THE FUTURE OF ENERGY NETWORKS

EASTERN AUSTRALIAN ENERGY MARKET OUTLOOK CONFERENCE

17 SEPTEMBER 2014

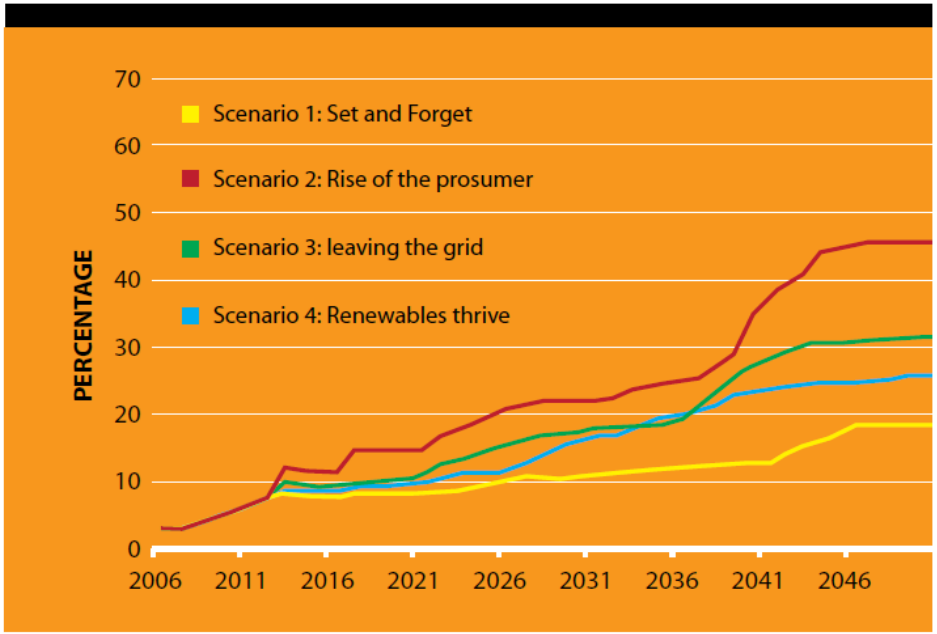
Focus for Today…

- The changing role of centralised grids
- The opportunities and threats of DER
- How distribution and transmission business models are changing
- Launch of the ENA & ARENA collaboration – ‘Renewable Energy Stocktake’

Potentially diverse futures for Network Use…

- No 'Right' Answers but – **Risk of Partial Substitute**
- Exposure to highly **volumetric tariffs**
- Exposure to '**tipping points**' through step changes in use and technology

