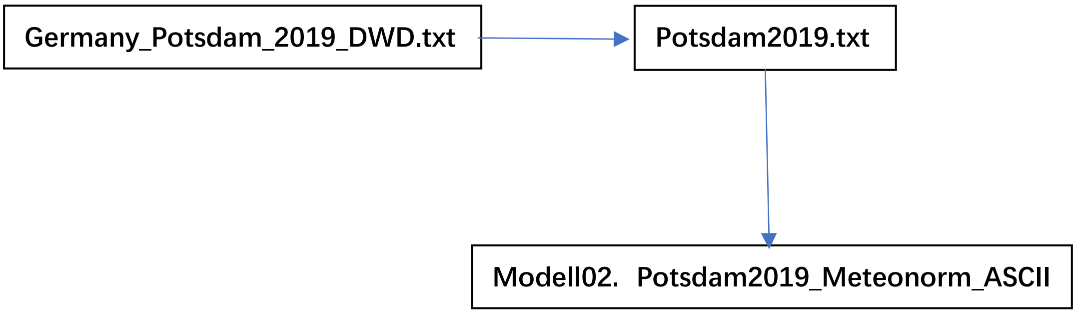
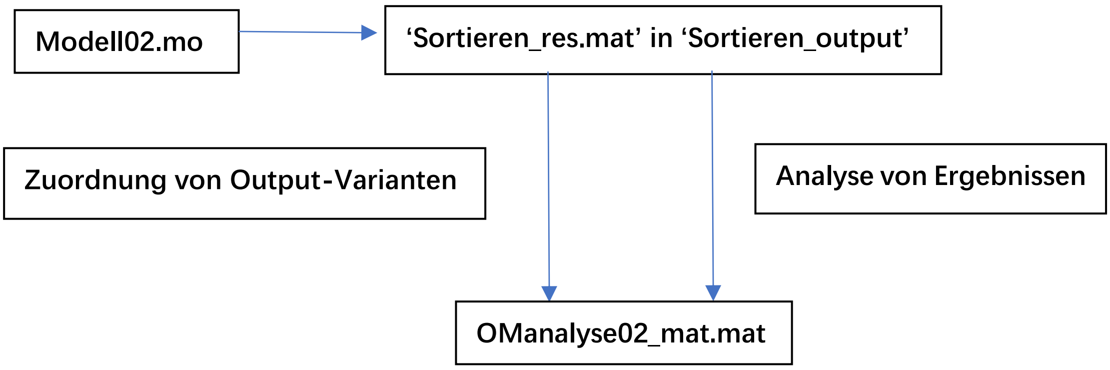
Contents:

- Struktur von Modell02

■ Weatherdateneinlesen:

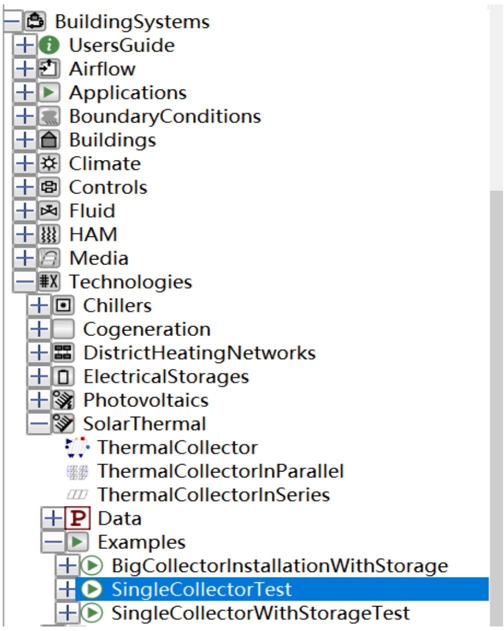


■ Zuordnung und Analyse von Ergebnissen



Beispiel von Kollektormodell in openmodelica verstehen

In diese openmodelica_Liberary haben wir eine gute Beispiel 'SingleCollectorTest' gefunden.

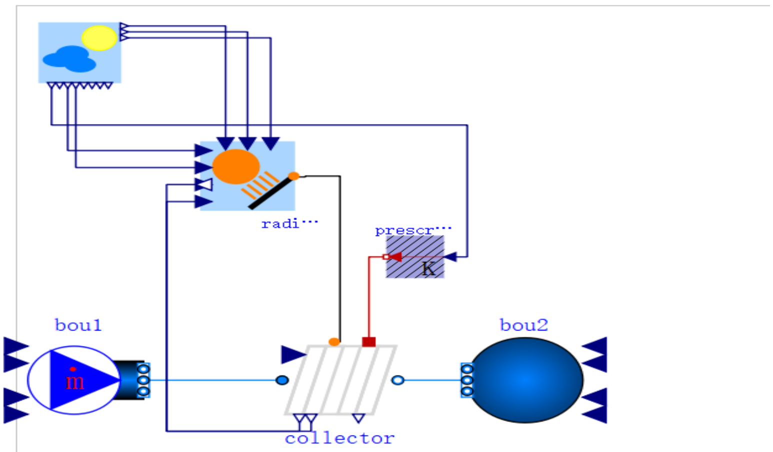


Es gibt 6 Komponenten in diese Schaubild.

