# The Future of Offshore Wind

## REvision2024

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14 March 2024

# About UN ESCAP

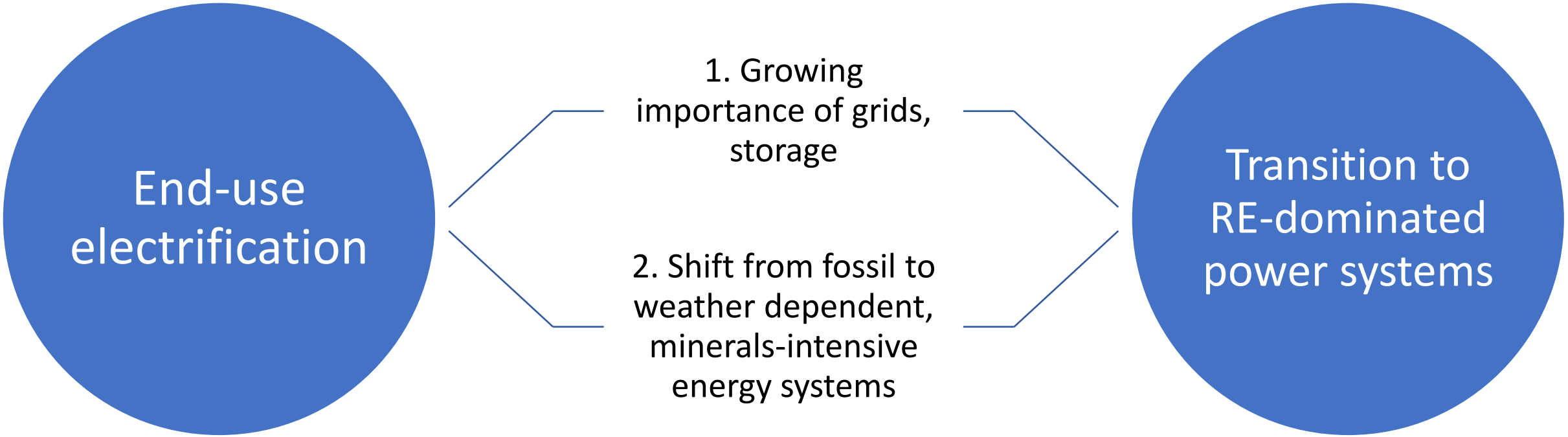
**The United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) is one of five UN regional hubs**

- 53 member States
- 9 associate members

**Promotes inclusive and sustainable economic development in the Asia-Pacific region, and supports implementation of the 2030 Agenda for Sustainable Development.**

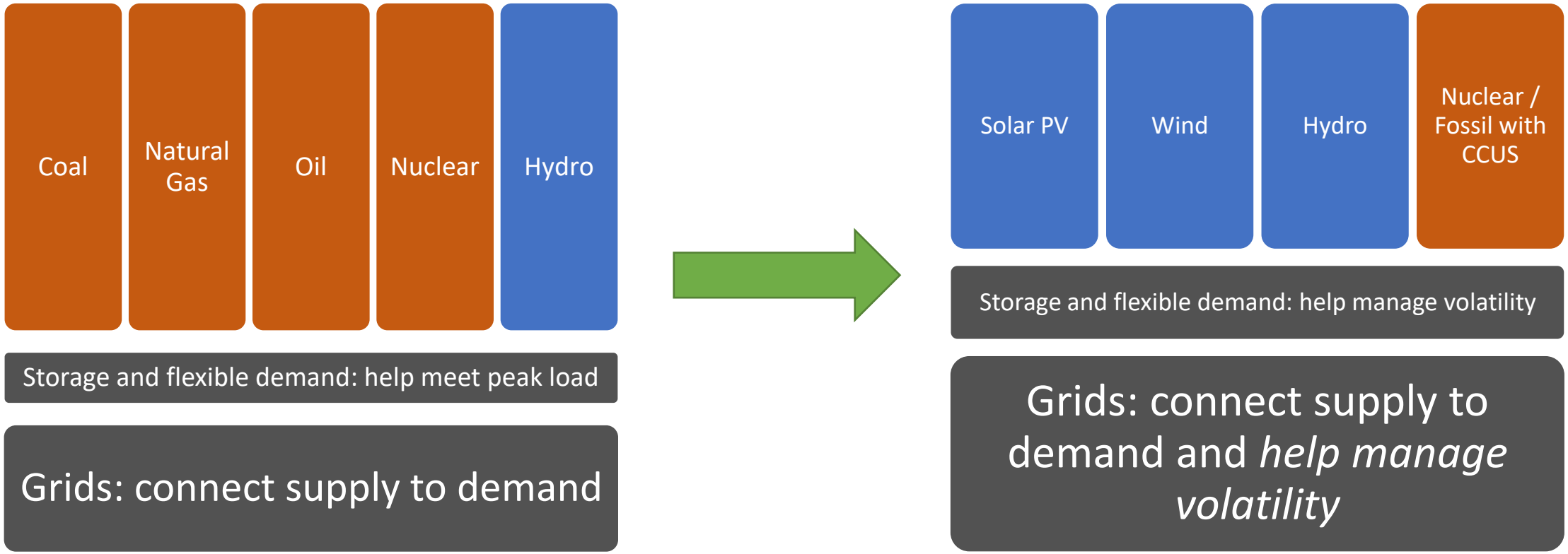
**Energy Division areas of work: (1) Achieving SDG 7; (2) Enabling energy connectivity; (3) Energy transition and the extractive industries**