FIGURE 1: PROJECTED SHARE OF ELECTRICITY DELIVERED FROM ONSITE GENERATION

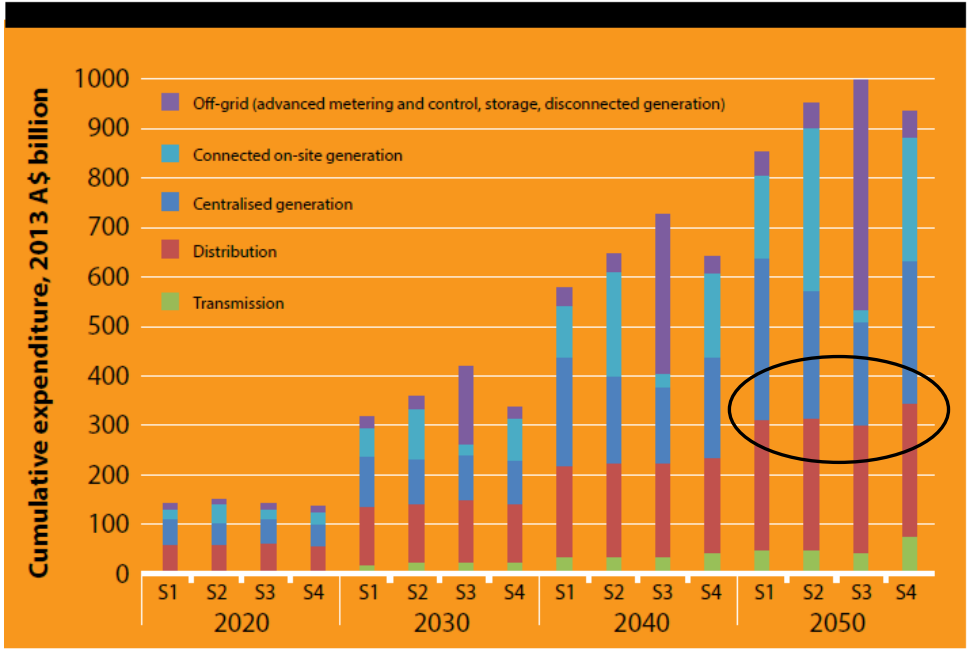


Data sourced from 'Change and Choice' Figure 16, p. 34

All scenarios require efficient access to capital…

- All Future Grid forum scenarios require over $300 BN in capital investment
- Cost of Capital can be 50-70% of annual network revenue, so customers have a direct interest in low risk investment environment.
- Realistic Regulation needed - Regulator says risk is falling.

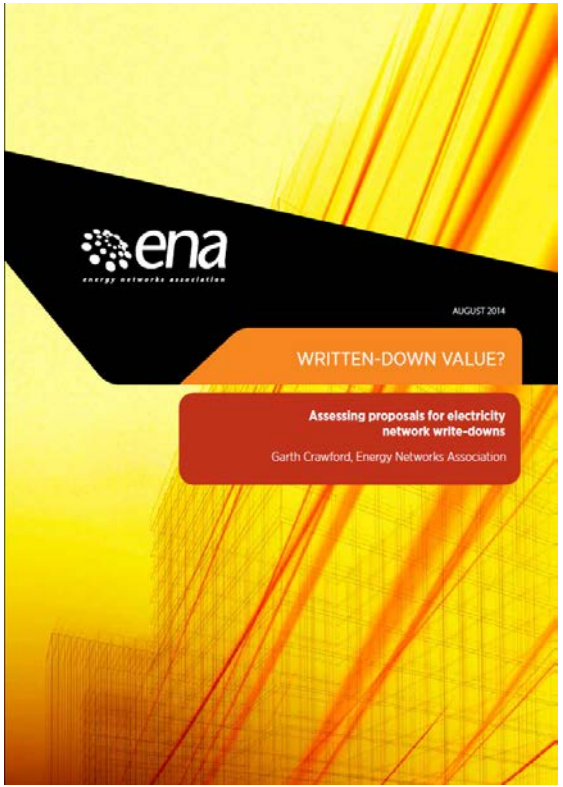
FIGURE 2: PROJECTED CUMULATIVE SYSTEM COST BY 2050



Data sourced from 'Change and Choice' Figure 23, p. 44

All scenarios require efficient access to capital…

- All Future Grid forum scenarios require over $300 BN in capital investment
- Cost of Capital can be 50-70% of annual network revenue, so customers have a direct interest in low risk investment environment.
- Realistic Regulation needed - Regulator says risk is falling.
- Calls for Regulatory Asset Writedowns likely to increase costs to Consumers

