

Home Batteries

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Introduction –

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A brief history of places worked, lived and survived.

My Adventures

State Electricity Commission of Victoria (SECV) –
all Latrobe Valley Power Stations – making lots of Electricity

Aluminium Bahrain – Generating lots of Electricity to make Aluminium

Qatar Gas – making lots of Liquefied Natural Gas (LNG)

ALCAN Gove – turning lots of Bauxite into Alumina

Energy Australia – Yallourn W Power Station – Training Power Station Ops

ALINTA - Loy Yang B – Training Power Station Ops & Maintenance

BCH – Community Advisory Committee – Sustainability / Clinical Trials / OHSA

Why do Home Batteries Matter?

- Renewable Energy Transition
- Energy Independence & Resilience
- Cost Savings
- Broken Hill and Northern Territory fiasco

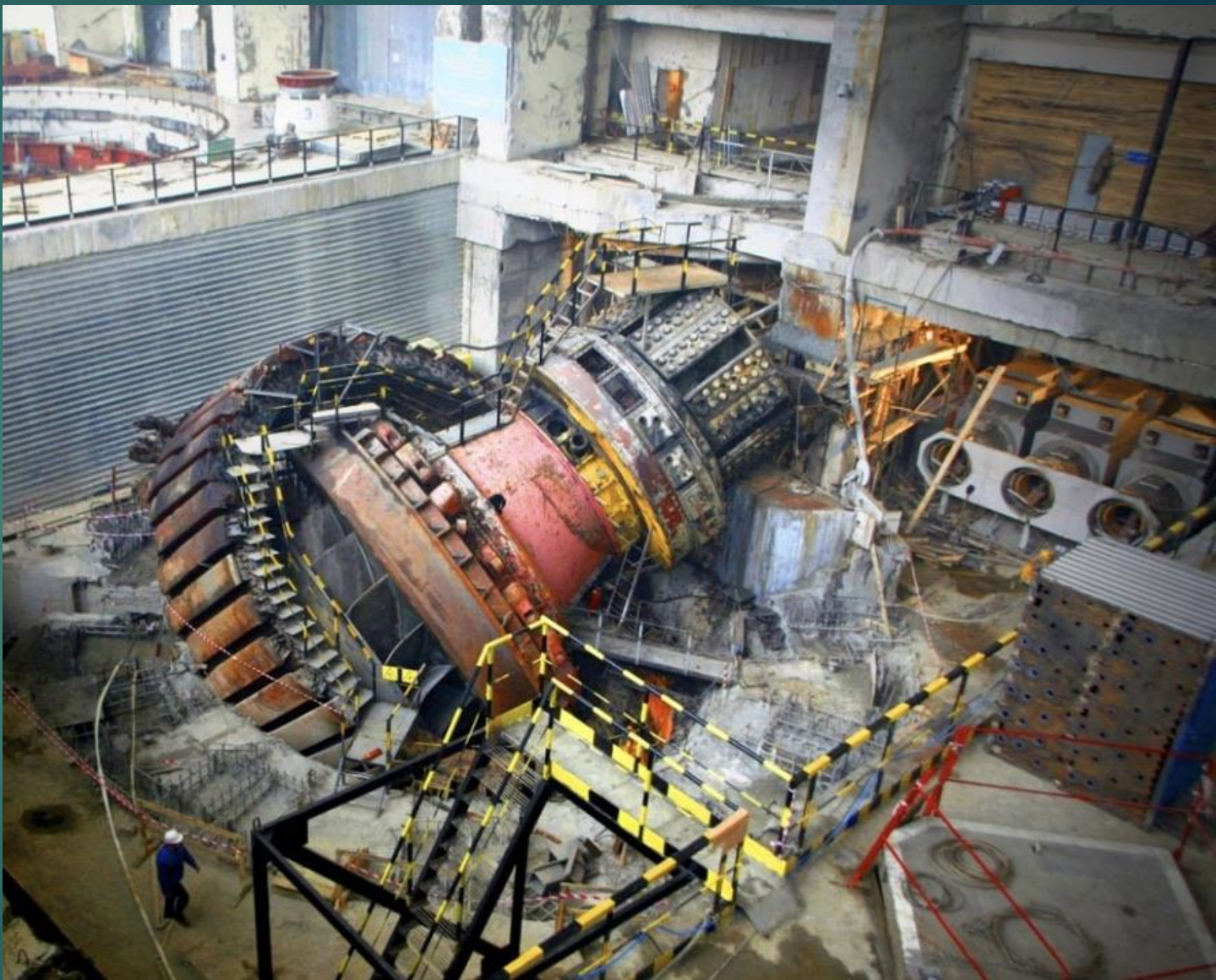
Things are changing rapidly now,
because we can generate our own
power and store it within our own
homes and community batteries.

But why bother?











What happens when The Ducks DO Line Up?







The Broken Hill Outage

- 220kV Transmission line blown over by massive windstorm
- 1 of 2, 25MW 50-year-old Diesel Fired Gas Turbines on Standby (one out of service and not available) 
- 200MW Silverton Windfarm about 10kms away 
- 50MW/50MWh Big Battery - Islanding Mode operation turned off by order of AGL the owner. 
- 53MW Solar Farm just across the road 
- Nothing to be done till after the installation of a Compressed Air Storage System in 2027 

Northern Territory

They installed three major Solar Farms in the Northern Territory about five years ago.

They have finally been given permission to connect to the grid after five years of regulatory mayhem.

The Latrobe Valley's brown coal fired power stations, The Ageing Fleet –

Hazelwood was around 55 years old when shutdown

Yallourn W Power Station – 1974 & 80 (50 years old)

Loy Yang A – 1984 (40 years old)

Loy Yang B – 1994 (30 years old)

They were designed to operate for 25 – 30 Years

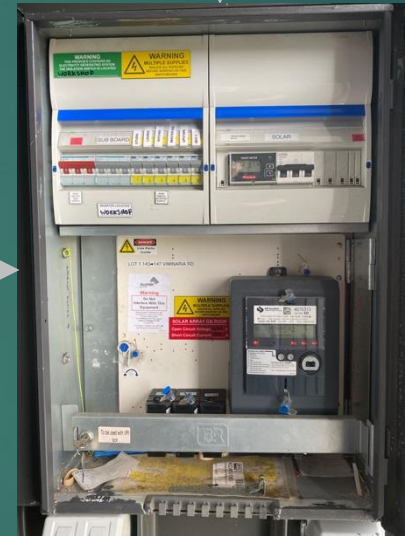
What we'll be covering

- Basics of Home Energy Storage
- How do Home Batteries Work
- Benefits and Considerations
- Real World Applications
- Q&A & Next Steps

Basics of Home Energy Storage

House Supply to or from the grid

240 Volts AC @ 50 Hertz



Grid Connection

Main Switchboard

What's the difference between?

- Grid Follow Mode
- Grid Forming Mode

Grid Forming vs Grid Following ?

Grid Forming Inverters in Interconnected Systems



Grid Forming



Grid Following



Power



100% Grid Forming
0% Grid Following



75% Grid Forming
25% Grid Following



25% Grid Forming
75% Grid Following



0% Grid Forming
100% Grid Following

Grid Follow / Following Explained

Towing Kimbo home
from Mt. Erica to Moe



Grid FORMING inverter

Grid FOLLOWING inverter

Difference? SOFTWARE!

Solar PV Installed – Wersula Power Station 3.0

Solar PV Output from Panels



Direct Current (DC)

Fronius
Primo
Solar PV
Inverter



Fronius
Smart Meter



Grid Connection



House Supply to or from the grid
240 Volts AC

Strictly Grid Follow



DC from Solar PV

AC Supply
to or from Grid



AC Supply to House



Fronius
Primo Gen 24
Solar PV Inverter

BYD HV
Battery



DC Supply
To or From
the Battery

Grid Follow or
Grid Following
+ delay



DC from Solar PV



Solar PV
Inverter



AC Supply
to or from
the Grid

AC Supply to House



TESLA Gateway
Switchbox

TESLA Power Wall 1 & 2 need a Solar PV Inverter
TESLA Power Wall 3 has an inbuilt Solar Inverter



DC from Solar PV

AC Supply
to or from Grid

AC Supply to House

25kW
DC Car
Charger

Gateway
Switch box

SIGENERGY's
SigenStor

Note : Supports 25kW
Bi-directional Car Charging
The Future!



How Do Batteries Work



A QUICK LOOK AT
HOW A BATTERY
WORKS



USING THE WORLD-
FAMOUS WATER
ANALOGY

Voltage

Voltage can be represented by the pressure in a water tank forcing water through the pipe



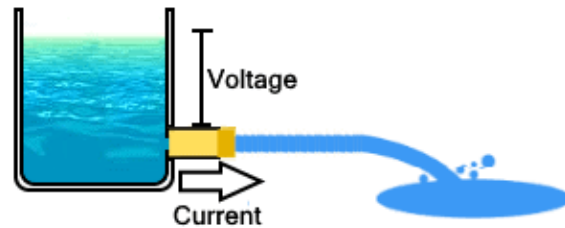
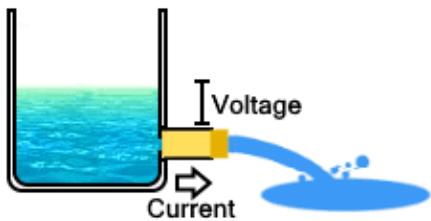
Resistor

The small diameter of the pipe restricts water flow, similar to the way a resistor restricts the current of a circuit



Current

The water flowing through the pipe represents the electrical current, the more pressure there is the more current you get



