

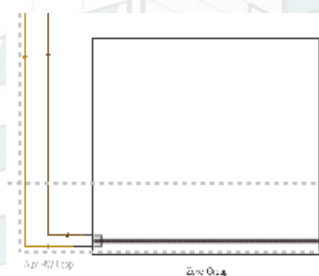
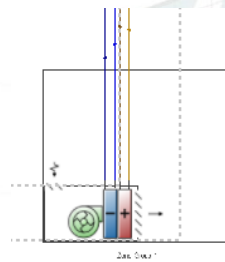
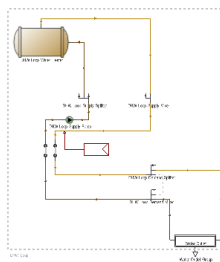
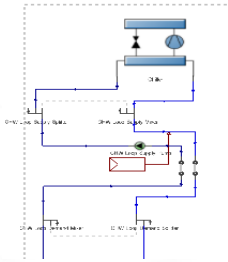
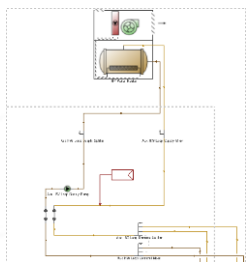
Modeliranje termotehničkog sustava na reprezentativnoj zgradi

Denis Dergestin, Ružica Jurjević
Marina Malinovec Puček



Opis termotehničkog sustava

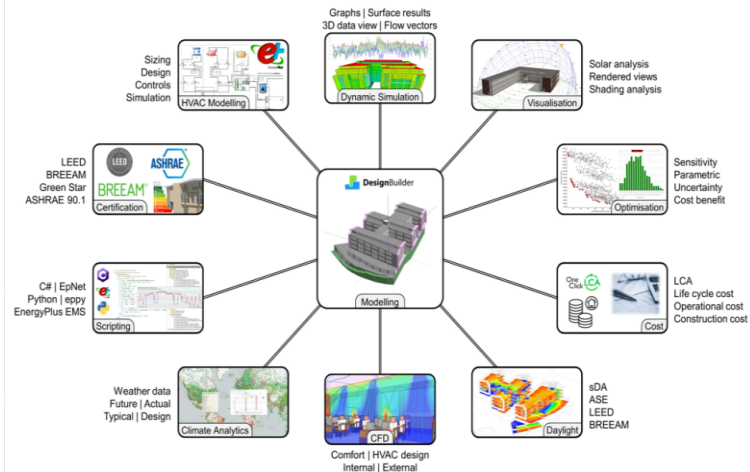
- Centralni sustav grijanja i hlađenja s **dizalicom topline zrak-voda** kao izvorom grijanja i hlađenja i **ventilokonvektorima** kao ogrjevnim i rashladnim tijelima u kombinaciji sa **sustavom podnog grijanja** za prostorije dnevnog boravka i kupaoonica
- Za pripremu potrošne tople vode predvidjeti **električni bojler** volumena 80 litara



- <https://designbuilder.co.uk/helpv7.0/index.htm>

Welcome To DesignBuilder V7

DesignBuilder is a user-friendly modelling environment where you can work (and play) with virtual building models. It provides a range of environmental performance data such as: energy consumption, carbon emissions, comfort conditions, daylight illuminance, maximum summertime temperatures and HVAC component sizes.



Kako uključiti mode za detaljno modeliranje termotehničkog sustava?

Kliknuti na ključ ili
shortcut key F11



Model Options - Building and Block

Model Options

Model Options - Building and Block

Data | Advanced | Heating Design | Cooling Design | Simulation | Display | Drawing tools | **Block** | Project details | Carbon

Construction and Glazing Data

Gains Data

Gains data

Lumped Early Detailed

Occupancy method

Occupancy latent gains

Equipment gain units

Lighting gain units

Timing

HVAC

Simple Detailed

HVAC sizing

Simple HVAC autosize method

☒ Specify Simple/Design HVAC details

Auxiliary energy calculations

Mechanical ventilation method

Natural Ventilation and Infiltration

Natural ventilation

Scheduled

Infiltration units

BIM Surfaces

Early gains
Internal gains are separated into various categories (e.g. occupancy, lighting, computing etc.)

1-Occupancy density

1-Dynamic calculation

1-Power density

2-Normalised power density

Simple HVAC
HVAC systems are modelled using Ideal Loads, fuel consumption is calculated from loads using seasonal efficiencies

3-Autosize

1-EnergyPlus

2-Separate fans and pumps

2-Ideal loads

Scheduled ventilation
Ventilation is defined as an air-change rate modified by an operation schedule and controlled using a set-point temperature.

1-ac/h

Povući
slider na
Detailed

Model Options - Building and Block

Model Options

Model Options - Building and Block

Data | Advanced | Heating Design | Cooling Design | Simulation | Display | Drawing tools | **Block** | Project details | Carbon

Construction and Glazing Data

Gains Data

Gains data

Lumped Early Detailed

Occupancy method

Occupancy latent gains

Equipment gain units

Lighting gain units

Timing

HVAC

Simple Detailed

HVAC sizing

Simple HVAC autosize method

☐ Run free (disable detailed HVAC system)

Natural Ventilation and Infiltration

Natural ventilation

Scheduled

Infiltration units

BIM Surfaces

Early gains
Internal gains are separated into various categories (e.g. occupancy, lighting, computing etc.)

1-Occupancy density

1-Dynamic calculation

1-Power density

2-Normalised power density

Detailed HVAC
EnergyPlus HVAC systems are defined graphically using components

1-Simple HVAC Data

Scheduled ventilation
Ventilation is defined as an air-change rate modified by an operation schedule and controlled using a set-point temperature.

4-n50 (ac/h at 50 Pa)