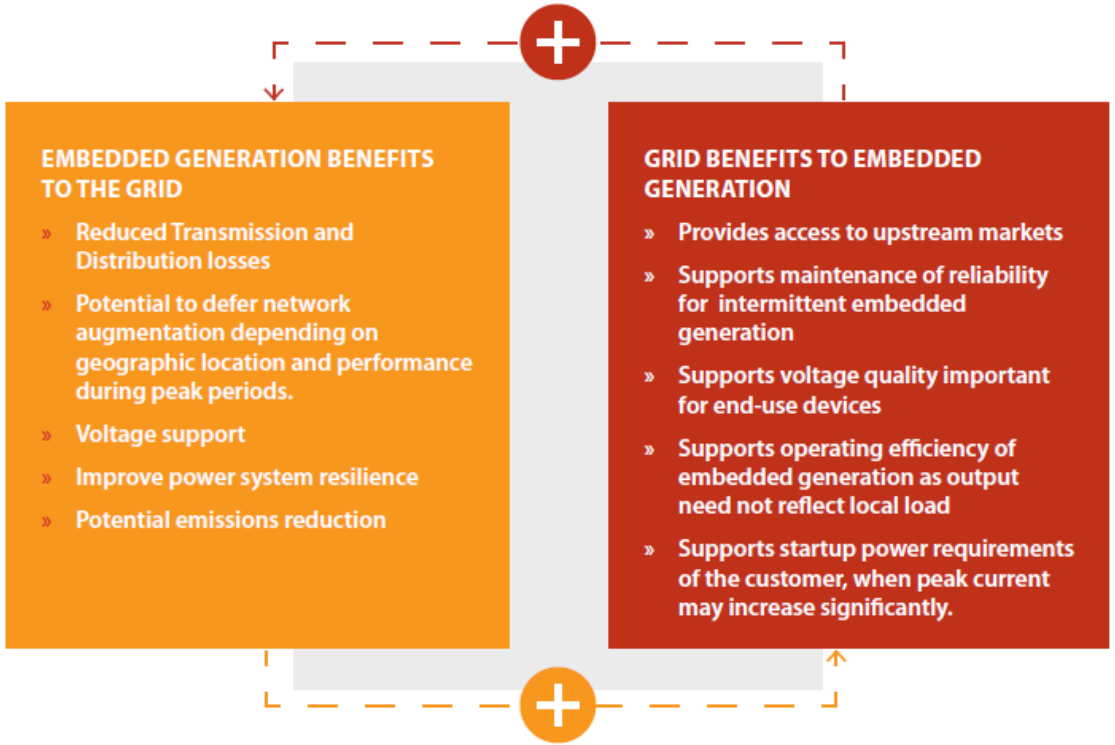


Opportunities and Threats of DER

Grid is rapidly accommodating new assets

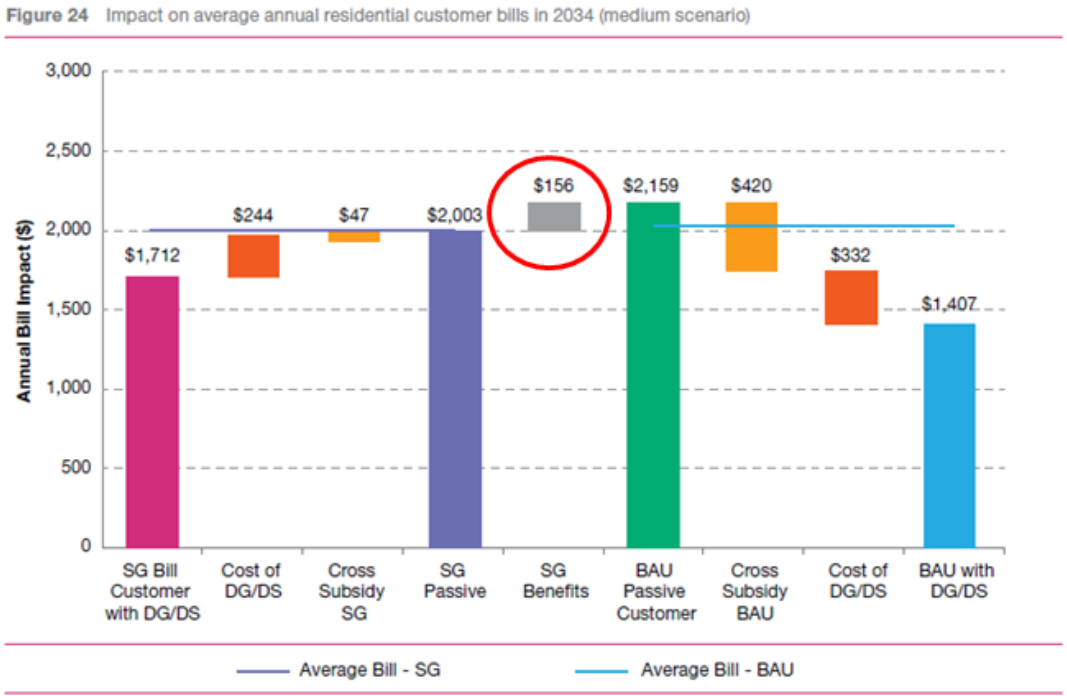
- Australia is installing solar at a world-leading pace
- Hawaii often cited as at the edge of the solar envelope, with higher solar penetration than any mainland utility yet it is only at 10% and 300 MW
  - lower than most of our big states and dwarfed by Qld 23% (1000 MW) and SA 25% and 500 MW.
- California, the largest has c.700 MW in 2013 and may get to 1600 MW by 2016.
- Perspective needed when networks are argued to be resisting connection of embedded generation