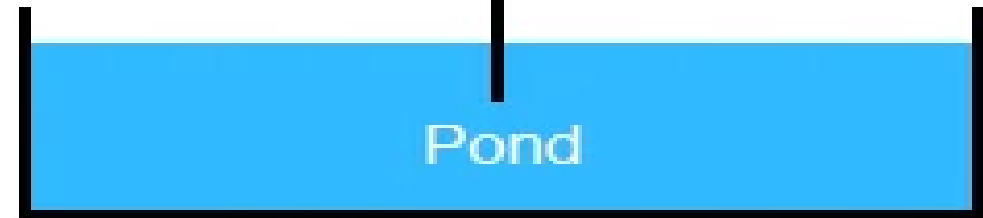
Energy Stored

Water Flow
Power Flow
Megawatts



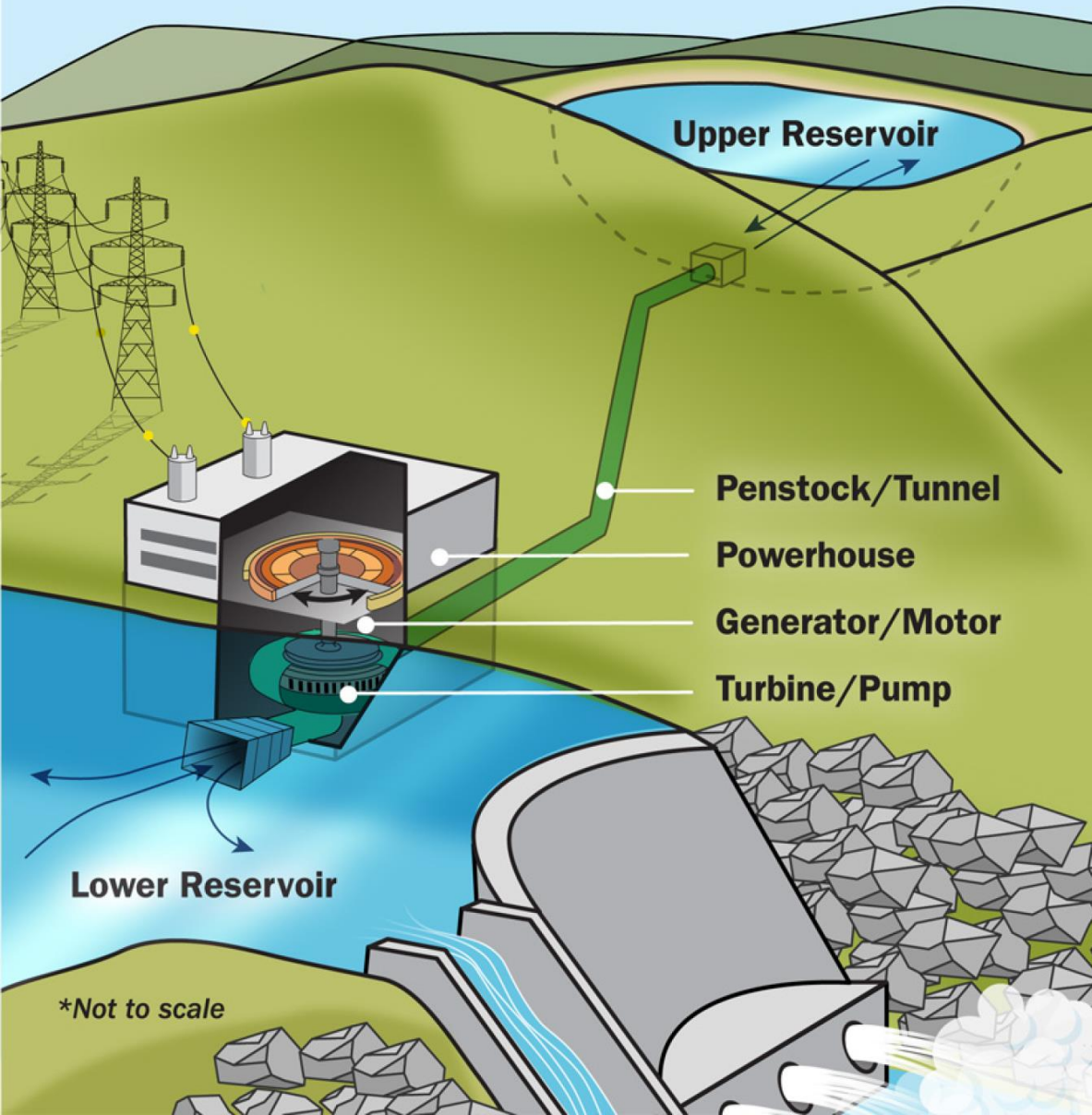
Pump

Gen



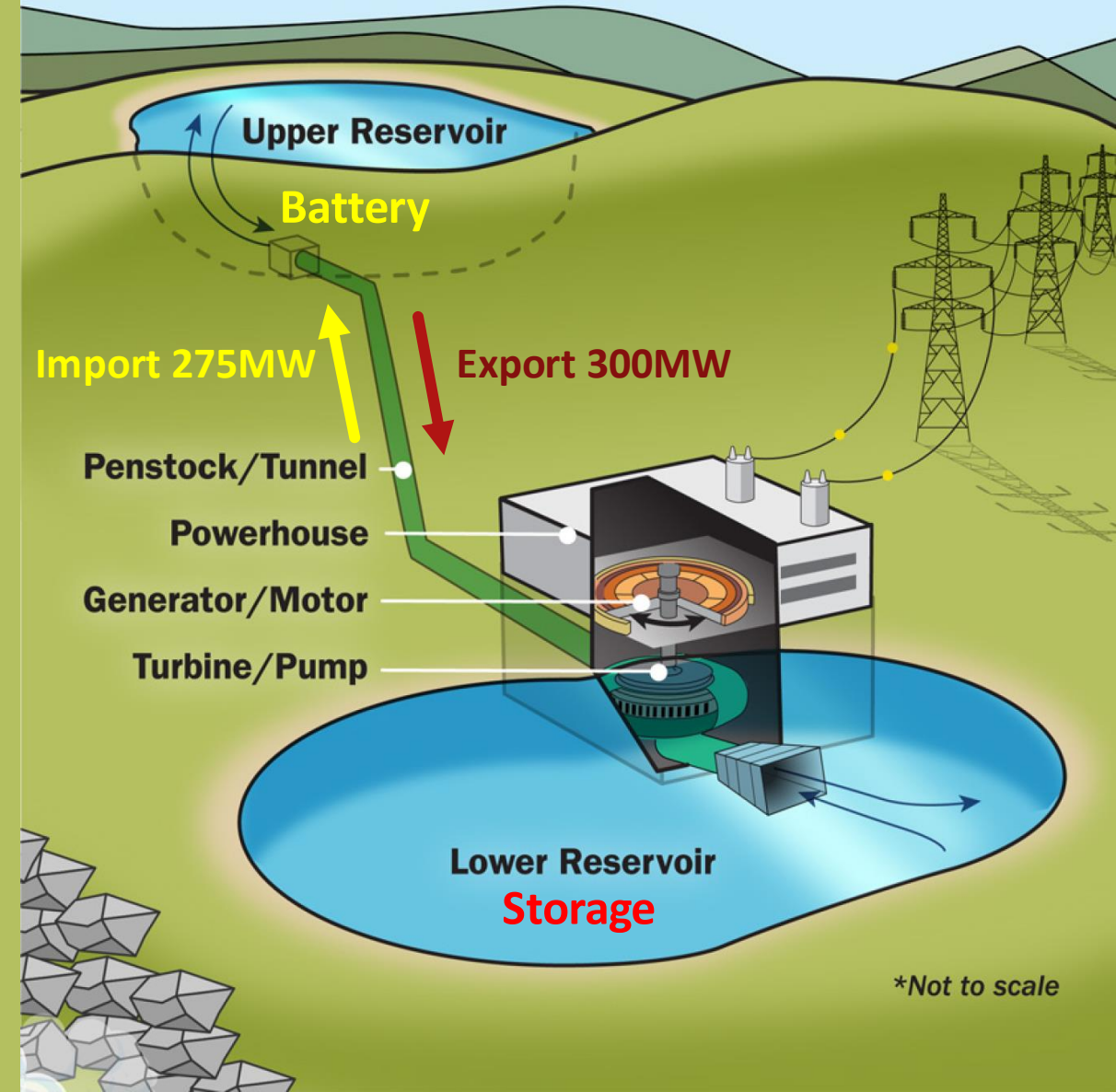
OPEN-LOOP PUMPED STORAGE HYDROPOWER

Projects that **are** continuously connected to a naturally flowing water feature



CLOSED-LOOP PUMPED STORAGE HYDROPOWER

Projects that **are not** continuously connected to a naturally flowing water feature



Types of Home Batteries

Battery Chemistry

Lead Acid Batteries

Lithium-Ion Chemistries

- PowerWall 2 – Lithium Nickel Manganese Cobalt (NMC)
- PowerWall 3 – Lithium Ferro Phosphate (LFP)
- BYD – Lithium Ferro Phosphate (LFP) Blade Design

Battery Safety – Statement from the Queensland Government website

Fact: EVs are far less likely to catch fire than petrol vehicles

Worldwide studies show EVs have a far lower risk of catching fire than internal combustion vehicles (ICE).

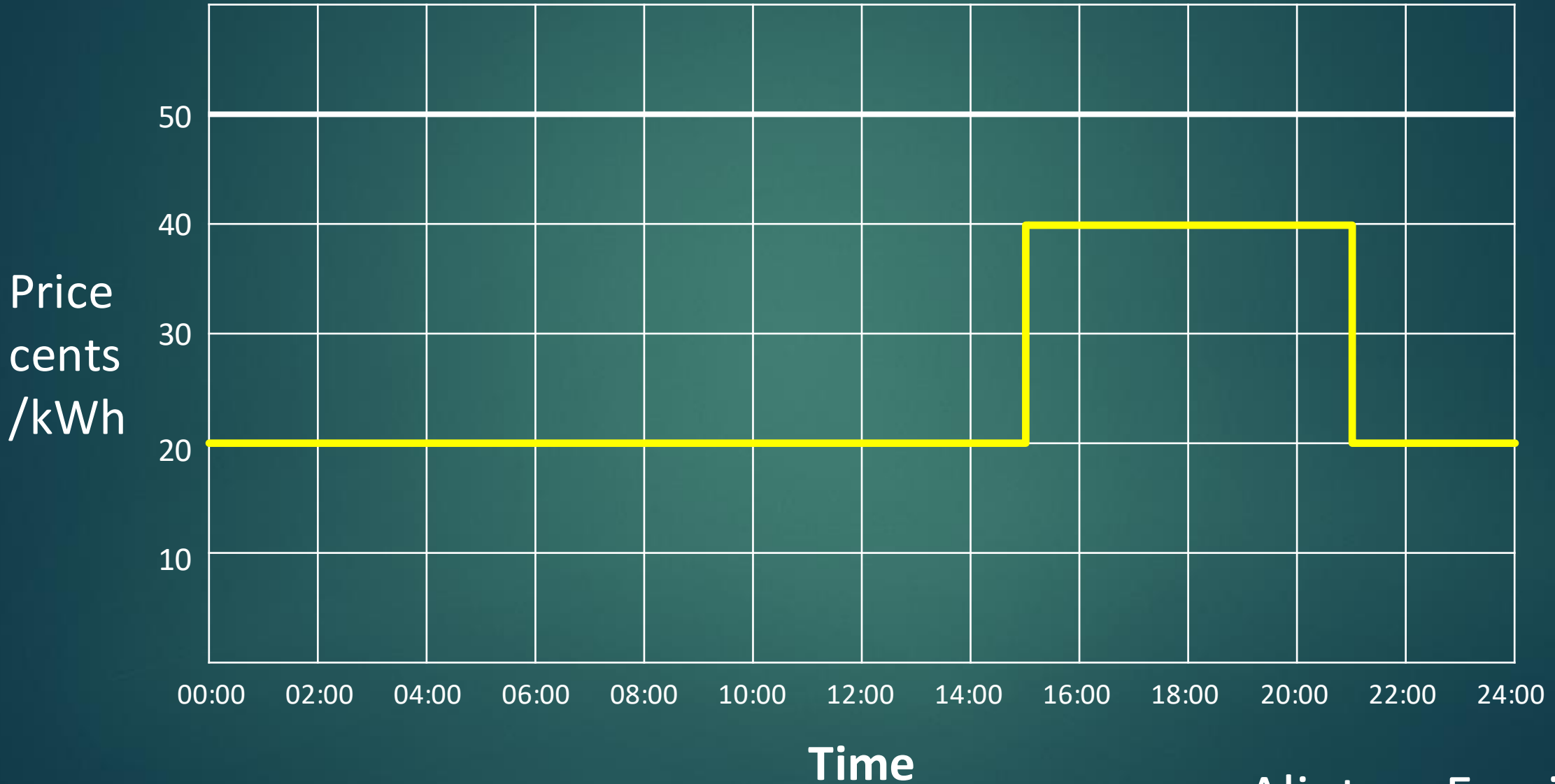
The International Energy Agency reports there are now 40 million EVs on the road worldwide. From 2010 to June 2024, EV FireSafe recorded 511 verified passenger EV battery fires across the world.

It says 6 EVs caught fire in Australia between 2010 and September 2023. In comparison, there were 2,803 internal combustion vehicle fires in NSW alone in the 2022-23 financial year according to Fire and Rescue NSW incident data.

**EV vehicles are 100 times less likely
to catch fire than an ICE car.**

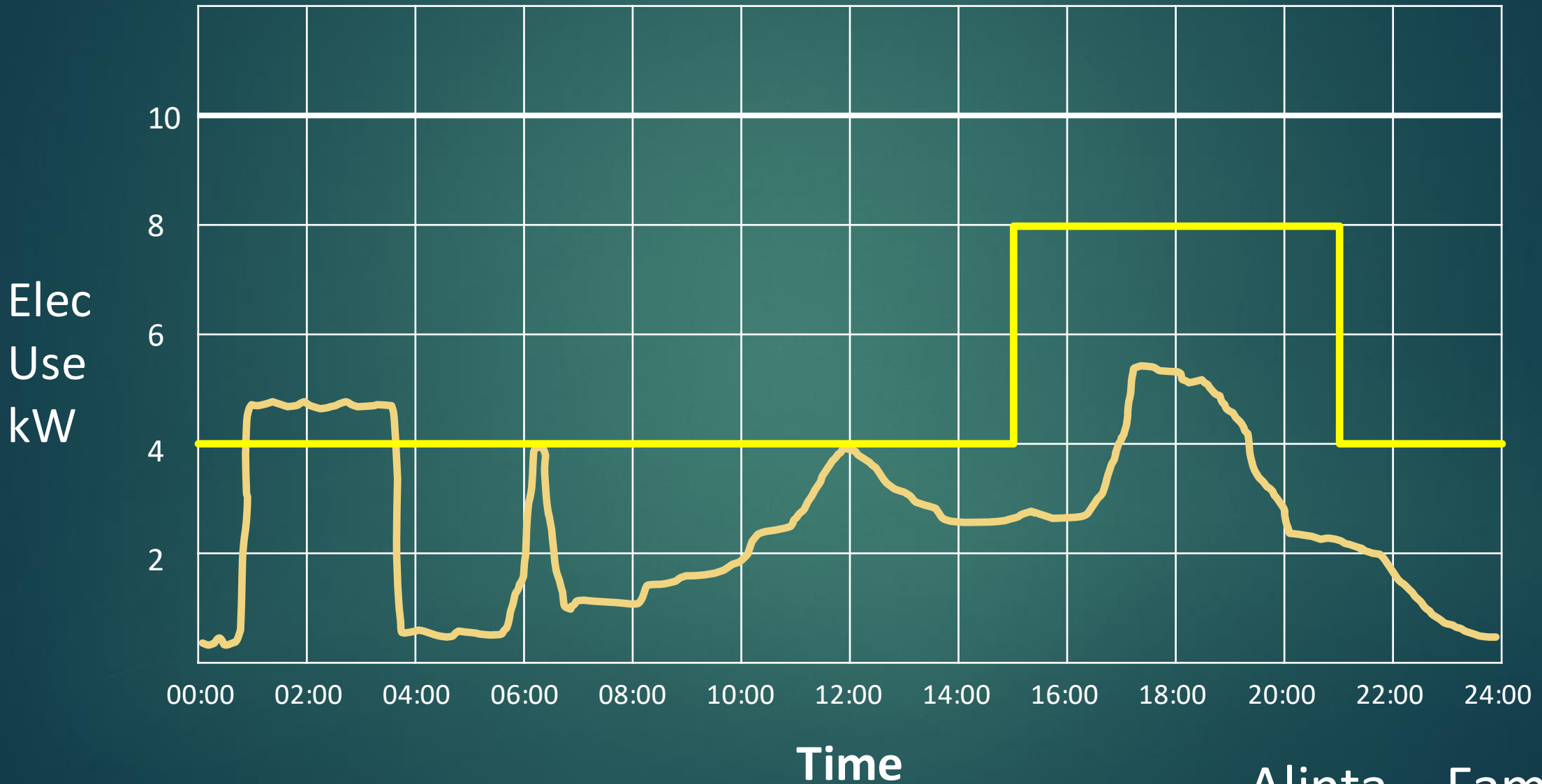
Benefits & Considerations of a Home Battery

