KNOWLEDGE SERIES

May | June | July 2019

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eds
environmental design solutions

Implementing Partner

LIT

CLACS

ECBC baseline generator

BUILDING PERFORMANCE TOOLS

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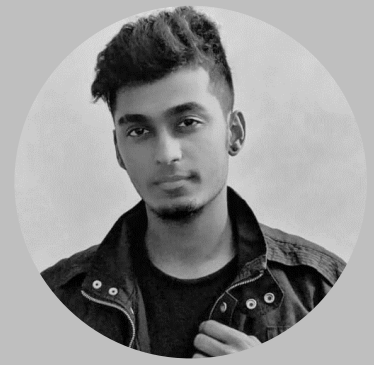

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M.Arch (Ongoing)
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Tools:

LIT:

Speeds up the day lighting simulation process for LEED compliance.

CLACS:

Tool which assists in designing Chiller Plants for buildings.

ECBC Baseline Generator:

The program uses an Energy Model file (idf) and creates code compliant baseline and proposed case energy model for compliance.

LIT

Tool to automate modelling and reporting of Daylight simulation for LEED compliance

Features

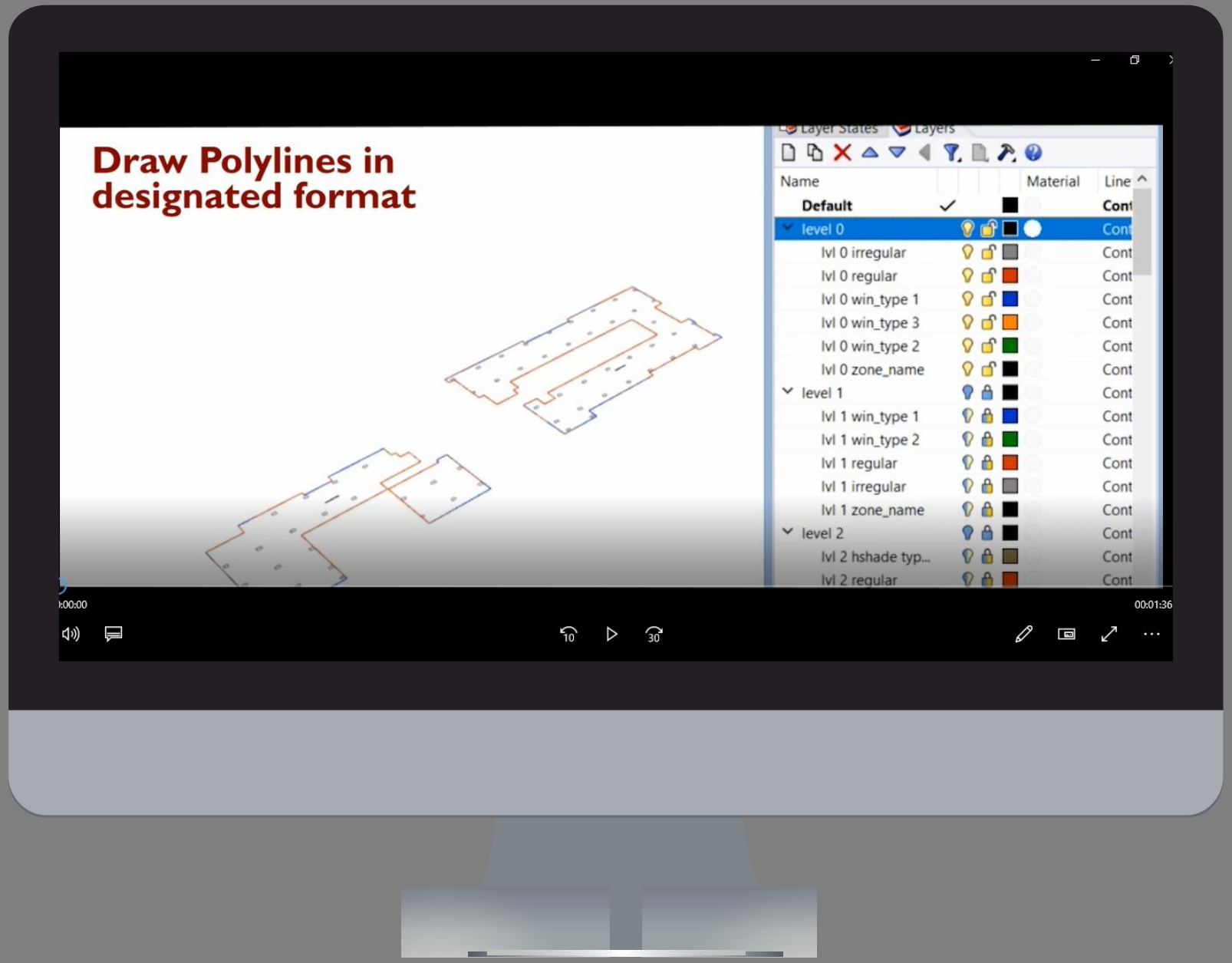
- Expedites the LEED Daylighting compliance process by upto 5 times
- Automates Geometry Generation
- Automates Reporting for LEED: No hassle of postprocessing
- Easy to navigate interface
- Can be used by amateurs without in-depth knowledge on Daylighting algorithms

Pain point 1:

Geometry Generation takes a too much Time. It involves the following steps:

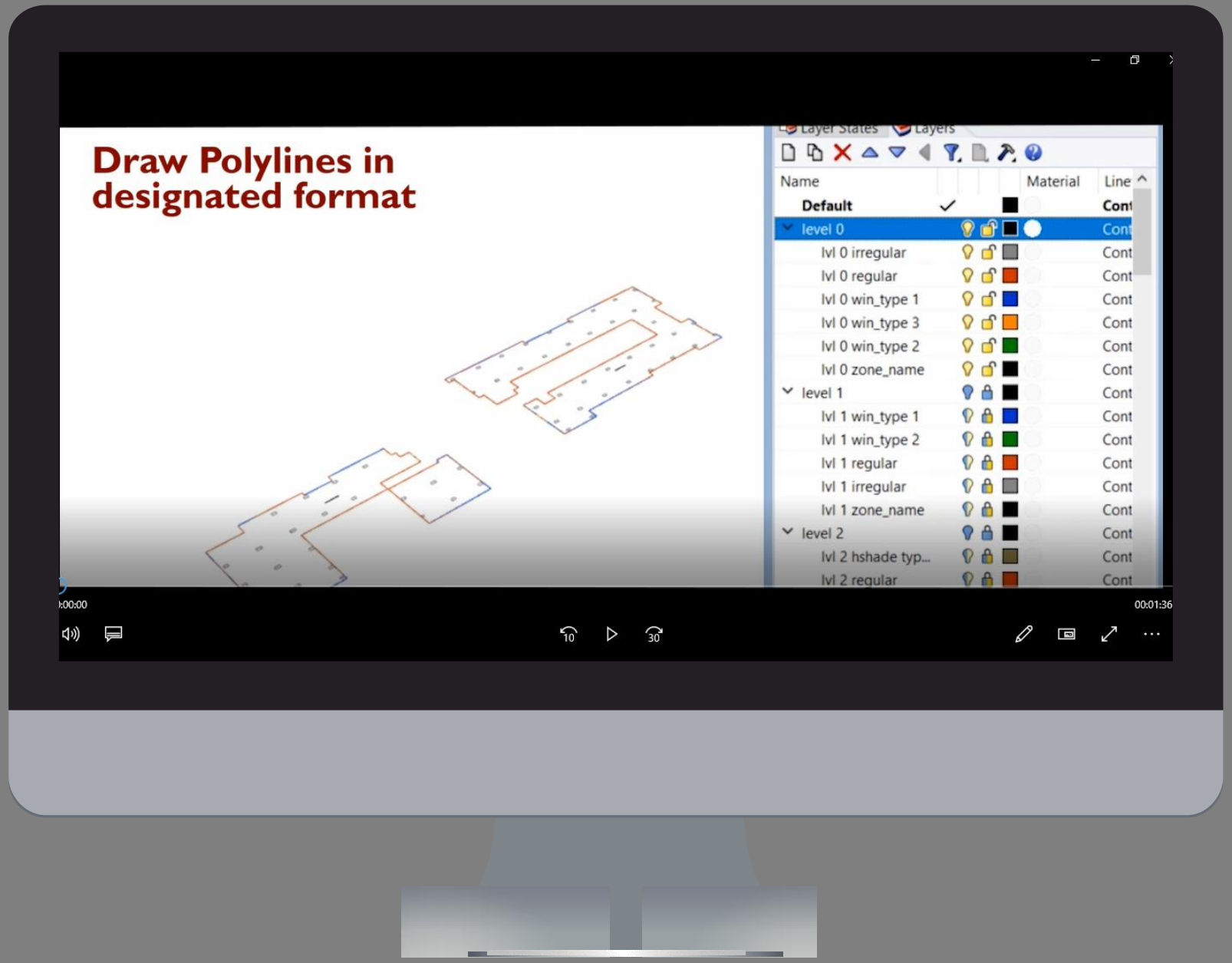
Solution

Geometry generation is automated by Layer data Mapping



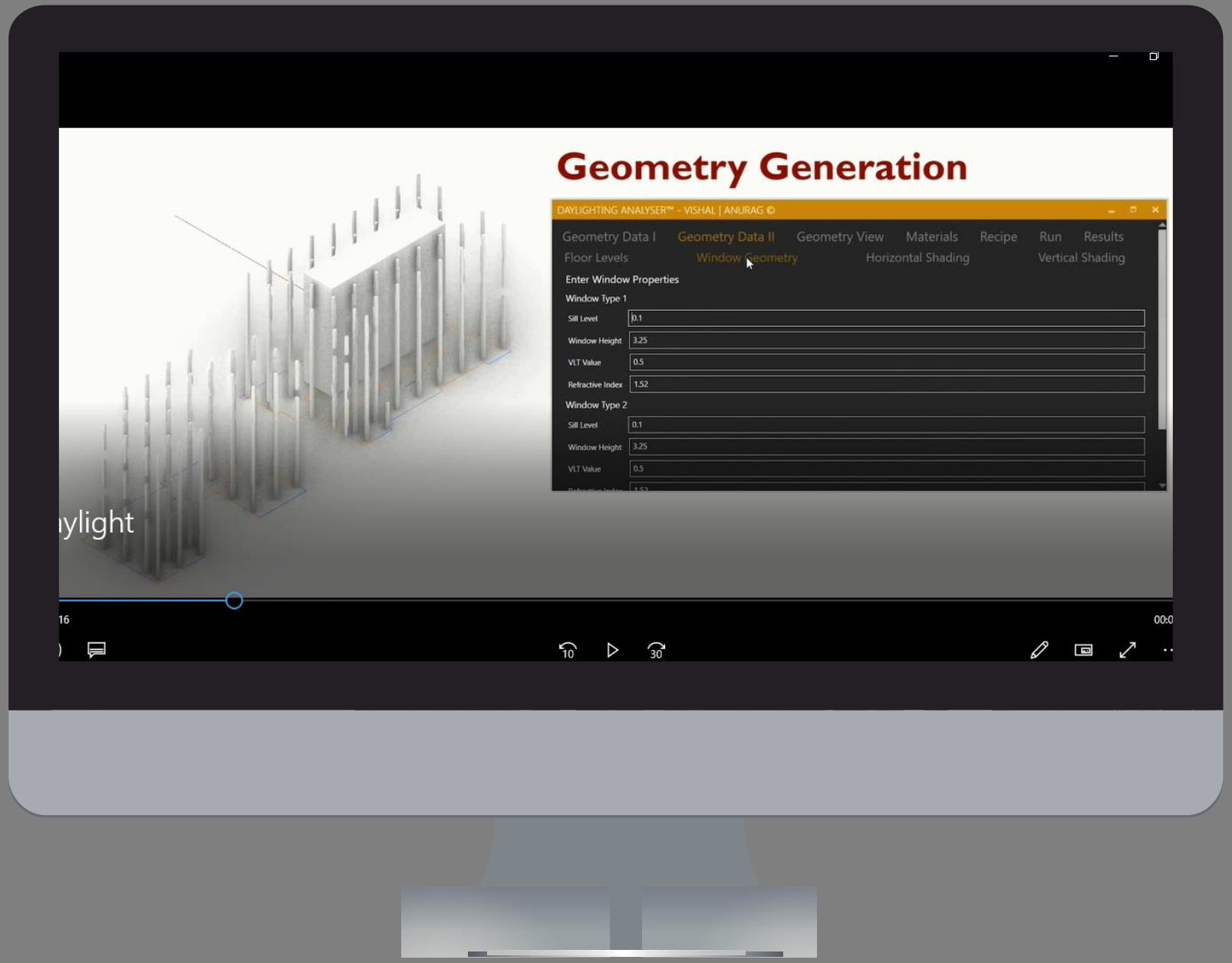
Process

1. User needs to draw polylines in designated layers



Process

2. Give dimensional inputs for Floor levels, Windows, Shading, etc



Process

3. Whole building Geometry is automatically created

Pain point 2:

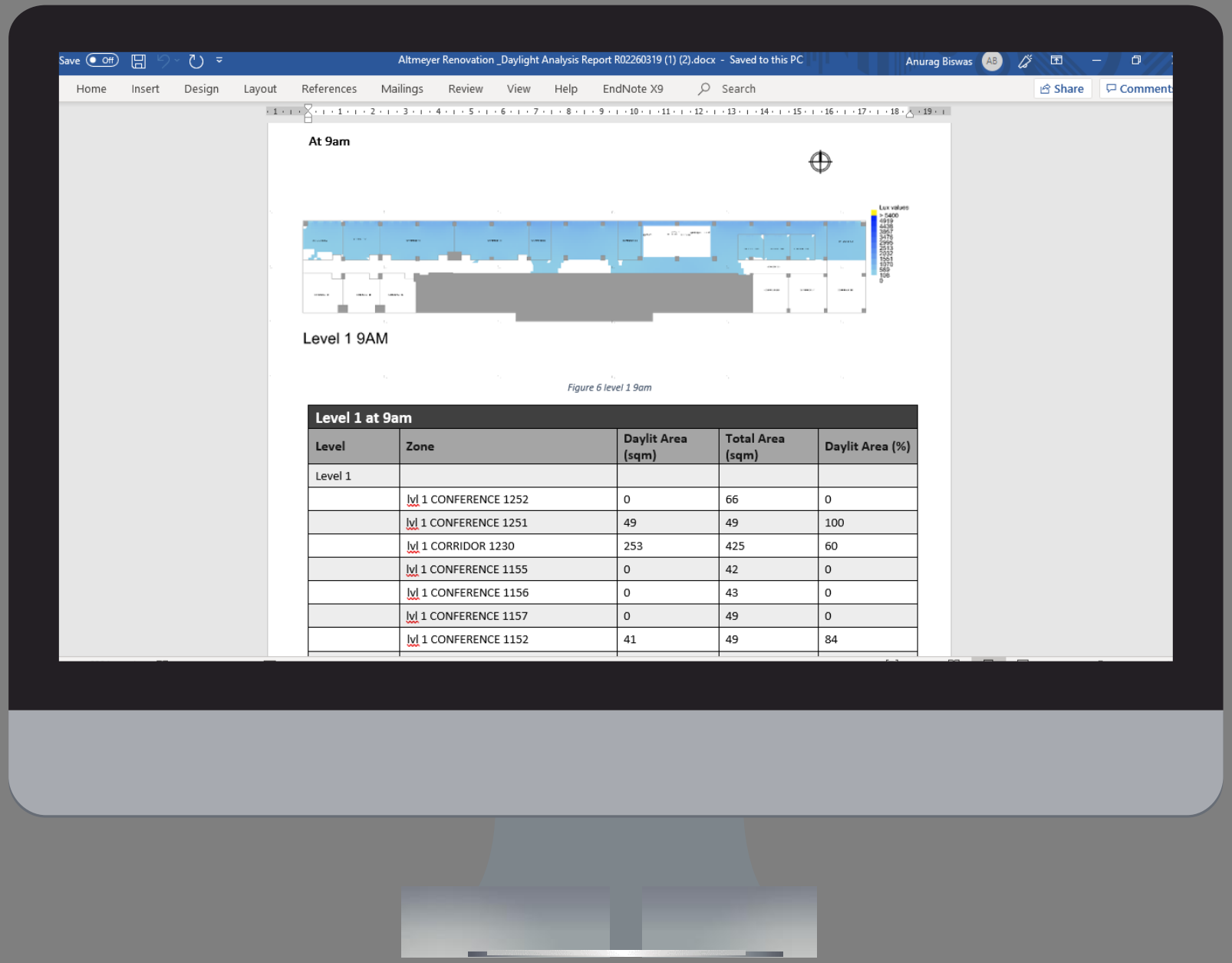
LEED compliance asks for **space by space** daylight reporting

However, most simulation software simulates Daylight **floor by floor.**

A lot of effort and time goes into **post-processing** the result

Solution

This tool generates formatted report, images and excel files which has **Space by Space** reporting



Level 1 at 9am				
Level	**Zone**	**Daylit Area (sqm)**	**Total Area (sqm)**	**Daylit Area (%)**
Level 1				
	lvl 1 CONFERENCE 1252	0	66	0
	lvl 1 CONFERENCE 1251	49	49	100
	lvl 1 CORRIDOR 1230	253	425	60
	lvl 1 CONFERENCE 1155	0	42	0
	lvl 1 CONFERENCE 1156	0	43	0
	lvl 1 CONFERENCE 1157	0	49	0
	lvl 1 CONFERENCE 1152	41	49	84

Pain point 3:

LEED Option 2 compliance Instructions dictates that we need to take clearest sky from 15 days of the Equinoxes for Daylight simulation.

To do it manually takes a lot of hard work and expert level knowledge

Solution

The inbuilt algorithm automatically creates the desired skyfile.

To find out Sky Clearness this Definition from core Radiance algorithm is used:

```
double sky_clearness()
{
        double value;

        value = ( (diffuseirradiance + directirradiance)/(diffuseirradiance) +
1.041*sunzenith*M_PI/180*sunzenith*M_PI/180*sunzenith*M_PI/180 ) / (1 +
1.041*sunzenith*M_PI/180*sunzenith*M_PI/180*sunzenith*M_PI/180) ;

        return(value);
}
```

Pain point 4:

Generally, other daylight simulation tools enable us to do Floor by Floor simulation

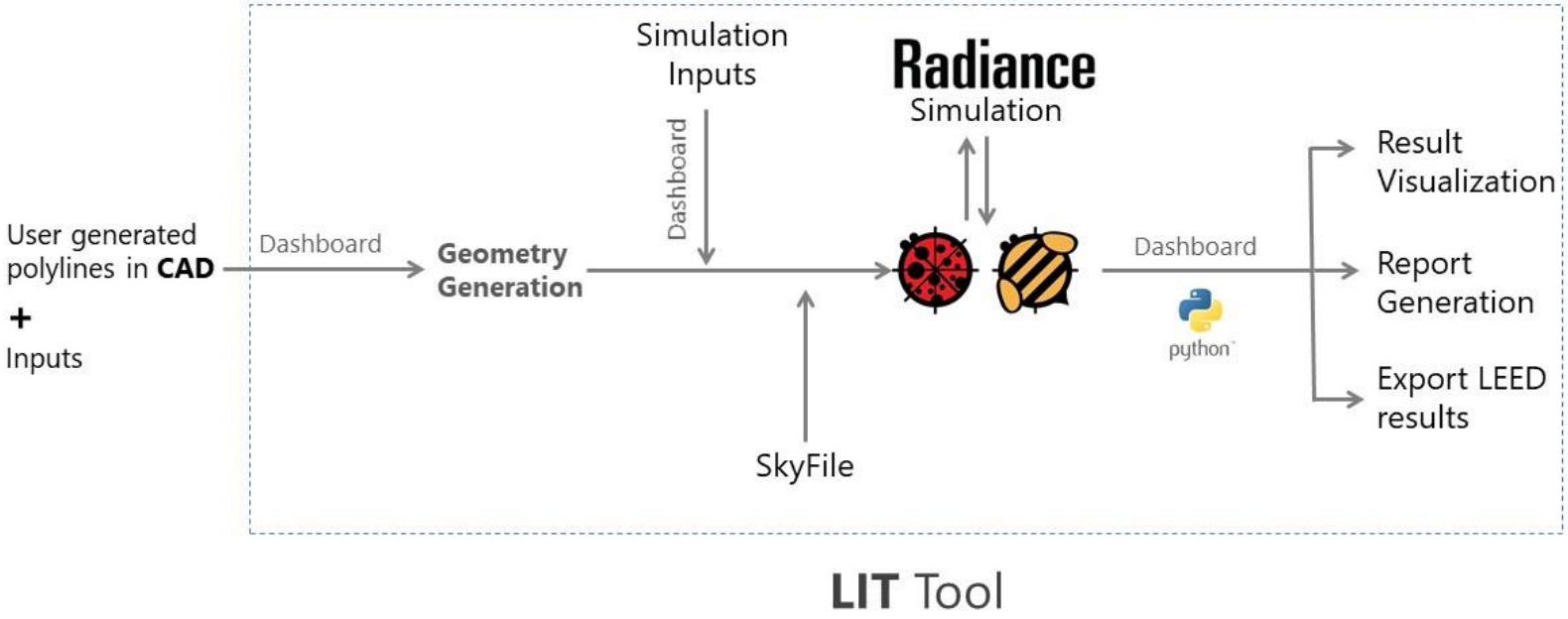
This takes simulation time for each floor.

