Wingecarribee SHIRE COUNCIL

Southern Highlands Future Forum

In partnership with

winzero
WINGECARRIBEE NET ZERO EMISSIONS

Bringing the energy experts to you

7 September Session 1 – 10:00am

Acknowledgement of Country

We acknowledge the traditional custodians of this land and pay respect to elders past, present and emerging of this land we now call the Wingecarribee Shire.

We recognise the continuous and deep connection for Gundungurra and Tharawal people to their country and its great cultural significance to first nations people both locally and in the region.

Cultural Burn - Gibbergunyah

Disclaimer

The information and opinions shared by the speakers of the Southern Highlands Future Forum are those of the participants and do not necessarily reflect the views or positions of Wingecarribee Shire Council. It is important that each of you continue your educational journey and do your own research following this event.

Session 1 – 7 Sept 10:00am-12:00pm

The Energy Industry – What is happening globally, locally, and what savings can be made

Ty Christopher
Director Energy Futures Network
University of Wollongong

Adam Corrigan
Founder
Your Energy Friend

James Hazelton
Manager Future Energy Strategy
Endeavour Energy

Miles Lochhead
Sharing his journey as an early adopter

Ty Christopher

Director Energy Futures Network
University of Wollongong

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University of Wollongong Energy Futures Network

Provides a trusted voice to inform Government, Utilities, Regulators, Industry and communities with well-designed strategies based on data and evidence.

We have brought together a University-wide network of energy researchers who meet regularly to coordinate their activities to create a holistic energy research environment.

Tackling the big issues in clean energy with coordinated Technical, Economic and Social research.

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An inclusive clean energy future

UOW is optimistic that our region's capabilities will parallel the success of Pittsburgh, a former steel city that has undergone a dramatic environmental transformation and technological makeover, earning its reputation as one of America's "most liveable" cities.

- We are working with our industry partners and communities to establish a centre of excellence in clean energy transformation. The establishment of a Hydrogen Hub at Port Kembla, Wollongong, and the declaration of a Renewable Energy Zone in the Illawarra create an unprecedented opportunity for the region.
- Questions to be considered include:
  - **What do consumers need and want from their energy?**
  - **How do we align consumer needs with technology and the economy to create an inclusive energy future?**
  - **How do we provide the workforce of the future and transition existing workforces into the clean energy sector?**


Artificial intelligence
UOW CENTRE FOR ARTIFICIAL INTELLIGENCE
Decarbonisation of networks
FUTURE FUELS COOPERATIVE RESEARCH CENTRE (FUTURE FUELS CRC)
Economic impacts
UOW FACULTY OF BUSINESS AND LAW
UOW Energy Futures Network
Future grids
ENERGY FUTURES SKILLS CENTRE
ARC TRAINING CENTRE IN ENERGY TECHNOLOGIES FOR FUTURE GRIDS
Infrastructure planning
SMART INFRASTRUCTURE FACILITY
Battery design and management
AUSTRALIAN INSTITUTE FOR INNOVATIVE MATERIALS (AIIM)
Power systems
AUSTRALIAN POWER QUALITY AND RELIABILITY CENTRE (APQRC)
SUSTAINABLE BUILDINGS RESEARCH CENTRE (SBRC)
Social impacts - net community benefit and consumer behaviour
UOW FACULTY OF BUSINESS AND LAW
UOW FACULTY OF THE ARTS AND SOCIAL SCIENCE
AUSTRALIAN CENTRE FOR CULTURE, ENVIRONMENT, SOCIETY AND SPACE (ACCESS)

Energy Futures Skills Centre

Designing and delivering courses to train and re-skill the clean energy and clean manufacturing workforce of the future

Courses jointly designed by UOW and TAFE NSW to train the energy workforce of the future, as well as transition programs to re-train existing highly skilled people, equipping them for careers in the clean energy and clean manufacturing industries

Engaging communities in the development and implementation of an equitable energy future

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Energy Grids 101

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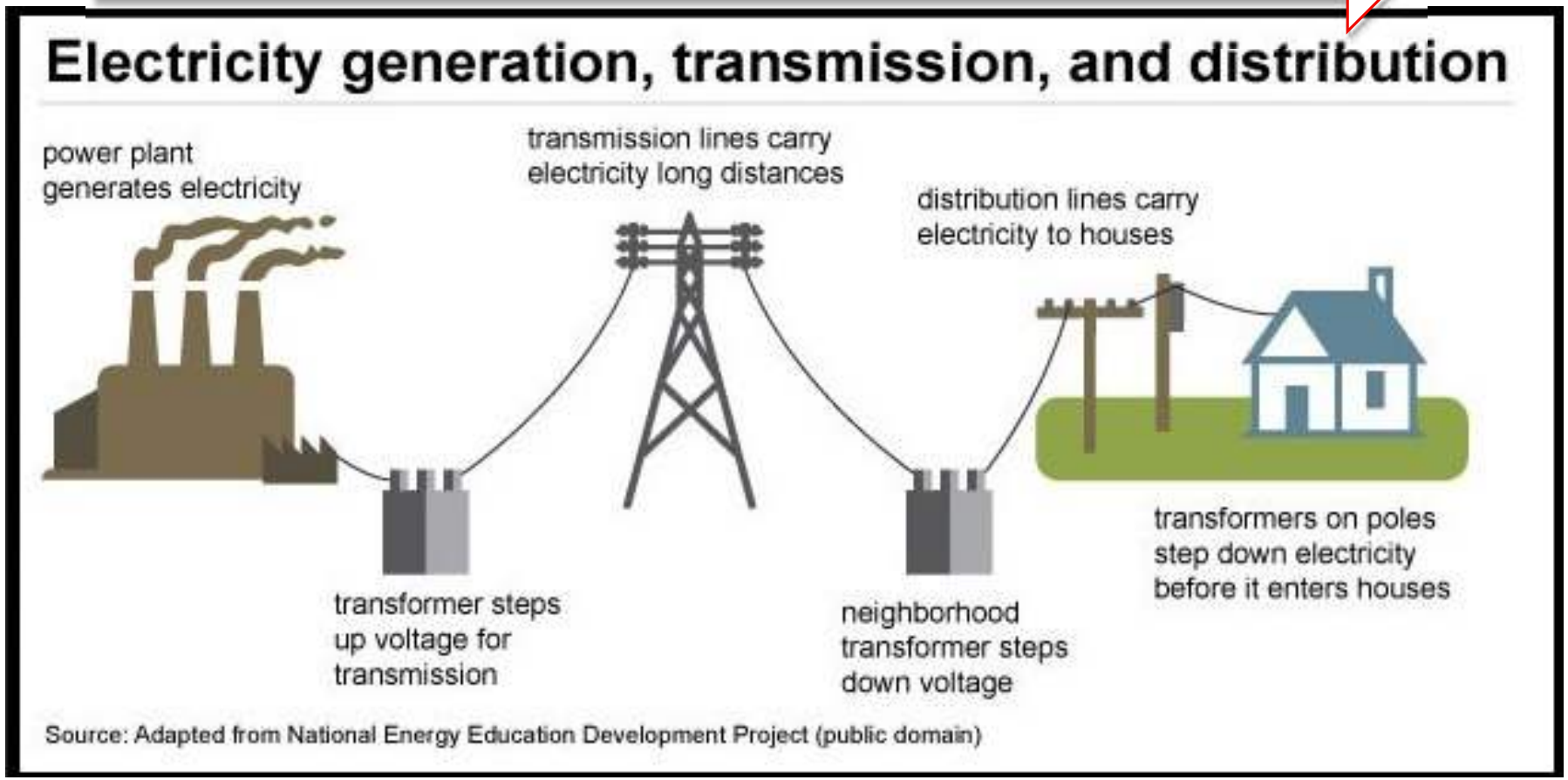
Traditional Electricity Grid

One-way power flow and "big grid", centralised control

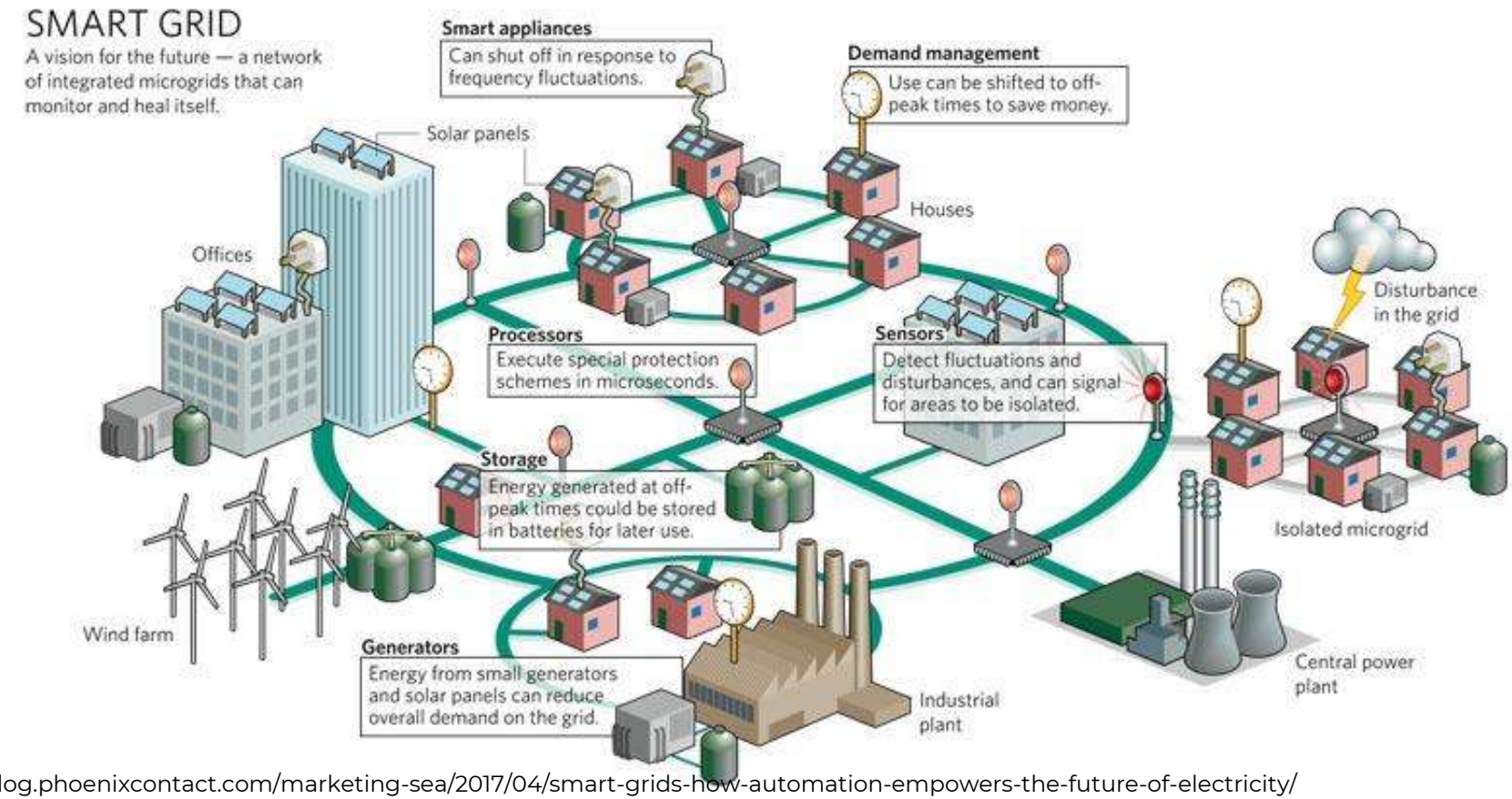
Power flow



The modern electricity grid – multi-way power flows

"Big Grid" plus "Small Grid" operation – a decentralised system

Power flow



Source: https://blog.phoenixcontact.com/marketing-sea/2017/04/smart-grids-how-automation-empowers-the-future-of-electricity/

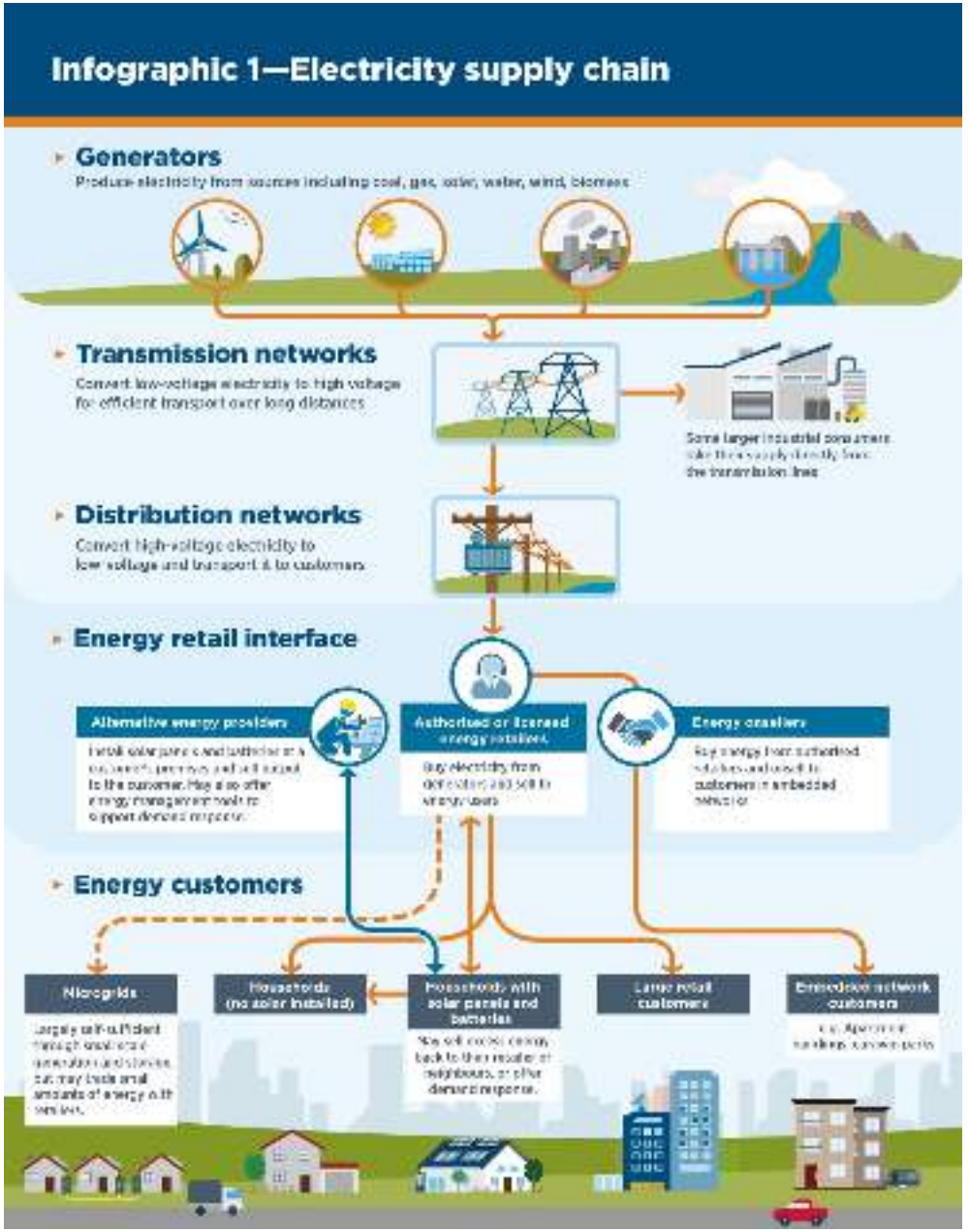
The National Electricity Market (NEM) a “big grid” model

Generators and retailers operate in a “**market**”

Transmission and Distribution Networks (TNSP’s and DNSP’s) are **monopolies** regulated by the Australian Energy Regulator

Illegal to be a TNSP/DNSP AND a Generator or Retailer

Legal to be a Generator AND a Retailer – i.e. a “Gentailer”

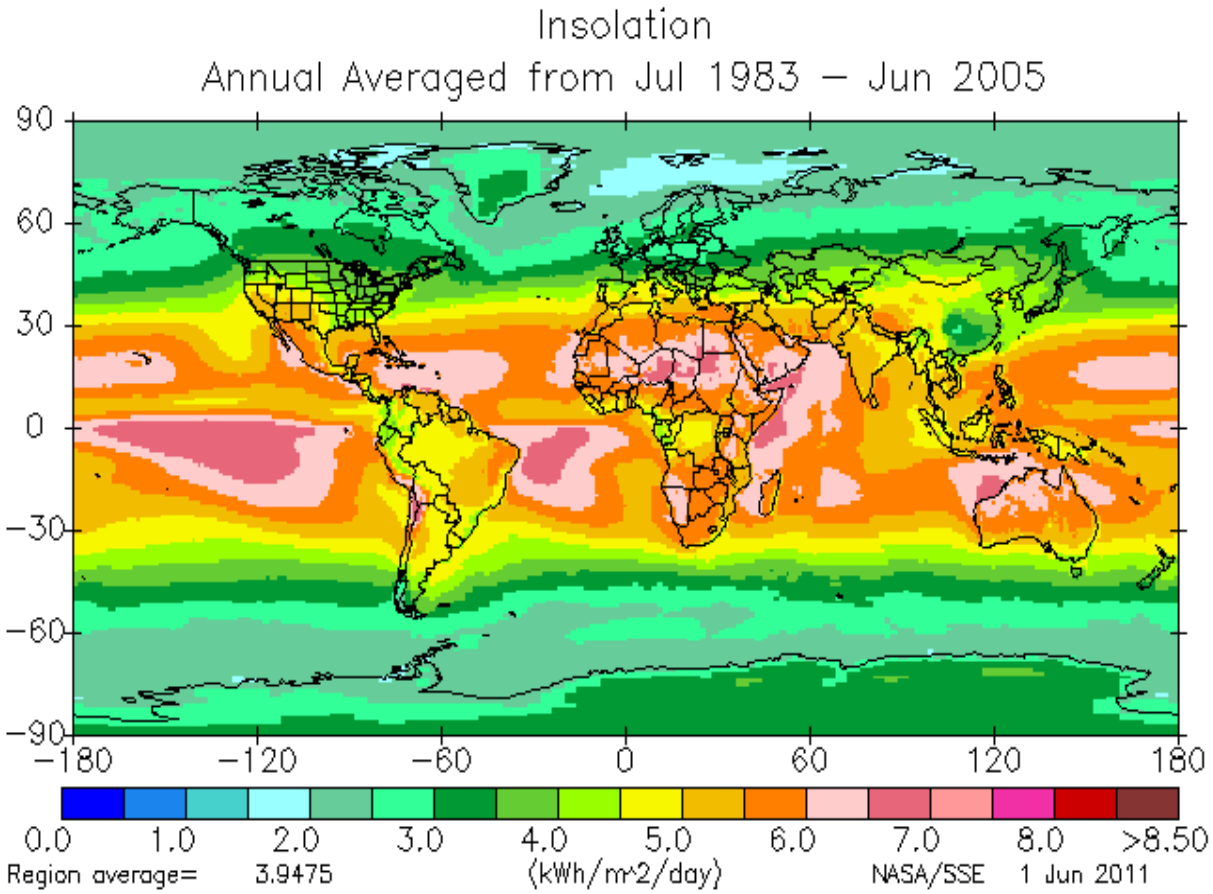


Source: https://www.aer.gov.au/publications/state-of-the-energy-market-reports/state-of-the-energy-market-2018-data-maps-and-graphics

NEM facts and figures

- Largest coal fired power plant is Eraring = 2.9 GW
- Large scale solar farms = 10 GW
- Solar on homes = 23 GW
- We are now running the electricity grid ’backwards’ on most days when the sun is shining
- The result is many of the rules and regulations which control the electricity grid are now also ‘backwards’ in terms of relevance

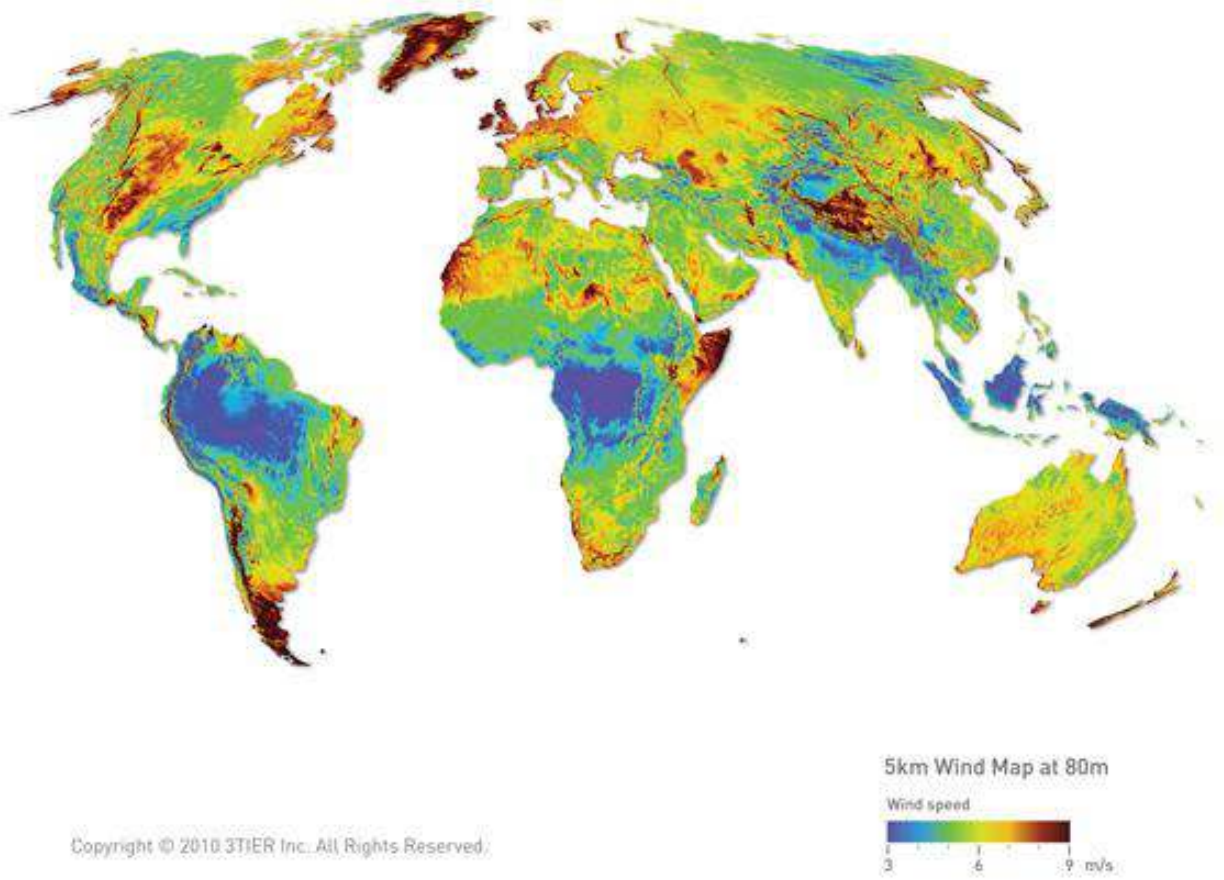
Solar Energy Resource



(NASA Atmospheric Science Data Center, *NASA Surface meteorology and Solar Energy: Global/Regional Data*)

Wind Energy

Available wind energy - globally



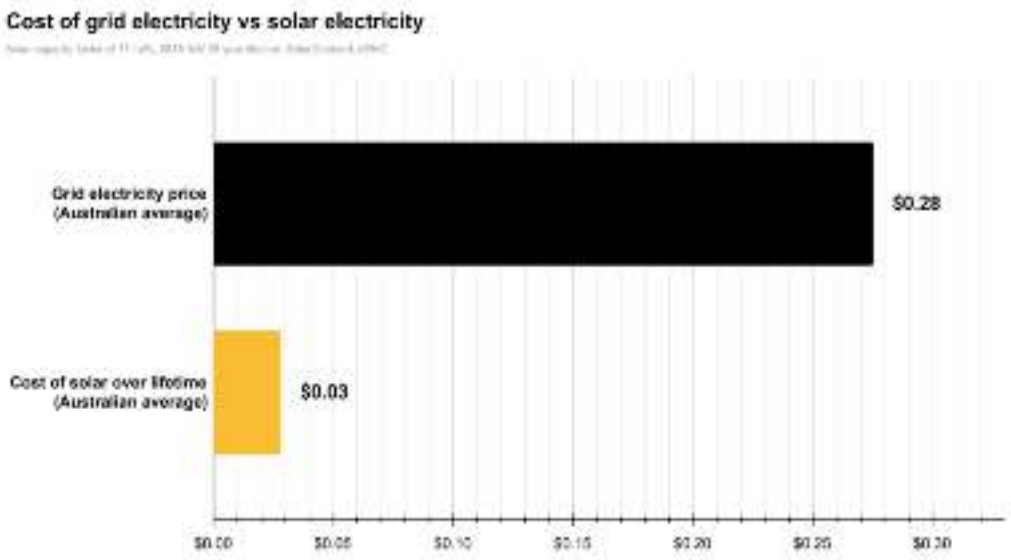
(http://www.windpoweringamerica.gov/windmaps, accessed February 2012)

Rewiring Australia on the benefits of solar

Luckily in Australia we have access to the **cheapest home energy in the world - our rooftop solar**. We are the sunburnt country after all.

