

Supporting the Grid Transition to 100% Renewable Energy

Strategies for Commercial Energy Users

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CIBSE ANZ Seminar Series Day 1 - Pathways, Stairways & Highways

August 2023



UNSW
SYDNEY

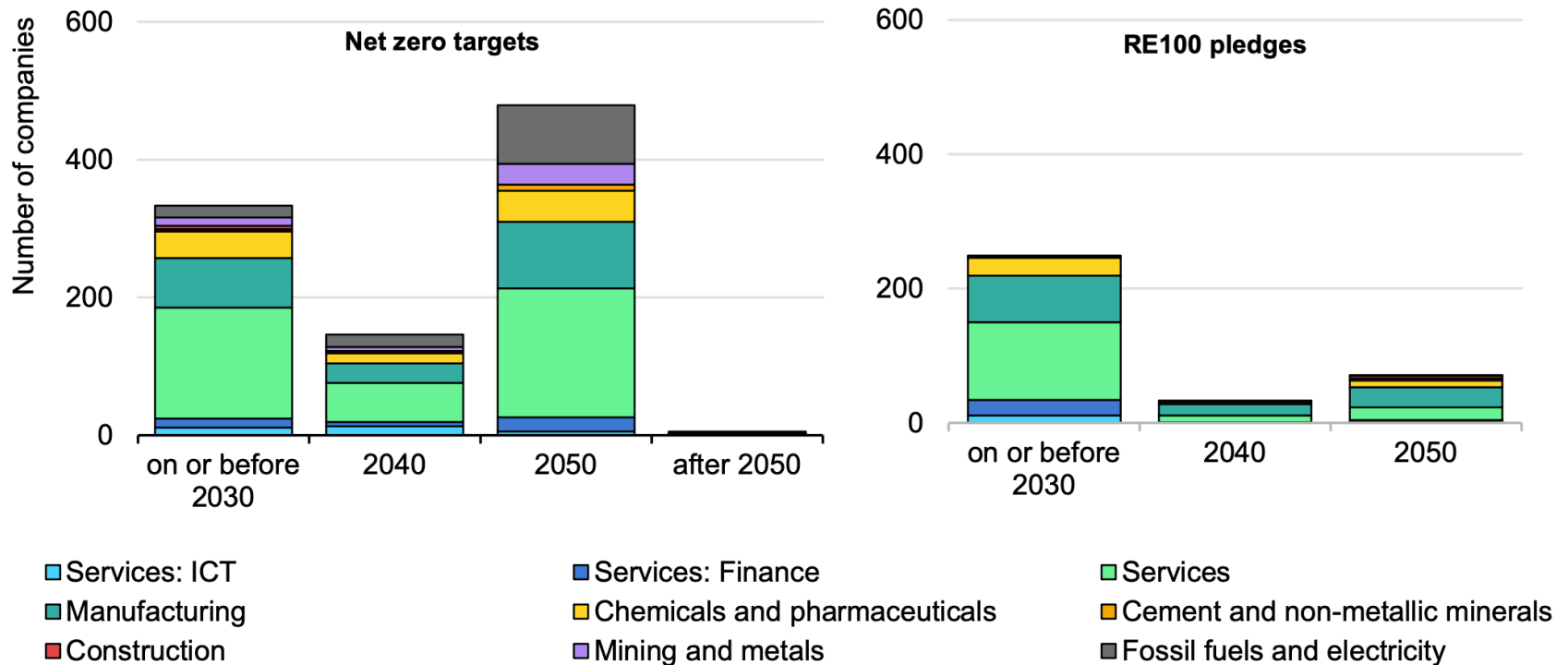
Structure



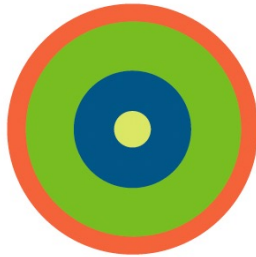
- Role for corporate RE purchasing in the transition to 100%
- Challenges in the transition
- Corporate procurement strategies that best support transition
- Evolving certification and PPAs

Corporates are committing to climate and renewable energy transition, globally

Number of companies with net zero targets (left) and Renewable Energy 100 pledges (right) by year and by sector

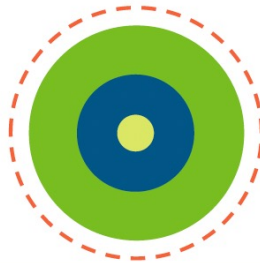


IEA. CC BY 4.0.



Standard building

Measure typical greenhouse gas (GHG) emissions due to energy use and repair, maintenance & refurbishment.



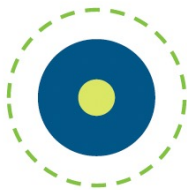
Fossil fuel free

Eliminate natural gas for space heating, domestic hot water and cooking, both base building and tenants.



Highly efficient

Significantly reduce all building energy consumption through demand reduction, energy efficiency and effective controls.



Powered by renewables

Provide all electricity from 100% renewable sources – on-site and/or off-site.



Reduce embodied carbon

Significantly reduce embodied carbon through material/product selection during operations and



GHG EMISSIONS

USED FOR



Natural gas

Space heating, domestic hot water and cooking.



Electricity

Ventilation, cooling, lighting, pumps, small power, lifts, security, controls, and IT systems.



Other

Emergency (backup) power, and refrigerants.



Materials in operation

Emissions from products, materials and activities for repair, maintenance and refurbishment.

