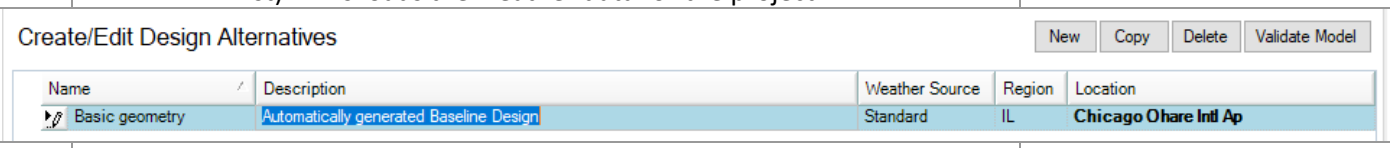
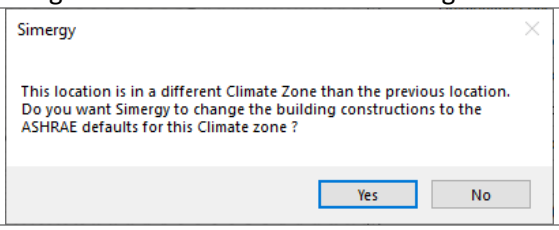
Simergy advanced training course

Lesson 1: Basic DWG model over with load calculations – Design Alternative

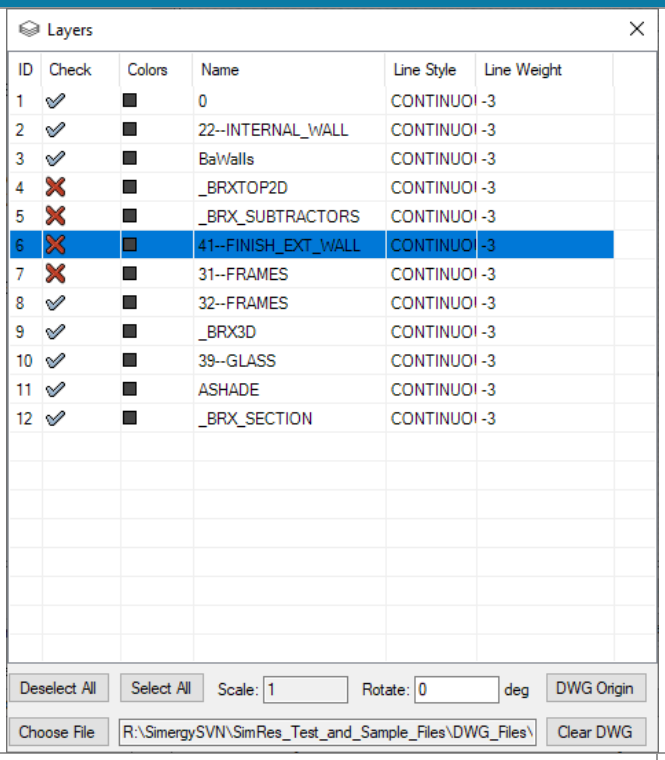
1	Click on the **File** Menu	
2	Click on the New Menu-Button to create a new project.	
3	In the **Project** workspace	
4	In the Project Information palette	
5	For **Design Alternative 1**, set the **Regio**n dropdown to	*"IL"*
6	Set the **Location** dropdown to (or type in "Chicago" to filter the list) - This loads the weather data for the project.	*"Chicago Ohare Intl Ap"*



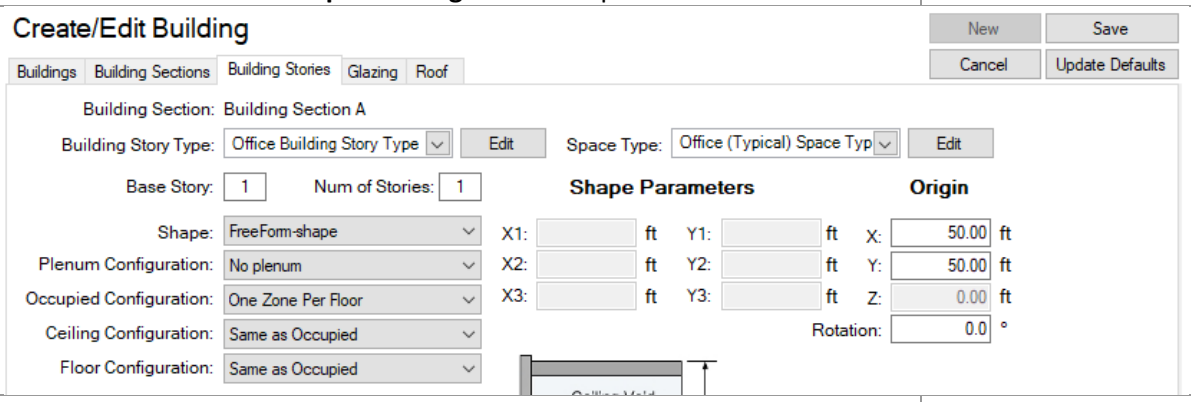
7	Confirm the dialog that notifies you about the building constructions changes due to the climate zone change with **Yes**	



8	Rename the **Design Alternative 1** to	*"Basic geometry"*
9	Go to the **Buildings** Workspace	
10	In the **Create/Edit Buildings** ribbon menu	
11	In the **Create/Edit Building** palette	
12	In the **Building Stories** tab	
13	Click on **DWG Settings**… (all the way in the lower right corner)	
14	Click on **Choose File**	
15	Browse for the "Simergy102-DWGModelOver.dwg"	
16	Click **Ok**	
17	Place the DWG on top of the origin (by a left click)	



18	Unselect unnecessary layers • _BRXTOP2D • 41—FINISH_EXT_WALL • 31—FRAMES You can close the Layer window now.	
19	Click the **New Stories** button	
20	Change **Num of Stories** to	*1*
21	Select the **Shape** dropdown as	*"Freeform Shape"*
22	Select the **Occupied Configuration** dropdown as	*"One Zone Per Story"*

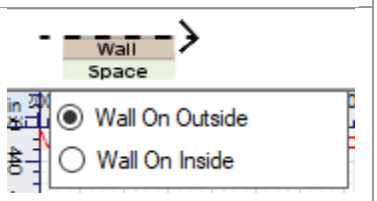
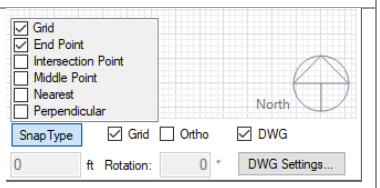


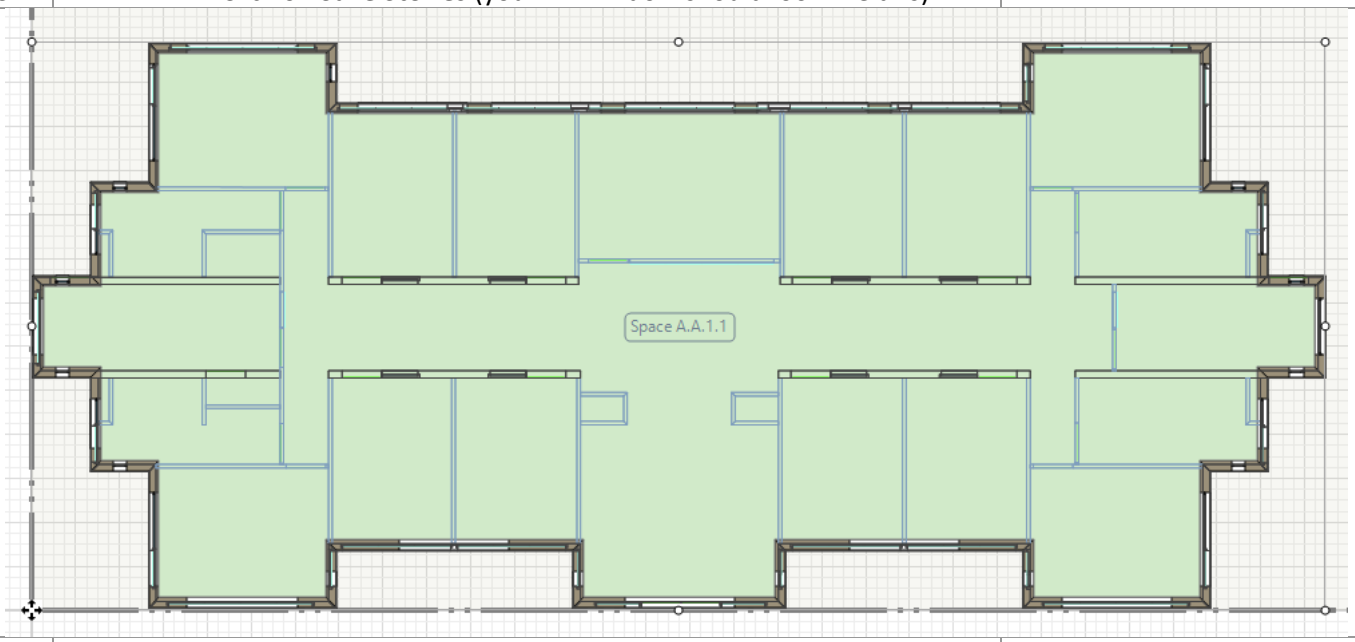
23	Click on the **Glazing** tab	
24	Change the **Calculation Method** dropdown to	*Percentage*
25	Set **Target Win/Wall Ratio** (for north and south) to	*"40%"*
26	Set **Target Win/Wall Ratio** (for east and west) to	*"35%"*
27	Set **Window Top Elevation** to	*"10 ft"*
28	Set **Window Width** to	*"8 ft"*
29	Set **Window Offset From Left** to	*"1 ft"*
30	Set **Window Offset From Right** to	*"1 ft"*

Arrays: One Window Array Calculation Method: Percentage

Array One Window Type: Default By Orientation Overhang Type: Overhang (1.5 Fin Type: Fin (1.5 ft)

