CHANGING WEATHER
Transforming Energy

with

ENERGY TOGETHER
Connecting Community Energy Groups

formerly the Coalition for Community Energy



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Electrical Engineer

Chair – Energy Together

Churchill Fellow

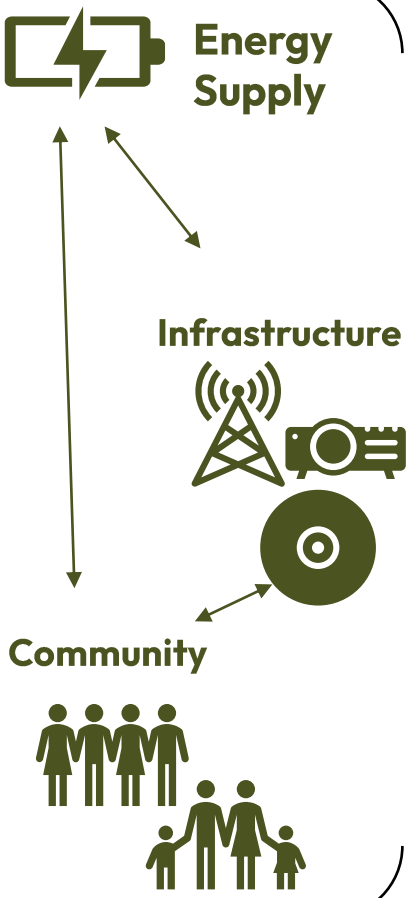
20 November 2026 – CADEER workshop





Resilience Framework

1. Resilience of what?



2. Disturbances - Resilience to what?

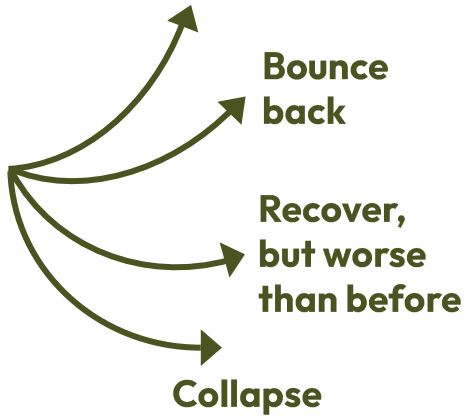


3. Capacity to deal with disturbance

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

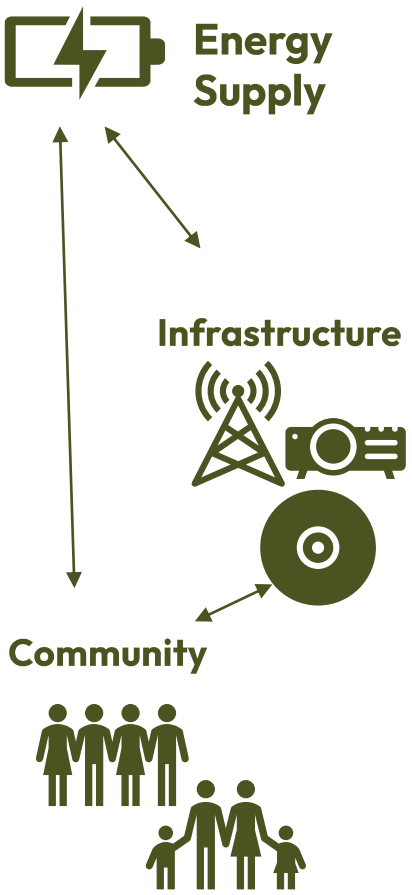
Bounce Back = Preparation, monitoring, responding

