

EnergyPlus – Eight-Session Course Syllabus

This comprehensive EnergyPlus training consists of eight live sessions, each led by **Karen Walkerman**. Every **two-hour module** includes a live **Q&A session**, ensuring interactive learning and expert guidance.

Unlike other EnergyPlus trainings that rely on third-party software for geometry and complex inputs, this course takes a unique approach by using **EP3 instead of OpenStudio**. As a participant, you'll be among the first to experience **EP3's groundbreaking capabilities**, which provide unparalleled insight into EnergyPlus at a fundamental level.

It is only available at Energy-models.com!

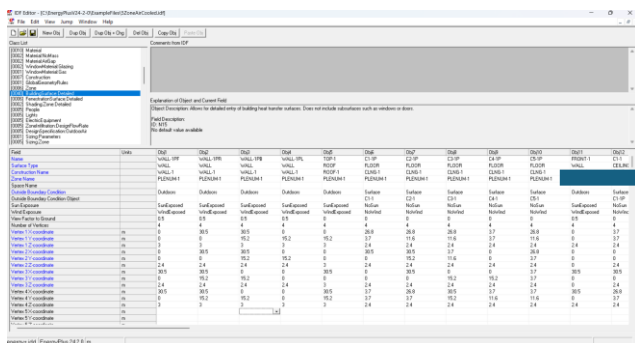
Course Schedule

The training follows this structured schedule:

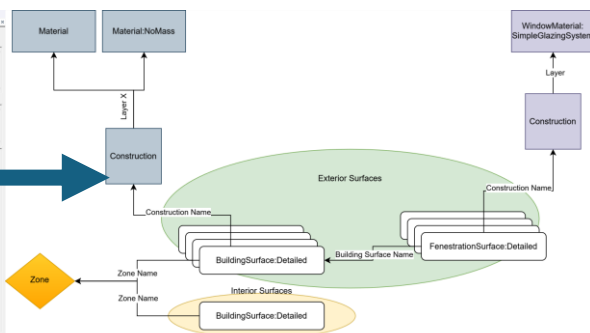
- 1) **EnergyPlus Overview and Structure – March 17, 2025 12pm – 2pm EST** – In this module we are introduced to EnergyPlus and learn about how the EnergyPlus structure allows us to create flexible models. The companion homework tutorial will guide participants in creating and inspecting an EnergyPlus model using EP3.

Specific topics

- a) Introduction to EnergyPlus as "object-oriented modeling"
- b) Discuss how objects relate to each other and how connections are made - not just HVAC connections, but references to other objects by "name" & "type"
- c) Learn how to diagram EnergyPlus connections to make sense of EnergyPlus models