Price of Electricity – Time of Use



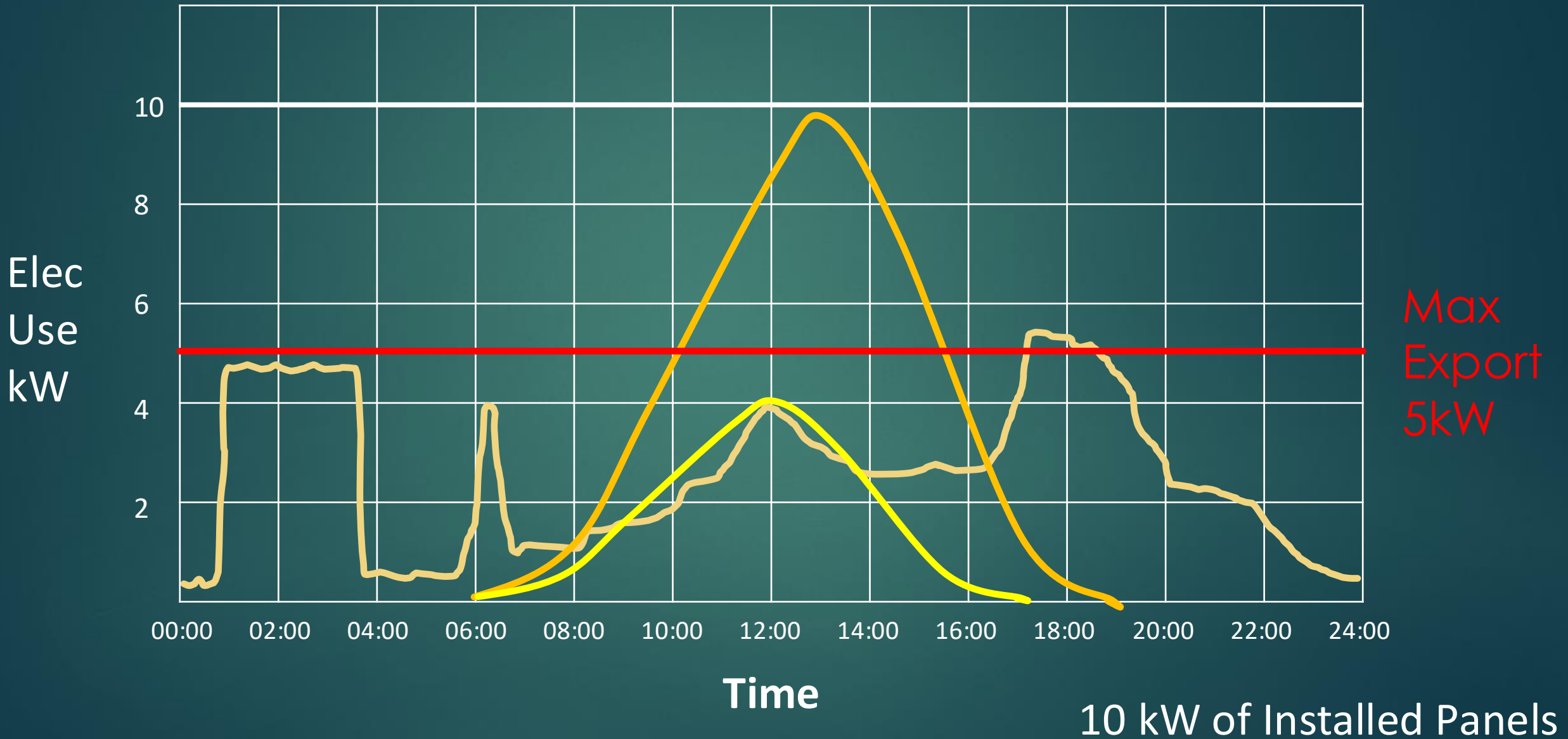
Alinta – Family Rate

Electricity – average daily consumption

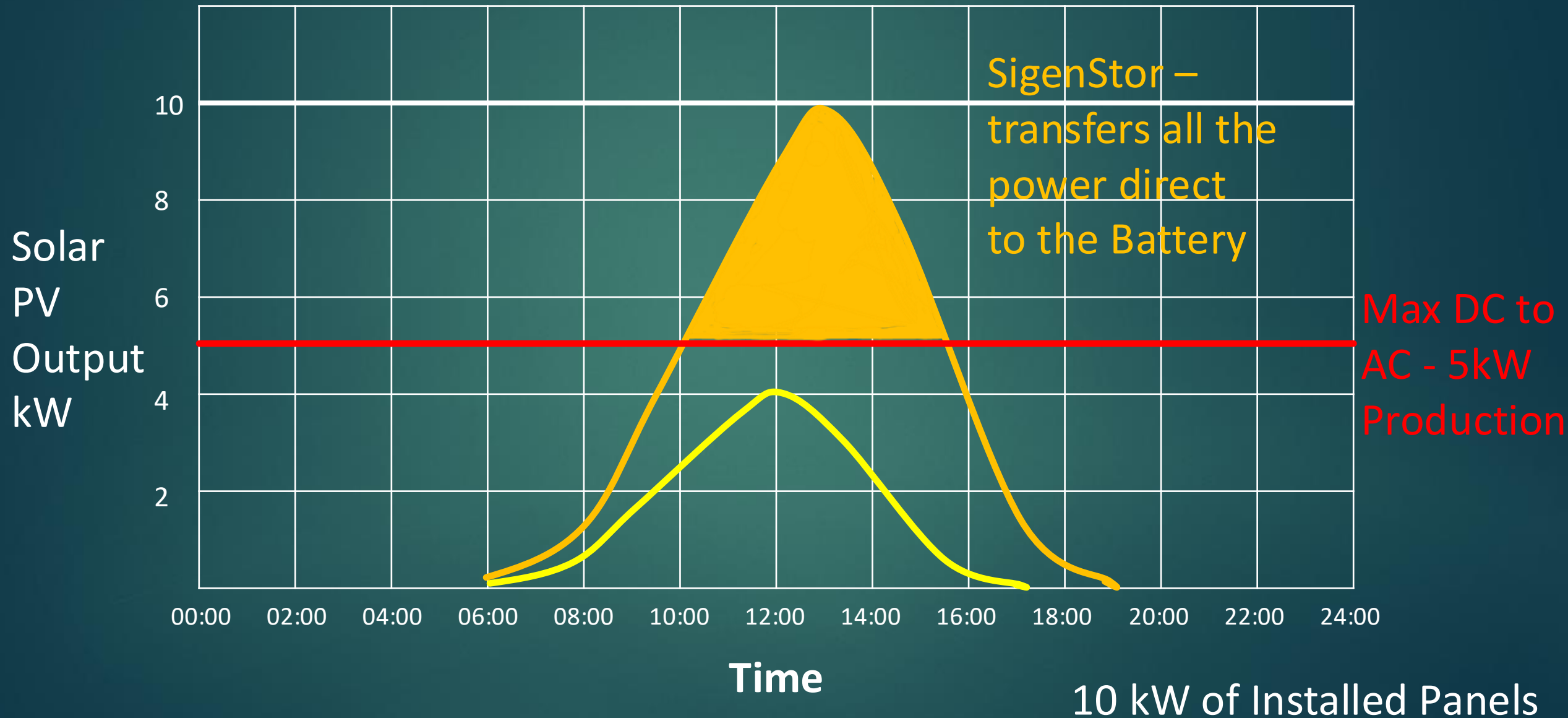


Alinta – Family Rate

Electricity – average Summer & Winter Solar Output

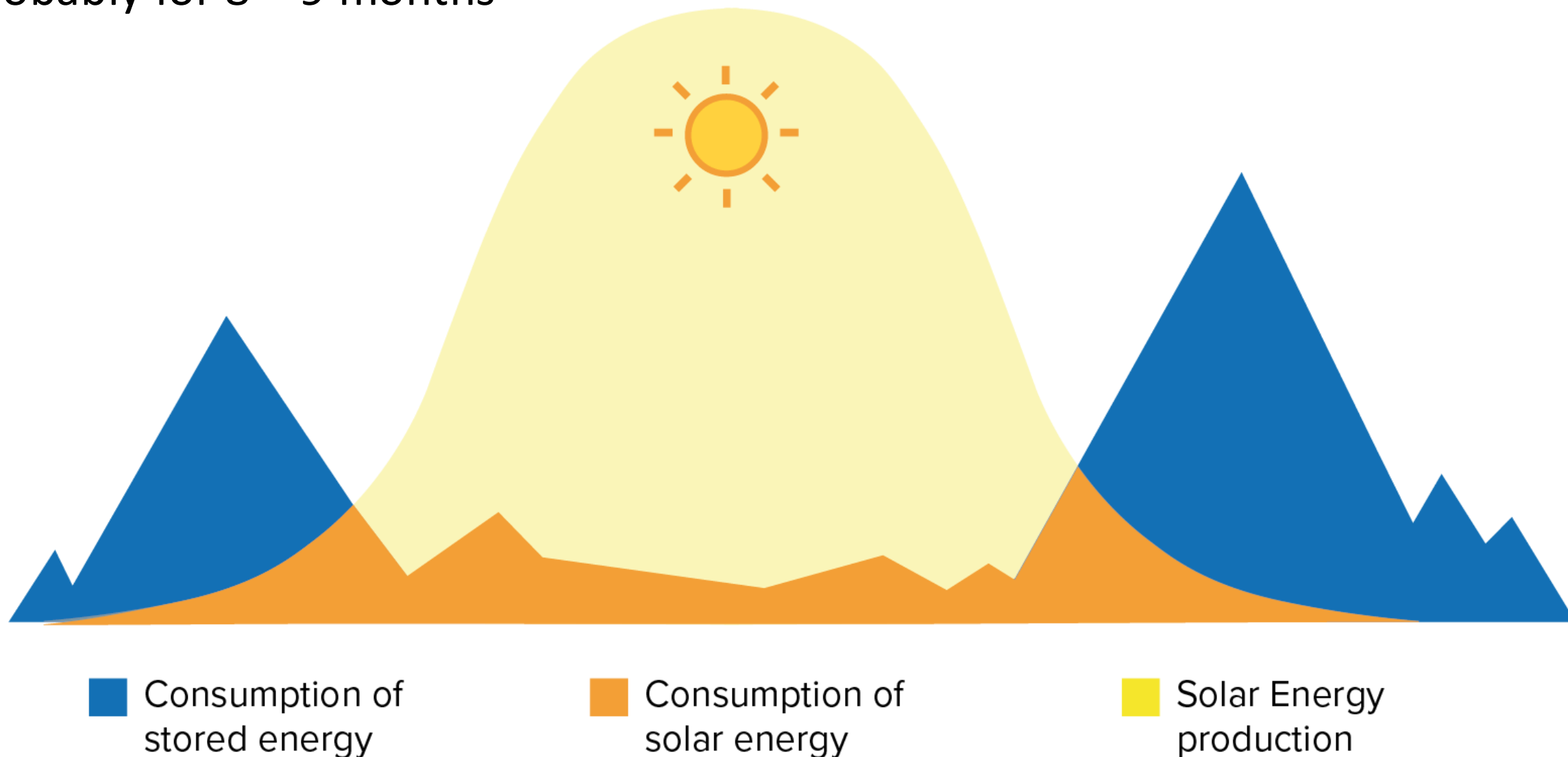


Solar PV Production – Sun Shining



The key is adding battery storage –

We can easily shift to Net ZERO Power Import in the sunnier months of the year probably for 8 – 9 months



Considerations for selecting a Home Battery and Solar PV

Note : Not all home battery systems are created equal!

