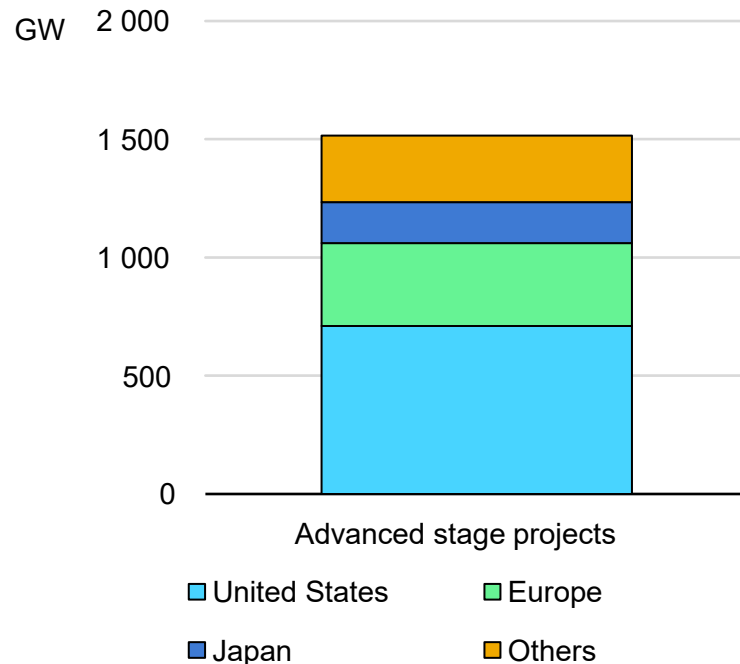
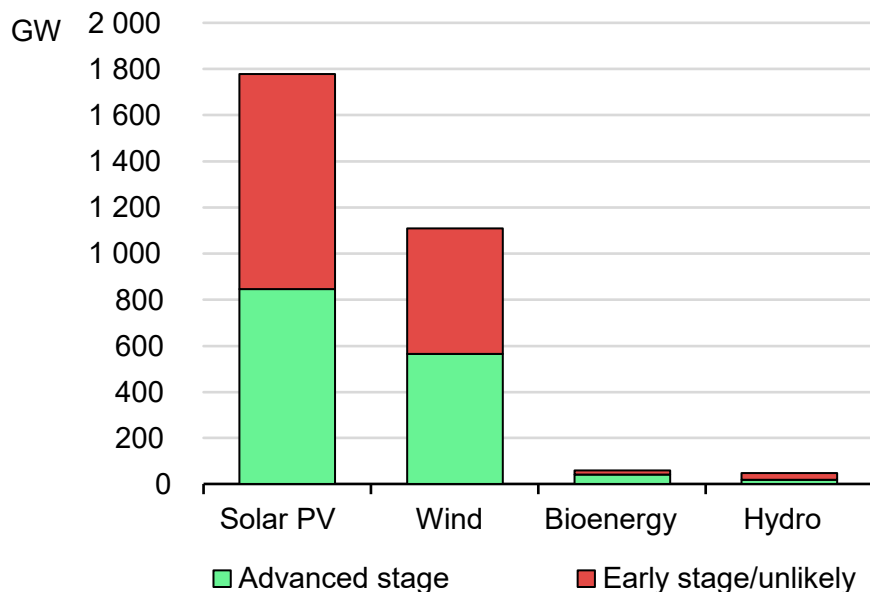
Electricity is the beating heart of modern economies and demand is set to grow fast, with new demand types growing, while wind and solar PV are re-shaping electricity supply and are set to be 80% of new capacity additions

