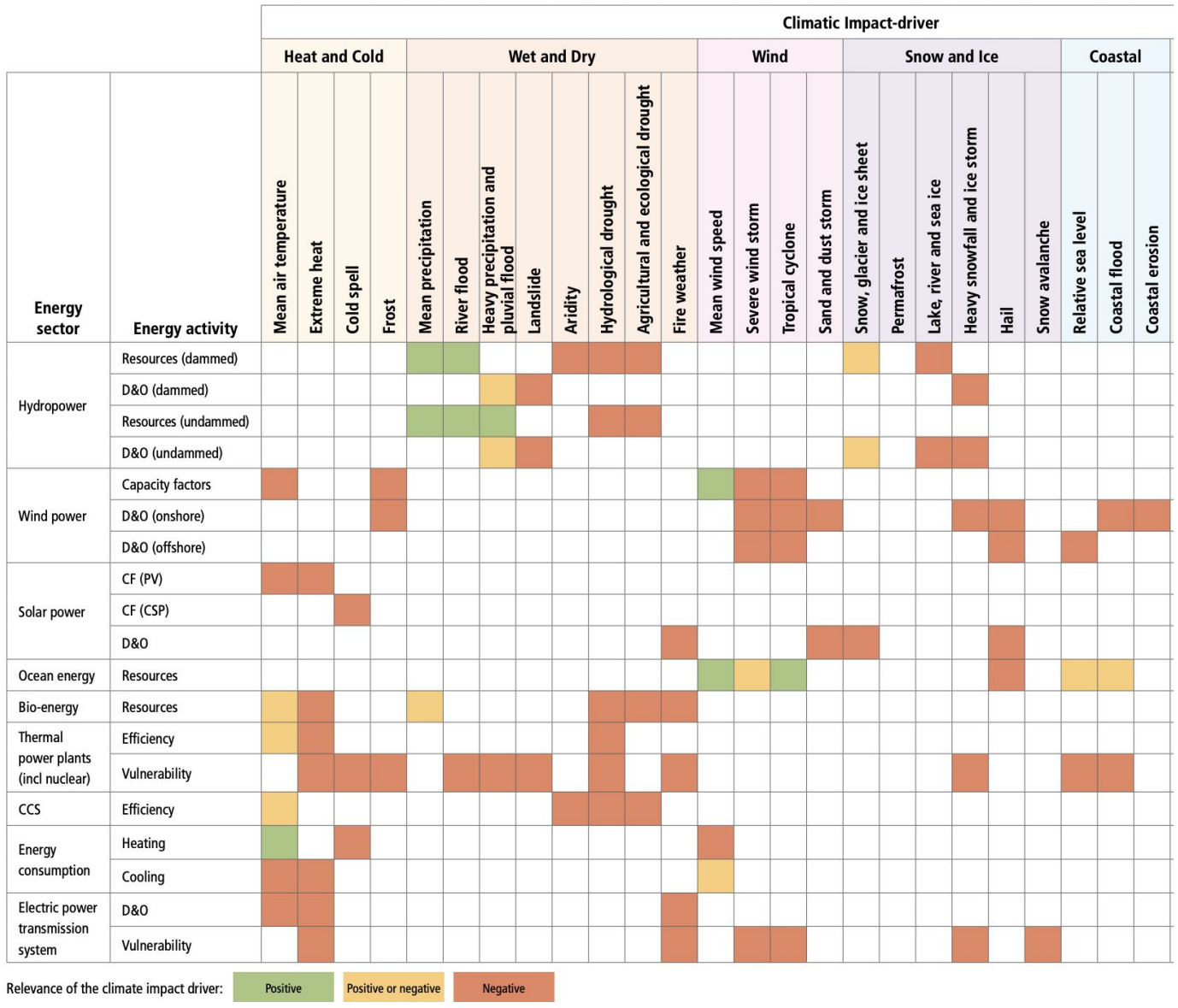
Resilient energy systems against extreme weather events

4 June 2025

Increasing Impacts of Extreme Weather Events on Energy Systems



Source: IPCC (2021), "IPCC Sixth Assessment Report: Working Group III: Mitigation of Climate Change"

Fuel supply

- Floods, droughts and wildfires can negatively affect biofuel production, critical minerals mining and fuel transportation.
- Tropical cyclones coupled with sea-level rise could disrupt major fuel production and storage areas on the coasts.

