WELCOME

Evans Area Resilience Network invites you to...

A Community Gathering about Energy

LOCAL BLACKOUTS BACKGROUND BRIEFING

What's happening with these blackouts?

What are our energy risks?

How can we be better prepared?

Thursday 10 April

5:00 – 6:30pm

RSL Club Evans
11-13 McDonald Pl
Remembrance Room

evansarearesiliencenetwork@gmail.com

What's happening tonight?

- Welcome
- Evans Area Background Briefing Part 1
  - What have we learned so far?
- Small group discussion (Q + A)
- EARN Energy Survey Part 2
  - Collecting data from the community
  - Starting a household energy audit
- Next gatherings

CLIMATE-AMPLIFIED DISASTER EMERGENCY ENERGY RESPONSE

BLACKOUTS AND ENERGY RESILIENCE STRATEGIES

Application of a Calculational Tool

Evans Head Community, NSW

EARN Climate-Amplified Disaster Energy Task Force

Stuart Bunn, Rena Frohman, Peter Hayes, Jally Hawthorn, Joanne Howlett, Kelli MacDonald, Steve Posselt, Heather Smith, David von Hippel, Lyuba Zarsky

This powerpoint may be downloaded here

April 10, 2025

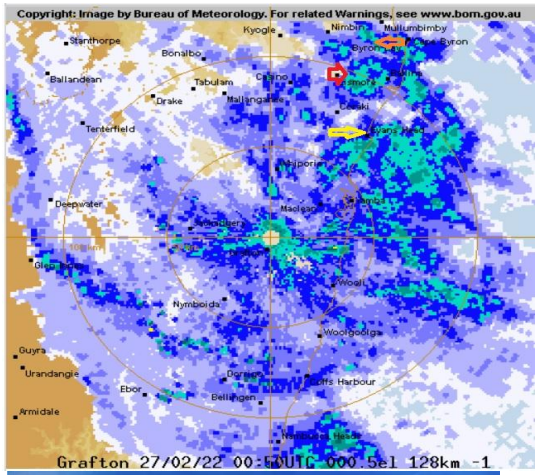
RSL Evans Head

NAUTILUS INSTITUTE

EVANS AREA RESILIENCE NETWORK

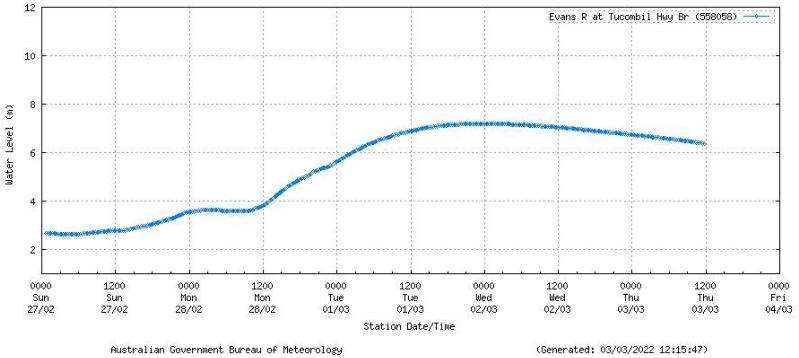
C4CE COALITION FOR COMMUNITY ENERGY

EVANS AREA: We are vulnerable to climate-amplified disasters



- ✓ Floods
- ✓ Cyclones/storm surge
- ✓ Heatwaves
- ✓ Fires
- ✓ War-induced fuel scarcity

Later:
Droughts
Pandemics
Tsunamis
Coincidental + polycrises



Not including
x Earthquakes
x Volcanic Eruptions
x Snow/Ice Storms
x Technological Failures

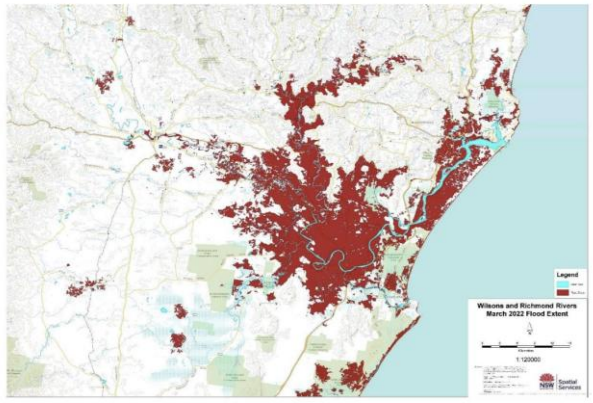
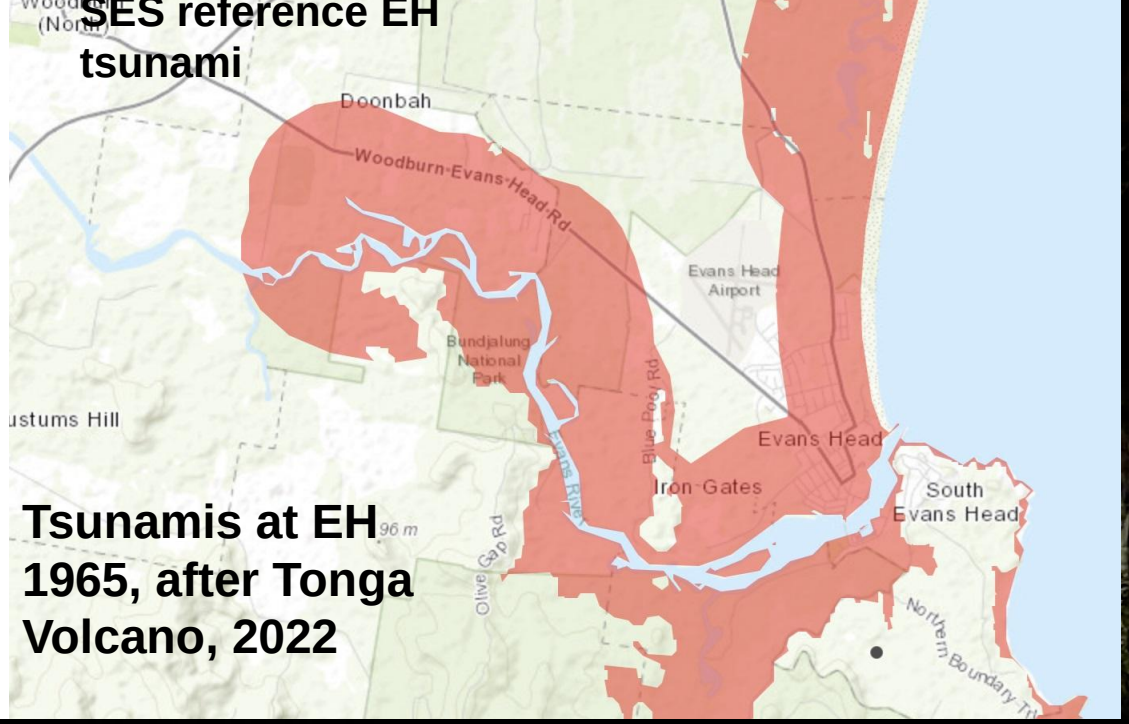
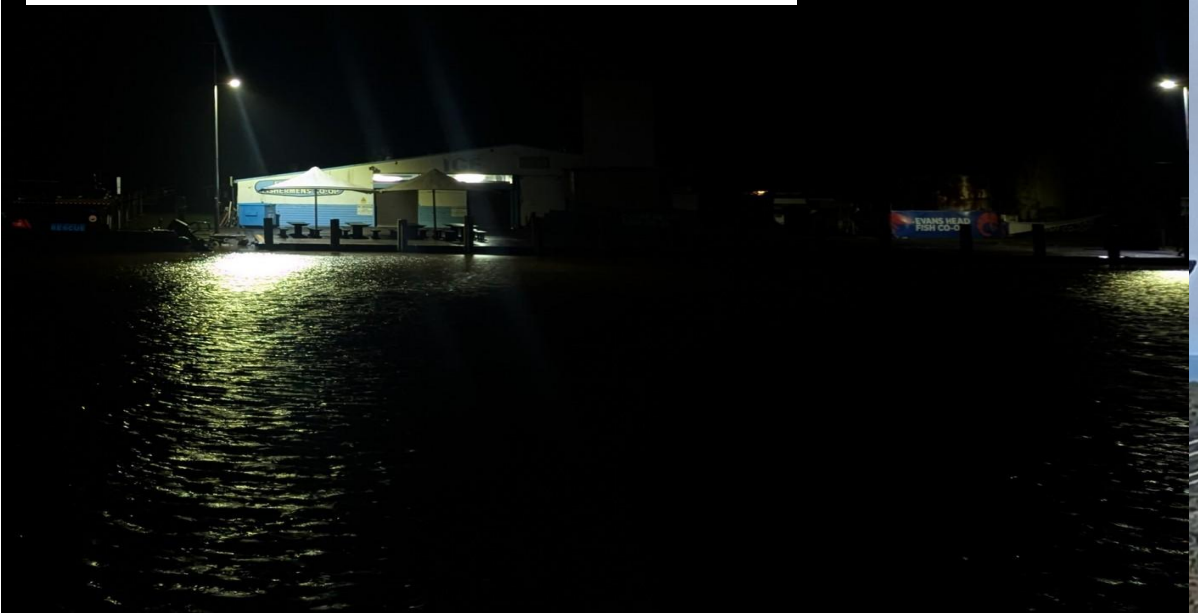


Figure 6. Wilsons and Richmond River region March 2022 flood inundation areas (source: NSW Spatial Services 2022)



Bushfire 2023

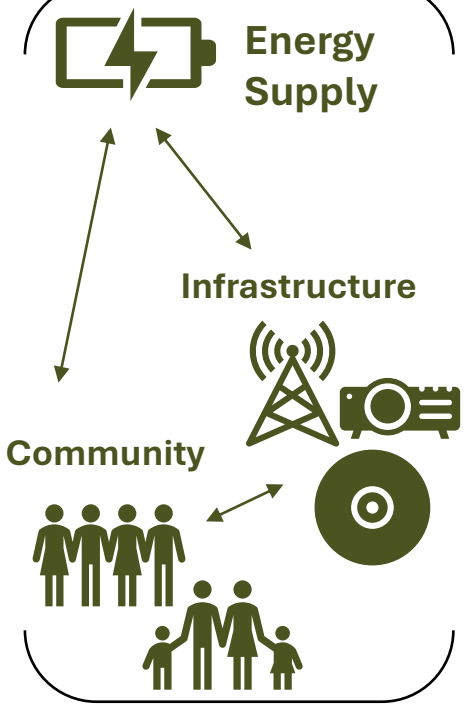


Storm surge 40cm Cyclone Alfred

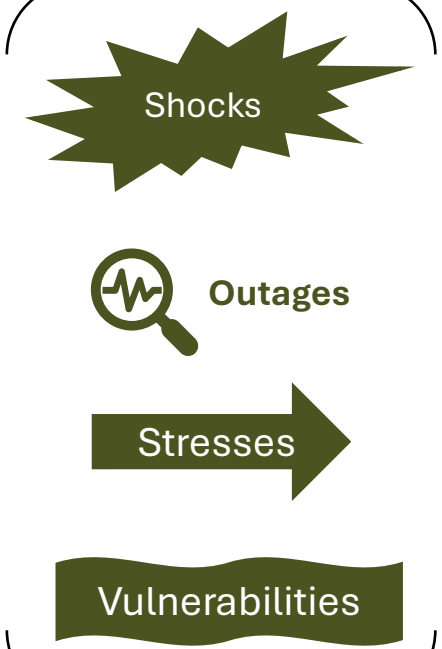
Resilience Framework

COMMUNITY ENERGY for Venus Bay?

1. Resilience of what?



2. Disturbances - Resilience to what?

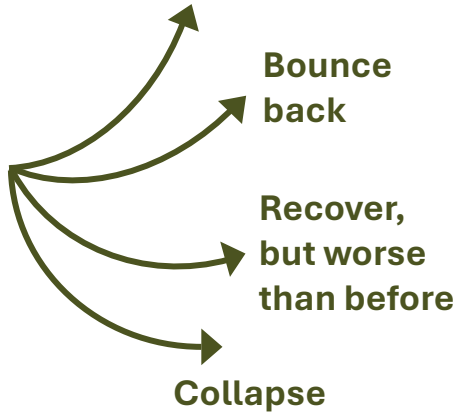


3. Capacity to deal with disturbance

What do you think?

- Being prepared
- Knowing who can help - connectivity
- Spare capacity, diversity, flexibility, alternatives / multiple options
- Adaptability
- Managing with less
- Support from authorities

4. Reaction to disturbance



5. Due to what actions?

Better = learning, adapting and transforming

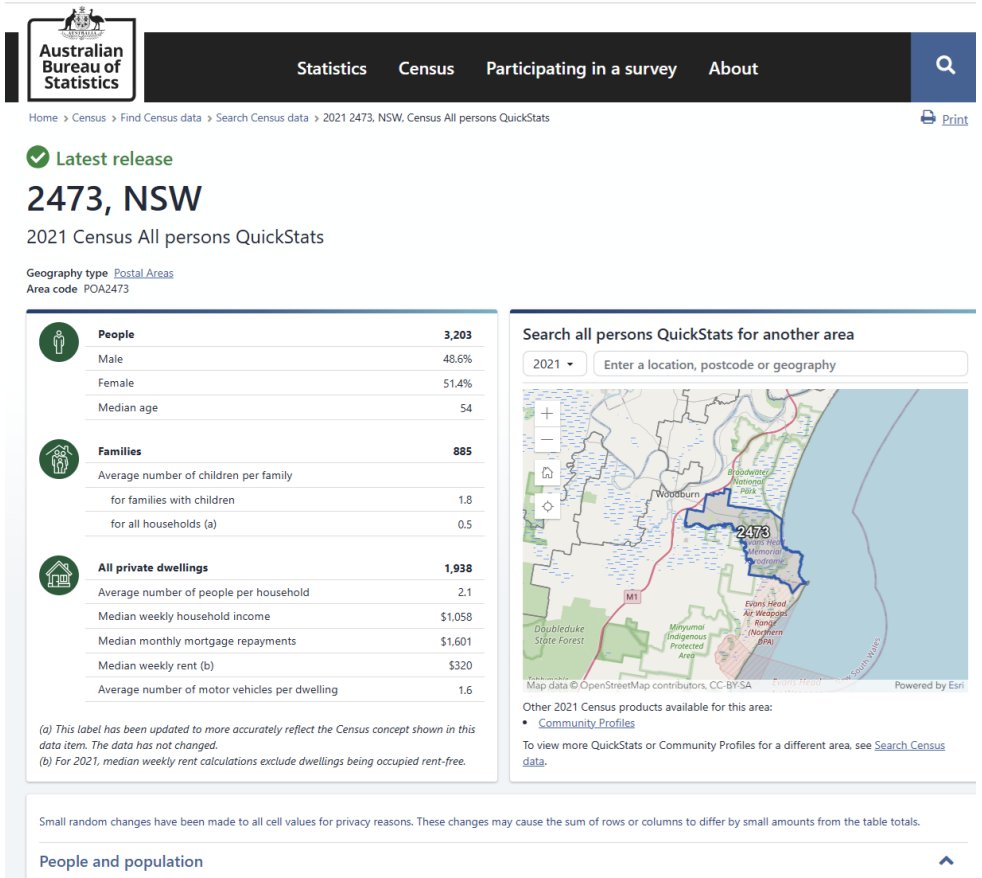
Bounce Back = Preparation, monitoring, responding

Recover..ish = Coping, absorbing the shock but performance declines

Collapse = fundamentally changed by the event/s

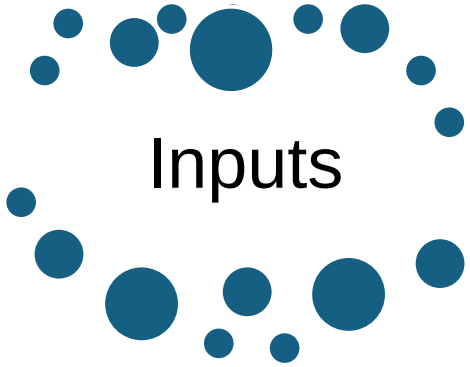
What are we learning about the Evans Area?

“EVANS AREA” = POSTCODE 2473 BOUNDARY ⟺ CENSUS 2021 DATA



How did we learn this?

Calculation Tool 1: CADEER



- Community size + attributes
- Energy sources + end uses
- Disaster scenarios (effects on energy system)
- Impacts of disaster on infrastructure by scenario
- Coverage needed for response/relief/restoration
- Technology/management selection

Calculations in Tool

- Energy needs to be met by fuel/energy type and end-use, and by disaster scenario
- Infrastructure and energy stores requirements
- Costs by end use and fuel/energy type

Outputs

- Mapping of infrastructure, priority emergency demand, disaster impacts
- Capacity of new energy infrastructure required for disaster response
- Volume of fuels/energy to be stored
- Estimated costs, benefits and co-benefits to implement disaster relief energy systems, by scenario
- Qualitative requirements and benefits such as organizational plan, training needs, job provision, improvement of daily-use energy system….

What State are you in?	NSW	*Click in cell and use drop down to select State and Year
What Year relates best to your data?	2025	is calculator will not work for Australia on average - you'll need to select a state
How many occupied homes in your community?	650	Insert your answer. For a rough answer do population divided by 2.5. (your answer is used in the "Your Community" tab)
What is the name of your community?	Evans Head	
Postcode (for solar data)	2473	

Some information about your postcode from ABS (2021 Census) and the Clean Energy Regulator (Jan 2023):

1642	Occupied Homes	3	kW small wind*	* this data appears dodgy - I suspect the
293	Unoccupied homes	4	kW small hydro*	
3,209	kW Solar PV as at Feb 2023	49	heat pumps for hot water installed	
757	solar PV installations	392	solar hot water systems installed	
39%	approx (includes business installs)	2,518	kW Solar PV from systems under 10kW	

Fuels in your community

Do you have access to gas? Or rely on LPG?	☐ Gas ☑ LPG	
Is wood likely to be used in any serious way?	☐ Yes, my community uses wood	
Would you like to use this breakdown for homes using each fuel for cooking?		Electricity 90%, , LPG 10%
☐ No, I'd like to choose my own breakdown - >		
Would you like to use this breakdown for the fuels used to heat homes?		Electricity 97%, , LPG 3.4%,
☐ No, I'd like to choose my own breakdown - >		
Would you like to use this breakdown for types of hot water used?		Electricity 94%, , LPG 6.1%,
☐ No, I'd like to choose my own breakdown - >		

Average annual energy use of:	HM per home?	Electricity all homes kWh	Electricity, elec homes kWh	LPG in LPG homes kWh equiv	Average kWh per home for your state	Average kWh for Evans Head breakdowns	
Appliances							
Fridges and Freezers	1.9	703			703	703	
Washing and dishwashing	1.7	230			230	230	
Entertainment and IT	9.0	680			680	680	
Other Appliances including chargers	24.6	504			504	504	
Cooking (ovens, stoves and microwaves)							
Microwave	1.0	109			109	109	
proportion of households ->			90%	10%			
Ovens and stovetops or uprights	1.6		625	1,028			
Lighting	44.9	305					
Heating and Cooling (incl Fans)	3.9						
cooling proportion of households ->		4% evaporative	21% fully ducted elec aircon				
Cooling		314	547				
Heating a gas ducted home		269					
Heating other homes		-111	862	1902			
heating proportion of households ->			97%	3.4%			
Average space conditioning			1,304	2,106			
Water heating	1.0		Electricity	LPG	2,449	2,140	
hot water proportion of households ->			94%	6%			
Electric hot water	58% of total		2,089				Breakdown: 75% Large, 16% Small, 2% Heat Pump, 6% Solar.
Gas Hot Water	38% of total						Breakdown: 63% Instant, 36% Storage, 1% Solar.
LPG Hot Water	3.7% of total			2,929			Breakdown: 67% Instant, 33% Storage, 1% Solar.

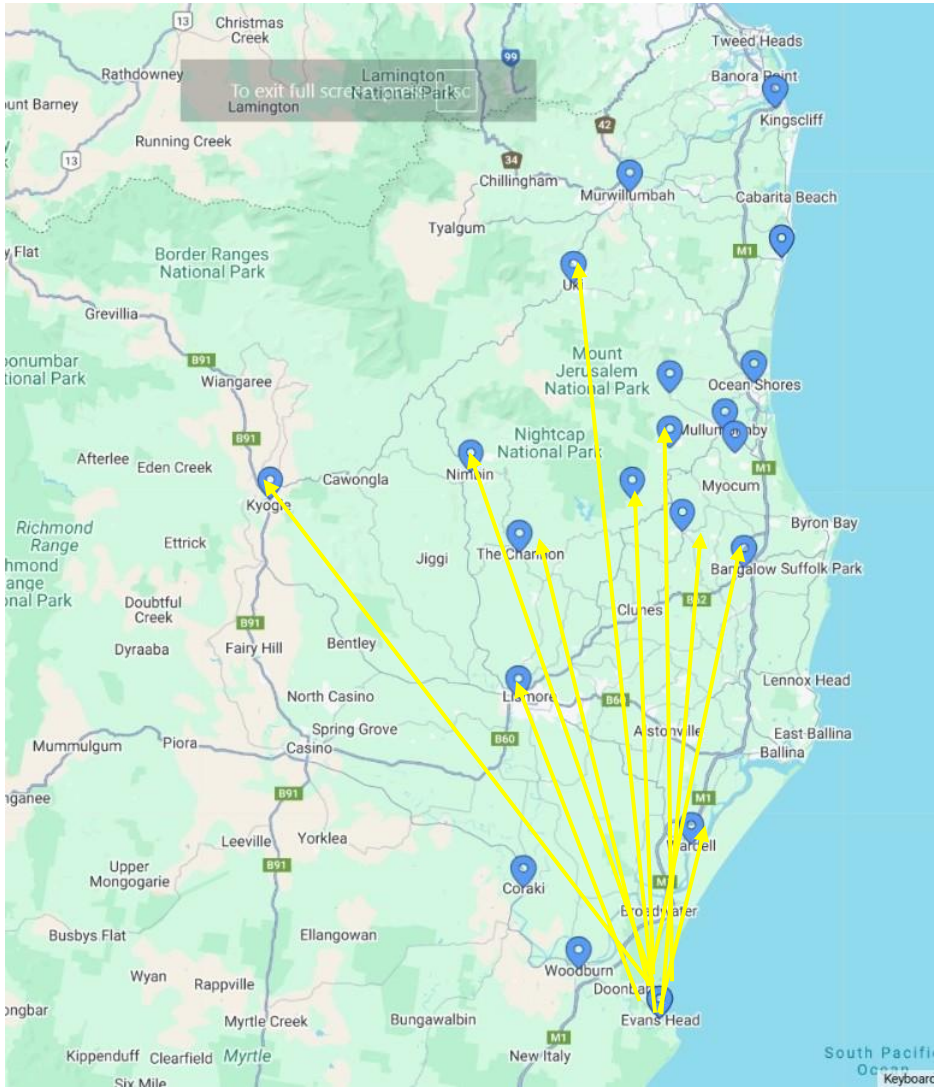
How did we learn this?
Calculation Tool 2: C4CE

Benefit of future refined tool:

- **rapid replication of baseline energy profile for any postcode in Northern Rivers + Australia**

How can we share our learnings?