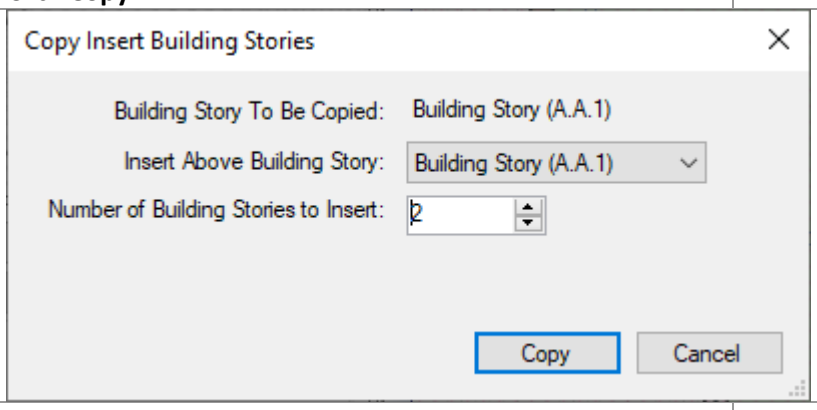
Window Orientation	Strip	Target Win/Wall Ratio	Win Top Elevation	Window Width	Window Height	Window Minimum Gap	Window Offset From Left	Window Offset From Right	Exterior Shading Horiz.	Exterior Shading Cont.	Exterior Shading Fin L	Exterior Shading Fin R
North	☐	40 %	10.00 ft	8.00 ft	NaN ft	2.00 ft	1.00 ft	1.00 ft	☐		☐	☐
South	☐	40 %	10.00 ft	8.00 ft	NaN ft	2.00 ft	1.00 ft	1.00 ft	☐		☐	☐
East	☐	35 %	10.00 ft	8.00 ft	NaN ft	2.00 ft	1.00 ft	1.00 ft	☐		☐	☐
West	☐	35 %	10.00 ft	8.00 ft	NaN ft	2.00 ft	1.00 ft	1.00 ft	☐		☐	☐

31		Zoom in and start drawing the exterior wall clockwise on the outside face. Tip 1: On top of the drawing window, you choose to draw with the wall on the Outside or Inside. (by default we trace on the inside with "Wall On Outside" selected) Tip 2: You can zoom in and out with your mouse wheel. Tip 3: If you misplaced a point you can click Undo in the ribbon or type Ctrl-Z to undo the last point.	
32		For this DWG each corner point will be automatically snapped to. You can adjust the Snap Type in the lower right of the drawing window in include more options like: • Intersection Point • Middle Point • Nearest Point • Perpendicular There is also a checkbox to turn orthogonal mode on and off.	
33		Once you are done drawing over the interior shape, select the **Shape Complete** button	
34		Click on **Save Stories** (your 2D window should look like this)	

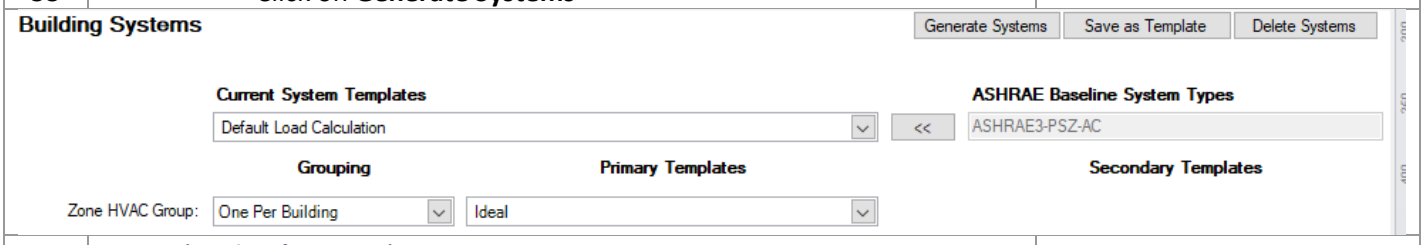


35		You may have noticed that our wall construction does not have the same thickness as the DWG. We will correct this now:	
36		In the 2D window select a wall and right click properties.	

37	The thickness of the exterior wall in too thick. Let's adjust the external wall construction. Click on the … button right next to the **Construction Name** property.	
38	The total thickness is 4.4 in, but we need 8 in.	
39	Set the thickness of the *Continuous insulation R-19* layer to	4.5 in
40	Click on **Save –this Ref Only** (this will make a copy of the material layer set and assign it to this wall only)	
41	Click on the **Building** tab	
42	Click on **Edit** Building Construction	
43	Select the just created in the Exterior Wall dropdown	"WALL-EXT_BrickAir6"MtlStudGyp for Wall A.1.2"
44	Click on **Save Changes**	
45	Click on **Save** (now the external walls align with the lines in the drawing) Tip 4: Create or adjust a Building Construction template and all relevant material properties before you create geometry of your model.	
46	**Right click** on the Story: Building Story A.A.1 node in the project tree and select **Copy Building Story**	
47	Set the **Number of Building Stories to Insert** to	2
48	And Click **Copy**	

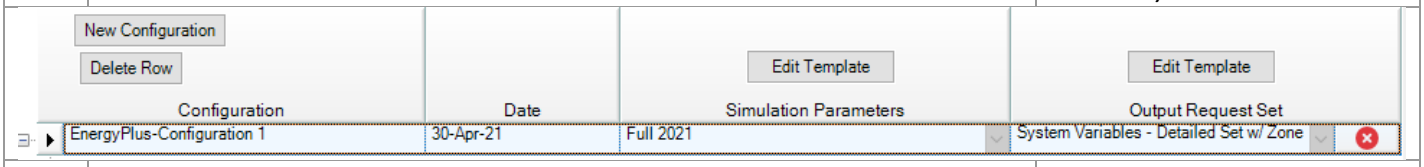


49	Go to the **Systems** Workspace	
50	In the **Systems Creator** ribbon menu	
51	Select the **Template Name** dropdown as	*"Default Loads calculation"*
52	Set the radio button for Zone HVAC Groups to	*"One per building"*
53	Click on **Generate Systems**	

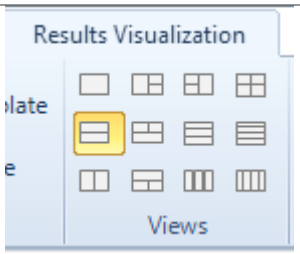
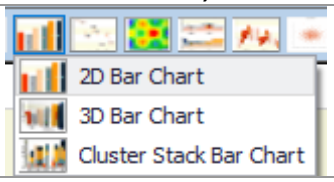


54	Go to the **Simulate** Workspace	
55	In the **EnergyPlus** ribbon menu	
56	In the lower left palette	
57	Click on **New Configuration**	

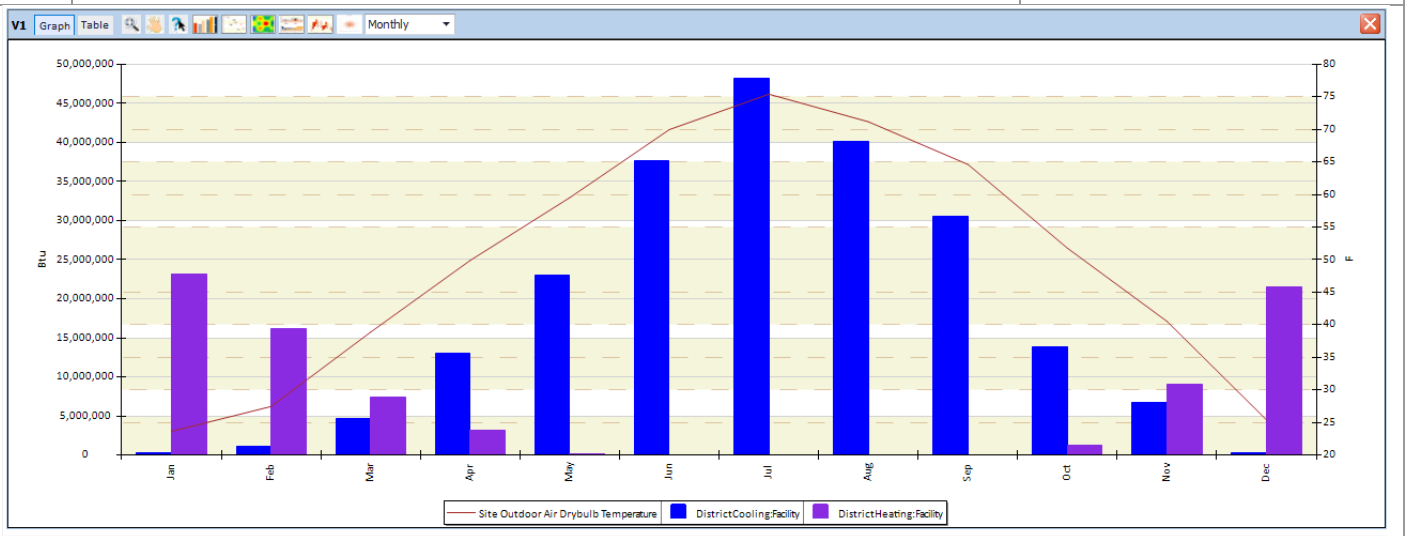
58	Select the **Simulation Parameter** template dropdown as *For the load calculations (sizing) we do not necessarily need the annual run, but since we want to compare results of annual runs later, we are selecting a full annual run here.*	*"Full 2021"*
59	Select the **Request Set Parameter** template dropdown as	*"System Variables – Detailed Set w/Zones + Meters"*

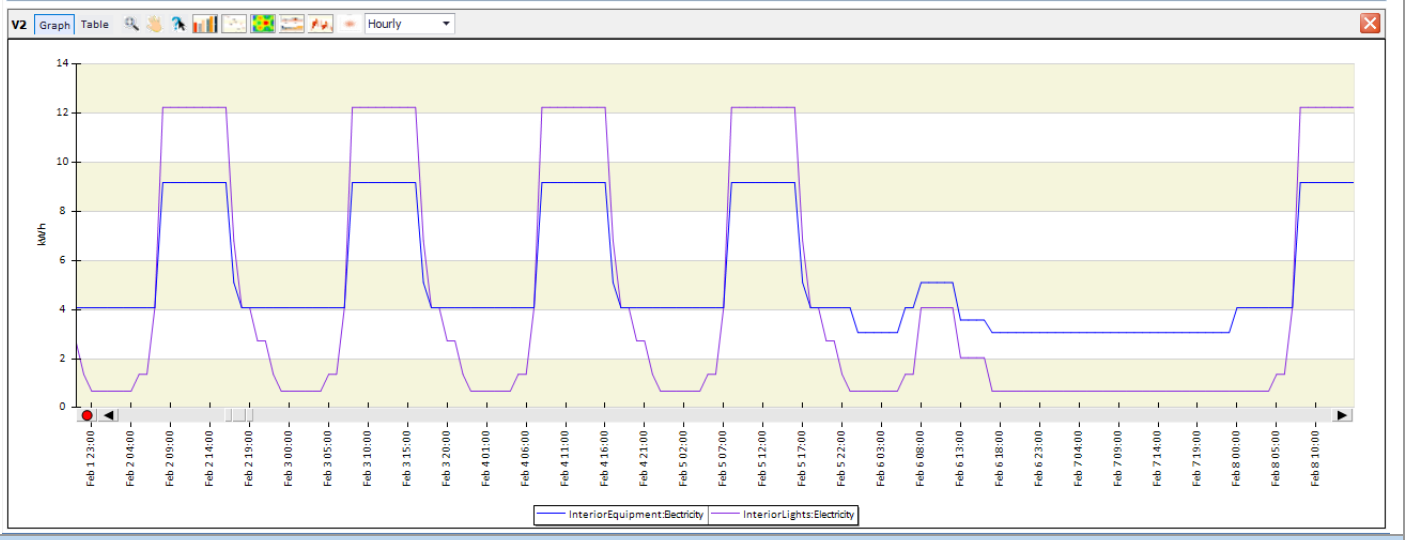


60	Click on the **File** Menu	
61	Click on the **Save** Button to save the current model.	
62	Set **File name** to	*"Simergy102-Lesson1"*
63	In the **Simulate** Workspace	
64	In the **EnergyPlus** ribbon menu	
65	In the lower right palette	
66	Click on **Run Simulation** – watch the progress bar and progress messages thereafter (Step 1: Simulation preparation, Step 2: Simulation) *The Simergy UI is disabled for a short period of time. After that the simulation and its preparation runs in the background and Simergy is enabled again.*	
67	Wait for simulation to finish and go to the **Results Visualization** workspace	

