CLIMATE-AMPLIFIED DISASTER EMERGENCY ENERGY RESPONSE

Application of a Calculational Tool

Evans Head Community, NSW

EARN Climate-Amplified Disaster Energy Task Force

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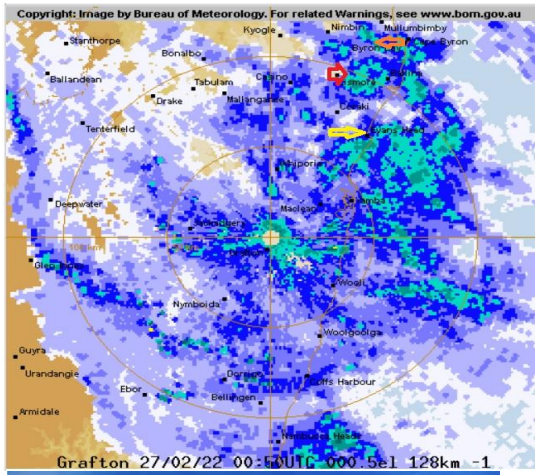
NAUTILUS INSTITUTE

EVANS AREA RESILIENCE NETWORK

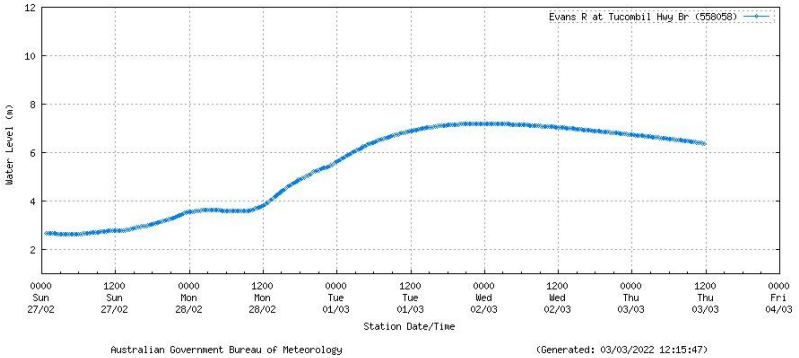
C4CE COALITION FOR COMMUNITY ENERGY

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

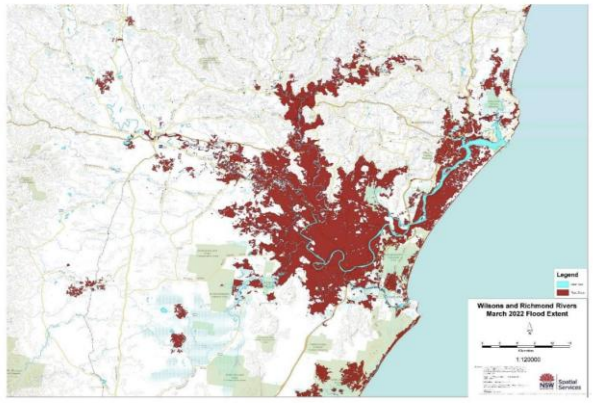
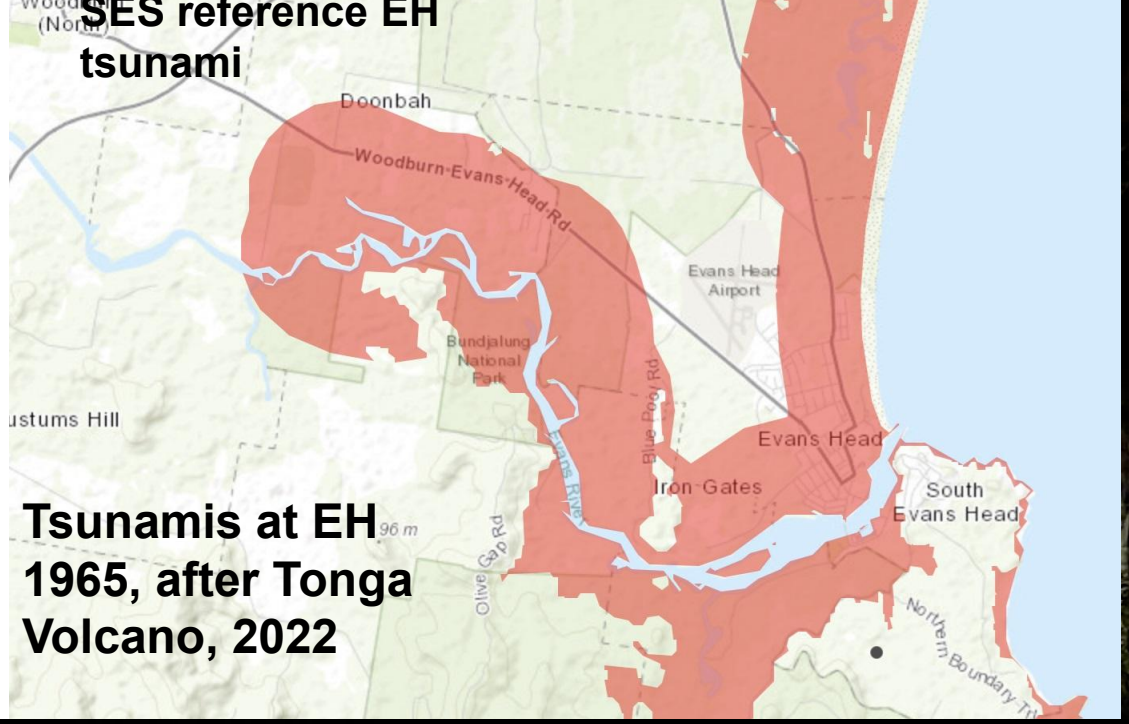
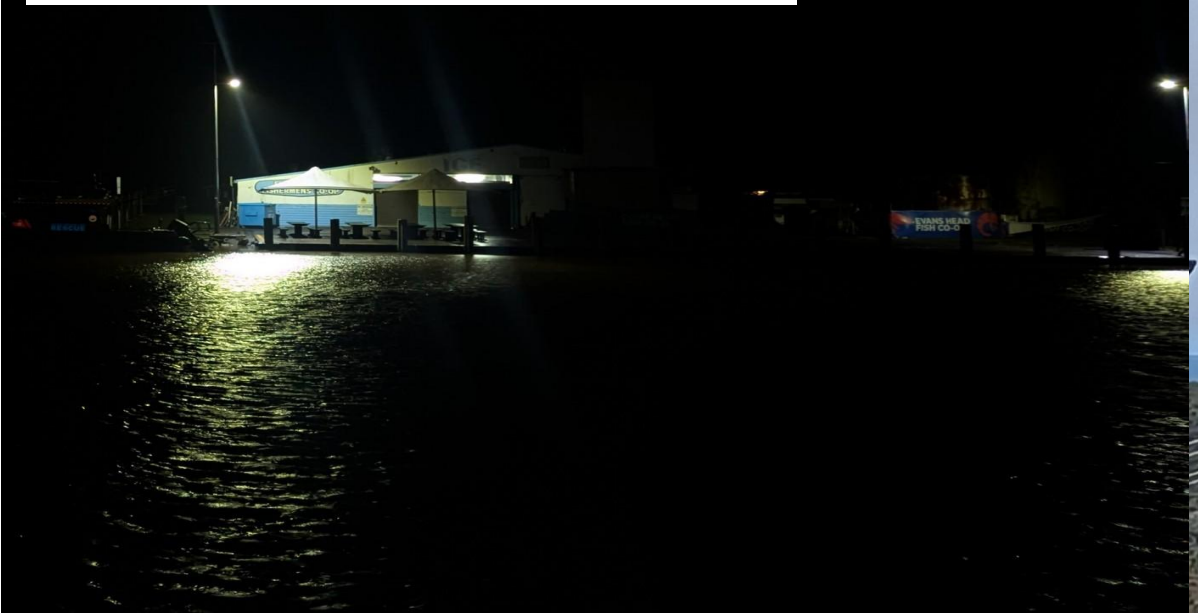


Figure 6. Wilsons and Richmond River region March 2022 flood inundation areas (source: NSW Spatial Services 2022)



Bushfire 2023

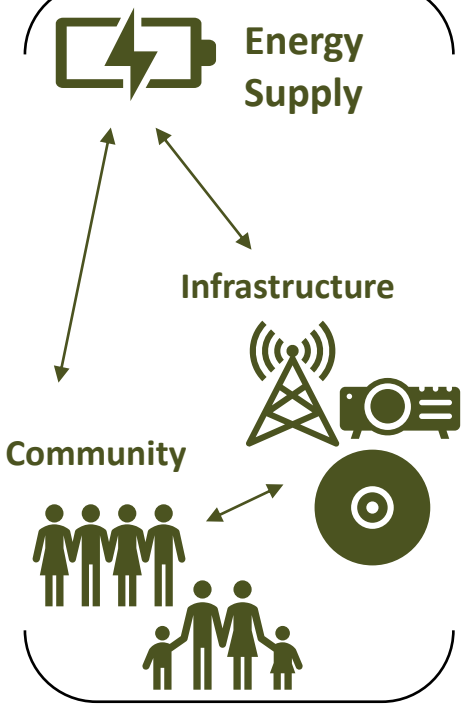
Storm surge 40cm Cyclone Alfred



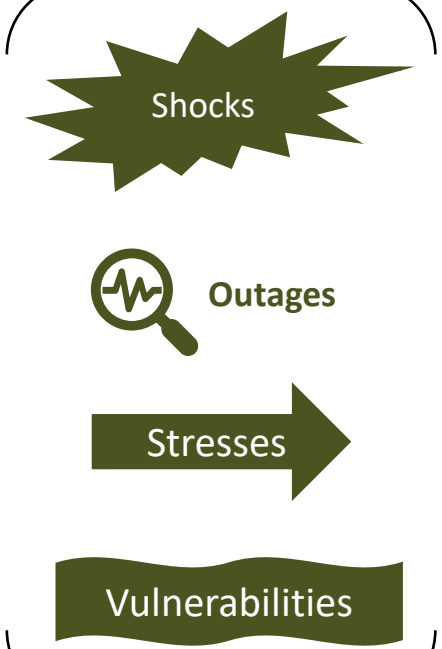
Resilience Framework

COMMUNITY ENERGY for Venus Bay?

1. Resilience of what?



2. Disturbances - Resilience to what?

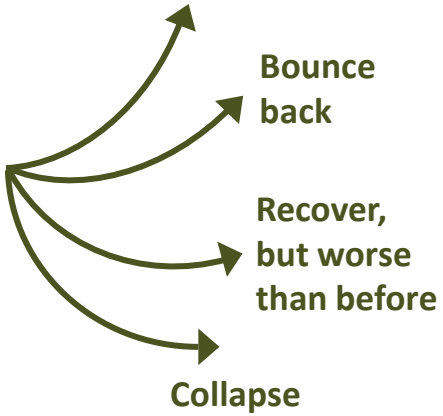


3. Capacity to deal with disturbance

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

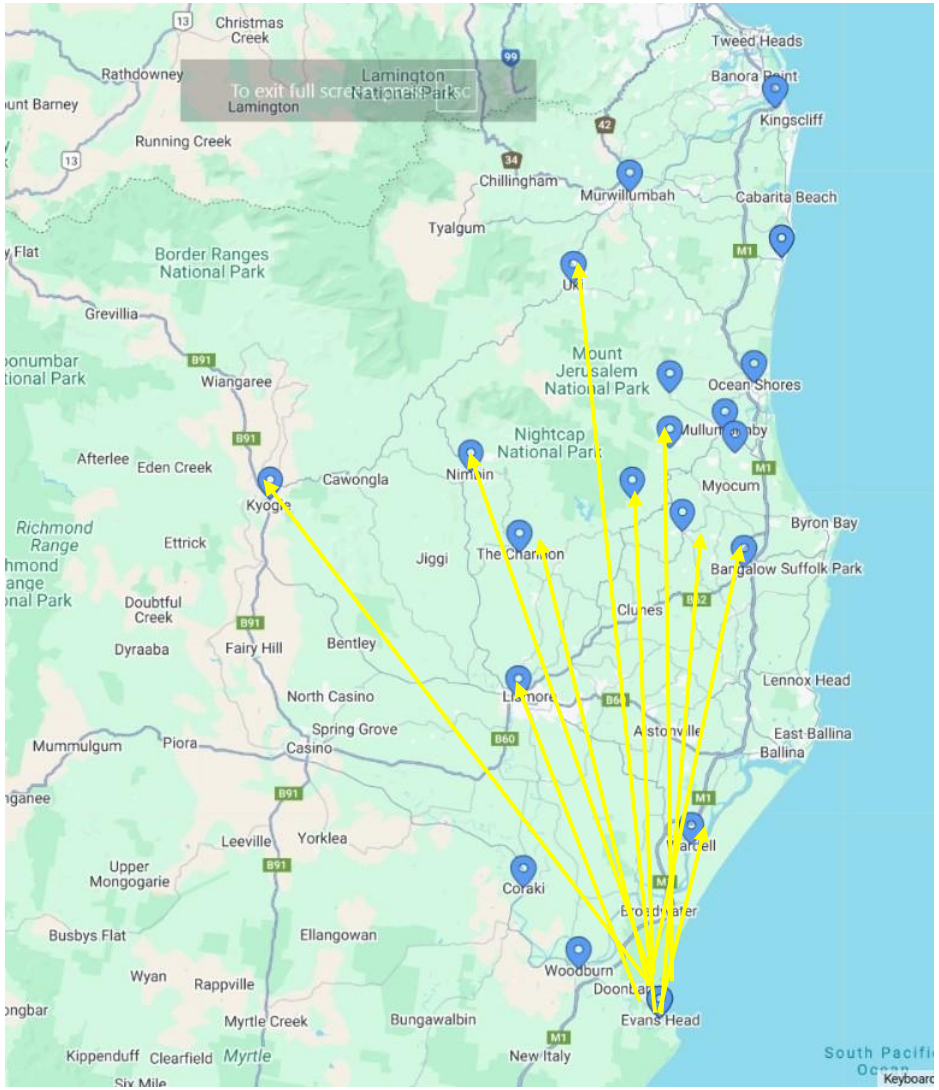
Bounce Back = Preparation, monitoring, responding

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

Collapse = fundamentally changed by the event/s

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

March 2026 On-line EARN Workshop

What is the Evans Area?

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

Australian Bureau of Statistics

Statistics | Census | Participating in a survey | About

Home › Census › Find Census data › Search Census data › 2021 2473, NSW, Census All persons QuickStats

Print

Latest release

2473, NSW

2021 Census All persons QuickStats

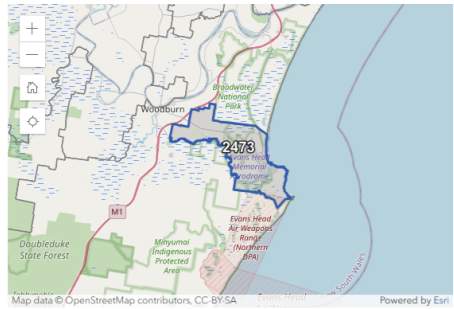
Geography type Postal Areas
Area code POA2473

People	**3,203**
Male	48.6%
Female	51.4%
Median age	54
Families	**885**
Average number of children per family	
for families with children	1.8
for all households (a)	0.5
All private dwellings	**1,938**
Average number of people per household	2.1
Median weekly household income	$1,058
Median monthly mortgage repayments	$1,601
Median weekly rent (b)	$320
Average number of motor vehicles per dwelling	1.6

(a) This label has been updated to more accurately reflect the Census concept shown in this data item. The data has not changed.
(b) For 2021, median weekly rent calculations exclude dwellings being occupied rent-free.

Search all persons QuickStats for another area

2021 | Enter a location, postcode or geography



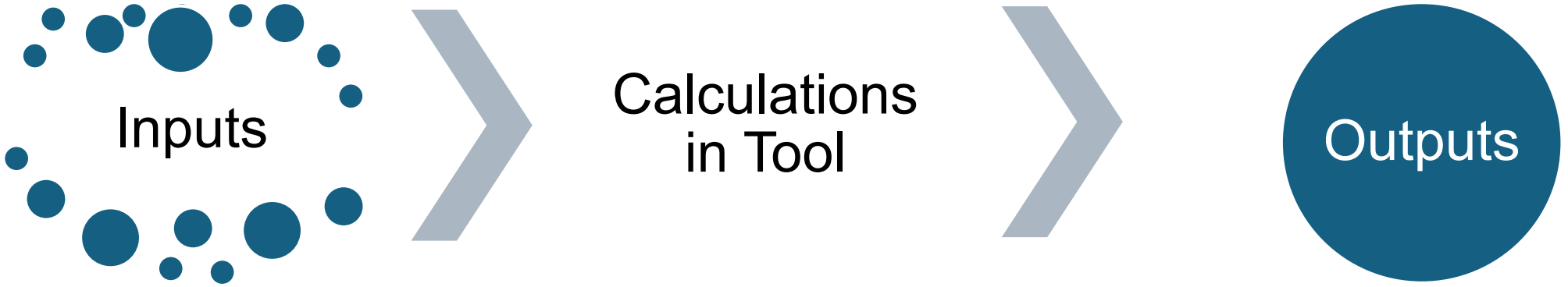
Other 2021 Census products available for this area:
- Community Profiles

To view more QuickStats or Community Profiles for a different area, see Search Census data.

Small random changes have been made to all cell values for privacy reasons. These changes may cause the sum of rows or columns to differ by small amounts from the table totals.

People and population

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

- 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

- 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 ther
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 - >		

Calculation Tool 2: Local Breakdown Tool

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			
Gas Hot Water	38% of total					
LPG Hot Water	3.7% of total			2,929		

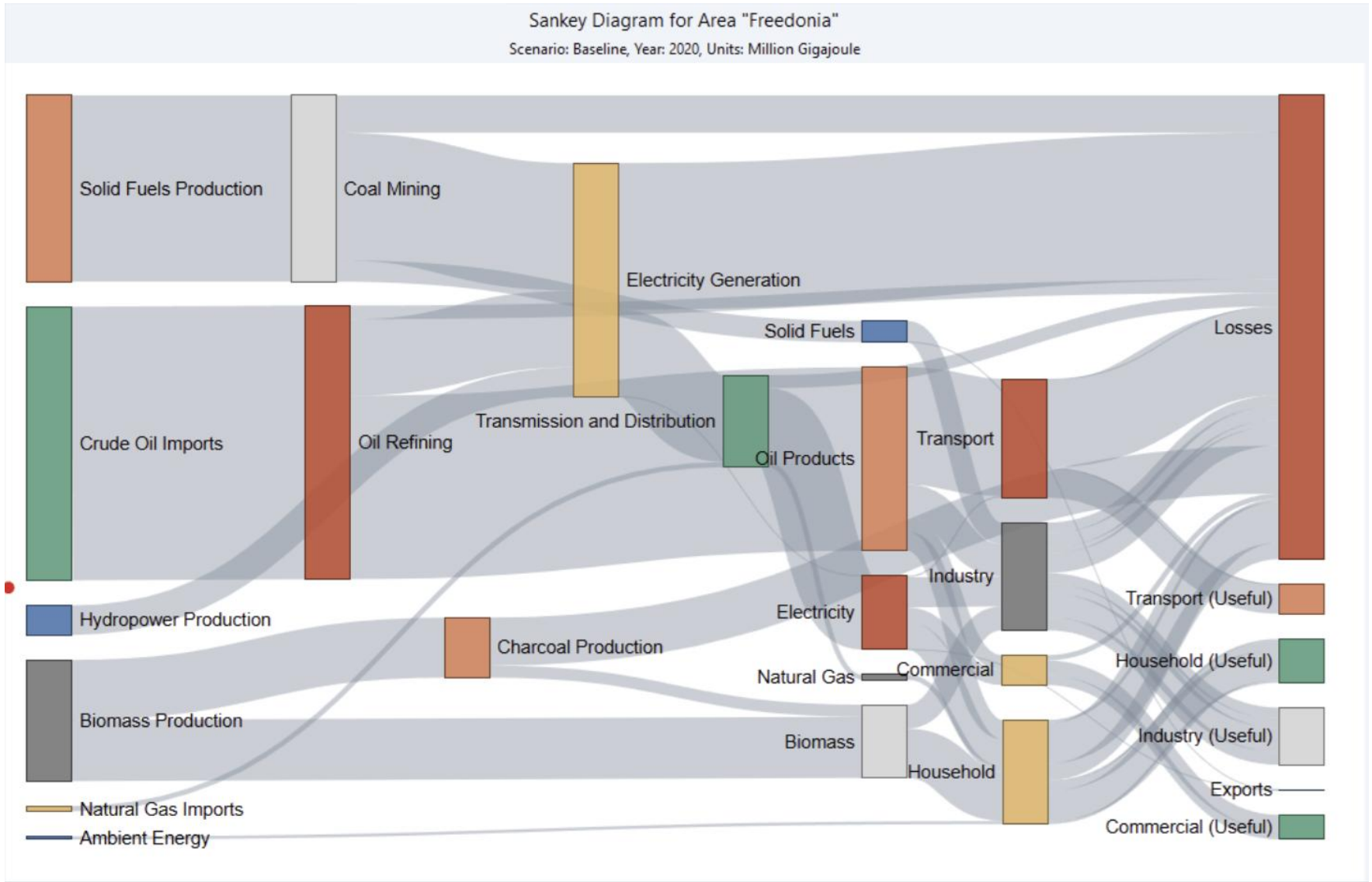
Breakdown: 75% Large, 16% Small, 2% Heat Pump, 6% Solar.
Breakdown: 63% Instant, 36% Storage, 1% Solar.
Breakdown: 67% Instant, 33% Storage, 1% Solar.

How did we learn this?

