

ROOFTOP SOLAR INTEGRATION IN AUSTRALIA

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FORMERLY WITH THE
ENERGY SECURITY BOARD
IEEFA GUEST CONTRIBUTOR

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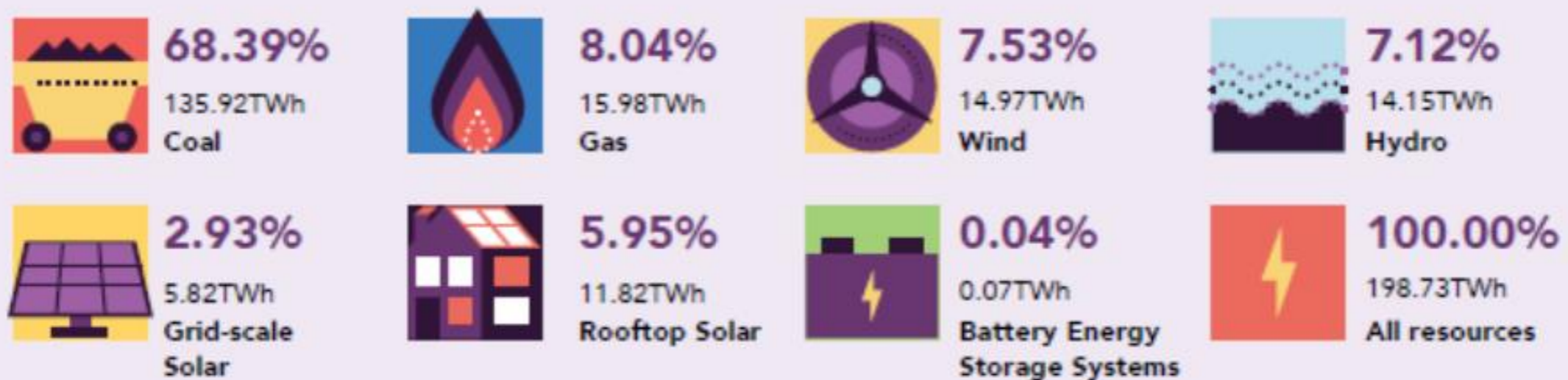


Photo source: RenewEconomy

THE SCALE OF CONSUMER INVESTMENT IN ENERGY INFRASTRUCTURE AND SERVICES

- 2021 – now 2.5m household rooftop PV systems, capacity: 13GW; total PV: 19+GW
- The difference is the scale of consumer investment in generation
 - and the technology that can enable real-time demand response
 - average system size approaching 9kW - with increasing C&I installs

Annual generation by fuel type (2019/20)