Electricity Generation

- Floods and droughts require adaptation measures for hydro power plants.
- Extreme heat events increase the need for cooling options for solar PVs.
- Rising water temperature and reduced water availability put additional challenges to thermal power plants.
- Intensifying tropical cyclones in some areas reduce power generation from wind turbines.

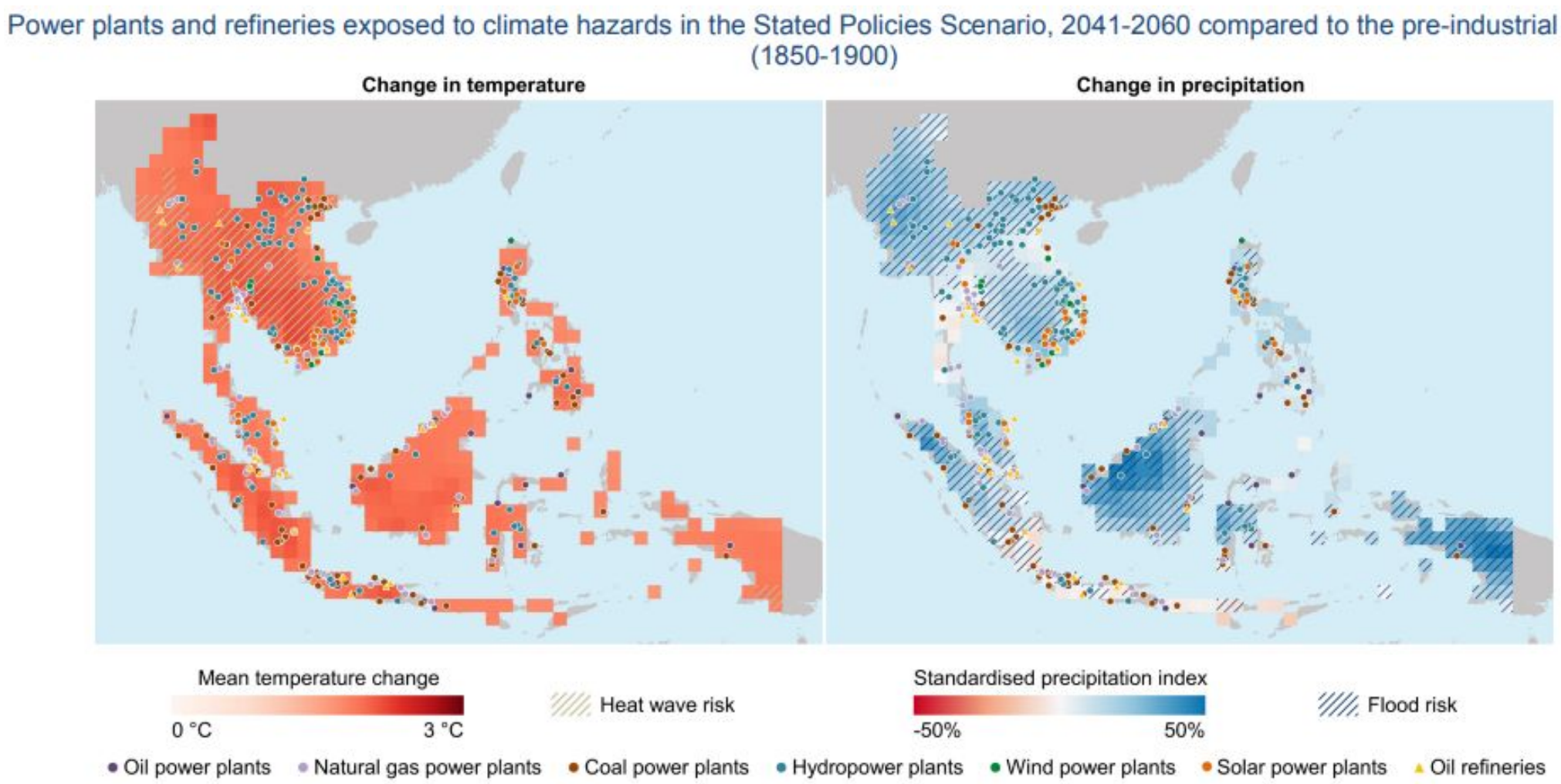
Electricity Transmission and Distribution