Activity & HVAC tab template

Activity Template

Template stanovi

Sector Copy of Residential spaces

Zone multiplier 1

☒ Include zone in thermal calculations

☒ Include zone in Radiance daylighting calculations

Floor Areas and Volumes

Occupancy

Occupancy density (people/m2) 0.0208

Schedule _Obiteljska_okupiranost

Metabolic

Clothing

Comfort Radiant Temperature Weighting

Contaminant Generation and Removal

Holidays

DHW

Consumption rate (l/m2-day) 0.635

Environmental Control

Heating Setpoint Temperatures

Heating (°C) 20

Heating set back (°C) 12.0

Cooling Setpoint Temperatures

Cooling (°C) 26

Cooling set back (°C) 28.0

Heating Comfort PMV Setpoints

Cooling Comfort PMV Setpoints

Humidity Control

Ventilation Setpoint Temperatures

Minimum Fresh Air

CO2/Contaminant Setpoints

Lighting

HVAC Template

Template Heated floor, Boiler HW, Nat Vent

Mechanical Ventilation

☐ On

Heating

☒ Heated

Sizing Zone Equipment

Natural ventilation load 1-Met by zone equipment

Type

Supply Air Condition

Maximum supply air temperature (°C) 35.00

Maximum supply air humidity ratio (g/g) 0.0156

Operation

Schedule OK_heating

Cooling

☒ Cooled

Cooling system Default

Supply Air Condition

Operation

Schedule OK_cooling

Humidity Control

DHW

☒ On

Operation

Schedule _obiteljska_DHW

Natural Ventilation

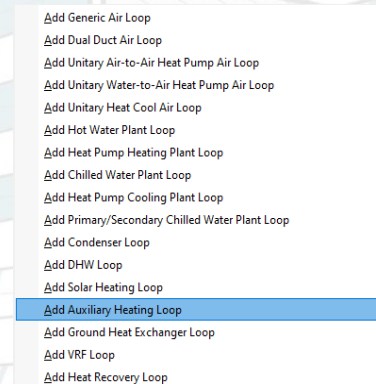
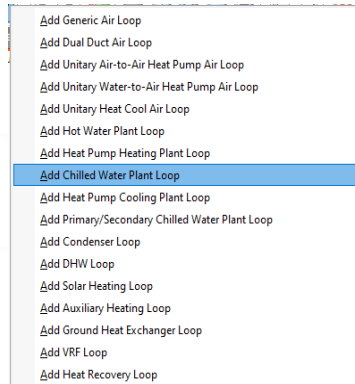
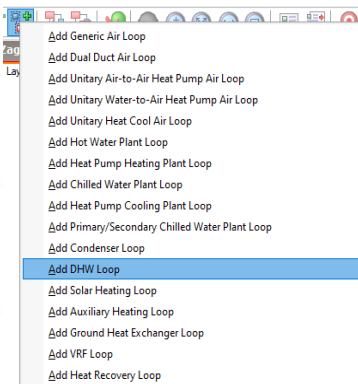
Earth Tube

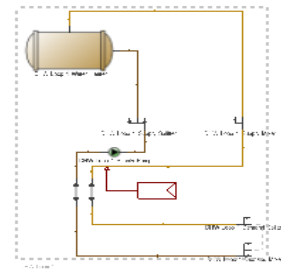
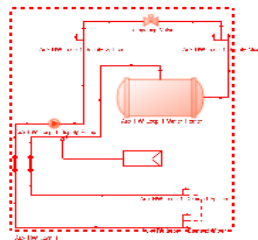
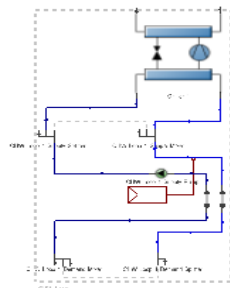
Air Temperature Distribution

Environmental Impact Factors

Cost

- Dodati dvije Zonske grupe klikom na Add Zone group
- Dodati Loop-ove za pripremu PTV-a (**Add DHW Loop**), rashladni dio dizalice topline (**Add Chilled Water Plant Loop**) i ogrjevni dio dizalice topline (**Add Auxiliary Heating Loop**)

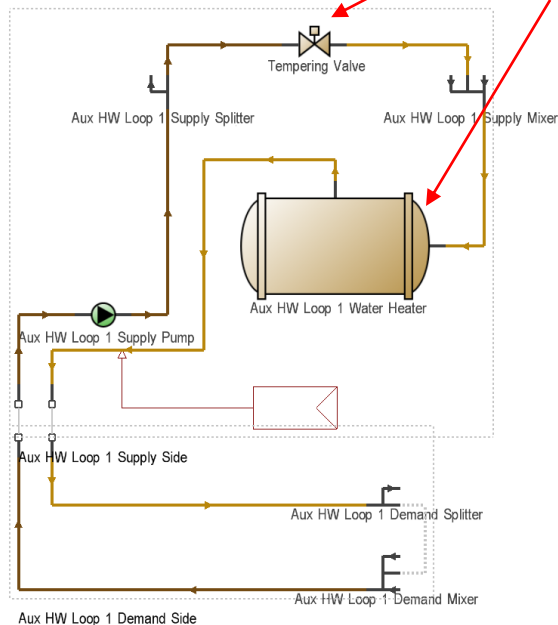




Priloga 1



Priloga 2



Obrisati
Tempering Valve i
Aux HW Loop
Water Heater

S desne strane na
Info, Help kliknuti
na Add Water
heater heat pump
i postaviti na
mjesto Tempering
Valve

Info, Help

Help

Data

Supply Aux HW Sub Loop

The supply Aux HW sub loop includes one or more heating equipments, i.e. water heaters or water heater heat pumps and optionally one or more tempering valves, setpoint managers and pumps.

From here you can:

- Add and connect water heaters or water heater heat pumps, tempering valves, setpoint managers and pumps.
- Navigate down to the components by double clicking on them in the edit screen.
- Edit components by first selecting them so they are highlighted in red then right-clicking in the edit screen and selecting 'Edit selected component' in the right-click menu

 [Place tempering valve](#)

 [Add Pump](#)

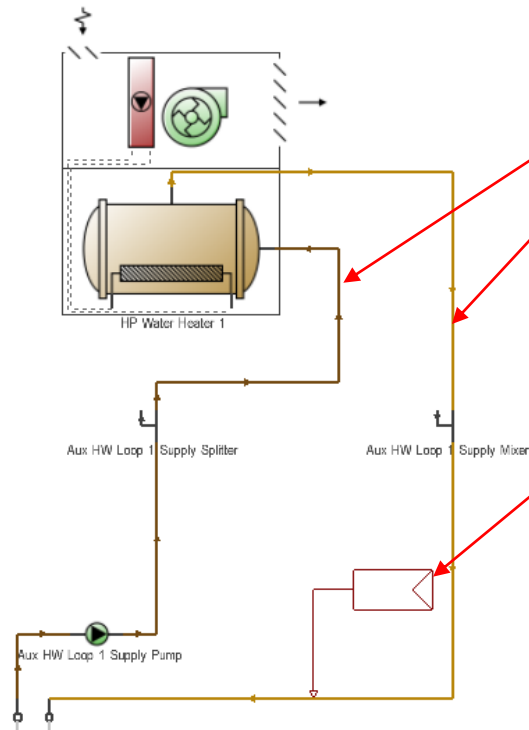
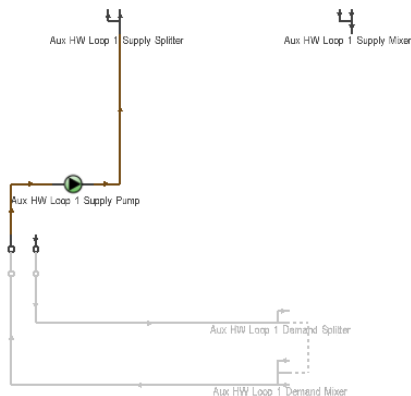
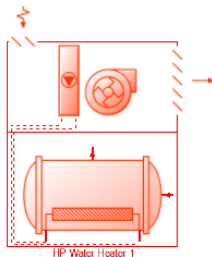
 [Add Setpoint manager](#)

