

From: Scott Armstrong <[REDACTED]>
Sent: Thursday, May 23, 2024 11:01 AM
To: AER Inquiry <aerinqury@aer.gov.au>
Subject: Energex and Ergon Regulatory Submission

Hi,

Please find attached my comments and concerns with the gaps in the regulatory submissions:

- Customer Energy Resource (now + 15years)
- Community Energy Zones - required to integrate and optimise both embedded and customer energy/storage/services
- Supports accelerated carbon reductions, Qld still at 700kg-CO2e/MWh and likely stall with the Gov hydrogen electro demand policies without a DNSP to Customer delivery strategy
- Supports likely delays and impacts of remote TNSP-based projects
- Improved resilience for customer supply
- Qld Customers Summer 2023/24 - tens of thousands lost supply due to storms, mini tornadoes, cyclones and hot days
- A detailed assessment will identify current design failures to meet both climate impacts and customer supply-demand changes.

Please consider this as a late submission for Bothe Energex and Ergon 2025-2030 Reg Resets.

Appreciated

Scott Armstrong
Energy2
[REDACTED]






3 Attachments, followed by supporting PowerPoint Presentation Slides

Attachment 1 (AER missing)

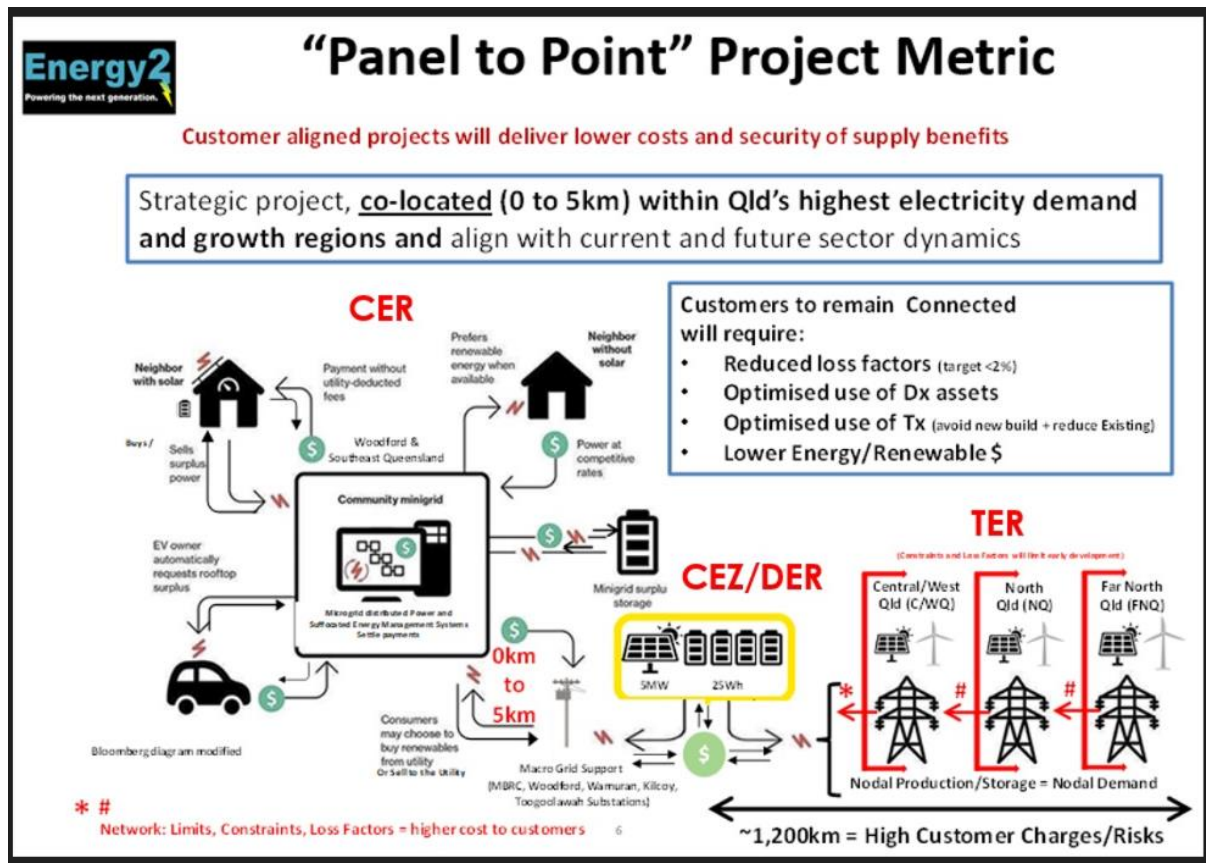
AER submission:

- #5 – Grid Investment to support embedded growth, improve asset utilisation and supply resilience, and reduce exposure to TUoS costs and completing transmission-connected customers (eg Hydrogen)

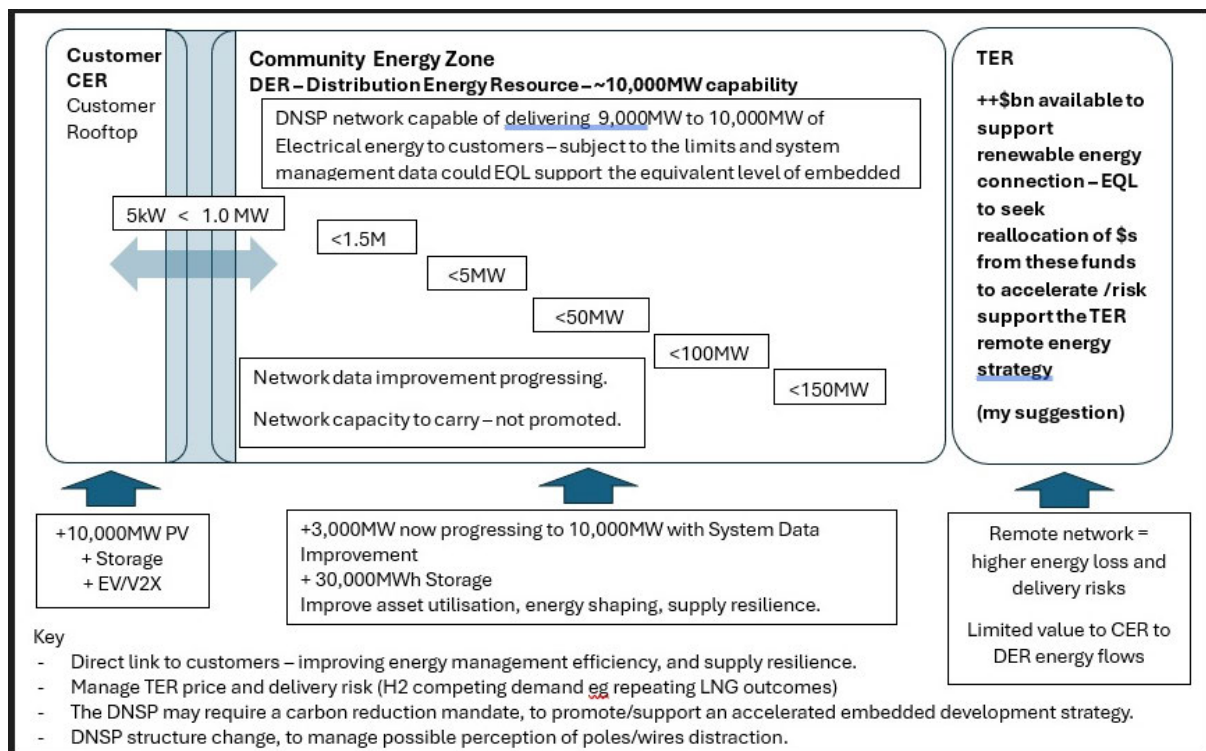
Five ~~Four~~ investment priorities

 #1 Deliver electricity services in the most efficient and affordable way	 #2 Ensure the safety and reliability of our ageing network	 #3 Provide a well-integrated and resilient electricity network to meet future needs	 #4 Facilitate customer opportunities in the transition to renewable energies	 Missing #5 Facilitate embedded development to accelerate carbon reduction and support customer integration
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Attachment 2 (CER-DER)



Attachment 3 (CEZ)



WOODFORDIA ENERGY Company

Showcase Integrated Power Plant

Evergreens – 12:30pm to 1:15pm

29 Dec 2023

Scott Armstrong, CEO - Energy 2

Powering The Next Generation™

Find me on LinkedIn

WE ARE POWERING THE COMMUNITY

- POWER RESILIENCE**
- TELECOMS RESILIENCE**
- SHOWCASE COMMUNITY INFRASTRUCTURE**
- AREA CARBON REDUCTIONS**
- MASTERING KNOWLEDGE**

~~3~~ 2 YEAR TARGET

1st Year Progress 2023 – Small Step



Mega Shed – completed Aug 2023

- State Gov grant approved May 2023
- 40kW_{dc} PV + 42kWh battery storage
- 30kW Inverters
- 3 x 15amp (EV charges outlets)
- 2 x Security LED lights

Key Metrics:

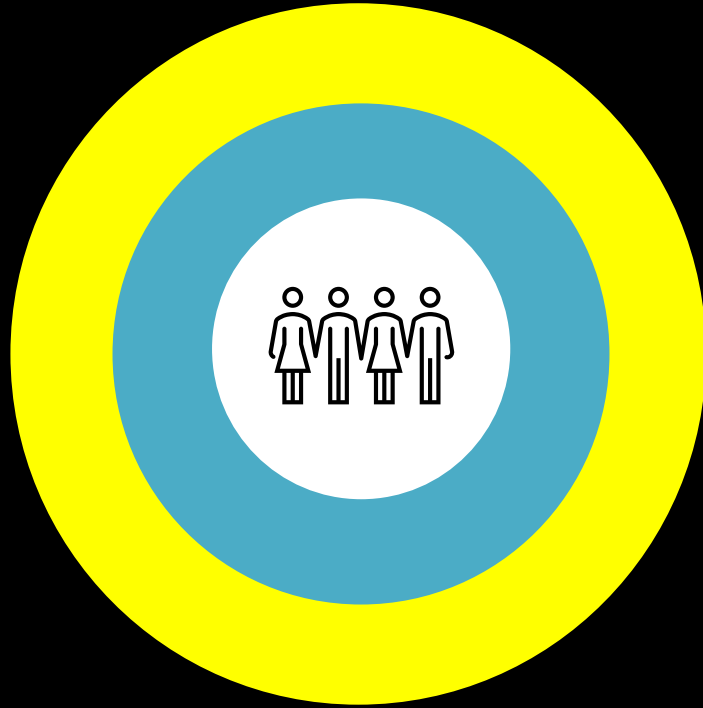
- Production - +45,000kWh/an
- Avoid \$15,500/an system purchases (35c/kWh)
- Pay back <6 years
- 5% of Woodfordia's energy demand requirements

Opportunity:

- Larger battery + additional Solar PV
- Switch from 5kW/phase to 10kW/phase



START WITH THE CUSTOMER



- IMPROVE ELECTRICAL SUPPLY RESILIENCE
- IMPROVE TELECOMS RESILIENCE
- LOWEST COSTS/HIGHEST SERVICE LEVELS
- EFFICIENT (QUICKEST) CARBON REDUCTION TRAJECTORY
- COMMUNITY INTEGRATION (OPTIMISATION - IPP)
- CUSTOMER CHOICE
- **MASTERING KNOWLEDGE – ENERGY, DATA, COMMS AND SOFTWARE DEMONSTRATION PROJECT**
- **ALIGNED IMPACT AND BENEFIT ***

*** Difficult to sell impacts on regional communities when the services produced are not for them**

Resilience Improvement Acceleration



Blackout - Loss of Power

– inconvenient for most (dangerous for some), and amplifies over time

Absolute Blackout – Loss of Power and Communications/information

– instantaneous, isolation, no information, no status for return of any services

Frequency of high impact weather events will increase

WHY?