Zuerst wird WeatherDataReader **Gb, Gd,** die geogradische Koordinaten von eine Stadt(z.B. Wurzburg) als Eintrittsparameter in 'SolarRadiationTransformer' und **Ta** in 'Heattransfer' importieren.

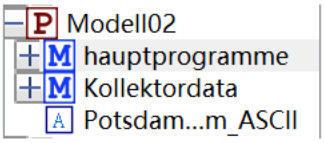
Danach wird 'SolarRadiationTransfer' G an 'RadiationPort' , auch Azimut, tilt angle in Kollektor importieren. **Ta** von 'Heattransfer' importieren an 'Heatport' von Kollektor. 'MassFlowSource1' wird die Massenstrom und Eintrittstemperatur von Kollektor in Kollektor importieren.

Zuletzt wird die Austrittstemperatur von Kollektor in 'MassFlowSource2' exportieren.



● Kollektordaten und Weatherdaten verändern

Package als ‘Modell 02‘ einstellen. Block ‘Potsdam2019_Meteronorm_ASCII‘ in ‘Modell 02‘ einstellen. Model ‘Kollektordaten‘ und ‘hauptprogramme‘ in ‘Modell 02 ‘ einstellen.



■ Weatherdaten zu verändern

Block ‘Potsdam2019_Meteronorm_ASCII‘ beschreiben.

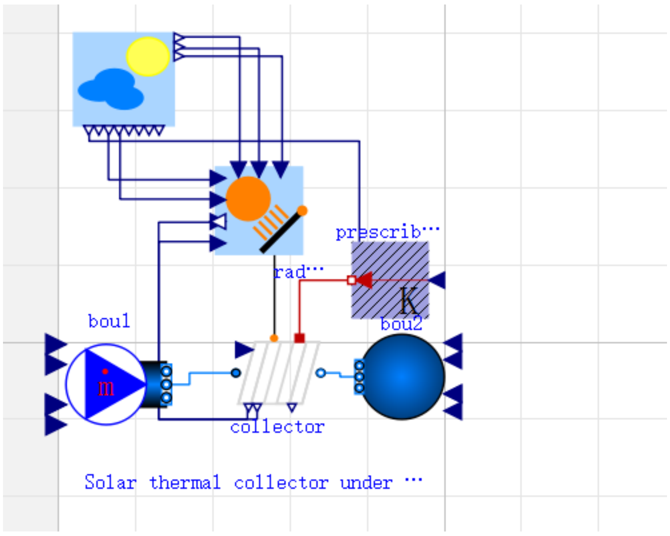
```
block Potsdam2019_Meteonorm_ASCII
  extends
BuildingSystems.Climate.WeatherData.BaseClasses.WeatherDataFileASCII(info = "Source: Meteonorm 7.0", filNam =
Modelica.Utilities.Files.loadResource("modelica://Modell02/Potsdam2019.txt"), 'Weatherdaten zu lesen'
final tabNam = "tab1", final timeFac = 1.0 / 3600.0,
final deltaTime = 1800.0, final columns = {5, 6, 3, 8, 9,
4, 7}, final scaleFac = {1.0, 1.0, 1.0, 1.0, 1.0, 0.01,
1.0}, final latitudeDeg = 49.47, final longitudeDeg =
9.57, final longitudeDeg_0 = 1.0);
'Einlesensparameter'
  // beam horizontal radiation
  // diffuse horizontal radiation
  // air temperature
  // wind speed
  // wind direction
  // relative humidity
  // cloud cover
  annotation(
    Documentation(info = "<html>source: Meteonorm
7.0</html>"));
end Potsdam2019_Meteonorm_ASCII;
```

■ **Kollektordaten zu verändern**

‘Kollektordaten‘ beschreiben

```
model Kollektordata
  record Modell2SolarCollector =
BuildingSystems.Technologies.SolarThermal.Data.Collectors
.CollectorPartial(final IAMC = 0.92, final V_A = 1 / 0.1
/ 980, final C_0 = 0.80, final C_1 = 3.5, final C_2 =
0.01, A = 2.0) annotation(
    uses(BuildingSystems(version = "2.0.0-beta")));
   end Kollektordata;
```