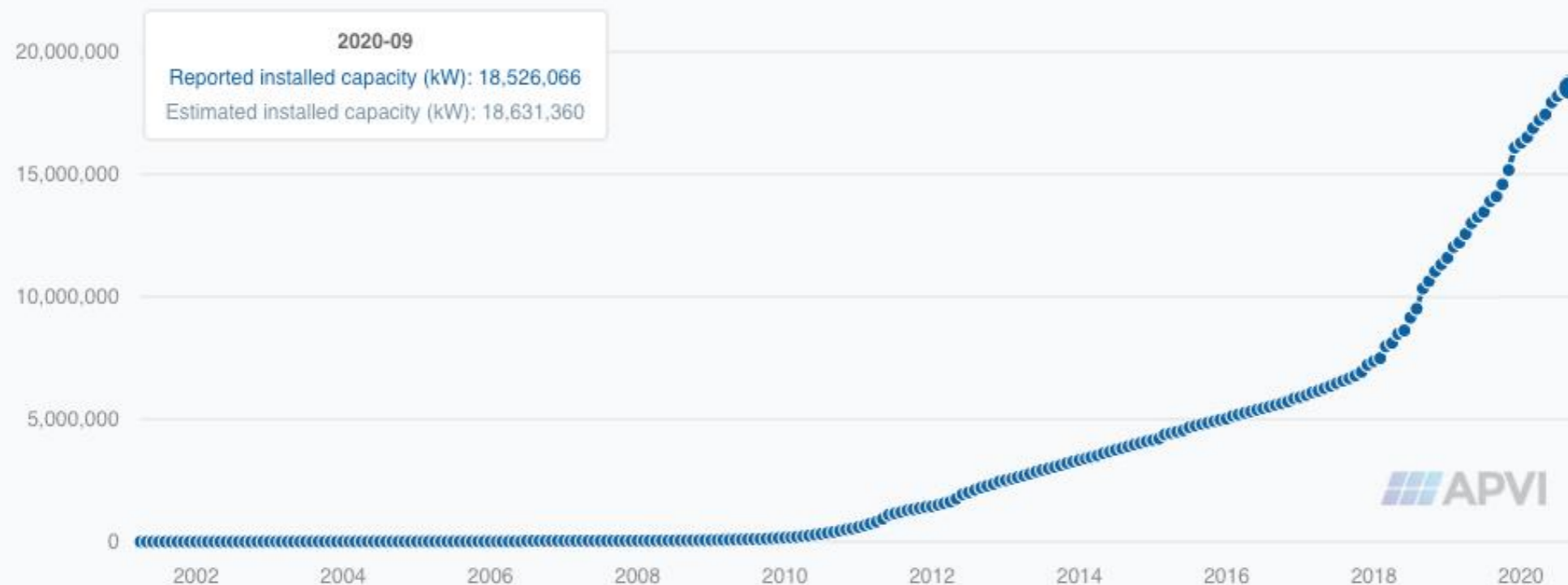


source: AEMO

RECORD INSTALLATION RATES IN 2020 - C&I INCREASING, COVID WFH

- Record rate of 3GW installs in 2020, +39% yoy - highest per capita install rate ever in the world
<https://reneweconomy.com.au/rooftop-solar-market-ends-tricky-2020-by-smashing-records-surpassing-13gw-total-capacity/>
- Note: Vietnam rooftop solar install: 9GW in 2020 alone!
- State government subsidies have varied dramatically over time – from 40-66c/kWh
 - Now generally retailer set – roughly 6-12c/kWh BUT vary greatly (and sometimes zero)

Australian PV installations since April 2001: total capacity (kW)