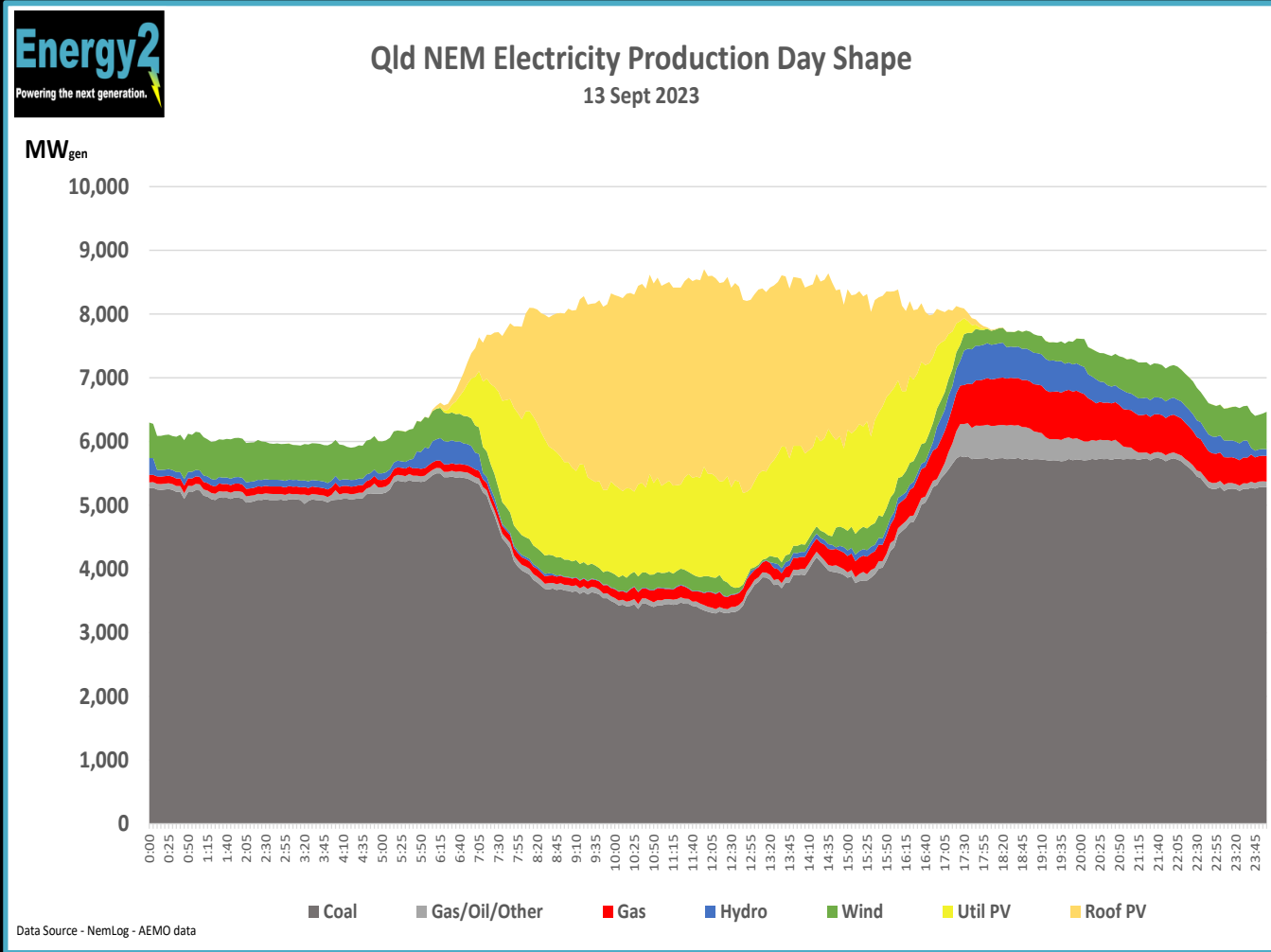
QUEENSLAND, FOR EVERY 1,000KWH SUPPLIED TO CUSTOMERS FROM THE NATIONAL ELECTRICITY MARKET (NEM), +700KG-CO₂E IS EMITTED FROM COAL AND GAS GENERATION.

(Note: not including methane leakage from the source coal or gas mines)

**LEGISLATED TARGETS:
2005 EMISSIONS REDUCED BY 75% BY 2035**



QLD NEM DAY SHAPE



Coal still 65% of Qld electricity supply

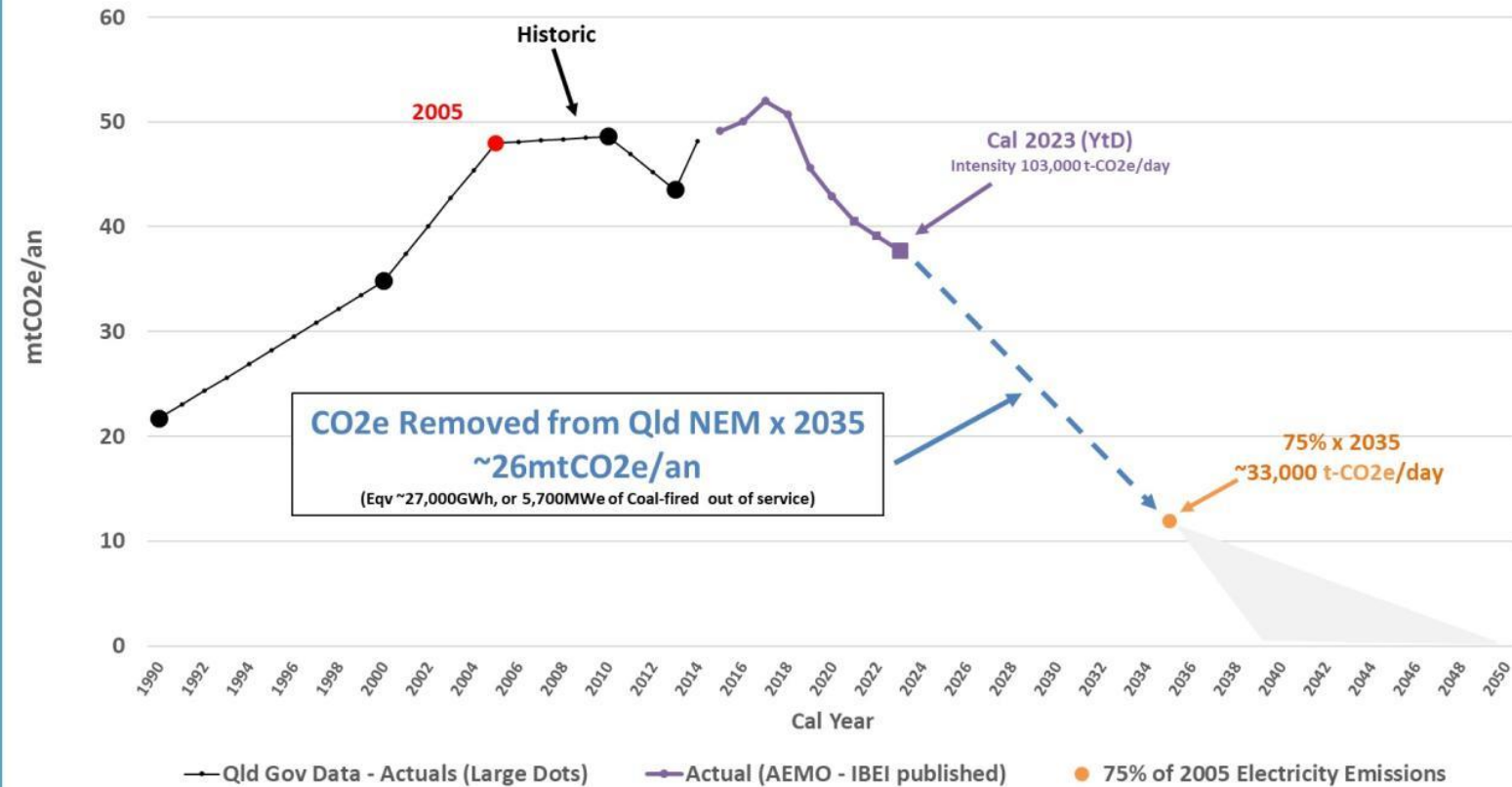
- Coal on this day emitted – 110,000t-CO₂e₂
or +40mt-CO₂e/an_e

- Annual average is ~38mt-CO₂e/an

QLD NEM CARBON EMISSIONS



Queensland NEM Electricity Sector Carbon Emissions and Target



Source Data - Industry Benchmark Emission Index (IBEI) AEMO published information 2011 to 10 Dec 2023
 + Qld Carbon Pollution Projections (2014) : Queensland's baseline greenhouse gas emissions projections to 2030

2035 Target:

- Down to ~12mt-CO₂e/an, or
- 33,000t-CO₂e/day; or
- ~200kg-CO₂e/1,000kWh

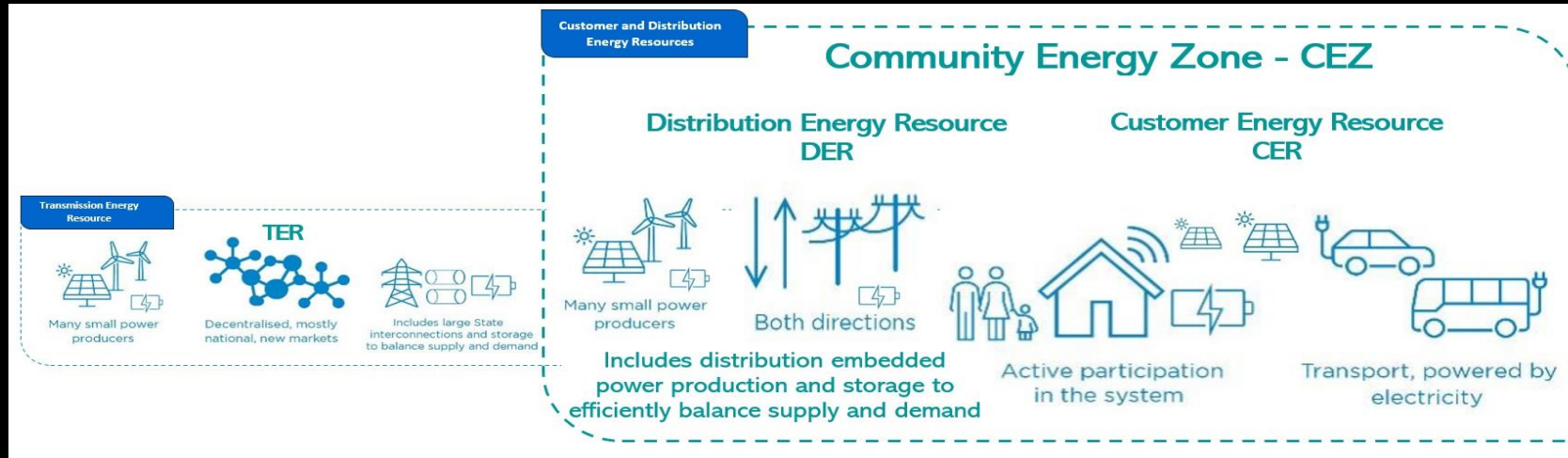
Increased domestic and industrial rooftop solar +