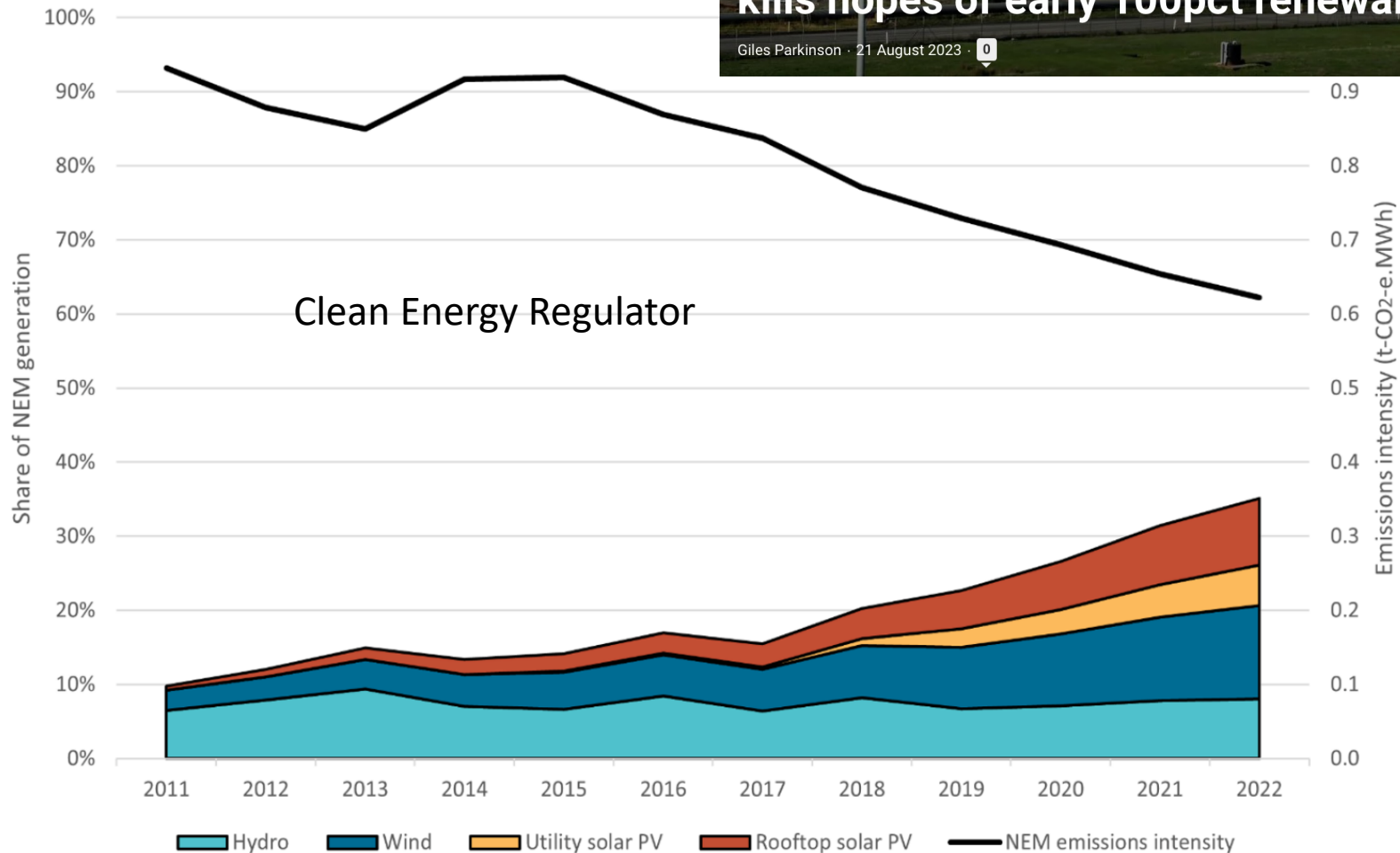
Australian grids are decarbonizing

..but still a long way to go to 82% by 2030 without clear policy

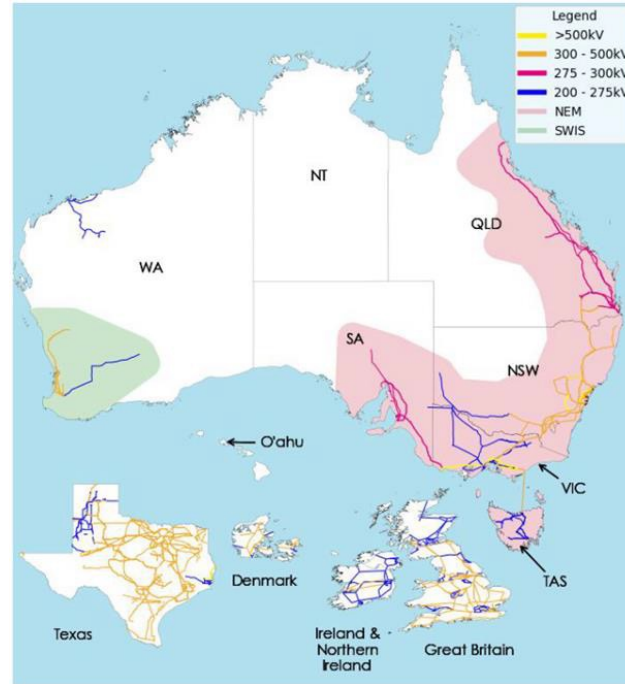


Closure deal on Australia's dirtiest power station kills hopes of early 100pct renewables

Giles Parkinson · 21 August 2023 · 0

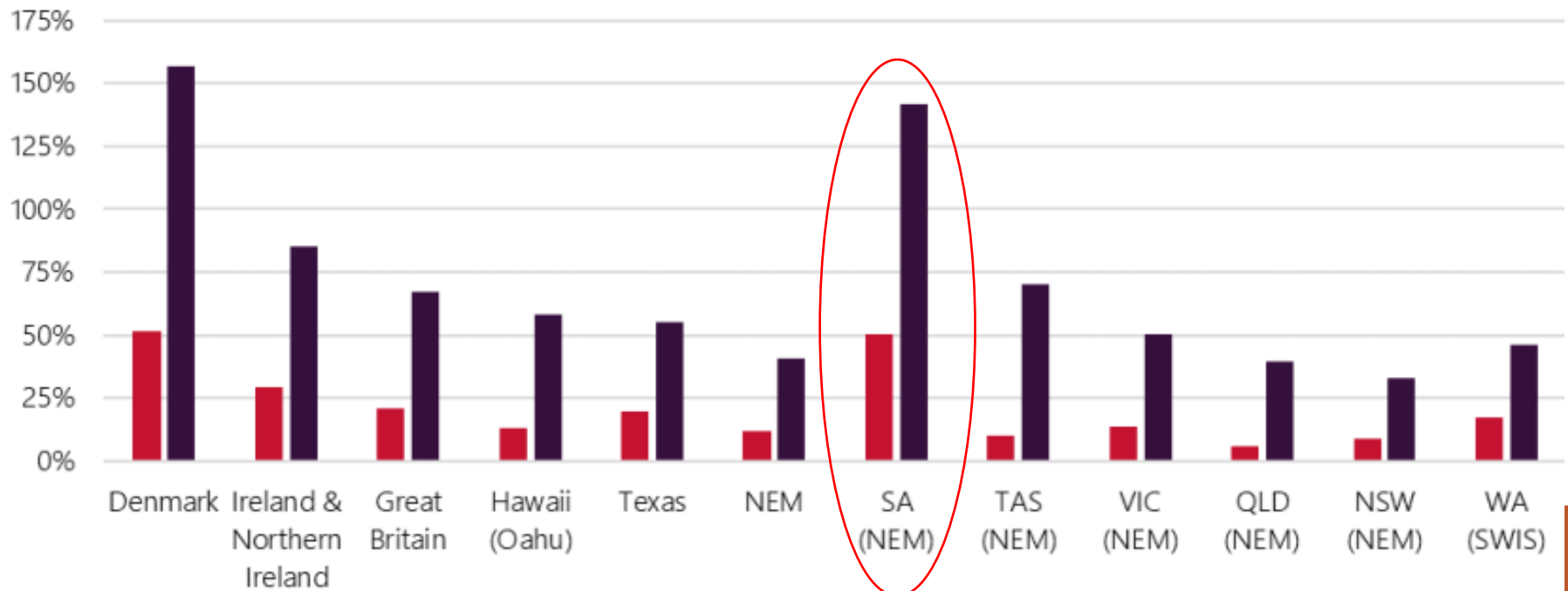


Already world leading Variable Renewable Energy penetrations



■ Annual energy % (Wind + Solar)

■ Max (Wind + Solar) relative to native demand (half hour period)



Two key challenges:

1. Current investment in RE pipeline too slow
 - Policy insufficient
 - Supply chain, connection and social license issues
2. High RE penetrations leading to balancing challenges including congestion and curtailment



The energy transition is far too slow, AEMO warns



Angela Macdonald-Smith
Senior resources writer

Jun 20, 2023 - 5.00am

Investment in new, clean electricity supply is not happening fast enough to replace closing coal power stations and the grid build-out lags what is needed for the energy transition, the head of the Australian Energy Market Operator will warn on Tuesday.

Daniel Westerman will say that investments are also urgently needed in “firming” technologies – such as pumped hydro, batteries and gas – to fill in the gaps when renewable energy is not available, with storage needing to expand by a factor of 30 by 2050.