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

Collapse = fundamentally changed by the event/s

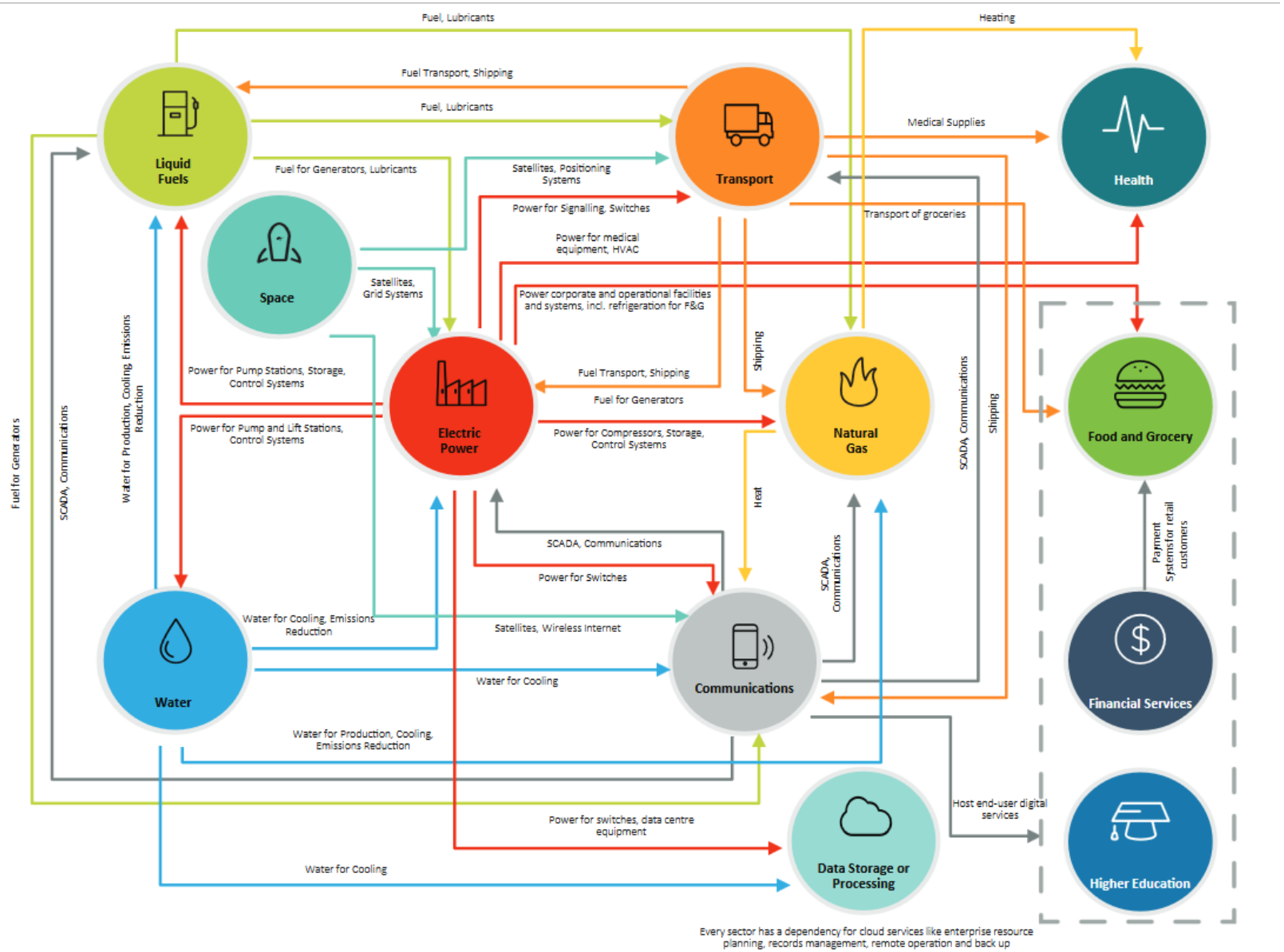
Relationships!

1. **Resilience of what?**



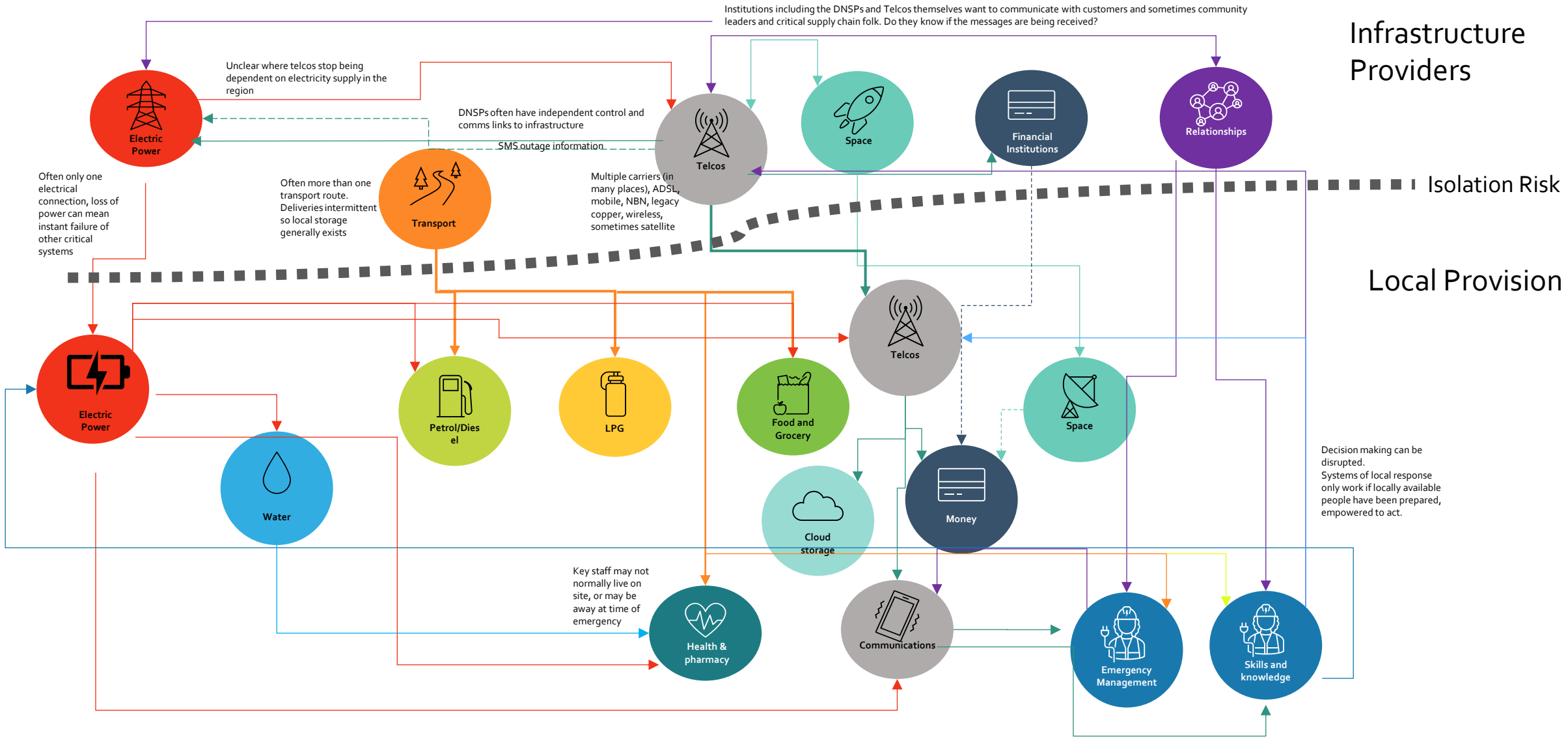
- Local energy – system
- Telecommunications – energy
- Water system – energy
- Fuels – electricity
- Transport system – transport energy
- People – energy (understanding, fixing, operating)
- Energy people – local people
- Institutions – roles
- Leaders - everyone
- People – people
- Communication between people, things, people and things

