



Task 1

Melodie de l'Epine, Task 1 co-manager

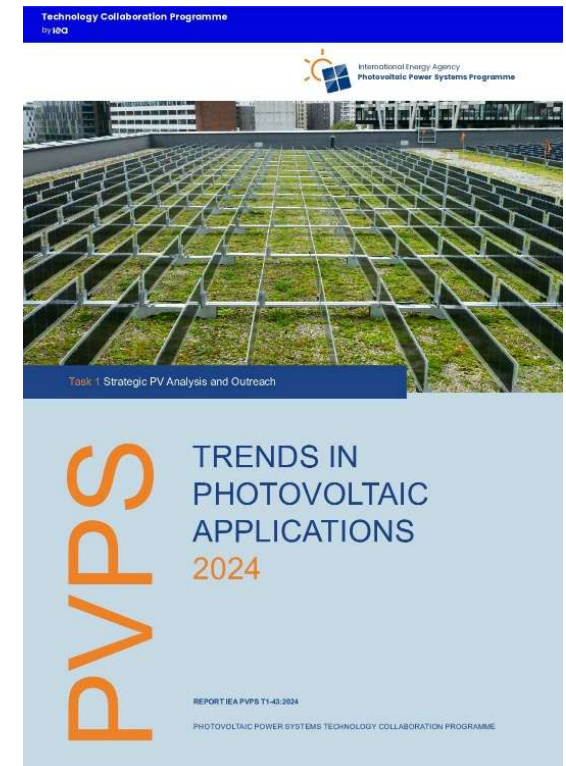
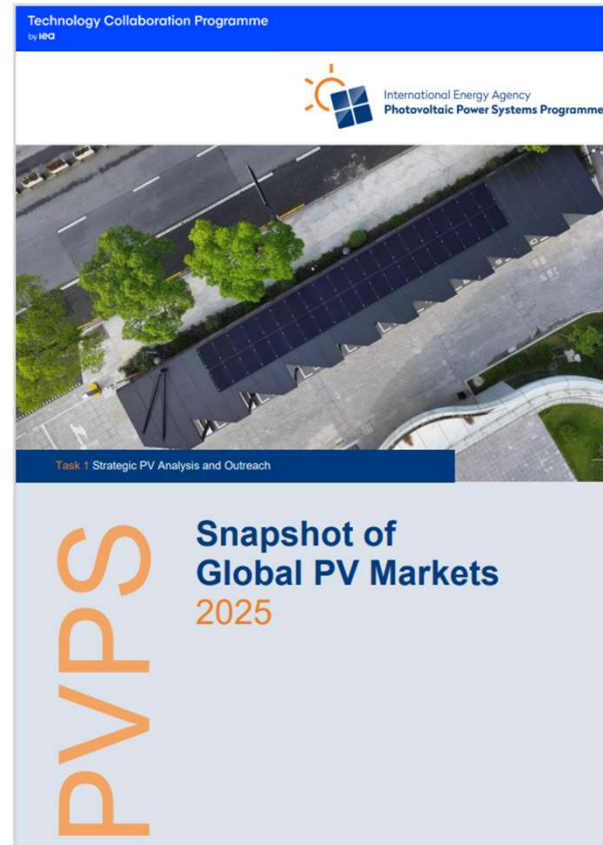
Storage for PV integration: increasing PV penetration, flexibility, and bankability

What is the Task 1 of IEA PVPS?



- Group of market and industry experts from IEA PVPS countries.
Focus on understanding market, policy and industry trends.
- Nonprofit think tank active in the PV sector.
- Two key reports per year: Snapshot of PV markets (April) – Trends in PV applications (October) + national survey reports.