68	In the **Results Visualization** Workspace	
69	Click the button in the ribbon menu for two horizontally divided graphs.	
70	Multiselect cooling and heating and click in the **ADD to Selection** button	*Cooling:DistrictCooling* *Heating:DistrictHeating*
71	Change the Timeinterval from Hourly to	*Monthly*
72	Change the chart type to **2D Bar Chart**	
73	Select the following variable and add it to View 1	*Site Outdoor Air Drybulb Temperature*
74	This allows to add the outdoor air temperature as a line chart into the predefined bar chart.	
75	Select *View V2* by clicking either clicking on the V2 heading or by selecting View 2 in the dropdown in the **Output Variable Selection**	
76	Multiselect interior equipment and lights electricity and click in the **ADD to Selection** button	*InteriorEquipment:Electricity* *InteriorLights:Electricity*

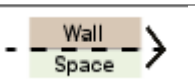
77	Click the **Data Zoom** button to look at about a week of data, so access the weekly patterns of the internal load schedules. Tip 5: You can click on the Zoom button again to view the full range, the control below the graph enables to move the zoom window along the time axis and well as changing its zoom level.	
78	Click on **Save** in the Results Screen ribbon section.	

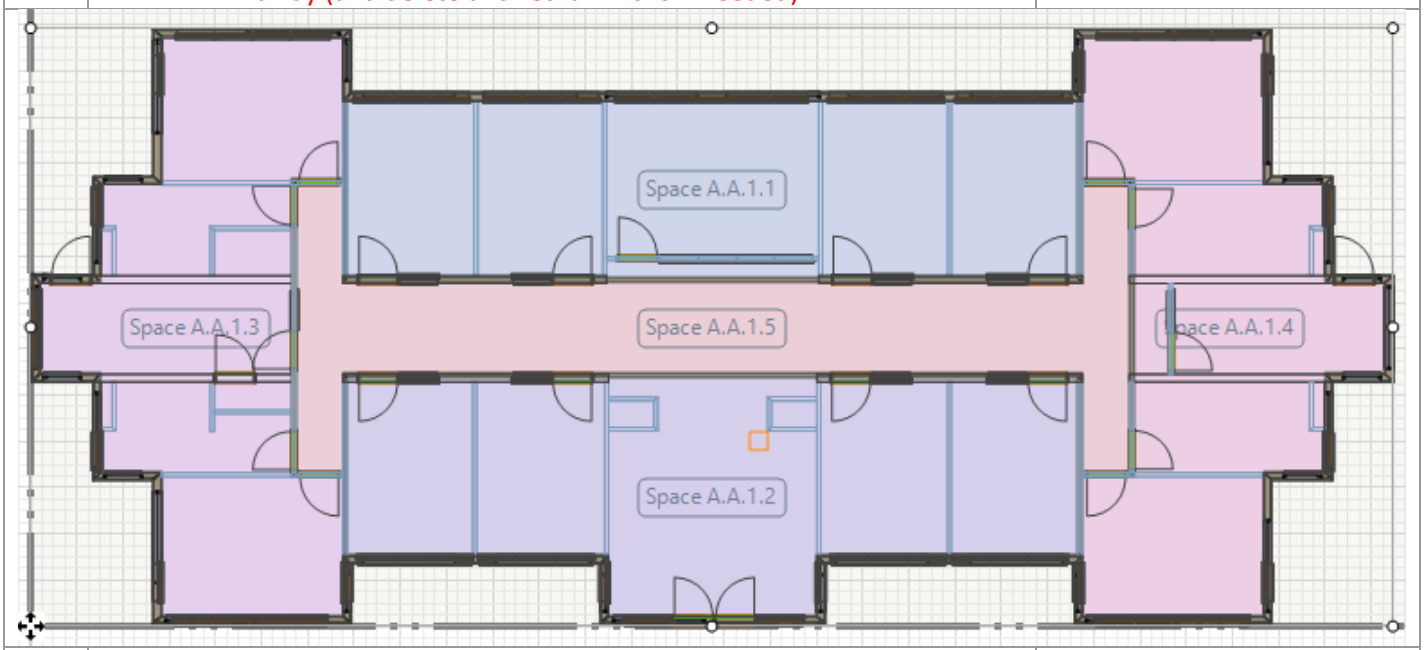




Lesson 2: DESIGN ALTERNATE 1 – Simplified geometry

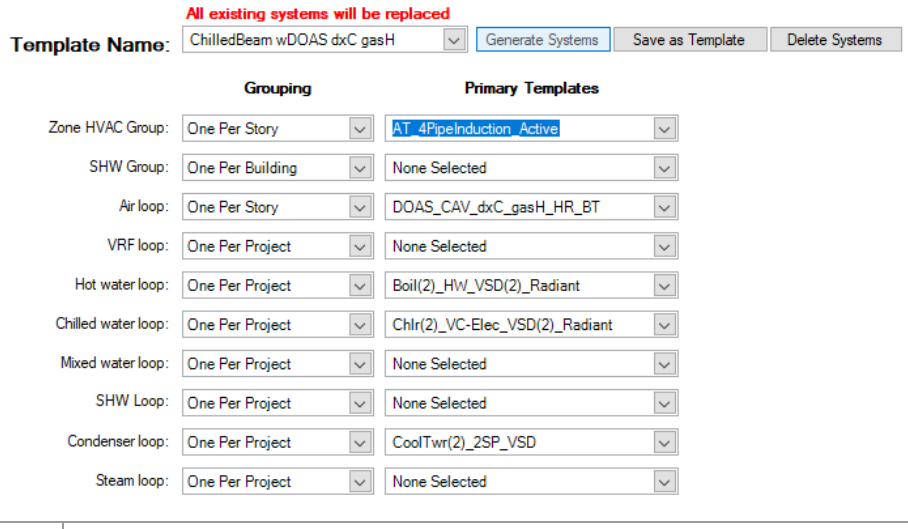
79	In the **Project** workspace	
80	In the Project Information palette	
81	Select the "*Basic geometry*" design alternative and click on the **Copy** button	
82	Rename the **Design Alternative 1** to	*"Simplified geometry"*
83	Go to the **Buildings** Workspace	
84	In the Create/Edit Buildings ribbon menu	
85	In the Create/Edit Building palette	
86	In the **Building Stories** tab	
87	Select the Building Story A-2 and A-3 in the tree	
88	Right click and **Delete**	
89	Select the Building Story A-1 in the tree	
90	Select the **Occupied Configuration** dropdown as	*"Custom Zones"*
91	Click on **Save Stories** on the **Create/Edit Building** palette	

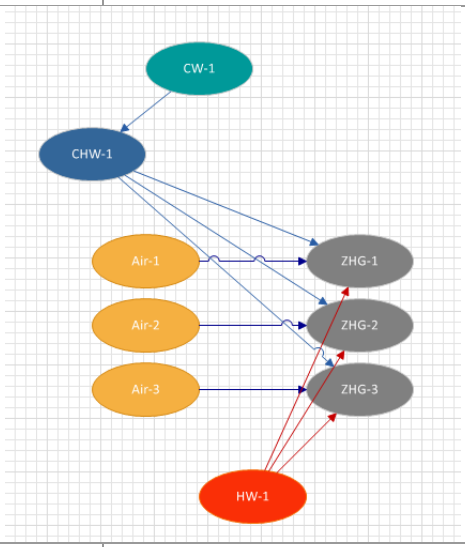
92	Go to the **Interiors** ribbon menu	
93	Click on the **New Wall** button.	
94	Draw **simplified** interior walls as shown in the figure below, by selecting points in the DWG. Tip 6: Adjusting the reference line of the wall can make it easier to draw certain walls. Tip 7: After completing all walls of a space, seed the space right away so you can detect issues with walls not touching right away (and delete and redraw walls if needed).	



95	Go To Create/Edit Buildings	
96	Select Building Story A-2, right click and Copy	
97	Go to the Systems workspace	
98	Click on the Zone HVAC Groups tab	
99	Select the Zone HVAC Group 1 Notice that the zone assignment to this group was lost.	
100	Select all Thermal Zones in the project tree and drag and drop the onto the **Zone HVAC Group - 1**	
101	Go to the **Simulate** Workspace	
102	In the **EnergyPlus** ribbon menu	
103	In the lower right palette	
104	Click on **Run Simulation**	
Lesson 3: DESIGN ALTERNATE 3 – Active beam (water heating and cooling) with DOAS (gas heating and DX cooling)		
105	In the **Project** workspace	
106	In the Project Information palette	
107	Select the ***"Basic geometry"*** design alternative and click on the **Copy** button	
108	Rename the **Design Alternative 1** to	*"Active beam with DOAS"*
109	Go to the **Systems** Workspace	
110	In the **Systems Creator** ribbon menu	

111	Select the **Template Name** dropdown as	*"ActiveBeam wDOAS dxC gasH"*
112	Set the radio button for Zone HVAC Groups to	*"One per story"*
113	Set the radio button for Air Loops to	*"One per story"*
114	Click on **Generate Systems**	