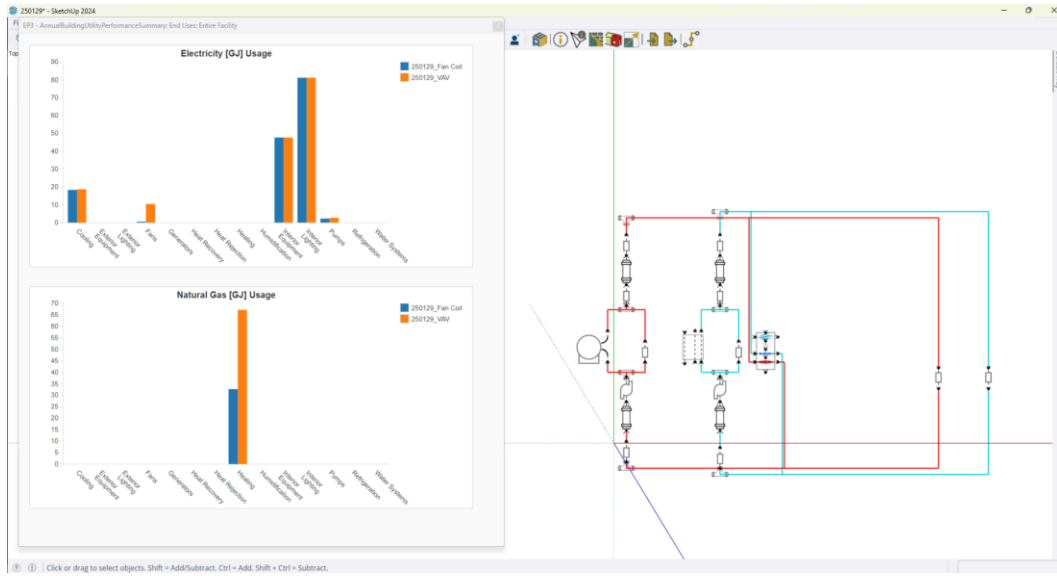


Object Name	Type	Material	Material:NoMass	Construction	Zone
Zone 1	Zone				Zone 1
Zone 2	Zone				Zone 2
Zone 3	Zone				Zone 3
Zone 4	Zone				Zone 4
Zone 5	Zone				Zone 5
Zone 6	Zone				Zone 6
Zone 7	Zone				Zone 7
Zone 8	Zone				Zone 8
Zone 9	Zone				Zone 9
Zone 10	Zone				Zone 10
Zone 11	Zone				Zone 11
Zone 12	Zone				Zone 12
Zone 13	Zone				Zone 13
Zone 14	Zone				Zone 14
Zone 15	Zone				Zone 15
Zone 16	Zone				Zone 16
Zone 17	Zone				Zone 17
Zone 18	Zone				Zone 18
Zone 19	Zone				Zone 19
Zone 20	Zone				Zone 20
Zone 21	Zone				Zone 21
Zone 22	Zone				Zone 22
Zone 23	Zone				Zone 23
Zone 24	Zone				Zone 24
Zone 25	Zone				Zone 25
Zone 26	Zone				Zone 26
Zone 27	Zone				Zone 27
Zone 28	Zone				Zone 28
Zone 29	Zone				Zone 29
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Zone 36	Zone				Zone 36
Zone 37	Zone				Zone 37
Zone 38	Zone				Zone 38
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Zone 40	Zone				Zone 40
Zone 41	Zone				Zone 41
Zone 42	Zone				Zone 42
Zone 43	Zone				Zone 43
Zone 44	Zone				Zone 44
Zone 45	Zone				Zone 45
Zone 46	Zone				Zone 46
Zone 47	Zone				Zone 47
Zone 48	Zone				Zone 48
Zone 49	Zone				Zone 49
Zone 50	Zone				Zone 50



- d) Create our first model and view results

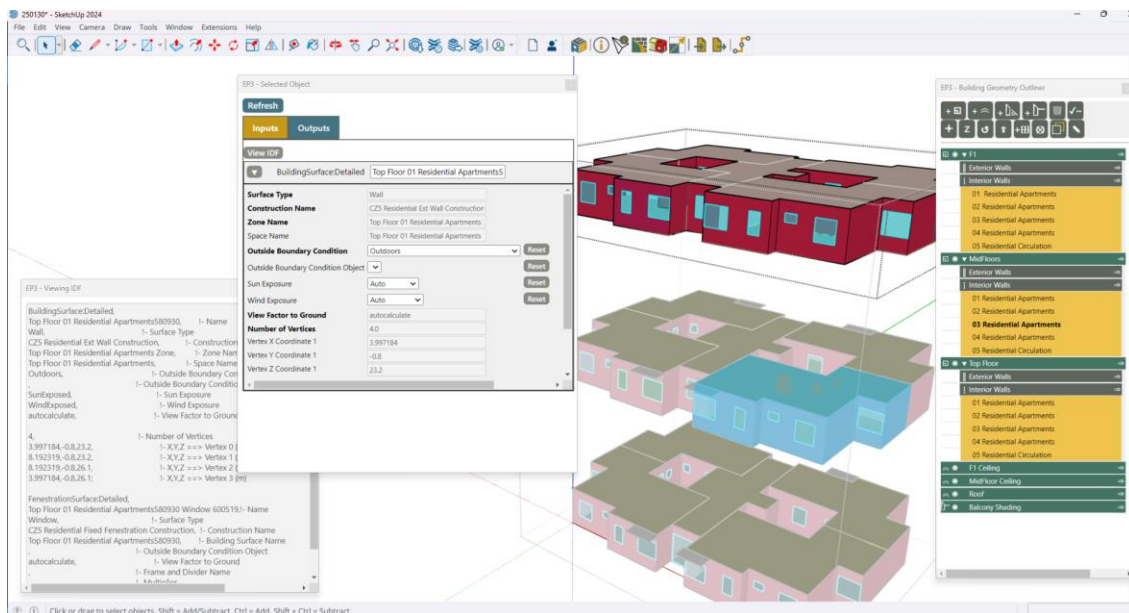
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- 2) **Building Geometry – March 18, 2025 12pm – 2pm EST** – In this module we dive deeper into building geometry. We'll learn about the most common ways to describe walls, constructions and surface adjacencies. Most EnergyPlus users make use of a UI to create EnergyPlus geometry – we'll use EP3, and utilize the IDF viewer to compare 3D geometry to the EnergyPlus format.

