Opportunities, Actionable Solutions, and Technologies for Just Energy Transition

Grids and Energy Storage

Matthew Wittenstein

Chief of Section, Energy Connectivity, UN Economic and Social Commission for Asia and the Pacific (ESCAP)

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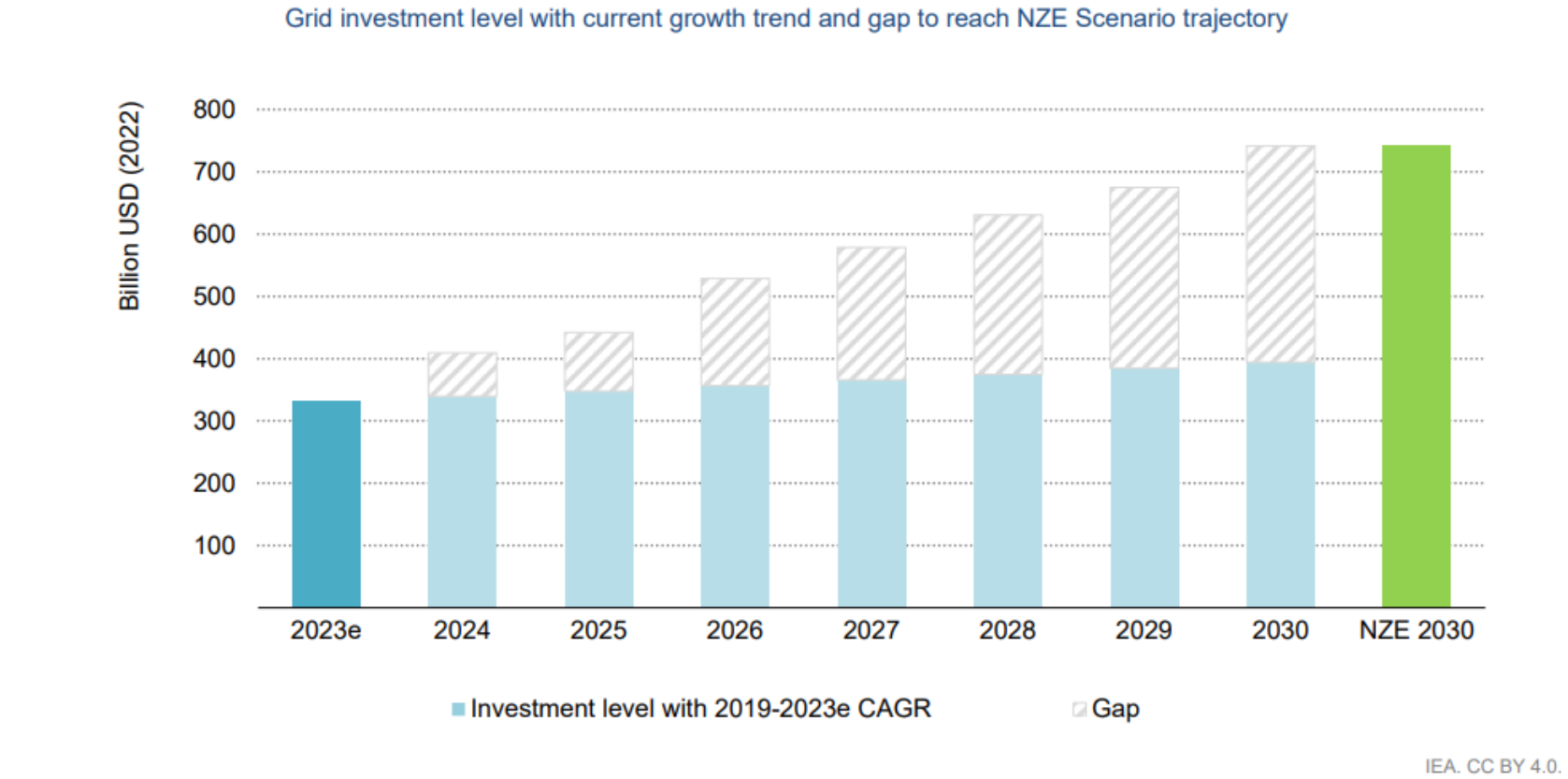
Grid investments: required vs trend