- Extreme weather events test the physical resilience of electricity transmission and distribution networks.

Energy Demand

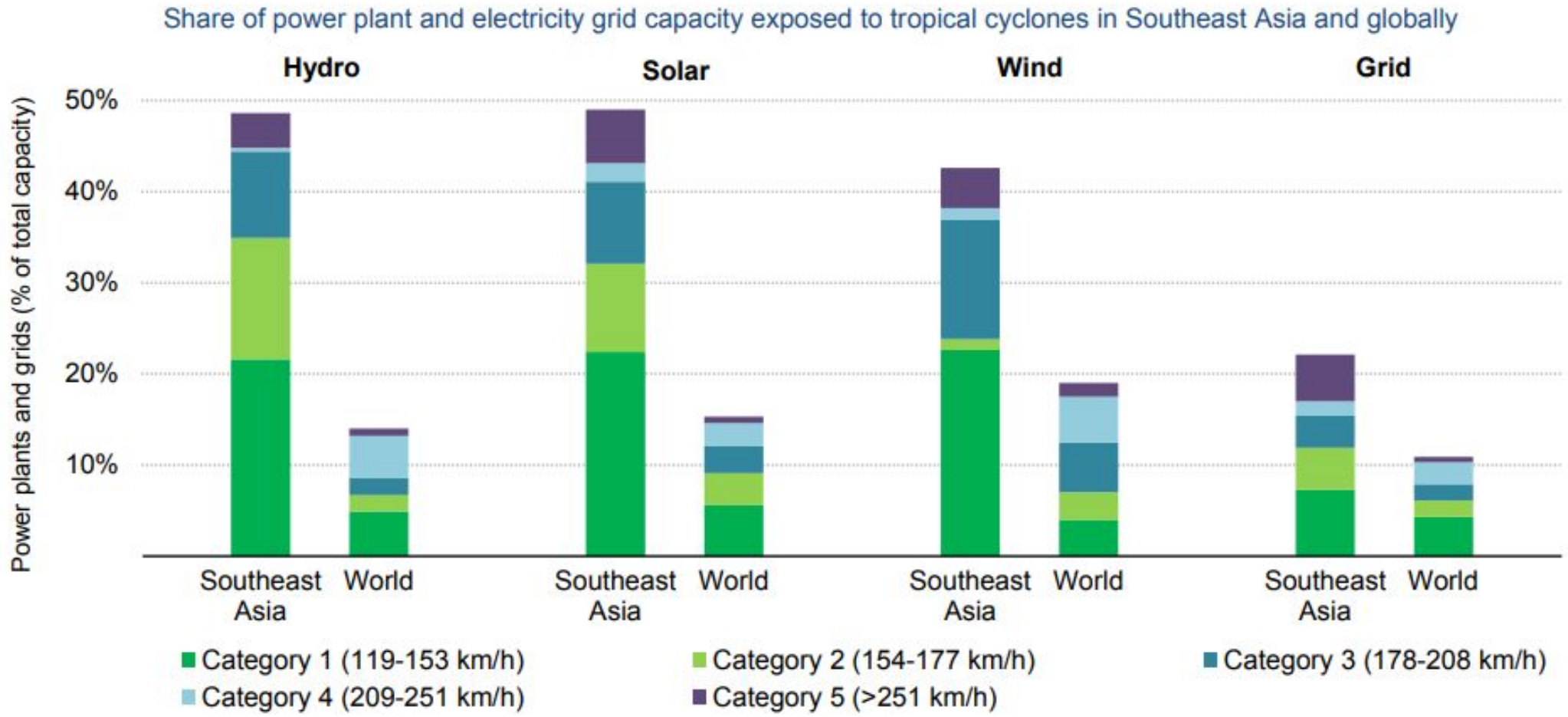
- Extreme heat events drive higher demand for cooling.
- Frequent droughts increases electricity consumption