Grids are becoming a bottleneck for energy transitions

送電網がエネルギー転換のボトルネックになりつつある

Capacity of renewable energy projects in connection queues

Capacity of advanced stage projects in queues

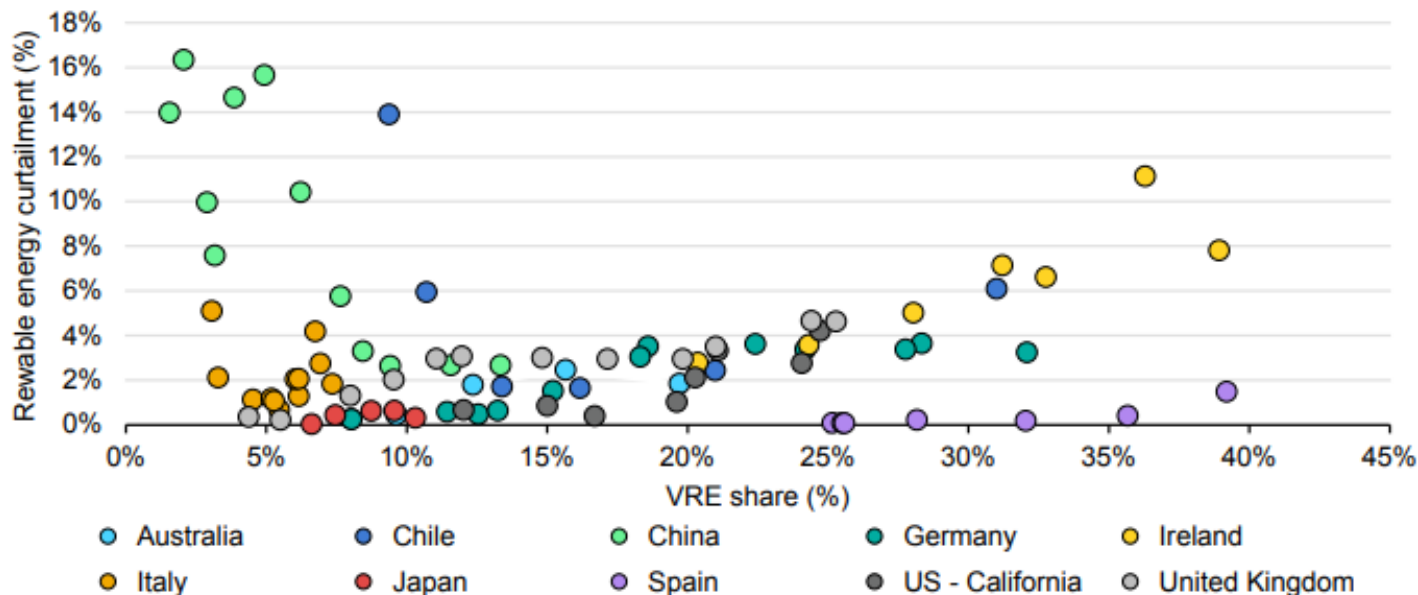


We estimate at least 1500 GW are wind and solar projects around the world are in an advanced stage of development. While investment in renewables has almost doubled in the last decade, investment in grids has remained stagnant.

More variable renewable energy connection results in curtailment

変動型再生可能エネルギー接続の拡大と出力制御

Variable renewable energy(VRE) shares in generation and technical curtailment for selected countries



Source: [Renewable Energy Market Update - June 2023](#) (IEA)