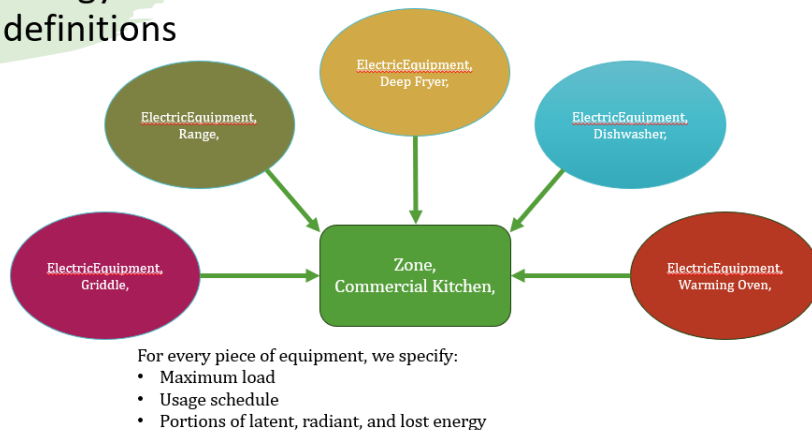
Specific topics

- Discussion of specific EnergyPlus object types that are useful for building geometry and the most-common ways to describe surfaces
- Discussion of how surface adjacencies are defined
- Overview of constructions and materials
- Introduction / practice with drawing geometry in EP3
- Inspection and identification of EnergyPlus objects using EP3



- 3) **Internal Loads & Schedules – March 19, 2025 12pm – 2pm EST** – In this module we discuss internal loads in EnergyPlus, and the flexibility given by the EnergyPlus structure. We also discuss schedules – their functions, different types, and different ways to define schedules. The companion homework tutorial will guide participants in creating schedules and internal loads to fine-tune their model.

EnergyPlus structure allows flexible internal loads definitions



3/17/2025

Karen Walkerman, EP3 / Infinite Atelier

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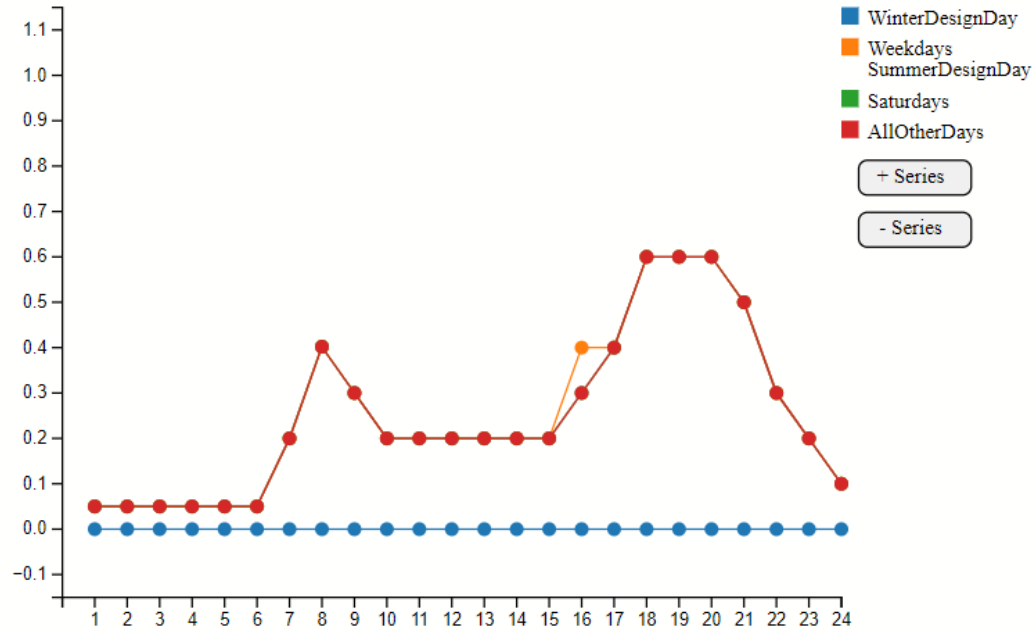
Specific Topics:

- a) Introduce the most common object types needed to do "equivalent to eQuest" definition of internal loads
 - i) People
 - ii) Lights
 - iii) Electric Equipment
 - iv) Infiltration
- b) Introduce workflow for managing internal loads - how to use ZoneLists as a flexible replacement for templates
- c) Discuss the use of additional equipment for unique needs - data closets, for example

- d) Discuss schedules, and edit Schedules using EP3's graphical user-interface

Res Elevator Schedule

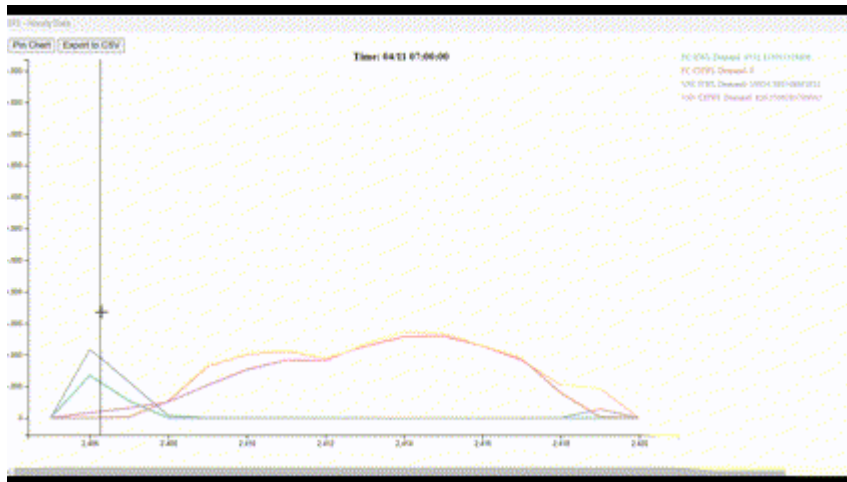
From: 1/1 Through: 12/31



- e) Advanced techniques for custom 8760 schedules using Schedule:File

4) **Techniques for troubleshooting and verifying models – March 20, 2025 12pm – 2pm EST** – In this module we discuss techniques for troubleshooting models in EnergyPlus, and review resources provided by EnergyPlus. The companion homework tutorial will guide participants in generating and viewing timestep or hourly output variables for their EP3 model.

a) Introduce users to the use of Output:Variables to track and view detailed model data



b) Introduce users to resources provided with EnergyPlus

c) Evaluate a model for quality control

d) How to access available variables for an EnergyPlus model

- 5) **HVAC Systems – ZoneHVAC – March 24, 2025 12pm – 2pm EST** – In this module we dive into our first topics regarding HVAC systems in EnergyPlus. We start by tackling Zone-level HVAC objects. The companion homework tutorial will guide participants in customizing Zone HVAC objects in an EP3 model. Participants will run efficiency measures comparing two or more different types of Zone HVAC equipment.