Increasing Impacts of Extreme Weather Events in Asia and the Pacific



Sources: IEA (2024), Southeast Asia Energy Outlook 2024

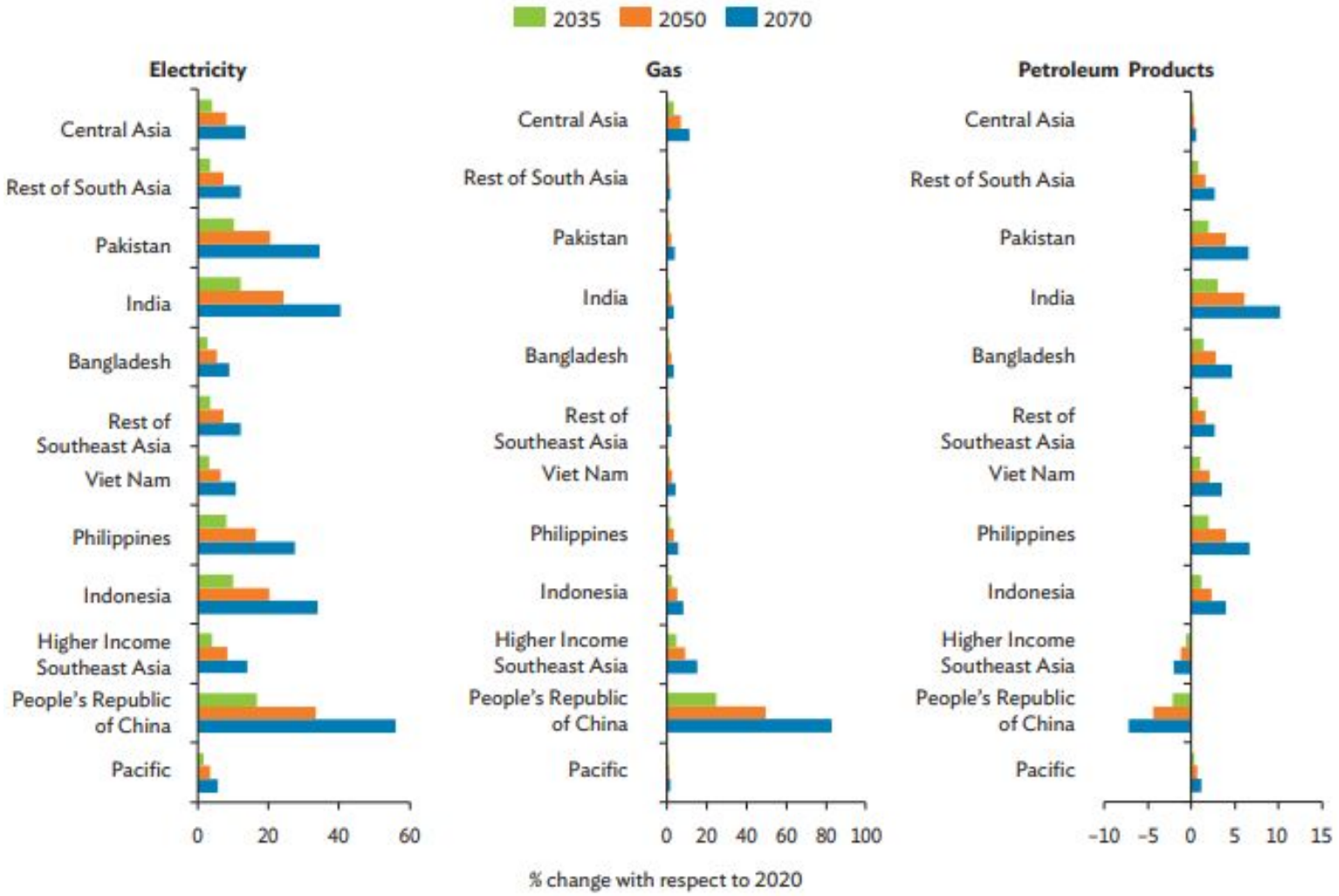
Increasing Impacts of Extreme Weather Events in Asia and the Pacific



