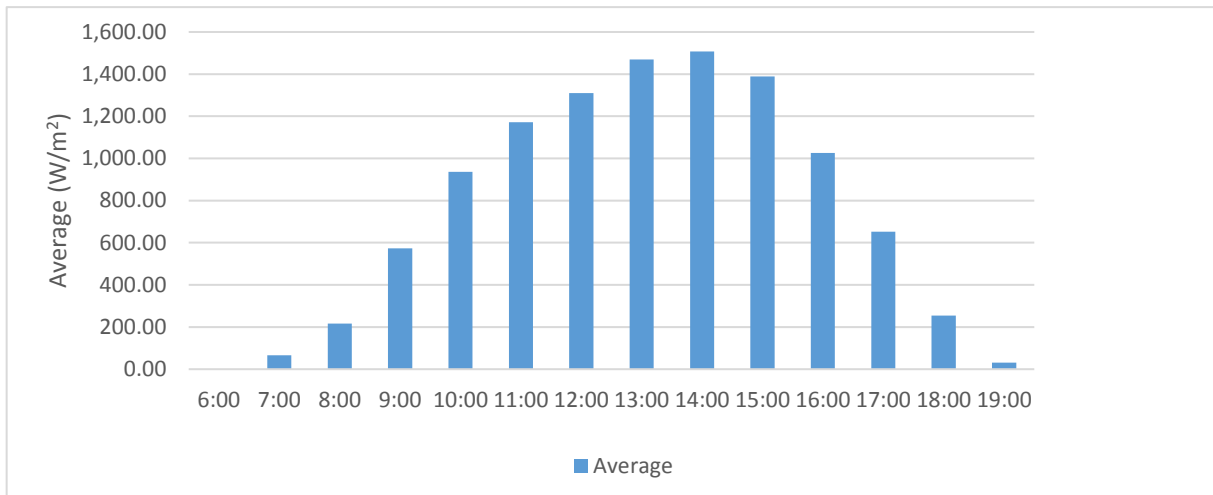


Annex 1

Hourly Solar Radiation

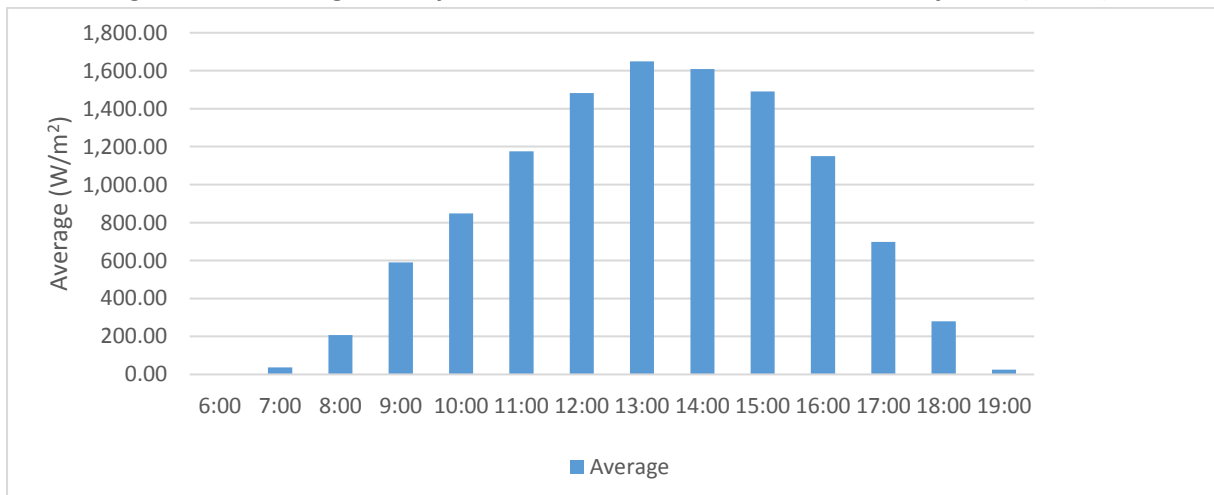
Annex 1 provides hourly solar radiation data in Brunei Darussalam in 2016. Brunei Darussalam Meteorological Department recorded the solar radiation data in Brunei International Airport meteorological station. The trend of monthly average daily solar radiation in 2015–2016 is shown in Figure 1.1, Chapter 1.

Figure A1.1. Average Hourly and Maximum Solar Radiation, January 2016 (W/m²)



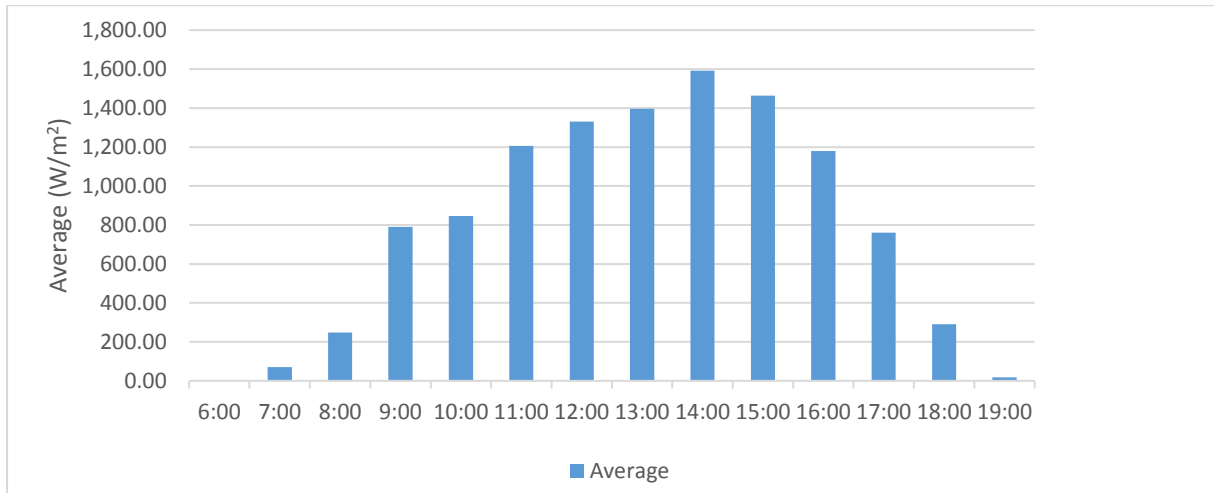
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.2. Average Hourly and Maximum Solar Radiation, February 2016 (W/m²)



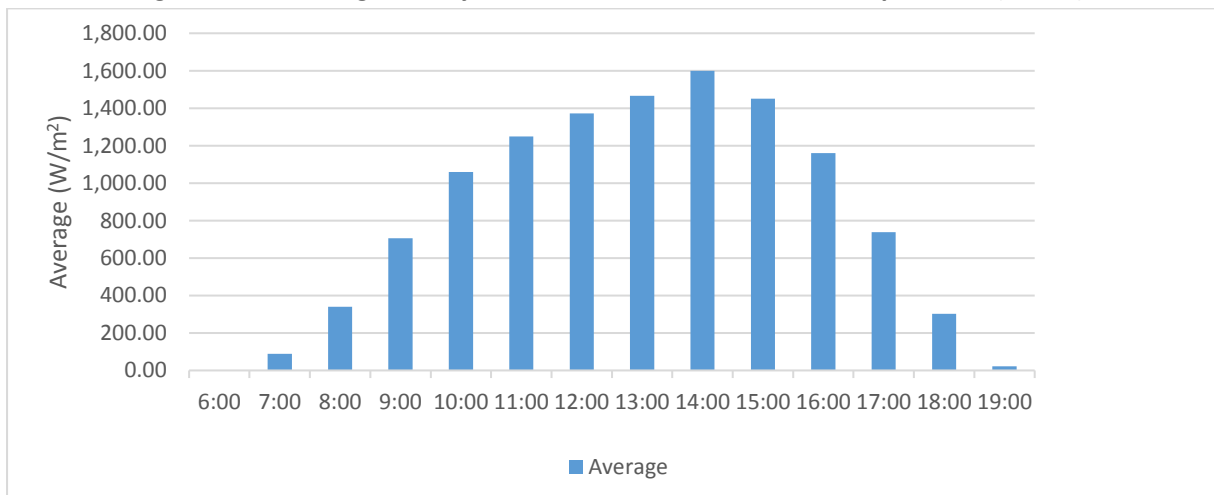
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.3. Average Hourly and Maximum Solar Radiation, March 2016 (W/m²)



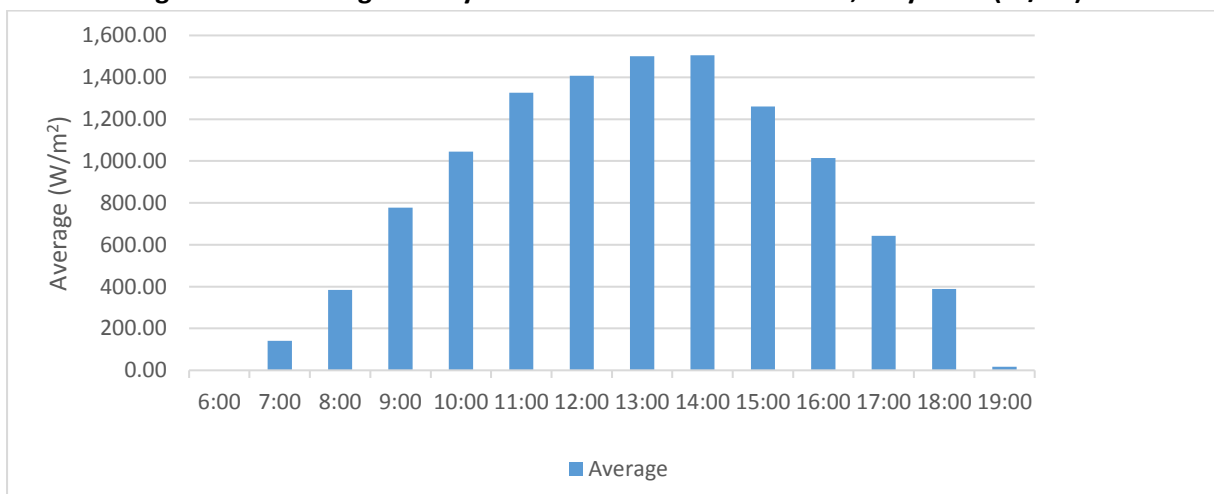
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.4. Average Hourly and Maximum Solar Radiation, April 2016 (W/m²)



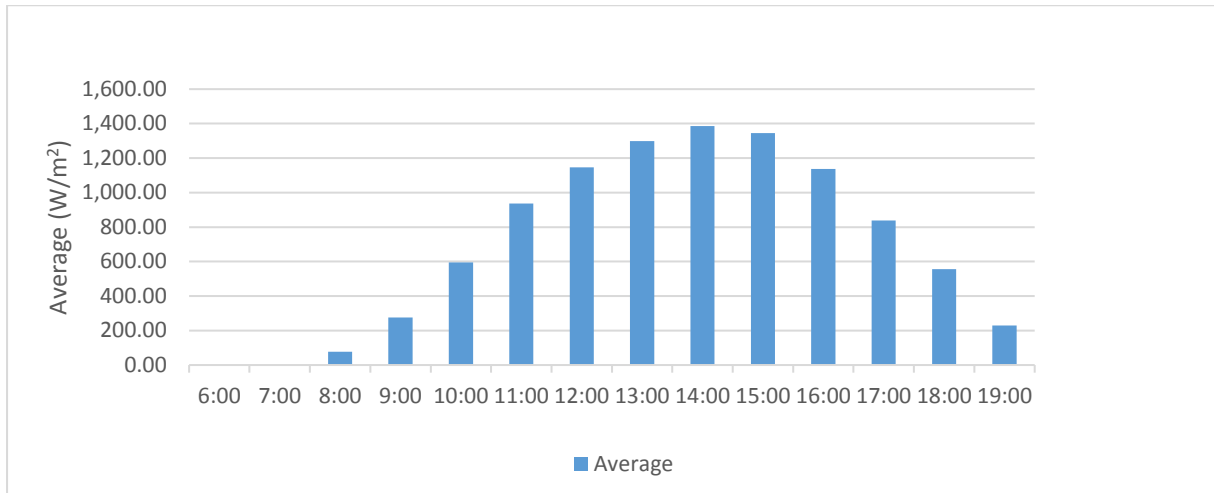
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.5. Average Hourly and Maximum Solar Radiation, May 2016 (W/m²)



