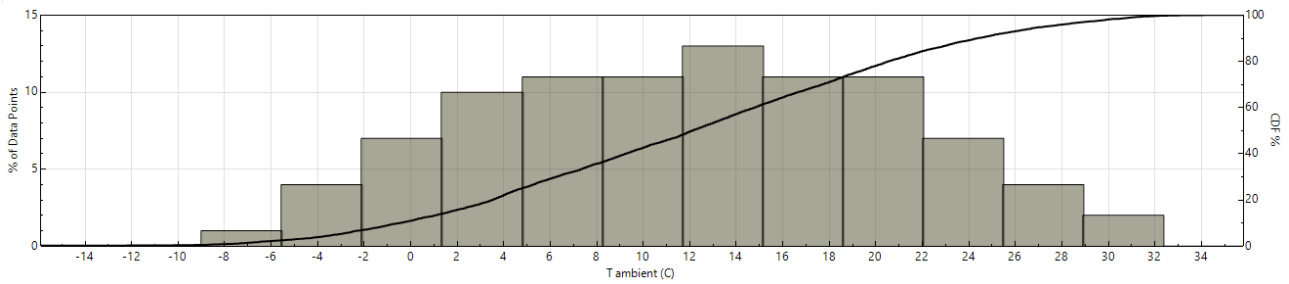
PAPER TITLE: **SIMULATION BASED SOLAR WATER HEATING SYSTEM OPERATION IN RESIDENTIAL ENVIRONMENT**

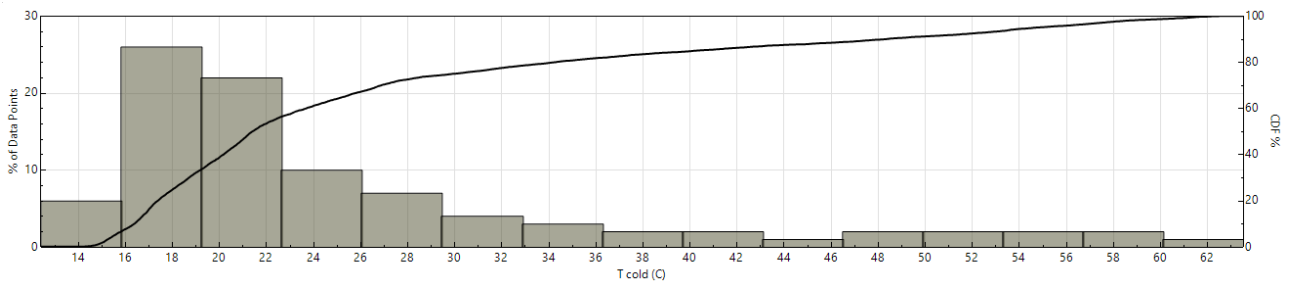
AUTHORS: *To be added upon potential acceptance of the manuscript*

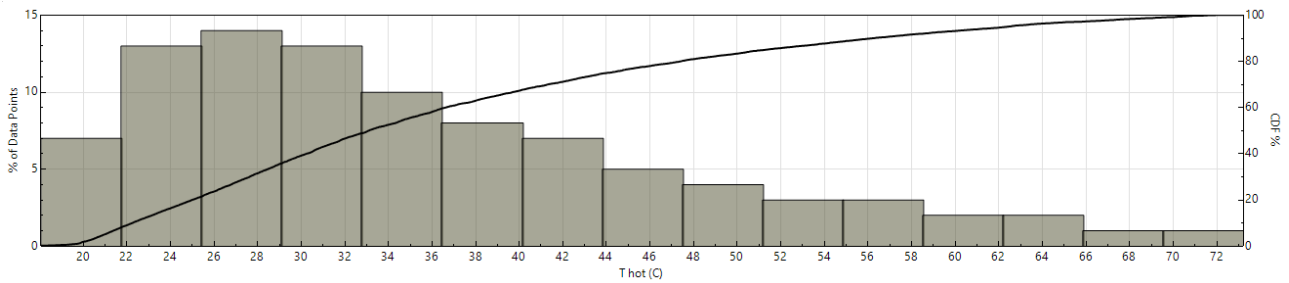
SUBJECT: **APPENDIX 3 -** ***Complete graphical representations***

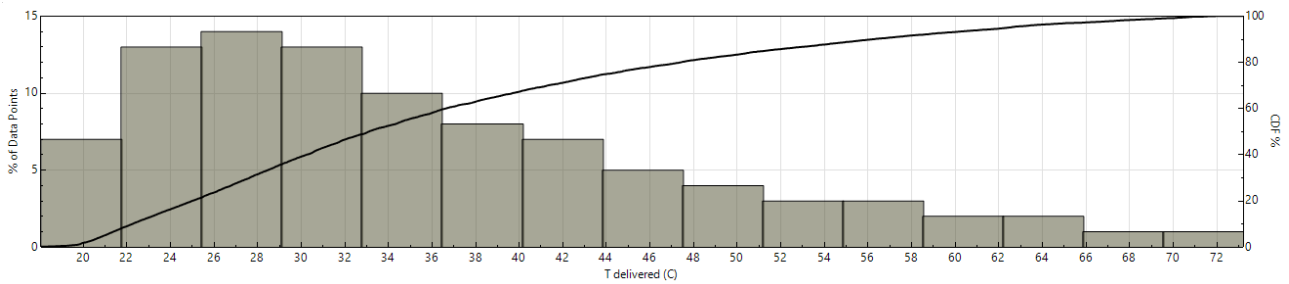
Primary tools used for these representations are monthly profiles, hourly plots, heat maps, as well as probability density functions (PDF's) in the form of a histogram, based on Sturge's formula.

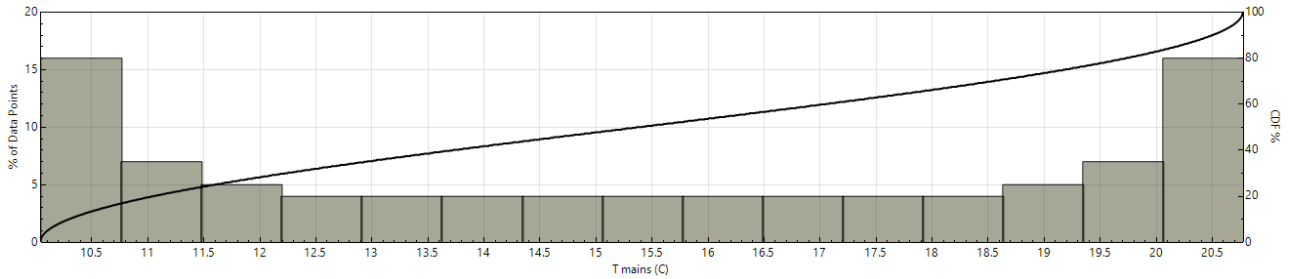
1. Temperatures

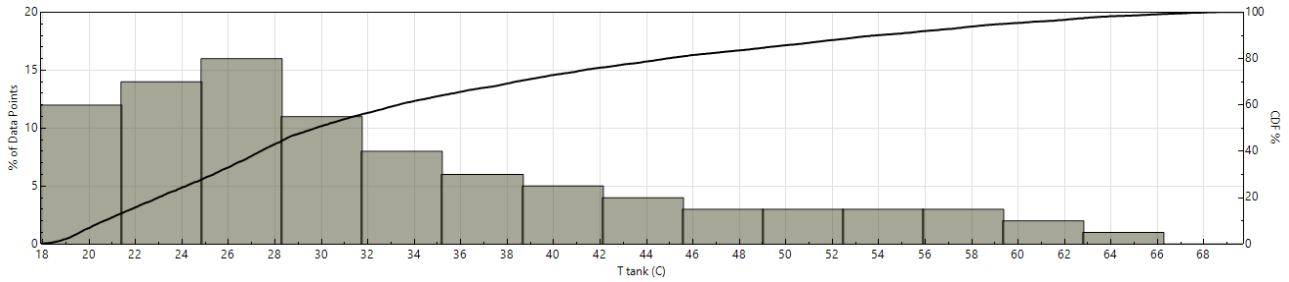


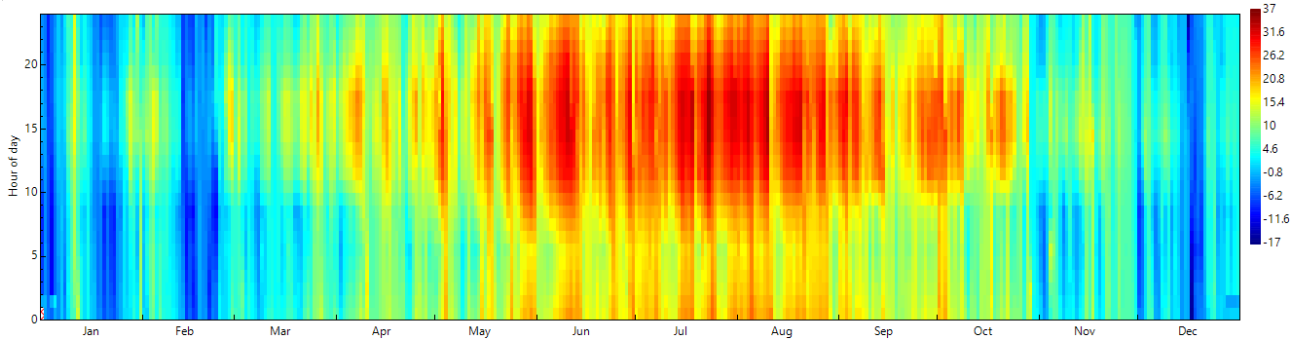




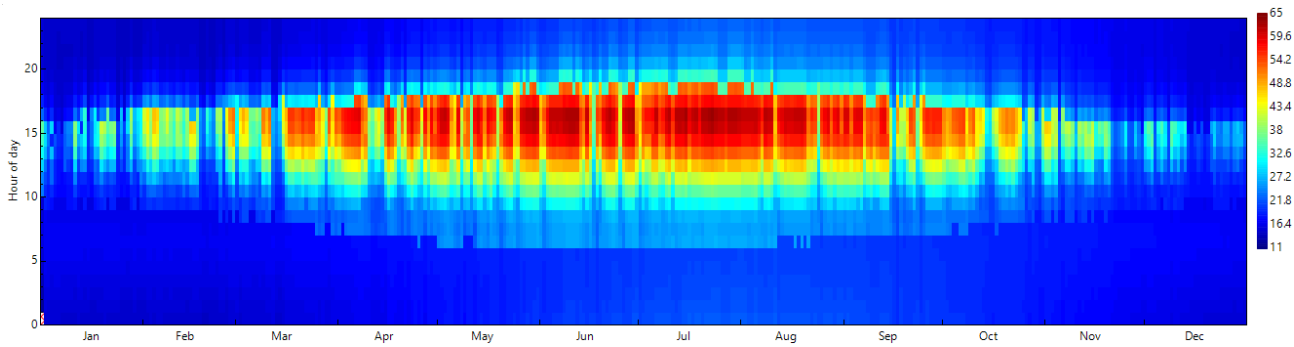




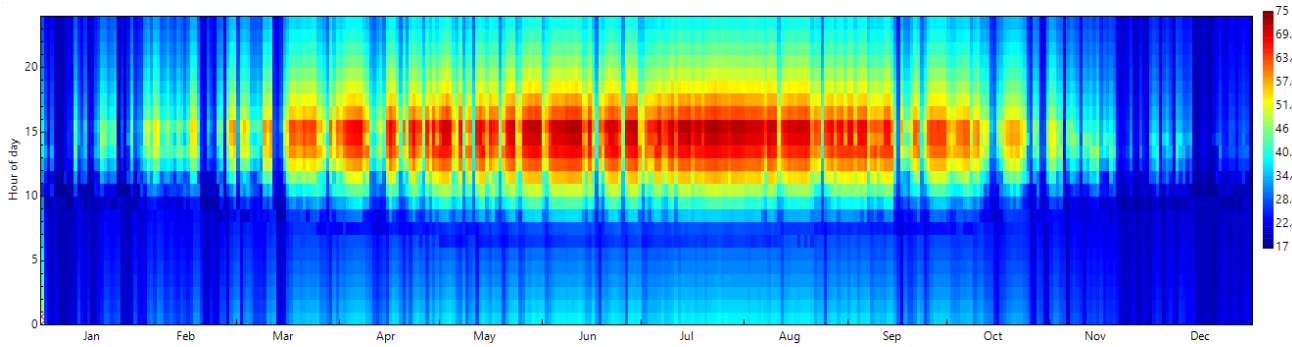




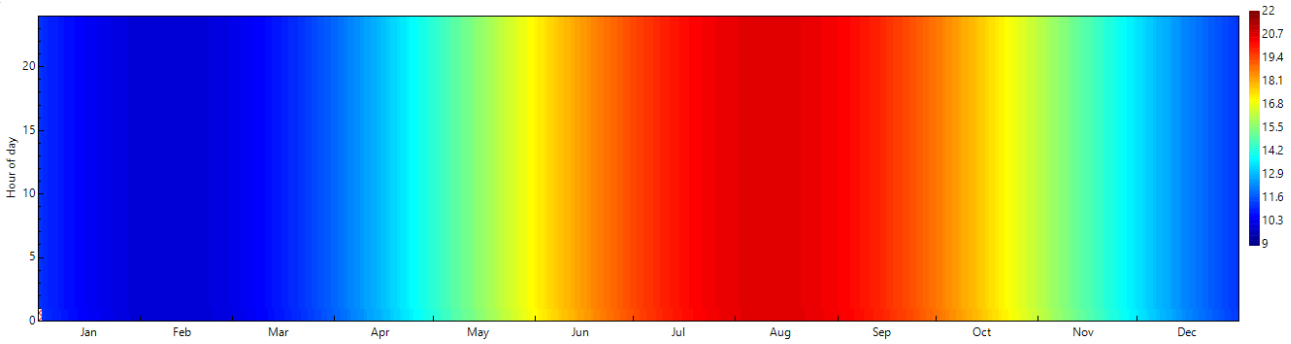
T ambient (°C)



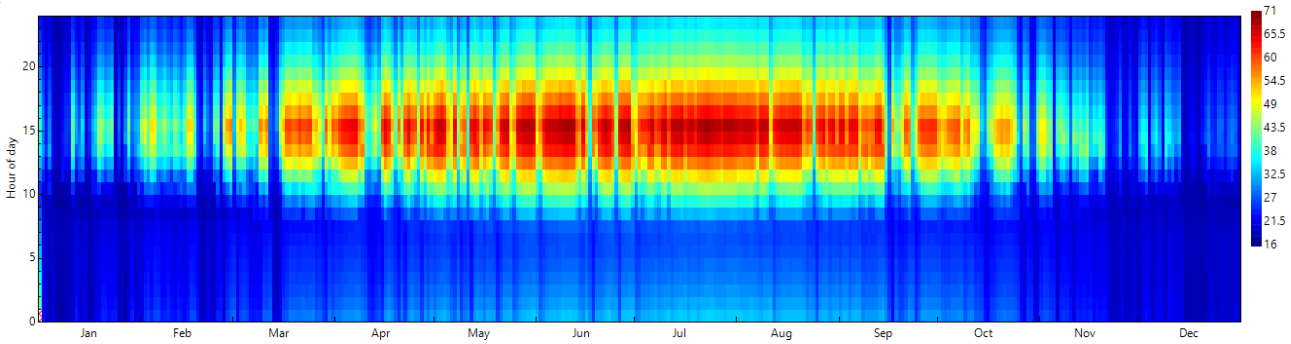
T cold (°C)

