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Storing renewable energy in homes and communities – views from Australia

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Chair in Sustainable Energy Futures
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- Horizon scanning series - The role of energy storage in Australia's future energy mix https://acola.org.au/wp/esp/

Storage - the next big thing?

Battery storage could be solution to electricity blackouts

ENERGY

Battery Storage Poised to Expand Rapidly

The 2016 Los Angeles gas leak put battery storage of electricity on the fast track

'Energy storage is vital, but industry isn't ready'

EV battery prices imply residential costs are still 2-3X too high

Household battery storage costs: So near and yet so far

Cheap, sustainable battery for grid energy storage could be on the horizon

Energy Storage Poised for Growth

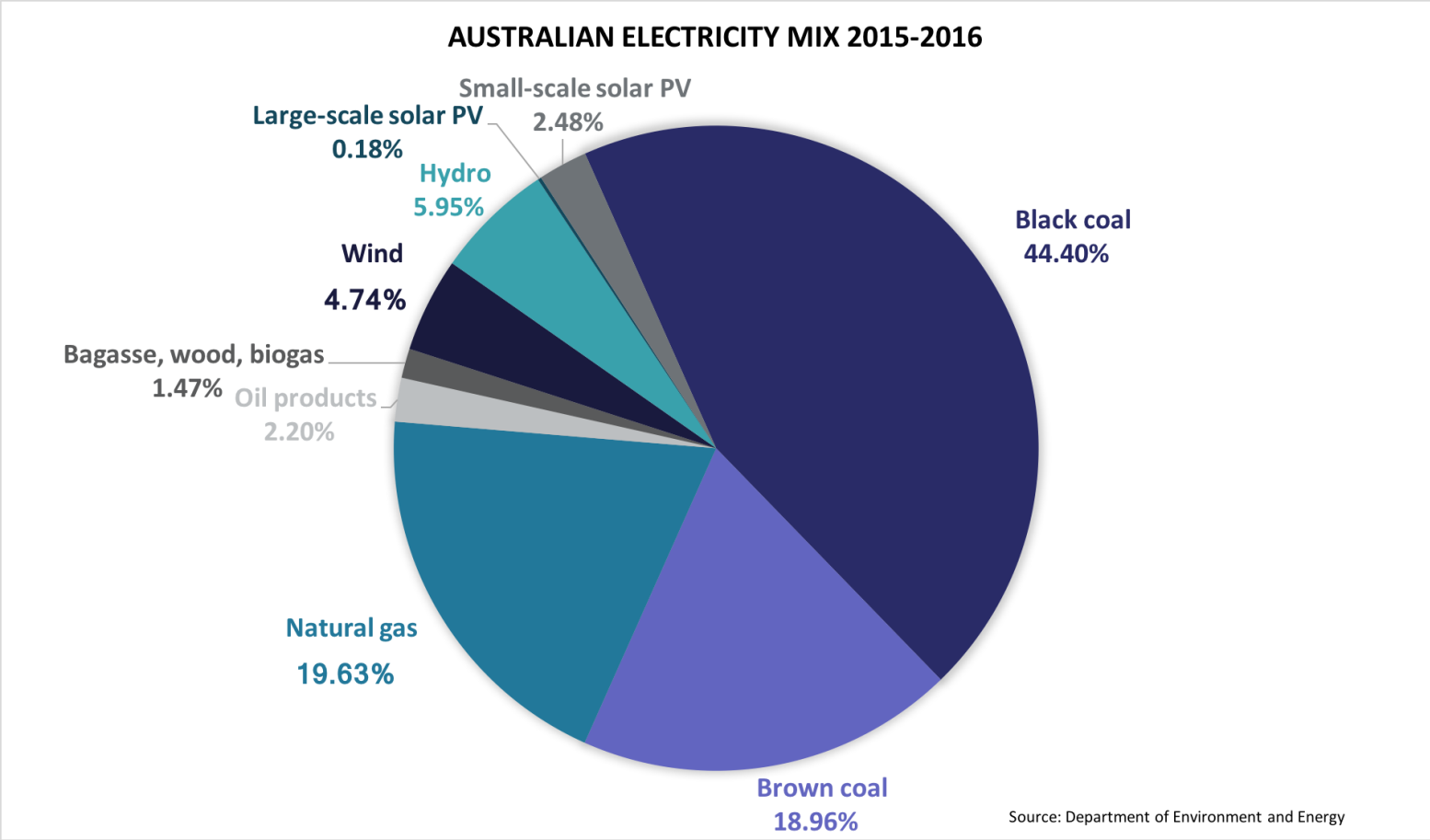
COSMOS CONVERSATION TECHNOLOGY 02 JANUARY 2017 4 MINUTE READ READ LATER + SHARE TO +