Over its lifetime rooftop solar costs about 3 cents per kWh, cheaper than any other source of home energy. Combined with a home or community battery it's still cheaper than the grid. When the grid becomes renewable you can use it for backup too, but the cheapest energy will always come from your roof.

Next slide



Source: https://www.rewiringaustralia.org

Rewiring Australia on the benefits of solar

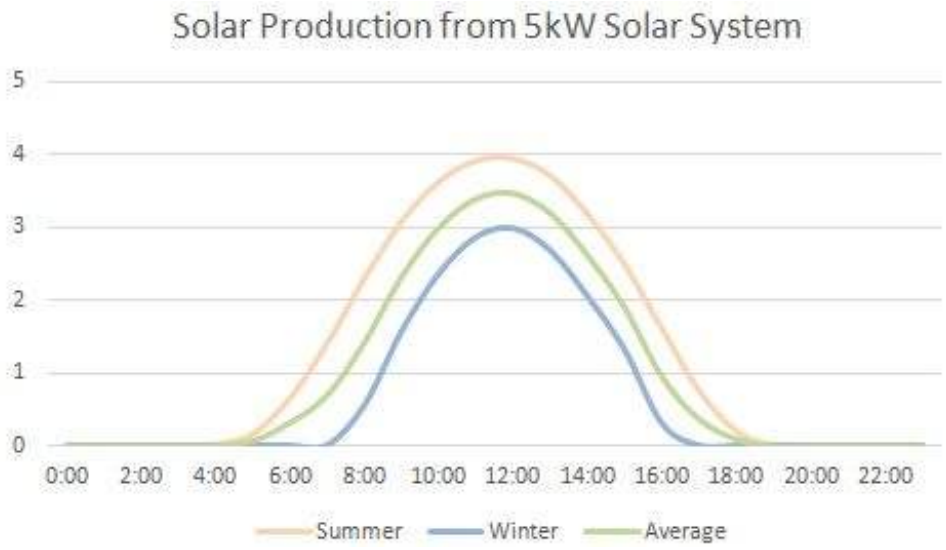
Australian rooftop solar is so cheap that **even a magic power plant providing free energy wouldn't beat it.**

The cost of sending that energy over powerlines alone is more than the cost of the energy that comes from your roof. The best option is to power as much of your home off solar as you can.

Next slide

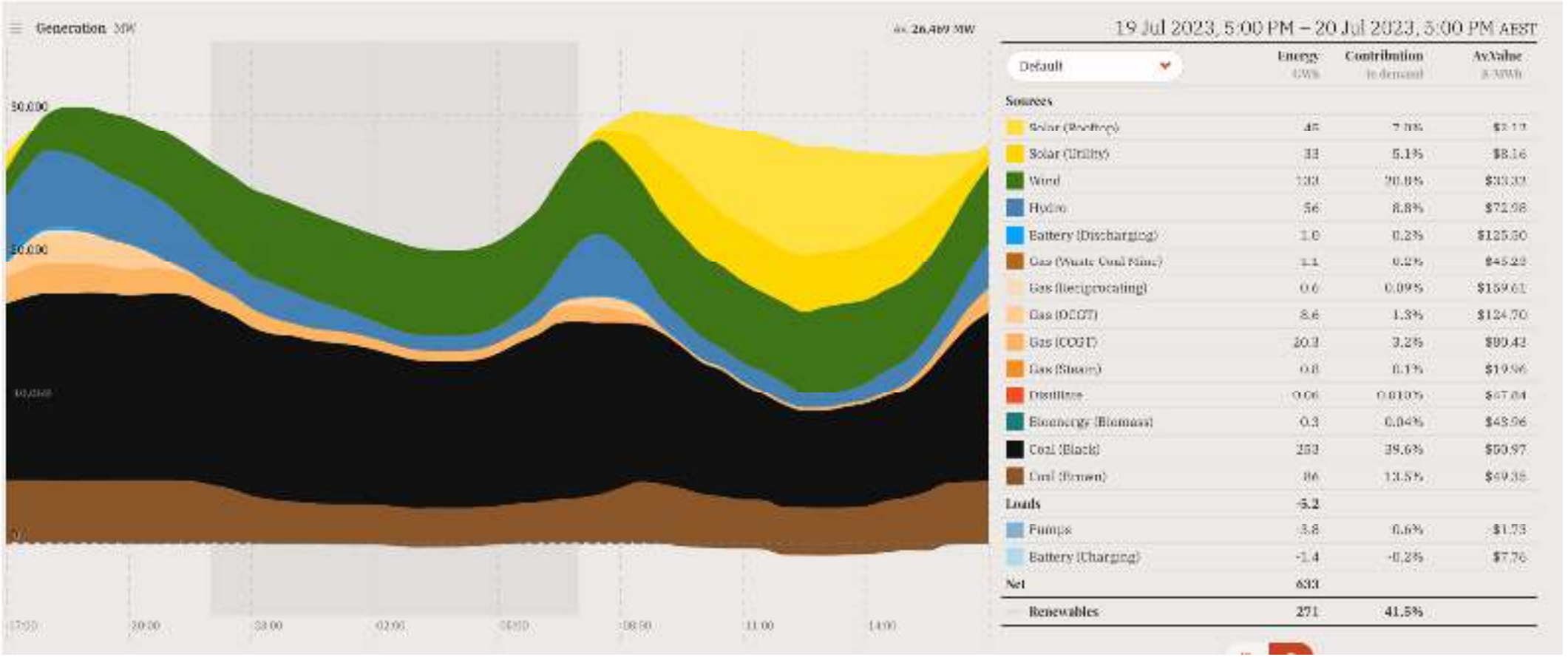
Source: https://www.rewiringaustralia.org

Solar is great, until the sun goes down



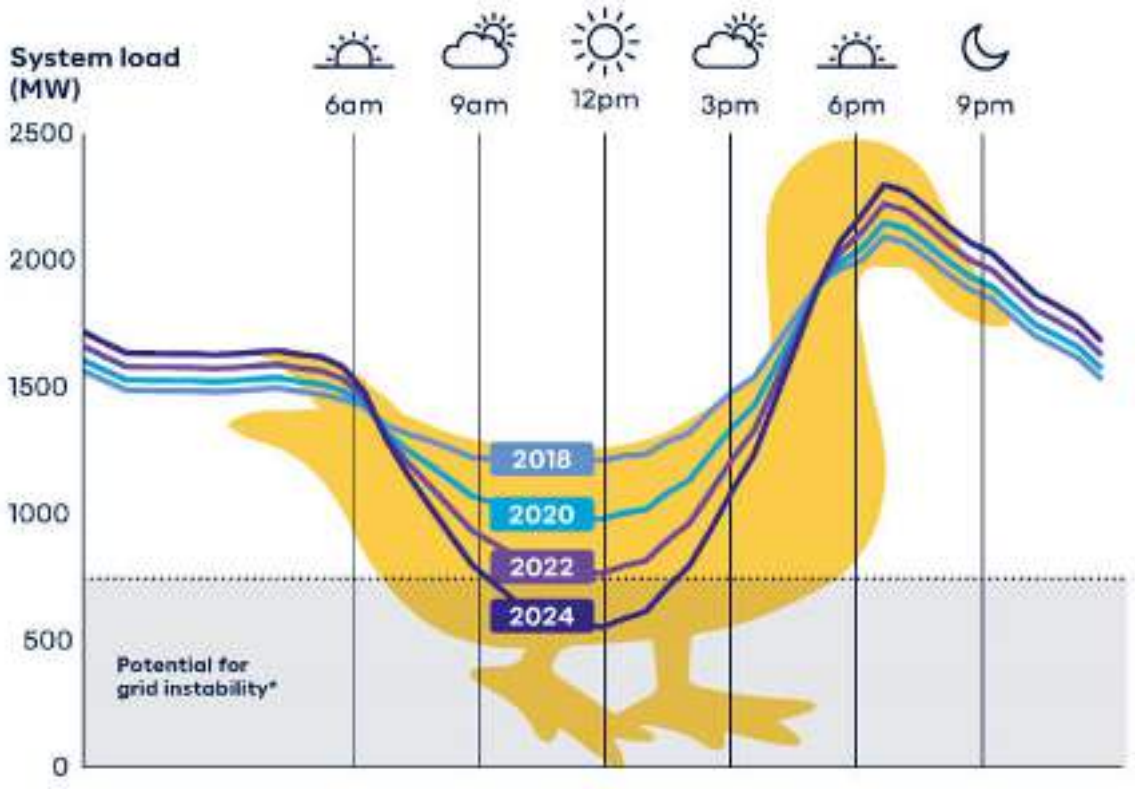
- Storage is needed to extend solar into the evening peak demand period and beyond

NEM load/generation sources



Source: https://opennem.org.au/energy/nem/?range=7d&interval=30m

The Duck Curve - Physics



Intraday wholesale Pricing by State - economics

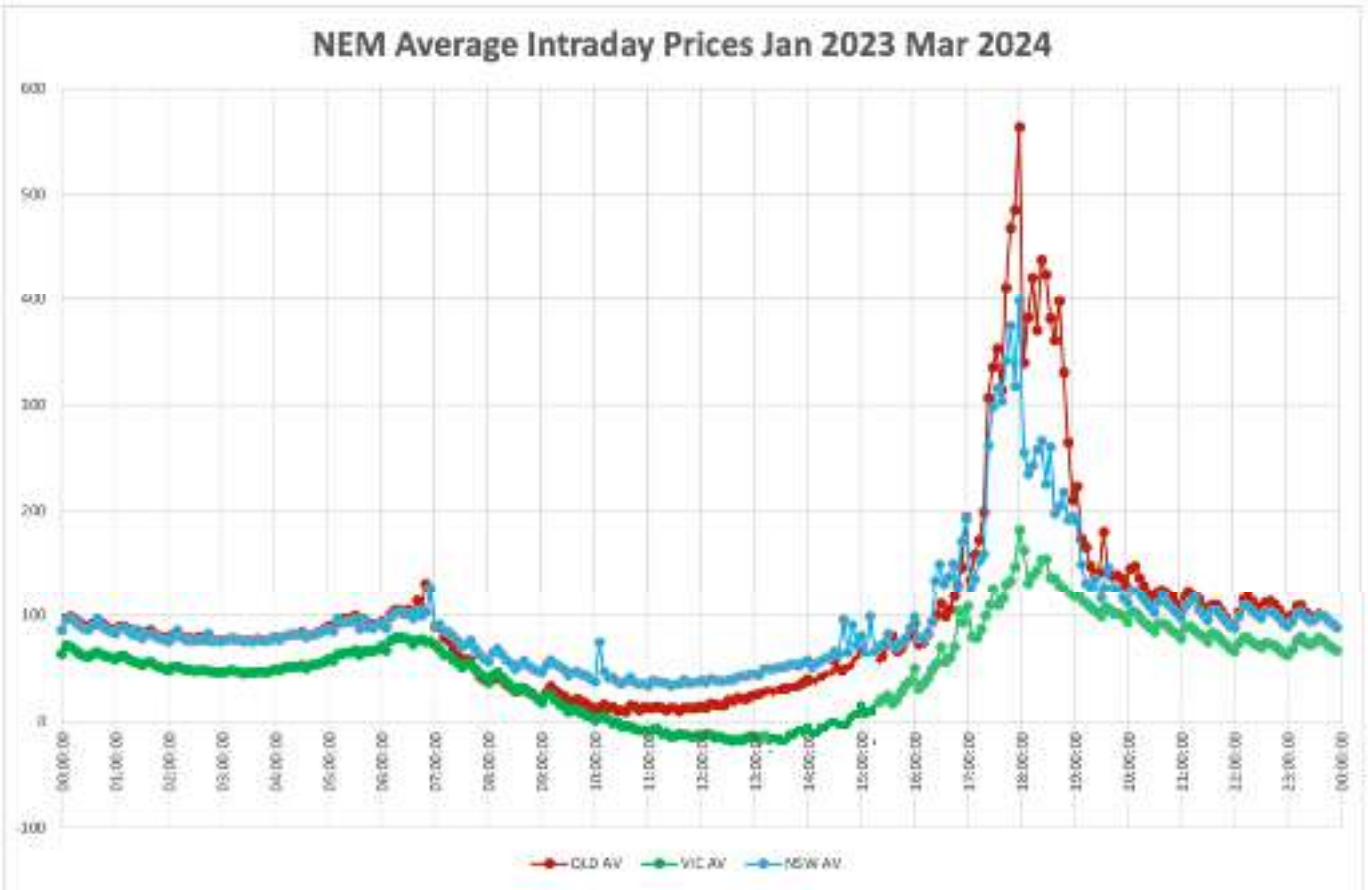
"Average" wholesale prices may be falling, but no fall in evening peak

Daytime prices become lower each year

This "duck curve" will get more extreme:

- ongoing rooftop solar PV proliferation depresses daytime prices
- retirement of coal-fired generation drives evening peaks

- charging (filling) batteries during the day when electricity is almost free and then discharging (emptying) the batteries in the evening = $$$$$



Offshore wind energy

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Capacity factors

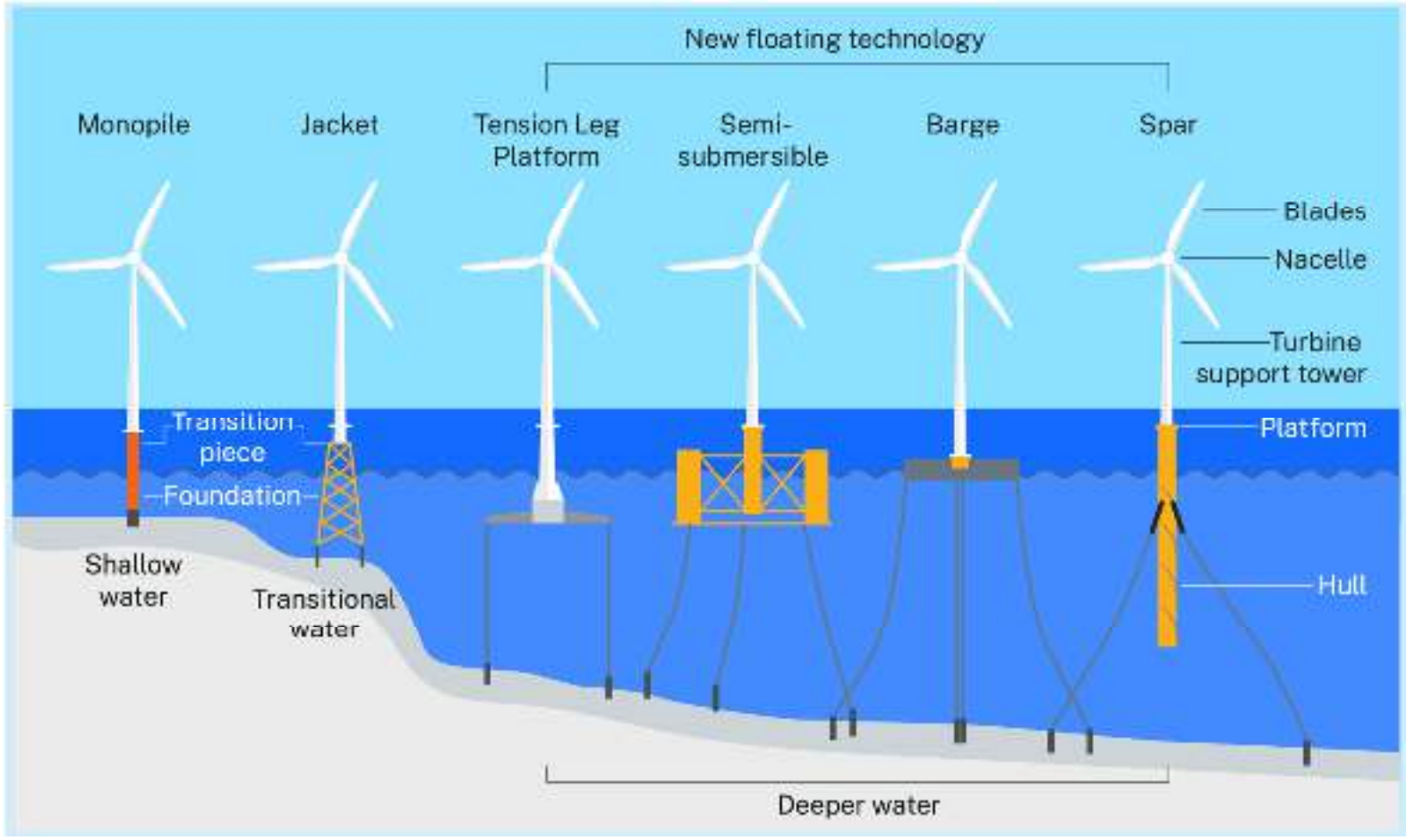
Capacity Factor = total amount of energy produced during a period of time / the amount of energy the plant would have produced at full capacity.

On Shore wind capacity factor 30-35%

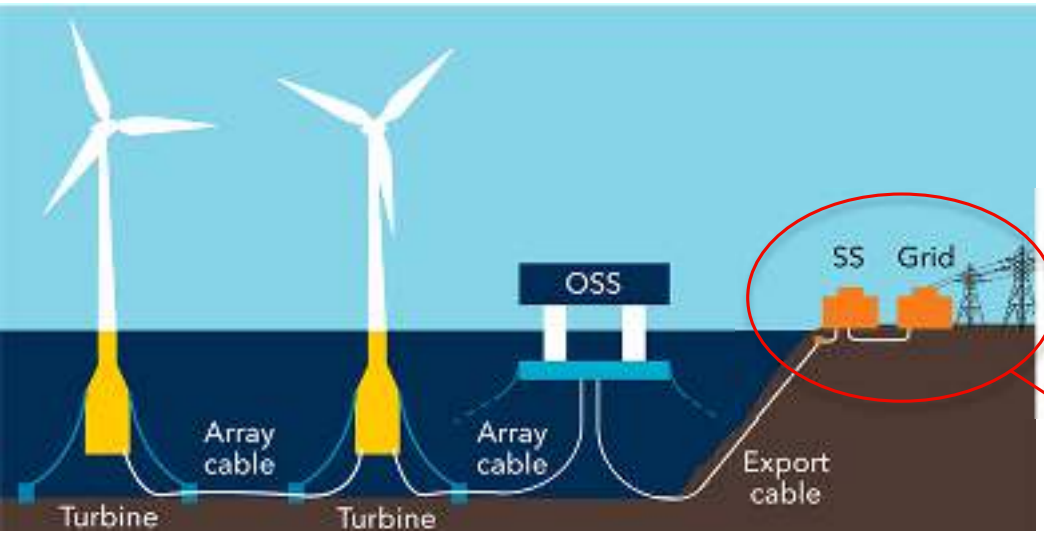
Off Shore wind capacity factor 45-55%

Offshore wind energy behaves like ‘traditional’ base load generation (Coal = 65%)

Offshore Wind Energy Technologies



Offshore Wind Energy = Substantial Onshore Infrastructure

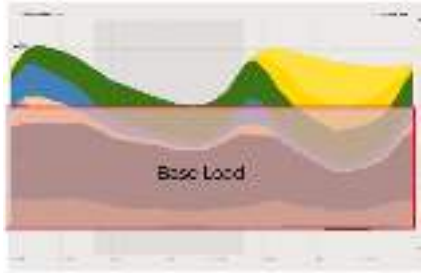


The bottom line…..

Offshore wind energy is important because it delivers:

1. Scale: Multi-Gigawatt size generation

2. Availability: High capacity factor



3. Proximity: Close to where energy is used

Hydrogen

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Hydrogen primary colours

Hydrogen is the most abundant element in the known universe. It has no colour in nature, but...

Green hydrogen

- Most commonly produced using an electrolyser which splits water into hydrogen and oxygen. If the electricity that powers the electrolyser comes from renewable sources, such as wind, solar, then we produce green hydrogen. There are also pathways to produce green hydrogen from waste biomass.

Blue hydrogen

- Produced using a process called ‘steam reforming’, which uses steam to separate hydrogen from natural gas. This produces significant CO2 as a by product, but carbon capture and storage technologies capture and store those emissions.

Grey hydrogen

- Also extracted from natural gas using steam reforming but in this case the CO2 by products are released into the atmosphere.

Brown and black hydrogen

- Brown hydrogen (made from brown coal) and black hydrogen (made from black coal) are produced via gasification. It's an established process used in many industries that converts carbon-rich materials into hydrogen and carbon dioxide. As a result, gasification releases those by-products into the atmosphere.

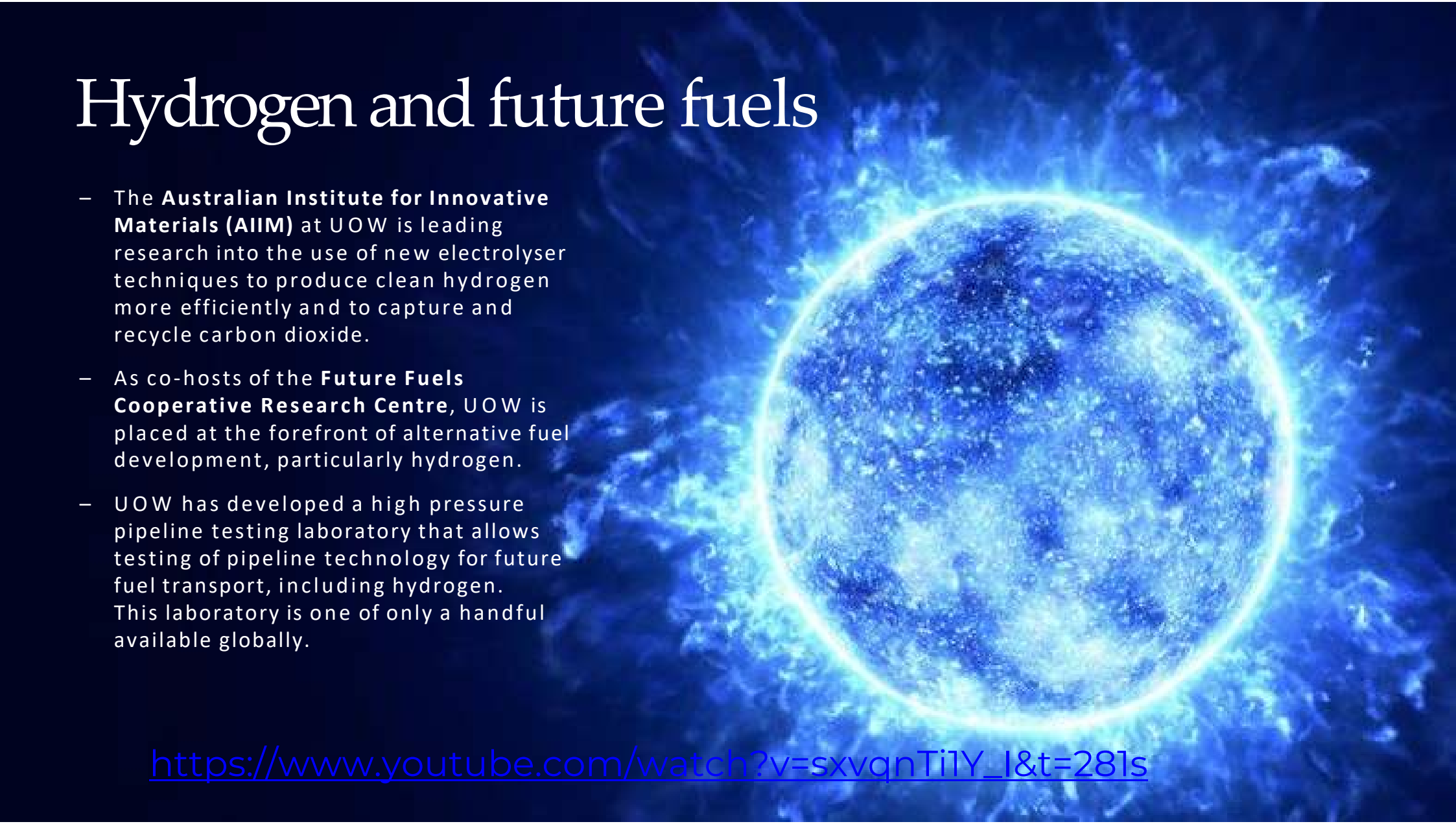
Hydrogen uses

Heavy Transport and Industry

- Trucks and Buses
- Trains
- Iron making
- Global Shipping
- Fertiliser manufacture
- Ammonia Production

Hydrogen and future fuels

- The **Australian Institute for Innovative Materials (AIIM)** at UOW is leading research into the use of new electrolyser techniques to produce clean hydrogen more efficiently and to capture and recycle carbon dioxide.
- As co-hosts of the **Future Fuels Cooperative Research Centre**, UOW is placed at the forefront of alternative fuel development, particularly hydrogen.
- UOW has developed a high pressure pipeline testing laboratory that allows testing of pipeline technology for future fuel transport, including hydrogen. This laboratory is one of only a handful available globally.



https://www.youtube.com/watch?v=sxvqnTi1Y_I&t=281s

Energy Storage

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Energy storage is the key to unlocking a decarbonised grid

Storage is needed across varying time frames

Short duration – Home batteries

- Store energy from rooftop panels for use later in the day after sunset
- High capital cost
- Can store about 2-3 hours worth of energy for the average home
- Generally only the battery owner can use the energy in the battery