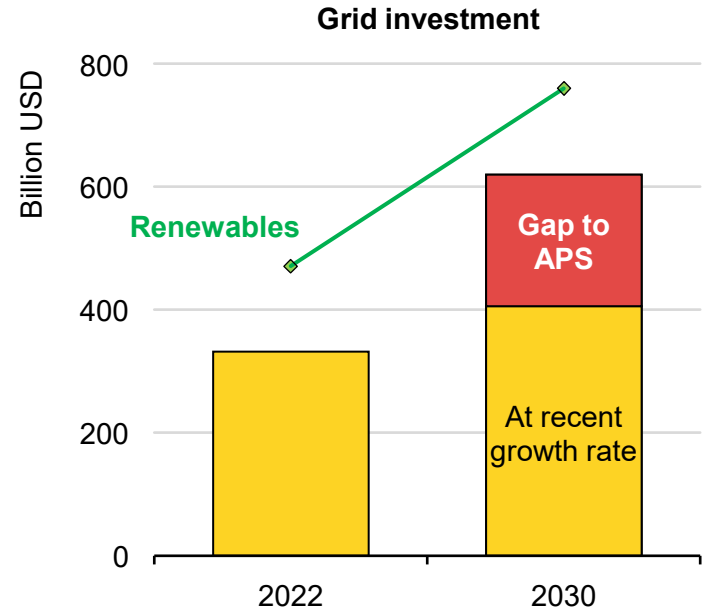
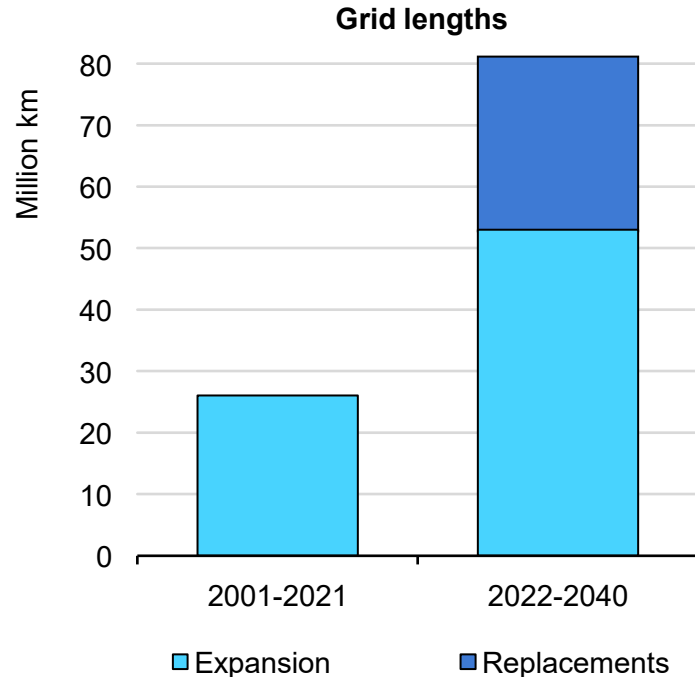
IEA. CC BY 4.0.

This trend is particularly evident in areas where major grid infrastructure investments and/or advanced market design and regulation are not keeping pace with VRE deployment.