Despite the hype, batteries aren't the cheapest way to store energy on the grid

Batteries That Make Use of Solar Power, Even in the Dark

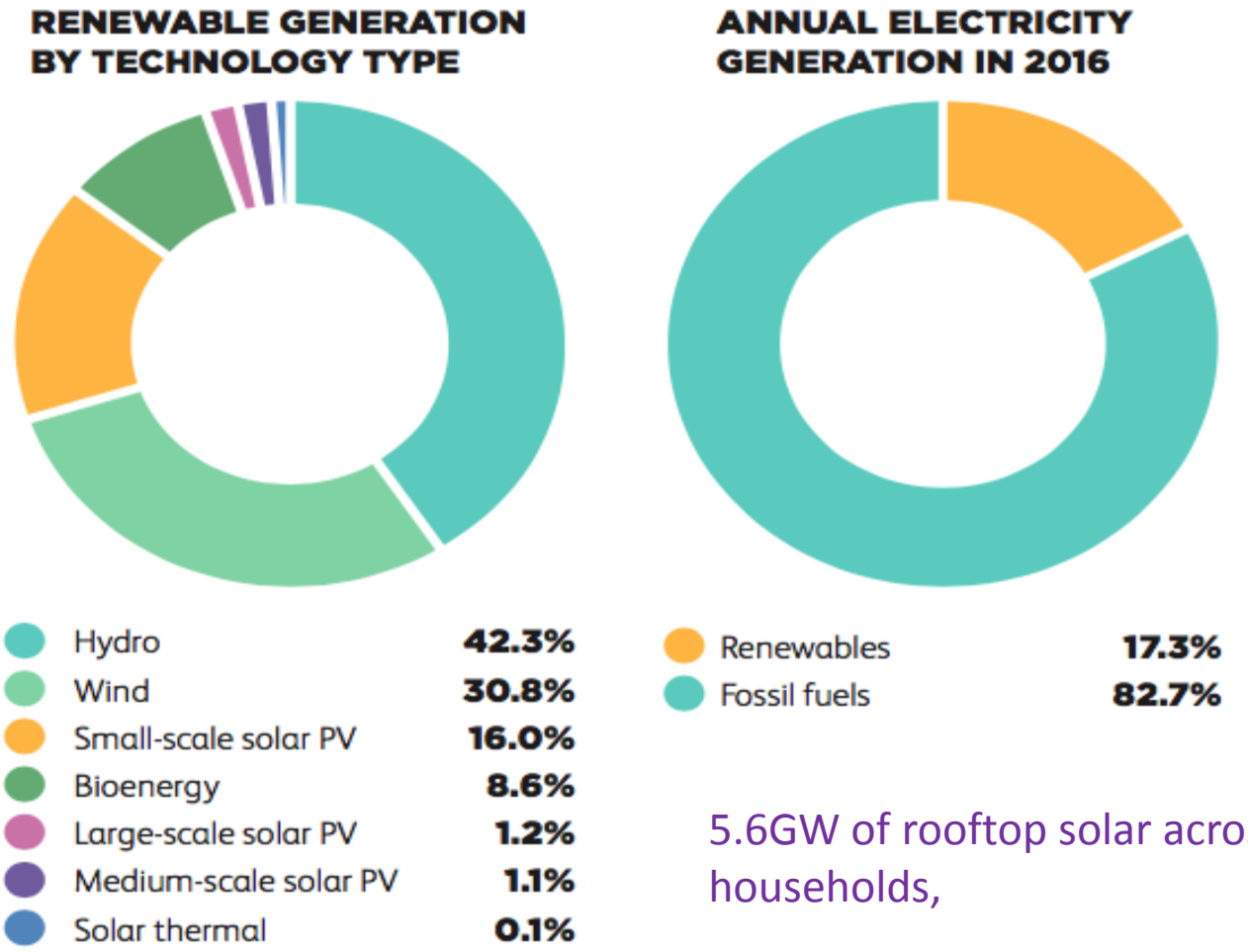
Vanadium-Flow Batteries: The Energy Storage Breakthrough We've Needed

Australia's current electricity mix



RE percentage of mix

Renewable Energy Target (RET), which is set at 33,000 GWh in 2020.