Solution

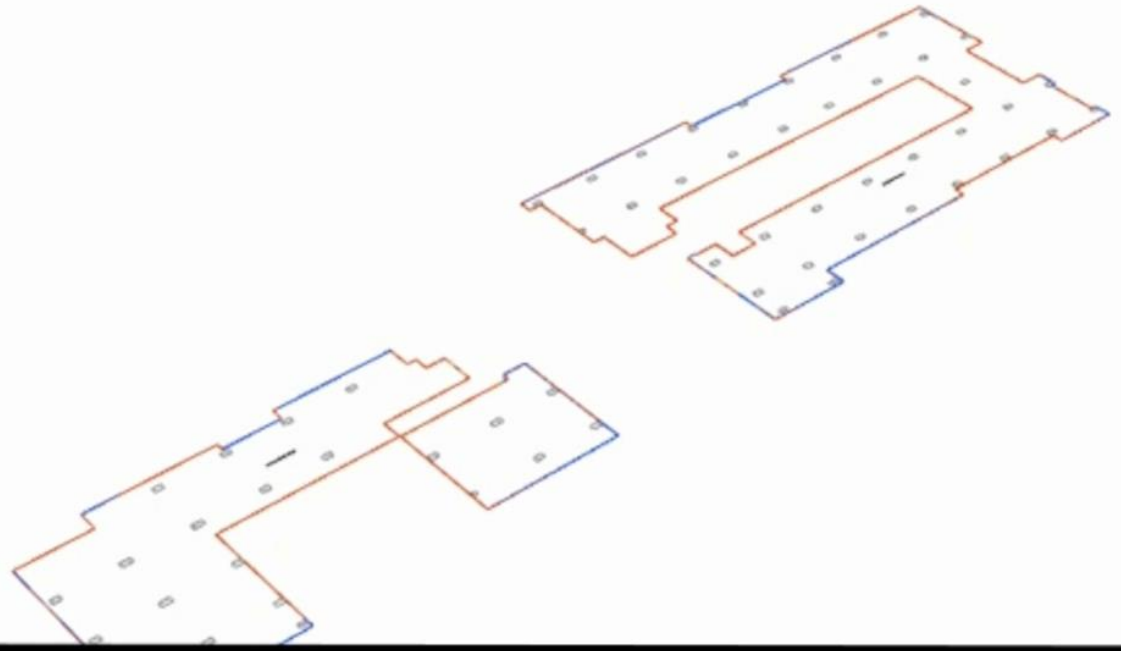
Only one simulation is needed as the **whole building** is simulated together.

This speeds up the total process.

WorkFlow


User generated polylines in CAD
+
Inputs
Dashboard
Geometry Generation
Simulation Inputs
Dashboard
Radiance Simulation
SkyFile
Dashboard
python
Result Visualization
Report Generation
Export LEED results
LIT Tool

Draw Polylines in designated format

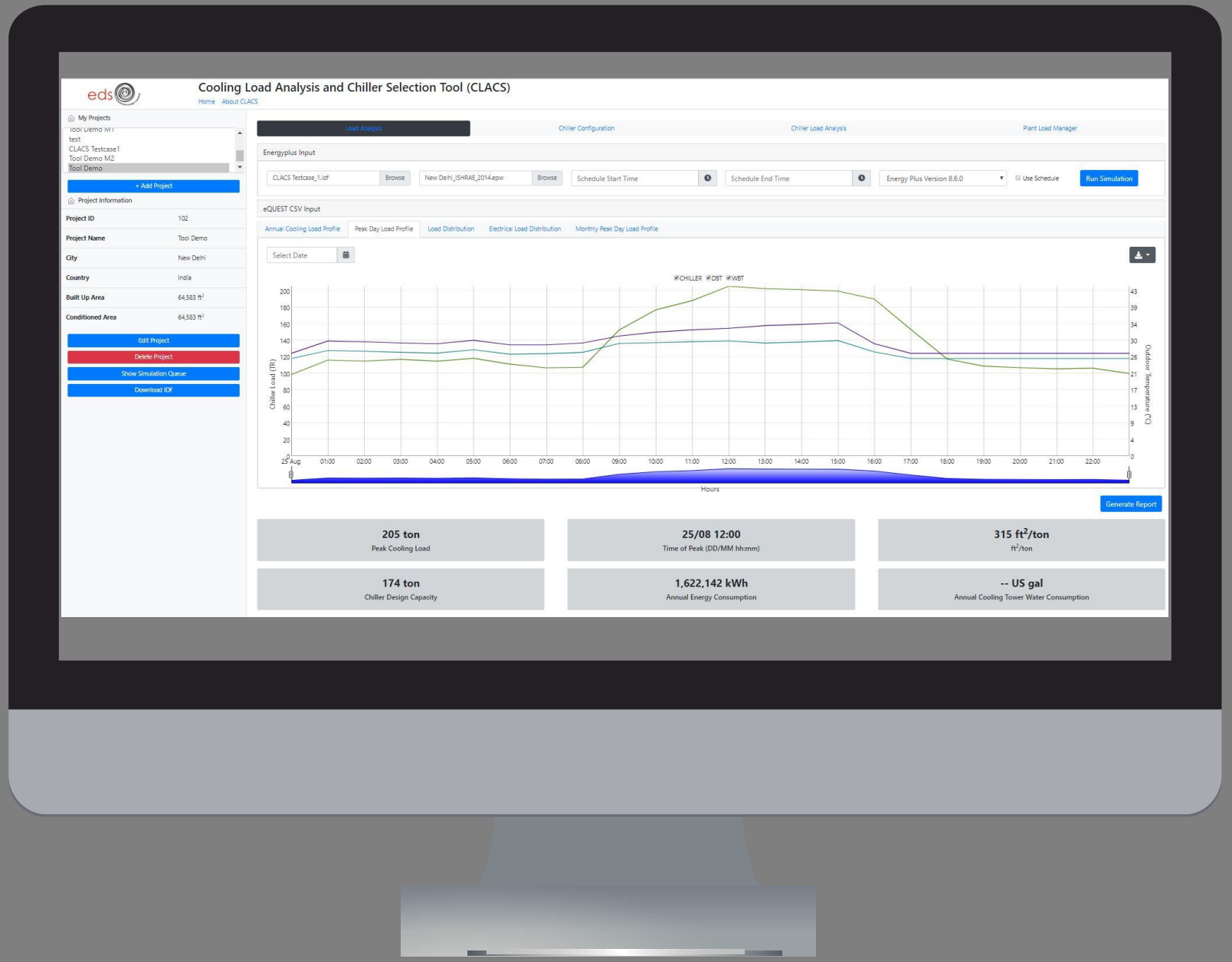


Layer States | Layers

Name	Material	Line
Default		Cont
level 0		Cont
lvl 0 irregular		Cont
lvl 0 regular		Cont
lvl 0 win_type 1		Cont
lvl 0 win_type 3		Cont
lvl 0 win_type 2		Cont
lvl 0 zone_name		Cont
level 1		Cont
lvl 1 win_type 1		Cont
lvl 1 win_type 2		Cont
lvl 1 regular		Cont
lvl 1 irregular		Cont
lvl 1 zone_name		Cont
level 2		Cont
lvl 2 hshade typ...		Cont
lvl 2 regular		Cont

CLACS

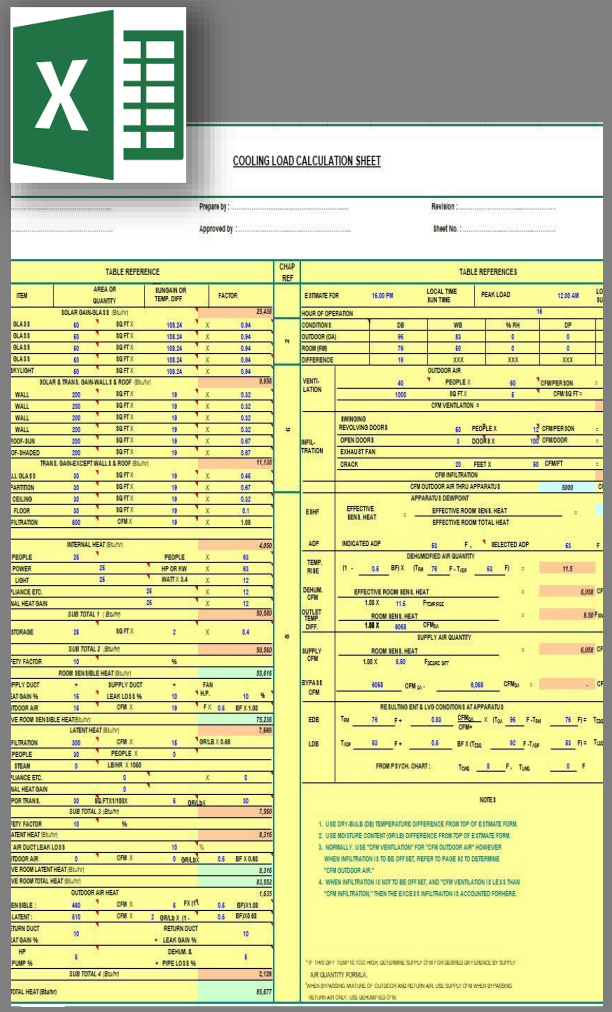
Tool which assists in designing Chiller Plants for buildings



Features

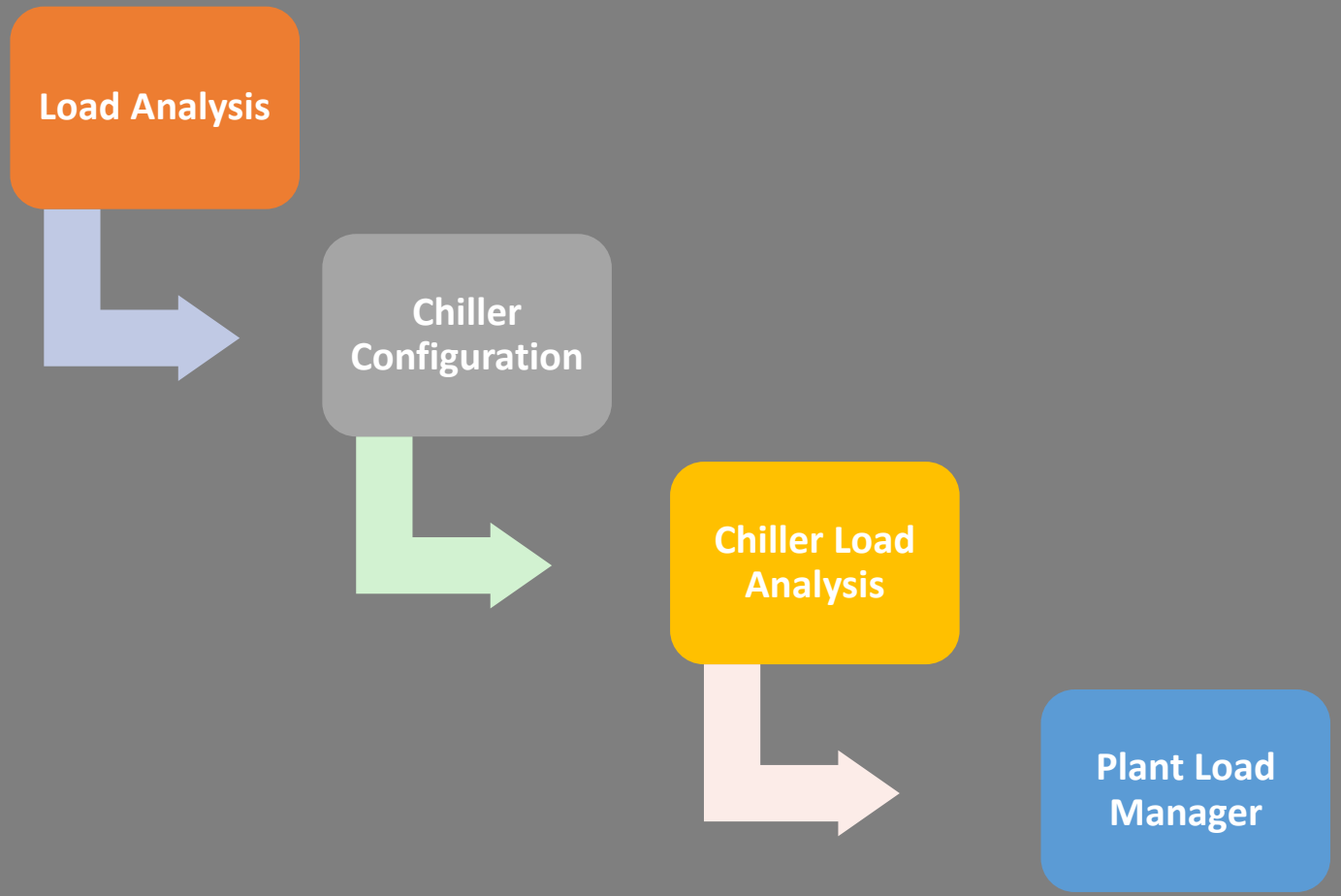
- Streamline & Automate the Process of HVAC Chiller Plant Design
- Perform Cloud based Simulation
- Automates Reporting
- Interactive