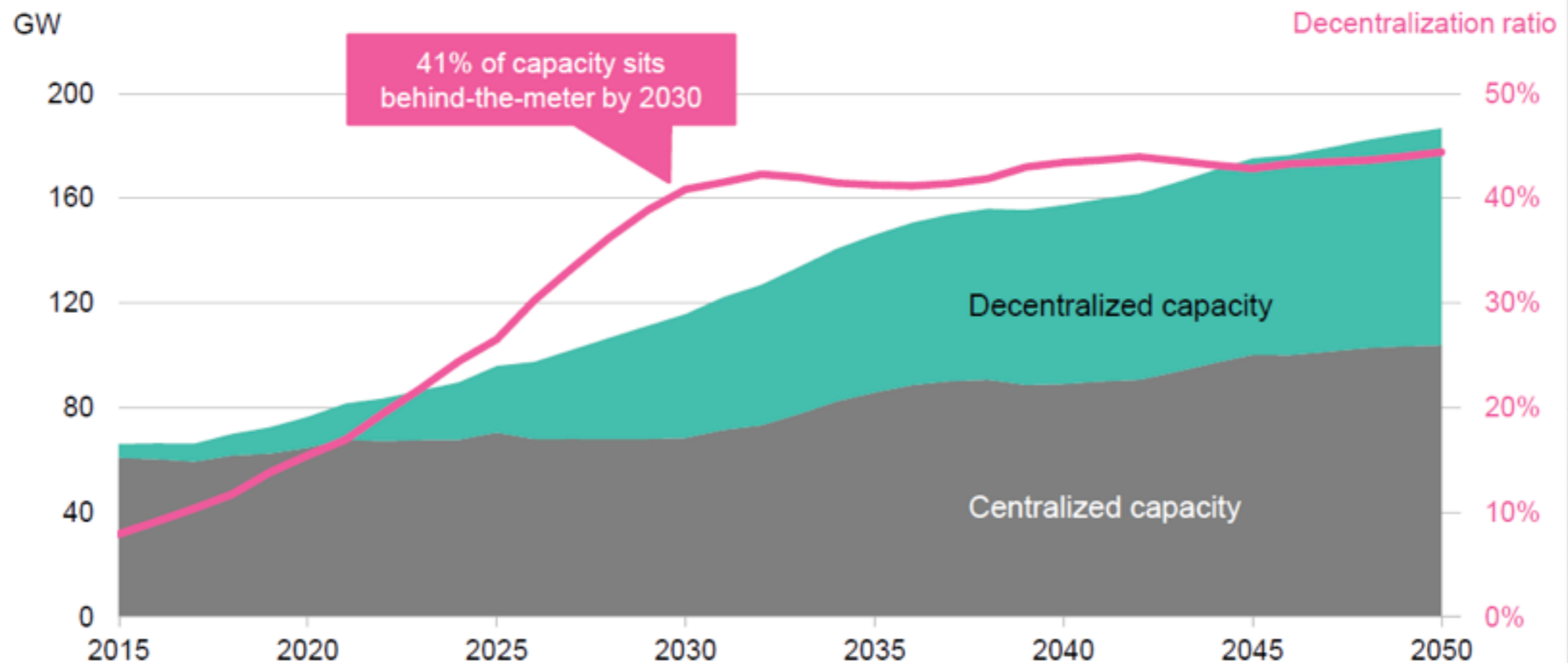


DER IS FUNDAMENTALLY CHANGING THE ELECTRICITY SYSTEM

THIS PROJECTION UNDERESTIMATES EVS

- Residential solar install costs ~ A\$0.80/kW (~Rs 45) (estimated 9,7000 jobs in rooftop PV)
- Single axis tracking utility solar instal costs ~A\$1.30/kW (~Rs 74), roughly 2x production, but also congestion losses (estimated 3,400 jobs in large scale PV)

Installed capacity in Australia, centralized vs decentralized



Source: BloombergNEF. Note: For more details see: [Australia behind-the-meter PV and storage forecast \(Web | Terminal\)](#).