Embedded projects like Woodfordia will accelerate carbon reduction targets



DNISP ENERGY FLOW CHANGES:

- Rooftop PV + Storage – Residential and C&I growth
- Embedded PV + Storage – growth across Energy Qld networks/substations
- Electric Vehicle growth plus V2X development opportunities



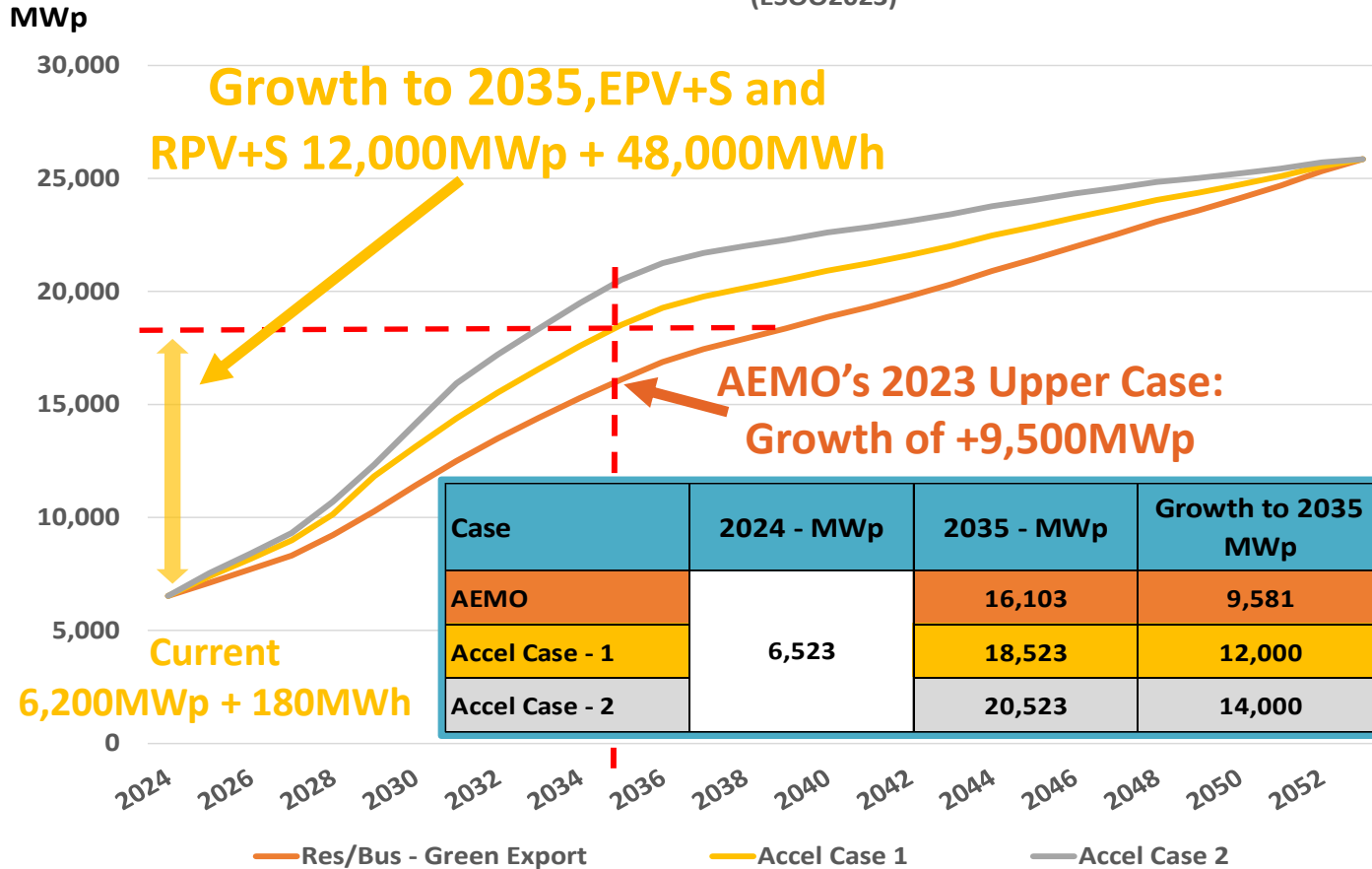
Is Energy Queensland ready for the embedded energy transition –
The “Back of Boundary Meter” strategy

(DNISP – Distribution Network Service Provider – Energy Queensland)

QLD EPV+S & RPV+S GROWTH



Qld Rooftop PV - Residential + Business + Embedded
2 x Accelerated Cases to 2035
(ESOO2023)



Data Source: AEMO and <http://forecasting.aemo.com.au>, (RPS CF - ~14%p)

Targeted embedded projects will provide efficient support for:

- Qld/Fed Gov targets
- Reduce pressure (and cost to customers) due to new transmission and
- Support regional customers and microgrid developments.
- Resilience Improvements (Lights On)
- harnessing and using PV power efficiently

Growth “Accelerated Case – 1” x 2035 Energex/Ergon DNSP:

- PV +12,000MWp
- Storage +48,000MWh

EPV+S - Embedded Solar PV + Storage

RPV+S - Rooftop Solar PV + Storage



ENERGY QLD - FUTURE PROOF OPPORTUNITY

ASSETS +\$29BN, UNDERUTILISED (<40% & DECLINING)

EPV+S Developments	Actual	Target No.	@MWp	New - MW	+S hours	New - MWh
Adjoining Substations	508	110	30	3,300	5	16,500
Cut-In 132kV	+130,000km	10	50	500	5	2,500
Cut-in 110kV		5	40	200	5	1,000
Cut-in 33kV		60	20	1,200	5	6,000
Cut-in 11kV		50	6	300	5	1,500
EPV+S - Total				5,500		27,500
RPV+S - New				6,500	1.8	11,500
RPV+S - Retrofit					1.6	9,000
Total				12,000		48,000

Growth Targets (Accel Case - 1):

EPV+S - Growth

- EPV 5,500MWp
- Storage 27,500MWh

RPV+S - Growth

- RPV 6,500MWp
- Storage 11,500MWh
- Retrofit + S 9,000MWh

Growth x 2035

- PV +12,000MWp
- Storage +48,000MWh

Woodfordia Energy Showcase Project
The 1st of +200 possible targets



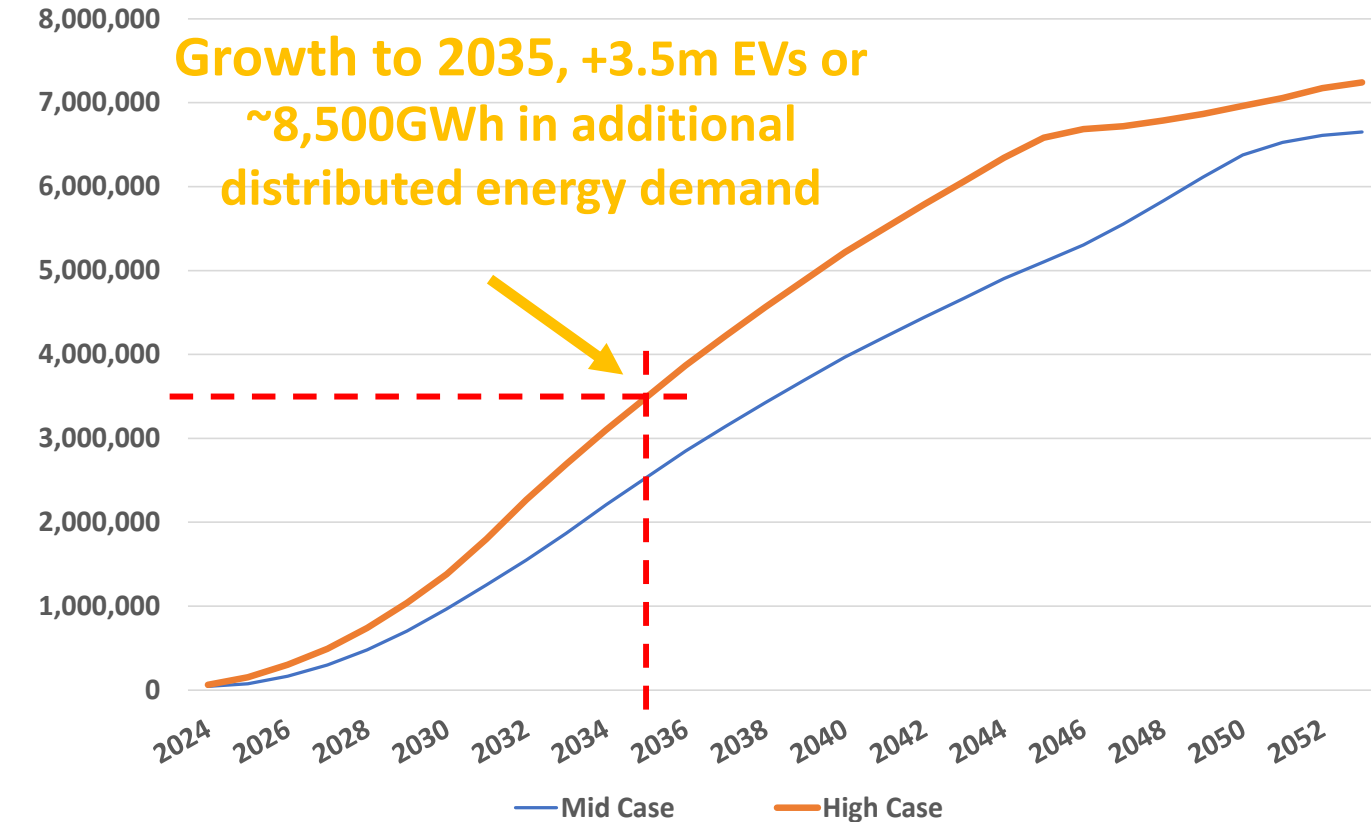
QLD EV OPPORTUNITY MANAGEMENT



Qld Electrical Vehicle Numbers

(ESOO2023 Indicative MWh/an per Vehicle)

Vehicle No.s



Data Source: AEMO and <http://forecasting.aemo.com.au>

Home, plus down the road:

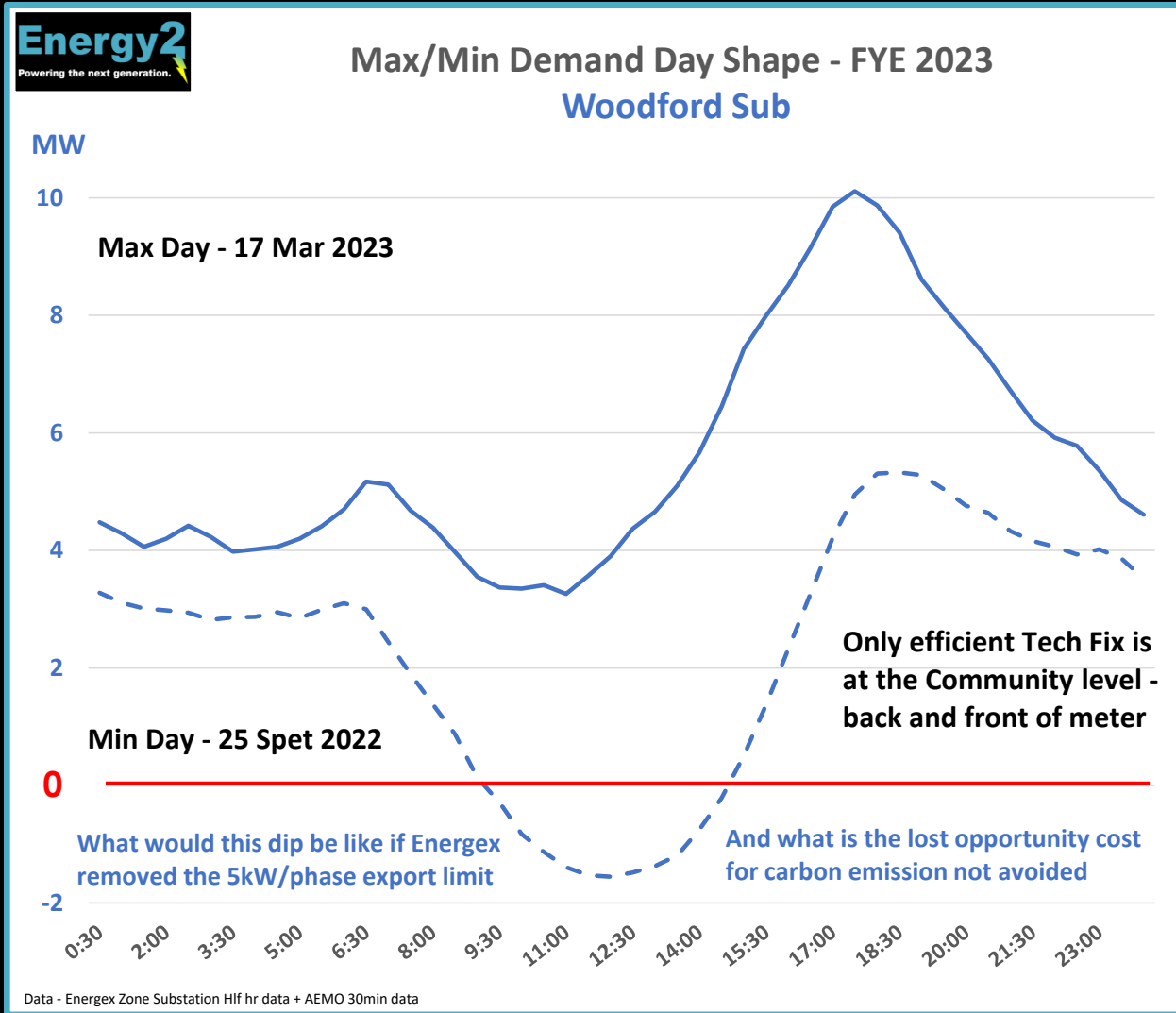
- Assess ability to self-supply (larger RPV+S)
- Co-located with Business (Ditto)
- DNSP support systems (EPV+S - Micro)
 - Road/Highway based distributed
 - Embedded support/management systems
- Resilience Improvements –
 - V2G, V2L, V2X
 - VPP, PP

Growth to 2035 Energex/Ergon DNSP:

- EV Vehicles: 3.5m, still growing
- EV Demand +8,500GWh/an
- Stored Energy up to ~200GWh



NOT SOLVED BY TRANSMISSION



Distribution level issues can't be solved by:

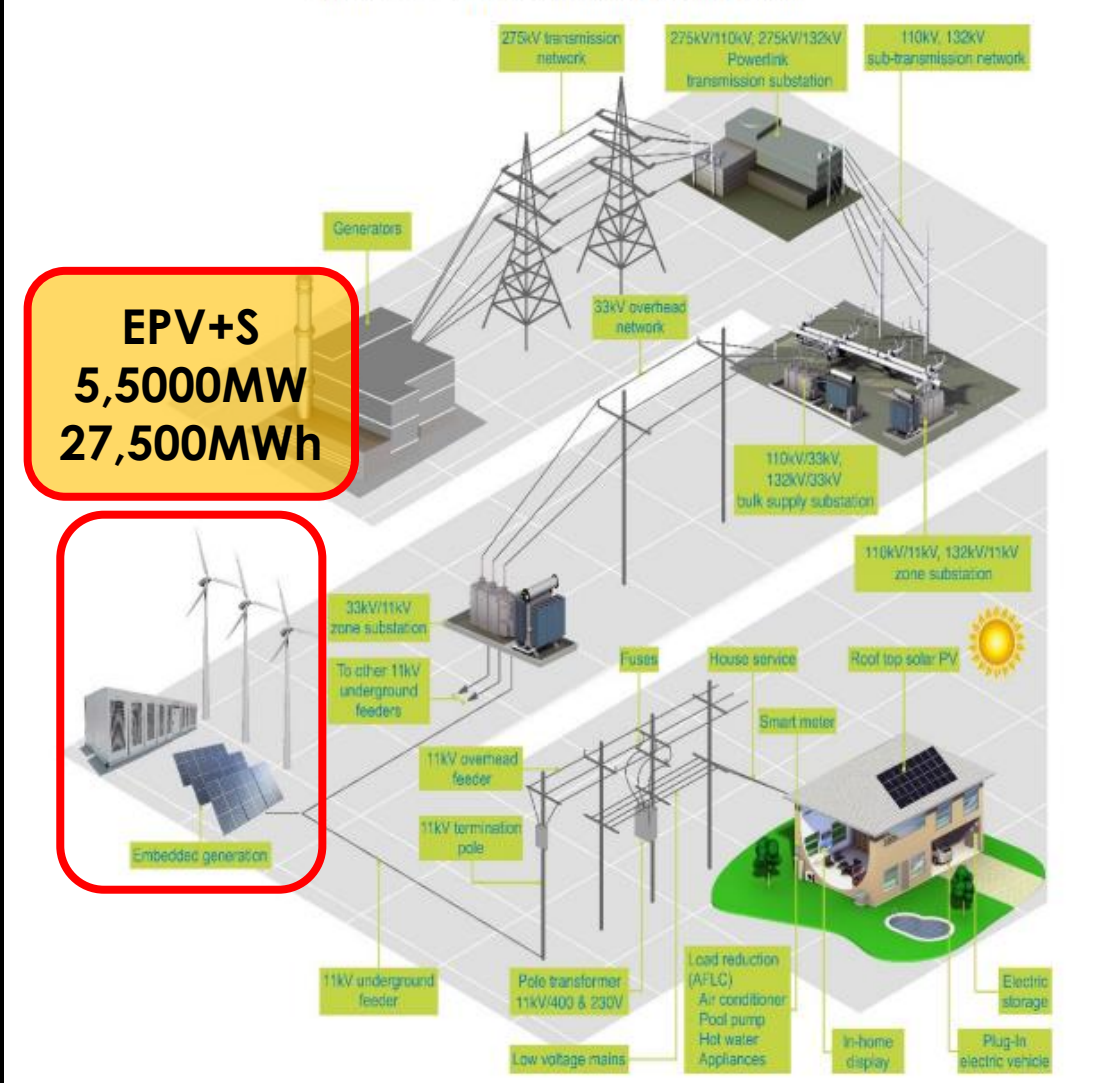
- Remote transmission development, or
- Remote generation development (including renewables)

Energex embedded PV at +40% export; currently avoids 8% of transmission delivered energy

Transmission avoidance to 2035 could be +80% and higher in some zones, such as Woodford.

ENERGY QLD – DARP EMBEDDED GEN

Figure 1-1 – Typical Electricity Supply Chain



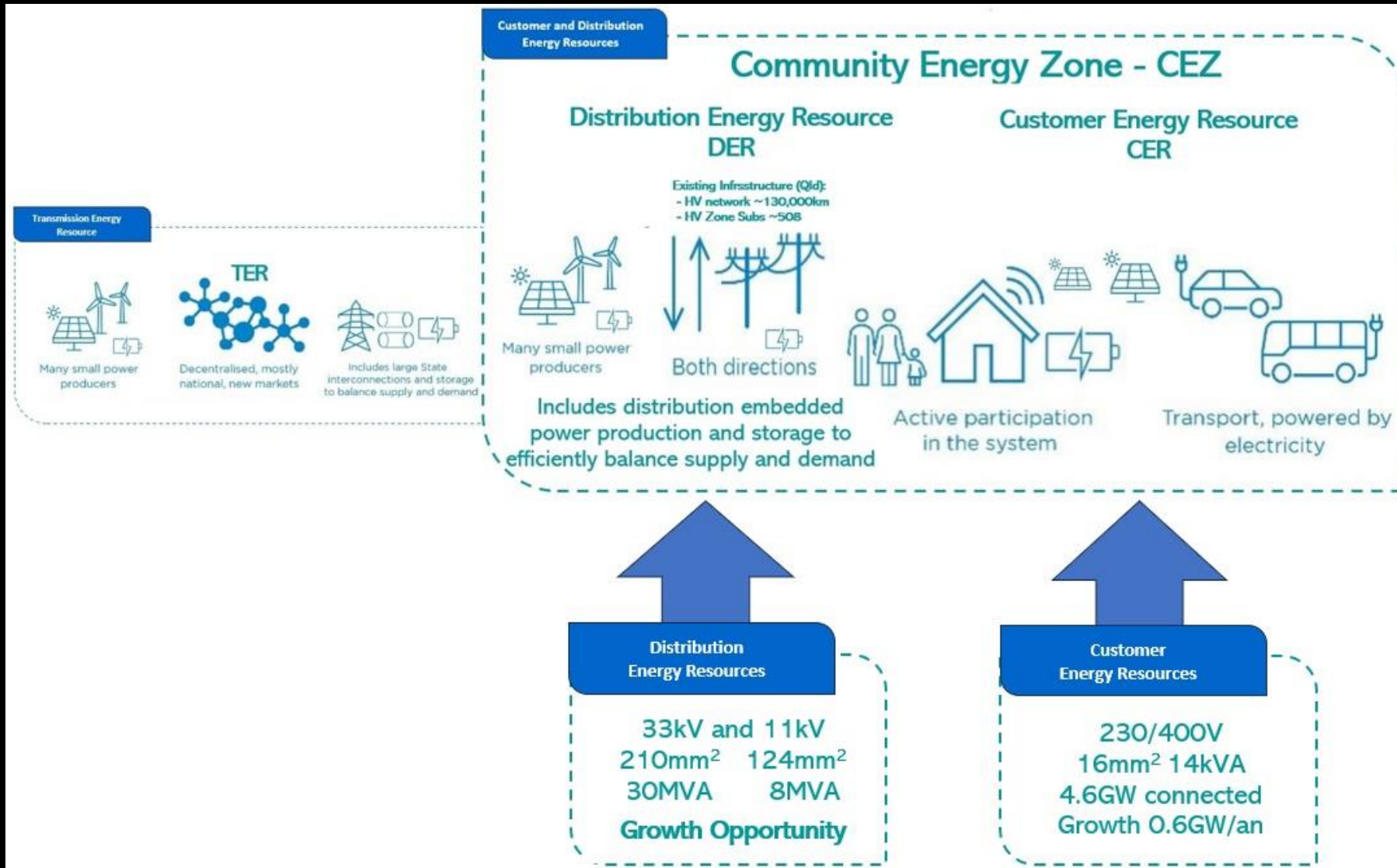
DNSP embedded enablement and forecast connections:

- Pre-emptive CER energy integration management
- Identify Community Energy Zones
- HV connection dynamic limit development to accelerate embedded developments
- CER export limitations (eg 4kVA average)

Supporting an accelerated carbon reduction trajectory.

ENERGY QLD – DARP EMBEDDED GEN

Additional meeting notes promoting the DNSP's ability to accelerate carbon reduction targets.