● **model hauptprogramme beschreiben :**




```
model hauptprogramme
  package Medium =
BuildingSystems.Media.Antifreeze.PropyleneGlycolWater(X_a
= 0.40, property_T = 293.15);

Modelica.Thermal.HeatTransfer.Sources.PrescribedTemperatu
re prescribedTemperature annotation(
    Placement(visible = true, transformation(origin = {-
14, 16}, extent = {{10, -10}, {-10, 10}}, rotation =
0)));
```

```
  BuildingSystems.Fluid.Sources.MassFlowSource_T
boul(nPorts = 1, m_flow = 0.02083, redeclare package
Medium = Medium, T = 323.15) annotation(
    Placement(visible = true, transformation(origin = {-
93, -9}, extent = {{-13, -13}, {13, 13}}, rotation =
0)));
  BuildingSystems.Fluid.Sources.Boundary_pT bou2(redeclare
package Medium = Medium, nPorts = 1) annotation(
    Placement(visible = true, transformation(origin = {-5,
-9}, extent = {{11, -11}, {-11, 11}}, rotation = 0)));

BuildingSystems.Climate.SolarRadiationTransformers.SolarR
adiationTransformerIsotropicSky radiation(rhoAmb = 0.2)
annotation(
    Placement(visible = true, transformation(origin = {-
48, 34}, extent = {{-14, -14}, {14, 14}}, rotation =
0)));
    'Weatherdaten zu lesen'
  BuildingSystems.Climate.WeatherData.WeatherDataReader
weatherData(redeclare block WeatherData =
Modell02.Potsdam2019_Meteonorm_ASCII) "time Gdot_beam
Gdot_diffuse T_air_env" annotation(
    Placement(visible = true, transformation(origin = {-
83, 68}, extent = {{-13, -12}, {13, 12}}, rotation =
0)));
 'Kollektordaten zu lesen'
BuildingSystems.Technologies.SolarThermal.ThermalCollecto
r collector(redeclare package Medium = Medium, redeclare
Kollektordata.Modell2SolarCollector collectorData,
angleDegAzi = 0.0, angleDegTil = 45.0, dp_nominal = 2.0,
m_flow_nominal = 0.02083, nEle = 1) annotation(
    Placement(visible = true, transformation(origin = {-
43, -8}, extent = {{-11, -10}, {11, 10}}, rotation =
0)));

'alle Komponenten zu verbinden'
equation
  connect(collector.heatPortCon,
prescribedTemperature.port) annotation(
    Line(points = {{-37.5, 1}, {-37.5, 16}, {-24, 16}},
color = {191, 0, 0}));
  connect(collector.angleDegAzi, radiation.angleDegAzi)
annotation(
```

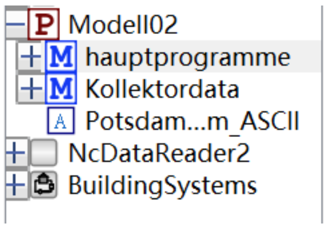
```
    Line(points = {{-51, -17}, {-51, -20}, {-74, -20}, {-
74, 26}, {-59, 26}}, color = {0, 0, 127}));
  connect(weatherData.IrrDifHor, radiation.IrrDifHor)
annotation(
    Line(points = {{-84, 55}, {-84, 37}, {-59, 37}}, color
= {0, 0, 127}));
  connect(weatherData.longitudeDeg,
radiation.longitudeDeg) annotation(
    Line(points = {{-69, 76}, {-48, 76}, {-48, 45}}, color
= {0, 0, 127}));
  connect(radiation.radiationPort,
collector.radiationPort) annotation(
    Line(points = {{-37, 34}, {-44, 34}, {-44, 1}}));
  connect(weatherData.TAirRef, prescribedTemperature.T)
annotation(
    Line(points = {{-92, 55}, {-92, 52}, {-22, 52}, {-22,
16}, {-2, 16}}, color = {0, 0, 127}));
  connect(collector.angleDegTil, radiation.angleDegTil)
annotation(
    Line(points = {{-48.5, -17}, {-48.5, -20}, {-74, -20},
{-74, 31}, {-59, 31}}, color = {0, 0, 127}));
  connect(bou1.ports[1], collector.port_a) annotation(
    Line(points = {{-80, -9}, {-66, -9}, {-66, -8}, {-54,
-8}}, color = {0, 127, 255}));
  connect(weatherData.longitudeDeg0,
radiation.longitudeDeg0) annotation(
    Line(points = {{-69, 74}, {-42, 74}, {-42, 45}}, color
= {0, 0, 127}));
  connect(radiation.latitudeDeg, weatherData.latitudeDeg)
annotation(
    Line(points = {{-53, 45}, {-53, 79}, {-69, 79}}, color
= {0, 0, 127}));
  connect(collector.port_b, bou2.ports[1]) annotation(
    Line(points = {{-32, -8}, {-27, -8}, {-27, -9}, {-16,
-9}}, color = {0, 127, 255}));
  connect(weatherData.IrrDirHor, radiation.IrrDirHor)
annotation(
    Line(points = {{-87, 55}, {-87, 42}, {-59, 42}}, color
= {0, 0, 127}));
  annotation(
    uses(Modelica(version = "3.2.3"),
BuildingSystems(version = "2.0.0-beta")),
```

```
    Diagram(graphics = {Text(lineColor = {0, 0, 255},
extent = {{-94, -26}, {-4, -46}}, textString = "Solar
thermal collector under real weather data")}),
    experiment(StartTime = 0, StopTime = 31536000,
Tolerance = 1e-6, Interval = 3600));
end hauptprogramme;
```