Level	Lower Electricity Bill	Blackout protection	Solar PV Charges Battery during Power Outage	
0	Yes	No	No	?
1	Yes	Yes - but limited	No	?
2	Yes	Yes - Full	No	?
3	Yes	Yes - Full	Yes	?

These options need to be discussed with your installer and the features explored on the many YouTube Video's

Things to consider –

- Will a Battery sized to provide your power needs for 24 hours be enough?
- Battery sized to supply power for - 1 day, 2 days or 3 days?
- Enough inverter capacity to supply all your power needs or only partial power needs – fridges & lighting?
- Electric Vehicle charging?
- Can the battery be charged by Solar PV whilst the grid is not available?
- Future Proof? Bi-Directional EV Battery capability – V2X?

Real World Applications of Home Batteries

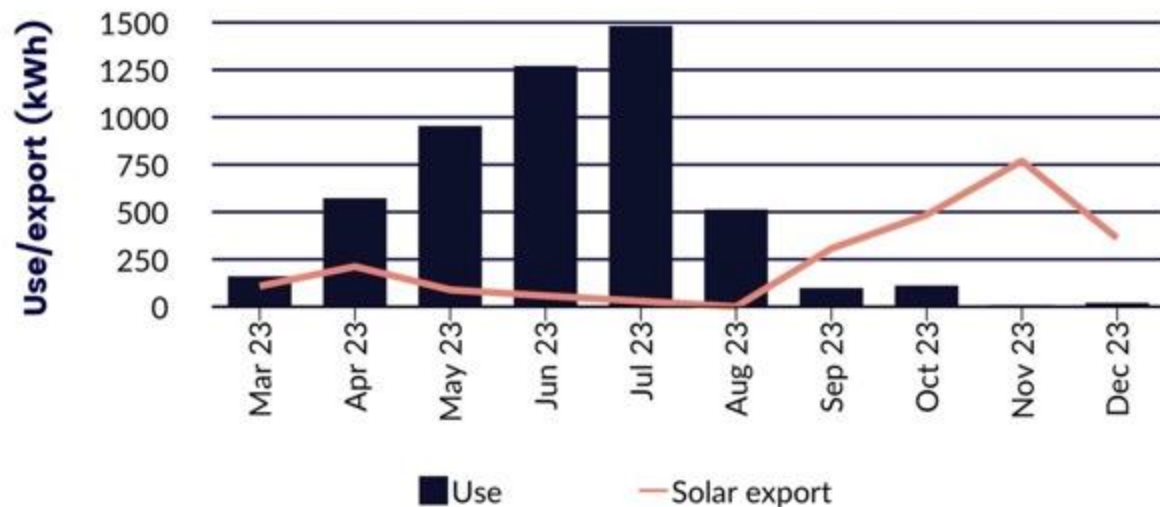
Wersula

Power Station 3.1

Islandable Microgrid by adding a battery and an Inverter for each of the three phases