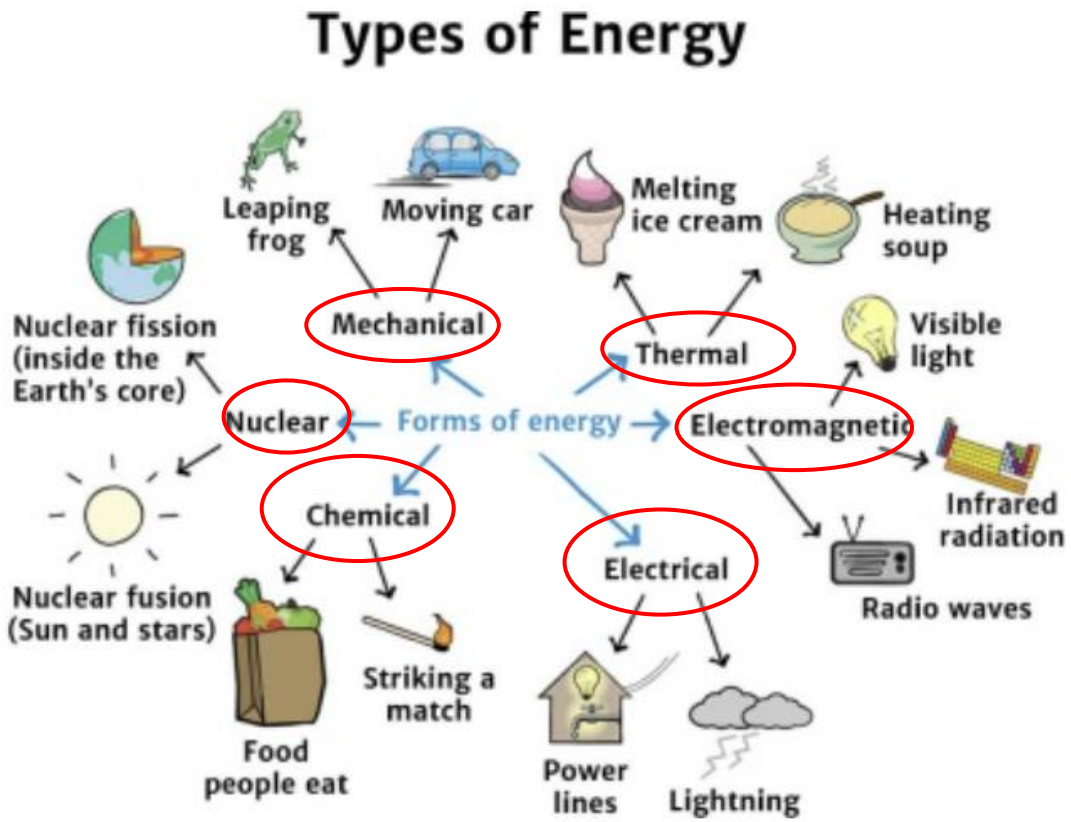
Northern Rivers Community Resilience Groups



Bangalow Resilience Network	Bangalow NSW, Au...
Bilin Road Street Network	Bilin Rd, Myocum N...
Chinderah Community Hub	unit 23/18 Ozone St...
Coraki Hub	Coraki NSW, Australia
Evans Area Resilience Network	Evans Head NSW 2...
Evans Area Resilience Network (EARN)	Evans Head NSW, ...
Federal, Eureka & Goonengerry Community Led...	Federal NSW, Austr...
Hub 2484	shop 7/41-45 Murwi...
ICOPE (Iluka Community Organisation Planning ...	54 Spenser Street, I...
Kyogle Together	161 Summerland W...
Main Arm Disaster Recovery (MADR)	Main Arm NSW, Au...
Minyon Resilience Network	Minyon Falls Road, ...
Nimbin Disaster Resilience Group	Nimbin NSW, Austr...
Resilient Lismore	Resilient Lismore, K...
Resilient Uki	Uki NSW, Australia
Shedding Community Workshop Inc	18 Prince St, Mullu...
South Golden Beach/New Brighton/Ocean Shor...	Ocean Shores NS...
The Channon Hub	The Channon NSW,...
Together Pottsville	Pottsville
Together Pottsville	Pottsville NSW 248...
Wardell CORE	3 Sinclair Street, W...
Wilson's Creek, Huonbrook and Whanganui Co...	Wilsons Creek NS...
Woodburn Hub	Woodburn NSW, Au...

Open Access/Open Source

Power is the capacity to do work, eg kWe
Energy is power over time, eg kWhe or kWht



Energy can be transformed from one form to another in different ways.

Source: https://solarschools.net/knowledge-bank/energy/types

Units and examples

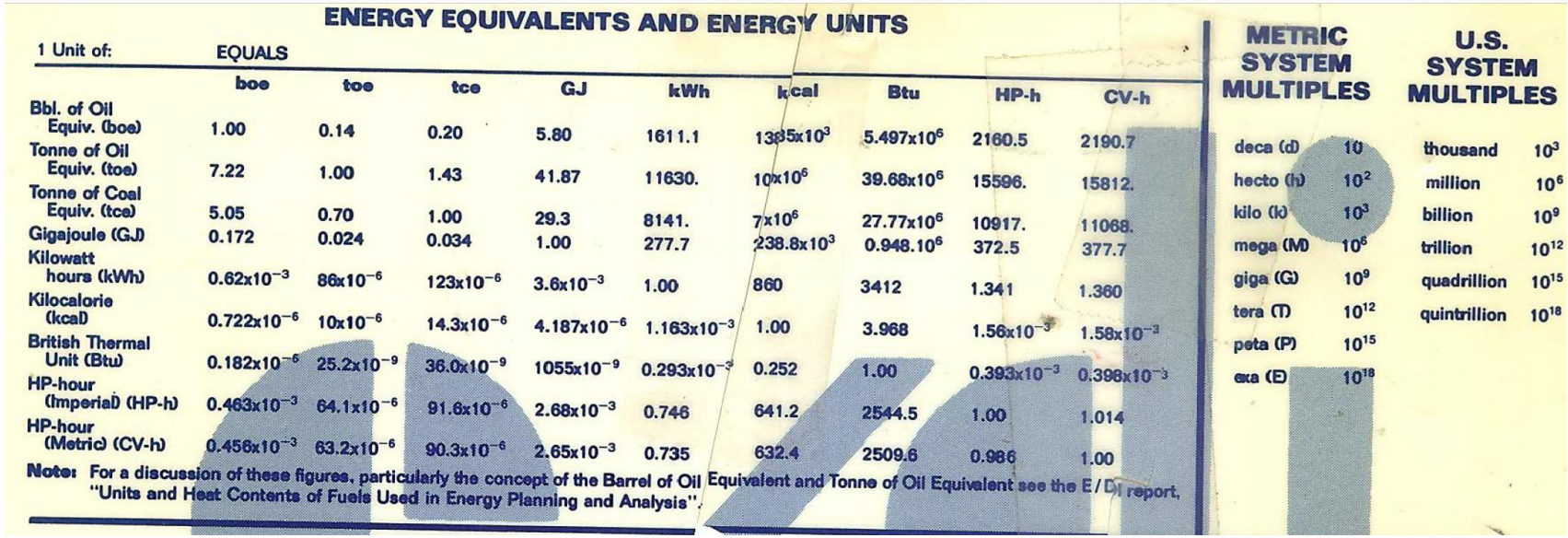
1 J (joule) = equal to the work done by a force of one newton acting through one metre

1 watt = unit of power = energy * time = 1 joule/second

1 kWhe = 3.6MJ (million joule) of electrical energy

1 Gigajoule (GJ) = 10^9 or 1 billion J which is:

- ~ to 278 kilowatt-hours (kWhe) or about **26 liters of petrol**
- 1 GJ ~ to a **1kWe toaster on for 278 hours**
- Typical Ozzie HH uses 6-20 kWhe per day ~ 0.06-0.07 GJ.
- **In Evans, it's ~ 18 kWhe = 0.07GJ/day**



ENERGY EQUIVALENTS AND ENERGY UNITS

1 Unit of:	EQUALS boe	toe	tce	GJ	kWh	kcal	Btu	HP-h	CV-h
Bbl. of Oil Equiv. (boe)	1.00	0.14	0.20	5.80	1611.1	1385×10^3	5.497×10^6	2160.5	2190.7
Tonne of Oil Equiv. (toe)	7.22	1.00	1.43	41.87	11630.	10×10^6	39.68×10^6	15596.	15812.
Tonne of Coal Equiv. (tce)	5.05	0.70	1.00	29.3	8141.	7×10^6	27.77×10^6	10917.	11068.
Gigajoule (GJ)	0.172	0.024	0.034	1.00	277.7	238.8×10^3	$0.948 \cdot 10^6$	372.5	377.7
Kilowatt hours (kWh)	0.62×10^{-3}	86×10^{-6}	123×10^{-6}	3.6×10^{-3}	1.00	860	3412	1.341	1.360
Kilocalorie (kcal)	0.722×10^{-6}	10×10^{-6}	14.3×10^{-6}	4.187×10^{-6}	1.163×10^{-3}	1.00	3.968	1.56×10^{-3}	1.58×10^{-3}
British Thermal Unit (Btu)	0.182×10^{-6}	25.2×10^{-9}	36.0×10^{-9}	1055×10^{-9}	0.293×10^{-3}	0.252	1.00	0.393×10^{-3}	0.398×10^{-3}
HP-hour (Imperial) (HP-h)	0.463×10^{-3}	64.1×10^{-6}	91.6×10^{-6}	2.68×10^{-3}	0.746	641.2	2544.5	1.00	1.014
HP-hour (Metric) (CV-h)	0.456×10^{-3}	63.2×10^{-6}	90.3×10^{-6}	2.65×10^{-3}	0.735	632.4	2509.6	0.986	1.00

Note: For a discussion of these figures, particularly the concept of the Barrel of Oil Equivalent and Tonne of Oil Equivalent see the E/D report, "Units and Heat Contents of Fuels Used in Energy Planning and Analysis".

METRIC SYSTEM MULTIPLES

deca (d)	10
hecto (h)	10^2
kilo (k)	10^3
mega (M)	10^6
giga (G)	10^9
tera (T)	10^{12}
peta (P)	10^{15}
exa (E)	10^{18}

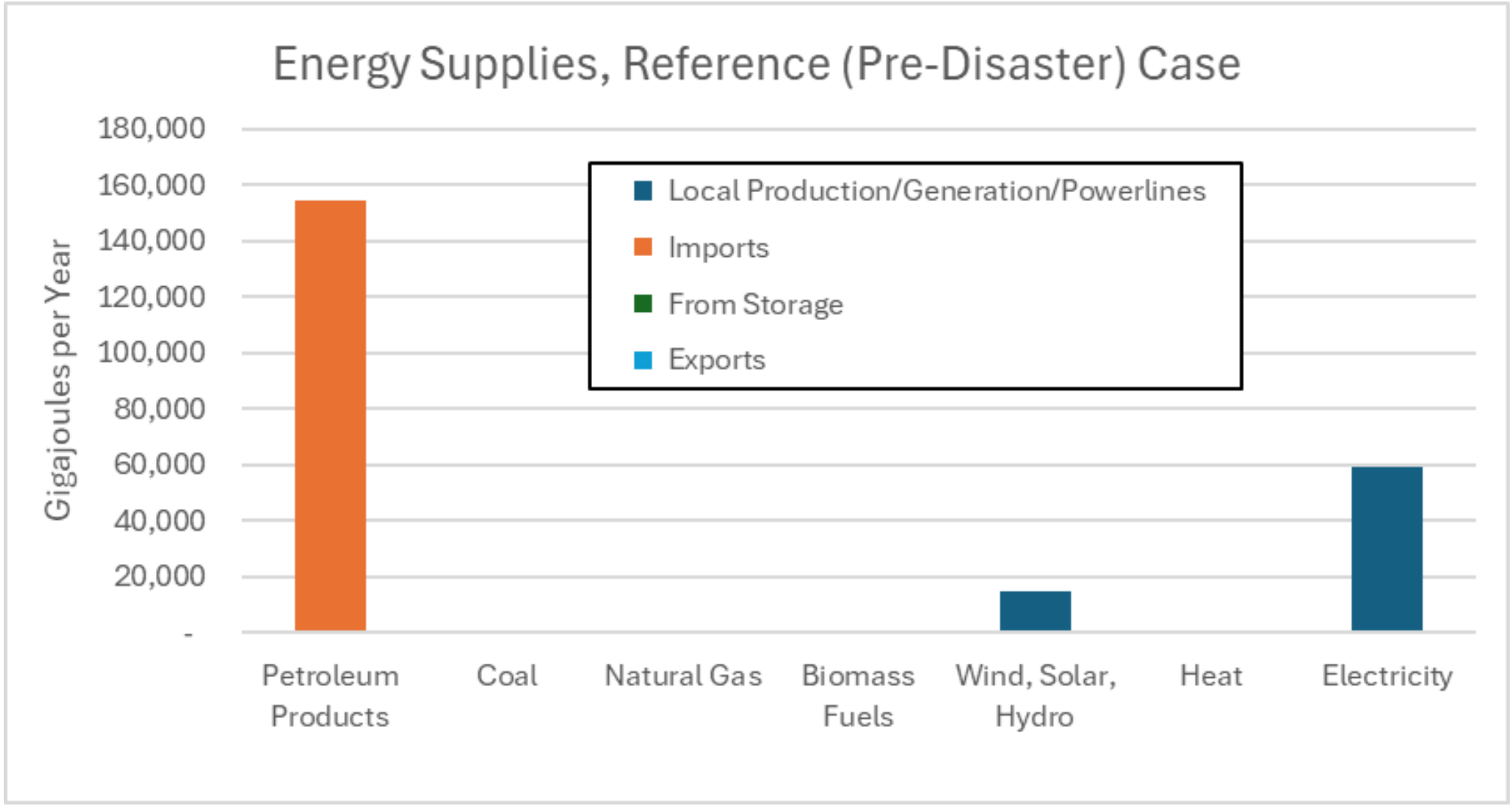
U.S. SYSTEM MULTIPLES

thousand	10^3
million	10^6
billion	10^9
trillion	10^{12}
quadrillion	10^{15}
quintrillion	10^{18}

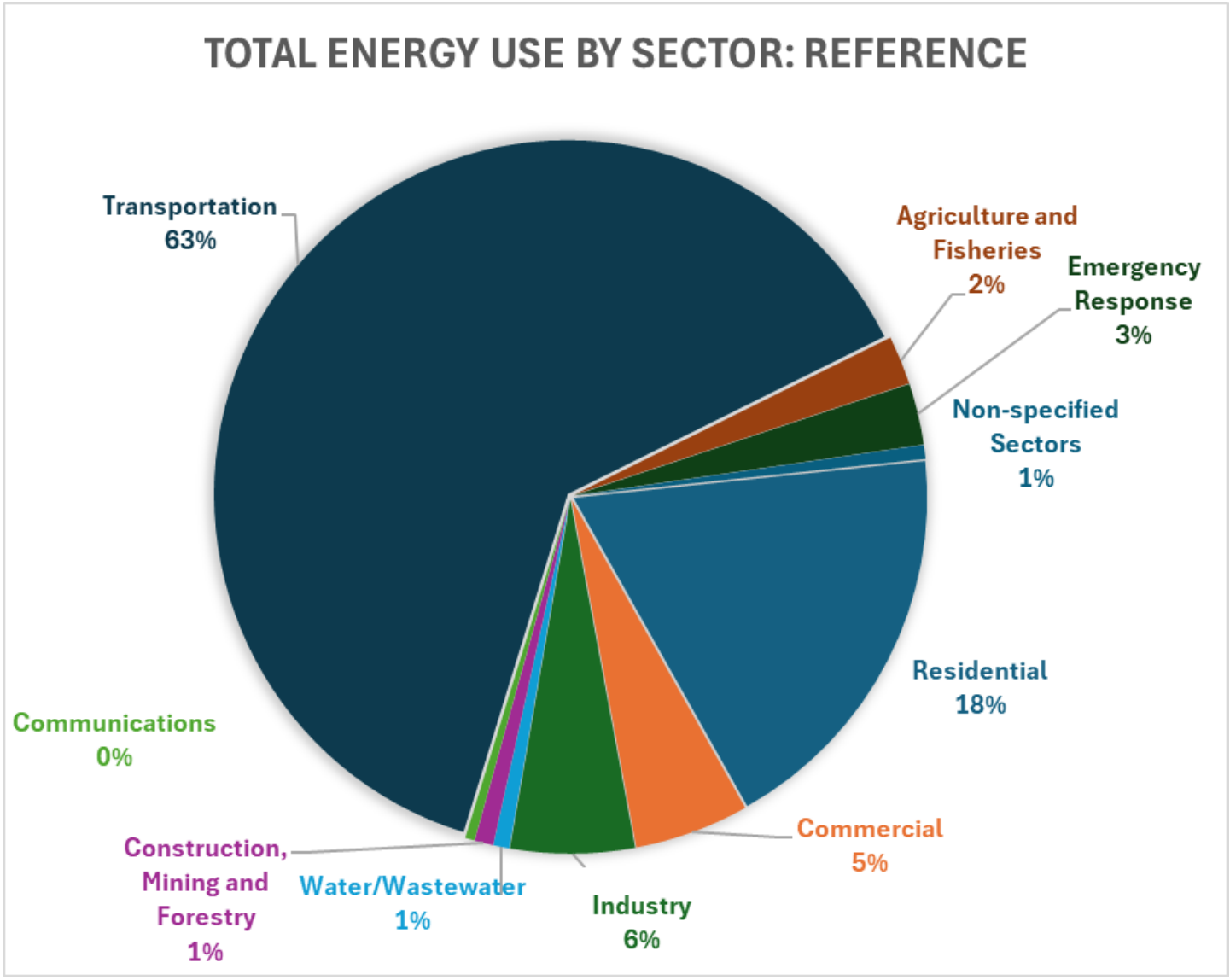
Household Item	Energy Content/Consumption	Monthly Energy Use (Approx.)
Bread (Cooking)	Baking bread in an oven consumes approximately 1-2 kWh per loaf [2] [3].	30-60 kWh (assuming 15-30 loaves/month).
Lighting	LED lighting uses ~0.01-0.02 kWh per hour per bulb [3] [5].	~15-30 kWh/month for typical usage (~5 bulbs, 4 hrs/day).
Hot Water	Electric storage water heaters consume ~3-6 kWh/day depending on size and climate zone [6] [7].	~90-180 kWh/month.
Gasoline (Transport)	Energy content of gasoline is ~33 MJ/L (~9.2 kWh/L) [7].	Varies widely; ~460 kWh/month for a car using 50 L gasoline.
Cooking (Oven/Stove)	Typical oven/stove usage consumes ~2-4 kWh/day [2] [5].	~60-120 kWh/month.

Where are we getting our energy from?

