



Energetic building simulation integrating renewable energies and conventional heat generators

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The company

200 employees, 60.000 clients

ETU Software has been developing technical and CAD software since 2002 for the fields of energy efficiency, building services and HVAC planning for new buildings and the renovation of old buildings.

In the field of energy consulting, ETU Software is today the market leader in Germany (70% market share).

The data acquisition of manufacturer data for use in calculation software is another of the services offered by ETU Software.



Subsidiaries in Germany, Austria & Spain

Hottgenroth Group

Hottgenroth Software GmbH & Co. KG was founded in 1996 by Karl-Heinz Hottgenroth. In 2002 Hottgenroth took over **ETU Software GmbH**.

Nowadays, further subsidiaries strengthen the headquarter in Cologne.

HOTTGENROTH & TACOS GmbH in Münster is a further subsidiary and a specialist in sophisticated design of non-residential ventilation systems.

ETU Software GmbH is the trading partner for foreign business within the **Hottgenroth Group**.



HottCAD und exchange of data

BIM-Methodology

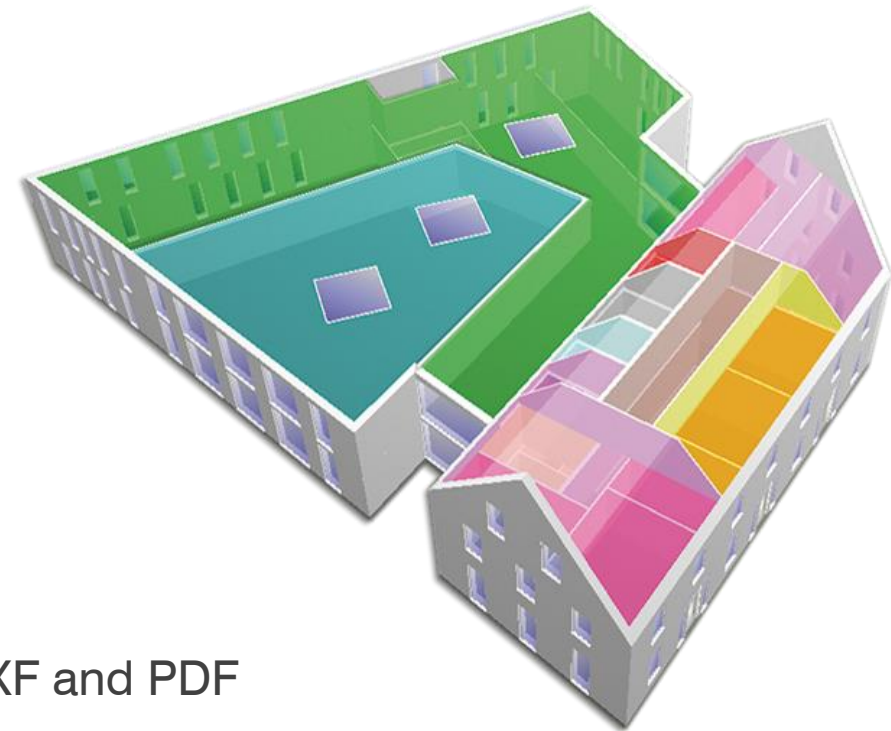
HottCAD is an integrated CAD solution that has been specially developed for the requirements of technical building calculations. All modules work with data from the common 3D model and enrich it if required.

IFC files can be imported and exported.

Plug-ins allow 3D models from other CAD programs like Autodesk Revit or Nemetschek Allplan.

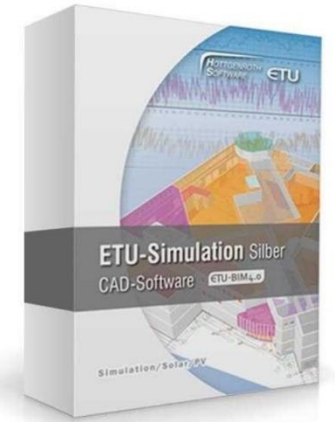


Alternatively, planning documents such as image files, DWG/DXF and PDF can be used for retracing the building in **HottCAD**.