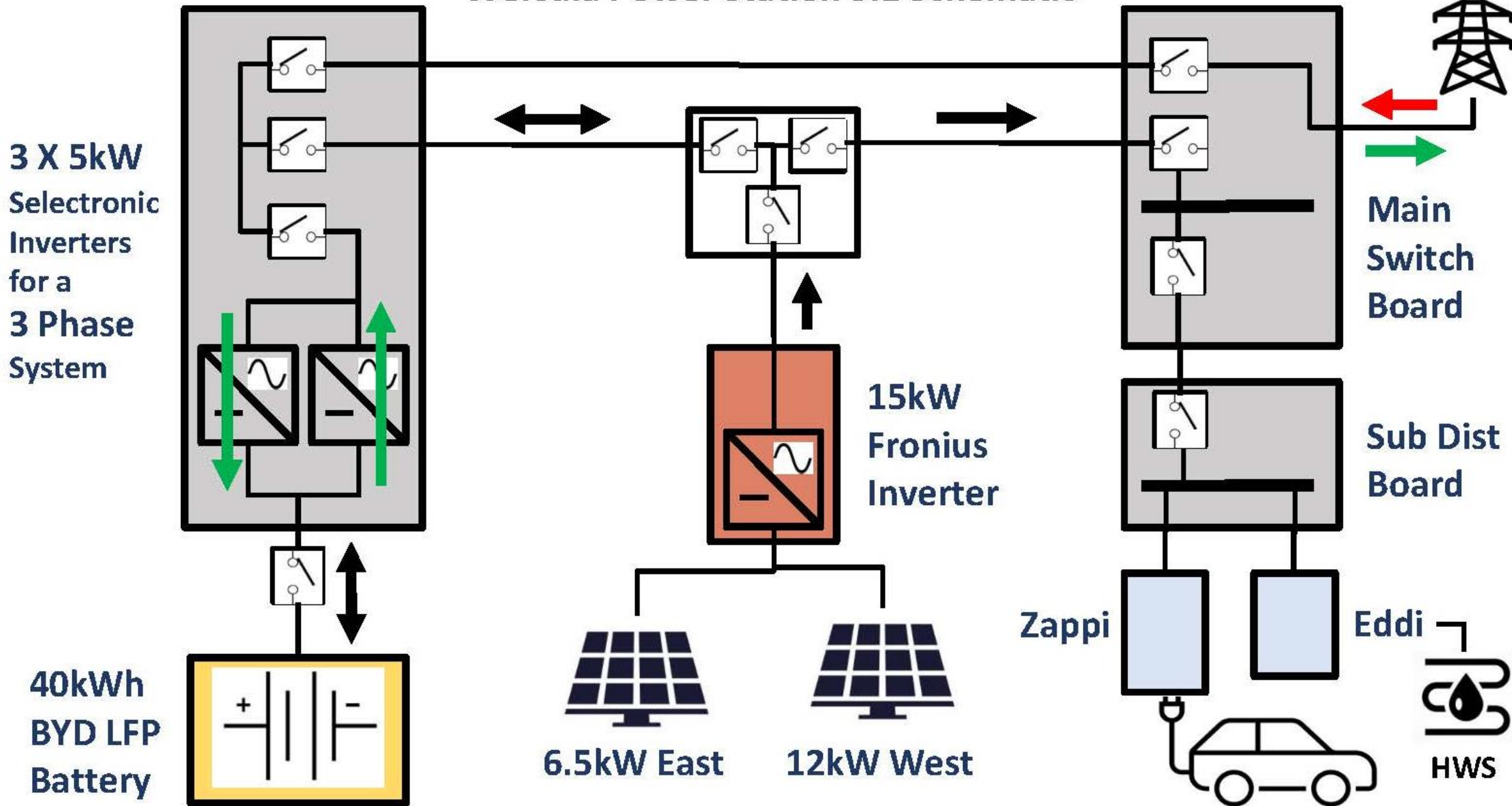


YOUR USAGE

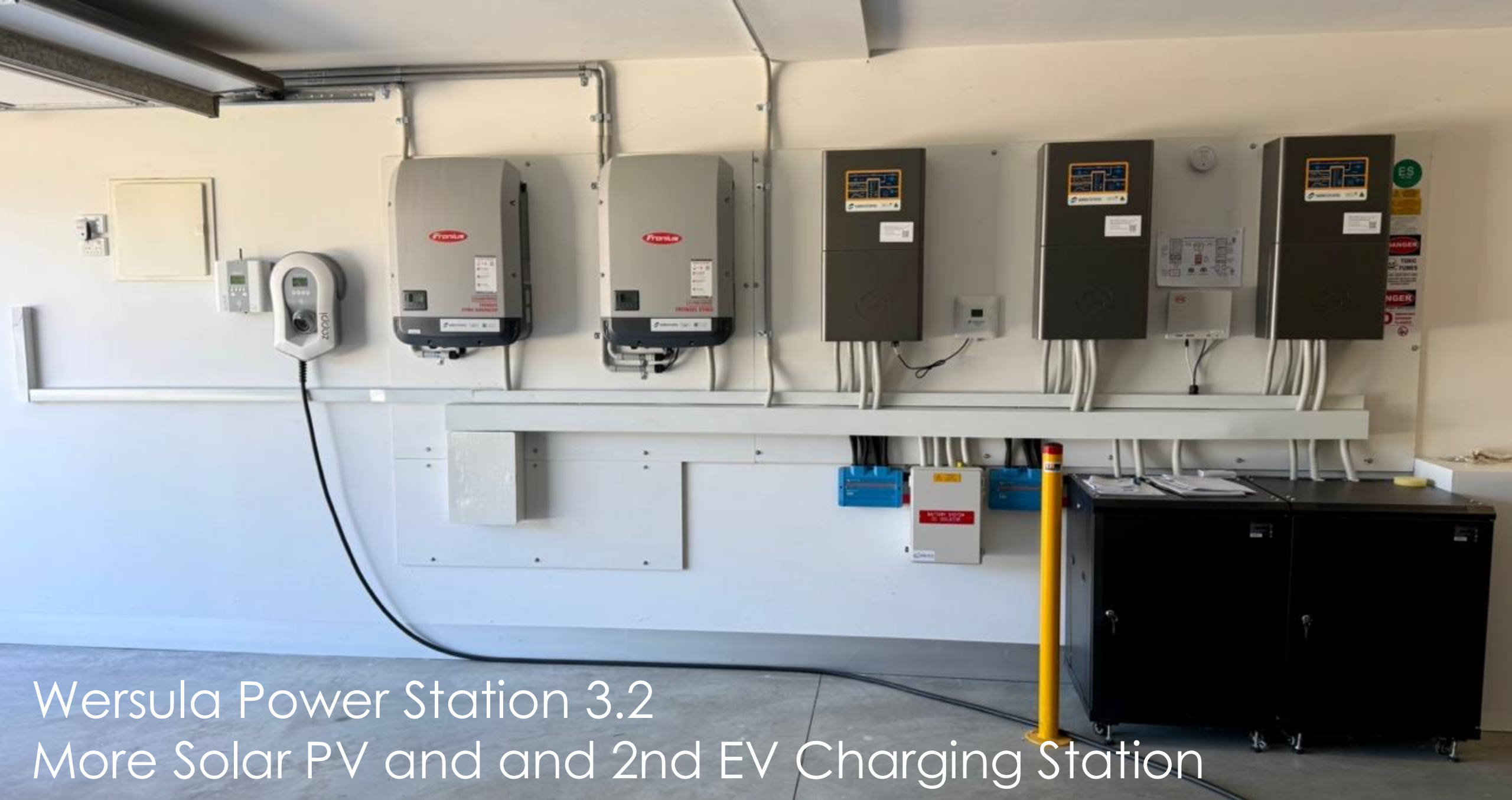


Wersula Power Station 3.1

Wersula Power Station 3.1 Schematic



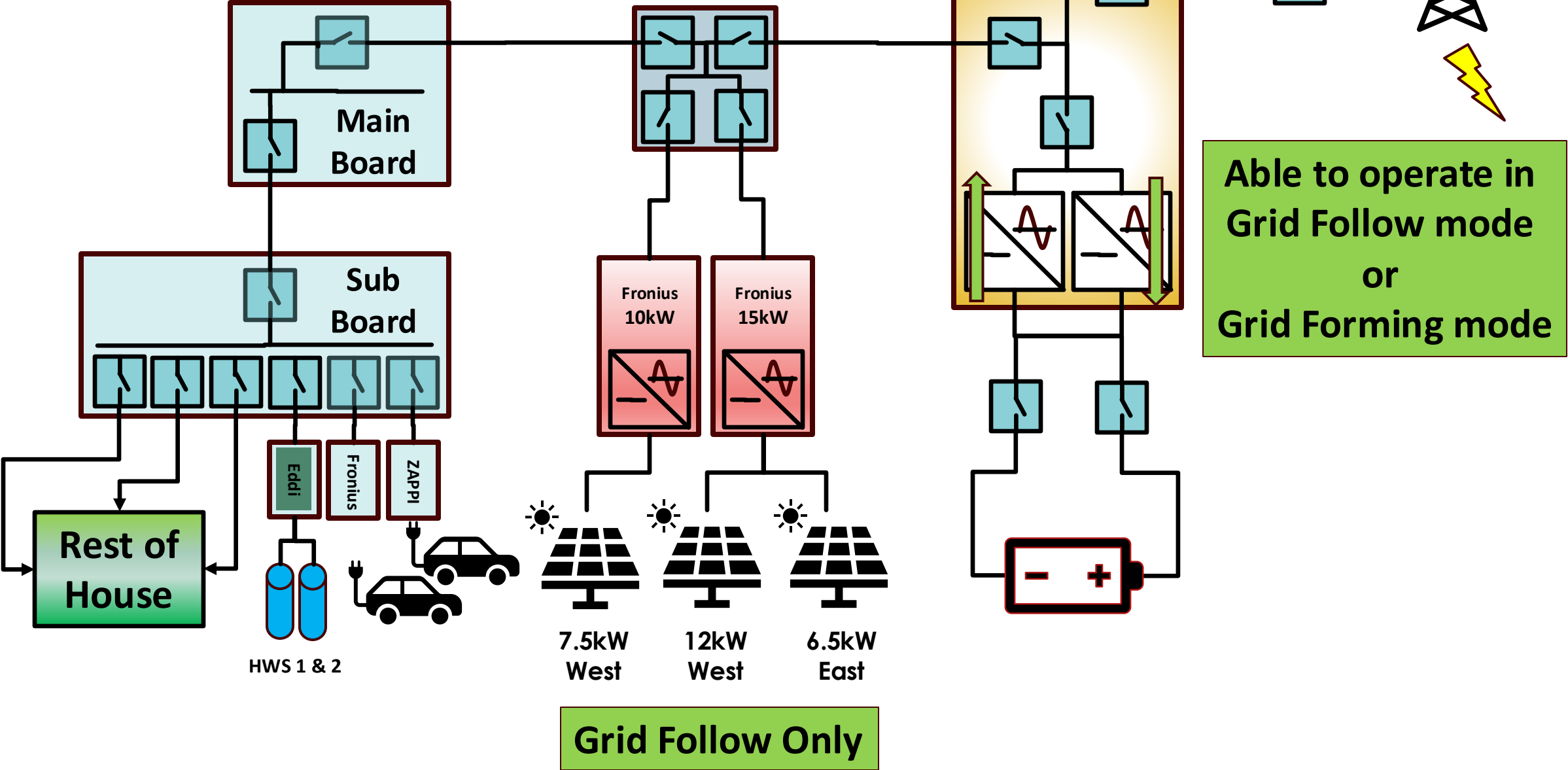




Wersula Power Station 3.2
More Solar PV and 2nd EV Charging Station

Wersula Power Station 3.2

3 of 5kW Selectronic Inverters



We have
Electrified
Everything



ELECTRIFY BASS COAST



All done in
Harmers Haven!

REWIRING AUSTRALIA

Unplanned Outages & Resilience

We have many outages in Bass Coast, two of which ended up being extended outages. The most recent in Feb of 2024 when the 500kV towers on the other side of Melbourne got blown over and Mirboo North got flattened by severe winds, was it a Tornado?

Our Selectronic Units changed over to Battery supply without interruption, maintaining Starlink Data & WiFi Telephone calls. Hospitals and Community Hub's are also looking into Starlink.

The following day was a sunny day which charged up both the home battery and the Electric Vehicles. Petrol wasn't available.

The power came back on the second day, but the Voltage was above the allowable limit of the Selectronic Units, therefore they wouldn't connect to the grid. It wasn't a problem as the battery was being filled each day by the sunshine.

Some systems can perform these functions, whereas some of the cheaper systems cannot – you need to consult your installer.

Q&A & Next Steps

Living with a Home Battery : The Ultimate Owner's Guide
Solar Quotes : 14.36mins. <https://youtu.be/a1YIfU6zmqg?si=ycXCaDDsPBX01JEw>

Further sources of information about Solar PV & Home Batteries on YouTube

Buying Solar in Australia 2025 : Everything you need to know - Solar Quotes 17:07mins

<https://youtu.be/6pZajgA-Cwo?si=fy3zJbvSQG4GRdi6>

Buying Home Batteries in Australia in 2025 : What you need to know - Solar Quotes

16:10mins

https://youtu.be/1N_ZsLrfUJM?si=Cx0FtbUF7hf2F_Pk

Installing Australia's Fastest EV Charger - Solar Quotes 10:06mins

https://youtu.be/gf3KtyZ56Ks?si=q0_VpoNLO2Exl38j

Watch out, Tesla! Here comes Sigenenergy – Gary Goes Solar 22:34mins

<https://youtu.be/HU3BunXKpw4?si=prwm8j0Rm1BNu0xP>

Tesla Powerwall 3 vs SIGENERGY Sigenstor – Which is best? 35:01mins

<https://youtu.be/pzRo2wQD1Os?si=v0oVMonsdW1ZYFFw>

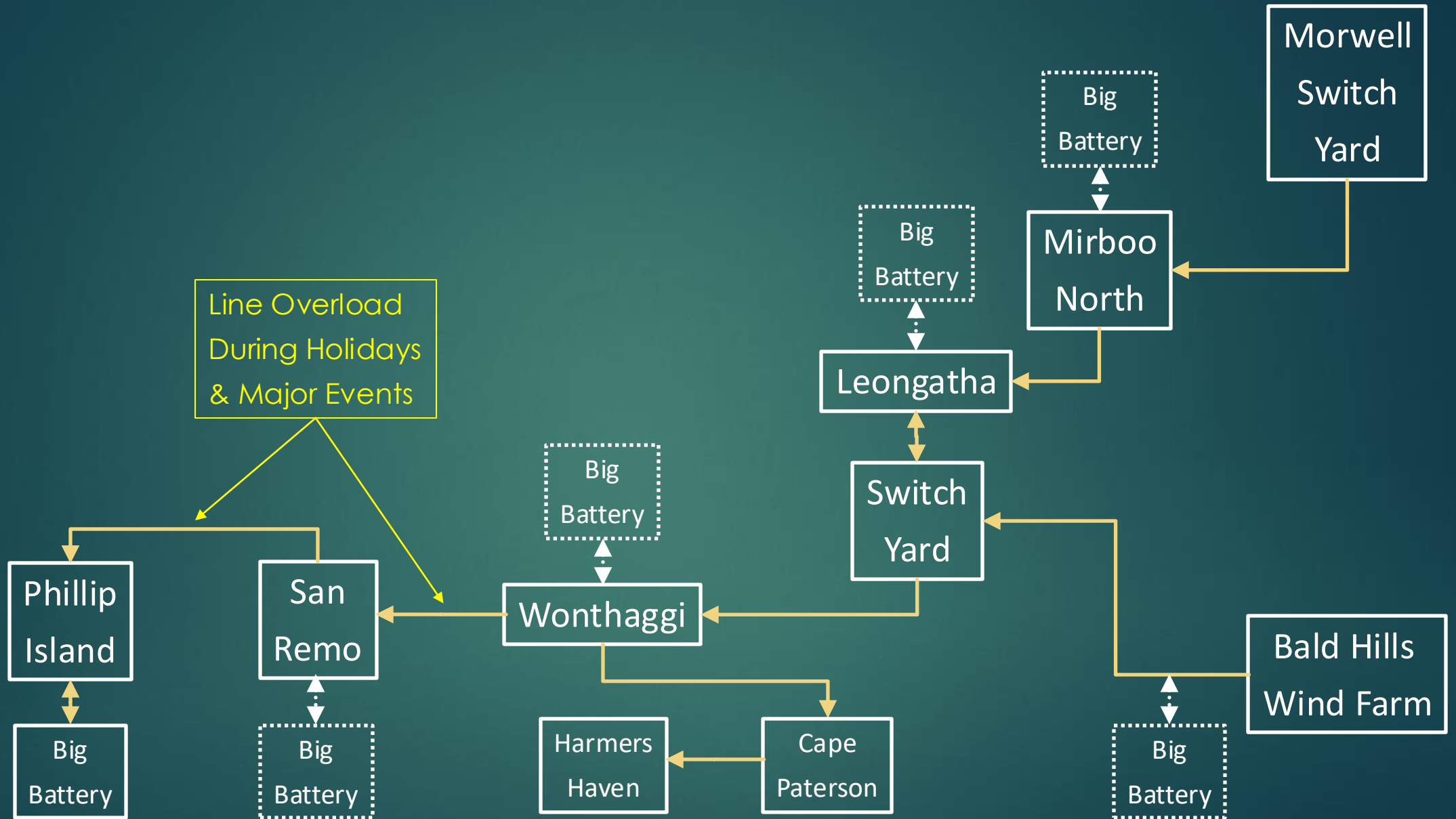
Why SigenStor is going Viral in Australia – PSC Energy 22:15

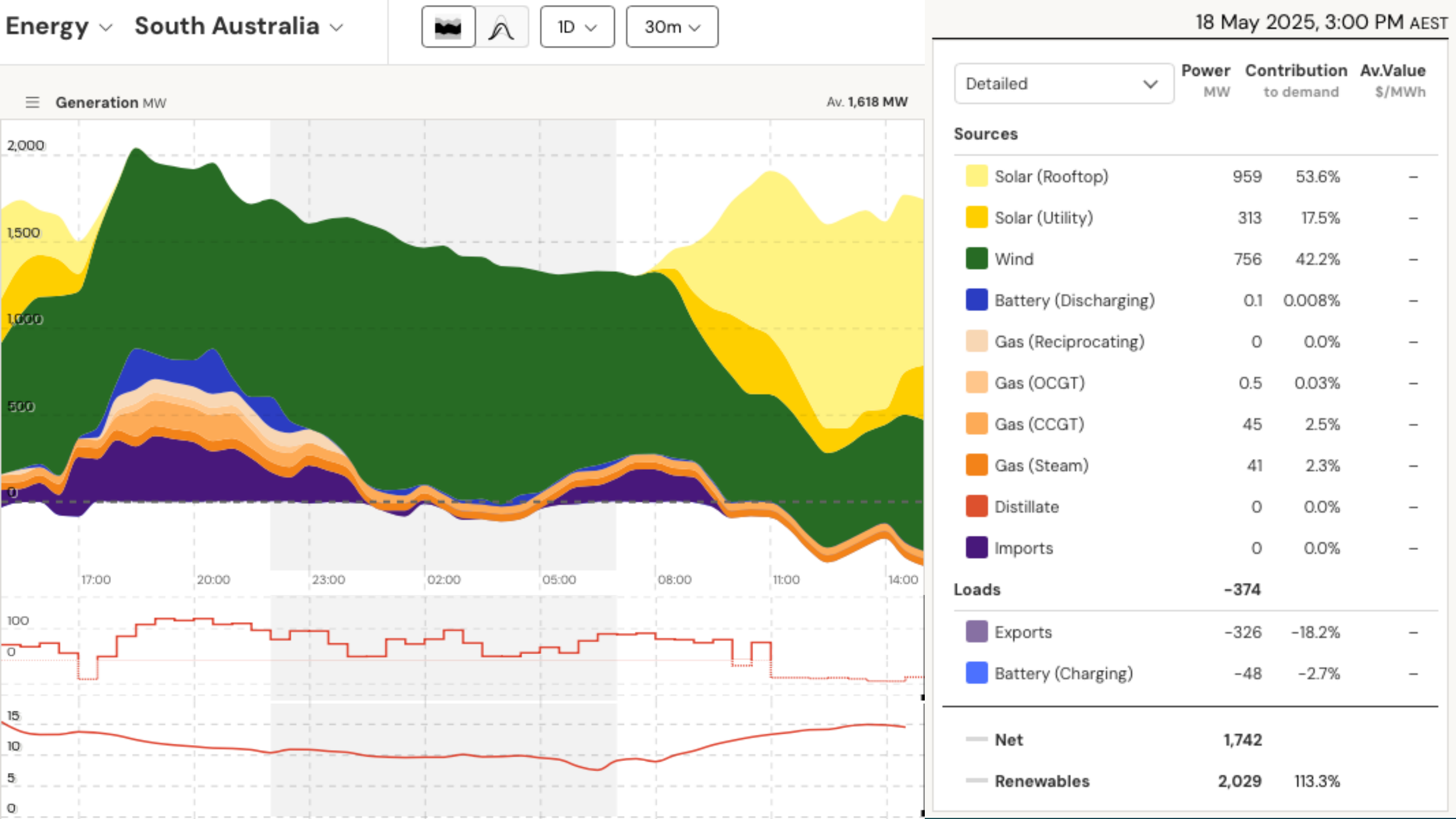
<https://youtu.be/smGdvua9Bso?si=ZfeHJLFvffJ3aYZD>