Calculational Tool: Initial Evans Area Summary Results

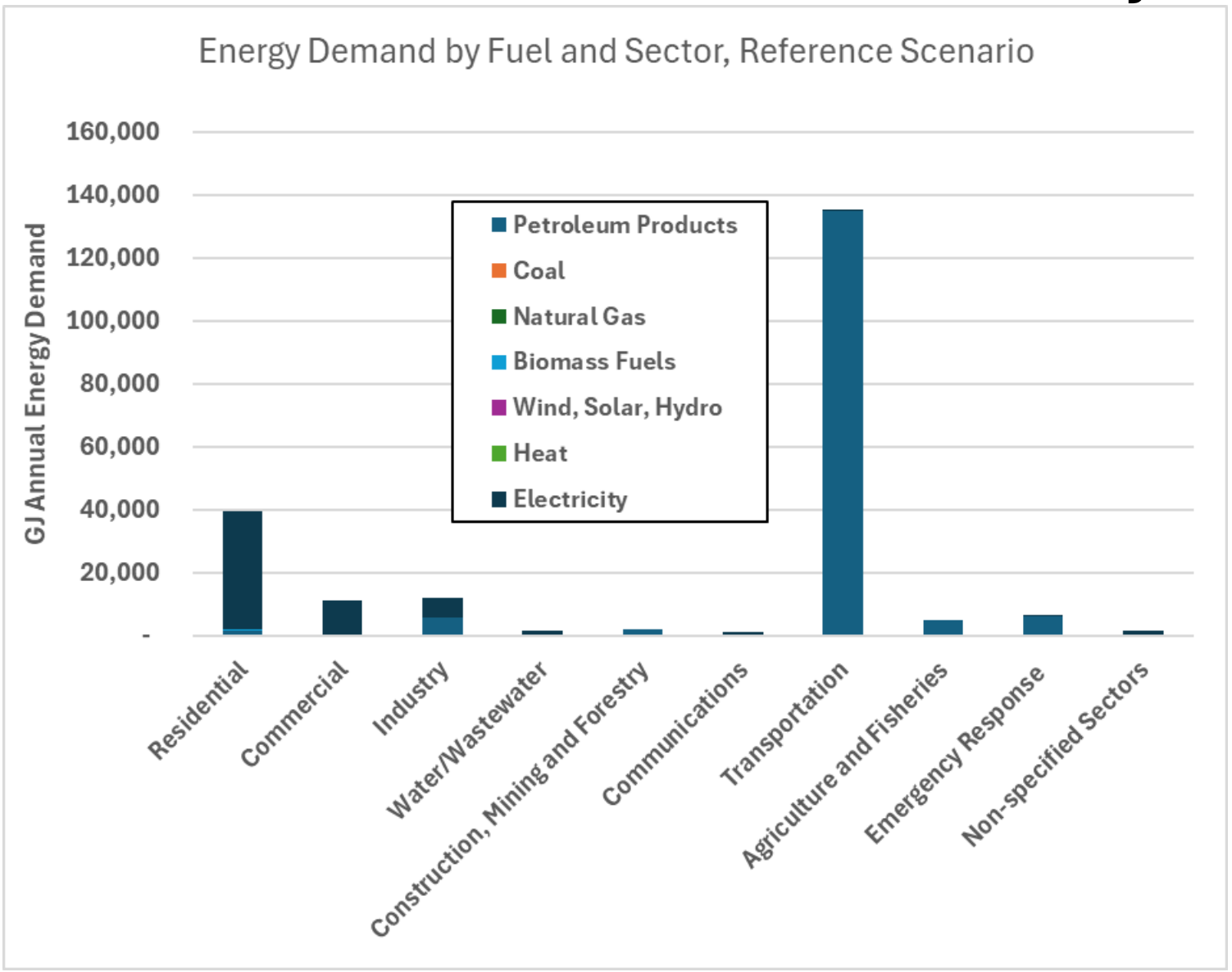


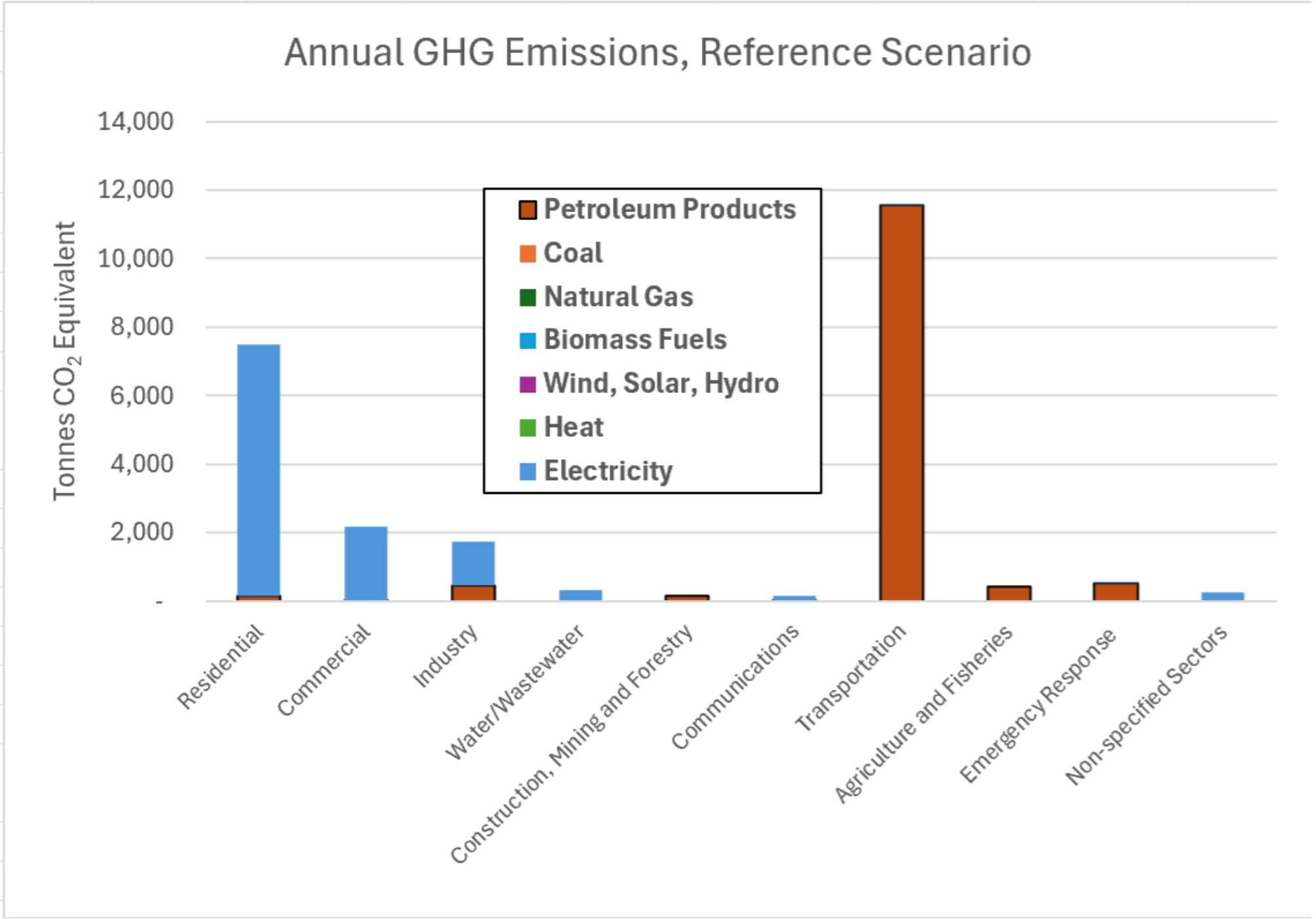
How do we use energy ?
Calculational Tool: Initial Evans Area Summary Results



Who uses each energy form?

Calculational Tool: Initial Evans Area Summary Results



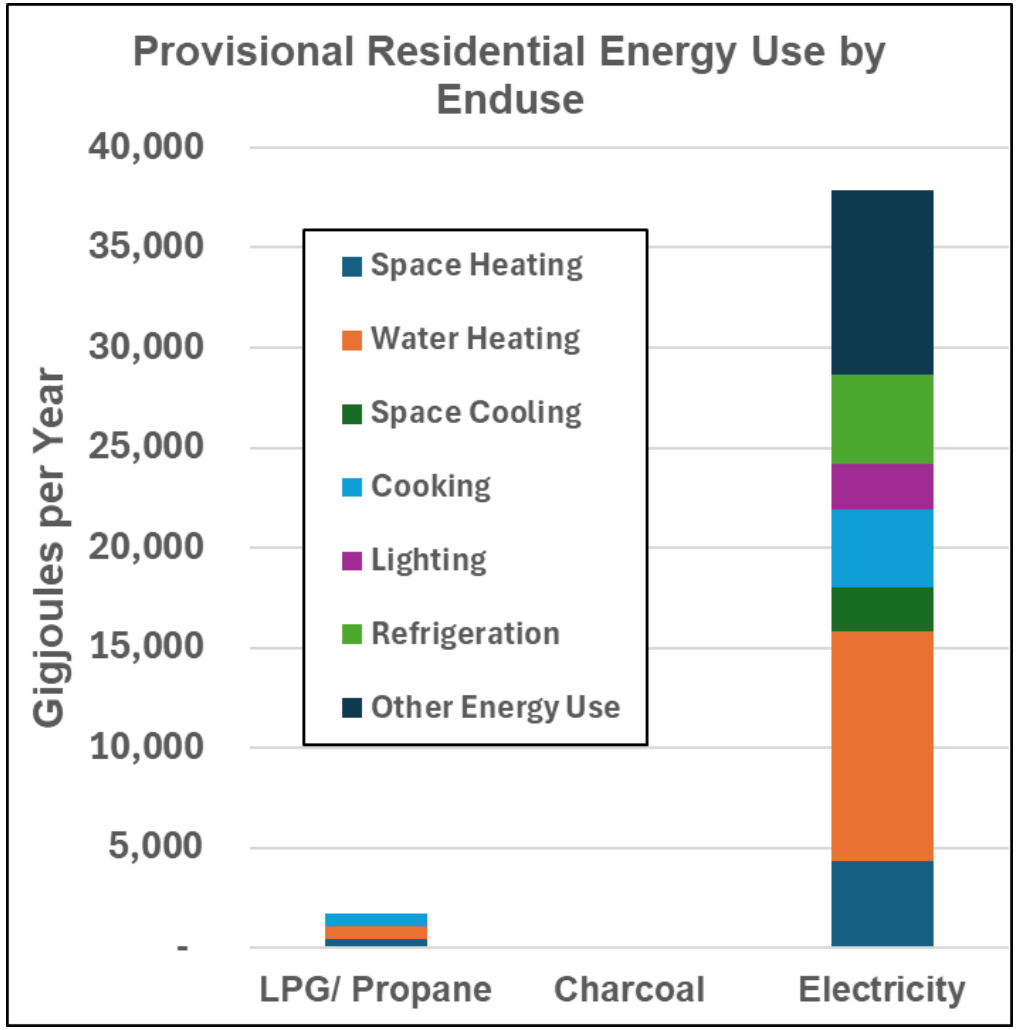

Annual GHG Emissions, Reference Scenario
Tonnes CO_2 Equivalent
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
Petroleum Products
Coal
Natural Gas
Biomass Fuels
Wind, Solar, Hydro
Heat
Electricity
Residential
Commercial
Industry
Water/Wastewater
Construction, Mining and Forestry
Communications
Transportation
Agriculture and Fisheries
Emergency Response
Non-specified Sectors

How much energy do households use in Evans Area?

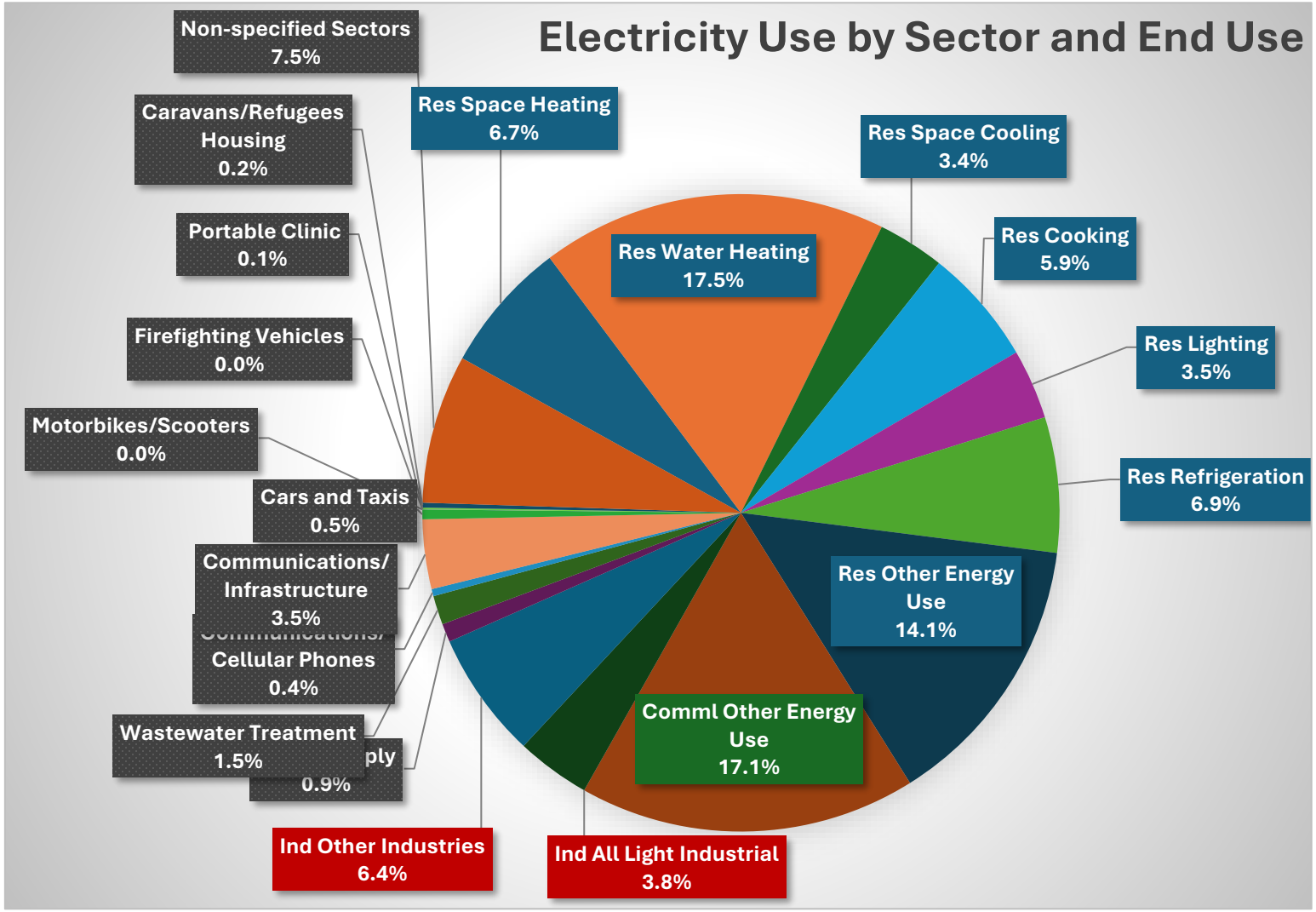
REFERENCE CASE ENERGY DEMAND SUMMARY (GJ/YR), RESIDENTIAL USE BY ENDUSE

END USE	LPG/ Propane	Charcoal	Electricity	TOTAL
Space Heating	442	-	4,369	**4,811**
Water Heating	614	-	11,437	**12,051**
Space Cooling	-	-	2,210	**2,210**
Cooking	654	71	3,869	**4,595**
Lighting	-	-	2,311	**2,311**
Refrigeration	-	-	4,475	**4,475**
Other Energy Use	-	-	9,186	**9,186**
TOTAL HOUSEHOLDS	**1,710**	**71**	**37,857**	**39,638**

Electricity is about 18 kWhe per day per non-transient HH

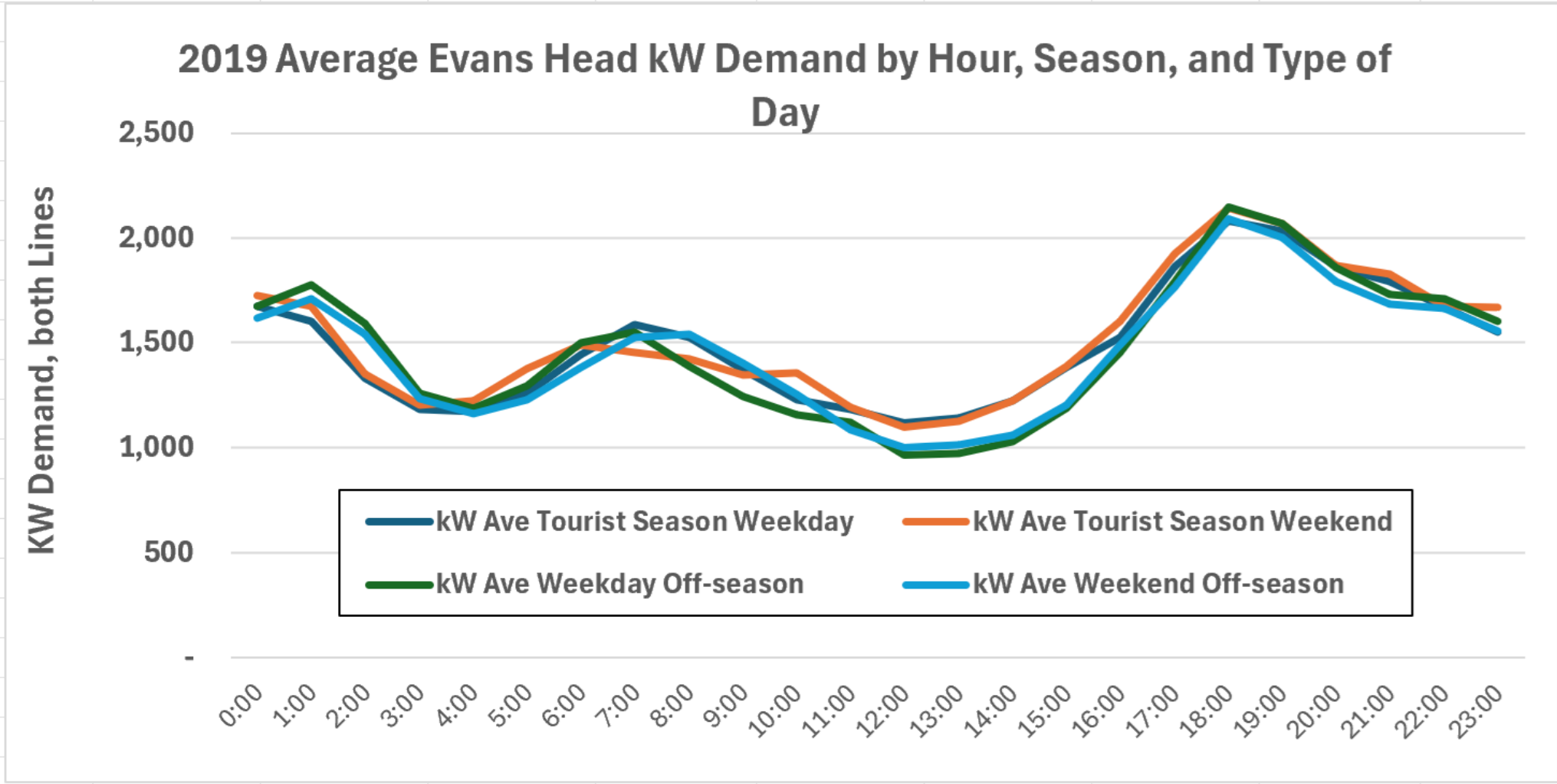


REFERENCE CASE
ELECTRICITY DEMAND BY SUBSECTOR/END USE
(GJ AND MWH/YR)



2019

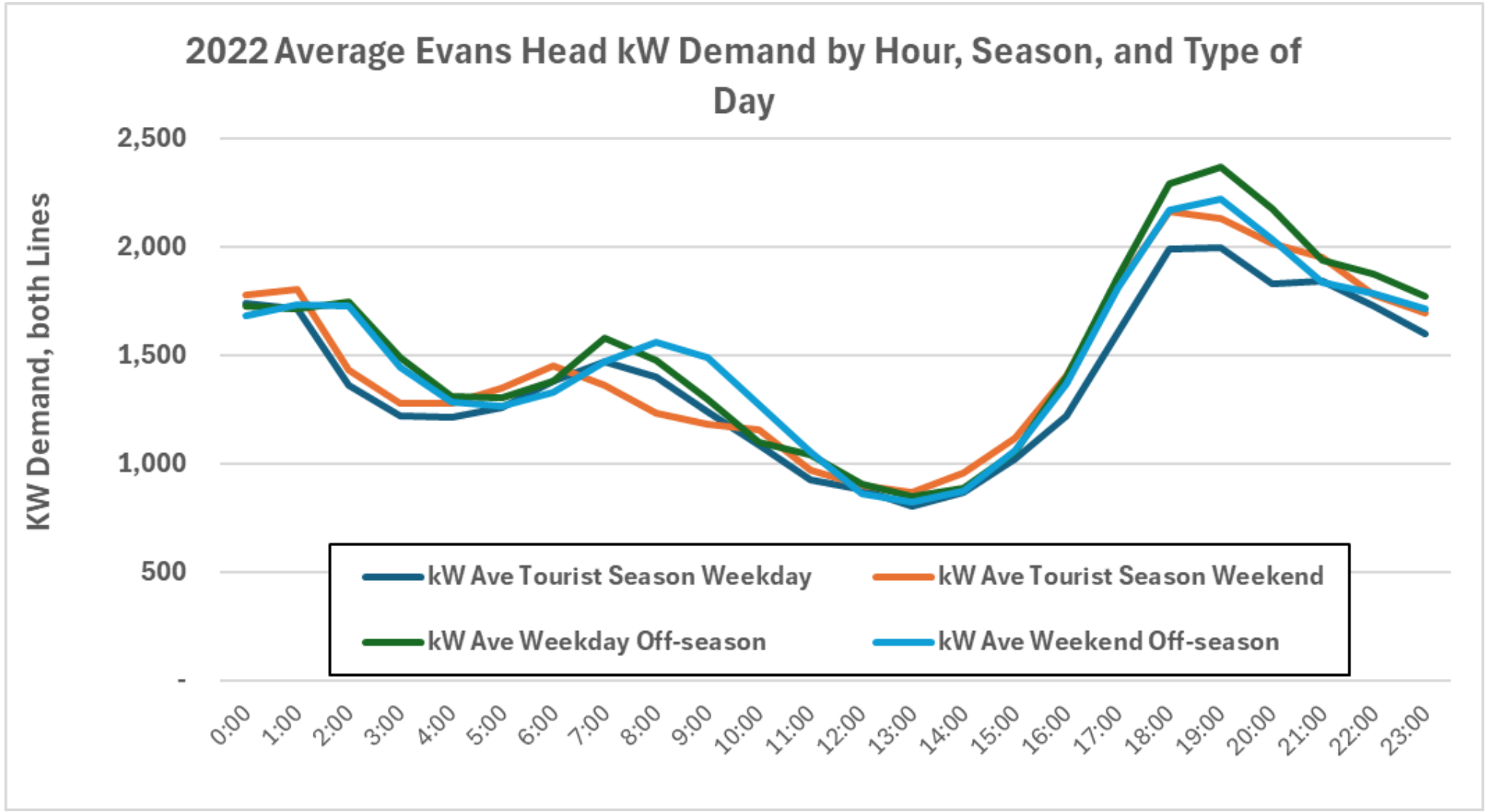
Evans Head Power Load Curve
tourist/non-tourist + weekday/weekend