5.6GW of rooftop solar across 1.7 million households,

https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html

The National Electricity Market

Wholesale value of electricity traded

$11.7 billion

40,000 kilometres of transmission lines

National maximum summer operational demand

32,859 MW

National maximum winter operational demand

31,977 MW

Number of metered customers

9.6 million

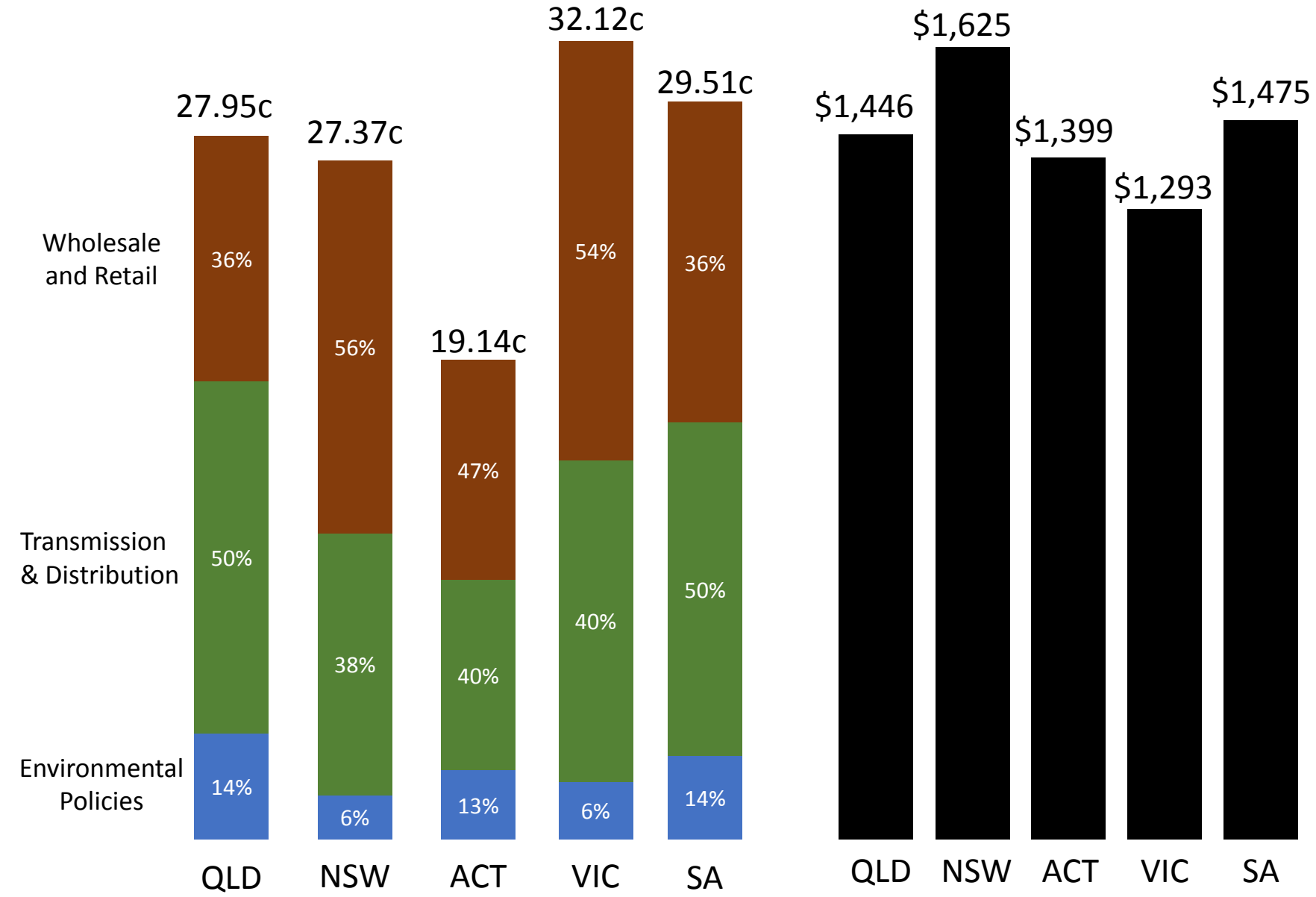
Installed capacity

47,148 MW

NEM emissions

162 Mt CO_2-e

Price comparison



Tesla's 100 MWh battery (1/12/17)