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If Time allows

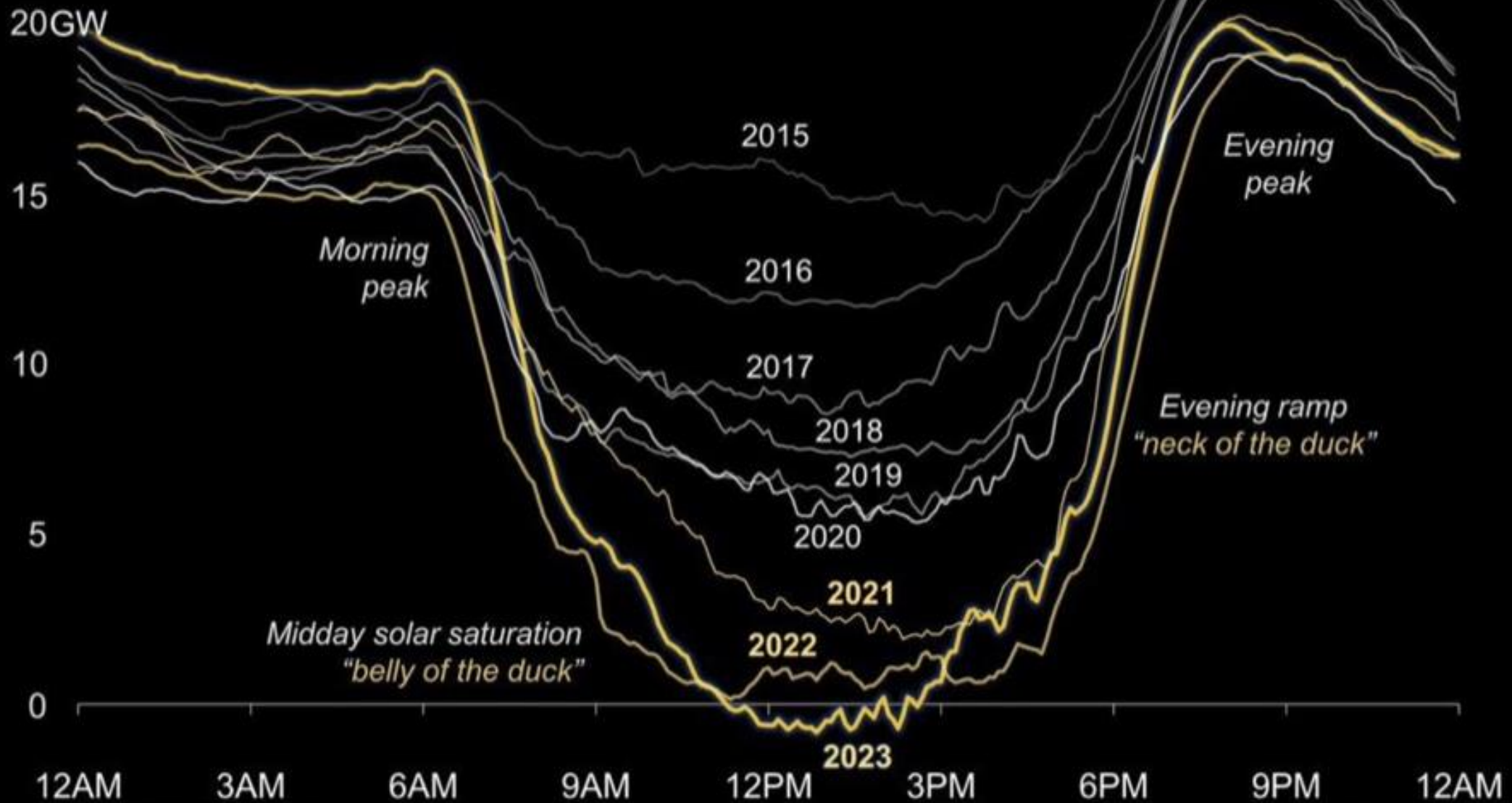
Modern System Operation
with Big Battery Storages
or Community Batteries
or Home Batteries





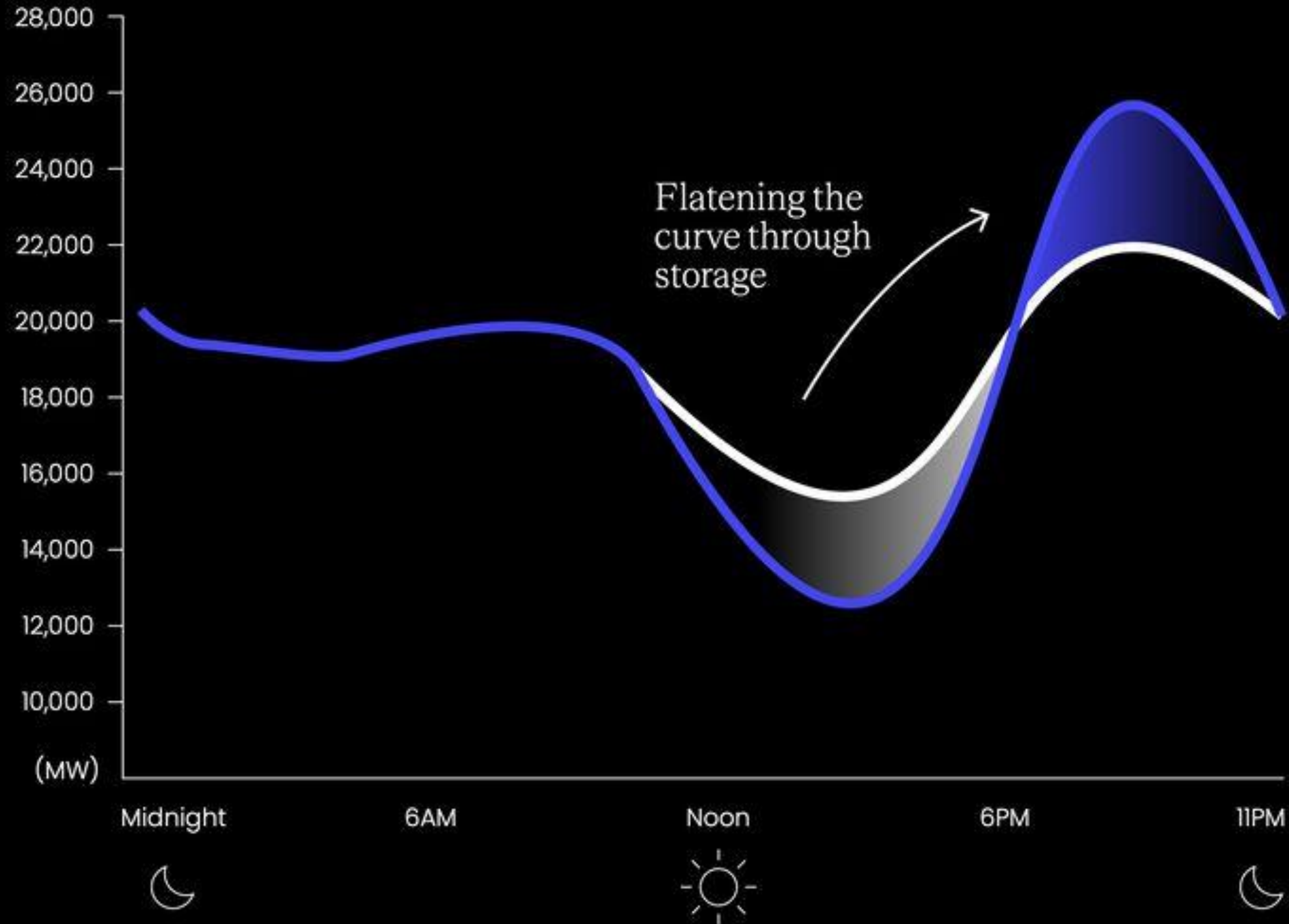
California's duck curve hits record lows

