



West Coast Network

Supplementary Information - Substation Load Characteristics

EECA

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INSPIRED. AGILE. GENUINE.

 **ERGO**
CONSULTING

Document history and status

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Revision details

Revision	Details
A	Supplementary document created to reduce size of overall “spare capacity and load conversion opportunity report”
B	Issued in Final

Table of Contents

1.	Introduction	1
2.	Transmission/GXP Substations.....	2
3.	Zone Substations.....	17
3.1	EA Networks	Error! Bookmark not defined.
3.2	Buller Electricity.....	36

List of Figures

Figure 1	Dobson: Apparent power (MVA) load characteristics.....	3
Figure 2	Dobson: Reactive power (MVar) load characteristics.....	4
Figure 3	Greymouth: Apparent power (MVA) load characteristics.....	5
Figure 4	Greymouth: Reactive power (MVar) load characteristics.....	6
Figure 5	Hokatika: Apparent power (MVA) load characteristics.....	7
Figure 6	Hokatika: Reactive power (MVar) load characteristics.....	8
Figure 7	Kumara: Apparent power (MVA) load characteristics.....	9
Figure 8	Kumara: Reactive power (MVar) load characteristics.....	10
Figure 9	Otira: Apparent power (MVA) load characteristics.....	11
Figure 10	Otira: Reactive power (MVar) load characteristics.....	12
Figure 11	Reefton: Apparent power (MVA) load characteristics	13
Figure 12	Reefton: Reactive power (MVar) load characteristics	14
Figure 13	Robertson Street: Apparent power (MVA) load characteristics	15
Figure 14	Robertson Street: Reactive power (MVar) load characteristics.....	16
Figure 15	Arnold 33/11kV zone substation: Apparent power (MVA) load characteristics	18
Figure 16	Blackwater 33/11kV zone substation: Apparent power (MVA) load characteristics	19
Figure 17	Dobson 33/11kV zone substation: Apparent power (MVA) load characteristics.....	20
Figure 18	Franz Glacier 33/11kV zone substation: Apparent power (MVA) load characteristics.....	21
Figure 18	Fox Glacier 33/22kV zone substation: Apparent power (MVA) load characteristics	22
Figure 19	Greymouth 66/11kV zone substation: Apparent power (MVA) load characteristics	24
Figure 20	Harihari 33/11kV zone substation: Apparent power (MVA) load characteristics.....	25
Figure 21	Hokatika 66/11kV zone substation: Apparent power (MVA) load characteristics.....	26
Figure 22	Kumara 66/11kV zone substation: Apparent power (MVA) load characteristics	27
Figure 23	Logburn 110/11kV zone substation: Apparent power (MVA) load characteristics.....	28
Figure 24	Ngahere 33/11kV zone substation: Apparent power (MVA) load characteristics	29
Figure 25	Otira 66/11kV zone substation: Apparent power (MVA) load characteristics.....	30
Figure 26	Rapahoe 33/11kV zone substation: Apparent power (MVA) load characteristics.....	31
Figure 27	Reefton 110/11kV zone substation: Apparent power (MVA) load characteristics.....	32
Figure 28	Ross 33/11kV zone substation: Apparent power (MVA) load characteristics.....	33

Figure 29 Wahapo 33/11kV zone substation: Apparent power (MVA) load characteristics	34
Figure 30 Whataroa 33/11kV zone substation: Apparent power (MVA) load characteristics.....	35
Figure 31 Robertson Street 110/11kV zone substation: Apparent power (MVA) load characteristics	37
Figure 32 Ngakawau 33/11kV zone substation: Apparent power (MVA) load characteristics.....	38
Figure 33 Kongahu 33/11kV zone substation: Apparent power (MVA) load characteristics.....	39

1. Introduction

The following figures illustrate the characteristics of the major electrical substations (both GXPs and Zone Substations) in the West Coast Region. This document supplements the main report titled “West Coast Network – Spare Capacity and Load Conversion Opportunity Report”.

For each GXP, the January 2021 through December 2022 apparent (MVA) and reactive loadings (MVar) are presented. For each Zone Substation, the apparent (MVA) loadings only are presented. The data is presented in graphs of:

- The load profile for the entire year.
- The maximum and minimum loads for each of the 365 days.
- Load profiles for two weeks in summer and two weeks in winter.
- Typical daily summer and winter load profiles.
- A load duration curve for the entire year.

2. Transmission/GXP Substations

The characteristics of the transmission substation **apparent and reactive power loadings** are shown in the following:

- **Dobson GXP**
 - Figure 1 Dobson: Apparent power (MVA) load characteristics
 - Figure 2 Dobson: Reactive power (MVar) load characteristics
- **Greymouth GXP**
 - Figure 3 Greymouth: Apparent power (MVA) load characteristics
 - Figure 4 Greymouth: Reactive power (MVar) load characteristics
- **Hokatika GXP**
 - Figure 5 Hokatika: Apparent power (MVA) load characteristics
 - Figure 6 Hokatika: Reactive power (MVar) load characteristics
- **Kumara GXP**
 - Figure 7 Kumara: Apparent power (MVA) load characteristics
 - Figure 8 Kumara: Reactive power (MVar) load characteristics
- **Otira GXP**
 - Figure 9 Otira: Apparent power (MVA) load characteristics
 - Figure 10 Otira: Reactive power (MVar) load characteristics
- **Reefton GXP**
 - Figure 11 Reefton: Apparent power (MVA) load characteristics
 - Figure 12 Reefton: Reactive power (MVar) load characteristics
- **Robertson Street GXP**
 - Figure 13 Robertson Street: Apparent power (MVA) load characteristics
 - Figure 14 Robertson Street: Reactive power (MVar) load characteristics