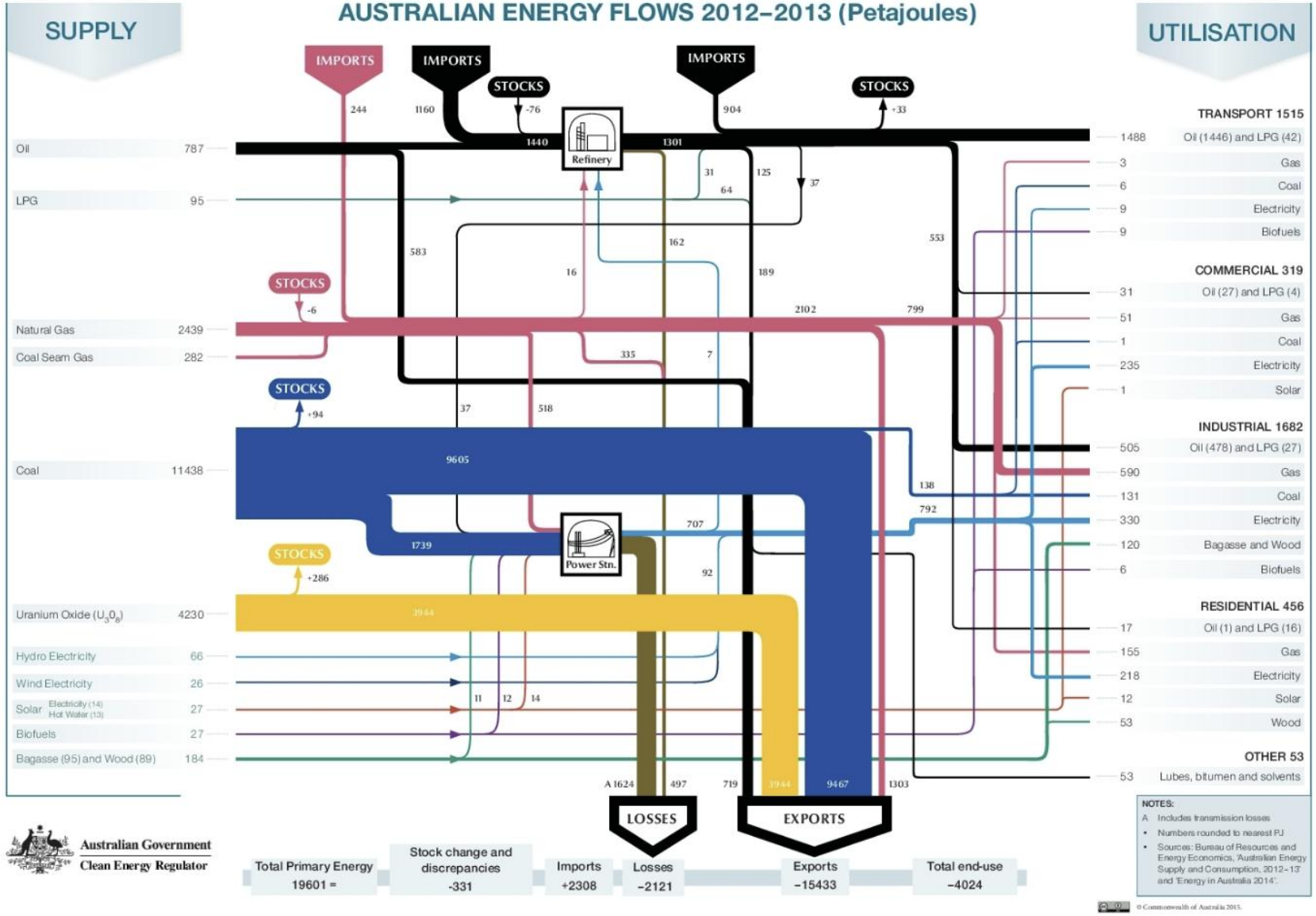
Benefit of future refined tool:

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

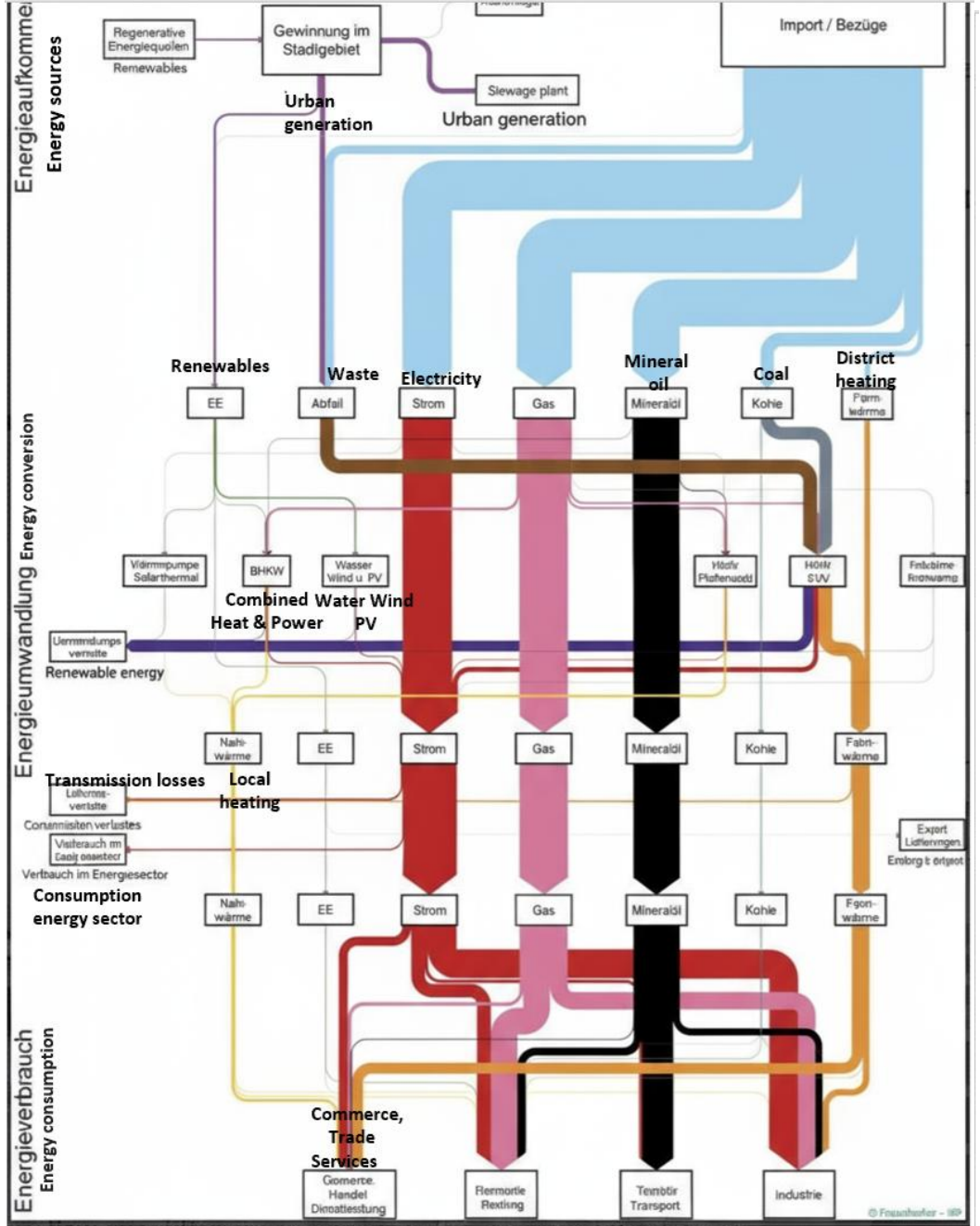
ENERGY FLOWS IN AN ECONOMY AT ANY SCALE ("SANKEY DIAGRAM")
(Read left to right)



SANKEY ENERGY FLOWS NATIONAL SCALE



SANKEY ENERGY FLOWS CITY SCALE STUTTGART



Stuttgart city eitergy flows, Sankey diagram by IBP Fraunhofer. Source: https://www.ibp.fraunhofer.de/de/Kompetenzen/energieeffizienz-und-raumklima/projekte/eer-projektdarstellungen/see---energiebilanz-stuttgart.html

CADEER
Calculational Tool
Sankey Flows in Tabular form:
Supply-Demand Balance (Evans Head)

Different balances for:

- **Annual average** use
- **Tourist season day**
- **Off-season day**
- Annual and daily balances for **disaster relief and recovery periods**

Other Results:

- **GHGs**
- **Costs**
- **Load Curves**

SUPPLY

Columns: Fuel and energy types used in area, including fuels used locally to produce end-use fuels

ROWS

Primary energy supply, secondary energy supply

Demand sectors & subsectors

Annual Energy Balance
Units: Gigajoules

Balance Category		Petroleum Products	Diesel	Gasoline	Kerosene	LPG/ Propane	Coal	Natural Gas	Biomass Fuels	Charcoal	Other Biomass	Wood	Wind, Solar, Hydro	Heat	Electricity	Total
	Local Production	-	-	-	-	-	-	-	-	-	-	-	14,790	-	-	14,790
	Imports	154,781	51,060	96,629	-	7,092	-	-	71	71	-	-	-	-	-	154,852
	Local Storage	-	-	-	-	-	-	-	-		-	-	-	-	-	-
	Exports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Primary Supply		154,781	51,060	96,629	-	7,092	-	-	71	71	-	-	14,790	-	-	169,642
	Electricity Generation	-	-	-	-	-	-	-	-	-	-	-	(14,790)	-	14,790	-
	Emergency Generation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	District Heat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Charcoal Manufacture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Powerlines and Pipelines	-	-	-	-	-	-	-	-	-	-	-	-	-	47,006	47,006
	Distribution Losses	-	-	-	-	-	-	-	-	-	-	-	-	-	(2,350)	(2,350)
Total Local Secondary Supply		-	-	-	-	-	-	-	-	-	-	-	(14,790)	-	59,445	44,655
Residential		1,710	-	-	-	1,710	-	-	71	71	-	-	-	-	37,857	39,638
	Space Heating	442	-	-	-	442	-	-	-	-	-	-	-	-	4,369	4,811
	Water Heating	614	-	-	-	614	-	-	-	-	-	-	-	-	11,437	12,051
	Space Cooling	-	-	-	-	-	-	-	-	-	-	-	-	-	2,210	2,210
	Cooking	654	-	-	-	654	-	-	71	71	-	-	-	-	3,869	4,595
	Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	2,311	2,311
	Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-	4,475	4,475
	Other Energy Use	-	-	-	-	-	-	-	-	-	-	-	-	-	9,186	9,186
Commercial		80	-	-	-	80	-	-	-	-	-	-	-	-	11,147	11,227
	Space Heating	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Water Heating	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Space Cooling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cooking	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other Energy Use	80	-	-	-	80	-	-	-	-	-	-	-	-	11,147	11,227
Industry		5,499	225	-	-	5,274	-	-	-	-	-	-	-	-	6,650	12,150
	All Light Industrial	35	-	-	-	35	-	-	-	-	-	-	-	-	2,451	2,486
	[Facility 2]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	[Facility 3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	[Facility 4]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	[Facility 5]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other Industries	5,464	225	-	-	5,239	-	-	-	-	-	-	-	-	4,199	9,663
Water/Wastewater		-	-	-	-	-	-	-	-	-	-	-	-	-	1,568	1,568
	Water Supply	-	-	-	-	-	-	-	-	-	-	-	-	-	607	607
	Wastewater Treatment	-	-	-	-	-	-	-	-	-	-	-	-	-	961	961
Construction, Mining and Forestry		1,834	1,778	56	-	-	-	-	-	-	-	-	-	-	-	1,834
	Construction	1,834	1,778	56	-	-	-	-	-	-	-	-	-	-	-	1,834
	Mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Forestry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Communications		222	222	-	-	-	-	-	-	-	-	-	-	-	704	926
	Cellular Phones	-	-	-	-	-	-	-	-	-	-	-	-	-	66	66
	Infrastructure	222	222	-	-	-	-	-	-	-	-	-	-	-	639	860
Transportation		134,711	39,540	95,171	-	-	-	-	-	-	-	-	-	-	90	134,800
	Cars and Taxis	101,385	12,340	89,045	-	-	-	-	-	-	-	-	-	-	89	101,475
	Motorbikes/Scooters	391	-	391	-	-	-	-	-	-	-	-	-	-	1	392
	Delivery Trucks	17,833	13,965	3,867	-	-	-	-	-	-	-	-	-	-	-	17,833
	Buses	1,716	1,503	214	-	-	-	-	-	-	-	-	-	-	-	1,716
	Ferries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Vessels	13,385	11,732	1,653	-	-	-	-	-	-	-	-	-	-	-	13,385
Agriculture and Fisheries		4,778	3,581	1,197	-	-	-	-	-	-	-	-	-	-	-	4,778
	Tractors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Agricultural Trucks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Other Agric Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Commercial Fishing Boats	3,503	3,503	-	-	-	-	-	-	-	-	-	-	-	-	3,503
	Small Fishing Boats	1,275	78	1,197	-	-	-	-	-	-	-	-	-	-	-	1,275
Emergency Response		5,949	5,714	207	-	28	-	-	-	-	-	-	-	-	61	6,010
	Ambulances	727	628	98	-	-	-	-	-	-	-	-	-	-	-	727
	Firefighting Vehicles	292	245	47	-	-	-	-	-	-	-	-	-	-	1	293
	Police Vehicles	491	462	30	-	-	-	-	-	-	-	-	-	-	-	491
	Coast Guard or Similar Vessels	4,411	4,379	31	-	-	-	-	-	-	-	-	-	-	-	4,411
	Portable Clinic	6	-	-	-	6	-	-	-	-	-	-	-	-	16	21
	Caravans/Refugees Housing	23	-	-	-	23	-	-	-	-	-	-	-	-	45	68
	[Other Emergency Response 1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	[Other Emergency Response 2]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-specified Sectors		-	-	-	-	-	-	-	-	-	-	-	-	-	1,367	1,367
	[Sector/End-use 1]	-	-	-	-	-	-	-	-	-	-	-	-	-	1,367	1,367
	[Sector/End-use 2]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	[Sector/End-use 3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Demand		154,782	51,061	96,630	-	7,092	-	-	71	71	-	-	-	-	59,445	214,299
Net Unmet Demand		1	1	1	-	0	-	-	-	-	-	-	-	-	0	1

Calculational Tool: CADEER , Example Community Information Input (Evans Head)

Estimating Climate-Amplified Energy Needs for Disaster Response

Calculational Tool: Prototype with Evans Head Application

Return to Worksheet Listing

Last Modified by:	D. von Hippel/P. Hayes
Last Modified:	11/11/2024

INPUT PARAMETERS: COMMUNITY OVERVIEW

Basic Demographics, Economics, and Demand Infrastructure

Seasonality of Community	Months per Year	Description
Off-Season	8	Uses definition employed for categorization of electricity feeder data, namely "Tourist Season" =
Tourist Season	4	December through March. "Off-season" = April through November

Residential	Off-Season	Tourist Season		
Number of Non-Transient Households in Community	1,642	1,642	From 2021 Census: See ***Note 1***	
Number of Transient Households	200	500	Estimates based on review of number of spaces/structures in EH caravan parks in Google Earth Pro photos, would include, for example, people housed in caravans, tents, shelters, and live-aboard vessels. Question--is there an overlap between this and the above?	Caravan/holiday park spaces: about 150 spaces or structures along river just north of bridge, plus 360 in park north of there (abutting beach)
Community Population, Non-transient Households	3,203	3,203	Off-Season from From 2021 Census, https://abs.gov.au/census/find-census-data/quickstats/2021/POA2473	
Community Population, Total Households (number)	3,603	4,203	Assumed average number of people per transient household	2.0
Fraction of Population Needing Medical Support at Home or Other Special Care (Vulnerable Populations)	10%	10%	Could include, for example elderly, pregant/nursing mothers, homeless, existing refugees, and/or those in extreme poverty-- ASSUMPTION	

Commercial and Institutional				
Non-residential Floorspace (square meters)	58,891	Equals	18.39	square meters per resident
Commercial Floorspace (square meters)	45,641	Assumes	78%	of non-residential floorspace (rough estimate based on data in ***Note 4***)
Institutional Floorspace (square meters)	13,250	Assumes	23%	of non-residential floorspace
--of which health care floorspace	20%			Assumption

Industry

Key Industrial Facilities (Describe and Name)	Output or Dimensions	Units	
All Light Industrial	9,810	square meters	Counts roughly 50 percent of buildings in industrial park near airport. Many buildings in that area seem based on Google Earth Pro labels to be commercial such as vehicle-related, storage.
[Facility 2]	0	Unit 2	
[Facility 3]	0	Unit 3	
[Facility 4]	0	Unit 4	
[Facility 5]	0	Unit 5	

Description of Community in numbers, notes, references

- **Seasons**
- **Size of community** (households, different populations…)
- **Commercial sector** (floorspace)
- **Industry**
- **Water Supply**
- **Food Supply**
- **Communications**
- **Transportation**
- **Emergency Services….**

Calculational Tool: **CADEER,** Example Energy Use Input (Evans Head)

Estimating Climate-Amplified Energy Needs for Disaster Response

Calculational Tool: Prototype with Evans Head Application

Return to Worksheet Listing

Last Modified by:	D. von Hippel/P. Hayes
Last Modified:	11/11/2024

INPUT PARAMETERS: ENERGY USE OVERVIEW (REFERENCE--TYPICAL CONDITIONS)

Note--Cells highlighted in Yellow are for menu-selected items	Please select one of "Kilowatt-hour", "Megawatt-hour" or "Gigawatt-hour" as units for electricity

Residential Energy Use by End Use and Fuel (enter additional data for electricity-using devices in "Electricity_Use_Overview")

End Use and Device (edit names below as appropriate)	*Fraction of Households with Device*	*Fuel (select from menu)*	*Average Fuel or Energy Use per Household with End Use*	*Physical or Energy Unit of Fuel Use (select from Menu)*	*Time Unit of Fuel Use (select from Menu)*	*Fraction of Annual Fuel Use by Time of Year*	
						Off-Season	*Tourist Season*
LPG Heat	3.9%	LPG/ Propane	6904.8	Megajoule	per Year	100%	0%
Electric Heat Gas Ducted	20%	Electricity	271	Kilowatt-hour	per Year	100%	0%
Space Heating 3	0%	Wood	150	Kilogram	per Year	100%	0%
Other Electric Heating	76.1%	Electricity	900	Kilowatt-hour	per Year	100%	0%
Water Heating 1	91.5%	Electricity	2071	Kilowatt-hour	per Year	60%	40%
Water Heating 2	3.5%	LPG/ Propane	10681.2	Megajoule	per Year	60%	40%
Water Heating 3	5%	Electricity	797.38	Kilowatt-hour	per Year	60%	40%
Ducted Cooling	20%	Electricity	577	Kilowatt-hour	per Year	55%	45%
Other Cooling	80%	Electricity	323	Kilowatt-hour	per Year	55%	45%
Cooking 1	11%	LPG/ Propane	3621.6	Megajoule	per Year	60%	40%
Cooking 2	89%	Electricity	613	Kilowatt-hour	per Year	60%	40%
Microwaves	100%	Electricity	109	Kilowatt-hour	per Year	60%	40%
Cooking 4	5%	Charcoal	30	Kilogram	per Year	60%	40%
Electric Lighting	100%	Electricity	391	Kilowatt-hour	per Year	65%	35%
Other Lighting	0%	Kerosene	5	Liter	per Month	65%	35%
Electric Refrigerators and Freezers	100%	Electricity	757	Kilowatt-hour	per Year	65%	35%
Other Refrigeration	0%	LPG/ Propane	1	Liter	per Day	65%	35%

Description of energy use by

- Sector and fuel
- Season
- Energy units
- Time units (per day/week/year)
- Commercial or Industrial facility
- Transport, emergency, water supply, agricultural, communications equipment….

Calculational Tool: **CADEER,** Example Electricity Use Input (Evans Head)

Estimating Climate-Amplified Energy Needs for Disaster Response

Calculational Tool: Prototype with Evans Head Application

Return to Worksheet Listing

Last Modified by:	D. von Hippel/P. Hayes
Last Modified:	3/13/2024

INPUT PARAMETERS: ELECTRICITY USE OVERVIEW

Residential Electricity Use by End Use

Information Imported from "Energy_Use_Overview"			*Off-Season Average Percent of Electricity Use by End Use/Device by Hour of the Day (no entry needed if cells are dark)*																							
End Use and Device	*Fuel*	*Total kWh per Year per Household*	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
LPG Heat	LPG/ Propane	N/A																								100%
Electric Heat Gas Ducted	Electricity	271																								100%
Space Heating 3	Wood	N/A																								100%
Other Electric Heating	Electricity	900																								100%
Water Heating 1	Electricity	2071																								100%
Water Heating 2	LPG/ Propane	N/A																								100%
Water Heating 3	Electricity	797																								100%
Ducted Cooling	Electricity	577																								100%
Other Cooling	Electricity	323																								100%
Cooking 1	LPG/ Propane	N/A																								100%
Cooking 2	Electricity	613																								100%
Microwaves	Electricity	109																								100%
Cooking 4	Charcoal	N/A																								100%
Electric Lighting	Electricity	391																								100%
Other Lighting	Kerosene	N/A																								100%
Electric Refrigerators and Free	Electricity	757																								100%
Other Refrigeration	LPG/ Propane	N/A																								
Other Energy Use 1	Electricity	1554																								100%
Other Energy Use 2	Kerosene	N/A																								100%
Other Energy Use 3	Wood	N/A																								100%
Other Energy Use 4	Other Biomass	N/A																								100%

Description of electricity use by

- **Sector**
- **Season**
- **End Use**
- **Energy units per unit time**
- **Time of use…**

Used to prepare estimate of power needs over time (including peak power needs)

Estimating Climate-Amplified Energy Needs for Disaster Response

Calculational Tool:

Prototype with Evans Head

Return to Worksheet Listing

Last Modified by:	D. von Hippel/ P. Hayes
Last Modified:	10/31/2024

INPUT PARAMETERS: TYPICAL/NORMAL ENERGY, FUEL, WATER, FOOD SUPPLY OVERVIEW

Primary Fuel Supply

	Annual Amounts of Fuel/Energy Supplies Under Typical/Normal Conditions That Are:				
Fuel/Energy Type	*Produced Locally*	*Imported*	*Taken from Local Storage (Net)*	*Exported*	*Units (select from menu)*
Charcoal		2.463			Metric ton
Coal		0			Metric ton
Diesel		1178.4	0		Metric ton
Electricity					Megawatt-hour
Gasoline		2156.9	0		Metric ton
Heat					Gigajoule
Kerosene		-			Kilogram
LPG/ Propane		277,600			Liter
Natural Gas		-			Gigajoule
Other Biomass		-			Metric ton
Wood		-			Cubic Meter

Secondary Fuel Supply ("Transformation")