PVPS



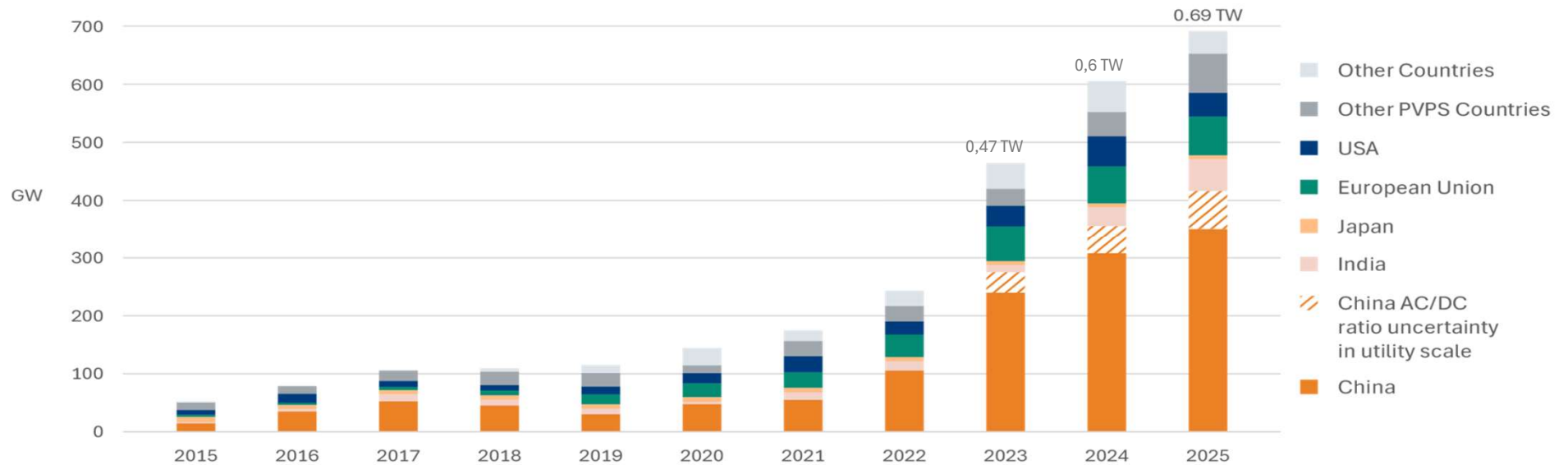
The scale of PV deployment is changing the value of PV



2025
≈690 GW
annual capacity

2025
2,96 TW
cumulative capacity

FIGURE 2.3: EVOLUTION OF ANNUAL PV INSTALLATIONS IN MAJOR MARKETS



New and flexible demands are opportunities for PV + storage



- Thermal demand can be shifted



- Charging can follow PV availability



- Production schedules can provide flexibility



- PV plus storage can displace transported fuel

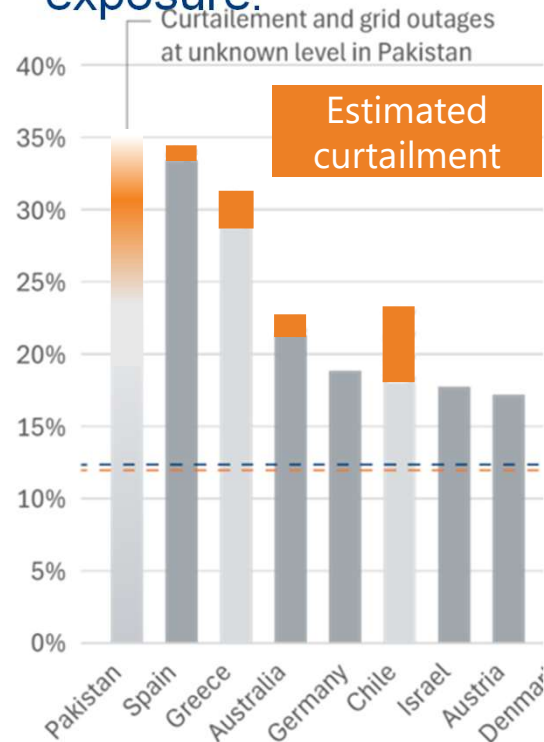


- Large anchor load for firmed renewable supply

Three forces are changing the value of PV and storage



- High PV penetration is increasing negative-price and curtailment exposure.