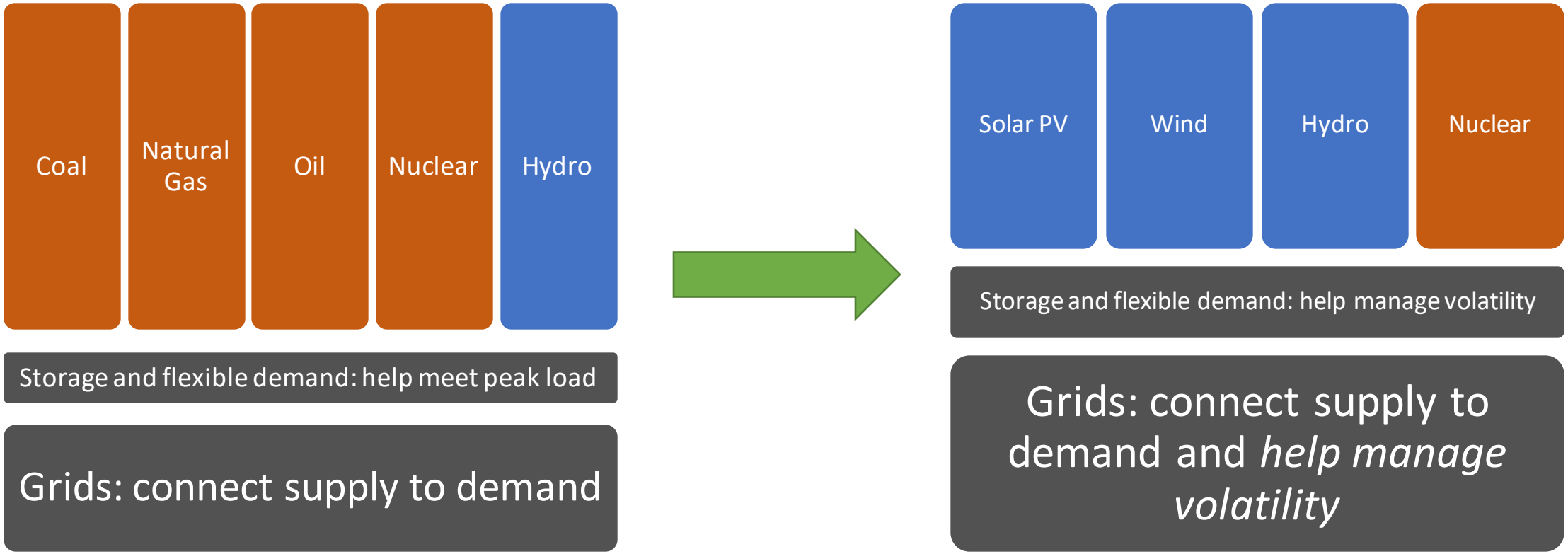


Notes: IEA estimation applying the compound annual growth rate (CAGR) of 2019 to 2023e to grid investment between 2024 and 2030; NZE = IEA Net Zero Emissions by 2050 Scenario; 2023e = estimated values for 2023.

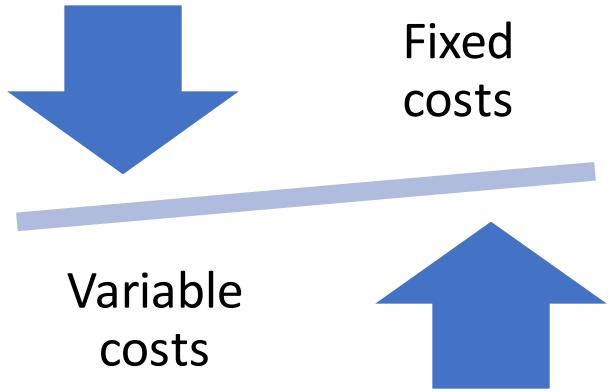
Source: World Energy Investment 2023 (IEA, 2023)

The evolving role of grids and storage

Energy transition implies a shift from *fuel-* to *weather-dependent* power systems