Energy storage is the key to unlocking a decarbonised grid

Storage is needed across varying time frames

Medium duration – Community batteries, smaller grid batteries

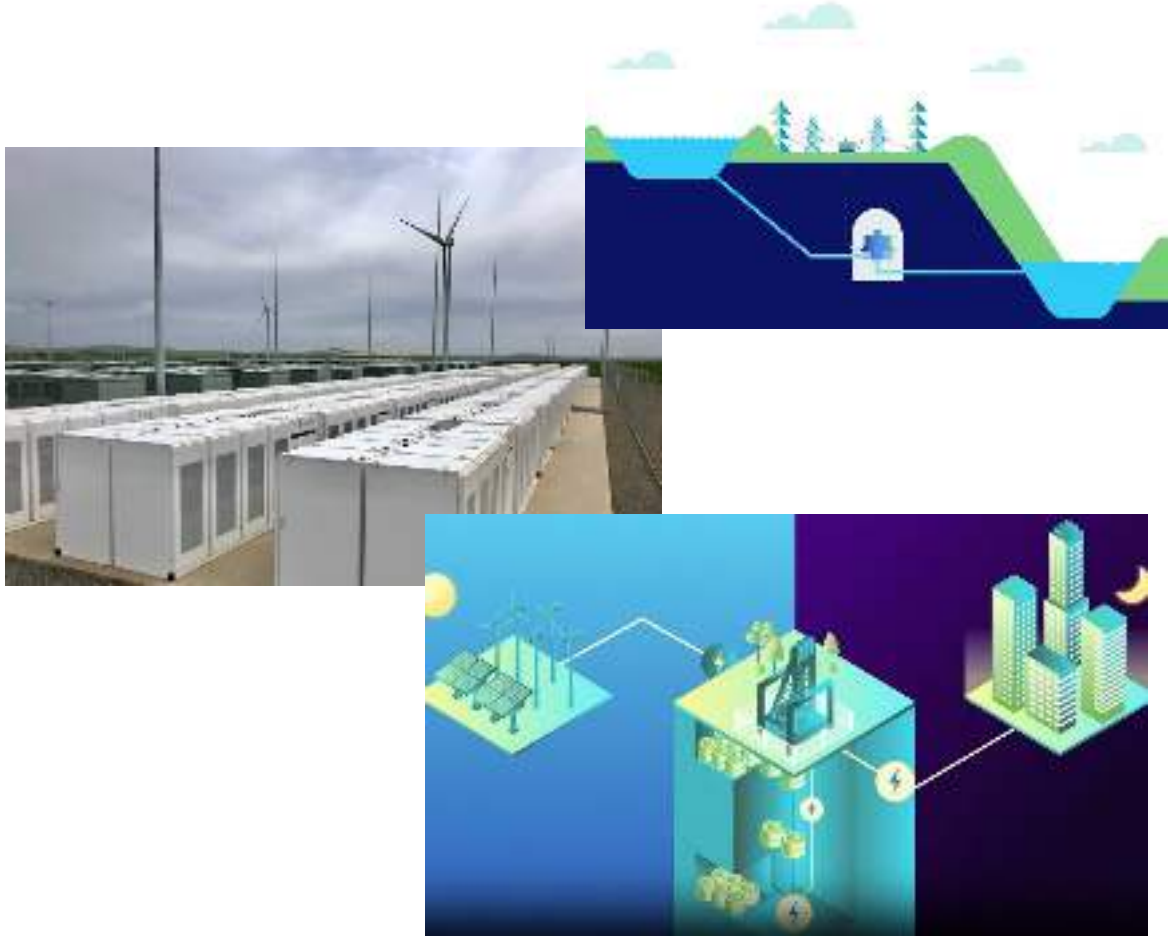
- Store energy from multiple homes for use later in the day after sunset
- Lower capital cost
- Can store about 3-6 hours worth of energy for the average street
- Allow energy consumers such as renters and lower income households to access locally generated clean electricity

Energy storage is the key to unlocking a decarbonised grid

Storage is needed across varying time frames

Long duration – gravity based storage, largest scale grid batteries

- Store energy from large scale solar farms, and wind farms for use later in the day after sunset or for wholesale energy trading
- High capital cost
- Can store about 6-12 hours worth of energy
- Mainly focused on delivering commercial outcomes for energy generation companies and grid support for the main grid.



Nuclear Energy

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Nuclear Energy in Australia

Advantages	Issues
Low carbon source of abundant energy	Social engagement/opposition in principle
Australia has substantial Uranium resources	Disposal of nuclear waste
Long life infrastructure	Costly to implement
New industry for Australia, potential for high tech employment	Significant legislative and legal framework change needed
Latest Generation Small Modular reactors have a small foot print	Long time to deploy starting from where we are (15 years plus)
Provides 24/7 base load generation	Not a complete solution to decarbonizing – will still need solar, wind and storage
Maximises utility of existing transmission grid	

Nuclear By Numbers

Too Late

- Minimum time to commission ONE nuclear reactor in Australia is 20 years.
- Coal retirement over the next 10 years.
- Where will we obtain our electricity from for the 10 years in between?

Too Small ?

- Eraring Coal fired power plant is 2.88 GW
- Small Modular reactors are 0.3 GW in size
- 2.88/0.3 = 10 SMR's needed just to replace Eraring!
- Large reactors are ~1.6 GW in size, will need many of them to replace Coal fired plants

Too Expensive

- Cost of onshore wind energy is $3000/kW
- Cost of Offshore wind energy is $6,500/kW
- Cost of Nuclear energy is $28,000/kW = 4 times more than the next most expensive option!

Sources: International Atomic Energy Agency, GenCost report, CSIRO

Questions?

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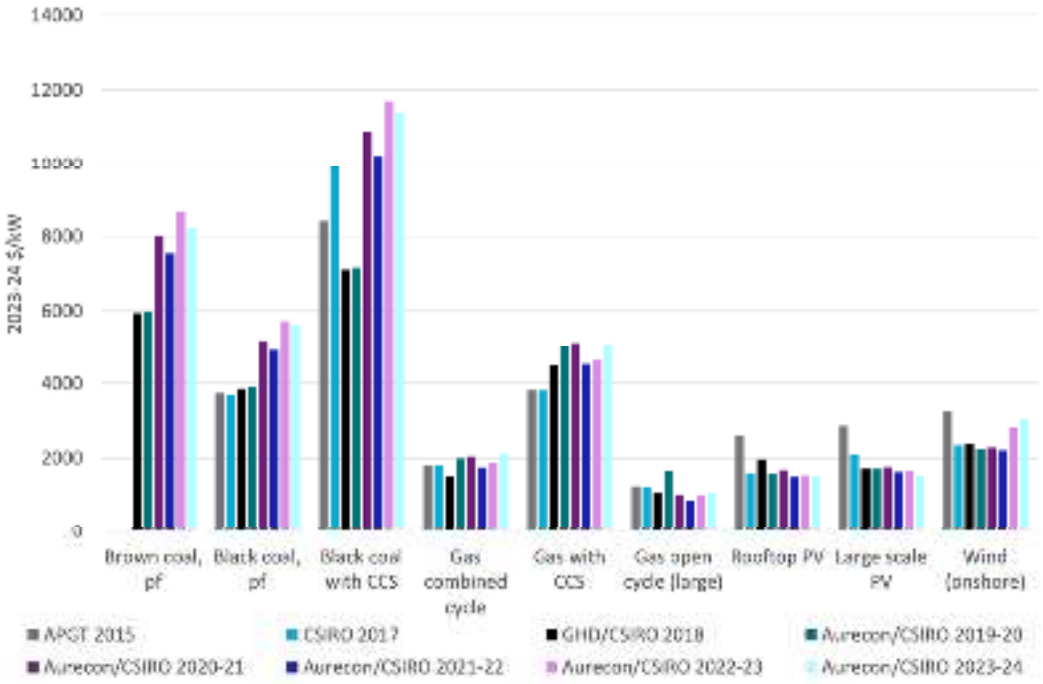
How do the costs stack up?



Cost component	Fixed offshore wind ($/kW)	Floating offshore wind ($/kW)
Foundation	597	2393
Remainder of cost	4065	4065
Total cost	4662	6459

Source: GenCost 2023-24 Consultation draft

What about the revenue?

- From Gencost report, present value cost to establish and maintain a 4.2 GW offshore wind energy farm in the Illawarra is approximately $26 billion

- From National Electricity Market (NEM) data, wholesale present value of energy produced by such an offshore wind farm is $29 billion

- From National Electricity Market (NEM) data, retail present value of energy produced by such an offshore wind farm is $66 billion

- The bottom line: Invest $26 billion for a return of up to $66 billion – this stacks up!

Marine environment impacts

PLEASE look here: https://www.uow.edu.au/ancors/blue-energy-futures-lab/frequently-asked-questions/

Potential positive and negative impacts are summarised in this illustration.

This figure shows the risks (habitat loss and avoidance behaviours for animals, sea surface disturbance for boats, underwater noise, vibrations and turbidity, distribution of invasive species, electromagnetic fields and seafloor disturbance) and the opportunities (food availability increase and roosting opportunities for birds, for under water life it could offer size and age increase, refuge area, increased reproductive success, nutrients and organics matter increase, introduction of desired species, habitat gain, food availability increase, biodiversity increase, abundance increase) around the off shore wind turbines.

Source: NORTH SEA FOUNDATION, 2022. Roll out wind at sea with respect for nature.

Whales

There are high levels of community concerns about the impacts of offshore wind farms on migratory whale species, including humpbacks and the endangered Southern Right Whale. In Australia whales are protected under the *Environment Protection and Biodiversity Conservation Act 1999* and therefore thorough consideration and mitigation of the impact on whales will need to be undertaken by developers in the completion of an Environmental Impact Statement.

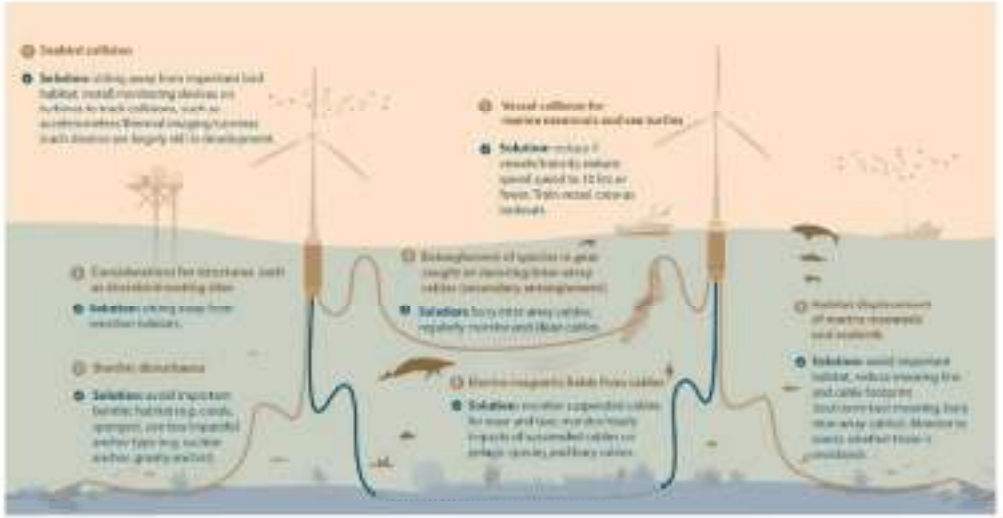


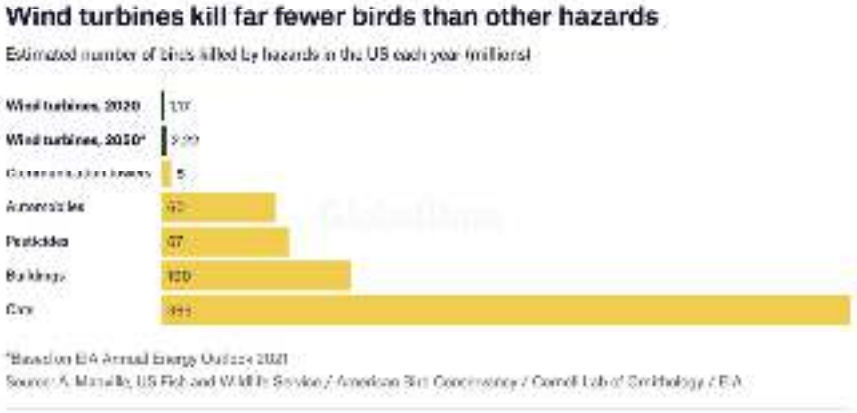
Figure 3: *Illustration of the potential impacts posed by floating offshore wind and potential solutions* (Maxwell et al. 2022).

Birds

The existing literature commonly reports that marine mammals (including whales), and seabirds may be negatively impacted by offshore wind developments. Negative impacts include disturbance and risk of collision with turbines and vessels servicing the windfarms, habitat alterations, as well as cascading effects if prey abundance is affected by windfarms.

Yet there may also benefit for some seabirds as the offshore infrastructure can create shelter and resting spots for some species. It is also worth noting that other hazards are responsible for far more bird deaths. One study in the US estimated the rate of bird deaths per Gigawatt hour across a range of energy sources and concluded that fossil fuel and nuclear power were responsible for greater bird fatalities than wind power.

Initial baseline research is required to fully capture existing information on species movements and potential impacts of proposals. In particular any examination of impacts needs to be conducted in the context of broader population and ecosystem level impacts. For example, research is required to understand where local level displacement in migratory pathways has broader level implications for the population of a species overall. In addition, cumulative impacts of multiple stressors will need to be accounted for within Environmental Impact Assessment processes



Fish

Underwater structures associated with floating wind farms can be designed to create artificial reefs, attracting marine life and potentially create biodiversity offsets or benefits. There is also the potential of a FAD (Fish Aggregation Device) effect, concentrating fish, with the potential for 'spillover' into regions where they can be exploited. This may well benefit commercial and recreational fishers. Impacts on migratory species, such as tuna remain inconclusive.

Subsea cables will be required to transfer electricity onshore and will generate Electromagnetic Field (EMF) emissions. Many fishes, particularly elasmobranchs (sharks and their relatives), are sensitive to EMF and concerns have been raised about these emissions interfering with their detection of prey and navigation. However, a study undertaken in shallow coastal waters of NSW with high levels of EMF generated by shark repulsion devices failed to elicit effects on fishes, with the exception of the smallest of scales (cms). Accordingly, EMF impacts on marine biota will require closer investigation.

End of life management

- Local Cunningham member Alison Byrnes has stated in her submission to the offshore wind zone consultation:

“Any offshore wind generation proposal must include remediation at end of life provisions so that materials used are either reused or recycled once it has reached end of life.”

- The nascent nature of offshore wind energy technology means that there are few examples of end of life recycling of materials.

- It is up to use to hold the approving entities – the government – to the highest standards in this area.

Some general thoughts…

- Many offshore wind energy developers are offshore oil and gas extraction companies, as the offshore technologies are substantially the same.

- Significant environmental assessment and whole of asset life requirements are being placed on offshore wind energy projects (and rightly so). However, similar requirements have not been placed upon historical offshore fossil fuel extraction projects…..

    1. Are we, with the best of intentions, creating an imbalanced playing field which is working against renewable energy generation?

    2. Are we inadvertently making Renewables pay while giving fossil fuels an ongoing free pass?

    3. If today's requirements were placed upon fossil fuel extraction projects, would fossil fuels be as cheap as they are?

Questions?

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James Hazelton

Endeavour Energy

Manager Future Energy Strategy

Endeavour Energy

Endeavour Energy

Endeavour Energy Future Energy Update

Southern Highlands Future Forum

POWER together

Endeavour Energy

Acknowledgment of Country

Endeavour Energy acknowledges the Traditional Custodians of Country where we work — the people of the Dharug, Wiradjuri, Dharawal, Gundungurra and Yuin nations.

We recognise their continuing connection to the land, waters, and community and pay our respect to Elders, past and present.

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Context and Forecasts

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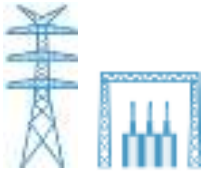
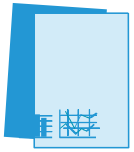
Endeavour Energy's position in the electricity value chain


Generators	Transmission	Distribution	Reta
Role: Generators produce electricity and compete to sell it in the National Energy Market ("NEM")	**Role:** Electricity is transported along high voltage transmission lines and underground cables (at 500kV, 330kV, 220kV and 132kV), through substations and delivered to distributors across NSW	**Role:** Electricity travels through sub-transmission lines and cables to zone substations. High voltage lines and cables then supply distribution substations. The system progressively reduces the voltage for use in	**Role:** Retailers and manage cu accounts and b

1 Being the total customer connections for Essential Energy, Ausgrid and Endeavour Energy per the AER State of the Energy Market 2023 Report, Figure 4.3, based on figures as at 30 June 2022

Who we serve

2.7 million people
living and working in Sydney's Greater West, Blue Mountains, Southern Highlands, Illawarra and South Coast of NSW

1.2 million
connected businesses & residential customers

30,000
new customers per year

43,000
life support customers

290,000
customers with renewable energy generation

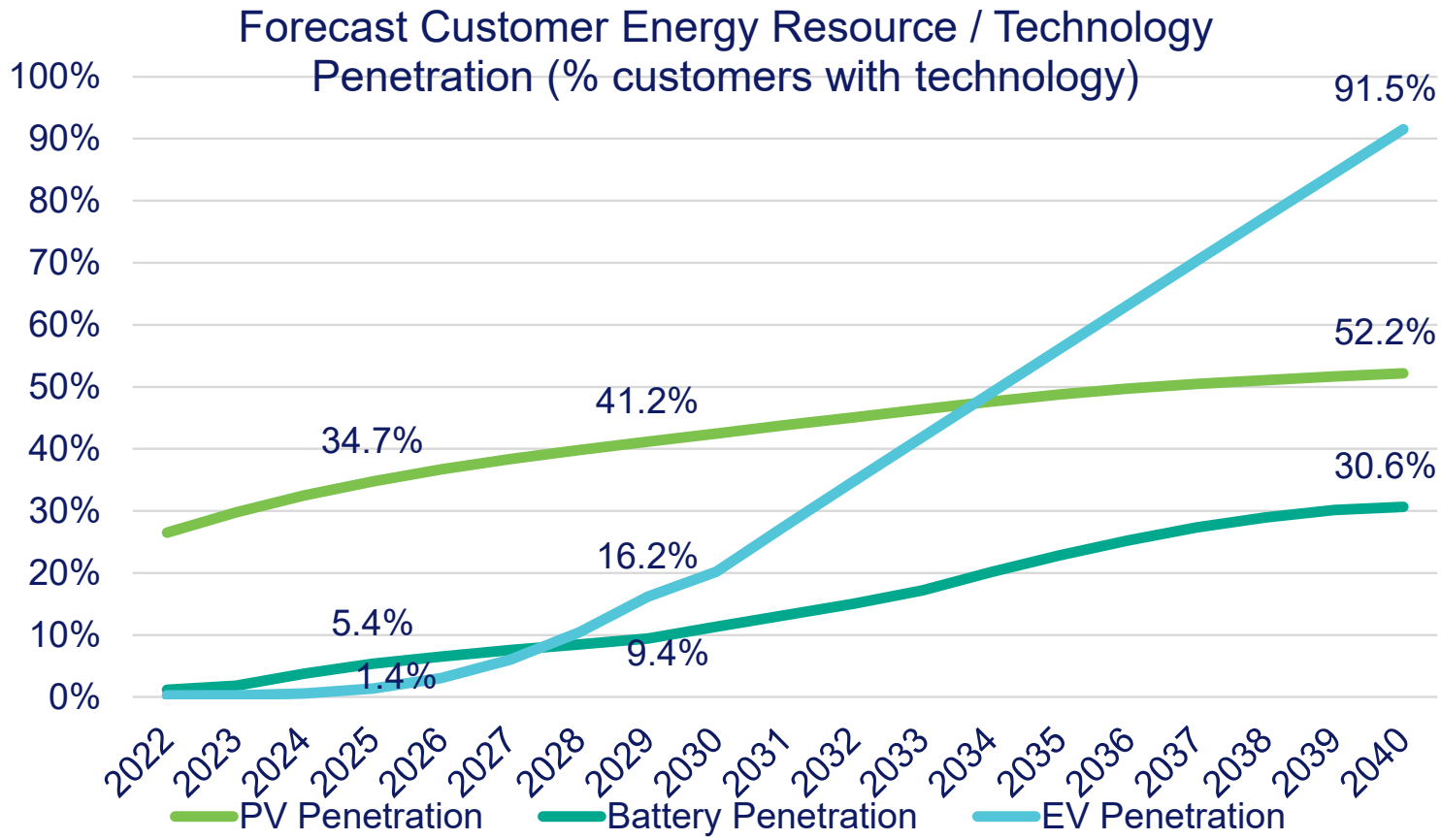
50% of Sydney's population
will reside in Greater Western Sydney by 2036

46% of Greater Western Sydney's population
speak a language other than English at home

280,000
Customers with renewable energy generation

Endeavour Energy

Energy industry has continuously underestimated the role and growth of customer's own energy resources (solar, battery and EVS)



Translated to our network from connection data and AEMO Draft 2024 Integrated System Plan

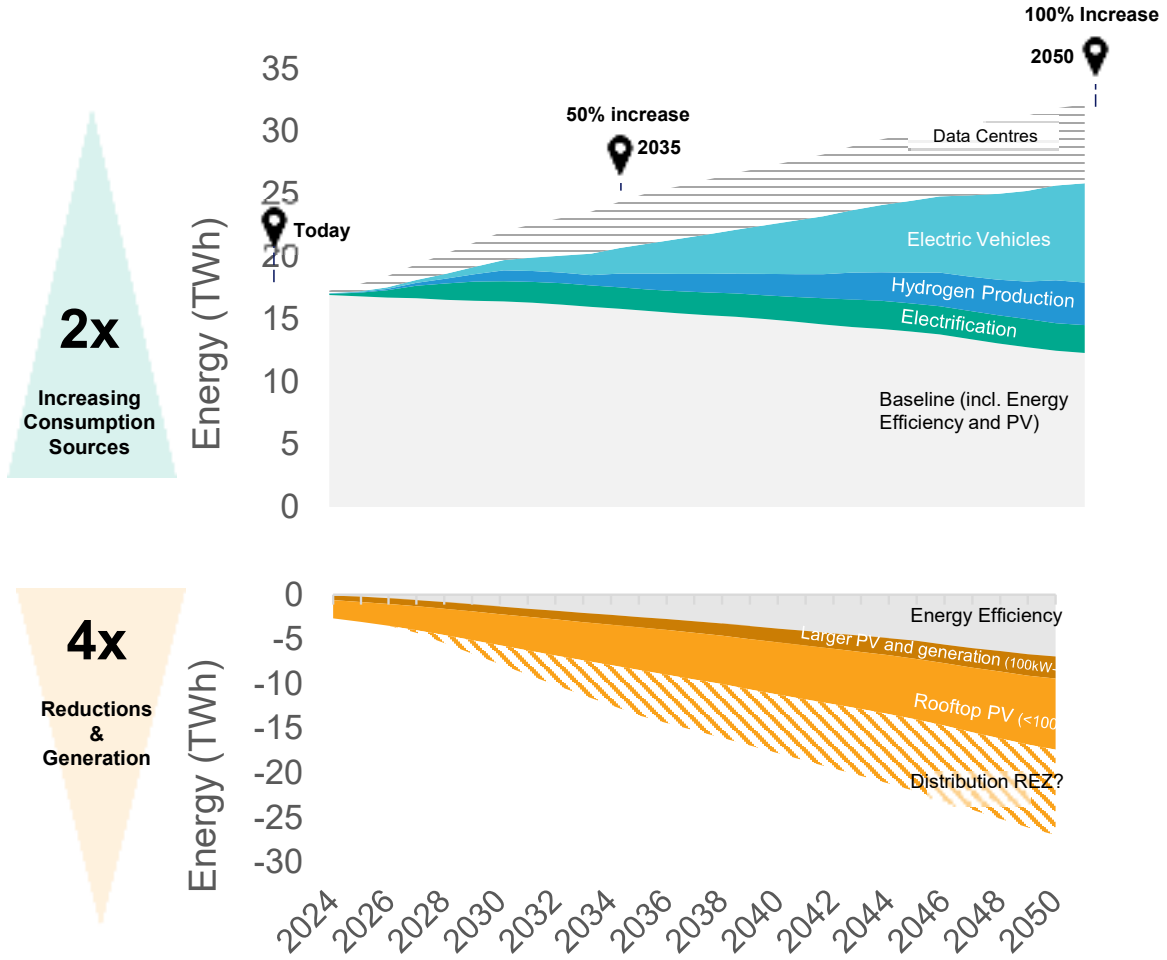
Electricity needs are expected to double over the next 30 years, the distribution network could host significantly more renewable generation and flexibility will be key.

Consumer demand:
- New communities
- Rooftop Solar
- Battery storage
- EVs
- Replacing gas appliances

Commercial & Industrial:
- Decarbonising as a business priority and competitive advantage.
- New and modernising industries (AI, hydrogen etc.)

Tech enablers:
Customers will increasingly seek to maximise their investments by engaging in the market through advanced digital platforms that allow for:
- Customer energy resource management (CERM)
- Energy aggregation
- Virtual power plants

What this means for Endeavour:
These changes are integral to enabling the energy transition, and our service and infrastructure must evolve to reliably and affordably manage and integrate dynamic, bidirectional flows that effectively support this transition.



Adapted from AEMO Draft 2024 Integrated System Plan – Step-change scenario; Additional assumptions; Data centres – 1200MW at 0.4 Load Factor (2030); Distribution REZ: 5100 GWh of existing network hosting capacity (BCG and Endeavour Energy analysis)

Endeavour Energy

Program Spotlights

POWER together

Program spotlight: Flexible Connections - we have a growing need to integrate rooftop solar sustainably and equitably.