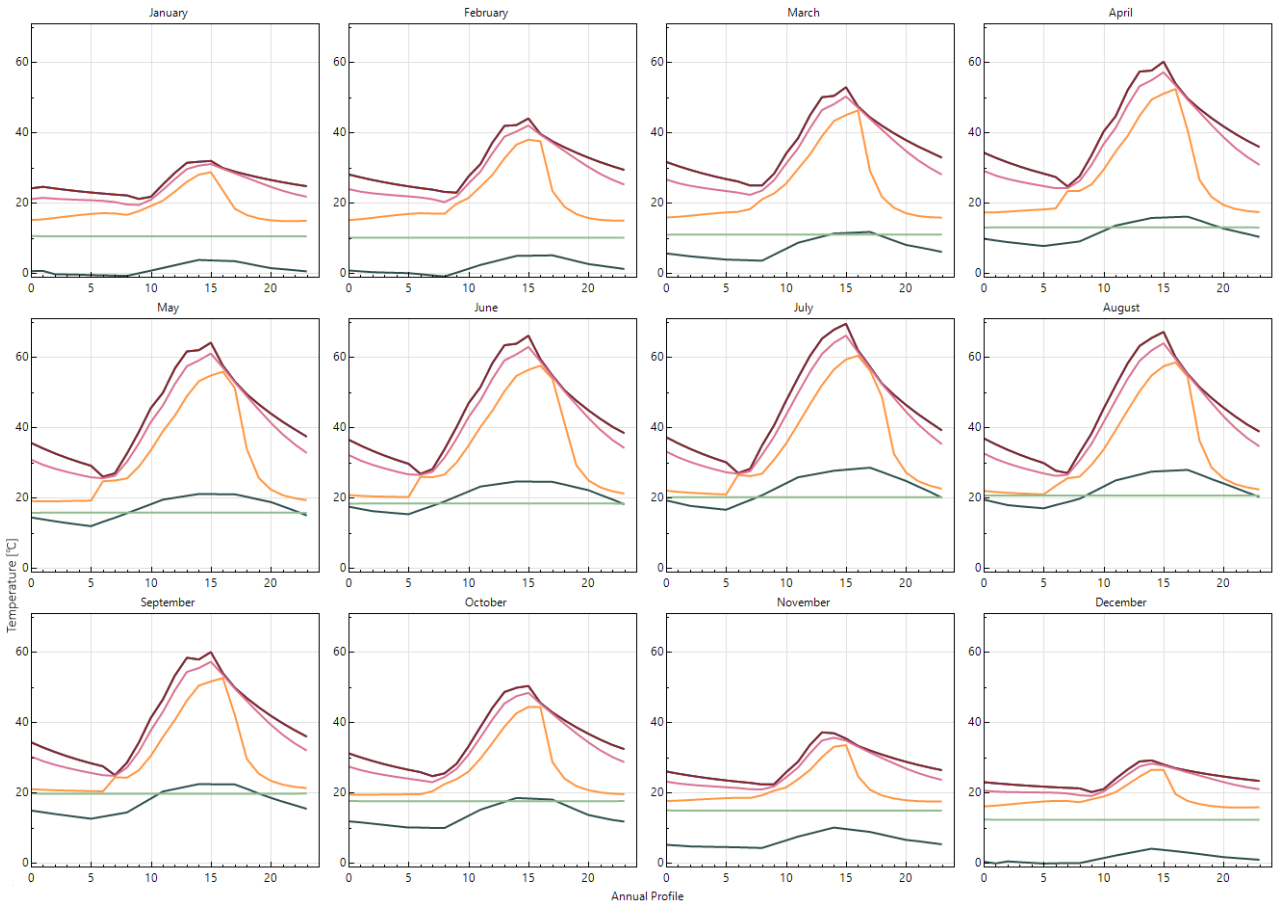


T delivered (°C) = T hot (°C)

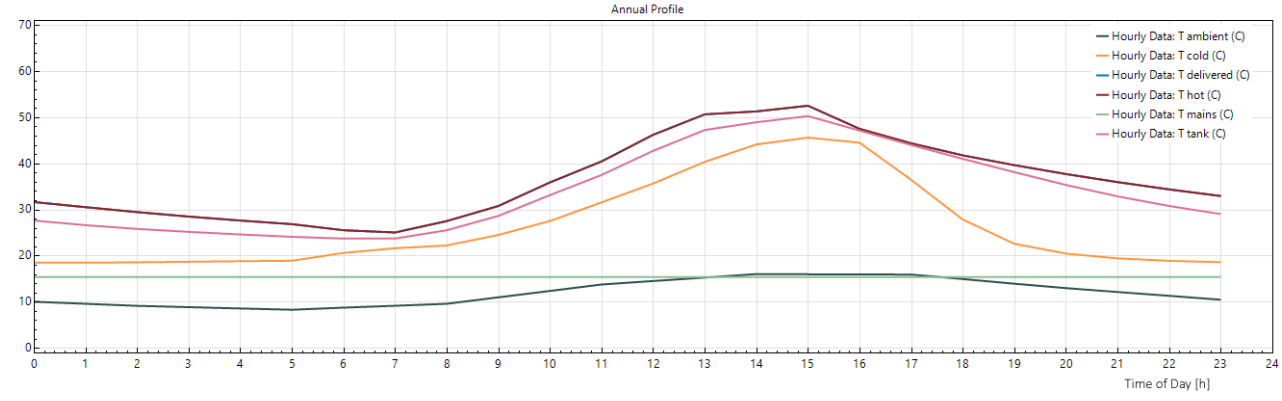


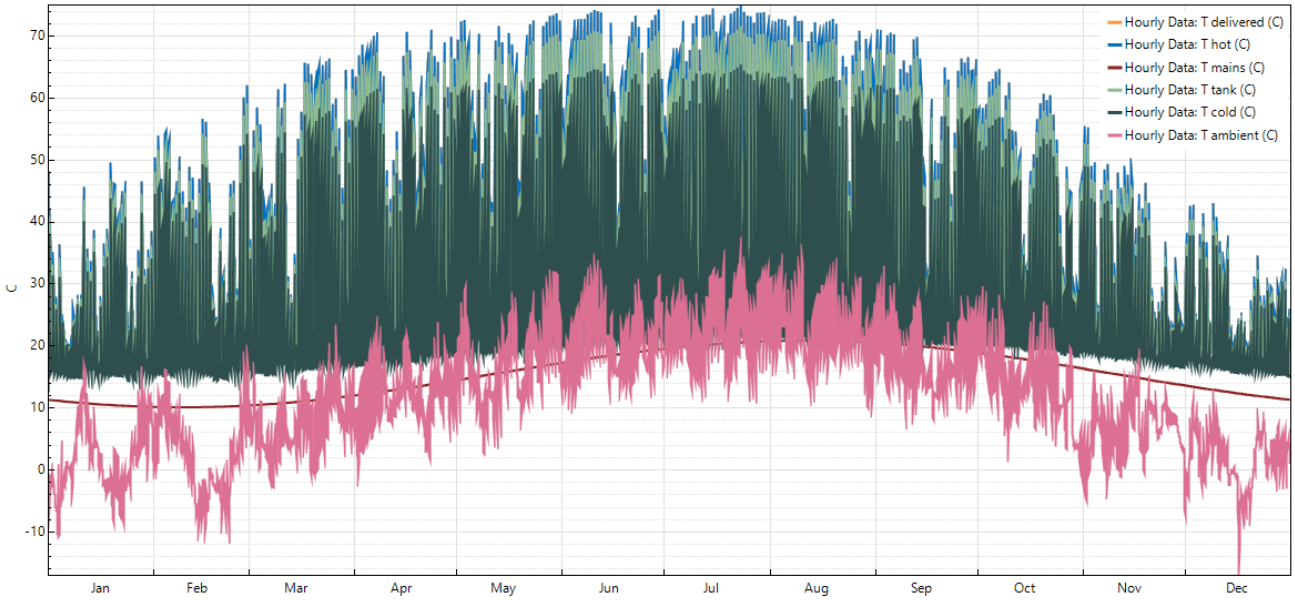
T mains (°C)



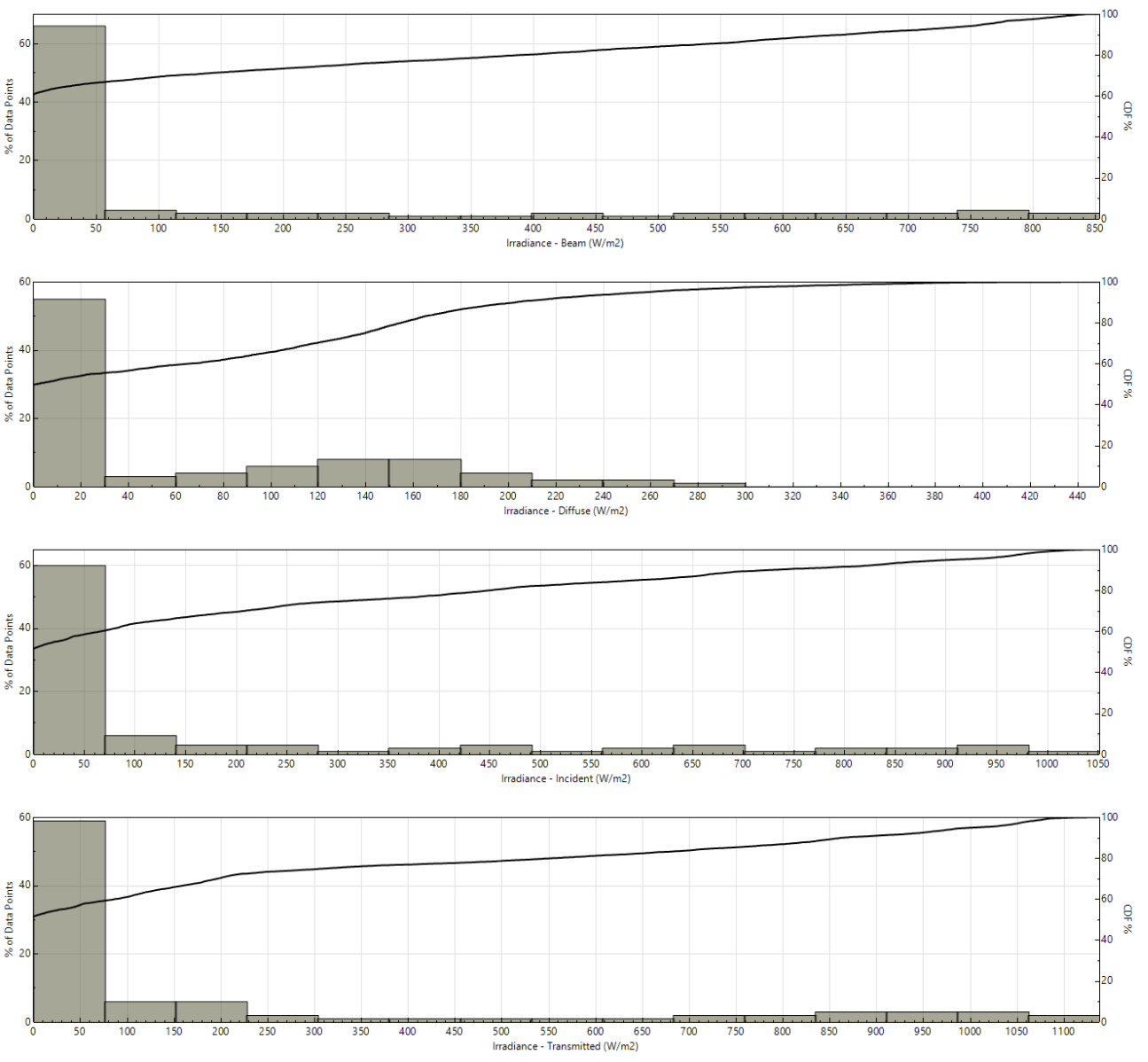


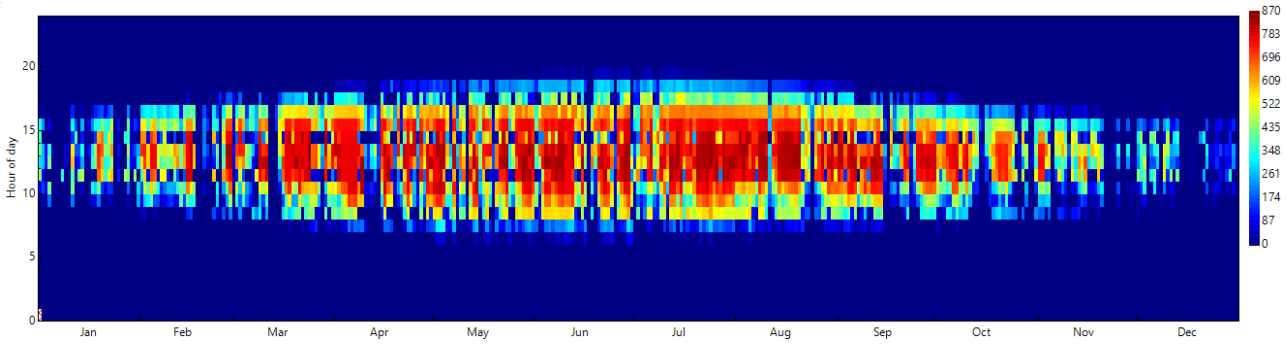
Annual Profile



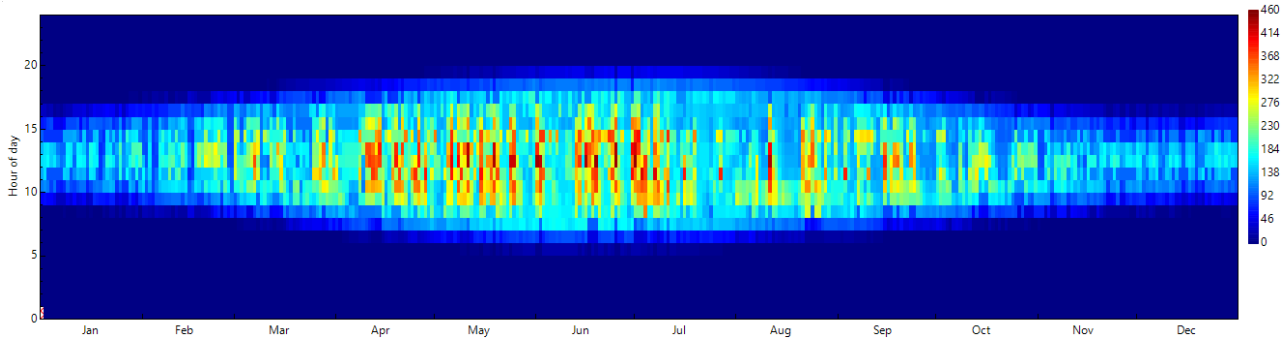


2. Irradiance

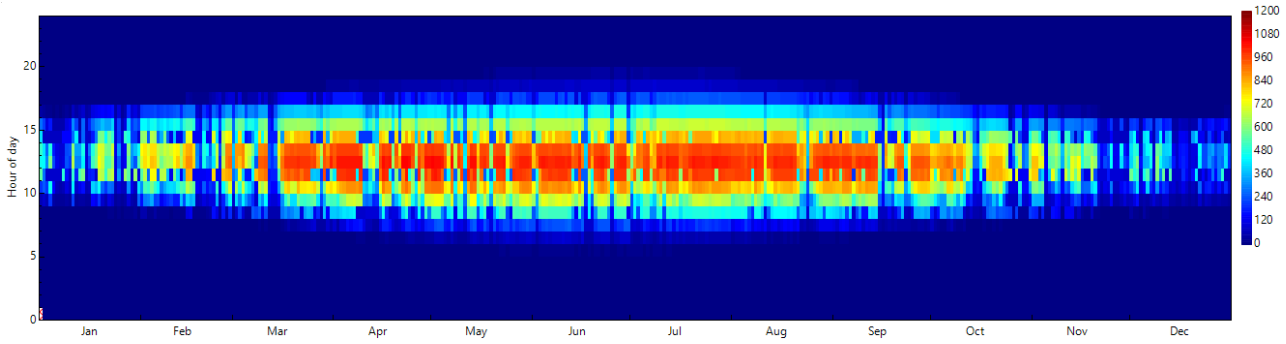




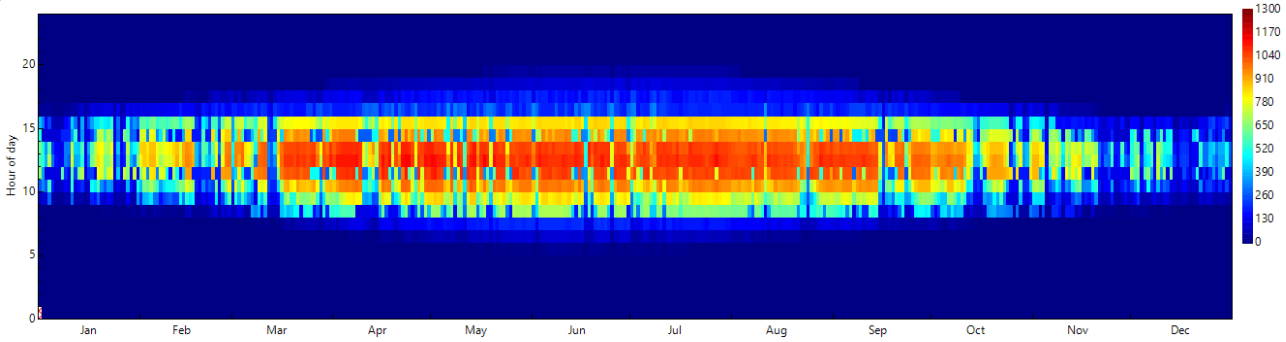
Irradiance – Beam (W/m2)