 [Add Water heater](#)

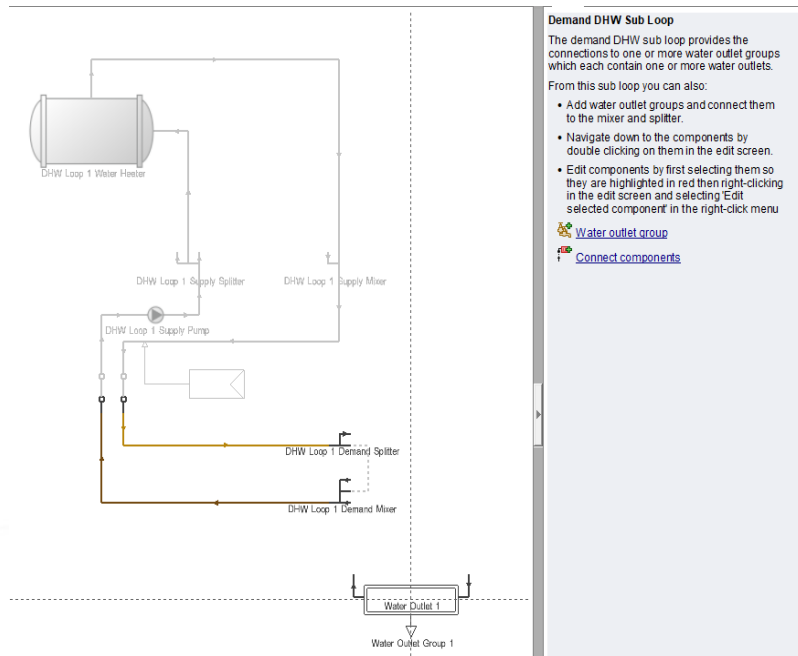
 [Add Water heater heat pump](#)

 [Add Fluid to fluid heat exchanger](#)

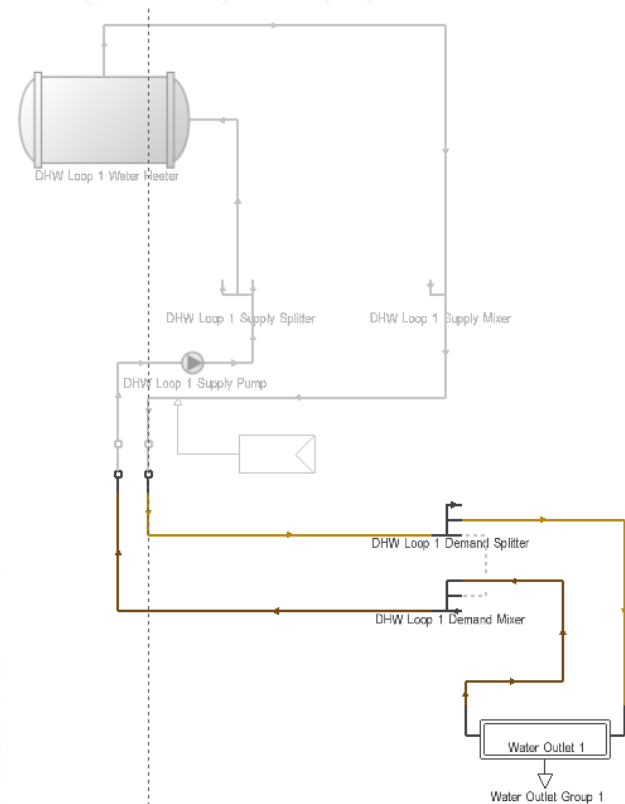
 [Connect components](#)

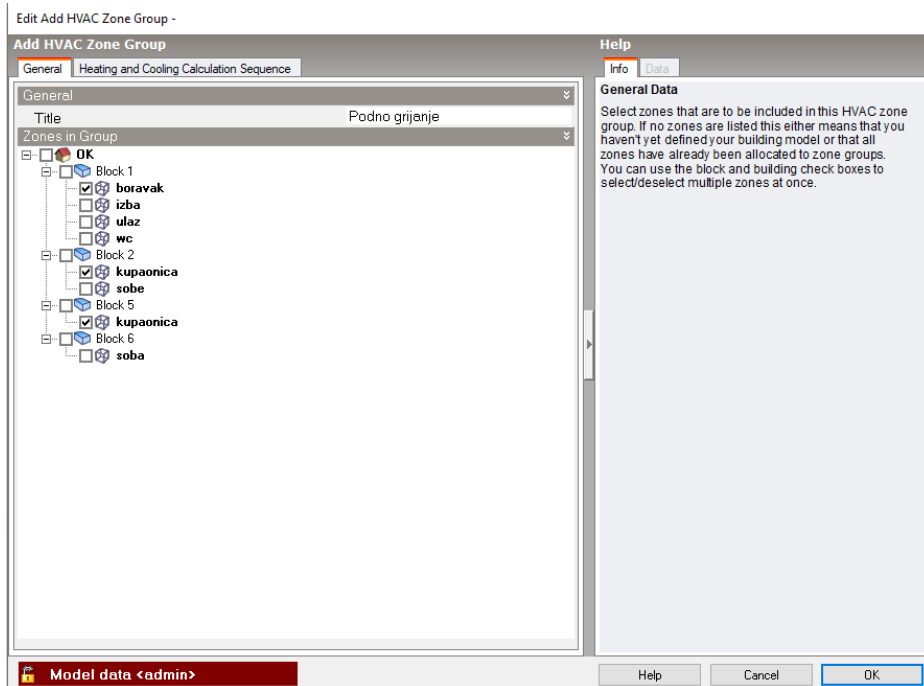


Pomoću Connect components, spojiti dijelove heatera sa Splitter-om i Mixer-om prema slici te dodati Setpoint Manager