Shared Benefits in Embedded Integration



However, tariff reform essential to achieve efficient DG

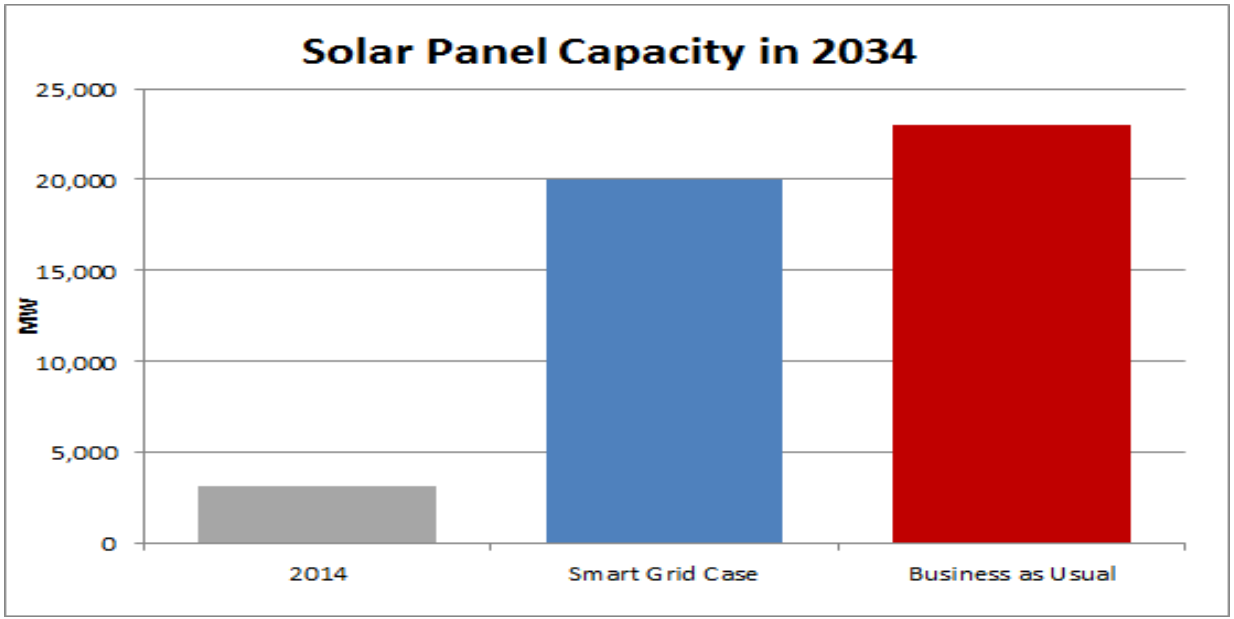
- Smart Grid Scenario assumes smart-meter enabled, cost reflective tariffs
- Avoiding $10 BN over investment in onsite generation and storage
- Saving $156 p.a. on Average Bills.



Smart Grid, Smart City - Shaping Australia's Energy Future (2014), p.71

Economic outcomes still see high growth in DER …

> Smart Grid, Smart City indicated difference was a 700% increase in Solar PV, not 800% increase.