DOBSON MVA

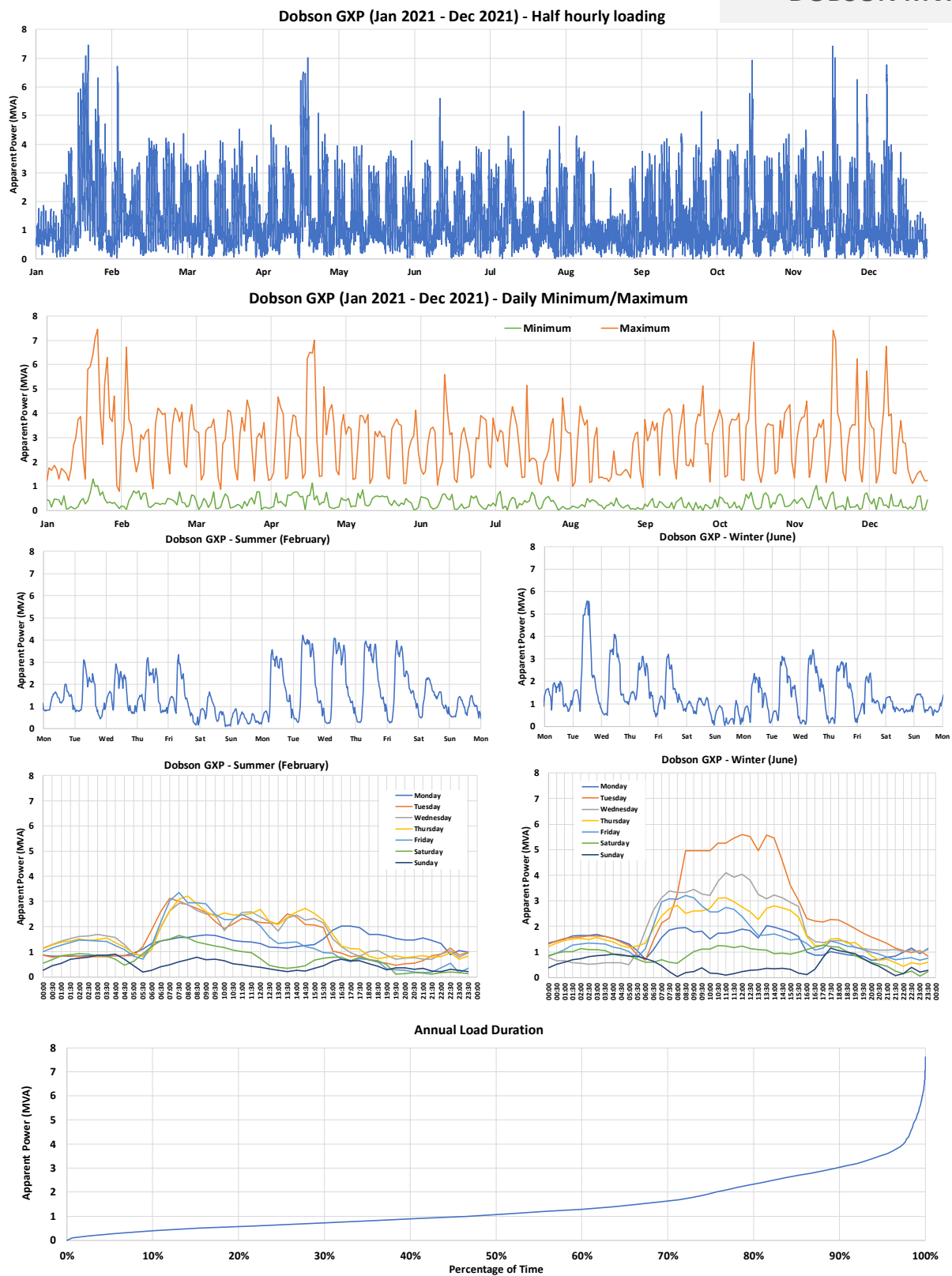


Figure 1 Dobson: Apparent power (MVA) load characteristics

DOBSON MVar

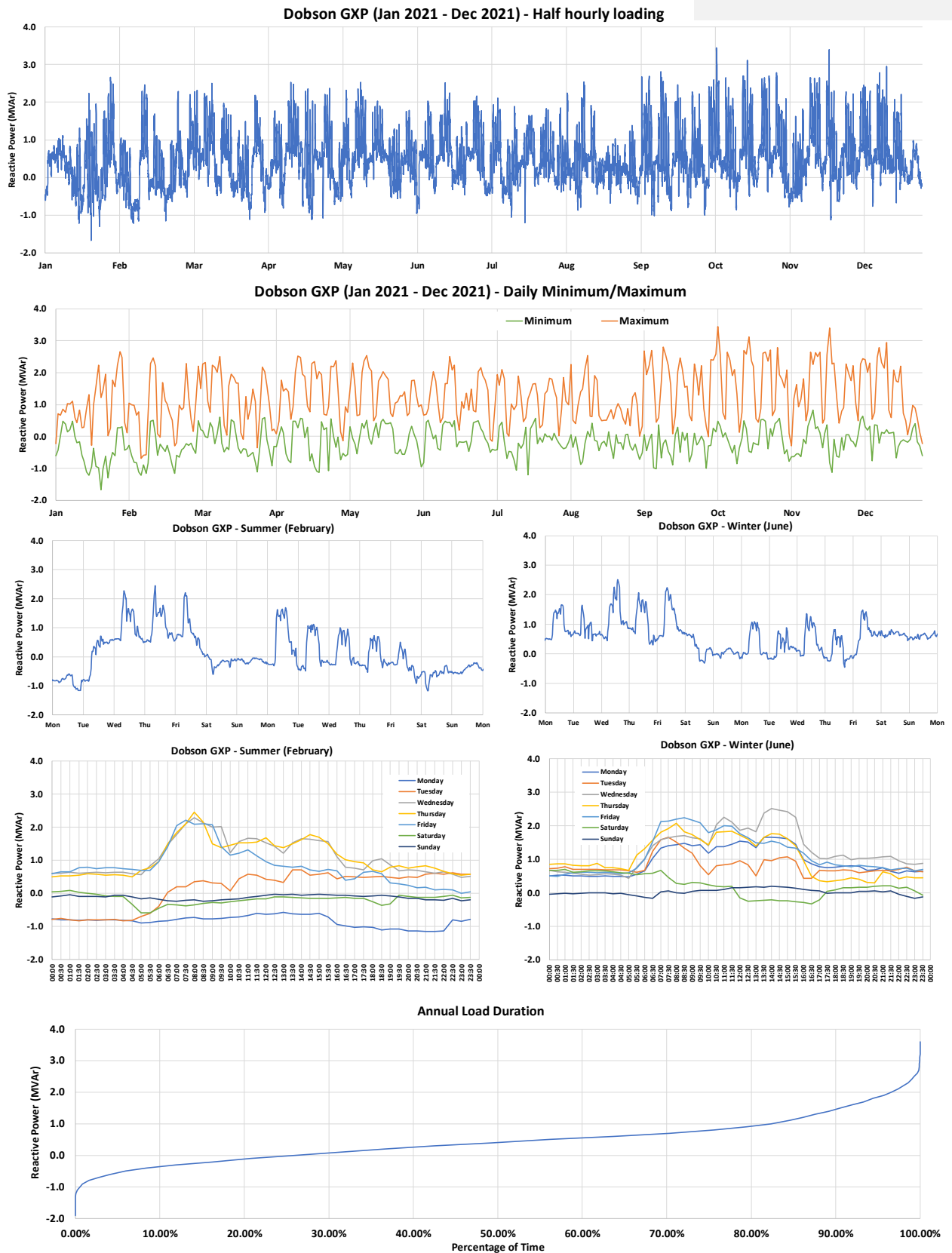


Figure 2 Dobson: Reactive power (MVar) load characteristics

GREYMOUTH MVA

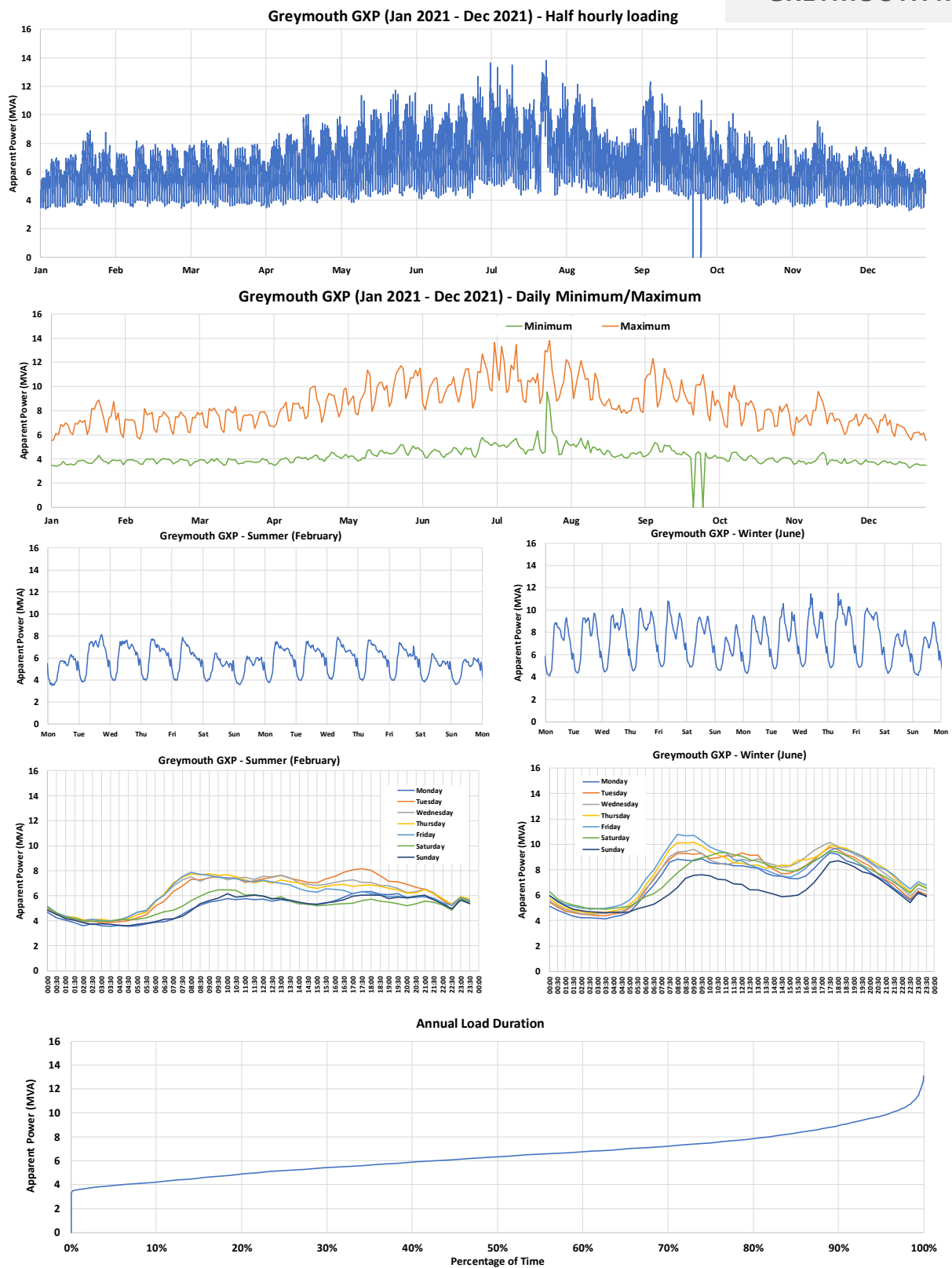


Figure 3 Greymouth: Apparent power (MVA) load characteristics

GREYMOUTH MVAR

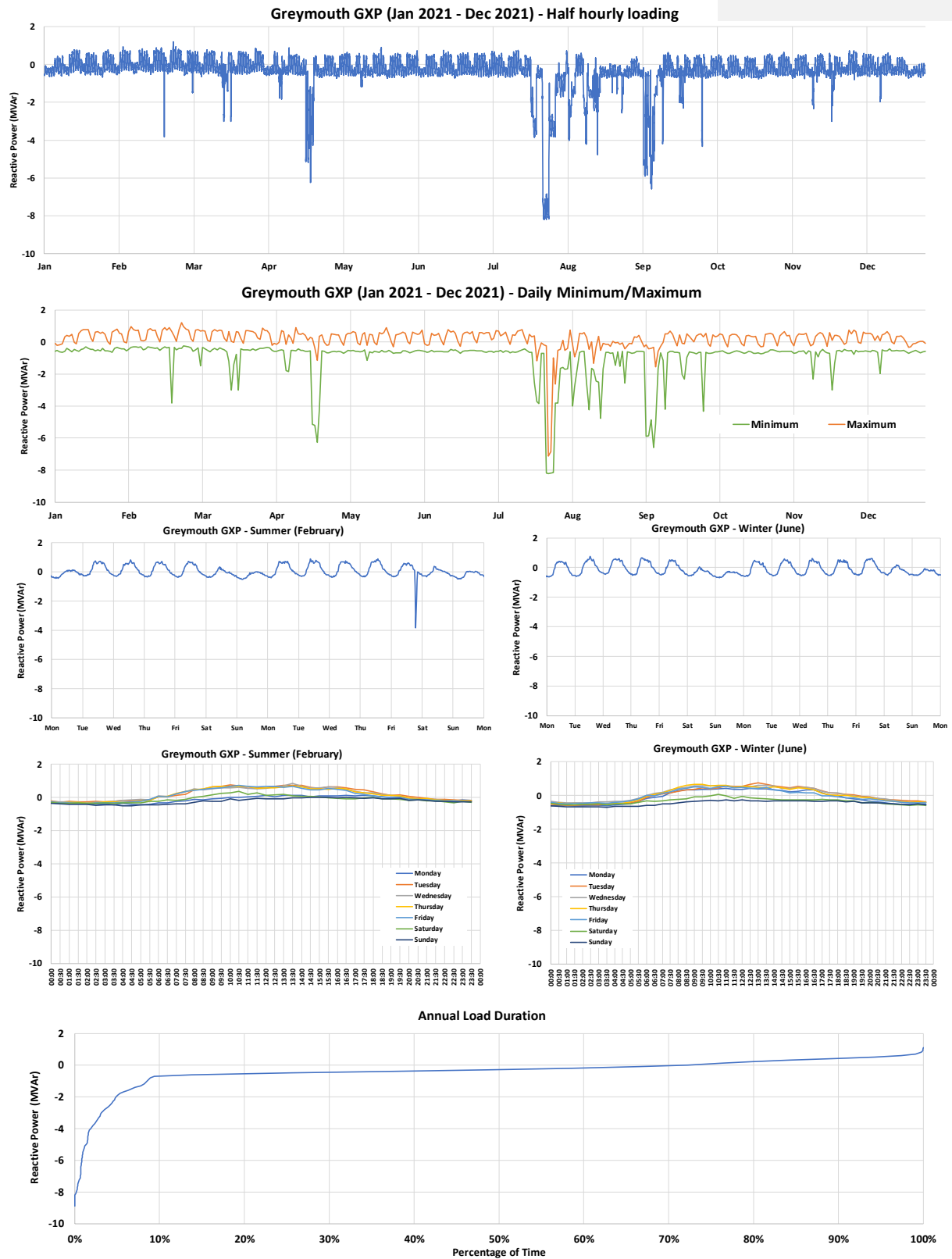


Figure 4 Greymouth: Reactive power (MVAR) load characteristics

HOKATIKA MVA

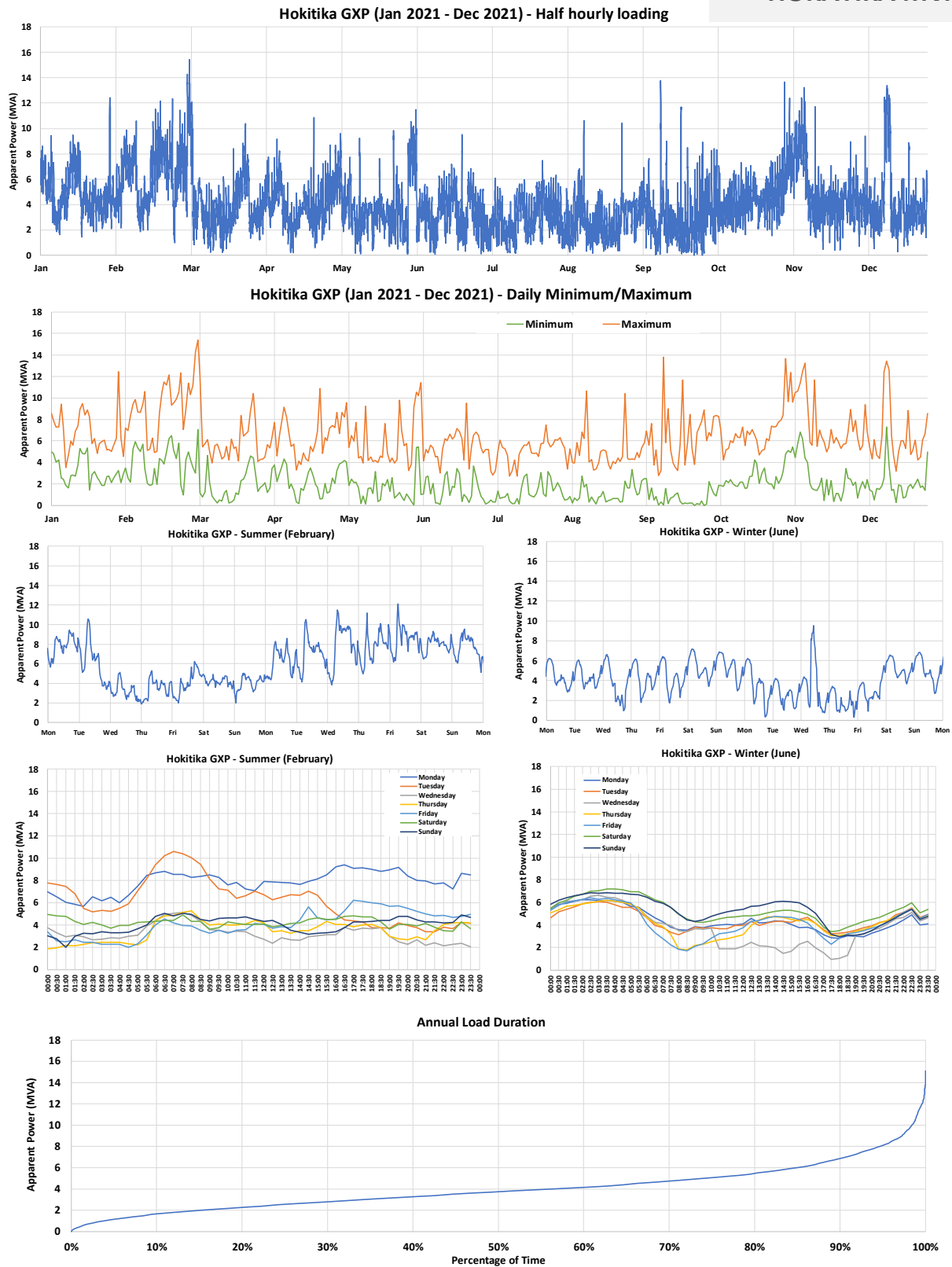


Figure 5 Hokatika: Apparent power (MVA) load characteristics

HOKATIKA MVar

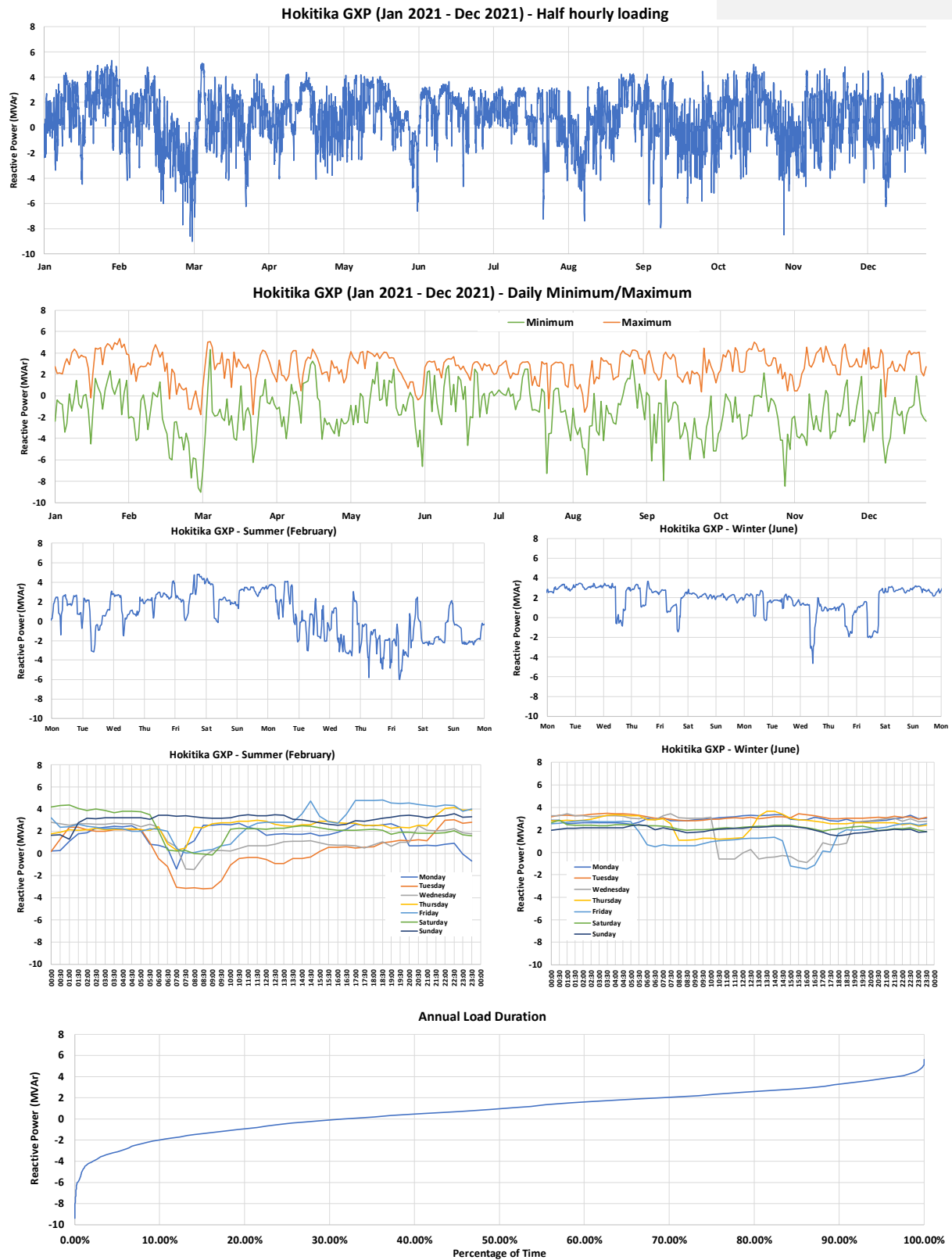


Figure 6 Hokatika: Reactive power (MVar) load characteristics

KUMARA MVA

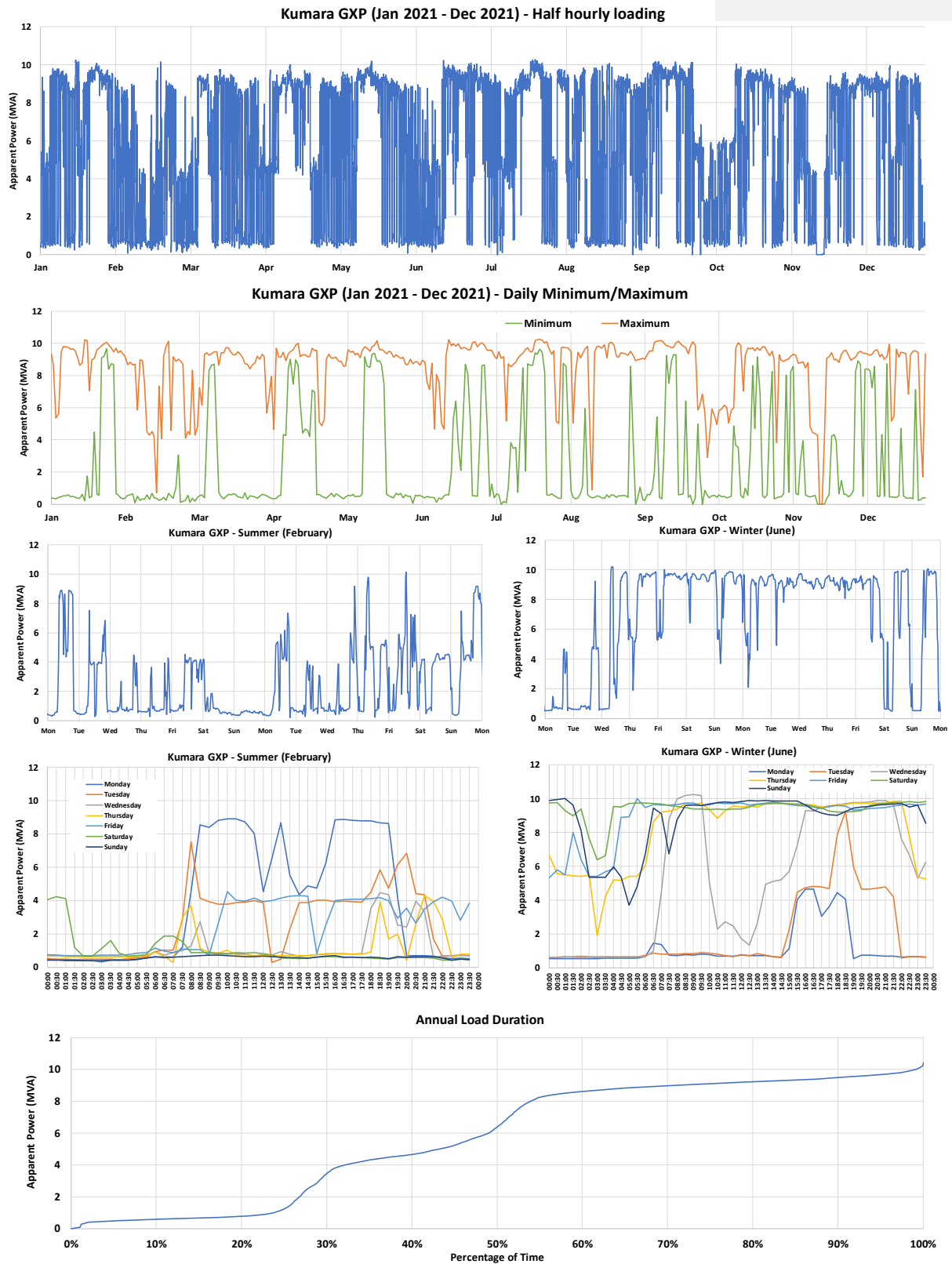


Figure 7 Kumara: Apparent power (MVA) load characteristics

KUMARA MVar

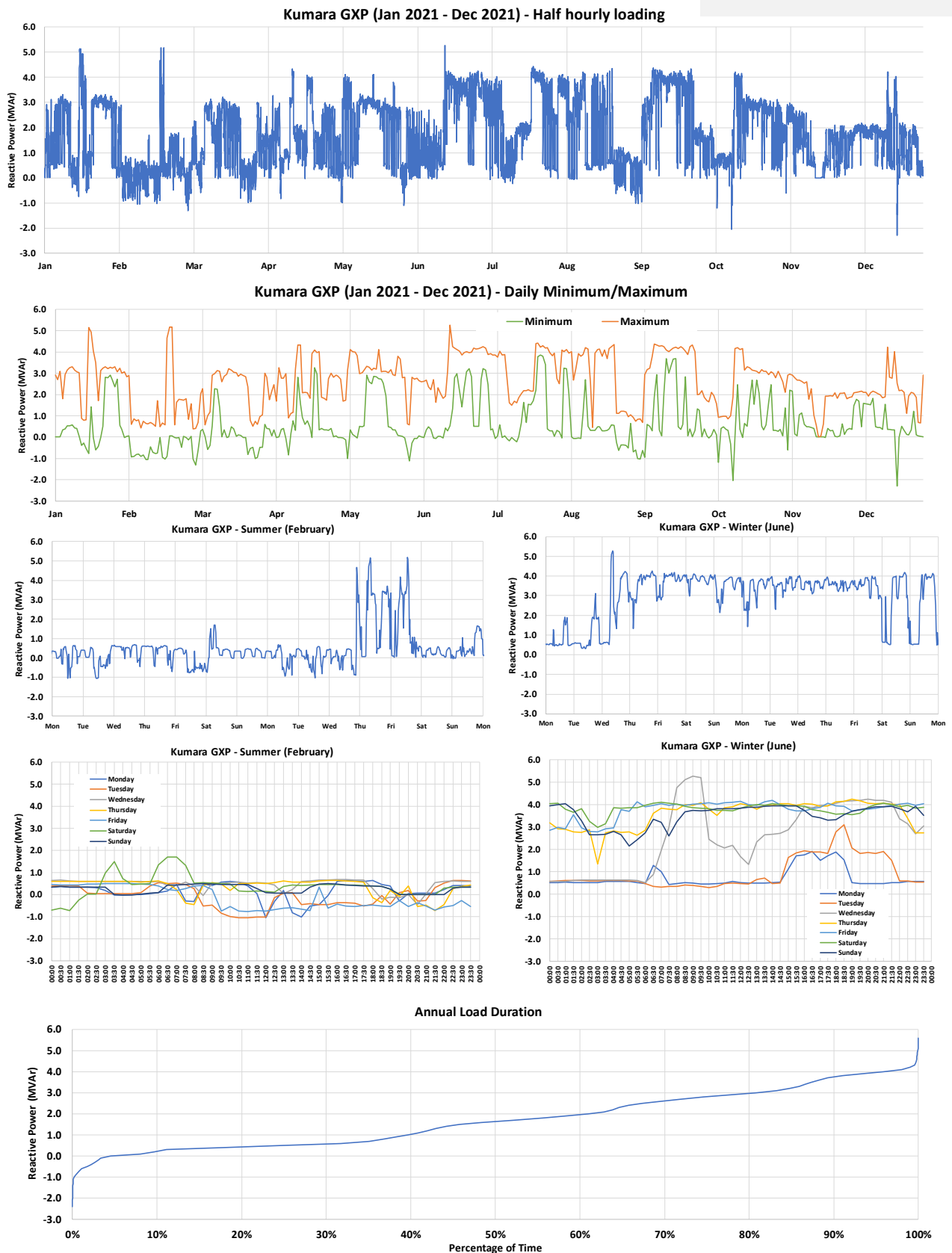


Figure 8 Kumara: Reactive power (MVar) load characteristics

OTIRA MVA

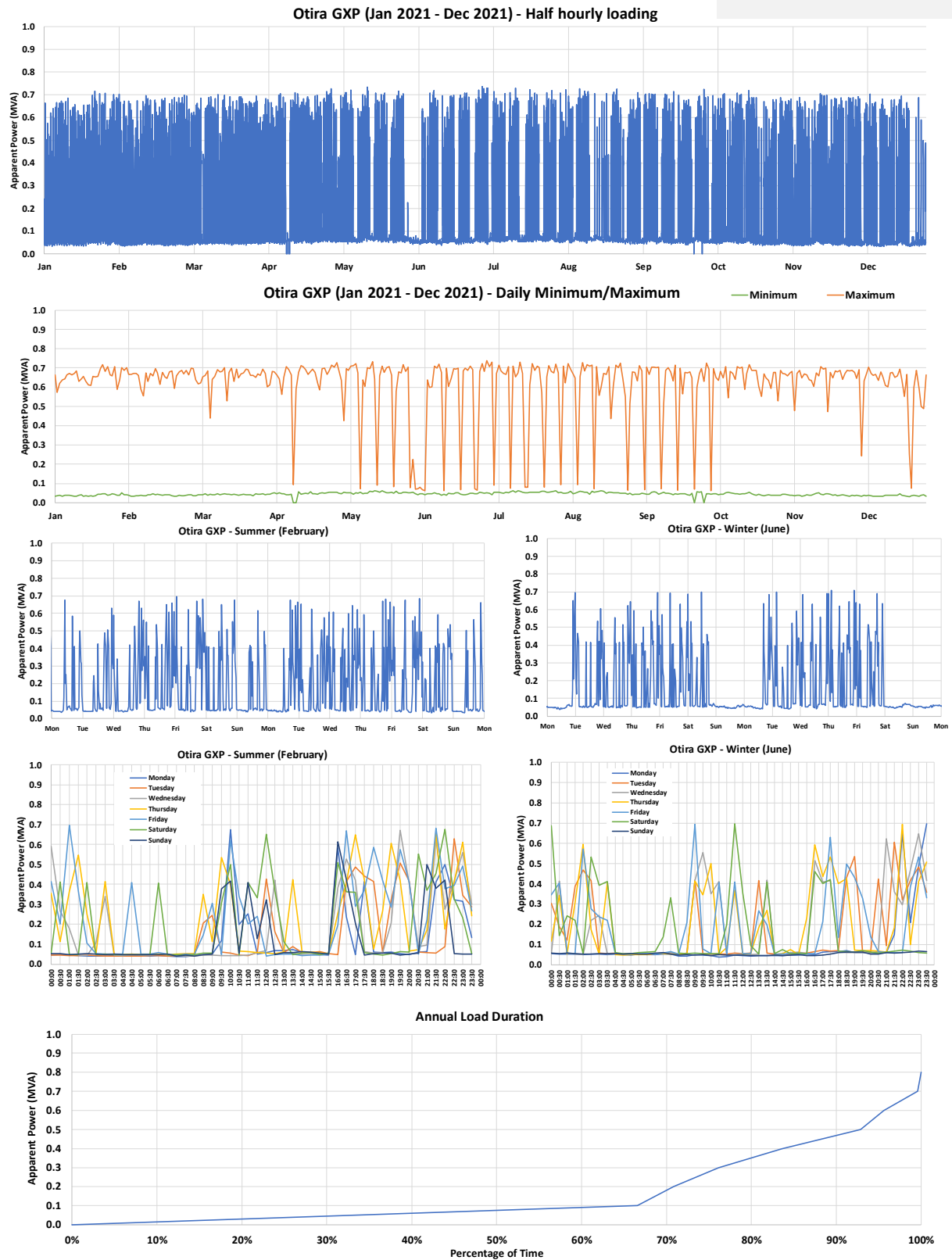


Figure 9 Otira: Apparent power (MVA) load characteristics

OTIRA MVar