Sources: IEA (2024), Climate Resilience for Energy Security in Southeast Asia

Increasing Impacts of Extreme Weather Events in Asia and the Pacific

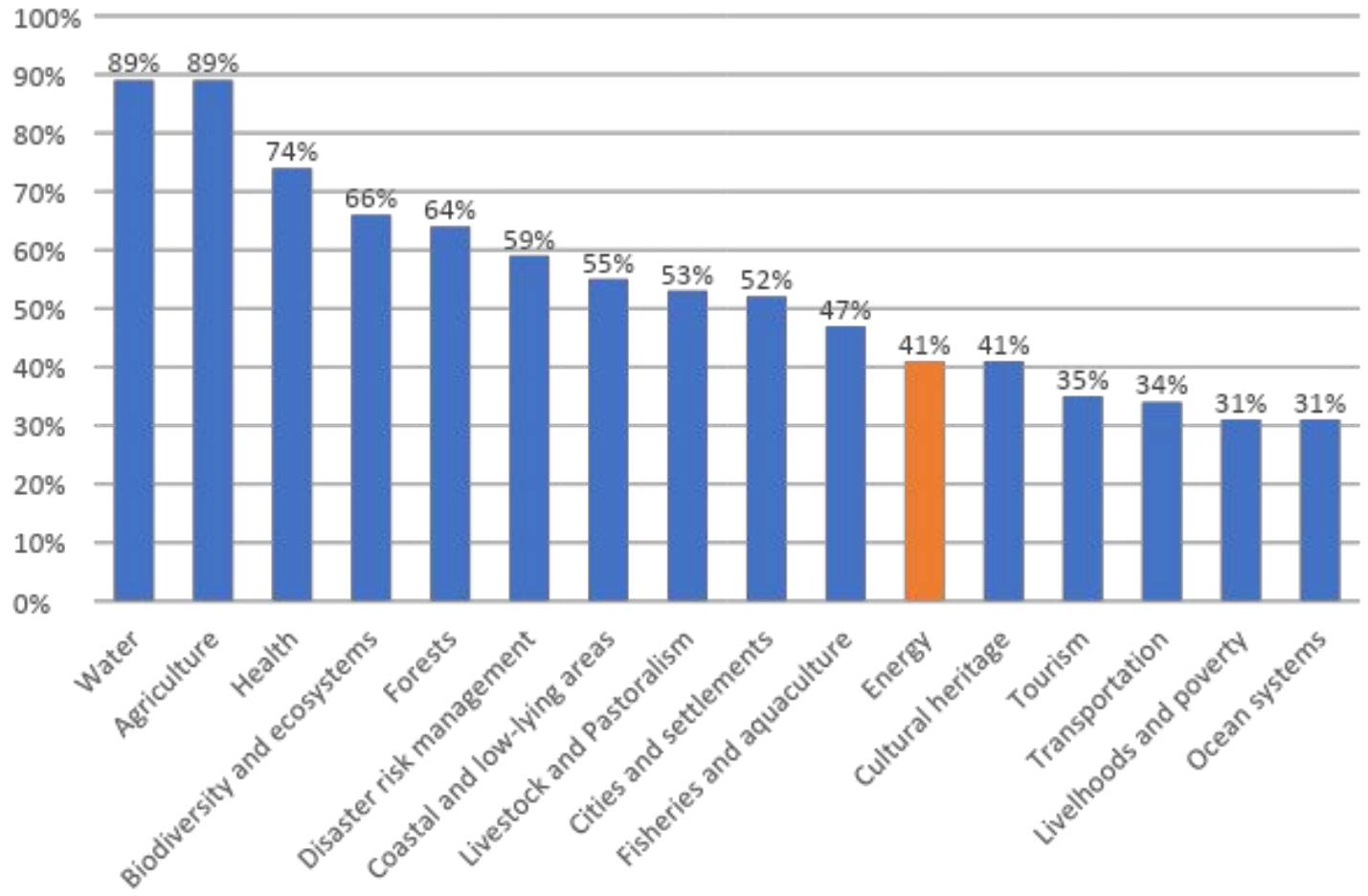
Climate impacts on final energy demand under a high-emissions scenario