Grid development needs to accelerate to keep up with transitions

エネルギー転換にあわせた系統整備の加速化が必要

Grid development in the Announced Pledges Scenario

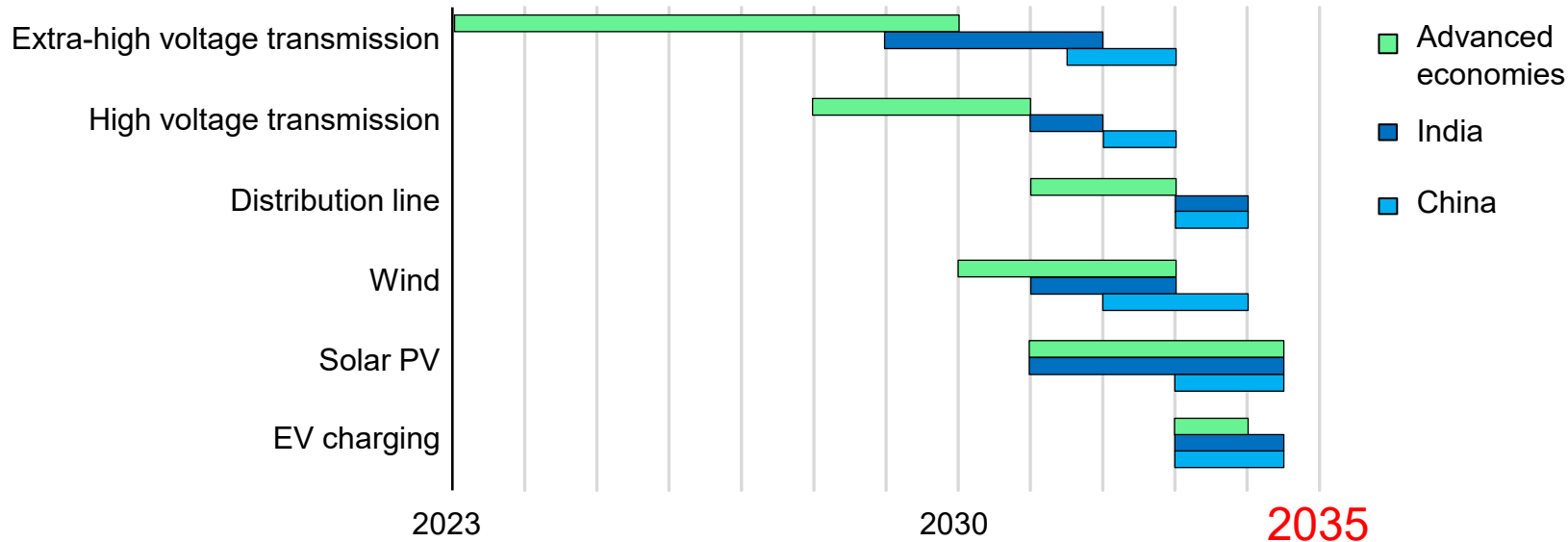


Over the next two decades, 80 million km need to be added or replaced, as much as the global grid length today, calling for grid investment to double by 2030, in step with renewables, raising material needs.

Long lead times for grids call for advanced planning

系統整備のリードタイムを考慮した計画が求められる

Decision timelines to complete typical projects by 2035

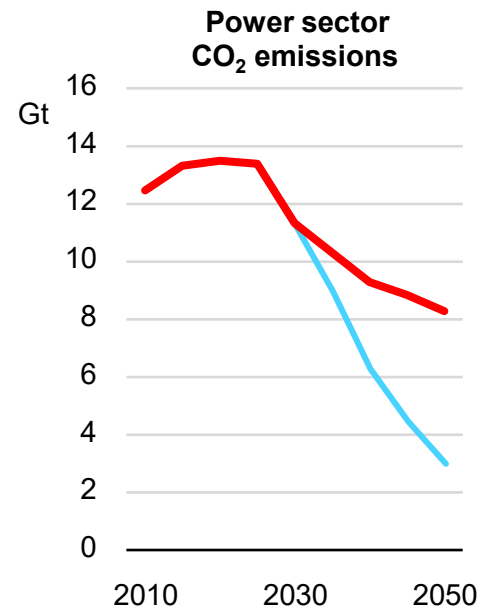
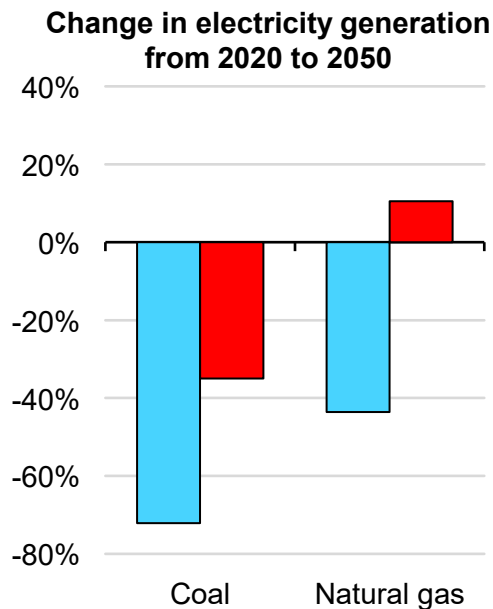
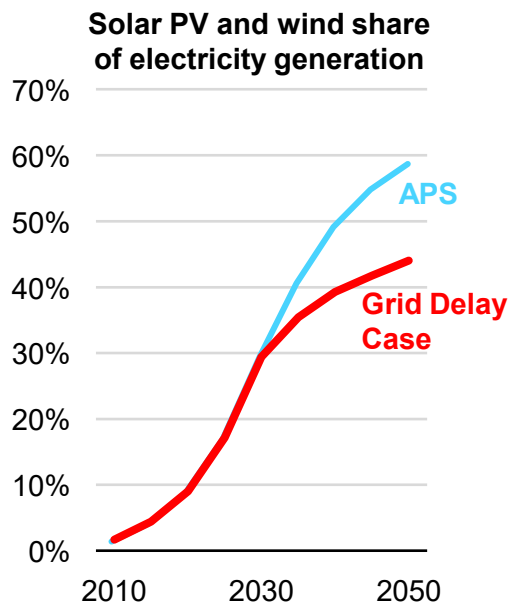