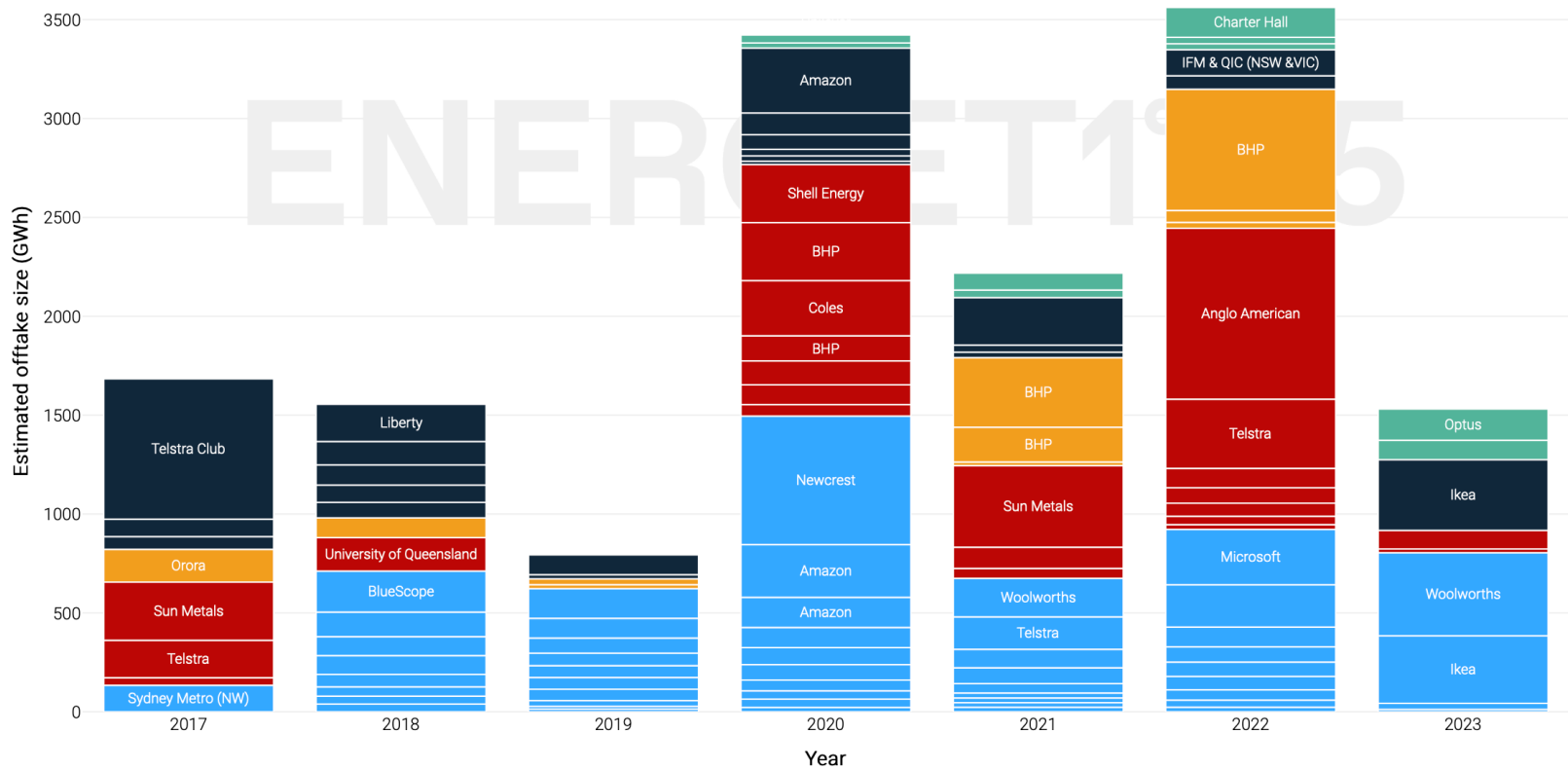


CLEAN ENERGY CONSTRUCTION PEAKS AS INVESTMENT PIPELINE BATTLES HEADWINDS

significant fall in new financial commitments in large-scale renewable generation projects. No renewable generation projects reached financial close in Q1 2023. This is a leading indicator for the renewable energy pipeline.

Companies are helping to drive new investment by moving beyond certificates

to make a more tangible contribution plus locking in future electricity prices



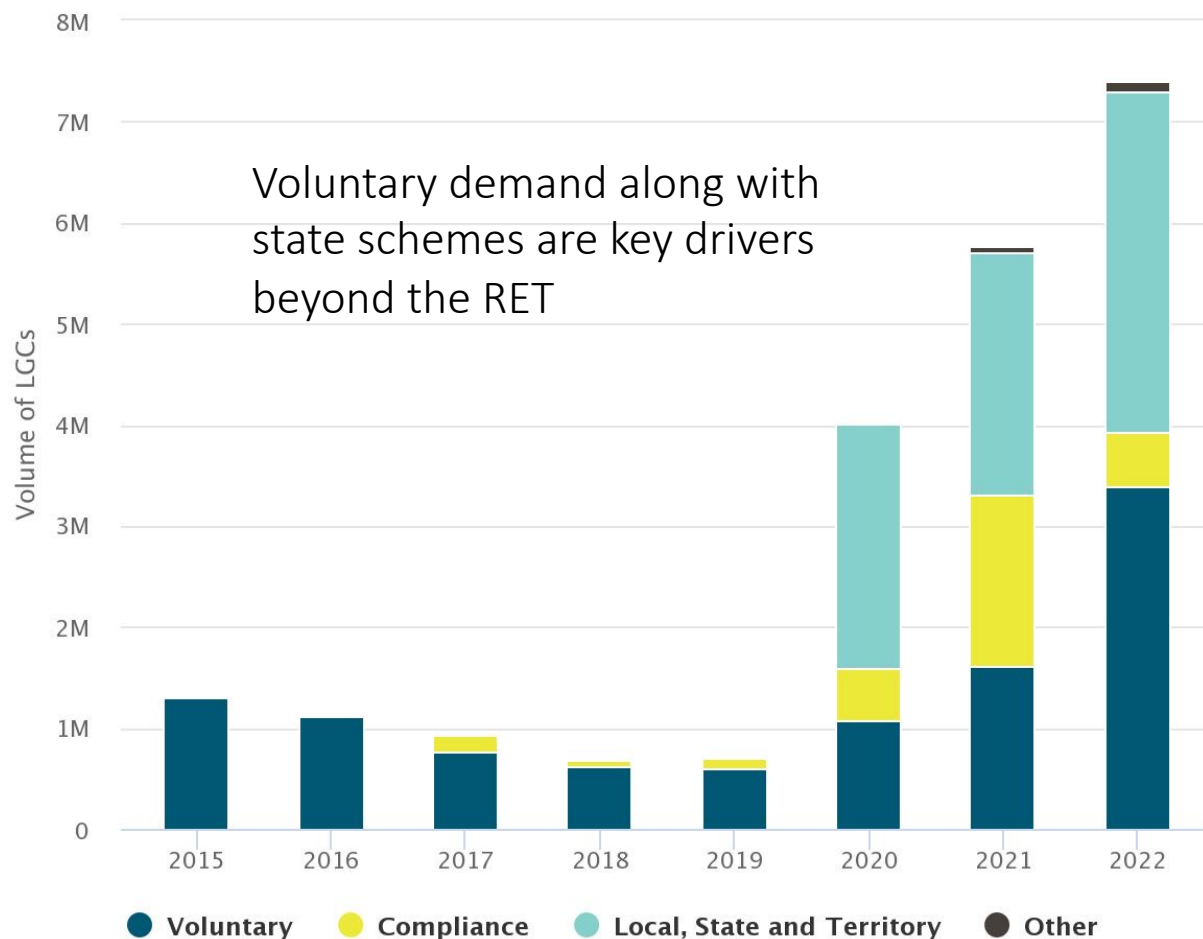
Role for corporate RE purchasing in driving the transition to 100%



Buildings consume approximately 50% of Australia's electricity

During peak periods, they consume around 77% of system capacity

Non-RET LGC cancellations by demand source
2015 to 2022



This graph shows LGC cancellations broken out by demand source.