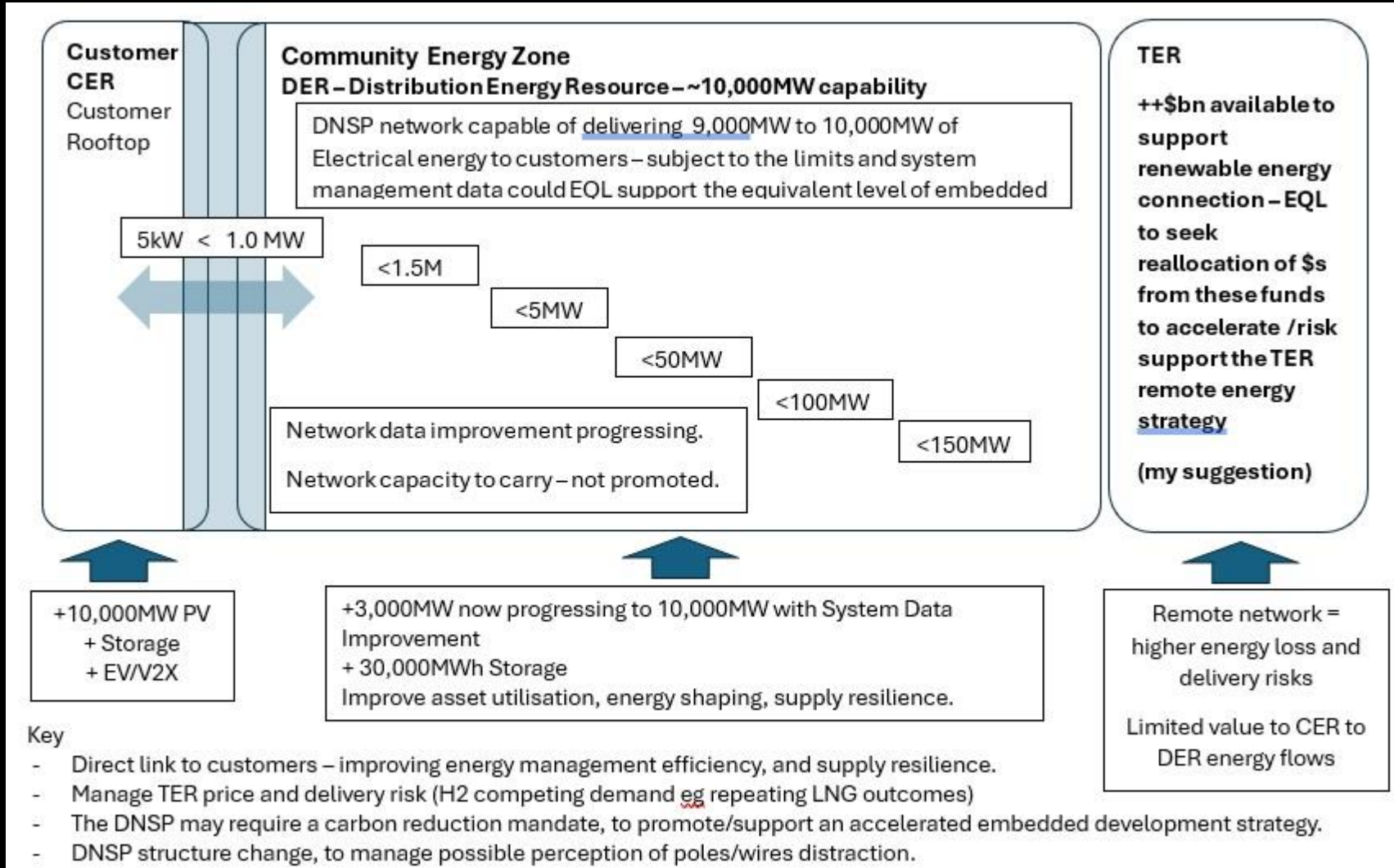


Metrics:

- What has already been delivered behind 16mm²
- What could be achieved with 210mm² and 124mm³

ENERGY QLD – DARP EMBEDDED GEN

Additional meeting notes promoting the DNSP's ability to accelerate carbon reduction targets.



ENERGY QLD – GROWTH OPPORTUNITY

AER submission:

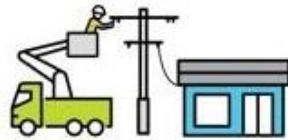
- #5 – Grid Investment to support embedded growth, improve asset utilisation and supply resilience, and reduce exposure to TUoS costs and completing transmission-connected customers (eg Hydrogen)

Five ~~Four~~ investment priorities



#1

Deliver electricity services in the most efficient and affordable way



#2

Ensure the safety and reliability of our ageing network



#3

Provide a well-integrated and resilient electricity network to meet future needs



#4

Facilitate customer opportunities in the transition to renewable energies

Missing



#5

Facilitate embedded development to accelerate carbon reduction and support customer integration

KEY MESSAGES:

- DNSP customer energy management is not efficiently managed via high-cost New Transmission and Remote Generation/Storage
- AEMO forecasting significant embedded PV and EV growth,
- The DNSP's response to growth will also support additional embedded growth (Accelerated Case 1 and 2 trends)
- DNSP connected generation and storage will reduce transfers from the TNPS to ~20% x 2035
- Support the growth of a Qld retailer

**Woodfordia Energy's Showcase Project –
AEMO forecast, DNSP change aligned, Qld Retailer (who?)**

(DNSP – Distribution Network Service Provider – Energy Queensland)

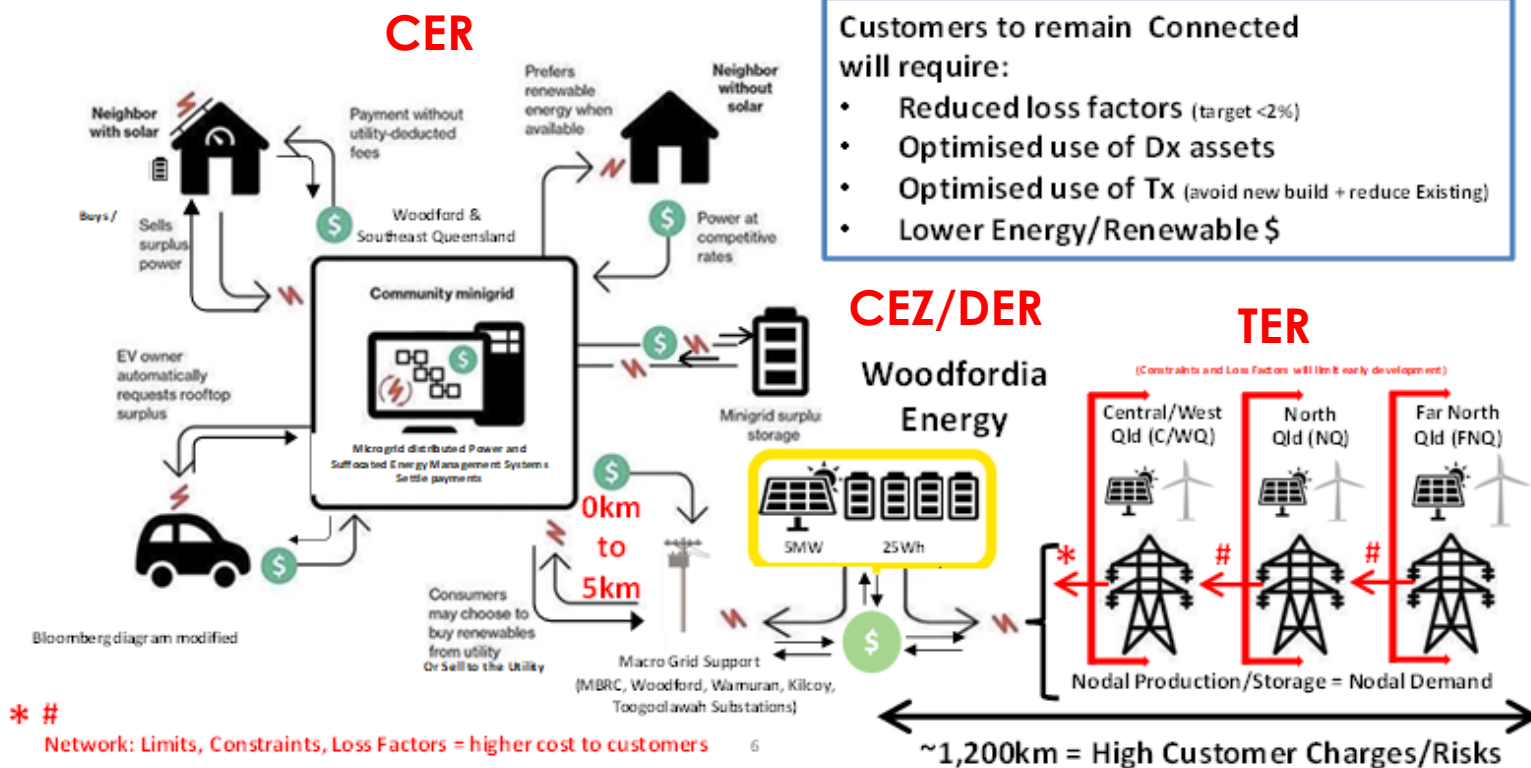
GROWTH OF CONCEPT

- **PURSUE THE WOODFORDIA ENERGY SHOWCASE PROJECT**
 - **RENEWABLE ENERGY, WITH TELECOMS RESILIENCE AT THE COMMUNITY LEVEL**
- **Ability to expand the Woodfordia Energy concept into neighbouring zones:**
 - E.g. Wamuran, Kilcoy, Toogoolawah, Esk....
- **Work with Energy Queensland to develop the Opportunity – Whole of State**
 - Target ~30% of Energy Queensland's +500 substations, plus 130,000km of HV network
- **Expand rooftop for Industrial buildings – some sheds in Brisbane ~5ha in area**
 - The “already built” sector of industrial sheds
- **Support ramp of Home Battery installs and development of IPP**
- **Community electricity production – PANEL TO POINT efficiencies**

“Panel to Point” Project Metric

Customer aligned projects will deliver lower costs and security of supply benefits

Strategic project, co-located (0 to 5km) within Qld’s highest electricity demand and growth regions and align with current and future sector dynamics



MASTERING KNOWLEDGE

New Technology Systems:

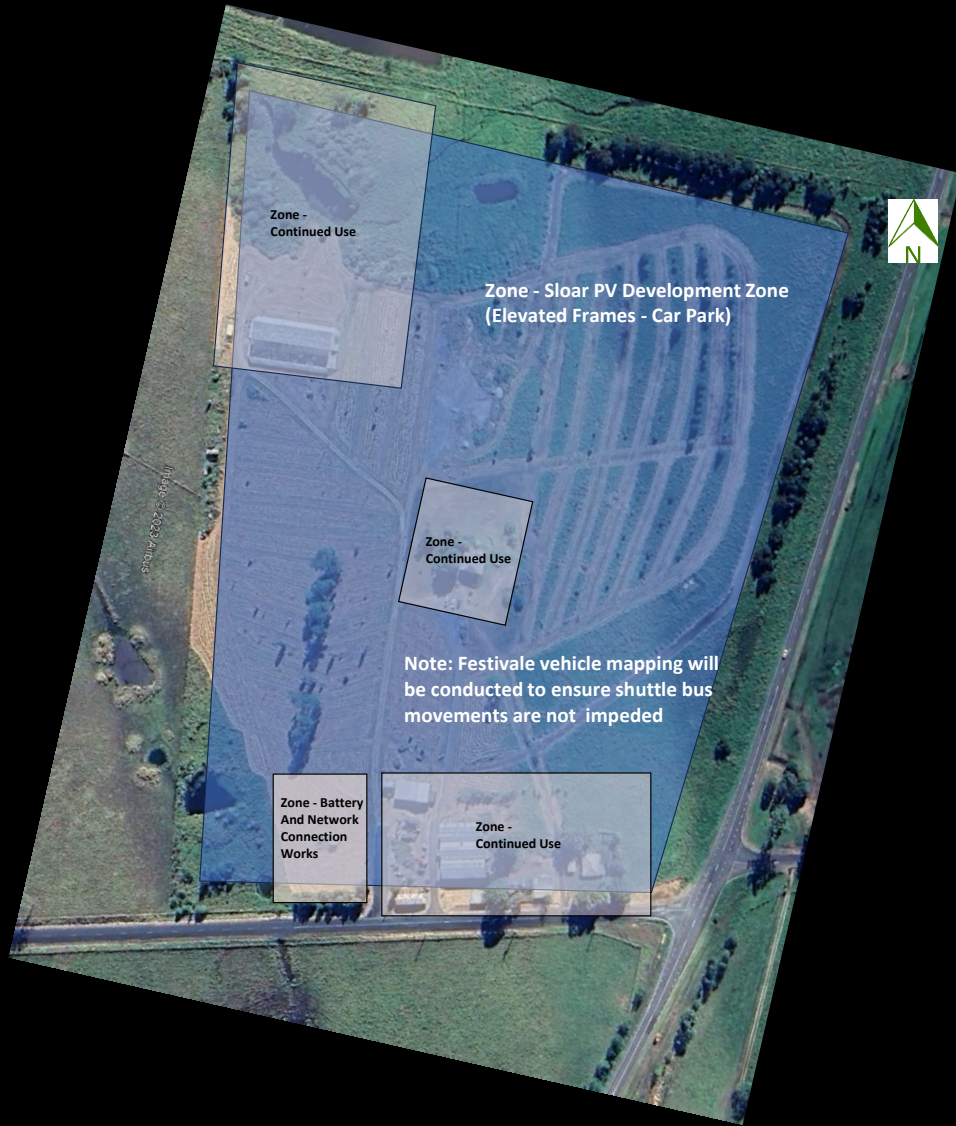
- Improve consumption efficiency; and
- Services.
- Improve Resilience.
- Reduce delivery costs.
- Reduce emissions.

WOODFORDIA ENERGY - SHOWCASE

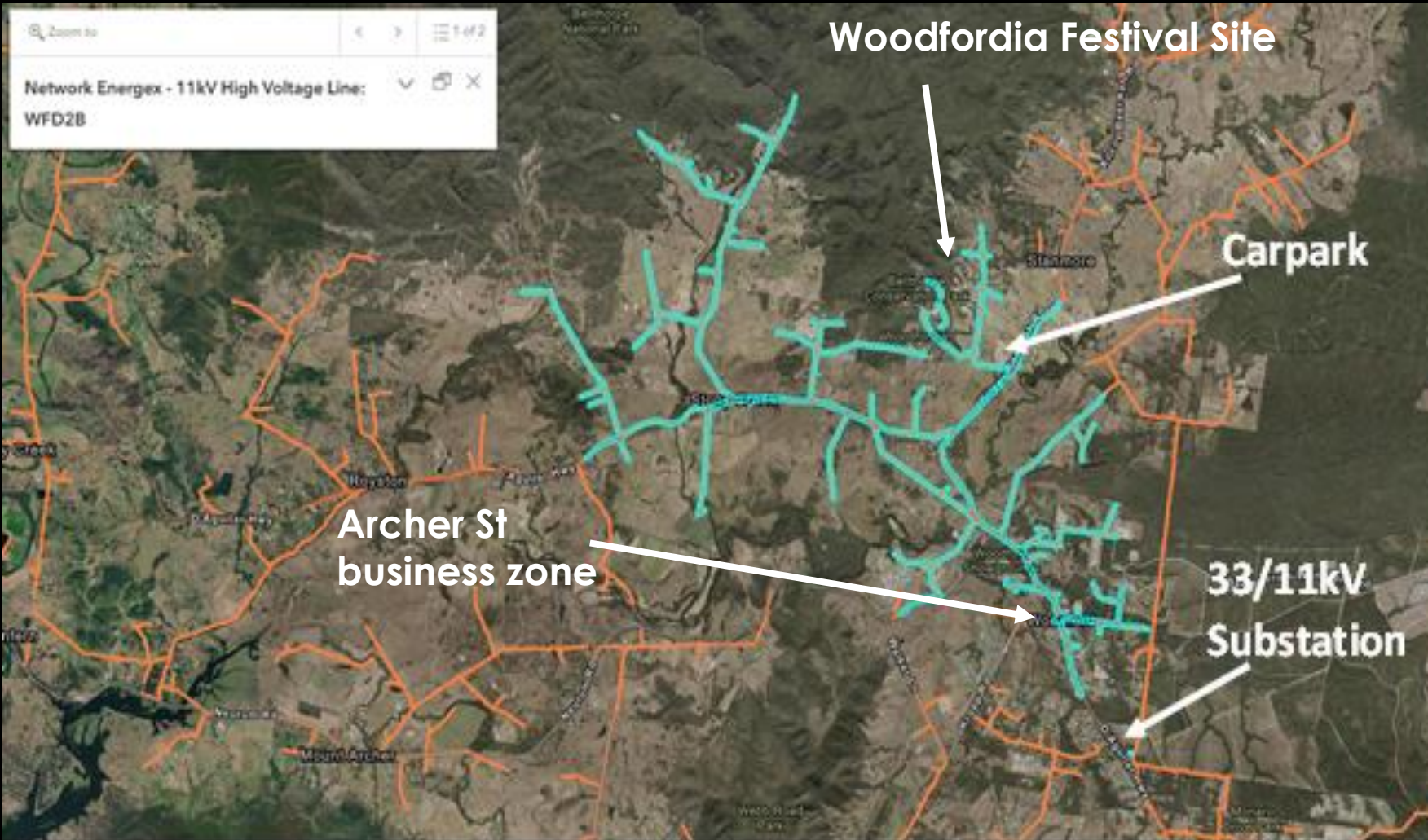
- **Project Scope:**

- Solar PV – up to 5MW(ac) (5 to 7 ha or 13,500 panels)
- Energy storage – up to 25MWh
- Reduce carbon to >300kg-CO₂e/MWh x 2025
- Energy services (FCAS, System Restart, Impedance matching, Telecoms etc)
- Integrated EV charging stations
- Adjoining an existing 11kV network
- Final design electrical/system connection design alignment and approval
- Geotech/Engineering/Site designs will meet construction permitting and approvals
- Woodfordia Inc. has an existing +30year community basis

WOODFORDIA ENERGY PROJECT



CONNECTED AREA – 11KV



- Supplying up to 5MW:
 - Woodfordia
 - Poultry facility
 - Town services
 - Shops/Hotels
 - Education
 - Other businesses
 - Housing Rural/Town

11kV Feeder WFD2B rated for 400Amps, supplies +30% of areas energy at a peak of ~5MW

EXAMPLE – 3MW DEVELOPMENT IN SA



NEXT STEPS:

- **Shovel Ready Mid 2024 – First Energy Mid 2025**
- Engineering Design and Layout
 - Confirm connection design – up to 5MW as a dynamic limit
 - Telecoms engagement
- Engage
 - Council for site planning and construction approvals scoping
 - State/Federal as a “Community Energy Project”
 - Local area community and businesses aligning benefits
 - Community base electricity retailer (with IPP systems)
- Continued development of the integration technology scope
- Continue engagement with suppliers to refine budget pricing and schedules
- Continued engagement to align project funding options

KEY MESSAGES:

- CARBON REDUCTIONS AT THE CUSTOMER, WILL SUPPORT:
- RESILIENCE IMPROVEMENT FOR BOTH POWER AND TELECOMS
- WORK DIRECTLY WITH REGULATORY BODIES FOR SUPPORT (AEMC/AER)
- Qld needs a Distribution (DNSP) Integrated Energy Growth Delivery Strategy
 - Energy Qld could be the world leader, best positioned to lead or facilitate
- Energy Qld Opportunity +12,000MWp Solar PV and 48,000MWh Storage x 2035
- WOODFORDIA ENERGY'S LEAD SHOWCASE PROJECT - EPV+S 5MW/25MWH
- Funding alignment for Woodfordia Energy Showcase Project - State/Federal

Community Empowerment Strategy – Power by the people for the people

(DNSP – Distribution Network Service Provider)

QUESTIONS?

ADDITIONAL MESSAGES:

- **CUSTOMER ENERGY RESOURCE**
 - **ENERGY EFFICIENCY**
 - **APPLIANCES**
 - **BUILDING STANDARDS**
 - **DEMAND MANAGEMENT AND OPTIMISATION**
 - **OPTIMISED SOLAR PV AND ENERGY STORAGE**
 - **ASSESS PV CURTAILMENT, AND EXPORT IMPROVEMENTS**

- **ECONOMIC REVIEW:**
 - **CLIMATE**
 - **LIGHTS ON, COMMS ON**
 - **COST IMPROVEMENT**
 - **LOCAL JOBS**
 - **QLD RETAILER SUPPORT**

ADDITIONAL MESSAGES:

- **NETWORK REENGINEERED FOR THE FUTURE**
 - **CUSTOMER MANAGEMENT - PV, STORAGE, EV, FUTURE – IS THERE A NEED FOR DEFINED LIMITS**
 - **REASONABLE ENERGY DEMAND CAPS – SUPPORTS FORECASTS, CAUSER PAYS, ETC; OR**
 - **RUN TO FAILURE – WHO DOES THIS IMPACT – EVERYONE/OUT OF CONTROL**
 - **IMPROVED INFORMATION PROVIDED TO CUSTOMERS – NO DATA = NO RESPONSE**
 - **RESILIENCE**
 - **COST IMPROVEMENTS + UNAVOIDABLE AS CUSTOMER DYNAMICS CHANGE**
- **REVIEW WEATHER EVENTS, FREQUENCY, AND NETWORK READINESS:**
 - **CYCLONE/LOWS**
 - **STORMS**
 - **FLOODS**
 - **HOT DAYS**

ADDITIONAL MESSAGES:

- INVOLVEMENT
 - TOWN HALL SESSIONS
 - COMMUNITY
 - LOCAL AREA INTEGRATION
 - TAFE/UNIVERSITIES
 - SOCIAL SUPPORT
 - BUILDING PRODUCTS (ENGINEERING STANDARDS)

“BENEFITS OF ISLANDING MICROGRIDS TO IMPROVE CUSTOMER SUPPLY LEVEL RESILIENCE...”

- HIGH-IMPACT LOW-PROBABILITY (HILP) EVENTS TO
- HIGH-IMPACT MEDIUM-PROBABILITY (HIMP) EVENTS



- Key Points LinkedIn Comments Plus:

1. Reduced the risks of potential time delays on large renewables, and hydro, and transmission projects

2. It opens up more capital from customers who want to participate.

3. It also opens up another local area workforce

- 4. It enables a lot of small businesses to scale

5. It also unlocks all the latent capacity in distribution networks that on average are only 40% used

6. Will reduce inflation

7. Increase productivity

etc

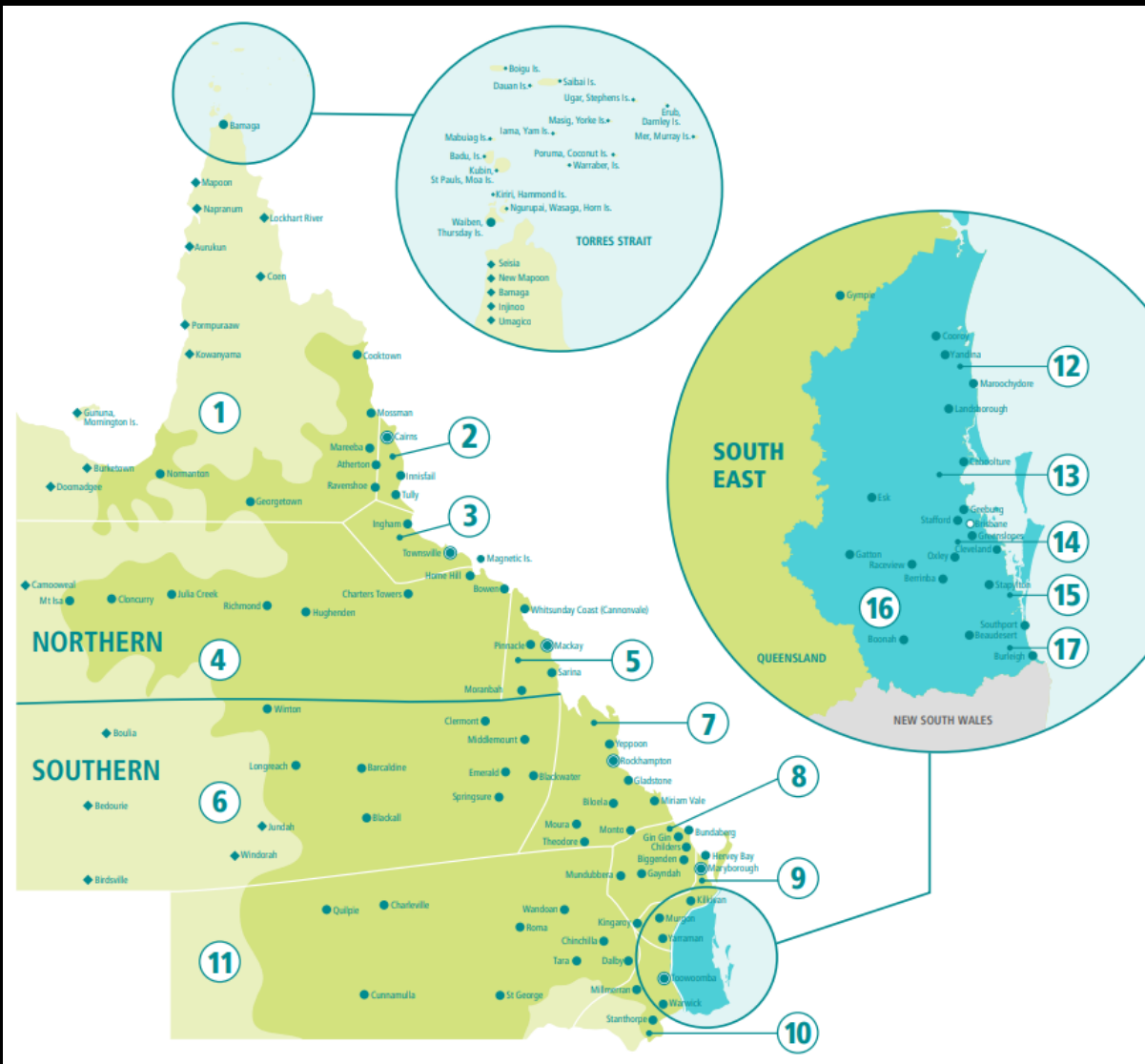
DNISP	Proportion of customers using export services	Export capacity per export customer (kVA)	Proportion of export customers with a battery	Measured exports as a proportion of all energy delivered
Energex	43%	4.9	2%	8%
Ergon Energy	32%	5.4	2%	5%
AusNet Services	26%	4.9	2%	18%
export capacity per export customer lowest for Energex (4.9kVA)				

Energy Qld vs AusNet

- Energex 43% exporting, only 8% of energy delivered
- AusNet 26% exporting, and 18% of energy delivered



Showcase
Project Site



Energy Qld

- +\$29bn of underutilised assets
- 508 Substations
- 130,000km of HV network
- +2,300,000 customers
- Significant CSO reduction opportunity

Aust Domestic Installs - PV and Batteries

(Nov 2023 Data)

Installs: No.

4,000,000

3,500,000

3,000,000

2,500,000

2,000,000

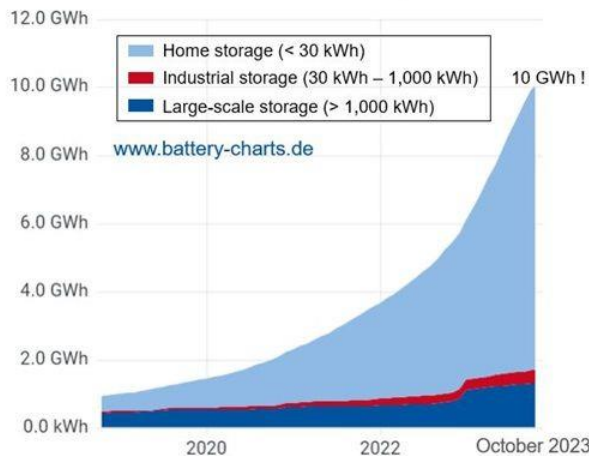
1,500,000

1,000,000

500,000

0

Stationary Battery Storage Systems in Germany
(Status October 2023)



Solar PV

Battery

Germany - 8,000MWh

NEM - 1,000MWh

Qld - 175MWh

Qld only 1 battery for every 16 RPV installs

Data <http://www.cleanenergyregulator.gov.au/DocumentAssets/Pages/Postcode-data-for-small-scale-installations.aspx>



5-hectare roof area
~7MWp of Solar PV

What the future holds for connections to the Qld DNSPs

	Now	2025	2030	2035
 Solar PV	4.3 GW	<ul style="list-style-type: none"> 6.7 GW (Fast) 6.3 GW (Medium) 5.9 GW (Slow) 	<ul style="list-style-type: none"> 10.5 GW (Fast) 9.3 GW (Medium) 8.1 GW (Slow) 	<ul style="list-style-type: none"> 11.9 GW (Fast) 10.3 GW (Medium) 8.6 GW (Slow)
 Battery	0.2 GWh	<ul style="list-style-type: none"> 0.8 GWh (Fast) 0.5 GWh (Medium) 0.4 GWh (Slow) 	<ul style="list-style-type: none"> 2 GWh (Fast) 1.4 GWh (Medium) 1.5 GWh (Slow) 	<ul style="list-style-type: none"> 2.6 GWh (Fast) 1.9 GWh (Medium) 1.6 GWh (Slow)
 Electric Vehicle	10,000	<ul style="list-style-type: none"> 124,000 (Fast) 25,000 (Medium) 14,000 (Slow) 	<ul style="list-style-type: none"> 1 M (Fast) 268,000 (Medium) 34,000 (Slow) 	<ul style="list-style-type: none"> 2.2 M (Fast) 1.3 M (Medium) 278,000 (Slow)

Scenarios: ● Slow ● Medium ● Fast



Customers are active participants



Multi-directional



Decentralised



Market-driven regulation



Intelligent Grid



Many renewable energy producers

EQL: 2023

PV fast:

Now 4,300MW

2035 11,900MW

Growth: 7,600MW

Battery fast:

Now 200MWh

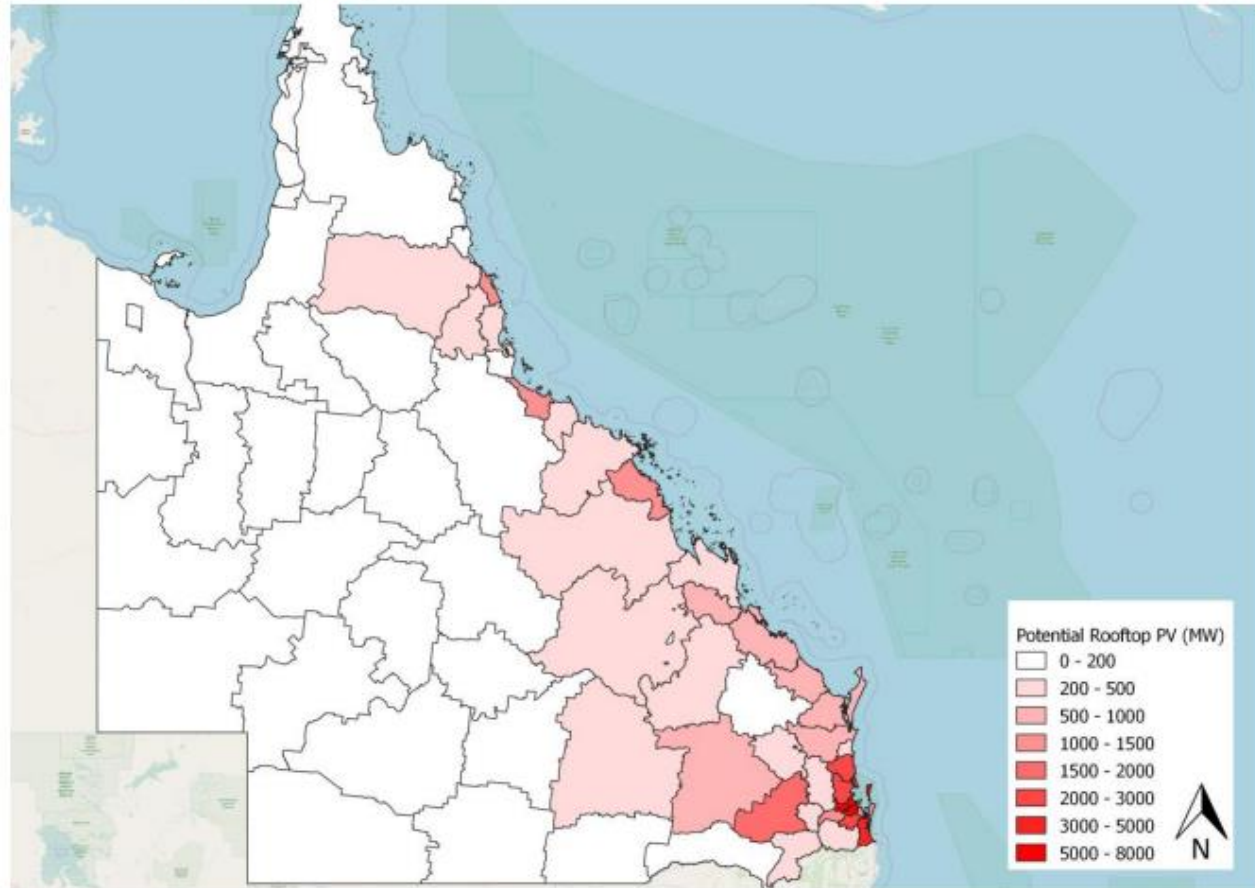
2035 2600MWh

Growth: 2,400MWh

Queensland

Queensland has the third highest total rooftop solar potential (37 GW). However, some of Queensland's LGAs have the highest potential in the country. Most of the potential is in LGA's along the east coast and reduces drastically as we move inland. In addition to Brisbane, some of the other coastal councils that have high rooftop solar potential include Fraser Coast, Bundaberg, Mackay, Townsville and Carins. Inland, Toowoomba shows very high potential.