Pain point :



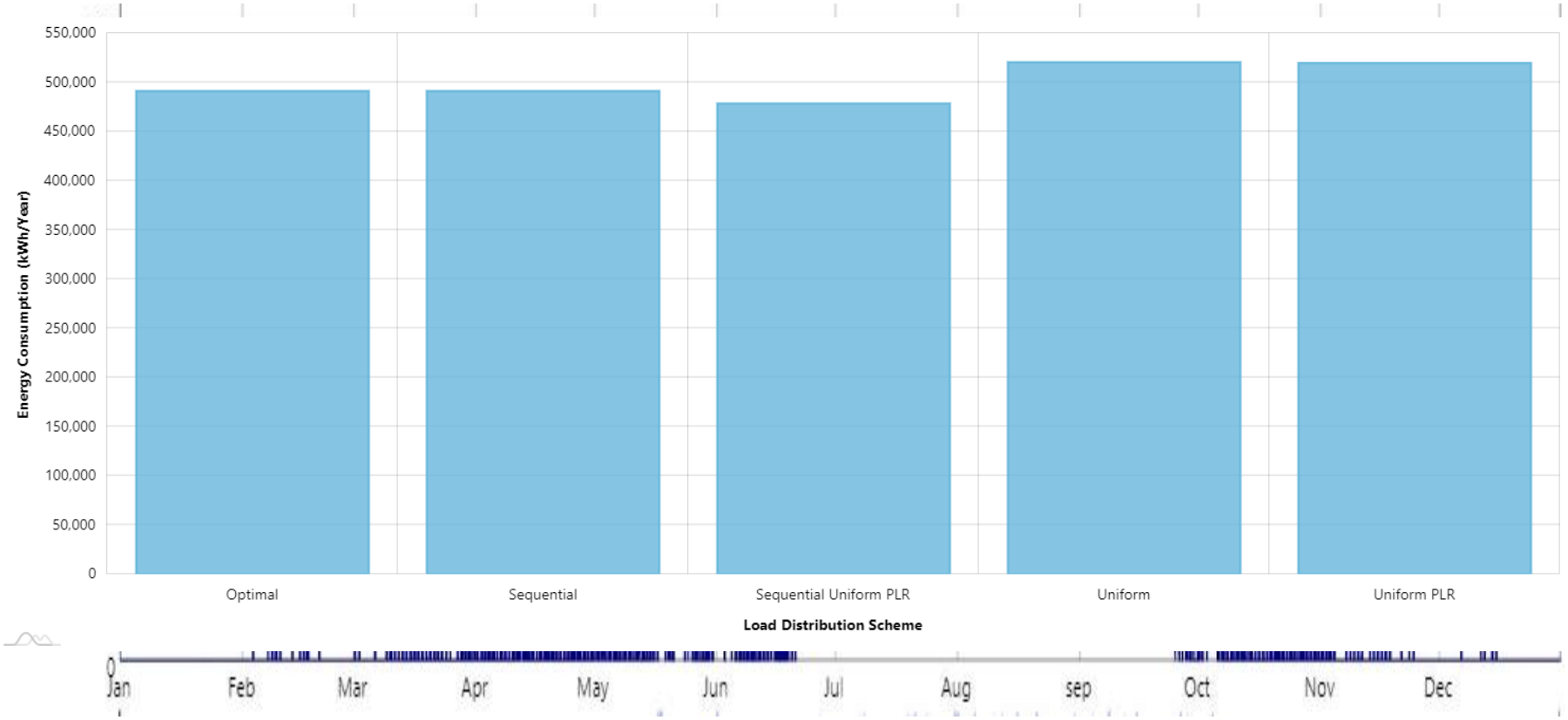
- Chiller Type
- Chiller Efficiency
- Chiller Part Load Performance

CLACS Modules



CLACS Modules

- Load Analysis
- Chiller Configuration
- Chiller Load Analysis
- Plant Load Manager



Input

.idf file

.epw file

User Workflow

Create a Project → Input → Simulation → Output

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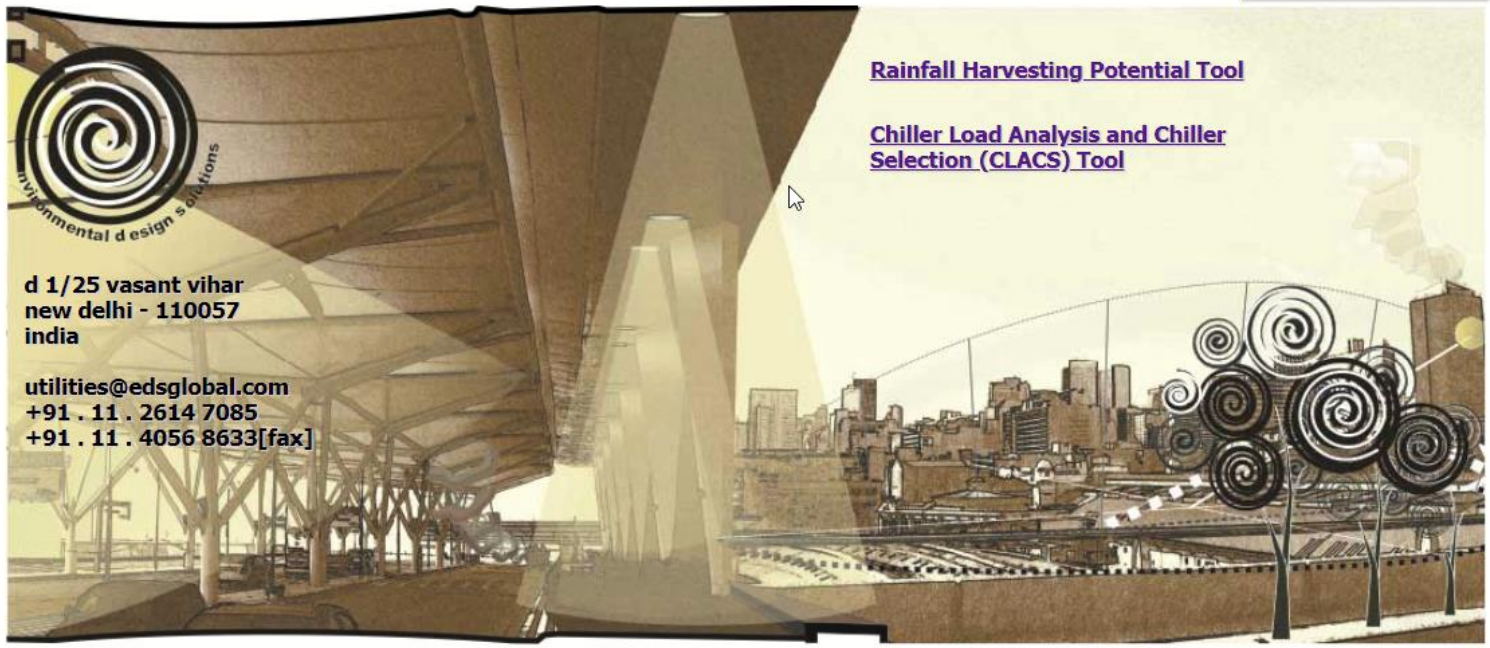


report (1).docx

Show all

Output

- Annual Cooling Load profile
- Peak Day Cooling Load Profile
- Cooling Load Bin Sizing
- Monthly Peak Day Load Profile

- Graphs Data can be exported in csv format

- Report Generation for Module 1 & Module 3

- Modified Energyplus input files can be download

ECBC Baseline Generator

Tool for automating ECBC compliance via Whole Building Performance Approach

Pain points

- Compliance documentation is a tedious and error prone process
- Energy Conservation Building Code (ECBC) is comprehensive and accommodates several use cases as exceptions.
- There is no platform for ECBC compliance automation in the public domain
- **ECBC COMPLIANCE IS MANDATORY, bridging this gap is essential.**

The Process

Rule-Sets

Prototypes

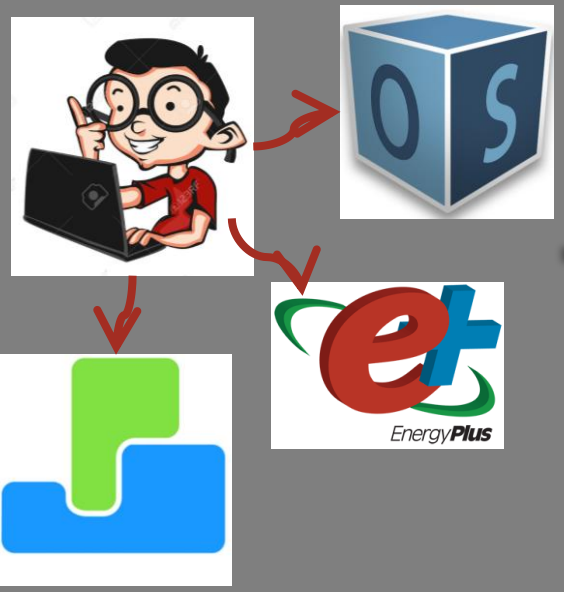
Database

Pseudo-code

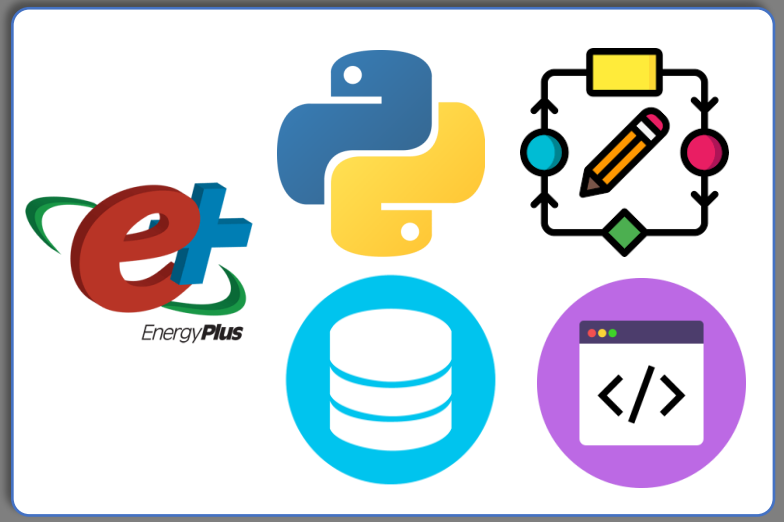
eppy

(Energy Plus for Python)

User Workflow



User Creates a Simulation model of the Designed Case on native E+, OS or DB following some naming conventions



The user created Input Definition File (IDF) is processed in the python utility which is essentially a collection of programmed rule-sets and database interacting with E+