More than 50% of our 1.2m customers expected to have rooftop solar systems by 2030 (up from 25% today).

Home systems have also more than doubled in size in the last decade from 3.2kW to ~8kW. Customers currently have **a static limit of 5kW per phase** to prevent overloading, this limit is conservative most of the time.

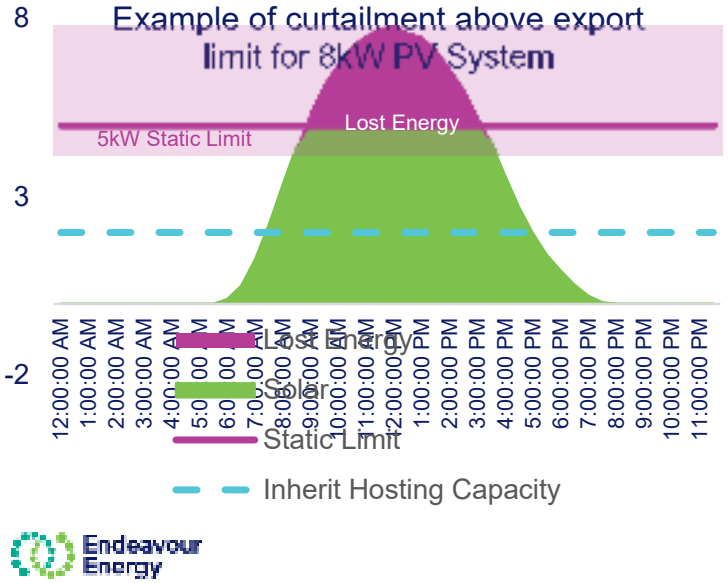
A **dynamic 10kW limit** would unlock capacity when it's available benefiting customers with more exports.

It will provide Endeavour and the Market Operator **a dynamic control lever to limit exports** when it will cause problems for the upstream network.

It can also be used to more equitably manage the hosting capacity of the network.

Flexible exports will double the amount customers can export to the grid, benefitting them to the tune of $24m a year.

This additional 500MW of customer-generated solar energy by 2032 will create more equitable access to the network's solar hosting capacity and a more sustainable energy future for customers.

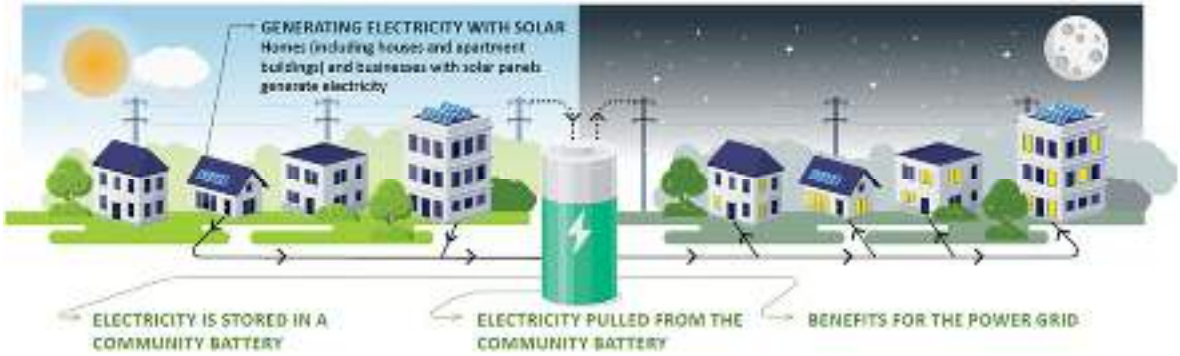


- Planned to be introduced for **new rooftop solar connections from 2026.**
- A choice of **10kW Dynamic** or **2-3kW Static** per phase will be offered.
- Services level targets introduced to ensure emergency curtailment limits are not excessive (e.g. for networks that have introduced this, full 10kW export capacity 95% of the time)

Endeavour Energy

Program Spotlight: Community Batteries

Community batteries benefit customers, the network and the energy market by storing excess solar power during the day and stabilizing the network from the impacts of high PV installations.



Endeavour's program will be rolled out across phases, including recently secured federal funding:

1 Endeavour Energy

Endeavour's Pilot

- Expected 10 sites in total, range of technologies and sizes.
- Locations: Bungarribee, South Granville, Shellharbour, Bowral, Kiama & more TBA

2

- Announced successful for the deployment of 44 batteries, revised to 38 under council consultation
- Combination of pole top and ground mounted units
- Postcodes preselected

ARENA

- Progressed from EOI to final application phase, approx 32 batteries being considered.
- Network wide deployment driven by highest network need.

Endeavour Energy

Program Spotlight: EV Charging

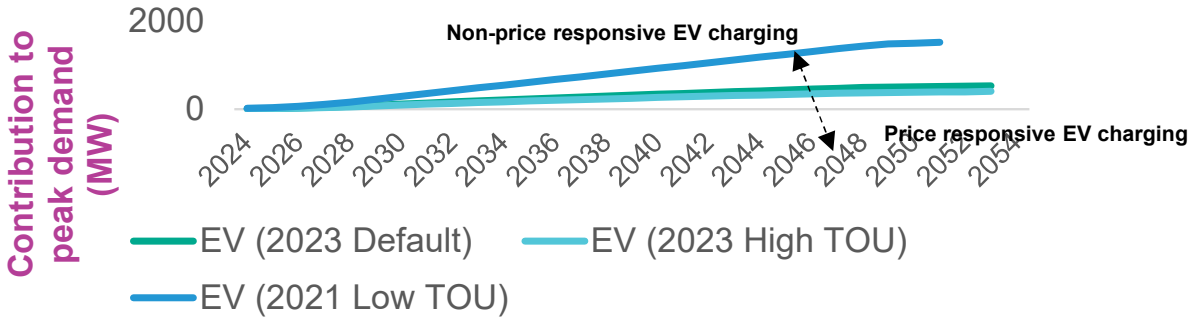
21,386 EVs garaged in the Endeavour Energy network (180% growth yoy)

59GWh of aggregate load from EV charging

90% of EVs charged from home in NSW*

8,200 (38%) of EVs charged using level 2 chargers**

30% of network consumption will be driven by EVs by 2050



*NSW Government
**Based on GridSight insights

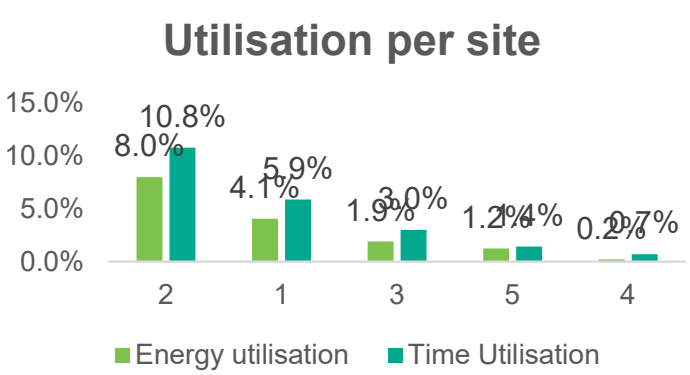
Program Spotlight: EV charging

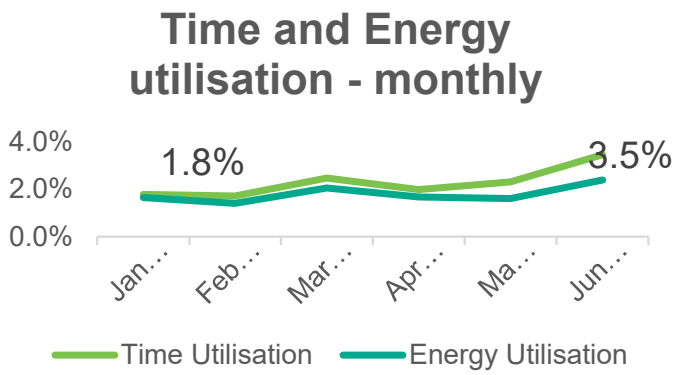
Overview

Installation of pole-mounted EV charging stations throughout the Endeavour Energy network in partnership with EVX and Jolt (Charge Point Operator) and several councils. Currently **7 chargers** operating with up to 20 planned in the next year.

Objectives

- **Obtain key learnings**: unit economics, optimal use cases, utilisation.
- **Establish a robust process** for larger scale roll-outs.
- **Instil public confidence** by making EV charging visible and accessible i.e. solve the ‘chicken and egg’ problem.





Program Spotlight: Bawley Point Microgrid – NSW first community microgrid, demonstrating community co-design and integrating customer owned resources.

The Area

- 3 coastal communities on the southern tip of our franchise
- 1032 connected customers, including 4 holiday parks and a major equestrian centre
- Popular tourist destination with a holiday swell of 4x – 5x
- Geography makes electricity services vulnerable to storms and bushfire risk
- No gas or water reticulation
- Large CER integrations planned

Program Aims

1. Improve reliability and resilience
2. Address evolving customer needs – demand growth & increasing CER integration
3. Demonstrate new planning approaches – integrating both network resources and CER
4. Accelerate decarbonisation by reducing diesel generation and increasing customer self-generation
5. Develop a cornerstone project to determine what is useful and efficient in other network contexts.

Currently Here

Planning Process

Identify needs → Consider Options → Consult & Select → Design & Detailed Consultation → Delivery → Operate & Maintain

Endeavour Energy

Technology Elements

Grid forming Battery 2.8 MW / 2.8MWh
(co located to existing diesel generator)

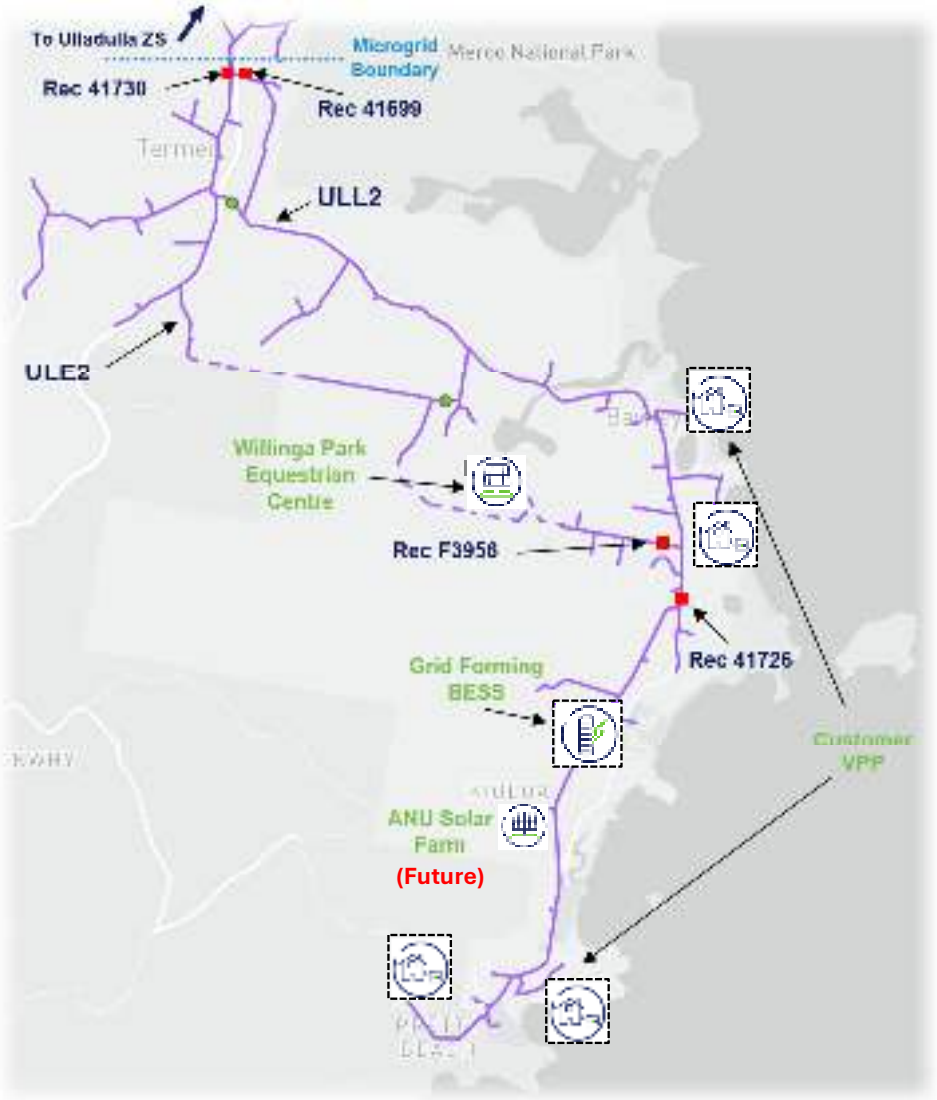
Residential **Virtual Power Plant** with ~1.2MWh Storage

Residential and larger scale **customer solar** "farm" installations (~1.5MW)

DERMS & Automated Switch gear for microgrid coordination and energy management, including enacting Dynamic Operating Envelopes in future

Smart meters for **off peak load control** and support **LV visibility and analytics** [Planned]

Customer installations supported by the Bushfire Local Economic Recovery fund.



Endeavour Energy

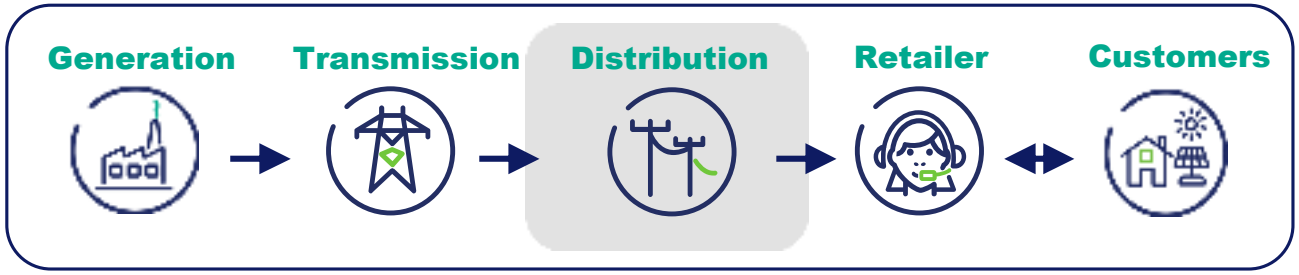
Australian Government

NSW GOVERNMENT

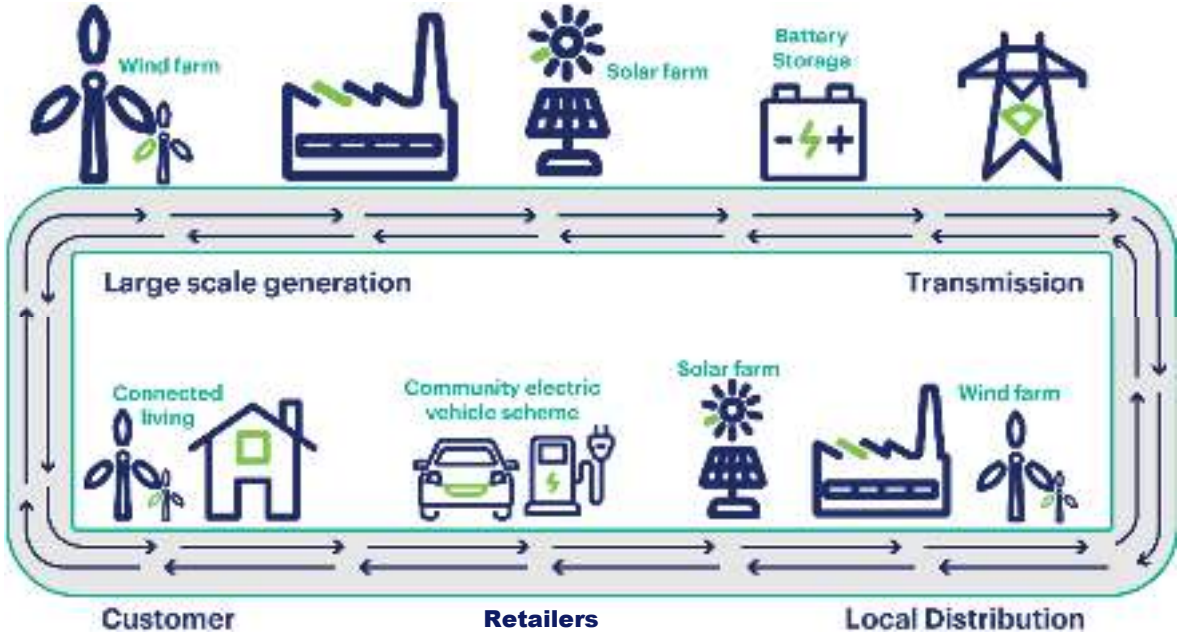
Endeavour Energy

Our changing role in the energy supply chain as a Distribution System Operator

The traditional supply chain was linear…



..distributed generation and flexible loads adds considerable opportunity to empower customers and decarbonize the grid.



Endeavour Energy


Endeavour
Energy
POWER
together

Questions?

Adam Corrigan
Founder
Your Energy Friend

YOUR ENERGY FRIEND

We're with you

Southern Highlands Future Forum

Saturday 7th September 2024

YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

Your Energy Friend Pty Ltd
Adam Corrigan
Managing Director

Your Energy Friend is an ***"Independent"*** energy Auditing company.

- Home Energy Assessments on behalf of NGO's, Not for Profits, NSW Councils, State and Federal Gov'ts
- Over 8000 homes Assessed to date

YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

Whats your Motivator?
The 4 C’s

1. Cost

2. Carbon

3. Comfort

4. sCorecard rating

YOUR ENERGY FRIEND

Wingecarribee
SHIRE COUNCIL

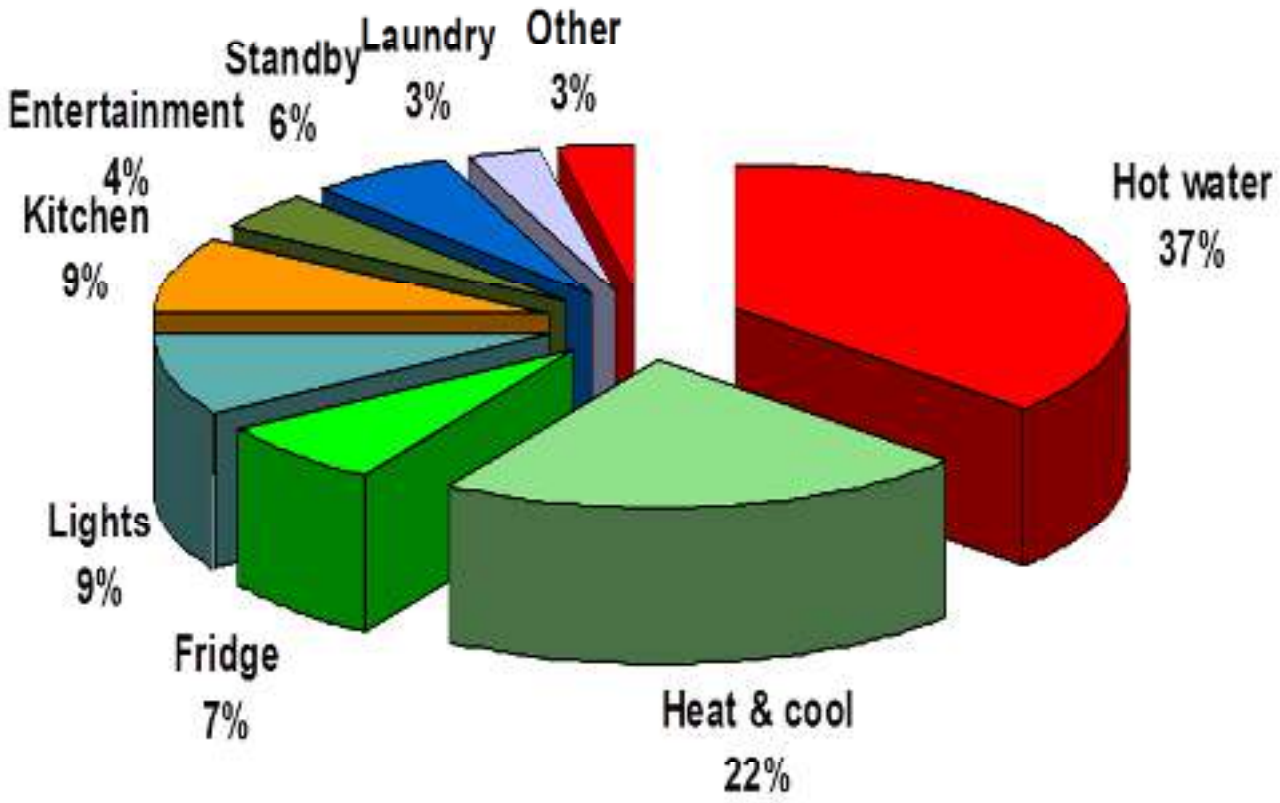
Your Energy Friend – The 5 Steps

1. Understand your Energy Bills – Tariffs, kWh's, Mj's, Time of Use……
2. Get The Best Rate – Shop around for your Energy Retailers – Big $ savings!!!!!!
3. Become Energy Efficient – Start to understand where you are using power and start saving – This is the big and most cost effective piece…..
4. Get Solar!!!!! Its free Energy …….
5. Keep an eye on Batteries….. Prices are coming down

YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

Where do we use Energy?



YOUR ENERGY FRIEND

Wingecarribee
SHIRE COUNCIL

Smart Meter

A) Time of use Tariff

Peak – 48¢ per kWh*

Shoulder – 22¢ per kWh

Off Peak – 18¢ per kWh

OR

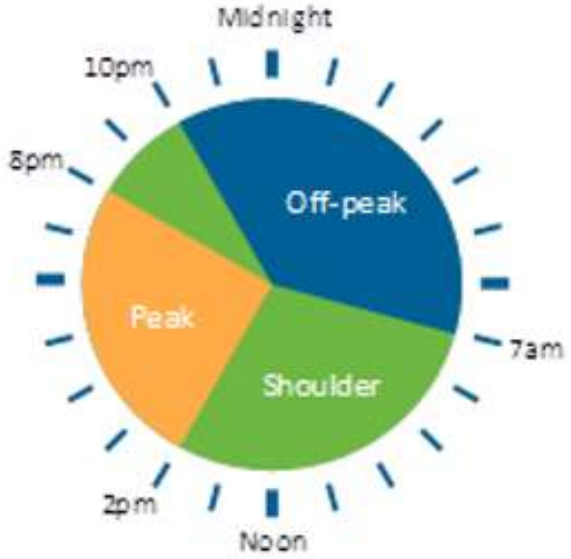
B) Flat Tariff / Single Rate

Flat rate – 25c to 30¢ per kWh

*Pricing will vary on contract terms and conditions and Energy Retailer

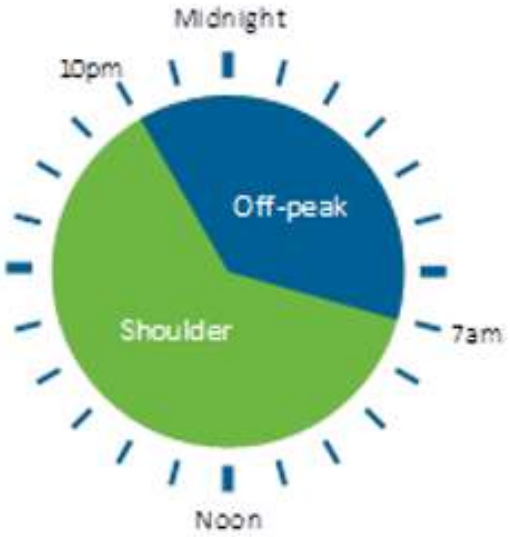
Wingecarribee Shire Council

Residential Customers Time of Use Graphic



Summer months
(working weekday)

Winter months
(working weekday)



All other times

YOUR ENERGY FRIEND

Wingecarribee
SHIRE COUNCIL

NSW, Endeavour Energy region

Peak: 1pm-8pm weekdays excluding public holidays

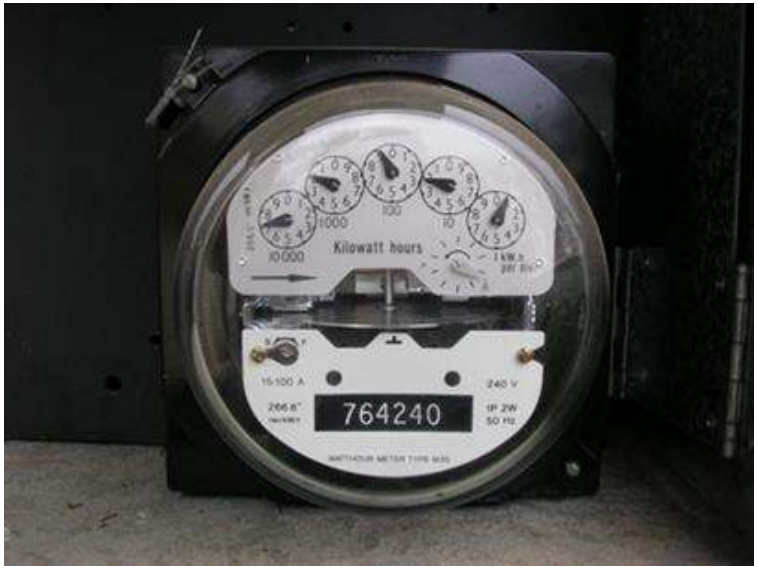
Shoulder: 7am-1pm, 8pm-10pm weekdays and 7am-10pm weekends and public holidays