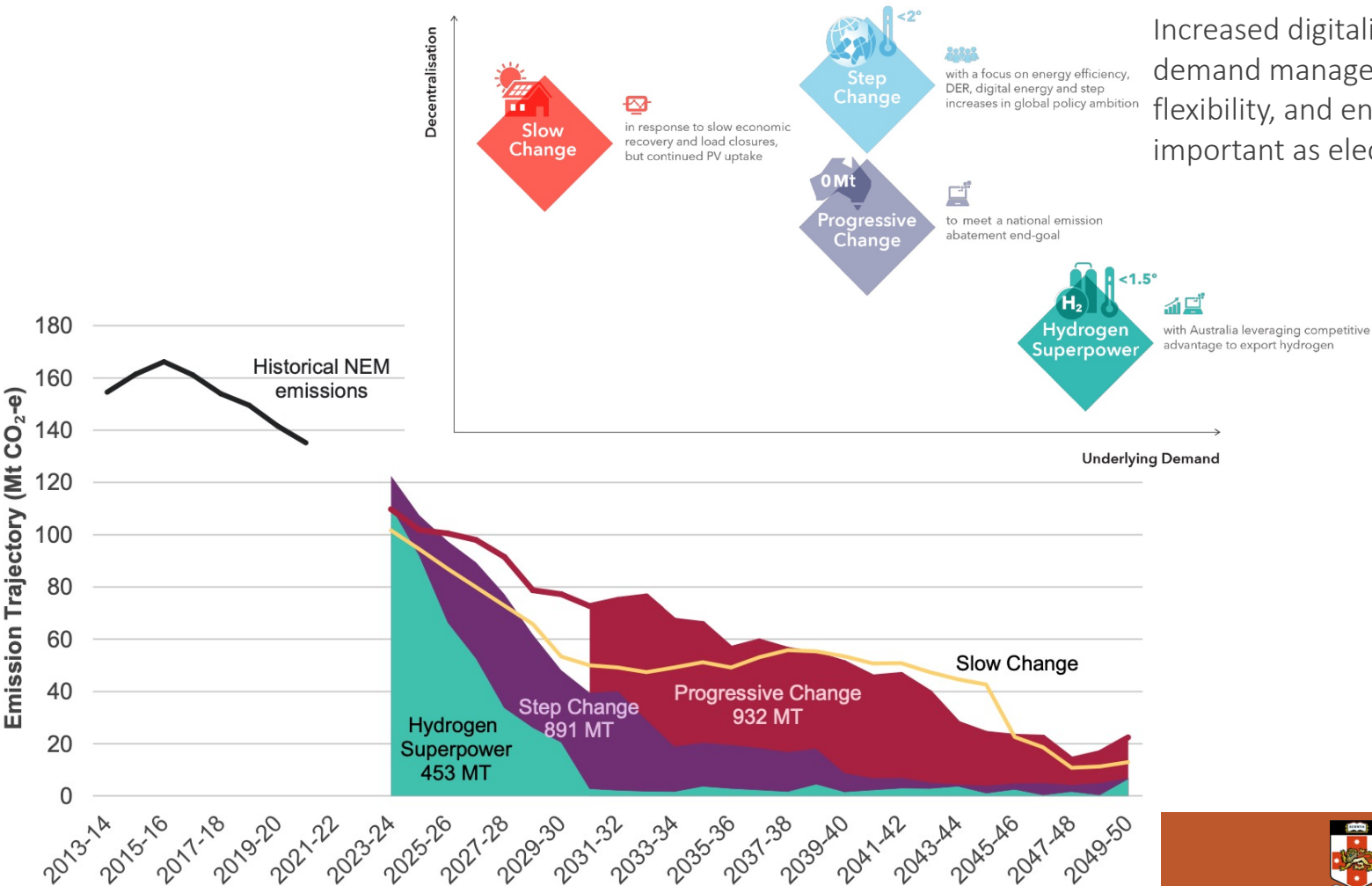


Electrification also needed to decarbonise heat and transport sectors

By 2050, most residential and business consumers rely on electricity for heating and transport, and the global manufacture of internal-combustion vehicles has all but ceased

Increased digitalisation helps both demand management and grid flexibility, and energy efficiency is as important as electrification.

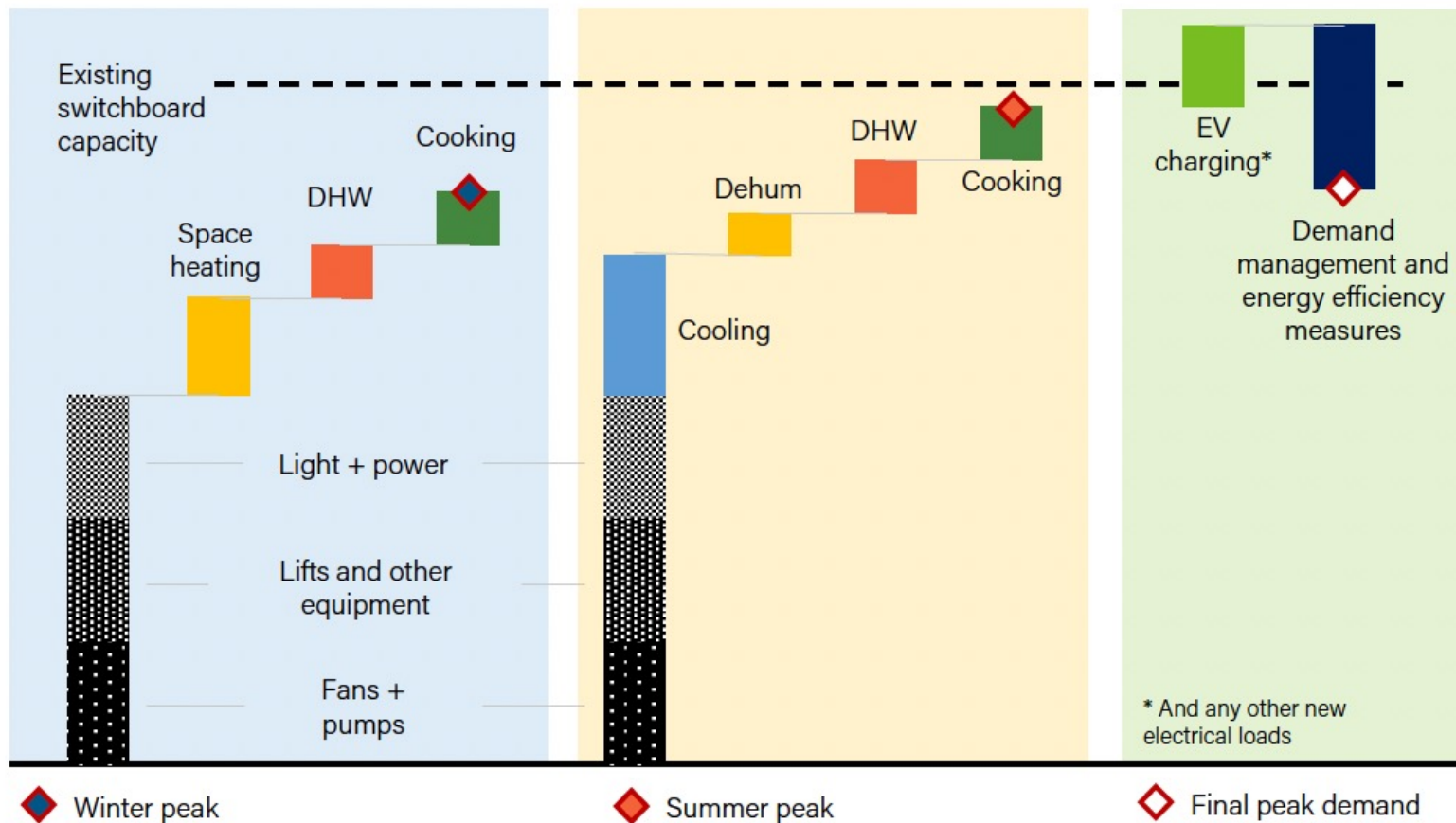
Figure 6 Scenarios used for the Draft 2022 ISP