Specific Topics

- a) Introduce how ZoneHVAC objects are connected to zones both in EP3 and EnergyPlus
- b) Introduce the concept of nodes, and visualize nodes using EP3

EnergyPlus Editor - [C:\EnergyPlus\24-2-ExampleFiles\ZoneFanCoilDOASCooling]

File Edit View Jump Window Help

Class List

Comments from IDF

Capacity Control Method was blank, defaulted to Cycling fan Setting fan coil outdoor air to zero, because zone is served by dedicated outdoor air system (DOAS)

Explanation of Object and Current Field

supply fan, hot water heating coil, chilled water cooling coil, and fixed-position outdoor air mixer.

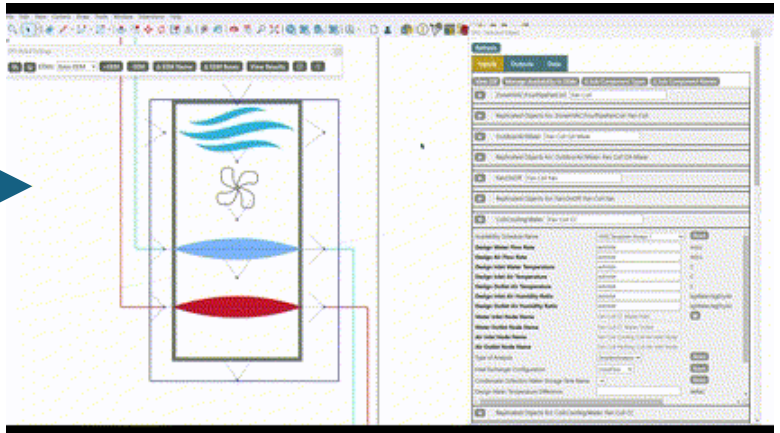
Field Description:

ID: A1

Enter a alphanumeric value

This field is required.

Field	Units	Obj1	Obj2	Obj3	Obj4	Obj5
Name		SPACE1-1 Fan Coil	SPACE2-1 Fan Coil	SPACE3-1 Fan Coil	SPACE4-1 Fan Coil	SPACE5-1 Fan Coil
Availability Schedule Name		FanVAVSched	FanVAVSched	FanVAVSched	FanVAVSched	FanVAVSched
Capacity Control Method		CyclingFan	CyclingFan	CyclingFan	CyclingFan	CyclingFan
Maximum Supply Air Flow Rate	m ³ /s	autoize	autoize	autoize	autoize	autoize
Low Speed Supply Air Flow Rate		0.33	0.33	0.33	0.33	0.33
Medium Speed Supply Air Flow Rate		0.66	0.66	0.66	0.66	0.66
Maximum Outdoor Air Flow Rate	m ³ /s	0	0	0	0	0
Outdoor Air Schedule Name		SPACE1-1 Fan Coil	SPACE2-1 Fan Coil	SPACE3-1 Fan Coil	SPACE4-1 Fan Coil	SPACE5-1 Fan Coil
Air Inlet Node Name		SPACE1-1 Supply In	SPACE2-1 Supply In	SPACE3-1 Supply In	SPACE4-1 Supply In	SPACE5-1 Supply In
Outdoor Air Mixer Object Type		OutdoorAirMixer	OutdoorAirMixer	OutdoorAirMixer	OutdoorAirMixer	OutdoorAirMixer
Outdoor Air Mixer Name		SPACE1-1 DA Mixer	SPACE2-1 DA Mixer	SPACE3-1 DA Mixer	SPACE4-1 DA Mixer	SPACE5-1 DA Mixer
Supply Air Fan Object Type		FanDrift	FanDrift	FanDrift	FanDrift	FanDrift
Supply Air Fan Name		SPACE1-1 Supply F	SPACE2-1 Supply F	SPACE3-1 Supply F	SPACE4-1 Supply F	SPACE5-1 Supply F
Cooling Coil Object Type		CoilCooling/Water	CoilCooling/Water	CoilCooling/Water	CoilCooling/Water	CoilCooling/Water
Cooling Coil Name		SPACE1-1 Cooling	SPACE2-1 Cooling	SPACE3-1 Cooling	SPACE4-1 Cooling	SPACE5-1 Cooling
Maximum Cold Water Flow Rate	m ³ /s	autoize	autoize	autoize	autoize	autoize
Minimum Cold Water Flow Rate	m ³ /s	0	0	0	0	0
Cooling Convergence Tolerance		0.001	0.001	0.001	0.001	0.001
Heating Coil Object Type		CoilHeating/Water	CoilHeating/Water	CoilHeating/Water	CoilHeating/Water	CoilHeating/Water
Heating Coil Name		SPACE1-1 Heating	SPACE2-1 Heating	SPACE3-1 Heating	SPACE4-1 Heating	SPACE5-1 Heating
Maximum Hot Water Flow Rate	m ³ /s	autoize	autoize	autoize	autoize	autoize
Minimum Hot Water Flow Rate	m ³ /s	0	0	0	0	0
Heating Convergence Tolerance		0.001	0.001	0.001	0.001	0.001
Availability Manager List Name						
Design Specification:ZoneHVAC:Supply Object Name						