Off Peak: all other times

YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

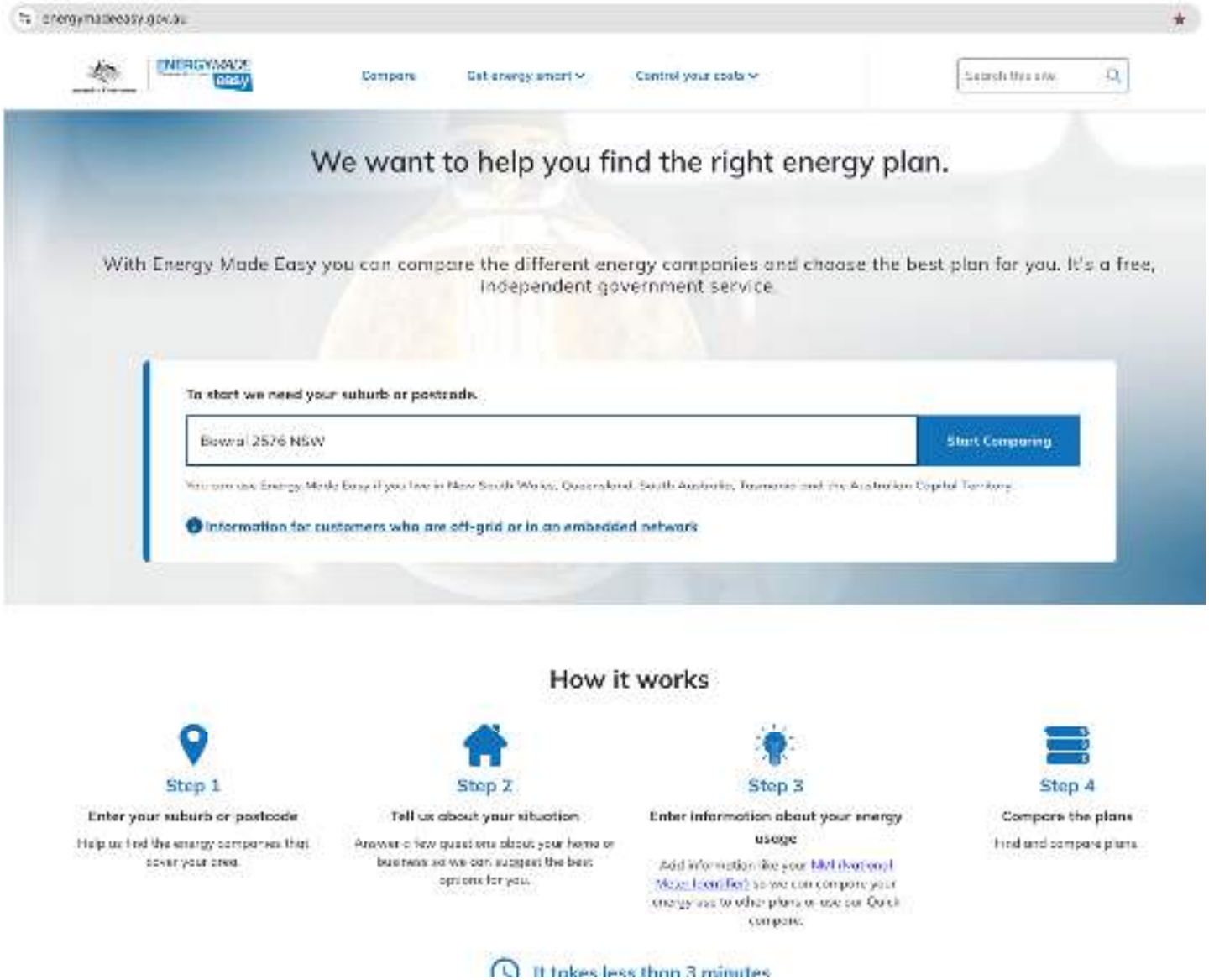
Accumulation Meter



B) Flat Tariff / Single Rate

YOUR ENERGY FRIEND

Compare Energy Prices - energymadeeasy.gov.au



YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

Understand your bill

Electricity charges are based on an actual meter reading
Bill period: 20 May 2024 to 19 Jun 2024 (31 days)

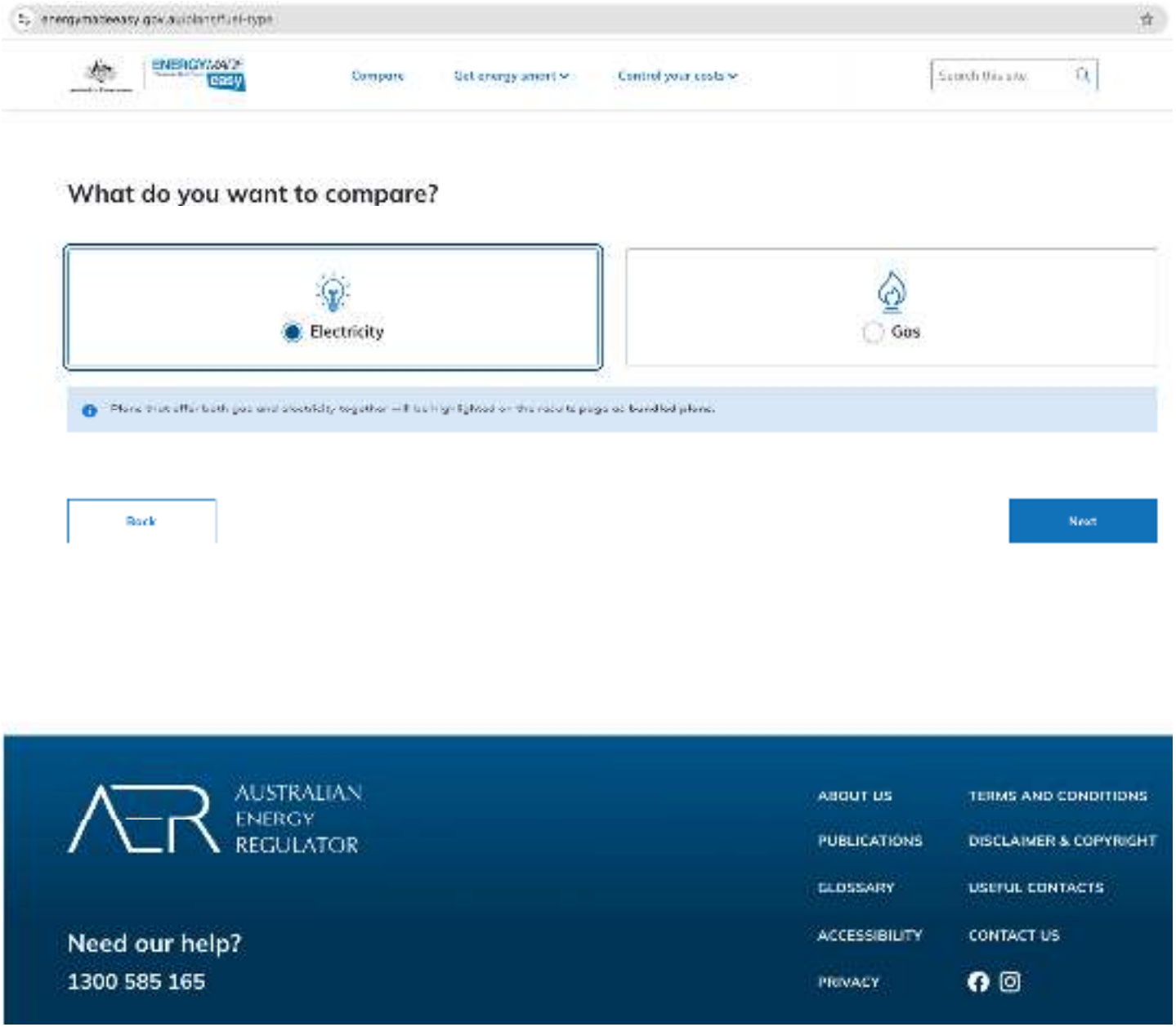
Previous balance and payments	Amount
Previous balance	$403.51
7 Jun 24 payment	$403.51cr
11 Jun 24 dishonoured payment	$403.51
14 Jun 24 payment	$403.51cr
Balance brought forward	**$0.00**

New charges and credits

Usage and supply charges	Time of use	Units	Price	Amount
General usage	At all times	416 kWh	$0.3531	$146.89
General usage next	At all times	508.072 kWh	$0.3531	$179.40
Controlled load 1	At all times	261.657 kWh	$0.2195	$57.43
Supply charge	Daily	31 days	$1.0279	$31.86
CL1 Supply charge	Daily	31 days	$0.0678	$2.10

Other charges		
Master credit card payment fee		$2.86
Carbon Neutral contribution (31 days @$0.12987)		$4.03
Total charges	+	**$424.57**
Total new charges and credits (excluding GST)	=	**$424.57**
Total GST	+	$42.46
Total new charges and credits (including GST)	=	**$467.03**
Amount due		**$467.03**

All items are subject to GST.


Compare
Get energy smart
Control your costs
What do you want to compare?
Electricity
Gas
Back
Next
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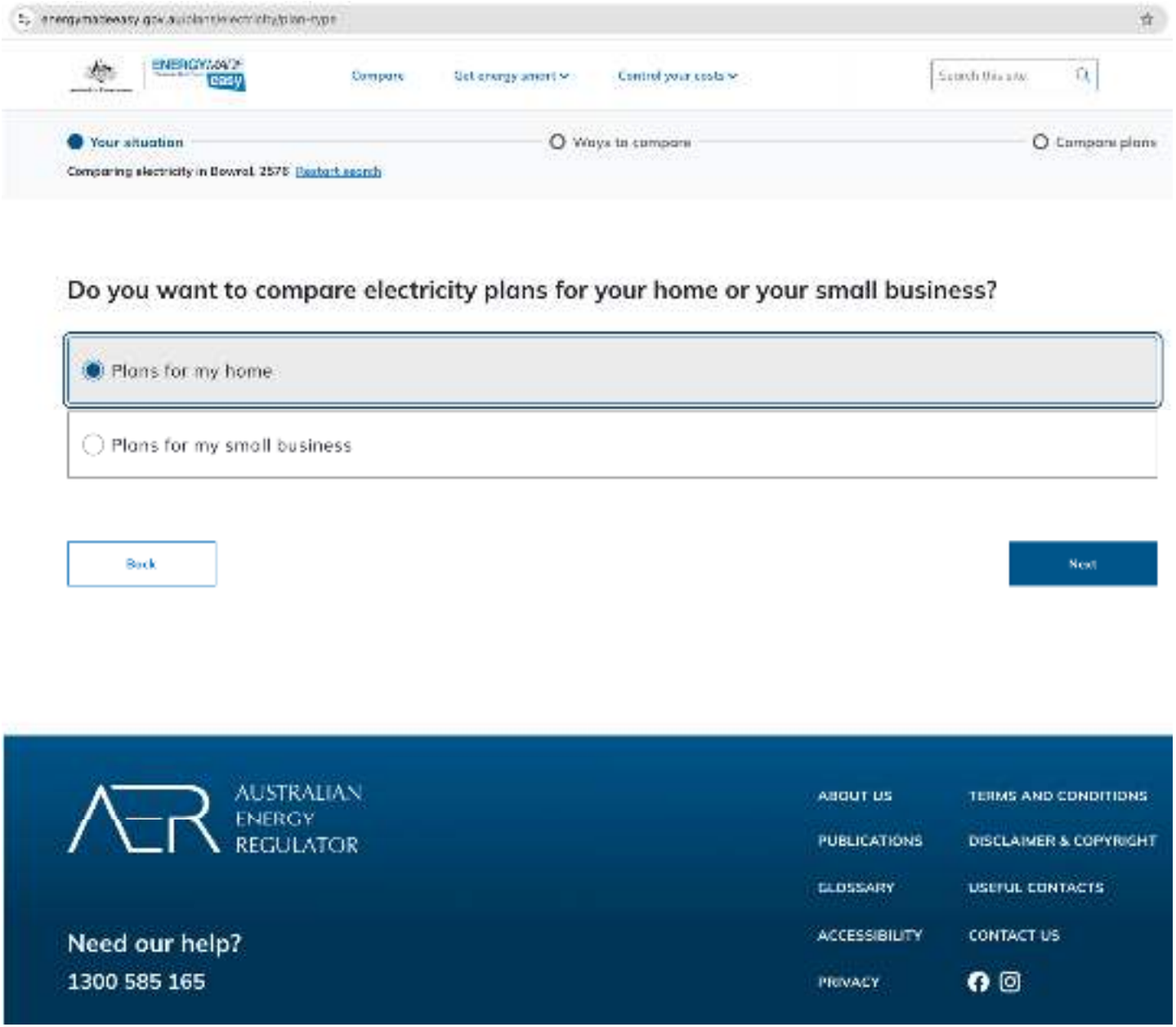
Compare
Get energy smart
Control your costs
Your situation
Ways to compare
Compare plans
Comparing electricity in Bowral 2576 Restart search
Do you want to compare electricity plans for your home or your small business?
Plans for my home
Plans for my small business
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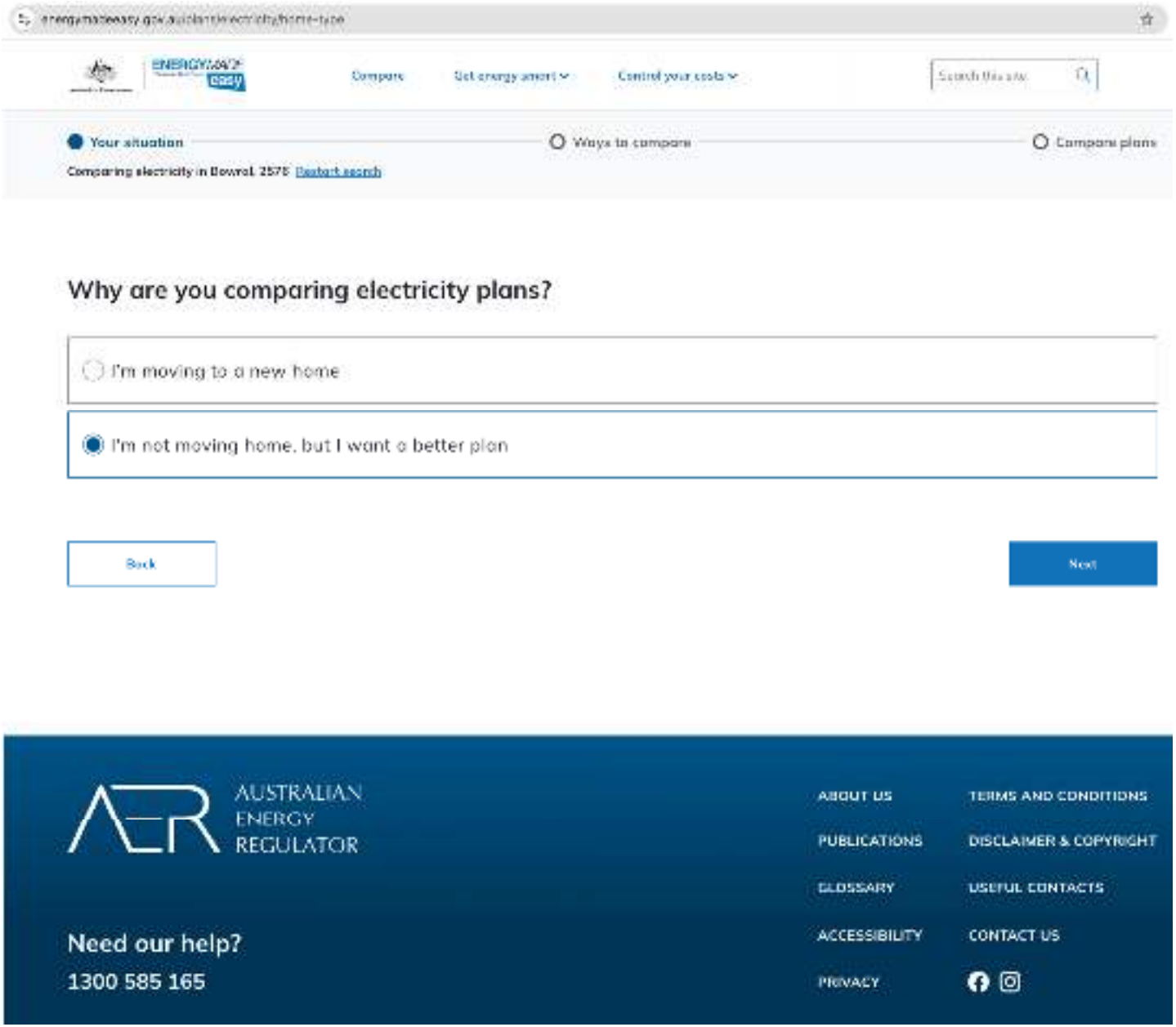
Compare
Get energy smart
Control your costs
Your situation
Ways to compare
Compare plans
Comparing electricity in Bowral 2576 Restart search
Why are you comparing electricity plans?
I'm moving to a new home
I'm not moving home, but I want a better plan
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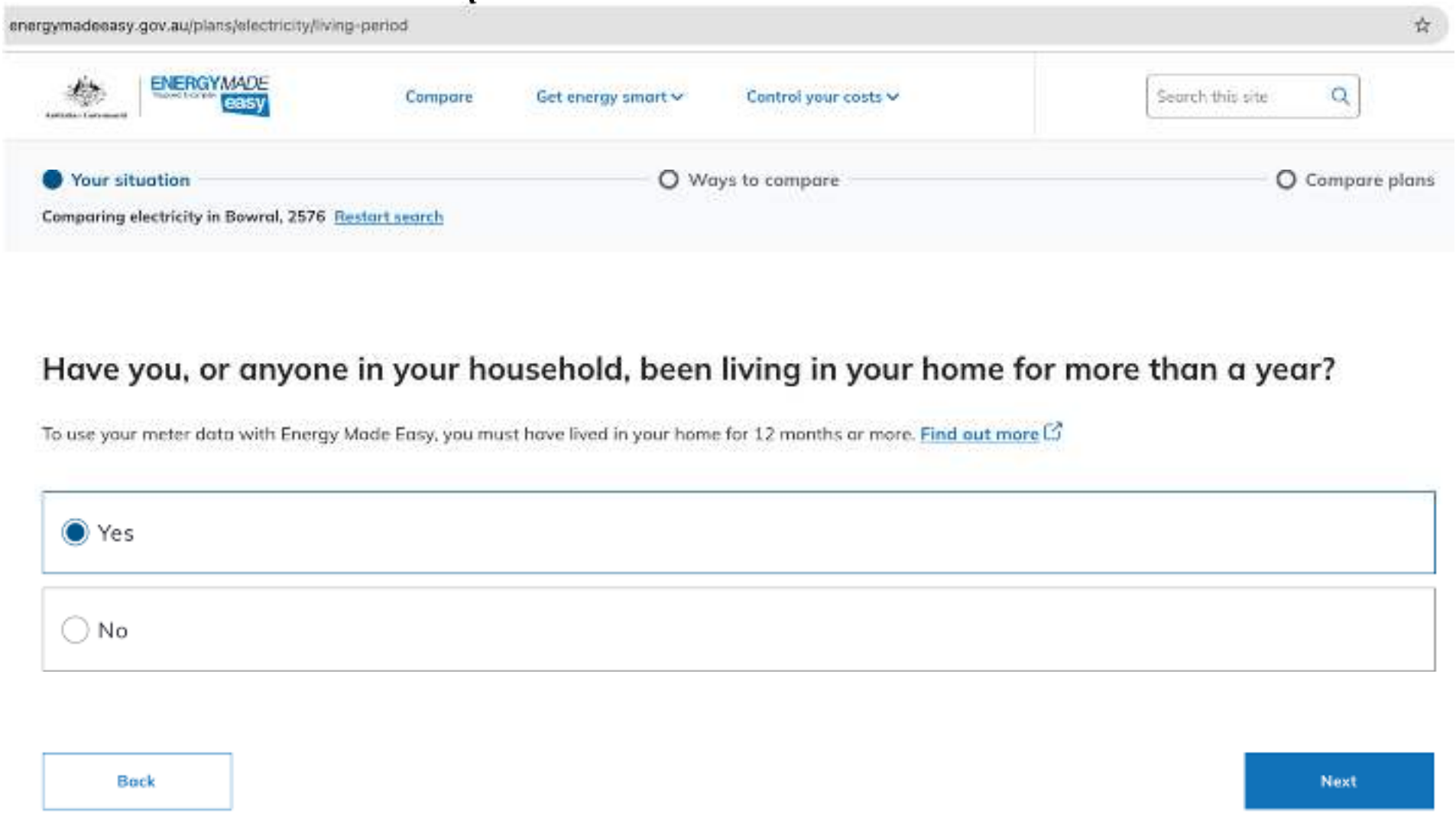
Option 1 - NMI Data



What company provides your electricity now?

Why do we need this information?

AGL

Back

Next

Option 2 – Manually Enter Billing

Answer the following questions using your bills so we can find the right plans for you

* Indicates a required field

QUESTION 1 OF 5

Enter your bill period. This can be from one or more bills.

For more accurate estimates, provide up to 12 months of your electricity usage. You can enter data from multiple bills by adding all of the kilowatt hour (kWh) usage for each usage type from all of your bills, and entering the total in the total usage field that will become available below.

Show me a sample bill

Bill start date * (dd/mm/yyyy)

20/05/2024

For multiple bills, enter the start date of your oldest bill.

Bill end date * (dd/mm/yyyy)

19/06/2024

For multiple bills, enter the end date of your most recent bill.

QUESTION 2 OF 5

Do you have peak and off-peak rates on your bill? *

- ○ Yes
- ◉ No

Total usage in kWh from the bill period entered above *

924 kWh

Usually found on page 2 of your bill, under usage and/or supply charges.

QUESTION 3 OF 5

Do you have a smart meter? *

- ○ Yes
- ○ No
- ◉ Not sure

QUESTION 4 OF 5

Do you have a controlled load? *

- ◉ Yes
- ○ No
- ○ Not sure

Controlled load usage in kWh *

262 kWh

This may be shown on your bill as 'dedicated circuit', 'off-peak' or if in Queensland, 'T31' or 'T33'.

QUESTION 5 OF 5

Do you have solar panels? *

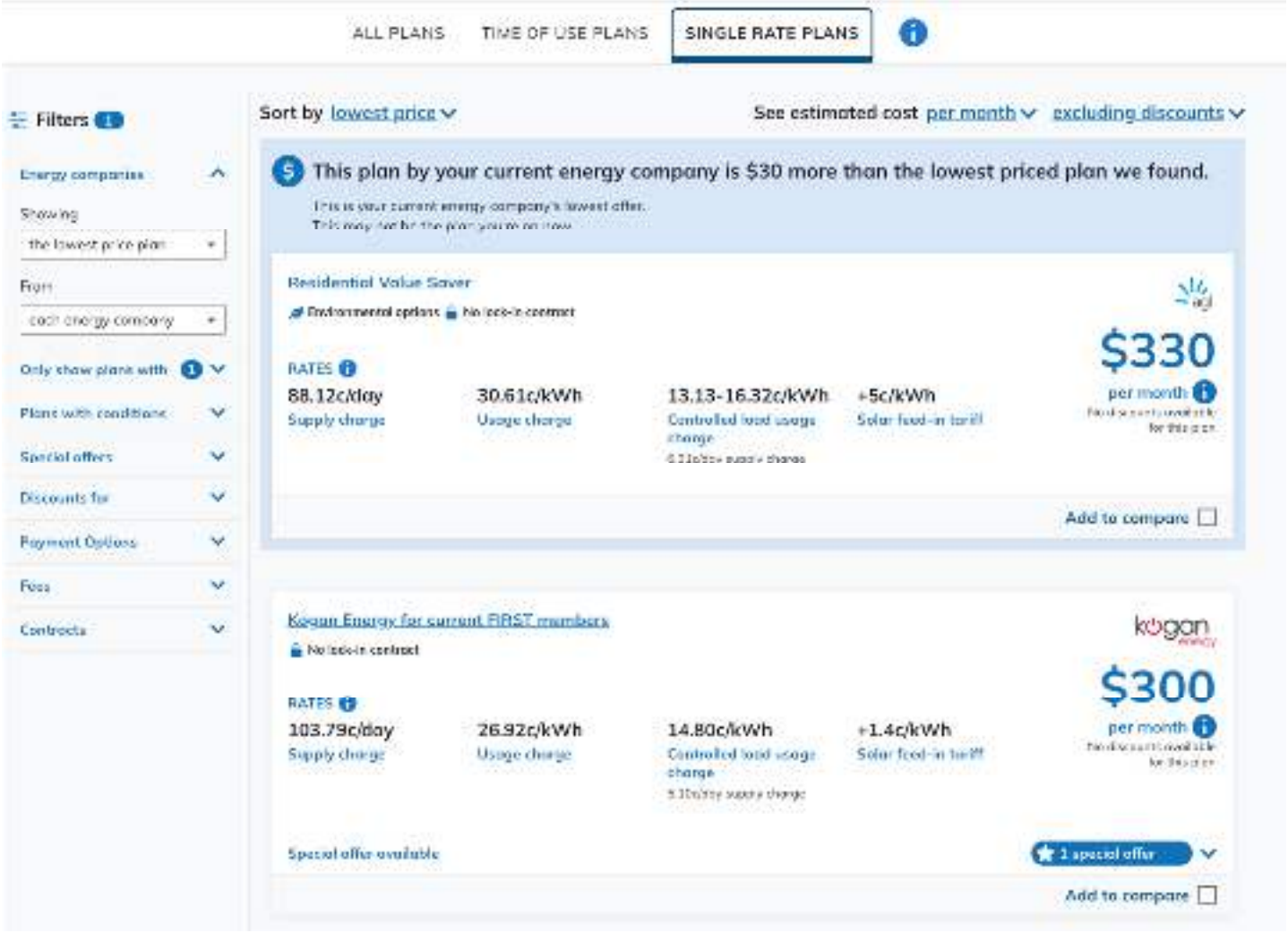
- ○ Yes
- ◉ No
- ○ Not sure

☑ I have read, understood and agree to the following terms and conditions. The AER does not endorse or recommend any particular plan. Plan information is provided by energy companies. The AER does not guarantee or warrant the accuracy, completeness or currency of the information provided. Cost estimates are indicative and should be used as a guide only. Your actual costs may vary. If you are interested in a plan listed on this website, you should contact the relevant energy company to make sure the plan is right for you.