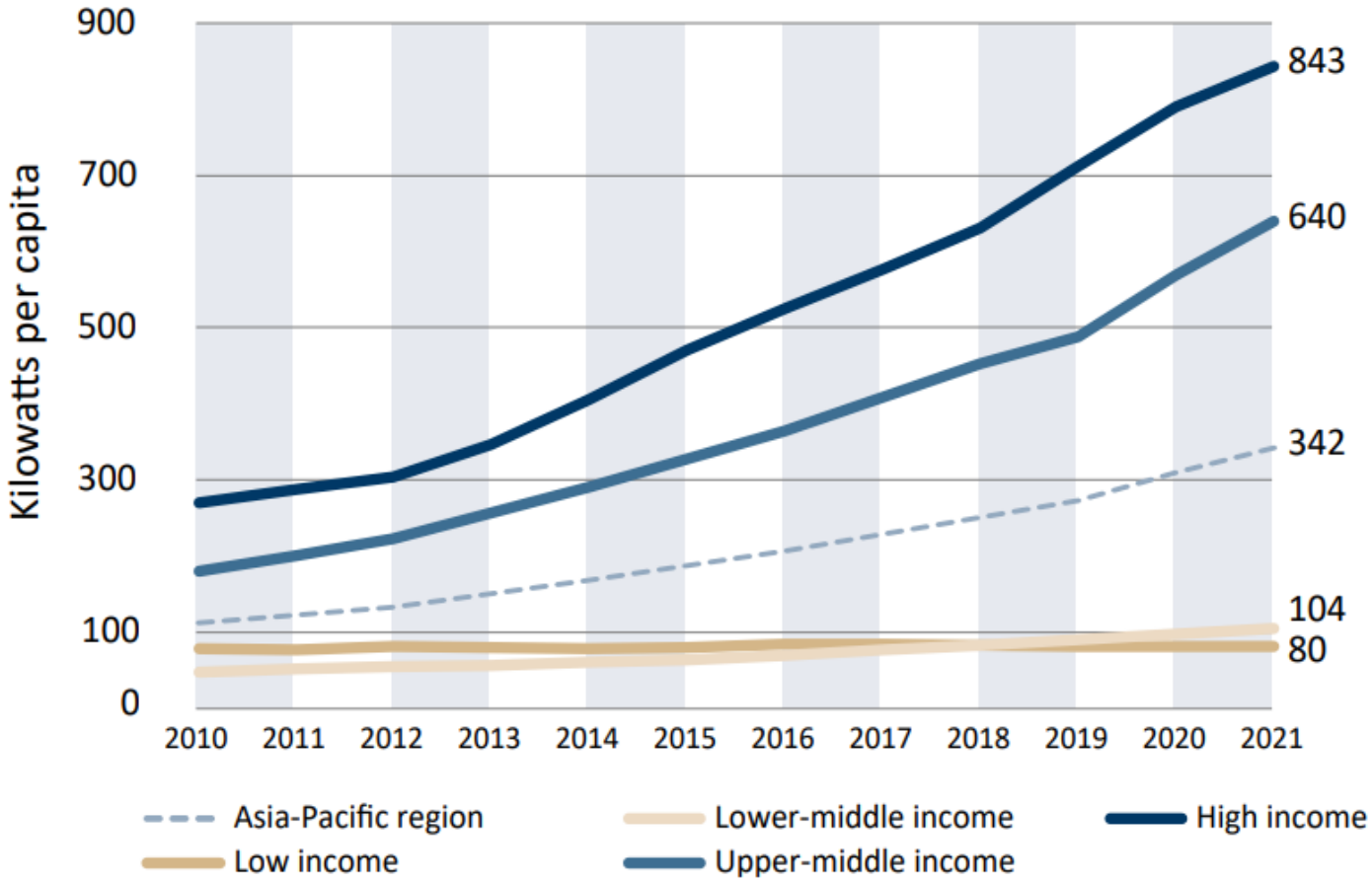


Financing the energy transition



- RE and batteries are increasingly cost competitive on a levelized cost of electricity (LCOE) basis
- But energy transition technologies are **capital-intensive**
- Sensitivity to capital costs can be a significant impediment to investment
- Need for **innovative financing mechanisms**, **private capital**, and **climate finance**, with an emphasis on investments in emerging economies

Renewable electricity capacity per capita, by Asia-Pacific income group



Source: ESCAP calculations based on International Renewable Energy Agency, Renewable Capacity Statistics 2022

Focus on: financing grids

Increasing grid investments requires leveraging all sources of funding

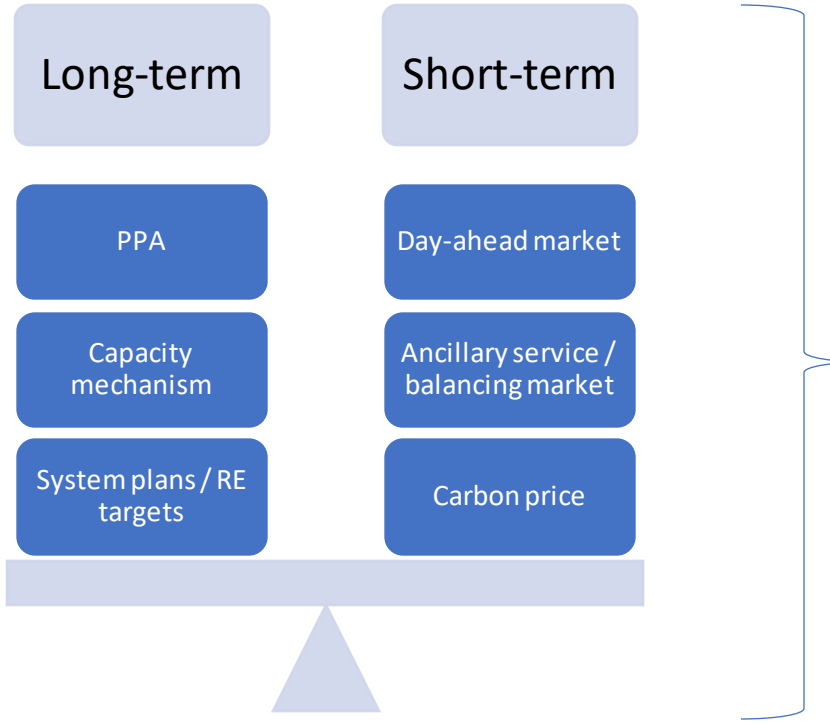
	Requires government funds?	Timeframe for ownership / concession?	Single line or whole grid?	Applicable to cross-border investments?	Examples
Public ownership	Yes	Unlimited	Whole grid	Yes	Most common model
Private ownership	No	Unlimited	Whole grid	Yes	Germany, India, UK, USA
Whole of grid concessions	No	20 to 30 years	Whole grid	No	Philippines, Senegal, Mali
Independent Power Transmission	No	25 to 45 years	Single line	Yes	India, Brazil, Colombia, USA, Australia
Merchant Power Transmission	No, except possibly risk mitigation	Asset lifetime	Single line	Yes	Australia, UK, USA
Financial ownership	Potentially, but less compared to alternatives	Asset lifetime	Single line	Yes	Denmark, Germany