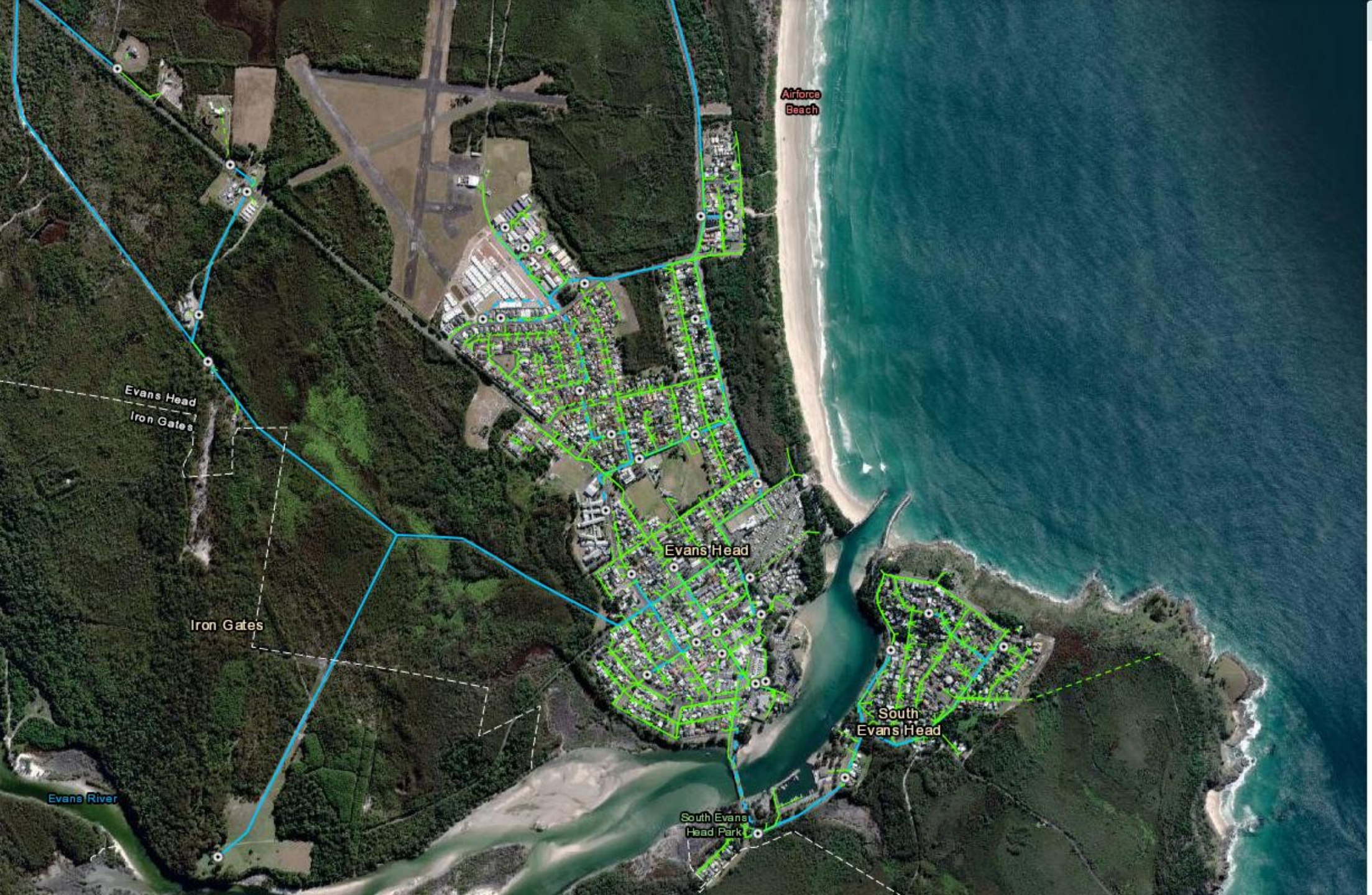
Interdependencies



Security of Critical Infrastructure, Australian Government

Local Interdependencies