For more information, see How the Energy Made Easy plan search works.

Submit

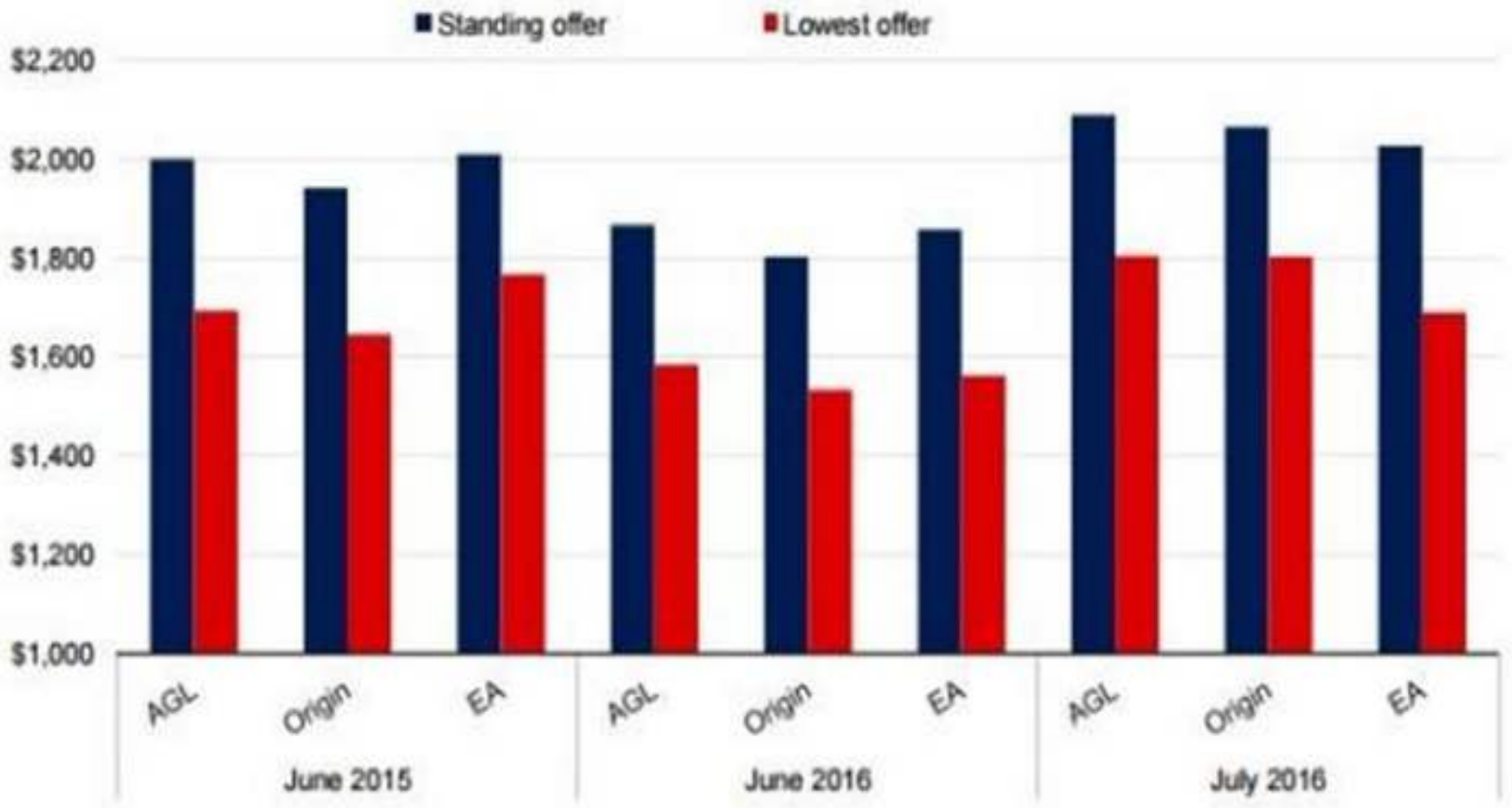
Results

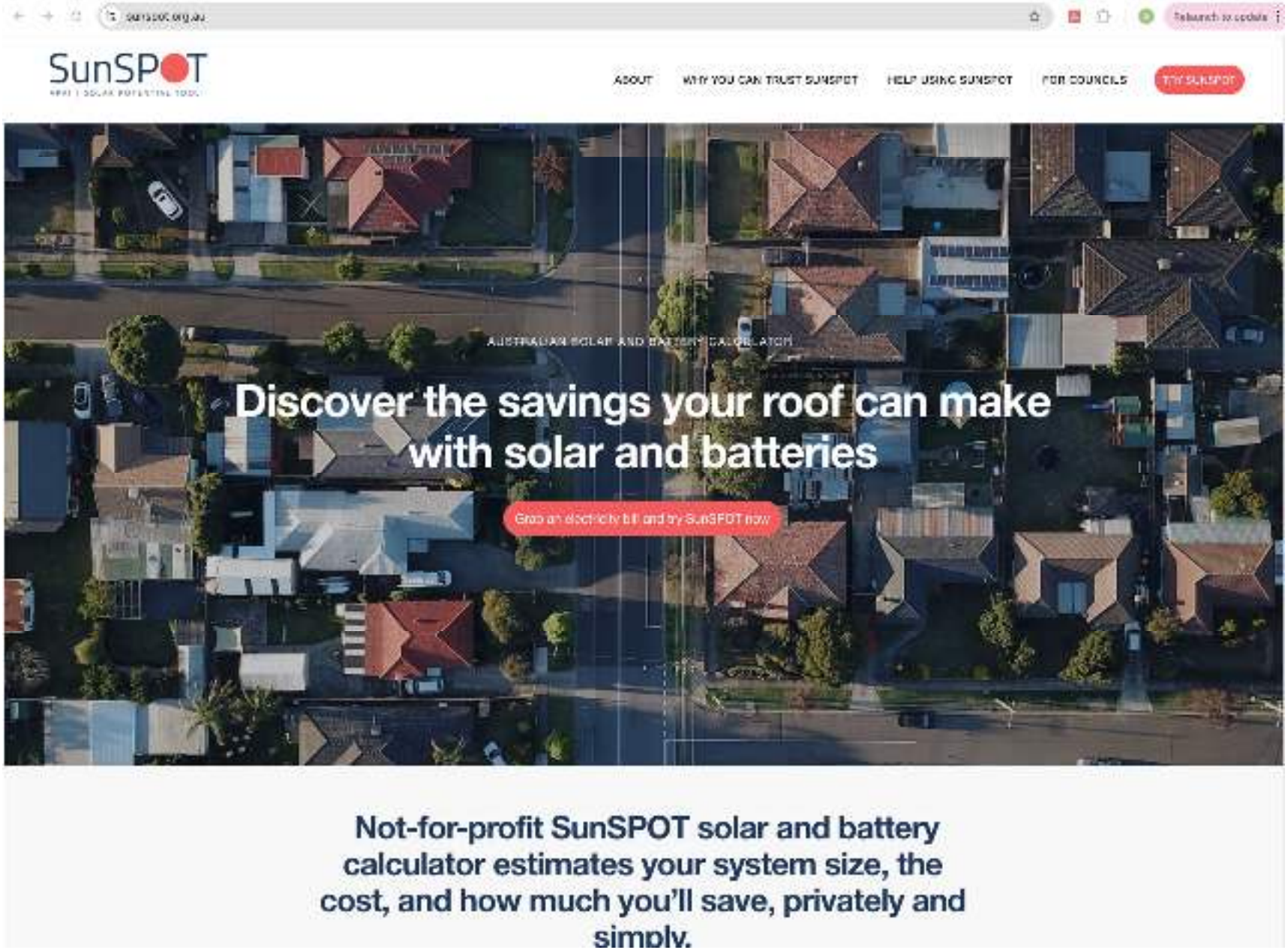

ALL PLANS
TIME OF USE PLANS
SINGLE RATE PLANS
Filters 1
Energy companies
Showing
the lowest price plan
From
each energy company
Only show plans with 1
Plans with conditions
Special offers
Discounts for
Payment Options
Fees
Contracts
Sort by lowest price
See estimated cost per month
excluding discounts
This plan by your current energy company is $30 more than the lowest priced plan we found.
Residential Value Saver
Environmental options
No lock-in contract
RATES
88.12c/day
Supply charge
30.61c/kWh
Usage charge
13.13-16.32c/kWh
Controlled load usage charge
+5c/kWh
Solar feed-in tariff
$330
per month
Add to compare
Kogan Energy for current FIRST members
No lock-in contract
RATES
103.79c/day
Supply charge
26.92c/kWh
Usage charge
14.80c/kWh
Controlled load usage charge
+1.4c/kWh
Solar feed-in tariff
$300
per month
Special offer available
1 special offer
Add to compare

YOUR ENERGY FRIEND

Why Shop Around?

Figure 7.1 **Estimated annual bills on standing offer prices and lowest priced offers for typical residential customers in the Ausgrid network area, June 2015 – July 2016 ($2016, inc. GST)**

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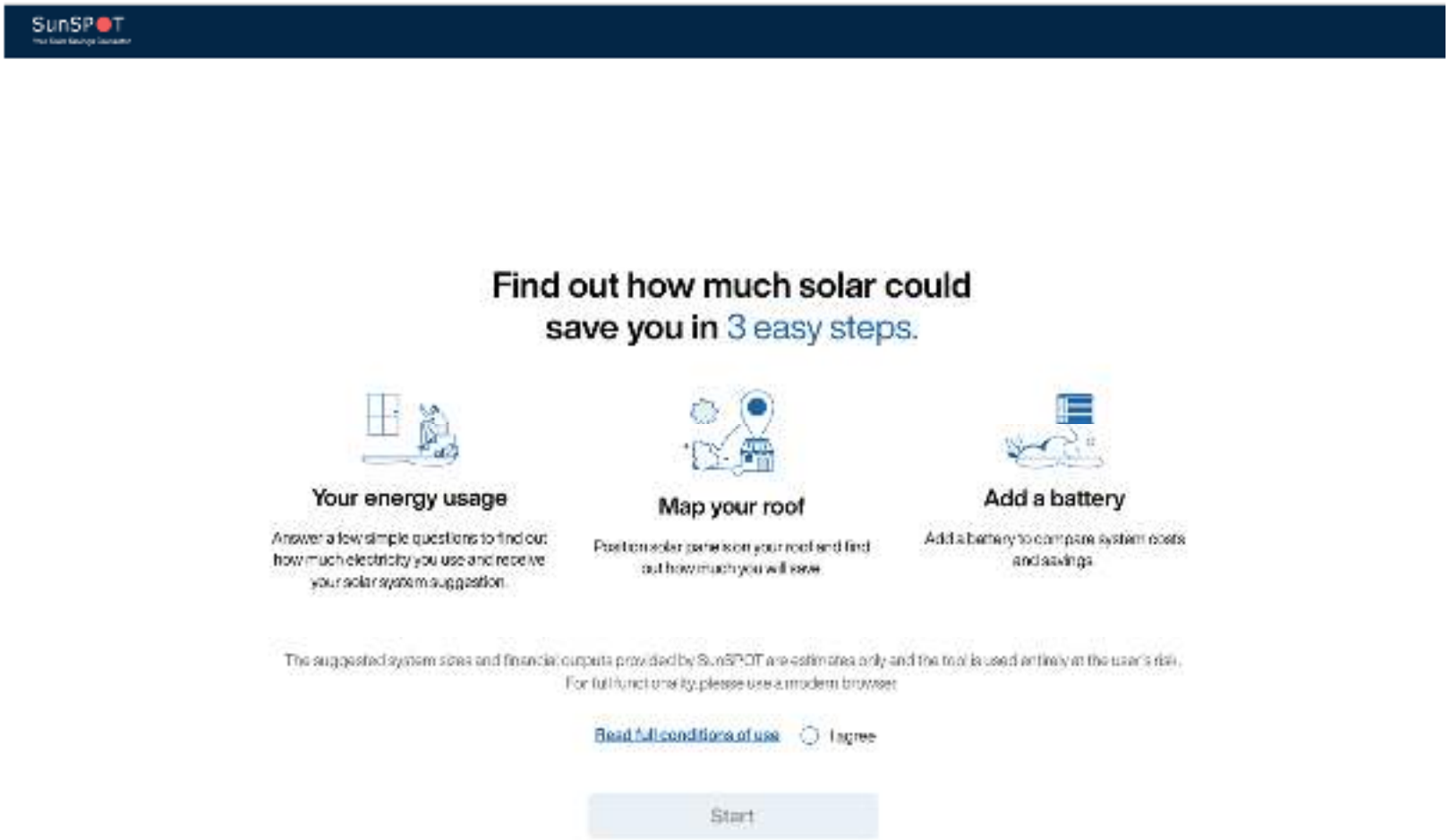
AUSTRALIAN SOLAR AND BATTERY CALCULATOR
Discover the savings your roof can make with solar and batteries
Grab an electricity bill and try SunSPOT now
Not-for-profit SunSPOT solar and battery calculator estimates your system size, the cost, and how much you'll save, privately and simply.

SunSpot – Australian Photo Voltaic Institute - UNSW



SunSPOT
Your Solar Savings Calculator

< Back

First let's find the property that you are considering for solar.

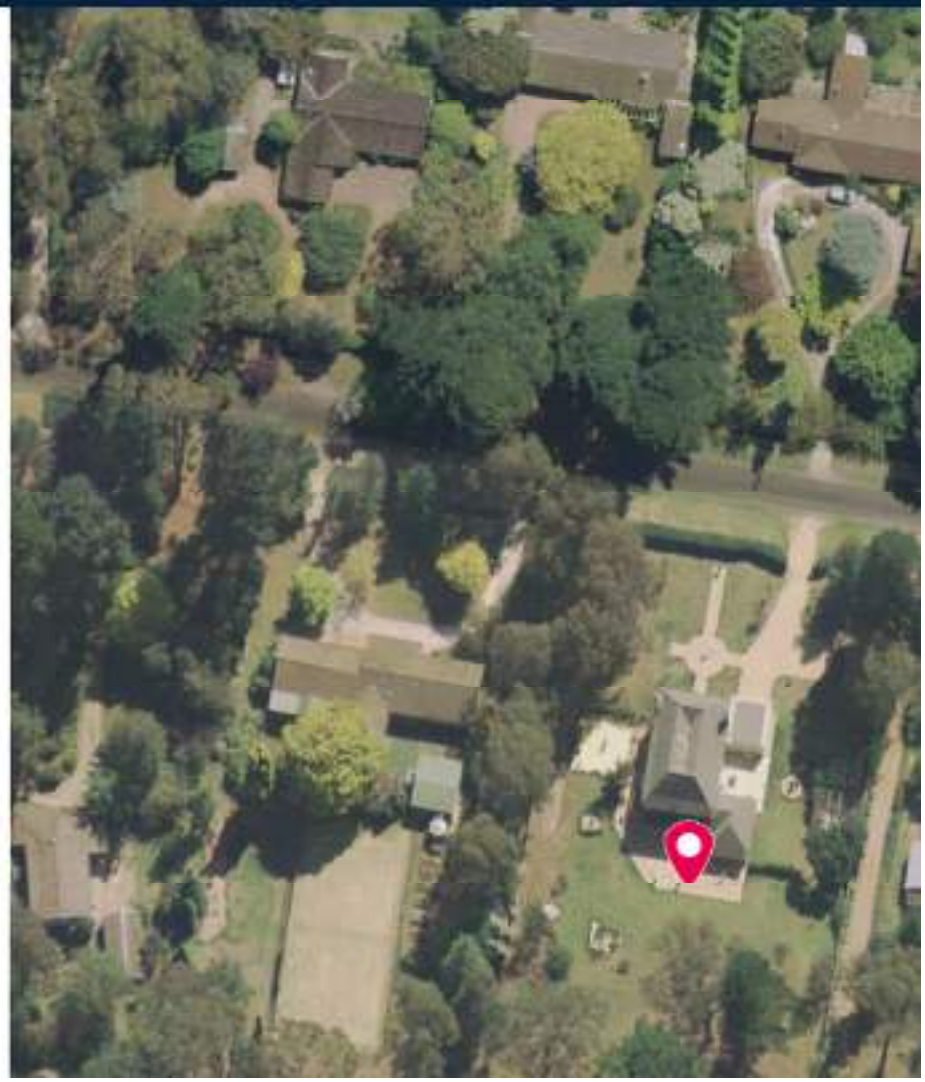
What's the property address?

49 Holly Road, Burradoo New South Wales 2576, Australia

What type of property is it?

- (•) Residential
- ( ) Commercial

Find property



SunSPOT

< Back

Now let's find out how much energy you use at your property.

If you have your last electricity bill handy, how much electricity do you use per day on average? ⓘ

What was the start and end date for the billing period? ⓘ

Start date: 31/04/2024

End date: 31/07/2024

Next >

I'm not sure

SunSPOT

Share link | Download report

My Solar Estimate

49 Holly Road, Burradoo New South Wales 2576

This estimate is based on your inputs and average data for your area. To refine the estimate, follow the next steps.

Next Steps

- Map My Roof
- Energy Usage
- Add a Battery

Solar System

This is a summary for your suggested system. Learn more ↗

SOLAR SYSTEM SIZE (SUGGESTED SIZE 10 KW)

− 10 kW +

ESTIMATED SYSTEM COST
$7,000–$11,078

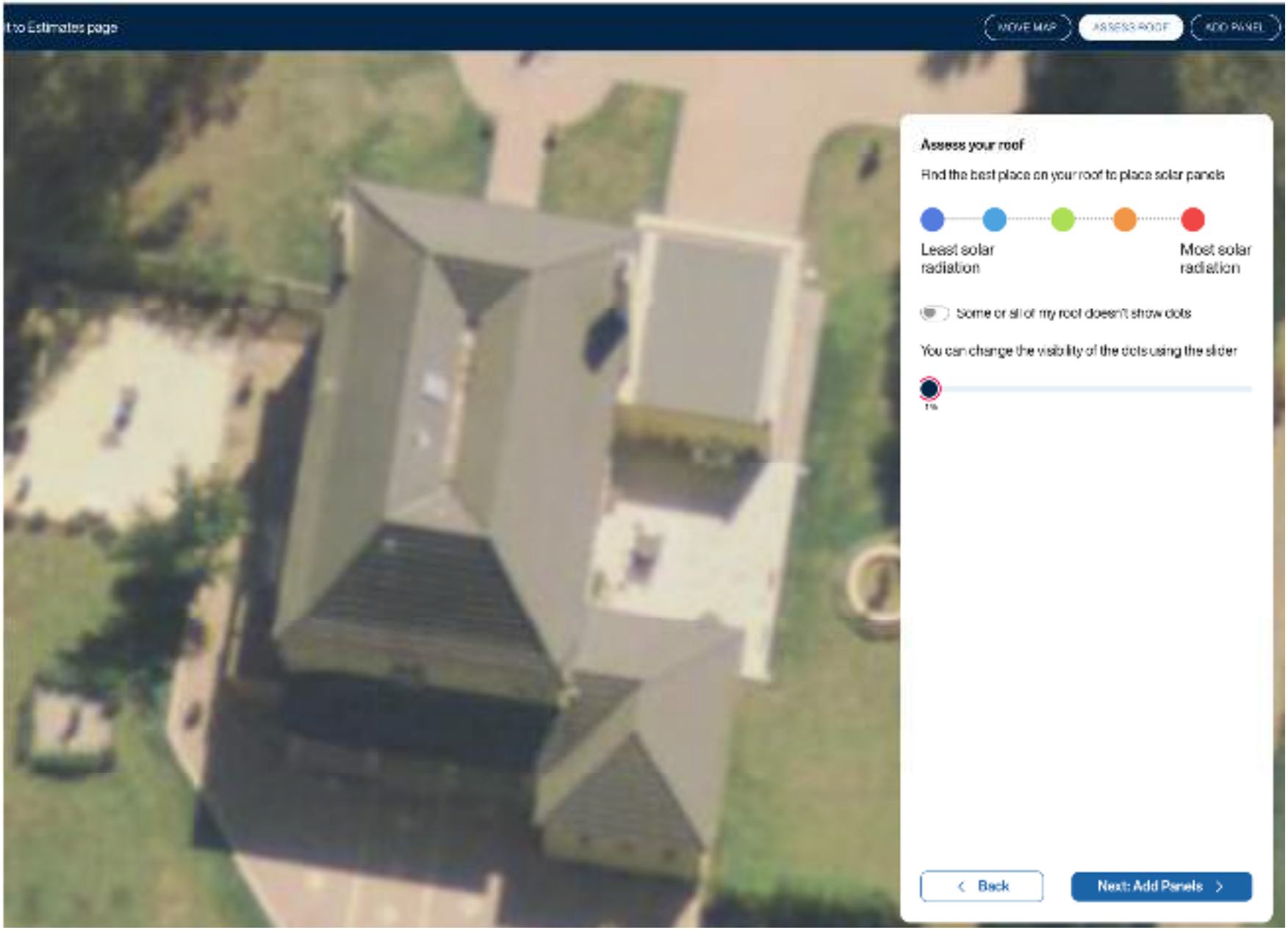
ANNUAL ELECTRICITY BILL WITH SOLAR
$1,793