- **Simulation zu laufen**

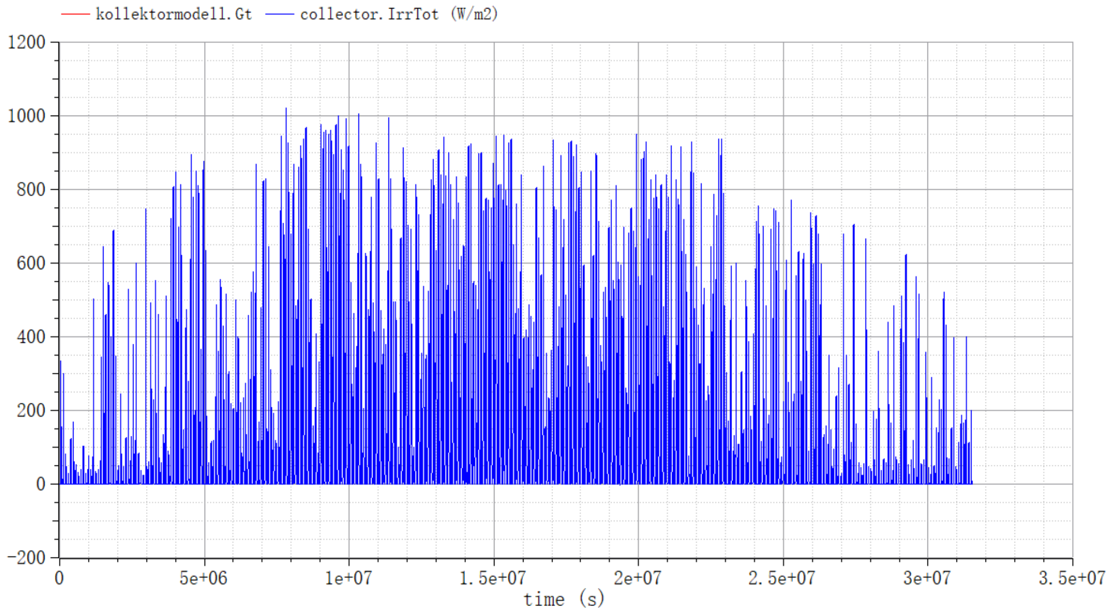
Um die Simulation zu laufen, wählen Sie das Arbeitsverzeichnis als Aktendeckel’ Model_02_v15 ‘.

Wenn man ,Modell02.hauptprogramme ‘ zu laufen bringen möchte, muss man auch Omlibrary ,Buildingsystem ‘ öffnen, um die Komponenten aus dem in Ordnung zu funktionieren.