Legend

Substation

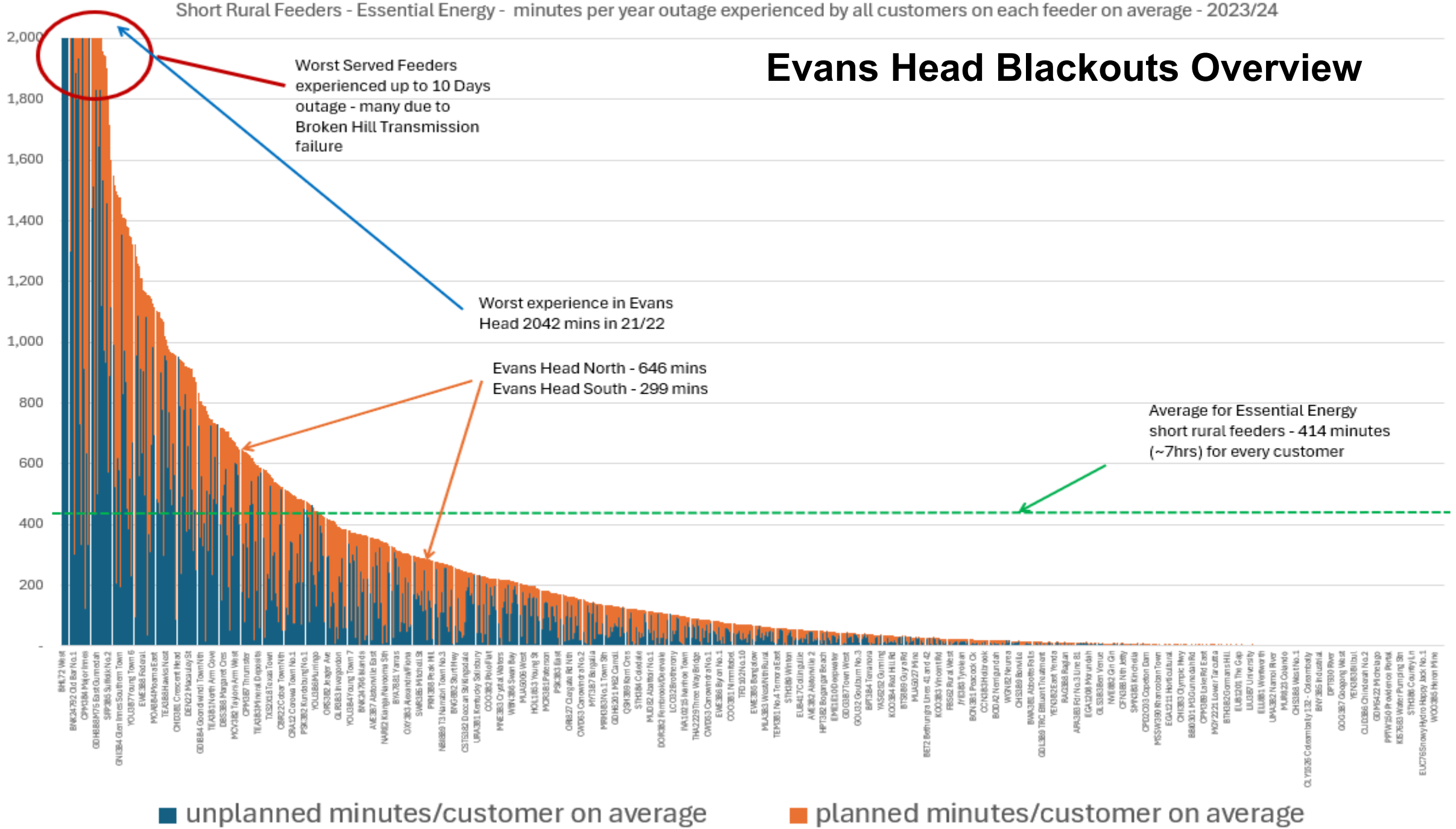
EE OH Span

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