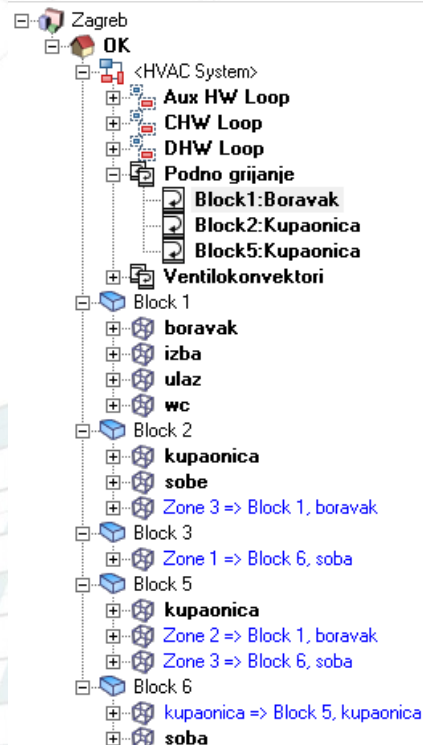


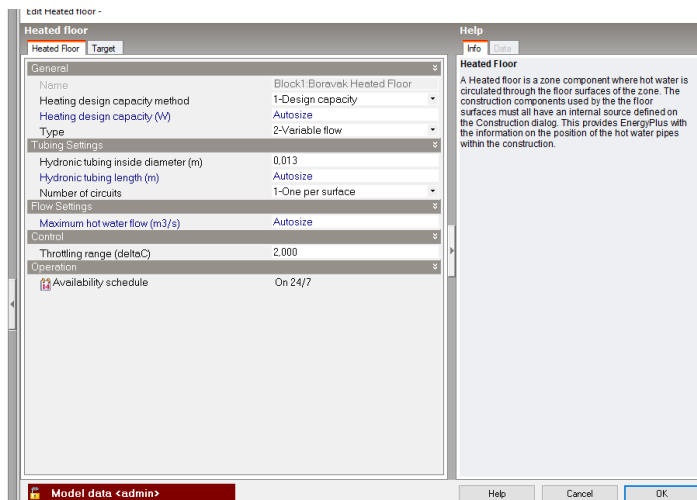
U DHW Loopu dodati Water outlet group te opet spojiti komponente pomoću Connect Components





U Zone Group
kliknuti i odabrati
zone 'boravak',
'kupaonica' i
'kupaonica' te
moguće imenovati
grupu 'Podno
grijanje' na Title
tabu, kliknuti na
Block1:Boravak

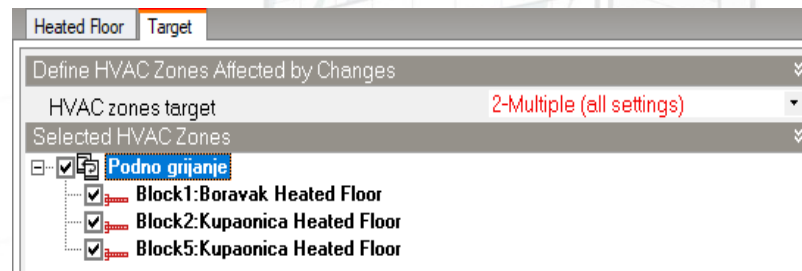
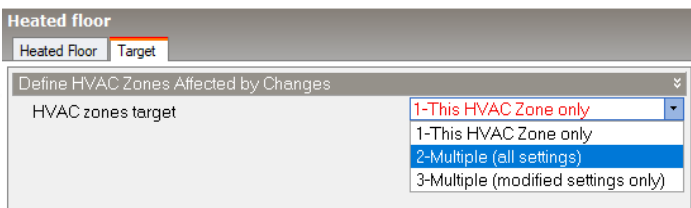


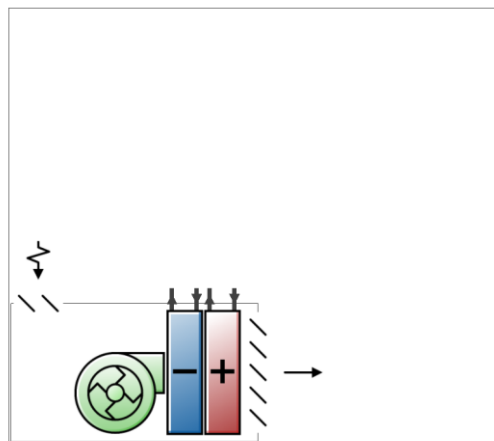
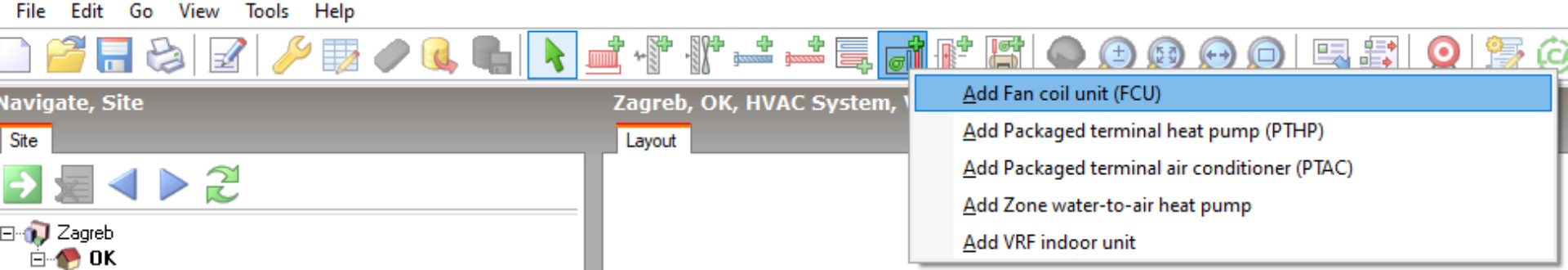


Dodati Heated floor u zoni boravka, kliknuti na Block1: Boravak Heated Floor->Target->Multiple (all settings) i odabrati sve



Edit Heated floor -





Block1:Izba

Slično kao s podnim grijanjem, ponoviti postupak u Zone Group 1 i dodati Fan coil unit (FCU), promijeniti Capacity control method na 3- i Target na sve blokove

Edit Fan Coil Unit -

Fan Coil Unit

Fan Coil Unit Target

General

Name Block1:Izba Fan Coil Unit

Maximum supply air flow rate (m3/s) Autosize

Capacity control method 3-Variable fan variable water flow

Outdoor Air Supply

☐ Outdoor air supply

Operation

Availability schedule On 24/7

Heating Coil

Maximum hot water flow rate (m3/s) Autosize

Minimum hot water flow rate (m3/s) 0.000000

Cooling Coil

Maximum cold water flow rate (m3/s) Autosize

Minimum cold water flow rate (m3/s) 0.000000

Advanced

Help

Info Data

Fan Coil Unit

Fan Coil Units (FCU) are in-room forced-convection hydronic units containing an outdoor air mixer, a fan, a heating coil and a cooling coil. They are mostly used in exterior zones, usually in hotels, apartments, or offices. They may be connected to ducted outside air, or have a direct outside air vent, but they do not have outside air economizers.

The heating or cooling output of the FCU is controlled by varying the air flow rate, the water flow rate, or both. Air flow rate can be controlled by cycling the fan on/off or with a variable speed fan drive. The most common setup is a two or three speed fan with the speed selected by hand. The fan then cycles on/off to control heating / cooling output. The controls are often a wall mounted thermostat with hand selection of heating/cooling and fan speed (off/low/medium/high).