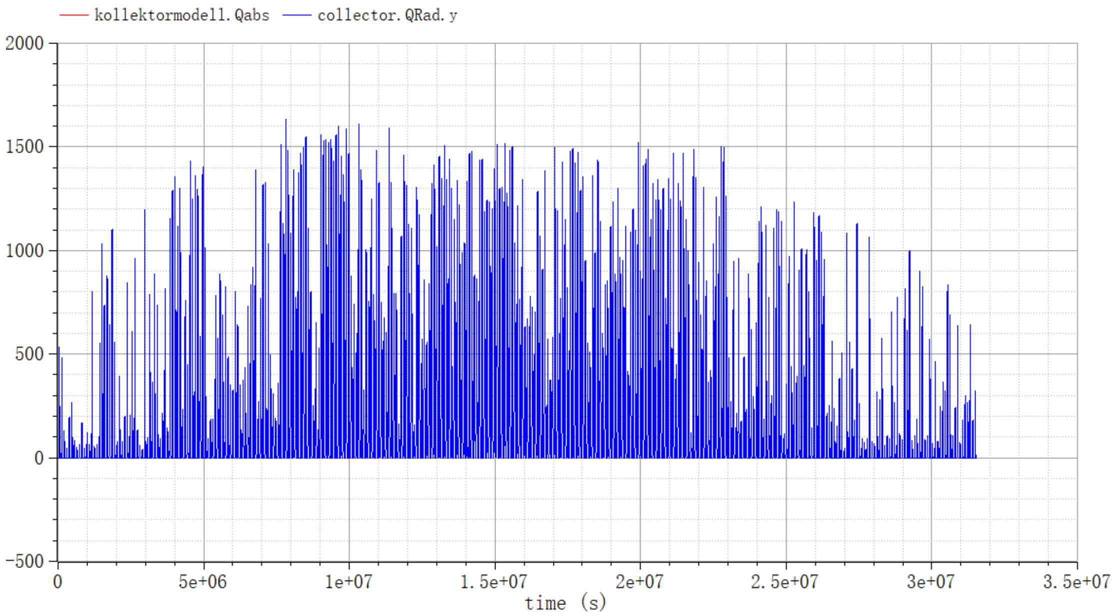


- ## Vergleich Modell 02 mir Modell 01

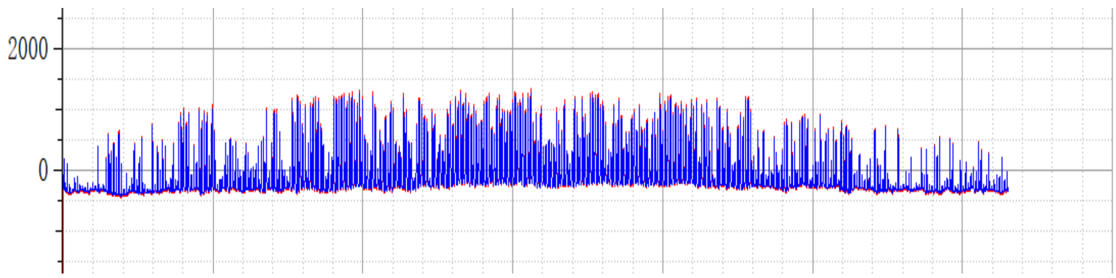
G：



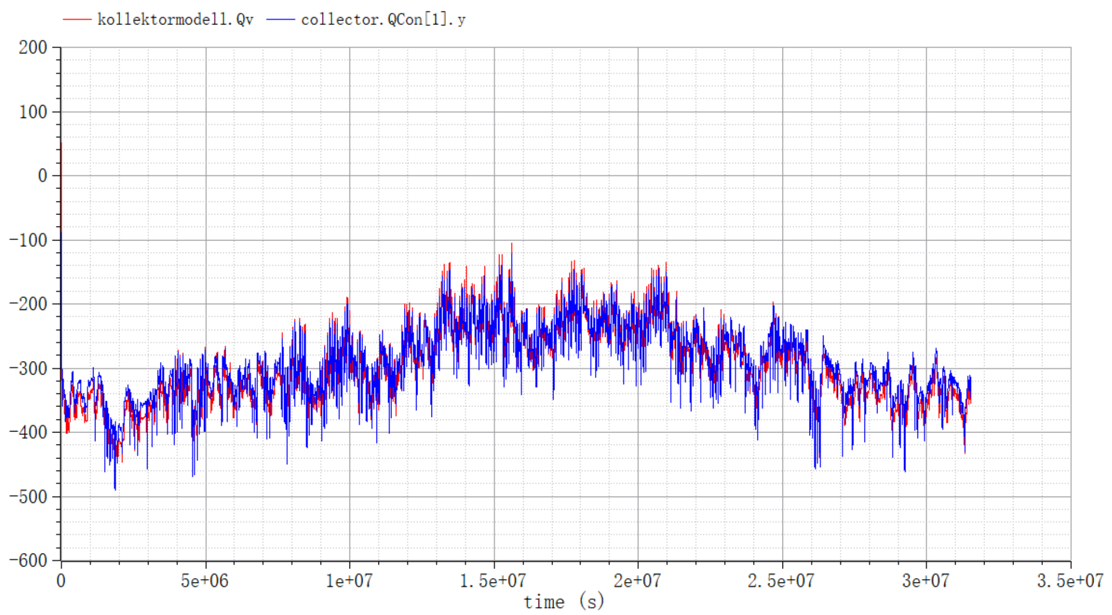
Qabs:



Quse:



Qverlust:

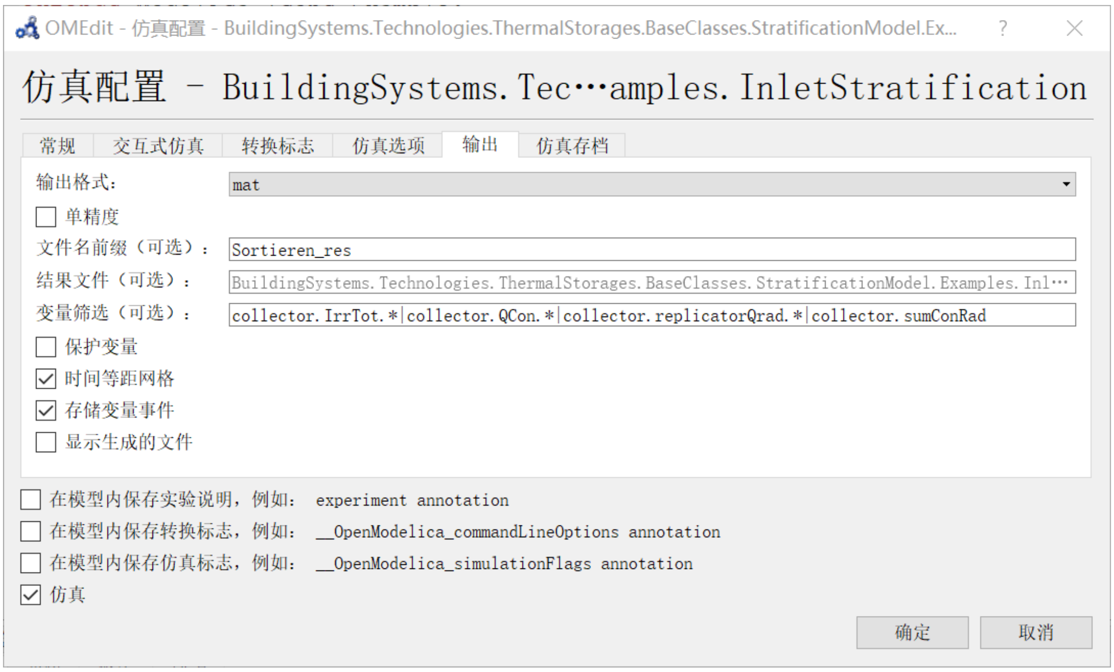


- **Ergebnisse:**

Modell01 und Modell02 haben die gleiche Weatherdatenquelle (‚Germany_Potsdam_2019_DWD.txt ‘) benutzt. Die Ergebnisse zeigt, Modell01 und Modell02 kann gut miteinander anpassen. So können wir weiter gehen.