					Fraction of Annual Output by Time of Year	
Facility (or Type of Facility, if Many)	*Main Input Fuel Type (select from menu)*	*Efficiency (%)*	*Capacity (kW)*	*Capacity Factor (average %/yr)*	*Off-Season*	*Tourist Season*
Rooftop Solar Generation	Solar	100%	2518	18.6%	65.4%	34.6%
[Electricity Generator 2]	Diesel	33%	0	30%	25%	75%
[Electricity Generator 3]	Diesel	33%	0	17.3%	25%	75%
[Electricity Generator 4]	Hydro	100%	0	40%	25%	75%
[Electricity Generator 5]	Natural Gas	33%	0	25%	25%	75%
[Electricity Generator 6]	Wind	100%	0	30%	25%	75%
[Electricity Generator 7]	Solar	100%	0	15%	25%	75%
[Electricity Generator 8]	Solar	100%	0	15%	25%	75%
[Electricity Generator 9]	Solar	100%	0	0	25%	75%
[Electricity Generator 10]	Solar	100%	0	0	25%	75%
[Emergency Generators 1]	Diesel	25%	500	0%	25%	75%
[Emergency Generators 2]	Gasoline	20%	1000	0%	25%	75%
[Emergency Generators 3]	Solar	100%	2000	0%	25%	75%
[Emergency Generators 4]	Gasoline	10%	1,184.29	0%	25%	75%

Calculational Tool: **CADEER,** Example Energy Supply Input (Evans Head)

Description of energy source

- **Primary energy supply by fuel**
- **Imports, production, storage**
- **Secondary energy "transformation" such as electricity generation**
- **Capacity, fuel type, units, capacity factor…**

- **Used to prepare estimate of energy supply by type**

Calculational Tool: **CADEER,** Example Energy Disaster Scenario Input (Evans Head)

Estimating Climate-Amplified Energy Needs for Disaster Response

Calculational Tool: Prototype with Evans Head Application

Return to Worksheet Listing

Last Modified by:	D. von Hippel/P. Hayes
Last Modified:	4/23/2024

INPUT PARAMETERS: DISASTER SCENARIO 1 IMPACTS ON SUPPLY AND DEMAND

GENERAL PARAMETERS: DISASTER IDENTIFICATION AND ESTIMATED OUTAGE DURATION

Type of Climate-Amplified Disaster **Earthquake** Select from drop-down menu

Narrative Description of Disaster:

[INSERT DISASTER DESCRIPTION]

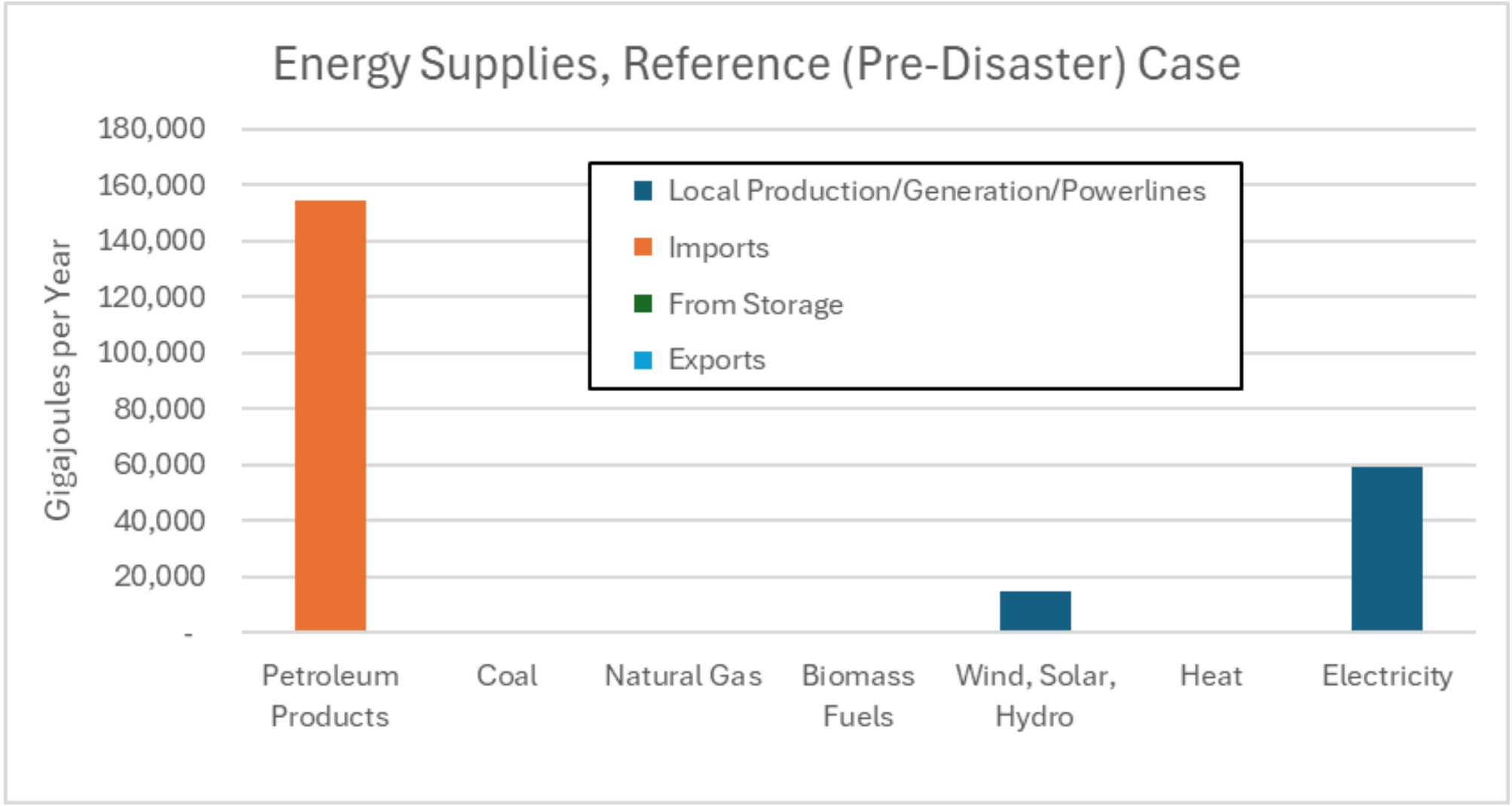
Assumed Average Duration of RELIEF Efforts for Planning Purposes:	14 days
Assumed Average Duration of RECOVERY Efforts for Planning Purposes:	70 days
Assumed Fraction of Homes Not Habitable as a Result of Disaster During RELIEF Period	50%
Assumed Fraction of Homes Not Habitable as a Result of Disaster During RECOVERY Period	33%
Assumed Fraction of Non-Residential Buildings Not Usable as a Result of Disaster During RELIEF Period	60%
Assumed Fraction of Non-Residential Buildings Not Usable as a Result of Disaster During RECOVERY Period	40%
Assumed Fraction of Population Classified as Most Vulnerable that Must Be Served During RELIEF Period	20%
Assumed Fraction of Population Classified as Most Vulnerable that Must Be Served During RECOVERY Period	15%
Assumed Number of Incoming Refugees to Be Served During RELIEF Period	500

Description of disaster in terms of impact on community energy use

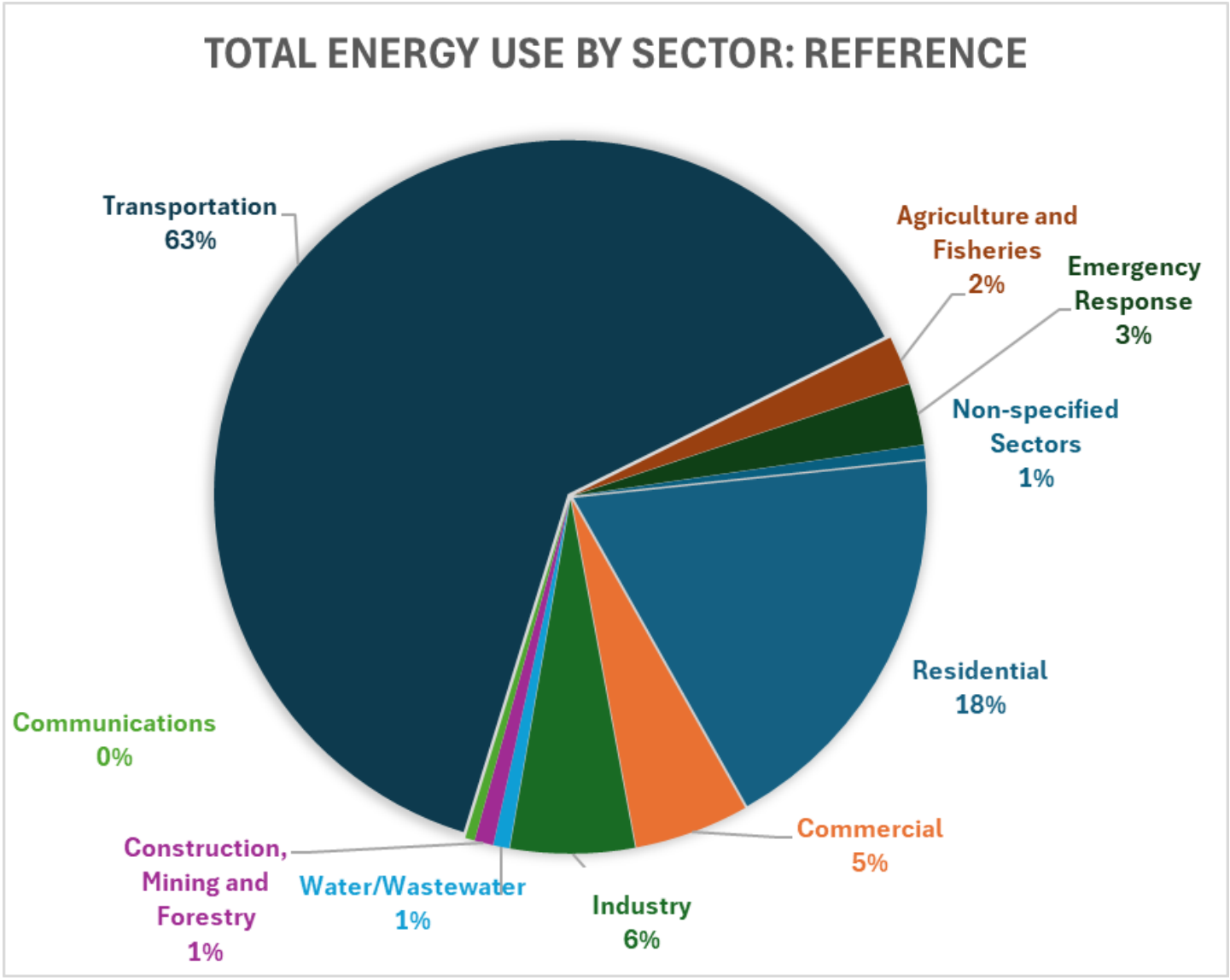
- **Duration**
- **Impacts on community and community needs**
- **Impacts on demand sectors**
- **Impacts on energy supplies (imports, production, storage)**
- **Impacts on energy "transformation" such as electricity generation**
- **Energy needs during relief and recovery periods**

Where are we getting our energy from?

Calculational Tool: Initial Evans Area Summary Results

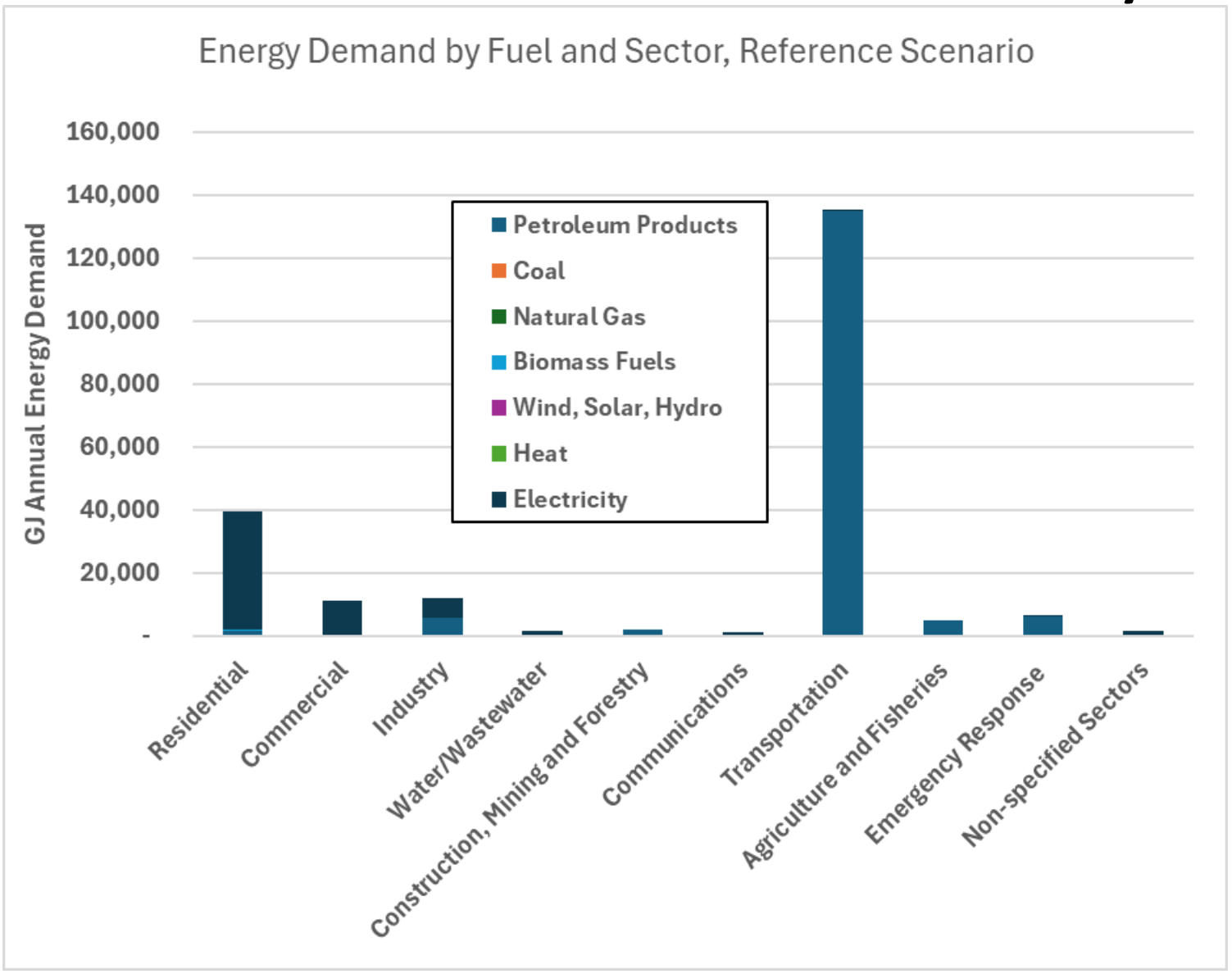


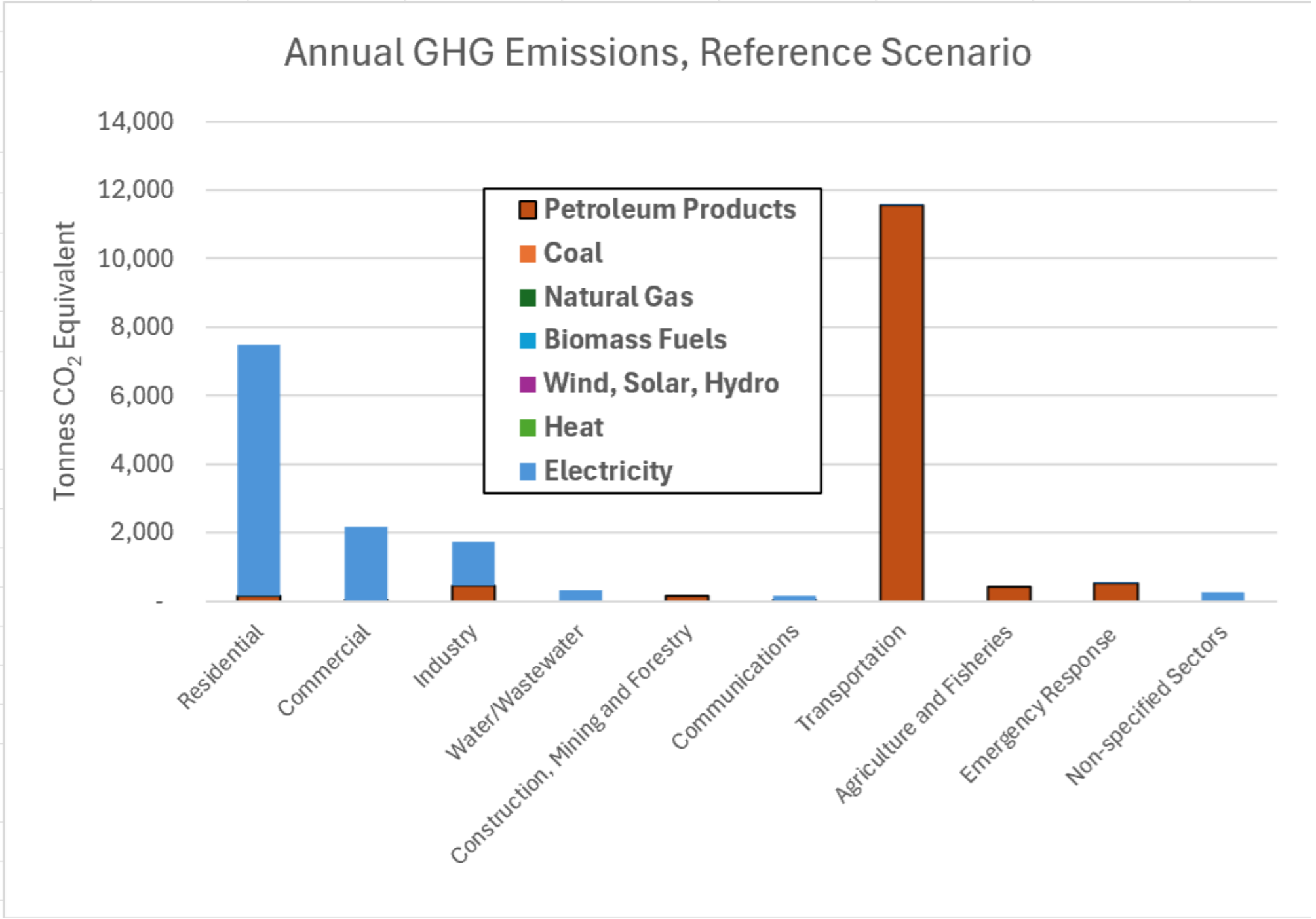
How do we use energy ?
Calculational Tool: Initial Evans Area Summary Results



Who uses each energy form?

Calculational Tool: Initial Evans Area Summary Results



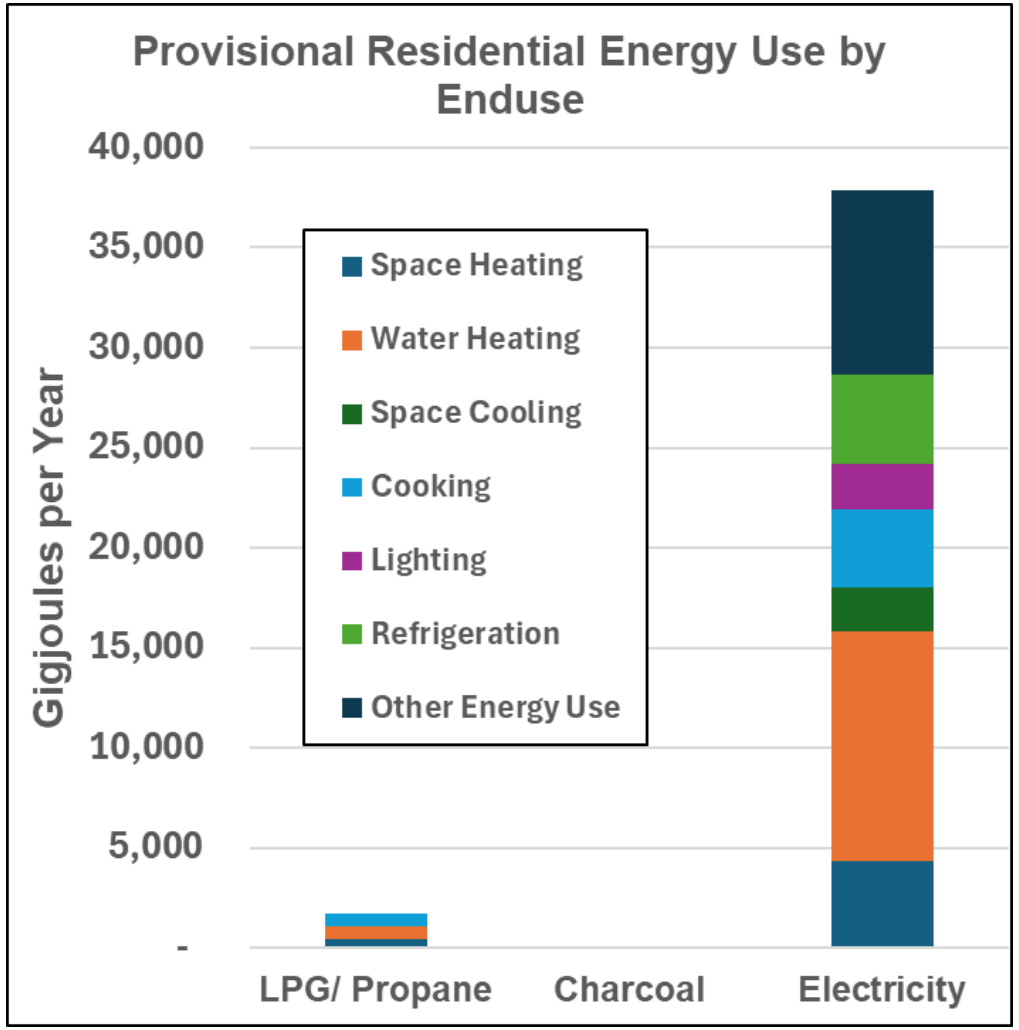

Annual GHG Emissions, Reference Scenario
Tonnes CO_2 Equivalent
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
Petroleum Products
Coal
Natural Gas
Biomass Fuels
Wind, Solar, Hydro
Heat
Electricity
Residential
Commercial
Industry
Water/Wastewater
Construction, Mining and Forestry
Communications
Transportation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

How much energy do households use in Evans Area?