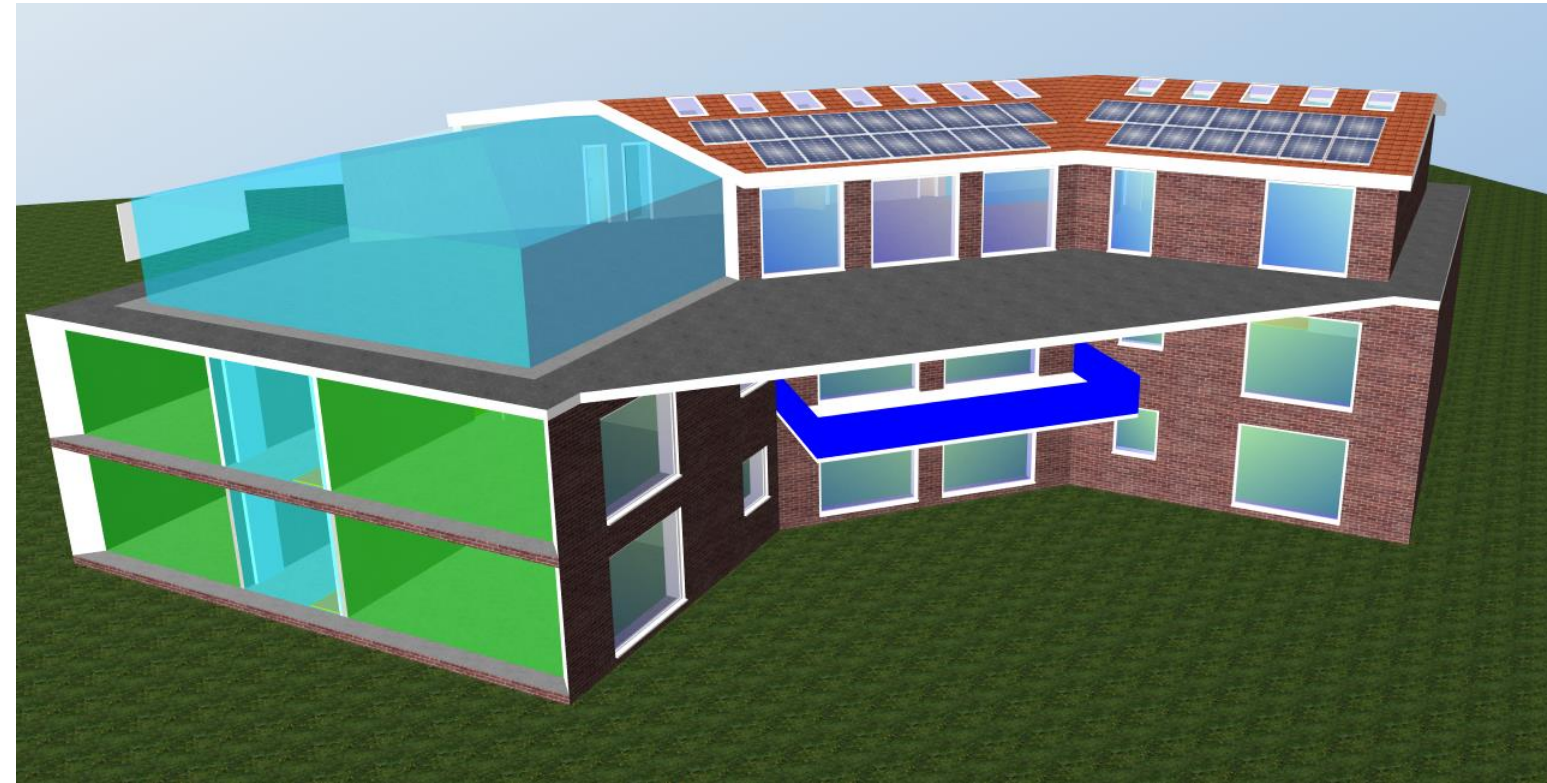
ETU-Simulation

Thermal building simulation and plant scheme simulation including solar energy and geothermal energy (optionally with boiler and CHP)



Parameters of the thermal building simulation:

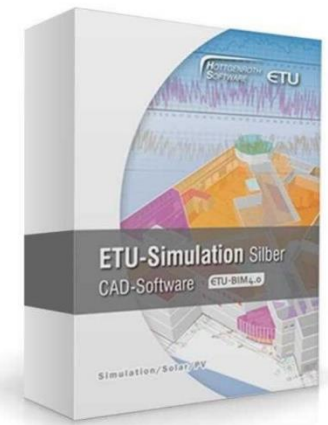
- Building components
- Climate data
- Usage profiles
- Shading
- Demand profiles
- Zones for same profiles



ETU-Simulation - Results

Thermal energy balance of the building

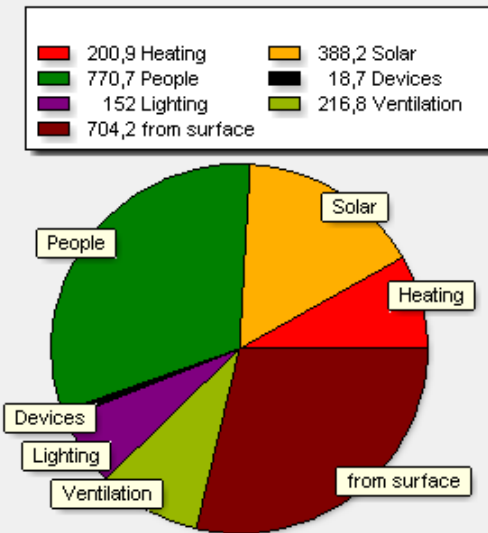
Heating energy demand:	633,8 kWh	Max. emitted heating power:	0,91 kW (27.January, 17-18 h)
Heating energy supply:	200,9 kWh	Emitted dimensioning heating power:	0,82 kW (12.February, 17-18 h)
Cooling energy demand:	1559,4 kWh	Max. emitted cooling power:	2,39 kW (31.August, 12-13 h)
Cooling energy supply:	1267,7 kWh	Emitted dimensioning cooling power:	2,39 kW (31.August, 12-13 h)
Heat emission from devices and lighting:	170,7 kWh	Operating hours:	475 h (heating), 2980 h (cooling)
Total energy supply:	1639,3 kWh (198,7 kWh/m²)		



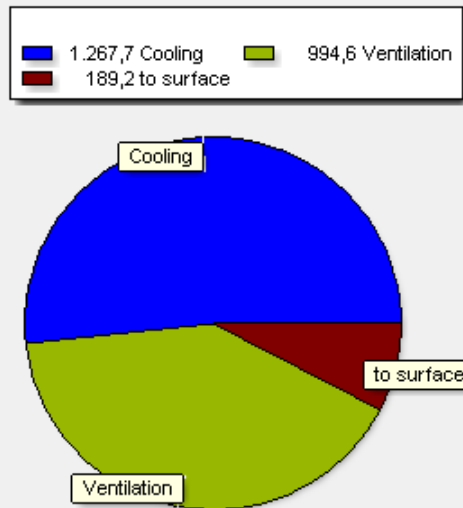
Results:

- Heat demand
- Cooling Demand
- Devices
- People
- Solar load
- Lighting
- Air infiltration
- Surface heat output
- Ventilation

Heat gains (2451,5 kWh)



Heat losses (2451,5 kWh)



Excess and under temperatures:

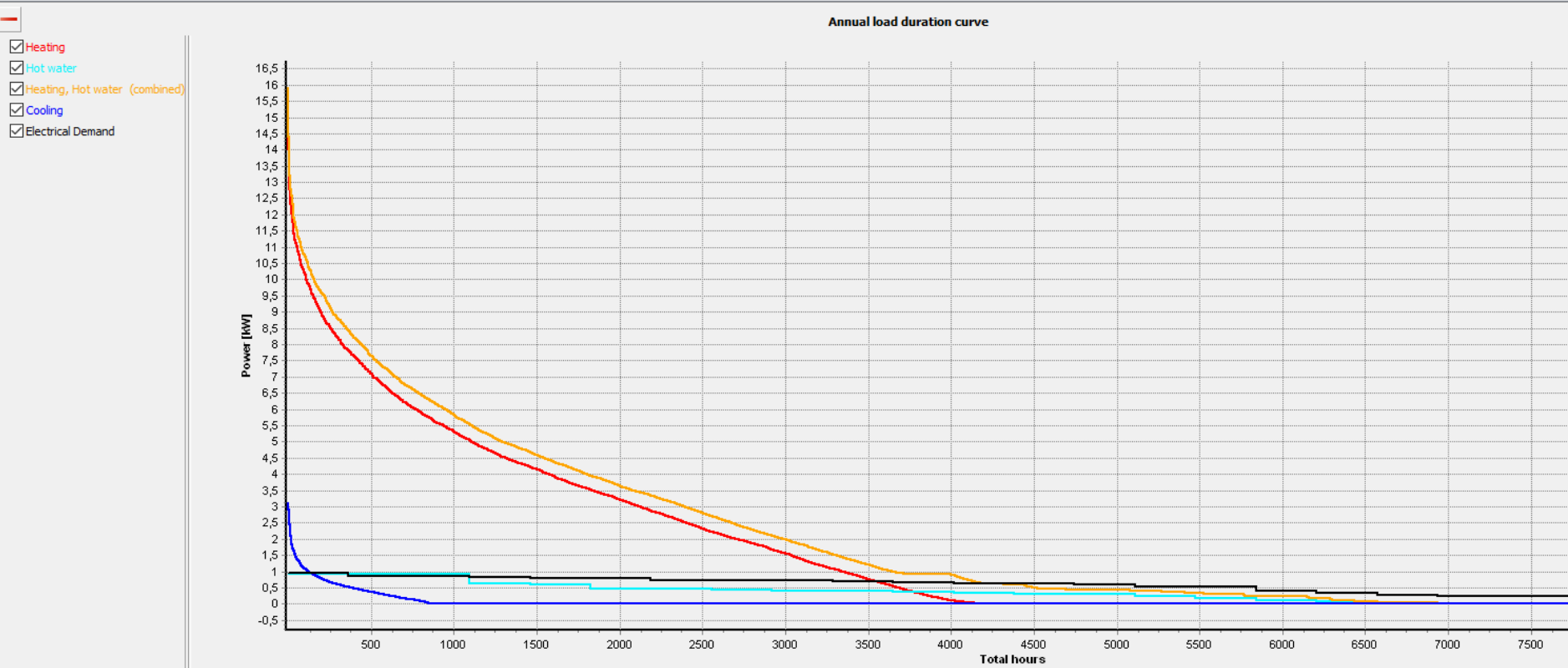
Maximum temperature overrun:	3 °C	Maximum temperature undercut:	2,6 °C
Hours of excessive temperature (Internal air):	950 h	Hours of under temperatures (Internal air):	790 h
Degree hours of excessive temperature (Operative):	1719,8 °h	Degree hours of under temperatures (Operative):	672,3 °h
Hours of occupancy:	3285 h		

ETU-Simulation

Simulation of the annual load duration curve

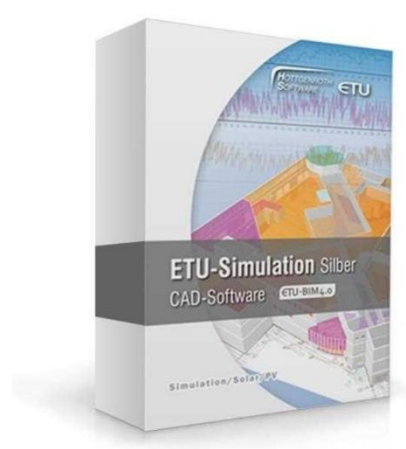


	manual input	Maximum load [kW]	Moment	Maximum specific load [W/m²]	Annual energy demand [kWh/a]
Heating	☐	15,54	13.01. (05:30)	114,53	14839,47
Hot water	☐	0,93	01.01. (07:30)	6,83	2968,06
Heating, Hot water (combined)	☐	15,94	13.01. (05:30)	117,46	17807,53
Cooling	☐	3,13	20.08. (00:30)	23,09	487,27
Electrical Demand	☐	0,97	01.01. (18:30)	7,17	5000



ETU-Simulation

Plant configuration



Building Data Entry

How do you want to enter the geometry of the building?



☐ Basic assistant

Geometrical entry via several parameters - compatible to HottCAD



☒ HottCAD

Entry via integrated HottCAD



☐ Tabular building entry

Tabular Entry of Building Elements - not compatible with CAD

Calculation Mode

Which boundary conditions shall be used for the simulation of the building?



☒ Free simulation

Simulation of room temperatures, heating- and cooling load. Climate data and usage profiles can be chosen freely.



☒ Account for humidity

Calculate humidity of rooms using humidity sources and external Airexchange. Condensation at cooling emitters increases required cooling.



☐ Summer heat protection acc. to DIN 4108-2 8.4

Climate data from test reference years are used, determined by the climatic region (summer) of the location (for locations in Germany; else standard climate data). Usage profiles are fixed. The aim of the calculation is to ensure the adherence to upper limits for room temperatures.



☐ German VDI 2078 - Cooling load

Artificial climate data is used, determined by the location's cooling load zone. The aim of the calculation is mainly to determine the cooling load. Only for locations in Germany and Austria.

Plants

Choose whether to simulate detailed plants or just roughly consider their effects on the building simulation.

☐ Simple mode

No Simulation of the Plants

☒ Detailed mode

Dimensioning and Simulation of the Plant



☐ Cooling system



☒ Heating system



☐ Ventilation system

OR



☐ Combined heating and cooling system



☒ PV System

Even if no pv-system was created in the beginning, this is still possible in HottCAD later on.



☐ DIN calculation (DIN 18599/DIN EN 15316)

Calculation of pv-system according to DIN - without simulation.



☐ Quick examination

Simulation of pv-system without detailed calculation of connection.
- it could be changed to detailed connection anytime.



☒ Detailed Connection

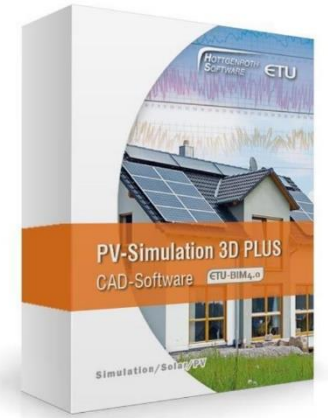
Dimension and following simulation of pv-system including selection of an inverter and connection of modules into strings.

Plant simulation:

- Cooling
- Ventilation
- Humidity
- PV
- Solar thermal
- Heat pumps
- CHP

PV-Simulation

Manufacturer-independent simulation software for the planning and design of photovoltaic systems



Software for time-saving measurement of roof areas, facades, windows and doors using a digital image file. The determined areas can be transferred to the PV-Simulation programme for further calculations.