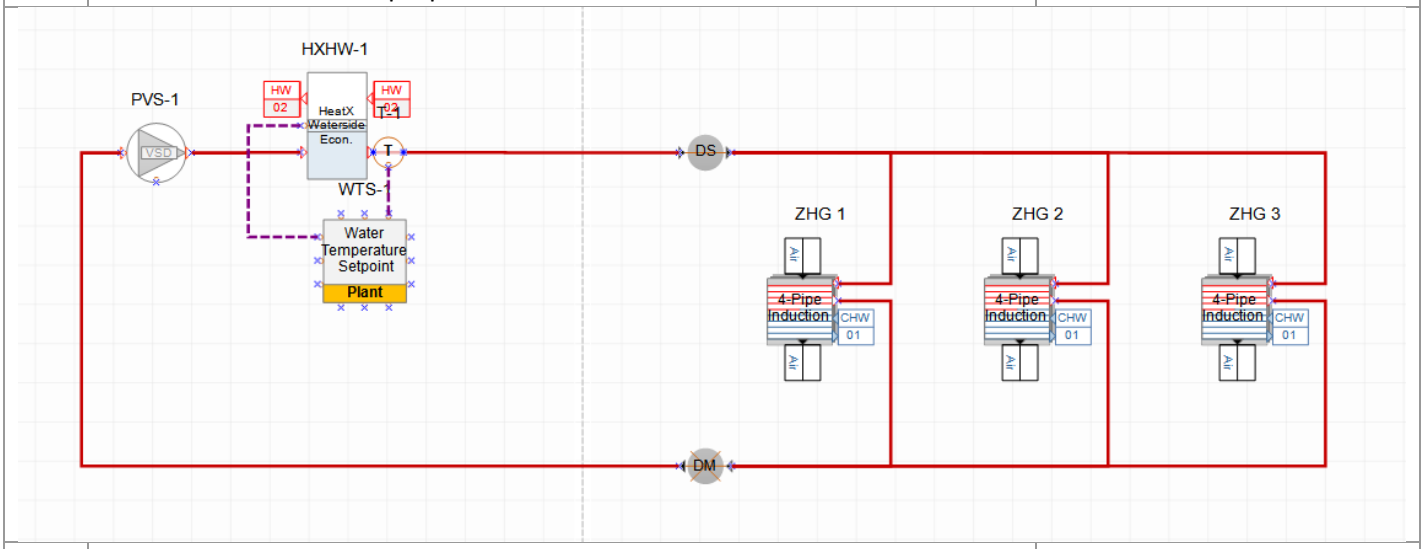
115	Go to the **Buildings** Workspace	
116	Go to the **Zone Loads Groups** ribbon menu	
117	Click on **Edit Template Values**	
118	Select the **Sizing and HVAC tab**	
119	Select in the dropdown menu for Sizing Definition	*ZS Office 59-86 F / 15 – 30 C*
120	Click On **Save Changes**	
121	Click on the **File** Menu	
122	Click on the **SaveAs** Button to save the current model.	
123	Set **File name** to	*"Simergy102-Lesson3"*
124	Go to the **Simulate** Workspace	
125	In the **EnergyPlus** ribbon menu	
126	In the lower right palette	
127	Click on **Run Simulation**	

Lesson 4: DESIGN ALTERNATE 4 – Active chilled beam (water heating and cooling) with DOAS (water heating and cooling)

128	In the **Project** workspace	
129	In the Project Information palette	
130	Select the *"Active beam with DOAS"* design alternative and click on copy	
131	Rename the **Design Alternative 1** to	*"Active beam with DOAS water"*
132	Go to the **Systems** Workspace	
133	Go to the **Air Loops** ribbon menu within **Create/Edit Building Systems**	
134	Select the DX cooling coil and click the **Delete** key	
135	Confirm the deletion by selecting **Yes**	
136	Drag and drop the "Cooling Coil 2-Port" at the same place in the diagram	
137	Select the following library entry and click on **Save**	*"CoolingCoilWaterAutosize"*

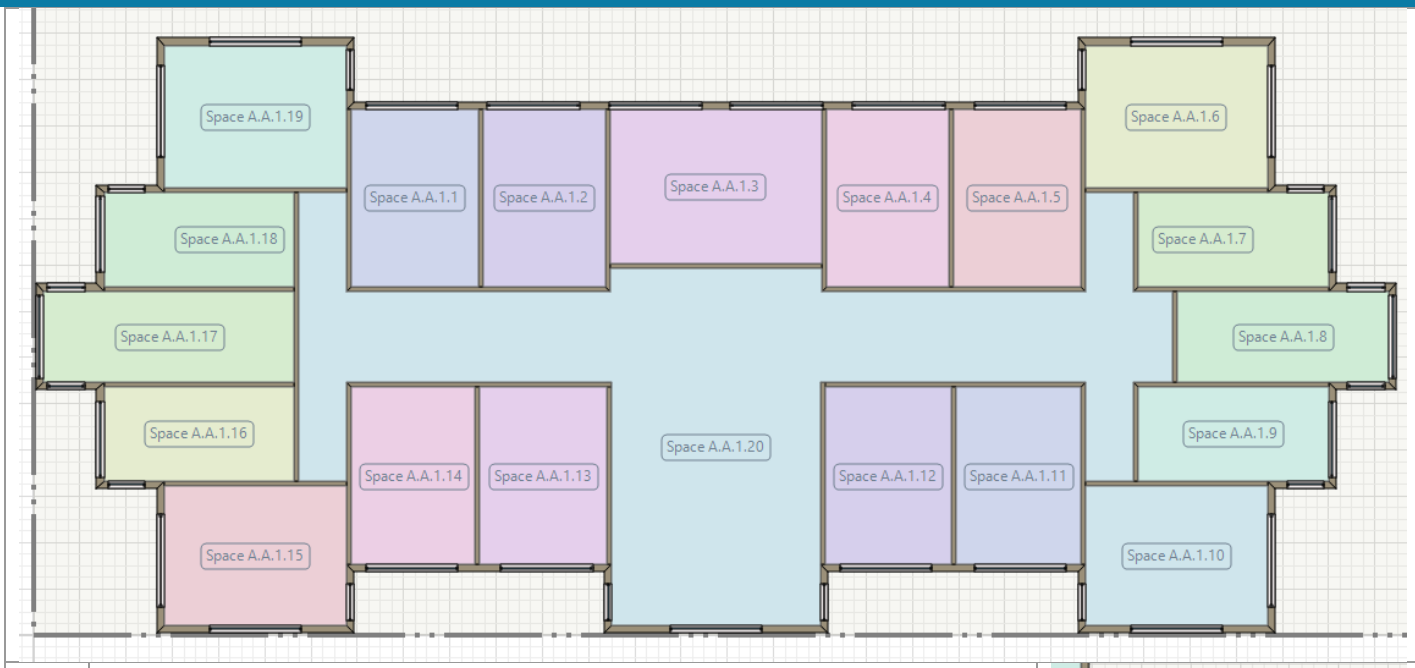
138		In the CHW Loop Dropdow select	"—Create new Loop-- "
139		Select the gas heating coil**, right click** and select **Delete** from the right click menu options	
140		Confirm the deletion by selecting **Yes**	
141		Drag and drop the "Heating Coil 2-Port" at the same place in the diagram	
142		Select the following library entry and click on **Save**	*"HeatingCoilWaterAutosize"*
143		In the HW Loop Dropdow select	"—Create new Loop-- "
144		Reconnect the connectors to both coils and check the loop consistency by clicking the **Validate** button	
145		Click on the **Save as Template** button in the controls just above the diagram	
146		In the popup window, set the name of the template to	"DOAS Loop with water heating and cooling"
147		Click **Ok** on the Template successfully saved popup dialog	
148		Select Manage Systems in the lower left palette and click on	"Air Loop 2"
149		In the Air Loop Template dropdown select the just created template	"DOAS Loop with water heating and cooling"
150		In the diagram, select the cooling coil and select the following CHW Loop in the dropdown	"CHW Loop 2"
151		In the diagram, select the heating coil and select the following HW Loop in the dropdown	"HW Loop 2"
152		Select Manage Systems in the lower left palette and click on	"Air Loop 3"
153		In the Air Loop Template dropdown select the just created template	"DOAS Loop with water heating and cooling"
154		In the diagram, select the cooling coil and select the following CHW Loop in the dropdown	"CHW Loop 2"
155		In the diagram, select the heating coil and select the following HW Loop in the dropdown	"HW Loop 2"
156	Go to the **Water Loops** ribbon menu within **Create/Edit Building Systems**		
157		In the lower left palette click on	*"CHW Loop 2"*
158		In the Water Loop Template dropdown select the template	*"Chlr(2)_VC-Elec_VSD"*
159		Select both chiller and assign them to the following loop in the CW Loop dropdown	*"CW Loop 1"*
160		Select Manage Systems in the lower left palette and click on	*"HW Loop 2"*
161		In the Water Loop Template dropdown select the template	*"Boil(2)_HW_VSD"*
162		Select Manage Systems in the lower left palette and click on	*"HW Loop 1"*
163		From the Water Loop Template dropdown select	*"< Empty System >"*
164		Drag and drop the following shape onto the diagram	*"Heat Exchanger HWtoHW"*
165		Set the required bolded properties to	*"autosize"*
166		Select the following loop in the HW Loop dropdown	*"HW Loop 2"*
167		Drag and drop the following shape onto the diagram left of the heat exchanger	*"Pump VSD LtR HW"*
168		Select the following library entry	*"Pump-HW-VSD_COMNET"*
169		Drag and drop the following shape onto the diagram over the pump	*"Water Temperature Setpoint"*
170		Select the following library entry	*"Setpoint Controller - 100F - HW – Radiant"*
171		Drag and drop the following shape onto the diagram and dock it to the right outlet of the heat exchanger	"T Sensor"