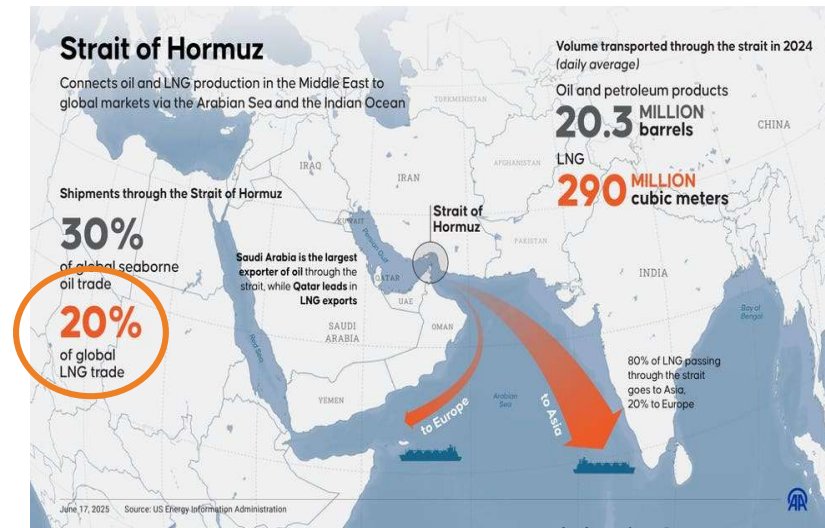


- AI data centres are creating large, concentrated and comparatively flat new loads.

- **415 TWh** global data-centre consumption in 2024

- **945 TWh** projected in 2030

- Fuel-supply shocks are increasing the value of predictable, domestically generated electricity.

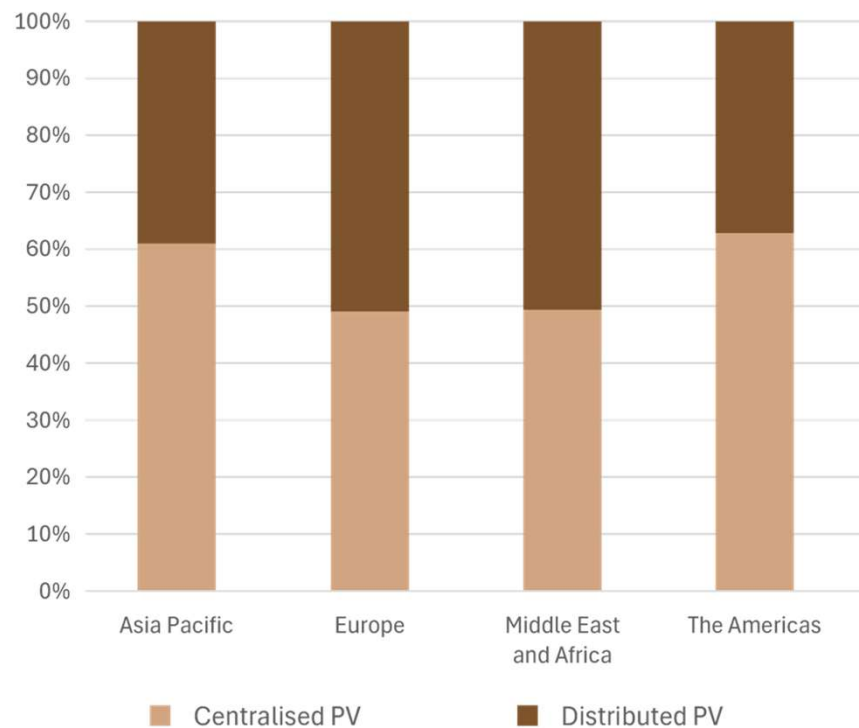


Anadolu via Getty Images

Four distinct PV + storage markets



FIGURE 2.12: ANNUAL GRID-CONNECTED CENTRALISED AND DISTRIBUTED PV INSTALLATIONS BY REGION IN 2025



1. Residential
2. Commercial and industrial
3. Utility-scale co-location
4. Standalone or aggregated storage

SOURCE: IEA PVPS & OTHERS

Not all storage, or solar+storage, can be financed



Possible value

- Energy sales + arbitrage
- Curtailment reduction
- Capacity
- Balancing services
- Customer savings
- Resilience

Accessible value

- Removes services that storage cannot access because of:
 - market rules;
 - minimum bid sizes;
 - aggregation restrictions;
 - connection conditions.