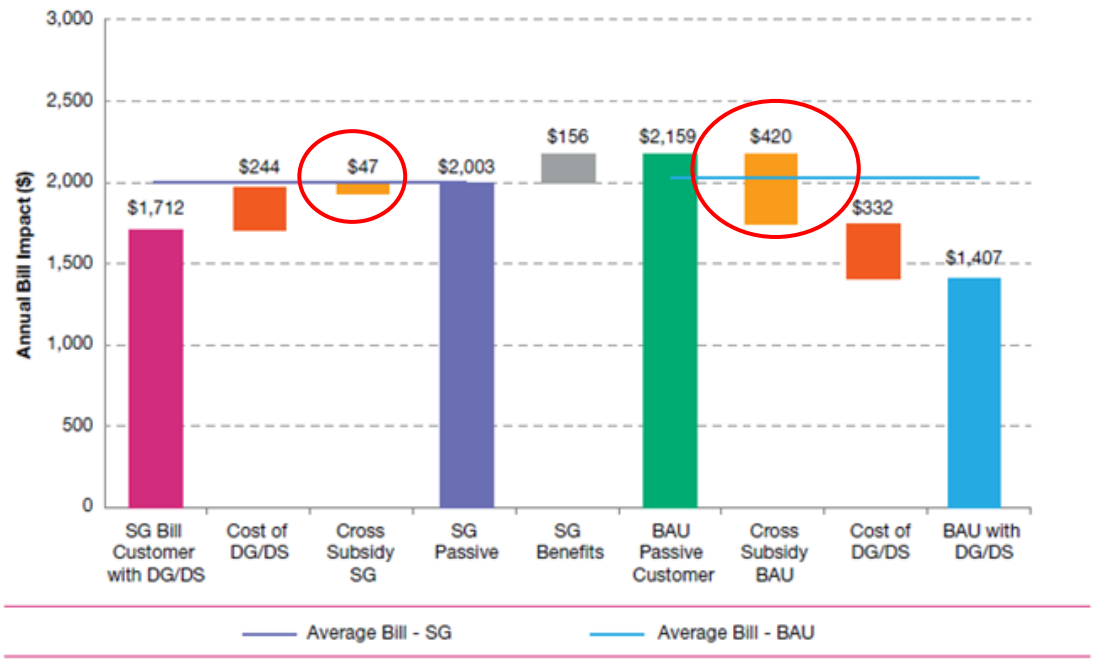


Data from Smart Grid, Smart City - Shaping Australia's Energy Future (2014)

Significant dividends for fairness…

- Current A/C cross-subsidies of c. $350 pa to $700 pa.[1]
- Current Solar Cross Subsidies estimated $120 p.a.[2]
- Smart Grid Smart City report shows potential DG/DS to increase to $420 p.a.

Figure 24 Impact on average annual residential customer bills in 2034 (medium scenario)



1. Productivity Commission (2012) , AEMC (2014) Draft Determination (Distribution Pricing)
2. AEMC (2014)

Smart Grid, Smart City - Shaping Australia's Energy Future (2014), p.71

How will Networks adapt?

Short-term: Redefining Current Services

> Real tariff reform essential to:

1. reduce exposure to highly volumetric tariffs which encourage duplication and higher costs to consumers
2. manage current cross subsidies; and
3. incentivise efficient distributed energy delivery

> Transforming relationships with consumers:

- Negotiated service delivery
  - Five year business plans
  - Infrastructure planning
  - Design of products and services
  - Reliability investment

Trust will be the basis of a long-term partnership with consumers

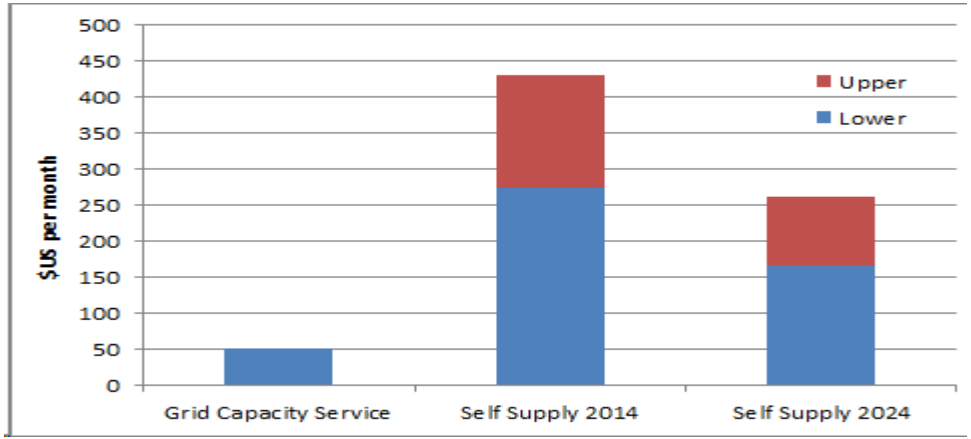
Diverse Pricing Options …and Consequences

Current Structures	Energy	Demand	Other
- Increased Fixed charges	- Time of Use	**- Anytime MD**	$/kW charge for net metering (APS)
- Declining Block tariffs	- Critical Peak Pricing	**- Coincident MD**	Fixed $/month all customers (SDGE)
	- Peak Time Rebate		

- Challenges
  - Simplicity, User Friendly
  - Avoid prescriptive, one size fits all solutions.
  - Allow service providers to tailor for customers - in consultation with customers.