172	Create the proper connections for hot water and controls	

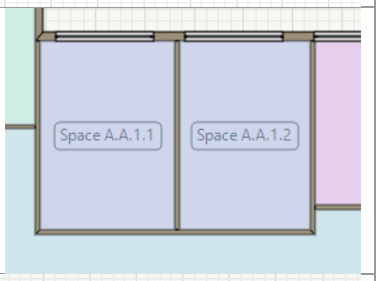


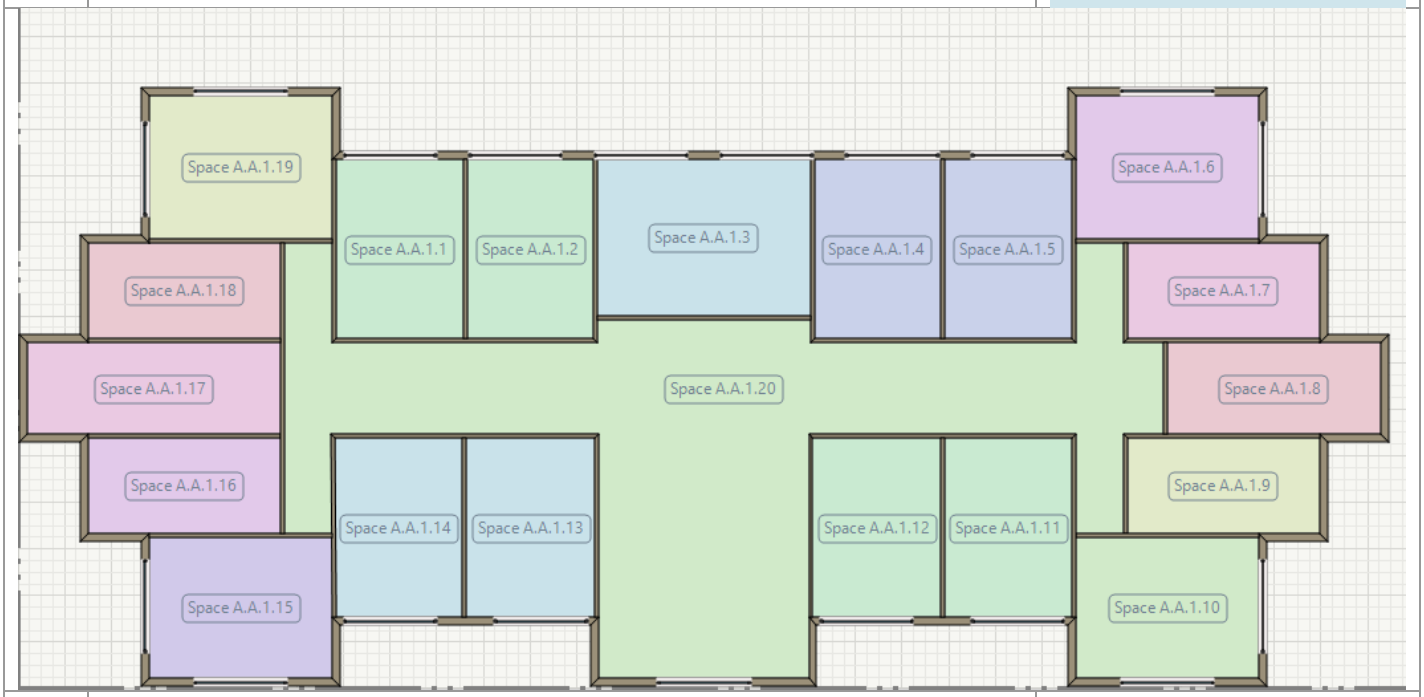
173	Click on the **File** Menu	
174	Click on the **SaveAs** Button to save the current model.	
175	Set **File name** to	*"Simergy102-Lesson4"*
176	Go to the **Simulate** Workspace	
177	In the **EnergyPlus** ribbon menu	
178	In the lower right palette	
179	Click on **Run Simulation**	

	Lesson 5: DESIGN ALTERNATE 1 – Really detailed geometry	
180	In the **Project** workspace	
181	In the Project Information palette	
182	Select the *“Basic geometry”* design alternative and click on the **Copy** button	
183	Rename the **Design Alternative 1** to	*"Detailed zones”*
184	Go to the **Buildings** Workspace	
185	In the Create/Edit Buildings ribbon menu	
186	In the Create/Edit Building palette	
187	In the **Building Stories** tab	
188	Select the Building Story A-2 and A-3 in the tree	
189	Right click and **Delete**	
190	Select the Building Story A-1 in the tree	
191	Select the **Occupied Configuration** dropdown as	*“Custom Zones"*
192	Click on **Save Stories** on the **Create/Edit Building** palette	
193	Go to the **Interiors** ribbon menu	
194	Click on the **New Wall** button.	
195	Draw the interior walls, by selecting points in the DWG. Tip 6: Adjusting the reference line of the wall can make it easier to draw certain walls.	
196	After you completed drawing all the walls, click on **Seed Spaces** and click in each space to automatically draw it. Your result should look like this:	



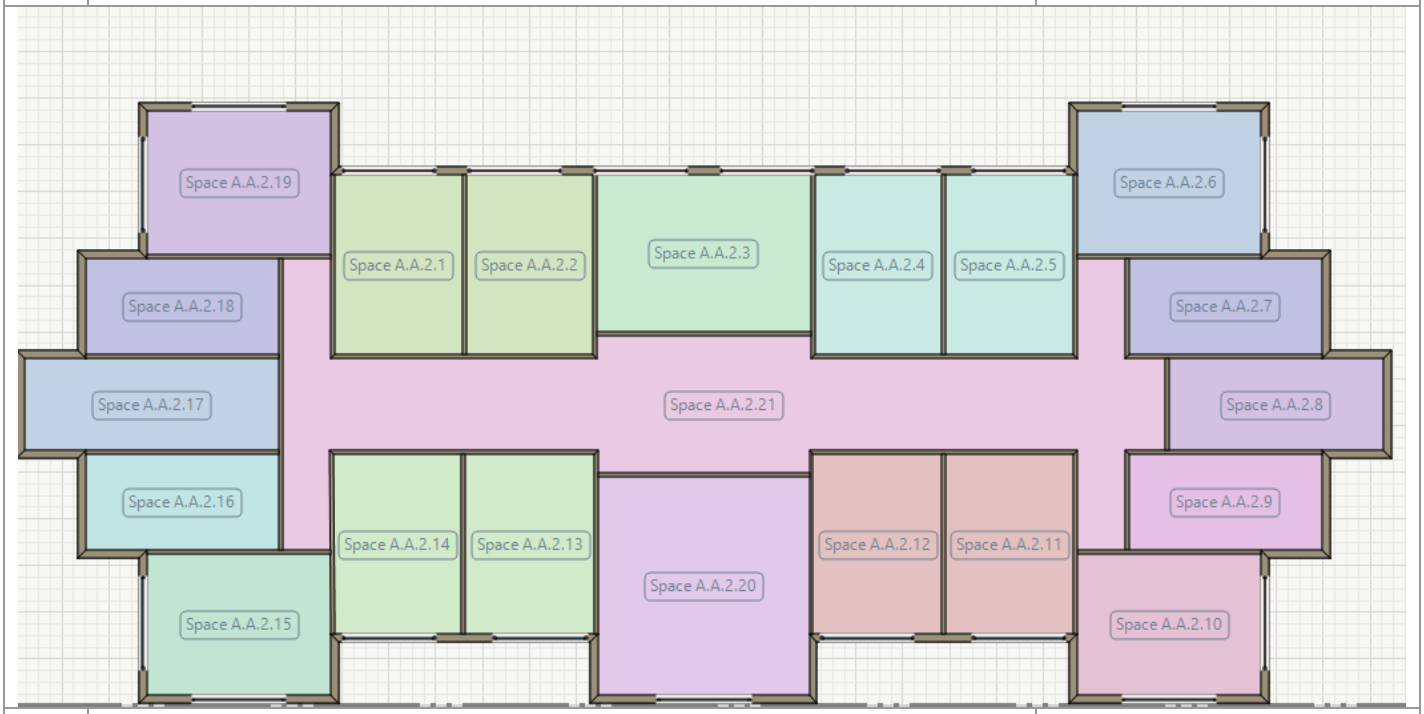
197	Go to Create/Edit Zones	
198	Select Thermal Zone A-1-2	
199	Drag and drop the neighboring space from the 2D window into the same zone	
200	Delete the empty zone	
201	Do the same for all four neighboring 2 space groups until your model looks like this	



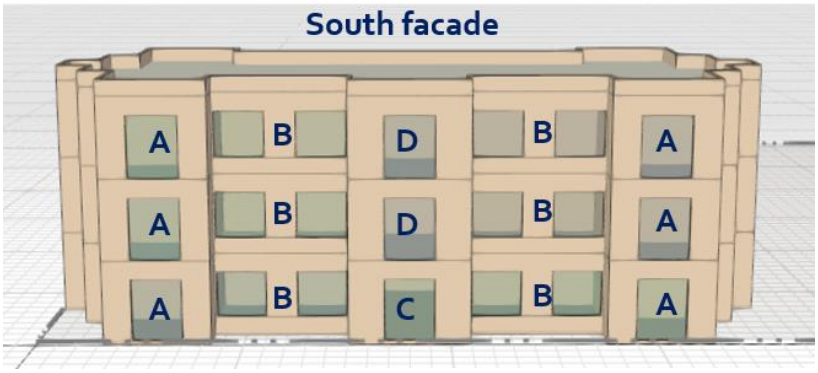


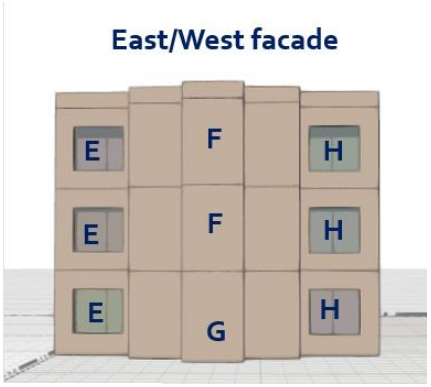
202	**Right** click on the *Building Story (A.A.1)* node in the project tree and select **Copy Building Story**	
203	Set the **Number of Building Stories to Insert** to	1
204	And Click **Copy**	
205	Select the *Building Story (A.A.2)* node in the project tree	
206	Go To Create/Edit Buildings	

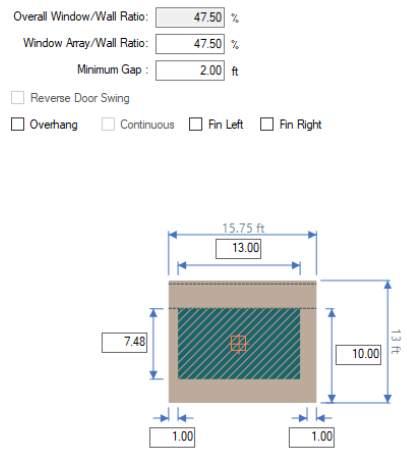
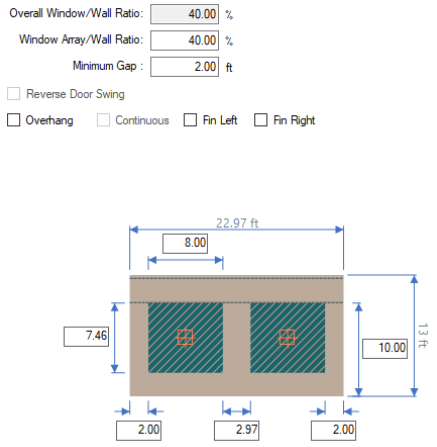
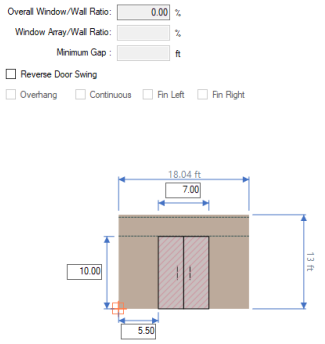
207	Delete Space A.A.1.20, draw a wall in the entrance area and seed two more spaces, so your model matches the following screenshot	