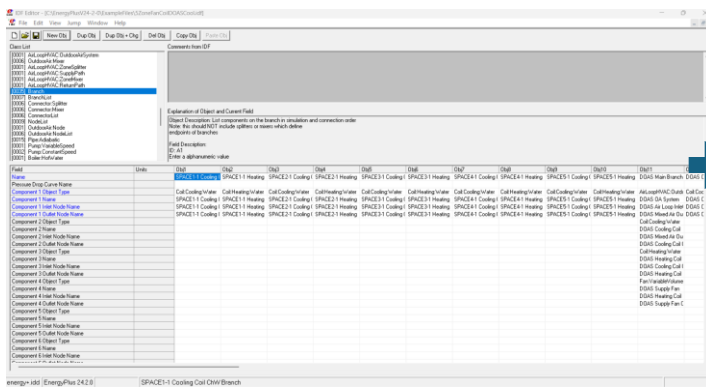
- c) Introduce commonly used Zone HVAC object types:
 - i) VAV air terminals
 - ii) Fan Coils
 - iii) Heat Pumps
 - iv) VRF terminals
- d) Discuss how to assign multiple ZoneHVAC equipment to one zone, and how to control equipment priority

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- 6) **HVAC Systems – Waterside – March 25, 2025 12pm – 2pm EST** – In this module we will continue our exploration of HVAC systems in EnergyPlus. We'll discuss how connects are made using Loops, Branches and nodes. We'll use EP3 to diagram a water-side system and make water-side connections. The companion homework tutorial will guide participants in customizing Loops in an EP3 model. Participants will run efficiency measures comparing two or more water-side efficiency measures.

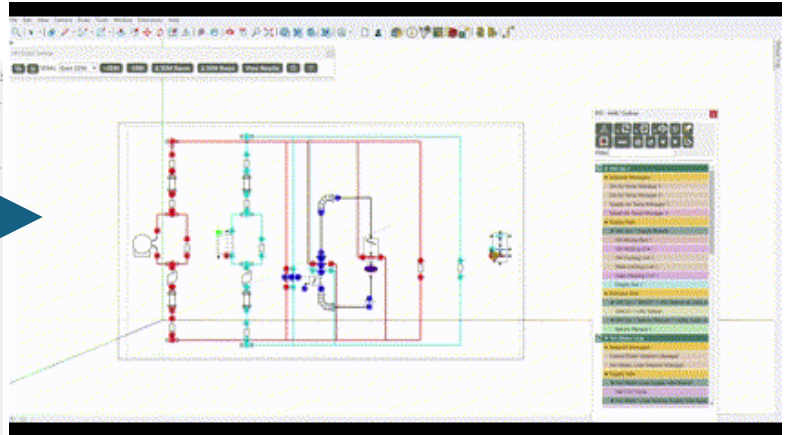
Specific topics:

- Introduce concept of loops
- Discuss associated object types required for Loop simulation
- Discuss how to control loop temperature
- Edit loop connections using EP3



energy+.idd | EnergyPlus 24.2.0 | SPACE1-1 Cooling Coil Chiller Branch

Name	Units	SN1	SN2	SN3	SN4	SN5	SN6	SN7	SN8	SN9	SN10	SN11	SN12	SN13	SN14	SN15	SN16	SN17	SN18	SN19	SN20	SN21	SN22	
Pressure Drop Curve Name																								
Component 1 Name																								
Component 1 Inlet Node Name																								
Component 1 Outlet Node Name																								
Component 2 Name																								
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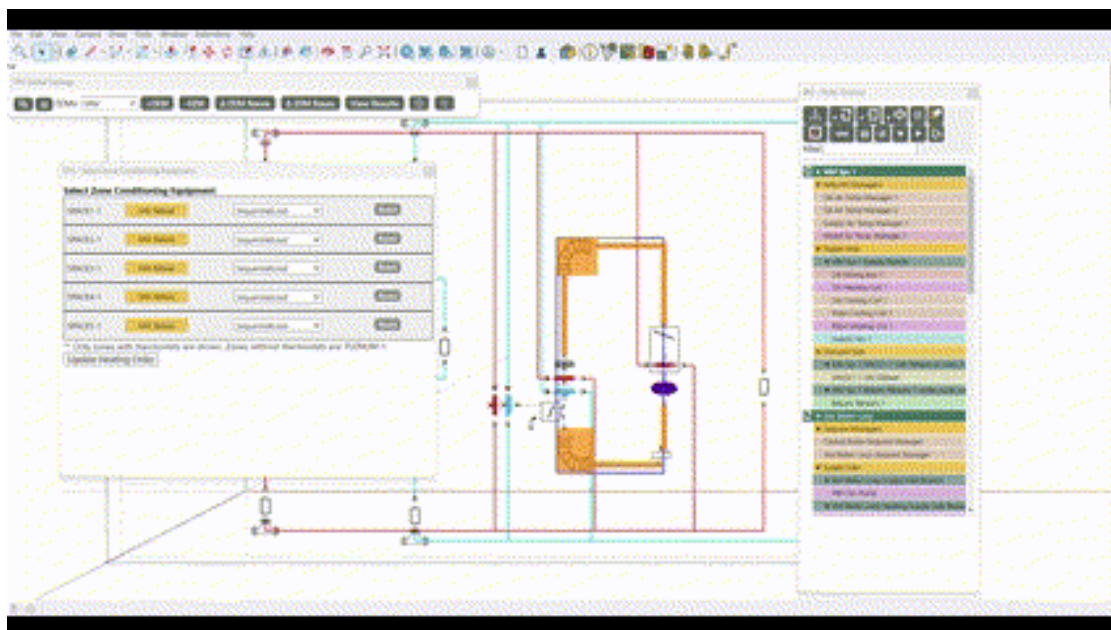


- Introduce the wide variety of plant equipment available in EnergyPlus, including air and water-source heat pumps

- 7) **HVAC Systems - Airside – March 26, 2025 12pm – 2pm EST** – In this module we will continue our exploration of HVAC systems in EnergyPlus. We'll focus on airside connections and discuss some of the differences between air and water loops in EnergyPlus. We'll continue using EP3 to create air handlers that serve multiple zones, and to create air-side connections. The companion homework tutorial will guide participants in customizing air loops in an EP3 model. Participants will run efficiency measures comparing two or more air-side efficiency measures.

Specific Topics:

- Discuss use of air loops – when to use a loop, and when to use zone HVAC equipment
- Discuss outdoor air and outdoor air controls
- Introduce different types of air terminals and controls
- Draw airside connections in EP3



- Demonstrate EP3's ability to replicate AirLoopHVAC per zone, floor, or group of zones

- 8) **Special Topics – March 27, 2025 12pm – 2pm EST** – This module is reserved to cover topics requested by participants of the course. We will either revisit a previous topic in more detail, or discuss an advanced topic. The special topic will be selected by participants on or before March 25. Potential topics:
- a) Use of python or EnergyManagementSystem to create custom behavior in your EnergyPlus file
 - b) Advanced techniques for drawing complex building geometry
 - c) Advanced techniques for generating schedules for buildings with varied seasonal use (such as schools or hotels)
 - d) Techniques for compliance modeling
 - e) Revisit previous topics in more detail