Source: ADB (2024), "Asia-Pacific Climate Report 2024"

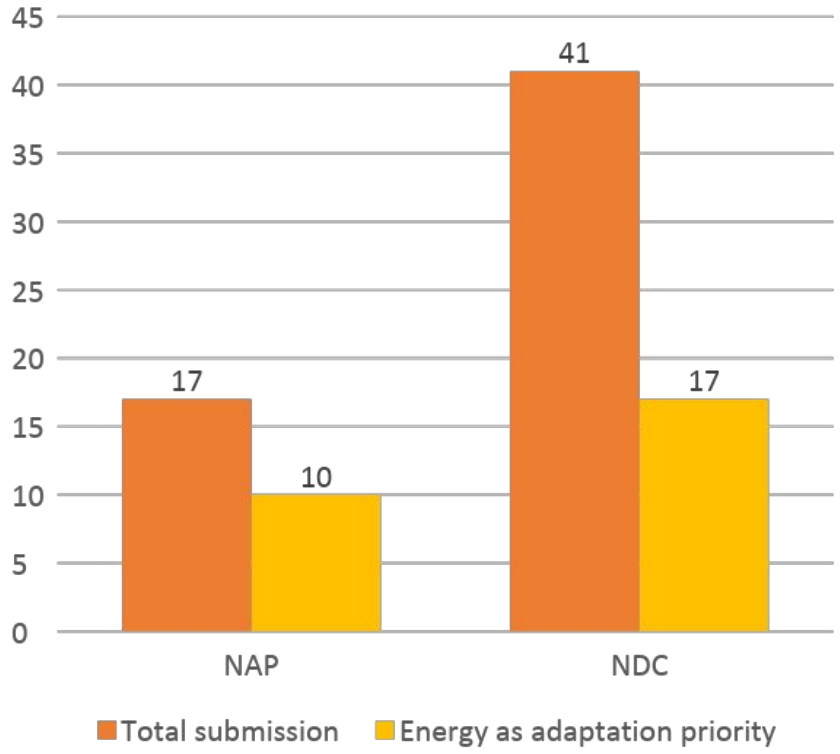
Further Support Needed to Build Climate-Resilient Energy Systems