EnergyPlus FCUs cannot be connected directly to a central AHU but this system type can instead be approximated by providing air from an AHU through a direct air ADU in parallel with the FCU.

Autosizable data is shown in blue. This can either have the text 'autosize' or numeric data. In the case where 'autosize' is entered EnergyPlus will calculate an appropriate value before the simulation based on the sizing data provided.

Edit Fan Coil Unit -

Fan Coil Unit

Fan Coil Unit Target

Define HVAC Zones Affected by Changes

HVAC zones target 2-Multiple (all settings)

Selected HVAC Zones

☒ Ventilatori HVAC zones target

☒ Block1:Ulaz Fan Coil Unit

☒ Block1:Izba Fan Coil Unit

☒ Block1:Wc Fan Coil Unit

☒ Block2:Soba Fan Coil Unit

☒ Block6:Soba Fan Coil Unit

HVAC Zone

General Target

General

Name	Block1:Izba
Humidistat Control	
CO2 and Contaminant Control	
Zone Air Distribution Effectiveness	
Sizing	

Cooling Sizing

Cooling design supply air temperature input method	1-Supply air temperature
Cooling design supply air temperature (°C)	18
Cooling design supply air humidity ratio	0.009
Cooling minimum air flow fraction (turndown ratio)	0.000
Zone cooling sizing factor	1
Cooling design air flow method	1-Design day

Heating Sizing

Heating design supply air temperature input method	1-Supply air temperature
Heating design supply air temperature (°C)	35
Heating design supply air humidity ratio	0.004
Zone heating sizing factor	1
Heating design air flow method	1-Design day

Outside Air Sizing

Outside air method	4-Sum
Outside air flow per person (m3/s-person)	0.010000
Outside air flow per zone floor area (m3/s-m2)	0.000000

Dedicated Outdoor Air System (DOAS)

☐ Include DOAS system?

Model data <admin>

Help

Info Data

HVAC Zone

The zone sizing data covers heating, cooling, humidity control and ventilation requirements.

Use the "Target" tab to save this data to other HVAC zones as well as this one.

Zone Setpoints

The "1-Simple HVAC Data" Detailed HVAC activity data method is selected, so setpoint values for zone heating, cooling, humidification and dehumidification as well as fresh air ventilation rates are taken from the Activity and HVAC tabs in model data.

Outside air data

The equivalent outside air sizing data that will be used in simulations is displayed, greyed out here for your convenience.

The outside air sizing data will only be used if the "Outdoor air flow rate" on the Outside Air System tab of the AHU dialog is autosized.

Help

Cancel

OK

Ventilokonvektori

Block1

Block

Edit

Go to selected

Delete

Block1:Ulaz

Block1:Wc

Block2:Sobe

Block6:Soba

Edit HVAC Zone -

HVAC Zone

General Target

Define HVAC Zones Affected by Changes

HVAC zones target 2-Multiple (all settings)

Selected HVAC Zones

Ventilokonvektori

Block1:Ulaz

Block1:Izba

Block1:Wc

Block2:Sobe

Block6:Soba

Unutar Fan coil unit, odabrati parameter za Cooling coil, Heating coil i Fan te Target za sve blokove

Edit Water Cooling Coil -

Water Cooling Coil

Cooling Coil

Target

General

Name

Block1.1zba Fan Coil Unit Cooling C

Type

1-Water

Design water flow rate (m³/s)

Autosize

Design air flow rate (m³/s)

Autosize

Design inlet water temperature (°C)

Autosize

Design inlet air temperature (°C)

Autosize

Design outlet air temperature (°C)

Autosize

Design inlet air humidity ratio

Autosize

Design outlet air humidity ratio

Autosize

Type of analysis

1-Simple analysis

Heat exchanger configuration

2-Counter flow

Operation

Availability schedule

On 24/7

Help

Info

Data

Water Cooling Coil

The water cooling coil can provide detailed output with simplified inputs. Complex coil geometry is not required for this model, instead the coil is sized in terms of autosizable thermodynamic inputs. The coil requires thermodynamic inputs such as temperatures, mass flow rates and humidity ratios.

The coil is sized using autosized user design input conditions and the UA values are calculated from the design conditions. A rough estimate of the coil area is provided along with percentage of surface wet and/or dry. This model uses the NTU-effectiveness approach to model heat transfer and has two types of flow arrangements cross-flow or counter-flow.

Type of analysis
You can choose between a 'Simple' or 'Detailed' analysis. The simple mode reports the value of surface area fraction wet of the coil as dry or wet. The detailed mode gives the exact value, however the execution time in detailed mode is noticeably higher.

Autosizable data is shown in blue. This can either have the text 'autosize' or numeric data. In the case where 'autosize' is entered EnergyPlus will calculate an appropriate value before the simulation based on the sizing data provided.

Model data <admin>

Help

Cancel

OK

Edit Heating Coil -

Heating Coil

Heating Coil

Target

General

Name

Block1.1zba Fan Coil Unit Heating C

Type

1-Water

Performance input method

2-UA and design water flow rate

Maximum water flow rate (m³/s)

Autosize

UA (W/K)

Autosize

Operation

Availability schedule

On 24/7

Help

Info

Data

Heating Coil

Water heating coils provide sensible heating of the air only and uses the Effectiveness-NTU algorithm assuming a cross-flow heat exchanger.

There is a choice of input methods:
"UFactorTimesAreaAndDesignWaterFlowRate" or "NominalCapacity". If "UFactorTimesAreaAndDesignWaterFlowRate" is selected, values are input for UA of the Coil and Max Water FlowRate of the Coil (and Rated Capacity is ignored). If "NominalCapacity" is chosen, input a Rated Capacity for the coil. UA of the Coil and Max Water FlowRate of the Coil will be ignored. Rated capacity is defined as the heating capacity in watts of the coil at the rating points (i.e., the rated inlet and outlet water/air temperatures).

Autosizable data is shown in blue. This can either have the text 'autosize' or numeric data. In the case where 'autosize' is entered EnergyPlus will calculate an appropriate value before the simulation based on the sizing data provided.