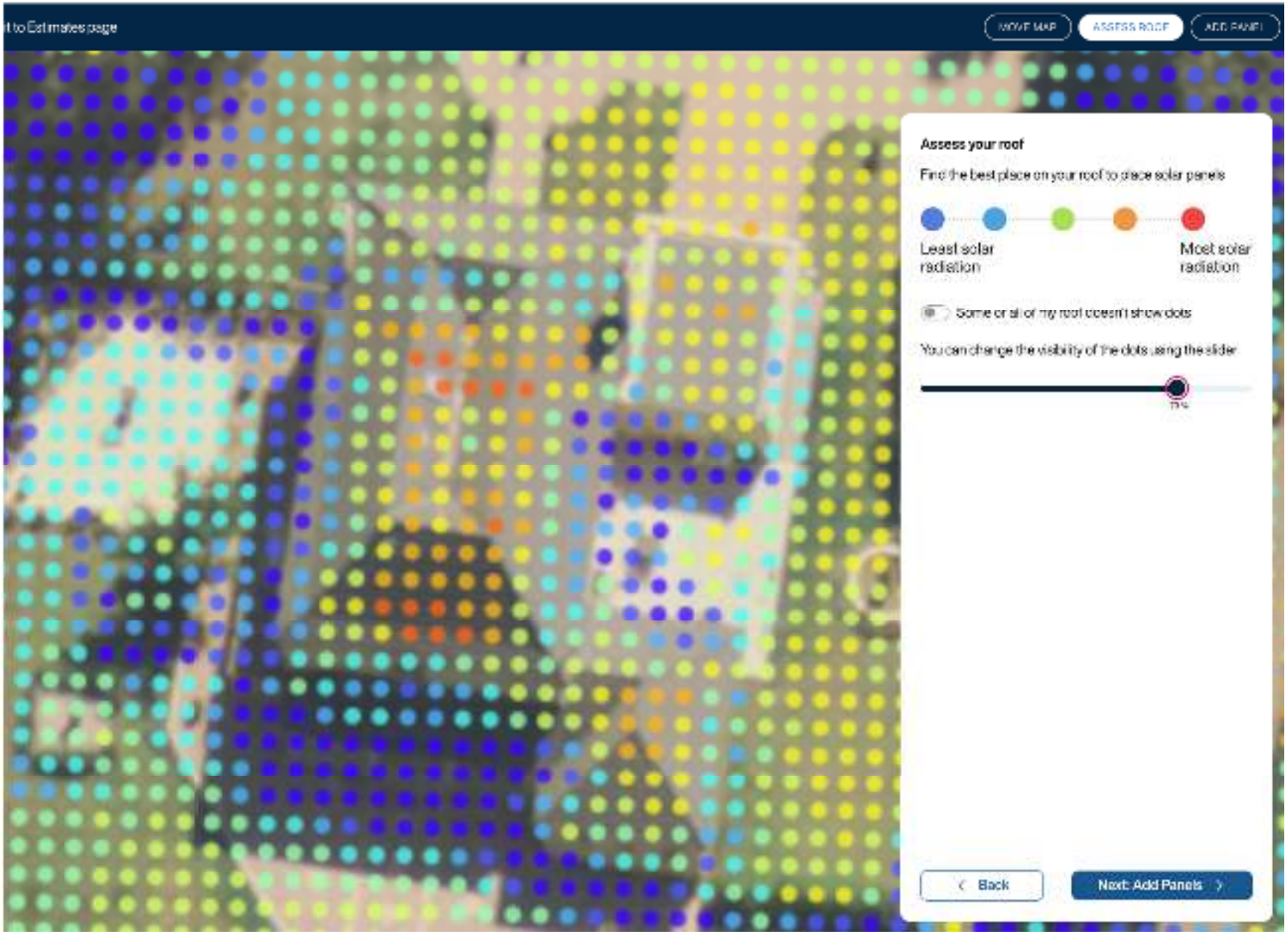
ANNUAL BILL SAVINGS
$2,270 savings

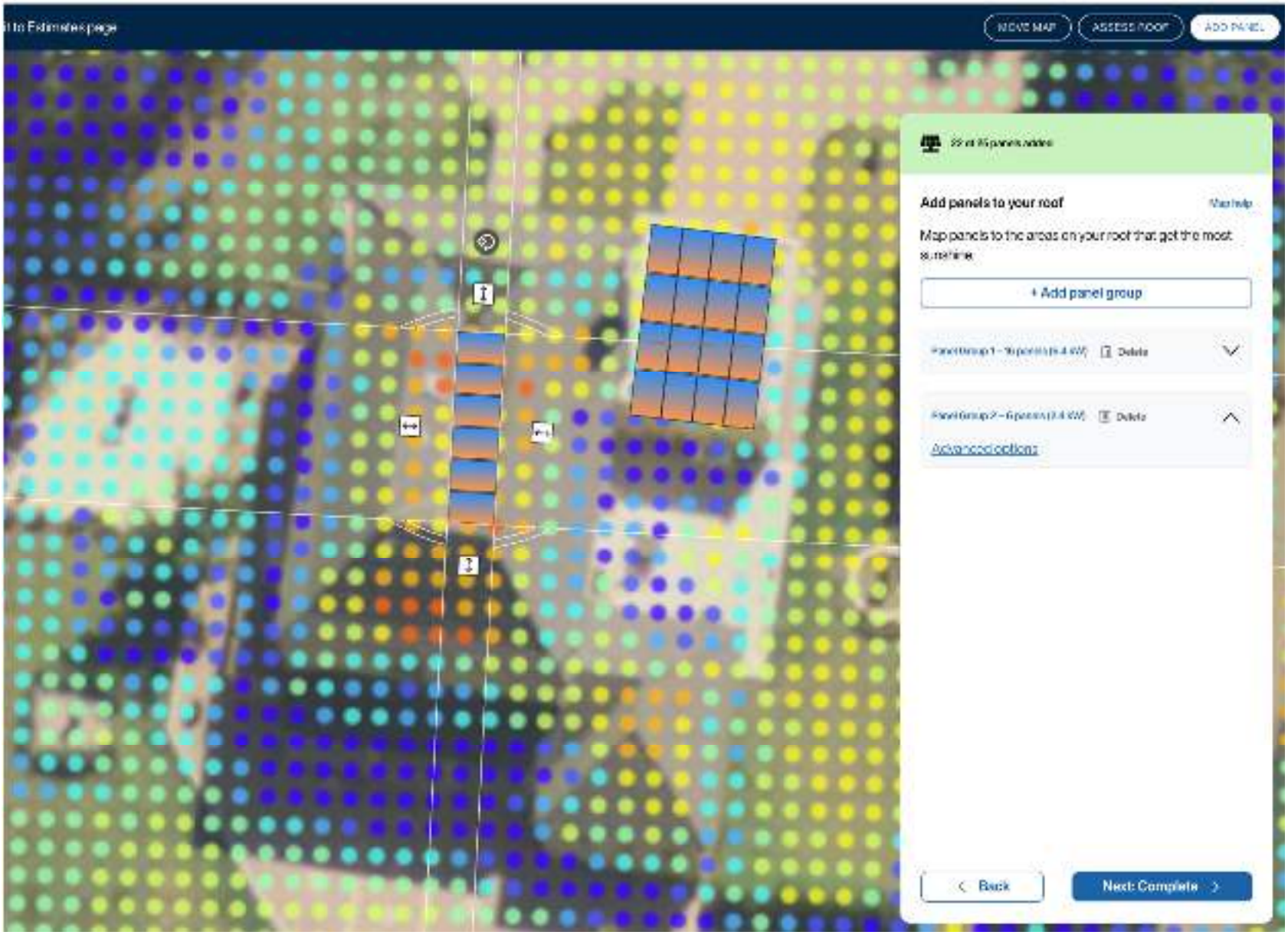
TIME TO PAY BACK YOUR SYSTEM
3.1–4.9 years

Next: Map My Roof

Next, map your solar system to your roof to see how it will fit and perform.


t to Estimates page
MOVE MAP
ASSESS ROOF
ADD PANEL
Assess your roof
Find the best place on your roof to place solar panels
Least solar radiation
Most solar radiation
Some or all of my roof doesn't show dots
You can change the visibility of the dots using the slider
1%
Back
Next: Add Panels


t to Estimates page
MOVE MAP
ASSESS ROOF
ADD PANEL
Assess your roof
Find the best place on your roof to place solar panels
Least solar radiation
Most solar radiation
Some or all of my roof doesn't show dots
You can change the visibility of the dots using the slider
75%
Back
Next: Add Panels


MOVE MAP
ASSESS ROOF
ADD PANEL
Add panels to your roof
Map panels to the areas on your roof that get the most sunshine.
+ Add panel group
Delete
Delete
Advanced options
Back
Next: Complete

SunSPOT

Back to Estimate

Add a Battery

Add a battery to see how it affects your estimate. Learn more

Select a battery from the common sizes below.

10 kWh: $11,280 – $13,630

A battery this size could increase your electricity self-sufficiency from **43%** to around **73%**.

Apply to my estimate

The benefit of a battery

A battery lets you store your free surplus solar power for use when the sun isn't shining. Batteries can:

- Increase your energy self-sufficiency by maximising use of your free solar power at home.
- Reduce your electricity bills by avoiding peak rates for grid-supplied electricity.

What size battery do I need?

If you want to reduce your bills: test the sizes on offer to find out which has the fastest payback.

If you want to increase your energy self-sufficiency: test the sizes to see the results.

If you need back-up in case of blackouts: you'll need a large solar and battery system that can disconnect from the grid during an outage.

SunSPOT is not designed to produce estimates for off-grid solar and battery systems.

SunSPOT

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My Solar Estimate

49 Holly Road, Burradoo New South Wales 2576

This estimate is based on your inputs and average data for your area. To refine the estimate, follow the next steps.

Next Steps

- Map My Roof — TO DO
- Energy Usage — IN PROGRESS
- Add a Battery — COMPLETE

Solar System

With battery

This is a summary for your suggested system. Learn more

SOLAR SYSTEM SIZE

10 kW

BATTERY SIZE

10 kWh

ESTIMATED SYSTEM COST

$18,280–$24,708

ANNUAL ELECTRICITY BILL WITH SOLAR + BATTERY

$854

ANNUAL BILL SAVINGS

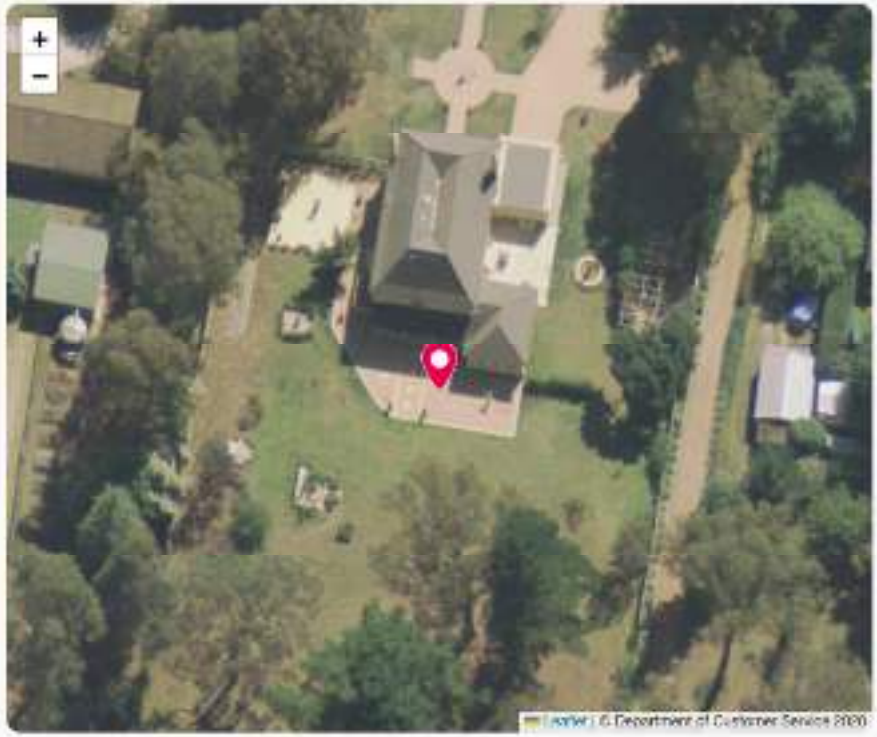
$3,209 savings

TIME TO PAY BACK YOUR SYSTEM

6.7–7.7 years

Next: Map My Roof

Next, map your solar system to your roof to see how it will fit and perform.



Solar System Benefits

Electricity Bill

Annually

This shows your estimated electricity bill before and after adding solar, based on what you have told us and average data for your area. You can add more detail in the Energy Usage page to refine these estimates. Learn more ↗

Without solar	With solar	With solar + battery
$4,063 owing	**$1,793** owing	**$854** owing
	How this is calculated:	**How this is calculated:**
	Your current electricity bill: **$4,063** owing	Your current electricity bill: **$4,063** owing
	- MINUS	- MINUS
	Savings from your solar system: **$2,270** credit	Savings from your solar system: **$3,209** credit

Savings

Annually

This shows your estimated bill savings after adding solar. You can add more detail in the Energy Usage page to refine these estimates. Learn more ↗

Without solar	With solar	With solar + battery
$0 saving	**$2,270** saving	**$3,209** saving
	How this is calculated:	**How this is calculated:**
	Solar energy exported to the grid: **$534** credit	Solar energy exported to the grid: **$312** credit
	+ PLUS	+ PLUS
	Solar energy used on site: **$1,736** saving	Solar energy used on site: **$2,898** saving

Solar Usage

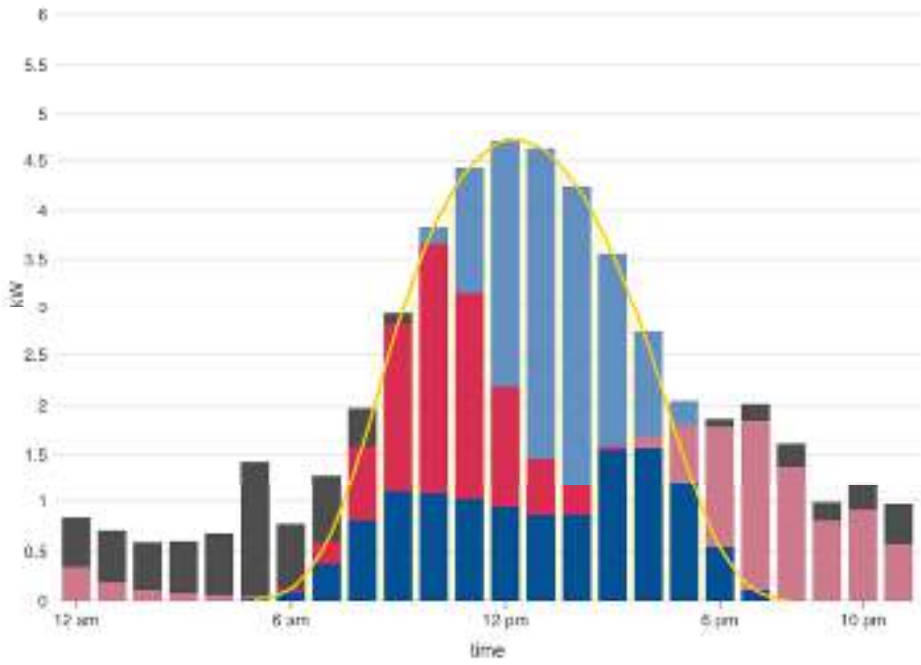
Annual

This is an estimate of your daily electricity usage and solar generation, averaged Annually or by season. Learn more

35 kWh / Day	12 kWh / Day	13 kWh / Day	7.2 kWh / Day
$0.79 savings	$7.94 savings	$0.05 credit	$2.11 cost
Solar generated	Solar used on site	Solar sent to grid	Electricity bought

Solar generated · Solar used on site · Electricity bought · Solar sent to grid · Charging battery · Using battery

With battery



Solar + Battery Investment

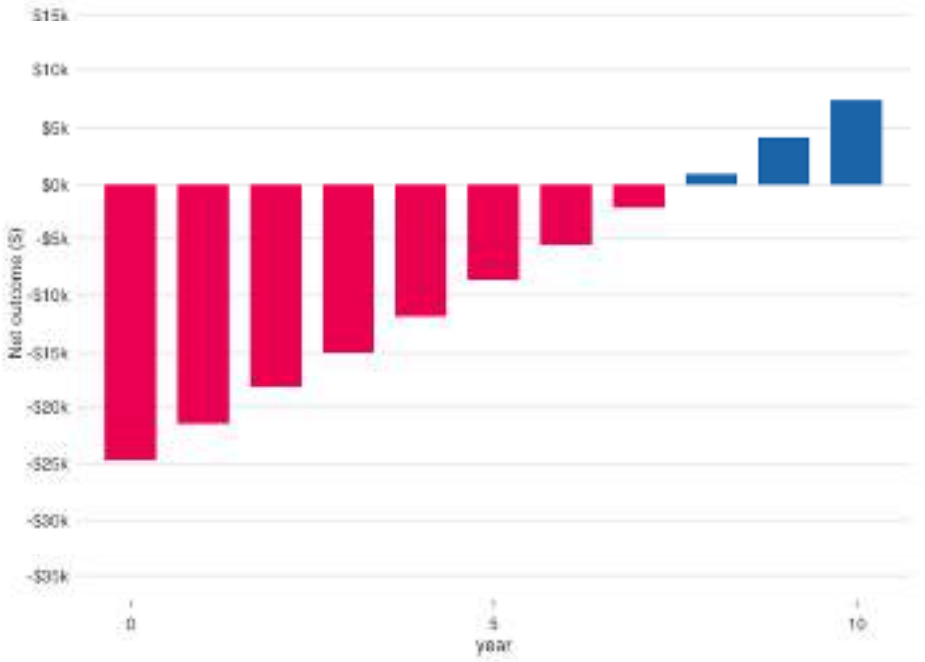
10 years

This is a summary of the financial outcomes for your system over 10 years. Learn more

$24,708	$7,384	3.0–7.6 %	5.7–7.7 Years
System cost	Net outcome at 10 years	Annual return on investment	Time to pay back

Investment cash flow

With battery



Energy Self-Sufficiency

Self-sufficiency is the estimated percentage of your electricity use that comes from solar generation.

You can increase self-sufficiency by adding a battery or shifting your electricity usage into times when the sun is shining.

Solar Self-Consumption

Self-consumption is the percentage of total solar generation that is used on the property.

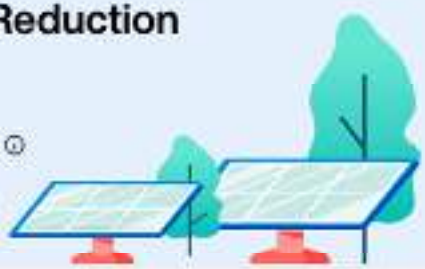
A lower self-consumption means that you are sending more of your solar electricity to the grid, rather than using it on site.

Annual Carbon Emissions Reduction

8,168 kg

CO_2 reduction per year ⓘ

After installing solar



THIS IS EQUIVALENT TO

1.4 × Average household's annual carbon emission

47 Sydney to Melbourne trips

Driving from Sydney to Melbourne (880 kms)

Resources, Available Incentives and Rebates

Rooftop solar: With solar, your home generates its own clean power. Solar electricity is about five times cheaper than grid prices.

- Clean Energy Council's Solar Purchasing Guide
- Find an approved seller
- SunSpot tool from The Australian Photovoltaics Institute to help you map and design your Homes Solar PV System – SunSpot

Heating and cooling: Reverse-cycle air conditioners are the most efficient and healthiest way to heat and cool your home.

- NSW Government Rebate to Upgrade your Air Conditioner
- Ausgrids Winter Heating Guide
- Ausgrids Summer Cooling Guide

Hot water: Heat pumps and solar hot water systems (Thermosiphon, i.e. tank and hot water panels on roof)) are the most efficient way to heat water. They use around a quarter of the energy of conventional hot water systems.

- Hot Water Guide
- NSW Government Heat Pump Rebate Scheme

Cooking: Induction cooking is faster and cheaper. It saves your household from inhaling harmful asthma-causing pollutants.

- Induction Cooking Guide

Rebates:

- Low Income Household Rebate: Helps people with eligible concession cards pay their electricity bill.
- Gas Rebate: Helps people who hold eligible concession cards pay their natural gas or residential LPG bills.
- Family Energy Rebate: Helps households pay their electricity bill if they have dependent children and receive the Family Tax Benefit.
- Life Support Rebate: Helps people pay their electricity bills if someone in the household uses approved energy-intensive equipment.
- Medical Energy Rebate: Helps people who are unable to self-regulate body temperature pay their electricity bill.
- Seniors Energy Rebate: Provides independent self-funded retirees with an annual rebate to help with the cost of living.
- Rebate swap for energy efficient upgrades: If you currently receive the Low Income Household Rebate, you can swap it for a free 3kW solar system.
- Energy Accounts Payment Assistance scheme: Helps people experiencing a short-term financial crisis or emergency to pay their electricity or natural gas bill.
- Help for households facing energy bill stress: Households having a hard time paying their electricity or natural gas bills may be eligible for this payment.
- Upgrade your household lighting: Replace the old lights throughout your home with new energy- efficient LED lights.
- Upgrade your pool pump: Replace your pool pump for a more energy efficient model.

Additional Resources

- Your Home Guide – Australia's Guide to Environmentally Sustainable Homes https://www.yourhome.gov.au/?gclid=EAIaIQobChMI9pCr5P799QIVepFmAh1EEg3vEAAYASAAEgIUnPD_BwE&gclsrc=aw.ds

- Ausgrid heating and cooling guides - https://www.ausgrid.com.au/Your-energy-use/Save-energy-at-home

- Link to the energy made easy website – https://www.energymadeeasy.gov.au/

YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

Questions ?

And hopefully some answers…….

Adam Corrigan
Your Energy Friend
adam@yourenergyfriend.com.au
0417 011 728

YOUR ENERGY FRIEND

Wingecarribee SHIRE COUNCIL

Miles Lochhead

Sharing his journey as an early adopter

disRupting eneRgy

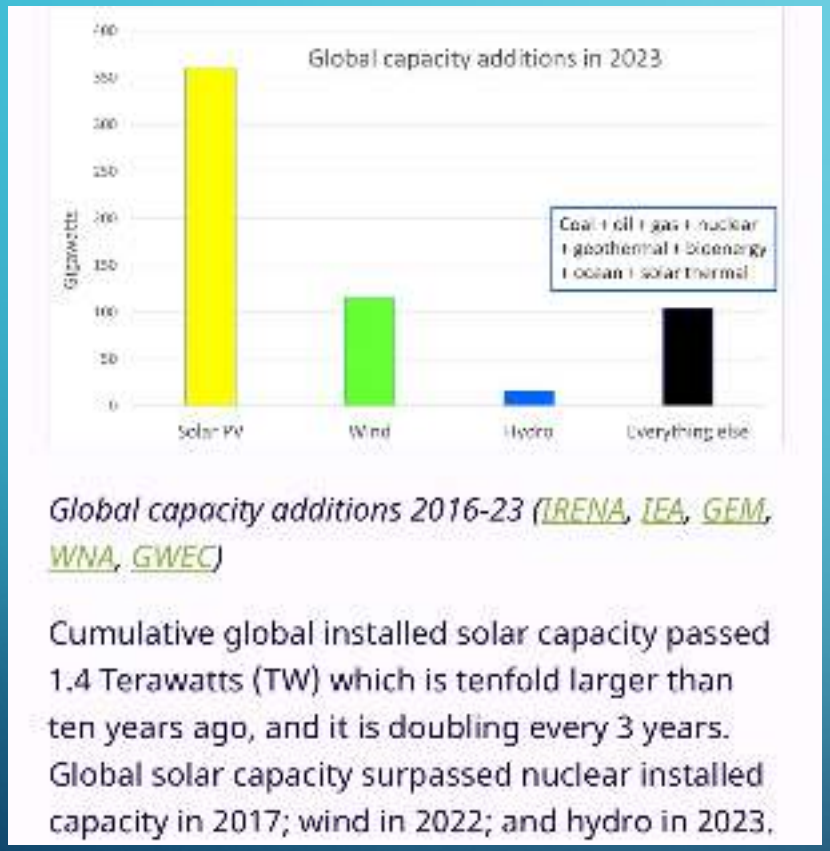
(a personal experience)

winzero
WINGECARRIBEE NET ZERO EMISSIONS

FUTURE FORUM – 7 SEPTEMBER 2024

miles lochhead
zeRRRo
0409 038 366

why Renewables? 10x +



Global capacity additions 2016-23 (IRENA, IEA, GEM, WNA, GWEC)

Cumulative global installed solar capacity passed 1.4 Terawatts (TW) which is tenfold larger than ten years ago, and it is doubling every 3 years. Global solar capacity surpassed nuclear installed capacity in 2017; wind in 2022; and hydro in 2023.

ouR jouRney – 2.3 ⟹ 17.8kW

- Based in Mittagong ~120k south of Sydney. House aspect is 10^0 East of North, on North sloping block.
- September 2010, started solar journey with 12 x 190W Solarfun panels (all NNE facing,) and Aerosharp 2kW inverter – Also installed Edwards Solar thermal hot water system – 'free' hot water for 13 years
- SUNCROWD September 2017, upgraded with 12 additional Tindo 265W panels (3870 W NNE and 1590 W WNW) with Enphase microinverters and added a Tesla Powerwall2
- November 2021, retired original Solarfun panels (reused) and upgraded our electrical system to 3 phase, installed additional capacity
- NB old system did not comply with AS AS/NZS 5033:2021. AS / NZS 5139:2019 so contractors could not reconfigure (move)!

2009

2010

Generation 2010-2024 (MWh) -Solarfun: 33.58 (removed); Enphase: 47.4; Fronius: 38.9

2017

2021

install configuRation

- **Total now = 17.8kW** (as below - 4 extra 330W Tindo panels and 38 x 360W MSquare panels [**all Aussie**!])
  - 3180W NNE (originally - Tindo 12 x 265 W [2017, half West, half North, all relocated to North 2021])
  - 1320W NNE (Tindo 4 x 330 W [added 2021])
  - 7000W WNW (MSquare 20 x 350W) [added 2021]
  - 6300W ENE (MSquare 18 x 350W) [added 2021]
- [total 54 panels – roof pitch ~23^0].
- Upgrade included install of a new Neurio device for the Powerwall2 Gateway.

install and Retailer summaRy

- **Installs:**
  - 2010 – Solargain;
  - 2017 – Sunny Afternoons/IJED (through Suncrowd Community Solar Bulk Buy scheme);
  - 2021 – Roland Lawrence Electrical

- Retailers:
  - Had been with electricity retailer **Powershop for 6+ years.** Following last install, we changed our supply plan to 'EV' with time-of-use. (Dec 2021) – then FIT $0.05/kWh.
  - Moved to Amber Jan 2023 – more later….

202?

some stats - solar

- **Total generation** Sep 2010 to July 2024: 123.2 MWh
  – now 22.1 MWh or 60 kWh / day for **2023** **(since upgrade)**
    - **Gen Value @$0.27 = $33,289. ~ $6,000pa for at least 15 more years…..**
- **Total usage** Sep 2010 to July 2024: 53.31 MWh, or 10.29 kWh/day ave prior to EV – (Post EV **2022** - 7.4 MWh or 20.27 kWh / day ~ $1997pa)
    - **Usage Value of total @$0.27 = $14,393**
- **Powerwall total** Sep 2017 to Jul 2024 – Charge = 18.76MWh Discharge 15.77MWh

moRe stats

- **Net Feed in Tariff** credits Sep 2010 to Jun 2016: $11,079
- **Net Feed in Tariff** credits Jul 2016 to Jul 2024: $2,635 (Powershop) and ~$1000 (Amber)
- **Total credits >$14.6k**

otheR paRts of the jouRney

- June 2021 we purchased a **Tesla Model 3** and installed a Tesla Gen3 Wall Connector (November 2021)
- October 2023 we purchased a **Tesla Model Y** (Sold Model 3)
- Next Powerwall 3???