Lowest minimum net load day each year in CAISO, 2015-2023

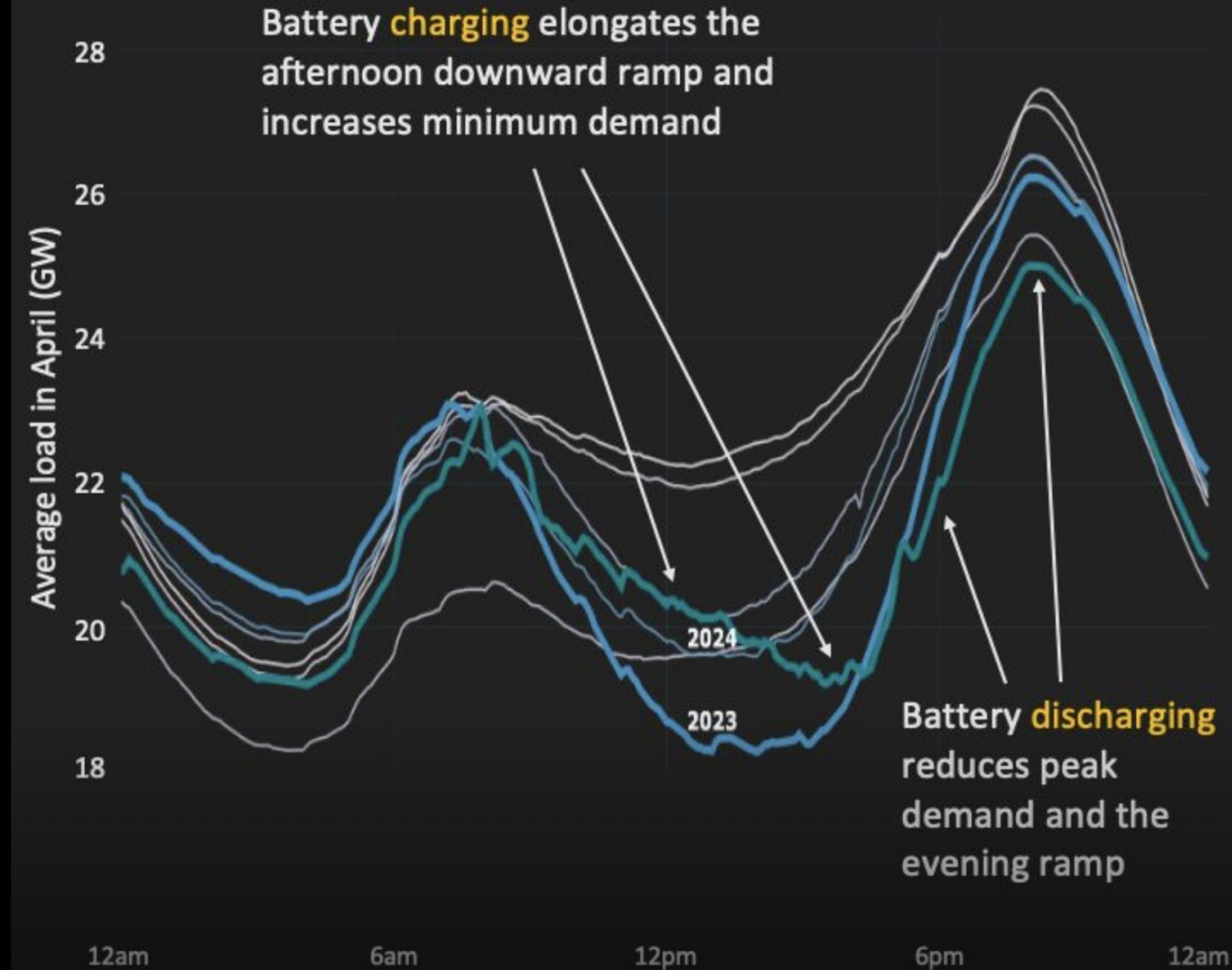


Source: CAISO | @BPBartholomew

Note: Net load shown is demand minus utility solar and wind output

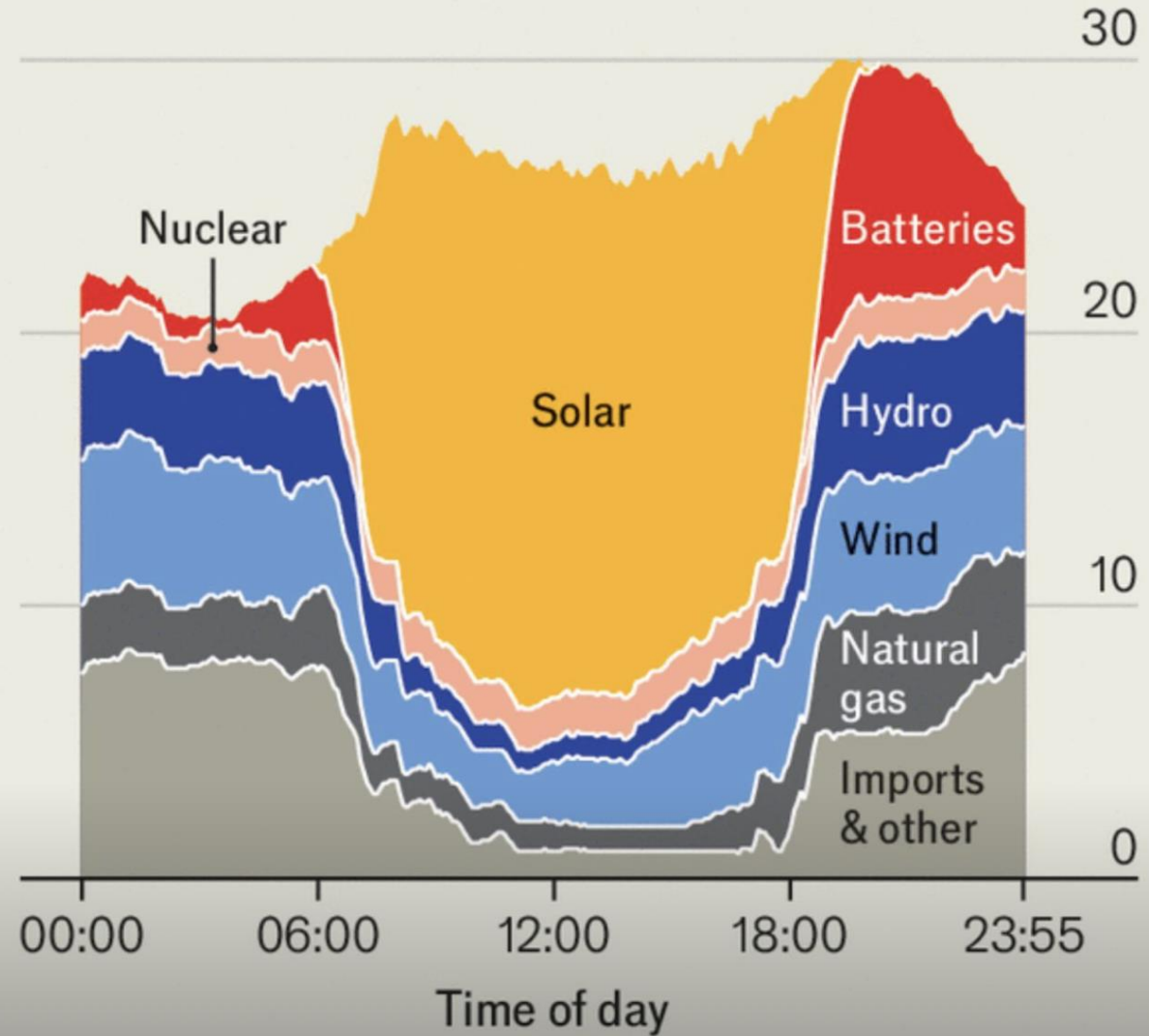


Batteries are now flattening the duck curve in California



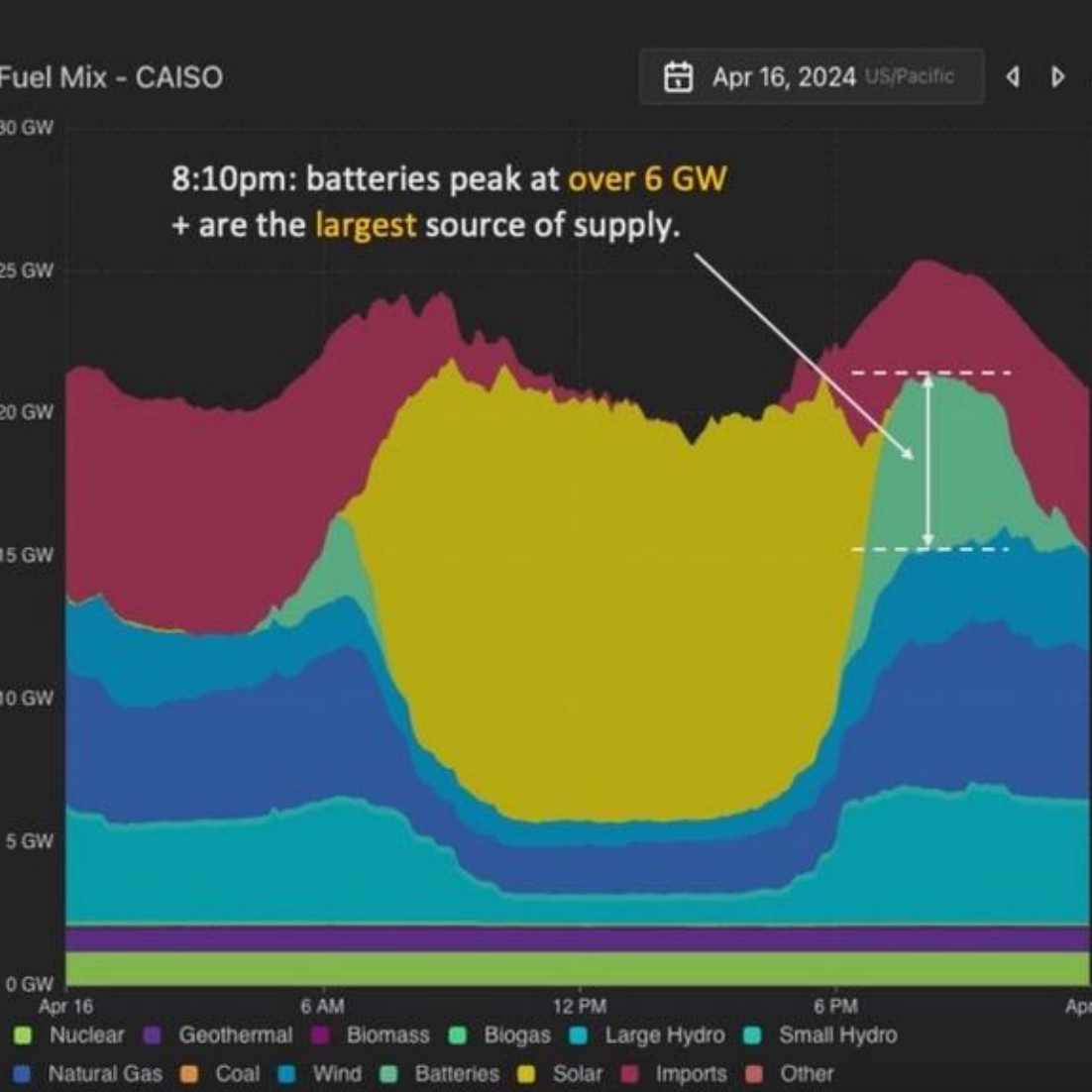
Buy and cell

US, California's energy supply, gigawatts
May 19th 2025



Source: California Independent System Operator

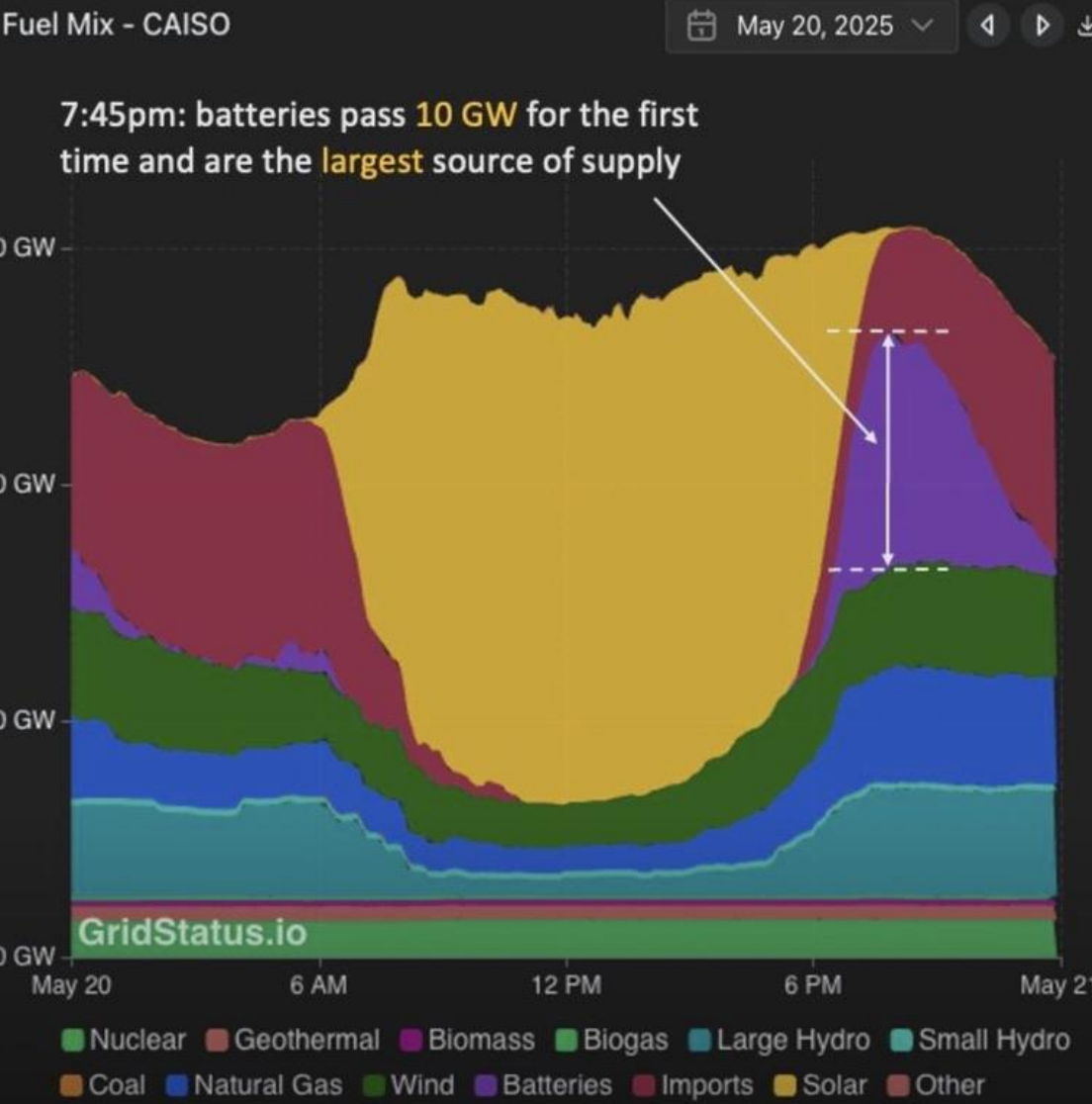
Batteries show their strength in California's electricity mix