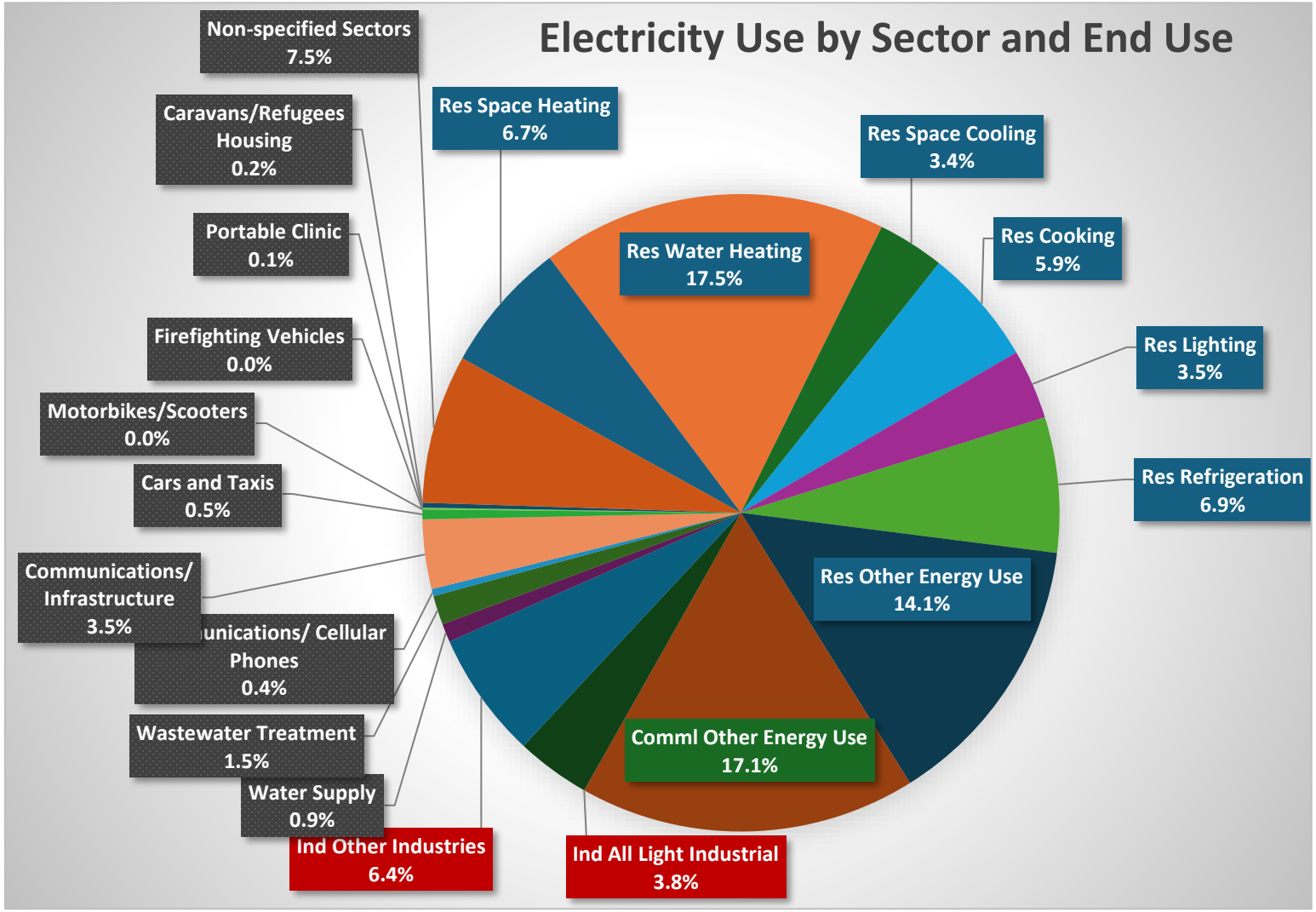
REFERENCE CASE ENERGY DEMAND SUMMARY (GJ/YR), RESIDENTIAL USE BY ENDUSE

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

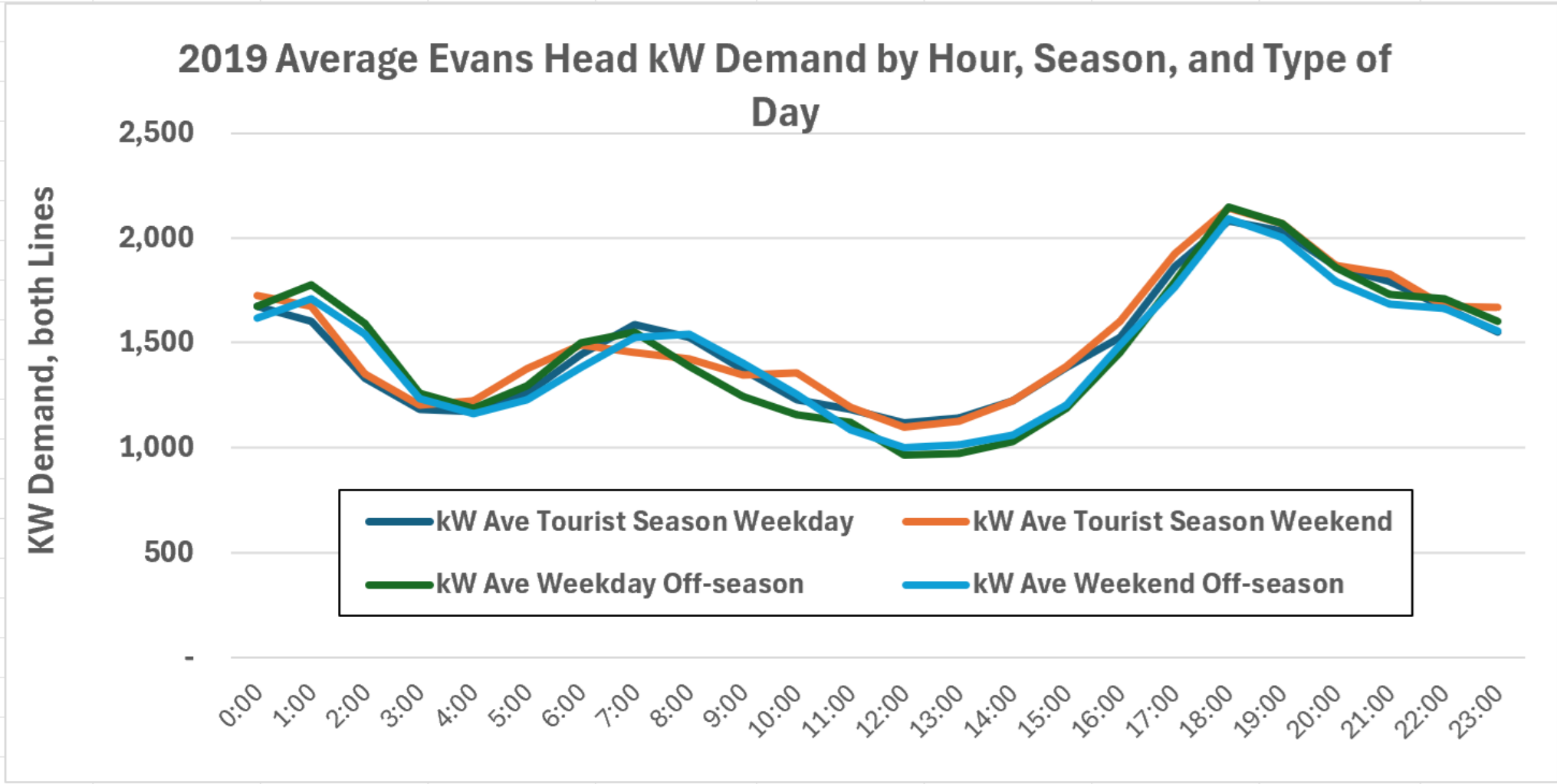


REFERENCE CASE
ELECTRICITY DEMAND BY SUBSECTOR/END USE
(GJ AND MWH/YR)



2019

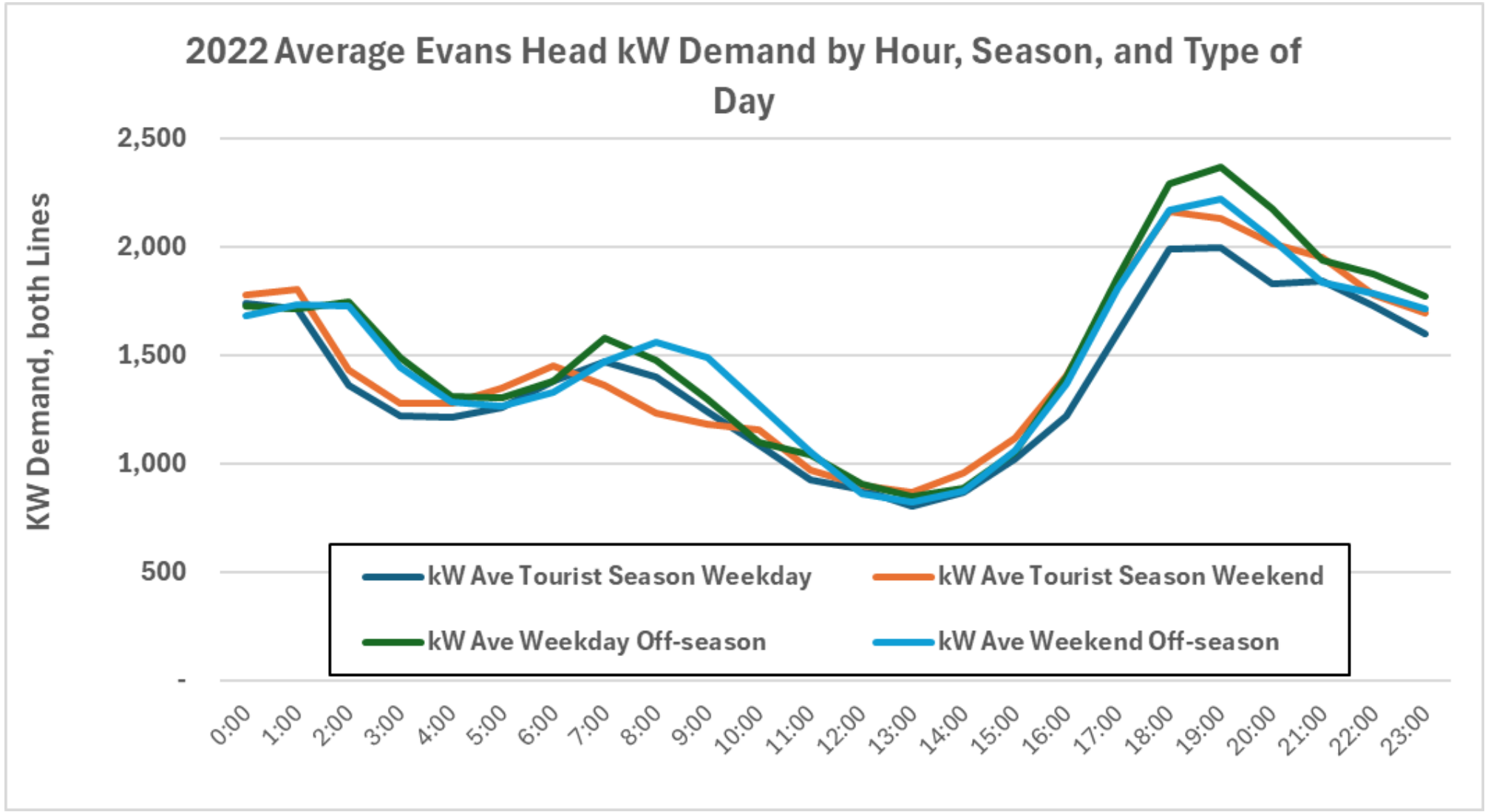
Evans Head Power Load Curve
tourist/non-tourist + weekday/weekend



Source: Essential Energy dataset provided to the study

2022

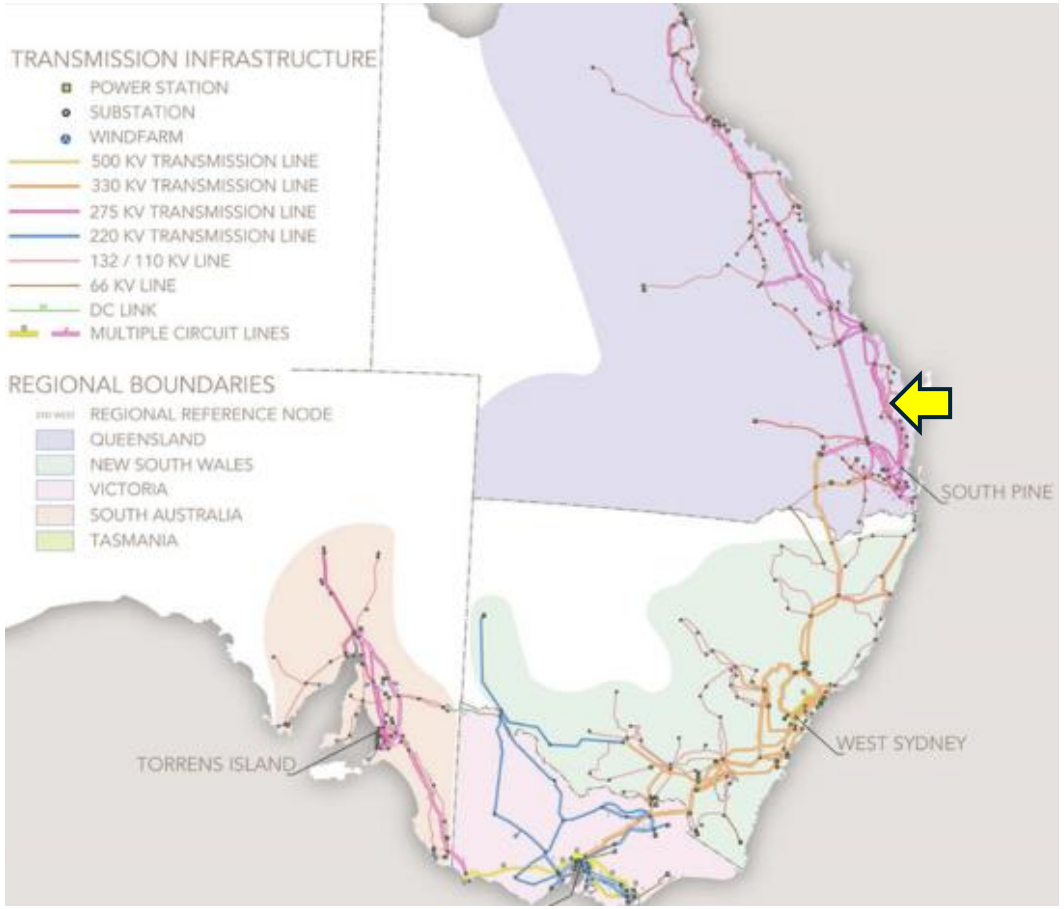
Evans Head Power Load Curve
tourist/non-tourist and weekday/weekend



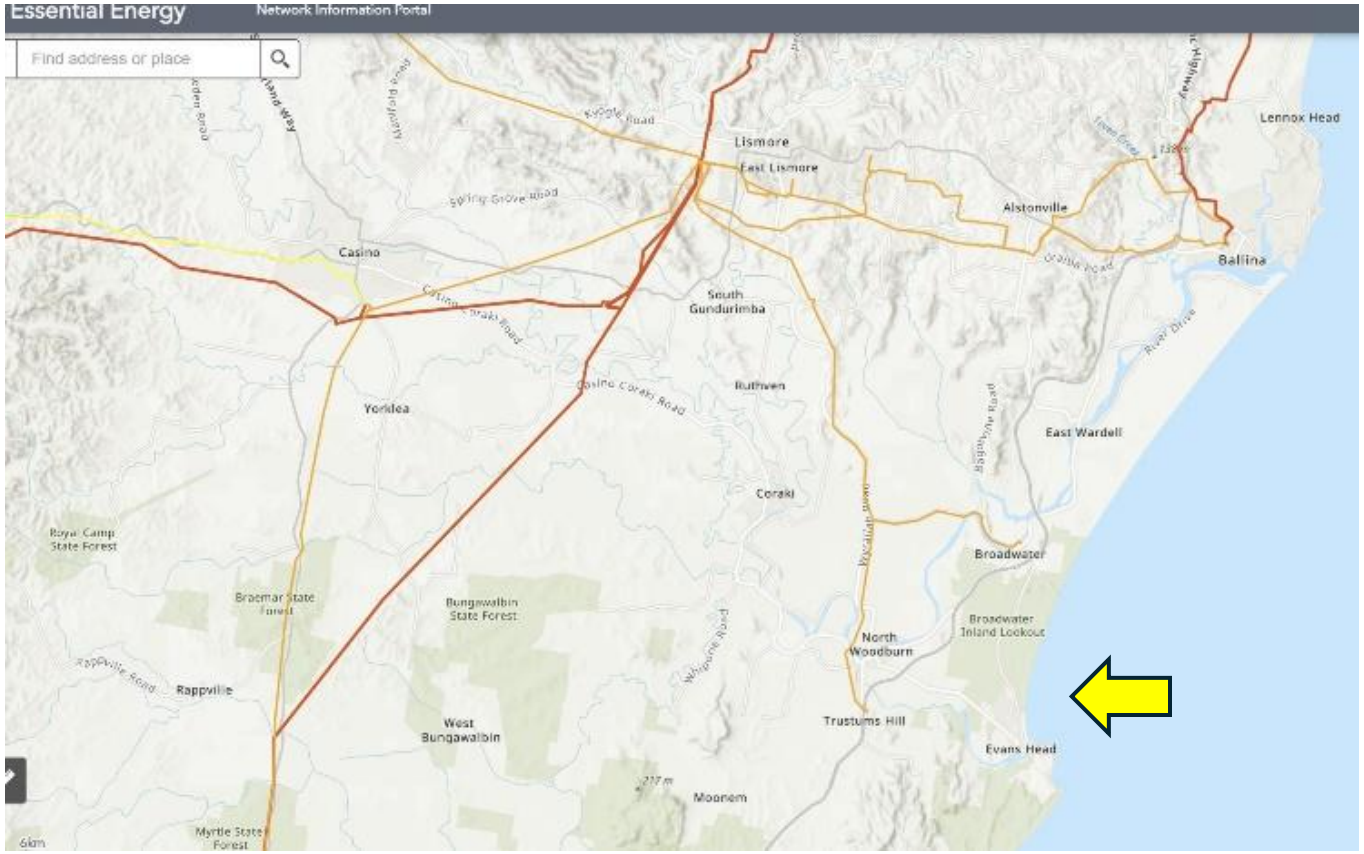
Source: Essential Energy dataset provided to the study

DVH ENDS HERE
PH CONTINUES!

POWER, OUTAGES, BACKUPS: NATIONAL GRID TO LOCAL LEVEL—EVANS HEAD

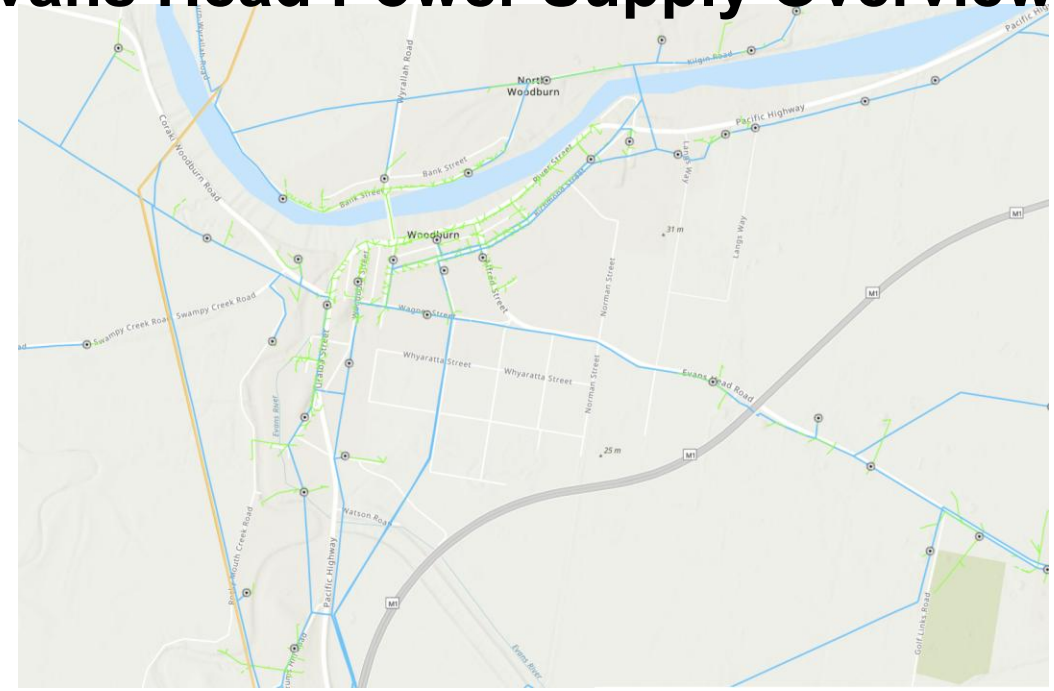


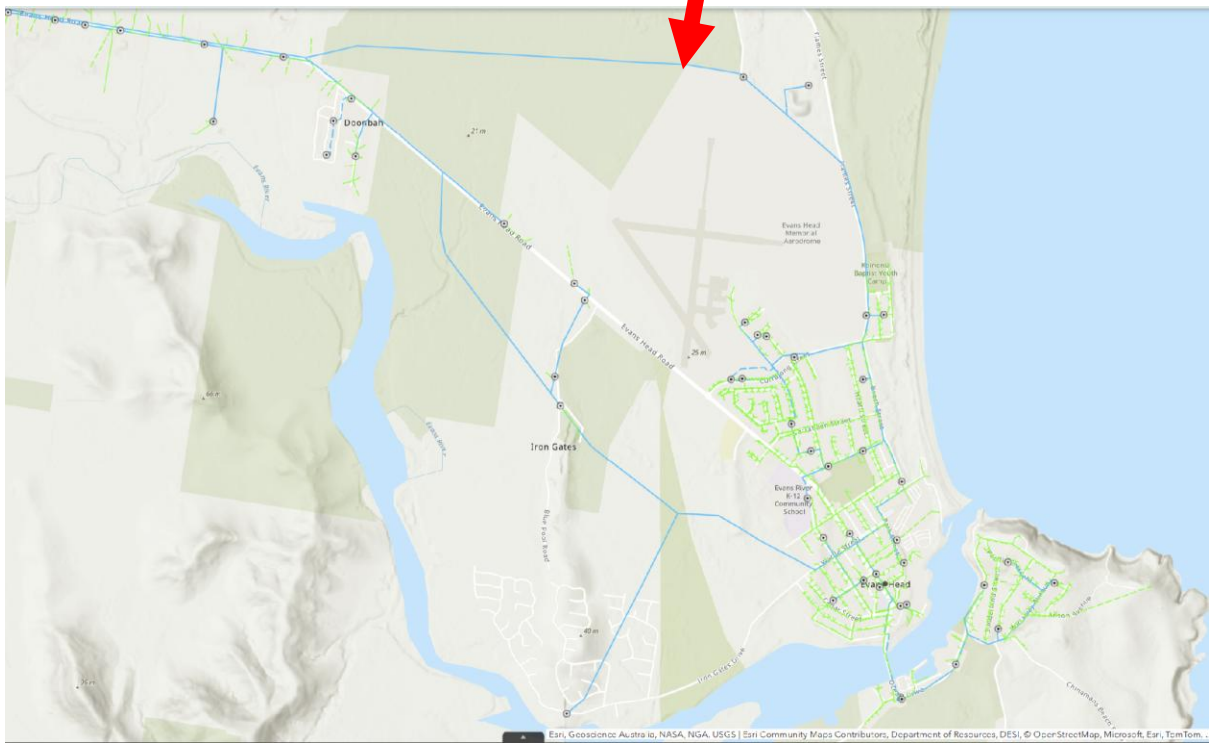
- linked to the national grid as it transits Northern Rivers



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

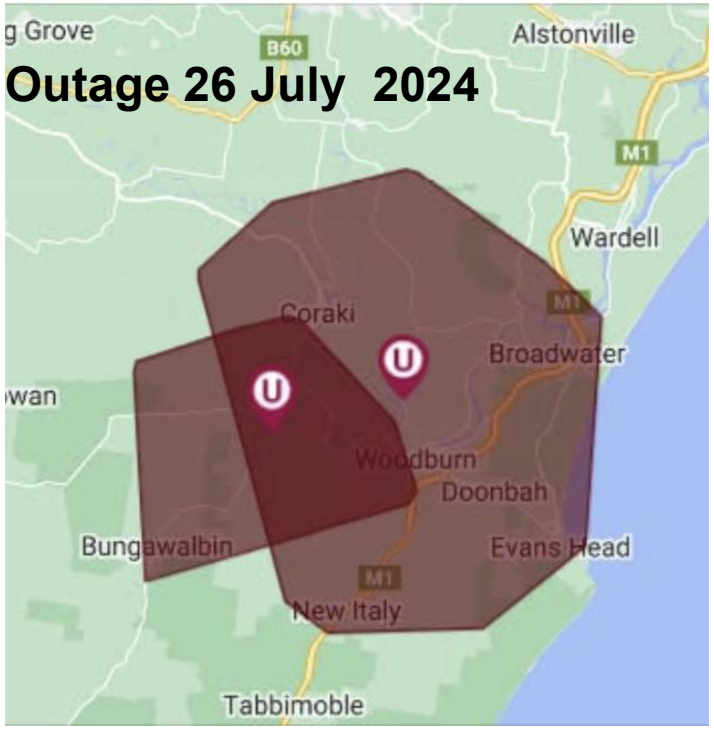
- Branches into the bush area between the road + river, emerging on Wattle Street.
- Supplies most of residential EH, the CBD, + south of the river.