Demand management can more than offset the impact of electrification

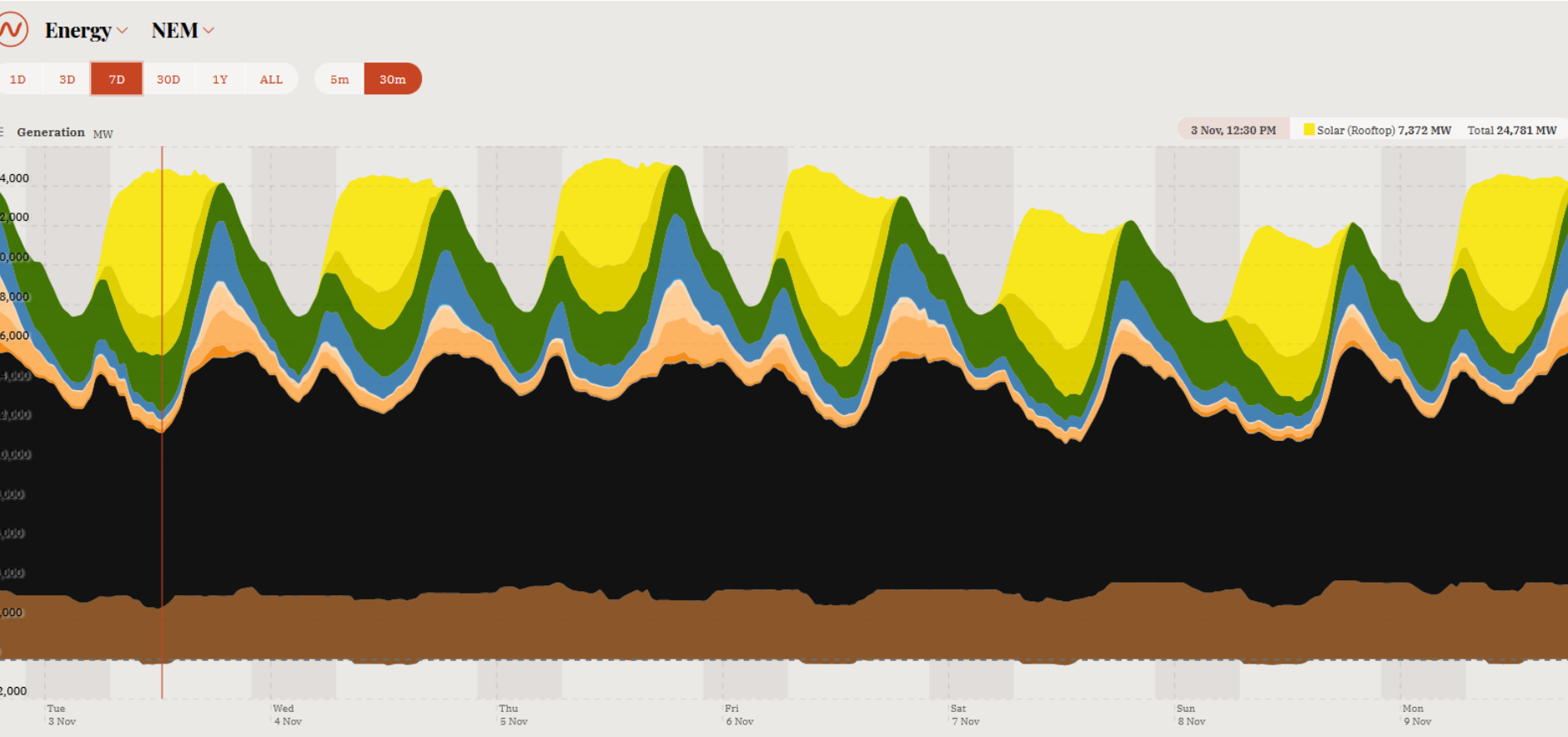
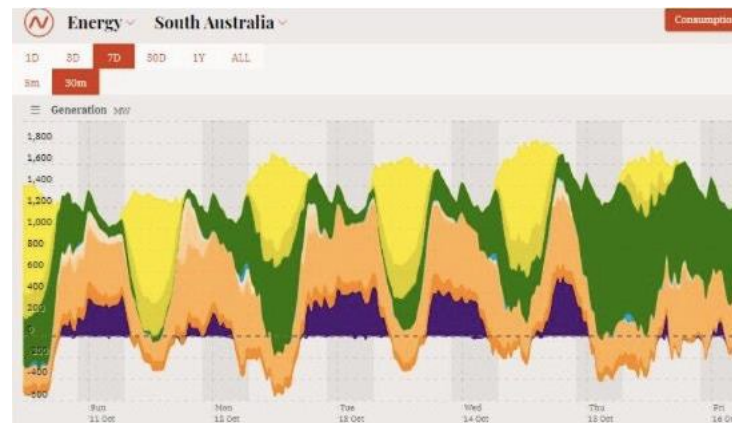


Green Building Council Australia



Emerging balancing challenges

>50% instantaneous
(and 100% for SA)



Congestion and curtailment

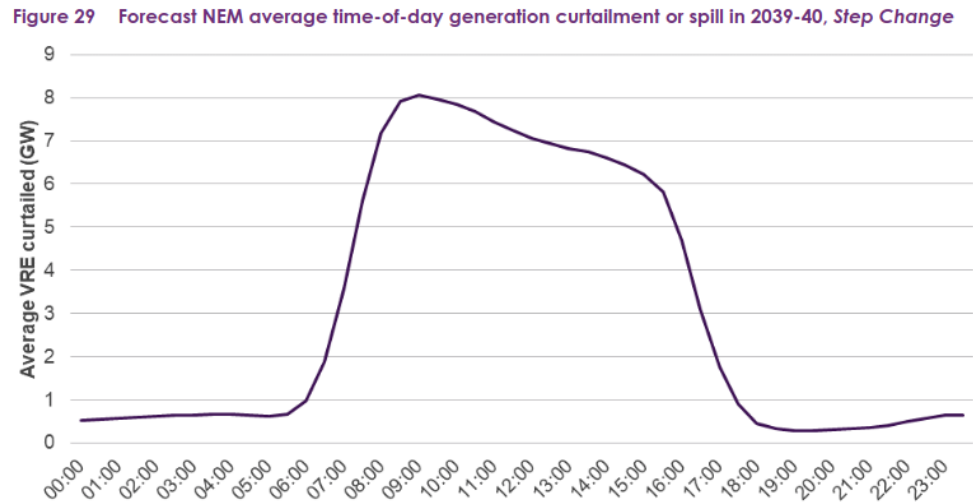
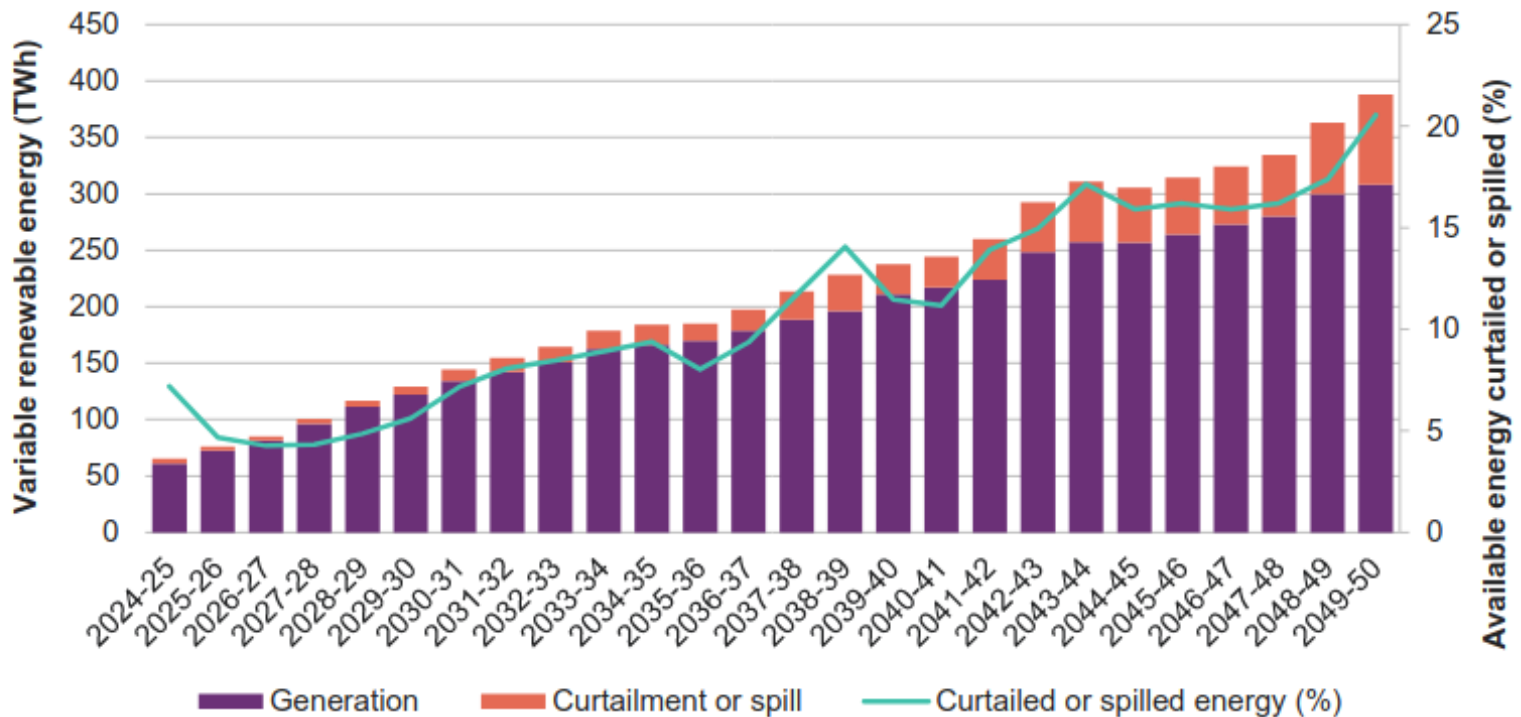
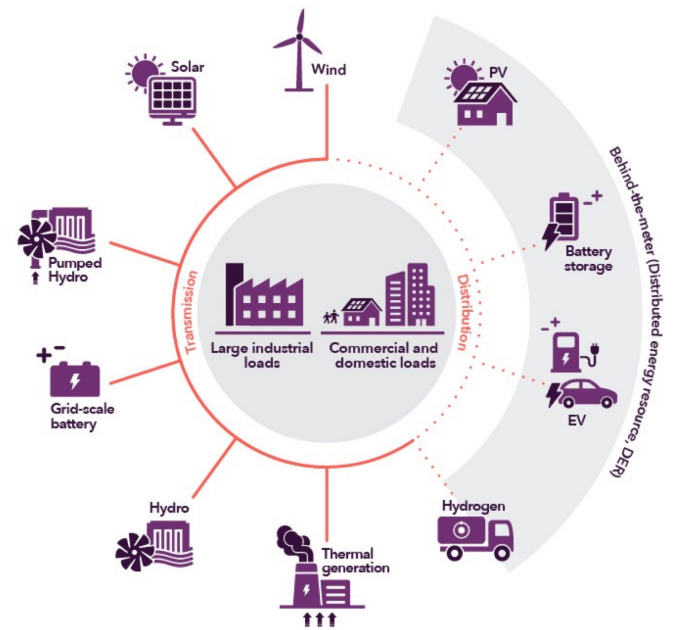