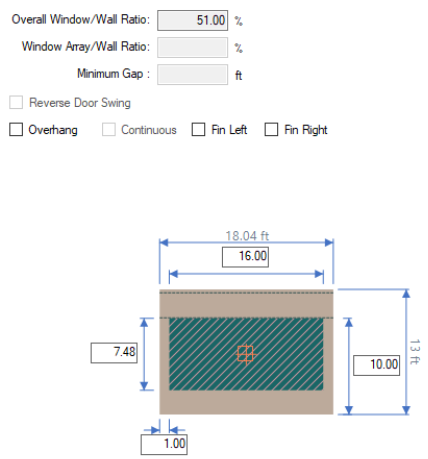
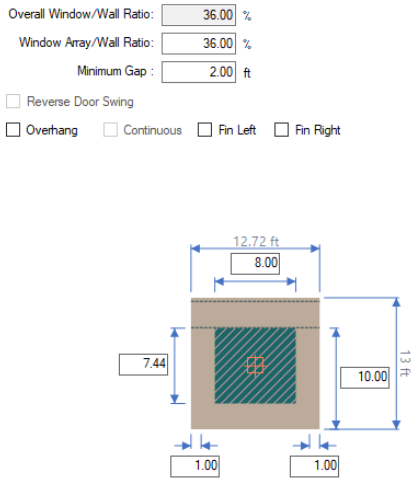
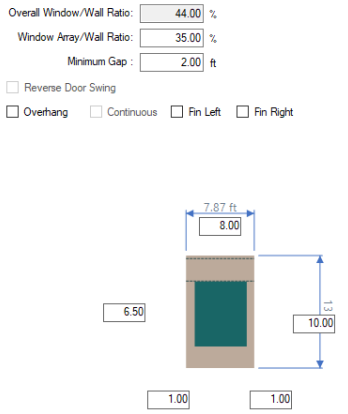
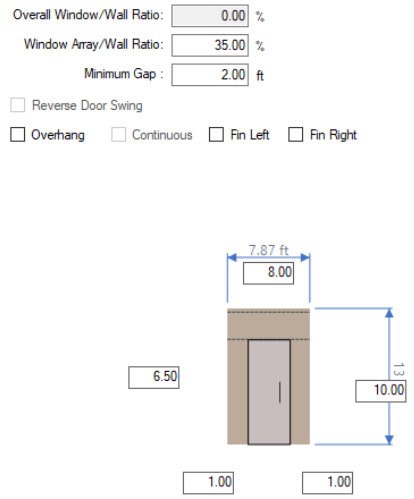
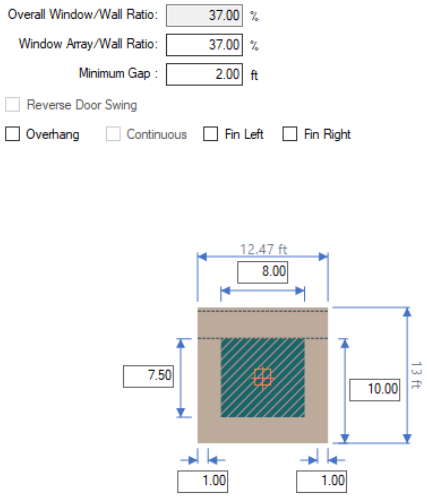
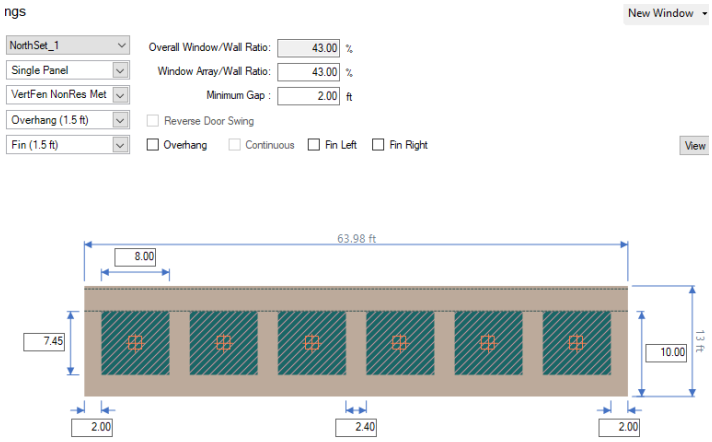


208	**Right** click on the *Building Story (A.A.2)* node in the project tree and select **Copy Building Story**	
209	Set the **Number of Building Stories to Insert** to	1
210	And Click **Copy**	
211	Click on the **File** Menu	
212	Click on the **Save** Button to save the current model.	
213	Set File name to	*"Simergy102-Lesson5"*
214	Go To Systems Workspace	
215	In the Systems Creator	
216	In the template dropdown select	"Default Load Calculation"
217	Click on **Generate Systems**	
218	Go to the **Simulate** Workspace	
219	In the EnergyPlus ribbon menu	
220	In the lower right palette	
221	Click on **Run Simulation**	
222	In the **Project** workspace	
223	In the Project Information palette	
224	Select the "Detailed zones" design alternative and click on the **Copy** button	
225	Rename the Design Alternative 1 to	*"Detailed geometry"*
226	Go To Custom Openings	
227	For each façade adjust the windows accordingly:	





228	Select all other walls one by one and correct the window placements according to the following screenshots	
229	Window A  	Window B  	Door C 

230	Window D 	Window E  Window F 
231	Door G 	Window H 
232	Window I 	
233	Go To Create/Edit Buildings	
234	Select Building Story A-2, right click and Copy	
235	Go To Zone Grouping	
236	Ensure that all thermal zones are part of the office Zone Group	
237	Go To Systems Workspace	
238	In the Systems Creator	
239	In the template dropdown select	“Default Load Calculation”

240	Click on **Generate Systems**	
241	Click on the **File** Menu	
242	Click on the **SaveAs** Button to save the current model.	
243	Set **File name** to	*"Simergy102-Lesson5b"*
244	Go to the **Simulate** Workspace	
245	In the **EnergyPlus** ribbon menu	
246	In the lower right palette	
247	Click on **Run Simulation**	
	Lesson 6: Results	
248	Go To Reports workspace	
249	Select the Project Comparison report	
250	Select the 4 different geometry variations	
251	From Basic geometry, Simplified geometry to Detailed Zoning, the actual floor area decreases due to the additional internal walls. Hence the internal loads decrease. Since the simulation is in a cold climate, missing internal loads increase the space heating and reduce the space cooling. The window wall ratio increases for the detailed geometry alternative compared to the other three (we have increased most of the window areas in lesson 5). This leads to higher heating loads due to higher heat losses through the windows in the winter and higher cooling loads due to higher gains in summer.	

Project Comparison

Basic geometry | EnergyPlus-Configuration 1 | SimRun1 — Calculated at YMD=2021.05.19 15:59

Project Name: Training102-Lesson5b.simp — Simergy Version: v4.0.2

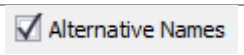
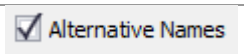
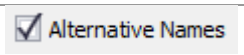
Alternative Energy End Use and Demand Comparison

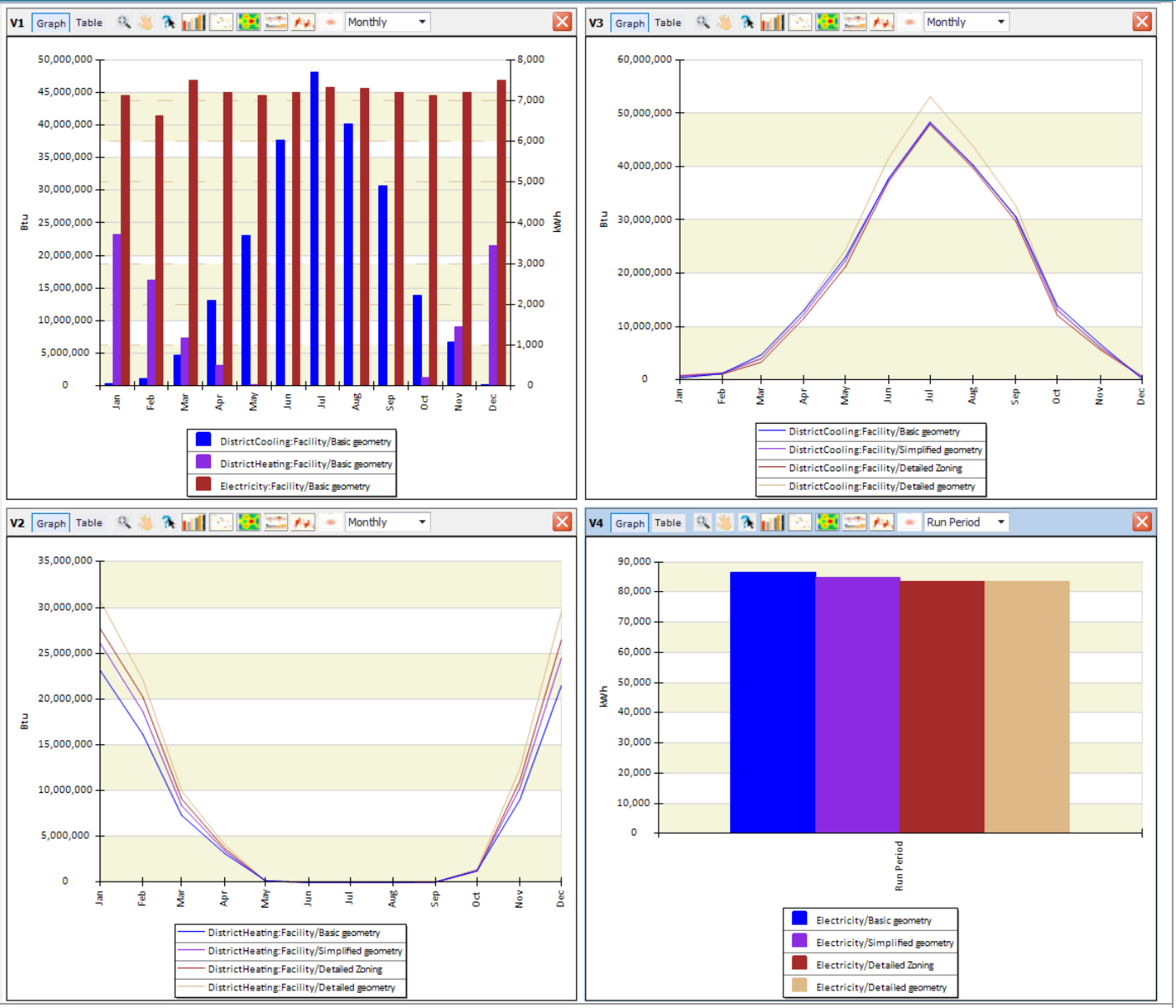
Energy Usage	Basic geometry | EnergyPlus-Configuration 1 | SimRun1		Simplified geometry | EnergyPlus-Configuration 1 | SimRun1		Detailed Zoning | EnergyPlus-Configuration 1 | SimRun1		Detailed geometry | EnergyPlus-Configuration 1 | SimRun1	
	Total Energy End Use (kWh)	Electric Demand (kW)	Total Energy End Use (kWh)	Electric Demand (kW)	Total Energy End Use (kWh)	Electric Demand (kW)	Total Energy End Use (kWh)	Electric Demand (kW)
Space Cooling	64,317	0	63,647	0	61,692	0	68,883	0
Space Heating	23,958	0	27,175	0	29,208	0	32,378	0
Heat Rejection	0	0	0	0	0	0	0	0
Fans	0	0	0	0	0	0	0	0
Pumps	0	0	0	0	0	0	0	0
Humidification	0	0	0	0	0	0	0	0
Heat Recovery	0	0	0	0	0	0	0	0
Interior Receptacles	46,217	9.19	45,344	9.01	44,567	8.86	44,567	8.86
Exterior Receptacles	0	0	0	0	0	0	0	0
Interior Lighting	40,233	12.25	39,475	12.02	38,797	11.81	38,797	11.81
Exterior Lighting	0	0	0	0	0	0	0	0
Service Water Heating	0	0	0	0	0	0	0	0
Refrigeration	0	0	0	0	0	0	0	0
Site Power Generation	0	0	0	0	0	0	0	0
Grand Total	174,728	21.44	175,642	21.03	174,264	20.67	184,625	20.67