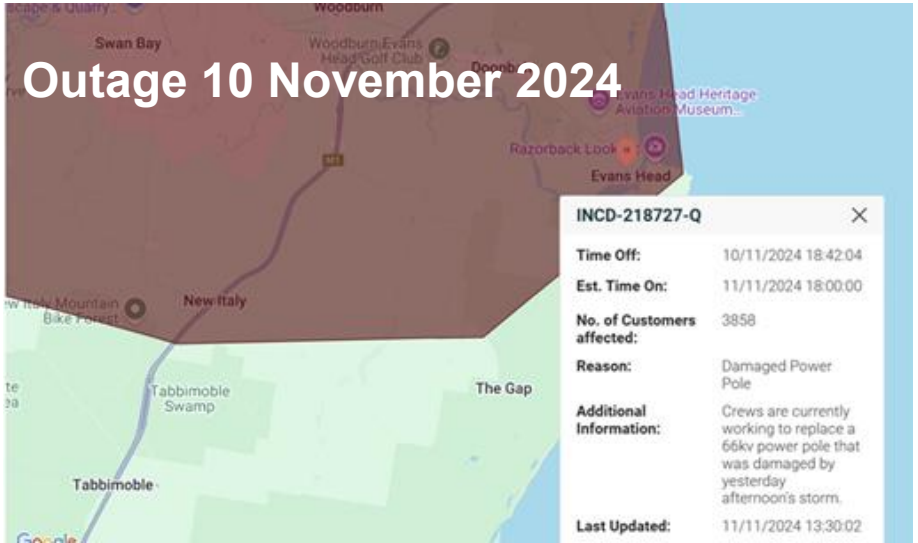
Evans Head Power Supply Overview

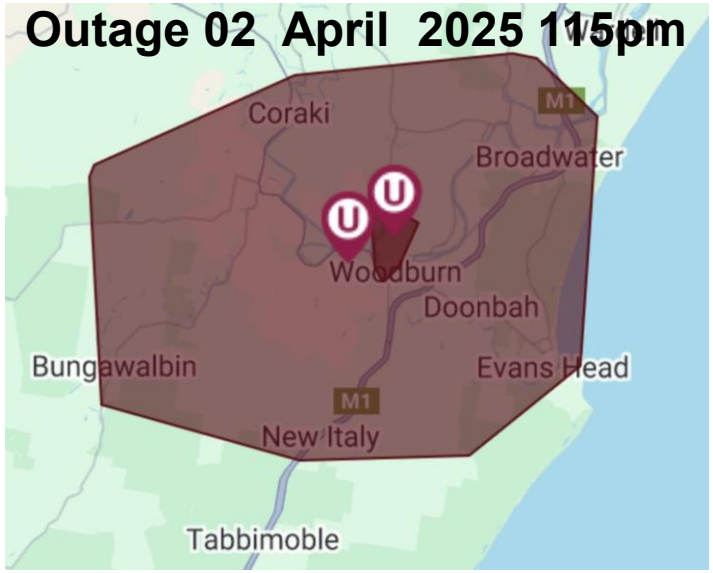
Evans Head Blackouts Overview

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**







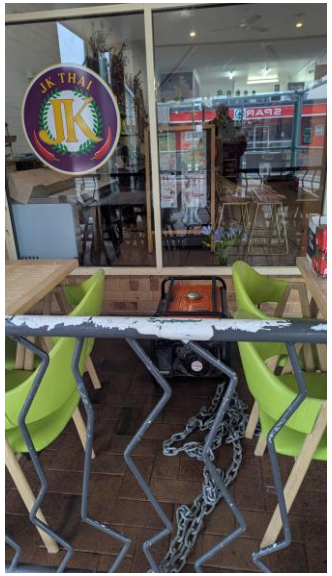
Outage self-help: a range of large to small business responses

IGA

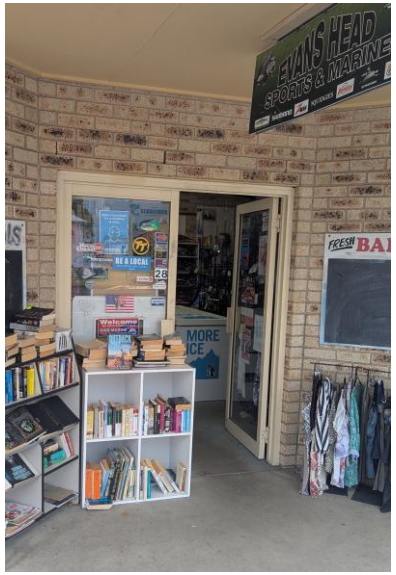
Ambo

RSL

Contractor power on-site



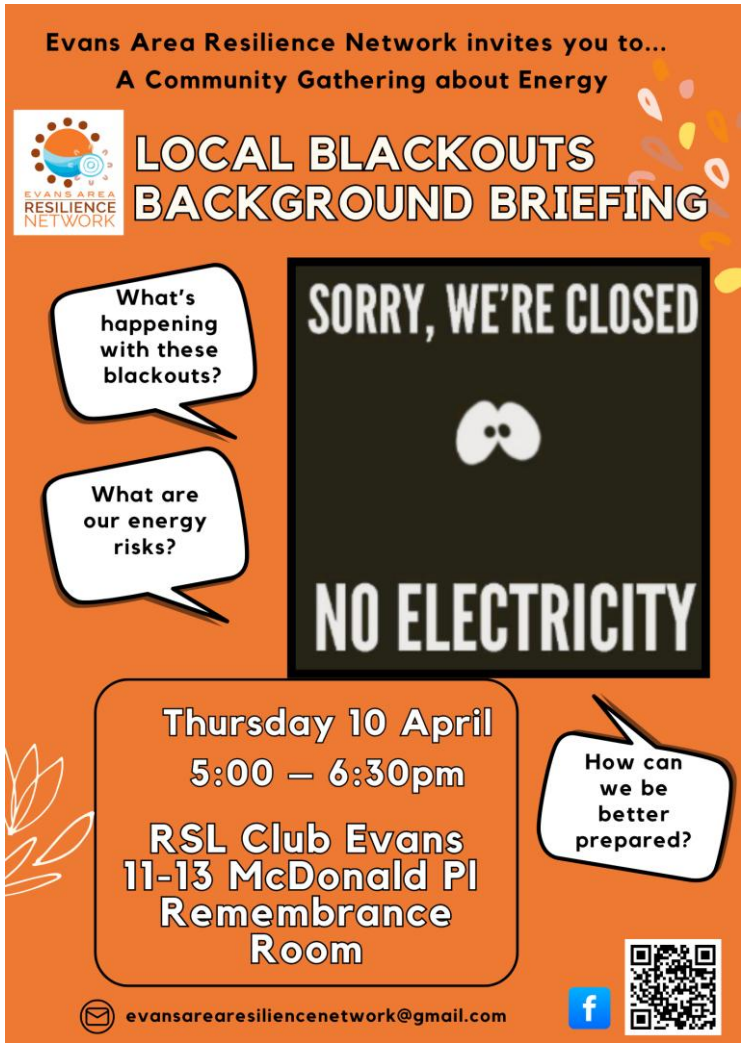
Restaurant open



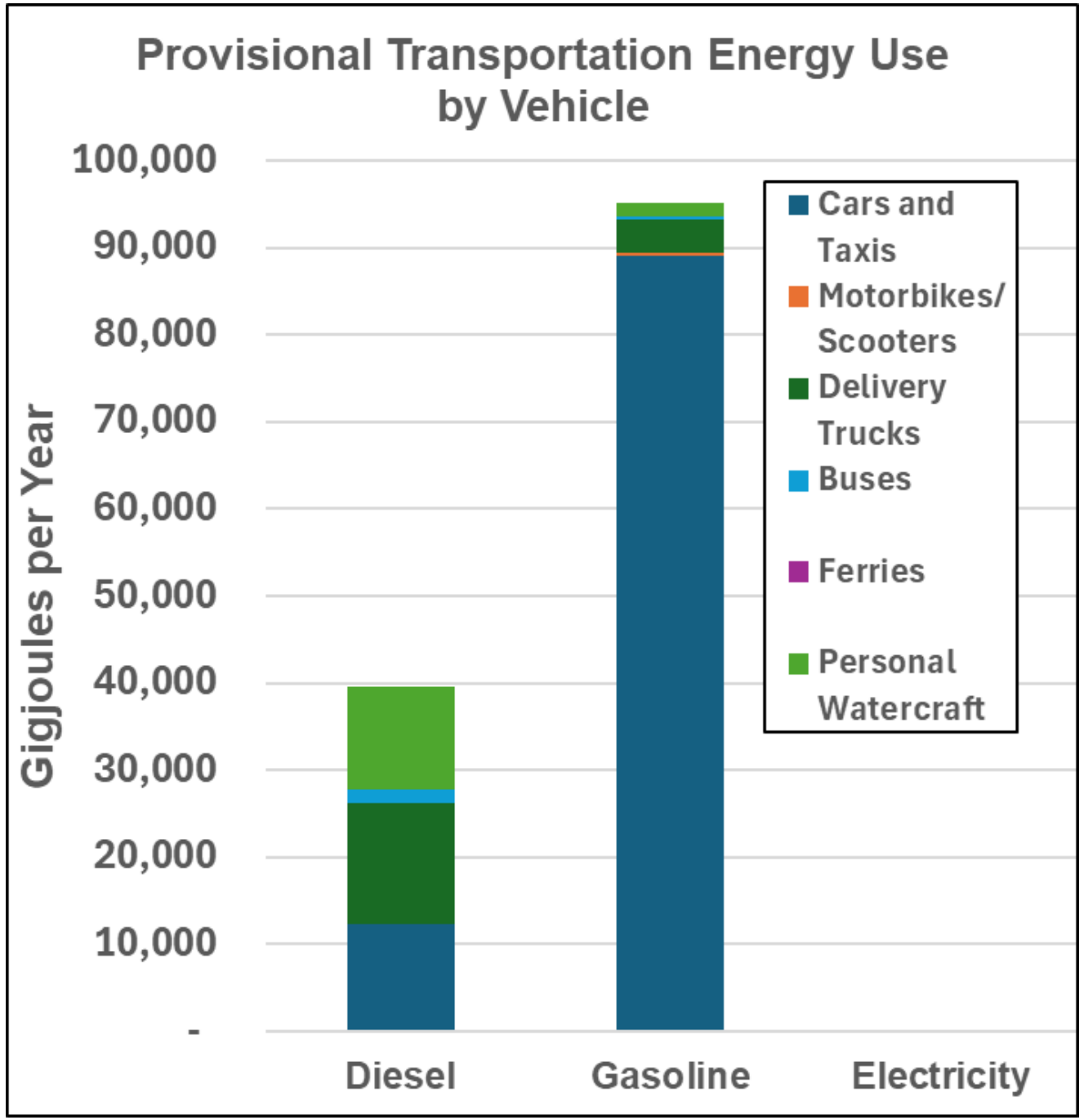
Take home

Close, protect freezer

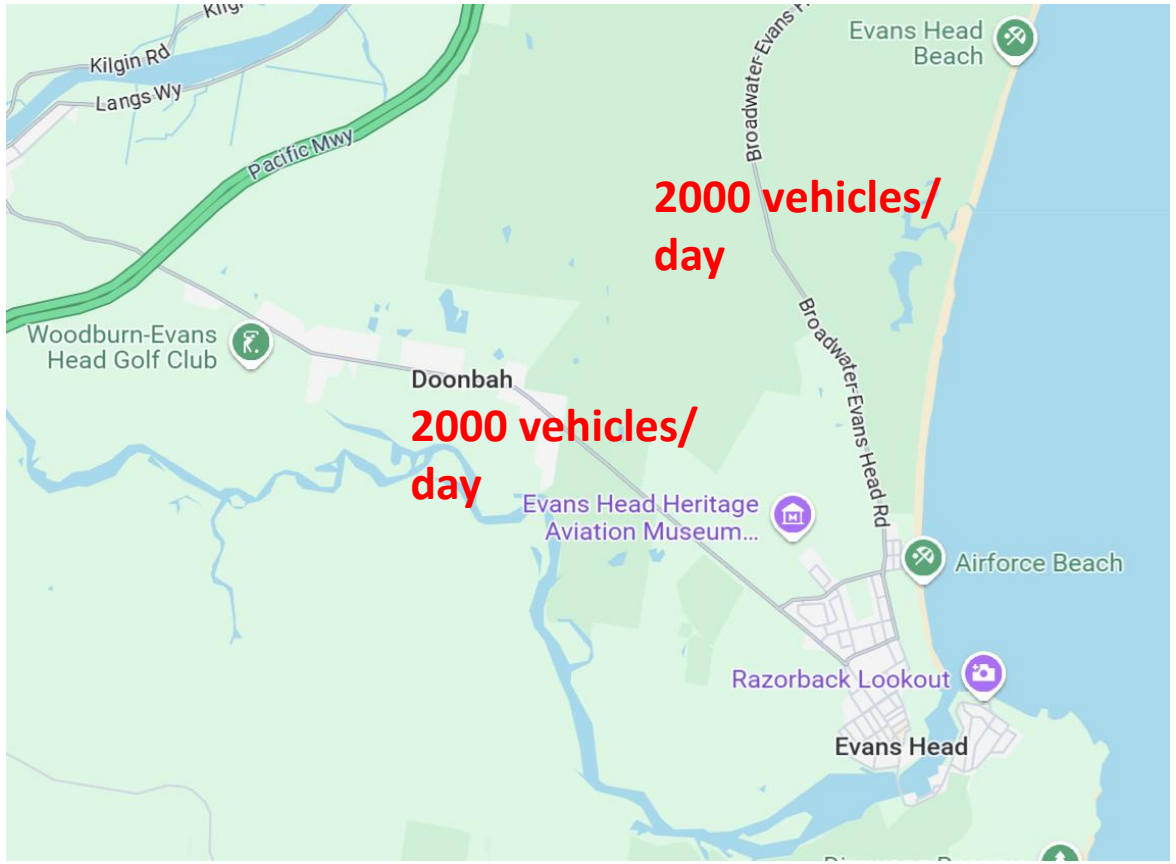
Lessons from Prior Projects: Household: essential vs enough



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%


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 Document 5

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

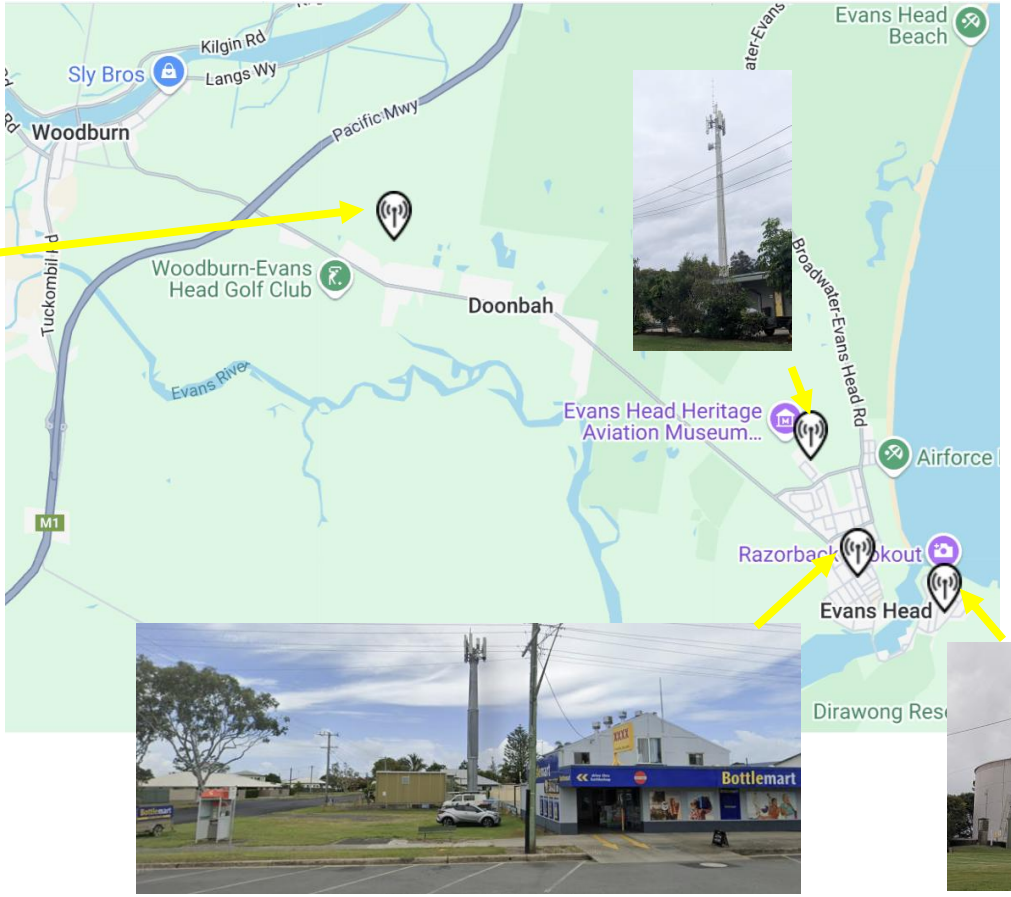
18 Mar 2024 | Tyson Sara (https://www.aspistrategist.org.au/author/tyson-sara/)
North of 26° south (/dinkus/north-of-26-south/)

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

13000 litres of diesel in underground tank; the aux tank is topped up every 4 days

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

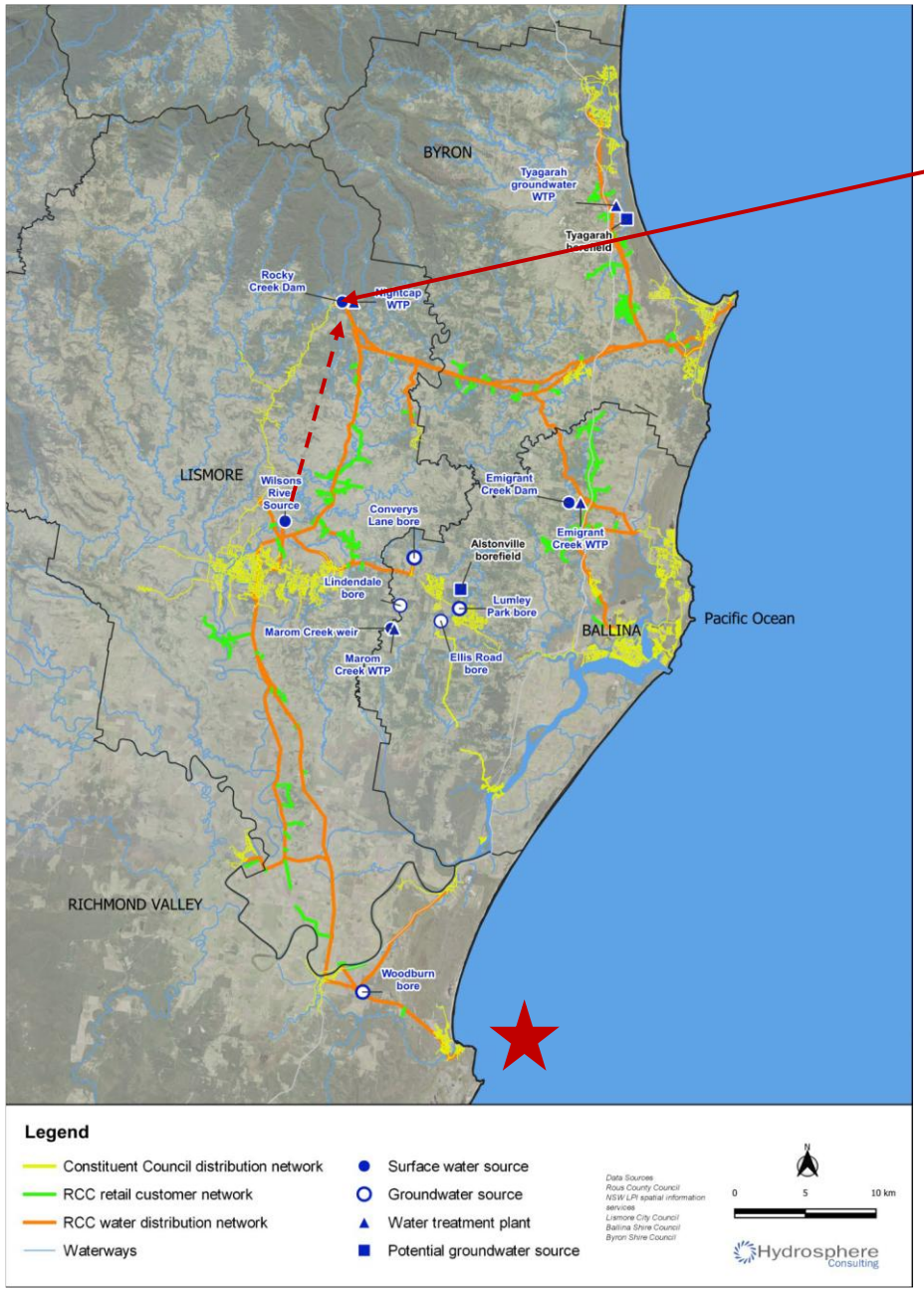
Key questions: backup batteries? Generators? Mobile towers? Satellite comms in EH? NBN network, nodes, power requirements to operate, does Telstra share Optus?