Grid services will compete on value to consumers…

- Efficiency of Supply
- New Services
- Access to New Markets
- Hidden services:
  - Back-up Service
  - Regulation (Balancing) Service
  - 'Start-up' service



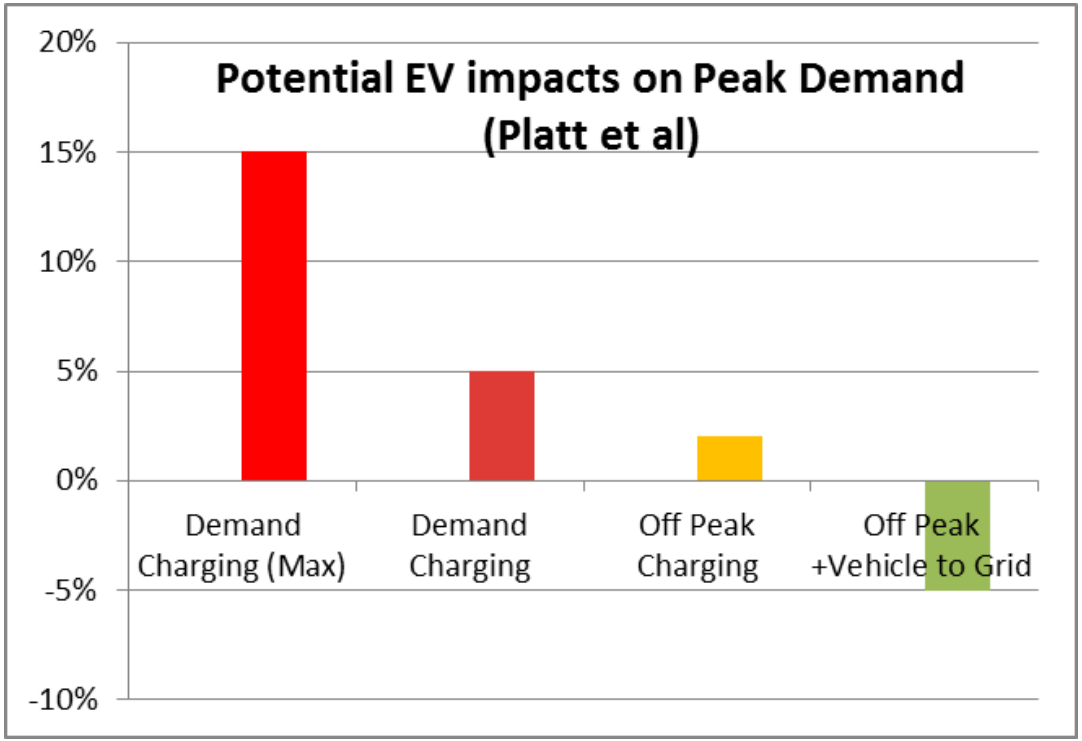
Data from EPRI – 'The Integrated Grid' (2014)

…making widespread 'grid defection' possible but unlikely.

Medium-term: redefining business models

1. ***Offering a wider range of customer centric services***
2. ***Value to networks of optionality in future investment***
    - Trade-offs between operating vs capital solutions
    - Non-network solutions to defer Infrastructure decision window
    - Innovation to build the market (e.g.Transgrid *Powering Sydney's future)*
    - Size of a customer connection
3. ***'Enabling Networks' and Distribution System Operators***
    - Central to State of New York's *Renewing the Energy Vision*
    - Pacific North-West Smart Grid Demonstration Project
    - Storage Solutions focused on utility benefits

One example… Electric Vehicles in 2033



Platt, Paevere,Higgins and Grozev (2014) in *Distributed Generation and its Implications for the Utility Industry*