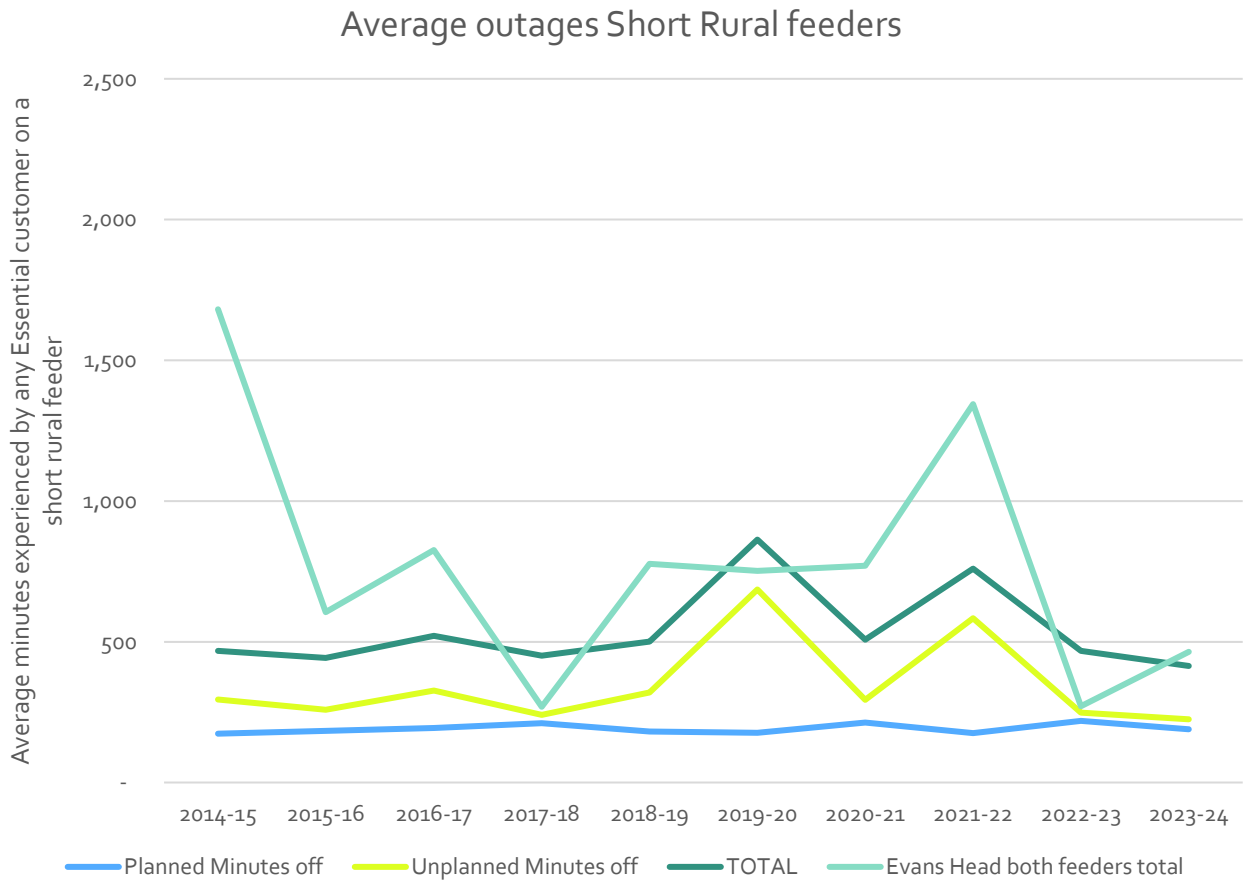
EE UG Cable

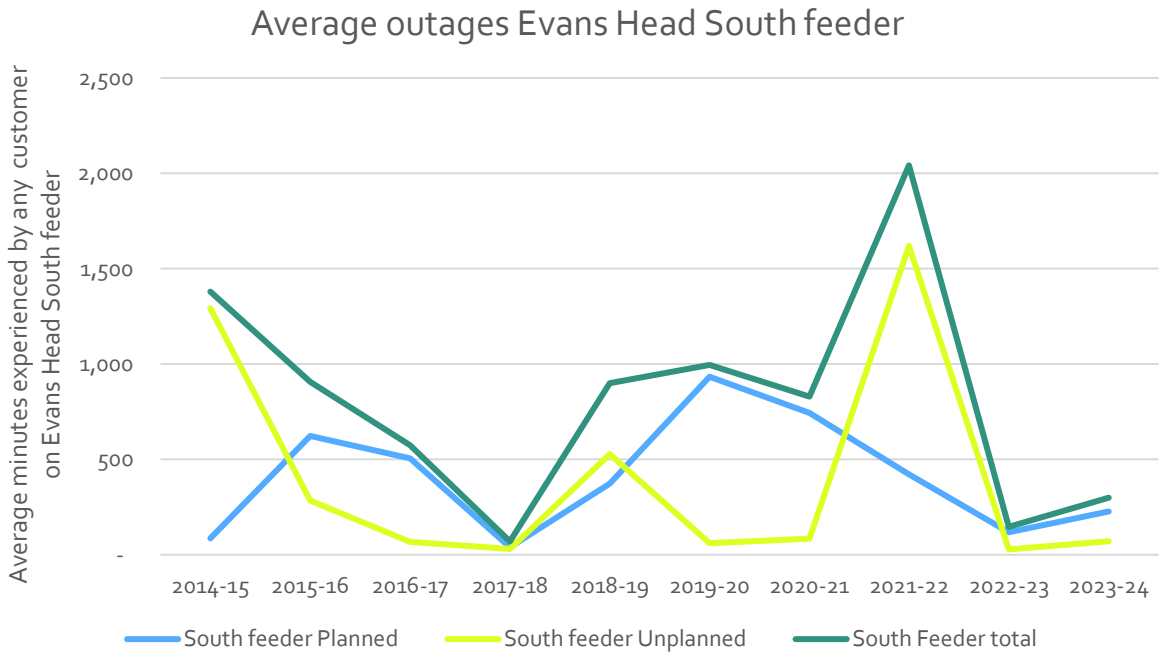
- 6.35kV
- 6.6kV
- LV
- 11kV
- 12.7kV
- 19.1kV
- 22kV
- 33kV