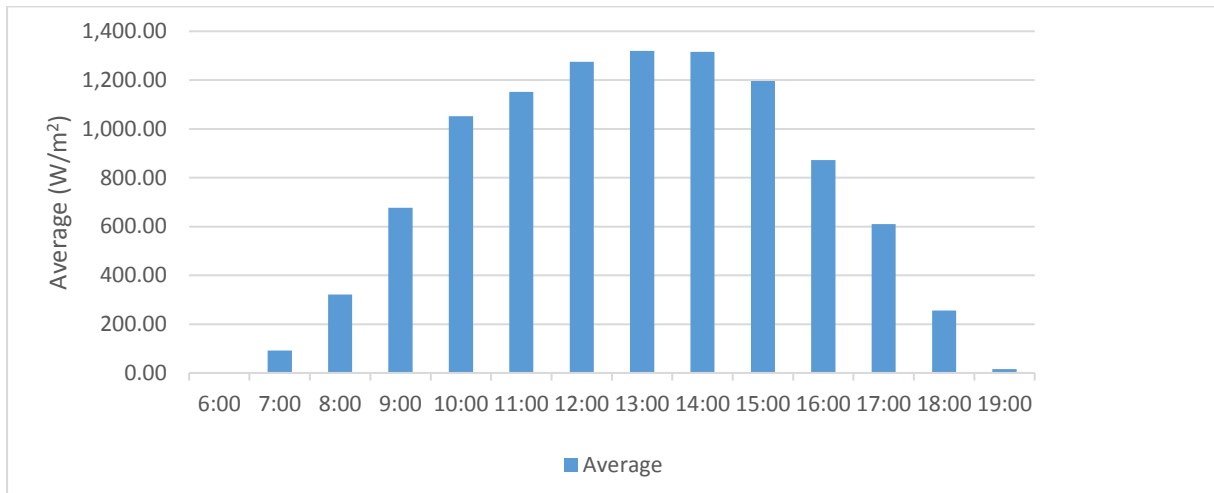
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.6. Average Hourly and Maximum Solar Radiation, June 2016 (W/m²)



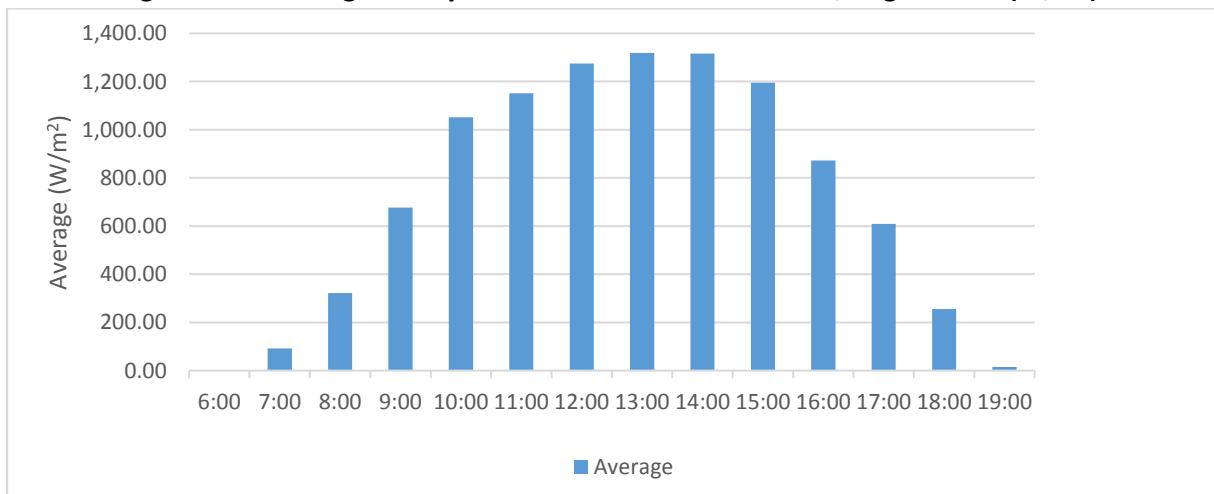
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.7. Average Hourly and Maximum Solar Radiation, July 2016 (W/m²)



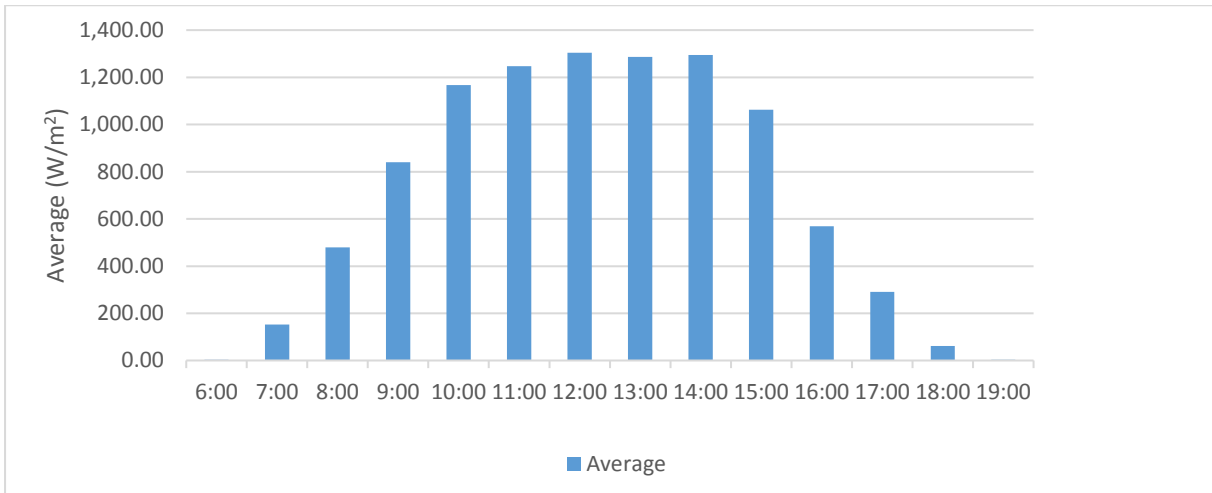
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.8. Average Hourly and Maximum Solar Radiation, August 2016 (W/m²)



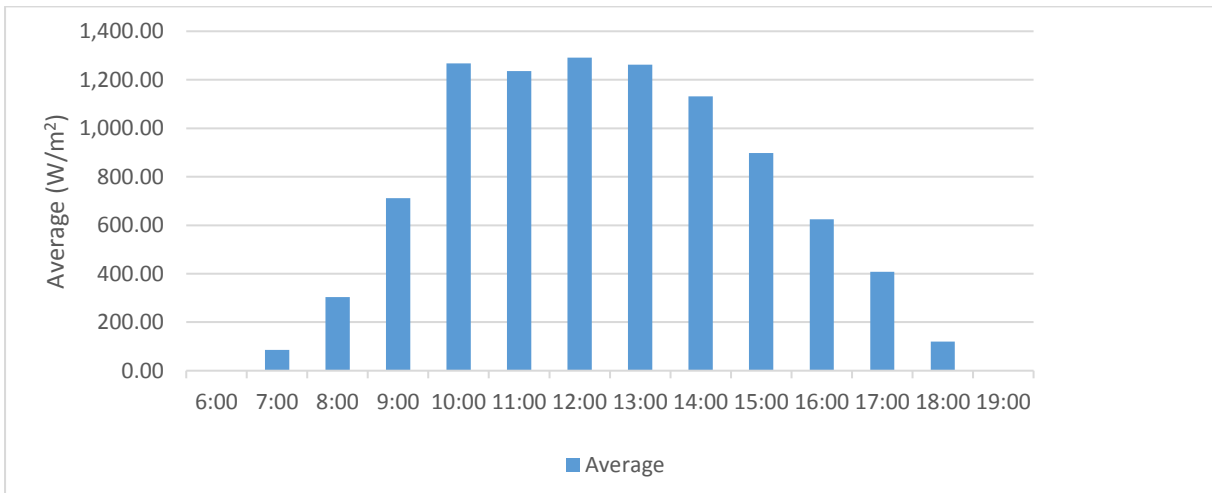
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.9. Average Hourly and Maximum Solar Radiation, September 2016 (W/m²)



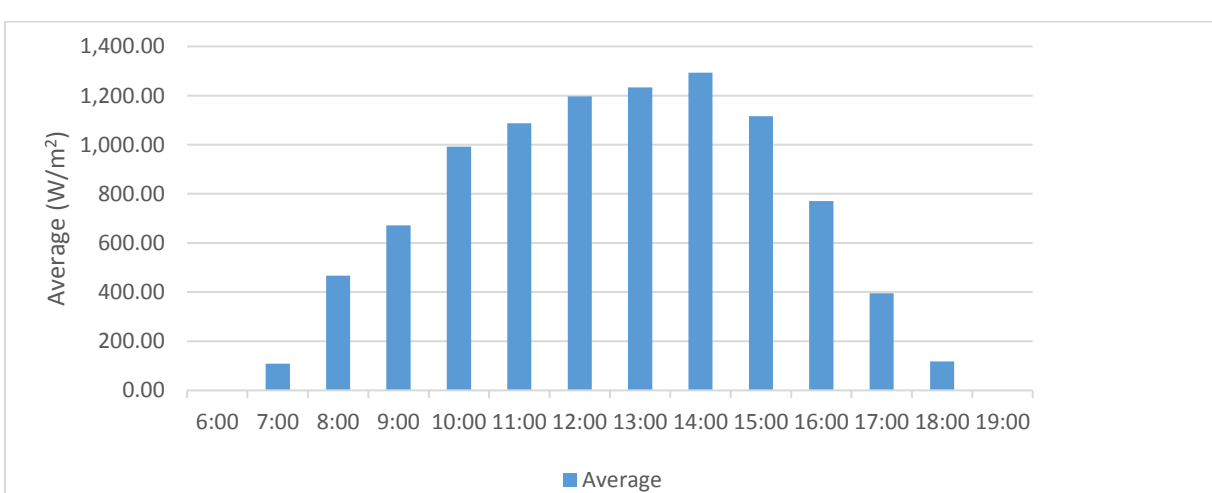
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.10. Average Hourly and Maximum Solar Radiation, October 2016 (W/m²)