Stocktake: Database of renewable energy grid integration projects

ARENA

Australian Government

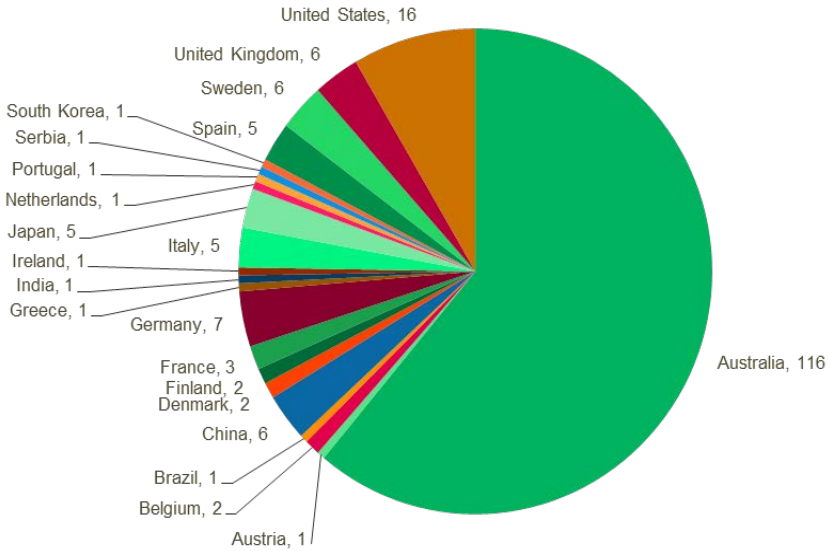
Australian Renewable Energy Agency

ena

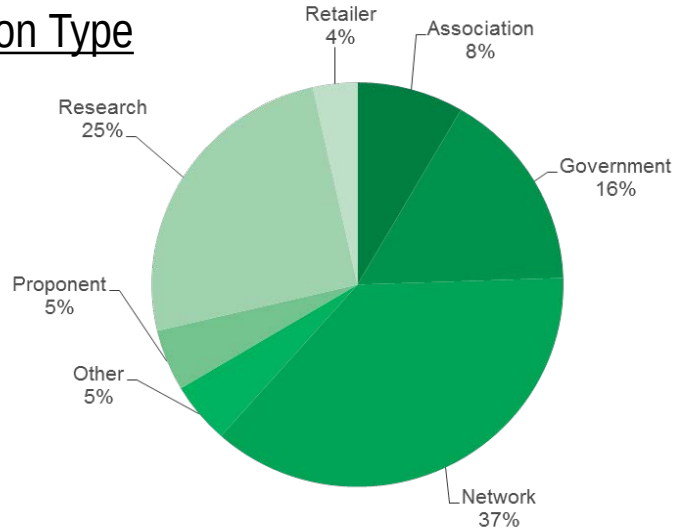
energy networks association

ARENA Stocktake

Country of Origin



Organisation Type



The final stocktake includes 176 projects, of which 116 are from Australia.

How will this stocktake help?

- Help the industry **understand** the state of knowledge – the first step to improving it…
- Form a view of **common / thematic opportunities and barriers** by synthesising the stories from each approach
- Make it easier for **networks** and **proponents** to share information about how opportunities can be exploited, and barriers overcome
- **Avoid duplication** of effort ("reinventing the wheel")