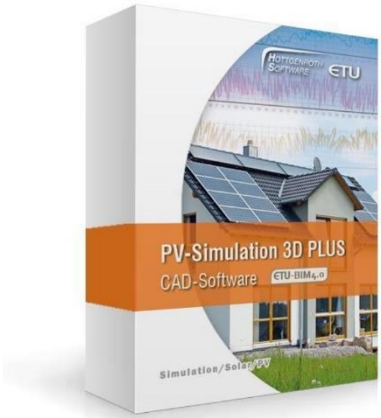
Results:

- Forecasts for yield and profitability
- Dimensioning of the PV system including battery
- Optimisation of the plant to the usage behaviour
- Project report for consulting and documentation



PV-Simulation

Results



General

Project Data

Project Options

Location

Climate Data

Shading

Horizon

Usage

Demand Profiles

Photovoltaik sy...

Module Catalog

Fields

Inverters

Design

Electrical Storage

Summary

Simulation

Diagrams - Photovo...

Profitability

Revenues and Expendi...

Parameters

Key Figures

Risk Analysis

TotalModulfeld 1

Sizing

Gross surface: 34,93 m²

Nominal Power: 5,4 kWp

Annual results

Annual generation: 4965 kWh

Specific Generation: 919,5 kWh/kWp/a

Performance Ratio: 85,5 %

CO2 Reduction: 2428 kg/a

Own-Consumption

Own-Consumption Rate: 64,3 %

Self-Sufficiency Rate: 63,9 %

Solar Power Storage

Nominal Capacity Battery: 8,1 kWh

Usable Capacity Battery: 5,7 kWh

Number Cycles Battery: 207 /a

OverviewDiagramstable

Usage of PV Production

Category	Value (kWh/a)
Own-use directly	2066
Battery charge	1281
Grid feed-in	1619

Electrical Demand Coverage

Category	Value (kWh/a)
PV directly	2066
Battery discharge	1127
Grid Energy	1807

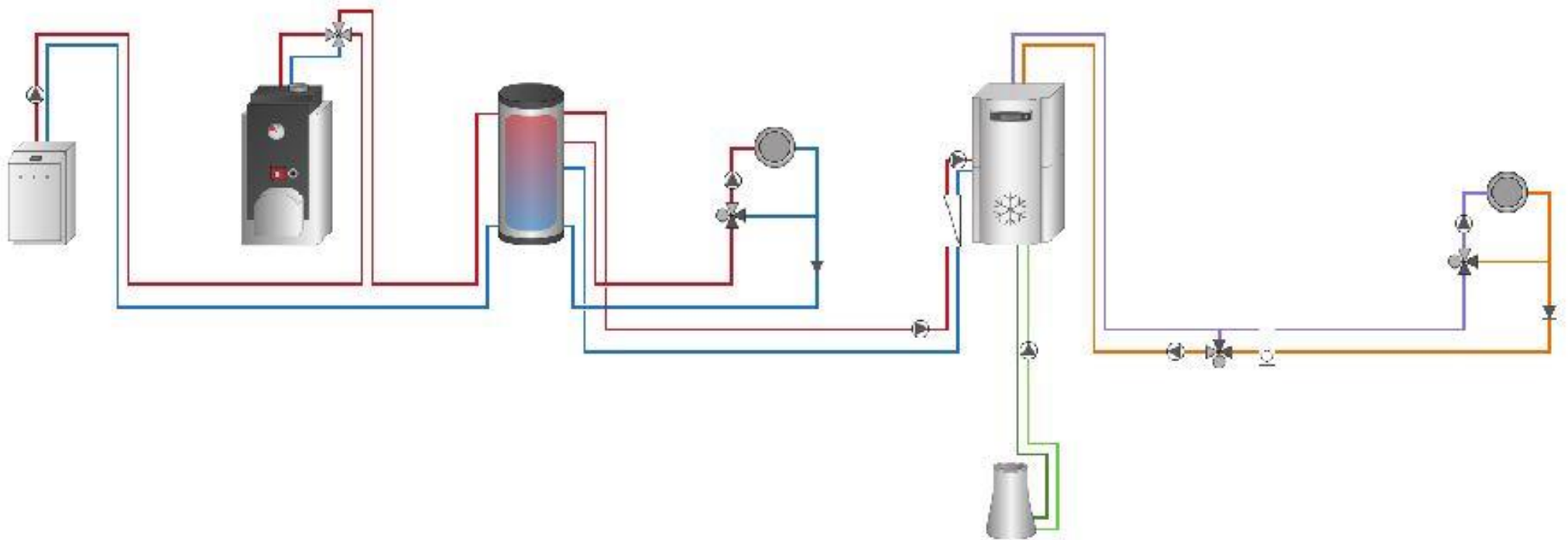
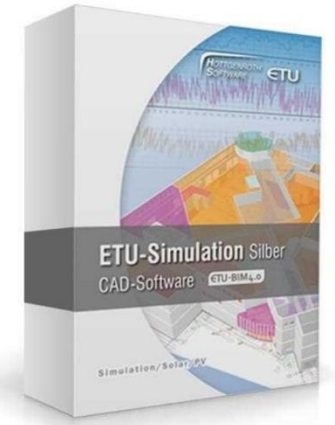
XXII Simpósio Luso-Alemão
Eficiência Energética, 20.10.20