Model data <admin>

Help

Cancel

OK

Edit Fan -

Fan

Fan

Target

General

Name

Block1.1zba Fan Coil Unit Supply Fan

Type

2-Variable volume

Fan total efficiency

0.70000

Pressure rise (Pa)

100.0

End-use subcategory

General

Flow Rates

Minimum flow rate input method for fan power

2-Fixed flow rate

Minimum air flow rate for fan power (m³/s)

0.000

Maximum flow rate (m³/s)

Autosize

Motor

Motor efficiency

0.90000

Motor in airstream fraction

1.000

Part Load Performance

Performance curve template

Fan Part-Load Power, Inlet Vane Dampers

Fan Coefficients

Fan coefficient 1

0.0015302800

Fan coefficient 2

0.0052080600

Fan coefficient 3

1.1086242000

Fan coefficient 4

-0.1163556300

Fan coefficient 5

0.0000000000

Operation

Availability schedule

On 24/7

Model data <admin>

Help

Cancel

OK

CHW Loop & Chiller

Edit Plant loop -

Plant loop

General | Plant Equipment Operation

General

Name: CHW Loop

Fluid type: 2-EthyleneGlycol

Glycol concentration: 0,250

Plant loop volume (m3): Autocalculate

Flow Type

Plant loop flow type: 2-Variable flow

Temperature

Maximum loop temperature (°C): 80,00

Minimum loop temperature (°C): 0,00

Flow Rate

Maximum loop flow rate (m3/s): Autosize

Minimum loop flow rate (m3/s): 0,000000

Load distribution scheme: 1-Sequential

Plant loop demand calculation scheme: 1-SingleSetPoint

Sizing

Design loop exit temperature (°C): 7,00

Loop design temperature difference (deltaC): 5,00

Operation

Availability schedule: OK_cooling

Outside Temperature Operation

☐ Outside temperature operation

Edit Plant loop -

Plant loop

General | Plant Equipment Operation

General

Number of schemes: 1

Scheme 1

Operation type: 2-Cooling load

Operation schedule: OK_cooling

Number of ranges: Operation schedule

Range 1

Lower limit (W): 0,00

Upper limit (W): 1000000000000000,00

Equipment

☒ Chiller

Priority: 1

CHW Loop & Chiller

Edit Chiller -

Chiller

General	
Name	Chiller
Chiller template	Air Cooled Default
Chiller type	2-Electric EIR
Reference capacity (W)	Autosize
Reference COP	3,500
Compressor motor efficiency	0,990
Chiller flow mode	3-Not modulated
Sizing factor	1,000
Condenser	
Condenser type	1-Air cooled
Condenser fan power ratio	0,035
Temperatures	
Reference leaving chilled water temperature (°C)	6,670
Reference entering condenser fluid temperature (°C)	29,400
Leaving chilled water temperature limit (°C)	5,000
Flow Rates	
Reference chilled water flow rate (m3/s)	Autosize
Performance Curves	
Cooling capacity function of temperature curve	Air cooled CentCapFT
Electric input to cooling output ratio function of temperature curve	Air cooled CentEIRFT
Electric input to cooling output	Electric input to cooling output ratio function of temperature curve
Part Load Settings	
Minimum part load ratio	0,100
Maximum part load ratio	1,000
Optimum part load ratio	1,000
Minimum unloading ratio	0,250

Odabrali Chiller template pod sekcijom 'Air Cooled' Air Cooled Default template i promijeniti Reference COP na vrijednost 3.5. U CHW Loop Setpoint Manager postaviti schedule s 'Always 7 C'.

Edit schedule - Chilled water flow set point temperature: Always 7 C

Schedules

General

General	
Name	Chilled water flow set point temperature: Always 7 C
Description	
Source	DesignBuilder
Category	<General>
Region	General
Schedule type	2-Compact Schedule
Profiles	
Schedule: Compact, On, Any Number, Through: 12/31, For: All Days, Until: 24:00, 7;	

Aux HW Loop

Edit Plant loop -

Plant loop

General Plant Equipment Operation

General

Name

Aux HW Loop

Fluid type

1-Water

Plant loop volume (m3)

Autocalculate

Flow Type

2-Variable flow

Plant loop flow type

2-Variable flow

Temperature

Maximum loop temperature (°C)

80.00

Minimum loop temperature (°C)

0.00

Flow Rate

Maximum loop flow rate (m3/s)

Autosize

Minimum loop flow rate (m3/s)

0.000000

Load distribution scheme

1-Sequential

Plant loop demand calculation scheme

1-SingleSetPoint

Sizing

Design loop exit temperature (°C)

55.00

Loop design temperature difference (deltaC)

5.00

Operation

Availability schedule

OK_heating

Outside Temperature Operation

☐ Outside temperature operation

Help

Info Data

Auxiliary Heating Loop

The Auxiliary Heating Loop loop consists of:

- Supply sub loop which contains one or more water heaters, a pump and a setpoint controller.
- Demand sub loop where hot water consuming equipment such as heating coils, radiators, baseboards and water outlet groups can be added.

This dialog covers the sizing and operation details of the overall loop.

Load Distribution Scheme

The Load Distribution Scheme selects the algorithm used to sequence equipment operation in order to meet the plant loop demand. There are 3 options:

- 'Sequential' uses each piece of equipment to its maximum part load ratio and will operate the last required piece of equipment between its minimum and maximum part load ratio in order to meet the loop demand.
- 'Optimal' operates each piece of equipment at its optimal part load ratio and will operate the last component between its minimum and maximum part load ratio in order to meet the loop demand.
- 'Uniform' evenly distributes the loop demand amongst all available components on the equipment list for a given load range.

Model data <admin>

Help

Cancel

OK

Edit schedule - Heating high water temperature schedule: Always 45.00

Schedules

General

General

Name

Heating high water temperature schedule: Always 45.00

Description

Source

DesignBuilder

Category

<General>

Region

General

Schedule type

2-Compact Schedule

Profiles

Schedule: Compact

On,

Any Number,

Through: 12/31,

For: AllDays,

Until: 24:00, 45 ;

Aux HW Loop

Izuzetno bitno je postaviti temperature Compressor setpoint temperature schedule 1.5 °C iznad sizing temperature. Također postaviti Minimum inlet air temperature for compressor operation na -15 °C.

Edit Water heater heat pump -

Water heater heat pump

General

Name: HP Water Heater

Availability schedule: OK_heating

Compressor Settings

Compressor setpoint temperature schedule: Heating high water temperature schedule

Deadband temperature difference (deltaC): 5.00

Minimum inlet air temperature for compressor operation (°C): -15

Compressor location: 3-Outdoors

Flow Rate Settings

Condenser water flow rate (m3/s): Autocalculate

Evaporator air flow rate (m3/s): Autocalculate

Inlet Air Settings

Inlet air configuration: 3-Outdoor air only

Fan Settings

Fan placement: 2-Draw through

Parasitic Load Settings

On cycle parasitic electric load (W): 0.00

Off cycle parasitic electric load (W): 0.00

Parasitic heat rejection location: 2-Outdoors

Help

Schedules

Heating high control temperature schedule: Always 21.00

Heating high water temperature schedule: Always 45.00

Heating high water temperature schedule: Always 50.00

Heating high water temperature schedule: Always 55.00

Heating high water temperature schedule: Always 56.5

Heating high water temperature schedule: Always 60.00

Heating low control temperature schedule: Always 15.00

Heating low water temperature schedule: Always 30.00

Heating set point schedule

Hot Water flow set point temperature: Always 80.0 C

Data Report (Not Editable)