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

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

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)

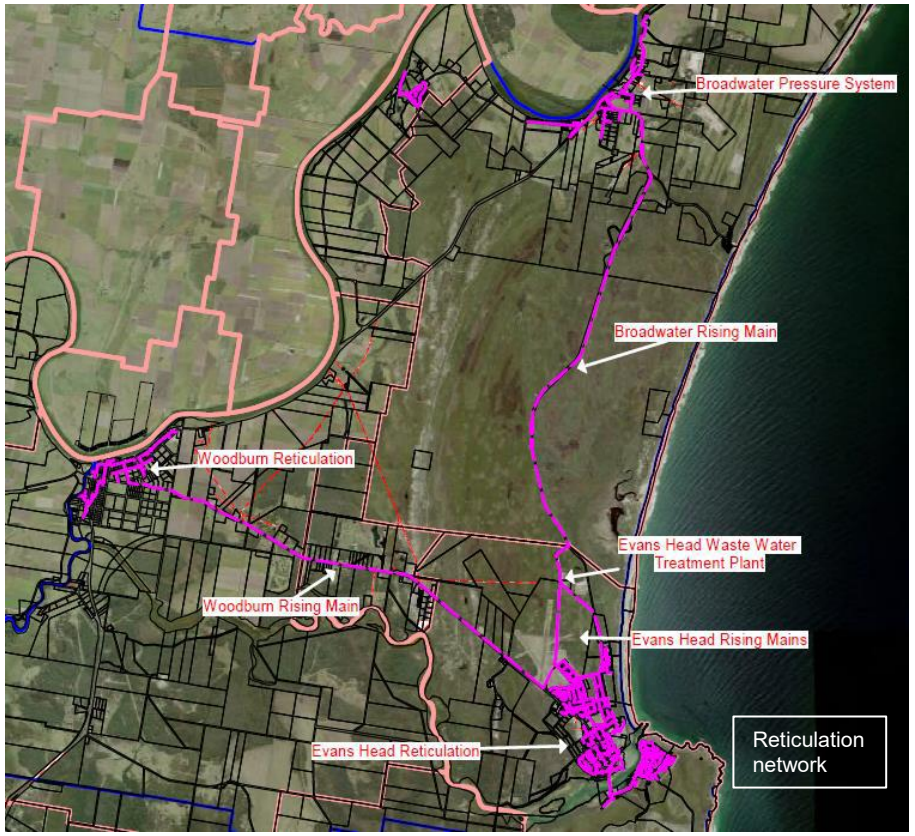
Initial energy considerations:

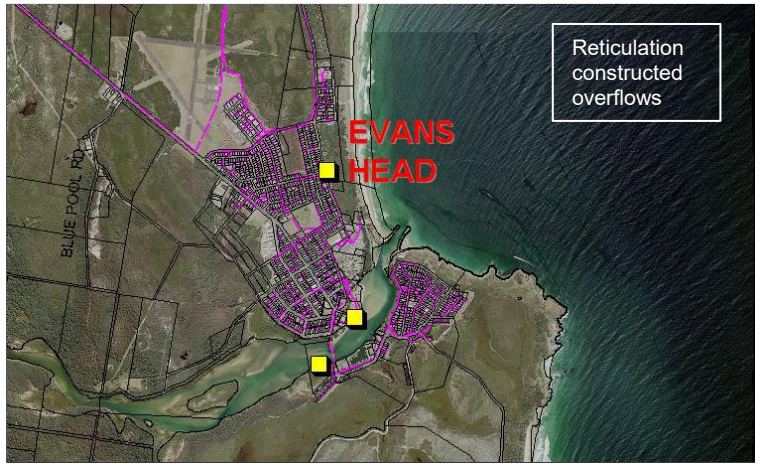
- Estimated Evans annual water demand (2,907 people @ ~120 kL/yr) = ~350ML
- Estimated energy demand for treatment (~0.45KWh/KL) = 430 kWh/day
- Nightcap WTP – 2 backup generators (700kva and 400kva) and 13-14,000l diesel
- Additional chlorination at Woodburn WTP

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:

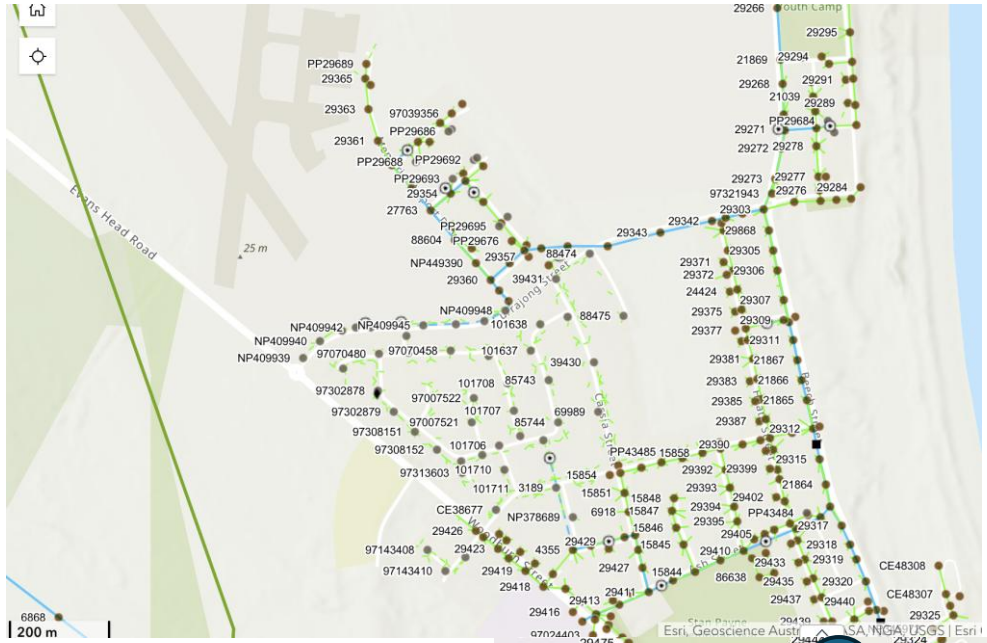
- Actual energy use at STP (RVC)
- Energy use by pumping stations
- Emergency generators for pumping stations
- Number of households with pressure sewage systems (? @ ~200W/day). How many days of storage during outage?

Additional considerations:

- Water quality & health issues from overflows during power outages

NEXT STEPS

- **Modify draft survey/audit questions** as needed for each sector
- **EARN TEAM LORIKEET: Carry out surveys/audits/interviews key energy users in emergency**
- **Update the existing energy sector analysis** for Evans Area
- 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
- **Communications priority? C3, needed above all else for communication, coordination, collaboration**
- **Local and regional meshed community coms (Uki, Channon, Byron)**

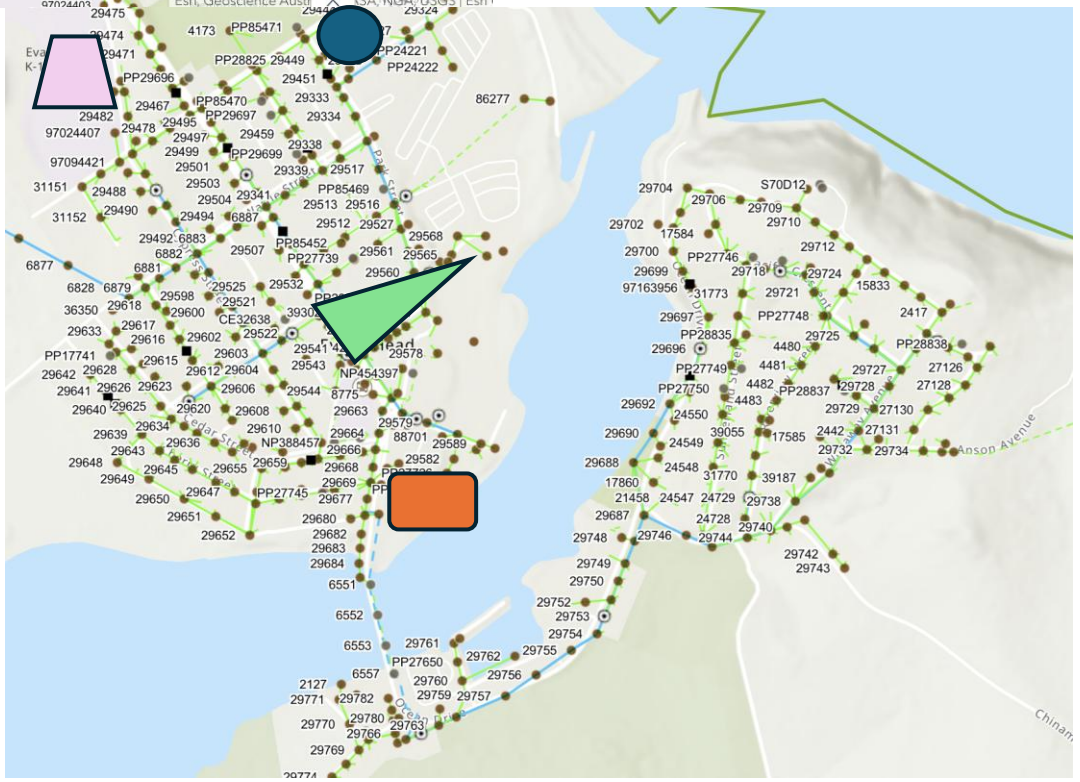


School

Bowlo Complex five sites

RSL Official Evac Centre

CBD food medical



No hub in South Evans!!! (Tsunami!)

The Greater Uki Emergency Cache Project

Emergency Communication Network Project

We have been establishing an alternative communications system using UHF radio and satellite internet. Around 50 community owned UHF radios have been distributed across the neighbourhood groups, to community leaders and easily isolated properties. These are being boosted with antennas, where needed, to navigate our hilly terrain.
The general public are being encouraged to buy their own radios and channels have been set for each neighbourhood. Training on the use and maintenance of these, and the options around alternative power sources is underway. This system will allow neighbourhoods to communicate with each other when the commercial mobile phone and internet networks are not functioning, as during past events.

Satellite internet has a key role to play in emergency comms. RUKI has secured Starlink satellite internet, which will be able to be activated in a disaster at a central hub in Uki village. This will ensure communication is possible between neighbourhood groups and a central hub/evacuation centre, as well as with outside agencies and support resources. This will be supplemented by privately owned satellite internet facilities within the various neighbourhoods.

This project has been made possible with the support of ITV Australia, GIVIT (with support from NSW Government), Conservation Volunteers Australia, Tweed Shire Council and from a donation by Mandy Nolan and Ellen Briggs (Women Like Us).

The Channon Resilience Hub
February 17, 2024 ·

WE ARE RE-LAUNCHING OUR CB RADIO NETWORK‼️ Please come on Sunday 18th Feb to learn how it will work. Tuntable, Terania and Keerrong valleys will have their own channels... See more

Community Emergency Communications - Starlinks

Most of the Byron Shire CHUBS have been provided with portable **Starlink dishes** by Council. These provide access to essential and life-saving communication if mobile and NBN networks fail.

This project was funded by the NSW and Australian Governments.

CHUBS groups also have radio networks and phone tree systems, for staying connected and distributing essential information.

END

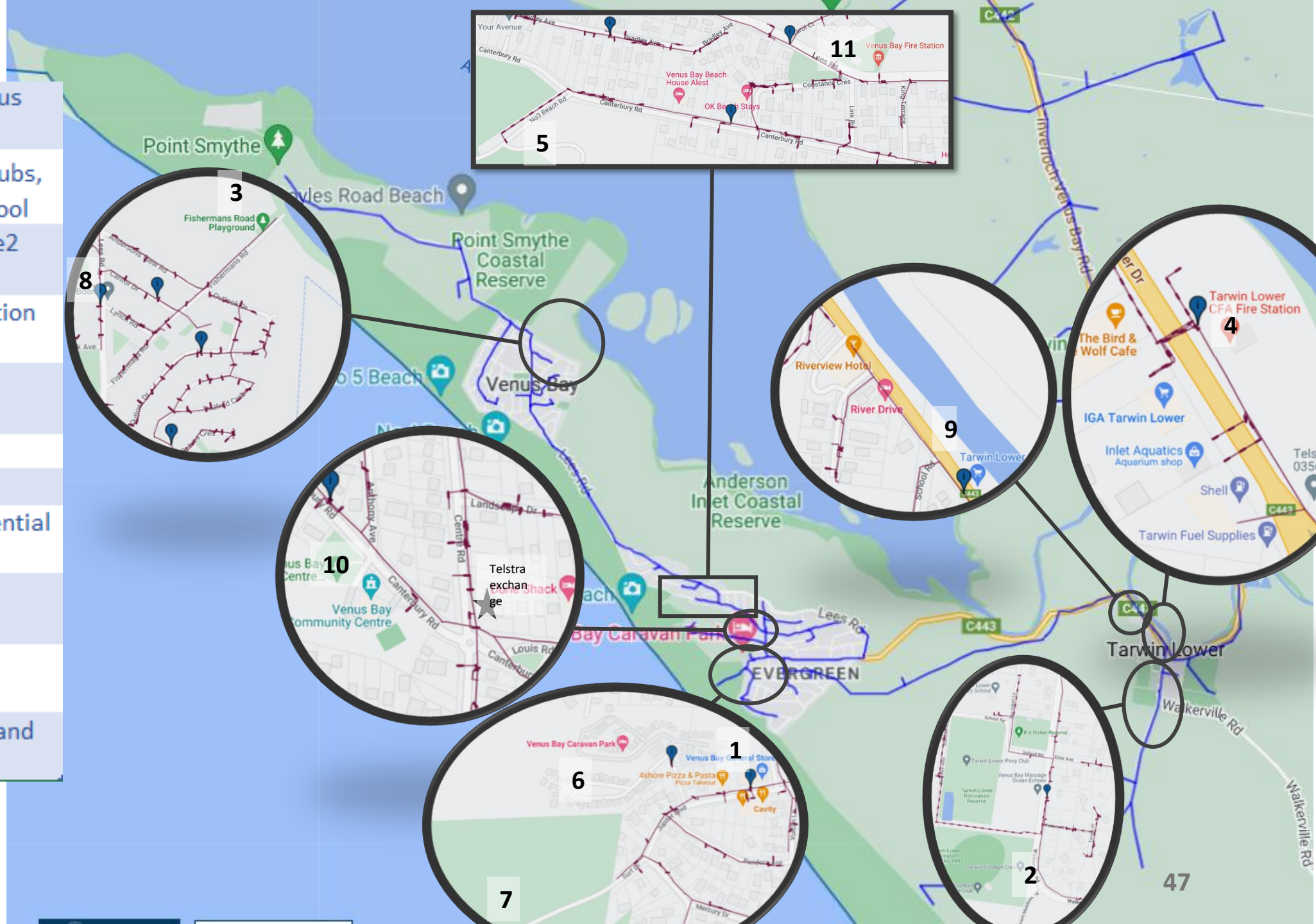
Part 1:
EARN Team Lorikeet-
-
Additional Slides On Research Questions and Survey

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

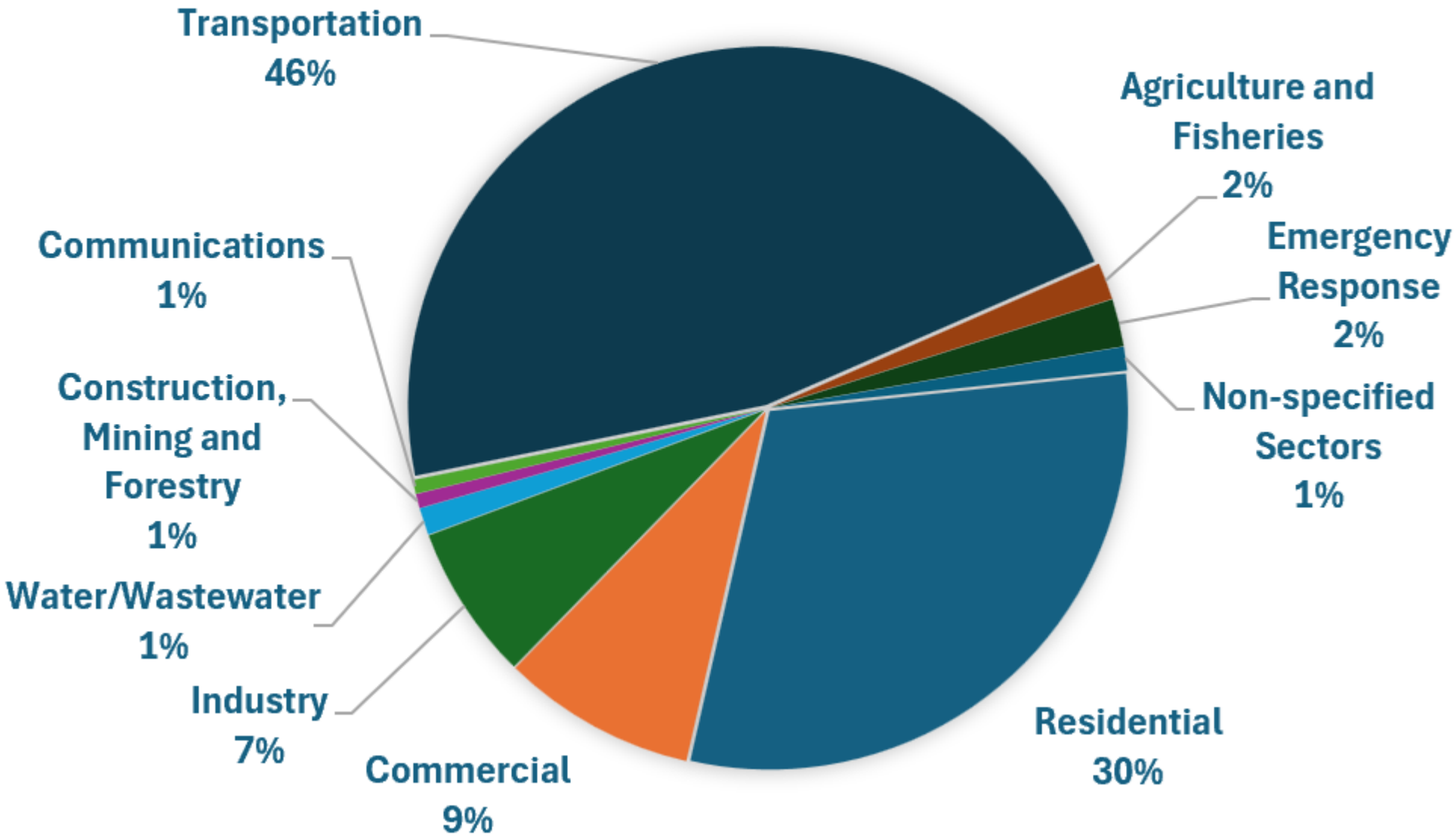
1. Please provide copies of electricity bills for a year if possible, or for representative months during December through March, and in April through November.
2. What is the floorspace (square meters) of your business or organization?
3. What does your business or organization do?
4. What do you use 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