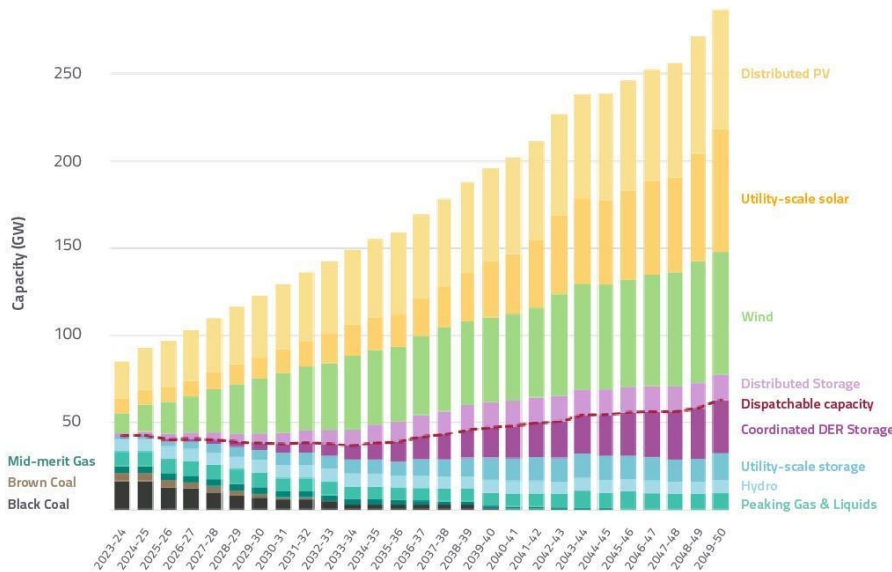
Figure 18 Curtailment and spill of NEM variable renewable generation, Step Change



Need for more dispatchable resources, and an important role for distributed storage and DER