General

Heating high water temperature schedule: Alwa

Source: DesignBuilder

Category: <General>

Region: General

Schedule type: 2-Compact Sche

Profiles

Schedule: Compact

On:

Any Number,

Through: 12/31,

For: AllDays,

Until: 24:00, 56.5;

Aux HW Loop

Edit Air to water heat pump coil -

Air to water heat pump coil

General **Target**

General

Name: HP Water Heater HP Water Heating Coil

Rated heating capacity (W): 18000.00

Gross rated COP: 3.500

Rated sensible heat ratio: 0.8500

Evaporator Settings

Rated evaporator inlet air dry-bulb temperature (°C): 29.44

Rated evaporator inlet air wet-bulb temperature (°C): 22.22

Rated evaporator air flow rate (m³/s): Autocalculate

☐ Evaporator fan power included in rated COP

Condenser Settings

Rated condenser inlet water temperature (°C): 55.72

Rated condenser water flow rate (m³/s): Autocalculate

☒ Condenser pump power included in rated COP

☐ Condenser pump heat included in rated heating capacity and rated COP

Condenser water pump power (W): 150.00

Fraction of condenser pump heat to water: 0.200

Crankcase Heater Settings

Crankcase heater capacity (W): 100.00

Maximum ambient temperature for crankcase heater operation (°C): 5.00

Performance Settings

Maximum ambient temperature for crankcase heater operation (°C): 2-wet-out temperature

Evaporator air temperature type for curves: ☒ Heating capacity function of temperature

☐ Heating capacity function of air flow fraction

☐ Heating capacity function of water flow fraction

☒ Heating COP function of temperature

☐ Heating COP function of air flow fraction

☐ Heating COP function of water flow fraction

Part-load Fraction Correlation Curve

☒ Part-load fraction correlation curve

Unit Water heater -

Water heater

Water heater **Sizing**

General

Name: HP Water Heater Water Heater

Type: 1-Mixed

Tank volume (m³): Autosize

External Heating Plant Connection

☒ External heating plant connection

Indirect water heating recovery time (hr): 1.50

Temperature Settings

☒ Setpoint temperature schedule: Heating high water temperature schedule: Always ...

Deadband temperature difference (deltaC): 5.00

Maximum temperature limit (°C): 90.00

Ambient Heat Transfer Settings

Ambient temperature indicator: 3-Outdoors

Heat Loss Coefficients

On-cycle loss coefficient to ambient temperature (W/K): 0.00

Off-cycle loss coefficient to ambient temperature: 0.00

Internal Heating Element

☐ Internal heating element

Use-Side Settings

Source-Side Settings

Help

Info **Data**

☒ Select this data

Heating high water temperature schedule: Always 45.00

Heating high water temperature schedule: Always 50.00

Heating high water temperature schedule: Always 55.00

Heating high water temperature schedule: Always 56.5

Heating high water temperature schedule: Always 60.00

Heating low control temperature schedule: Always 15.00

Heating low water temperature schedule: Always 30.00

Heating set point schedule

Hot Water flow set point temperature: Always 80.0 C

HPV/HWaterInletAUSch

Humidifier set point: Always 0.4

Hybrid Ventilation Control Mode Schedule: Always 1

Ice Thermal Storage Availability

Ice Thermal Storage Charging Schedule

Ice Thermal Storage Setpoint Temperature Schedule

IEA equipment

IEA equipment

Data Report (Not Editable)

General

Heating high water temperature schedule: Always 45.00

Source: DesignBuilder

Category: <General>

Region: General

Schedule type: 2-Compact Schedul

Profiles

Schedule: Compact

On

Any Number

Through: 12/31

For: AllDays

Until: 24:00, 45:

DHW Loop

Edit Plant loop -

Plant loop

General | Plant Equipment Operation

General

Name: DHW Loop

Fluid type: 1-Water

Plant loop volume (m3): Autocalculate

Flow Type

Plant loop flow type: 2-Variable flow

Temperature

Maximum loop temperature (°C): 80,00

Minimum loop temperature (°C): 0,00

Flow Rate

Maximum loop flow rate (m3/s): Autosize

Minimum loop flow rate (m3/s): 0,000000

Load distribution scheme: 1-Sequential

Plant loop demand calculation scheme: 1-SingleSetPoint

Sizing

Design loop exit temperature (°C): 55,00

Loop design temperature difference (deltaC): 5,00

Operation

Availability schedule: _obiteljska_DHW

Edit Water outlet -

Water outlet

Water Outlet | Zones served

Selected HVAC Zones

OK

- Block 1
 - boravak
 - izba
 - ulaz
 - wc
- Block 2
 - kupaonica
 - soba
- Block 5
 - kupaonica
- Block 6
 - soba

DHW Loop

Edit Water heater -

Water heater

Water heater Sizing

General

Name DHW Loop Water Heater

Type 1-Mixed

Tank volume (m3) 0.08

External Heating Plant Connection

☐ External heating plant connection

Temperature Settings

Setpoint temperature schedule Domestic hot water setpoint temperature: Always 52

Deadband temperature difference (deltaC) 5.00

Maximum temperature limit (°C) 80.00

Ambient Heat Transfer Settings

Ambient temperature indicator 2-Zone

Ambient temperature zone Block2.Kupaonica

Heat Loss Coefficients

On-cycle loss coefficient to ambient temperature (W/K) 0.00

Off-cycle loss coefficient to ambient temperature 0.00

Heat Loss Fractions to Zone

On-cycle loss fraction to zone 1.000

Off-cycle loss fraction to zone 1.000

Internal Heating Element

☒ Internal heating element

Internal Heating Element Settings

Heater control type 1-Cycle

Heater maximum capacity (W) Autosize

Heater minimum capacity (W) 0.000

Heater fuel type 1-Electricity

Heater thermal efficiency 1

☒ Heater part load factor curve 100% efficient

On-Cycle Settings

Off-Cycle Settings

Use-Side Settings

Help

Info Data

Curves

Curves

- Bi-Cubic
- Bi-Quadratic
- Cubic
- Cubic Linear
- Double Exponential Decay
- Exponent
- Linear
- Quadratic

Data Report (Not Editable)

General

100% efficient

Note

Source DBS

Category Linear

Curve Plot

100% efficient

Edit Water heater -

Water heater

Water heater Sizing

Sizing

Design mode

5-Per unit

Number of units

1

Storage capacity per unit (m3)

0.125

Recovery capacity per unit (m3/h)