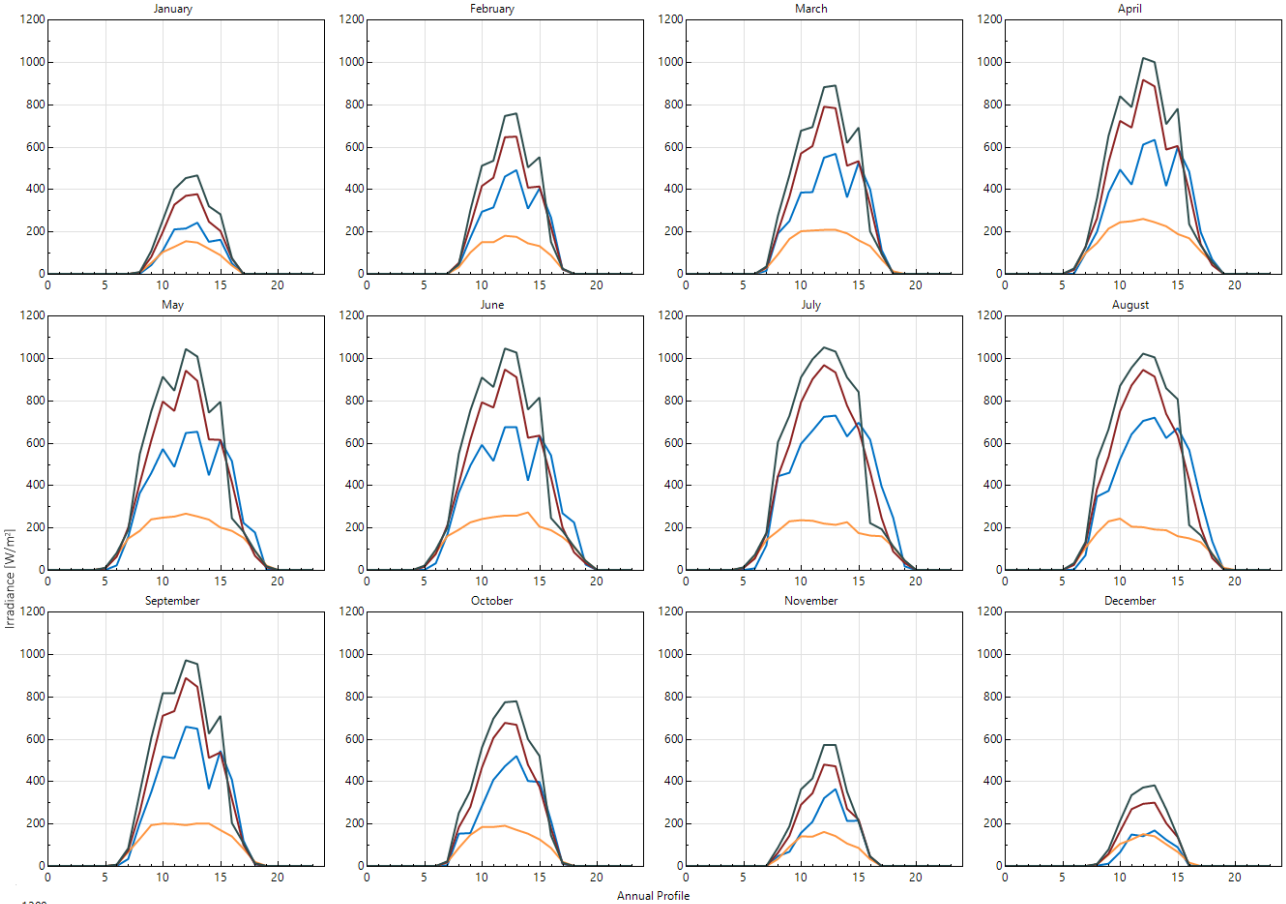
Irradiance – Diffuse (W/m2)

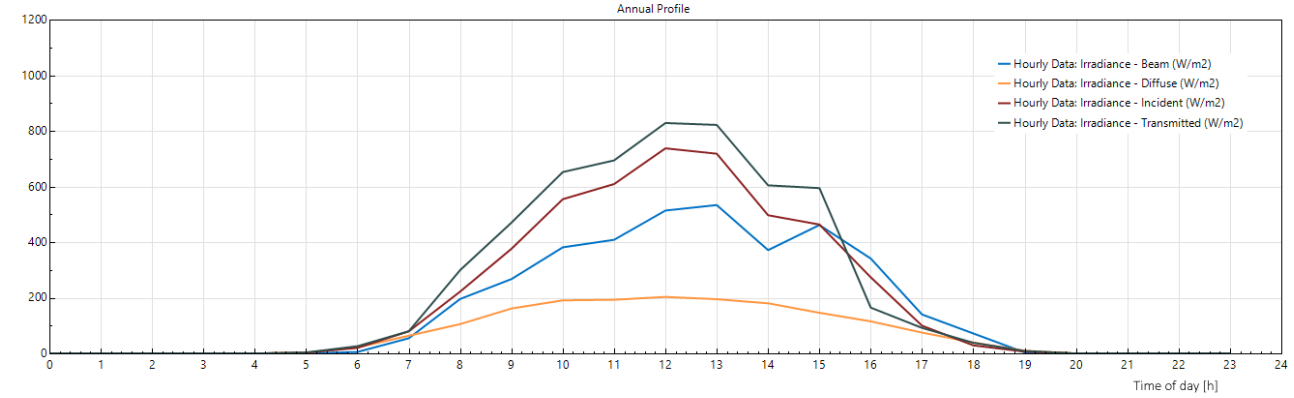


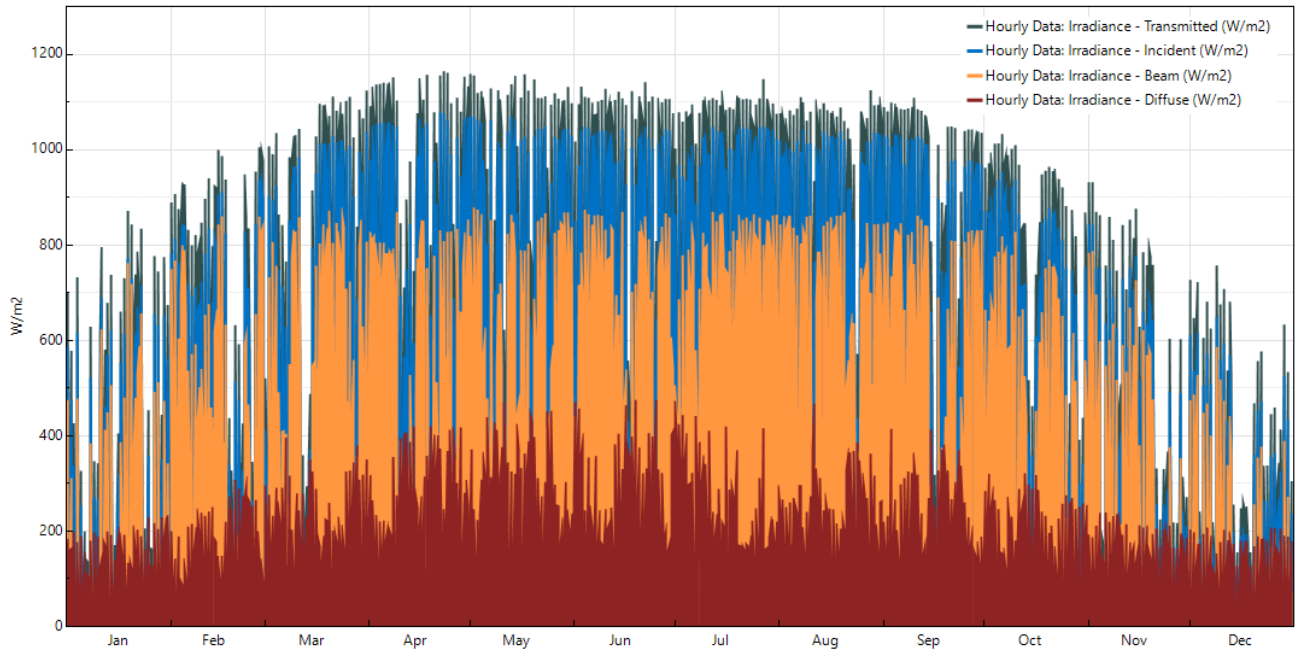
Irradiance – Incident (W/m2)



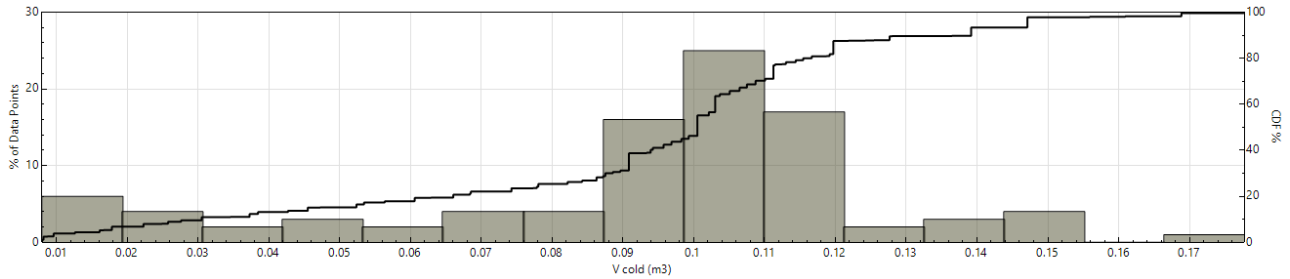
Irradiance – Transmitted (W/m2)

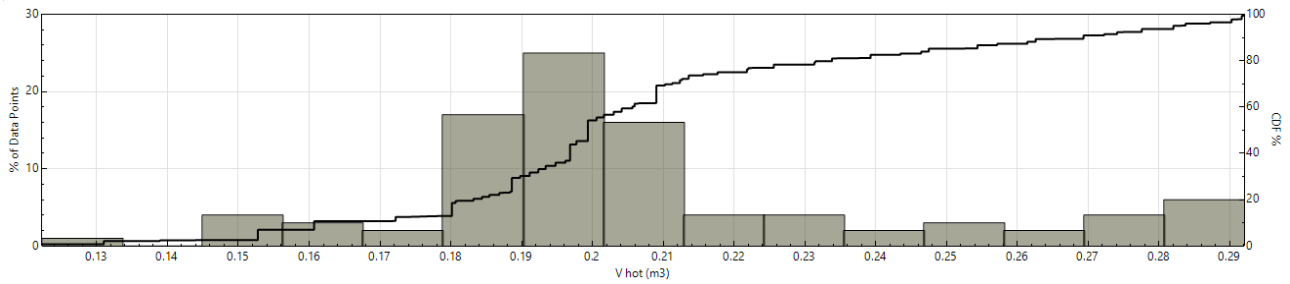

January
February
March
April
May
June
July
August
September
October
November
December
Irradiance [W/m²]

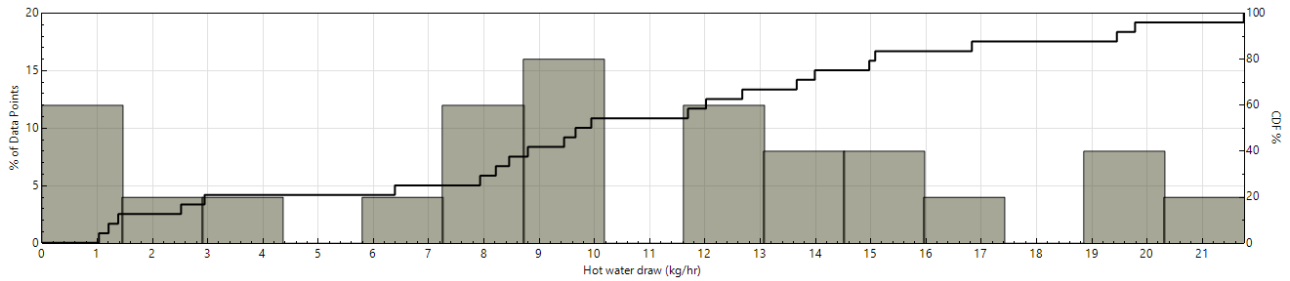

Annual Profile
Hourly Data: Irradiance - Beam (W/m2)
Hourly Data: Irradiance - Diffuse (W/m2)
Hourly Data: Irradiance - Incident (W/m2)
Hourly Data: Irradiance - Transmitted (W/m2)
Time of day [h]

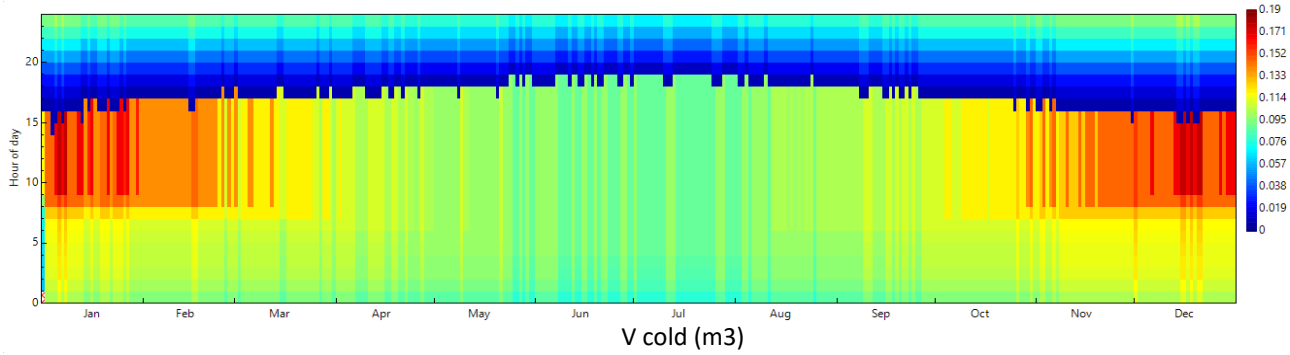

Hourly Data: Irradiance - Transmitted (W/m2)
Hourly Data: Irradiance - Incident (W/m2)
Hourly Data: Irradiance - Beam (W/m2)
Hourly Data: Irradiance - Diffuse (W/m2)
W/m2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