Source: Essential Energy dataset provided to the study

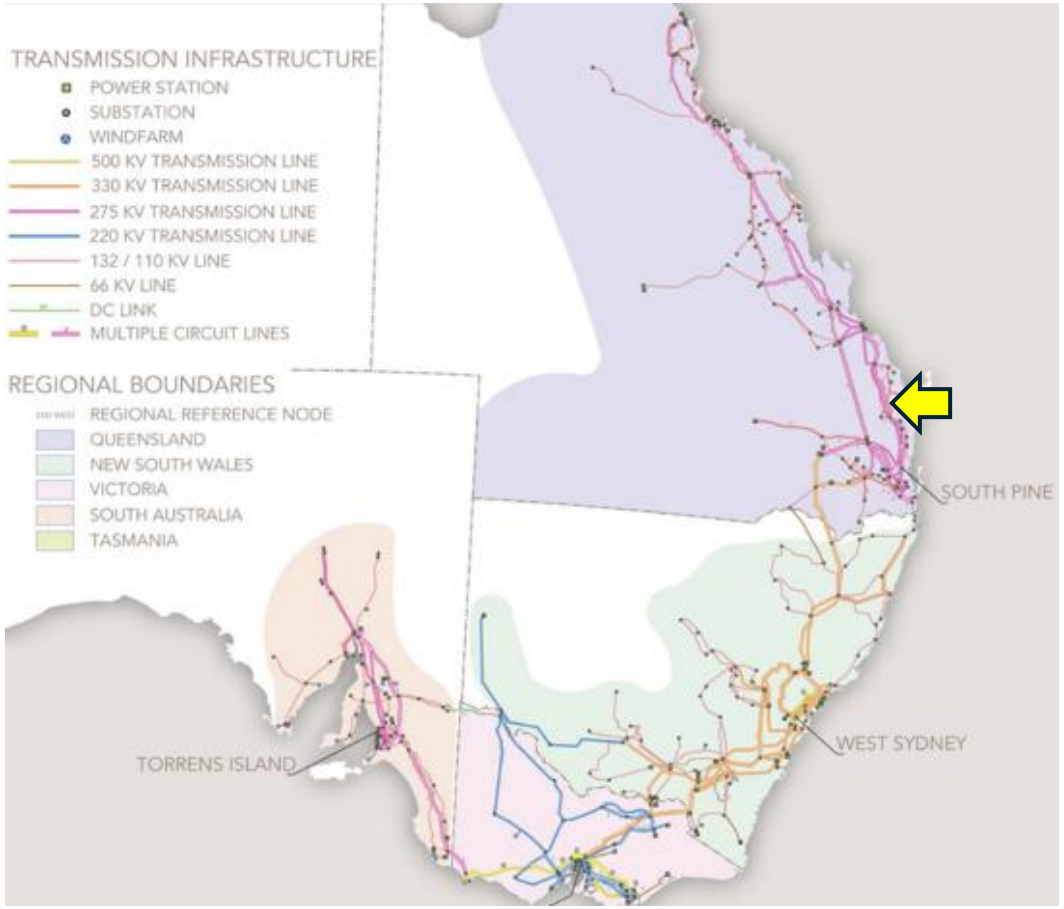
2022

Evans Head Power Load Curve
tourist/non-tourist and weekday/weekend

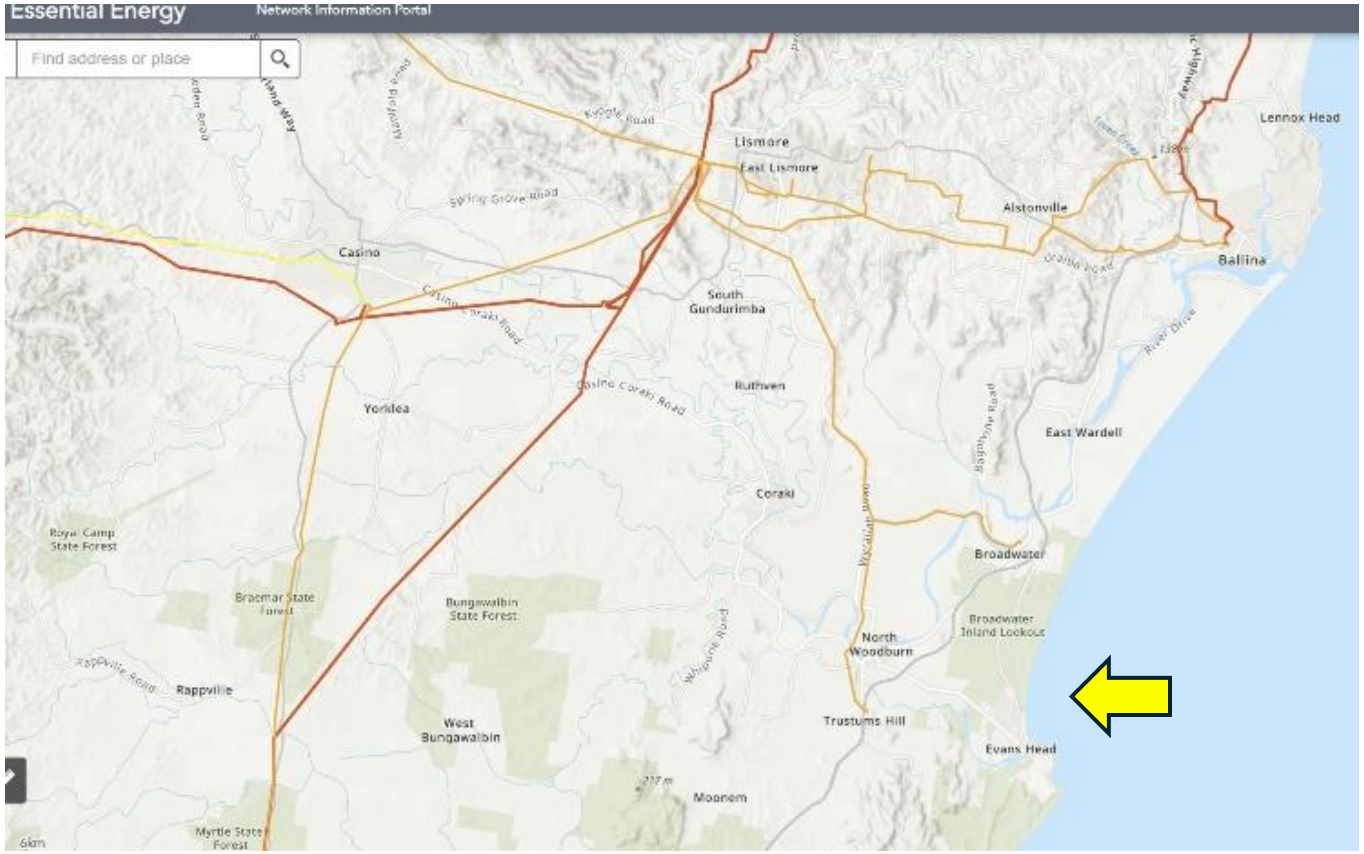


Source: Essential Energy dataset provided to the study

Learning about blackouts in the Evans Area

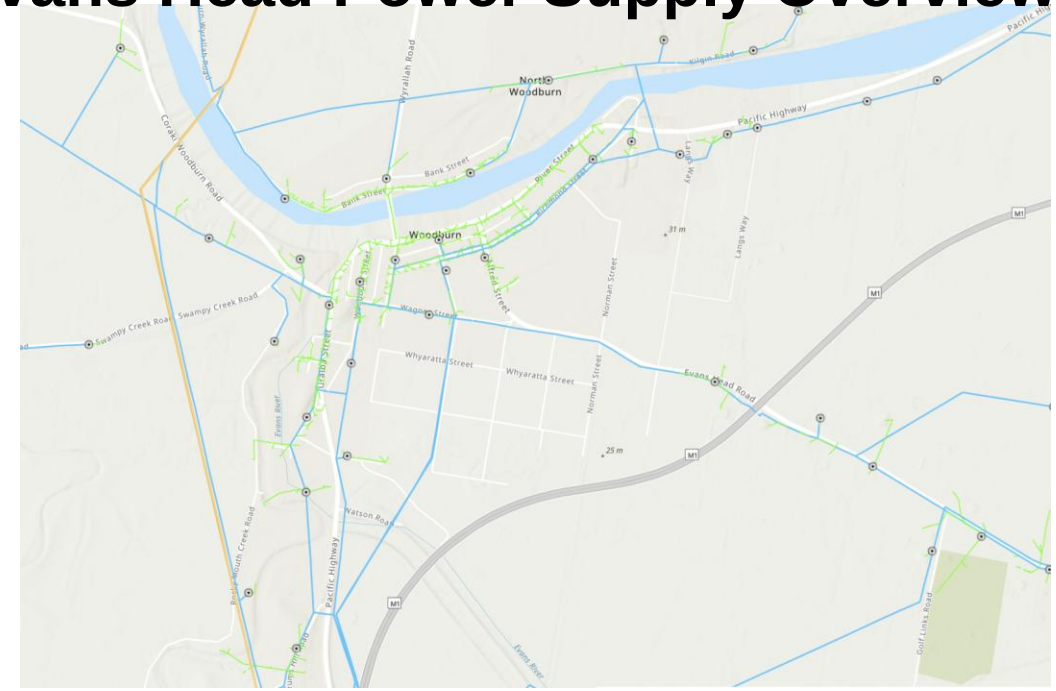


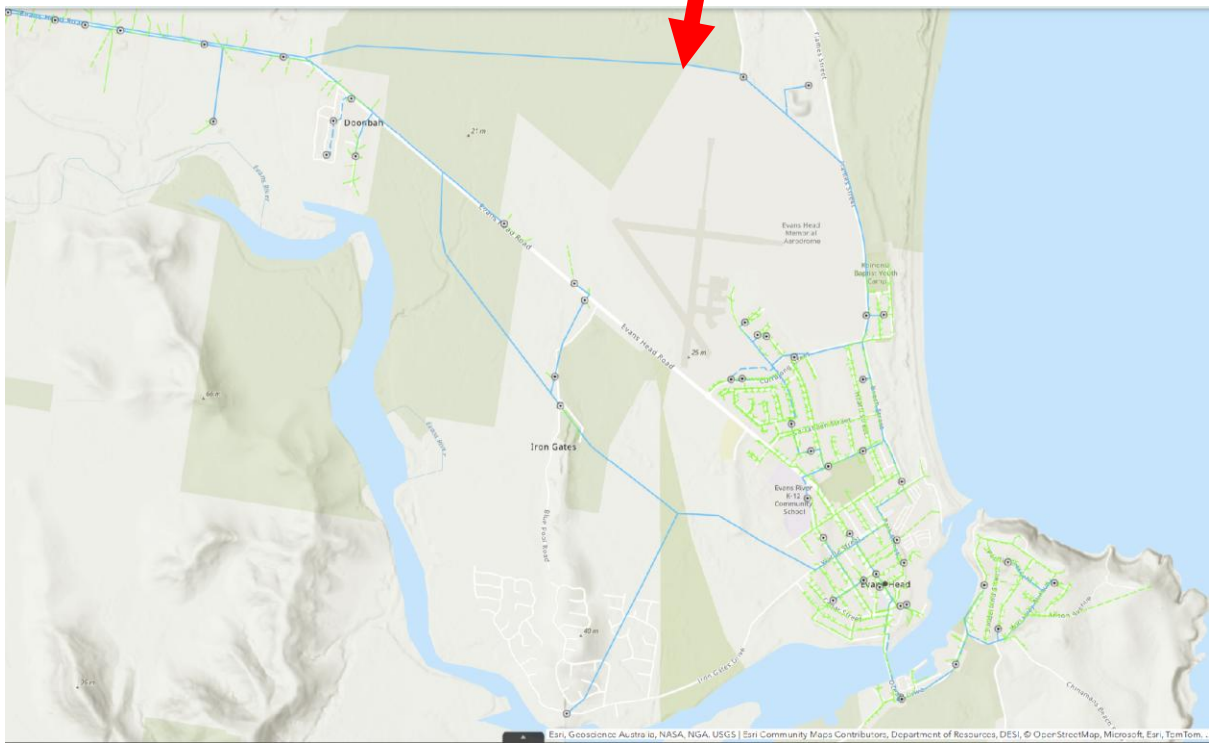
- linked to the national grid as it transits Northern Rivers



Source: [Essential Energy's map]

Evans Head Power Supply Overview





Source: Two feeder lines operated by Essential Energy, originating from the Woodburn substation.

Northern Feeder

- Runs along Woodburn Road, supplying power to:
    - Sewage plant
    - Industrial estate
    - Northern residential zone.

Southern Feeder

- Branches into the bush area between the road + river, emerging on Wattle Street.
- Supplies most of residential EH, the CBD, + south of the river.

Evans Head Power Supply Overview

Evans Head Power Supply

Legend

Substation

EE OH Span

- 6.6kV
- LV
- 11kV
- 12.7kV
- 19.1kV
- 22kV
- 33kV
- 66kV
- 110kV
- 132kV
- 220kV
- <all other values>

EE UG Cable

- 6.35kV
- 6.6kV
- LV
- 11kV
- 12.7kV
- 19.1kV
- 22kV
- 33kV

Evans Head Power Supply Overview


29573
8778
29544
8775
2755
29574
29607
29663
29575
99303
8773
29579
29609
8774
29665
29610
29664
29580
88701
NP388456
NP388457
29611
29589
29593
29666
29590
29662
29661
29582
29660
29659
29671
29668
29670
PP27728
Evans Head
South Evans Head
29669
29672
PP27744
29673
29674
PP27745
29675
PP27740
29677

(1 of 2)

EE Span: 29580:29582

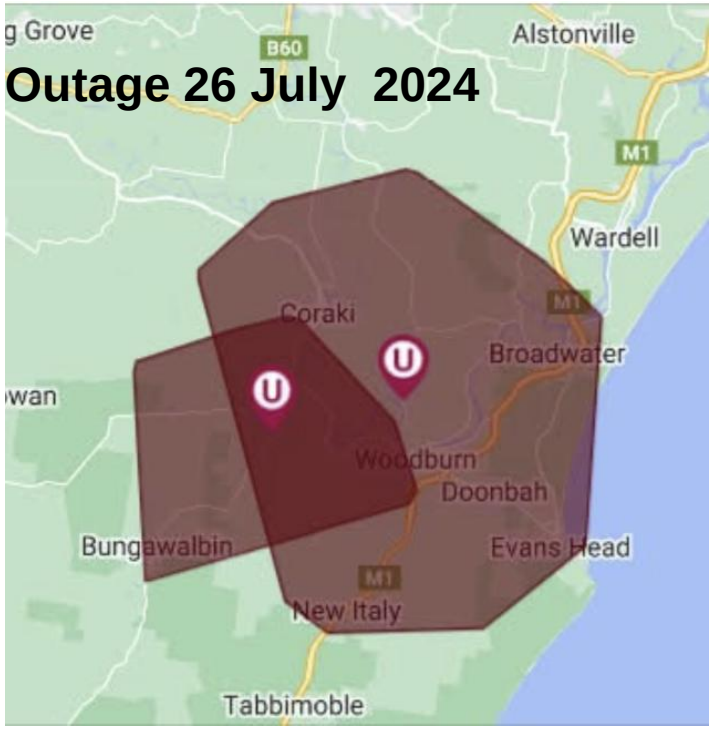
Request Data:	Email
Date Extracted	20250210
Asset ID	5677113
Asset Label	29580:29582
Operating Voltage	LV
Service Status	INSERVICE
Common Name	Unknown Twisted
Material Type	Unknown
Construction Type	Unknown
Phases	LV3
Number of Cables	Unkn
Stranding	

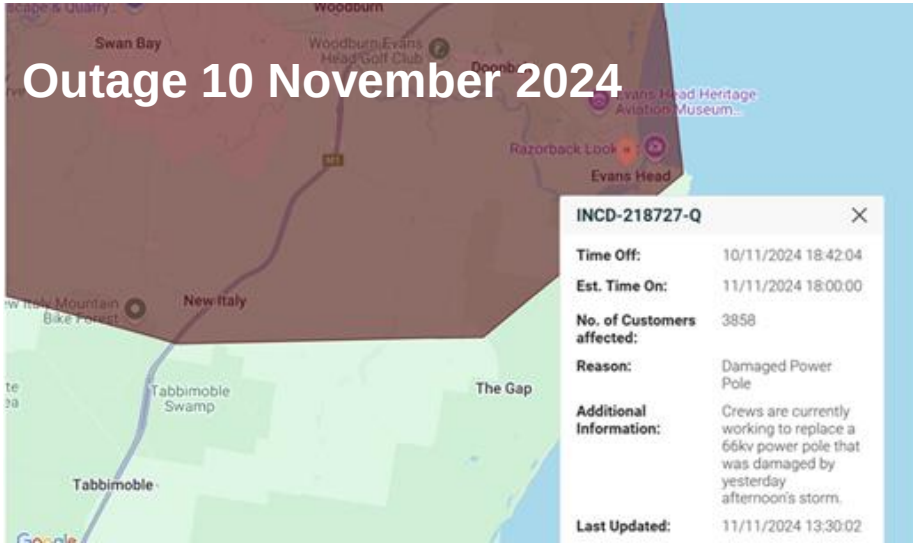
Zoom to

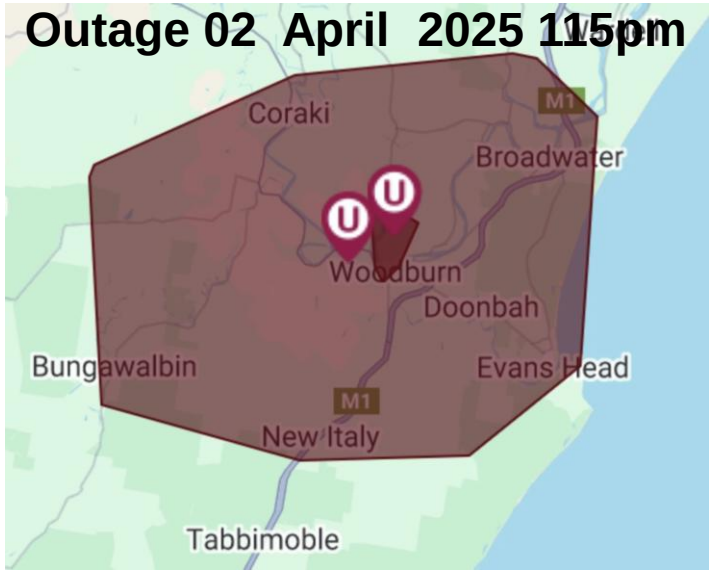
Evans Head Blackouts Overview

Outage 08 December 2024

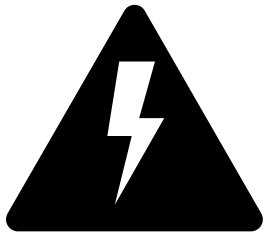
Essential Energy Notification for Outage Reference INCD-223635-q We are currently aware of an outage at your address, This is affecting 4,190 customers in BAGOTVILLE, BORA RIDGE, BROADWATER, BUCKENDOON, BUNGAWALBIN, CODRINGTON, CORAKI, DOONBAH, DUNGARUBBA, EAST CORAKI, ELLANGOWAN, EVANS HEAD, GREEN FOREST, KILGIN, LISMORE, MAROM CREEK, MEERSCHAUM VALE, NEW ITALY, NORTH WOODBURN, RILEYS HILL, RUTHVEN, SOUTH EVANS HEAD, SWAN BAY, TABBIMOBLE, THE GAP, TRUSTUMS HILL, TUCKI TUCKI,... **See more**







ELECTRICITY SUPPLY – RELIABILITY FACTORS



Essential Energy: Power Supply & Customer Impact

65% of customers are on short rural feeders like Evans Head

- Total of **960 short rural feeders** across the region

Evans Head Feeder Details

1. **Ballina Depot → Woodburn B2 → Evans Head South**
   - Serves **1,139 customers**
2. **Ballina Depot → Woodburn B5 → Evans Head North**
   - Serves **1,033 customers**

Performance Monitoring
Essential Energy tracks

- **Number of customers impacted by each outage**
- **Duration of power outages (in minutes).**

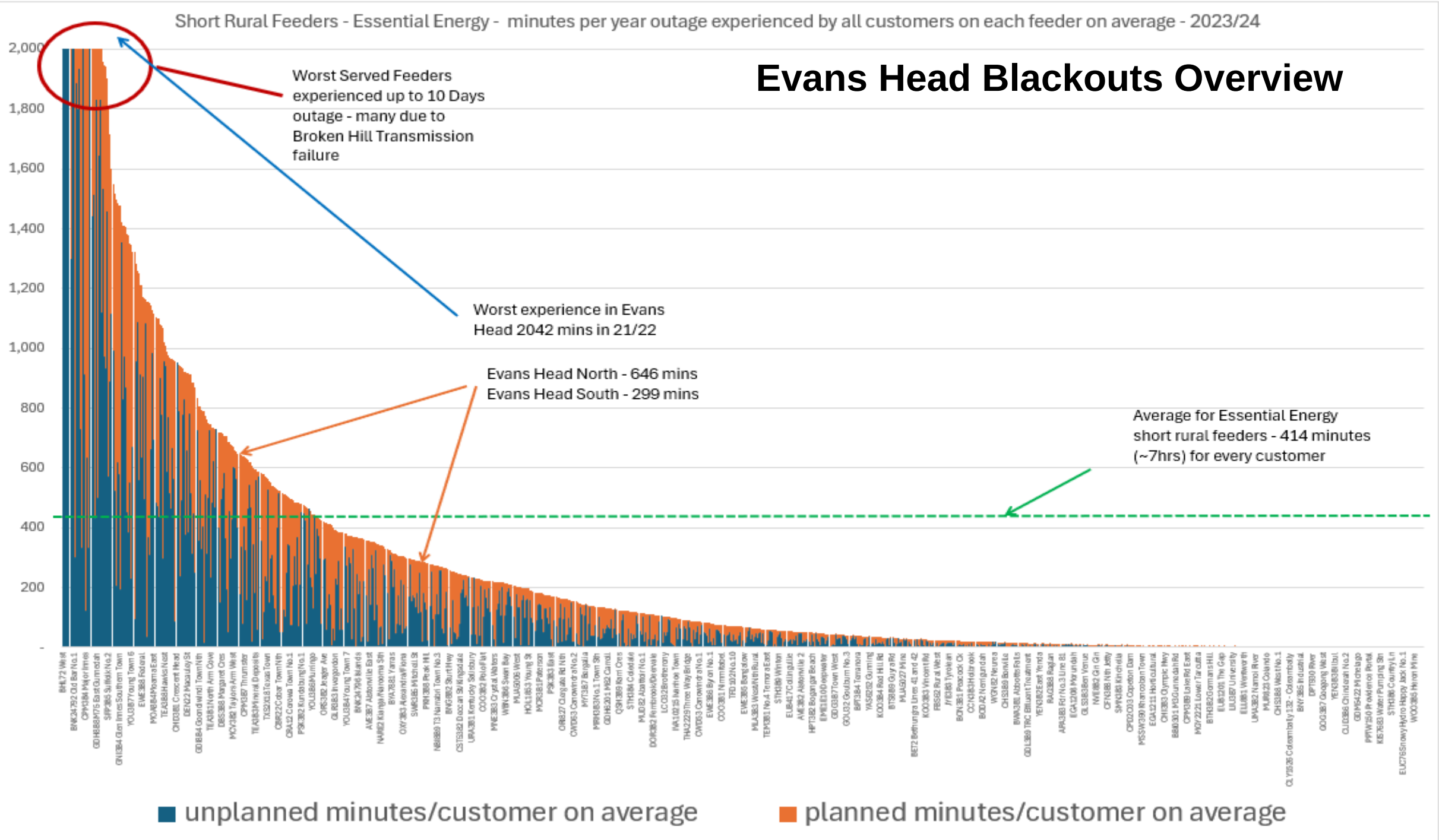
Performance Targets

- Focus on reducing average blackout minutes
- Minimizing the number of outages.

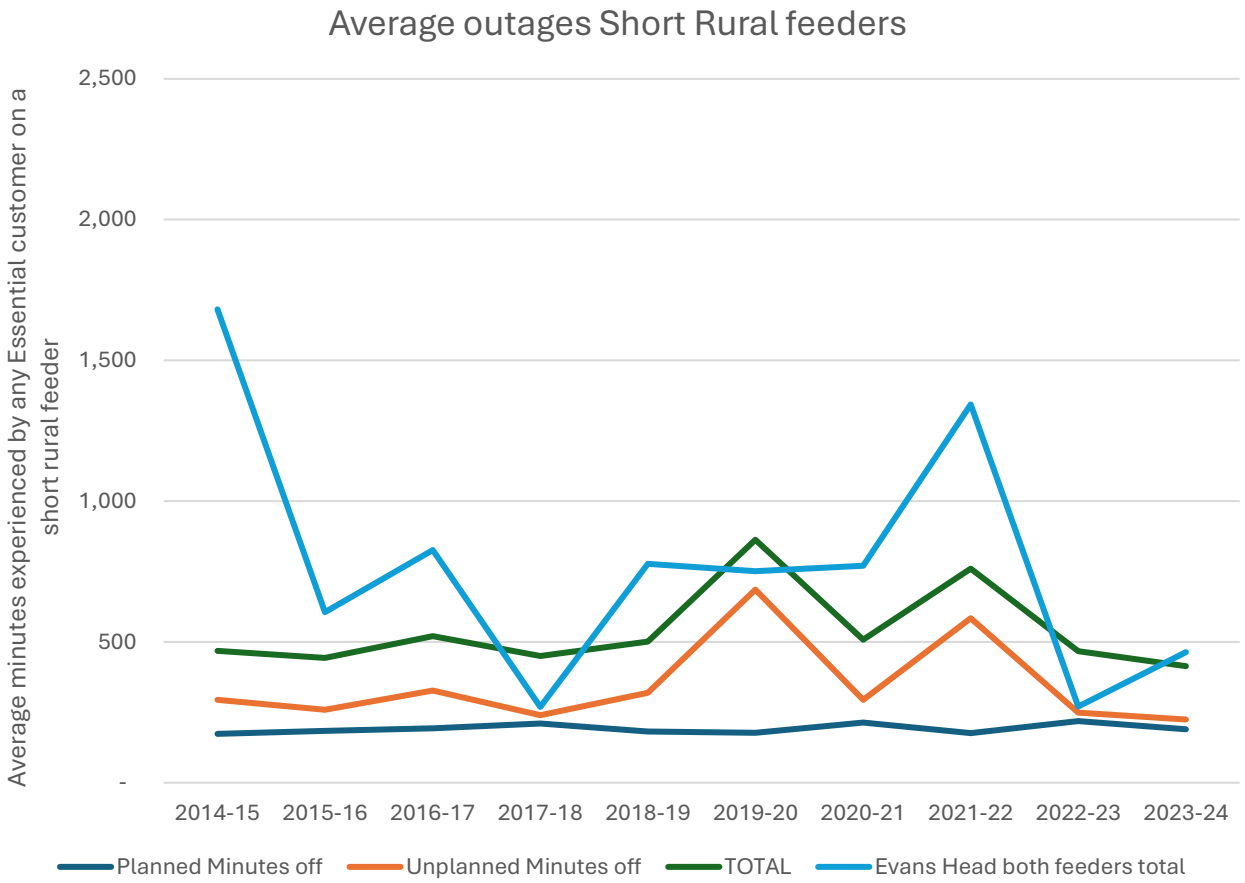
Major Event Days (e.g. floods) **do not count** against performance targets.