Electricity grid development is complex, involves many stakeholders and can take many years, requiring decisions well in advance to support electrification and renewables that can be deployed more quickly

Clean energy transitions depend on robust electricity grids

クリーンエネルギー転換は強固な電力網によって支えられる

Impacts of failing to accelerate grid investment and modernisation

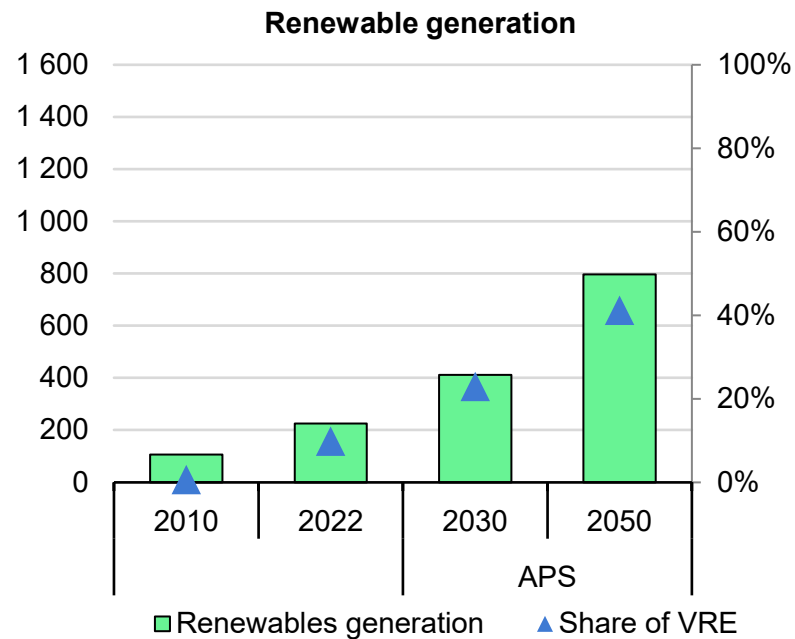
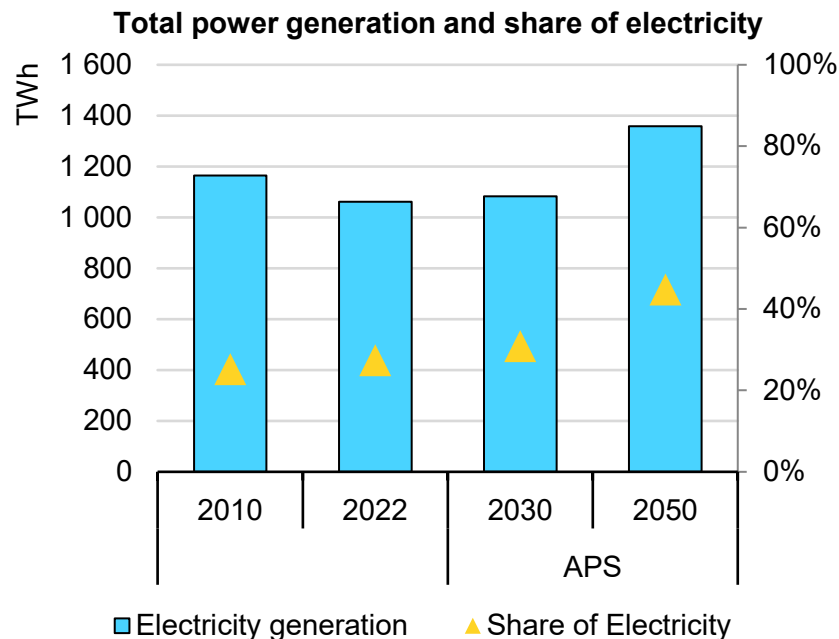