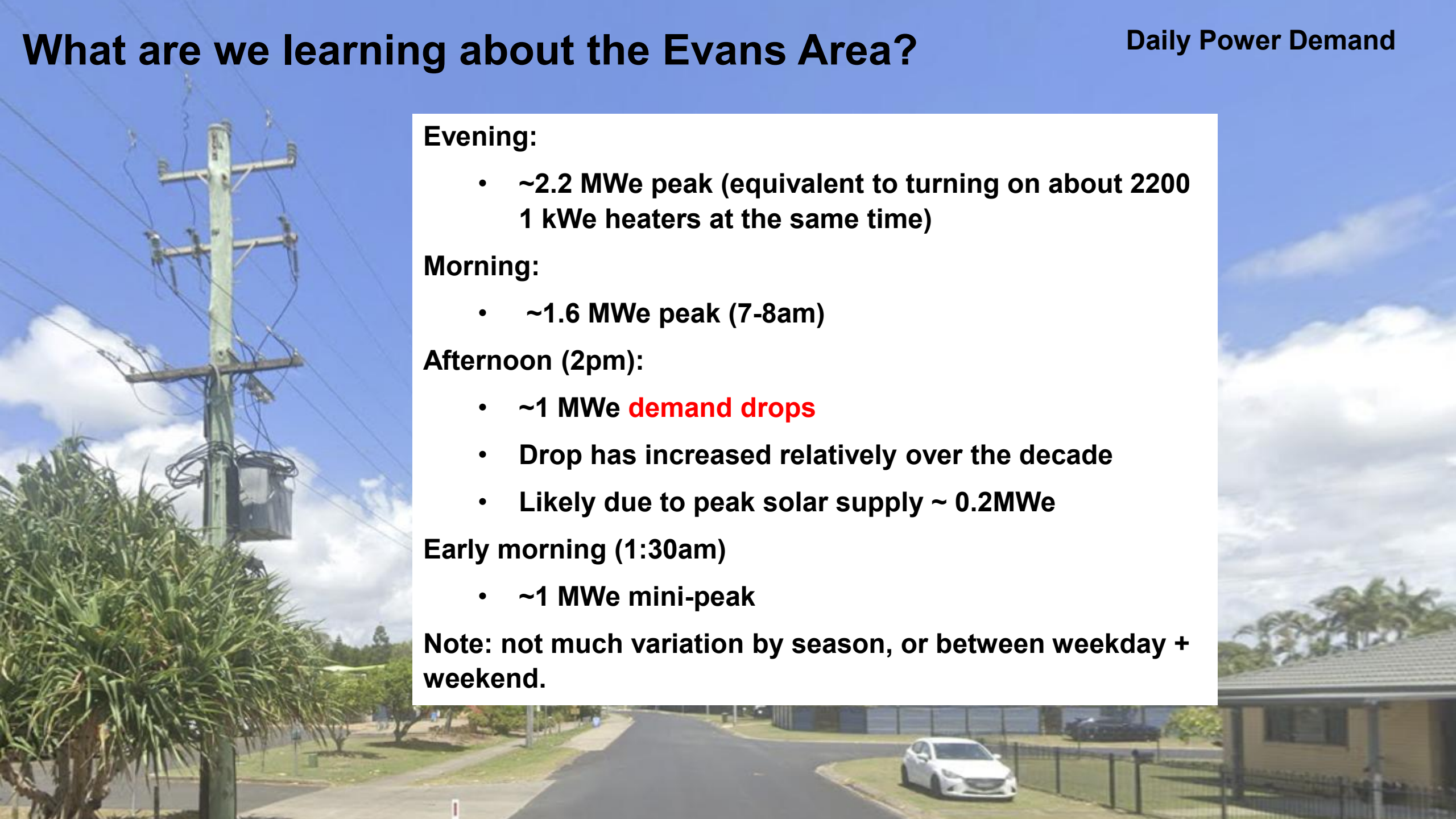
1	General store and Venus Bay shops
2	Recreation Reserve, clubs, Health Centre and School
3	Fishing club and Estate2 residential
4	Petrol station, Fire Station and IGA (plus shops)
5	Telstra tower and residential
6	Caravan Park
7	Surf club
8	Second possible residential cluster (Estate2)
9	Motel and pub,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



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**

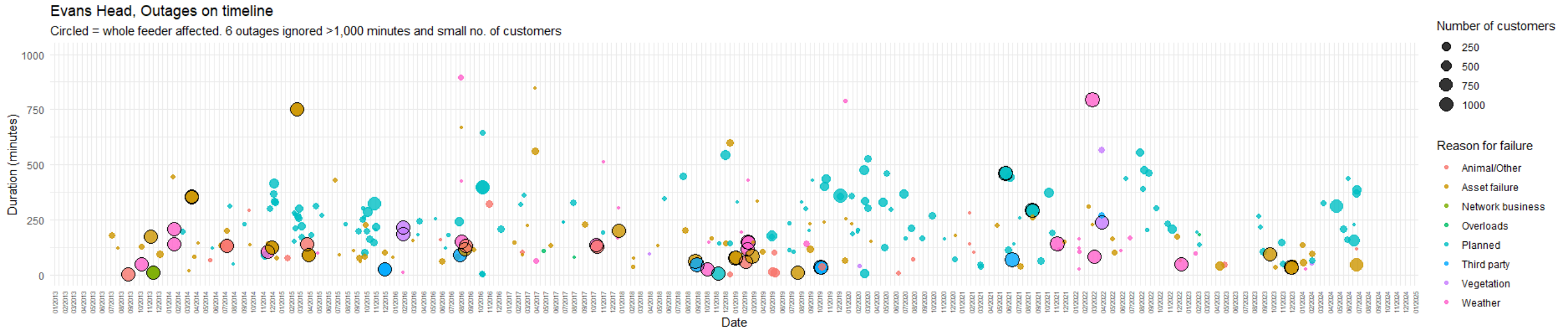
Note: not much variation by season, or between weekday + weekend.

Use the reference table below to figure out daily energy consumption

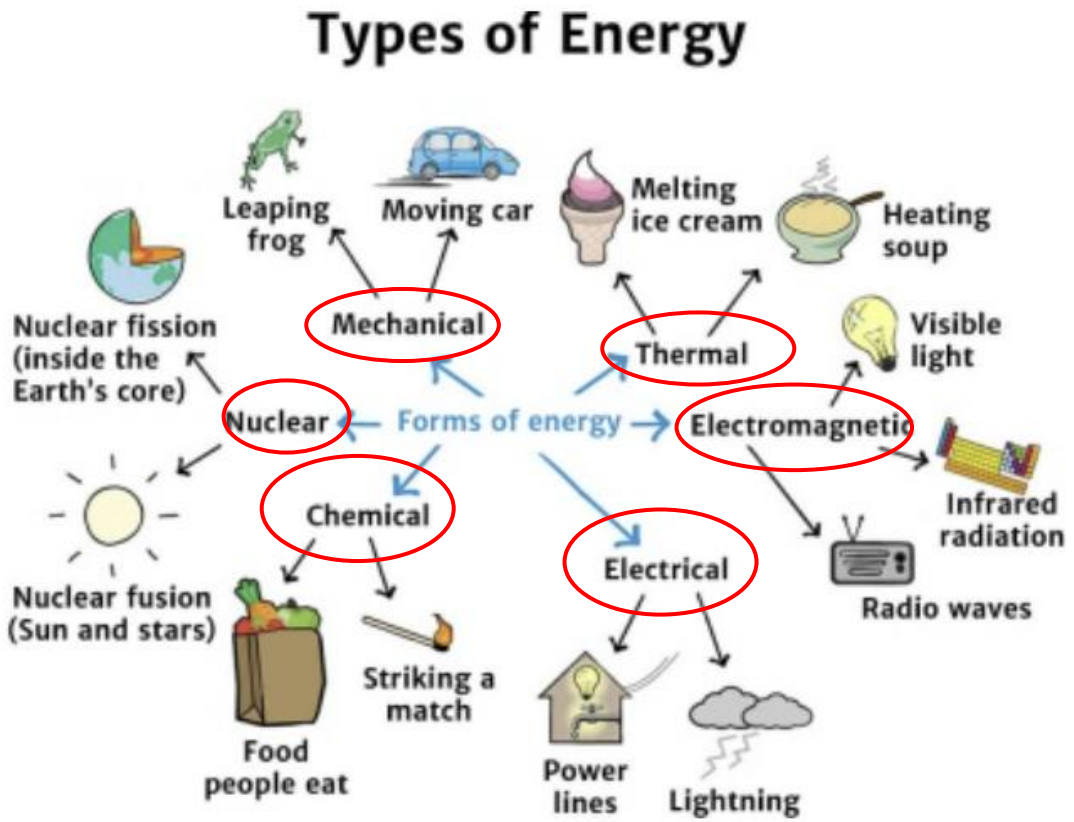
Appliance	Peak Power Demand (W)	Estimated Operating Time Per Day (hours)	Energy Consumption Per Day (kWh)
LED light bulb	5	5	0.025
Mobile phone charger	15	3	0.045
Portable camping fridge/freezer: 108L	50	8	0.4
CPAP medical device	75	8	0.6
Septic system aerator	120	24	2.88
Sump pump	600	2	1.2
Domestic 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

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

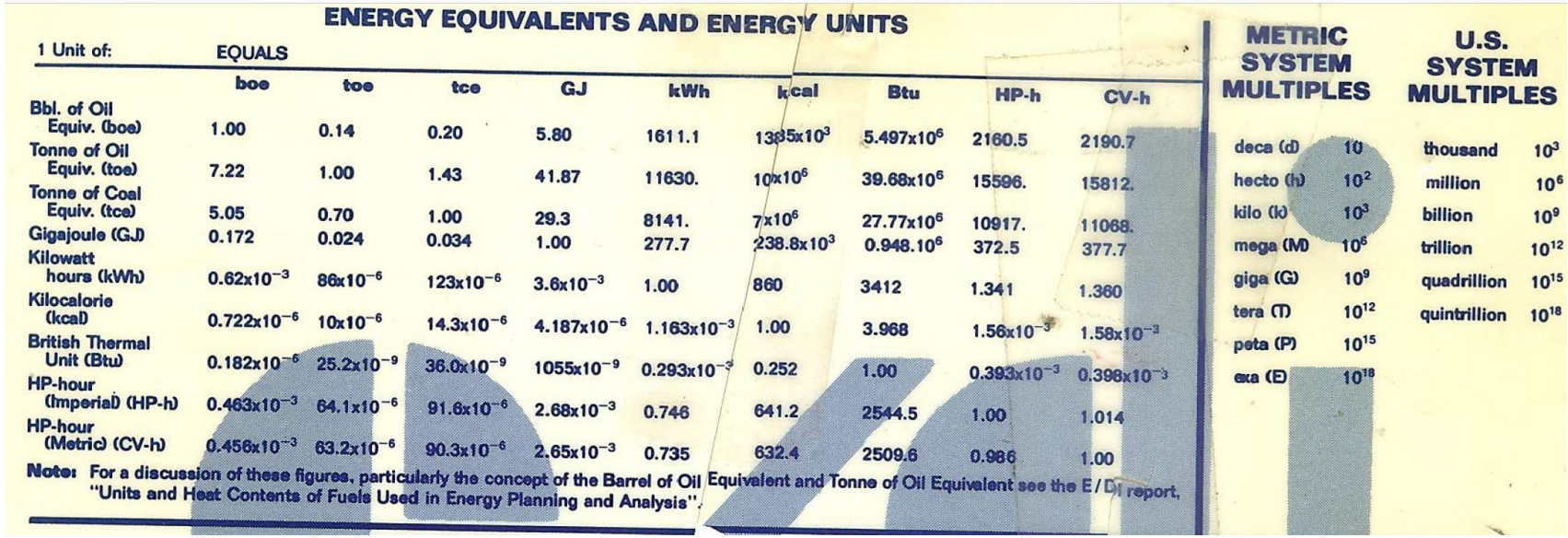
1 J (joule) = equal to the work done by a force of one newton acting through one metre

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.

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

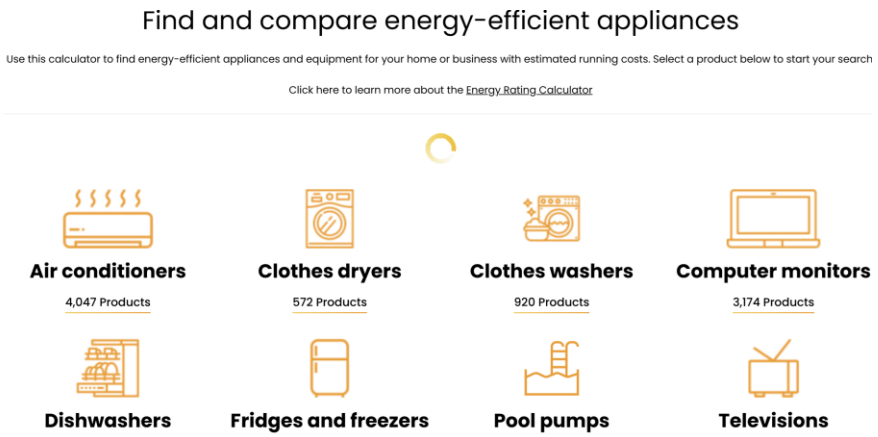
Part 1:
EARN Team Lorikeet-
-
Additional Slides On Research Questions and Survey

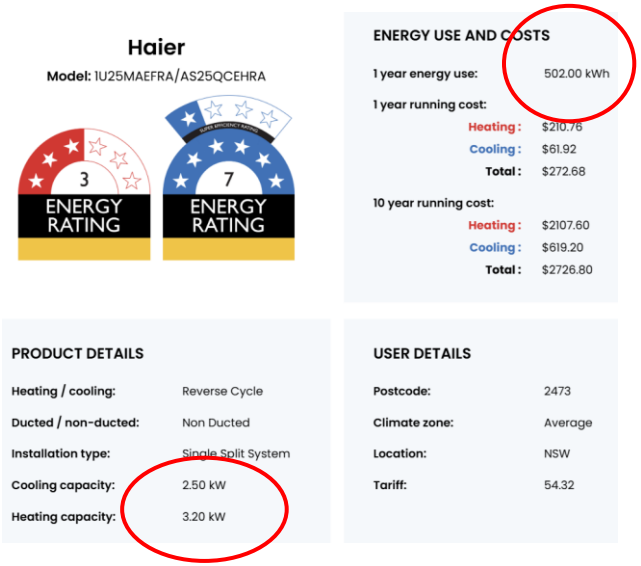
Example: how much energy does my household use per day?

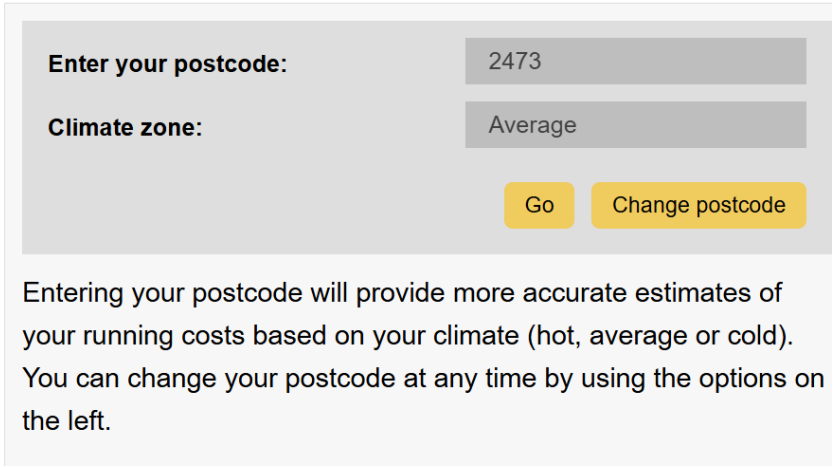
	kWe in Outage	h/d Outage	kWhe/d Outage
Washing Machine Bosch 239 kwh/year (warm but we do cold)	1.5	0	0
Refrigerator (with freezer on top) Samsung 300kwh/year	1.5	2	3
Aircon (used very infrequently for heat/cool)	3	0	0
3 ceiling fans (used very infrequently)	0.6	0	0
TV	0.01	0	0
Kettle/Toaster	1.5	0.13	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!**

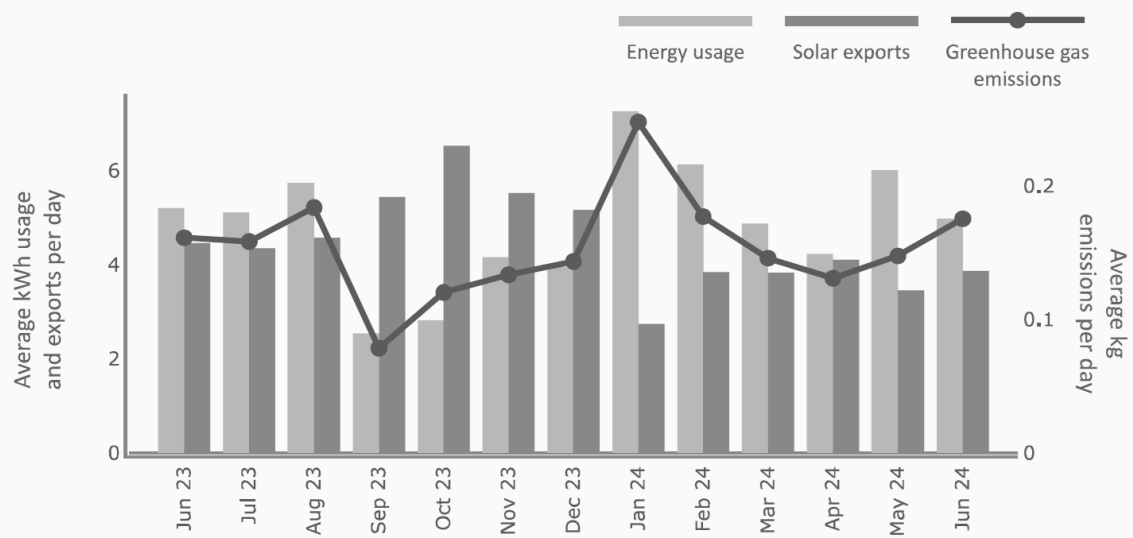
Your average daily usage this billing period.

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?


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

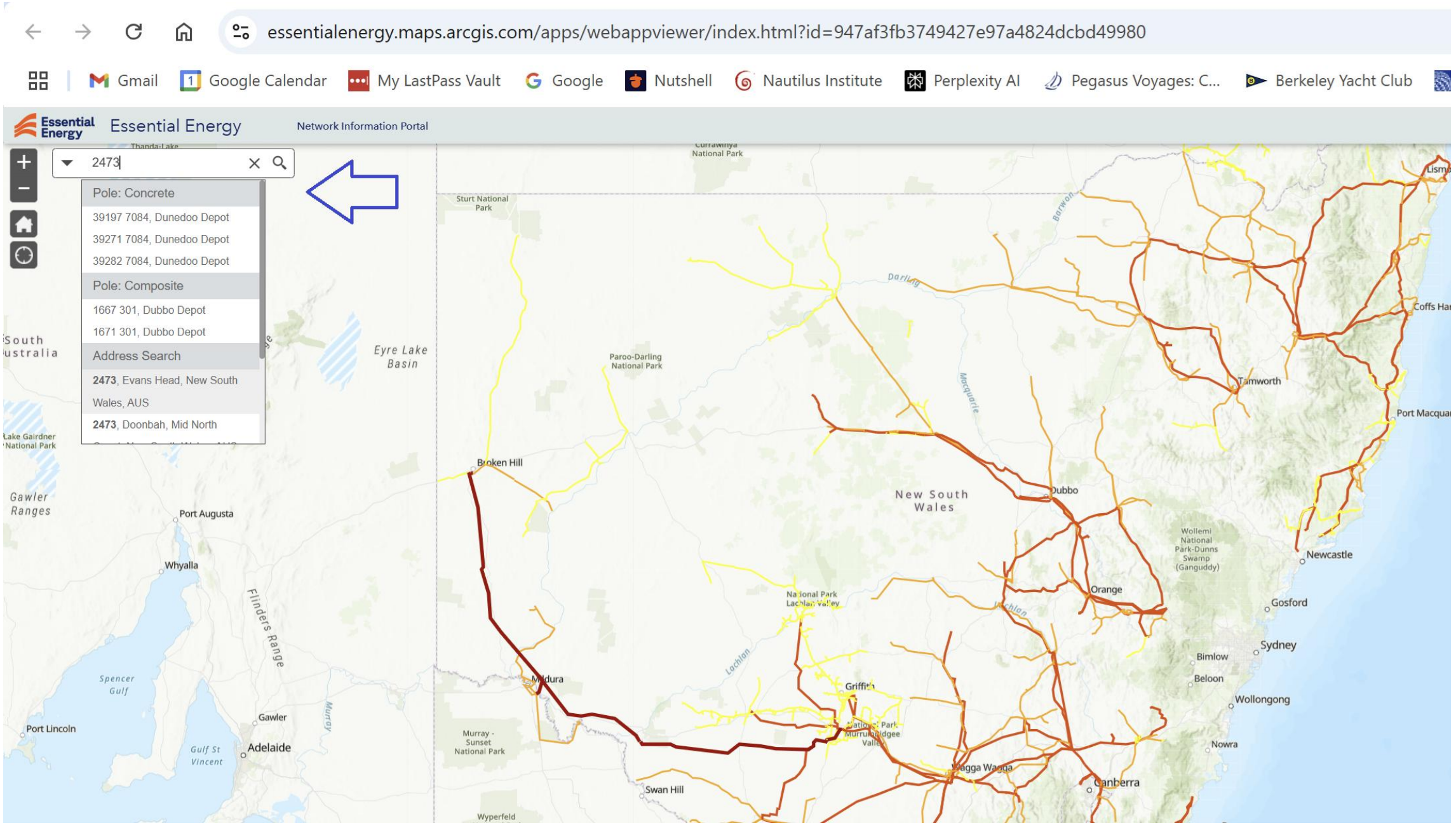
- Scan down the page and click on: **Network Information Portal**

- Click on **TERMS** box and **OK**

- **Find top left box:** Enter post code 2473 or Street Address from drop down box

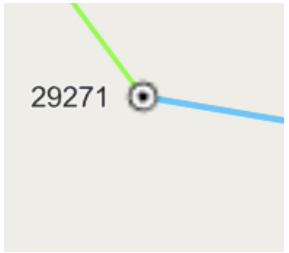
TIPS:

- 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

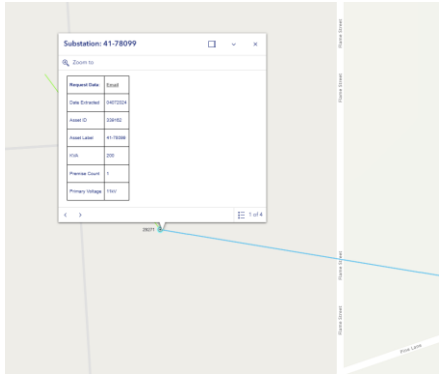

essentialenergy.maps.arcgis.com/apps/webappviewer/index.html?id=947af3fb3749427e97a4824dcbd49980
Gmail
Google Calendar
My LastPass Vault
Google
Nutshell
Nautilus Institute
Perplexity AI
Pegasus Voyages: C...
Berkeley Yacht Club
Essential Energy
Network Information Portal
2473
Pole: Concrete
39197 7084, 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
Wagga Wagga
Mildura
Swan Hill
Murray - Sunset National Park
Port Augusta
Whyalla
Gawler Ranges
Flinders Range
Spencer Gulf
Port Lincoln
Gawler
Adelaide
Gulf St Vincent
Darling
Macquarie
Lachlan
Murray