252	Overall, the difference between the total energy end use is about 5.7%, which is very small considering early design data uncertainties.	
253	Go To Results Visualization workspace	

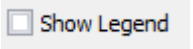
How do the different geometry models compare?

254	Press the button **New from Scratch**	

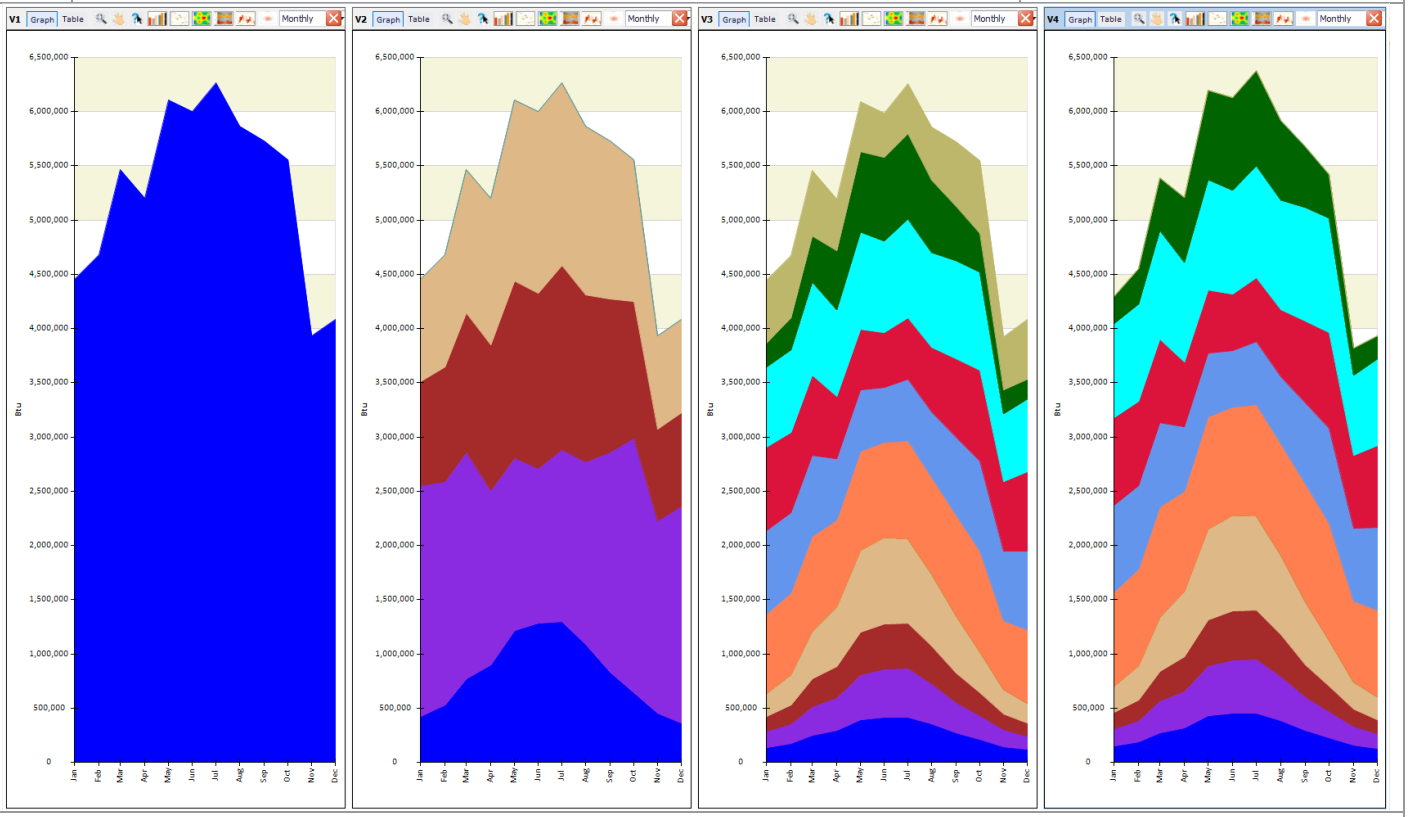
255		Filter the Environment column to include only annual runs (only needed if you select a simulation template with design days)	
256		Filter the Alternative column to include only	• *Basic geometry* • *Simplified geometry* • *Detailed Zoning* • *Detailed geometry*
257		Filter the Name column by typing	*":Facility"*
258		Select the view with 4 graphs	
259		Add the following variables of the Basic geometry alternative to View 1	• *DistrictCooling:Facility* • *DistricHeating:Facility* • *Electricity:Facility*
260		Add the following variable of all alternatives to View 2	• *DistrictCooling:Facility*
261		Add the following variable of all alternatives to View 3	• *DistricHeating:Facility*
262		Add the following variable of all alternatives to View 4	• *Electricity:Facility*
263		For View 1: Change the time interval to	*"Monthly"*
264		For View 1: Change the graph type to	*2D bar chart* 
265		For View 1: Right click – Properties – Check the **Alternative Names** checkbox in the **Name Composition** area	
266		For View 2: Change the time interval to	*"Monthly"*
267		For View 2: Right click – Properties – Check the **Alternative Names** checkbox in the **Name Composition** area	
268		For View 3: Change the time interval to	*"Monthly"*
269		For View 3: Right click – Properties – Check the **Alternative Names** checkbox in the **Name Composition** area	
270		For View 4: Change the time interval to	*"RunPeriod"*
271		For View 4: Change the graph type to	*2D bar chart* 
272		For View 4: Right click – Properties – Check the **Alternative Names** checkbox in the **Name Composition** area	
273		View 1: Shows the monthly cooling and heating as well as electricity consumption for the Basic geometry as an example. View 2: Illustrates the differences between the 4 alternatives in terms of heating. View 3: Illustrates the differences between the 4 alternatives in terms of cooling. View 4: Shows the electric consumption total over the 4 alternatives, alongside the reduced floor area the electric consumption (just plug loads and lighting).	
274		Click on **Save** to save your graphs (with **Rename** you could specify a proper name for this graph configuration)	



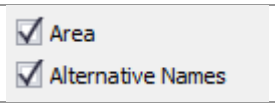
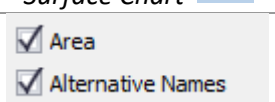
Is there a difference in solar radiation between the 4 geometric alternatives?

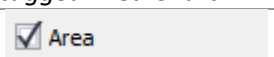
275	Press the button **New from Scratch**	
276	Filter the Name column by typing	*"Zone Windows Total"*
277	Filter the Area column by typing (to preselect all zones of the first story)	*"A.A.1"*
278	Select the view with 4 graphs	
279	Add the following variable of all first floor zones to each of the 4 graphs of both alternatives to View 1	*"Zone Windows Total Transmitted Solar Radiation Energy"*
280	For all views: Change the time interval to	*"Monthly"*
281	For all views: Change the graph type to	*Stacked Area Chart* 
282	For all views: Right click – Properties – Uncheck the **Show Legend** checkbox	

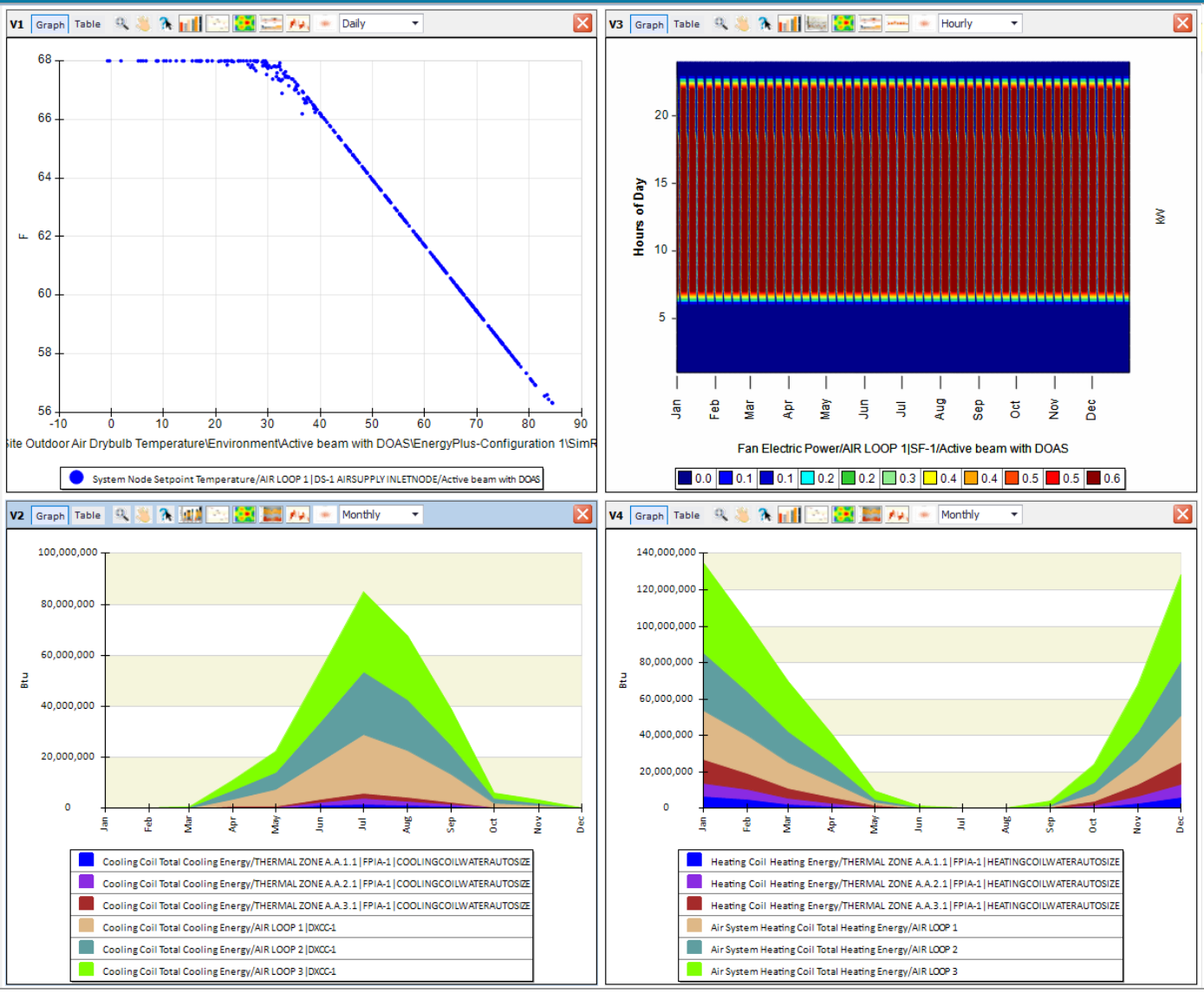
283	We can see that the first 3 views all have the same overall pattern (which was expected). They also nicely show that the solar radiation is distributed over more zones as we add more detail to the model. View 4 does show a slightly increased maximum value for solar radiation, but the overall pattern is the same and the increase not dramatic.	
284	Click on **Save** to save your graphs (with **Rename** you could specify a proper name for this graph configuration)	