Energy-efficient building technologies using renewable energies in Portugal

10

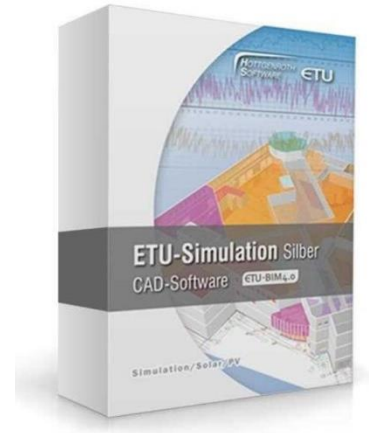
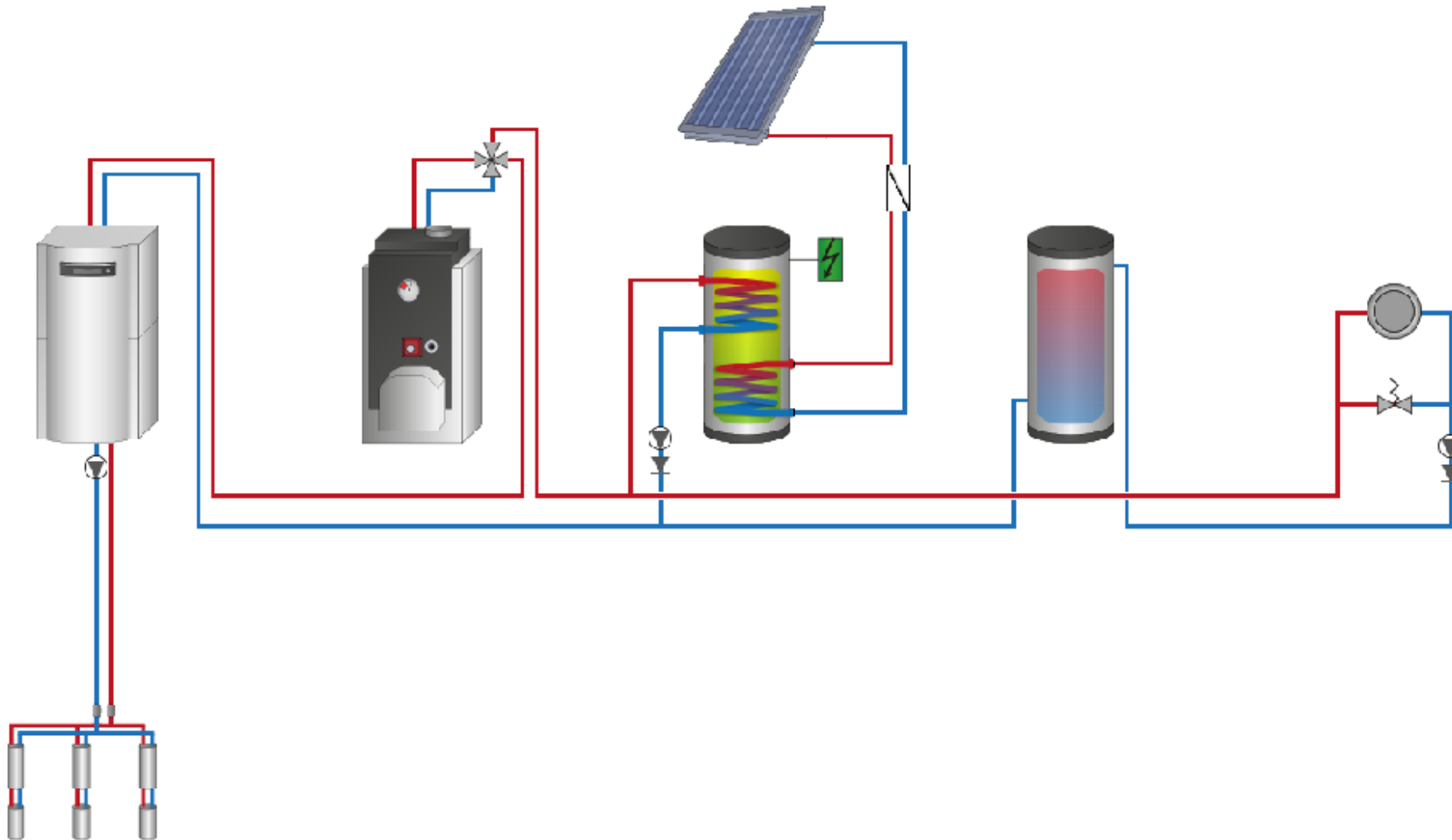
ETU-Simulation

System hydraulics / Plant schemes (1)



ETU-Simulation

System hydraulics / Plant schemes (2)



Manufacturer data