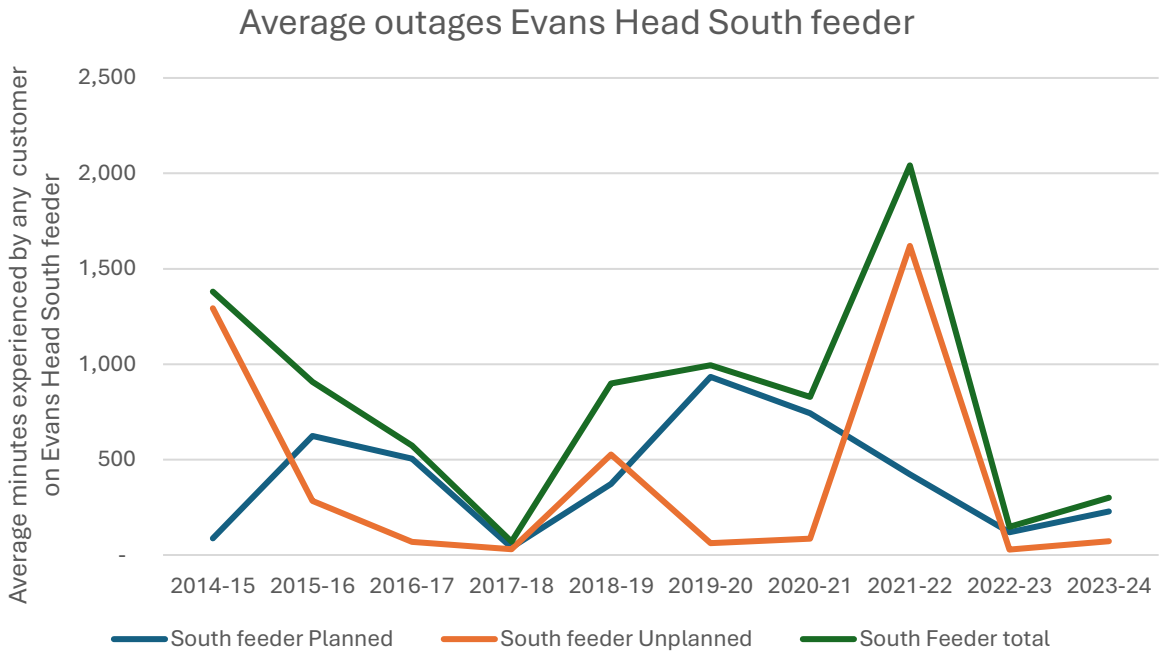
- Outages **not caused by Essential Energy** (e.g., Broken Hill blackout) are excluded from performance metrics.

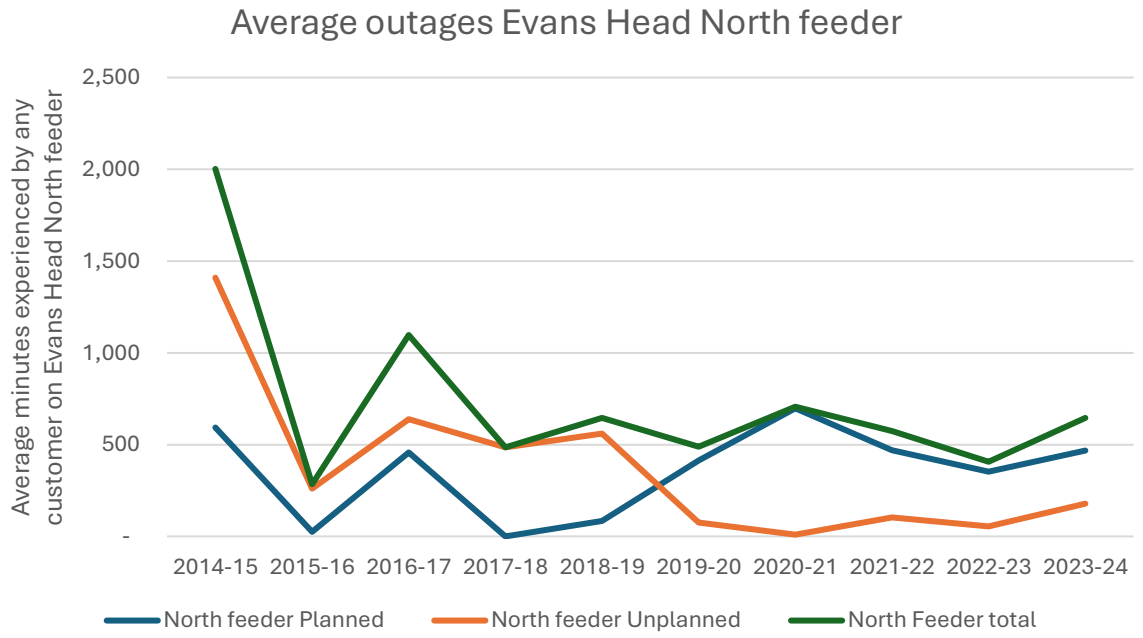
Evans Head Blackouts Overview

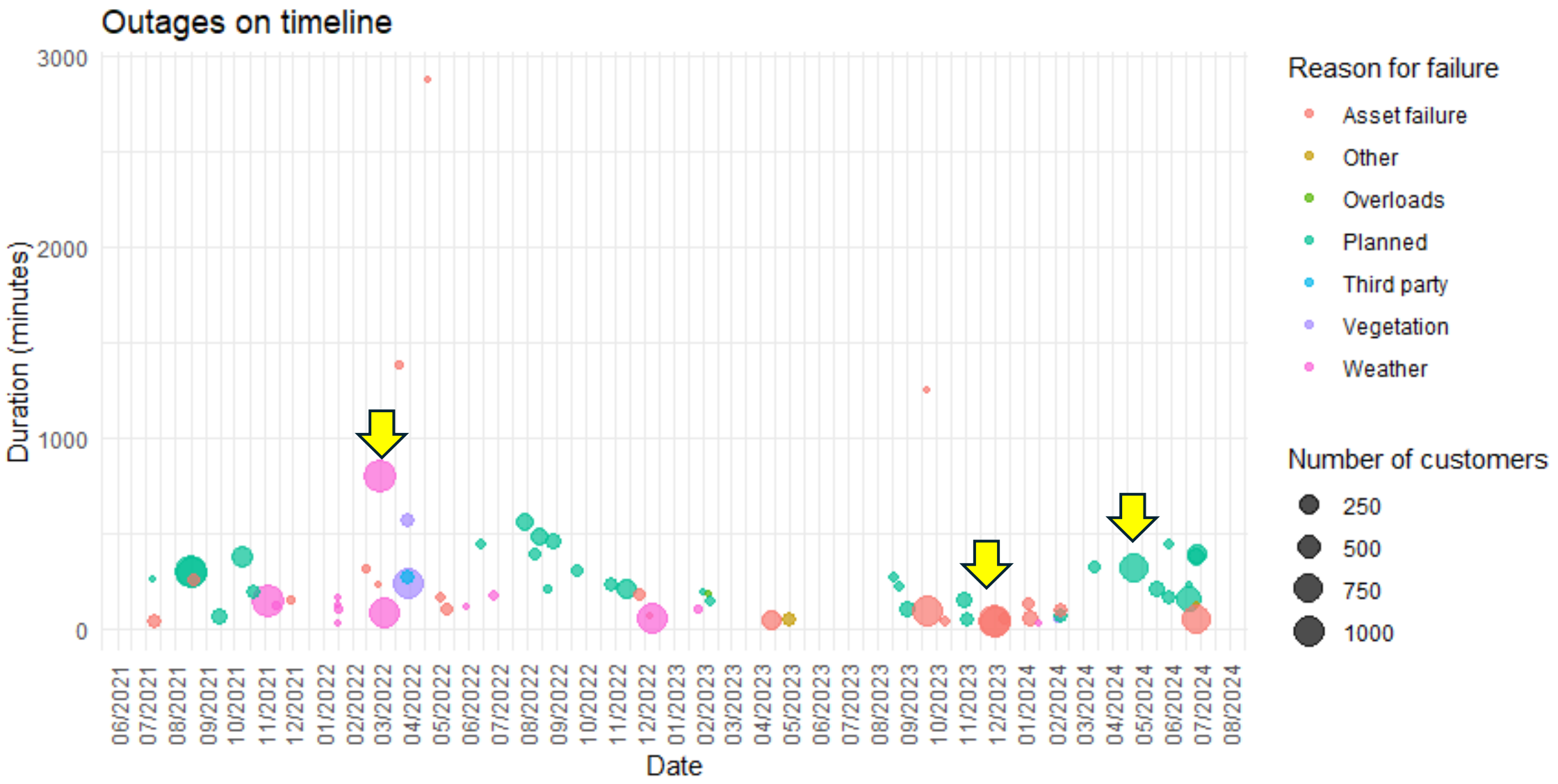


Evans Head Blackouts Overview








Outages on timeline
Duration (minutes)
3000
2000
1000
0
Date
06/2021
07/2021
08/2021
09/2021
10/2021
11/2021
12/2021
01/2022
02/2022
03/2022
04/2022
05/2022
06/2022
07/2022
08/2022
09/2022
10/2022
11/2022
12/2022
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04/2023
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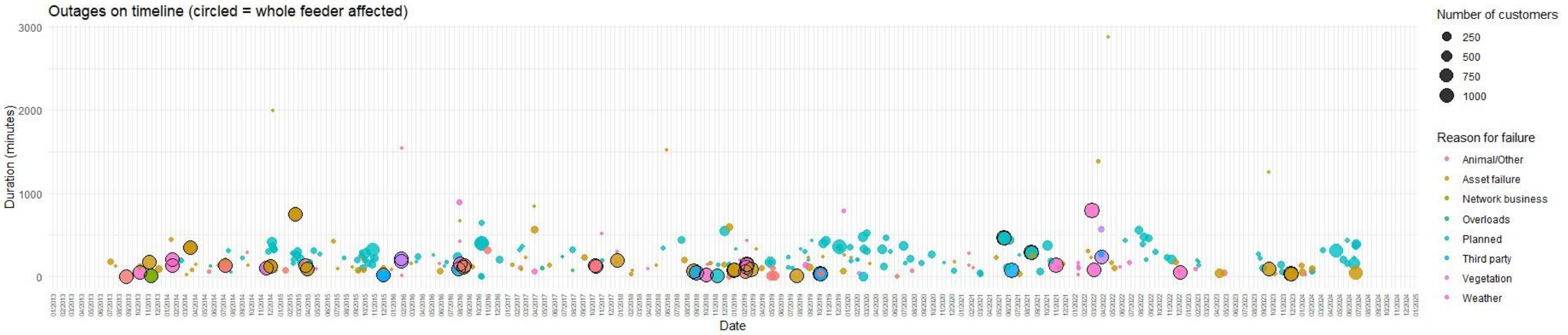
08/2023
09/2023
10/2023
11/2023
12/2023
01/2024
02/2024
03/2024
04/2024
05/2024
06/2024
07/2024
08/2024
Reason for failure
Asset failure
Other
Overloads
Planned
Third party
Vegetation
Weather
Number of customers
250
500
750
1000



Ring around circle = outages of more than 900 customers

Note: “more than 900 customers” also means one of the two feeders was completely knocked out and the problem was "upstream" of Evans Head because there weren’t that many customers on either feeder to Evans after Doonbah split

Not shown on graph but in source data:

If you look at the sheet of detailed outages, you'll see that some faults are classified as HV.

I originally thought those were faults that would knock out the whole Woodburn Zone substation and therefore the whole area, but if you look at them, some only have 100 customers affected, so it’s not clear.

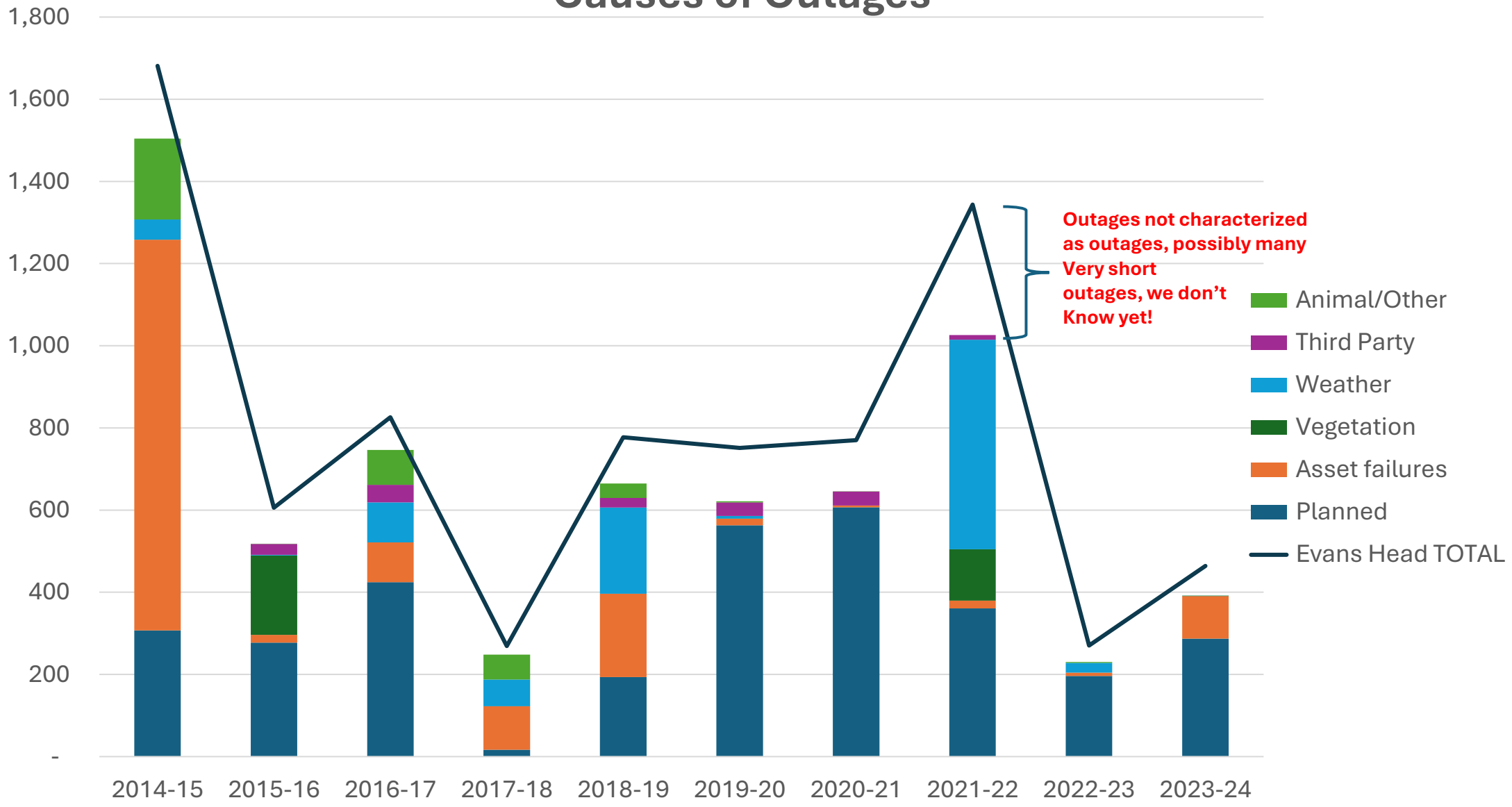
I also think some of the "third party" faults are upstream, but this is a broad category so I can't be sure.

Heather Smith April 6 2025

Top 60 Outages Sorted By Number Of Customers Affected

year	Date of event	Time of interruption	Asset ID	Feeder classification	Reason for interruption	Detailed reason for interruption	Number of customers affected by the interruption	Average duration of sustained customer interruption
21/22 stats	01/03/2022	4:23:06 PM	WBN3B2 Evans Head Sth	Short Rural	Weather		1,094	792
23/24 stats	01/12/2023	9:31:09 PM	WBN3B2 Evans Head Sth	Short Rural	Asset failure	Zone substation	1,094	32
21/22 stats	06/11/2021	11:22:05 PM	WBN3B2 Evans Head Sth	Short Rural	8 - STPIS Exclusion (3.3)(c)		1,072	138
21/22 stats	18/08/2021	11:00:14 PM	WBN3B2 Evans Head Sth	Short Rural	Planned		1,070	292
20/21 stats	23/05/2021	8:30:38 AM	WBN3B2 Evans Head Sth	Short Rural	Planned		1,049	460
20/21 stats	16/06/2021	12:22:21 PM	WBN3B2 Evans Head Sth	Short Rural	Third party	Vehicle impact	1,047	69
18/19 stats	14/02/2019	12:15	WBN3B2 Evans Head Sth	Short Rural	Weather		1,043	146
18/19 stats	28/02/2019	00:32	WBN3B2 Evans Head Sth	Short Rural	Asset failure	HV	1,043	81
18/19 stats	28/08/2018	16:14	WBN3B2 Evans Head Sth	Short Rural	Asset failure	HV	1,042	59
18/19 stats	5/01/2019	14:45	WBN3B2 Evans Head Sth	Short Rural	Asset failure	Subtransmission	1,042	77
19/20 stats	08/10/2019	3:40:55 PM	WBN3B2 Evans Head Sth	Short Rural	5 - STPIS Exclusion (3.3)(a)	Fire	1,042	34
18/19 stats	4/09/2018	13:53	WBN3B2 Evans Head Sth	Short Rural	Third party	Vehicle impact	1,041	46
22/23 stats	10/12/2022	18:27	WBN3B5 Evans Head Nth	Short Rural	8 - STPIS Exclusion (3.3)(a)		1001	50
23/24 stats	01/12/2023	9:31:09 PM	WBN3B5 Evans Head Nth	Short Rural	Asset failure	Zone substation	996	33
23/24 stats	21/09/2023	4:45:09 PM	WBN3B5 Evans Head Nth	Short Rural	Asset failure	HV	996	93
15/16 stats	1/12/2016	14:06	WBN3B2 Evans Head Sth	Short Rural	6 - STPIS Exclusion (3.3)(a)	Switching and protection error	994	27
15/16 stats	28/01/2016	17:21	WBN3B2 Evans Head Sth	Short Rural	Vegetation	Blow-in/Fall-in	994	186
21/22 stats	06/03/2022	3:24:22 PM	WBN3B5 Evans Head Nth	Short Rural	Weather		994	81
21/22 stats	18/08/2021	11:00:14 PM	WBN3B5 Evans Head Nth	Short Rural	Planned		988	292
14/15 stats	21/02/2015	00:30	WBN3B2 Evans Head Sth	Short Rural	Asset failure	Subtransmission	987	751
14/15 stats	1/04/2015	15:42	WBN3B2 Evans Head Sth	Short Rural	Asset failure	Subtransmission	987	91
14/15 stats	11/07/2014	00:12	WBN3B2 Evans Head Sth	Short Rural	Other		985	131
13/14 stats	20/03/2014	07:47	WBN3B2 Evans Head Sth	Short Rural	Asset failure		984	355
20/21 stats	23/05/2021	8:30:38 AM	WBN3B5 Evans Head Nth	Short Rural	Planned		980	461
13/14 stats	23/01/2014	06:56	WBN3B2 Evans Head Sth	Short Rural	Weather		978	139
13/14 stats	15/11/2013	12:05	WBN3B2 Evans Head Sth	Short Rural	Network business		972	9
13/14 stats	27/08/2013	14:25	WBN3B2 Evans Head Sth	Short Rural	Animal		971	3
19/20 stats	08/10/2019	3:40:55 PM	WBN3B5 Evans Head Nth	Short Rural	5 - STPIS Exclusion (3.3)(a)	Fire	966	34
19/20 stats	25/07/2019	11:10:34 AM	WBN3B5 Evans Head Nth	Short Rural	Asset failure	HV	961	10
18/19 stats	5/10/2018	07:00	WBN3B5 Evans Head Nth	Short Rural	Weather		959	25
18/19 stats	9/11/2018	08:00	WBN3B5 Evans Head Nth	Short Rural	Planned		959	7
18/19 stats	5/01/2019	14:45	WBN3B5 Evans Head Nth	Short Rural	Asset failure	Subtransmission	959	80
18/19 stats	8/02/2019	05:07	WBN3B5 Evans Head Nth	Short Rural	Animal	Animal impact	959	61
18/19 stats	13/02/2019	20:25	WBN3B5 Evans Head Nth	Short Rural	Weather		959	117
14/15 stats	4/12/2014	23:18	WBN3B2 Evans Head Sth	Short Rural	Asset failure	Subtransmission	958	124
18/19 stats	14/02/2019	12:15	WBN3B5 Evans Head Nth	Short Rural	Weather		958	146
17/18 stats	14/10/2017	16:01	WBN3B6 Evans Head Nth	8hort Rural	Weather		862	137
17/18 stats	16/10/2017	10:38	WBN3B6 Evans Head Nth	8hort Rural	Animal	Animal impact	862	130
17/18 stats	24/12/2017	03:04	WBN3B6 Evans Head Nth	8hort Rural	Asset failure	HV	861	201
16/17 stats	31/07/2016	20:26	WBN3B6 Evans Head Nth	8hort Rural	Third party	Fire	847	80
16/17 stats	4/08/2016	01:12	WBN3B6 Evans Head Nth	8hort Rural	Weather		847	163
16/17 stats	16/08/2016	08:07	WBN3B6 Evans Head Nth	8hort Rural	Asset failure	HV	847	116
16/17 stats	20/08/2016	22:38	WBN3B6 Evans Head Nth	8hort Rural	Animal	Animal impact	847	132
14/15 stats	25/03/2015	22:50	WBN3B5 Evans Head Nth	Short Rural	Animal	Animal impact	934	139
14/15 stats	1/04/2015	15:42	WBN3B5 Evans Head Nth	Short Rural	Asset failure	Subtransmission	934	91
15/16 stats	28/01/2016	17:21	WBN3B6 Evans Head Nth	8hort Rural	Vegetation	Blow-in/Fall-in	934	216
15/16 stats	1/12/2016	14:06	WBN3B6 Evans Head Nth	8hort Rural	6 - STPIS Exclusion (3.3)(a)	Switching and protection error	933	27
14/15 stats	19/11/2014	20:15	WBN3B5 Evans Head Nth	Short Rural	Weather		926	105
14/15 stats	4/12/2014	23:18	WBN3B5 Evans Head Nth	Short Rural	Asset failure	Subtransmission	926	124
14/15 stats	21/02/2015	00:30	WBN3B5 Evans Head Nth	Short Rural	Asset failure	Subtransmission	926	750
13/14 stats	9/10/2013	12:26	WBN3B2 Evans Head Sth	Short Rural	Weather		921	48
13/14 stats	20/03/2014	07:47	WBN3B5 Evans Head Nth	Short Rural	Asset failure		919	354
14/15 stats	11/07/2014	00:12	WBN3B5 Evans Head Nth	Short Rural	Other		919	131
21/22 stats	30/03/2022	6:41:14 AM	WBN3B2 Evans Head Sth	Short Rural	Vegetation	Blow-in/Fall-in	917	240
13/14 stats	23/01/2014	07:14	WBN3B5 Evans Head Nth	Short Rural	Weather		916	209
13/14 stats	8/11/2013	12:35	WBN3B5 Evans Head Nth	Short Rural	Asset failure		912	173
13/14 stats	15/11/2013	12:05	WBN3B5 Evans Head Nth	Short Rural	Network business		912	9
16/17 stats	12/10/2016	08:30	WBN3B6 Evans Head Nth	8hort Rural	Planned		890	400
19/20 stats	09/12/2019	10:01:24 PM	WBN3B2 Evans Head Sth	Short Rural	Planned		890	359
16/17 stats	12/10/2016	08:30	WBN3B2 Evans Head Sth	8hort Rural	Planned		881	389
23/24 stats	27/06/2024	10:57:51 AM	WBN3B5 Evans Head Nth	Short Rural	Asset failure	HV	798	44
23/24 stats	24/04/2024	9:31:08 AM	WBN3B5 Evans Head Nth	Short Rural	Planned		794	311
15/16 stats	28/10/2016	08:30	WBN3B2 Evans Head Sth	8hort Rural	Planned		781	323
23/24 stats	21/06/2024	9:17:43 AM	WBN3B5 Evans Head Nth	Short Rural	Planned		523	155