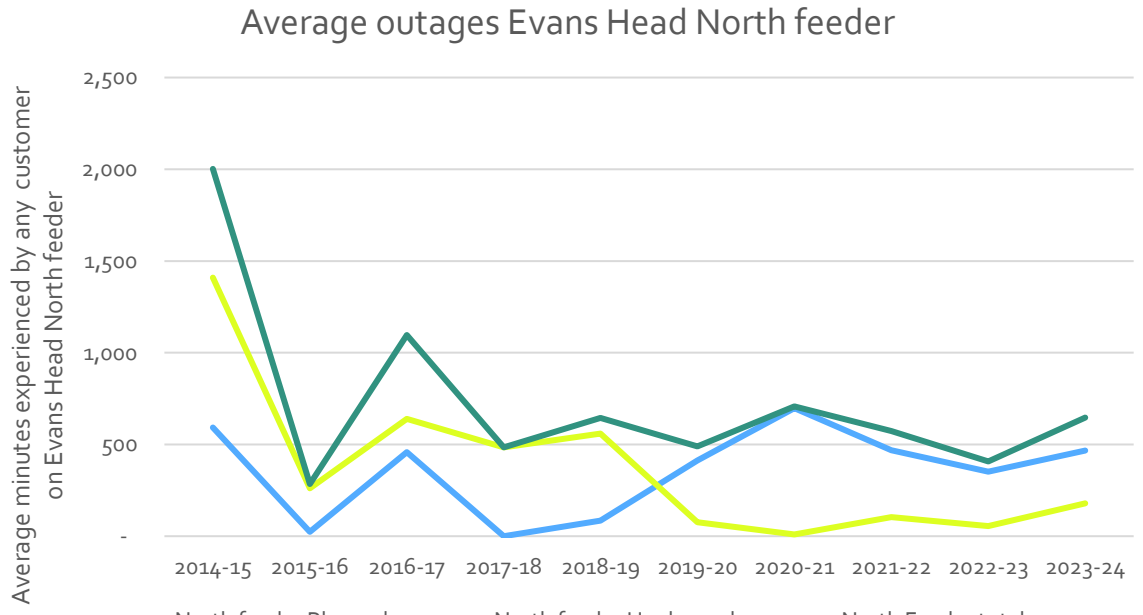
Evans Head Blackouts Overview

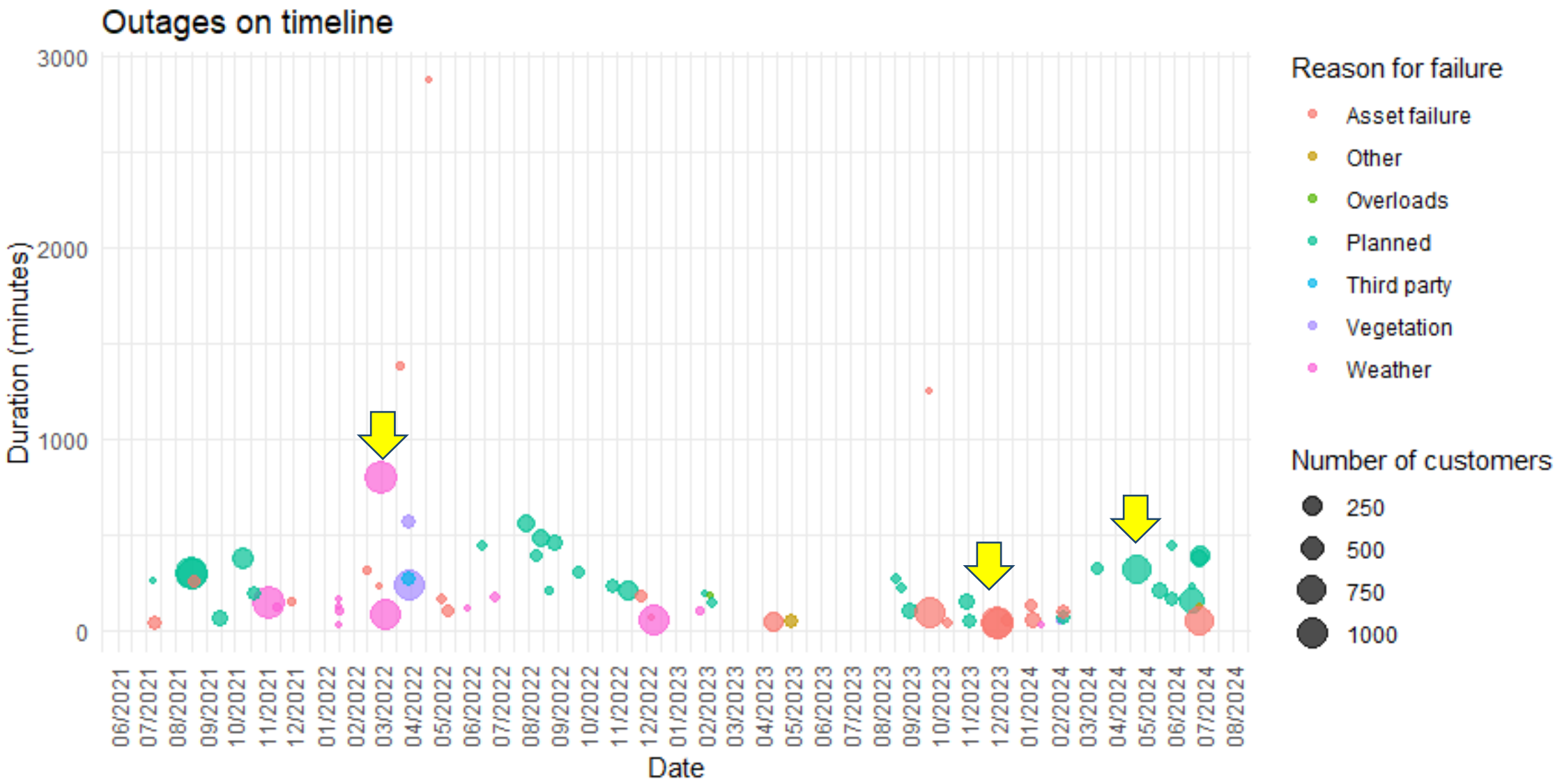


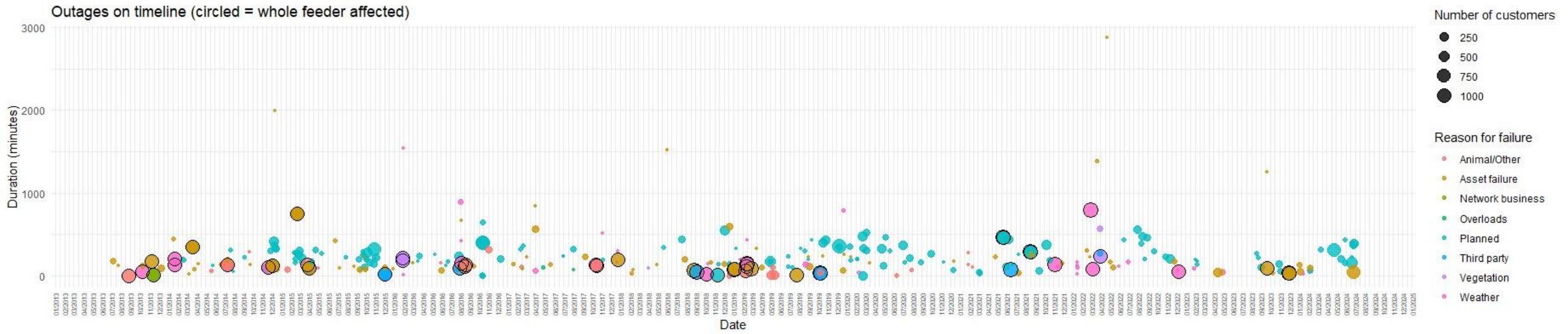
Evans Head Blackouts Overview








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

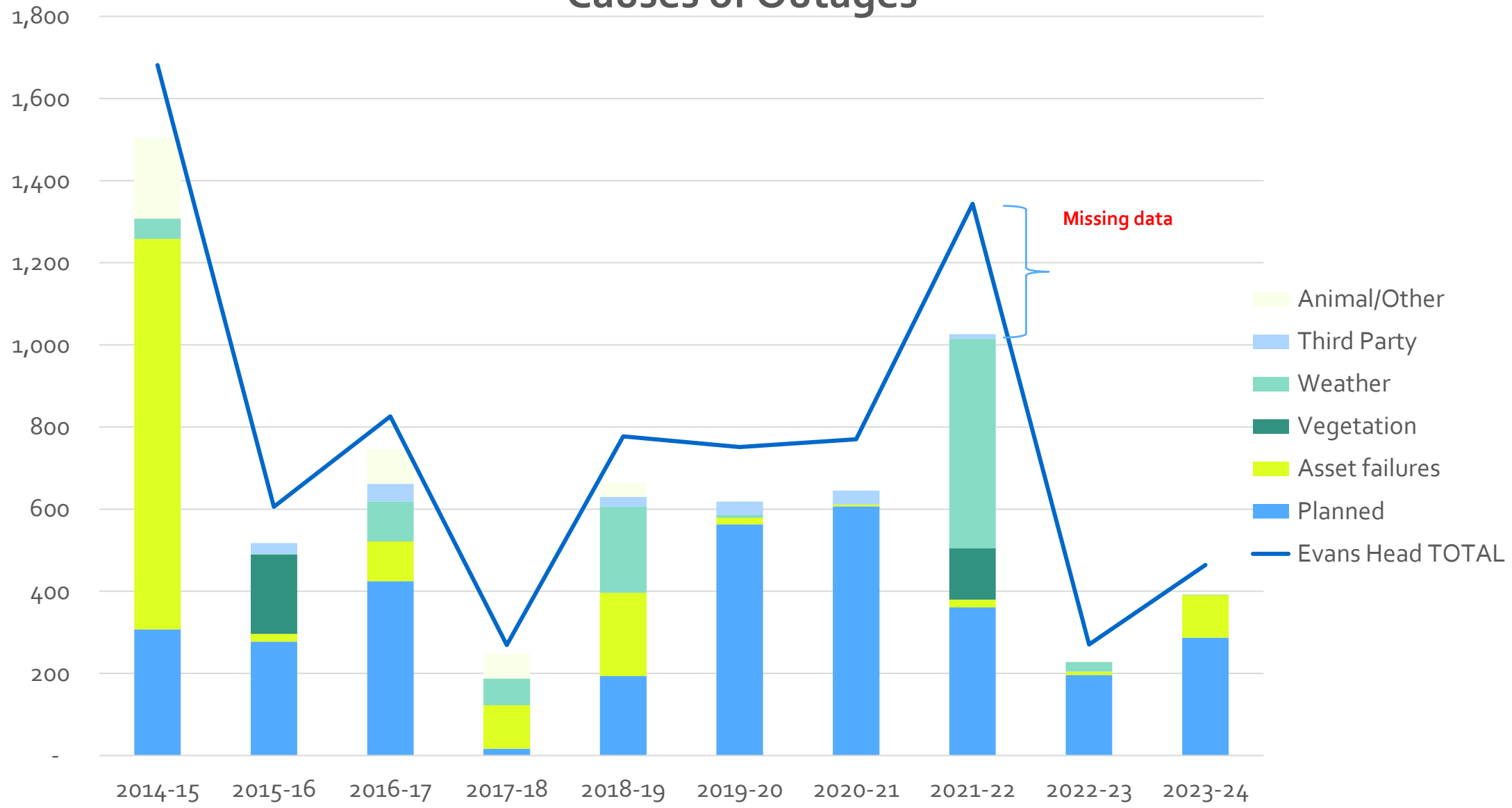


Ring around circle = outages of more than 900 customers = whole community