Digital product data for dimensioning, simulation and quotation

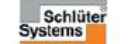
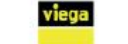


ETU TACOS

BIM Partner

Stand: 1.10.2019

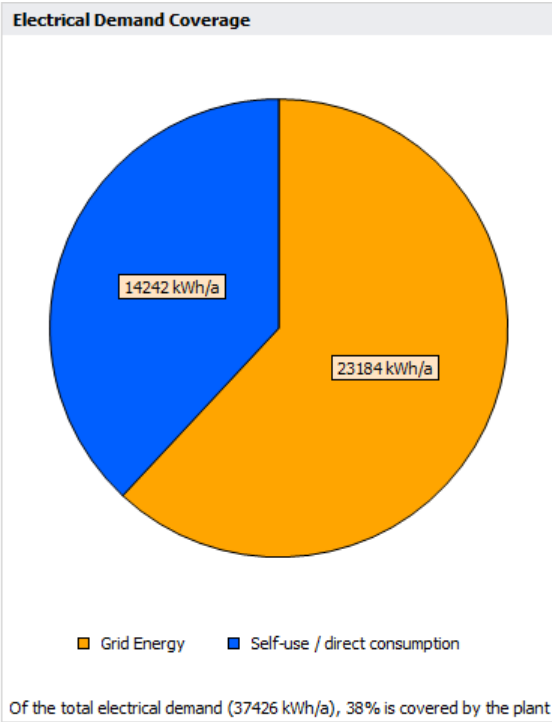
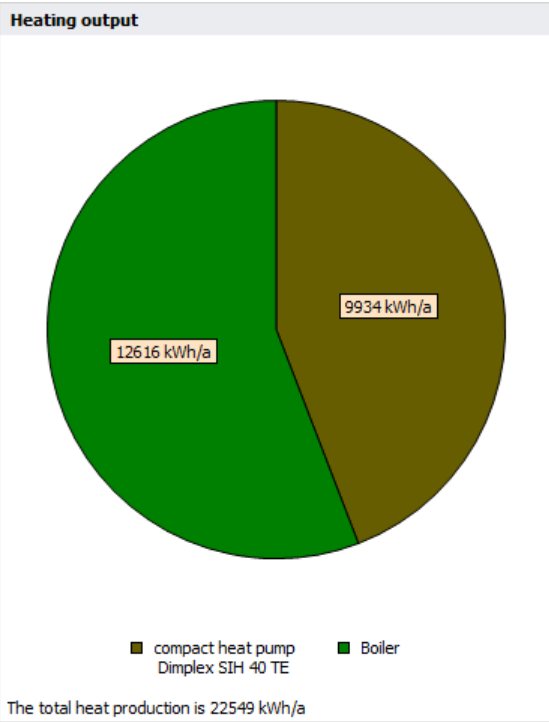
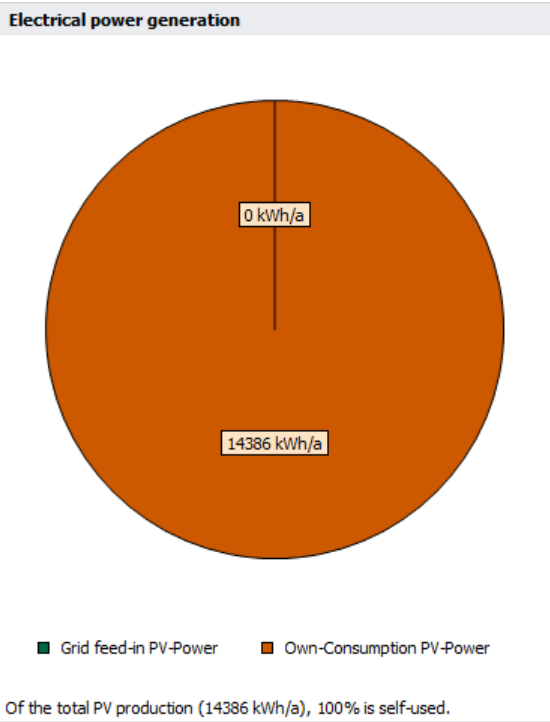
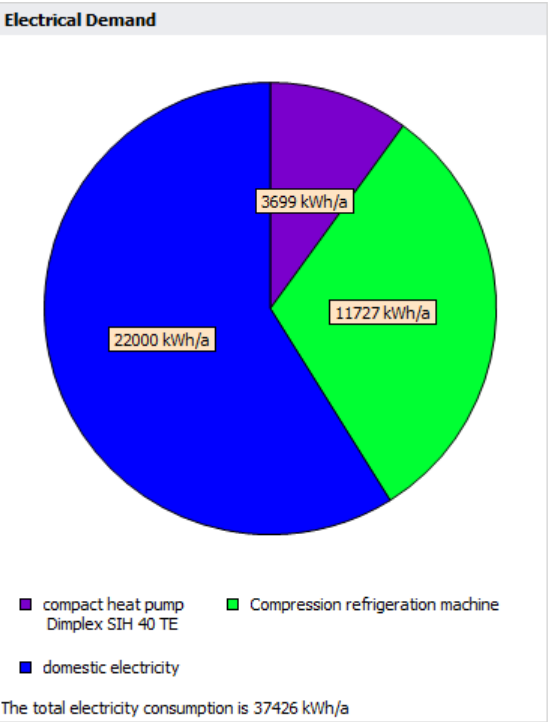
				