NEED TO CONSIDER ALL DIMENSIONS OF DER INTEGRATION

TECHNICAL INTEGRATION FOUNDATIONAL

Technical and operational challenges

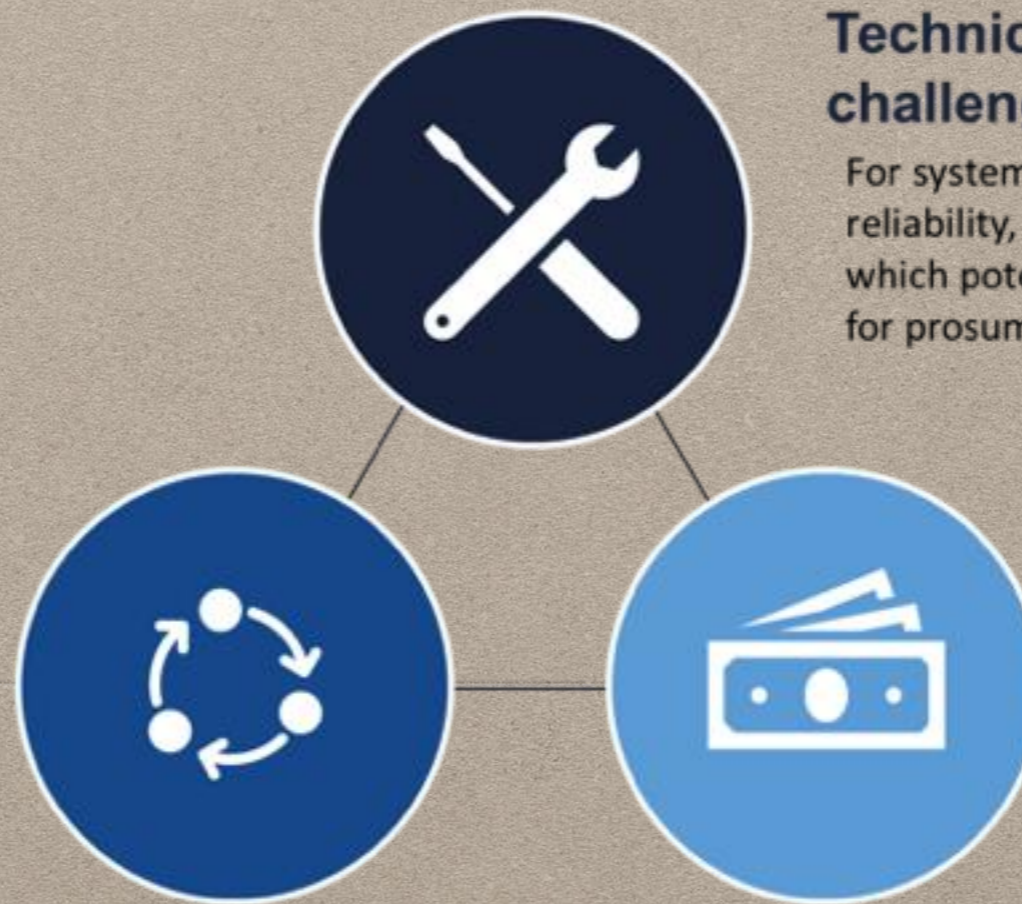
For system security and distribution network reliability, including DER visibility and standards – which potentially limit or reduce the value of DER for prosumers and consumers

Market and business model challenges

Electricity markets and DNSP business models need to be updated to support the benefits and minimise the costs of DER integration for all consumers

Regulatory and planning challenges

Include ringfencing regulation and integrated planning to optimise the benefits of DER integration