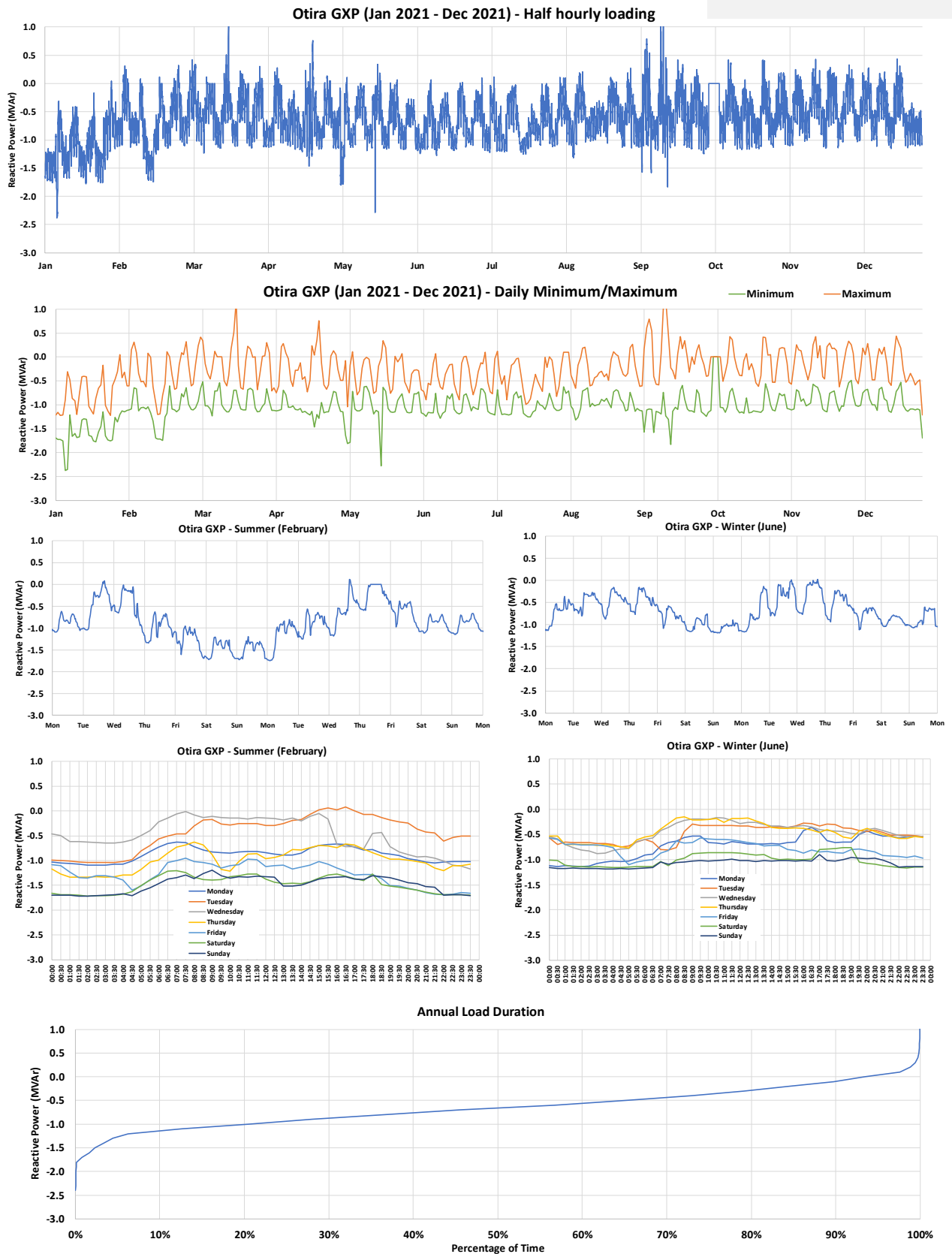


Figure 10 Otira: Reactive power (MVar) load characteristics

REEFTON MVA

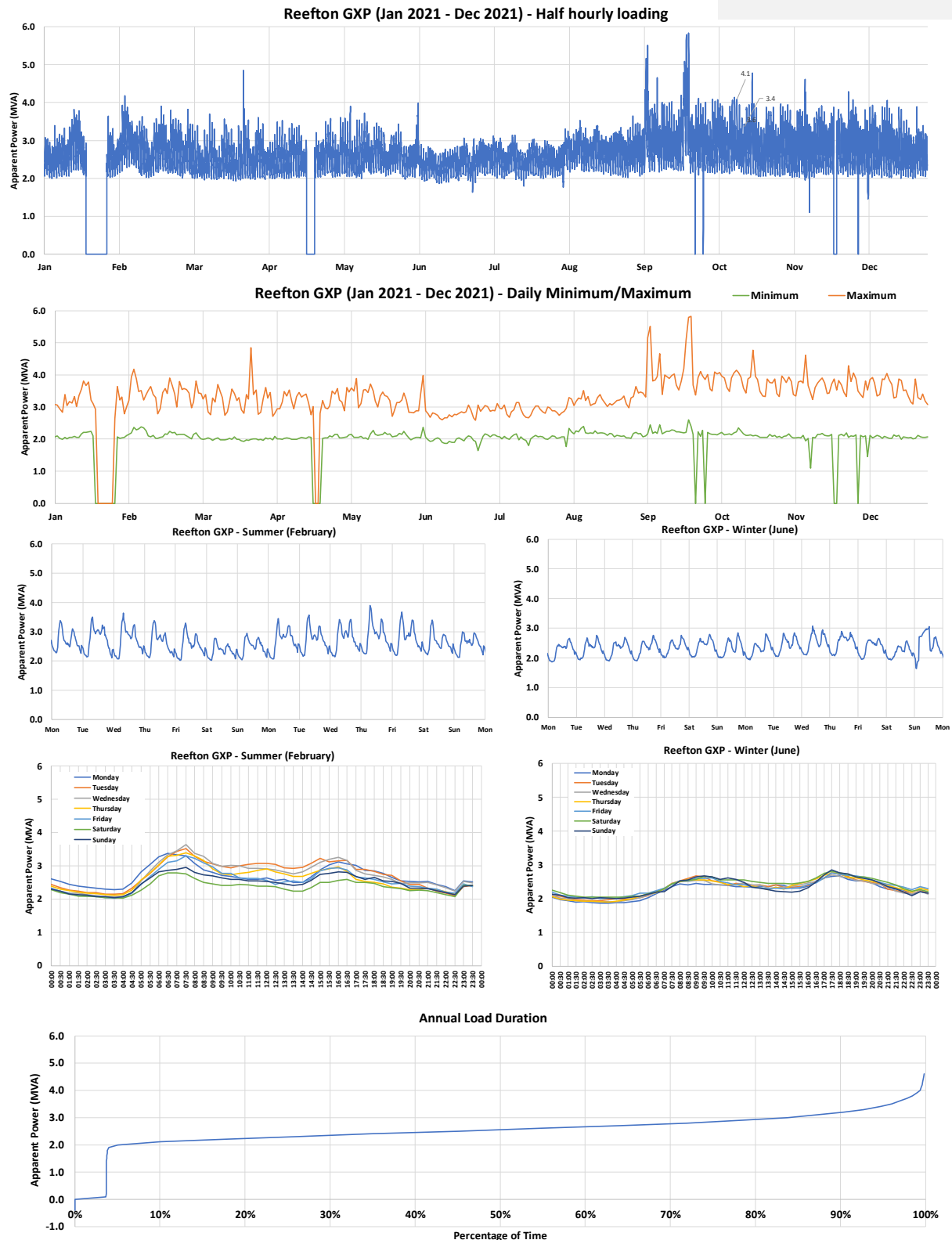


Figure 11 Reefton: Apparent power (MVA) load characteristics

REEFTON MVar

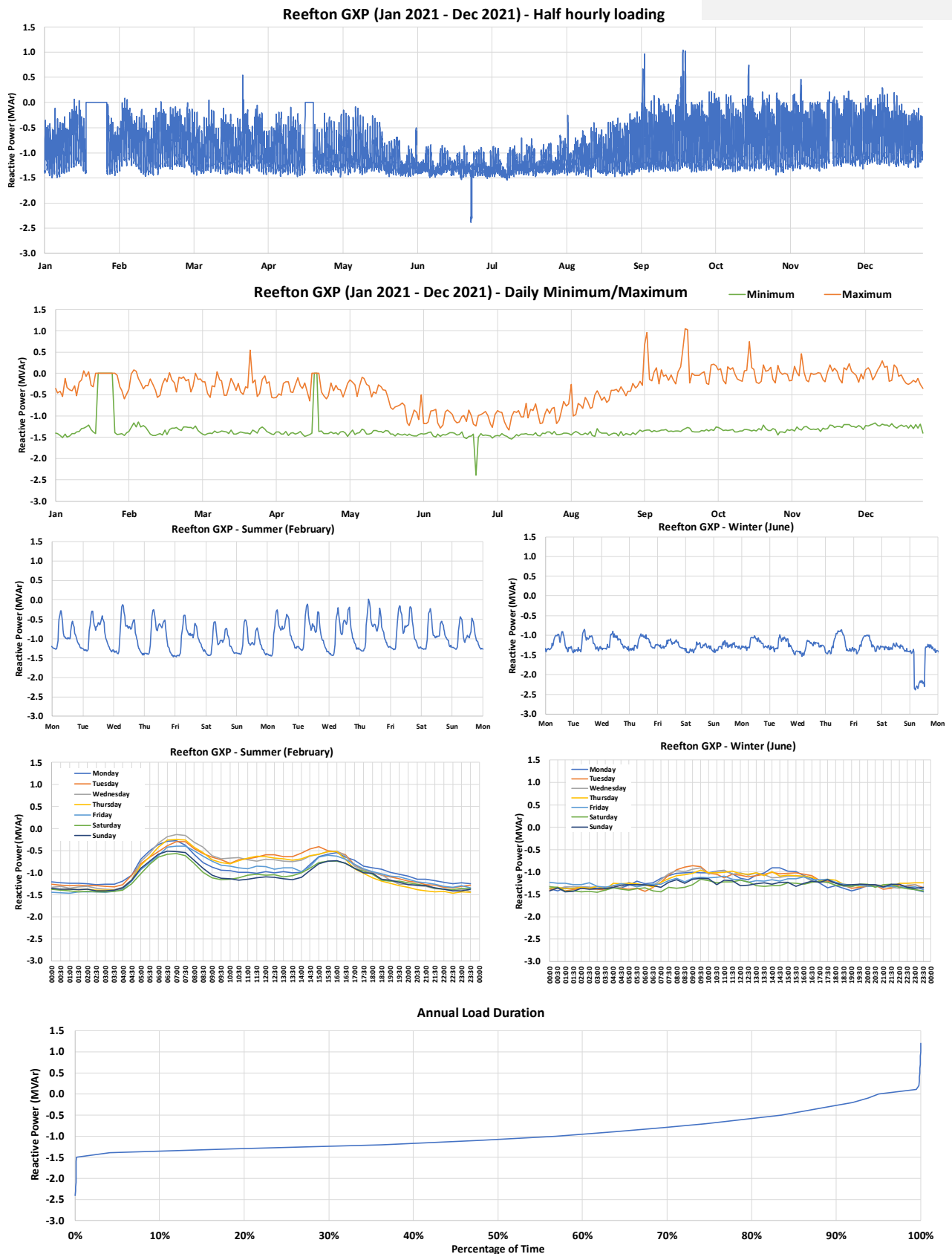


Figure 12 Reefton: Reactive power (MVar) load characteristics

ROBERTSON ST MVA

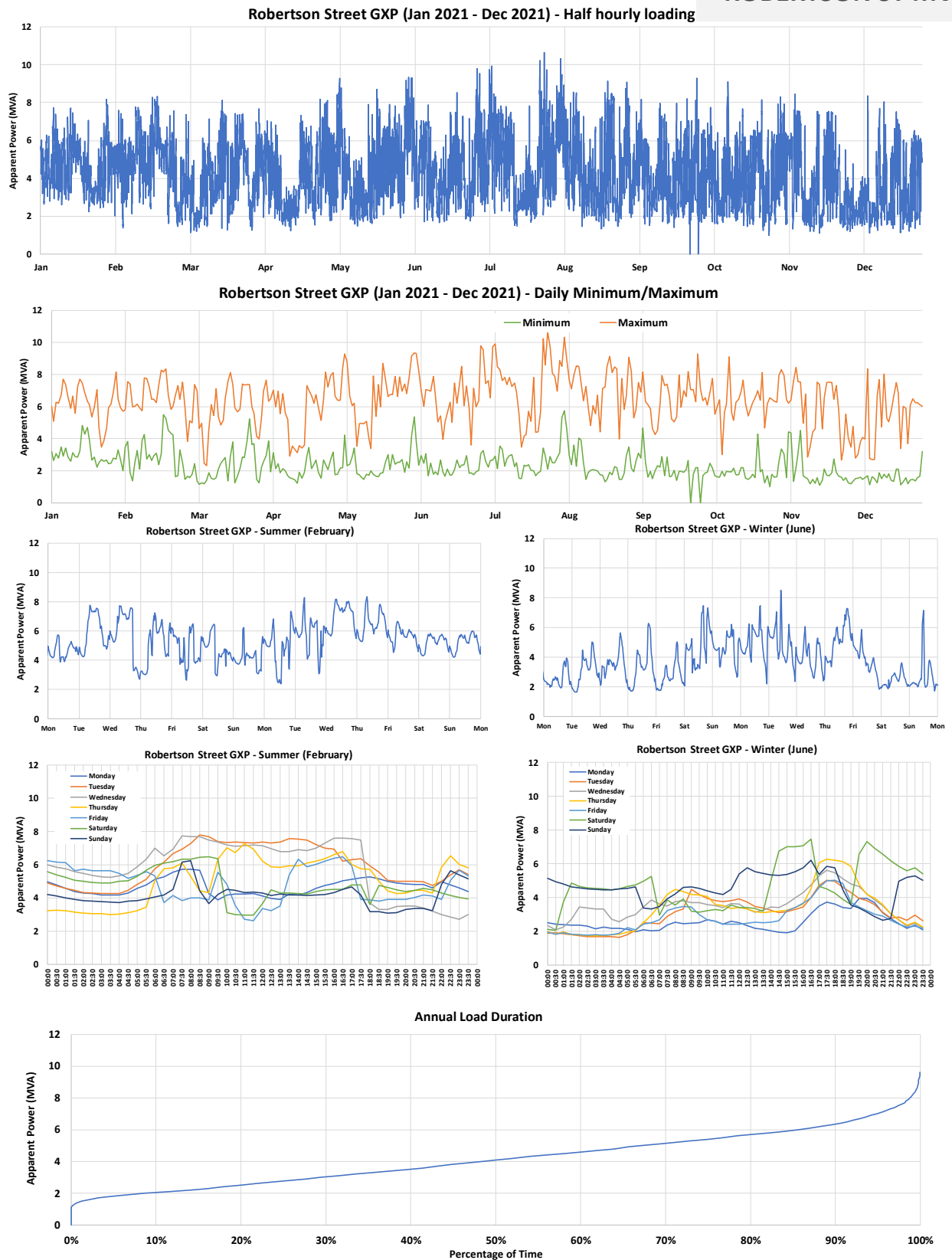


Figure 13 Robertson Street: Apparent power (MVA) load characteristics

ROBERTSON ST MVar

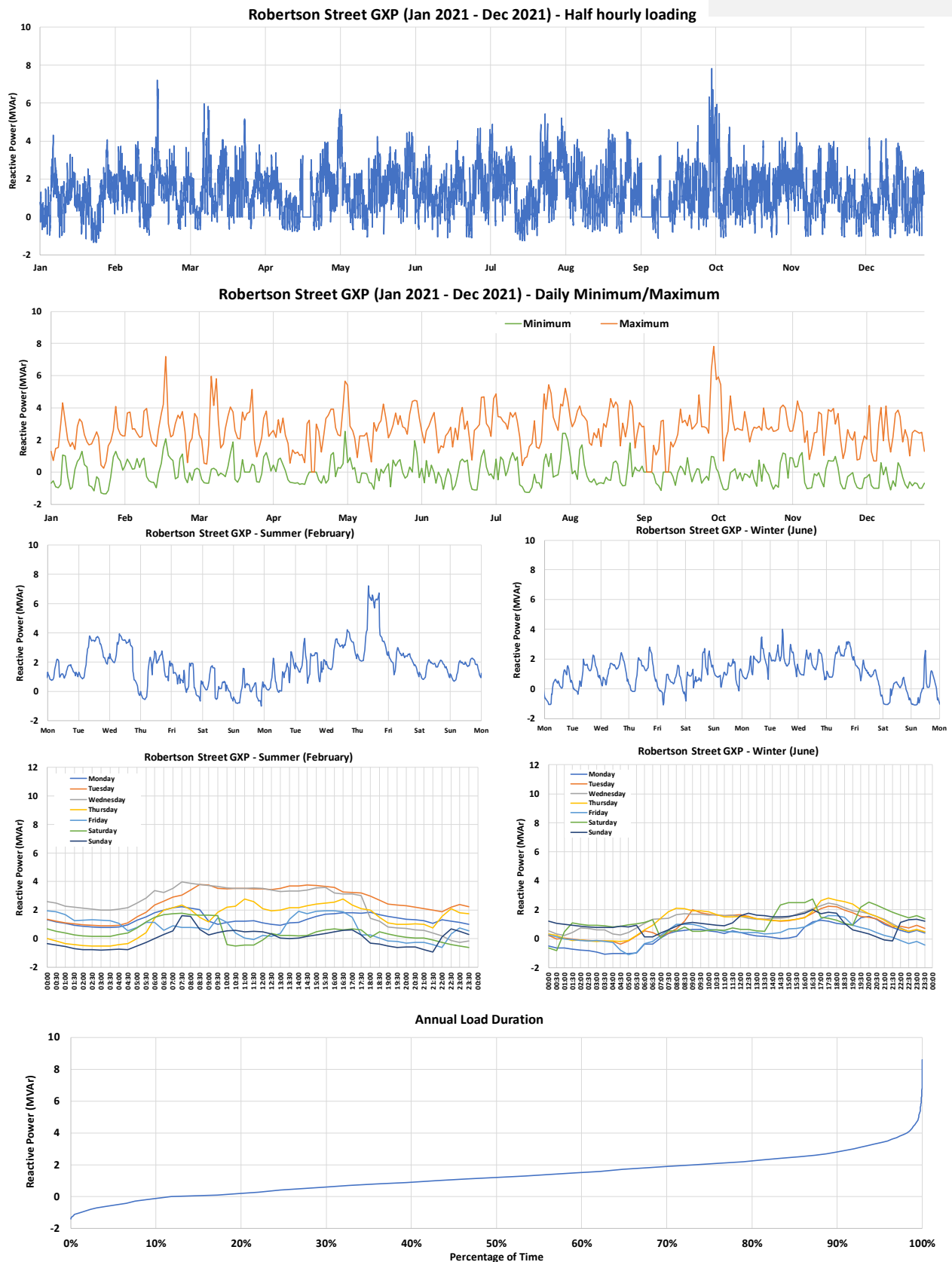


Figure 14 Robertson Street: Reactive power (MVar) load characteristics

3. Zone Substations

3.1 Westpower

The characteristics of the zone substation **apparent power loadings** within Westpower's network are shown in the following:

- **Figure 15** Arnold 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 16** Blackwater 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 17** Dobson 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 19** Fox Glacier 33/22kV zone substation: Apparent power (MVA) load characteristics
- **Figure 20** Greymouth 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 21** Harihari 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 22** Hokatika 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 23** Kumara 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 24** Logburn 110/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 25** Ngahere 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 26** Otira 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 27** Rapahoe 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 28** Reefton 110/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 29** Ross 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 26** Otira 66/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 30** Wahapo 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 31** Whataroa 33/11kV zone substation: Apparent power (MVA) load characteristics

EA networks was unable to provide loading data in excel format, and instead supplied the feeder loadings shown. These are each shown with their respective substation.