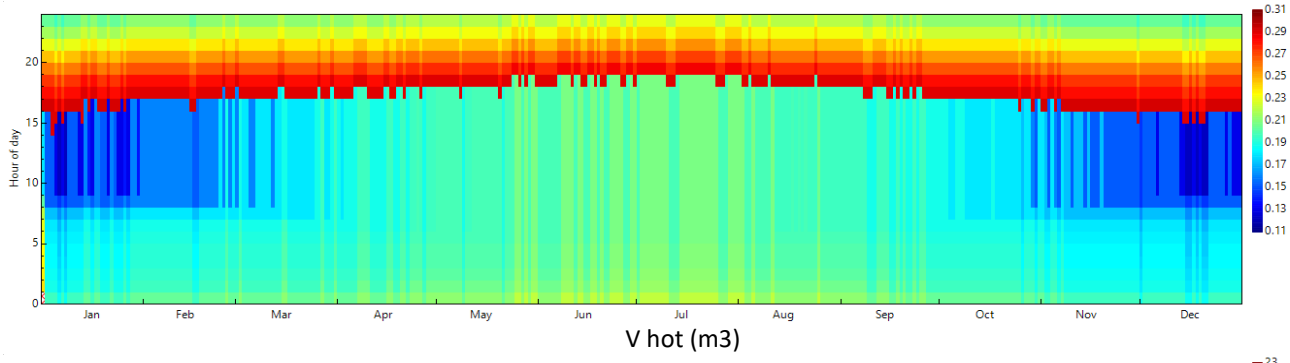
3. Tank volume & Hot water draw

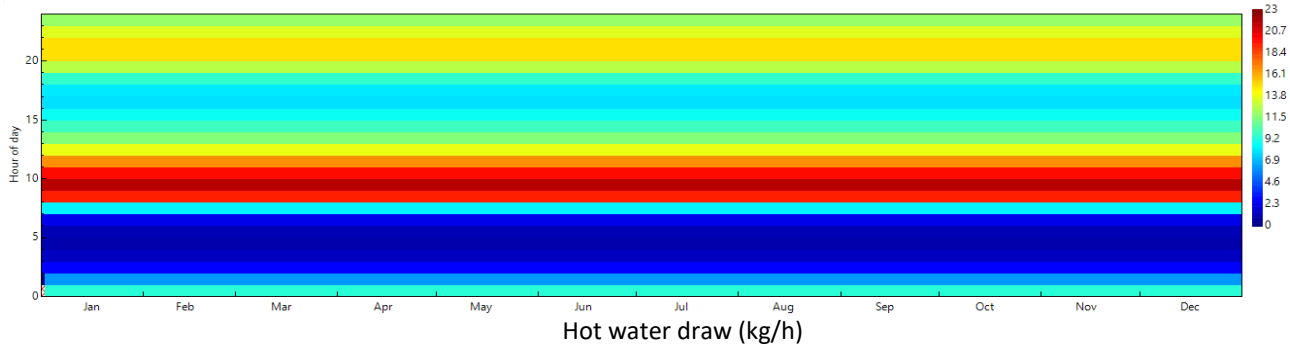


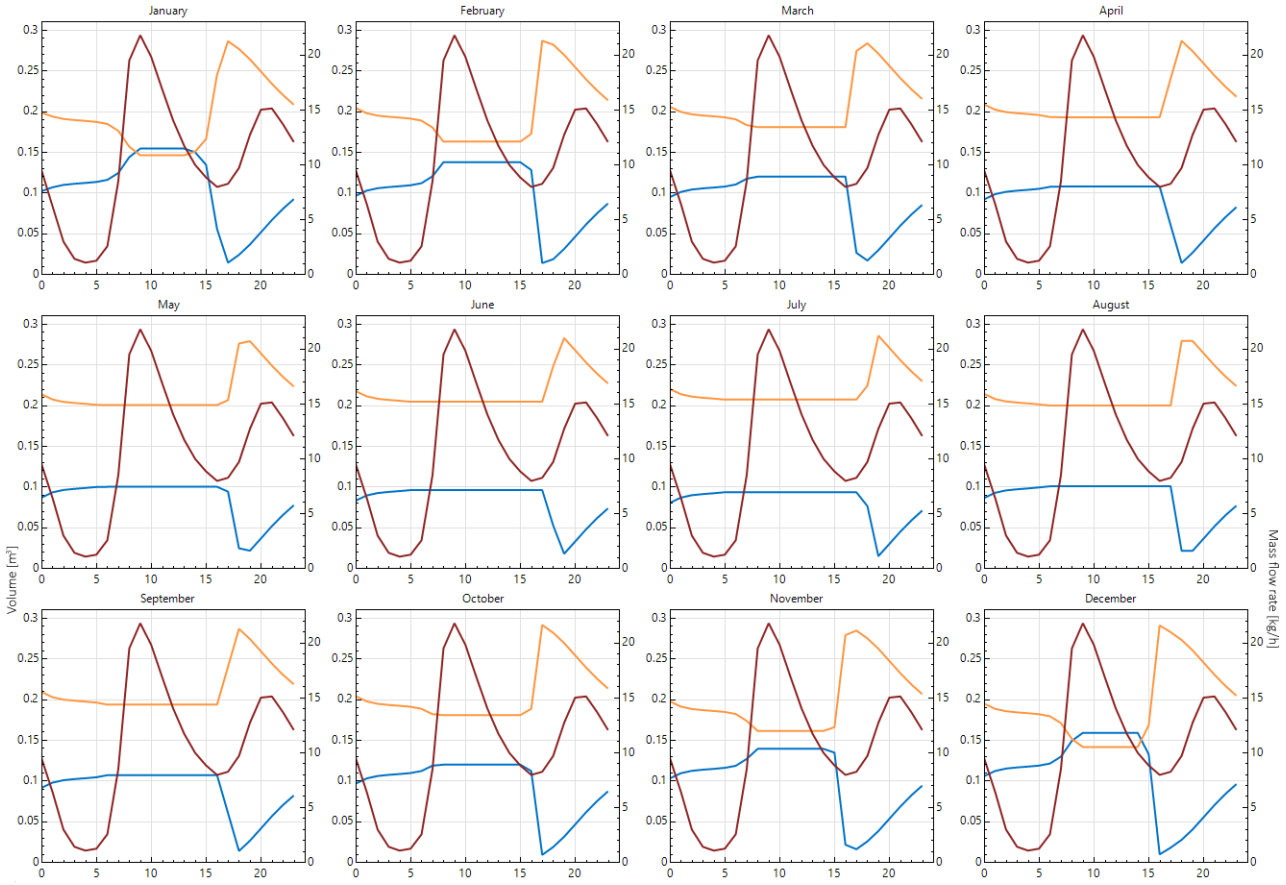


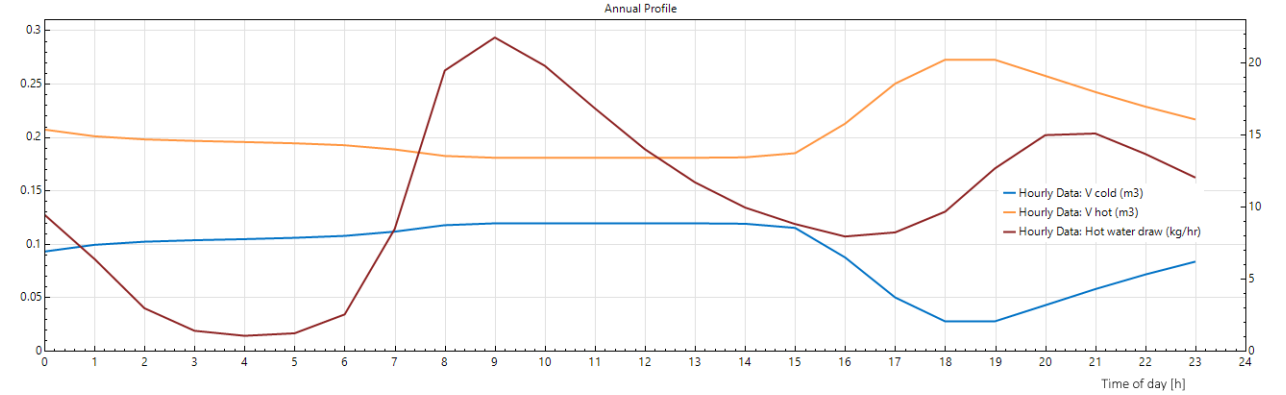


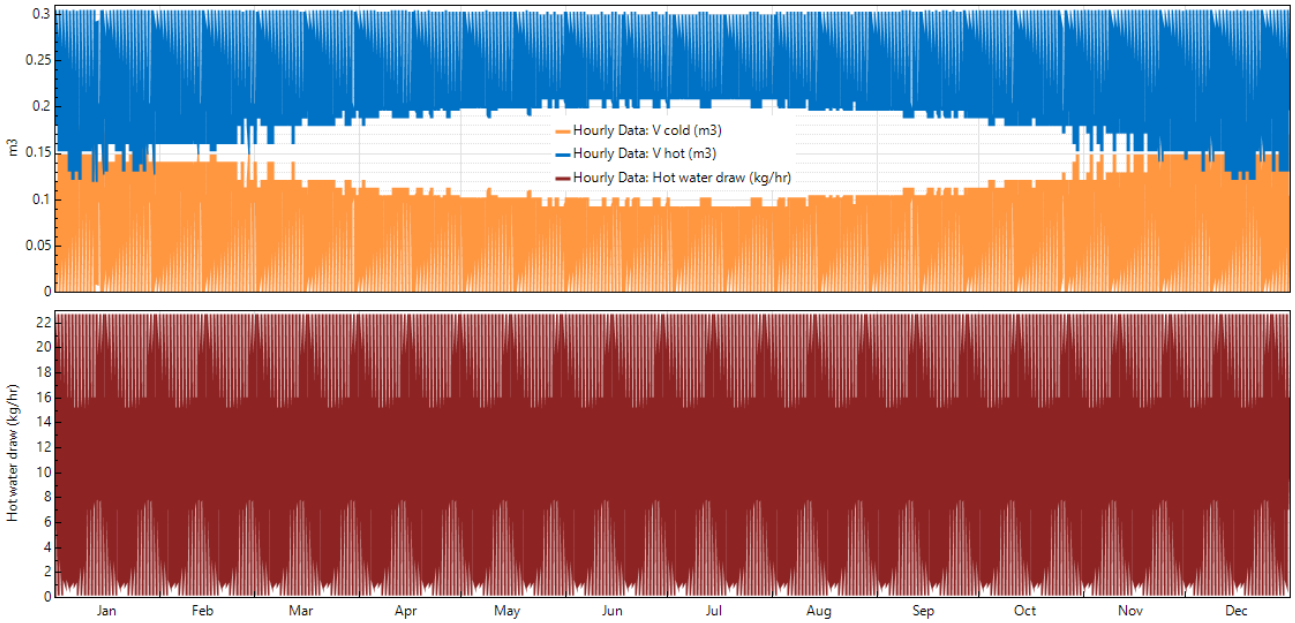




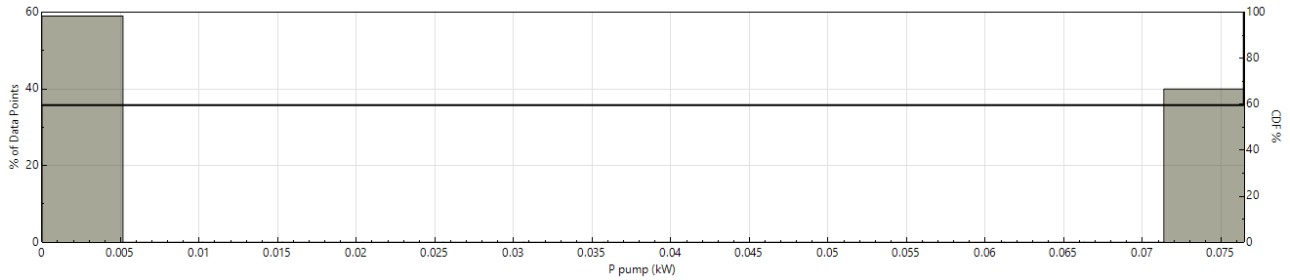


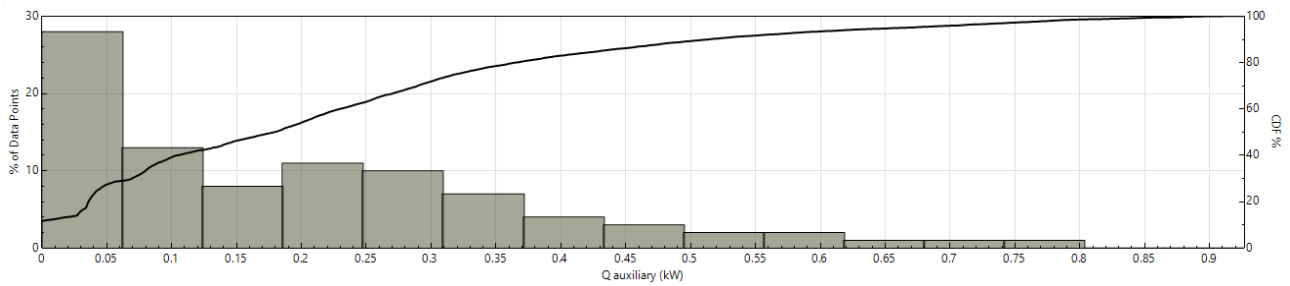

January
February
March
April
May
June
July
August
September
October
November
December
Volume [m³]
Mass flow rate [kg/h]

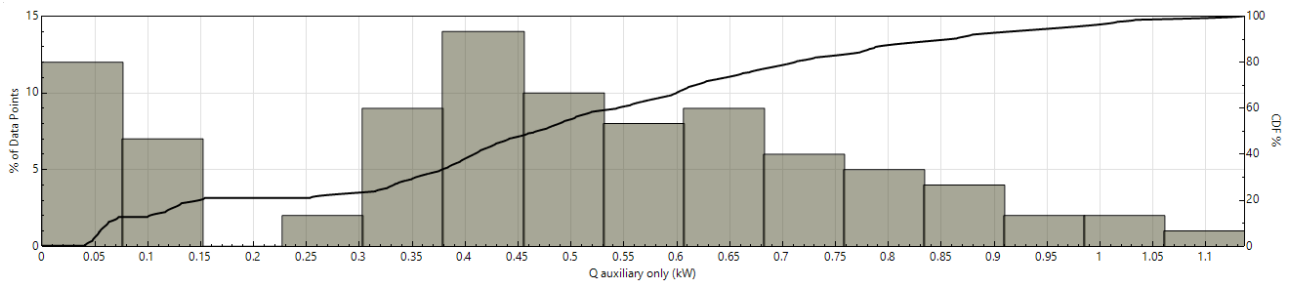

Annual Profile
Hourly Data: V cold (m3)
Hourly Data: V hot (m3)
Hourly Data: Hot water draw (kg/hr)
Time of day [h]