- Ergebnisse in Matlab auszugegebn

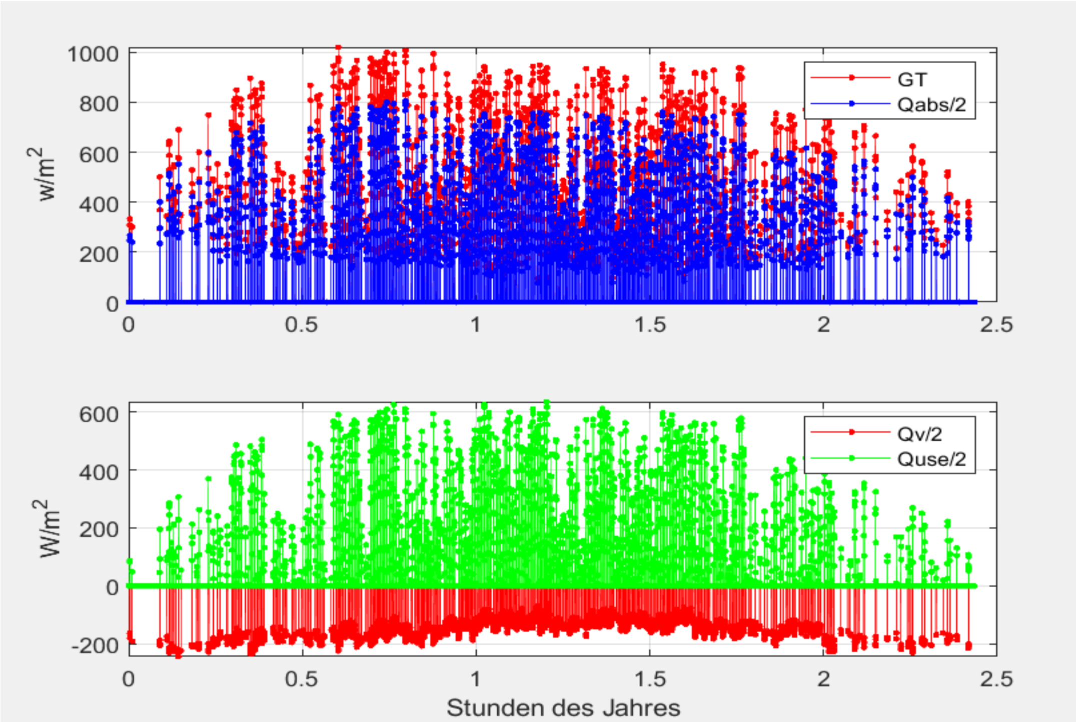
Zuerst gebe ich die Simulationsergebnisse von OpenModelica als Mat-File aus. Die ausgegebene Mat-Dateien sind als ‚Sortieren_res.mat‘ in Aktiendeckel ‚Sortieren_output‘ von ‚Modell02_v15‘ gespeichert.



Danach darstelle und analysiere ich die ausgegebene Ergebnissevarianten in Matlab durch folgende Matlab-Code.