Causes of Outages



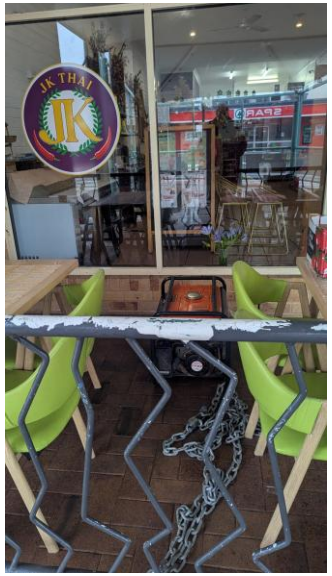
Outage self-help: a range of large to small business responses

IGA

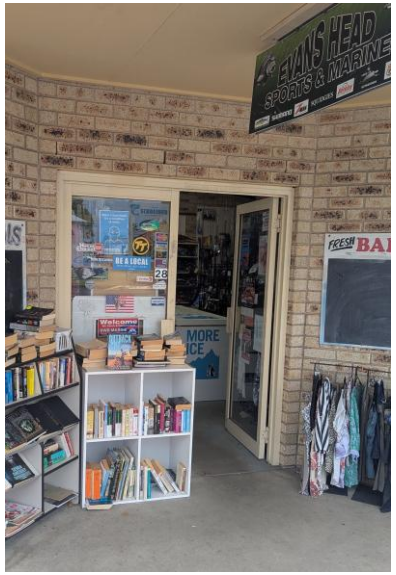
Ambo

RSL

Contractor power on-site



Restaurant open



Take home

Close, protect freezer


What is EARN doing to better understand our energy system during disasters?
EARN Lorikeet Research Team
Specific energy end use data for:
• Residential households
• Small businesses
• Mobile phone / internet
• Water supply
• Sewage
• Medical
• Transportation


Discussion
Time

Point your phone camera at this QR image and hit the url that appears

https://www.essentialenergy.com.au/our-network/overhead-network-maps

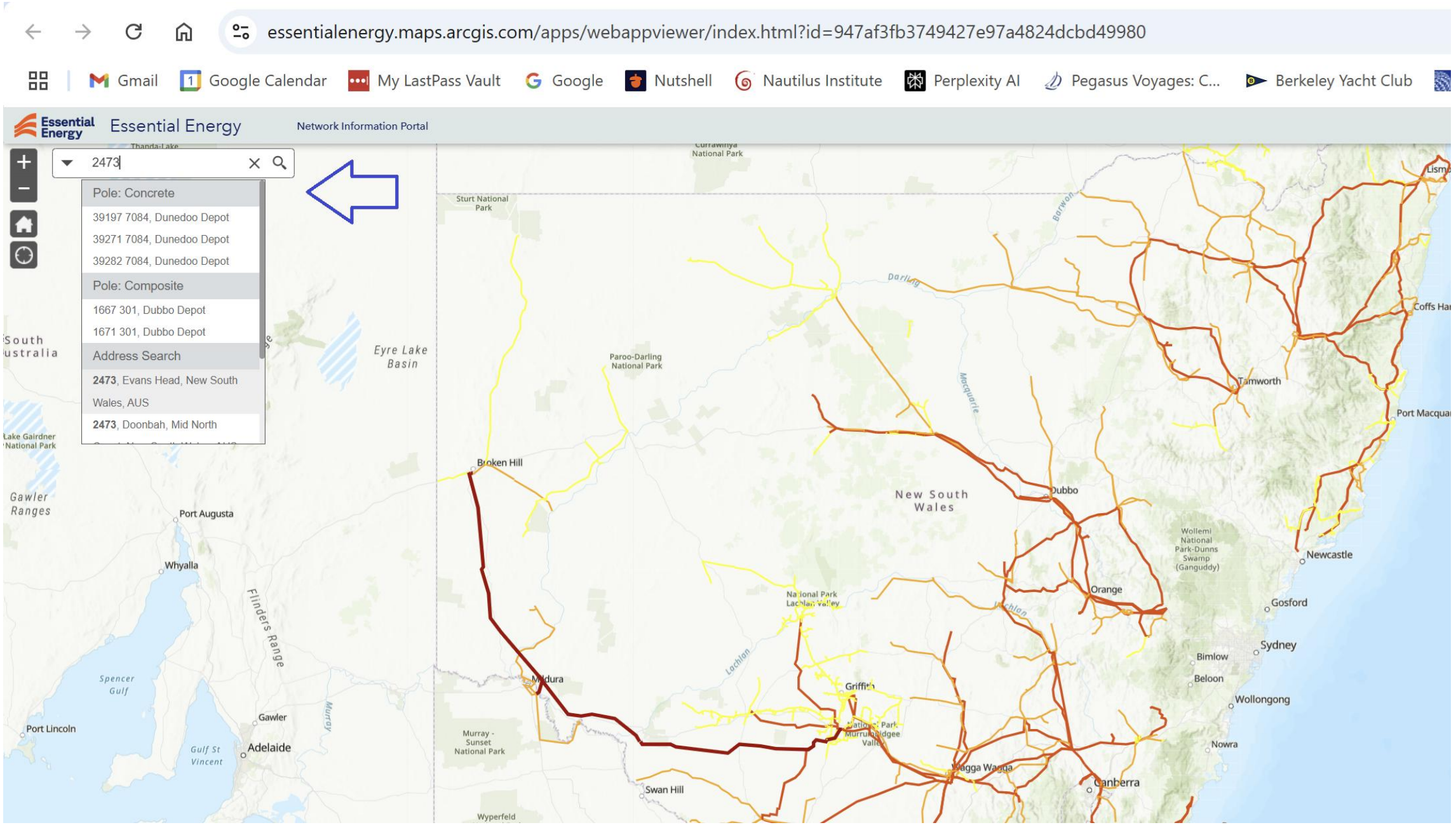
Step 1

Next Steps

- Scan down the page and click on: **Network Information Portal**
- Click on **TERMS** box and **OK**
- **Find top left box:** Enter post code 2473 or Street Address from drop down box

TIPS:

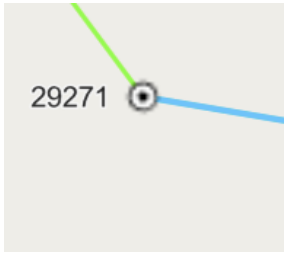
- Use 2 fingers to zoom in + out
- Use 1 finger to move around
- Tap on a symbol to bring up a table stating what it is


essentialenergy.maps.arcgis.com/apps/webappviewer/index.html?id=947af3fb3749427e97a4824dcbd49980
Gmail
Google Calendar
My LastPass Vault
Google
Nutshell
Nautilus Institute
Perplexity AI
Pegasus Voyages: C...
Berkeley Yacht Club
Essential Energy
Network Information Portal
2473
Pole: Concrete
39197 7084, Dunedoo Depot
39271 7084, Dunedoo Depot
39282 7084, Dunedoo Depot
Pole: Composite
1667 301, Dubbo Depot
1671 301, Dubbo Depot
Address Search
2473, Evans Head, New South Wales, AUS
2473, Doonbah, Mid North
Sturt National Park
Paroo-Darling National Park
Eyre Lake Basin
Broken Hill
New South Wales
Dubbo
Tamworth
Newcastle
Orange
Gosford
Sydney
Bimlow
Beloon
Wollongong
Nowra
Canberra
Griffith
Mildura
Swan Hill
Port Augusta
Whyalla
Gawler Ranges
Flinders Range
Spencer Gulf
Port Lincoln
Gawler
Adelaide
Gulf St Vincent
Murray - Sunset National Park
Darling
Macquarie
Lachlan
Murray

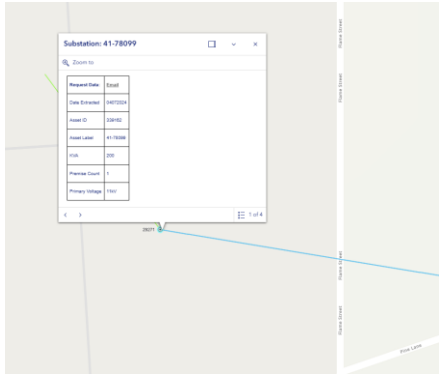
In groups

- **Identify the location of your closest transformer**
- **Discuss issues, questions, ideas you have about energy supply, demand vulnerabilities and blackouts**
- **Write down main points on post-it notes**

Symbol for Transformer = “sub-station”



Click on symbol to See detail



PART 2

INTRODUCING THE EARN ENERGY SURVEY AND HOUSEHOLD ENERGY AUDITS

EARN Energy Survey Rationale

1. **Ground-truth reference energy supply-demand model**

2. **What questions do you have about our vulnerability and resilience of Evans Area baseline and emergency energy supply and demand?**

3. **We need your help!**

Evans Head Bowling Club is pleased to support the EARN climate-amplified disaster emergency energy study for Evans Head and urges other businesses and stakeholders to participate in this important initiative for the Evans Head community.

Roger Hong, Manager, The Bowlo

We need to deepen our understanding of:

Commercial, especially food supply, cooking and energy supply-use

Food energy: About 2600 billion calories/yr (energy unit, “kcals) or about 2 tons of wheat flour or rice per day

Supermarkets, restaurants, bakeries, cafes, food stores, hotels, caravan park, pods, emergency housing sites

Residential cooking, about 1100 MWh/yr electricity, 650 GJ/yr or 14,000 kg/yr bottled gas (LPG), based on regional averages (to be revised)

Medical sector services and energy supply-use

Medical centre, pathology, dental, podiatry, physio, massage, nursing home care and equipment CPAP, O2.

Water/Sewage and energy supply-use

Communications networks and energy supply-use

“Hubs” and Emergency Services and energy supply-use

MRNC Neighborhood Centre, Fire brigade, police, SES, Marine Rescue, Ambo

EARN Survey Ethical Guidelines
Interviewees will receive an information sheet explaining the survey, and a consent form to sign

EVANS AREA RESILIENCE NETWORK

EARN ENERGY AUDIT SURVEY INFORMATION SHEET

Who is conducting the survey?

EARN Evans Area Resilience Network
Email: evansarearesiliencenetwork@gmail.com
Phone: 0432156347

Why is the research being conducted? To enable the Evans Area community to identify vulnerabilities to loss of energy supply and relief, recovery, and long-term resilience measures to provide energy in climate-amplified disasters

What you will be asked to do? You will be asked to answer questions relating to energy use based on your experience and expertise in the Evans Head region.

The basis by which participants will be selected or screened? Either you have offered to participate or you are an important energy user in the Evans Area that is representative of needs such as a business or a household, or your organization is mission-critical in providing energy to users in disaster in the Evans Area.

The expected benefits of the research? The survey will assist the community to insight and information that enables individual household and business energy users to obtain energy for critical services both routinely and in response to disasters by implementing strategies and policies at the individual and community level.

Risks to you? We do not envisage any risk to you from participating in the study. Participation is voluntary and all responses will be non-identifiable, as described below. We will not be collecting any personal information.

Your confidentiality: Responses will be collected in person or by email, de-identified at the point of analysis and the results summarised in a report. The names of respondents will not be provided in any draft or final reports or other publications. "De-identified" data means that all identifiers will be removed from the data prior to any publication of the data, re-use of the data (for example) in related research) or sharing of the data (for example, with other researchers). The data will be stored on secure computers at Nautilus Institute. Only the named study team will have access. In some instances, it may be important to identify the energy using entity in the publicly available results, but this will be done only with specific, written permission.

Your participation is voluntary

You participation is voluntary and you will be free to withdraw from the study at any time should you so wish..

Questions / further information:
Please contact: Peter Hayes, evansarearesiliencenetwork@gmail.com ph: 0417576836

The ethical conduct of this research

This research is being conducted in accordance with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the ethical conduct of the project please contact Rena Frohman, evansarearesiliencenetwork@gmail.com

Feedback to you

If you are interested in receiving feedback from this project we will send you a summary of the key findings. Please indicate your interest in receiving a summary on the EARN Energy Consent Form

EVANS AREA RESILIENCE NETWORK

EARN ENERGY AUDIT SURVEY
CONSENT FORM

Who is conducting the survey?

Names:
Email: evansarearesiliencenetwork@gmail.com
Phone:

By signing below, I confirm that I have read and understood the information package and in particular:

- I understand that my involvement in this research will include answering a set of questions about energy use;
- I have had any questions answered to my satisfaction;
- I understand the risks involved;
- I understand that there will be no direct benefit to me from my participation in this research;
- I understand that my participation in this research is voluntary;
- I understand that if I have any additional questions I can contact the research team;
- I understand that I am free to withdraw at any time, without explanation or penalty;
- I understand that my name and other personal information that could identify me will be removed or de-identified in publications or presentations resulting from this research;
- I understand that I can contact Peter Hayes on 0417576836 (or evansarearesiliencenetwork@gmail.com) if I have any concerns about the ethical conduct of the project; and
- I agree to participate in the project.

Name	
Signature	
Email	
Phone	
	Tick to left to receive a summary of the key findings

Household Energy Audit

- Understand your own energy needs

- Over 24 hours how much energy do you use when energy is reliable?
- Over 24 hours how much energy do you need for the **essentials** to live?

- Better understanding of your household energy needs can:
  - Help you prepare for blackout back up plans
  - Help you consider strategies for using less electricity
  - Help our EARN team better understand community needs

Lessons from Prior Projects: Household: essential vs enough

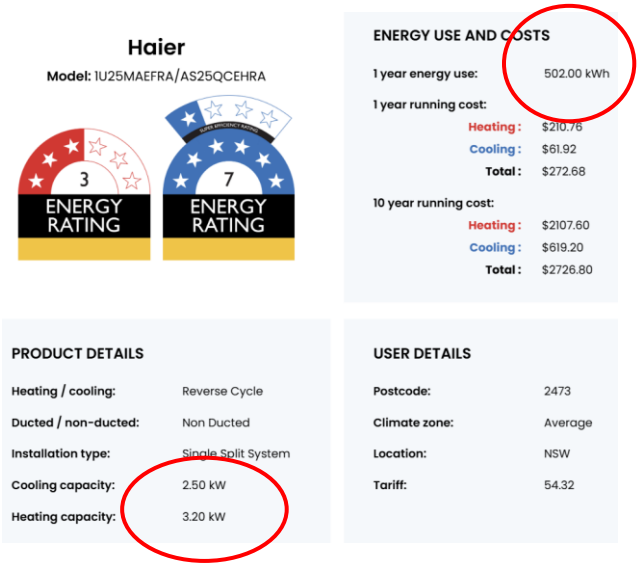
Breakdown	Essential	Enough
Heating & Cooling	10%	80%
Cooking	50%	80%
IT&HE	50%	100%
Lighting	20%	80%
Other Equipment	25%	75%
Transport		
Water Heating		25%
White Goods	100%	100%

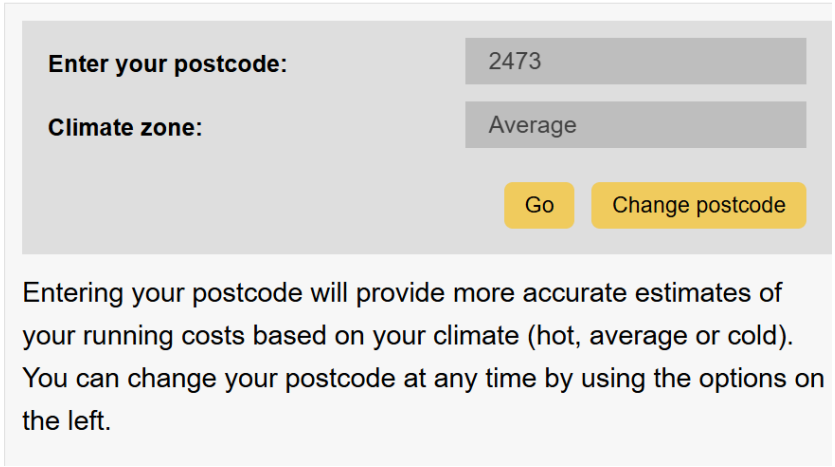
Example: how much energy does my household use per day?

	kWe in Outage	h/d Outage	kWhe/d Outage
Washing Machine Bosch 239 kwh/year (warm but we do cold)	1.5	0	0
Refrigerator (with freezer on top) Samsung 300kwh/year	1.5	2	3
Aircon (used very infrequently for heat/cool)	3	0	0
3 ceiling fans (used very infrequently)	0.6	0	0
TV	0.01	0	0
Kettle/Toaster	1.5	0.13	0.2
Electric stove/oven/microwave	2.5	0.25	0.625
2 laptops	0.02	5	0.1
Solar Water System separate from panels + system	0.5	0	0
Minor: charging phones, battery for garden tools	0.1	2	0.2
Future Purchase: EV (looking at MG Essence)		0	0
Lights	0.2	5	1
	11		**5.1**
Current av daily use June 2024			**4.83**

End use estimates by appliance

https://calculator.energyrating.gov.au/





		$/y	ratio	power kWe	kWhe/y	h/y
Calculation using Calculator	Heating	211	0.77	2.5	388	155
	Cooling	62	0.23	3.2	114	36
	Total $/y	**273**	**(power only)**		**502**	

CROSSCHECK Calculation from basics		d/y	h/d used	power kWe	kWe when heated/cooled	h to achieve steady state
	Heating	40	5.00	2.5	0.5	0.5
	Cooling	120	6.00	3.2	0.5	0.5

heating	90	kWhe at 0.5 kWe per 4.5 hours/day
	50	kWhe at 2.5 kWe per 0.5 hours/day
	140	kWhe heating/y
cooling	330	kWhe at 0.5 kWe per 5.5 hours/day
	192	kWhe at 2.5 kWe per 0.5 hours/day
	522	kWhe cooling/y
	662	Total kWhe/year
	0.4	$/kWhe
	265	**$/year power cost only!**

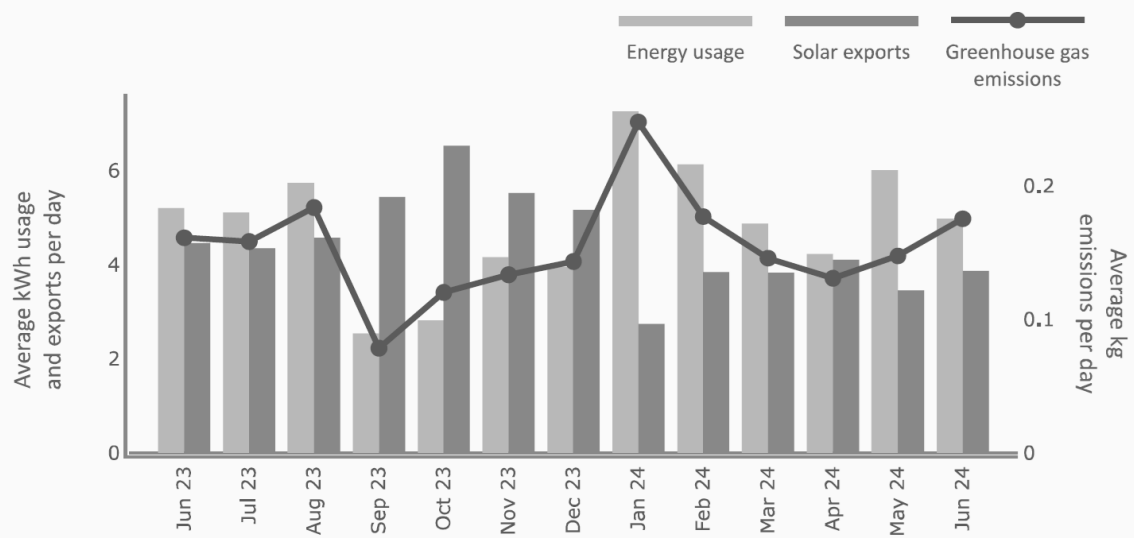
Your average daily usage this billing period.

Electricity usage: 4.83 kWh
Peak usage: 3.26 kWh
Solar export: 3.75 kWh
Controlled load usage: 1.57 kWh
Average daily cost: $3.33
Total electricity this period: 164.25 kWh

Compare your usage over time

This chart shows your average daily energy usage, solar exports and greenhouse gas emissions for each of the last 12 months.

Average daily usage this time last year: 5.00 kWh
Your average daily usage: 4.83 kWh
Total Greenhouse gas Emissions (Tonnes): 0.18



Understanding your bill

The billing period is 20 May 2024 - 22 June 2024 (34 days)

This bill is based on an actual read of your usage.