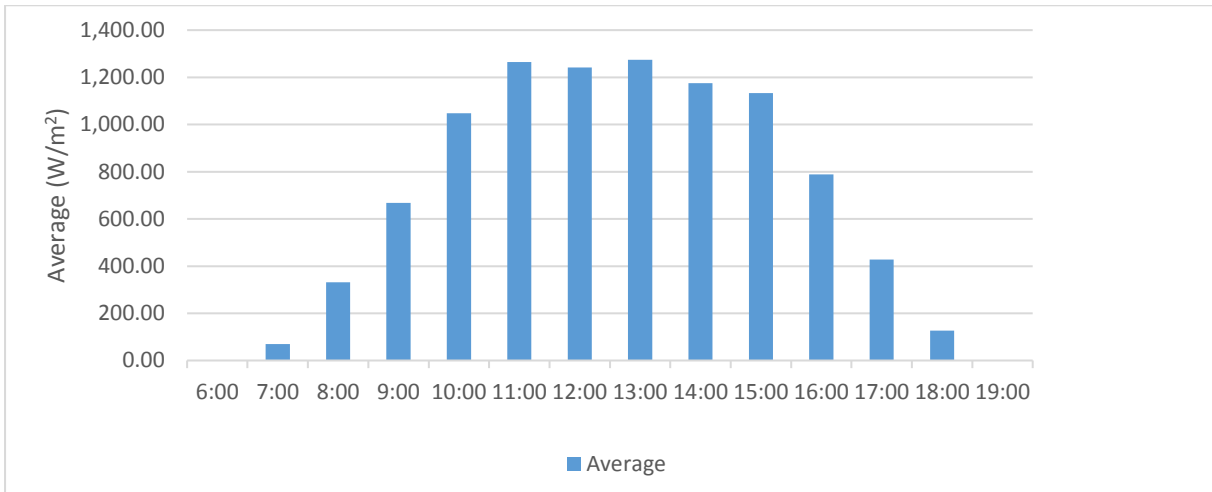
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.11. Average Hourly and Maximum Solar Radiation, November 2016 (W/m²)



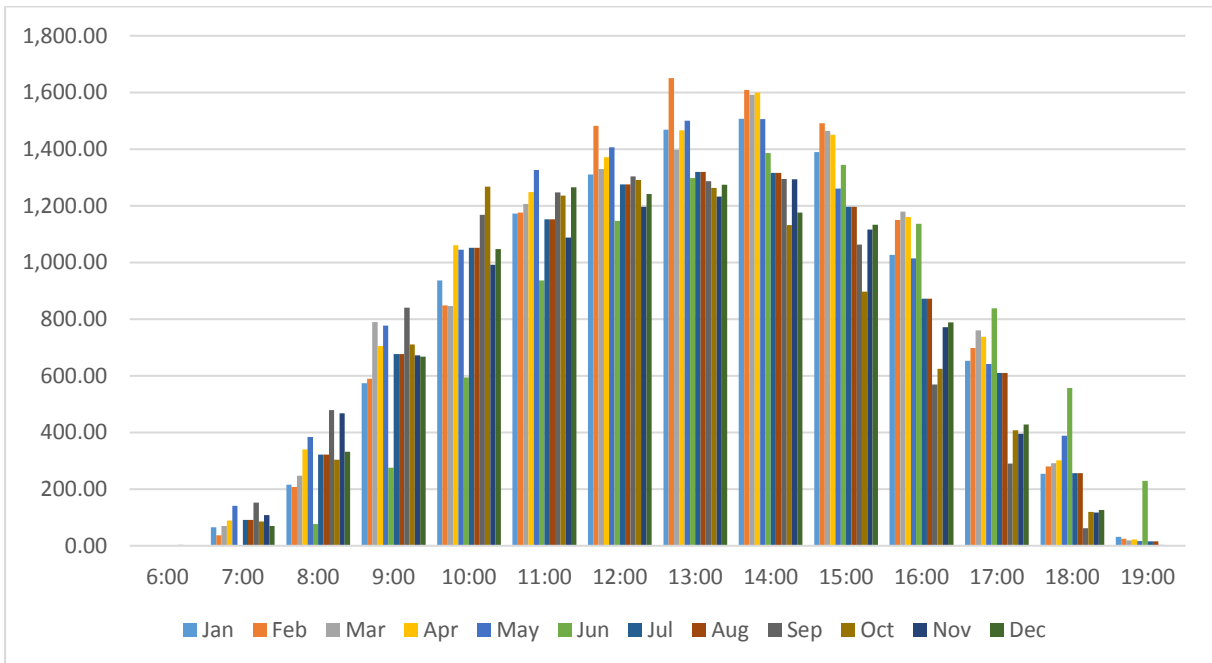
Source: Brunei International Airport Meteorological Station (2016).

Figure A1.12. Average Hourly and Maximum Solar Radiation, December 2016 (W/m²)



Source: Brunei International Airport Meteorological Station (2016).

Figure A1.13. Average Hourly Solar Radiation within 12 Months (W/m²)



Source: Brunei International Airport Meteorological Station (2016).

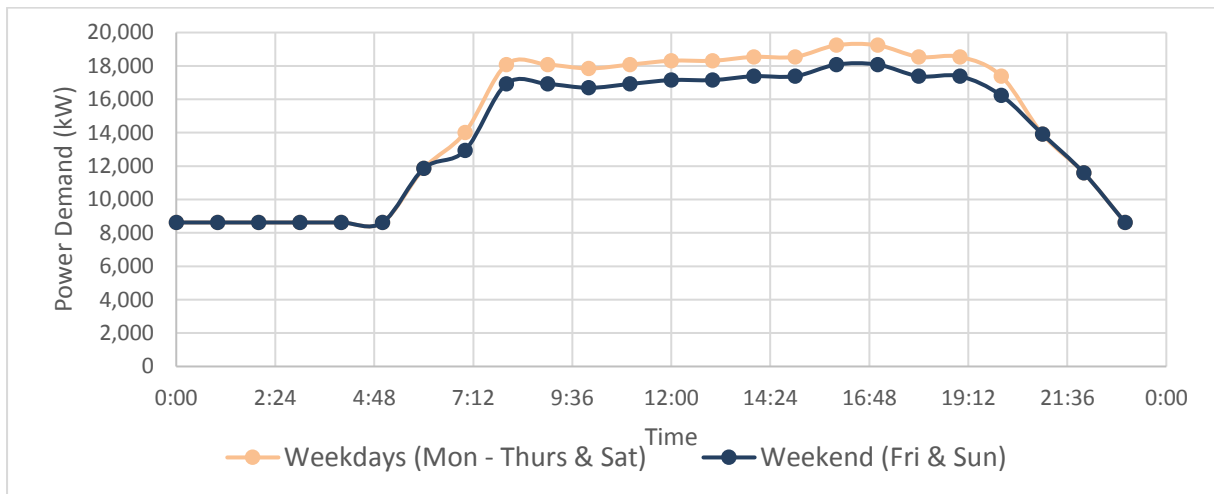
Annex 2

Forecast of Hourly Electricity Load Demand Profile in Temburong District (2025)

Annex 2 provides forecast data of hourly electricity load demand profile from January to December 2025 using two scenarios, normal development and eco development, to support data presentation in Chapter 2. The electricity demand forecast of Temburong Eco Town in 2025 was based on the information and interpretation of data provided in the Temburong District Plan 2006–2025 published by the Department of Town and Country Planning, Ministry of Development, Brunei Darussalam. The forecast of monthly electricity demand trends in 2025 for both scenarios are based on the electricity demand trends in 2016.

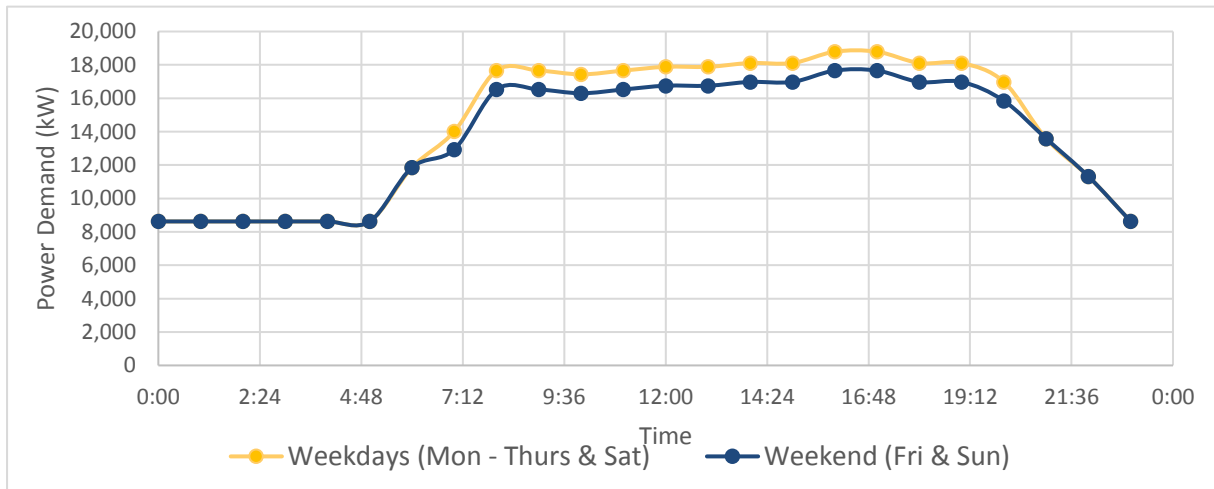
Forecast of Electricity Demand in Temburong Area in 2025 with 12-Month Normal Township Development Scenario

Figure A2.1. Daily Electricity Load Demand Profile, January 2025 (W/m²)



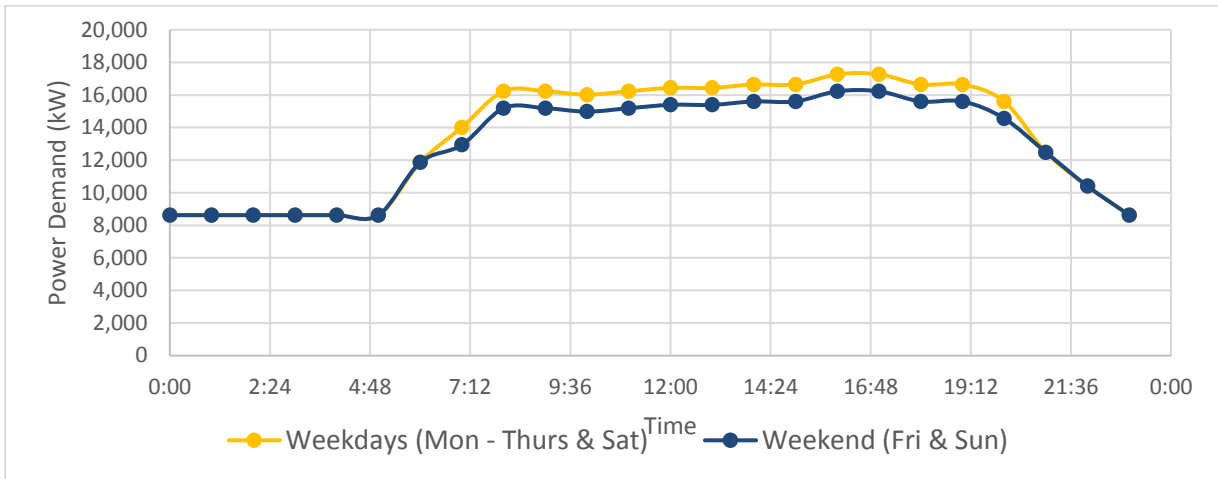
Source: Authors.

Figure A2.2. Daily Electricity Load Demand Profile, February 2025 (W/m²)



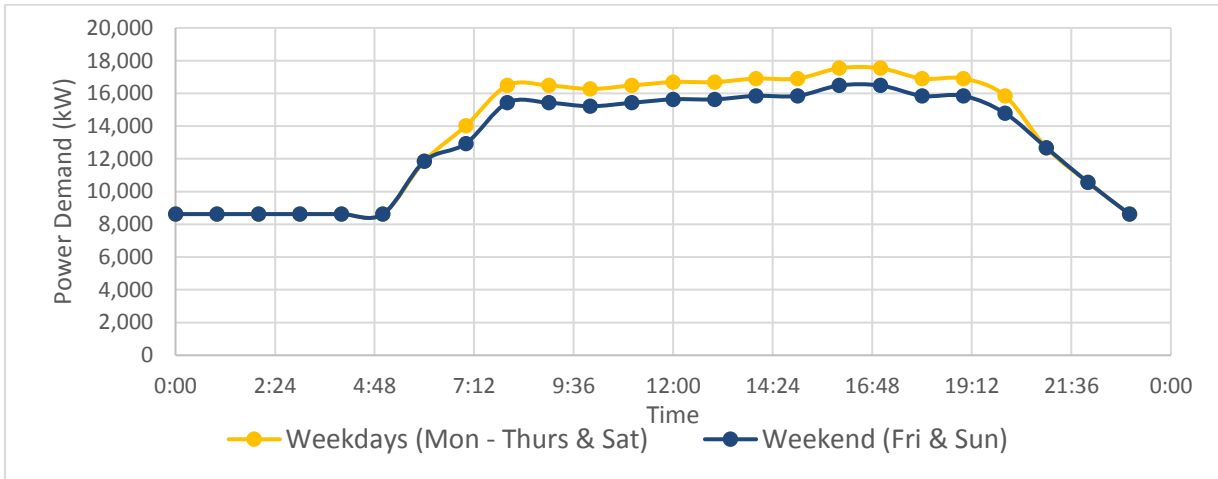
Source: Authors.

Figure A2.3. Daily Electricity Load Demand Profile, March 2025 (W/m²)



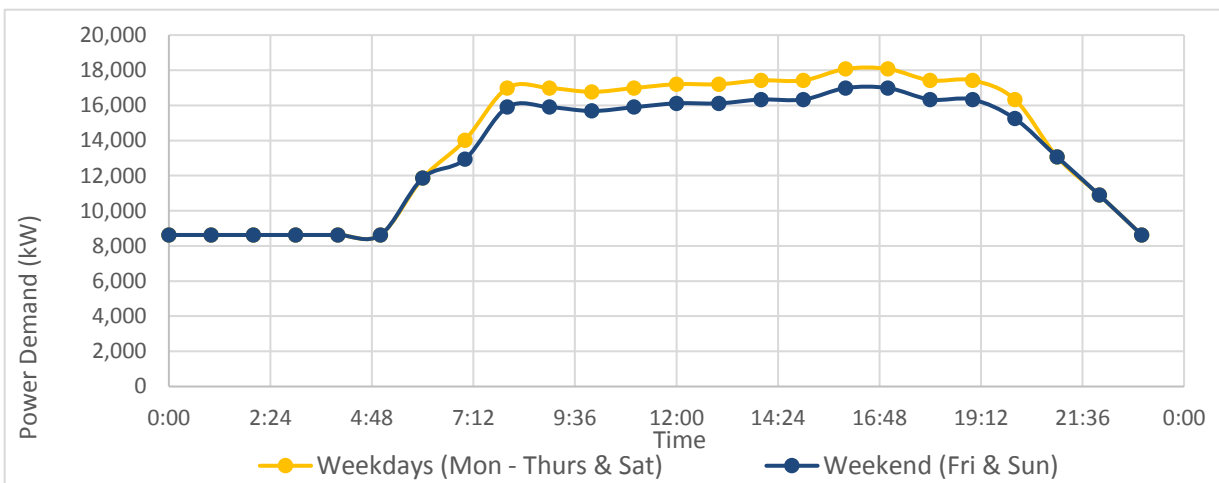
Source: Authors.

Figure A2.4. Daily Electricity Load Demand Profile, April 2025 (W/m²)



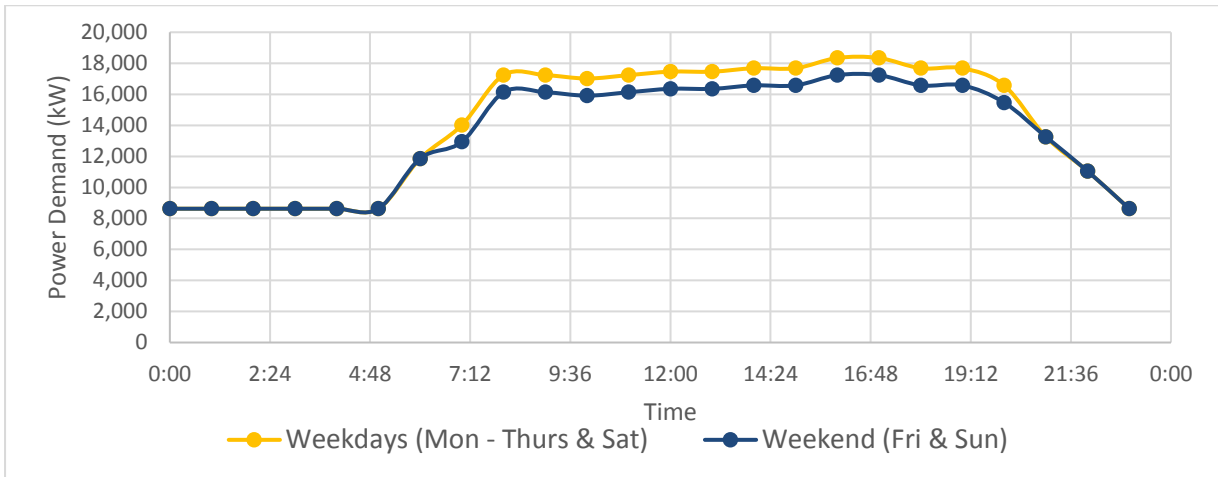
Source: Authors.

Figure A2.5. Daily Electricity Load Demand Profile, May 2025 (W/m²)



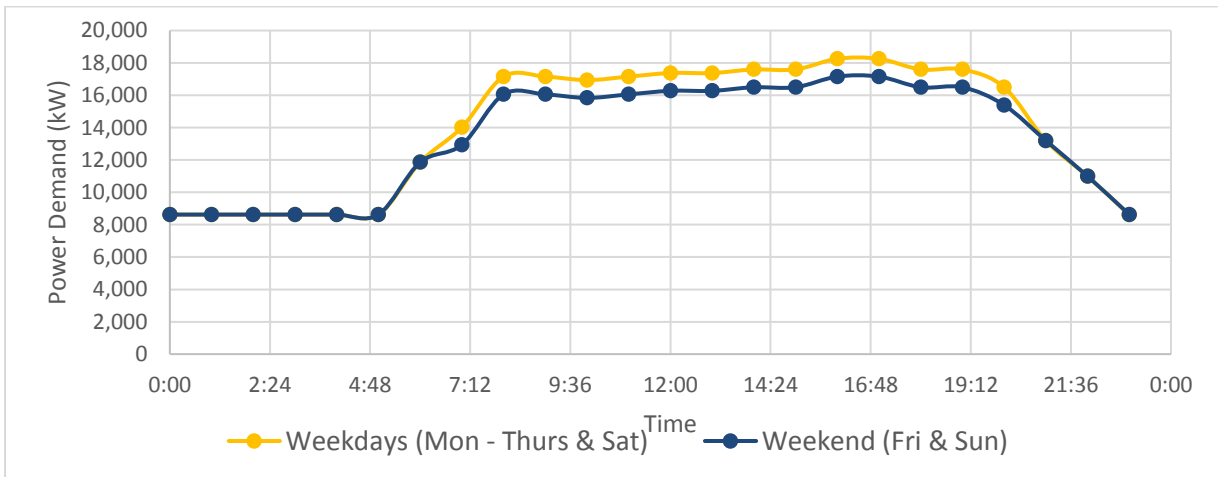
Source: Authors.

Figure A2.6. Daily Electricity Load Demand Profile, June 2025 (W/m²)



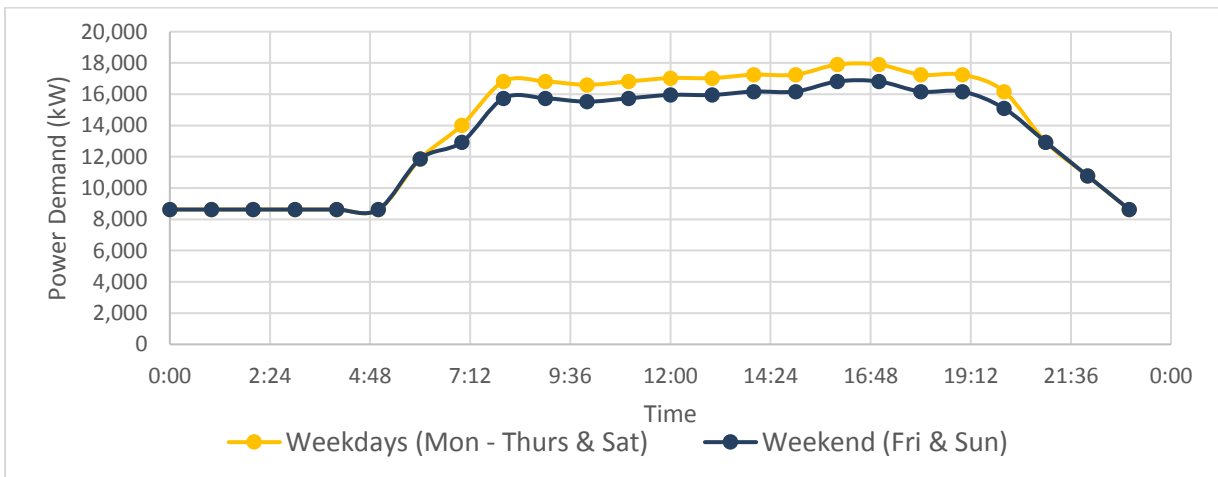
Source: Authors.

Figure A2.7. Daily Electricity Load Demand Profile, July 2025 (W/m²)



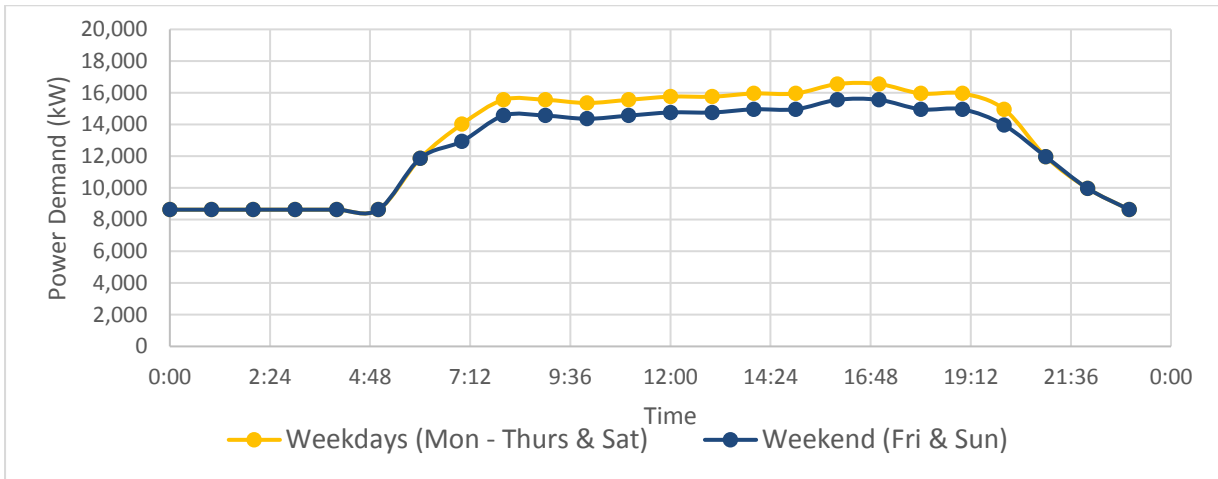
Source: Authors.

Figure A2.8. Daily Electricity Load Demand Profile, August 2025 (W/m²)



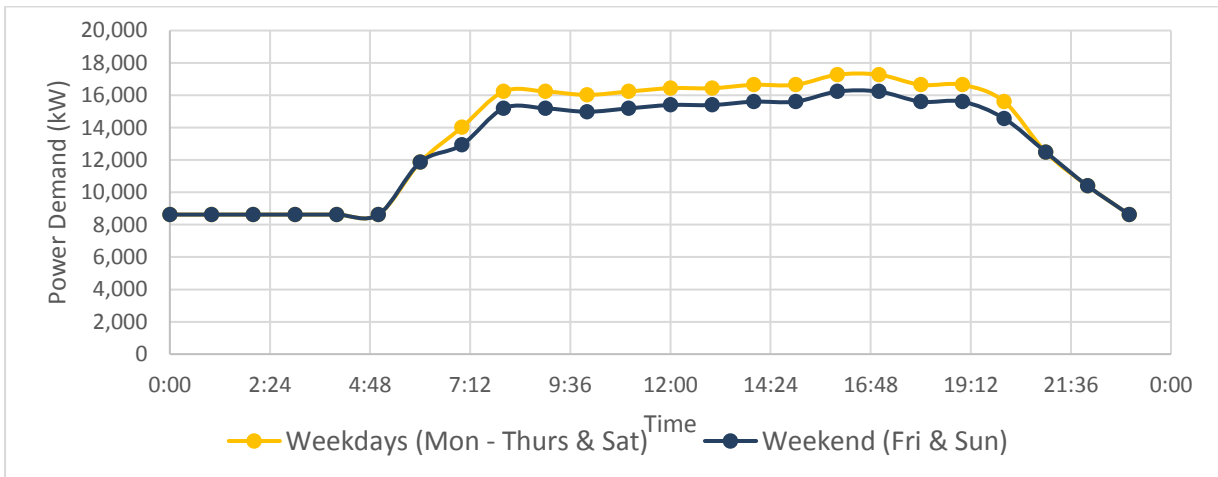
Source: Authors.

Figure A2.9. Daily Electricity Load Demand Profile, September 2025 (W/m²)



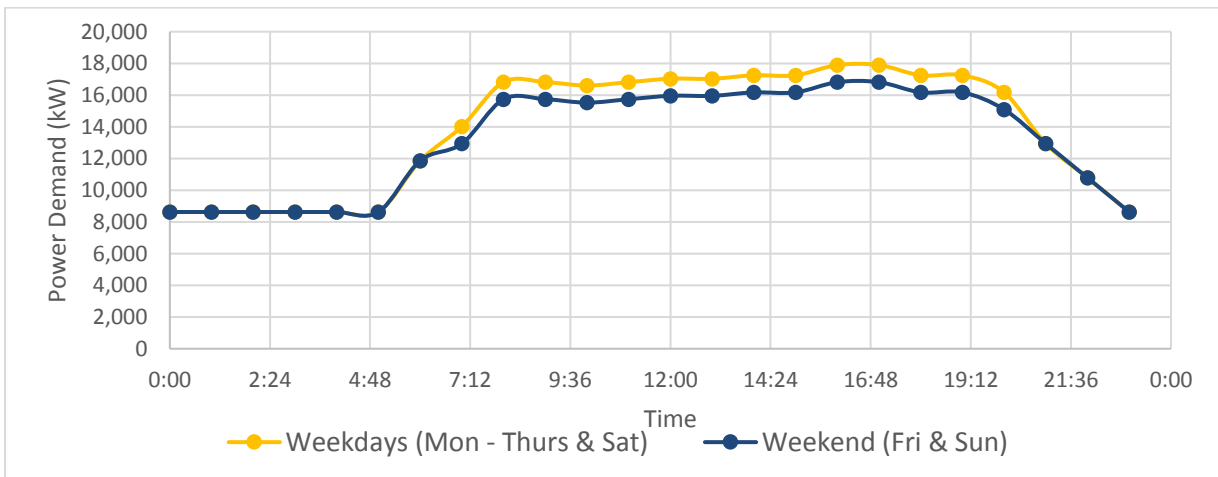
Source: Authors.

Figure A2.10. Daily Electricity Load Demand Profile, October 2025 (W/m²)



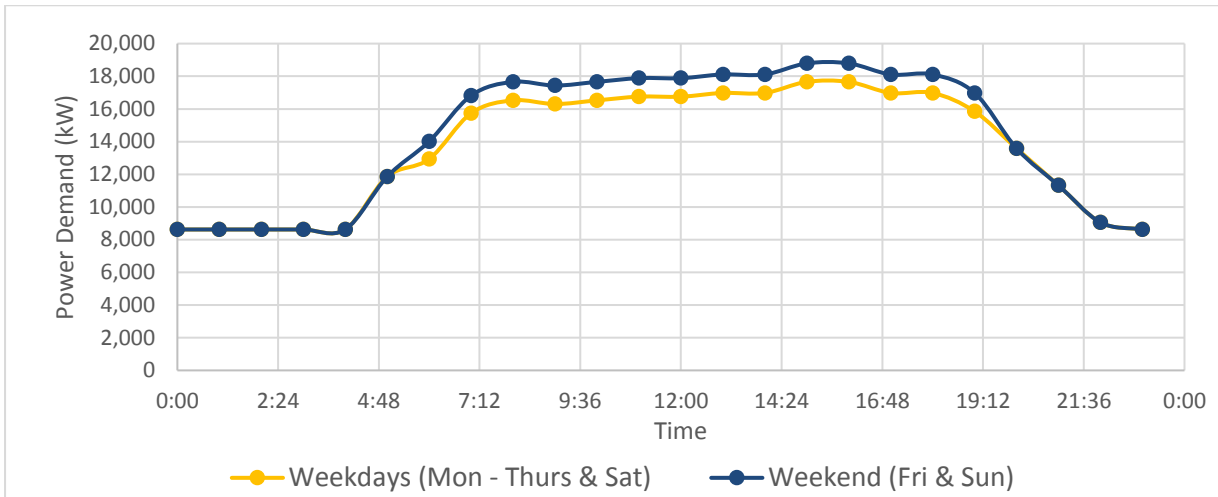
Source: Authors.

Figure A2.11. Daily Electricity Load Demand Profile, November 2025 (W/m²)



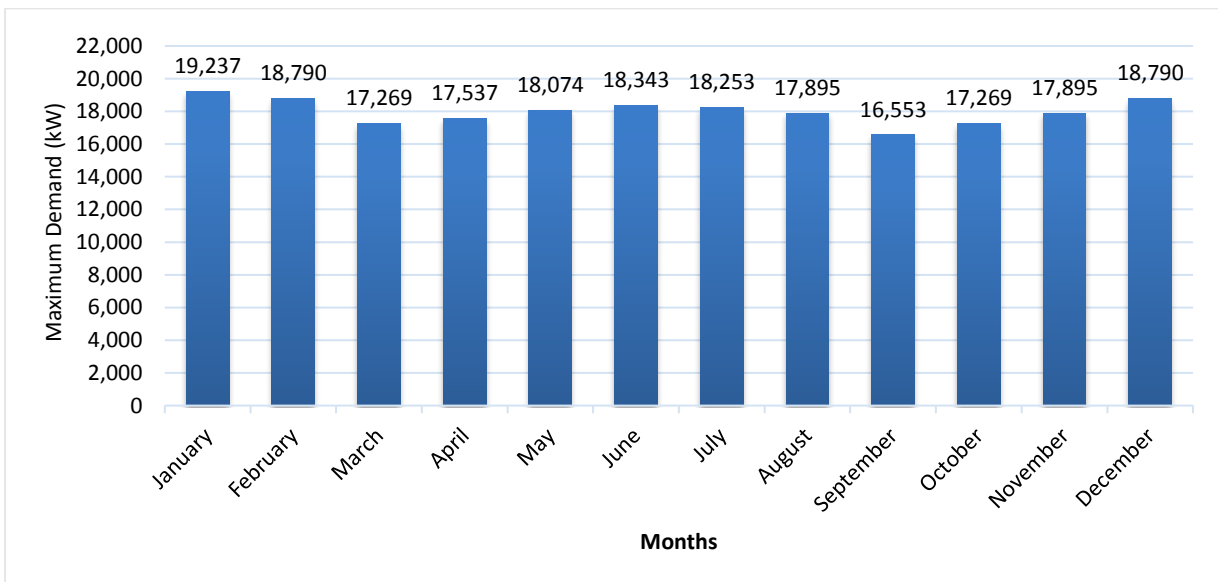
Source: Authors.

Figure A2.12. Daily Electricity Load Demand Profile, December 2025 (W/m²)



Source: Authors.

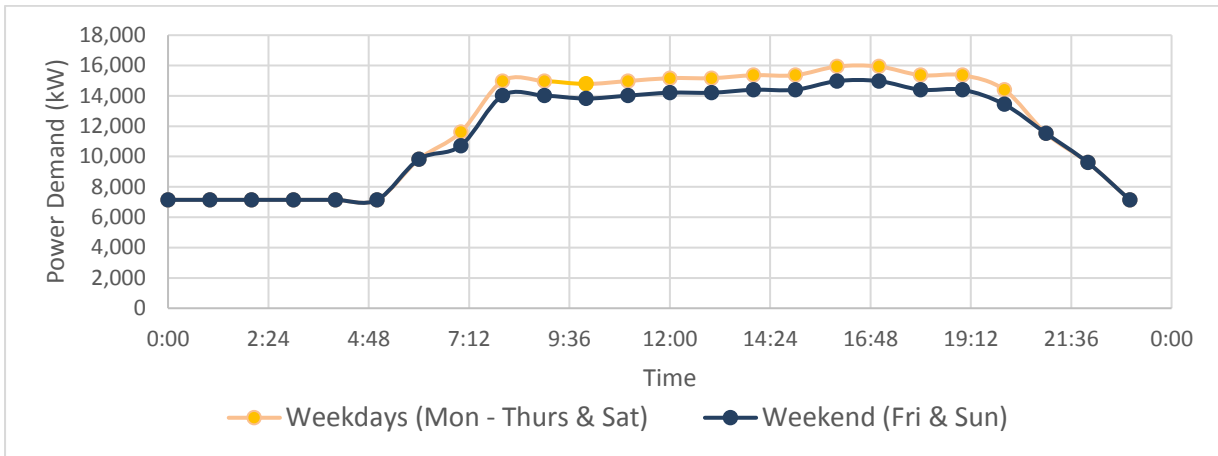
Figure A2.13. Forecast of Maximum Demand per Month, January–December 2025 (W/m²)



Source: Authors.

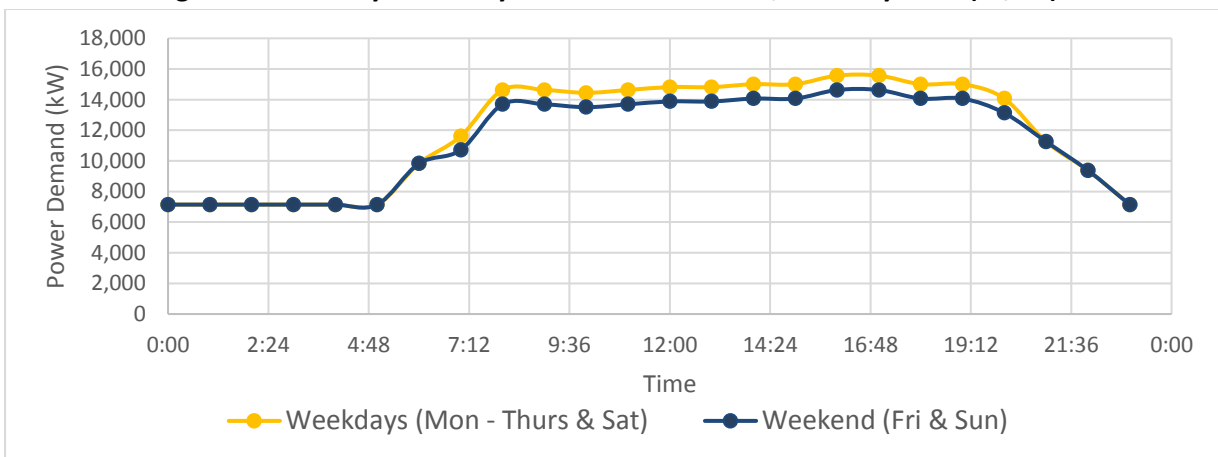
**Forecast of Electricity Demand in Temburong Area in 2025
with 12-Month Eco Development Scenario**

Figure A2.14. Daily Electricity Load Demand Profile, January 2025 (W/m²)



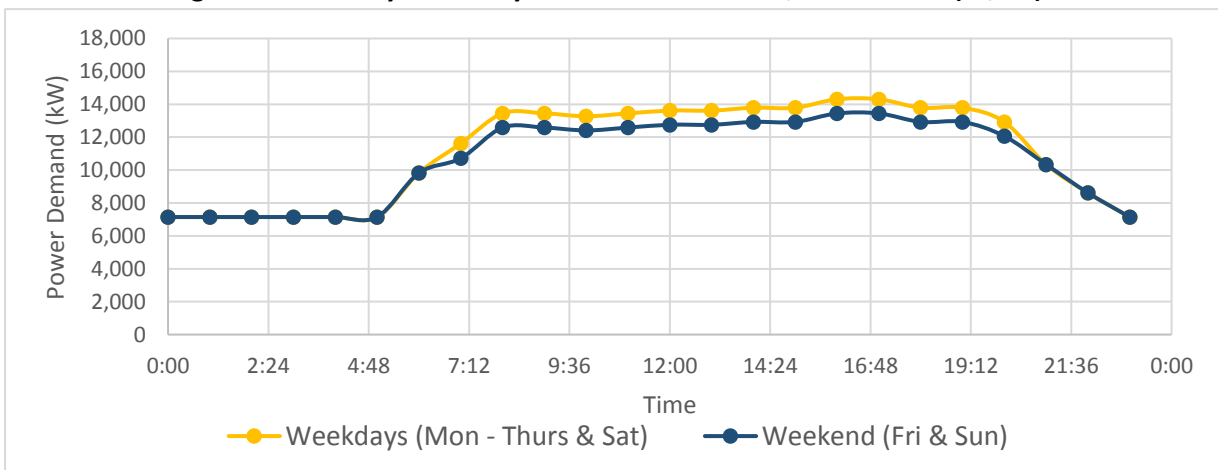
Source: Authors.

Figure A2.15. Daily Electricity Load Demand Profile, February 2025 (W/m²)



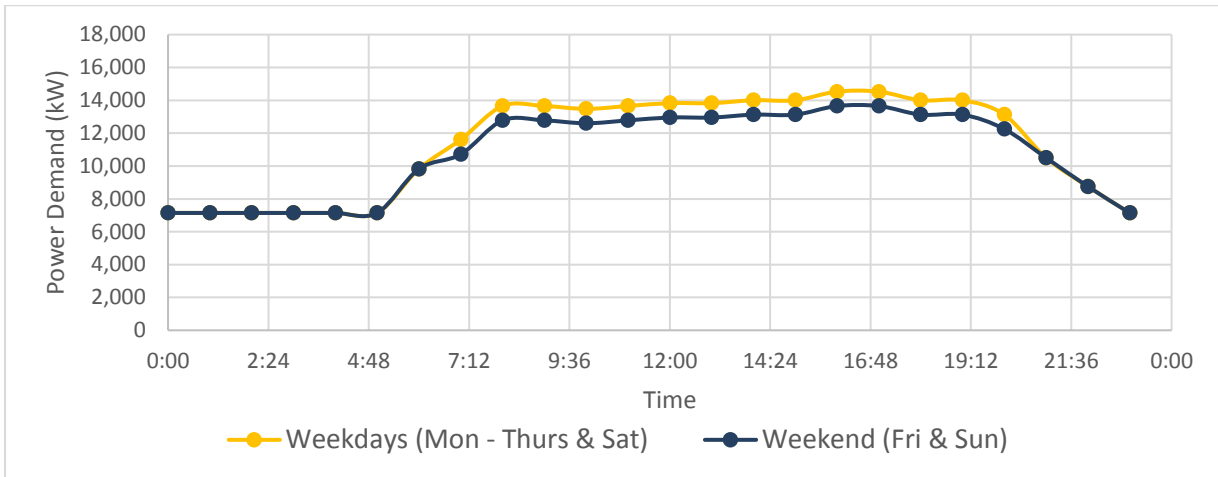
Source: Authors.

Figure A2.16. Daily Electricity Load Demand Profile, March 2025 (W/m²)



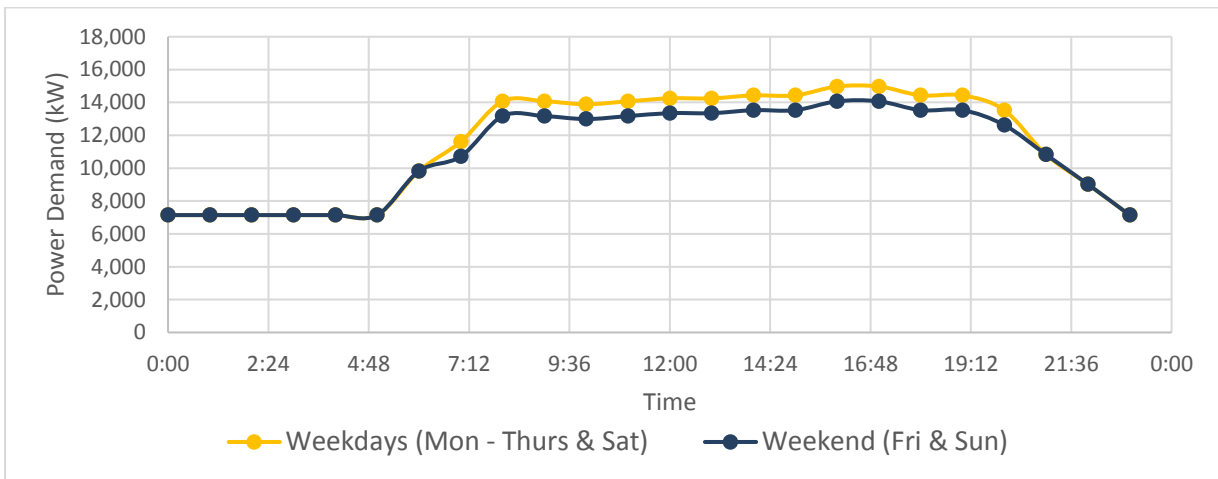
Source: Authors.

Figure A2.17. Daily Electricity Load Demand Profile, April 2025 (W/m²)



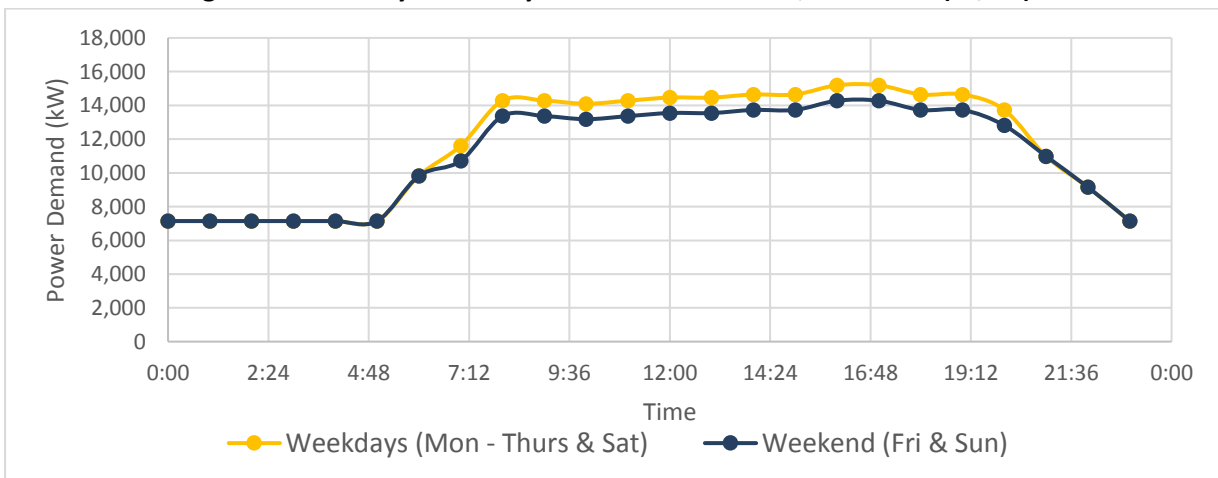
Source: Authors.

Figure A2.18. Daily Electricity Load Demand Profile, May 2025 (W/m²)



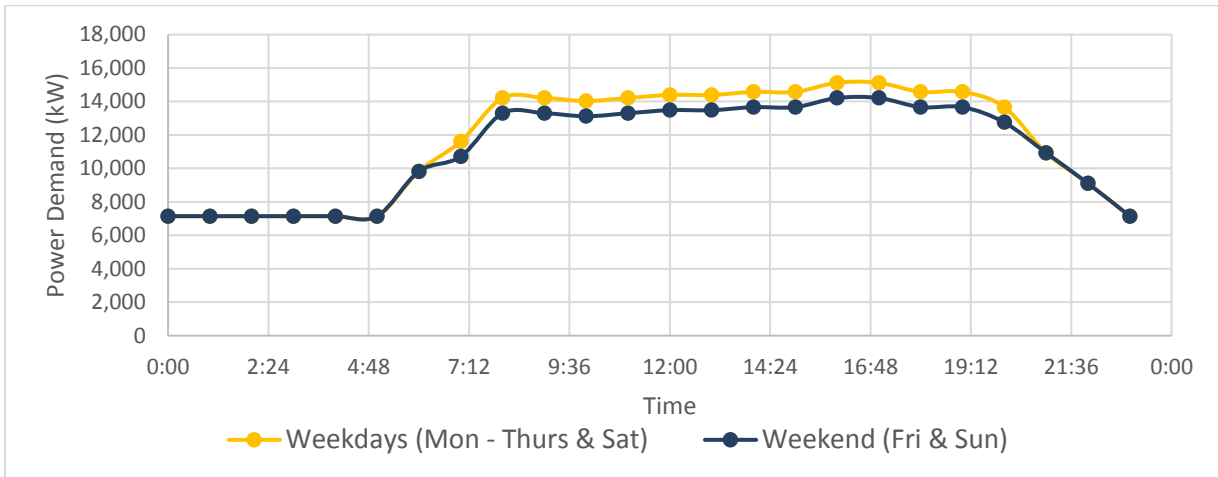
Source: Authors.

Figure A2.19. Daily Electricity Load Demand Profile, June 2025 (W/m²)



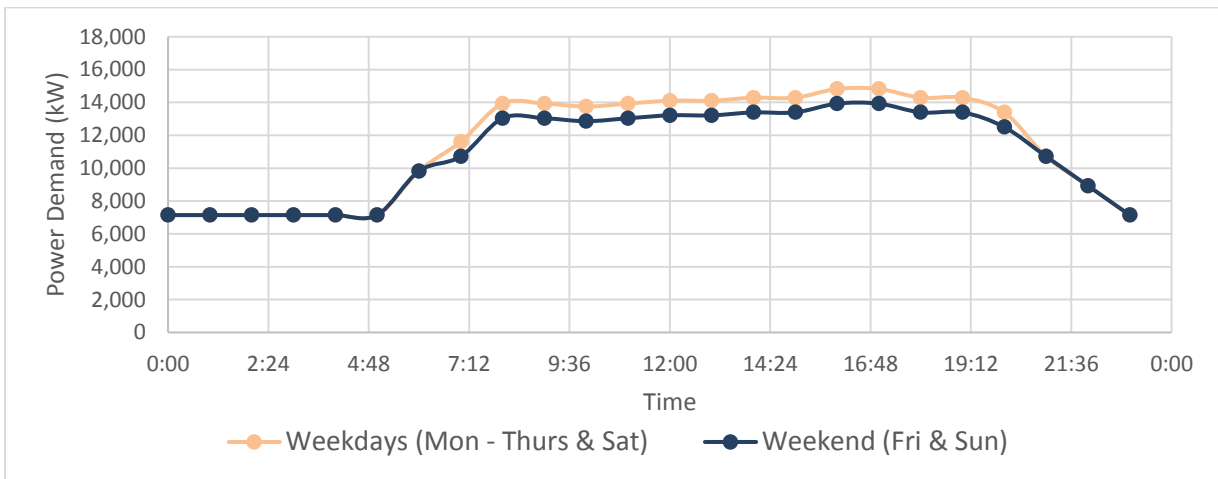
Source: Authors.

Figure A2.20. Daily Electricity Load Demand Profile, July 2025 (W/m²)



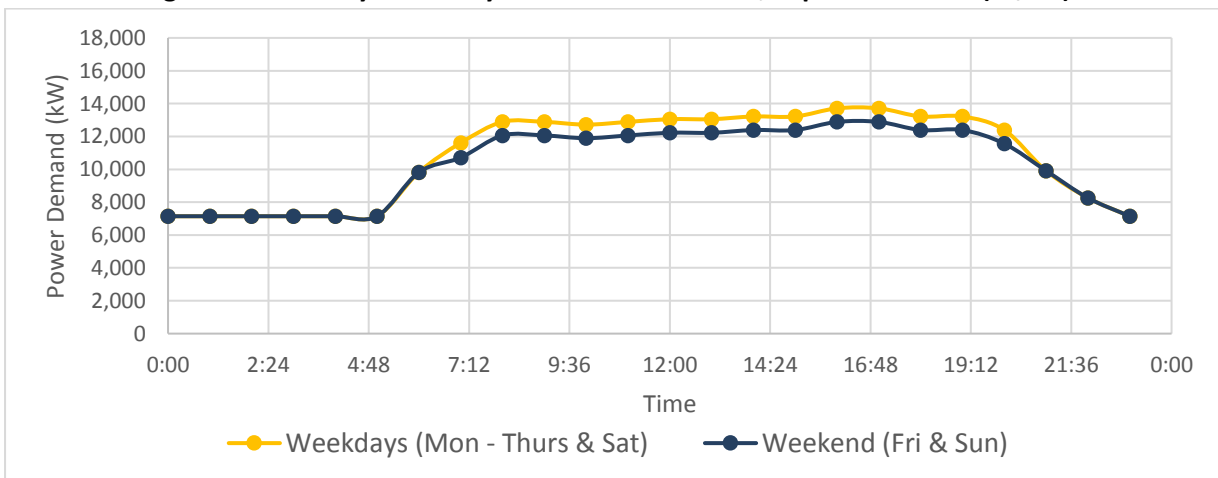
Source: Authors.

Figure A2.21. Daily Electricity Load Demand Profile, August 2025 (W/m²)



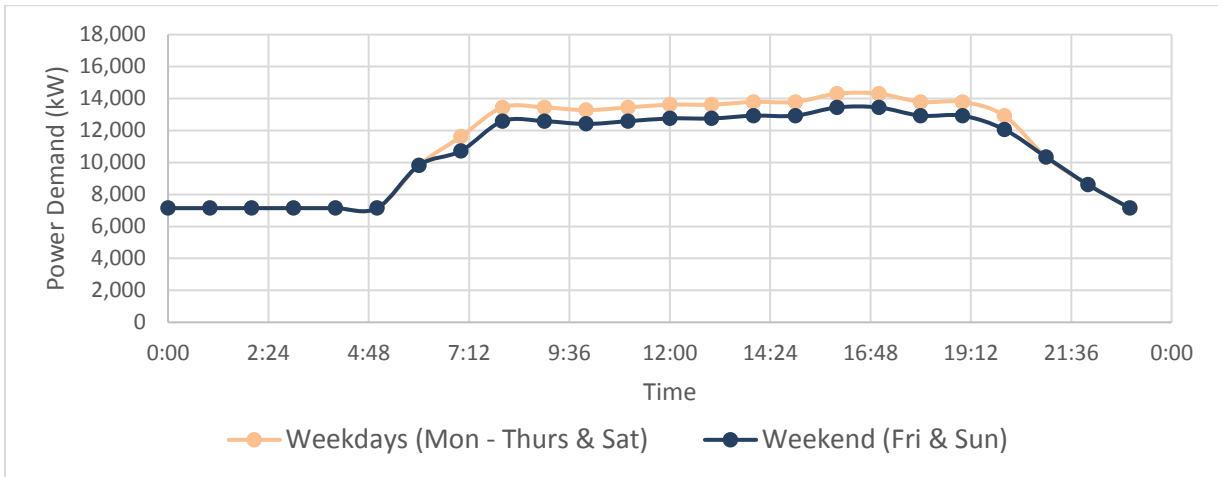
Source: Authors.

Figure A2.22. Daily Electricity Load Demand Profile, September 2025 (W/m²)



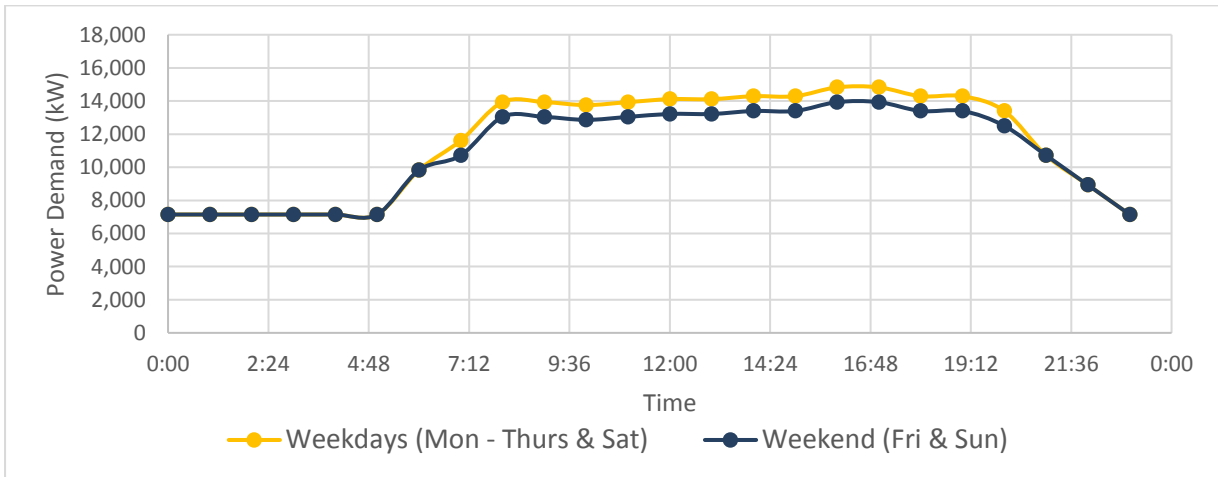
Source: Authors.

Figure A2.23. Daily Electricity Load Demand Profile, October 2025 (W/m²)



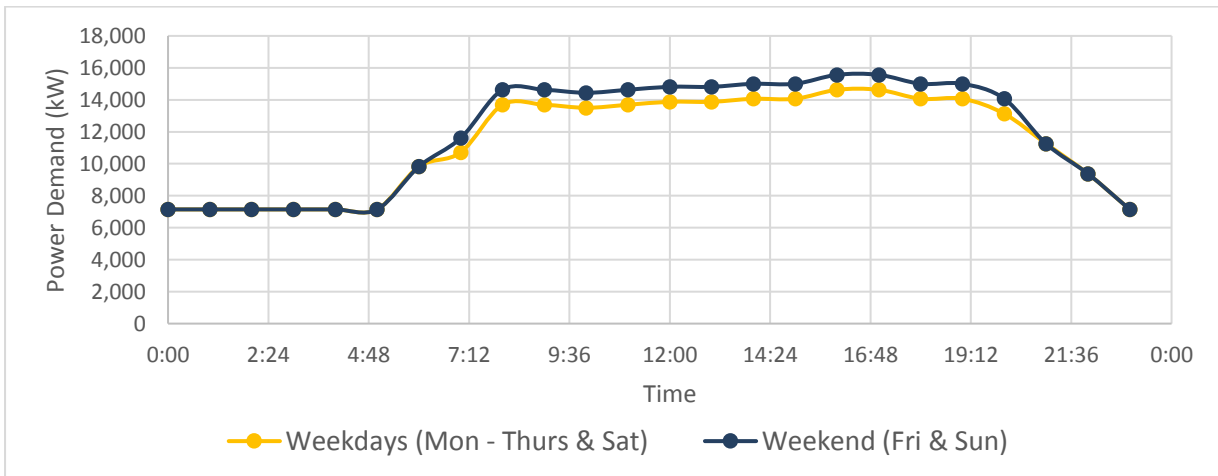
Source: Authors.

Figure A2.24. Daily Electricity Load Demand Profile, November 2025 (W/m²)



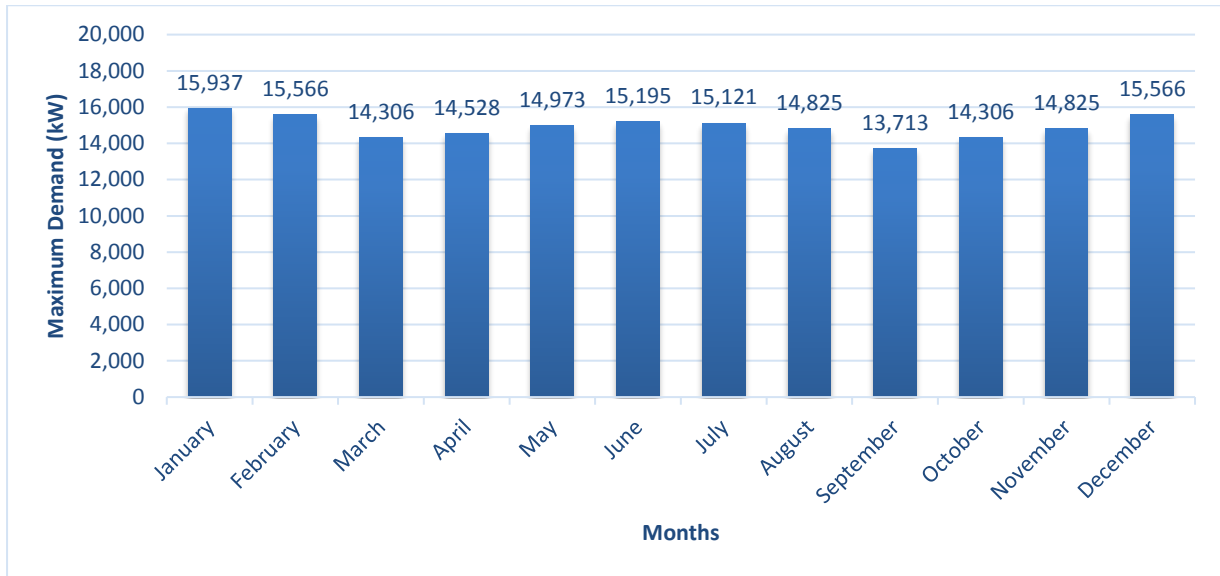
Source: Authors.

Figure A2.25. Daily Electricity Load Demand Profile, December 2025 (W/m²)



Source: Authors.

Figure A2.26. Forecast of Maximum Demand per Month, January–December 2025 (W/m²)



Source: Authors.

Annex 3

Additional Results on Electricity Supply in Temburong Eco Town

Operation schedule of diesel generators and electricity storage with minimum fuel cost of diesel generator was simulated using the model shown in Figure 1 and for the scenarios of solar PV and electricity storage described in Table 3.1 to Table 3.6 of Chapter 3. The scenarios from which demand supply balance was not obtained for the given capacities of solar PV and electricity storage are indicated by 'infeasible'.

I. Generated Electricity of Diesel Generator

Generated electricity of diesel generator is shown for each of the various capacities of PV and electricity storage in Table A3.1. to Table A3.5. Using these results, operation rates of diesel generators at the best power mix corresponding to Table 3.14 and Table 3.15 are calculated and shown in Figure 3.8 of Chapter 3.

Table A3.1. Generated Electricity by Diesel Generator with D=12MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	24	42	60	78	90
10	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
24	Infeasible	Infeasible	Infeasible	93098	93098
38	Infeasible	Infeasible	74055	73982	73971
53	Infeasible	61914	59789	58500	57984
67	Infeasible	55287	51852	49081	47588

Source: Authors.

Table A3.2. Generated Electricity by Diesel Generator with D=12MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	12	30	48	66
0	Infeasible	Infeasible	Infeasible	Infeasible
5	Infeasible	Infeasible	95897	95897
19	Infeasible	76264	76264	76264
34	Infeasible	58893	58272	58141

Source: Authors.

Table A3.3. Generated Electricity by Diesel Generator with D=6MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	150	180	210	240
96	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	7434	5310
144	Infeasible	5579	2820	1404
168	Infeasible	2986	1204	480

Source: Authors.

Table A3.4. Generated Electricity by Diesel Generator with D=6MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	90	120	150	180	210
48	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
72	Infeasible	Infeasible	Infeasible	20896	20380
96	Infeasible	15120	9902	6804	4944
120	Infeasible	9703	4445	1901	831

Source: Authors.

Table A3.5. Generated Electricity by Solar PV with D=12MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	24	42	60	78	90
10	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
24	Infeasible	Infeasible	Infeasible	26729	26729
38	Infeasible	Infeasible	45772	45844	45856
53	Infeasible	57913	60037	61327	61843
67	infeasible	64540	67974	70746	72239

Source: Authors.

II. Generated Electricity by Solar PV

Generated electricity by solar PV is shown for each of the various capacities of PV and electricity storage in Table A3.6 to Table A3.10. Using these results, solar PV load factor at the best power mix corresponding to Table 3.14 and Table 3.15 is calculated and shown in Figure 3.9 of Chapter 3.

Table A3.6. Generated Electricity by Solar PV with D=12MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	12	30	48	66
0	Infeasible	Infeasible	Infeasible	Infeasible
5	Infeasible	Infeasible	3379	3379
19	Infeasible	23011	23011	23011
34	Infeasible	40383	41004	41135

Source: Authors.

Table A3.7. Generated Electricity by Solar PV with D=6MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	150	180	210	240
96	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	112393	114517
144	Infeasible	114248	117007	118423
168	Infeasible	116841	118622	119347

Source: Authors.

Table A3.8. Generated Electricity by Solar PV with D=6MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	90	120	150	180	210
48	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
72	Infeasible	Infeasible	Infeasible	78380	78896
96	Infeasible	84156	89374	92472	94331
120	Infeasible	89573	94831	97375	98445

Source: Authors.

Table A3.9. Generated Electricity by Solar PV with D=0MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	450	480	510	540	570
120	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
144	Infeasible	Infeasible	Infeasible	119827	119827
168	Infeasible	119827	119827	119827	119827
192	Infeasible	119827	119827	119827	119827

Source: Authors.

Table A3.10. Generated Electricity by Solar PV with D=0MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	360	390	420	450	480
96	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	Infeasible	99276	99276
144	Infeasible	99276	99276	99276	99276
168	Infeasible	99276	99276	99276	99276

Source: Authors.

III. Average Charged Electricity in Storage

Average charged electricity in storage is shown for each of the various capacities of PV and electricity storage in Table A3.11 to Table A3.16. Using these results, average values of storage operation rate at the best power mix corresponding to Table 3.14 and Table 3.15 are calculated and shown in Figure 3.10 of Chapter 3.

Table A3.11. Average Charged Electricity in Storage with D=12MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	24	42	60	78	90
10	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
24	Infeasible	Infeasible	Infeasible	30	35
38	Infeasible	Infeasible	24	31	36
53	Infeasible	16	22	29	35
67	Infeasible	15	23	31	35

Source: Authors.

Table A3.12. Average Charged Electricity in Storage with D=12MW for Eco Demand (MWh)

PV(MW)\ Storage (MWh)	12	30	48	66
0	Infeasible	Infeasible	Infeasible	Infeasible
5	Infeasible	Infeasible	22	32
19	Infeasible	11	20	27
34	Infeasible	11	18	28

Source: Authors.

Table A3.13. Average Charged Electricity in Storage with D=6MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	150	180	210	240
96	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	90	103
144	Infeasible	79	89	99
168	Infeasible	79	88	96

Source: Authors.

Table A3.14. Average Charged Electricity in Storage with D=6MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	90	120	150	180	210
48	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
72	Infeasible	Infeasible	Infeasible	67	77
96	Infeasible	51	65	75	88
120	Infeasible	52	65	77	86

Source: Authors.

Table A3.15. Average Charged Electricity in Storage with D=0MW for Normal Demand (MWh)

PV(MW)\Storage (MWh)	450	480	510	540	570
120	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
144	Infeasible	Infeasible	Infeasible	164	189
168	Infeasible	160	160	176	163
192	Infeasible	151	156	176	176

Source: Authors.

Table A3.16. Average Charged Electricity in Storage with D=0MW for Eco Demand (MWh)

PV(MW)\Storage (MWh)	360	390	420	450	480
96	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	Infeasible	134	154
144	Infeasible	124	131	141	134
168	Infeasible	120	143	127	132

Source: Authors.

IV. Initial Investment Cost

Initial investment cost is shown for each of the various capacities of PV and electricity storage in Table A3.17 to Table A3.22. Using these results, fuel costs of diesel generators at the best power mix corresponding to Table 3.14 and Table 3.15 are calculated and shown in Figure 3.12 of Chapter 3.

Table A3.17. Initial Cost with D=12MW for Normal Demand (US\$)

PV(MW)\Storage (MWh)	24	42	60	78	90
10	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
24	Infeasible	Infeasible	Infeasible	95,400,000	97,800,000
38	Infeasible	Infeasible	135,000,000	138,600,000	141,000,000
53	Infeasible	174,600,000	178,200,000	181,800,000	184,200,000
67	Infeasible	217,800,000	221,400,000	225,000,000	227,400,000

Source: Authors.

Table A3.18. Initial Cost with D=12MW for Eco Demand (US\$)

PV(MW)\Storage (MWh)	12	30	48	66
0	Infeasible	Infeasible	Infeasible	Infeasible
5	Infeasible	Infeasible	31,800,000	35,400,000
19	Infeasible	71,400,000	75,000,000	78,600,000
34	Infeasible	114,600,000	118,200,000	121,800,000

Source: Authors.

Table A3.19. Initial Cost with D=6MW for Normal Demand (US\$)

PV(MW)\Storage (MWh)	150	180	210	240
96	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	405,900,000	411,900,000
144	Infeasible	417,900,000	477,900,000	483,900,000
168	Infeasible	543,900,000	549,900,000	555,900,000

Source: Authors.

Table A3.20. Initial Cost with D=6MW for Eco Demand (US\$)

PV(MW)\Storage (MWh)	90	120	150	180	210
48	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
72	Infeasible	Infeasible	Infeasible	255,900,000	261,900,000
96	Infeasible	315,900,000	321,900,000	327,900,000	333,900,000
120	Infeasible	387,900,000	393,900,000	399,900,000	405,900,000

Source: Authors.

Table A3.21. Initial Cost with D=0MW for Normal Demand (US\$)

PV(MW)\Storage (MWh)	450	480	510	540	570
120	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
144	Infeasible	Infeasible	Infeasible	540,000,000	546,000,000
168	Infeasible	6,000,000	606,000,000	612,000,000	618,000,000
192	Infeasible	672,000,000	678,000,000	684,000,000	690,000,000

Source: Authors.

Table A3.22. Initial Cost with D=0MW for Eco Demand (US\$)

PV(MW)\Storage (MWh)	360	390	420	450	480
96	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	Infeasible	450,000,000	456,000,000
144	Infeasible	510,000,000	516,000,000	522,000,000	528,000,000
168	Infeasible	582,000,000	588,000,000	594,000,000	600,000,000

Source: Authors.

V. Fuel Cost of Diesel Generator

Fuel cost of diesel generator is shown for each of the various capacities of PV and electricity storage in Table A3.23 to Table A3.26. Using these results, initial investment costs at the best power mix corresponding to Table 3.14 and Table 3.15 are calculated and shown in Figure 3.11 of Chapter 3.

Table A3.23. Fuel Cost of Diesel Generator with D=12MW for Normal Demand (US\$/Year)

PV(MW)\Storage (MWh)	24	42	60	78	90
10	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
24	Infeasible	Infeasible	Infeasible	9,003,538	9,003,537
38	Infeasible	Infeasible	7,167,505	7,145,458	7,153,310
53	Infeasible	5,987,409	5,781,847	5,657,124	5,607,127
67	Infeasible	5,346,351	5,014,082	4,745,951	4,607,519

Source: Authors.

Table A3.24. Fuel Cost of Diesel Generator with D=12MW for Eco Demand US\$/Year)

PV(MW)\Storage (MWh)	12	30	48	66
0	Infeasible	Infeasible	Infeasible	Infeasible
5	Infeasible	Infeasible	9,274,361	9,274,360
19	Infeasible	7,374,949	7,374,947	7,374,945
34	Infeasible	5,695,007	5,634,900	5,622,208

Source: Authors.

Table A3.25. Fuel Cost of Diesel Generator with D=6MW for Normal Demand (US\$/Year)

PV(MW)\Storage (MWh)	150	180	210	240
96	Infeasible	Infeasible	Infeasible	Infeasible
120	Infeasible	Infeasible	718,637	513,310
144	Infeasible	539,311	272,603	135,729
168	Infeasible	288,606	116,427	46,433

Source: Authors.

Table A3.26. Fuel Cost of Diesel Generator with D=6MW for Eco Demand (US\$/Year)

PV(MW)\Storage (MWh)	90	120	150	180	210
48	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible
72	Infeasible	Infeasible	Infeasible	2,020,088	1,970,174
96	Infeasible	1,461,629	957,195	657,768	477,971
120	Infeasible	937,971	429,692	183,726	80,351

Source: Authors.