# Two implications of the energy transition



# The evolving role of grids and storage

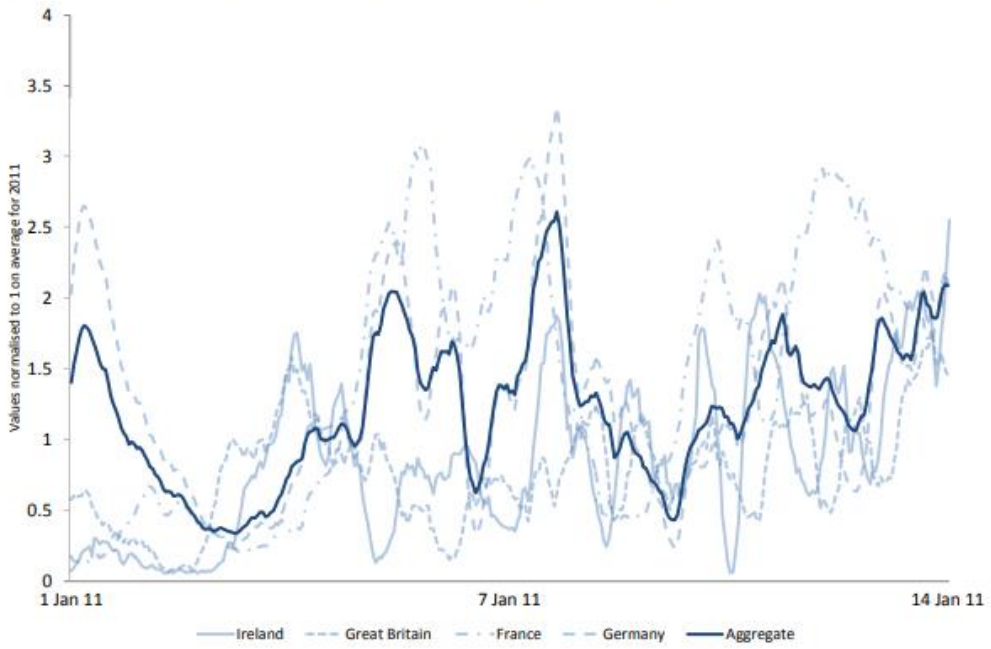
## Energy transition implies a shift from *fuel-* to *weather-dependent* power systems



# 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)

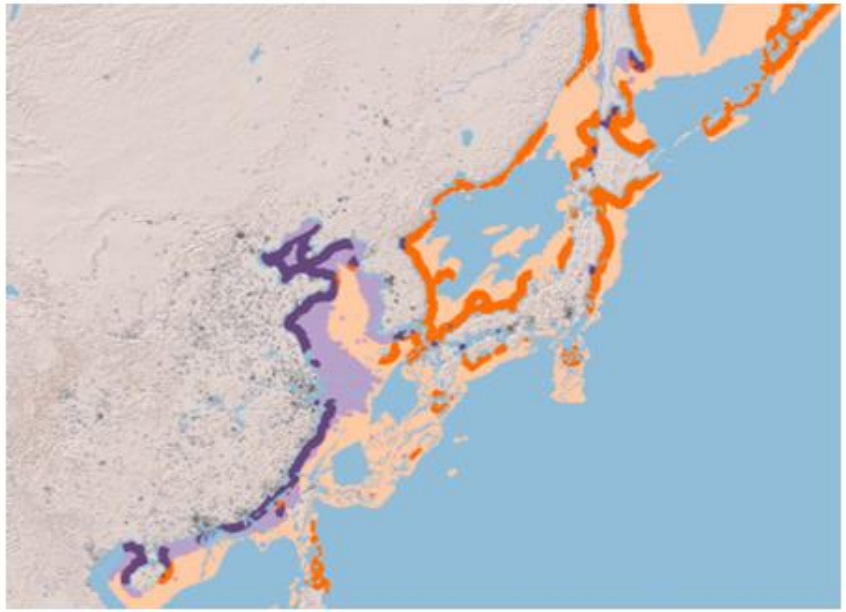
## ESCAP's Regional Roadmap on Power System Connectivity