Source: Attracting private finance to transmission in the Asia-Pacific region (ESCAP, 2022), available at https://www.unescap.org/kp/2022/attracting-private-finance-transmission-asia-pacific-region

The role of market signals

- **Encouraging investments in low-carbon technologies requires an <u>appropriate balance</u> of *long-term* and *short-term* market signals**

Incentivize efficient **long-term investment** decisions – **important for grids**

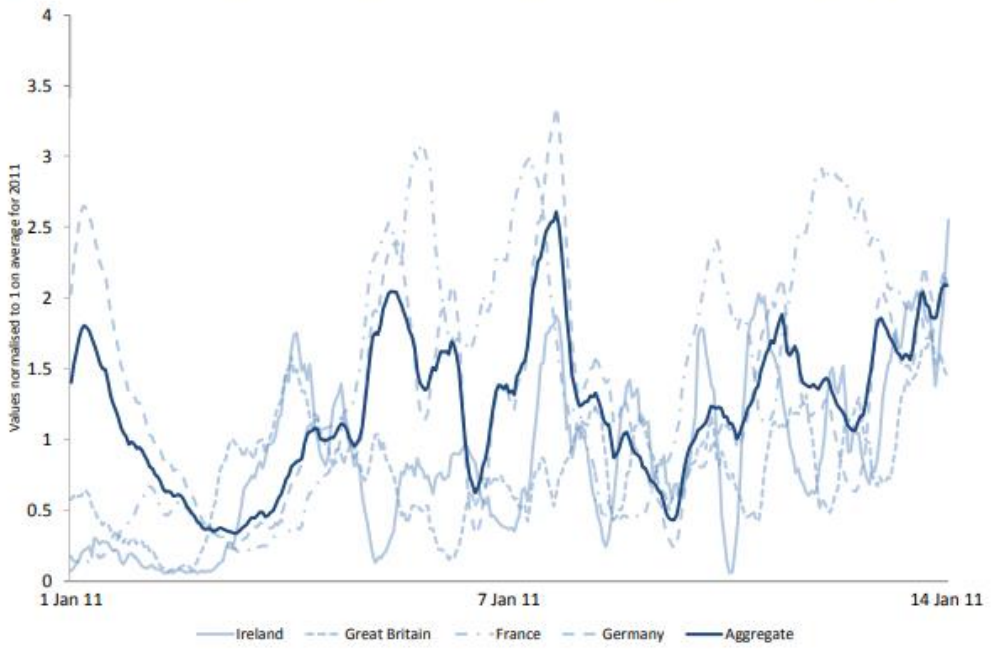


Incentivize efficient **operational** decisions – **important for batteries / storage**

The need for larger, more integrated power systems

Power system connectivity is a tool that can **lower costs**, **improve energy security**, and **enable decarbonization**

Figure 11. Variability of wind output for four European countries, 1 January to 14 January 2011



Source: Seamless Power Markets (IEA, 2014)

ESCAP's Regional Roadmap on Power System Connectivity

Planning	• **Develop a regional master plan (Strategy 2)** • **Coordinate cross-border transmission planning (Strategy 6)**
Financing and development	• **Mobilize investment in cross-border infrastructure (Strategy 7)**
Operations	• Move toward multilateral trading and competitive markets (Strategy 5) • Co-ordinate cross-border system operations (Strategy 6)
Cross-cutting	• Build trust and political consensus (Strategy 1) • Develop intergovernmental agreements (Strategy 3) • Coordinate, harmonize, and institutionalize policy and reg frameworks (Strategy 4) • Build capacity and share information, data, best practices (strategy 8) • Ensure coherence of connectivity with the SDGs (Strategy 9)

https://www.unescap.org/our-work/energy/energy-connectivity/roadmap

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