User created IDF

System Sizing IDF

Baseline Case IDF

Proposed Case IDF

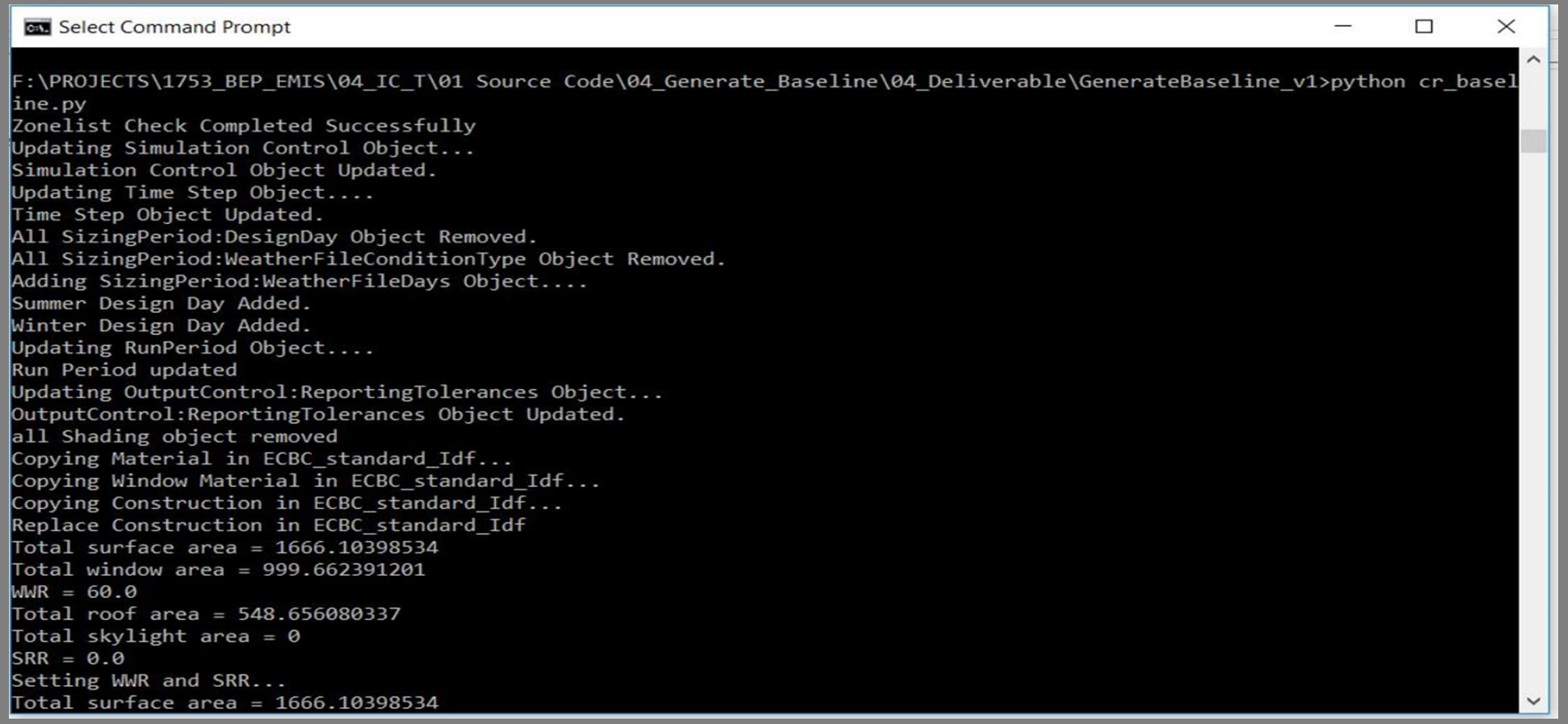
Input

- Weather File
- Compliance Level
- Location
- Proposed case IDF
- Over-sizing ratios and Temperature Set-points (Heating and Cooling)
- Special Conditions (Mandates for Air Cooled Chiller)
- Lighting Power Calculation Method

Automation

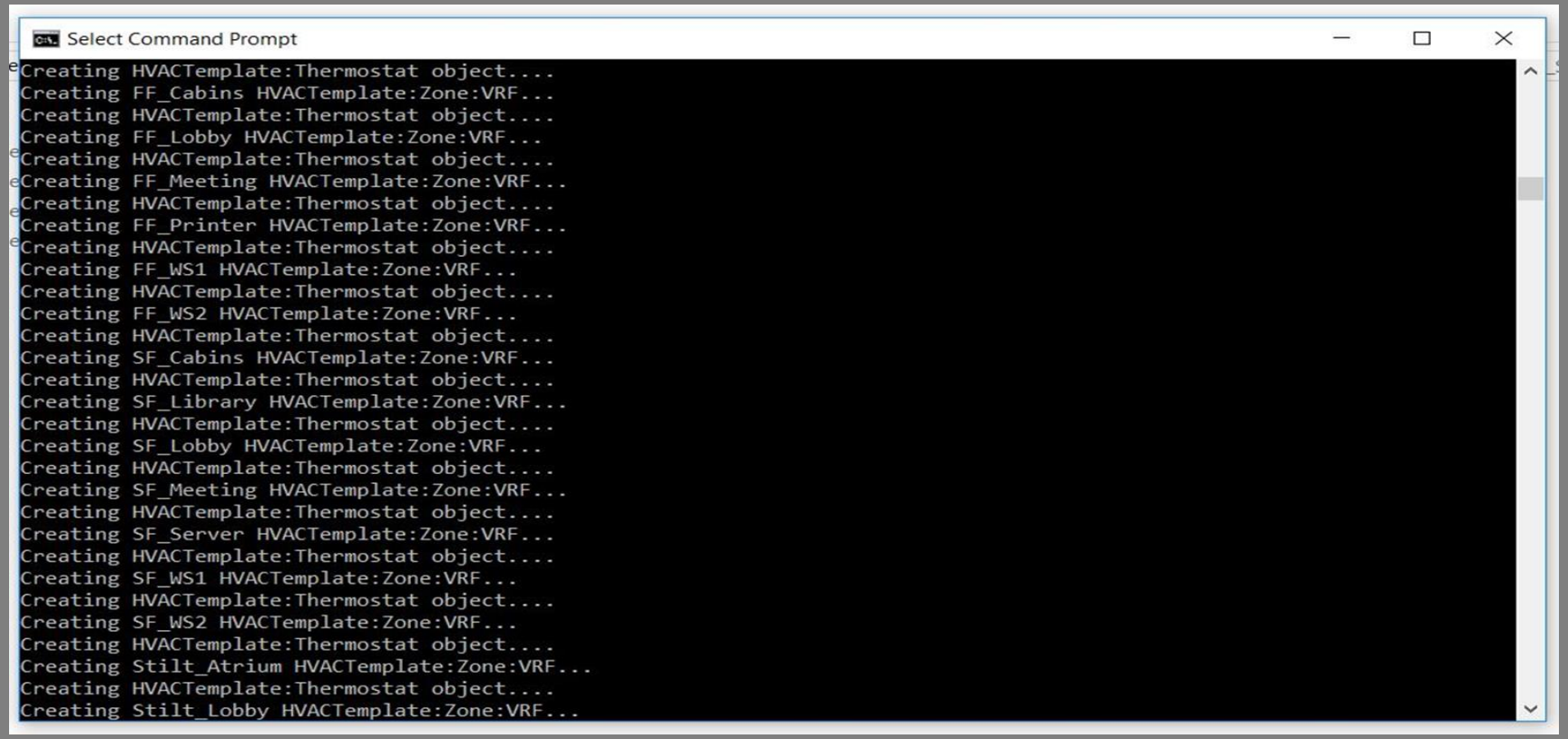
- Assignment of Mandatory and Prescriptive (as applicable) provisions for Baseline Case IDF
- Checking for Mandatory provisions in Proposed Case IDF
- Climate Zone mapping
- Baseline Envelope parameters
- Baseline HVAC System Mapping
- Baseline Lighting Systems
- etc.