ARNOLD MVA



Figure 15 Arnold 33/11kV zone substation: Apparent power (MVA) load characteristics

BLACKWATER MVA

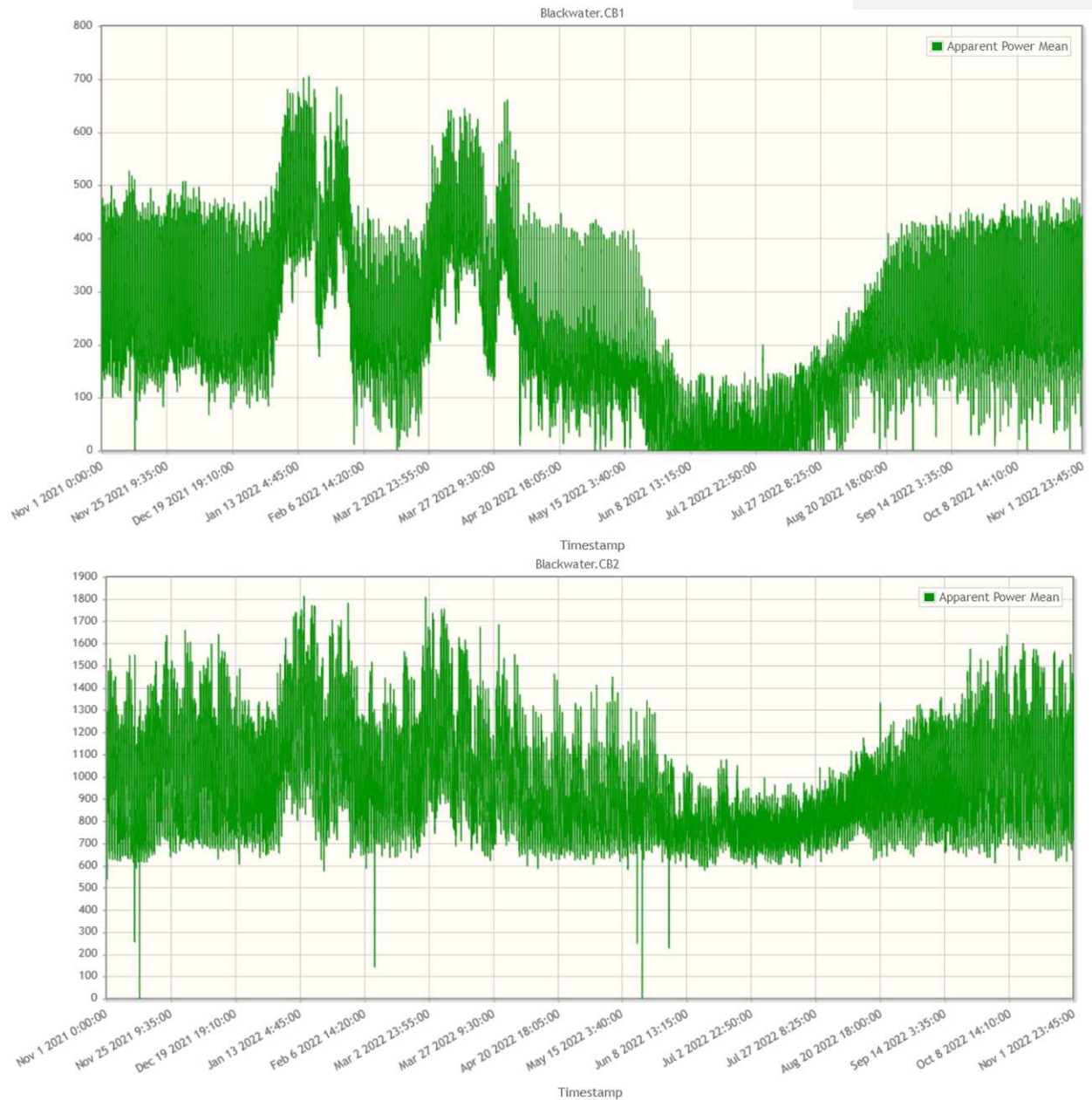


Figure 16 Blackwater 33/11kV zone substation: Apparent power (MVA) load characteristics

DOBSON MVA

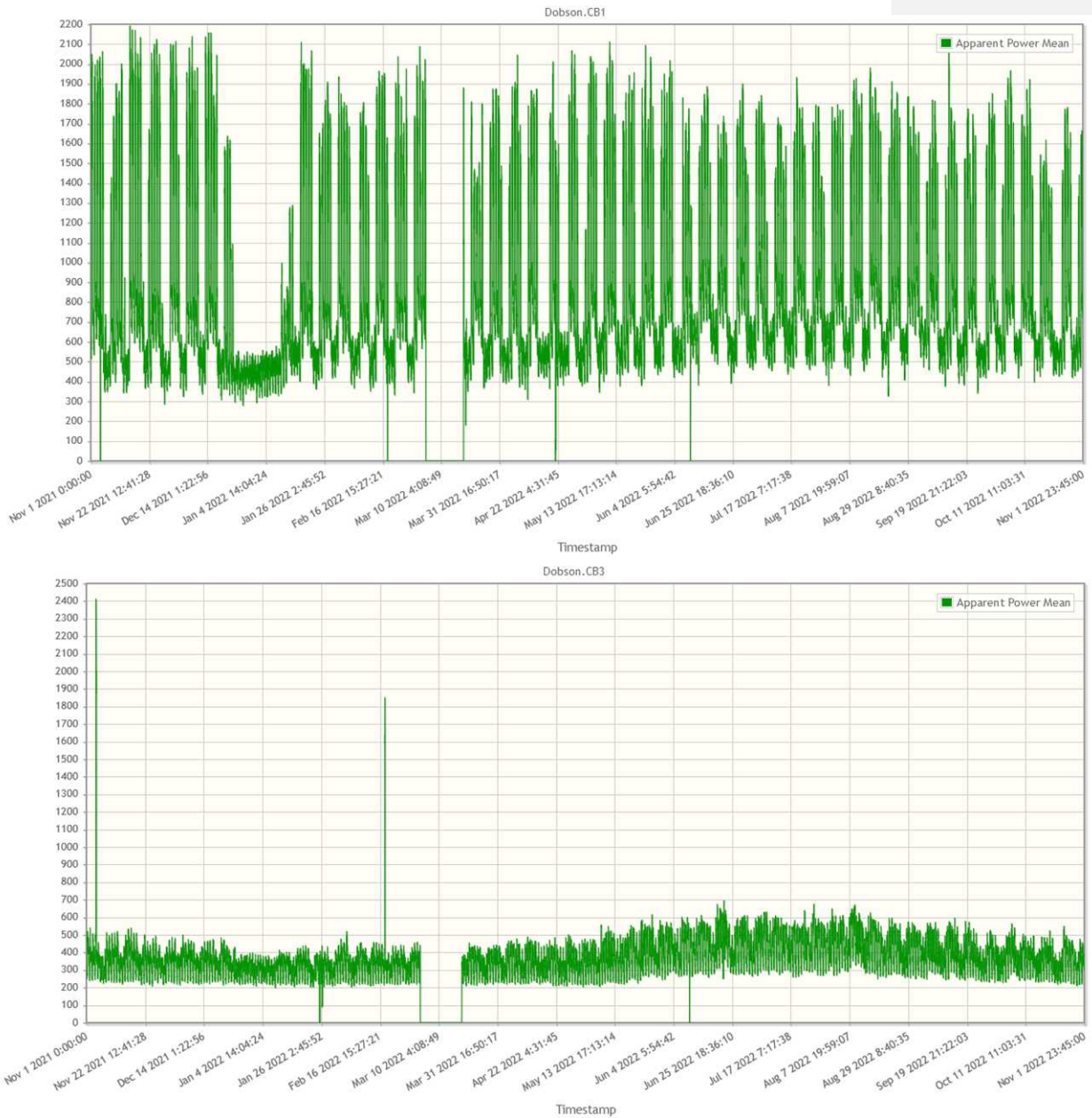


Figure 17 Dobson 33/11kV zone substation: Apparent power (MVA) load characteristics

FRANZ MVA

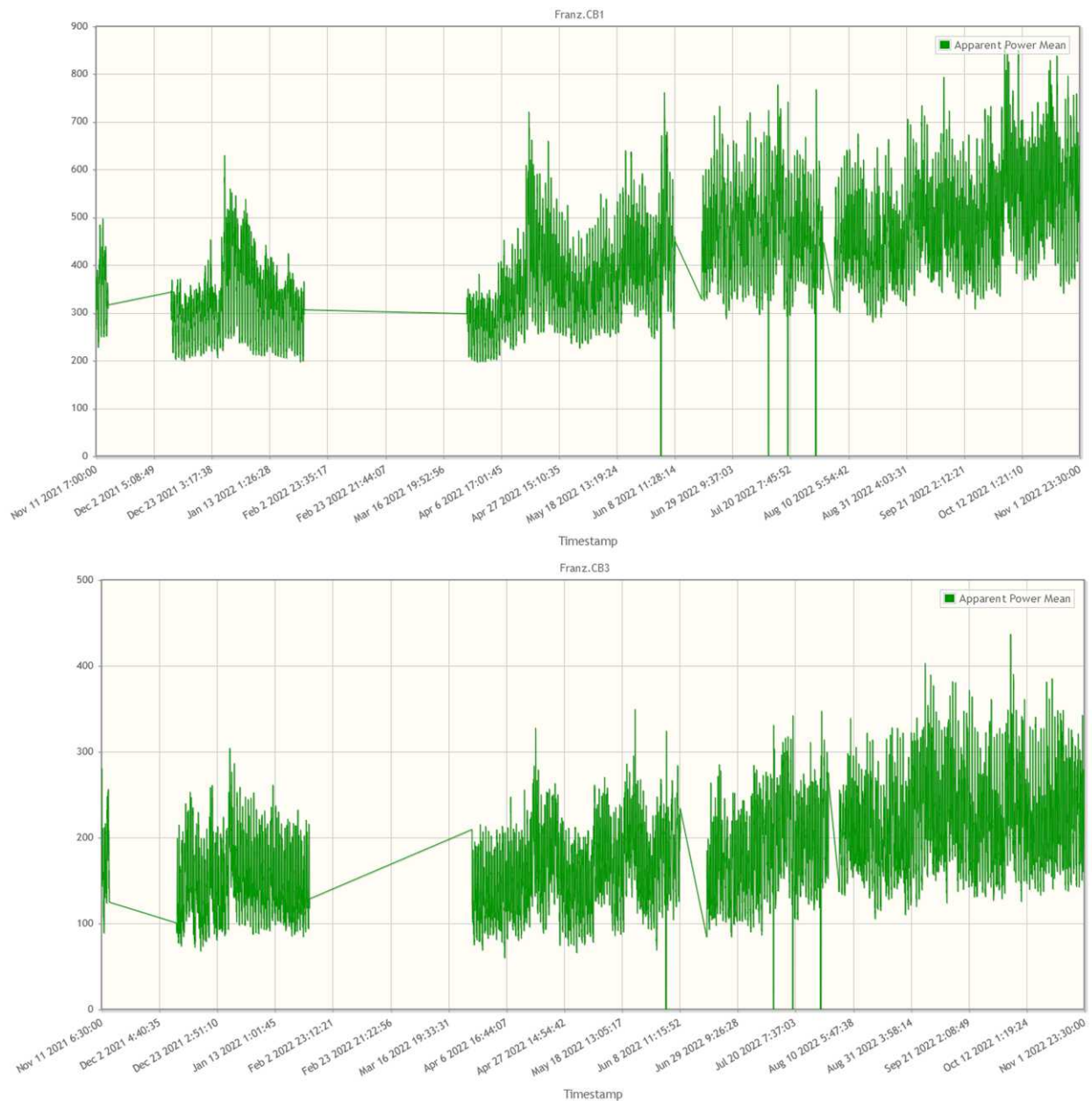


Figure 18 Franz Glacier 33/11kV zone substation: Apparent power (MVA) load characteristics