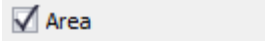
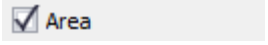
Are the air loops working as expected in the active beam system?

285	Press the button **New from Scratch**	
286	Select the view with 4 graphs	
287	Filter the Alternative column to include only	• *Active beam with DOAS*
288	Filter the Name column by typing	*"setpoint"*
289	Add the following variable of Air Loop 1 to View 1	*"System Node Setpoint Temperature"*
290	View 1: Change the graph type to	*Scatter Chart* 
291	For View 1: Right click – Properties – Check the **Area** and **Alternative Names** checkboxes in the **Name Composition** area	
292	Add the following variable of Air Loop 1|SF-1 to View 3	*"Fan Electric Power"*
293	For View 3: Change the graph type to	*Surface Chart* 
294	For View 3: Right click – Properties – Check the **Area** and **Alternative Names** checkboxes in the **Name Composition** area	
295	Add the following variables for all cooling coils to View 2	*"Cooling Coil Total Cooling Energy"*

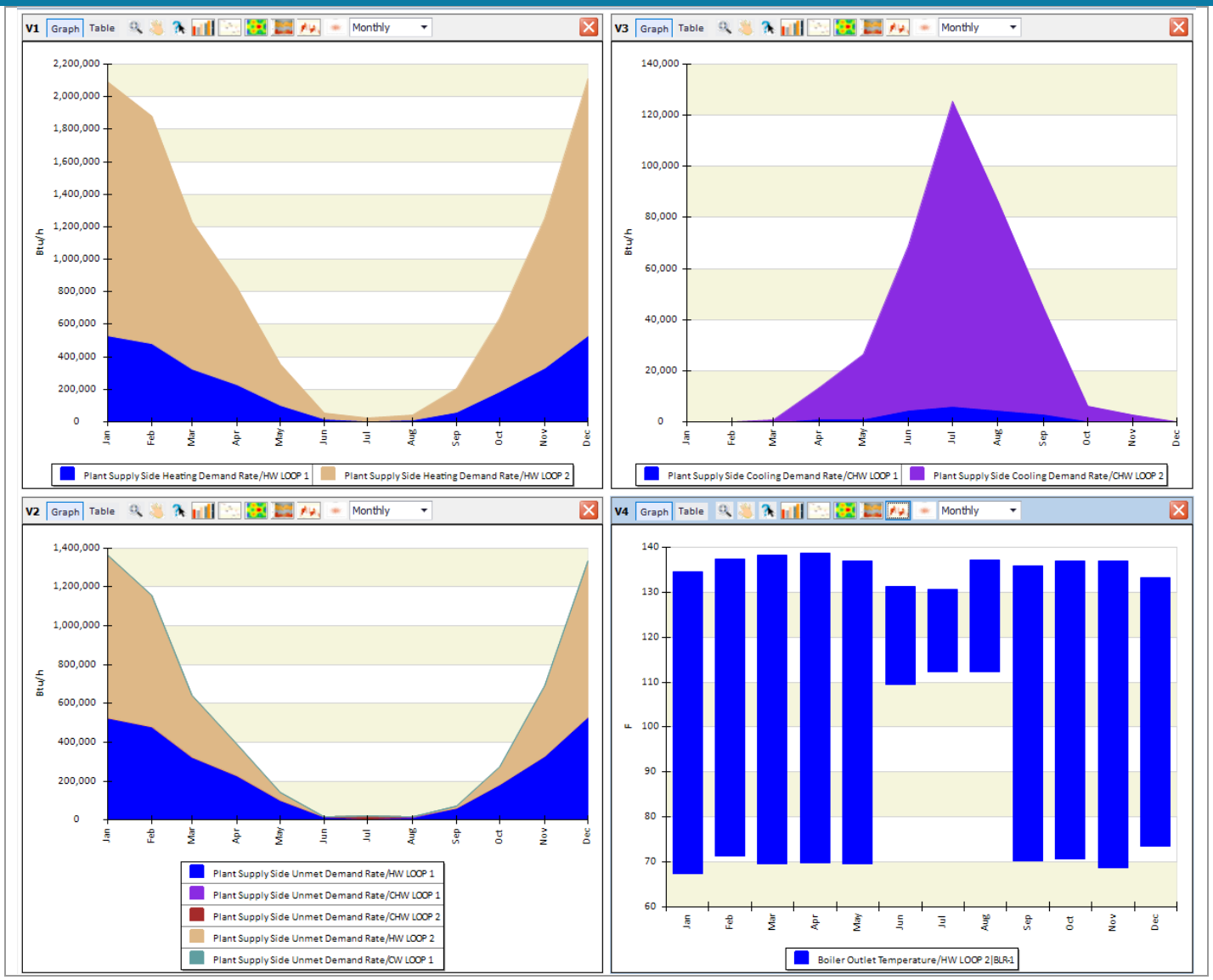
296	For View 2: Change the graph type to	*Stagged Area Chart* 
297	For View 2: Right click – Properties – Check the checkbox in the **Name Composition** area	
298	For View 2: Change the time interval to	*"Monthly"*
299	Add the following variables for all heating coils and air loops to View 4	*"Heating Coild Heating Energy"* *"Air System Heating Coil Total Heating Energy"*
300	For View 4: Change the graph type to	*Stagged Area Chart* 
301	For View 4: Right click – Properties – Check the checkbox in the **Name Composition** area	
302	For View 4: Change the time interval to	*"Monthly"*
303	View 1 shows the dependence of the air supply temperature setpoint of the outside air temperature as specified. View 2 shows the regular patter of the fans running from the morning to the evening for all weekdays. View 3 and 4 show the cooling respective heating energy for all coils to look at the different proportions of the active beam coils versus the air loop coils. From those views it appears that the loop coils have the higher impact on the system compared to the active beam coils.	
304	Click on **Save** to save your graphs (with **Rename** you could specify a proper name for this graph configuration)	



Are the water loops behaving as anticipated in the water-based alternative?

305	Press the button **New from Scratch**	
306	Select the view with 4 graphs	
307	Filter the Alternative column to include only	*Active beam with DOAS water*
308	Filter the Name column by typing	*"demand"*
309	Add the following variable of the HW Loops to View 1	*"Plant Supply Side Heating Demand Rate"*
310	For View 1: Change the time interval to	*"Monthly"*
311	For View 1: Change the graph type to	*Stagged Area Chart* 
312	For View 1: Right click – Properties – Check the checkbox in the **Name Composition** area	
313	Add the following variable of the CHW Loops to View 3	*"Plant Supply Side Cooling Demand Rate"*
314	For View 3: Change the graph type to	*Stagged Area Chart* 
315	For View 3: Right click – Properties – Check the checkbox in the **Name Composition** area	

316	Add the following variables for all loops to View 2	*"Plant Supply Side Unmet Demand Rate"*
317	For View 2: Change the graph type to	*Stagged Area Chart* 
318	For View 2: Right click – Properties – Check the checkbox in the **Name Composition** area	
319	For View 2: Change the time interval to	*"Monthly"*
320	Add the following variable of BLR-1 to View 4	*"Boiler Outlet Temperature"*
321	For View 4: Change the graph type to	*2D Floating Bar Chart* 
322	For View 4: Right click – Properties – Check the checkbox in the **Name Composition** area	
323	For View 4: Change the time interval to	*"Monthly"*
324	View 1 and 2 show the heating respective cooling demand of the cold and hot water loops. In both cases the second loop takes the higher load, which matches the observation before that the air loop coils take the higher load. View 3 show the unmet demand rate of all water loops. This is a useful variable o look at to find demand that is not met by the water loops, in our example both HW loops seem to have unmet demand. View 4 shows the Boiler Outlet temperature in a Floating Bar chart, so you can see the minimum and maximum values of the temperature for each month of the year.	
325	Click on **Save** to save your graphs (with **Rename** you could specify a proper name for this graph configuration)	


V1 Graph Table Monthly
Btu/h
2,200,000
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Plant Supply Side Heating Demand Rate/HW LOOP 1
Plant Supply Side Heating Demand Rate/HW LOOP 2
V3 Graph Table Monthly
Btu/h
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Plant Supply Side Cooling Demand Rate/CHW LOOP 1
Plant Supply Side Cooling Demand Rate/CHW LOOP 2
V2 Graph Table Monthly
Btu/h
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Plant Supply Side Unmet Demand Rate/HW LOOP 1
Plant Supply Side Unmet Demand Rate/CHW LOOP 1
Plant Supply Side Unmet Demand Rate/CHW LOOP 2
Plant Supply Side Unmet Demand Rate/HW LOOP 2
Plant Supply Side Unmet Demand Rate/CW LOOP 1
V4 Graph Table Monthly
F
140
130
120
110
100
90
80
70
60
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Boiler Outlet Temperature/HW LOOP 2|BLR-1