- **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



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

- **Evans Area Background Briefing Part 1**

- **EARN Energy Survey Part 2**

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).**

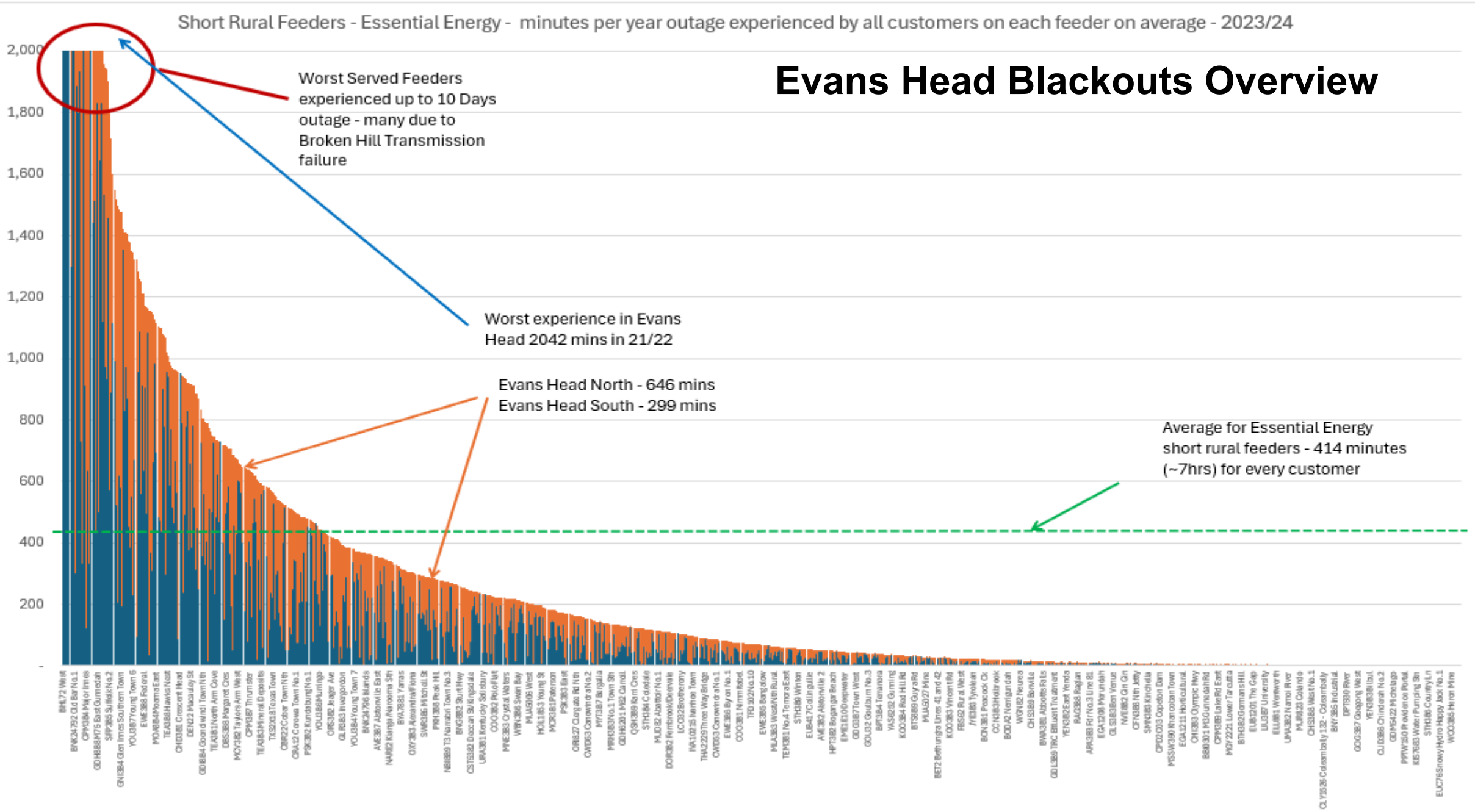
Performance Targets

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

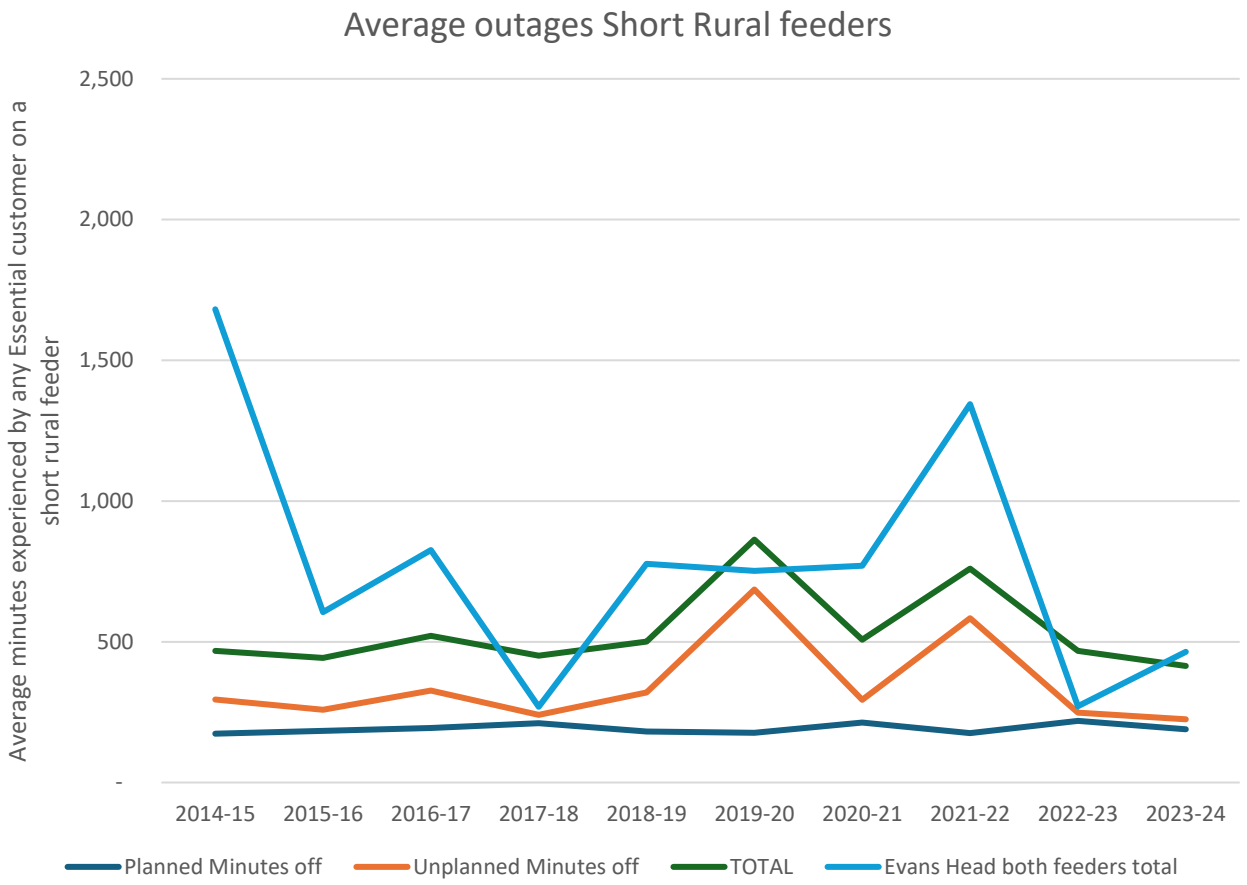
Major Event Days (e.g. floods) **do not count** against performance targets.

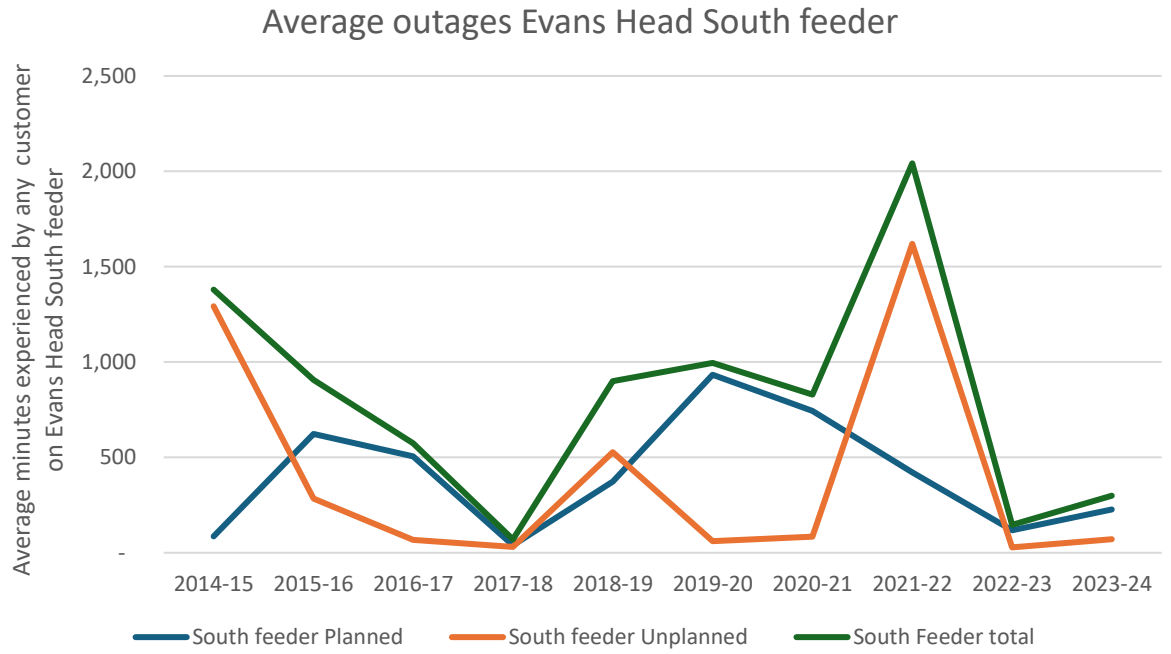
- Outages **not caused by Essential Energy** (e.g., Broken Hill blackout) are excluded from performance metrics.

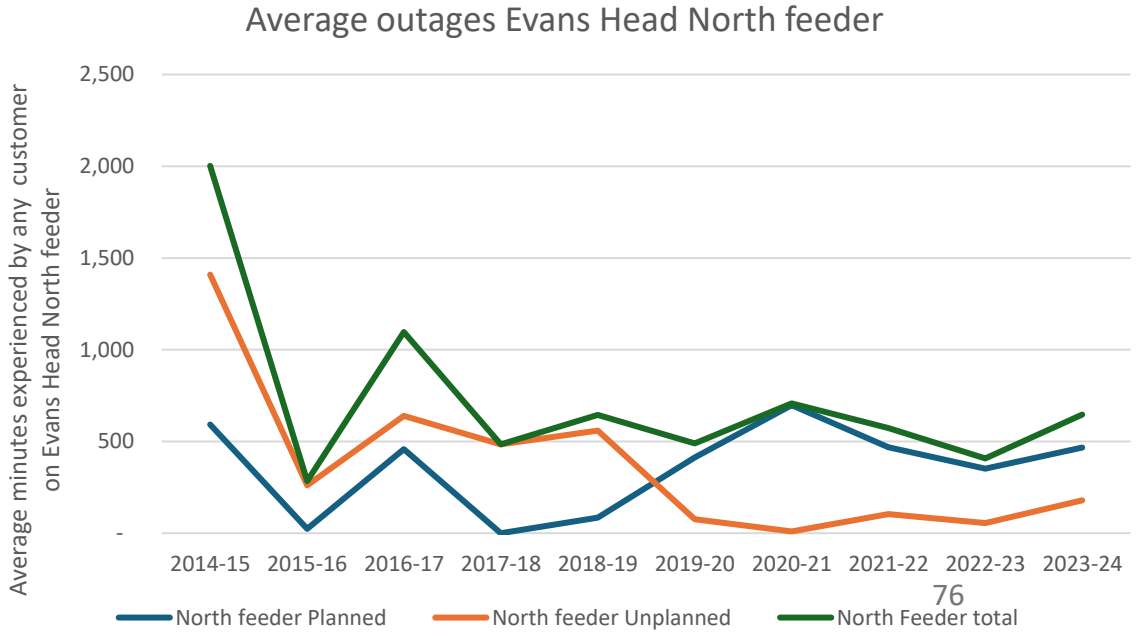
Evans Head Blackouts Overview

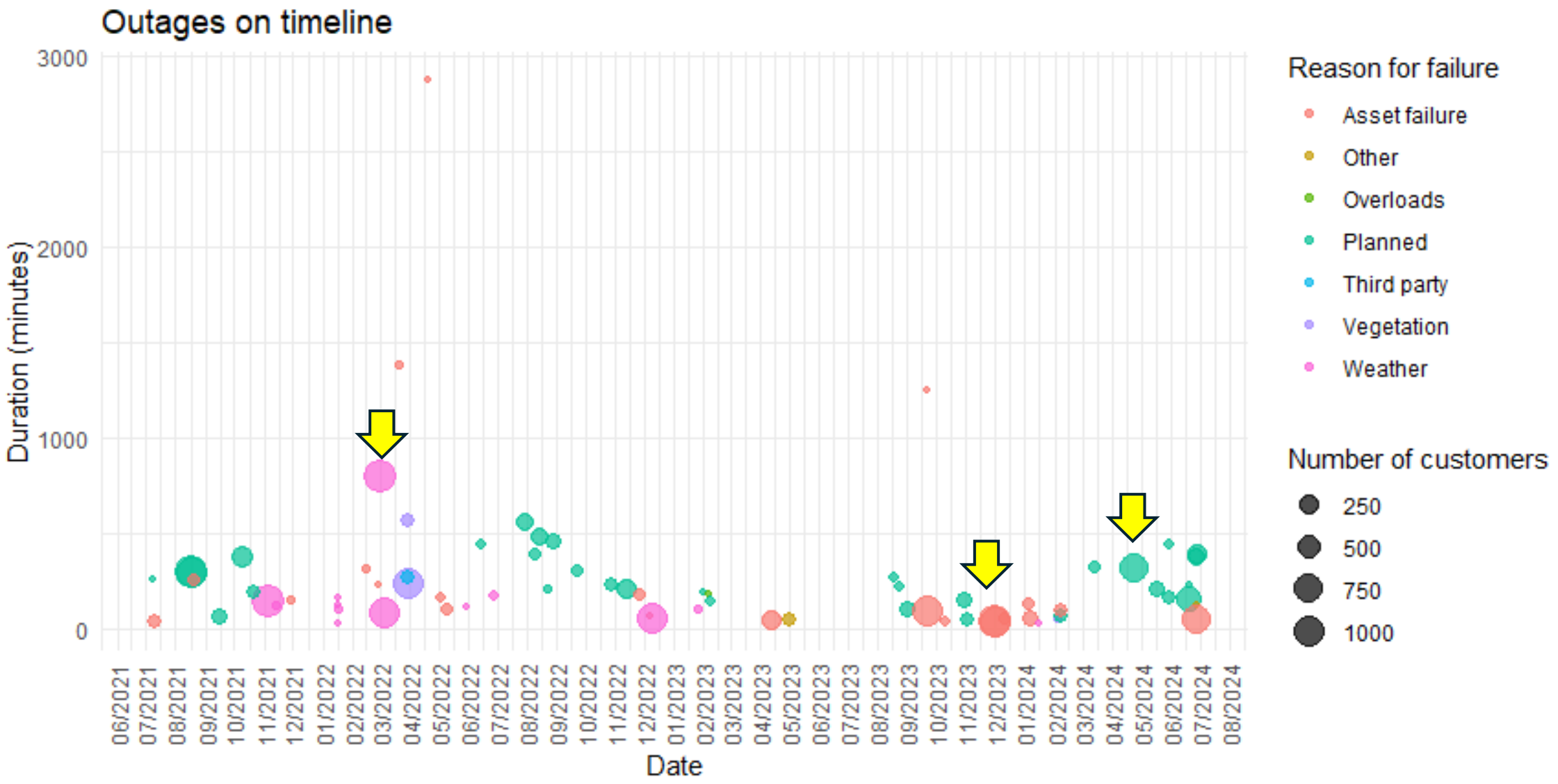


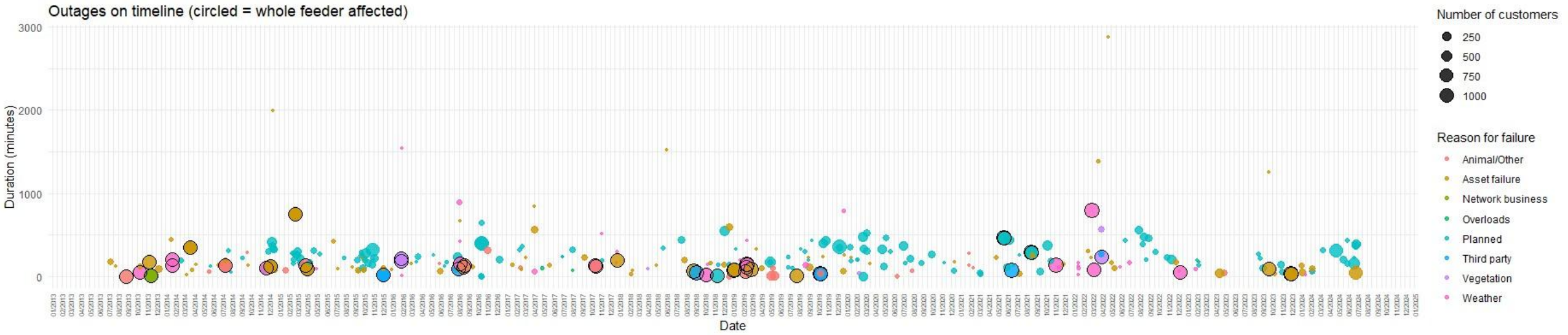
Evans Head Blackouts Overview








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



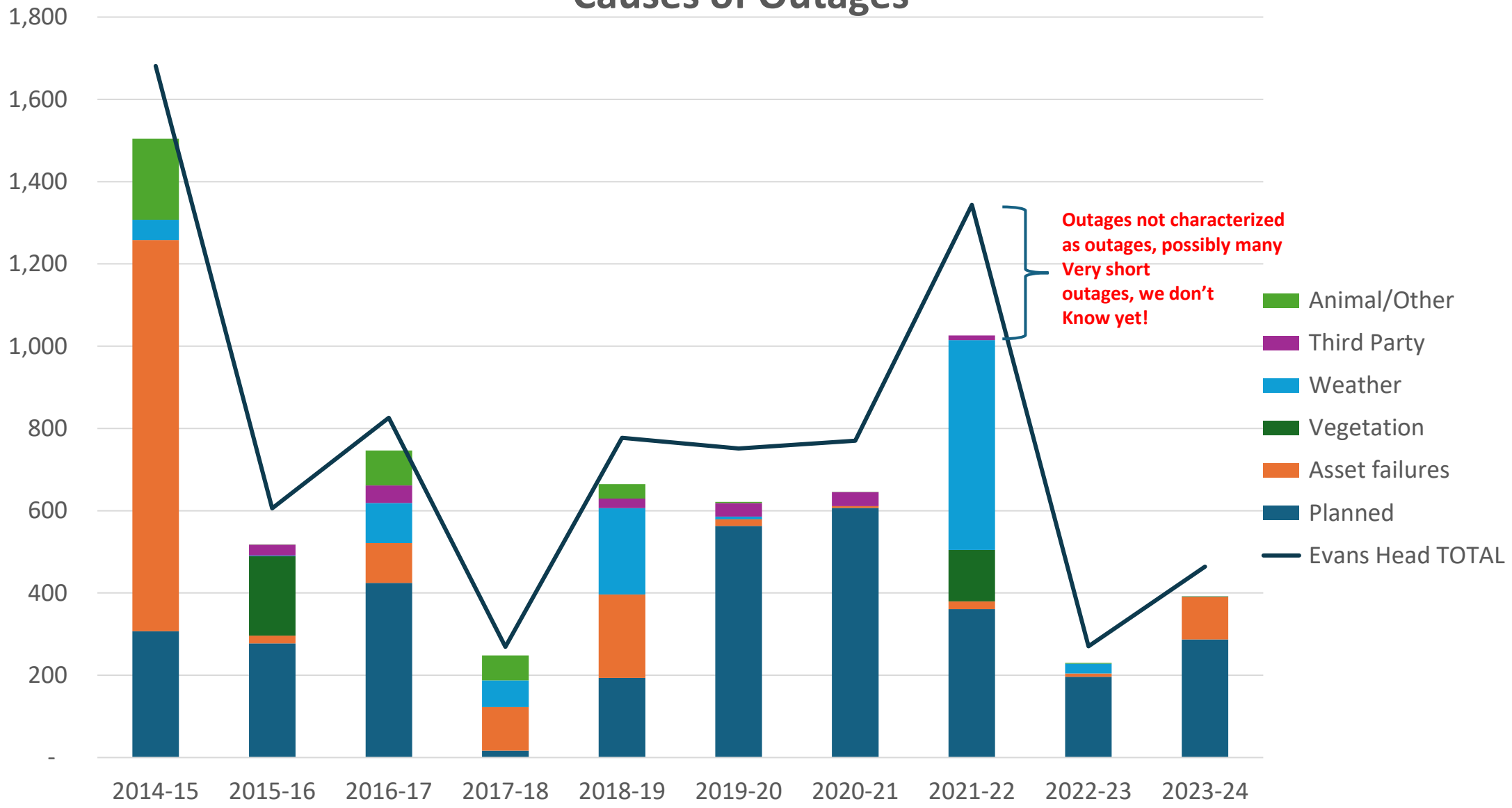
Ring around circle = outages of more than 900 customers
Note: “more than 900 customers” also means one of the two feeders was completely knocked out and the problem was "upstream" of Evans Head because there weren’t that many customers on either feeder to Evans after Doonbah split
Not shown on graph 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	Short Rural	Weather		952	137
17/18 stats	16/10/2017	10:38	WBN3B6 Evans Head Nth	Short Rural	Animal	Animal impact	952	130
17/18 stats	24/12/2017	03:04	WBN3B6 Evans Head Nth	Short Rural	Asset failure	HV	951	201
16/17 stats	31/07/2016	20:26	WBN3B6 Evans Head Nth	Short Rural	Third party	Fire	947	80
16/17 stats	4/08/2016	01:12	WBN3B6 Evans Head Nth	Short Rural	Weather		947	163
16/17 stats	16/08/2016	09:07	WBN3B6 Evans Head Nth	Short Rural	Asset failure	HV	947	116
16/17 stats	20/08/2016	22:38	WBN3B6 Evans Head Nth	Short Rural	Animal	Animal impact	947	132
14/15 stats	26/03/2015	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	Short Rural	Vegetation	Blow-in/Fall-in	934	216
15/16 stats	1/12/2016	14:06	WBN3B6 Evans Head Nth	Short 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	Short 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	Short 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	Short 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



Key issue to resolve: what is feeder interconnection at or after Doonbah split to avoid outages from one feeder going down?

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

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?

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


29580
88701
29589
29590
29582
29671
29670
PP27726
Evans Head
(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