FOX GLACIER MVA

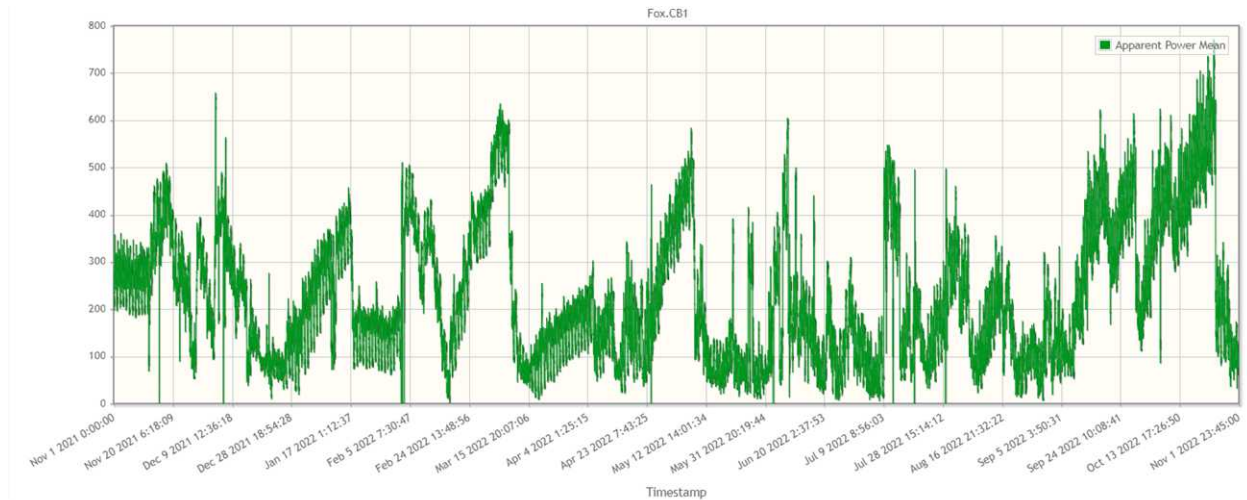
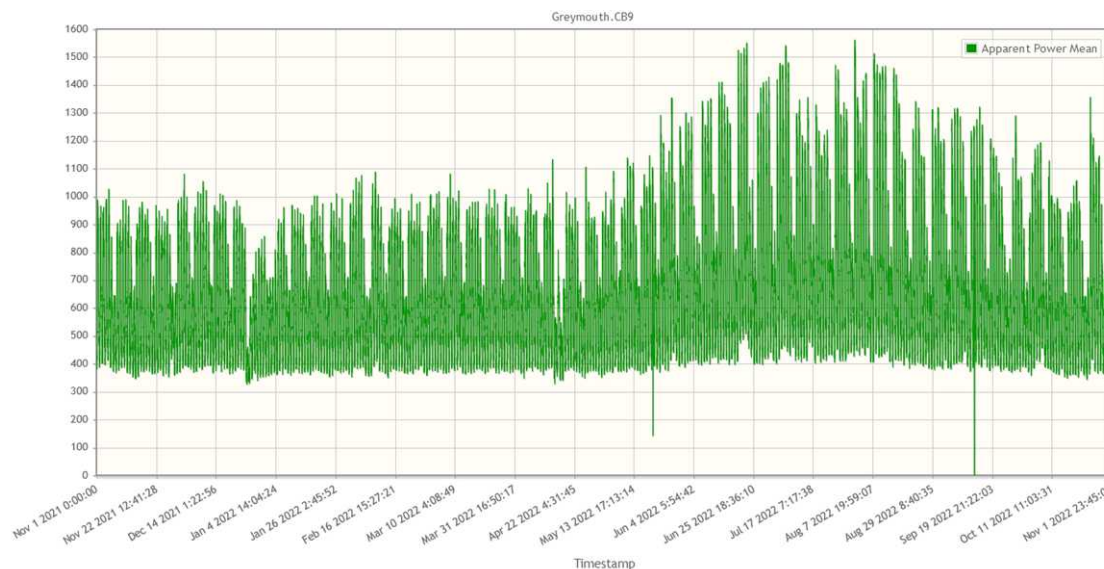
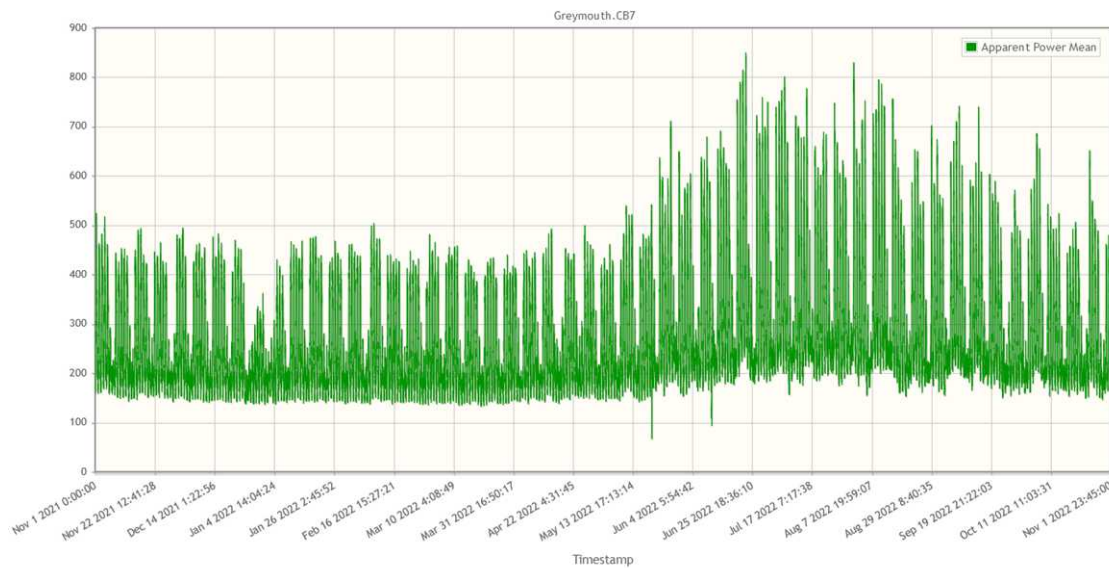
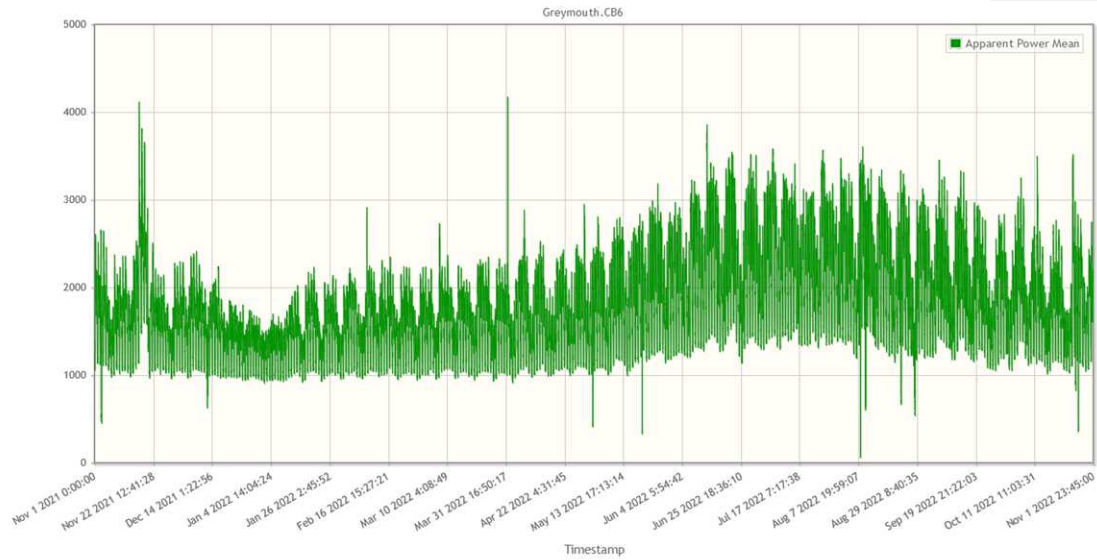


Figure 19 Fox Glacier 33/22kV zone substation: Apparent power (MVA) load characteristics

GREYMOUTH MVA



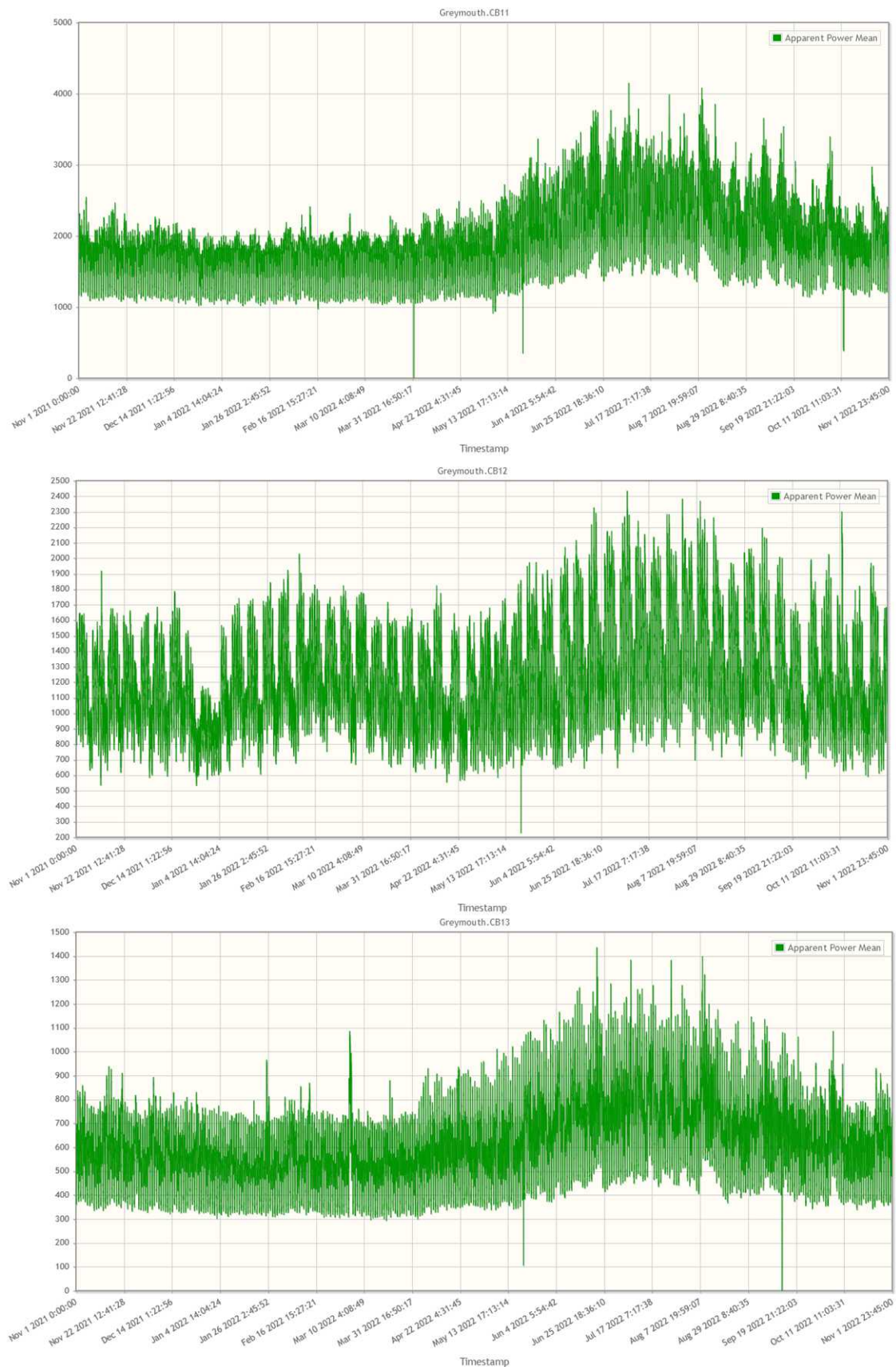


Figure 20 Greymouth 66/11kV zone substation: Apparent power (MVA) load characteristics

HARIHARI MVA

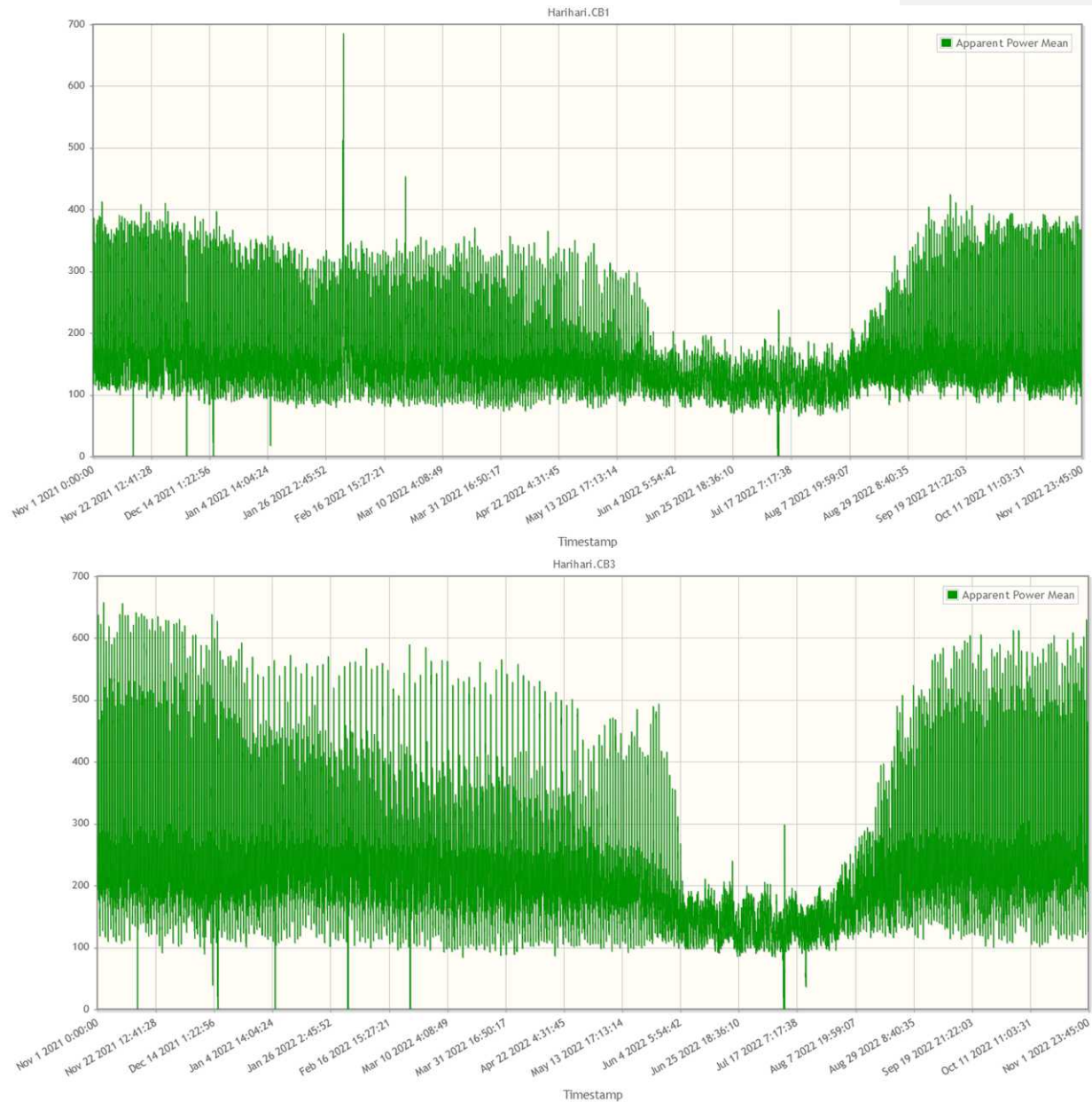


Figure 21 Harihari 33/11kV zone substation: Apparent power (MVA) load characteristics

HOKATIKA MVA

YET TO BE SUPPLIED
MAY BE ASSUMED TO BE THE SAME AS THE GXP

Figure 22 Hokatika 66/11kV zone substation: Apparent power (MVA) load characteristics

KUMARA MVA

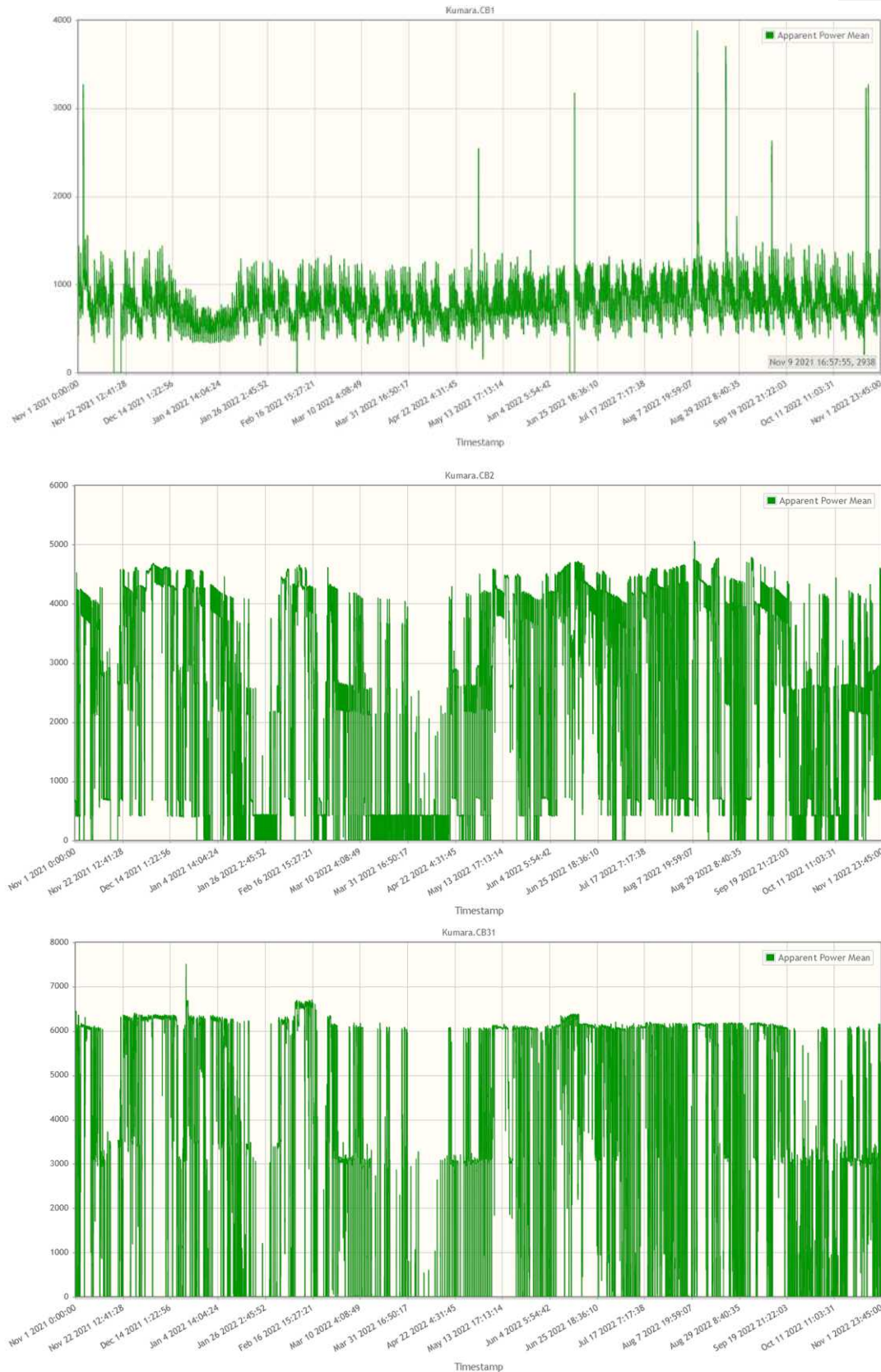


Figure 23 Kumara 66/11kV zone substation: Apparent power (MVA) load characteristics