Automation



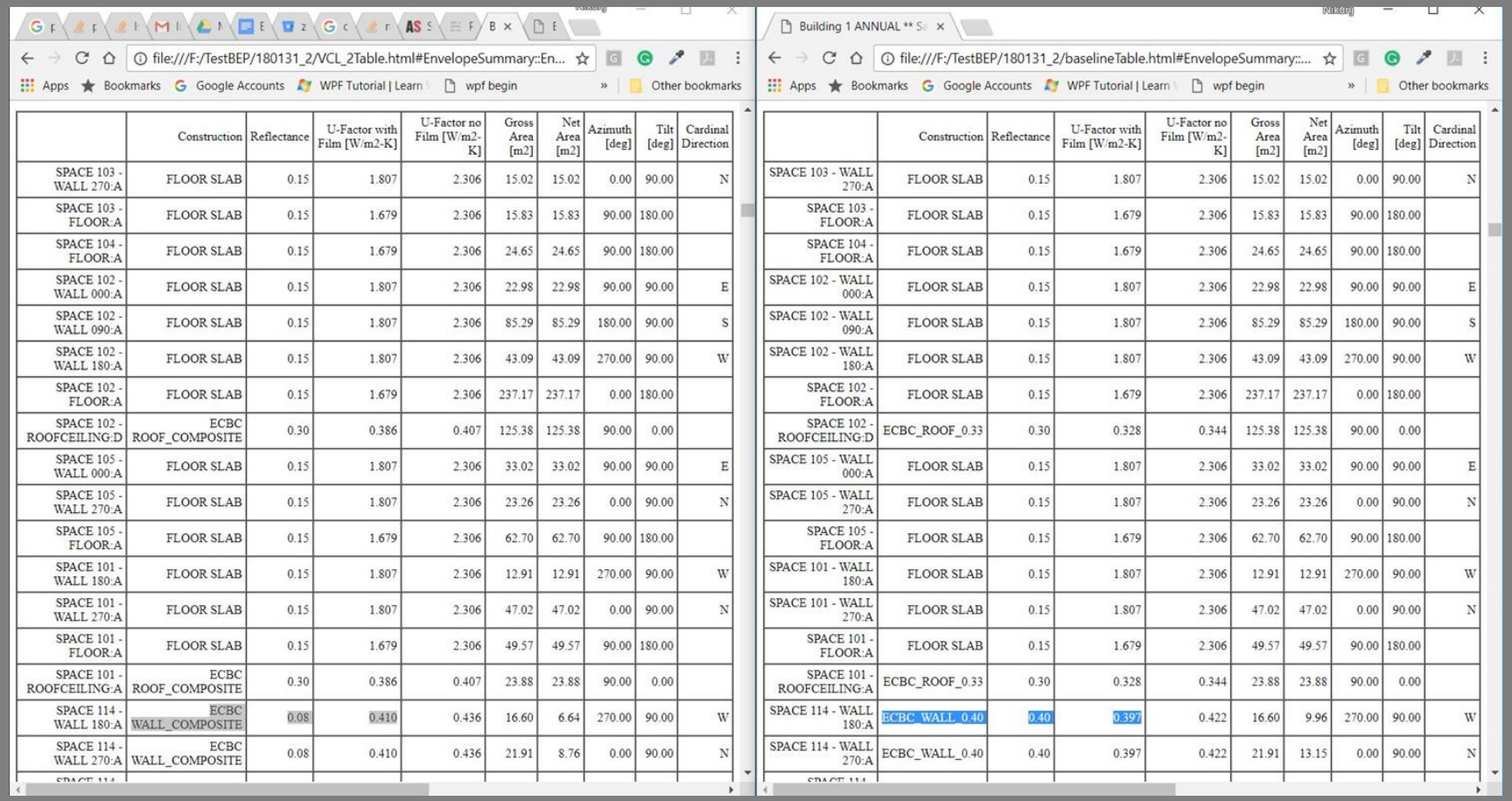
Setting simulation environment

Automation



Creating HVAC components

Output



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	Construction	Reflectance	U-Factor with Film [W/m2-K]	U-Factor no Film [W/m2-K]	Gross Area [m2]	Net Area [m2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction
SPACE 103 - WALL 270:A	FLOOR SLAB	0.15	1.807	2.306	15.02	15.02	0.00	90.00	N
SPACE 103 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	15.83	15.83	90.00	180.00	
SPACE 104 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	24.65	24.65	90.00	180.00	
SPACE 102 - WALL 000:A	FLOOR SLAB	0.15	1.807	2.306	22.98	22.98	90.00	90.00	E
SPACE 102 - WALL 090:A	FLOOR SLAB	0.15	1.807	2.306	85.29	85.29	180.00	90.00	S
SPACE 102 - WALL 180:A	FLOOR SLAB	0.15	1.807	2.306	43.09	43.09	270.00	90.00	W
SPACE 102 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	237.17	237.17	0.00	180.00	
SPACE 102 - ROOFCEILING:D	ECBC ROOF_COMPOSITE	0.30	0.386	0.407	125.38	125.38	90.00	0.00	
SPACE 105 - WALL 000:A	FLOOR SLAB	0.15	1.807	2.306	33.02	33.02	90.00	90.00	E
SPACE 105 - WALL 270:A	FLOOR SLAB	0.15	1.807	2.306	23.26	23.26	0.00	90.00	N
SPACE 105 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	62.70	62.70	90.00	180.00	
SPACE 101 - WALL 180:A	FLOOR SLAB	0.15	1.807	2.306	12.91	12.91	270.00	90.00	W
SPACE 101 - WALL 270:A	FLOOR SLAB	0.15	1.807	2.306	47.02	47.02	0.00	90.00	N
SPACE 101 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	49.57	49.57	90.00	180.00	
SPACE 101 - ROOFCEILING:A	ECBC ROOF_COMPOSITE	0.30	0.386	0.407	23.88	23.88	90.00	0.00	
SPACE 114 - WALL 180:A	ECBC WALL_COMPOSITE	0.08	0.410	0.436	16.60	6.64	270.00	90.00	W
SPACE 114 - WALL 270:A	ECBC WALL_COMPOSITE	0.08	0.410	0.436	21.91	8.76	0.00	90.00	N

Building 1 ANNUAL ** Su

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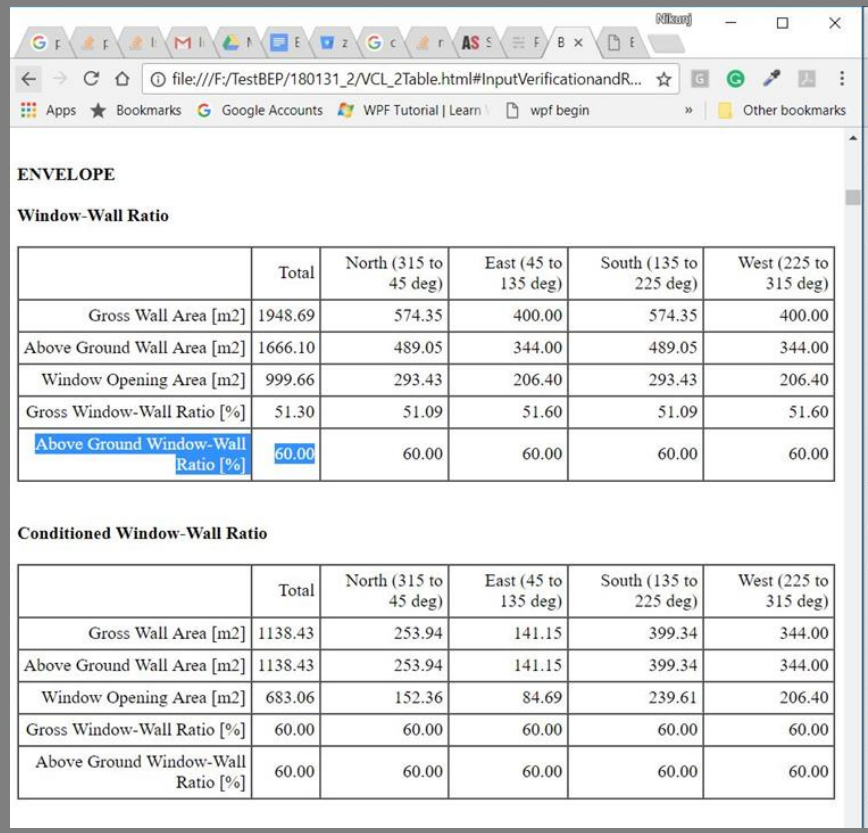
	Construction	Reflectance	U-Factor with Film [W/m2-K]	U-Factor no Film [W/m2-K]	Gross Area [m2]	Net Area [m2]	Azimuth [deg]	Tilt [deg]	Cardinal Direction
SPACE 103 - WALL 270:A	FLOOR SLAB	0.15	1.807	2.306	15.02	15.02	0.00	90.00	N
SPACE 103 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	15.83	15.83	90.00	180.00	
SPACE 104 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	24.65	24.65	90.00	180.00	
SPACE 102 - WALL 000:A	FLOOR SLAB	0.15	1.807	2.306	22.98	22.98	90.00	90.00	E
SPACE 102 - WALL 090:A	FLOOR SLAB	0.15	1.807	2.306	85.29	85.29	180.00	90.00	S
SPACE 102 - WALL 180:A	FLOOR SLAB	0.15	1.807	2.306	43.09	43.09	270.00	90.00	W
SPACE 102 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	237.17	237.17	0.00	180.00	
SPACE 102 - ROOFCEILING:D	ECBC_ROOF_0.33	0.30	0.328	0.344	125.38	125.38	90.00	0.00	
SPACE 105 - WALL 000:A	FLOOR SLAB	0.15	1.807	2.306	33.02	33.02	90.00	90.00	E
SPACE 105 - WALL 270:A	FLOOR SLAB	0.15	1.807	2.306	23.26	23.26	0.00	90.00	N
SPACE 105 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	62.70	62.70	90.00	180.00	
SPACE 101 - WALL 180:A	FLOOR SLAB	0.15	1.807	2.306	12.91	12.91	270.00	90.00	W
SPACE 101 - WALL 270:A	FLOOR SLAB	0.15	1.807	2.306	47.02	47.02	0.00	90.00	N
SPACE 101 - FLOOR:A	FLOOR SLAB	0.15	1.679	2.306	49.57	49.57	90.00	180.00	
SPACE 101 - ROOFCEILING:A	ECBC_ROOF_0.33	0.30	0.328	0.344	23.88	23.88	90.00	0.00	
SPACE 114 - WALL 180:A	ECBC_WALL_0.40	0.40	0.397	0.422	16.60	9.96	270.00	90.00	W
SPACE 114 - WALL 270:A	ECBC_WALL_0.40	0.40	0.397	0.422	21.91	13.15	0.00	90.00	N

Baseline envelope parameters

Output



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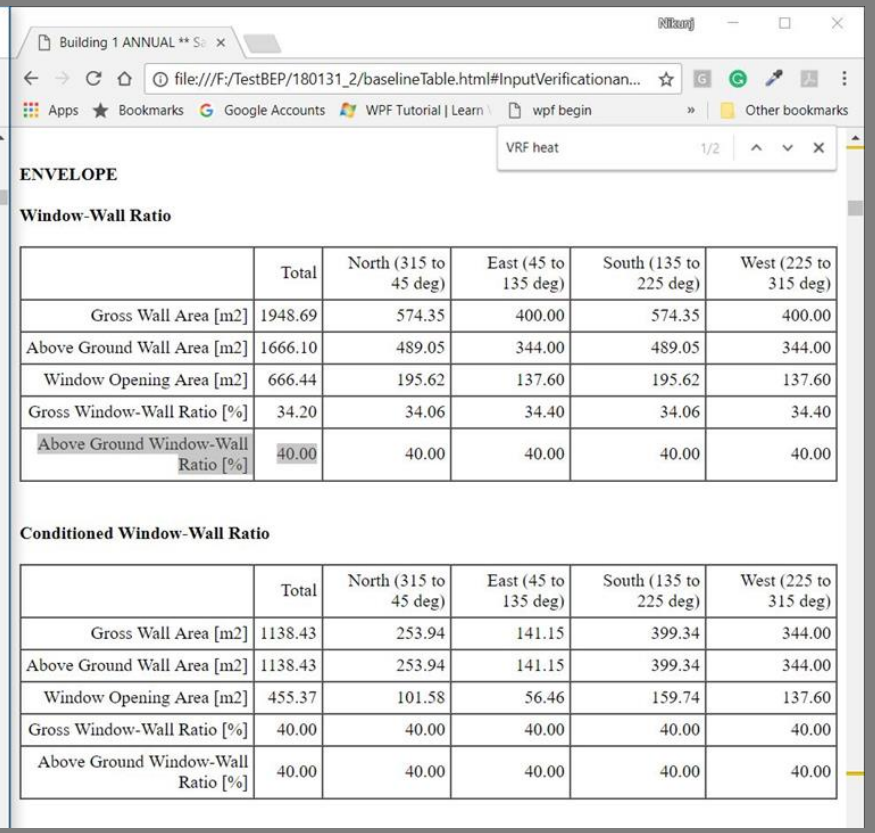
ENVELOPE

Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	1948.69	574.35	400.00	574.35	400.00
Above Ground Wall Area [m2]	1666.10	489.05	344.00	489.05	344.00
Window Opening Area [m2]	999.66	293.43	206.40	293.43	206.40
Gross Window-Wall Ratio [%]	51.30	51.09	51.60	51.09	51.60
Above Ground Window-Wall Ratio [%]	60.00	60.00	60.00	60.00	60.00

Conditioned Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	1138.43	253.94	141.15	399.34	344.00
Above Ground Wall Area [m2]	1138.43	253.94	141.15	399.34	344.00
Window Opening Area [m2]	683.06	152.36	84.69	239.61	206.40
Gross Window-Wall Ratio [%]	60.00	60.00	60.00	60.00	60.00
Above Ground Window-Wall Ratio [%]	60.00	60.00	60.00	60.00	60.00