				
				
				
				
				
				
				
				

VDI 3805

www.vdi3805-bim.de

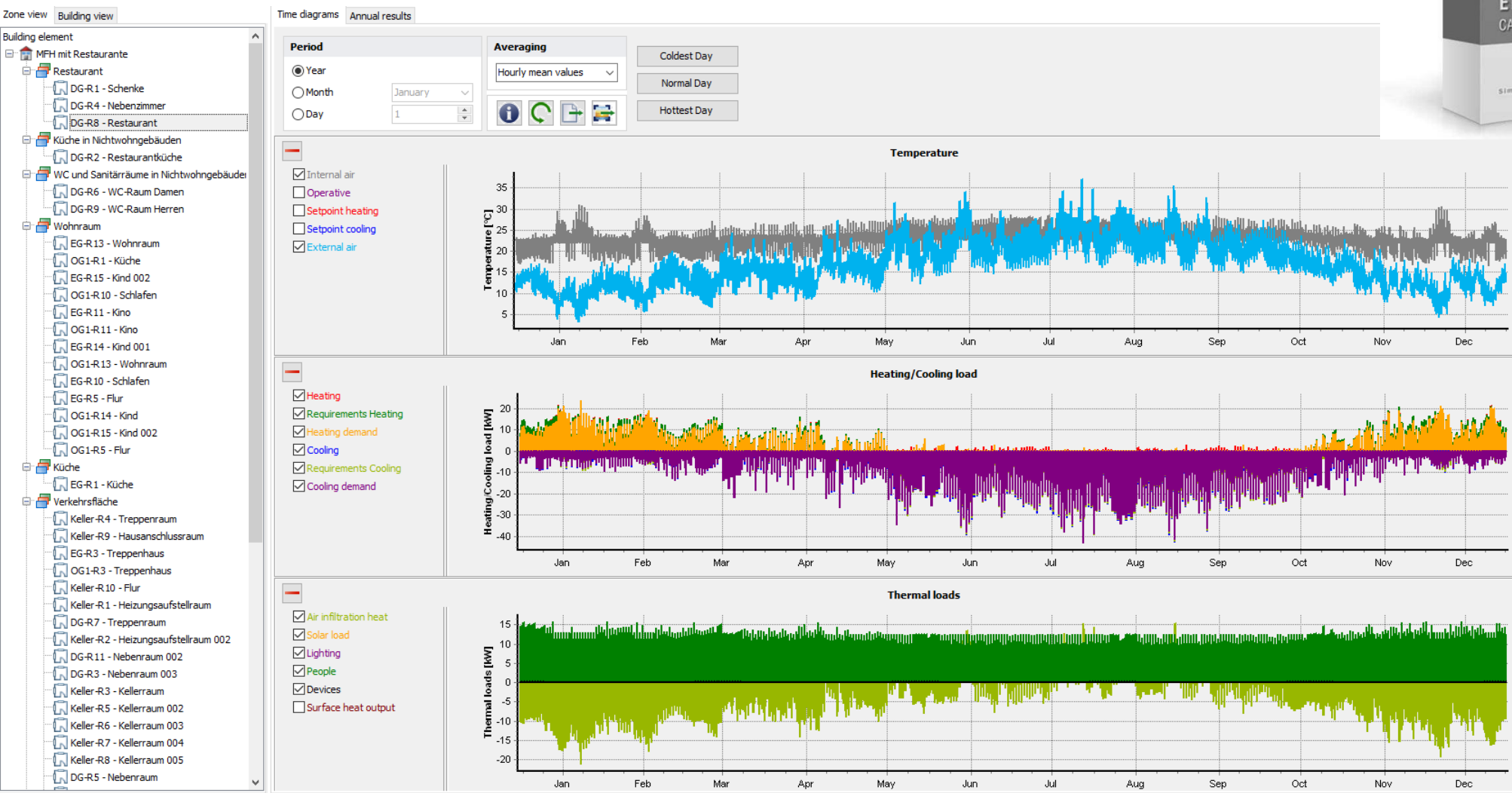
ETU-Simulation - Results

Energy Balance Plant Technology



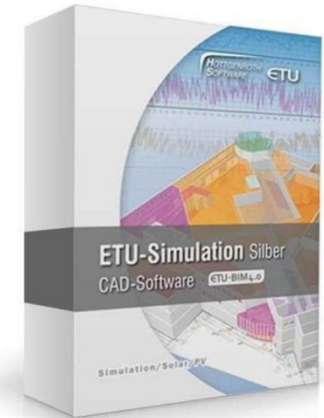
ETU-Simulation – Thermal time series

Time series for 1 year with hourly resolution for any zones or rooms



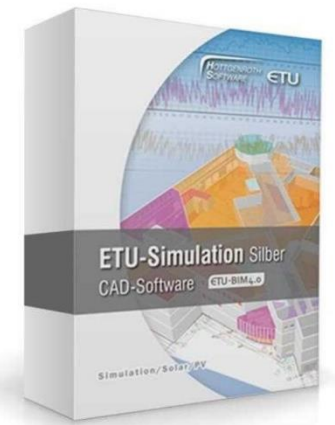
ETU-Simulation – Plant time series (1)

Time series for 1 year with hourly resolution for the chosen system

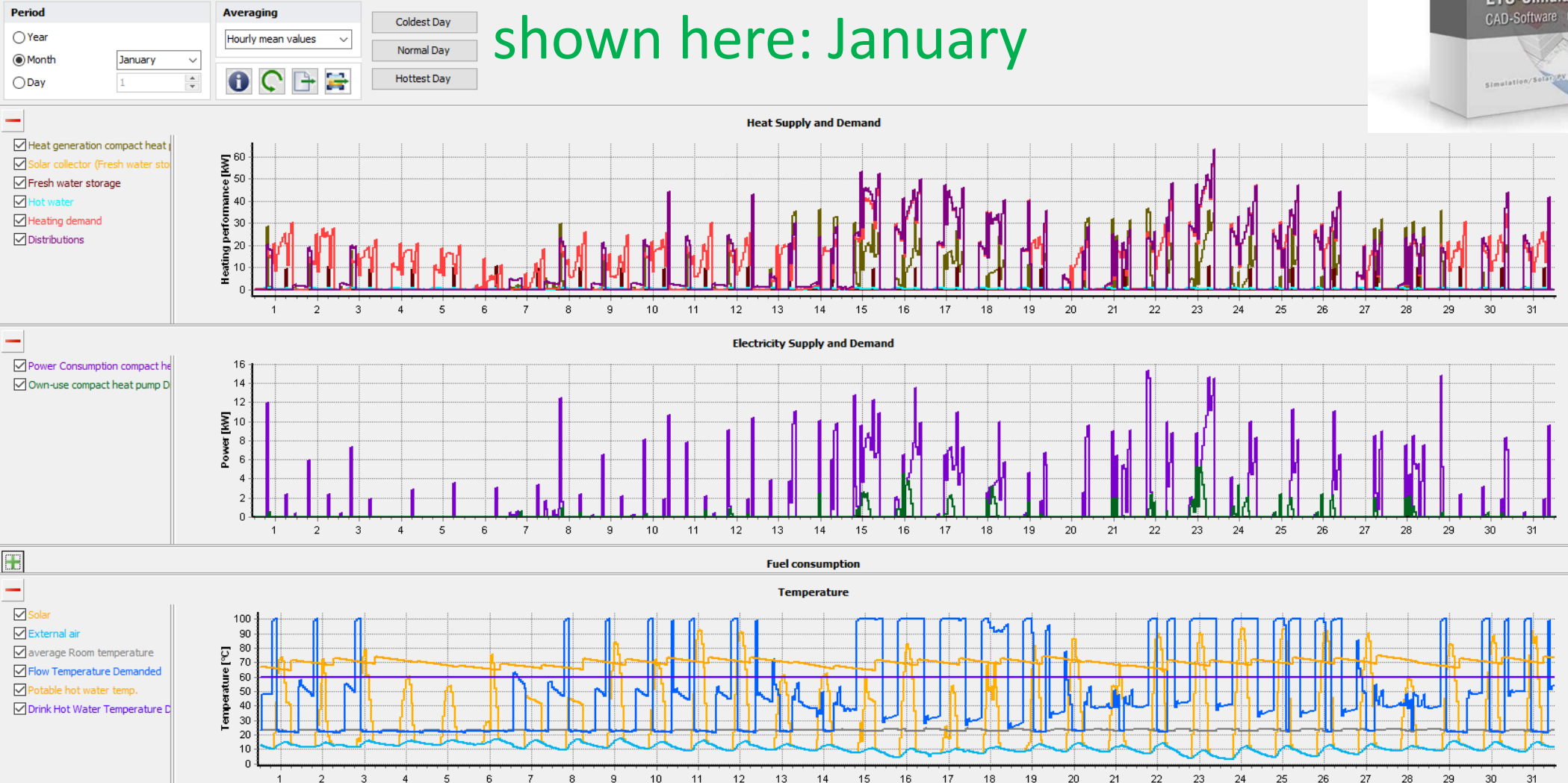


ETU-Simulation – Heating time series (2)

Time series for 1 year with hourly resolution for the chosen system



shown here: January



ETU-Simulation – Cooling time series (3)

Time series for 1 year with hourly resolution for the chosen system



shown here: Hottest Day (28. July)