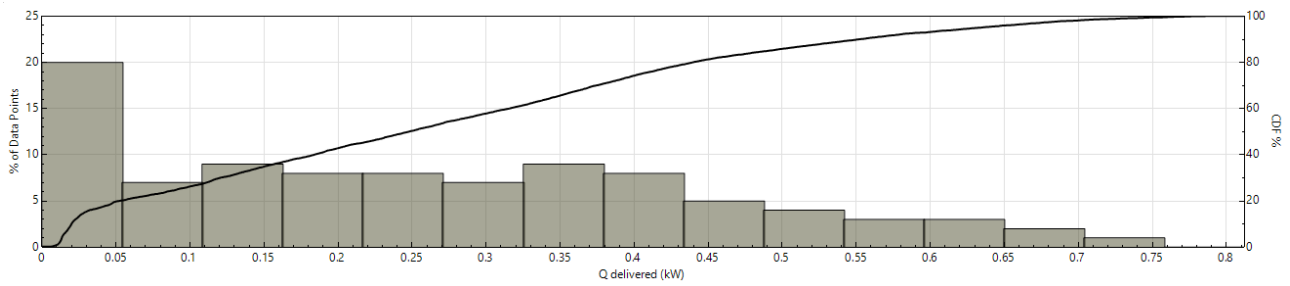

m3
Hourly Data: V cold (m3)
Hourly Data: V hot (m3)
Hourly Data: Hot water draw (kg/hr)
Hot water draw (kg/hr)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

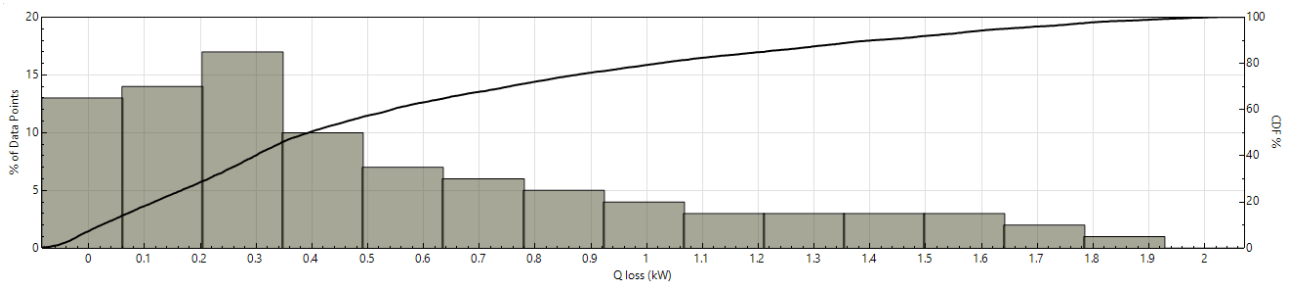
4. Power & Heat load

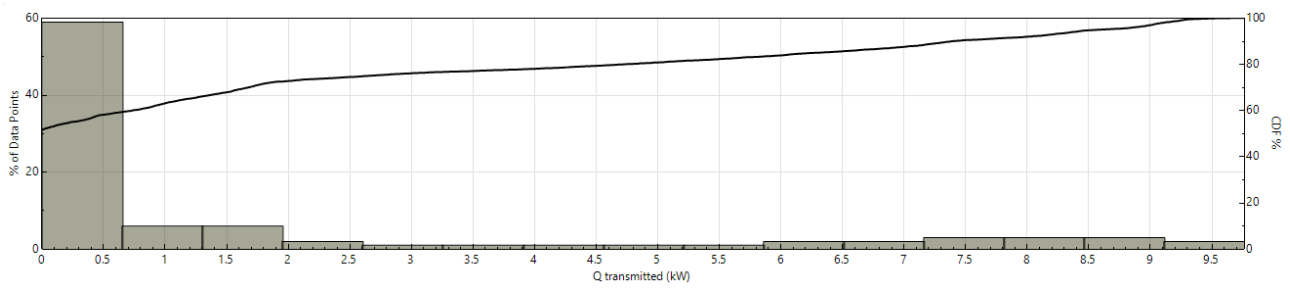


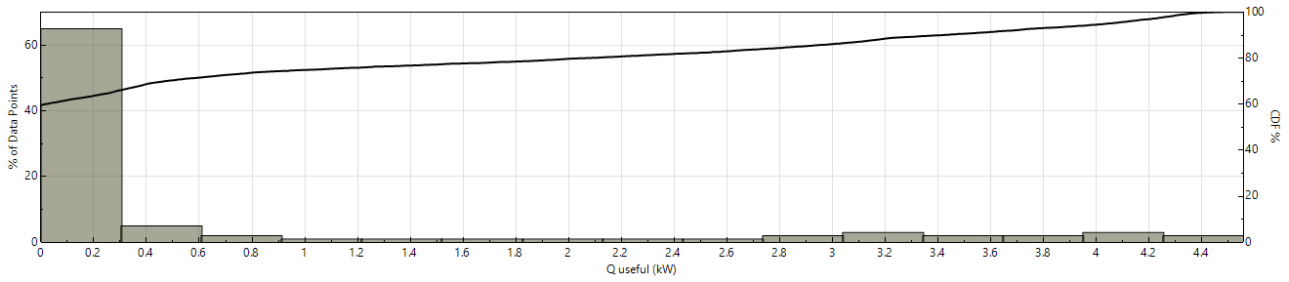


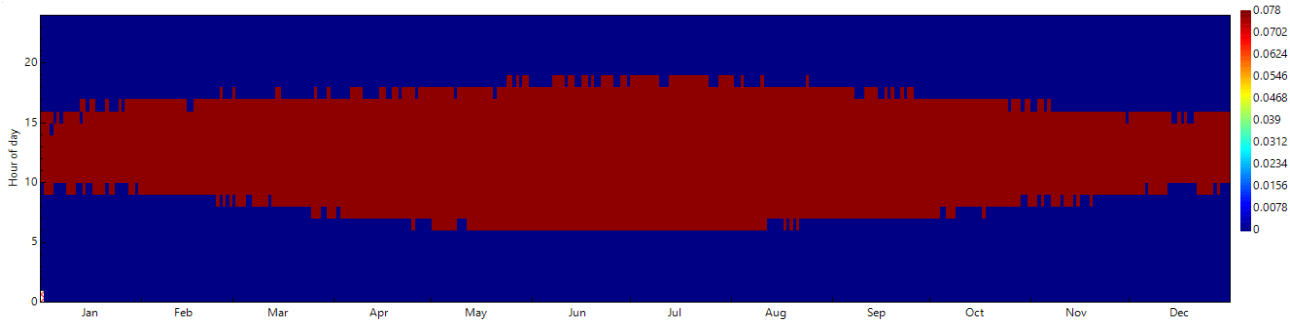




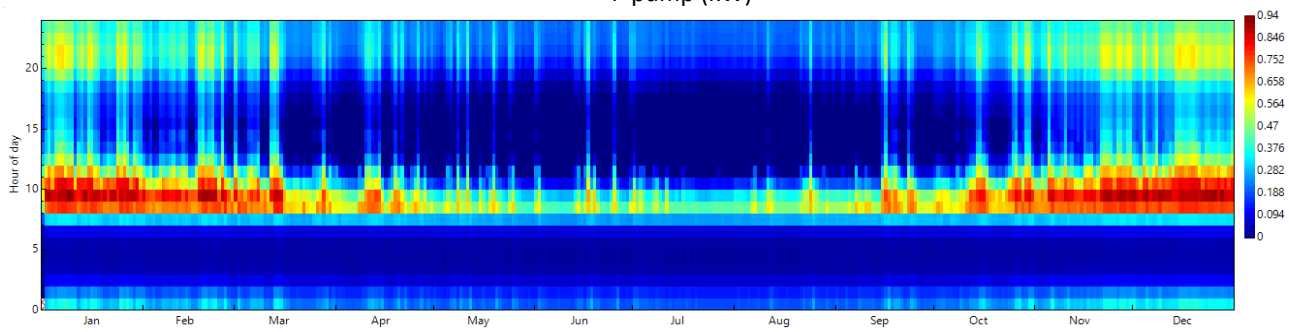




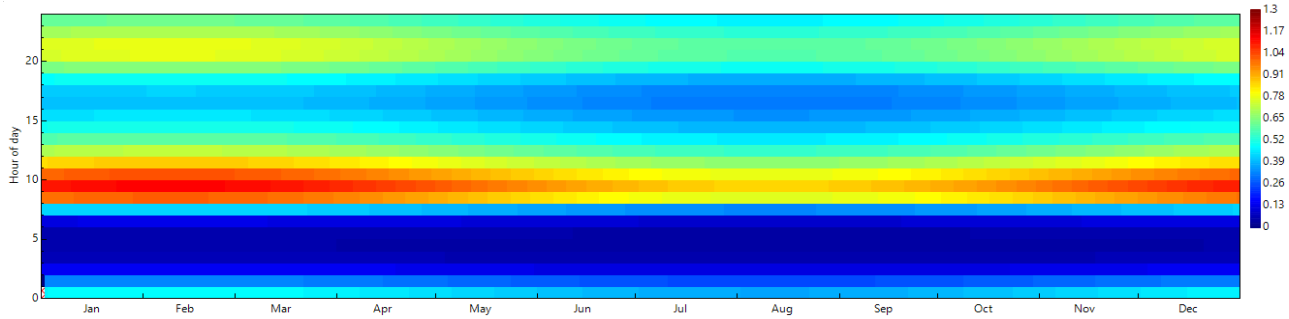




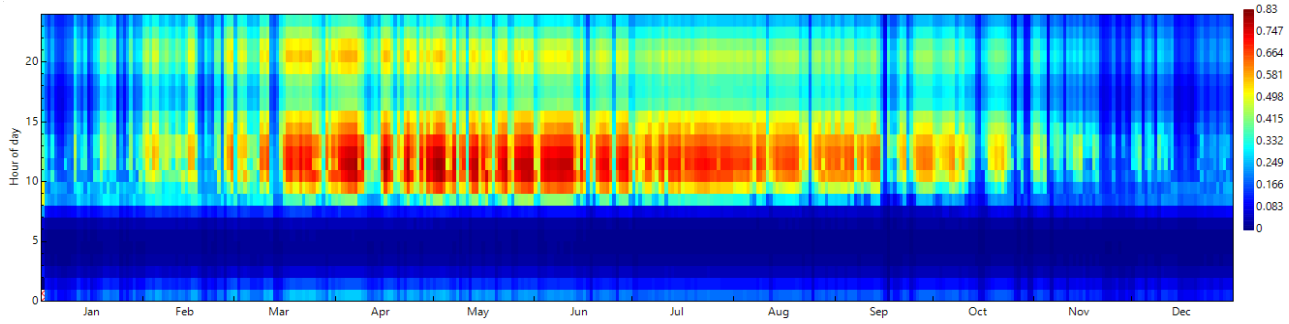
P pump (kW)



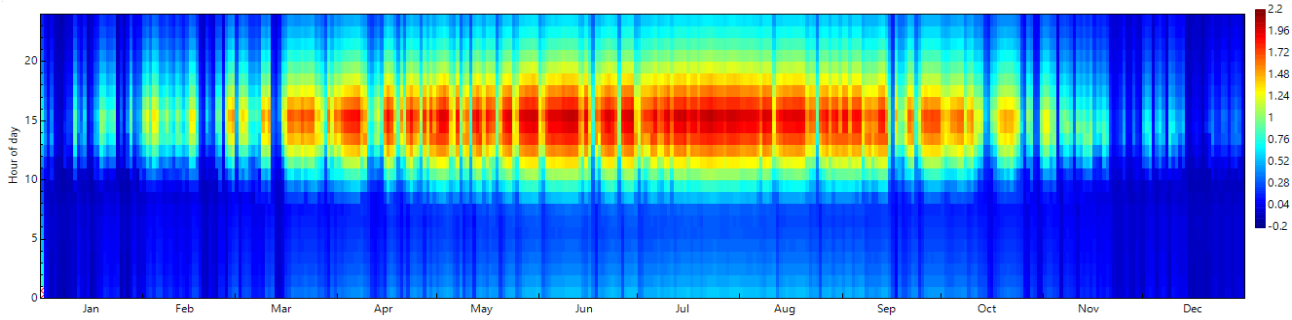
Q auxiliary (kW)



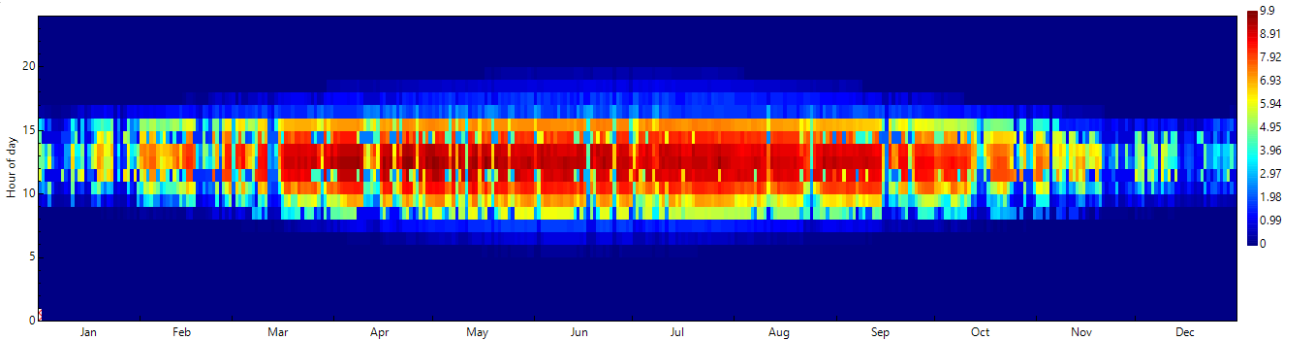
Q auxiliary only (kW)



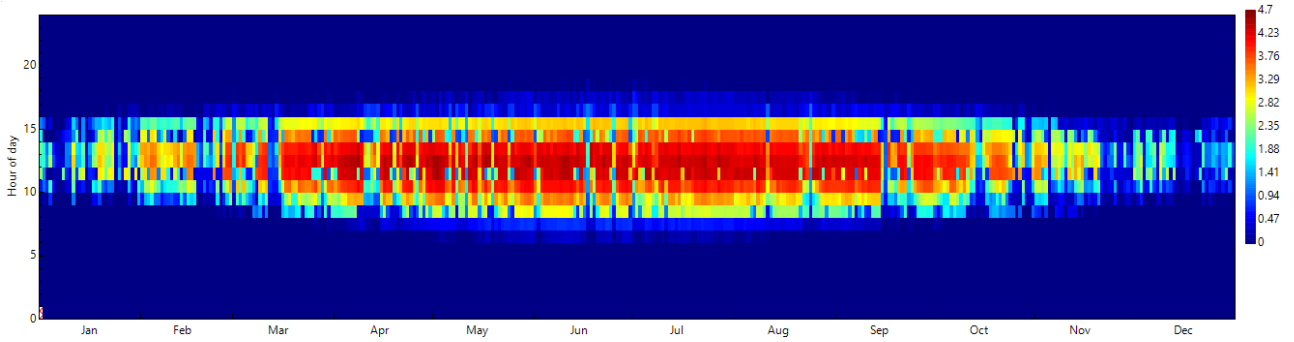
Q delivered (kW)