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VRF heat 1/2

ENVELOPE

Window-Wall Ratio

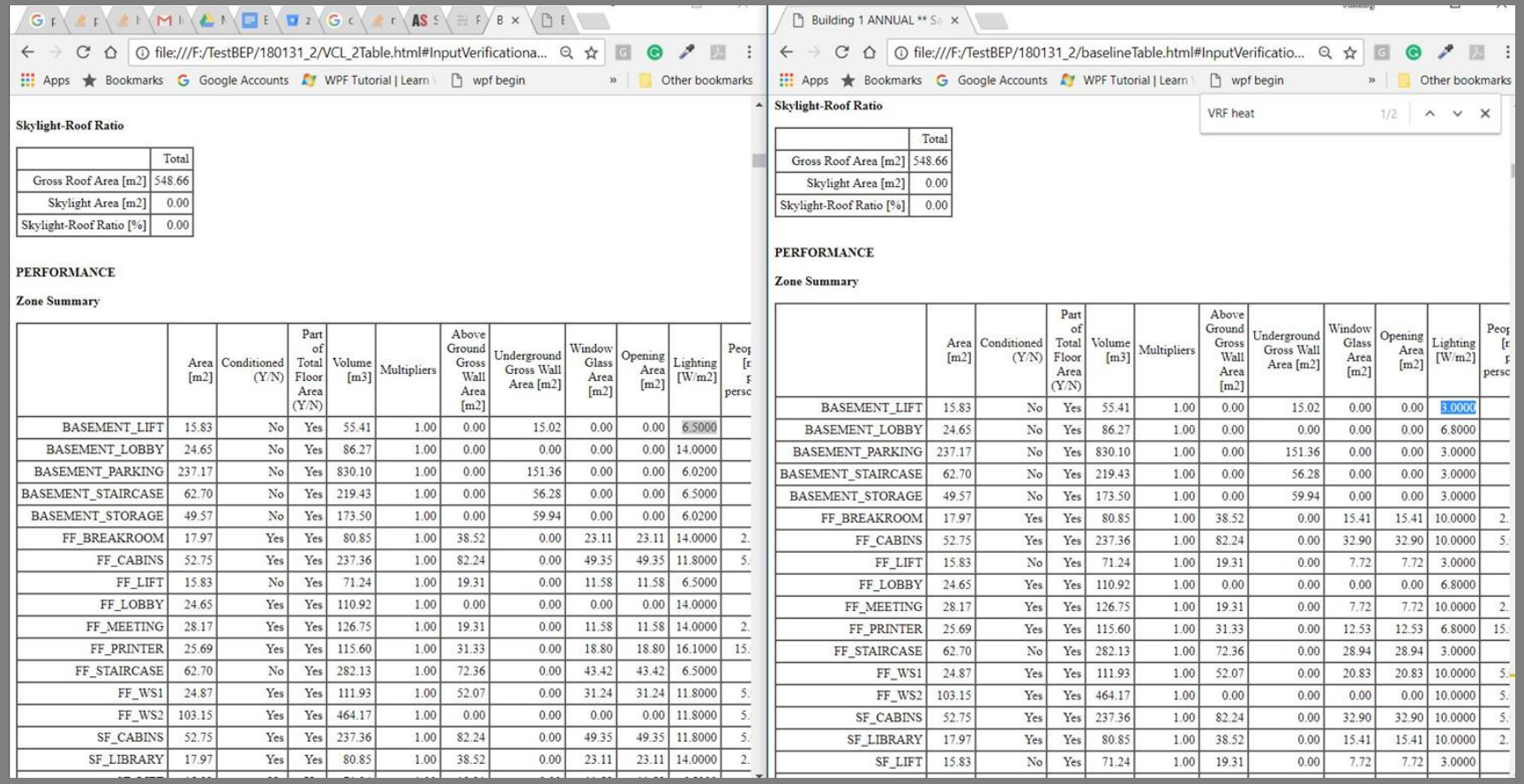
	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	1948.69	574.35	400.00	574.35	400.00
Above Ground Wall Area [m2]	1666.10	489.05	344.00	489.05	344.00
Window Opening Area [m2]	666.44	195.62	137.60	195.62	137.60
Gross Window-Wall Ratio [%]	34.20	34.06	34.40	34.06	34.40
Above Ground Window-Wall Ratio [%]	40.00	40.00	40.00	40.00	40.00

Conditioned Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	1138.43	253.94	141.15	399.34	344.00
Above Ground Wall Area [m2]	1138.43	253.94	141.15	399.34	344.00
Window Opening Area [m2]	455.37	101.58	56.46	159.74	137.60
Gross Window-Wall Ratio [%]	40.00	40.00	40.00	40.00	40.00
Above Ground Window-Wall Ratio [%]	40.00	40.00	40.00	40.00	40.00

Window wall ratio

Output



Skylight-Roof Ratio

	Total
Gross Roof Area [m2]	548.66
Skylight Area [m2]	0.00
Skylight-Roof Ratio [%]	0.00

PERFORMANCE

Zone Summary

	Area [m2]	Conditioned (Y/N)	Part of Total Floor Area (Y/N)	Volume [m3]	Multipliers	Above Ground Gross Wall Area [m2]	Underground Gross Wall Area [m2]	Window Glass Area [m2]	Opening Area [m2]	Lighting [W/m2]	Peop [r p perso
BASEMENT_LIFT	15.83	No	Yes	55.41	1.00	0.00	15.02	0.00	0.00	6.5000	
BASEMENT_LOBBY	24.65	No	Yes	86.27	1.00	0.00	0.00	0.00	0.00	14.0000	
BASEMENT_PARKING	237.17	No	Yes	830.10	1.00	0.00	151.36	0.00	0.00	6.0200	
BASEMENT_STAIRCASE	62.70	No	Yes	219.43	1.00	0.00	56.28	0.00	0.00	6.5000	
BASEMENT_STORAGE	49.57	No	Yes	173.50	1.00	0.00	59.94	0.00	0.00	6.0200	
FF_BREAKROOM	17.97	Yes	Yes	80.85	1.00	38.52	0.00	23.11	23.11	14.0000	2.
FF_CABINS	52.75	Yes	Yes	237.36	1.00	82.24	0.00	49.35	49.35	11.8000	5.
FF_LIFT	15.83	No	Yes	71.24	1.00	19.31	0.00	11.58	11.58	6.5000	
FF_LOBBY	24.65	Yes	Yes	110.92	1.00	0.00	0.00	0.00	0.00	14.0000	
FF_MEETING	28.17	Yes	Yes	126.75	1.00	19.31	0.00	11.58	11.58	14.0000	2.
FF_PRINTER	25.69	Yes	Yes	115.60	1.00	31.33	0.00	18.80	18.80	16.1000	15.
FF_STAIRCASE	62.70	No	Yes	282.13	1.00	72.36	0.00	43.42	43.42	6.5000	
FF_WS1	24.87	Yes	Yes	111.93	1.00	52.07	0.00	31.24	31.24	11.8000	5.
FF_WS2	103.15	Yes	Yes	464.17	1.00	0.00	0.00	0.00	0.00	11.8000	5.
SF_CABINS	52.75	Yes	Yes	237.36	1.00	82.24	0.00	49.35	49.35	11.8000	5.
SF_LIBRARY	17.97	Yes	Yes	80.85	1.00	38.52	0.00	23.11	23.11	14.0000	2.

Skylight-Roof Ratio

	Total
Gross Roof Area [m2]	548.66
Skylight Area [m2]	0.00
Skylight-Roof Ratio [%]	0.00

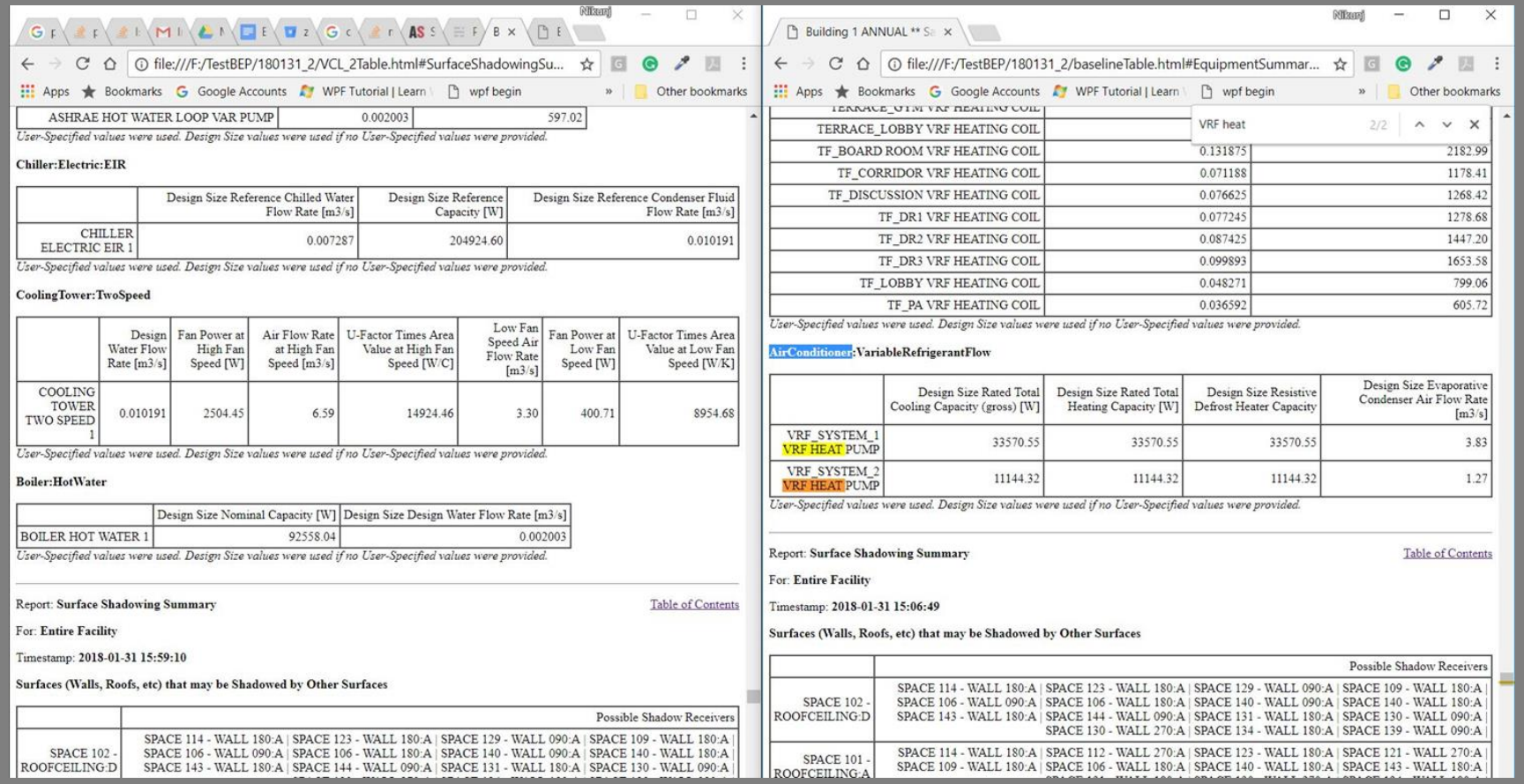
PERFORMANCE

Zone Summary

	Area [m2]	Conditioned (Y/N)	Part of Total Floor Area (Y/N)	Volume [m3]	Multipliers	Above Ground Gross Wall Area [m2]	Underground Gross Wall Area [m2]	Window Glass Area [m2]	Opening Area [m2]	Lighting [W/m2]	Peop [r p perso
BASEMENT_LIFT	15.83	No	Yes	55.41	1.00	0.00	15.02	0.00	0.00	6.0000	
BASEMENT_LOBBY	24.65	No	Yes	86.27	1.00	0.00	0.00	0.00	0.00	6.8000	
BASEMENT_PARKING	237.17	No	Yes	830.10	1.00	0.00	151.36	0.00	0.00	3.0000	
BASEMENT_STAIRCASE	62.70	No	Yes	219.43	1.00	0.00	56.28	0.00	0.00	3.0000	
BASEMENT_STORAGE	49.57	No	Yes	173.50	1.00	0.00	59.94	0.00	0.00	3.0000	
FF_BREAKROOM	17.97	Yes	Yes	80.85	1.00	38.52	0.00	15.41	15.41	10.0000	2.
FF_CABINS	52.75	Yes	Yes	237.36	1.00	82.24	0.00	32.90	32.90	10.0000	5.
FF_LIFT	15.83	No	Yes	71.24	1.00	19.31	0.00	7.72	7.72	3.0000	
FF_LOBBY	24.65	Yes	Yes	110.92	1.00	0.00	0.00	0.00	0.00	6.8000	
FF_MEETING	28.17	Yes	Yes	126.75	1.00	19.31	0.00	7.72	7.72	10.0000	2.
FF_PRINTER	25.69	Yes	Yes	115.60	1.00	31.33	0.00	12.53	12.53	6.8000	15.
FF_STAIRCASE	62.70	No	Yes	282.13	1.00	72.36	0.00	28.94	28.94	3.0000	
FF_WS1	24.87	Yes	Yes	111.93	1.00	52.07	0.00	20.83	20.83	10.0000	5.
FF_WS2	103.15	Yes	Yes	464.17	1.00	0.00	0.00	0.00	0.00	10.0000	5.
SF_CABINS	52.75	Yes	Yes	237.36	1.00	82.24	0.00	32.90	32.90	10.0000	5.
SF_LIBRARY	17.97	Yes	Yes	80.85	1.00	38.52	0.00	15.41	15.41	10.0000	2.
SF_LIFT	15.83	No	Yes	71.24	1.00	19.31	0.00	7.72	7.72	3.0000	

Lighting power

Output



ASHRAE HOT WATER LOOP VAR PUMP	0.002003	597.02

User-Specified values were used. Design Size values were used if no User-Specified values were provided.