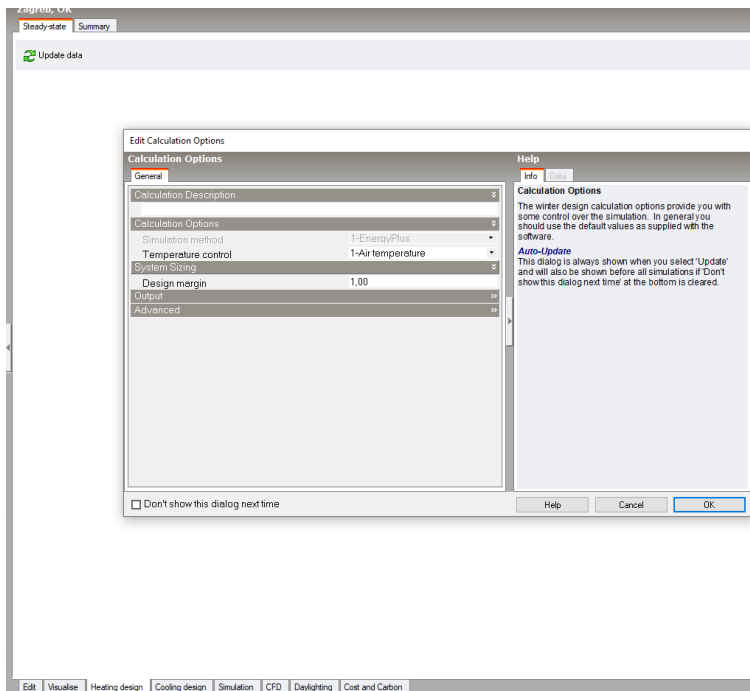
0.063

Height aspect ratio

1.000

Modelirati električni bojler volumena 80 L s linearnom krivuljom 100 % efficient.

Heating design



Steady-state Summary

21.50

EnergyPlus Output

Temperature and Heat Loss

Educational



Air Temperature (°C)	21.50
Radiant Temperature (°C)	19.31
Operative Temperature (°C)	20.41
Outside Dry-Bulb Temperature (°C)	-10.20
Glazing (kW)	-0.94
Walls (kW)	-2.07
Ceilings (int) (kW)	-0.01
Floors (int) (kW)	0.02
Ground Floors (kW)	-0.02
Partitions (int) (kW)	0.00
Roofs (kW)	-0.80
Floors (ext) (kW)	-0.03
External Infiltration (kW)	-0.34
External Vent. (kW)	-2.45
Zone Sensible Heating (kW)	9.06

Cooling design

Calculation Options - OK

Calculation Options

General

Calculation Description

Calculation Options

Simulation method 1-EnergyPlus

Temperature control 1-Air temperature

Summer Design Day

Day 15
Start month Jul
End month Sep
Day of week 9-SummerDesignDay

☐ Exclude all zone natural ventilation (infiltration is always included)

☐ Exclude all zone mechanical ventilation

☒ Exclude heat recovery

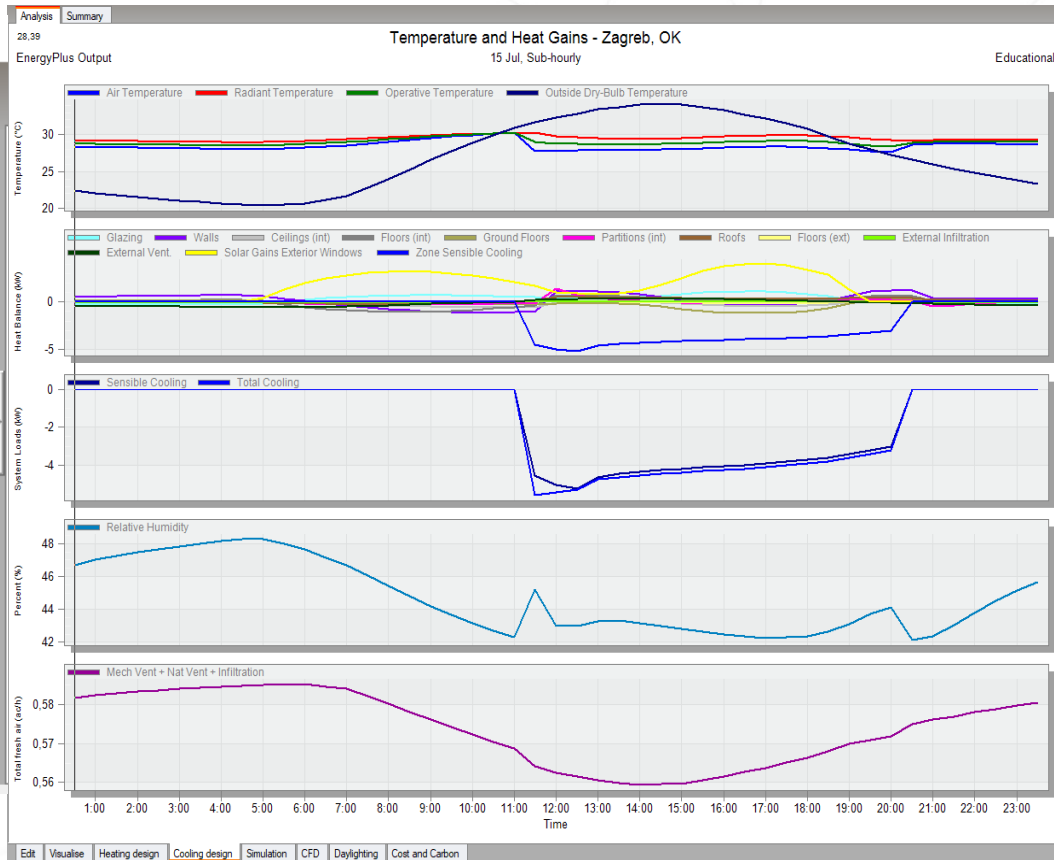
System Sizing

Design margin 1,00
Sizing method 1-ASHRAE
Airflow calculation method 1-Sensible only

Output

Solar

Advanced

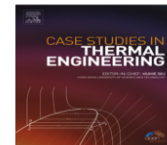




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Actual validation of energy simulation and investigation of energy management strategies (Case Study: An office building in Semnan, Iran)



Afshin Fathalian^a, Hadi Kargarsharifabad^{a,b,*}

Citat:

investigated only by simulating all factors interfering in energy efficiency of the building [3,4]. Various types of software have been developed in this regard that must be carefully selected [2]. Researcher simulated the energy consumption in a commercial building using EnergyPlus and compared the results with actual values [5]. In a research conducted by Skin and Torkaman [6], heating and cooling loads were simulated for a residential building in a cold and dry climate for 24 h using EnergyPlus and the results were compared to those of actual samples, so that the difference in heating and cooling loads was 3% and 5% respectively. In a study by

Hvala na pažnji!



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