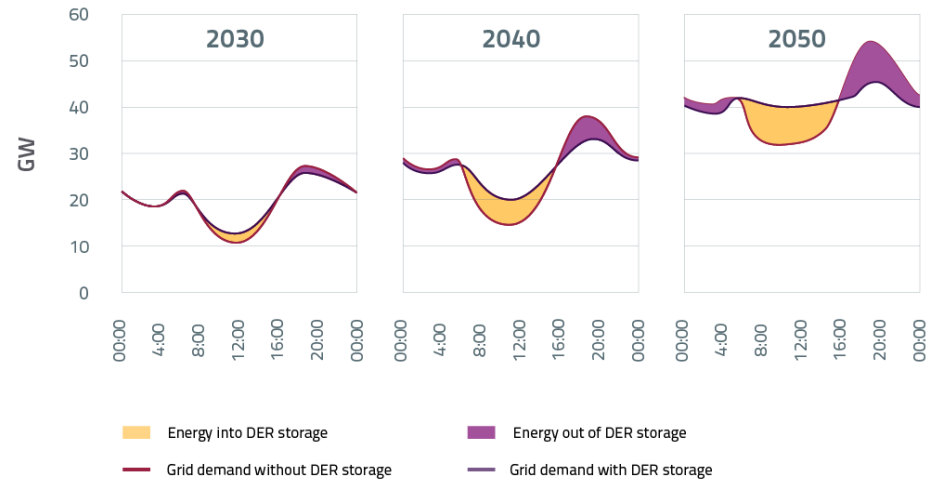


FORECAST NEM CAPACITY TO 2050 UNDER THE STEP CHANGE SCENARIO



Source: AEMO Integrated System Plan 2022

THE IMPACT OF STORAGE ON DEMAND

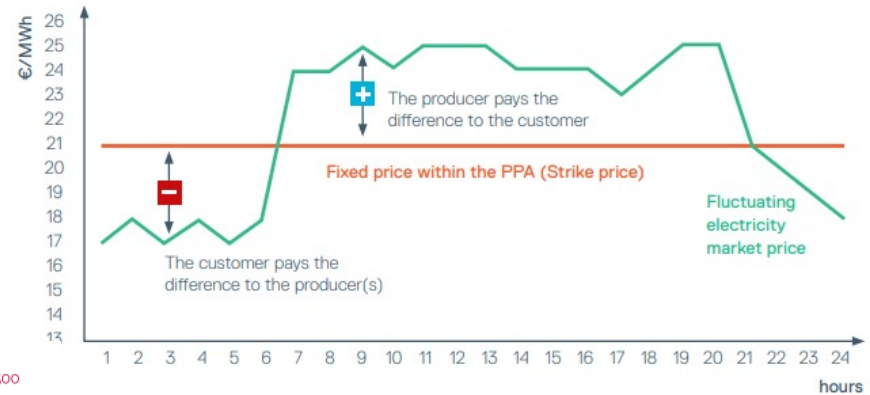


Source: AEMO Integrated System Plan 2022



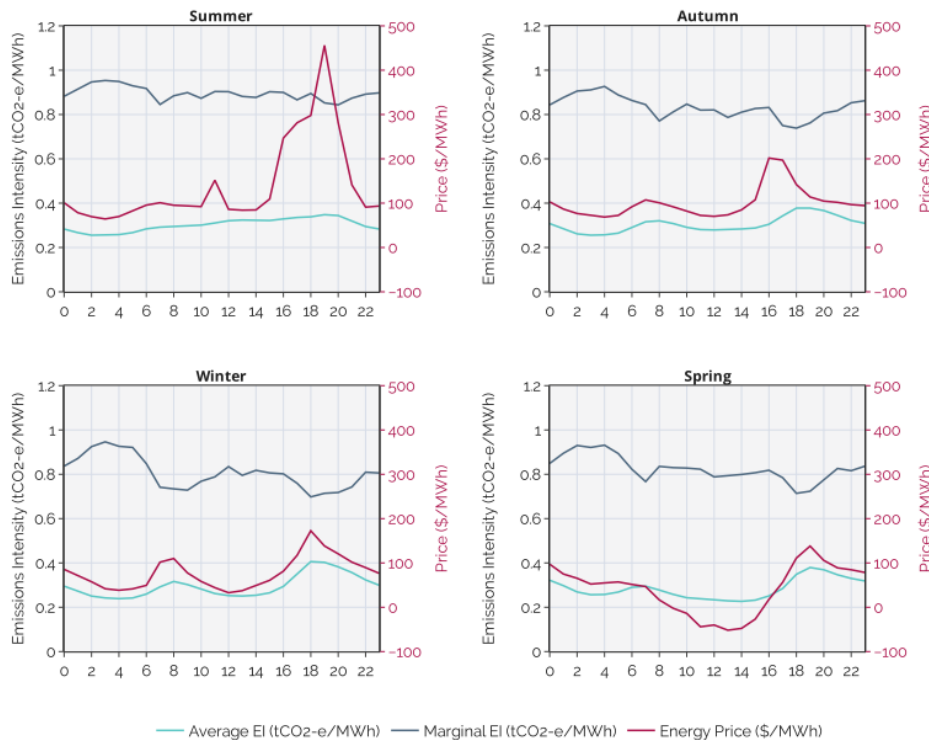
How can corporate RE purchasing support the grid transition?

Historically state 'pay as produced' PPAs incentivised RE MWh, regardless of temporal and locational match with demand



But both value of energy and emissions vary with time

Heim 2022



Clean energy purchasing arrangements can better support both power systems and actual emissions reductions

- Onsite
 - Own and operate behind the meter PV
 - Buy RE via an onsite PPA (the PV system is operated by a third party)



- Offsite PPA
 - Must retire certificates (LRECs) or the RE can be claimed by another buyer!
 - New projects are truly additional and the PPA allows developer to secure low cost financing
 - PPAs with clean firming (storage) can be better matched to demand and support the grid
 - Spot exposure can incentivise development of demand flexibility to achieve better matching
- And
 - Eliminate consumption of non-electricity fuels
 - Reduce energy consumption

High matching in a PPA reduces emissions as well as hedging against market exposure

Fig 1

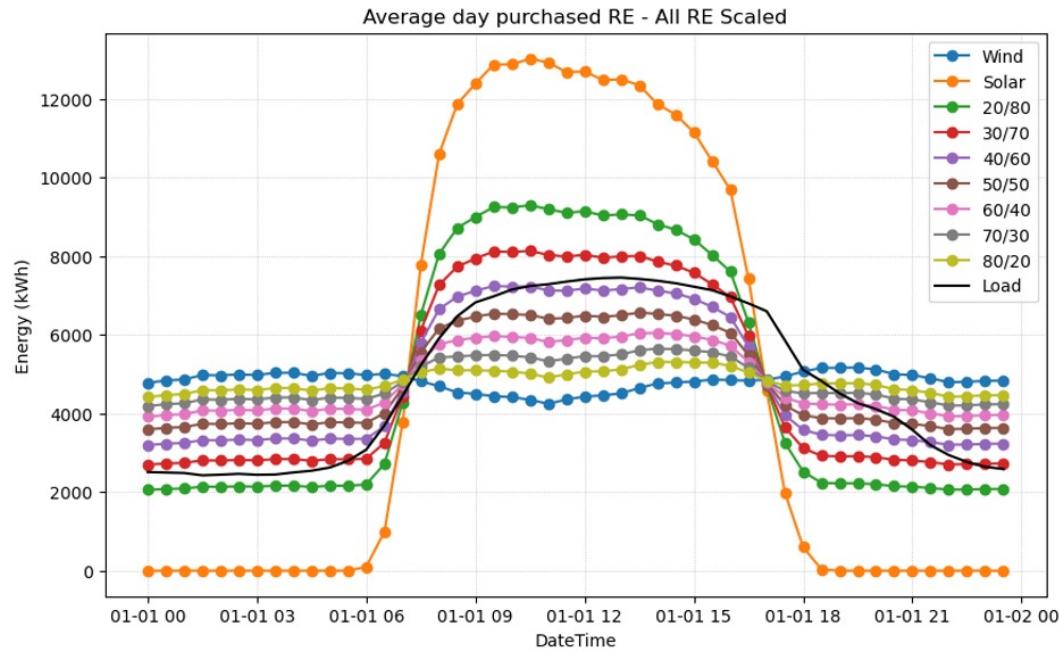
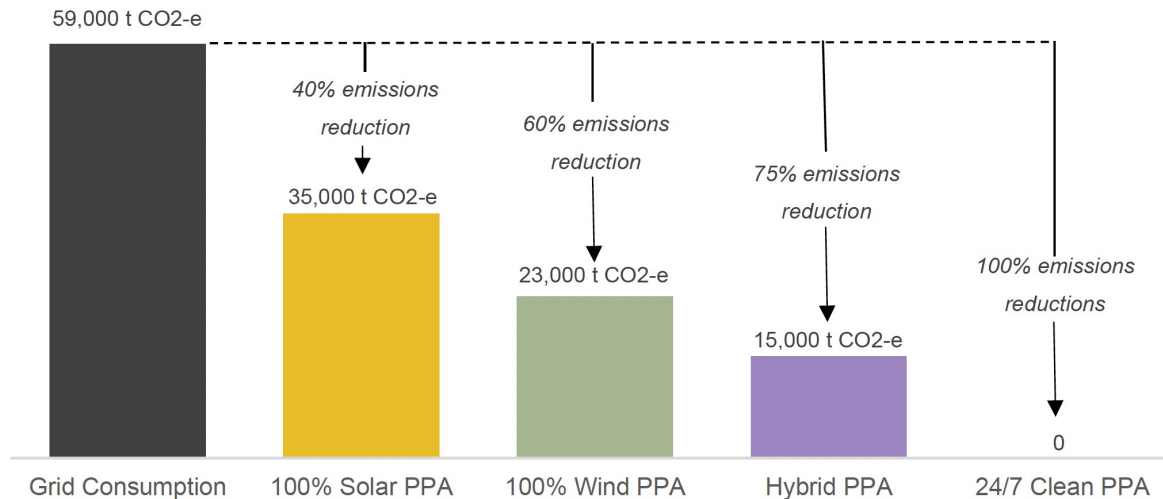