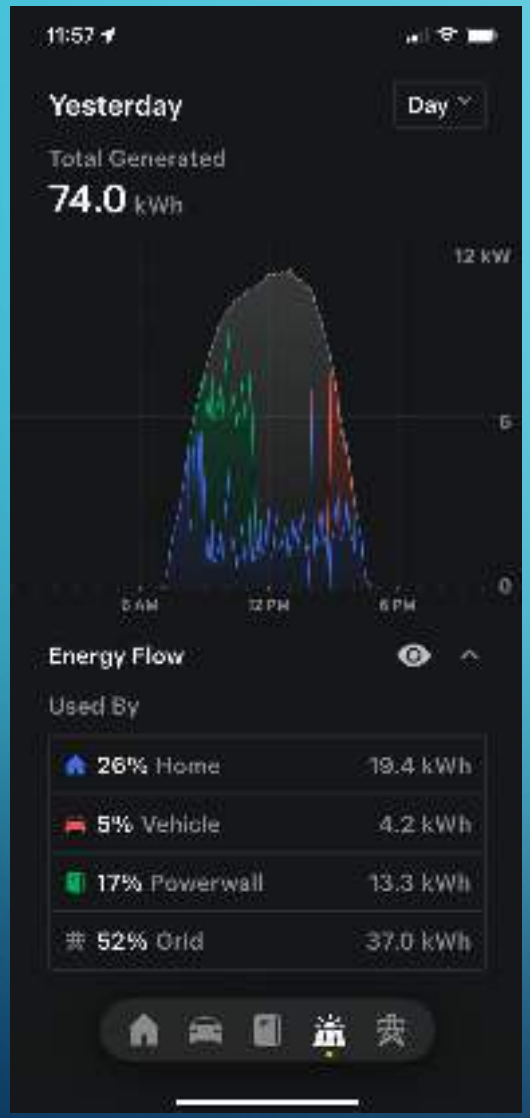
stats - EV

- **EV cars' consumption** @148Wh/km = 4454 kWh or ~$1,202 @ $0.27 or ~$311 opportunity cost @ $0.07 foregone FIT
- Equivalent petrol spend @8 litres/100ks = $4,334
- Actual out-of-pocket after 44,000km <$200

monitoRing

- Combination of Efergy/Enphase/Tesla/Fronius
- Using ChargeHQ app for smart charging Tesla Model3
- Plus Amber app and;
- Netzero app
- and Solcast…


INSTANT
0.420
kW
TARIFF
1
06:32:28
date
mode
efergy



PERFORMANCE

Is your system working?

kWh/kW = generation/inst kW

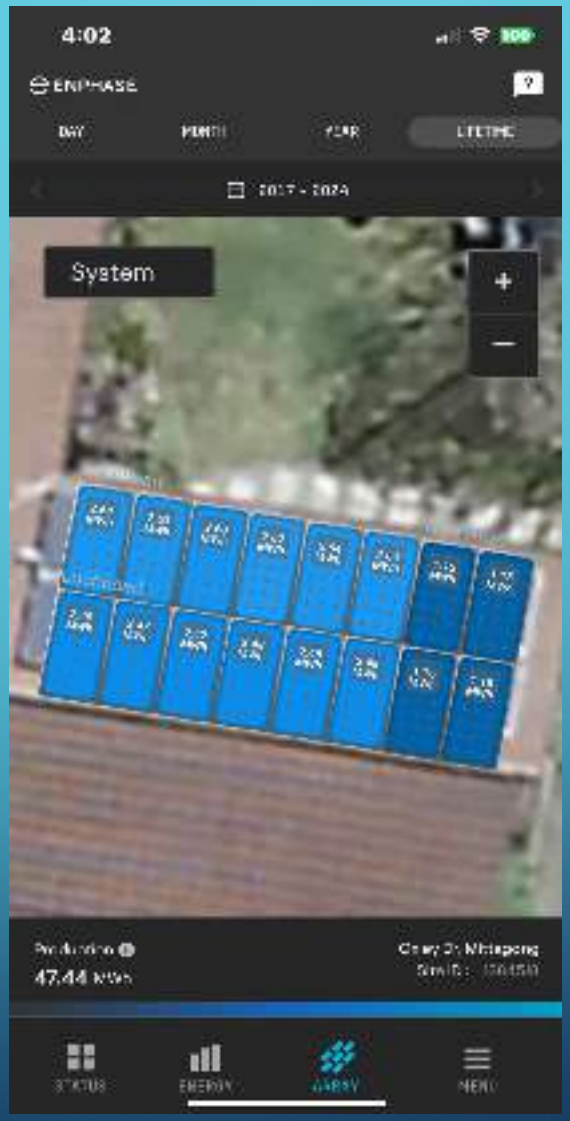
For 14 May 2024:

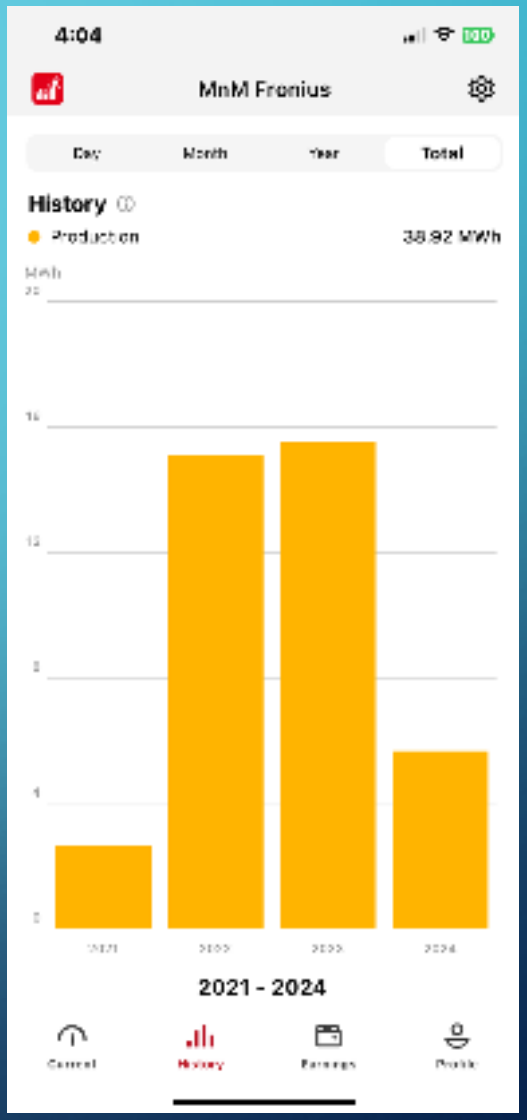
Rod	4.11
Miles	3.06

For 19 November 2023:

Rod	5.55
Miles	6.56


4:04
ENPHASE
Grid Dependence:


4:02
ENPHASE
System
47.44 kWh


4:04
MnM Fronius
Day
Month
Year
Total
History
Production
38.92 MWh
2021 - 2024


6:30
Solar
Today
Day
65.8 kWh
Energy Flow
Used By
11% Home
7.4 kWh
21% Powerwall
13.9 kWh
5:14
Today
Day
49.3 kWh
38.5 kWh
To Home
11.2 kWh
To Powerwall
1.6 kWh
To Grid
Energy Destinations
74%
28%
8%
Download My Data
3:29
Solar
Tue 15 Dec
Day
125.4 kWh
Energy Flow
Used By

Netzero app

It can be done…

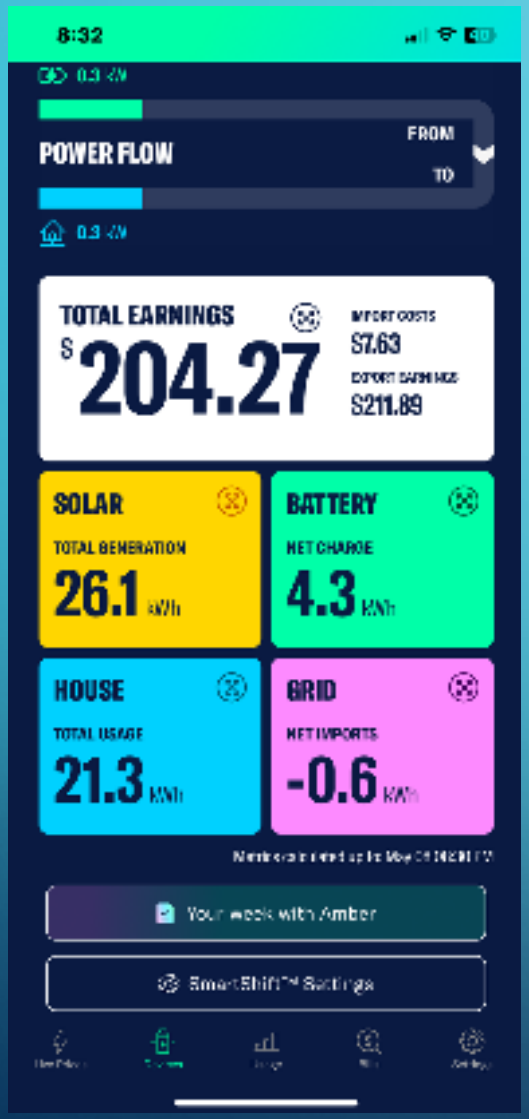
the jouRney to ambeR

- Switched to **Amber Electric (Carbon Neutral Plan) in January 2023** - in credit ~$1000 after 18 months
- Had been participating in a **Virtual Power Plant (VPP)** trial with Evergen/Powershop sharing energy back to the grid
- Amber now does this for us using SmartShift

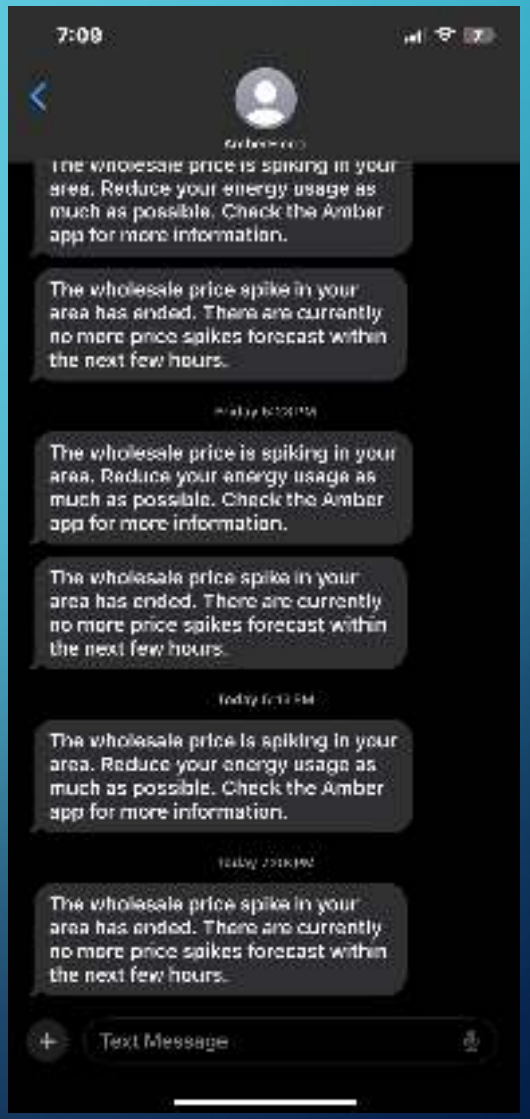
ambeR

amber

- Average FIT two last bill was $0.063 (after spike $5.763)
- Recent spike yielded $215.19 - $9.76 for 22kWh
- 3 month FIT ave - $0.307 (12 months $0.113
- Average **rate charge** last week was $0.195 (after spike $0.306)
- 3 month Usage ave - $0.257
- All run by SmartShift
- Great Customer Service
- Participating in ‘Alpha’ EV battery trial – now Beta


8:32
POWER FLOW
FROM
TO
TOTAL EARNINGS
$ 204.27
IMPORT COSTS
$7.63
EXPORT EARNINGS
$211.89
SOLAR
TOTAL GENERATION
26.1 kWh
BATTERY
NET CHARGE
4.3 kWh
HOUSE
TOTAL USAGE
21.3 kWh
GRID
NET IMPORTS
-0.6 kWh
Your week with Amber
SmartShift™ Settings


5:30
2578
amber
WARNING - PRICE SPIKES
$15.75
6%
$15.66
$14.17
Price Spikes
The wholesale price is currently spiking.
Reducing your usage of power-hungry appliances now is the best way to maximize your savings over the year.
Click here for more information
FORECAST - GENERAL USAGE
NOW
$15.75
32¢
37¢
39¢
6%
9%
10%


7:09
The wholesale price is spiking in your area. Reduce your energy usage as much as possible. Check the Amber app for more information.
The wholesale price spike in your area has ended. There are currently no more price spikes forecast within the next few hours.
The wholesale price is spiking in your area. Reduce your energy usage as much as possible. Check the Amber app for more information.
The wholesale price spike in your area has ended. There are currently no more price spikes forecast within the next few hours.
The wholesale price is spiking in your area. Reduce your energy usage as much as possible. Check the Amber app for more information.
The wholesale price spike in your area has ended. There are currently no more price spikes forecast within the next few hours.
Text Message

is ambeR for you??

- Energy systems have been designed for peaks, need to design for the troughs that is AMBER/VEN
- Horses for courses!
- Best for those with large solar and battery
- Watch the V2L/H/G space
- For EV owners, UQ trial and future Deakin University Project
- See email from AMBER CEO
- Fossil Off!!
- VEN is no fuss, hands off Peer to Peer trading – Derek

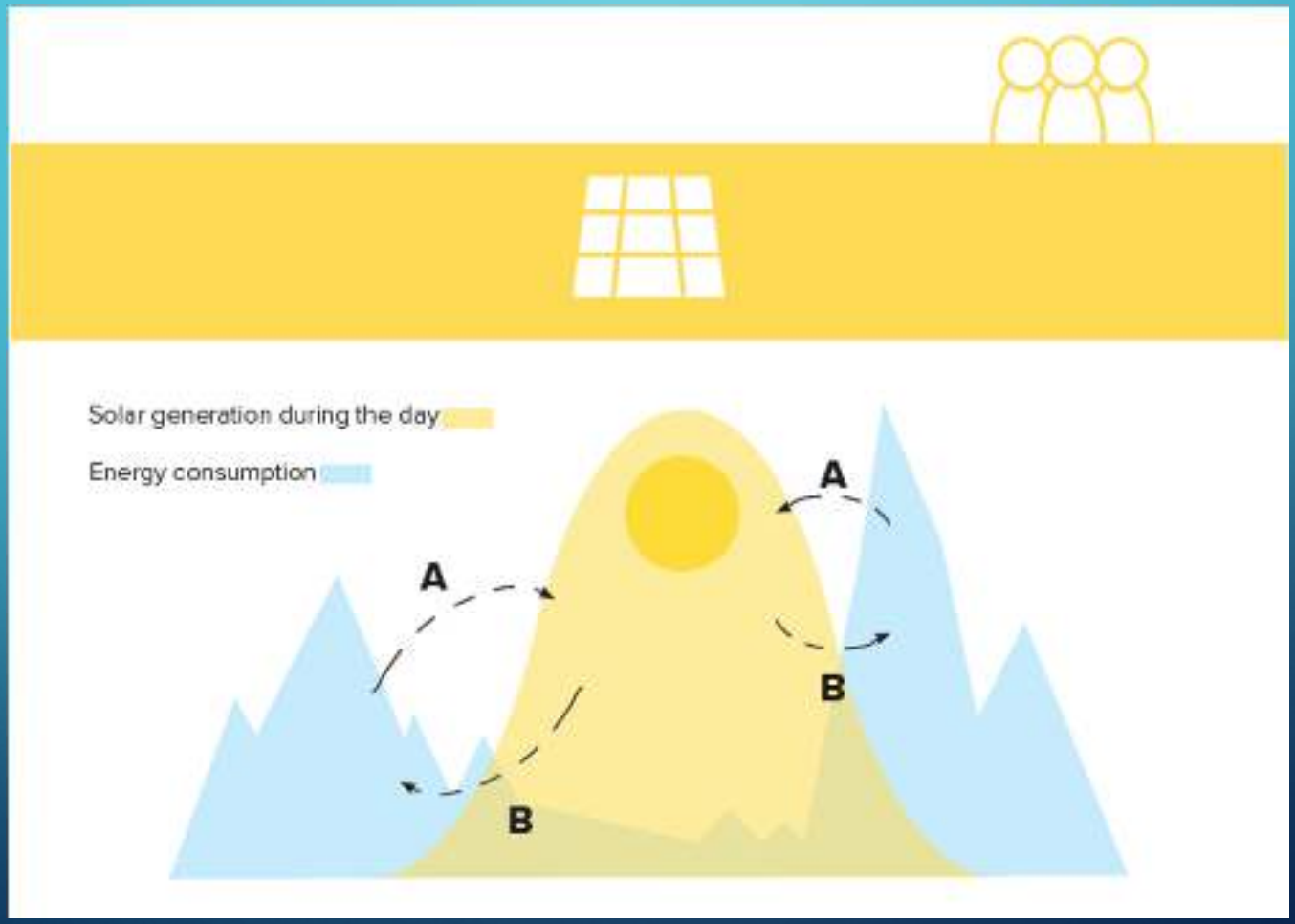
amber

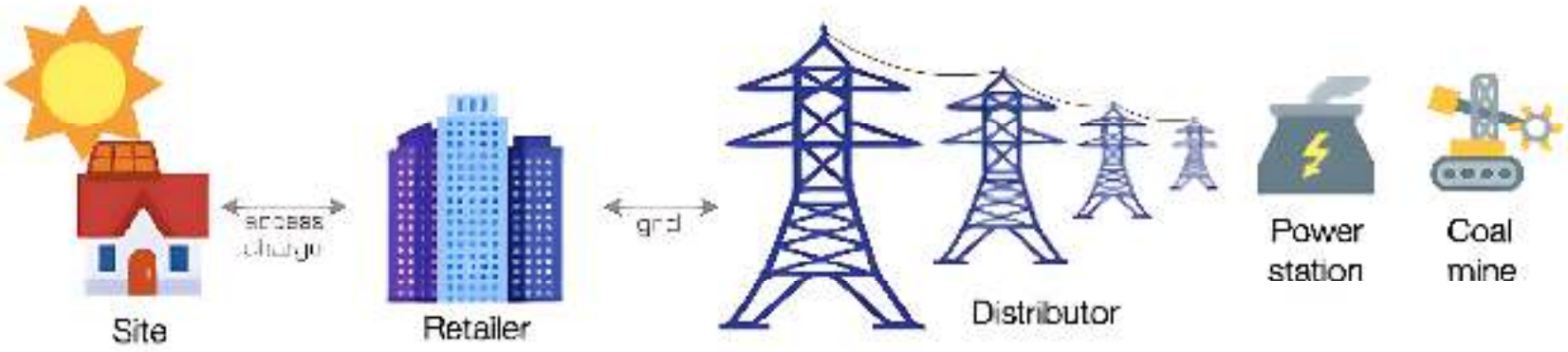
youR jouRney? - bewaRe

- Good / bad ??? (*Tier 1*)
  - ***Crap solar***
  - ***Solar Quotes***
- Legitimate
- How much $
- Size
- Warranty
- Weather proof
- Expandable
- Display / data
- -ve FIT
- Lets NOT talk about the budget*….

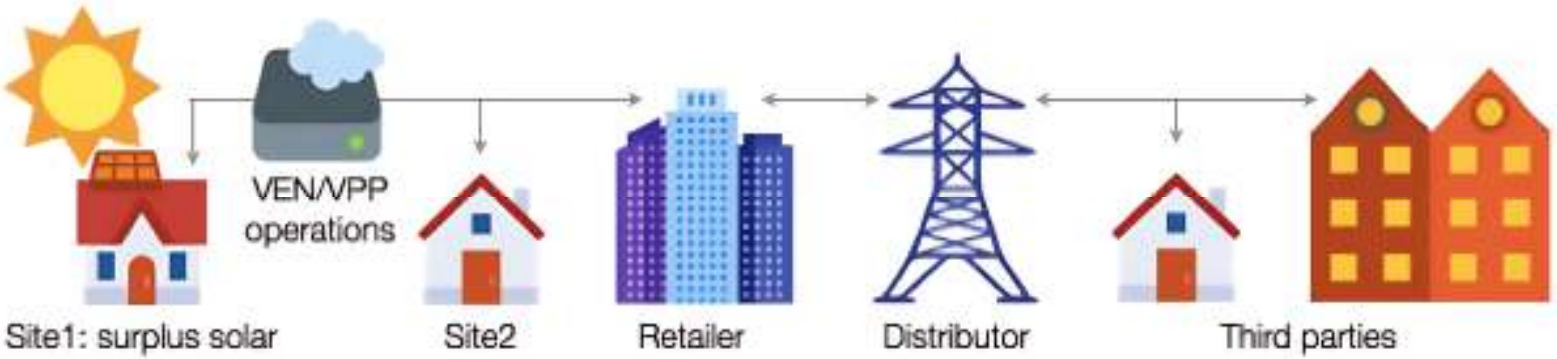
*Except $27.7m to integrate consumer energy resources!

secRets? – Rethink your eneRgy use



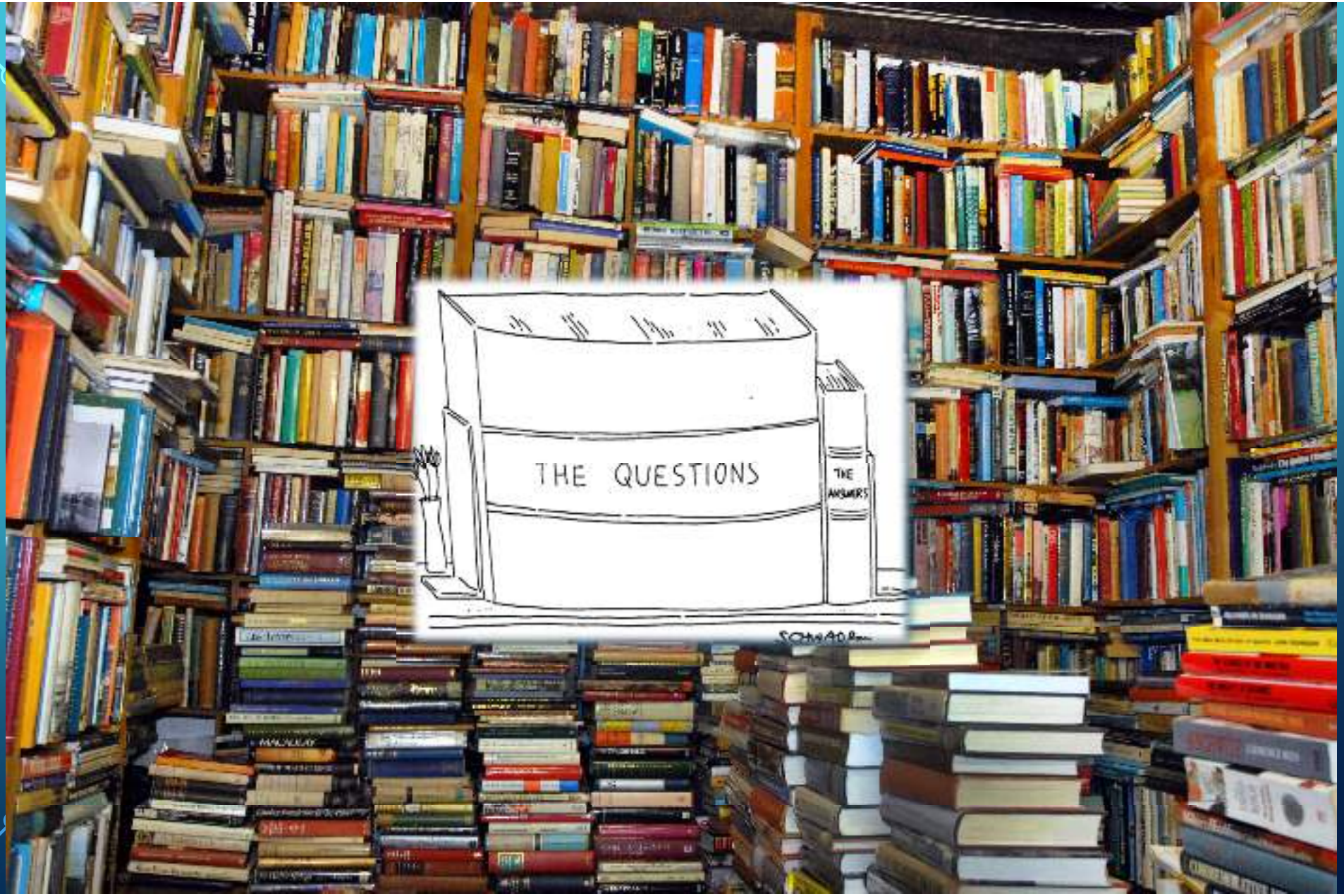


1.Traditional energy sourcing



2.Integrated energy solution (VEN)

Image: ReThink Sustainability


THE QUESTIONS
THE ANSWERS

miles lochhead

zeRRRo

0409 038 366

Thank you!

miles.lochhead@gmail.com

Questions?

Thank you for attending the first session of Southern Highlands Future Forum

Go outside and:

- **Have a FREE sausage sizzle,**
- **Grab a coffee**
- **Meet some of our local businesses**
- **Get a free virtual energy assessment of your home**
- **Have a look at some EVs**

Wingecarribee SHIRE COUNCIL

winzero
WINGECARRIBEE NET ZERO EMISSIONS

We're with you

Stay for Session 2 - from 1:30pm

Exploring electrification and energy efficiency in your home, finding savings for you

John Buchelin
Rewiring Australia
Project Manager

Adam Corrigan
Founder
Your Energy Friend

Jon Jutsen
Electrified his own home
45 Years of experience in energy and carbon management
Recently stepped down from CEO of Race for 2030