LOGBURN MVA

YET TO BE SUPPLIED

Figure 24 Logburn 110/11kV zone substation: Apparent power (MVA) load characteristics

NGAHERE MVA

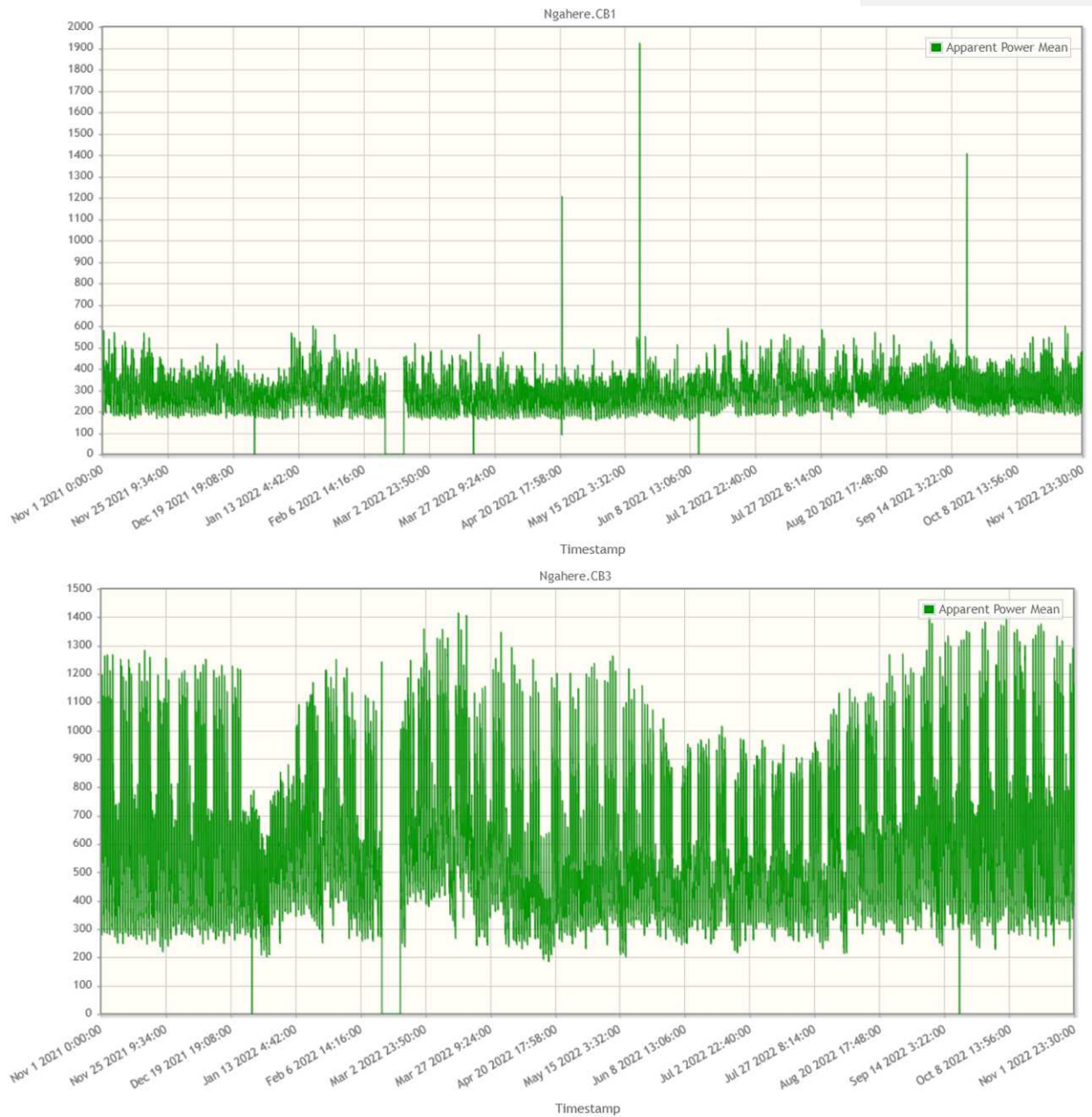


Figure 25 Ngahere 33/11kV zone substation: Apparent power (MVA) load characteristics

OTIRA MVA

YET TO BE SUPPLIED
MAY BE ASSUMED TO BE THE SAME AS THE GXP

Figure 26 Otira 66/11kV zone substation: Apparent power (MVA) load characteristics

RAPAHOE MVA

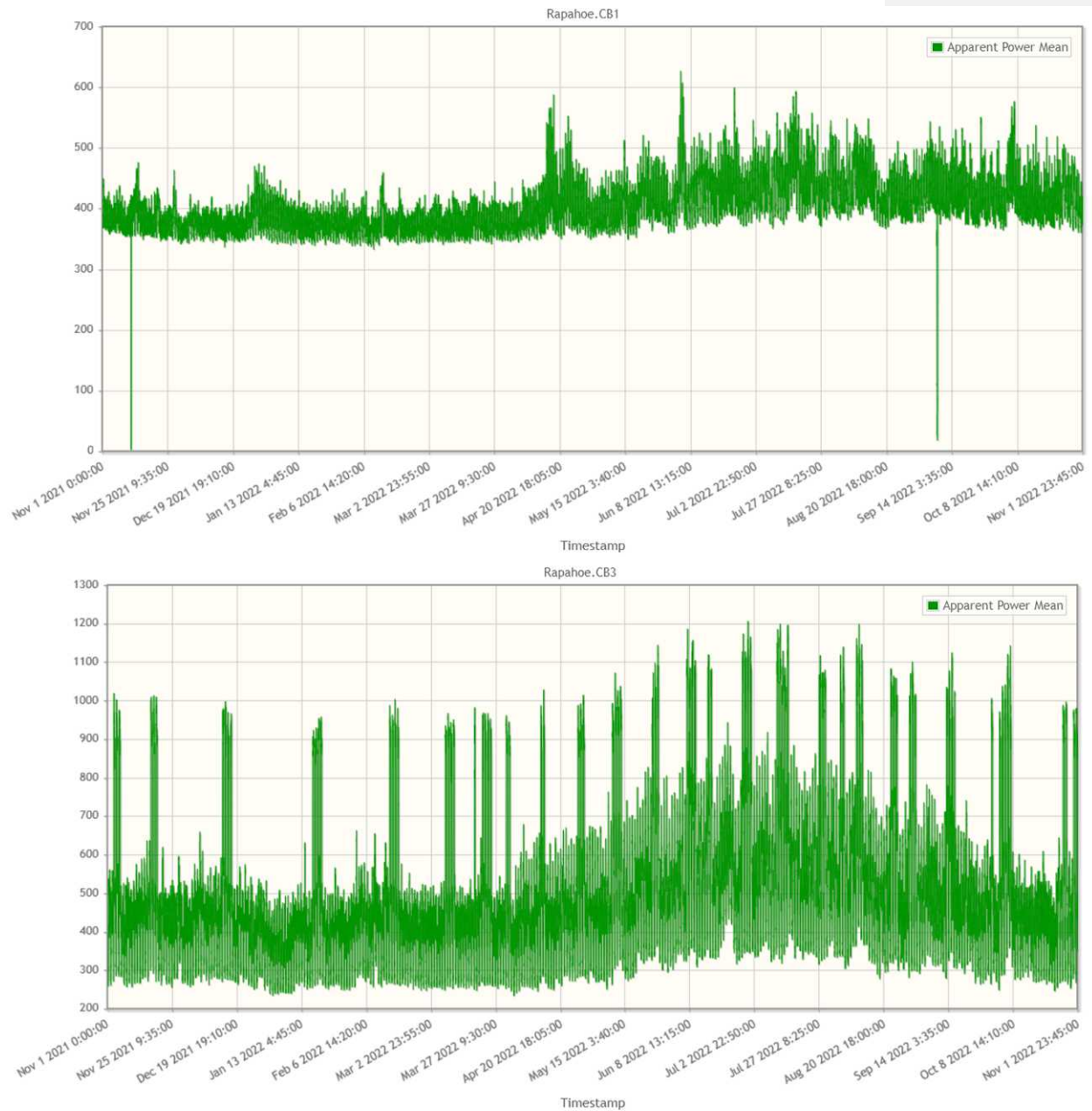


Figure 27 Rapahoe 33/11kV zone substation: Apparent power (MVA) load characteristics

REEFTON MVA

YET TO BE SUPPLIED
MAY BE ASSUMED TO BE THE SAME AS THE GXP

Figure 28 Reefton 110/11kV zone substation: Apparent power (MVA) load characteristics

ROSS MVA

YET TO BE SUPPLIED

Figure 29 Ross 33/11kV zone substation: Apparent power (MVA) load characteristics

WAHAPO MVA

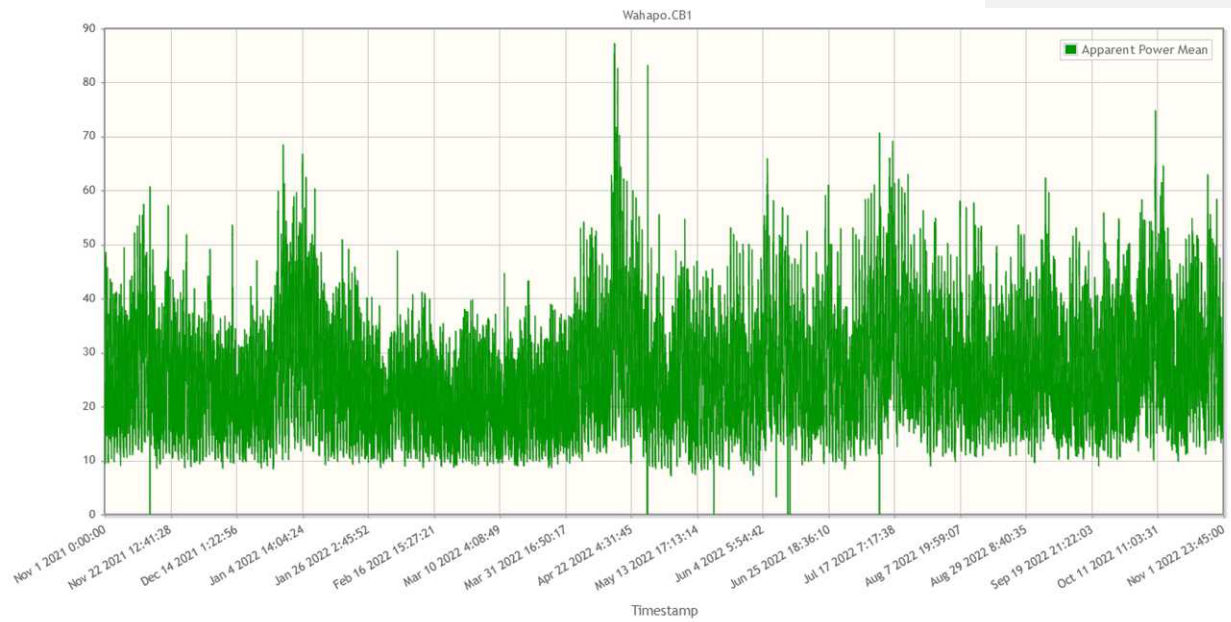


Figure 30 Wahapo 33/11kV zone substation: Apparent power (MVA) load characteristics

WHATAROA MVA

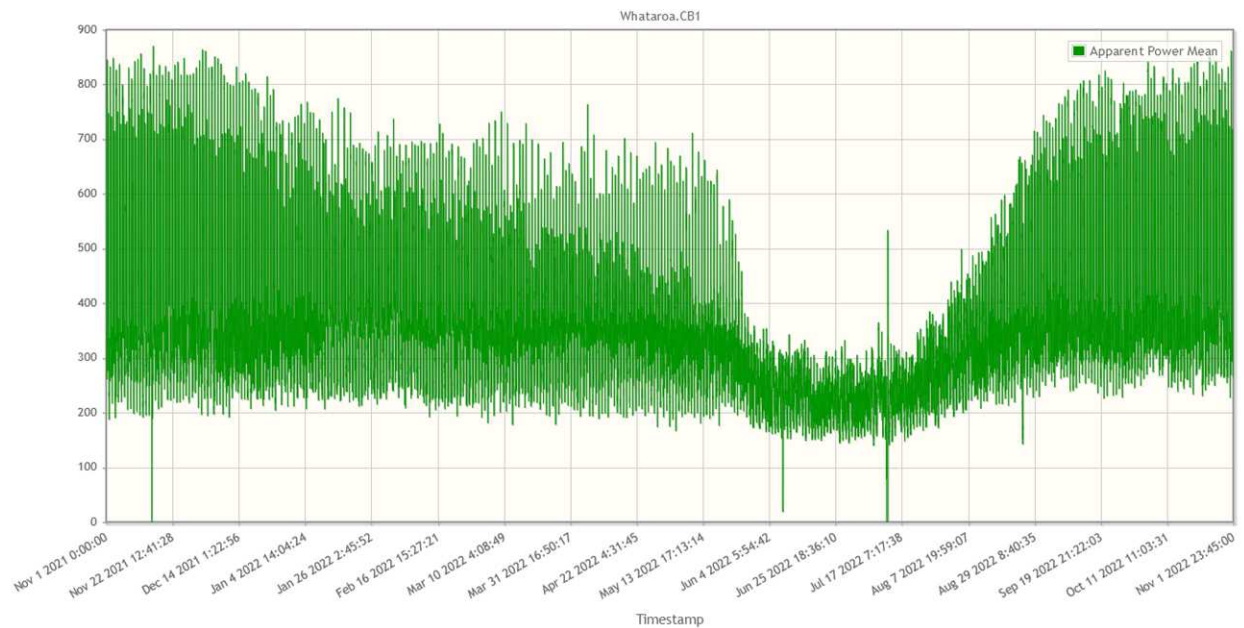


Figure 31 Whataroa 33/11kV zone substation: Apparent power (MVA) load characteristics