Fig 2



Yuan 2022

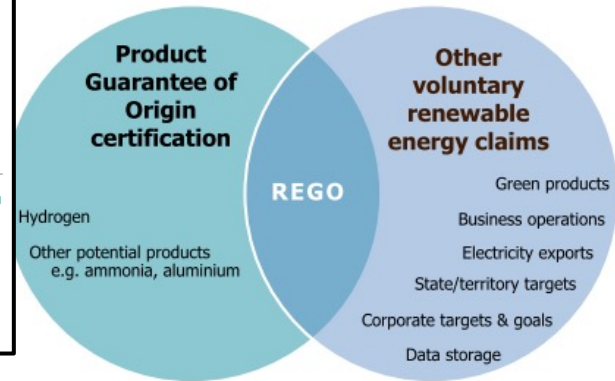
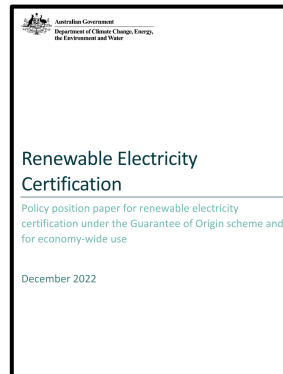
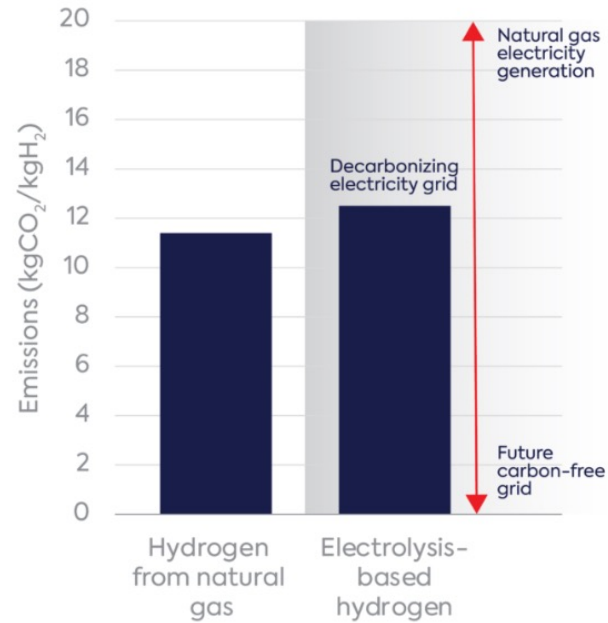
Evolving standards



EU Delegated Act defining green hydrogen is cleared by European Parliament after committee vote

The definition is crucial because it tells producers whether the H₂ they manufacture can be sold and traded as 'renewable' and be eligible for subsidies

28 March 2023 12:57 GMT UPDATED 28 March 2023 12:57 GMT



Policy position proposal 12: The Department proposes that REGOs created by power stations and storage facilities over 1 MW in capacity be required to include a timestamp reflecting the hour in which the electricity was dispatched by the power station or storage facility.



Evolving accounting guidance

- Most procurement is guided by GHG Protocol Scope 2 Accounting Guidance
 - Allows matching of demand with generation on an annual basis
 - E.g. under the RE100 initiative
- Stakeholder consultation on revision of guidance



2b. Responses on granular vs. broad data and quality criteria requirements

	Most cited reasons include:	
Create granularity	<ul style="list-style-type: none"> • More closely aligns with physical delivery of electricity • Reduces issue with double counting • Enables scaling of new clean technologies and emission reduction strategies 	<ul style="list-style-type: none"> • Empirical research indicates that procurement with: <ol style="list-style-type: none"> a) hourly matching to consumption, b) deliverability and c) additionality may improve alignment of inventory and system-wide emissions¹
Keep broad	<ul style="list-style-type: none"> • Doesn't preclude market participation from orgs with fewer resources • Needed where data and procurement options are unavailable or difficult to access 	<ul style="list-style-type: none"> • Granularity could restrict market development and investment in grids that need it most, leading to equity concerns • Allows for greater avoided emissions impacts from dirtier grids as opposed to local, clean ones



Key themes from Scope 2-related proposals

- Introduce more **granular data requirements** for LB and MB
- For MB, introduce more **precise quality criteria** for procurement of carbon-free electricity
- Introduce new requirement for **reporting of avoided emissions** in addition to (or in replacement of) LB and MB
- For MB, introduce **additionality or causality criteria**
- For MB, require **bundling** of EACs and delivered electricity
- Report **LB only where MB cannot be reported**, such as where reliable residual mix data is unavailable
- For MB, adjust **order of operations to reflect utility decarbonization** alongside voluntary procurement
- Develop guidance for **calculating residual mix data**
- Develop guidance on allocation of emissions from **waste-to-energy, IT, and other sector-specific accounting**
- Adopt a new framework that **mimics financial and cost accounting**

New types of PPAs

BHP signs baseload PPA contract with Neoen for 24/7 renewable energy

Australian headquartered mining giant BHP has signed a 70 MW baseload renewable energy contract with Neoen to meet 50% of its Olympic Dam mine operations in South Australia.

NOVEMBER 4, 2022 **BLAKE MATICH**

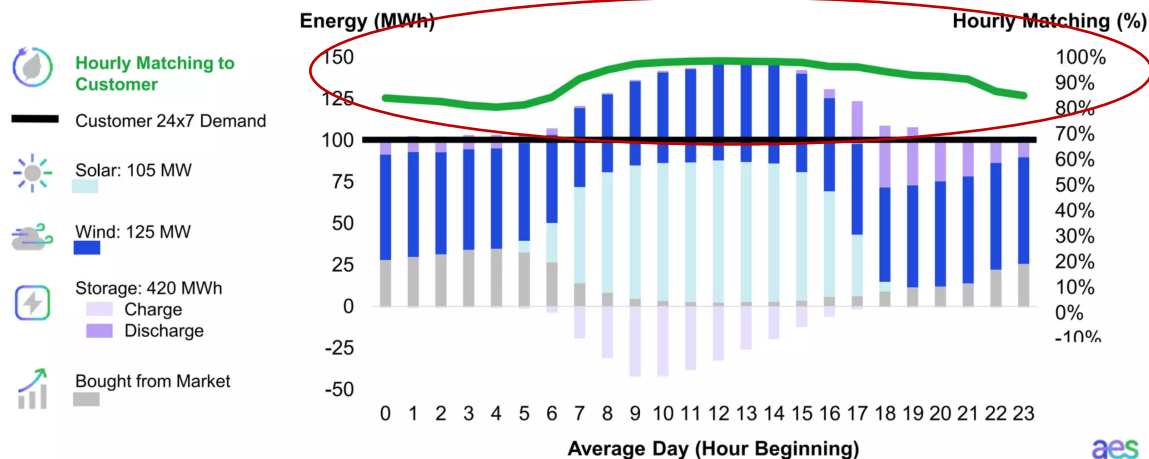
be thanked. In a company statement, Neoen says it will deliver a “24/7 green energy solution to the mine, along with the associated large-scale certificates (LGCs).” And it will do this by firming the intermittent wind resources of its 412 MW Goyder South Stage 1 wind farm with storage capacity from its Blyth Battery.

Defining and building a market for hourly energy certificates

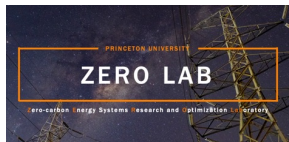
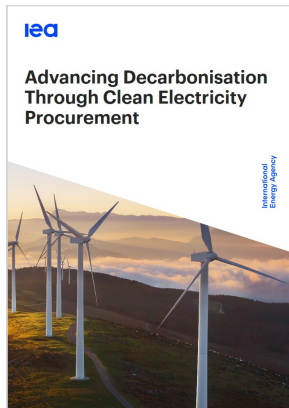
“Our mission is to accelerate the clean energy transition through 24/7 energy tracking”

The EnergyTag Initiative is an independent, non-profit, industry-led initiative to define and build a market for Granular Certificates that enables energy users to verify the source of their electricity and carbon emissions in real-time.

Illustrative Hourly Matching Operations



Impact of PPAs with temporal matching on the grid



- 24/7 CFE procurement can drive greater system-level emissions reductions than 100% annual matching if the CFE target is high enough
- 24/7 CFE procurement comes at a significant cost premium at high matching percentages
- Can stimulate deployment of the wider portfolio of flexible technologies needed for net zero transitions in the power sector

In conclusion

Corporates can support grid decarbonization by

- Supporting renewables investment
 - Installing solar onsite
 - Signing PPAs that support additional investment in new renewable energy
- Supporting development of flexible resources
 - Participation of flexible loads or storage
 - Signing PPAs that facilitate flexibility (on the supply side or the demand side)
- And
 - Electrification of heat and transport
 - Energy efficiency





Collaboration on Energy and
Environmental Markets

Thank you

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