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	15/08/2016	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 issues to resolve: How North South feeders are managed, emergency response, missing data

Minutes of outage on Venus Bay feeder (WGI24) over the

	2013	2014	2015	2016	2017	2018	2019	2020	2021
actual total minutes / customer experienced	246	322	86	510	361	964	-	554	2,672

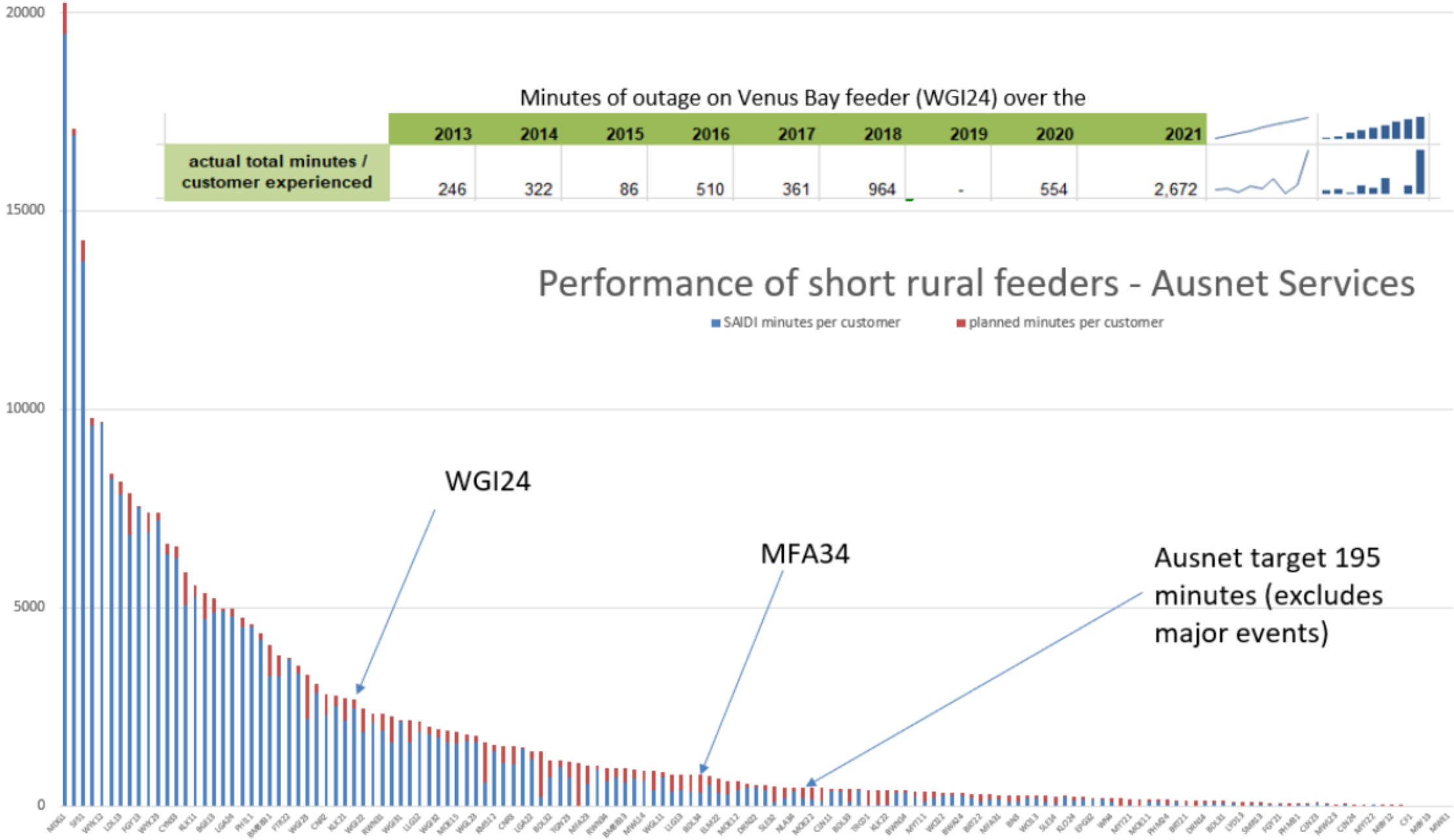


Figure 6 Comparison of Ausnet Short Rural feeders

Conclusion

- Reliability data only looks at electricity network perspective
- Data is not the whole story – planned, unplanned, major event days, momentary, enduring, which customers.
- Electricity system is always changing
- Can help ensure anecdotes and electricity company stories concur
- Can start the conversation