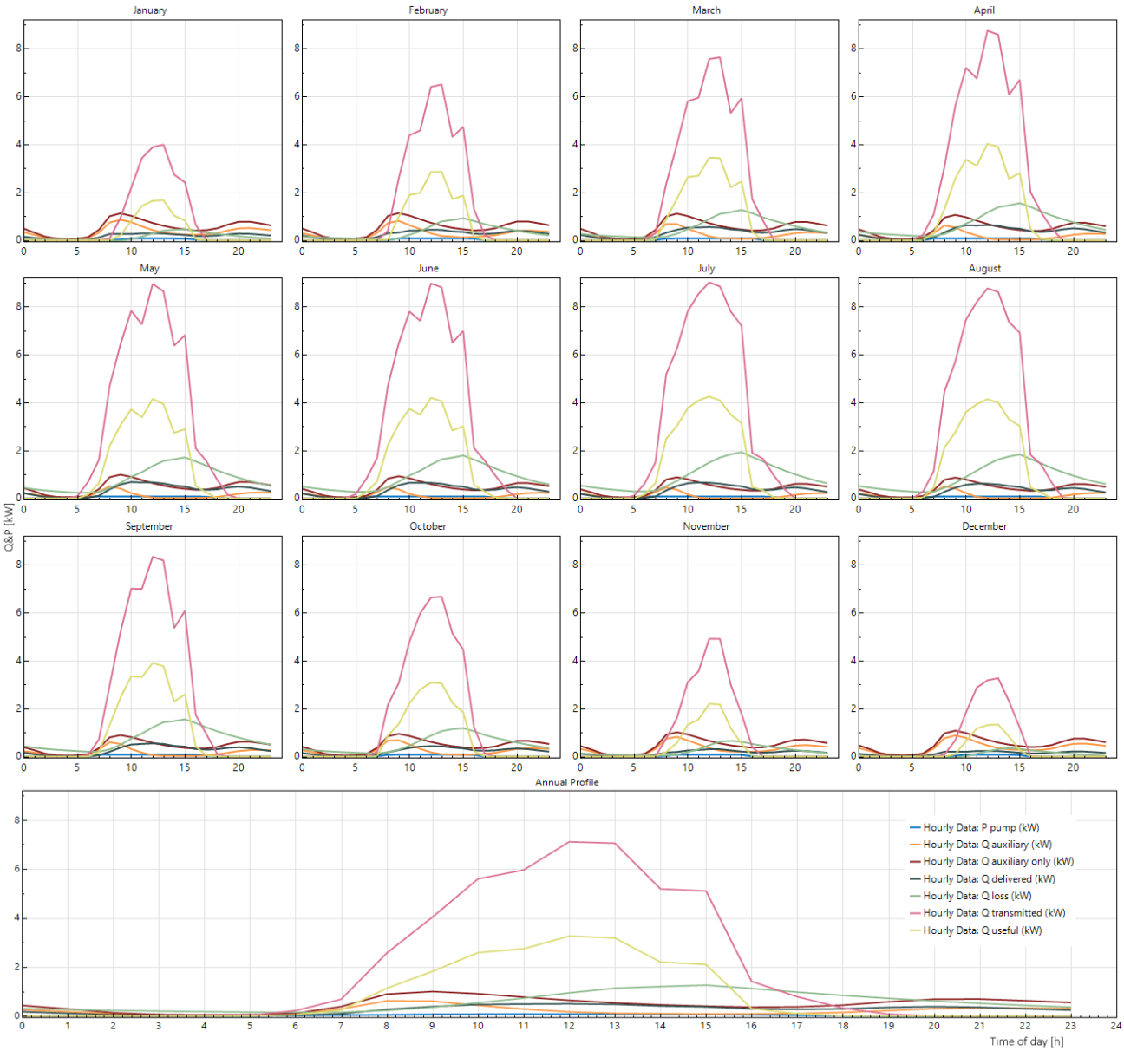
Q loss (kW)

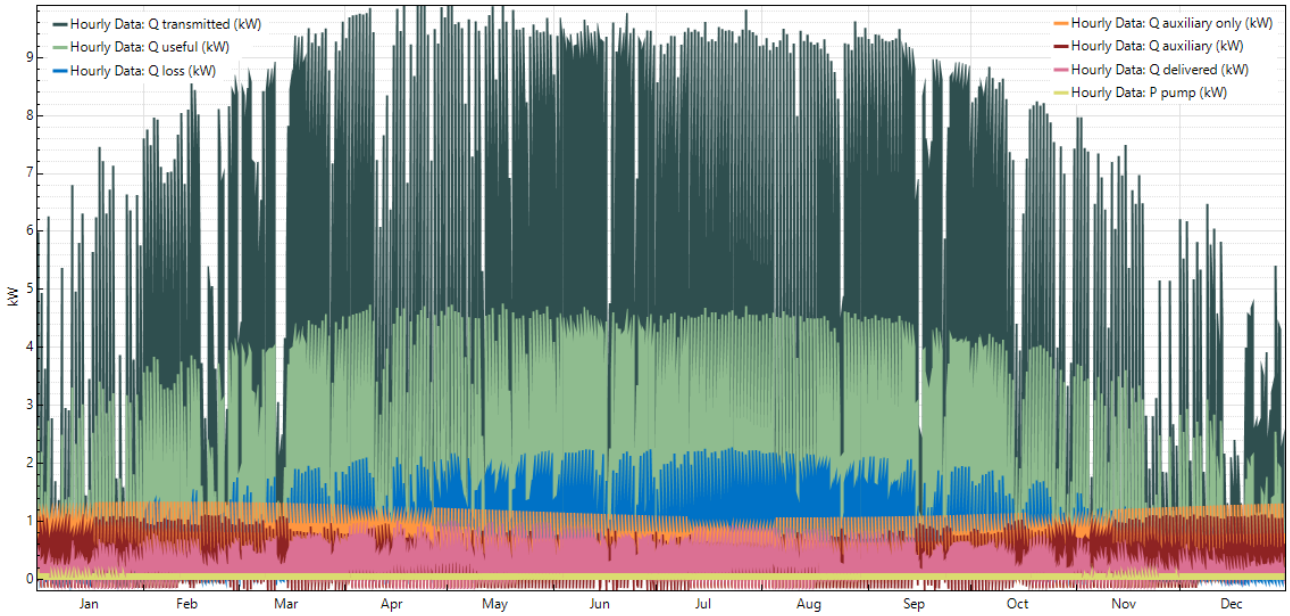


Q transmitted (kW)

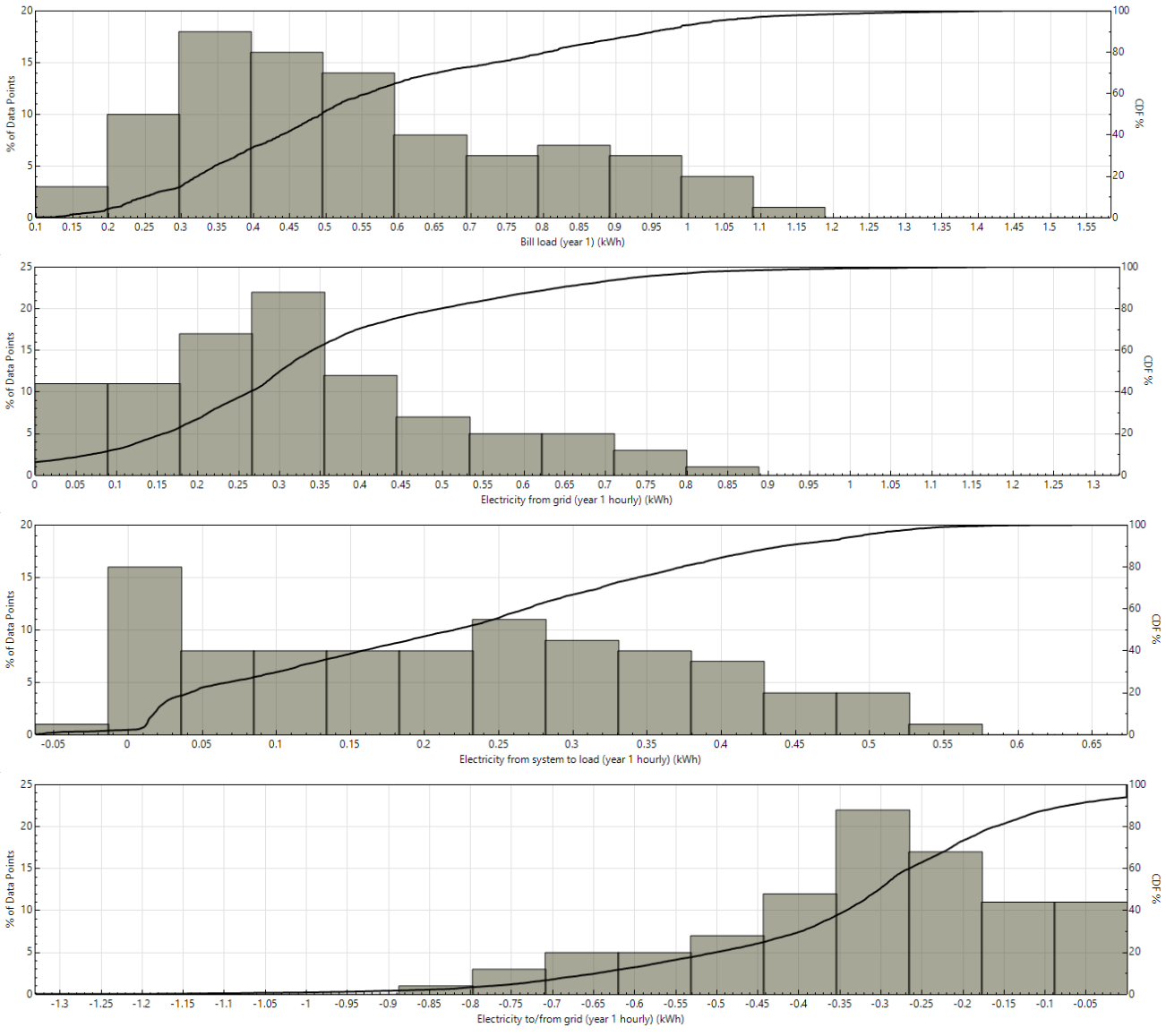


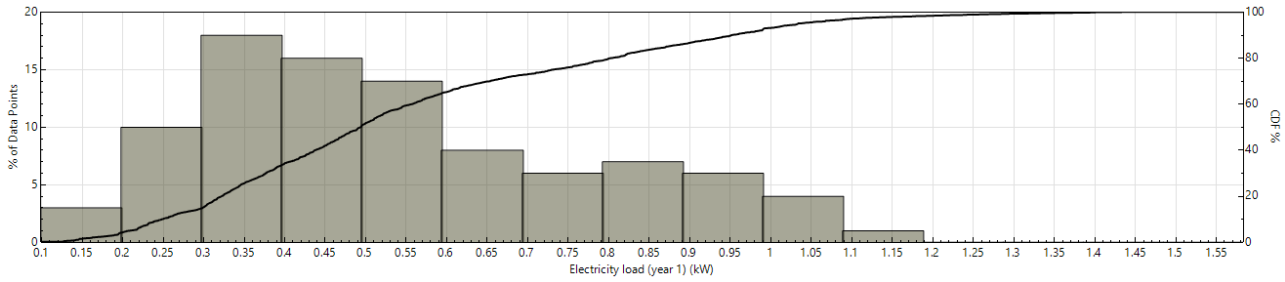
Q useful (kW)