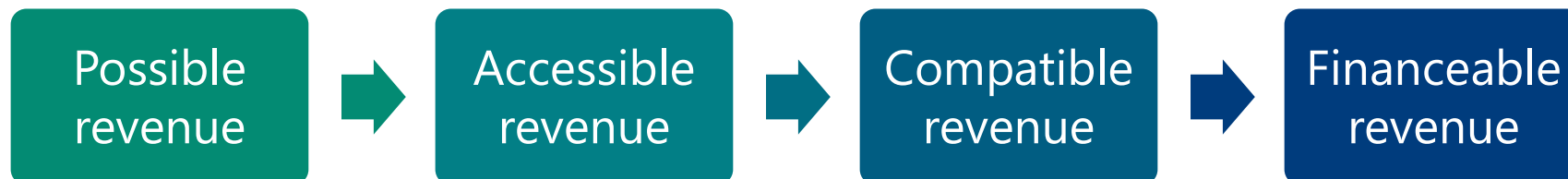
Compatible value

- Removes revenue that require the battery at the same time or in opposite operating states.

Financeable value

- Retains contracted or sufficiently predictable revenues that lenders and investors are prepared to recognise.

PVPS



Projects are bankable when revenues + risks are predictable



Is the revenue credible?

- Contracted revenue or credible route to market
- Realistic price and cycling assumptions
- Creditworthy counterparty

Can the project deliver?

- Secured connection and dispatch rights
- Performance and availability guarantees
- Degradation and augmentation plan

Who carries the risk?

- Curtailment
- Imbalance
- Battery degradation
- Regulatory change
- Merchant-price exposure



Spain and Australia are testing different policy approaches to data centers



Spain – draft decree

- 80% renewable coverage
- 80% matching in each hour
- Commissioned no more than 18 months earlier
- Minimum 10-year PPA
- Grid access tied to compliance

Australia – policy direction

- Underwrite new, additional renewable supply, backed by firming
- Deliver "at least as much energy" into the grid as they take out; possible exemptions
- Provide demand flexibility
- Meet stronger connection rules
- Pay attributable grid costs

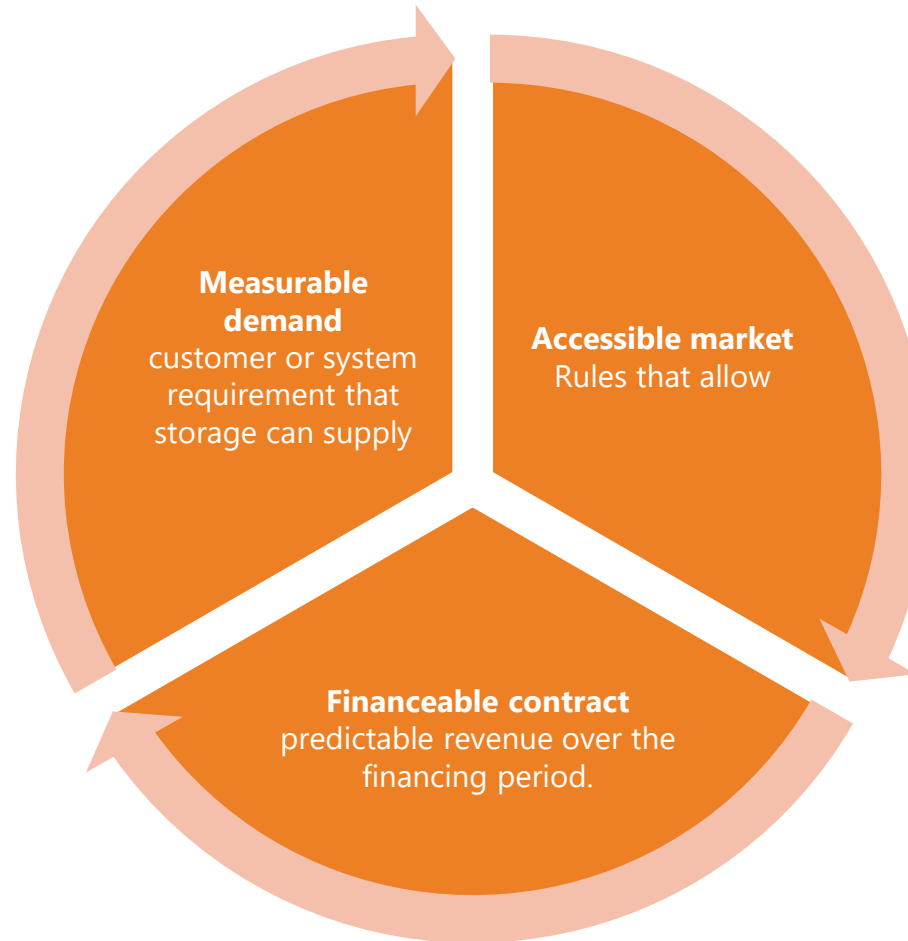
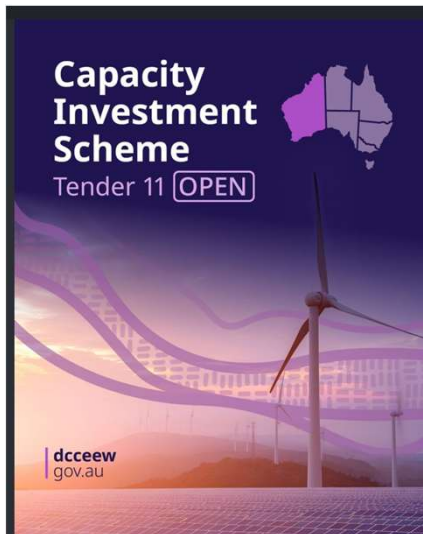
Both approaches can create direct demand for hybrid PV + storage