To check your actual usage, you can find instructions for reading your electricity meter at: energylocals.com.au/estimated-bills

Submit a self-read to us by following the instructions on our website: energylocals.com.au/self-meter-read

Description	Billing period	Quantity	Rate $ (inc. GST)	Total $ (inc. GST)
Anytime Usage	20/05/2024 - 22/06/2024	110.77 kWh	$0.3700	$40.99
Membership ($16.49/month)	20/05/2024 - 22/06/2024	34 days	$0.5407	$18.38
Supply Charge	20/05/2024 - 22/06/2024	34 days	$1.5500	$52.70
Controlled Load Usage	20/05/2024 - 22/06/2024	53.48 kWh	$0.2950	$15.77
GST included in new charges				**$11.62**
Total charges				**$127.84**
Solar export (*not subject to GST)				
* Solar FiT - Step 1	20/05/2024 - 22/06/2024	127.48 kWh	$-0.1150	$14.66 CR
Total Credits				**$14.66 CR**
Total Bill			=	**$113.18**

EARN COMMUNITY ENERGY USE DATA
DRAFT: RESIDENTIAL AND PERSONAL TRANSPORTATION SECTORS

1. Please provide copies of electricity bills for a year if possible, or for representative months during December through March and April through November.
2. Estimate of the amount of gas use in an average month or year, in kg, liters, or number of tanks of a given size.
3. What do you use gas for (cooking, water heating, space heating, or all three)?
4. Do you have an outside BBQ using LPG? If so, how many times per month do you use it? Do you have more than 1 tank? Are the tanks tethered?
5. Do you have an outside BBQ using wood or charcoal? If so, how many times per month do you use it, and how much fuel do you use per month?
6. Do you have an emergency generator? If so, how big is the generator (Watts or kilowatts), what fuel does it use (probably mostly gasoline), and what size of fuel tank do you keep to fuel it (liters or gallons)?
7. Do you have a solar PV system? If so, do you know its capacity (kW)? Do you have a battery connected to the PV system?
8. Do you have a solar water heater?
9. Do you have a swimming pool? If so, is it heated? Do you use electricity, gas, or solar to heat it?
10. How many cars/SUVs/utility vehicles does your household have in total?
11. How many kilometers do you drive in the average month or year (average over the cars in your household, or monthly or annual fuel costs)?
12. What fraction of your fuel purchases are made outside of Evans Head?
13. Do you own a boat with a diesel or petrol motor? If so, what is the horsepower of the engine, and how many hours per month or per year do you typically use the motor?

NEXT STEPS

- **Modify draft survey/audit questions** as needed for each sector
- **EARN TEAM LORIKEET: Carry out surveys/audits/interviews** with businesses, officials, and others who can help us to understand how energy is used in Evans Area and what end-uses and fuel supplies will be critical for disaster recovery, especially food chain, medical services.
- **Compile responses to surveys**, and use them to update the existing initial draft energy sector analysis for Evans Area
- Work with the team to identify and evaluate the **implications of "disaster scenarios"** for the Evans Area energy system
- Use the revised energy sector analysis and scenario results as tools to help plan **disaster energy resilience measures**
- **Map and define hubs** (Bowlo, RSL, School, Camp Koinonia, Coop) and functions

EARN 2025 ENERGY GATHERINGS

Gathering One **Focus: Local blackouts – Background Briefing** **Thursday 10 April: 5:00 – 6:30** **Club Evans Memorial Room** • Explore learnings + experiences related to Evans Area blackouts • Develop a deeper understanding of our energy vulnerabilities and resilience opportunities	**Gathering Two** **Focus: Energy Audits, Goals + Blackout Plans** **Thursday 24 July: 5:00 – 6:30** **Club Evans Memorial Room** • Figure out household energy needs and energy goals • Share strategies and tools to be more resilient during blackouts
Gathering Three **Focus: Solar Panels + Batteries to fit your needs** **Thursday 18 September: 5:00 – 6:30** **Club Evans Memorial Room** • Explore options for households and/or small business: solar panels + batteries • Share strategies and tools to more towards renewable energy for households	**Gathering Four (tbc)** **Focus: Evans Head Energy Supply + Demand Study Results** **Thursday 16 October** **Club Evans Memorial Room** • EARN Energy Taskforce study results • Ideas for disaster scenario + community energy prep (2026)

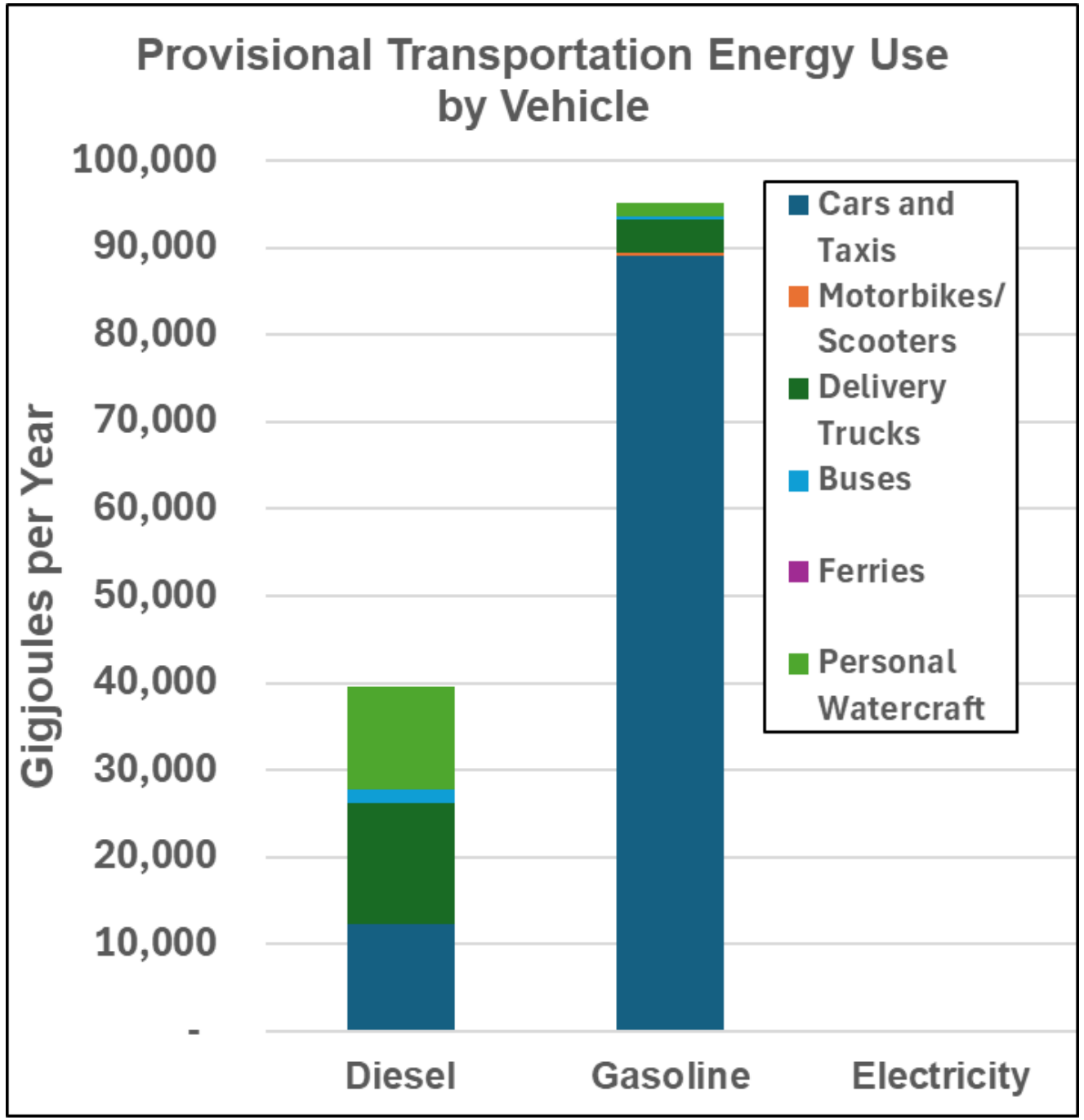
ADDITIONAL SLIDES NOT USED

Part 1:
EARN Team Lorikeet-- Additional Slides On Research Questions and Survey

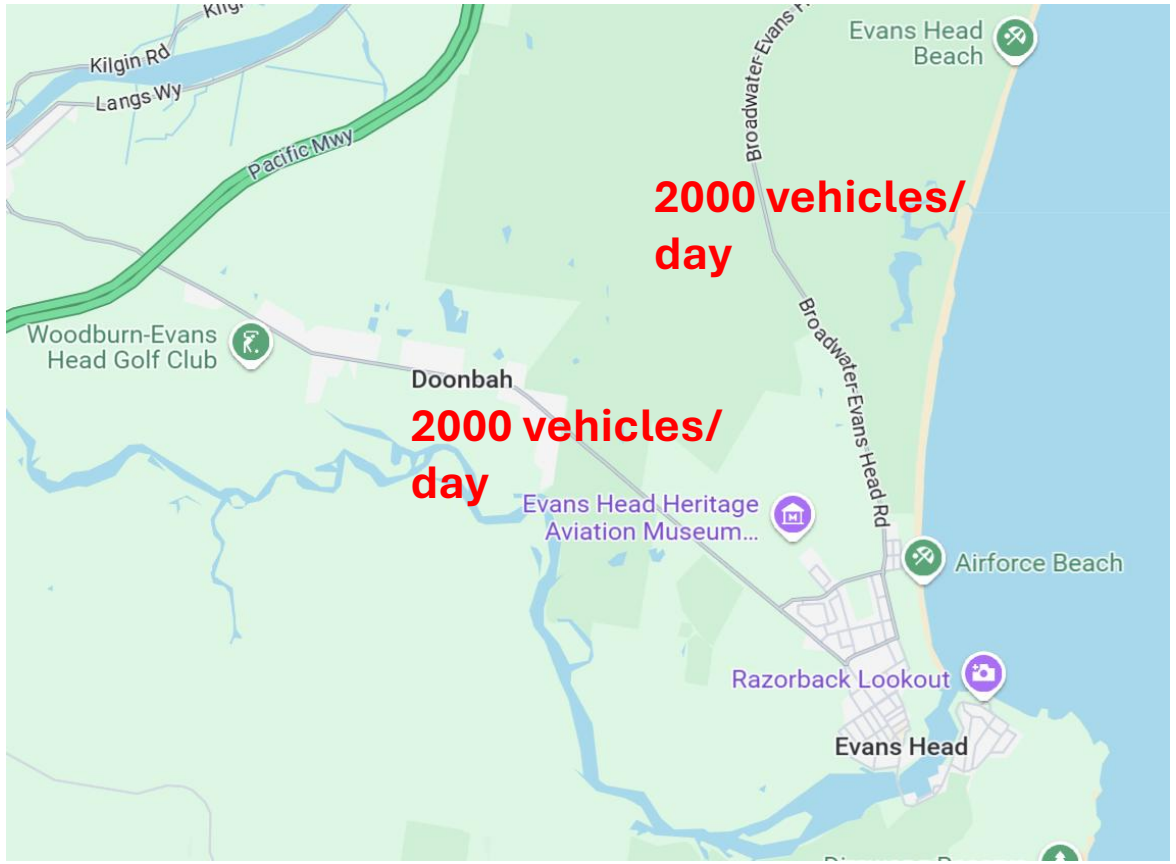
REFERENCE CASE ENERGY DEMAND SUMMARY (GJ/YR), TRANSPORTATION USE BY VEHICLE TYPE

VEHICLE TYPE	Diesel	Gasoline	Electricity	TOTAL
Cars and Taxis	12,340	89,045	89	**202,860**
Motorbikes/Scooters	-	391	1	**783**
Delivery Trucks	13,965	3,867	-	**35,665**
Buses	1,503	214	-	**3,433**
Ferries	-	-	-	**-**
Personal Watercraft	11,732	1,653	-	**26,770**
TOTAL TRANSPORTATION	**39,540**	**95,171**	**90**	**269,511**

Note: 1GJ is ~ energy content of 26 liters of gasoline so 269511 GJ is about 5000 T of gasoline at 0.7 specific gravity


Provisional Transportation Energy Use by Vehicle
Gigjoules per Year
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
Diesel
Gasoline
Electricity
Cars and Taxis
Motorbikes/ Scooters
Delivery Trucks
Buses
Ferries
Personal Watercraft

Daily vehicle use on Woodburn and foreshore roads drive transport fuel use within 2473



Transport fuels does not include vehicle use outside of 2473
Eg Ballina buses depoted at industrial estate

Transport fuels: external supply chain vs local scarcity (eg floods)

LEX 73875

Australian Government
Department of the Environment and Energy

NATIONAL LIQUID FUEL EMERGENCY RESPONSE PLAN:

POLICY MANUAL

what are australia's current fuel reserves

Answer | Sources 8

- **Gasoline**:
  - Importing: 27 days
  - Refining: 24 days 1 5
- **Diesel**:
  - Importing: 32 days
  - Refining: 20 days 1 5
- **Kerosene (Jet Fuel)**:
  - Importing: 27 days
  - Refining: 24 days 1 5

"Area" Sustainability Opportunity?
biofuel production on sugar cane land?

ASPI AUSTRALIAN STRATEGIC POLICY INSTITUTE THE STRATEGIST

Australia should grow its own fuel

18 Mar 2024 | Tyson Sara (https://www.aspistrategist.org.au/author/tyson-sara/)
North of 26° south (/dinkus/north-of-26-south/)

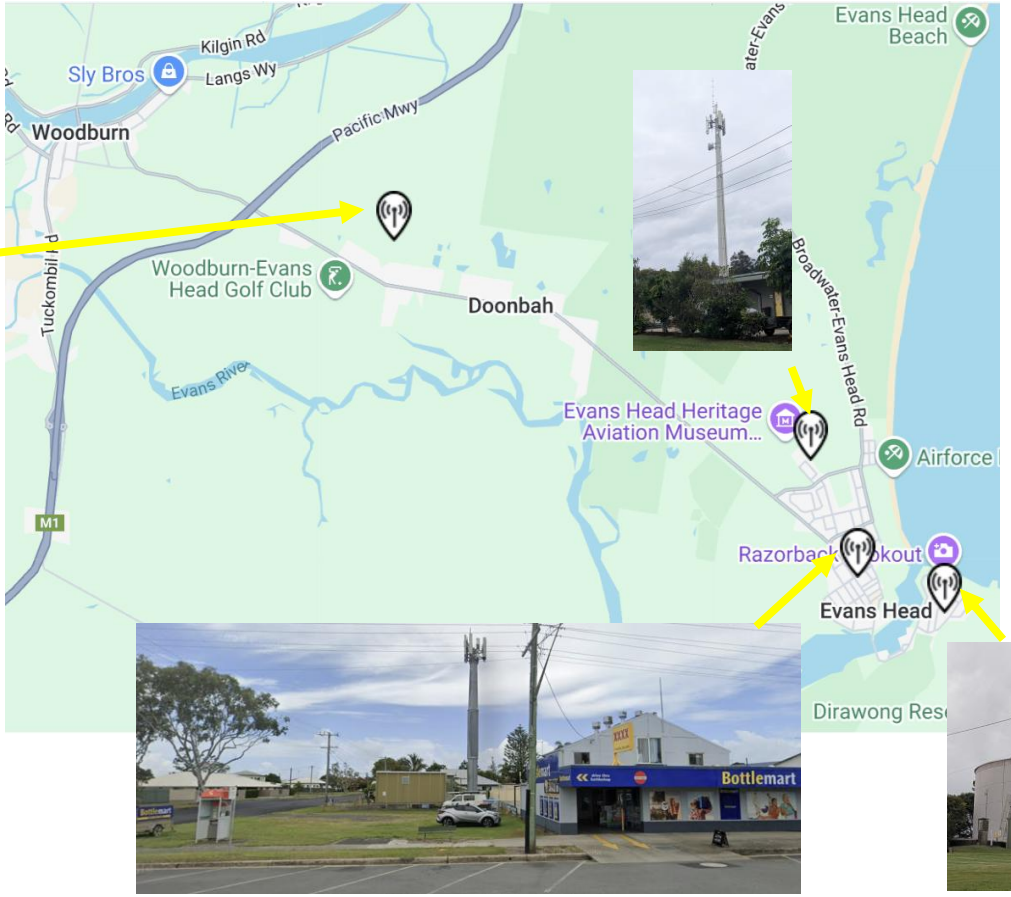
Australia really does run on the smell of an oily rag. Our fuel reserves are pitifully low by international standards, and we produce very little fuel domestically. This is a risk, both strategically and economically. But it also presents an opportunity we should grasp.

Servo: critical supply node for backup gennys

Initial Estimate of Energy Use for Communications in EH

- Assume about 3300 cell phone users (off-season residents)
- Assume 7 cell phone towers (may need to revise downward), 95% of energy from electricity, 5% from diesel
- Assume 5 satellite receivers
- Electricity use by cell phones: ~18 MWh/yr
- Electricity use for cell phone towers: ~166 MWh/yr
- Diesel use for cell phone towers: ~5000 liters/yr (to be confirmed)
- Electricity use by satellite receivers: ~1.8 MWh/yr
- Placeholder “other key communications systems: ~9.5 MWh/yr and ~300 liters diesel

Wireless Evans Head



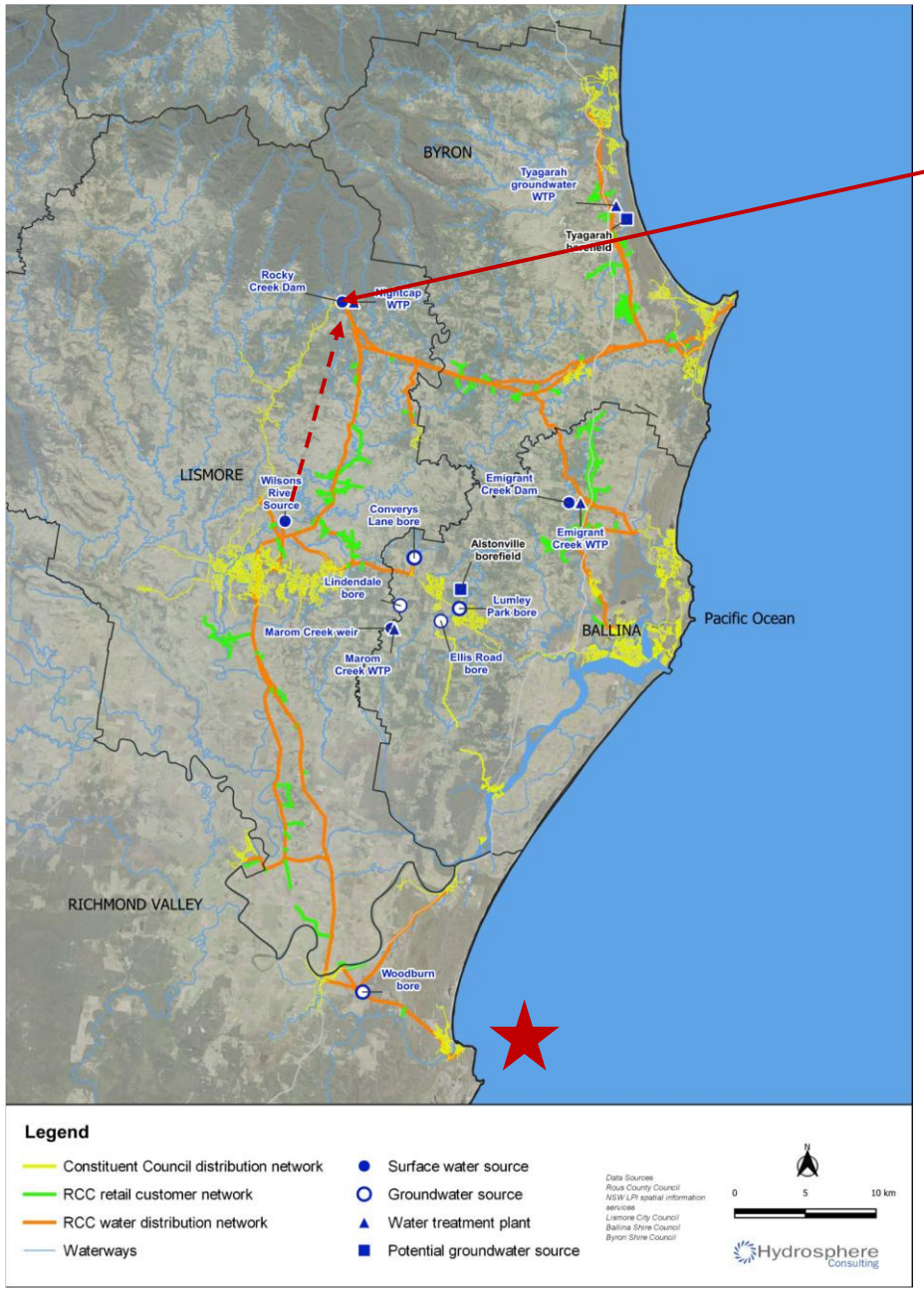
2473001	52 Woodburn Street EVANS HEAD NSW 2473 Telstra 3G 4GX 5G
2473002 C	Council Water Reservoir Wirraway Avenue EVANS HEAD NSW 2473 Optus 3G 4G+
2473003	355 Woodburn Evans Head Road DOONBAH NSW 2473 Optus 3G 4G 5G
2473004	3-5 Canberra Road EVANS HEAD NSW 2473 Optus Other 3G 4G+

No NBN on these towers and phone booth

Key questions: backup batteries? Generators? Mobile towers? Satellite comms in EH? NBN network, nodes, power requirements to operate, does Telstra share Optus?

Source: https://www.rfnsa.com.au

EVANS AREA WATER SUPPLY



Hydrosphere Consulting (2021) Rous Regional Supply: Future Water Project 2060, Integrated Water Cycle Management Strategy, July 2021.