*"The battery delivered **100 megawatts** into the national electricity grid in **140 milliseconds.***
"That's a record and the national operators were shocked at how quickly and efficiently the battery was able to deliver this type of energy into the market," Mr Koutsantonis told 5AA radio on Wednesday."

http://www.news.com.au/technology/environment/thats-a-record-south-australias-tesla-battery-responds-to-coalfired-plant-failure/news-story/d9e02c0dbf6774ffea948a1b919f3b7f

Project Overview

- *Aim to identify the social drivers and barriers of energy storage uptake, and the publically perceived risks and benefits of achieving energy storage uptake. Dec 2016 – Feb 2017*
- Extensive desktop review
  - Solar PV uptake, smart meters, FiT's, CRP's and EE
  - Socio-psychological theories
- 6 focus groups (N=58)
- 17 key stakeholder interviews
- 3 case studies
- National Survey (N=1015)

Interviews

The University Of Queensland
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Participants (19)

- 4 from CSO's
- 1 non-government organisation
- 4 from state government departments
- 1 federal government department
- 1 local government department
- 6 industry
- 2 ministerial advisers

Interviews

The University Of Queensland
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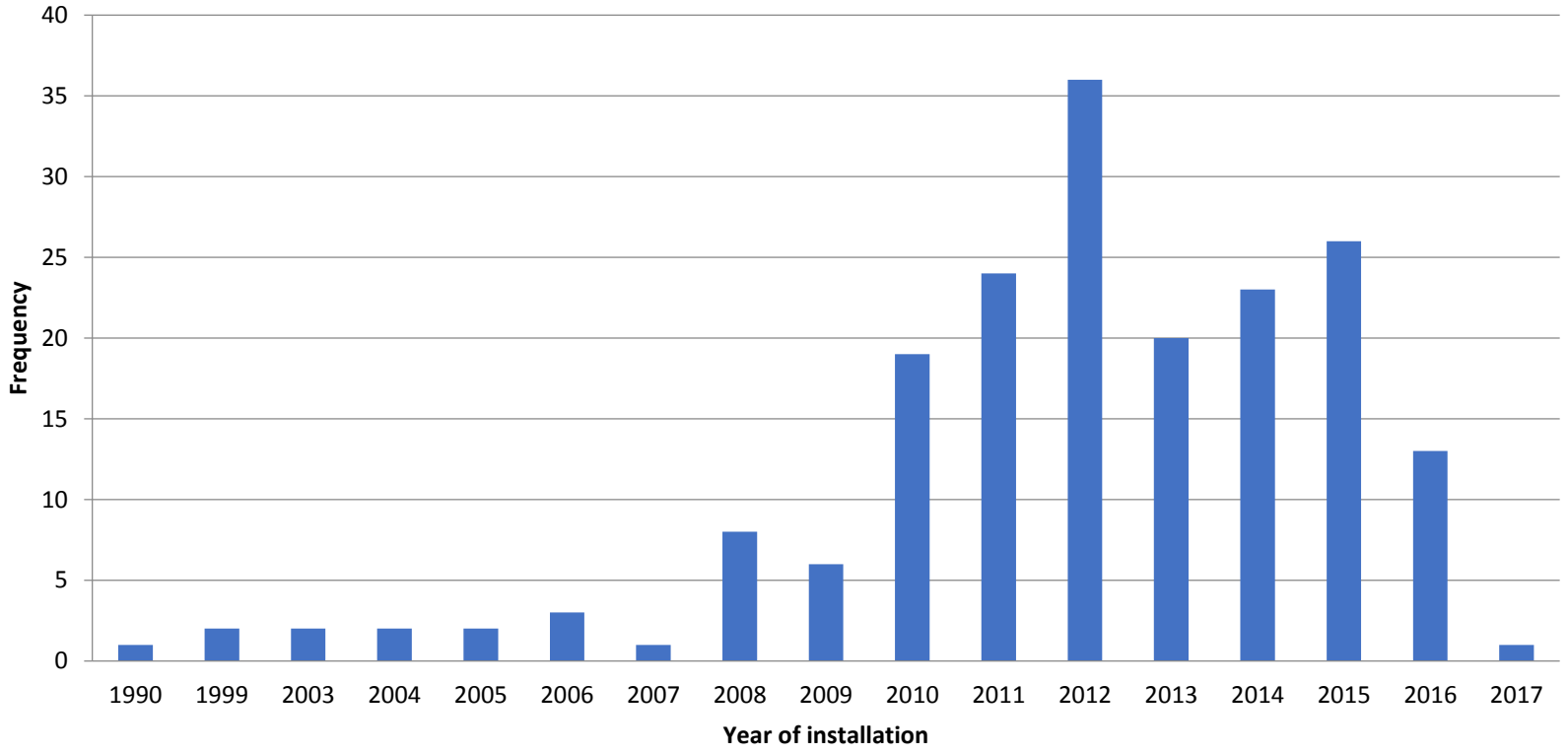
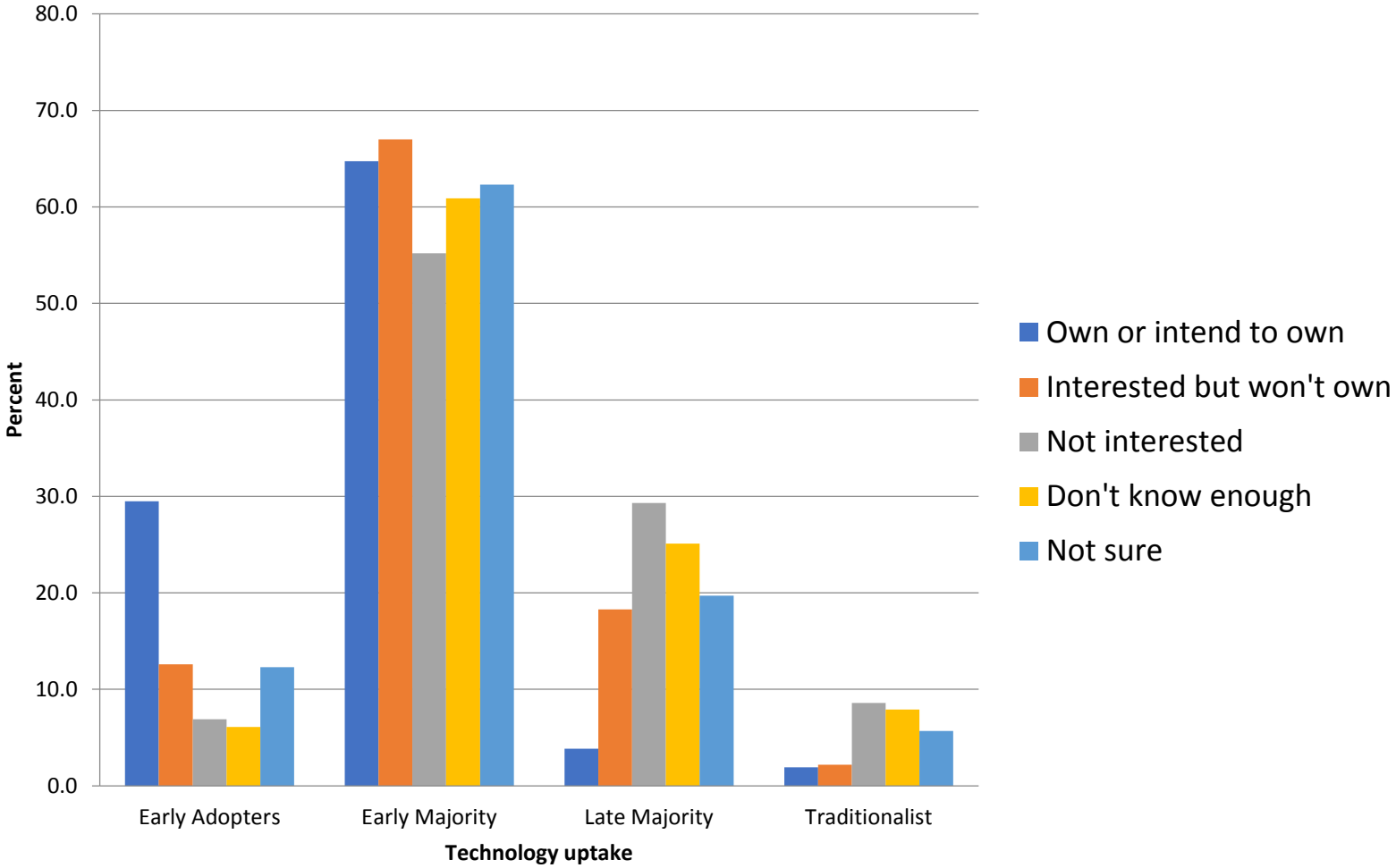
Key themes emerging