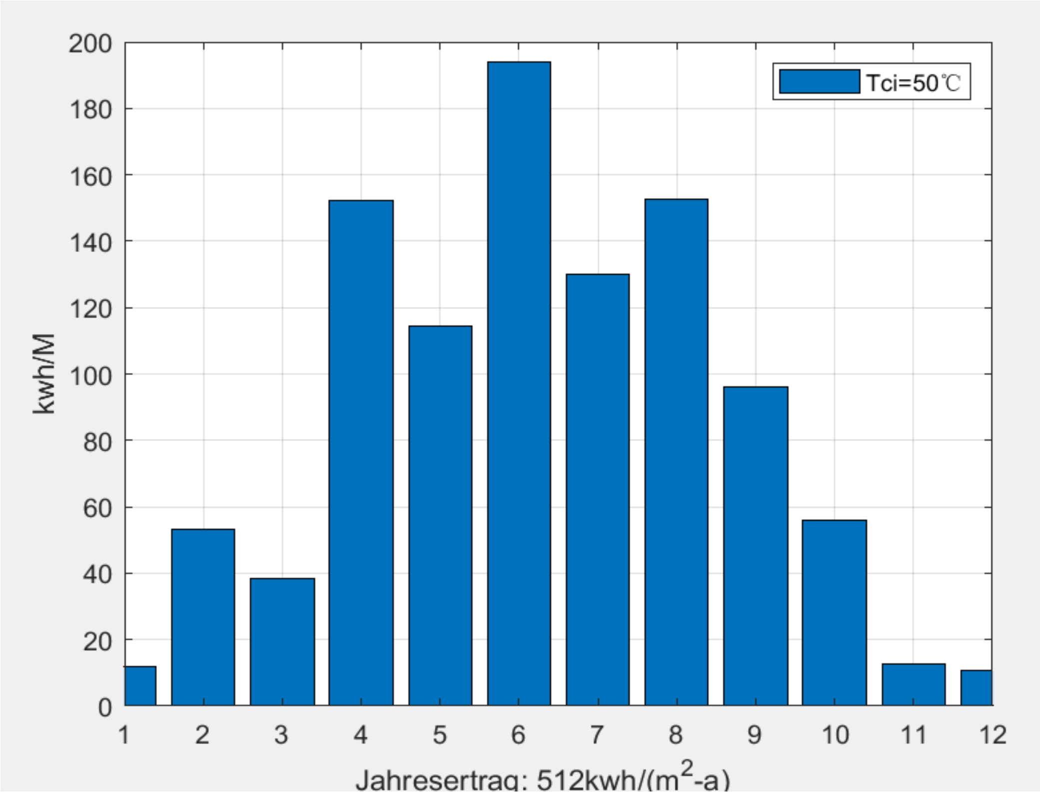
```
clc
clear all
%%
% load Sim_out.mat          % individueller Name
derAusgabedatei, alle Var: .*
load 'Modell02.hauptprogramme/Sortieren_res.mat'  %
alternativ


%%  Datenaufbereitung
[r,c] = size(data_2);



%%  Header
col1 = string(name(:,1:r)');
col2 = string(description(:,1:r)');
data = (data_2);
res_0 = table(col1,col2,data);
res_0.Properties.VariableNames{1} = 'Bez_var';
res_0.Properties.VariableNames{2} = 'OM_var';


%% Dateneinlesen
res_0.OM_var
ts0      = res_0.data(1,:)';
% Zeile 3:  "collector.IrrTot
"   "Total solar radiation on collector's absorber
surfcace [W/m2]
GT0      = res_0.data(3,:)';
% Zeile 4:  "collector.QCon[1].y
"   "Value of Convective heat flow Real output
Qv0       = res_0.data(4,:)';
% Zeile 6:  "collector.replicatorQrad.y[1]
"   "Value of Radiative heat flow Real output signals
Qabs0     = res_0.data(6,:)';
% Zeile 7:  "collector.sumConRad[1].y
"   "Value of Useenergy Real output signal
Quse0     = res_0.data(7,:)';
```

```
%% Filter für Stundenwerte
p = ts0/3600 - fix(ts0/3600);  %
pp = p ==0;     % wenn pp ==1, dann voller Stundenwert

ts = ts0(pp)/3600;  % Auwahl der vollen Stunden
ts = ts(2:end-1,1); % Eliomination erster / letzter Wert
GT = GT0(pp);
GT = GT(2:end-1,1);
Qv = Qv0(pp);
Qv = Qv(2:end-1,1);
Qabs = Qabs0(pp);
Qabs = Qabs(2:end-1,1);
Quse = Quse0(pp);
Quse = Quse(2:end-1,1);



%% Eingabeswert
Tci = 50 ;
Quse(Quse<0)=0;
ctr=Quse./Quse;
ctr(isnan(ctr))=0;


%% Zuordnung der Ergebnissen
figure(1)
subplot(2,1,1)
plot(ts/3600 ,GT.*ctr ,'.-r');
hold on
plot(ts/3600 ,Qabs/2.*ctr,'.-b');
hold off
legend('GT','Qabs/2')
grid
ylabel('w/m^2')
subplot(2,1,2)
plot(ts/3600 ,Qv/2.*ctr,'.-r');
hold on
plot(ts/3600 ,Quse/2.*ctr,'.-g');
hold off
grid
legend('Qv/2','Quse/2')
xlabel('Stunden des Jahres')
ylabel('W/m^2')
```