Bottom end of the distribution from Nightcap WTP, and shared with Ocean Shores, Byron, Ballina and Lismore

- ~70% from Rocky Ck Dam (RCD)
- ~30% pumped up from Wilson River
- Gravity fed (>200m head), distribution system
- Woodburn bore only used as an emergency supply (when RCD<60% - i.e. rarely)

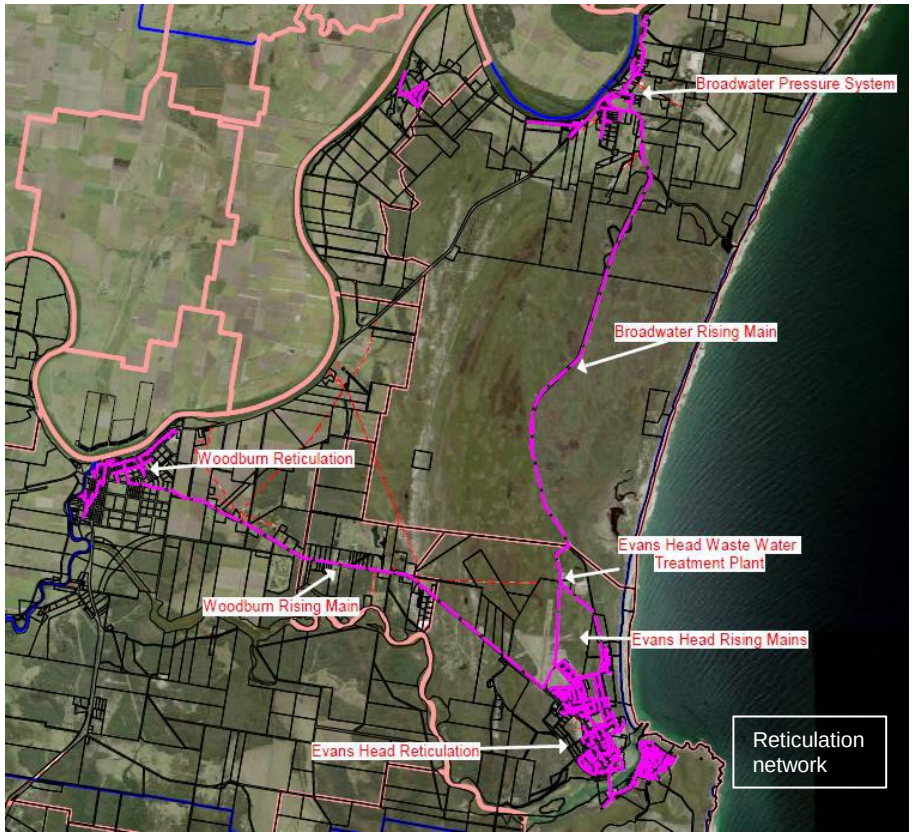
Initial energy considerations:

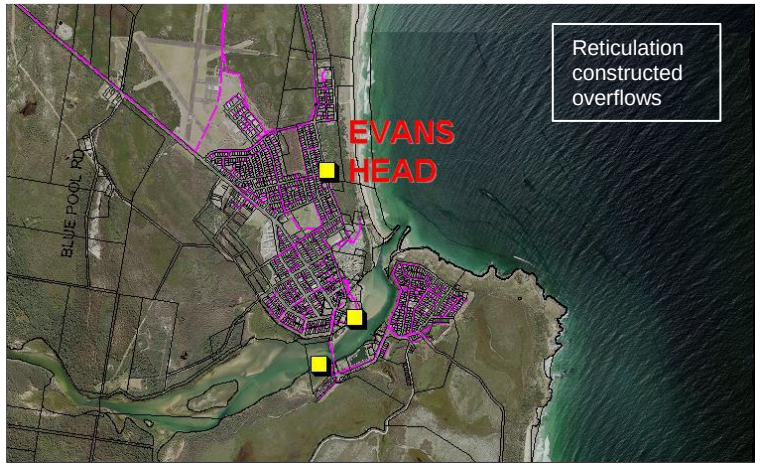
- Estimated Evans annual water demand (2,907 people @ ~120 kL/yr) = ~350ML
- Estimated energy demand for treatment (~0.45KWh/KL) = 430 kWh/day
- Nightcap WTP – 2 backup generators (700kva and 400kva) and 13-14,000l diesel
- Additional chlorination at Woodburn WTP

Still to determine:

- Energy needs to supply Sth Evans reservoirs and arrangements during power outage (RVC)
- Number of days of storage during outage
- Energy needs for pumping and treatment from Woodburn bore-field during drought (expected to be minor)
- ??

EVANS AREA WASTEWATER





RVC (2018) Evans Head STP pollution incident response management plan

Evans Head STP (sewage treatment plant)

- Also treats waste from Woodburn and Broadwater
- 9 pumping stations (4 more at Woodburn; ? at Broadwater)

Initial energy considerations:

- Average STP load = 1,876 kL/day
- Estimated energy use for treatment (using industry benchmarks)
  - 1,876 kL/day @ ~0.6 kWh/kL = 1,126 kWh/day
  - 4,260EP @ 45 kWh/EP/year = 525 kWh/day

Still to determine:

- Actual energy use at STP (RVC)
- Energy use by pumping stations
- Emergency generators for pumping stations
- Number of households with pressure sewage systems (? @ ~200W/day). How many days of storage during outage?

Additional considerations:

- Water quality & health issues from overflows during power outages

Part 1:
EARN Team Lorikeet-- Additional Slides On Research Questions and Survey

KEY POWER SECTOR QUESTIONS

We have not fully interrogated this data set yet, but we can already pose some key "supply side" power sector questions until we are ready to also examine the demand side.

1. **Outages:** how many outages occur per year, of what length; are the outages the result of failure on the feeder lines, at local substations such as Woodburn, or further upstream? Are the two feeder lines connected/connectable if one of them goes down but the other is working? What is the cost of not having power to households and businesses during outages?
2. **What is the fuel type on average** used to generate electrons that reach EH over the national grid, and therefore, the GHG emissions related thereto?
3. **How much PV** is already in place? How many **solar batteries**?
4. **How many local backup generators** exist?
5. **Is the servo a key common supply node** and possible common mode failure for big gennys
6. **Peak Season**: Households and commercial users dominate power use. We need to confirm that the influx of holiday makers does not have much seasonal impact on peak demand.
7. **How are buildings insulated**?
8. **Why is solar thermal hot water heating** not in widespread use?
9. **Why are there so few shade trees**?

Information Needed to Refine Initial Energy Use Estimates for Evans Area

- Need to revise or confirm residential energy use estimates, electricity and LPG, the latter particularly for use for cooking if electricity is out
- Need to assemble better data on commercial/services/institutional sector routine energy use and priorities in a disaster setting, including by type of business/organization
- Need better estimates of typical vehicle travel and energy use in EH, including distance, types of cars (if different from NSW average), typical sources of fuel if outside EH; also need information on ownership of/fuel use in boats
- Need estimates on presence/absence of emergency generators (residential/commercial/etc.), fuel tanks/fuel reserves
- Need better understanding of communications infrastructure and energy needs
- Need better information on emergency services energy needs
- Need better information on water supply/treatment impacts if pumps are down

GENERAL EVANS HEAD COMMUNITY INFORMATION NEEDED

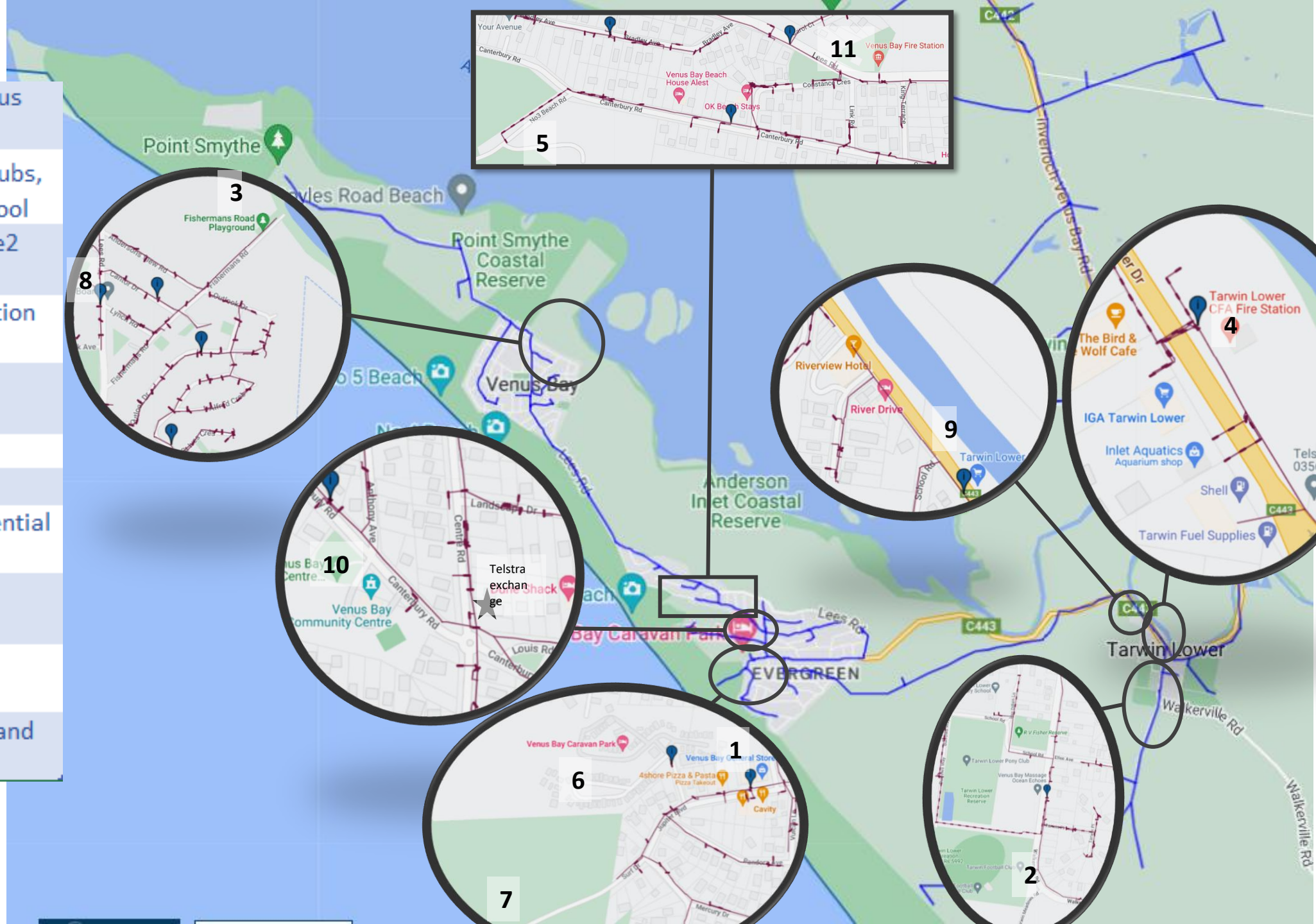
1. **Confirmation/update of number of non-transient households** (occupied homes) currently in use (we have an estimate of 1642, is derived from the 2021 Census), with indication as to whether number is on a postcode basis
2. **Average percentage occupied of caravan park spaces and "units"** (permanent tents and cottages) during the "Tourist Season", assumed to be December through March, and in the "Off-season", April through November
3. **Average electricity use (kWh or expenditures) per caravan** per day or month when occupied.
4. **Number of commercial fishing boats**, typical monthly use of fuel by fishing boats, and size of boat fuel tank.
5. **Information on energy use by medical emergency services organizations** (in buildings, vehicles, and for other uses).
6. **Inventory of communications systems** in use in Evans Head and monthly or annual energy use for same.
7. **Typical water requirements** per month or year in Evans Head, and volume of wastewater sent to treatment per month.
8. **Cross-linkage of North-South feeders**: Can all Evans Head households and businesses be fed from either or both of the Essential Energy feeders coming into the town?

Summary Request for Community Energy Use Data:
COMMERCIAL/SERVICES/ INSTITUTIONAL AND ASSOCIATED TRANSPORTATION SECTORS

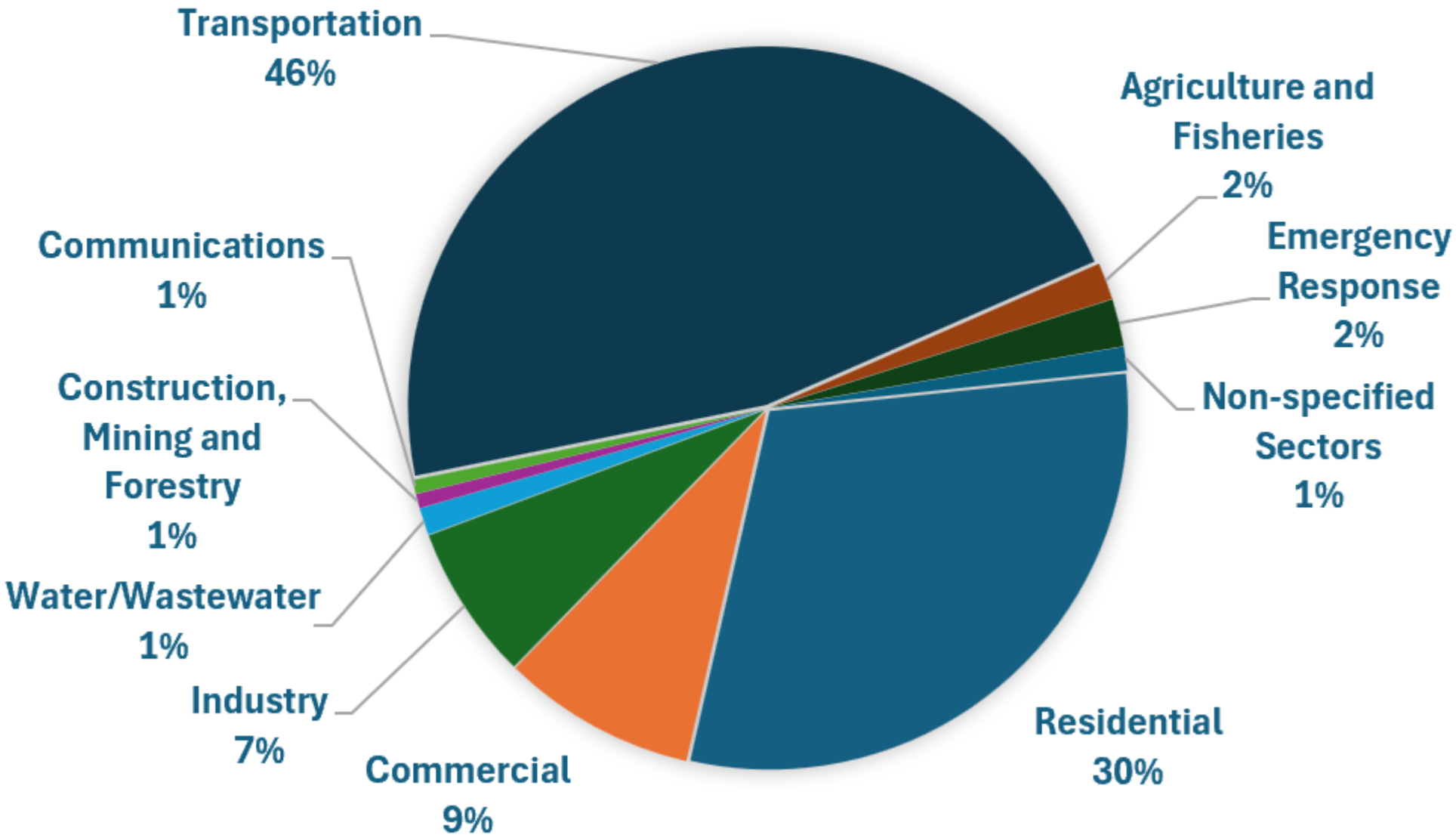
1. Please provide copies of electricity bills for a year if possible, or for representative months during December through March, and in April through November.
2. What is the floorspace (square meters) of your business or organization?
3. What does your business or organization do?
4. What do you use electricity for? Lighting, space heat, water heat, cooking, cooling, refrigeration, other uses?
5. Which appliances or equipment would be crucial for your business/organization to keep running in the event of a disaster?
6. Does your building have gas water heat, cooking, and/or space heat? Approximately how much gas does your building use per month or per year (kg or liters, or provide a representative bill)? What size is your gas (LPG) tank (liters or kg)?
7. Do you use wood or charcoal for cooking? If so, about how much do you use per month or per year (kg)?
8. Do you have an emergency generator? If so, how big is the generator (Watts or kilowatts), what fuel does it use (LPG, gasoline or diesel), and what size of fuel tank do you keep to fuel it (liters or gallons)?
9. Do you have a solar PV system? If so, do you know its capacity (kW)? Do you have a battery system connected to the PV system?
10. Do you have a solar water heater?
11. Do you use a vehicle for your business or organization? If so, how many, and what kinds (cars, SUVs, utility vehicles, larger trucks, vans, buses)? How many kilometers do the vehicles travel, on average, in a month or year, or how much does it cost to fuel the vehicle over a month or year?
12. What fraction of your transportation fuel purchases are made outside of Evans Head?

Key

1	General store and Venus Bay shops
2	Recreation Reserve, clubs, Health Centre and School
3	Fishing club and Estate2 residential
4	Petrol station, Fire Station and IGA (plus shops)
5	Telstra tower and residential
6	Caravan Park
7	Surf club
8	Second possible residential cluster (Estate2)
9	Motel and pub, Tarwin Lower
10	Venus Bay Community Centre and residential
11	Mens Shed, CFA shed and residential

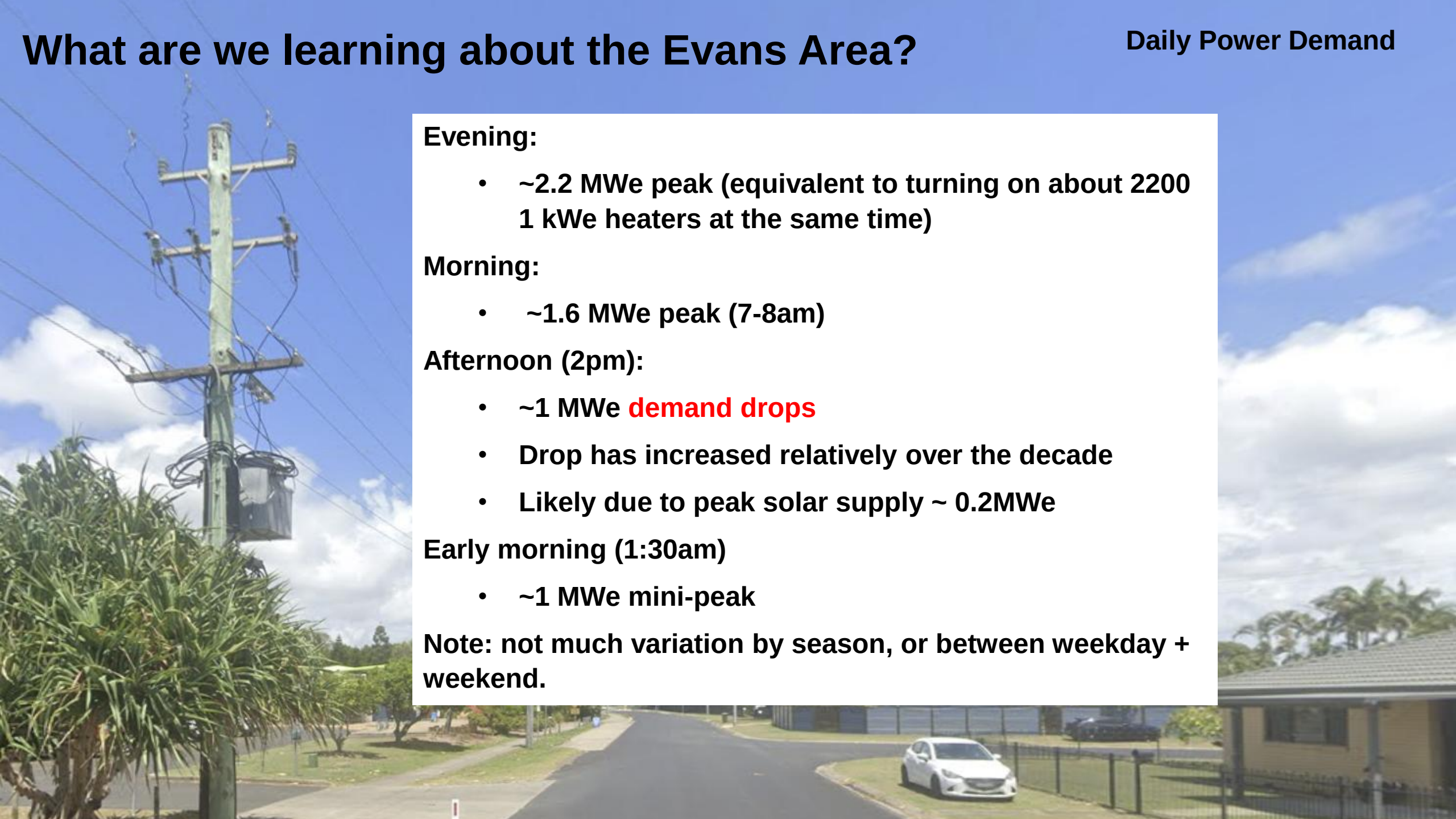


TOTAL GHG EMISSIONS BY SECTOR: REFERENCE



What are we learning about the Evans Area?

Daily Power Demand



Evening:

- **~2.2 MWe peak (equivalent to turning on about 2200 1 kWe heaters at the same time)**

Morning:

- **~1.6 MWe peak (7-8am)**

Afternoon (2pm):

- **~1 MWe demand drops**
- **Drop has increased relatively over the decade**
- **Likely due to peak solar supply ~ 0.2MWe**

Early morning (1:30am)

- **~1 MWe mini-peak**

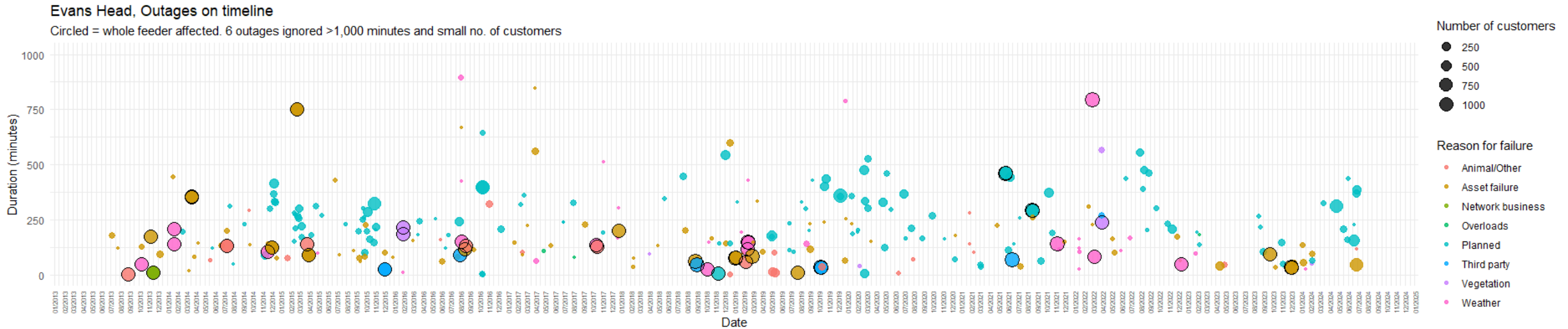
Note: not much variation by season, or between weekday + weekend.

Use the reference table below to figure out daily energy consumption

Appliance	Peak Power Demand (W)	Estimated Operating Time Per Day (hours)	Energy Consumption Per Day (kWh)
LED light bulb	5	5	0.025
Mobile phone charger	15	3	0.045
Portable camping fridge/freezer: 108L	50	8	0.4
CPAP medical device	75	8	0.6
Septic system aerator	120	24	2.88
Sump pump	600	2	1.2
Domestic pressure pump	850	2	1.7
Induction stove	1200	2	2.4
Household refrigerator: 380L	280	8	2.24
Fan heater	2400	4	9.6
Large split-system air conditioner	3600	4	14.4

Table 1: Peak power demand and 24-hour energy requirement of various common appliances.

(Source: One Stop Off the Grid)


Evans Head, Outages on timeline
Circled = whole feeder affected. 6 outages ignored >1,000 minutes and small no. of customers
Duration (minutes)
1000
750
500
250
0
Date
Number of customers
250
500
750
1000
Reason for failure
Animal/Other
Asset failure
Network business
Overloads
Planned
Third party
Vegetation
Weather