Share of Adaptation Priorities in All NDCs as of 2024



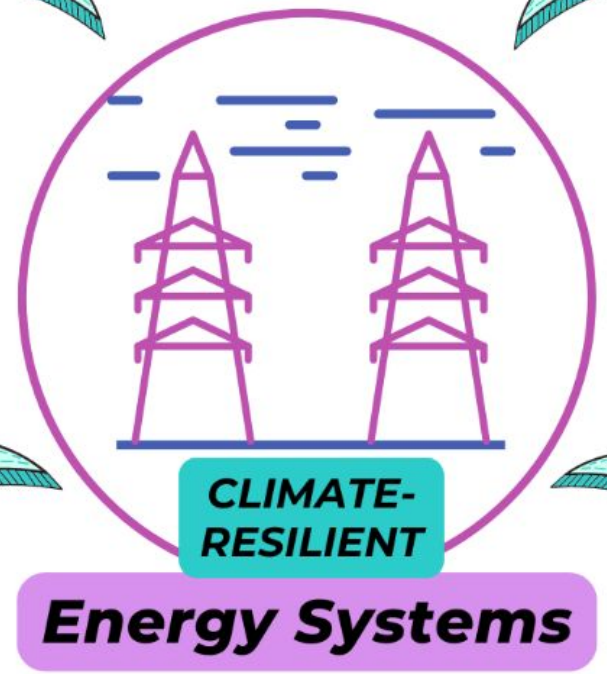
Source: Adapted from UNFCCC (2024), Nationally Determined Contributions under the Paris Agreement. Synthesis Report by the Secretariat

Adaptation Priorities in NDCs and NAPs of ADB DMCs



Source: Author

Multiple Benefits of Enhancing Climate Resilience of Energy Systems



01

Energy Security

Climate-resilient energy systems enable reliable energy supply against climate-driven disruptions and promote the use of domestically available energy sources.

02

Energy Access

Ensuring climate resilience of newly planned energy infrastructure can support energy access and reduce climate vulnerability.

03

Energy Transition

Incorporating future climate risks into energy planning supports transitions towards renewable energy which tends to be more sensitive to climate conditions than conventional energy.

04

Economic Development

Climate-resilient and reliable energy supply is essential for industrial and commercial activities, while reducing dependency on imported fuels.

05

Social Welfare

Climate-resilient energy systems are key for protecting vulnerable people against extreme weather events, supporting social services.

06

Disaster Risk Management

Early warning systems, fast disaster recovery and emergency communication channels of climate-resilient energy systems contribute to disaster risk management in general.

Deep Dive Workshop Agenda

09:00-09:10	• Opening remark: Toru Kubo, Senior Director, ADB (10 min)
09:10-09:20	• Introduction of the workshop with a short scene-setting presentation: Jinsun Lim, Climate Change Specialist, ADB (10 min)
09:20-09:30	• Group photo (10 min)
09:30-10:00	• **Discussion 1. Are extreme weather events an increasing concern? (30 min)** • Michiya Hayashi, Senior Researcher, National Institute for Environmental Studies, Japan • Madhurima Sarkar-Swaisgood, Deputy Chief of Disaster Risk Reduction, UN Economic and Social Commission for Asia and the Pacific (ESCAP)
10:00-10:30	• **Discussion 2. How do extreme weather events affect energy system resilience? (30 min)** • Henri Paillere, Head of Planning and Economic Studies Section, International Atomic Energy Agency (IAEA) • Wil Smith, Regional Manager of Southeast Asia and India, EPRI
10:30-11:00	• Break
11:00-11:40	• **Discussion 3. How can we strengthen resilience through investments and systemic changes? (40 min)** • Len George, Principal Energy Specialist, ADB • Selena Jihyun Lee, Energy Specialist, World Bank • Jhan Chan, Australasia Energy Transmission and Distribution Technical Leader, Arup
11:40-12:20	• **Discussion 4. How can policies and capacity building activities support building resilient energy systems? (40 min)** • Atty. Rachel Anne Herrera, Commissioner, Climate Change Commission, Philippines • H.E. Chhe Lidin, Under Secretary of State, Ministry of Mines and Energy, Cambodia • Ana Diaz, Program Manager, International Organization for Standardization (ISO)
12:20-12:30	• Closing remark: Noelle O'Brien, Director Climate Change, ADB (10 min)

THANK YOU

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