Failing to step up the pace of grid investment and modernisation would stifle the growth of renewables, and lead to greater use of coal and natural gas, raising fossil fuel import bills by USD 500 billion and CO₂ emissions

What does this mean for Japan? 日本に対する含意は？

Energy transitions rely on electrification and renewable energy

エネルギー転換には電化の進展と再生可能エネルギーが必要

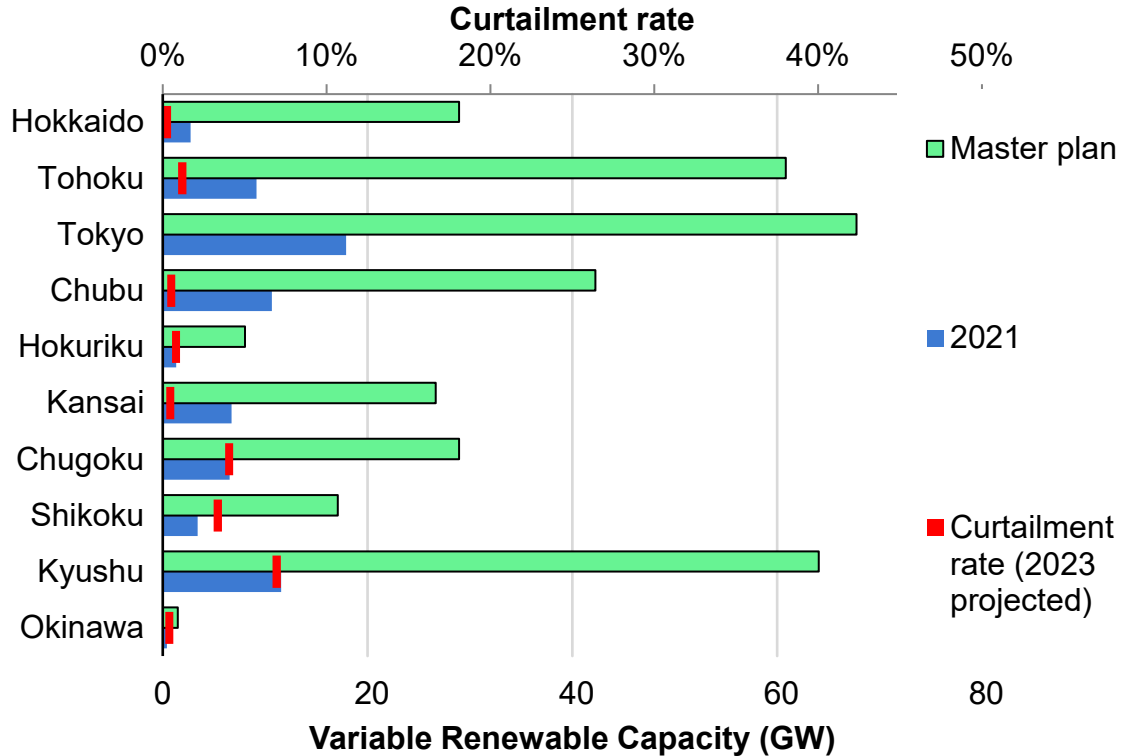


Source: [World Energy Outlook 2023](#) (IEA)

**Share of the electricity demand in final consumption is set to increase.
Additionally, there is a need to significantly expand renewable energy in order to decarbonise power sources.**