Period

☐ Year

☐ Month

☒ Day

July

28

Averaging

Hourly mean values

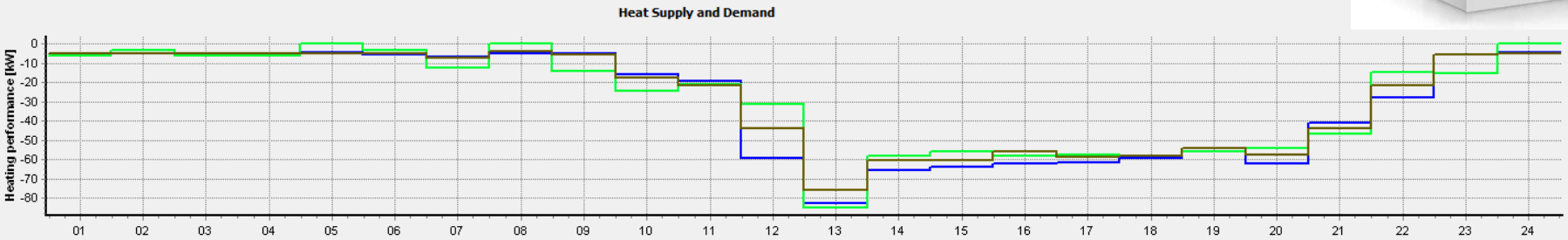
Hourly mean values

Coldest Day

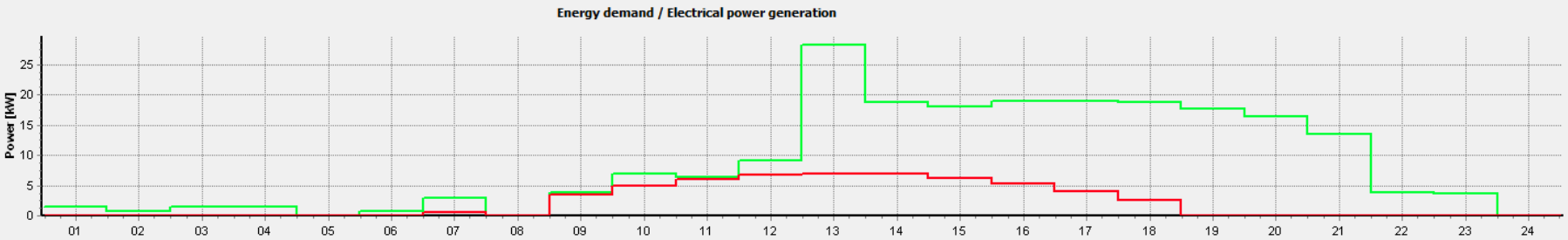
Normal Day

Hottest Day

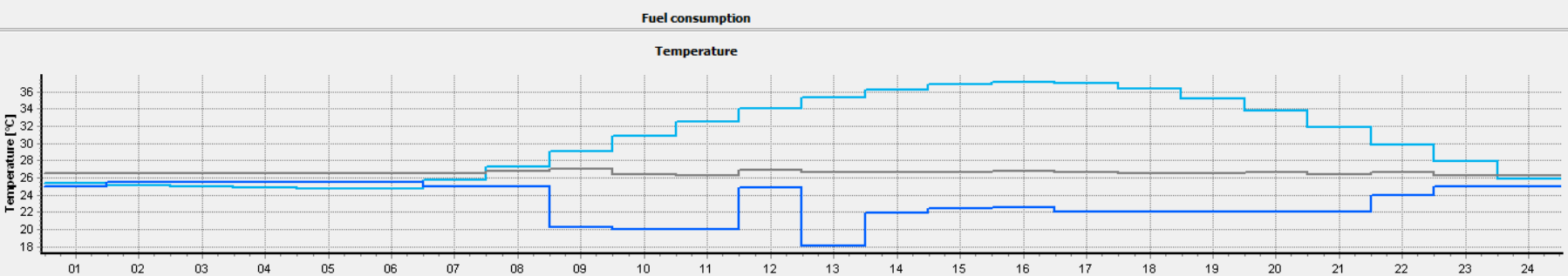
- ☒ Cooling demand
- ☒ Compression refrigeration mach
- ☒ Distributions
- ☒ Allocation (cooling emission) He



- ☒ Compression refrigeration mach
- ☒ Own-use Compression refrigera



- ☒ External air
- ☒ average Room temperature
- ☒ Flow Temperature Demanded



ETU-Simulation

Building simulation for energy concepts and renewable energies



Range of ETU-Simulation features	STANDARD	PREMIUM	PLATINUM
Building simulation according to VDI 6007	✓	✓	✓
Protection against summer heat acc. to DIN 4108	✓	✓	
HottCAD/3D	✓	✓	
BIM interfaces (IFC, Allplan, Revit and many more)	✓	✓	
CHP and CCHP simulation		✓	
Heat pump simulation		✓	
Photovoltaic simulation		✓	
Solar thermal simulation		✓	
Cooling load calculation acc. to VDI 2078 and VDI 6007			

Price overview	STANDARD	PREMIUM	PLATINUM
Monthly fee	59,— €* 59,— €	89,— €* 89,— €	99,— €* 99,— €

- Future-oriented planning with renewable energies
- Digital twin for energy optimisation in new and existing buildings
- Calculate profitability of energy measures

* VAT not included. The minimum duration of the contract is 24 months. All details regarding the contractual terms will be sent in written form for the conclusion of the contract.

GetSolar Professional

Simulation software for dimensioning solar thermal systems



- **Worldwide climate data available**
- **Calculation of sun position, instantaneous power, standstill temperature etc**
- **Solar backup heating and domestic hot water**

The screenshot shows the GetSolar Professional software interface. On the left is a sidebar with navigation options: Overview, Moment, Simulation, Position, System, Collector, and collector circuit calculation. The main area has tabs for System type, Temperatures / Consumption, Storage tank, Circulation, Swimming pool, and Back-Up. The 'System type' tab is active, showing a list of system configurations with radio buttons. The 'Solar circuit' section also has radio buttons. A schematic diagram of a solar thermal system is shown, including a collector, a storage tank, a pump, and a backup heater. A map of Portugal is on the right, showing various cities. At the bottom right, there are checkboxes for 'Circulation' and 'Swimming pool', both of which are checked.

Overview
Moment
Simulation
Position
System
Collector
collector circuit calculation

System type | Temperatures / Consumption | Storage tank | Circulation | Swimming pool | Back-Up

☒ Solar domestic hot water tank
☐ Two tanks
☐ Cascade
☐ Combined tank
☐ Heating tank and sdhw
☐ Heating tank + fresh water system
☐ Solar preheat combisystem
☐ Heating tank and flat stations

Solar circuit
☒ internal heat exchanger
☐ int. heat exch. and stratifier tube

☒ Circulation
☒ Swimming pool

Map of Portugal showing cities: Monção, Bragança, Vila do Conde, Porto, Aveiro, Viseu, Sequeira, Coimbra, Covilhã, Fundão, Pombal, Leiria, Monsanto, Santarém, Vila Franca de Xira, Lisboa, Sesimbra, Évora, Grândola, Moura, Sines, Aljustrel, Serpa, Odemira, Monchique, Lagos, Faro, Vila Real de Santo António, Portalegre, Castelo Branco, Covilhã, Fundão, Vila Franca de Xira, Évora, Grândola, Moura, Sines, Aljustrel, Serpa, Odemira, Monchique, Lagos, Faro.

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