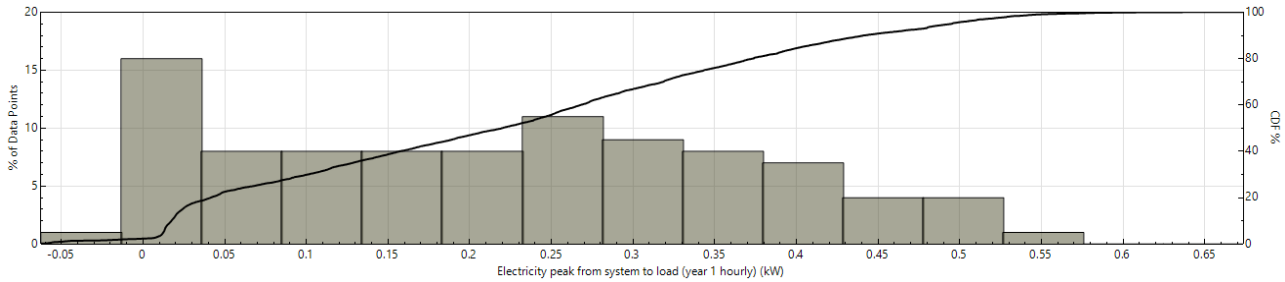


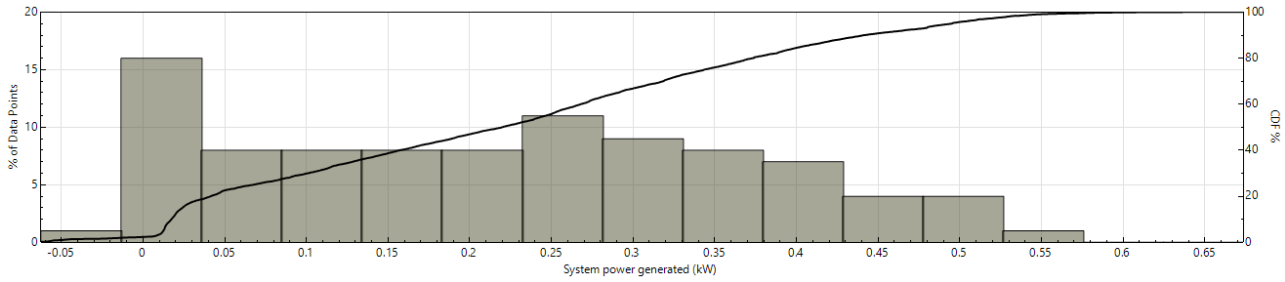


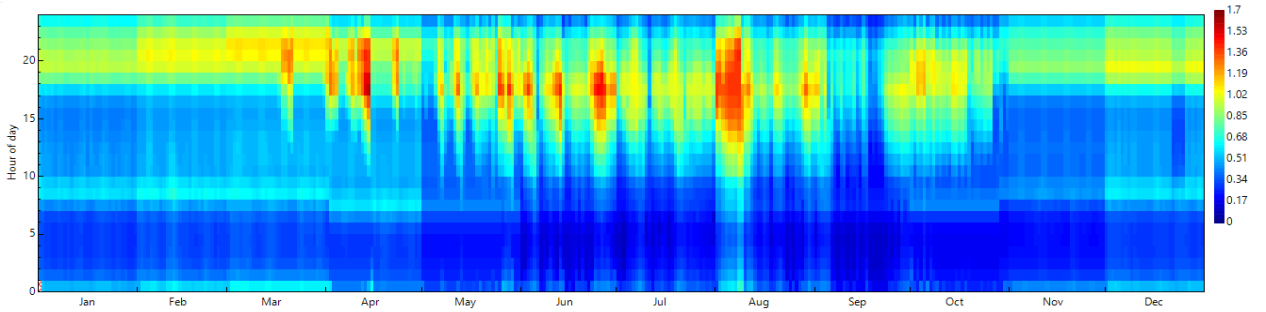
5. Energy consumption/generation/load



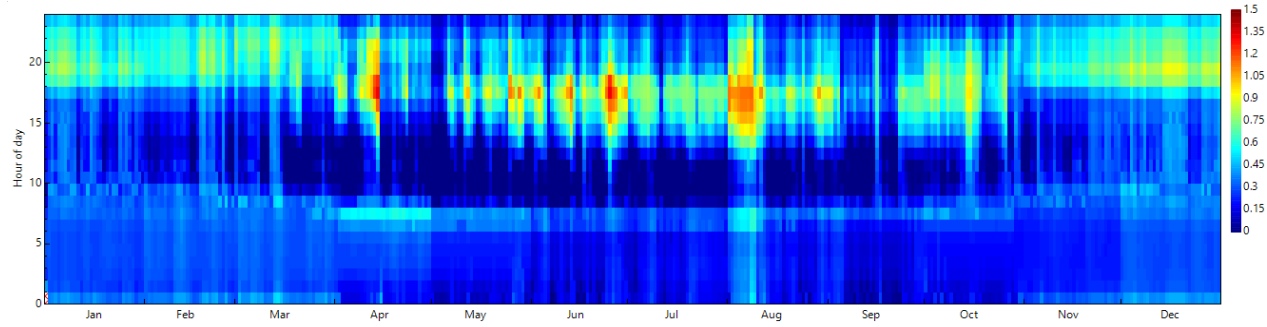




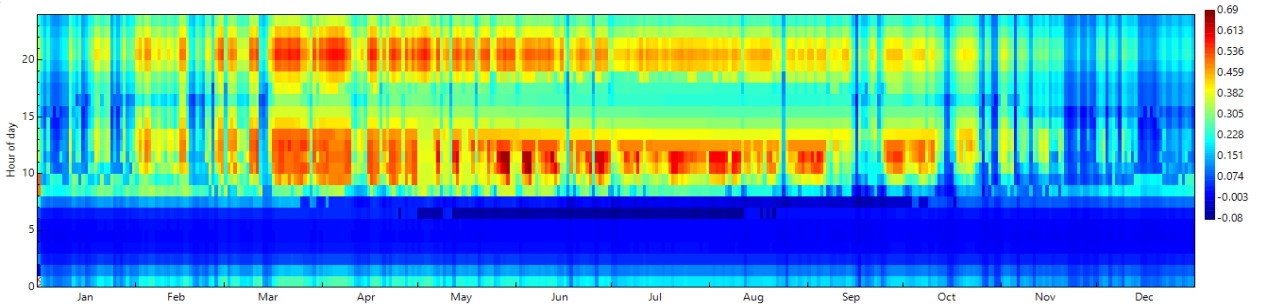




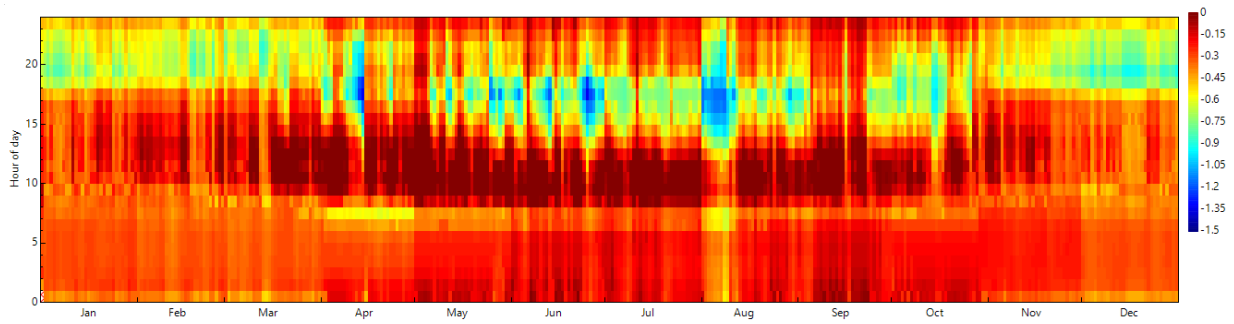
Bill load (kWh) = Electricity Load (kW)



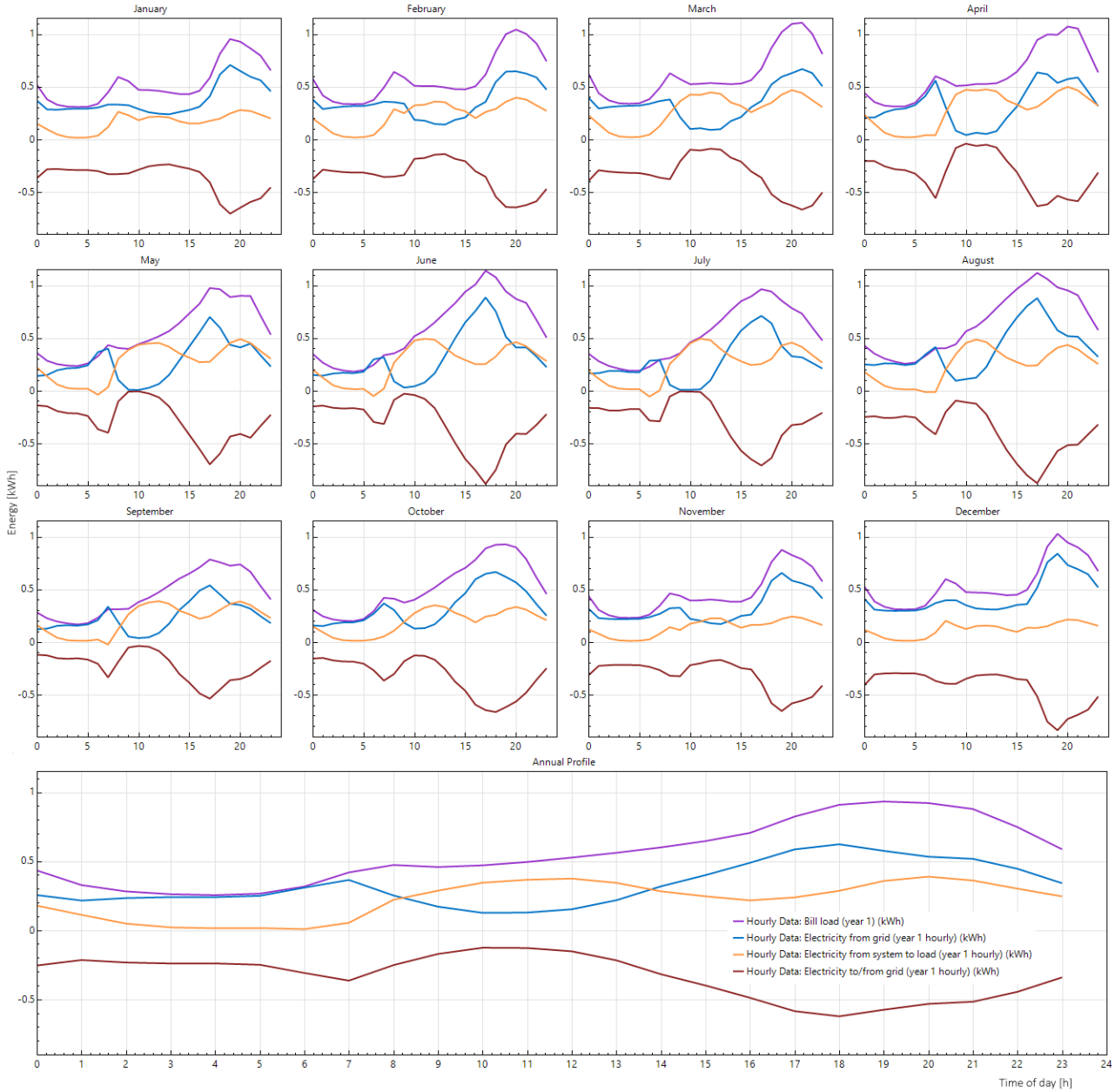
Electricity from grid (kWh)

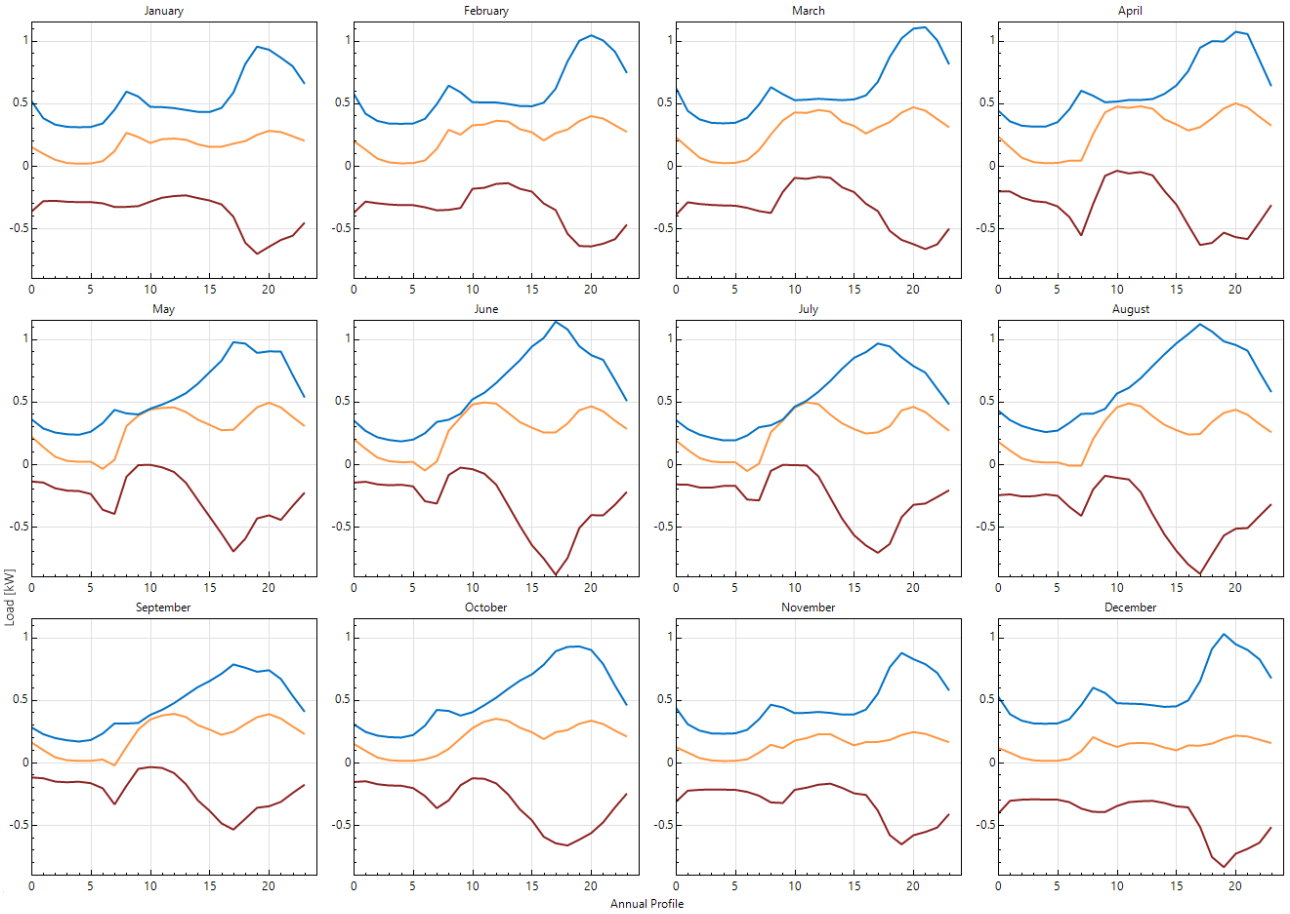


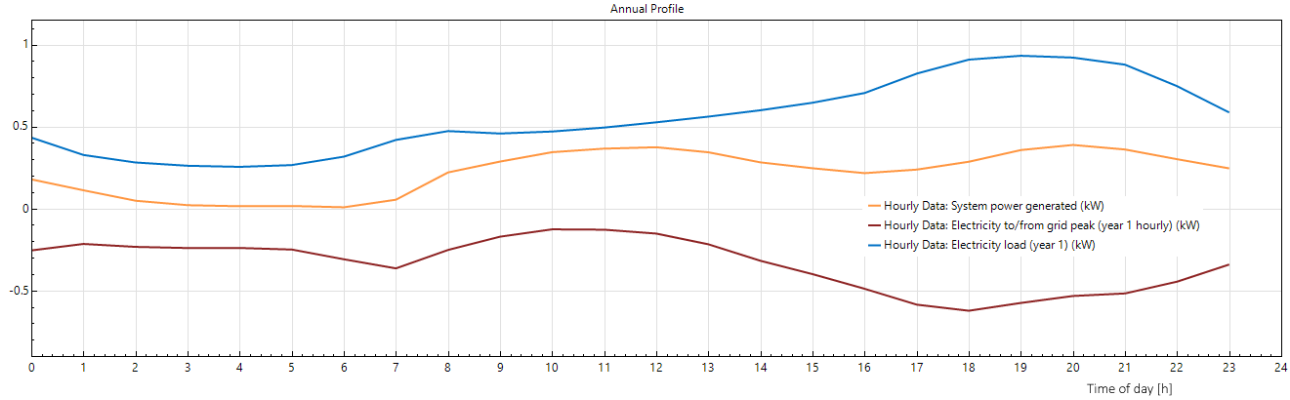
Electricity from system to load (kWh) = Electricity peak from system to load (kW) = System power generated (kW)