- concerns in relation to the use of storage (N=106)
- the market (N=64)
- social factors (N=52)
- policy and regulation (N=54)
- information about different types (N=52)
- the role of government in the process (N=32).

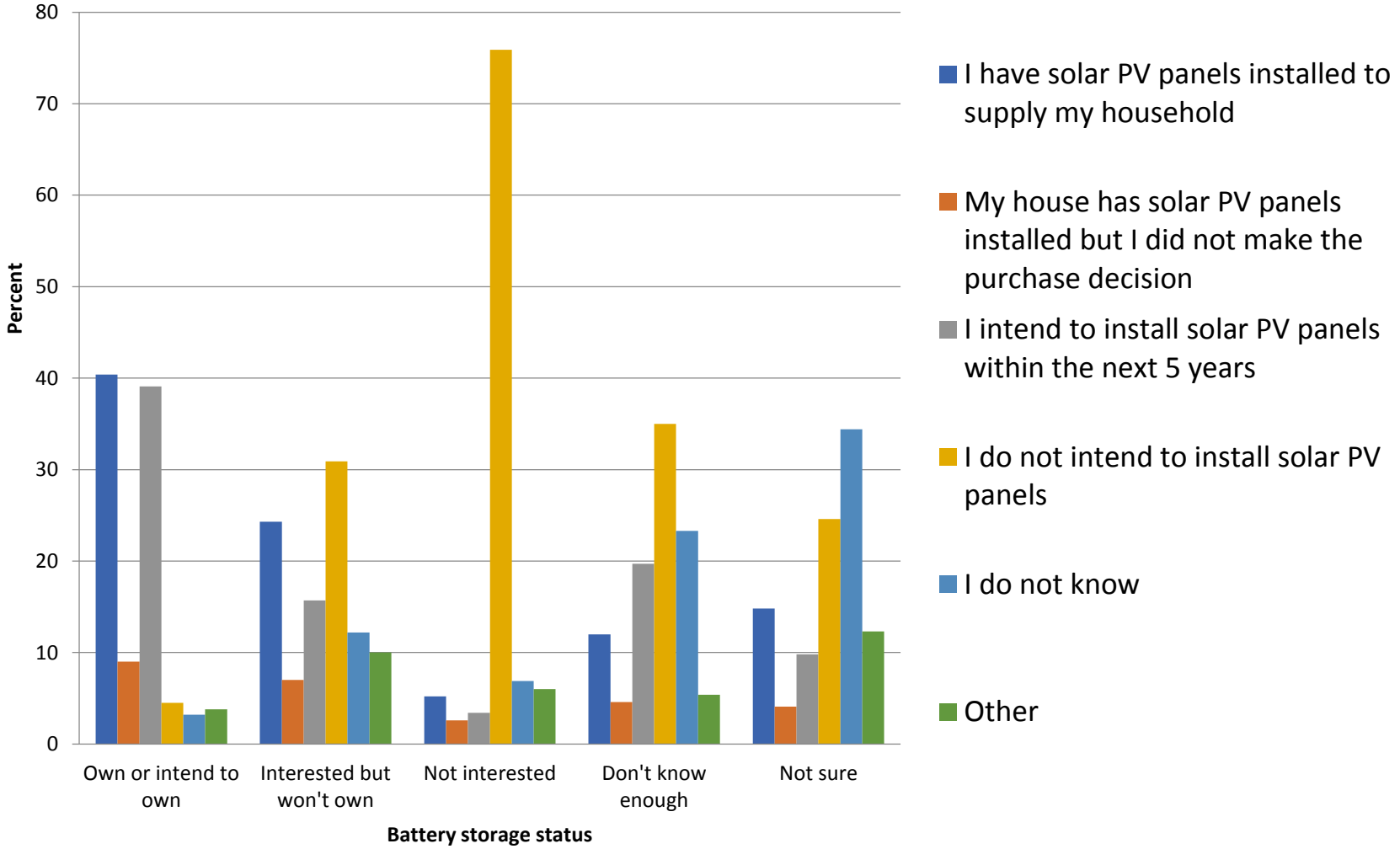
Solar PV purchase



Diffusion and uptake



PV and storage



Key Findings

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- Biggest concern for stakeholders is rising price of electricity
- Lack of trust in government and energy retailers overall – may push some to go off grid
- Storage not a well known concept, batteries most familiar because of Tesla and hype around this
- A number of safety concerns exist for batteries – need for regulation across this space
- Pumped hydro felt to be one of the cheapest options but need resource
- There are emerging business opportunities for various stakeholders at different scales

Case Study 2: Jayne & Cathy

Case Study 2: Jayne & Cathy

- Size: 6.6kw Solar with 32kW Lead-Gel Battery located in an insulated double car garage (former carport) and petrol generator as system backup
  - Grid connected but can operate off-grid.
  - Solar hot water with wood-fire backup as there is no gas within the area.
  - During summer the household air conditioning is used to cool the garage so that the batteries don't overheat.
- Motivation: Mainly due to too many grid drop-outs (Single Wire Earth Return line issues). Also wanted to be more self-more sufficient, mitigate against rising power costs into the future and some environmental considerations.

Case Study 2: Jayne & Cathy

- Finance: It was a very expensive experiment for them ($50k from their superannuation). But they found that using only the power they generated made them much more energy conscious.
- Choice: Battery selection came from extensive research. New technologies impressive but did not have the long term experience that lead had.

  Lead batteries have been around for 100 years, and everyone knows how they work.

- Did not like salt based batteries as they did not have the load characteristics required for their property.
- Lithium too expensive (twice as much as lead) and had too many many safety issues.


ARENA
Australian Government
Australian Renewable Energy Agency
EMC
ENERGY MADE CLEAN
synergy
lendlease
LANDCORP

Case Study 3: Alkimos Beach

Background:

1.1MWh Lithium Ion batteries in two shipping containers.

Residents are not physically connected to the battery.

Residents virtually deposit and withdraw credits from the battery through their excess rooftop solar production for $11/month.

Billing is settled at the end of the day, such that excess solar credits do not roll over, but is settled at the FiT rate (7.135c/kWh).

Where credits are exhausted residents are then put on a TOU tariff (47.85c/kWh) called *Peak Demand Saver Plan* (4pm-8pm) or 25.603c/kWh during any other part of the day.

Provides residents with a financial incentive to match their excess solar production during the day with evening electricity consumption.