Chiller:Electric:EIR

	Design Size Reference Chilled Water Flow Rate [m3/s]	Design Size Reference Capacity [W]	Design Size Reference Condenser Fluid Flow Rate [m3/s]
CHILLER ELECTRIC EIR 1	0.007287	204924.60	0.010191

User-Specified values were used. Design Size values were used if no User-Specified values were provided.

CoolingTower:TwoSpeed

	Design Water Flow Rate [m3/s]	Fan Power at High Fan Speed [W]	Air Flow Rate at High Fan Speed [m3/s]	U-Factor Times Area Value at High Fan Speed [W/C]	Low Fan Speed Air Flow Rate [m3/s]	Fan Power at Low Fan Speed [W]	U-Factor Times Area Value at Low Fan Speed [W/K]
COOLING TOWER TWO SPEED 1	0.010191	2504.45	6.59	14924.46	3.30	400.71	8954.68

User-Specified values were used. Design Size values were used if no User-Specified values were provided.

Boiler:HotWater

	Design Size Nominal Capacity [W]	Design Size Design Water Flow Rate [m3/s]
BOILER HOT WATER 1	92558.04	0.002003

User-Specified values were used. Design Size values were used if no User-Specified values were provided.

Report: **Surface Shadowing Summary** Table of Contents

For: **Entire Facility**

Timestamp: **2018-01-31 15:59:10**

Surfaces (Walls, Roofs, etc) that may be Shadowed by Other Surfaces

	Possible Shadow Receivers
SPACE 102 - ROOFCEILING:D	SPACE 114 - WALL 180:A | SPACE 123 - WALL 180:A | SPACE 129 - WALL 090:A | SPACE 109 - WALL 180:A | SPACE 106 - WALL 090:A | SPACE 106 - WALL 180:A | SPACE 140 - WALL 090:A | SPACE 140 - WALL 180:A | SPACE 143 - WALL 180:A | SPACE 144 - WALL 090:A | SPACE 131 - WALL 180:A | SPACE 130 - WALL 090:A |

TERRACE_LOBBY VRF HEATING COIL		
TF_BOARD ROOM VRF HEATING COIL	0.131875	2182.99
TF_CORRIDOR VRF HEATING COIL	0.071188	1178.41
TF_DISCUSSION VRF HEATING COIL	0.076625	1268.42
TF_DR1 VRF HEATING COIL	0.077245	1278.68
TF_DR2 VRF HEATING COIL	0.087425	1447.20
TF_DR3 VRF HEATING COIL	0.099893	1653.58
TF_LOBBY VRF HEATING COIL	0.048271	799.06
TF_PA VRF HEATING COIL	0.036592	605.72

User-Specified values were used. Design Size values were used if no User-Specified values were provided.

AirConditioner:VariableRefrigerantFlow

	Design Size Rated Total Cooling Capacity (gross) [W]	Design Size Rated Total Heating Capacity [W]	Design Size Resistive Defrost Heater Capacity	Design Size Evaporative Condenser Air Flow Rate [m3/s]
VRF_SYSTEM_1 VRF HEAT PUMP	33570.55	33570.55	33570.55	3.83
VRF_SYSTEM_2 VRF HEAT PUMP	11144.32	11144.32	11144.32	1.27

User-Specified values were used. Design Size values were used if no User-Specified values were provided.

Report: **Surface Shadowing Summary** Table of Contents

For: **Entire Facility**

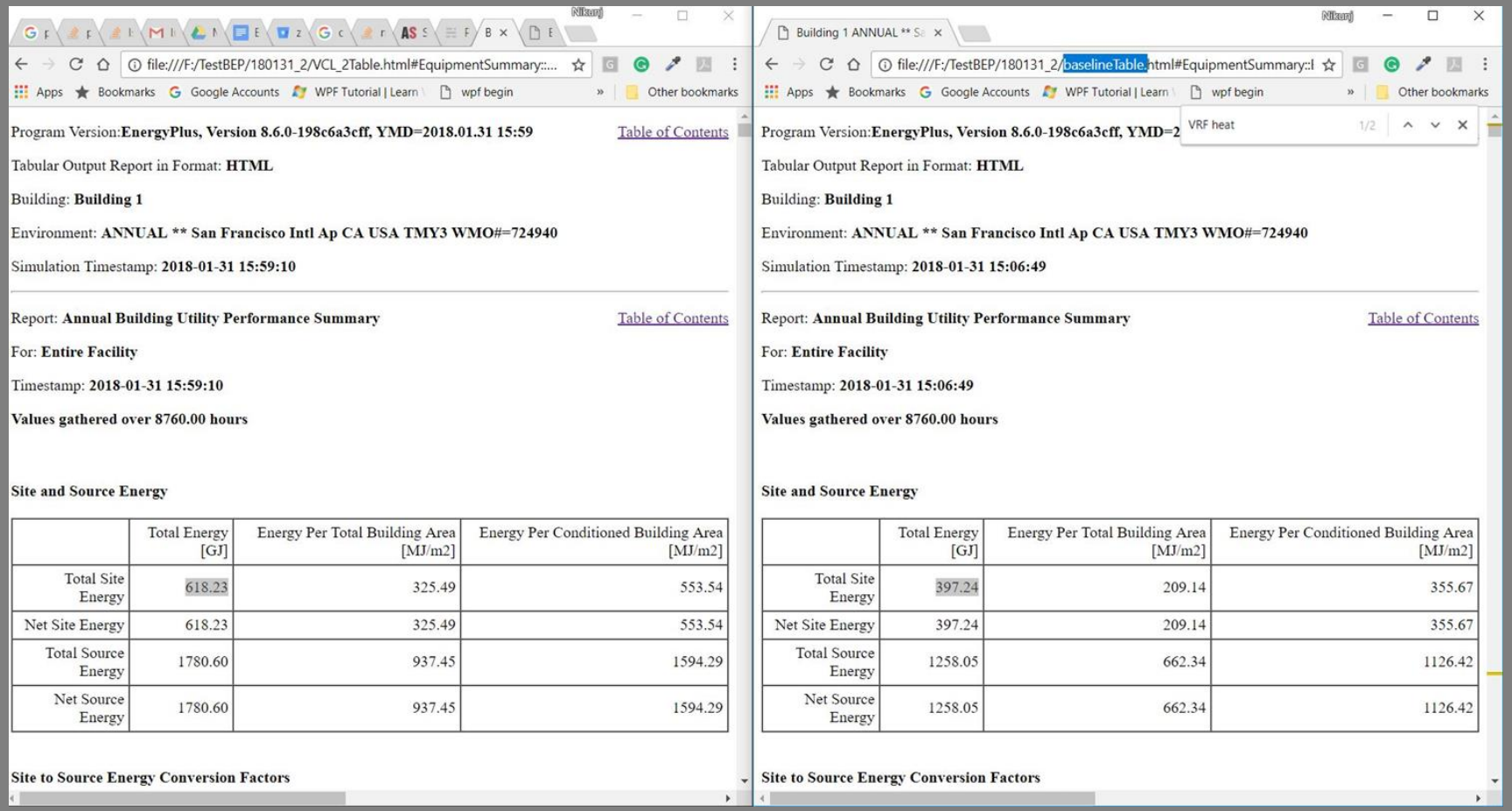
Timestamp: **2018-01-31 15:06:49**

Surfaces (Walls, Roofs, etc) that may be Shadowed by Other Surfaces

	Possible Shadow Receivers
SPACE 102 - ROOFCEILING:D	SPACE 114 - WALL 180:A | SPACE 123 - WALL 180:A | SPACE 129 - WALL 090:A | SPACE 109 - WALL 180:A | SPACE 106 - WALL 090:A | SPACE 106 - WALL 180:A | SPACE 140 - WALL 090:A | SPACE 140 - WALL 180:A | SPACE 143 - WALL 180:A | SPACE 144 - WALL 090:A | SPACE 131 - WALL 180:A | SPACE 130 - WALL 090:A | SPACE 130 - WALL 270:A | SPACE 134 - WALL 180:A | SPACE 139 - WALL 090:A |
SPACE 101 - ROOFCEILING:A	SPACE 114 - WALL 180:A | SPACE 112 - WALL 270:A | SPACE 123 - WALL 180:A | SPACE 121 - WALL 270:A | SPACE 109 - WALL 180:A | SPACE 106 - WALL 180:A | SPACE 140 - WALL 180:A | SPACE 143 - WALL 180:A |

HVAC system

Output



Program Version:**EnergyPlus, Version 8.6.0-198c6a3cff, YMD=2018.01.31 15:59** Table of Contents

Tabular Output Report in Format: **HTML**

Building: **Building 1**

Environment: **ANNUAL ** San Francisco Intl Ap CA USA TMY3 WMO#=724940**

Simulation Timestamp: **2018-01-31 15:59:10**

Report: **Annual Building Utility Performance Summary** Table of Contents

For: **Entire Facility**

Timestamp: **2018-01-31 15:59:10**

Values gathered over 8760.00 hours

Site and Source Energy

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m2]	Energy Per Conditioned Building Area [MJ/m2]
Total Site Energy	618.23	325.49	553.54
Net Site Energy	618.23	325.49	553.54
Total Source Energy	1780.60	937.45	1594.29
Net Source Energy	1780.60	937.45	1594.29

Site to Source Energy Conversion Factors

Program Version:**EnergyPlus, Version 8.6.0-198c6a3cff, YMD=2**

Tabular Output Report in Format: **HTML**

Building: **Building 1**

Environment: **ANNUAL ** San Francisco Intl Ap CA USA TMY3 WMO#=724940**

Simulation Timestamp: **2018-01-31 15:06:49**

Report: **Annual Building Utility Performance Summary** Table of Contents

For: **Entire Facility**

Timestamp: **2018-01-31 15:06:49**

Values gathered over 8760.00 hours

Site and Source Energy

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m2]	Energy Per Conditioned Building Area [MJ/m2]
Total Site Energy	397.24	209.14	355.67
Net Site Energy	397.24	209.14	355.67
Total Source Energy	1258.05	662.34	1126.42
Net Source Energy	1258.05	662.34	1126.42

Site to Source Energy Conversion Factors

Energy Use Output

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