3.2 Buller Electricity

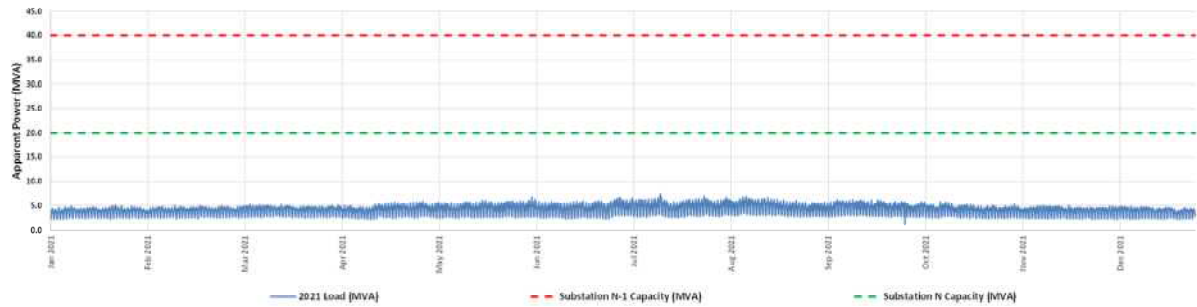
The characteristics of the zone substation **real power loadings** within Buller Electricity's network are shown in the following:

- **Figure 32** Robertson Street 110/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 33** Ngakawau 33/11kV zone substation: Apparent power (MVA) load characteristics
- **Figure 34** Kongahu 33/11kV zone substation: Apparent power (MVA) load characteristics

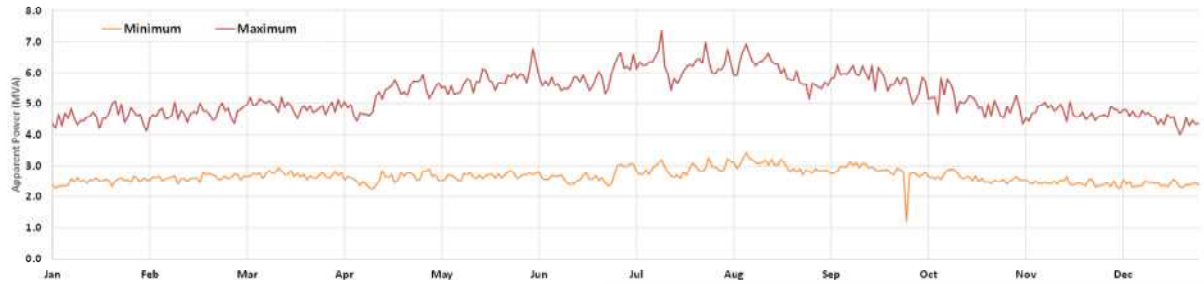
It should be noted that while multiple years of loading data were supplied by Buller Electricity, there were significant gaps in some years. For each substation, the most complete year of loading data supplied has been used.

ROBERTSON ST MVA

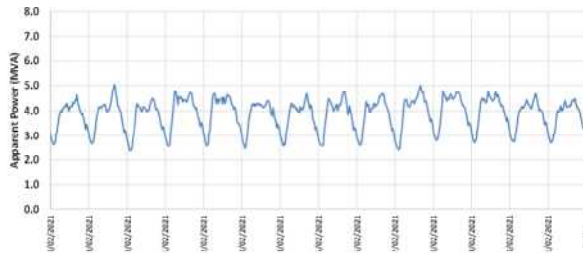
Robertson Street Zone Substation (2021 year) - Half hourly loading



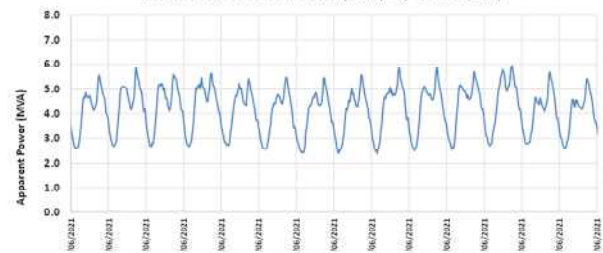
Robertson Street Zone Substation (2021 year) - Daily Maximum/Minimum



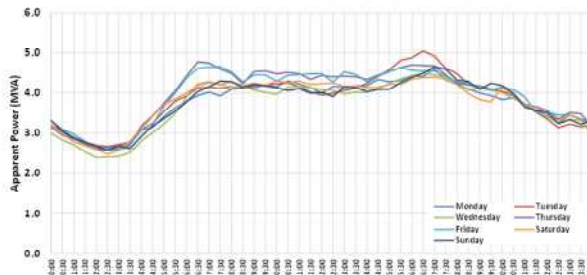
Robertson Street Zone Substation (2021 year) - Summer (February)



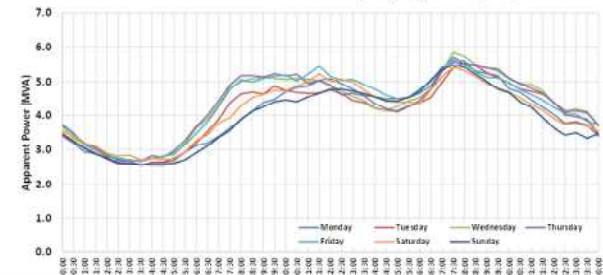
Robertson Street Zone Substation (2021 year) - Winter (June)



Robertson Street Zone Substation (2021 year) - Summer (February)



Robertson Street Zone Substation (2021 year) - Winter (June)



Robertson Street Zone Substation (2021 year) - Load Duration Curve

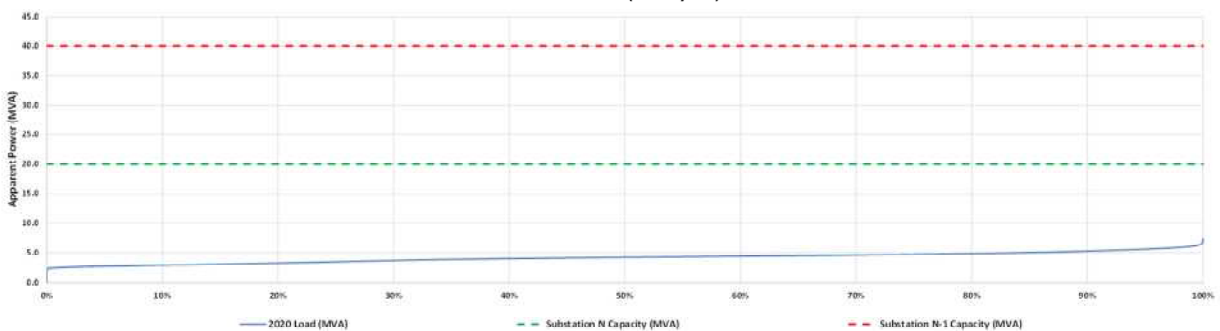
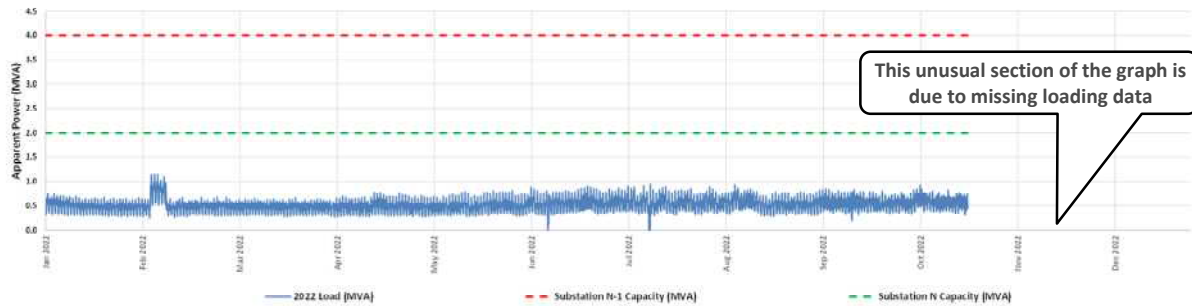


Figure 32 Robertson Street 110/11kV zone substation: Apparent power (MVA) load characteristics

NGAKAWAU MVA

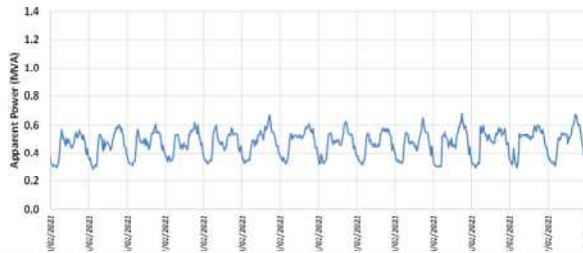
Ngakawau Zone Substation (2022 year) - Half hourly loading



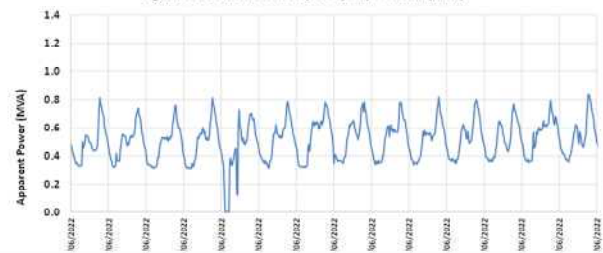
Ngakawau Zone Substation (2022 year) - Daily Maximum/Minimum



Ngakawau Zone Substation (2022 year) - Summer (February)



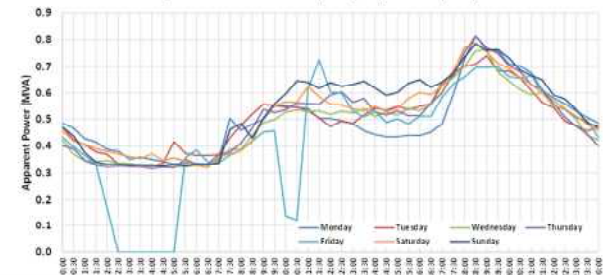
Ngakawau Zone Substation (2022 year) - Winter (June)



Ngakawau Zone Substation (2022 year) - Summer (February)



Ngakawau Zone Substation (2022 year) - Winter (June)



Ngakawau Zone Substation (2022 year) - Load Duration Curve

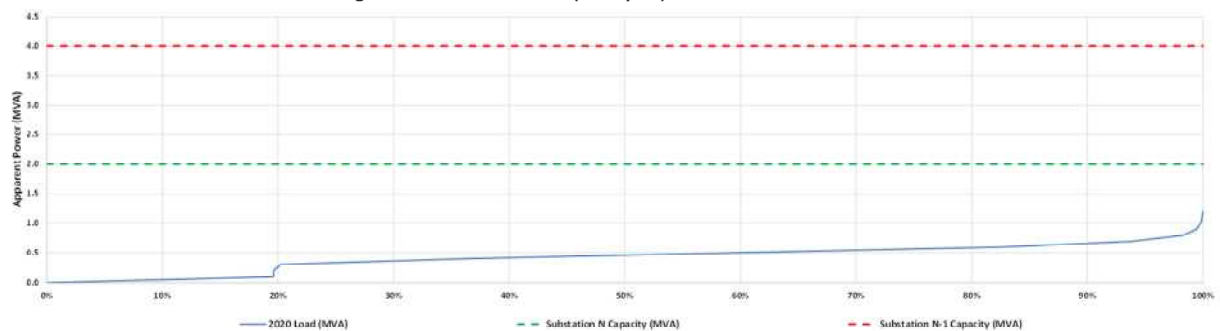


Figure 33 Ngakawau 33/11kV zone substation: Apparent power (MVA) load characteristics

KONGAHU MVA

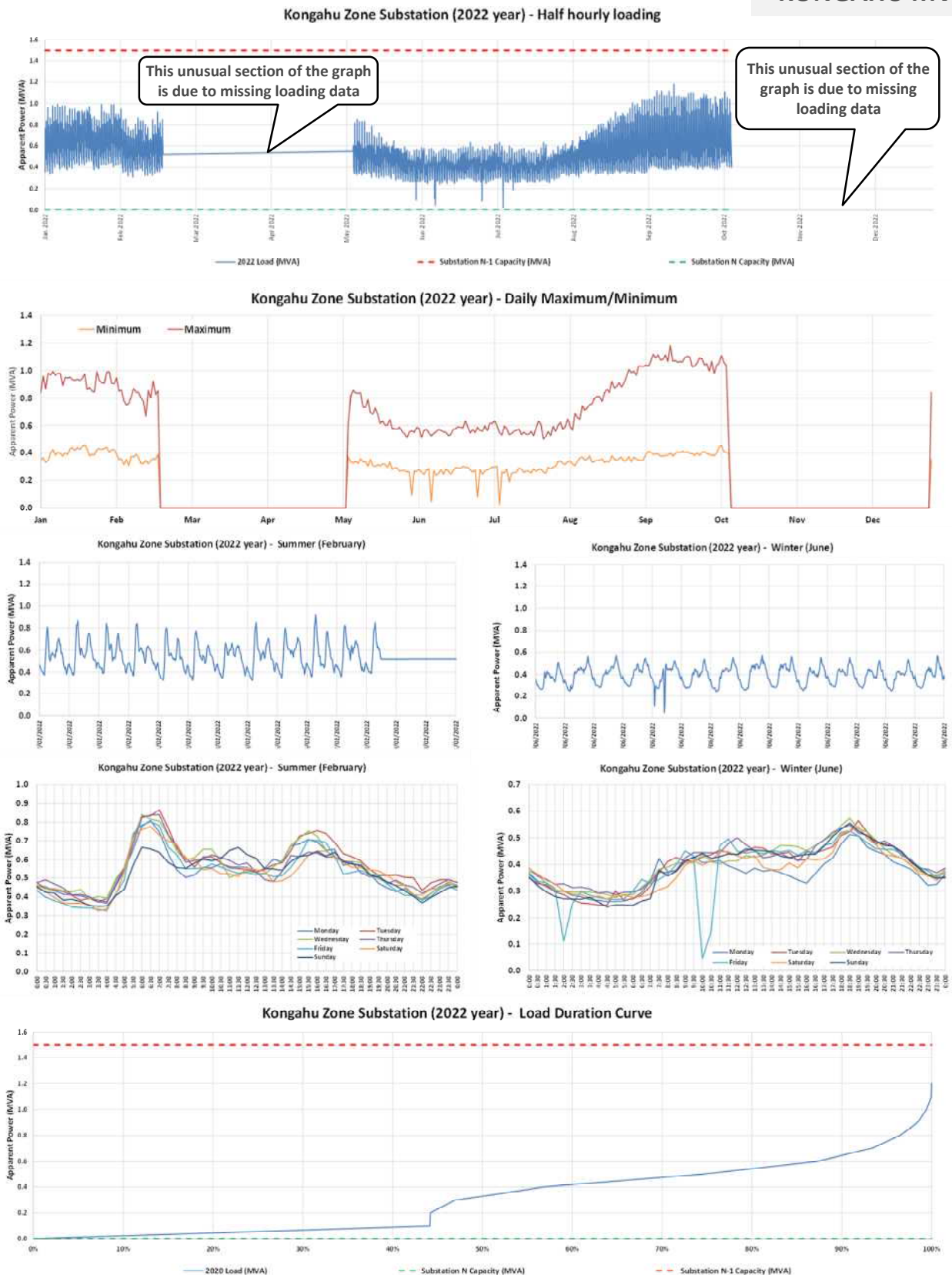


Figure 34 Kongahu 33/11kV zone substation: Apparent power (MVA) load characteristics