Growing regional challenges on curtailment

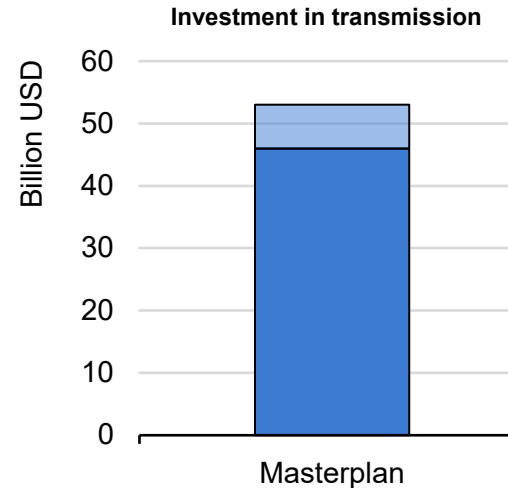
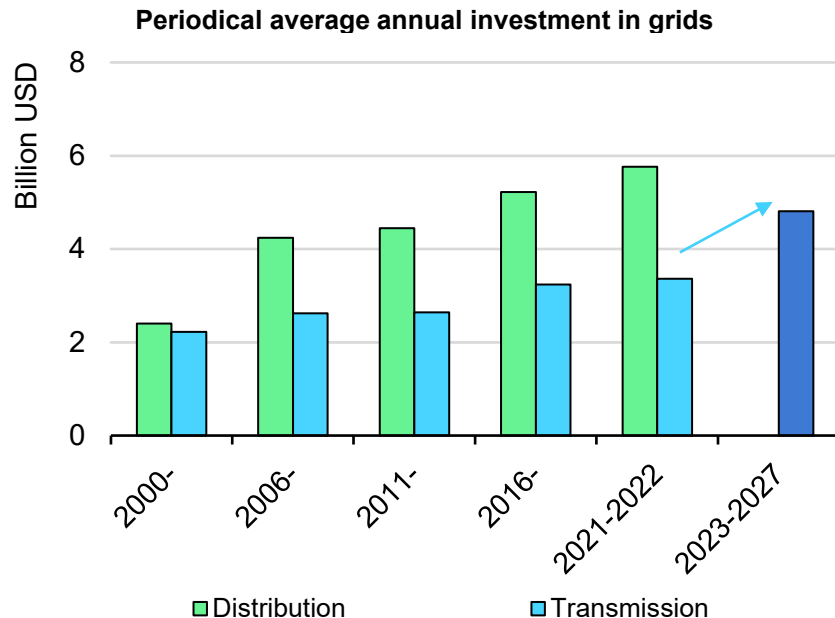
各地域での増加する出力制御の課題が長期的な課題に



Curtailment is already an issue in regions where the deployment of renewable energy is progressing. The regions where wind and solar power generation are expected to develop flexibility of these sources and grids.

Japan's transmission investment planning is more than the APS scenario

日本の送電網への投資計画はAPSシナリオを上回る水準



Note: the amount of estimated investment is 6-7 trillion JPY.

The revised wheeling charges for 2023-2027 and the Master plan prepared by OCCTO are expected to accelerate the Japanese energy transition.

- **Bring planning up to date** – Strategic and integrated planning across sectors
- **Unlock investment** – Improve how grid companies are remunerated
- **Address barriers** – Regulatory overhaul towards proactive grid development
- **Secure supply chains** – Firm & transparent project pipelines to enable resilient supply chains
- **Leverage digitalisation** – Digitalise infrastructure and advance distributed resources
- **Build a skilled workforce** – Create a pool of talent with digital and electricity skills

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Backup slides

- Importance of electricity grids is growing as demand for clean electricity grows
- There are signs that they are not keeping pace with development of demand and renewables
- The special report examines:
 - Stocktake of the world's grids as they stand now
 - Risks of them becoming a bottleneck for efforts to accelerate clean energy transitions and ensure electricity security.
 - Upgrades required to physical infrastructure and the way they are planned and managed
 - Costs of delayed action
 - Key recommendations for policy makers, highlighting what is necessary in areas such as investment, regulation and planning.

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17 October 2023

International
Energy Agency