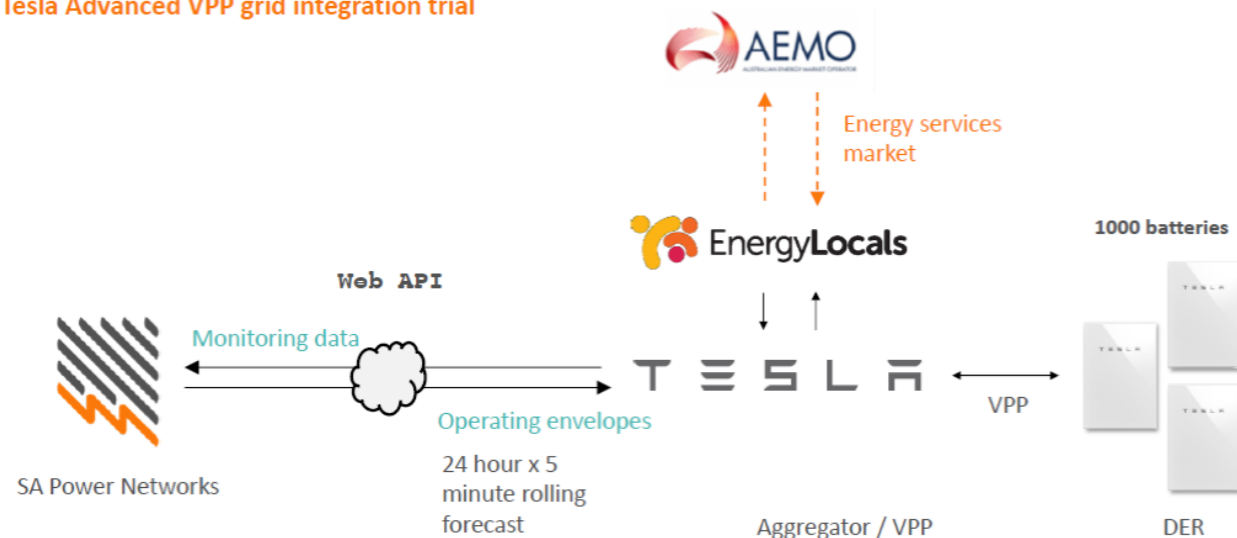


OPERATING ENVELOPES: VITAL ENABLING TECHNOLOGY

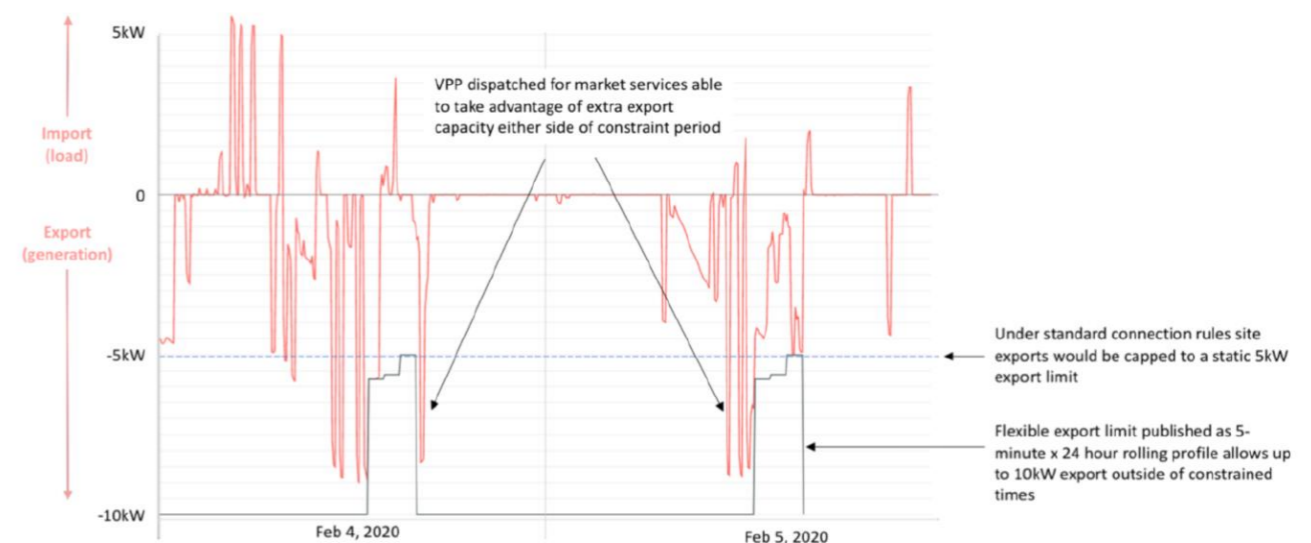
- For static planning: AEMO's DER register <https://aemo.com.au/energy-systems/electricity/der-register>
- Some sensors; one disco trialling telco data feeds
- Set dynamically – on 5-minute intervals, 24 hours in advance
- Needs regulatory support, including through consistency in APIs for information sharing
- Needs revenue allowances (but relatively small cf capex)

Architecture

Tesla Advanced VPP grid integration trial



Enabling greater market access – raising the limit



RISK AND VALUE OF ROOFTOP PV TO DISCOMS

- Risk of the 'death spiral' ...
 - Especially with falling battery and EV costs
- Potential for cheaper provision of services through PV/storage, especially in remote areas
 - In areas with sufficient rooftops, potential for local trading - export charges being explored in Australia
- Revenue regulation needs to be capped for service provision focus
 - Need to look to performance-based regulation
 - Tariffs then become an important, but secondary issue
- Complementary measures vital
 - E.g. valuing demand response

CONTACT DETAILS

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