Source: gridstatus.io

@gavinmooney

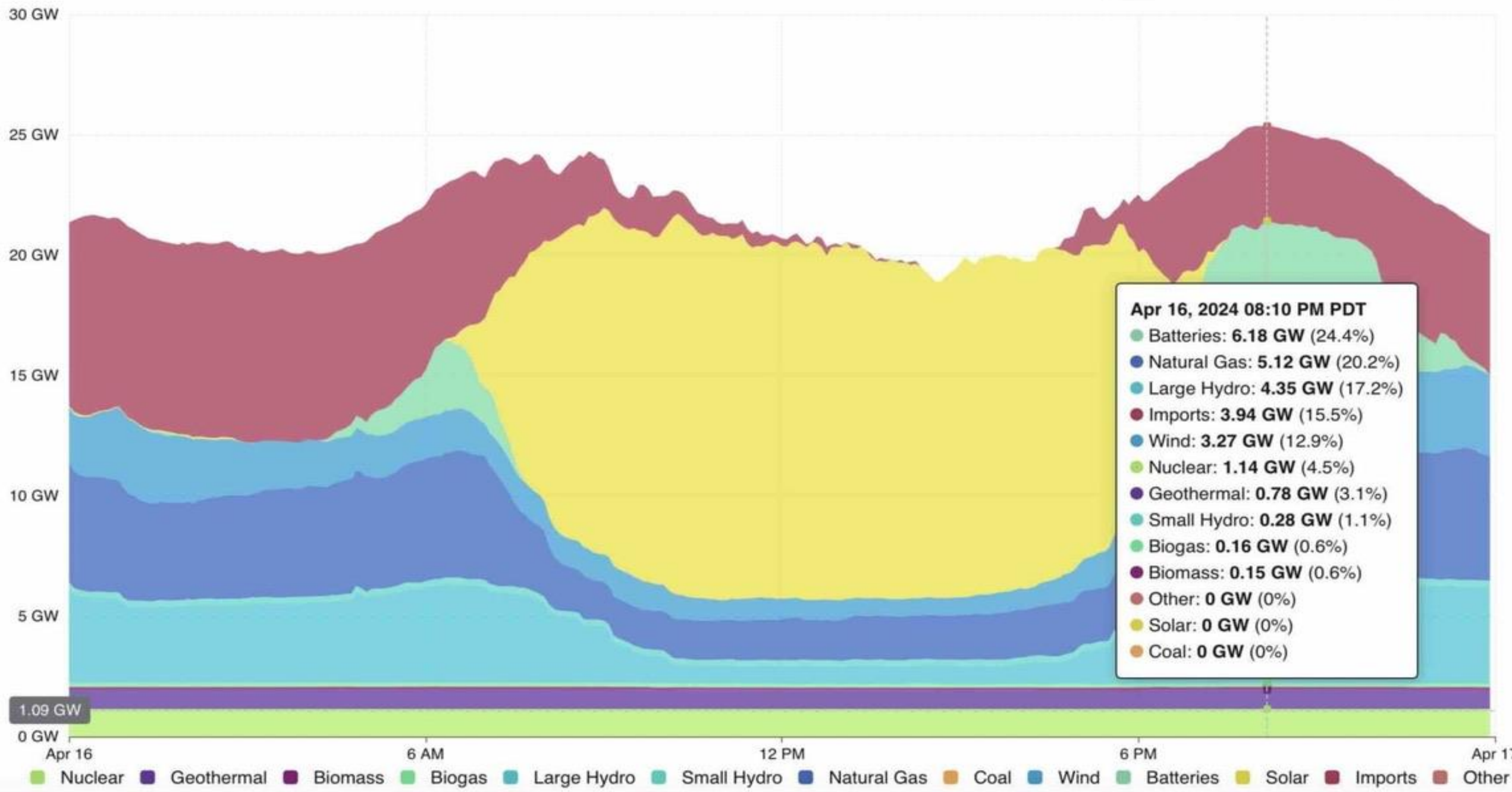
Batteries hit new heights in California's electricity mix



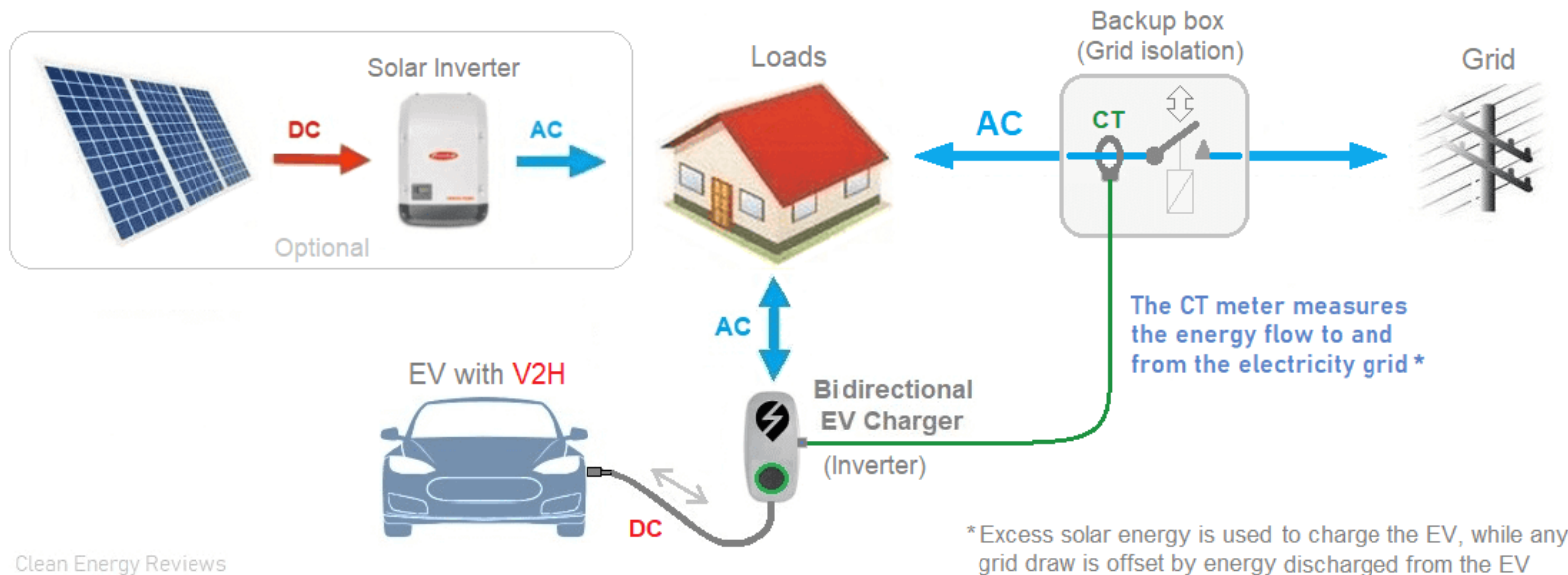
Source: gridstatus.io

@gavinmooney

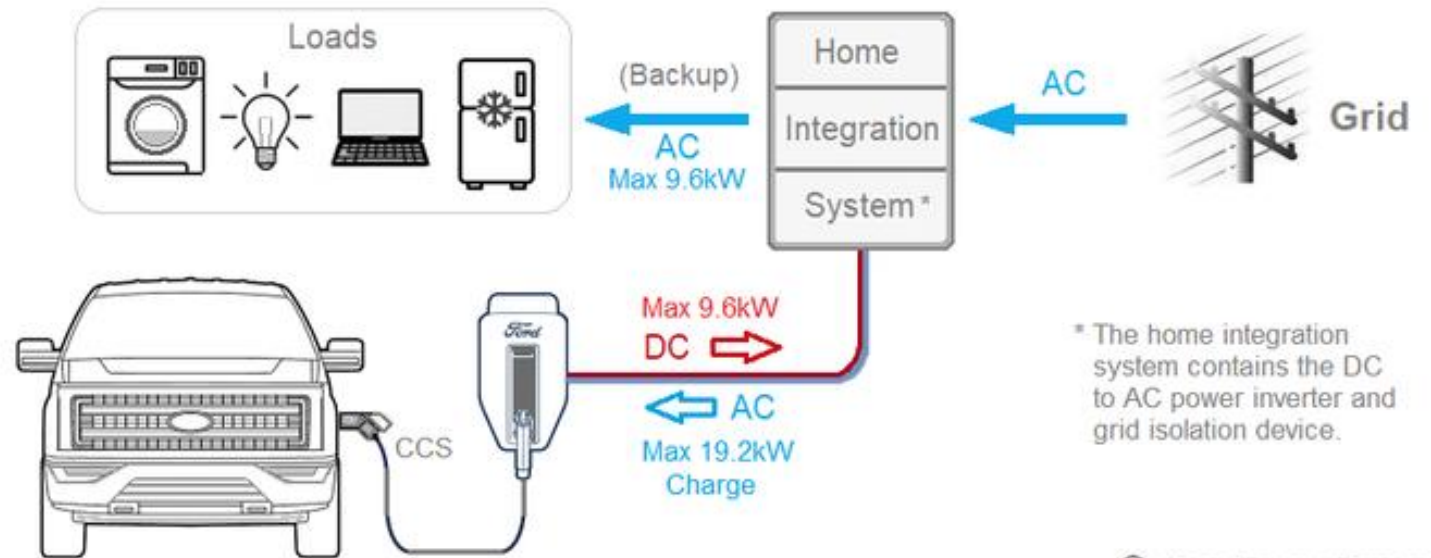
Fuel Mix - CAISO



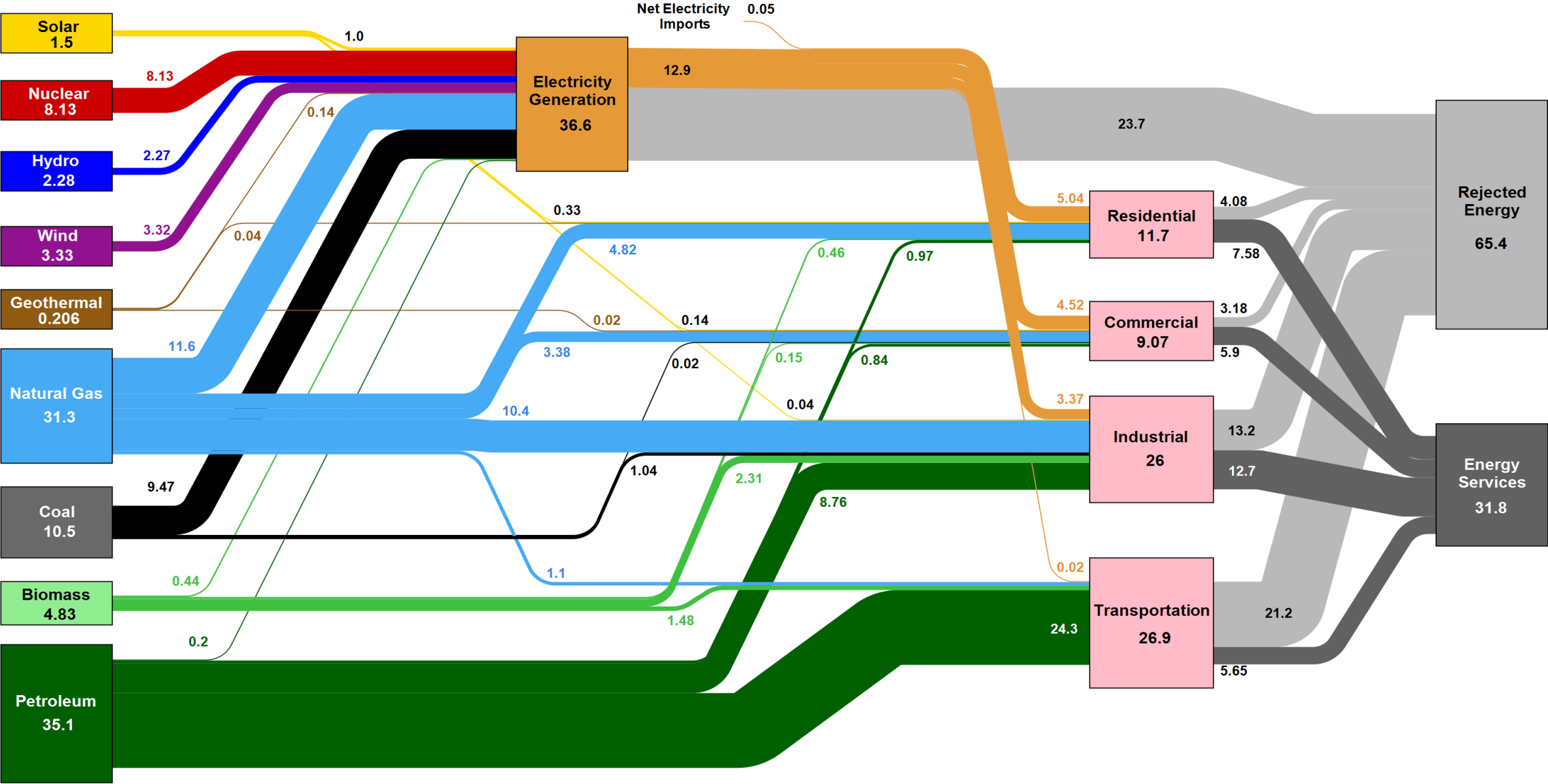
How V2H bidirectional charging works (+ Backup power)



Ford Charge Station Pro and Home Integration System



Estimated U.S. Energy Consumption in 2021: 97.3 Quads



Imagine if we could Electrify everything with renewable energy? The Rejected Energy = ____?

Estimated as 65% for the residential sector, 65% for the commercial sector, 21% for the transportation sector and 49% for the industrial sector, which was updated in 2017 to reflect DOE's analysis of manufacturing. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

Australian Emissions Breakdown

Total Emissions 554 Mt

2019 total reported emissions to the United Nations.
Excludes LULUCF.



Source: Rewiring Australia Castles & Cars Technical Study October 2021.

224 Mt of Trade Emissions – Emissions created by us for the products and materials we export.