Creating the conditions for investment in RES+storage



14 GW of new clean dispatchable capacity by 2030

- Firm increasing wind and solar generation
- Support peak electricity demand
- Maintain reliability as coal-fired generation retires



Competitive tenders for clean dispatchable capacity

- Storage projects compete for CIS support
- Projects continue participating in the NEM and earning market revenues
- Tenders 8 & 10 called **4 GW / 16 GWh dispatchable**

A long-term government revenue safety net

- The Capacity Investment Scheme Agreement underwrites project revenue
- Support is triggered when eligible revenue falls below an agreed level
- Revenue above an agreed ceiling is shared
- Commercial operation and market incentives are preserve

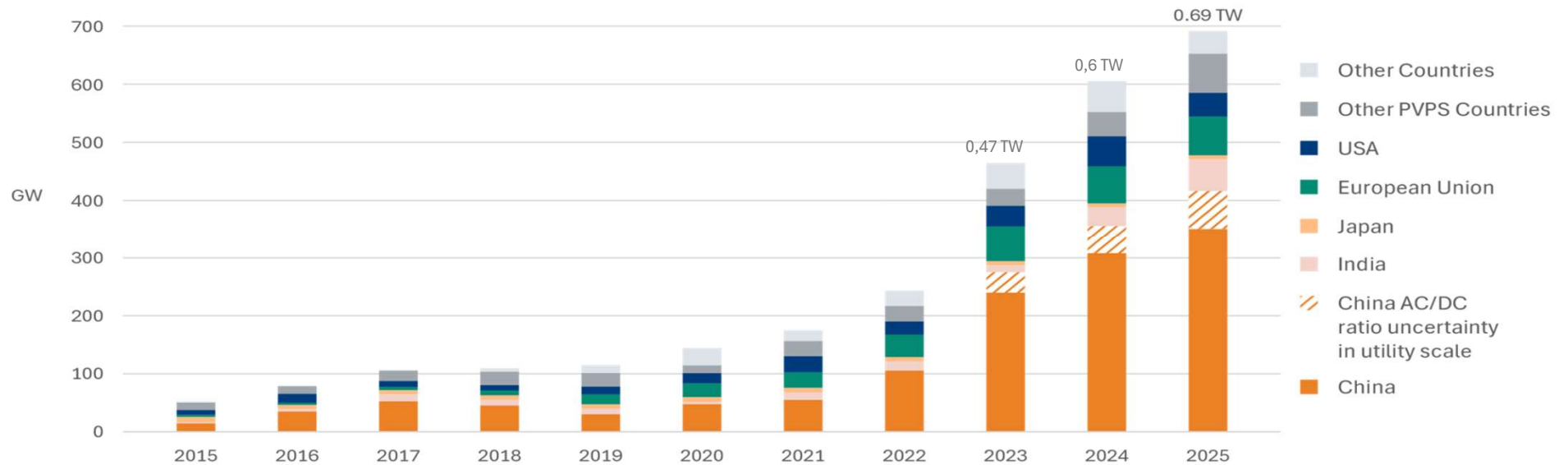
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www.iea-pvps.org

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