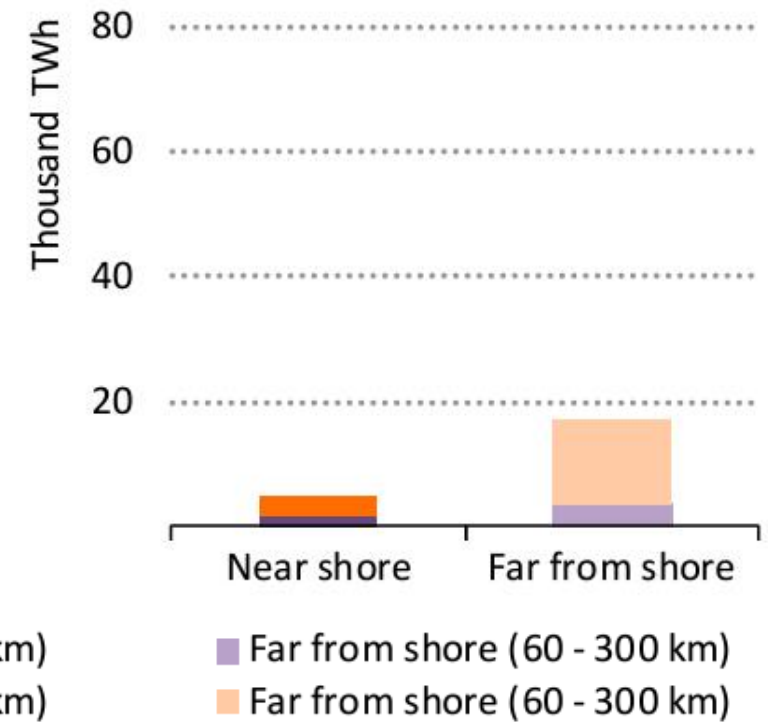
| | |
|---|---|
| Planning | • Develop a regional master plan (Strategy 2)<br>• Coordinate cross-border transmission planning (Strategy 6) |
| Financing and development | • Mobilize investment in cross-border infrastructure (Strategy 7) |
| Operations | • Move toward multilateral trading and competitive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

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

# Off-shore wind and the potential for regional collaboration

**Technical potential for offshore wind, East Asia**






Shallow water (10 - 60 m): Near shore (<60 km)
Deeper water (60 - 2 000 m): Near shore (<60 km)
Far from shore (60 - 300 km)
Far from shore (60 - 300 km)

Source: IEA, Offshore Wind Outlook 2019

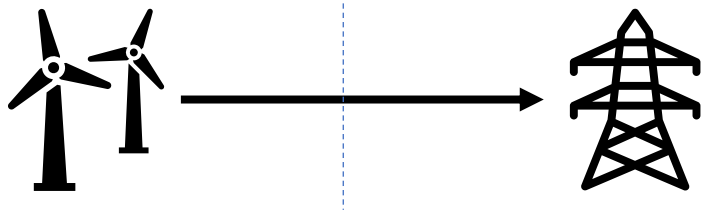
## Cross-border collaboration can accelerate off-shore wind development

Deep water resources with relatively high development costs. Collaboration can reduce costs and accelerate deployment:

- Co-develop supply chains and off-shore infrastructure
- Leverage supply-demand diversity
- Link to other low-carbon resources (on-shore RE, hydrogen)

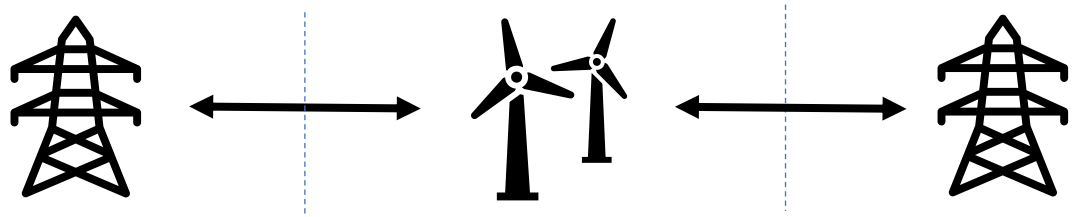
# Contrasting two integration models:

## Point-to-grid:



- Resource could be domestic or in neighboring territory
- Allows for increased certainty of resource type and availability
- Easier to measure costs and benefits (limited spillover effects)
- Enables integration of external resources into domestic system without considering conditions of host system
- Limits potential for resources optimization at system level
- Limited potential for bidirectional and multilateral trade

## Hybrid:

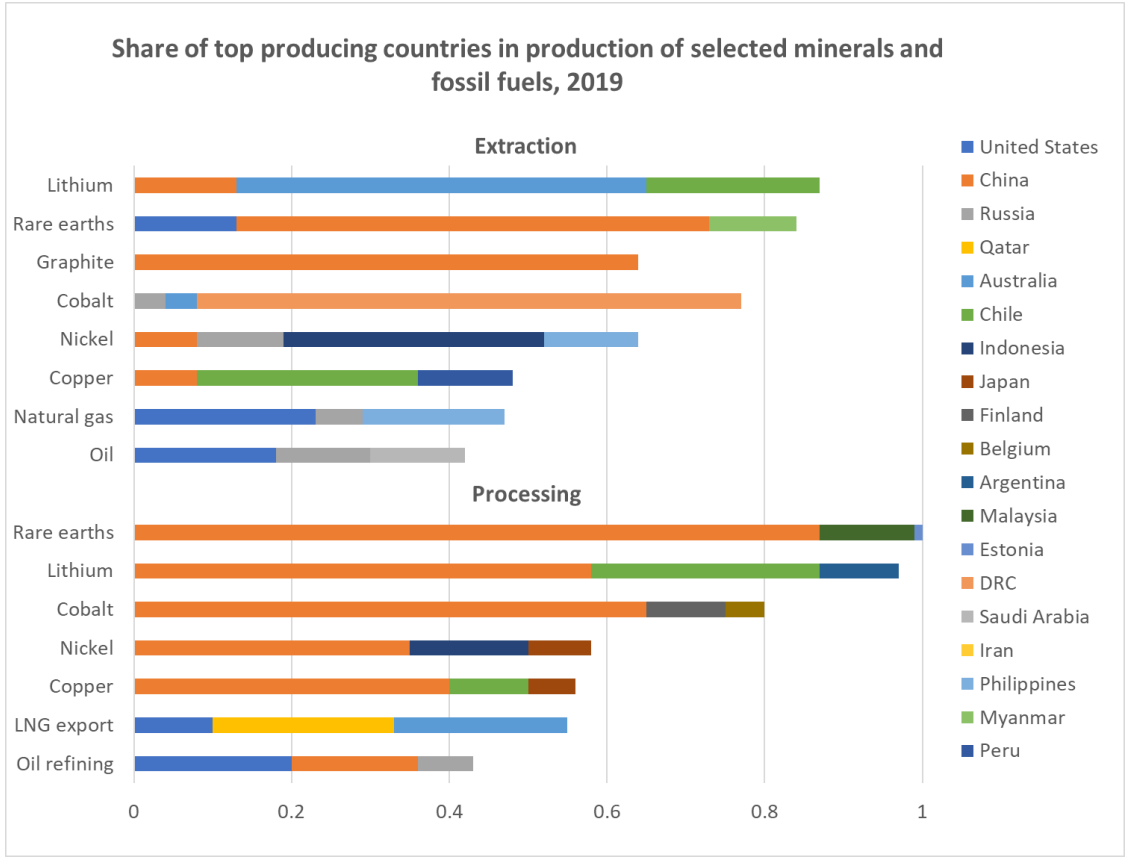


- Combined interconnector and generation resource(s) ('Energy Island')
- Share across two or more borders
- Enables interconnection of remote resources among multiple countries / jurisdictions while also facilitating bidirectional trade
- Enables increased utilization of both grid and generation
- Currently being used for offshore wind resources in Europe
- Requires closely integrated system operations and clear cost sharing / recovery method

# Critical energy transition materials: uneven distribution and concentrated supply chains

As the energy transition progresses, energy security discussions increasingly focus on **availability and security of the supply** of critical minerals.

Uneven resource distribution + Highly concentrated processing = Security of supply concerns



# Some key takeaways

- Energy transition will transform our energy systems across multiple dimensions
  - Reduced reliance on fossil fuels => implications for capacity, system services
  - Increased share of variable renewable energy resources => need for flexibility, storage
  - Increased demand for critical minerals => implications for supply chains
- Off-shore wind has tremendous potential, but challenges need to be addressed
  - High cost
  - Need for technical innovation (e.g. floating offshore)
- Collaboration can help overcome challenges:
  - Joint or coordinated development of infrastructure, supply chains
  - Harmonization of standards? Financing?
  - Potential for 'hybrid' model to unlock multiple benefits

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