Funding: $6.7mill in total

Case Study 3: Alkimos Beach

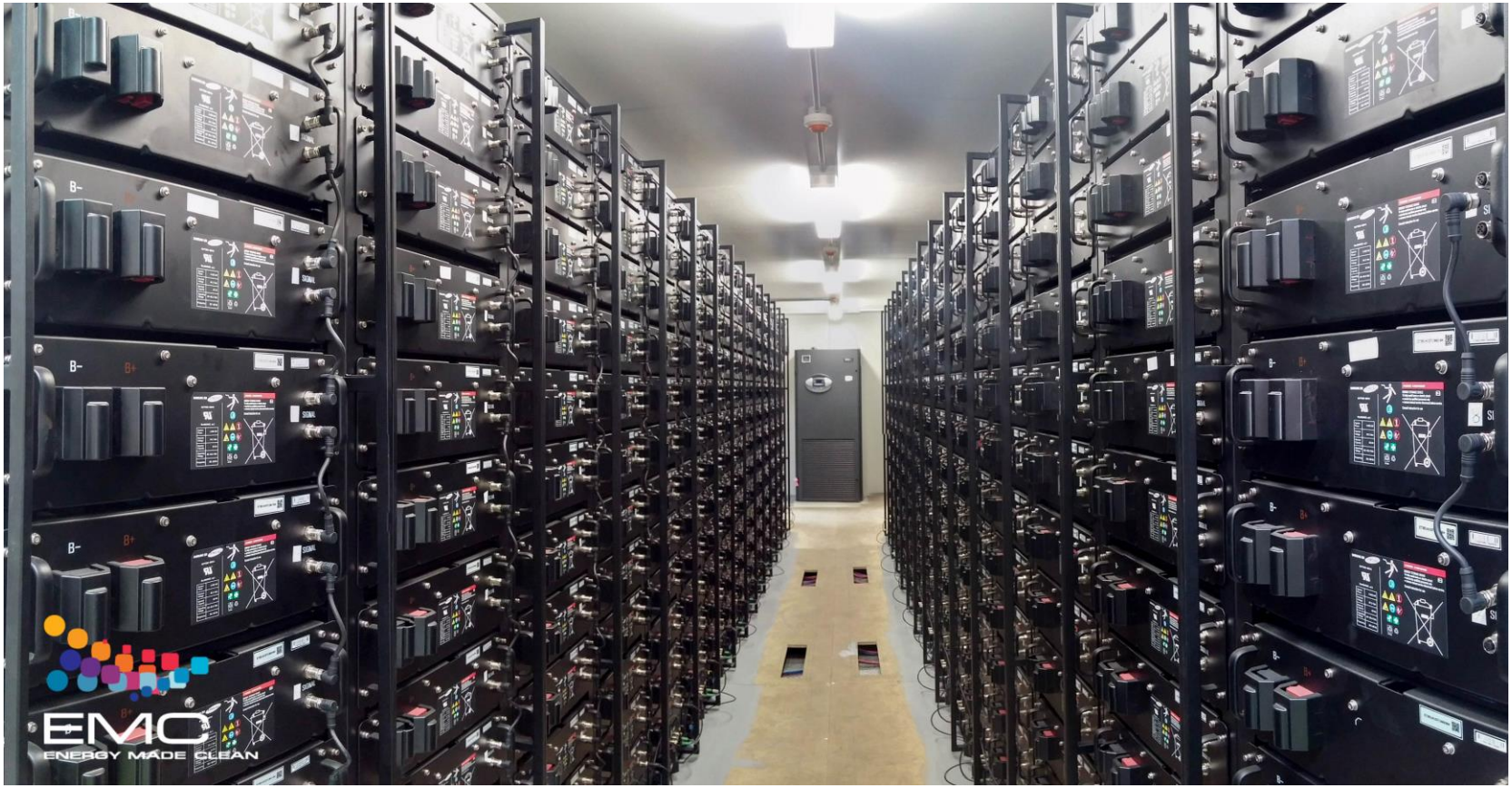
Cost saving was a significant factor in participating in the trial, we've been able to save 50% on our electricity bills. At the same time, we have learnt how to use our appliances around the new rules, because it's a little different now with a battery as opposed to before. But luckily for us, the big behaviour change was actually when we got the solar panels, with the battery you have a little bit more flexibility, but obviously you have to know how it works. It's not just set and forget, there are rules behind it, mostly coming from the power provider. Resident 01

Last winter we noticed that our electricity bill had gone up almost 80%. But we weren't surprised because we had noticed that our heating had gone up because of the long cold winter. It also rained a lot, so we were not producing a lot of solar unfortunately. But that's something you can't control. Other than that, we have been satisfied with the trial. Resident 02

That had a problem because multiple sub-divisions have no spare space, and don't forget that you're talking about something that looks like a sea container. And there's nowhere to put it, you're rapidly getting a NIMBY problem. ACOLA 015

…but where it really got interesting was how you attract the punters to sign up to this thing, because we could not get traction unless there was a demonstrated savings on peoples power bill. In other words, green fuzzy stuff doesn't cut it, unless you're really ideologically pre-disposed to it. ACOLA 015

Case Study 3: Alkimos Beach



References of interest

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