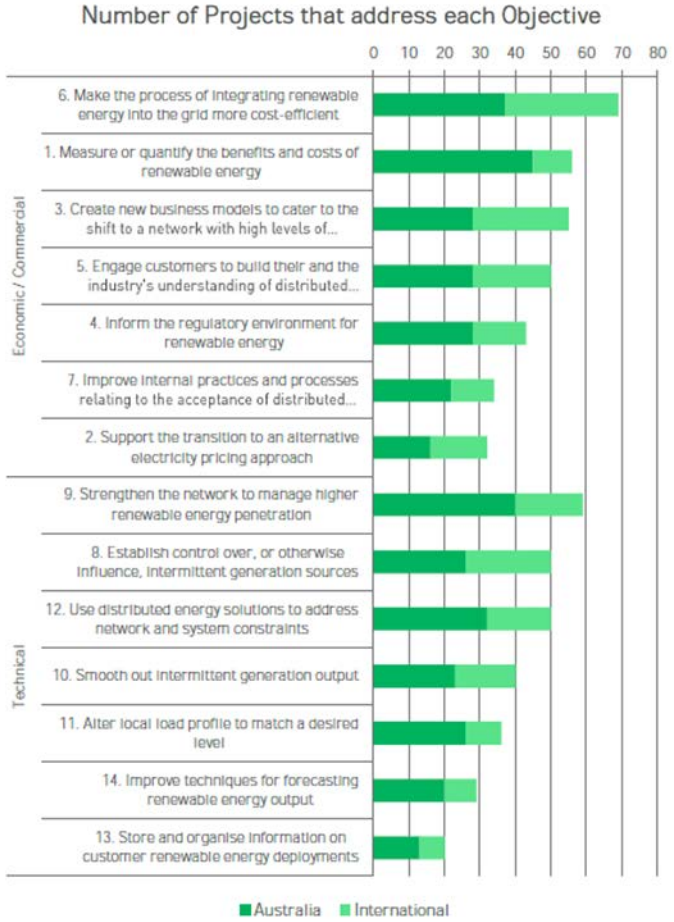
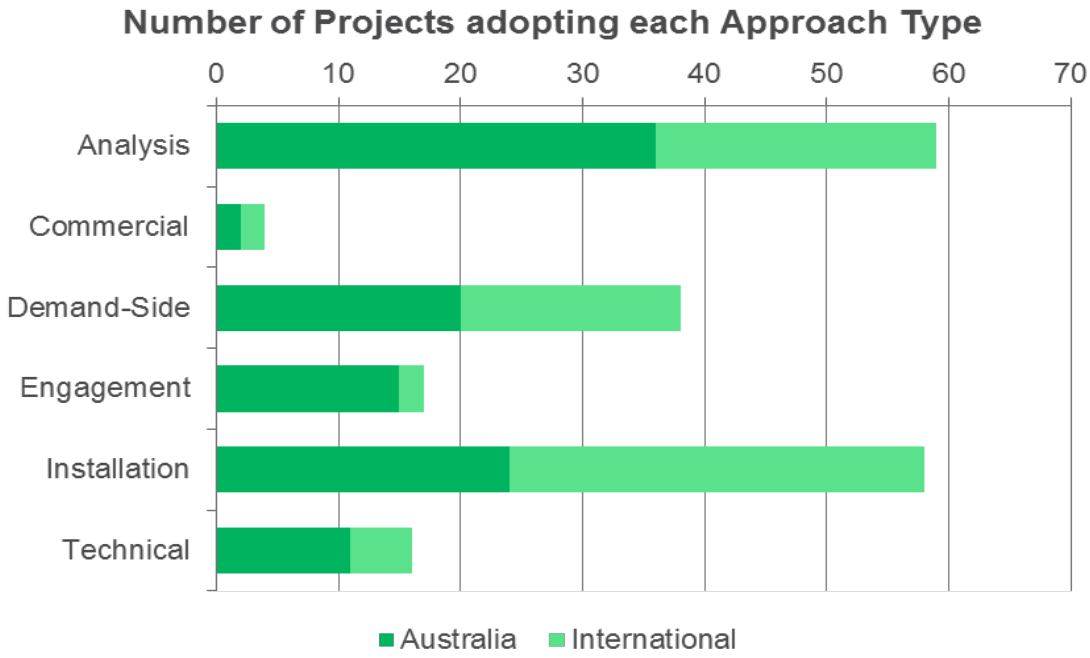


Figure 8: Number of Projects that address each Objective[2]

Project Categories

Analysis	Desk-based analysis, research, and modelling
Commercial	Joint ventures between organisations, internal initiatives, and policy advocacy
Demand-Side	Influencing customer loads through pricing, incentives, and direct control
Engagement	Interviews and Surveys
Installation	Installing distributed energy resources on the network
Technical	Changing the operation of the network through new approaches or equipment upgrades



Access the Stocktake and analysis here…

http://www.ena.asn.au/publications/arena-stocktake-project/