Figure 12 Potential Rooftop PV in Queensland



CEFC and Prop Council:

Aust rooftop potential:

179,000MWp

240,000GWh/an

Qld

37,000MWp

28,500MWac

49,000GWh/an

6.3.3 Queensland

LGA	PV capacity (MW)	Annual Energy output (GWh)
Brisbane (C)	7,075	10,330
Gold Coast (C)	3,418	4,880
Moreton Bay (R)	2,933	4,204
Sunshine Coast (R)	2,656	3,748
Logan (C)	2,219	3,223
Toowoomba (R)	1,680	2,509
Townsville (C)	1,469	2,283
Ipswich (C)	1,335	1,859
Cairns (R)	1,245	1,813
Mackay (R)	1,087	1,643

Qld majors projected

22,451MWp

34,682MWh

Qld Electricity Demand	GWh/an	53,000
Qld Land Area	km ²	1,852,642

Solar PV	Land Mounted	Rooftop	Land Mounted	Rooftop	Land Mounted	Rooftop
MWh/an/ha	730	1,264	730	1,264	730	1,264
Supplied from	100%	0%	70.0%	30%	13%	87%
GWh/an	53,000	0	37,100	15,900	6,890	46,110
Hectares	72,603	0	50,822	12,579	9,438	36,480
km ²	726	0	508	126	94	365
% of Queensland	0.039%		0.027%		0.005%	

CEFC Study (2019) - Qld GWh/an 49,000

Capacity of Australias Rooftops

	Qld	TER PV	RPV
500,000GWh/an	0.03%	508	126
Dom Dev land	0.03%		
Hydrogen Dev land	0.36%	6631	126
10 fold		13.1	

Largest cities by area:

- Brisbane (15,826 km²)
- Sydney (12,368 km²)
- Melbourne (9,990 km²)
- Perth (6,418 km²)
- Adelaide (3,258 km²)
- Darwin (3,164 km²)
- Hobart (1,696 km²)

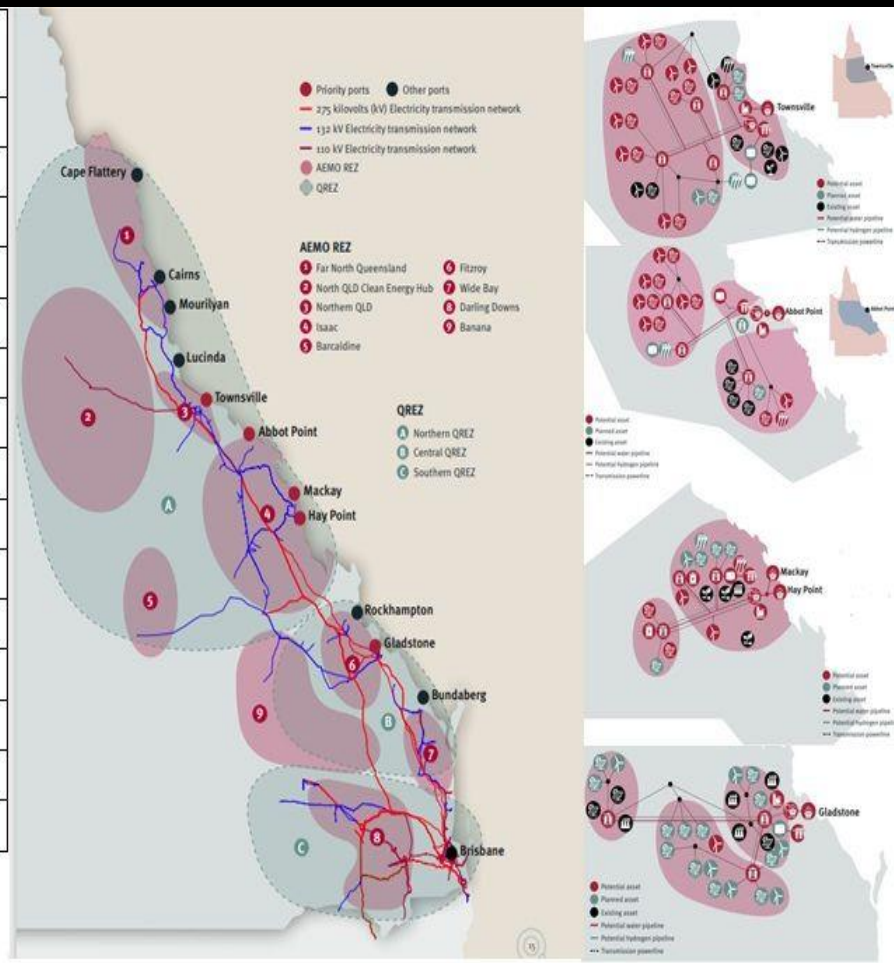
Qld land impacts of Hydrogen superpower strategy

Land Based - 500km² and falling with increased rooftop to Rooftop +120km²

Qld Hydrogen Overview	Renewable Generation	Hydrogen Process Consumption		Electrolysis Scale *	Capex	Hydrogen Production	Hydrogen Price	
	MW	GWh	ML-Water/an	MW	\$m	mt-H2/an	\$/kg-H2	\$/GJ-H2
Townsville	24,300	82,500	33,000	24,300	135,790	1.50	8.15	67.90
Abbot Point	30,600	75,900	30,360	30,600	166,180	1.38	10.84	90.32
Hay Point	20,800	42,900	17,160	20,800	114,320	0.78	13.19	109.92
Gladstone	16,000	33,550	13,420	16,000	93,800	0.61	13.84	115.33
Weipa	8,969	27,500	11,000	8,969	57,107	0.50	10.28	85.66
Karumba	19,015	58,300	23,320	19,015	121,795	1.06	10.34	86.18
Cape Flattery	19,733	60,500	24,200	19,733	126,315	1.10	10.33	86.12
Cairns	19,015	58,300	23,320	19,015	102,280	1.06	8.68	72.37
Lucinda	21,347	65,450	26,180	21,347	115,139	1.19	8.71	72.57
Mourilyan	21,347	65,450	26,180	21,347	116,139	1.19	8.78	73.20
Rockhampton	10,079	33,550	13,420	10,079	54,217	0.61	8.00	66.66
Brisbane	1,465	3,850	1,540	1,465	7,899	0.07	10.16	84.64
Bundaberg	3,812	9,350	3,740	3,812	20,803	0.17	11.01	91.78
Total	216,482	617,100	246,840	216,482	1,231,785	11.22	9.88	82.34

* Electro matched to Renew design

https://www.epw.qld.gov.au/_data/assets/pdf_file/0017/33191/enabling-qld-hydrogen-opportunities-report.pdf



Qld land impacts of Hydrogen superpower strategy, risks and cost of 500kV networks

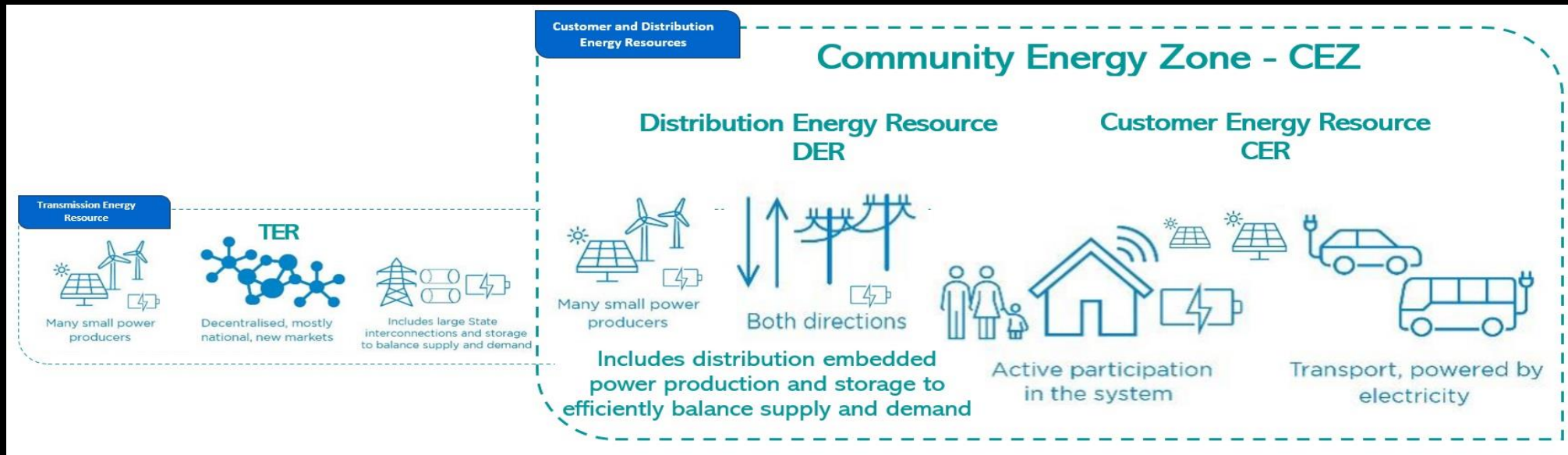
500km² and falling with increased rooftop to

+6,000km² for hydrogen superpower

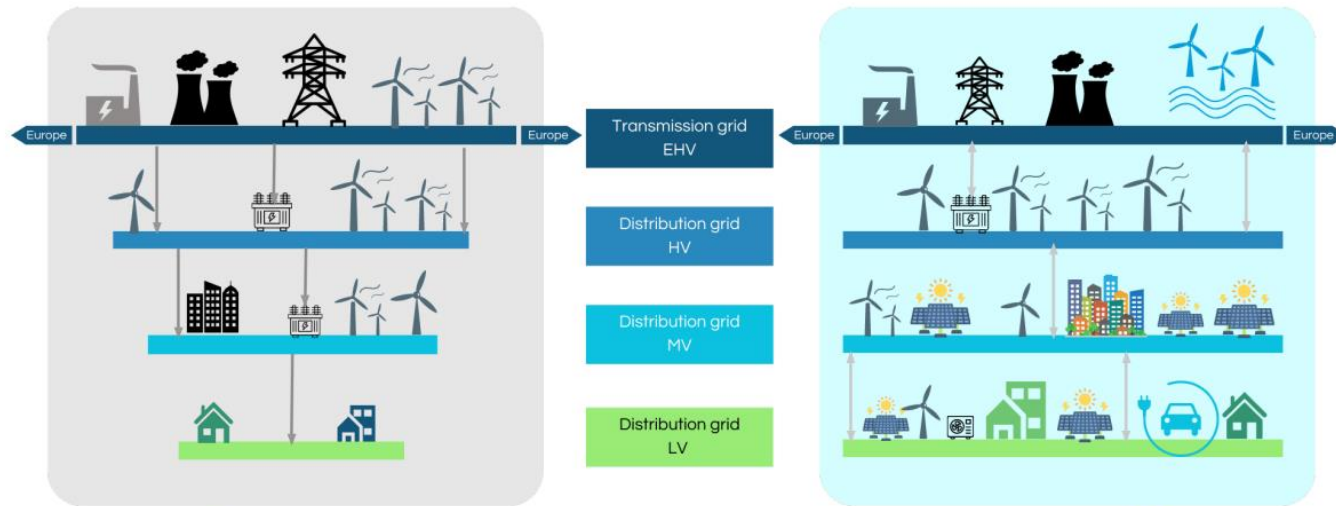
CUSTOMER INTERFACE:

Connection Limits:

- HV/LV Min/Max service levels aggregated management



GRIDS-FOR-SPEED_REPORT.PDF (EURELECTRIC.ORG)



Past

In the past, energy was generated at the transmission level and flowed down to the distribution level where it was consumed.

Future

Energy flows are now bi-directional, with generation and consumption happening at every level. This changes and increases DSOs' responsibilities.