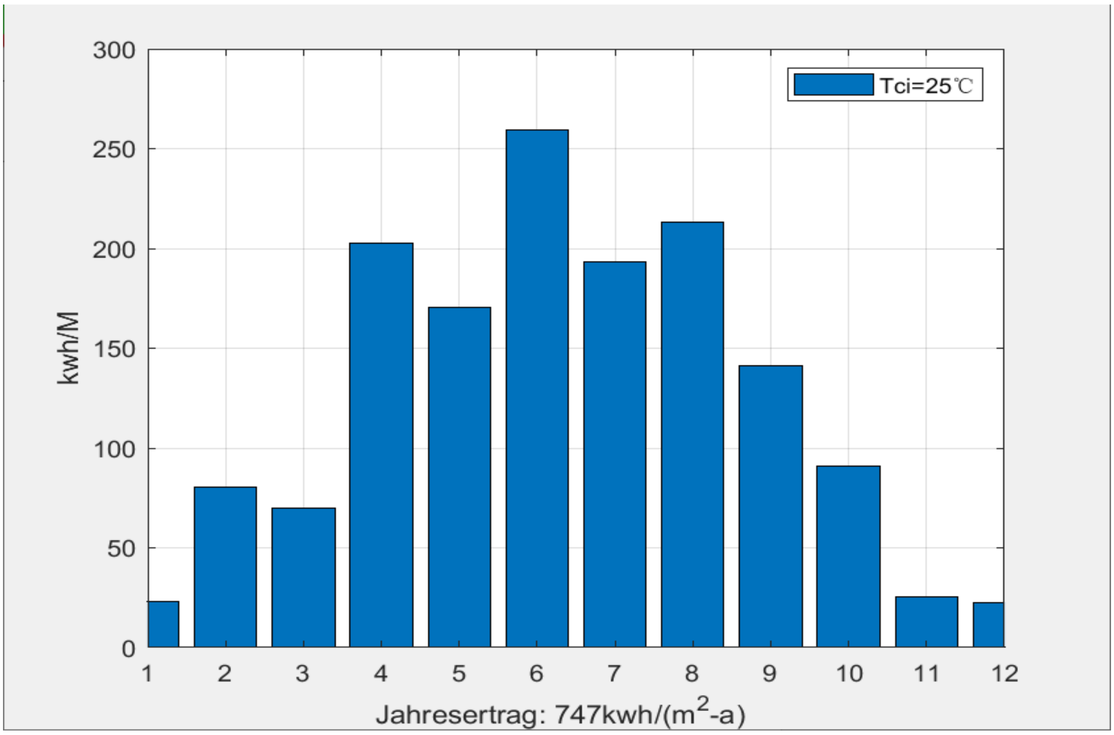



```
%%
QuseD=sum(reshape(Quse(1:8760,1),[24,365]))./1000;
QuseM(1,1)=sum(QuseD(1:31));
QuseM(1,2)=sum(QuseD(32:59));
QuseM(1,3)=sum(QuseD(60:90));
QuseM(1,4)=sum(QuseD(91:120));
QuseM(1,5)=sum(QuseD(121:151));
QuseM(1,6)=sum(QuseD(152:181));
QuseM(1,7)=sum(QuseD(182:212));
QuseM(1,8)=sum(QuseD(213:243));
QuseM(1,9)=sum(QuseD(244:273));
QuseM(1,10)=sum(QuseD(274:304));
QuseM(1,11)=sum(QuseD(305:334));
QuseM(1,12)=sum(QuseD(335:365));
%%
figure(2)
title 'Monatssummen'
bar(QuseM,'grouped');
grid
legend(['T{ci}=',num2str(Tci),'¡æ'])
xlim([1 12])
q_sol=sum(QuseM)/2;
xlabel(['Jahresertrag: ',num2str(ceil(q_sol)),...
    'kwh/(m^2-a)    :  '])
ylabel('kwh/M')
```

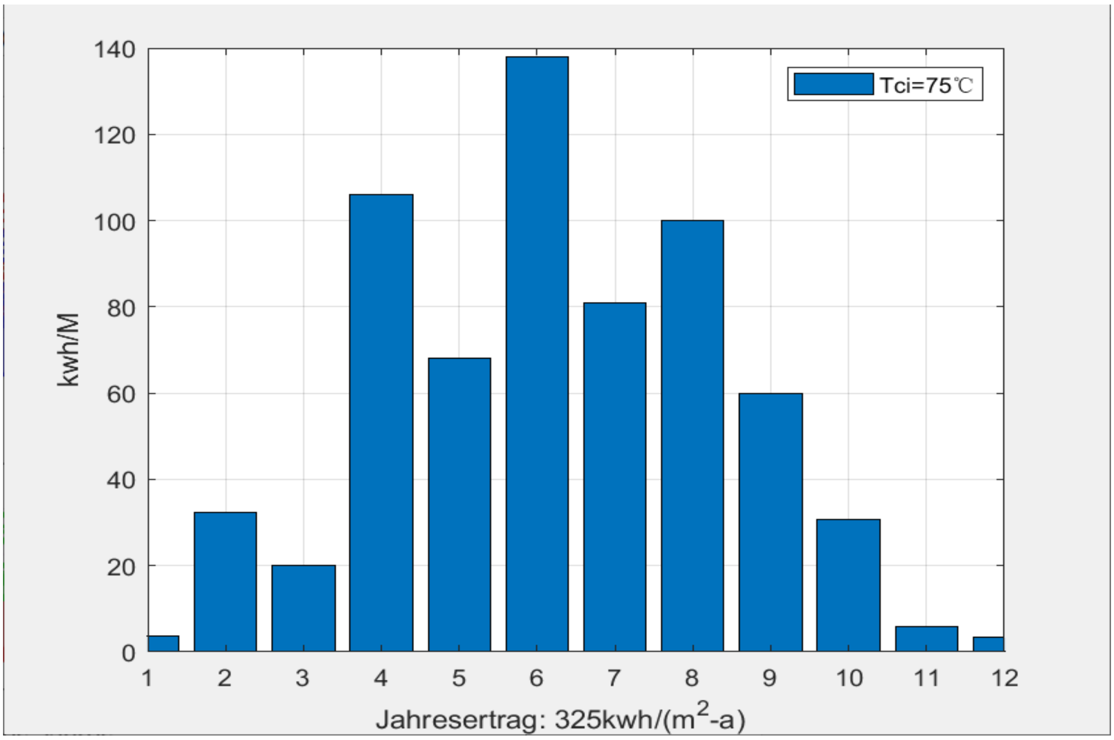
Wenn Tci=50



Wenn Tci=25



Wenn Tci=75



140
120
100
80
60
40
20
0
kwh/M
1
2
3
4
5
6
7
8
9
10
11
12
Tci=75℃
Jahresertrag: 325kwh/(m2-a)