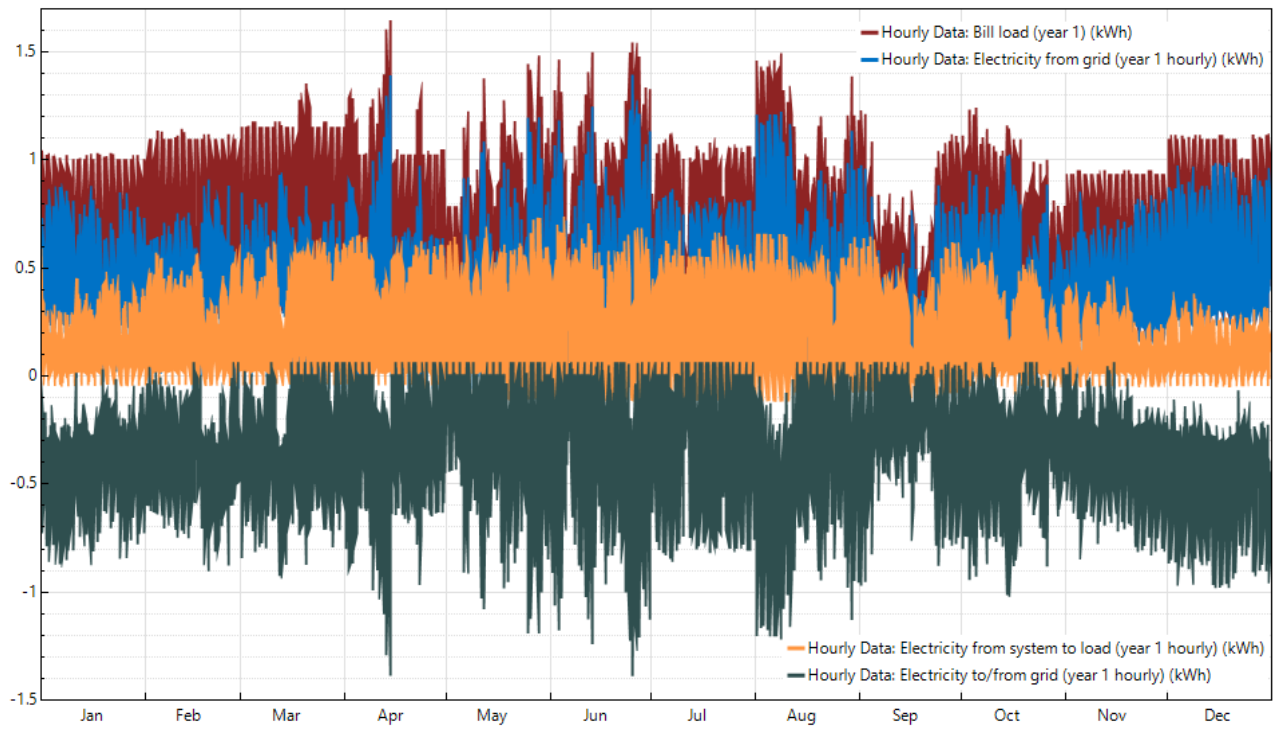


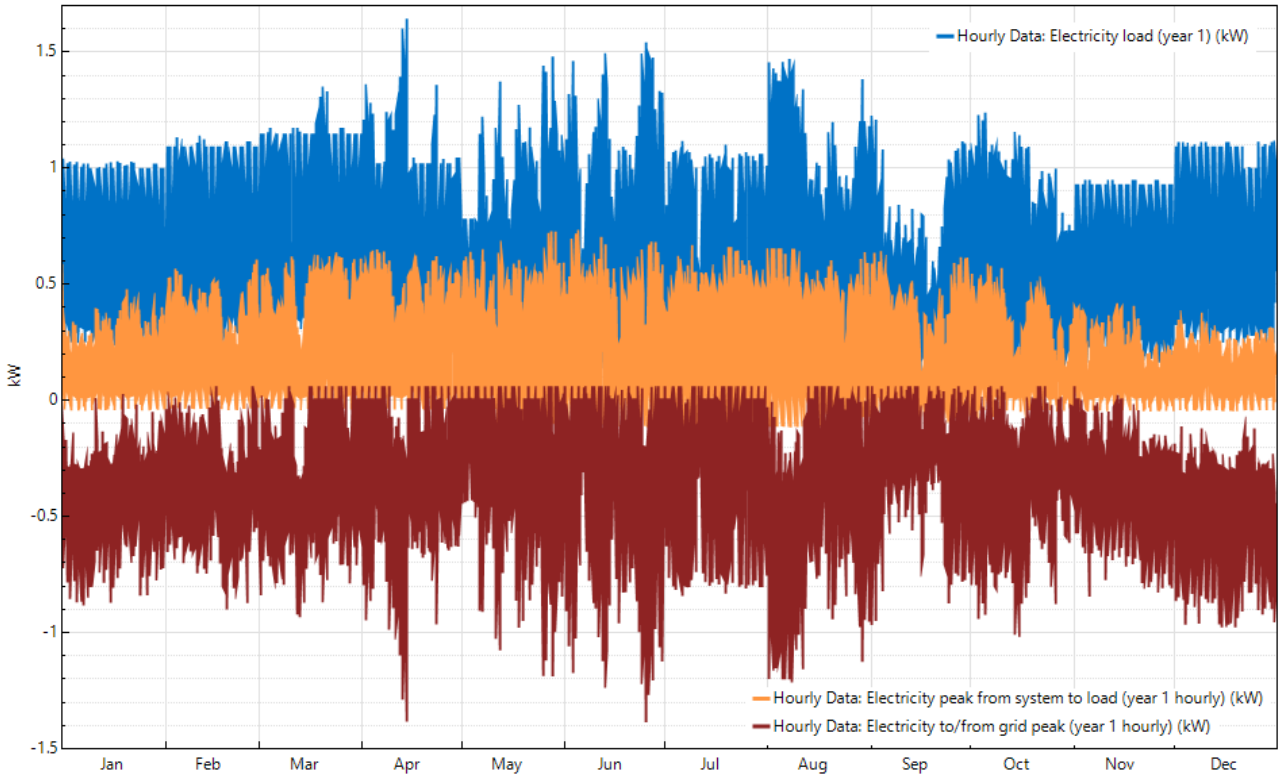
Electricity to/from the grid (kWh) = Electricity to/from the grid peak (kW)



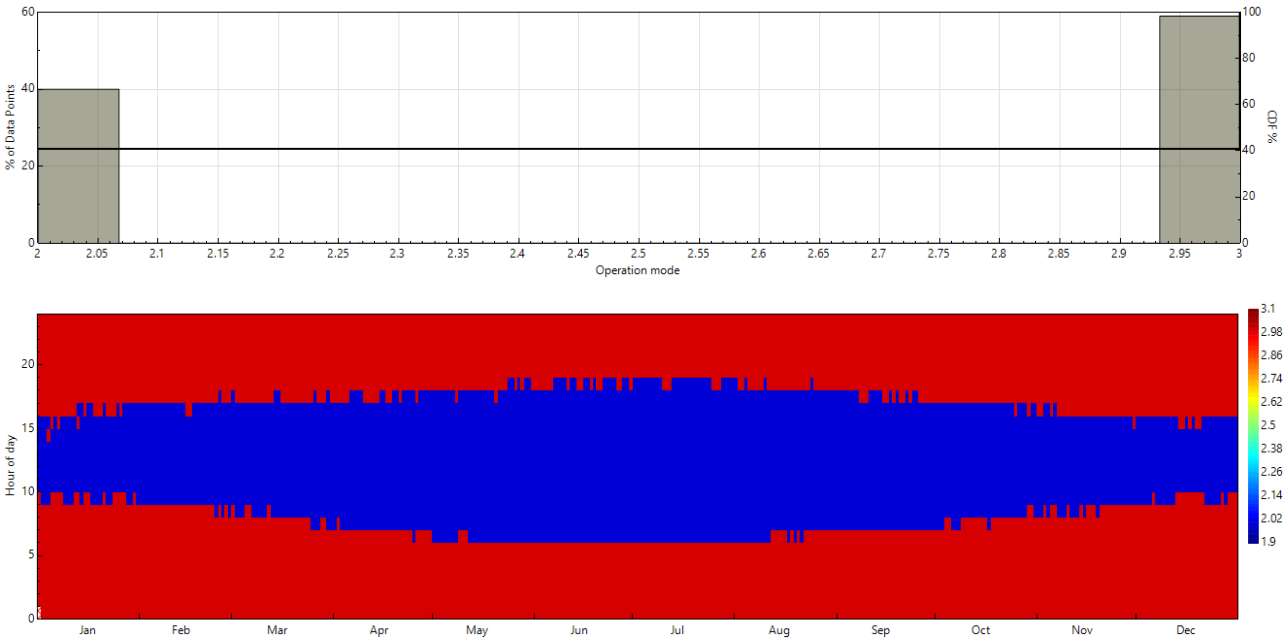

January
February
March
April
May
June
July
August
September
October
November
December
Load [kW]


Annual Profile
Hourly Data: System power generated (kW)
Hourly Data: Electricity to/from grid peak (year 1 hourly) (kW)
Hourly Data: Electricity load (year 1) (kW)
Time of day [h]

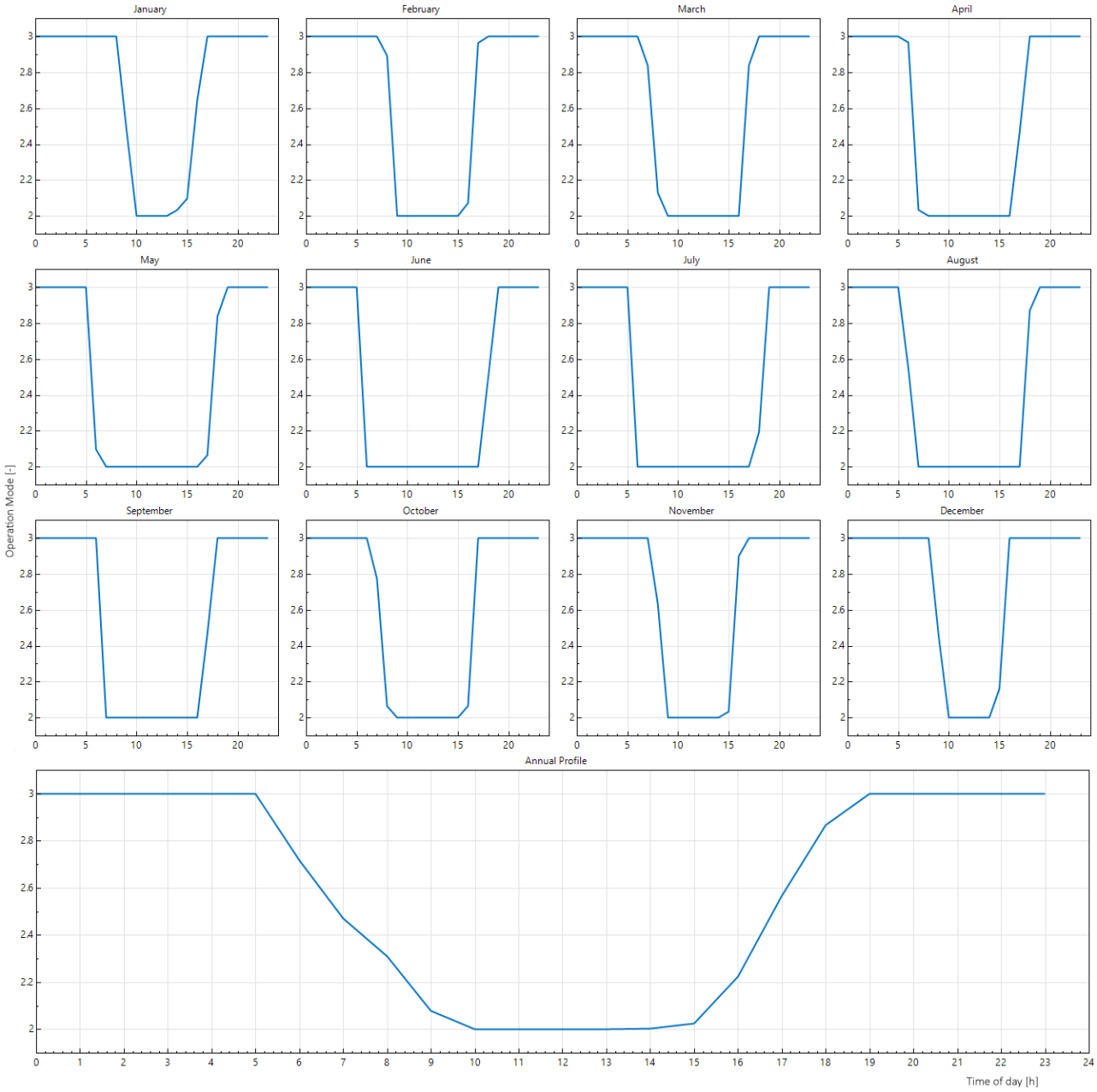

Hourly Data: Bill load (year 1) (kWh)
Hourly Data: Electricity from grid (year 1 hourly) (kWh)
Hourly Data: Electricity from system to load (year 1 hourly) (kWh)
Hourly Data: Electricity to/from grid (year 1 hourly) (kWh)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

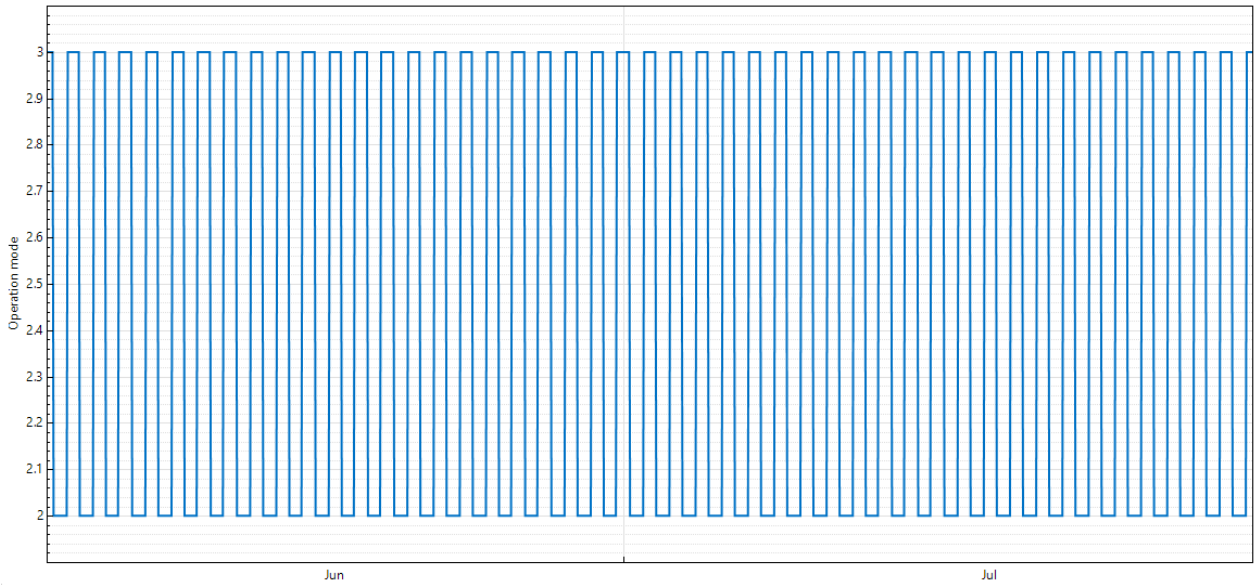


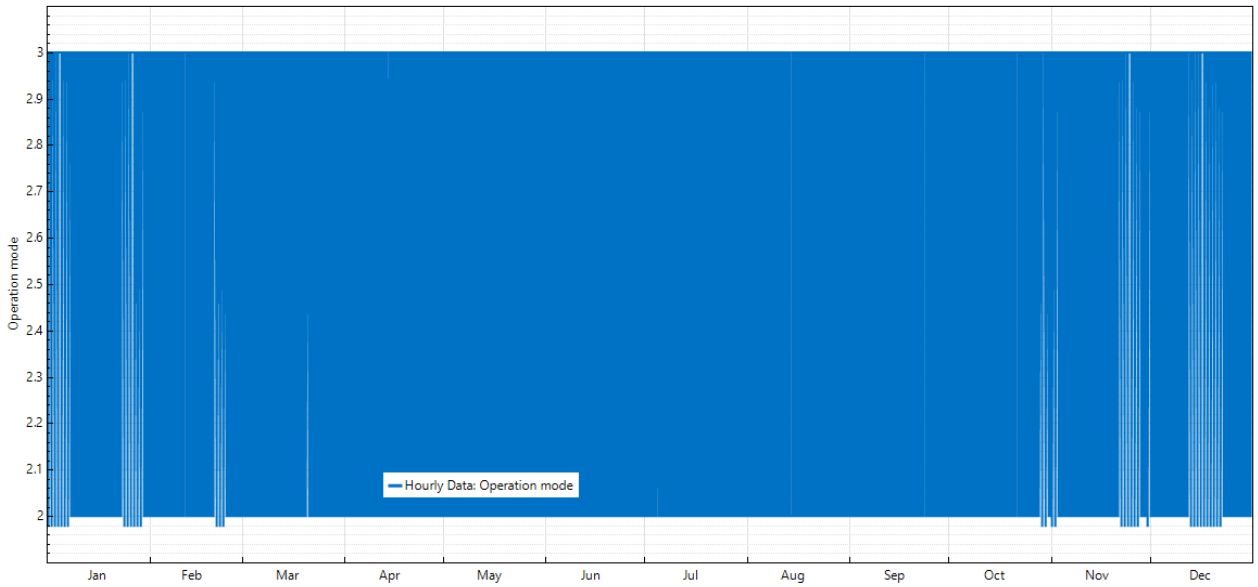
6. Operation mode



Operation mode (-)


January
February
March
April
May
June
July
August
September
October
November
December
Operation Mode [-]
Annual Profile
Time of day [h]


Operation mode
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
Jun
Jul


Operation mode
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
Hourly Data: Operation mode
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec