

Sustainability Case Studies: Perkins+Will and Johnson Controls

Jarod Schultz

Director of Research and Development





About the speaker

Jarod Schultz, Director of R&D

I help AEC firms streamline bottlenecks and pain points in their daily people, process, and technology workflows. With years of experience in the AEC industry, I have seen good and bad practices first hand. From this experience, I integrate what I have learned to enhance your daily outcomes. These final outcomes will be based on people, process, and technology workflows comprising of documentation, videos, workshops, mentoring, and software customized to that final solution. To start the process, I lead with a business strategy session with key people to assess your current situation. Through my targeted Q/A I can build a goal-oriented plan to start the process of improving your people, process, and technology workflows. My expertise is at; Delivering Creative Solutions | Architecture, Engineering and Construction Software | Strategic Growth, Process, and Workflow Management | Software Development/Documentation | Presentation/Public Speaking | and is a Kaizen Event/Emotional Intelligence Practitioner.

BLD221644 - Sustainability Case Studies: Perkins+Will and Johnson Controls

See how Autodesk sustainability design tools were used for the Architecture 2030 initiative with Perkins+Will, Johnson Controls, and MasterGraphics.aec.

The Perkins+Will case study centers around Director of Research John Haymaker's "Design Space Construction / Sprout Space" project. Discover how Perkins+Will and MasterGraphics.aec used Dynamo Studio, Fractal, FormIt, Revit software, and Insight to meet design, energy (2030), and view quality requirements.

Learn how Johnson Control's Clay Nesler (VP of global energy and sustainability) and MasterGraphics.aec used FormIt, Revit, and Insight on the JCI Shanghai HQ project, where they compared the accuracy of their existing process using other competing tools to the Insight workflow. In Mr. Nesler's words, "this is uncanny"—to see not only how close the results were, but also how few hours were used to generate the schematic design, design development, and construction documents models for the comparison, and that a large ROI was discovered.

BLD221644 - Sustainability Case Studies: Perkins+Will and Johnson Controls

LEARNING OBJECTIVE

Learn how 2 companies are utilizing the Autodesk sustainability tools

LEARNING OBJECTIVE

See how Dynamo, FormIt, Revit, and Insight can be best capitalized on for the Architecture 2030 initiative

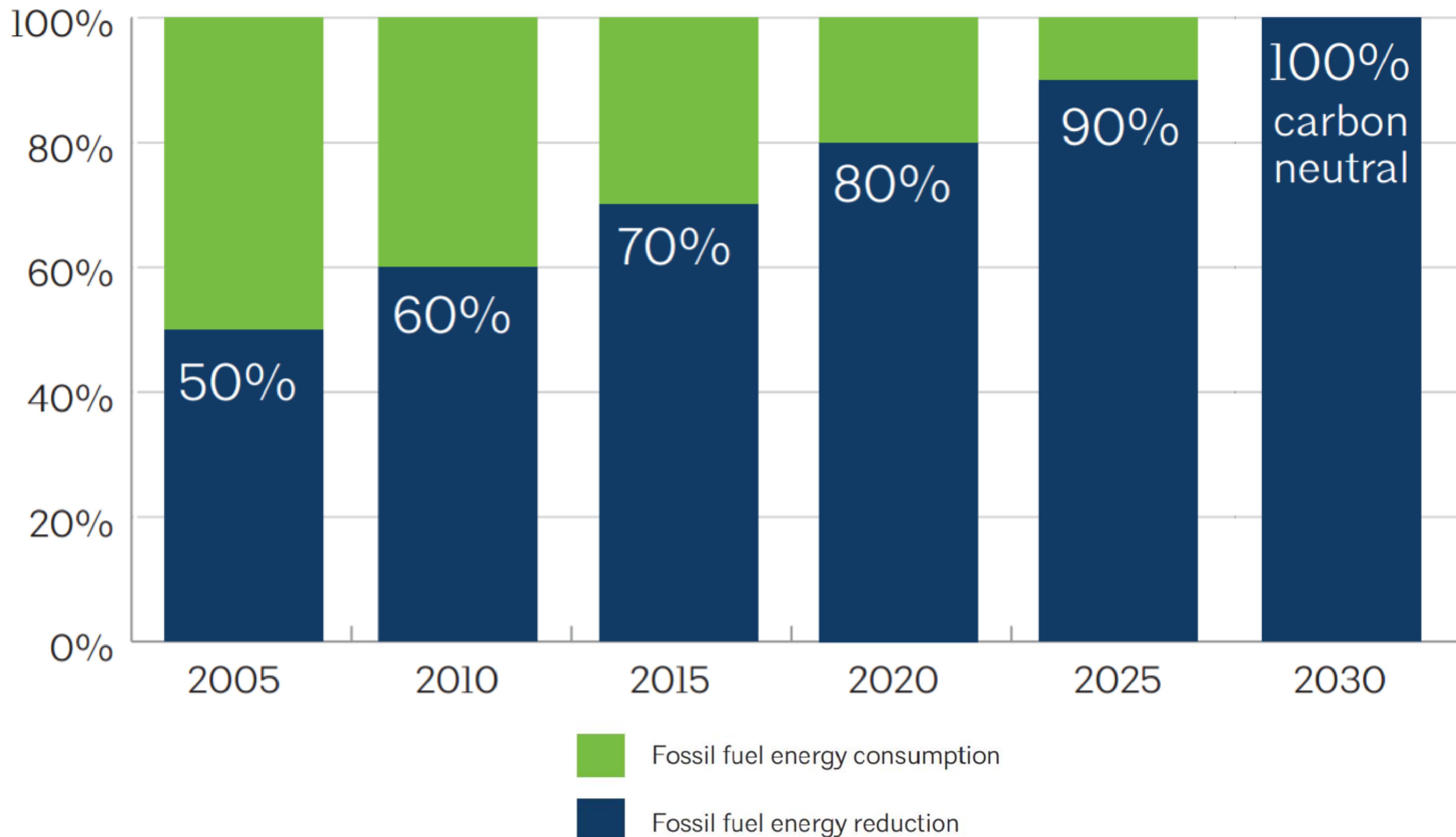
LEARNING OBJECTIVE

Understand how the Insight sustainability workflow can be used by everyone in the firm, not just a select few, when compared to the competing products

LEARNING OBJECTIVE

Learn how “accuracy” is the new method to determine energy use intensity (EUI) to better design and build sustainable buildings

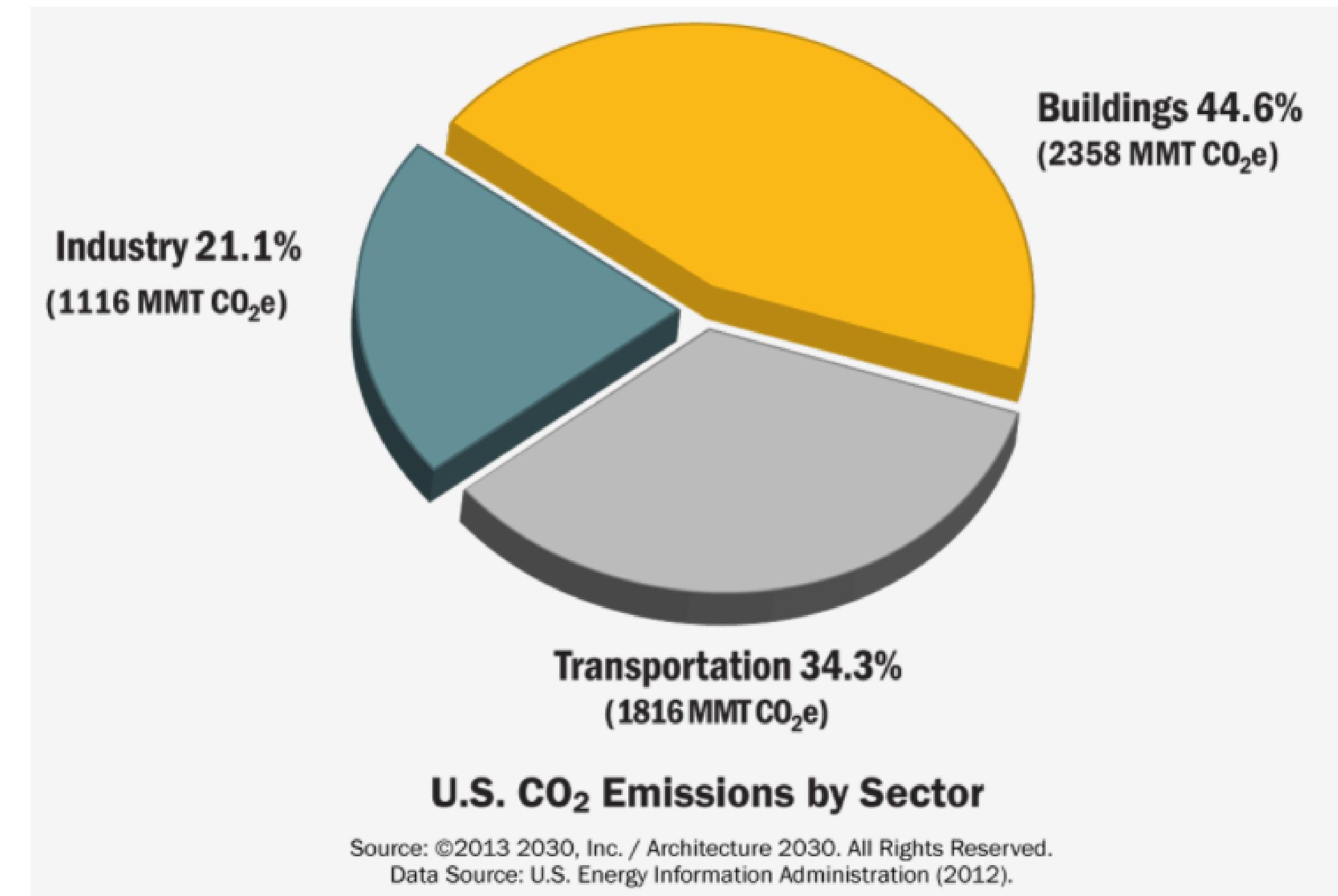
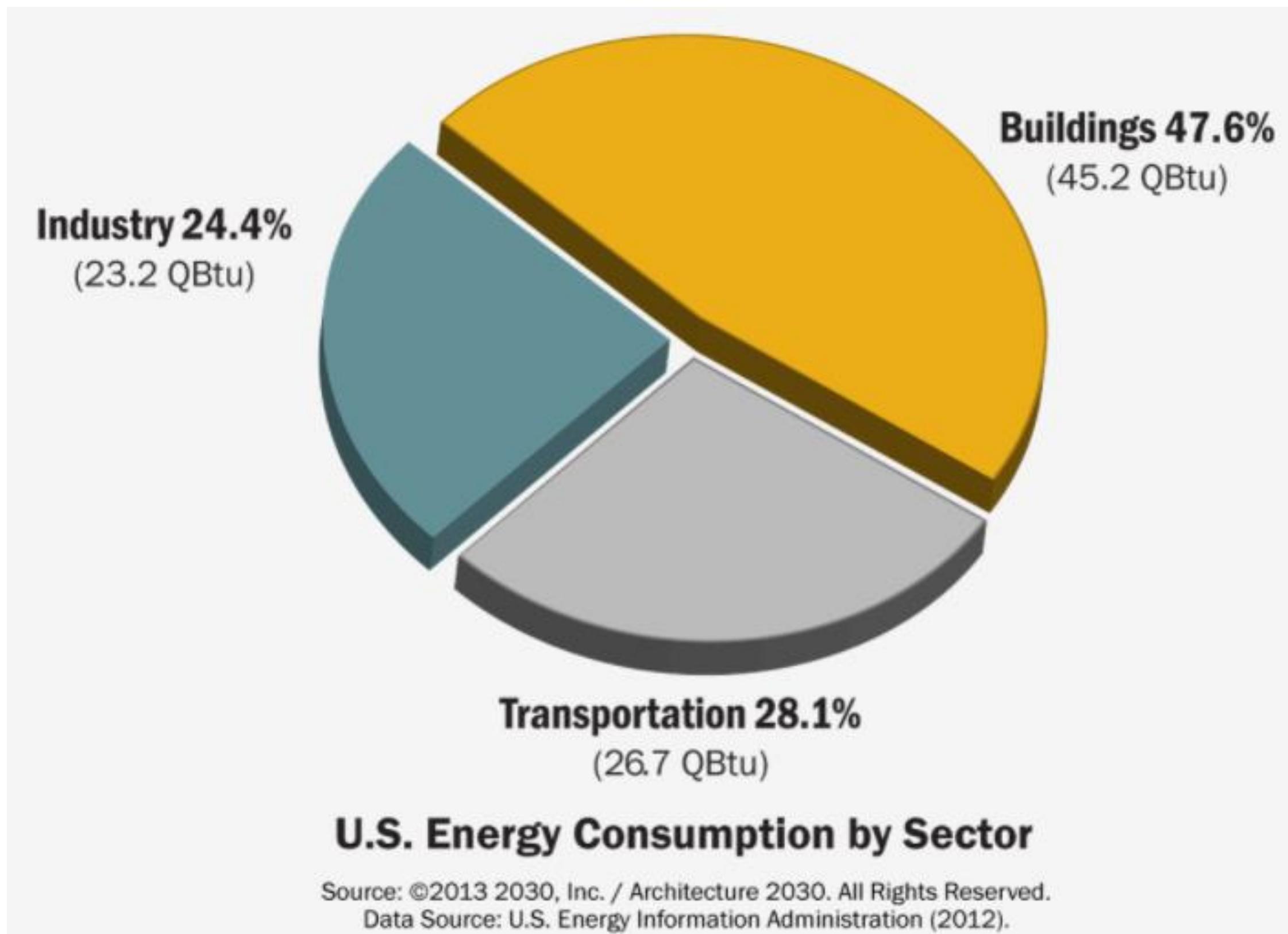
2030 Challenge Goals



BUILDINGS = BIGGEST POLLUTERS + ENERGY CONSUMPTION

Buildings consume nearly half of all the energy produced in the United States

Buildings are responsible for nearly half of US CO₂ emissions





Energy simulation is the key
to meeting the
2030 Challenge goals.

AIA 2030

500 Firms [LINK](#)

2030 DDx [LINK](#)

AIA 2030 Design Data Exchange

PORTFOLIO INPUTS REPORTS RESEARCH

(+)

PROJECT VIEW
2016 - CC

PREDICTED **41.29** kBtu/sf/yr [Predicted Energy Use Intensity]

BASELINE **88.7** kBtu/sf/yr [Baseline Energy Use Intensity]

GOAL **26.6** kBtu/sf/yr [Energy Use Intensity]

SAVINGS **53%**

CHALLENGE
2030 = 100% (Carbon Neutral)
2025 = 90%
2020 = 80%
2015 = 70%
2014 = 60%
[Architecture 2030 Challenge]

PROJECT SUMMARY
NoLa Office Site 3
Non-Residential

GENERAL INPUTS **BUILDING ENVELOPE** **HVAC SYSTEMS**

* AIA 2030 Commitment Required Input Fields

1. Input Building Specifications

Note: Basic General Inputs are required to be saved before Building Envelope and HVAC Systems screens can be accessed

Project Name *	NoLa Office Site 3	Project ID *	NoLaOfficeSite3
Project Category *	Non-Residential	Country *	United States of America
Project Phase *	Concept	State/Province *	Louisiana
Year of Occupancy	2016	Zip/Postal Code *	70112
Reporting Year *	2016	City	New Orleans
Target Certification	Select all that Apply	Climate Zone	2A Hot - Humid
Office Location	North Bethesda, MD, United States		

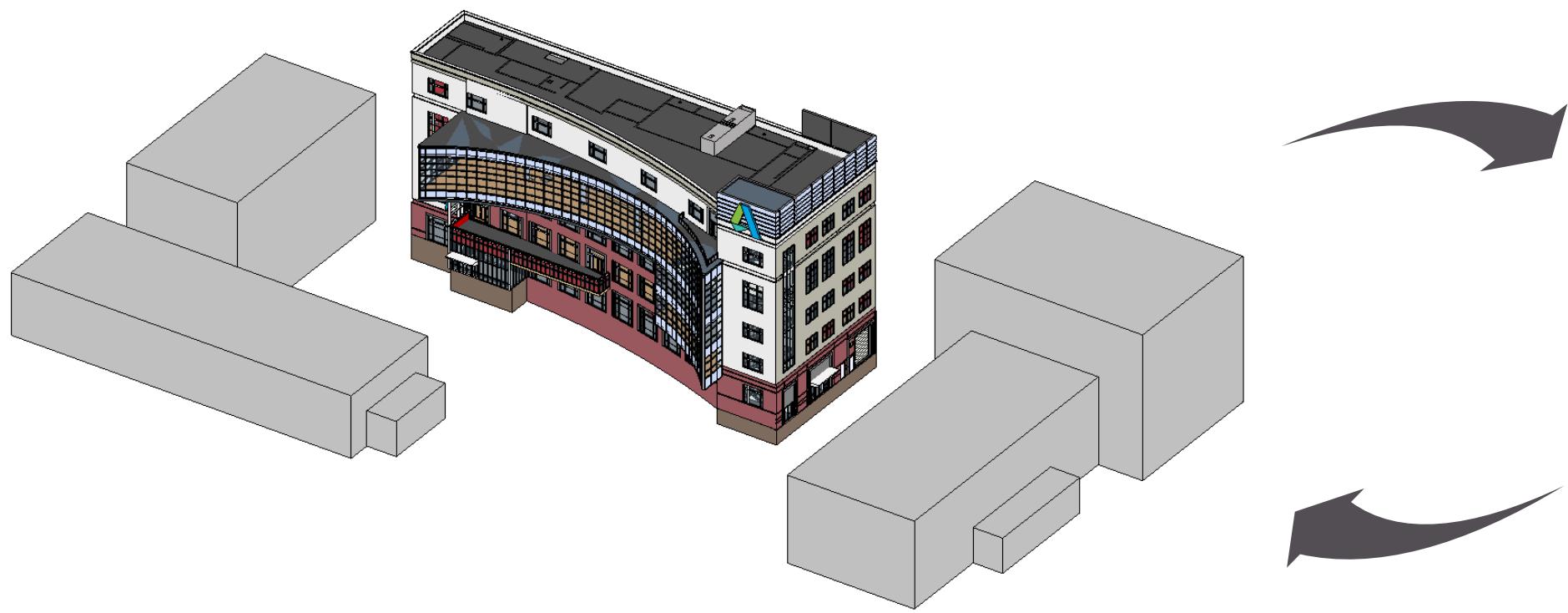
Use Types * **Area (GSF)**

Office - Large (greater than 100,000) ▾ 282381.9 × ⓘ

(+) **Total: 282.4K**

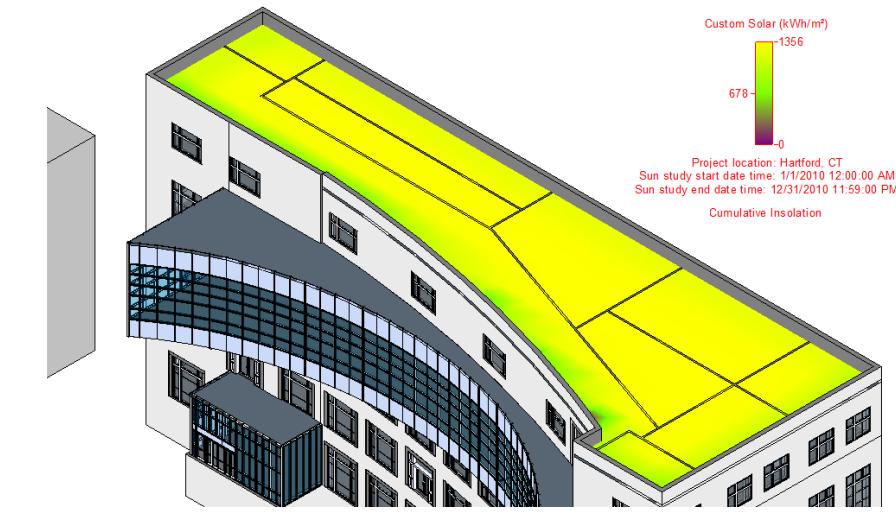
Available ?	BASELINE	GOAL	LPD Baseline
[Target Finder]	[National Avg.] kBtu/sf/yr	[2030 Challenge] kBtu/sf/yr	[ASHRAE 90.1-2007] W/sf
Yes	104	31.2	1.00
WEIGHTED	104.0	31.2	1.00

What is Insight?

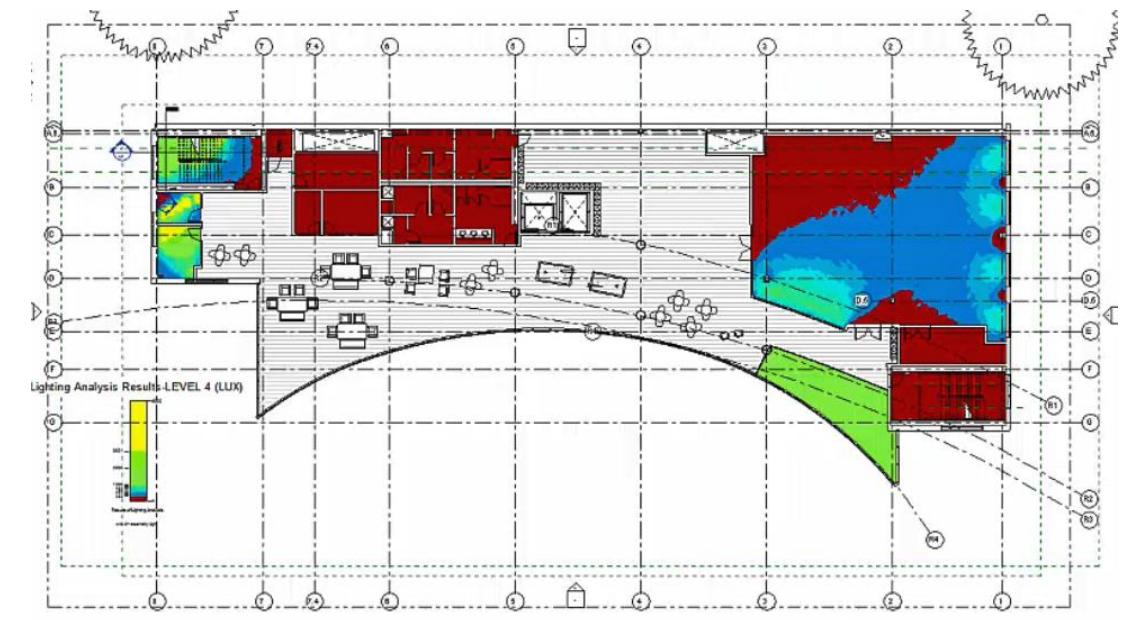


From any Revit Model
(FormIt – Conceptual)

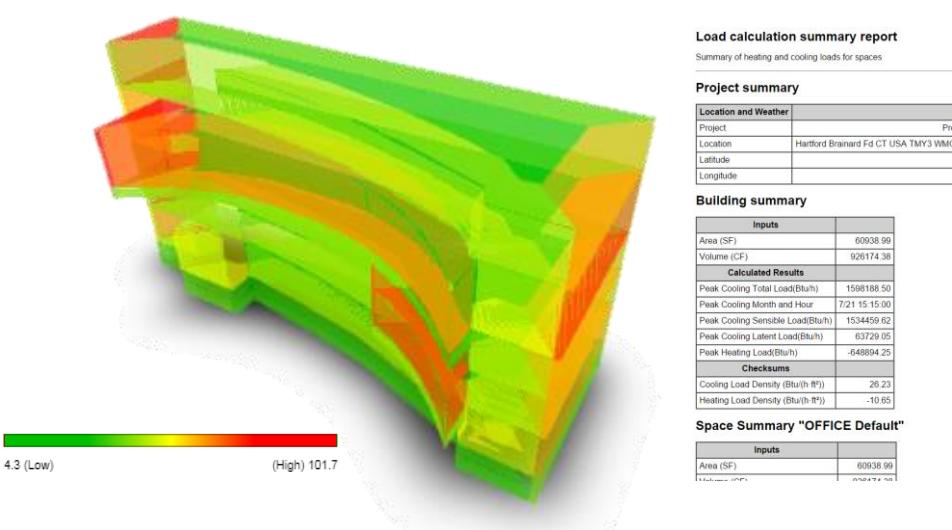
Building Energy



Solar Radiation

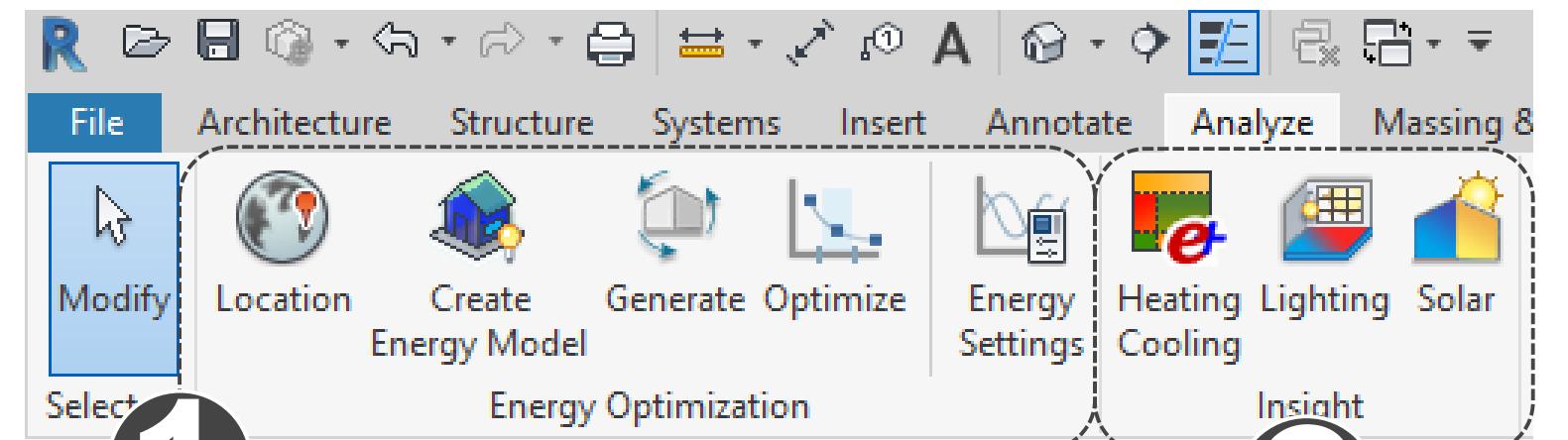


Daylighting

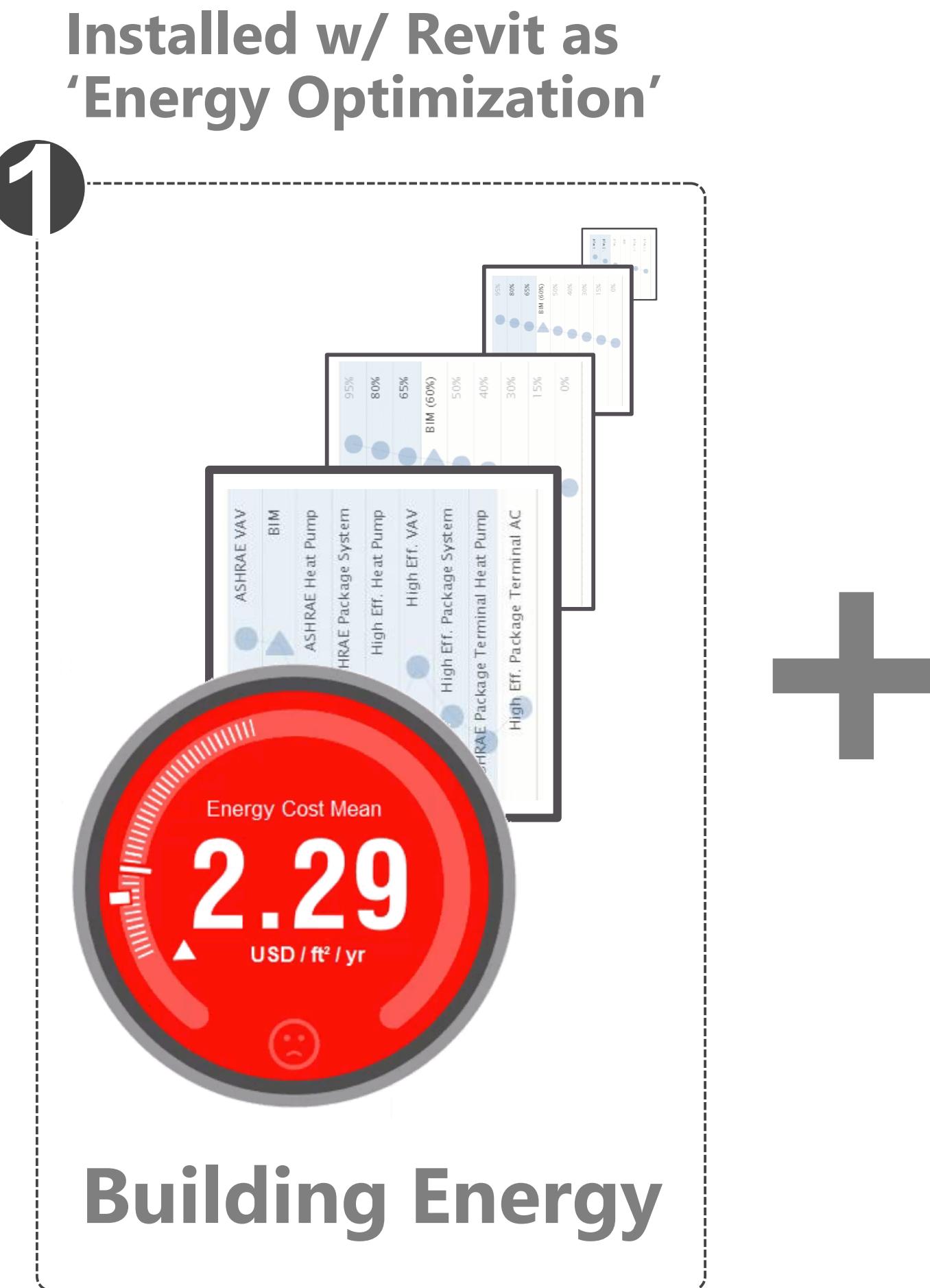


Heating/Cooling

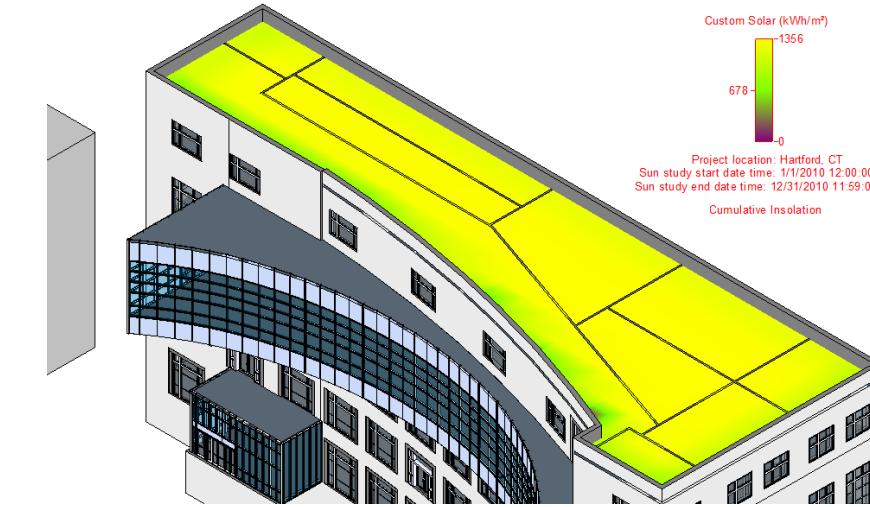
What is Insight?



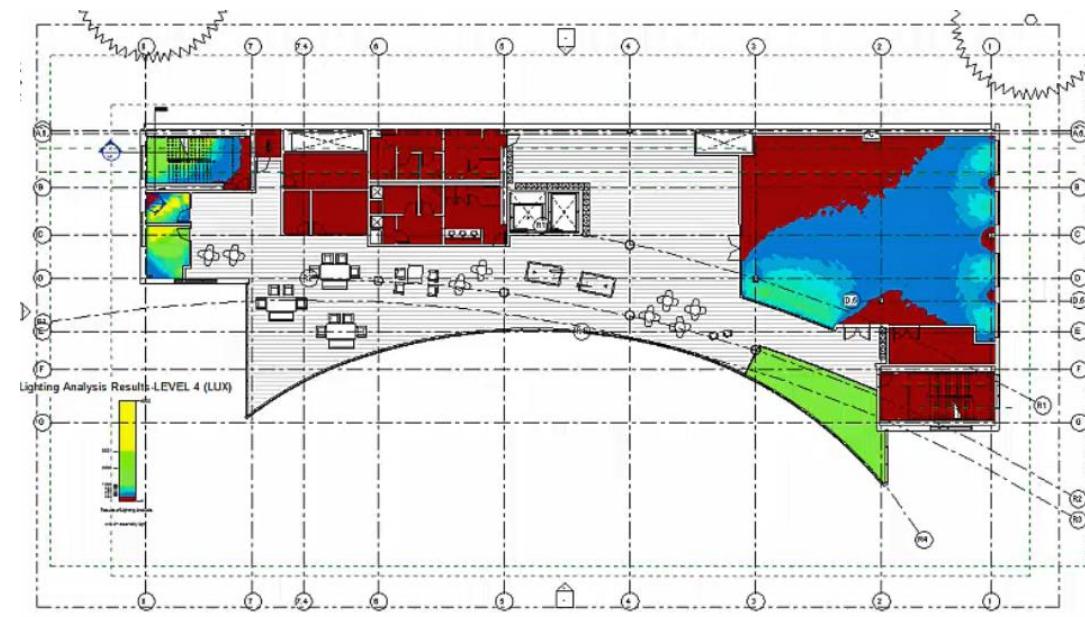
Revit / AEC Collection Subscription Feature



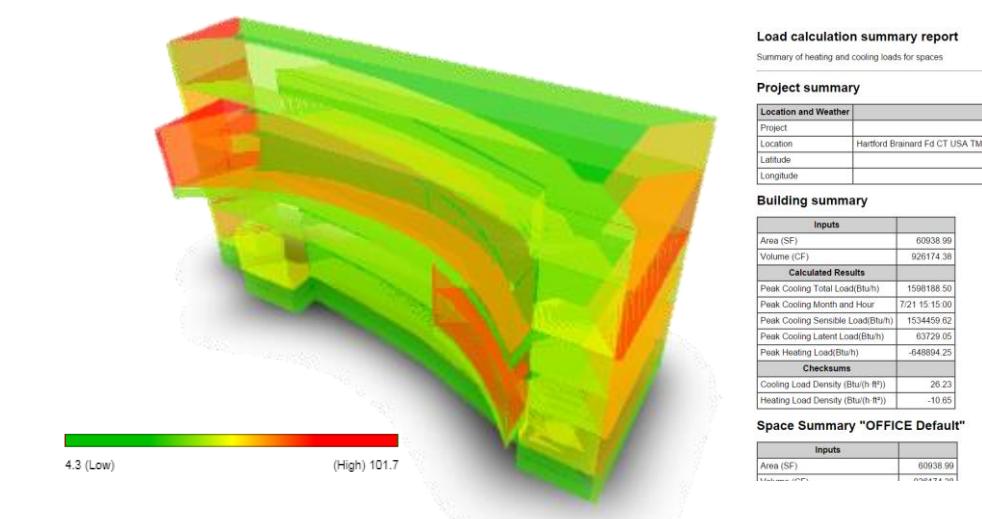
Download & Install the Revit Plugin



Solar Radiation



Daylighting



Heating/Cooling

LINK

How is Insight Different?

<https://www.buildingenergysoftwaretools.com/>



Software Listing

Total Listed Programs: 177

Radiance
Radiance is a suite of programs for the analysis and visualization of lighting and daylighting in design. Mainly developed at the Lawrence Berkley National Laboratory under DOE funding. Additional development and contributions sponsored by ISE in Germany and EPFL & HSLU in Switzerland.
Lighting Simulation
Last Software Update: 18 September 2015 | Last Entry Update: 17 November 2017
Ratings ★★★★★ | Reviews 0 | Add to compare

TRNSYS
TRNSYS - a component based transient simulation package.
Whole-building Energy Simulation
Last Software Update: 15 September 2015 | Last Entry Update: 18 July 2016
Ratings ★★★★★ | Reviews 0 | Add to compare

Climate Consultant
Graphically analyzed EPW climate data in dozens of different ways of particular value to designers.
Weather Data and Climate Analysis
Last Software Update: 19 September 2015 | Last Entry Update: 16 December 2015
Ratings ★★★★★ | Reviews 0 | Add to compare

AcousticCalc - HVAC Noise Prediction Program
HVAC Noise Source-Path-Receiver Acoustical Analysis program.
HVAC System Selection and Sizing
Last Software Update: 15 January 2016 | Last Entry Update: 01 June 2016
Ratings ★★★★★ | Reviews 0 | Add to compare

IDA Indoor Climate and Energy
IDA Indoor Climate and Energy (IDA ICE) is a whole year detailed and dynamic multi-zone simulation application for the study of indoor climate as well as energy.
Whole-building Energy Simulation
Last Software Update: 01 October 2015 | Last Entry Update: 06 October 2015
Ratings ★★★★★ | Reviews 0 | Add to compare

DesignBuilder
DesignBuilder provides advanced building performance simulation tools that minimize modelling time and maximize productivity.

**Total Listed Programs:
177**

How is Insight Different?

BIM

How is Insight Different?



Direction & Accuracy

Position & Precision !

Concept to Detail

Detailed Design !

Architect+Engineer+Client

Specialist/Engineer !

One Model

A Separate Model !

Every Project

Special Projects Only !



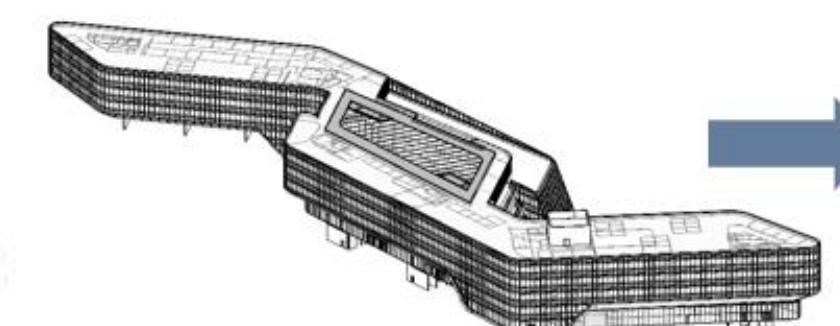
Shanghai HQ
JCI / Autodesk / MasterGraphics.aec

JCI

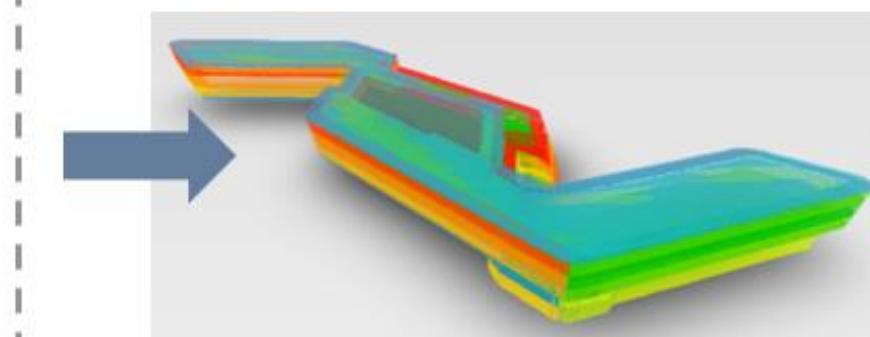


Clay Nesler • 1st

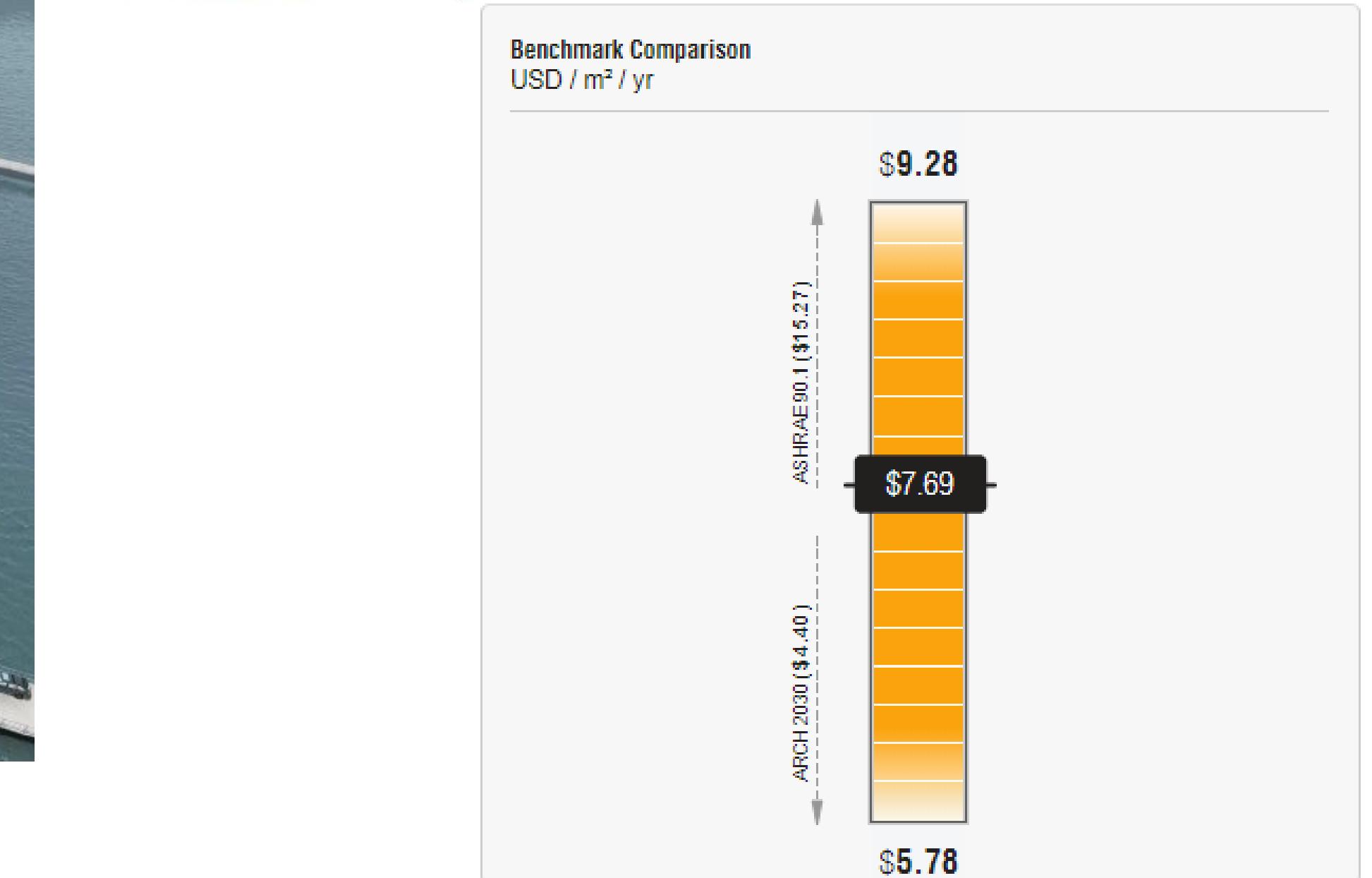
VP, Global Energy and Sustainability at Johnson Controls
Johnson Controls • University of Illinois at Urbana-Champaign



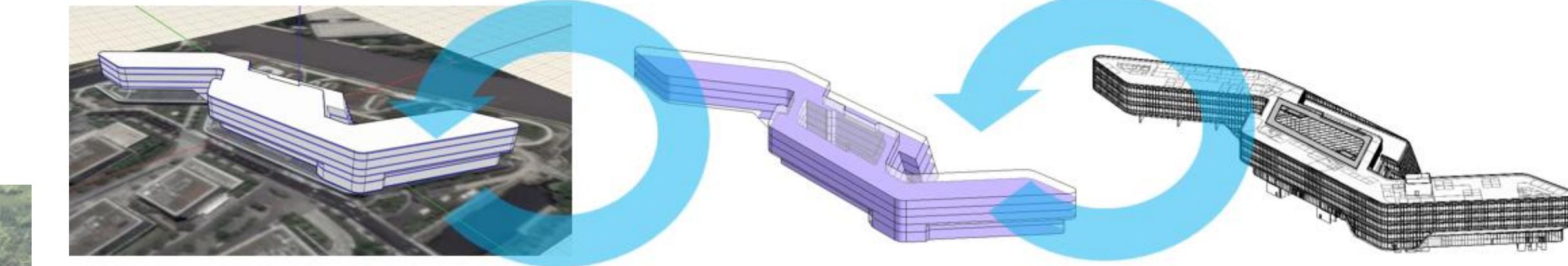
 AUTODESK®
INSIGHT 360™
 
gbXML Certified
+ ASHRAE 140 validation



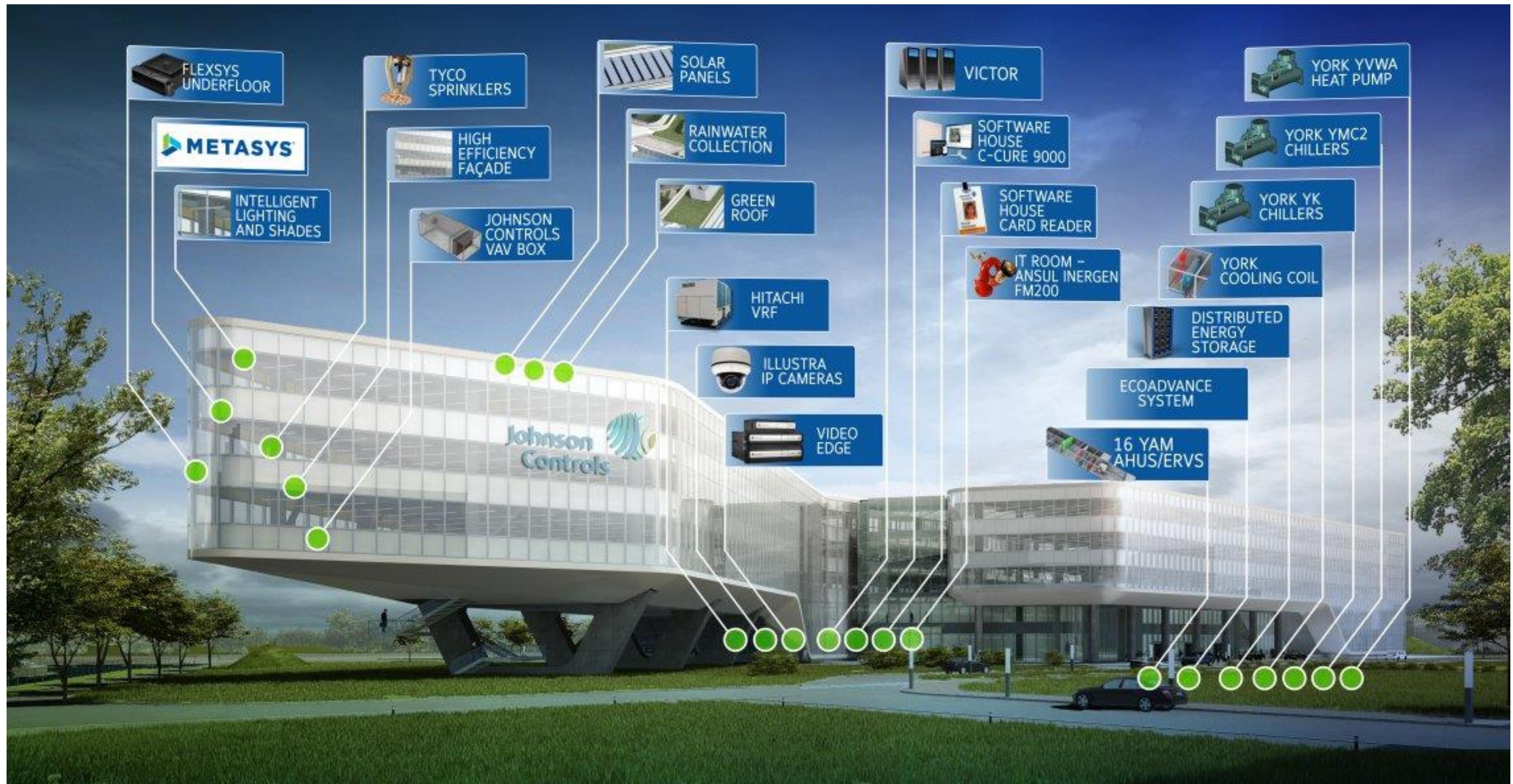
FormIt →

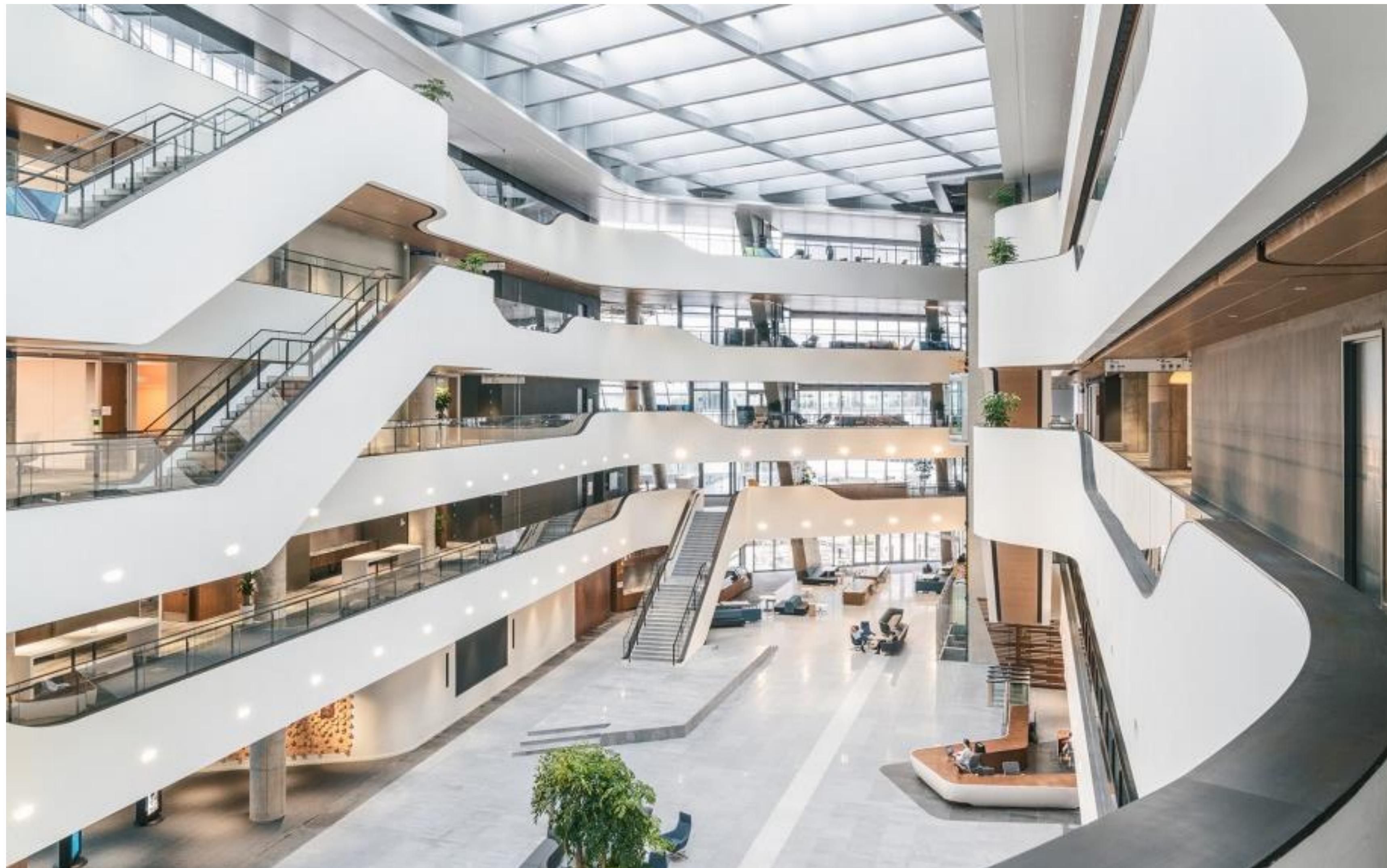


→ Revit



THE FIRST TRIPLE-CERTIFIED GREEN BUILDING IN CHINA PAVES THE WAY TOWARD A MORE SUSTAINABLE FUTURE

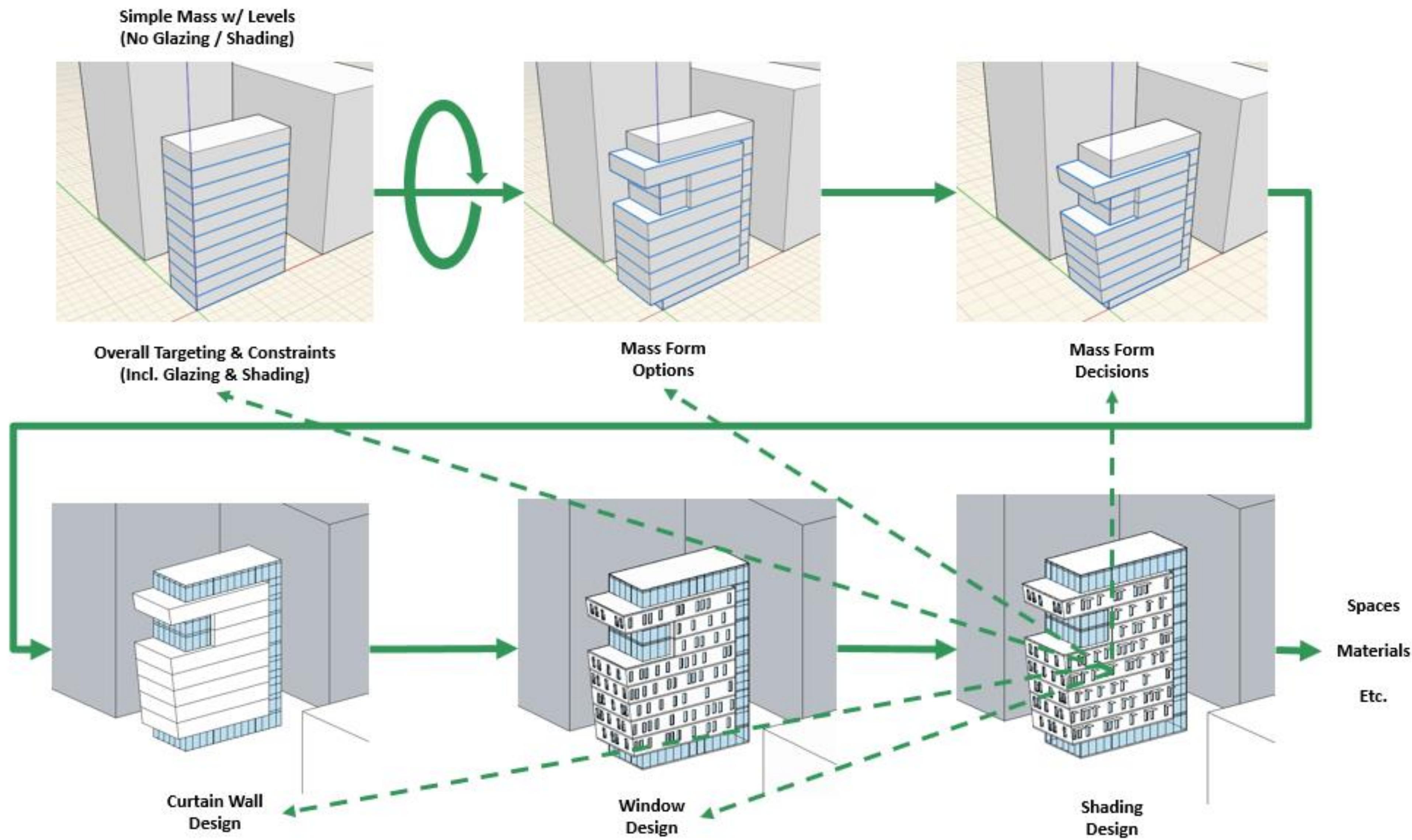




JCI headquarters, 45,000-square meter building, sets a new standard for green and smart buildings, being the first in China to receive several top global energy efficiency awards including:

- IFC-World Bank Group's EDGE (Excellence in Design for Greater Efficiencies) Certification
- U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) Platinum Certification
- China Green Building Design Label Three Star Certification.

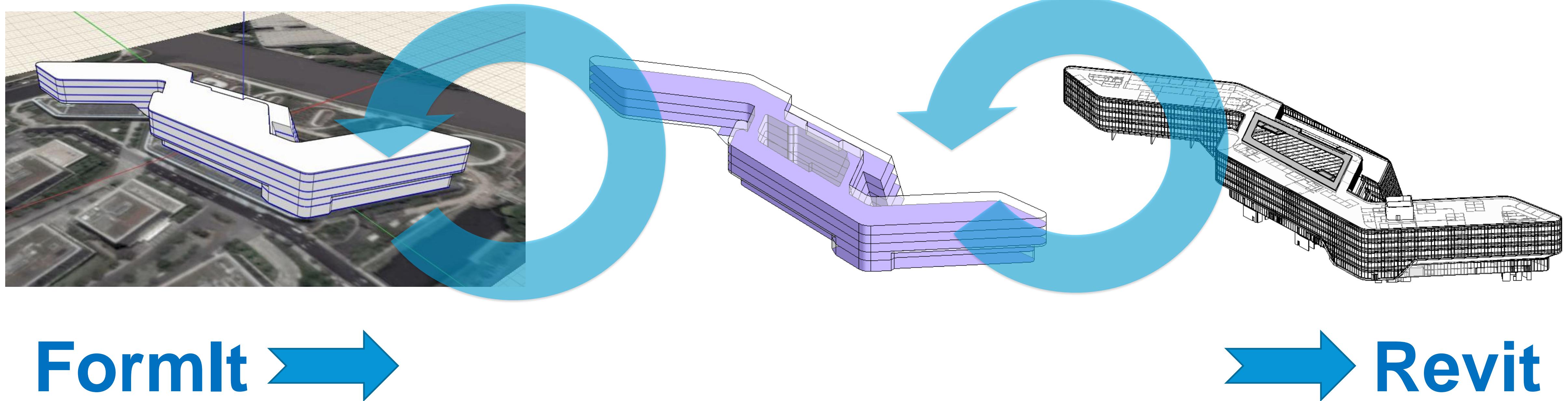
JCI Energy Performance



[LINK](#)

Frictionless, Reliable, Scalable

JCI Energy Performance
Cohesive and Scalable



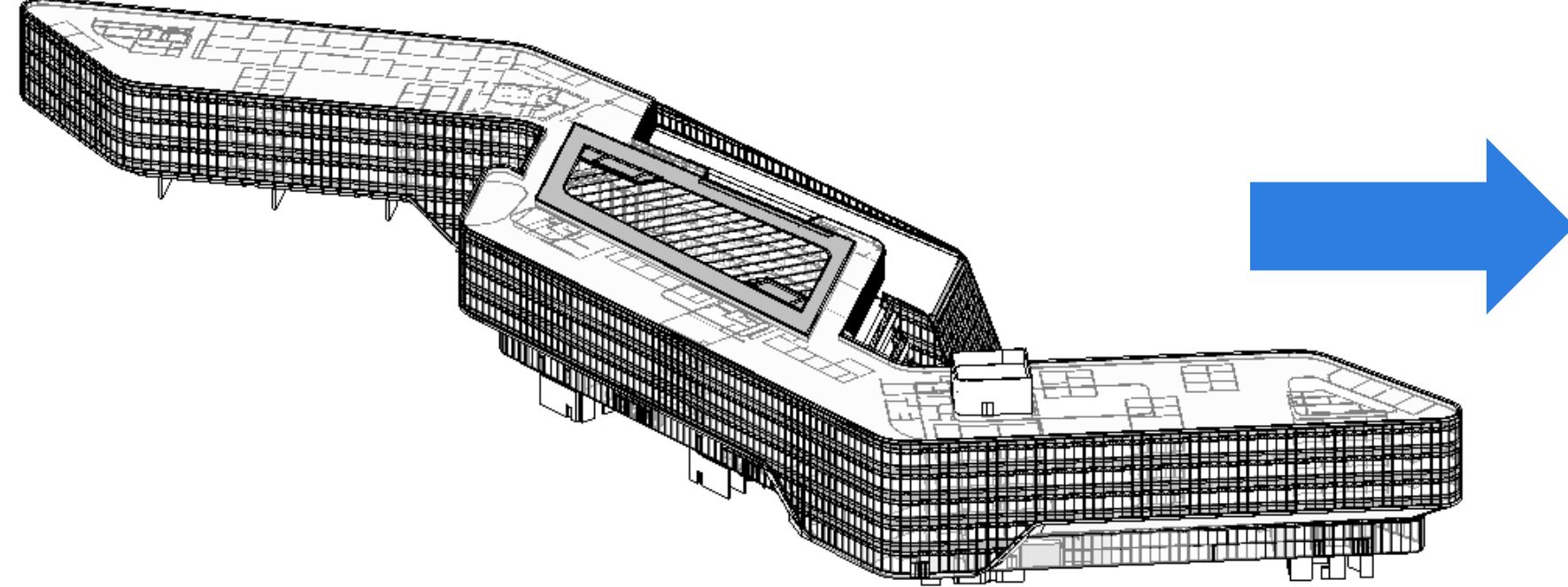
*Understand and optimize performance throughout the design process-
Get performance feedback when you need it, not when your model is ready*

JCI Energy Performance

Energy Range Paradigm with Real Time Feedback on any Model

AU Class: BLD196888-L

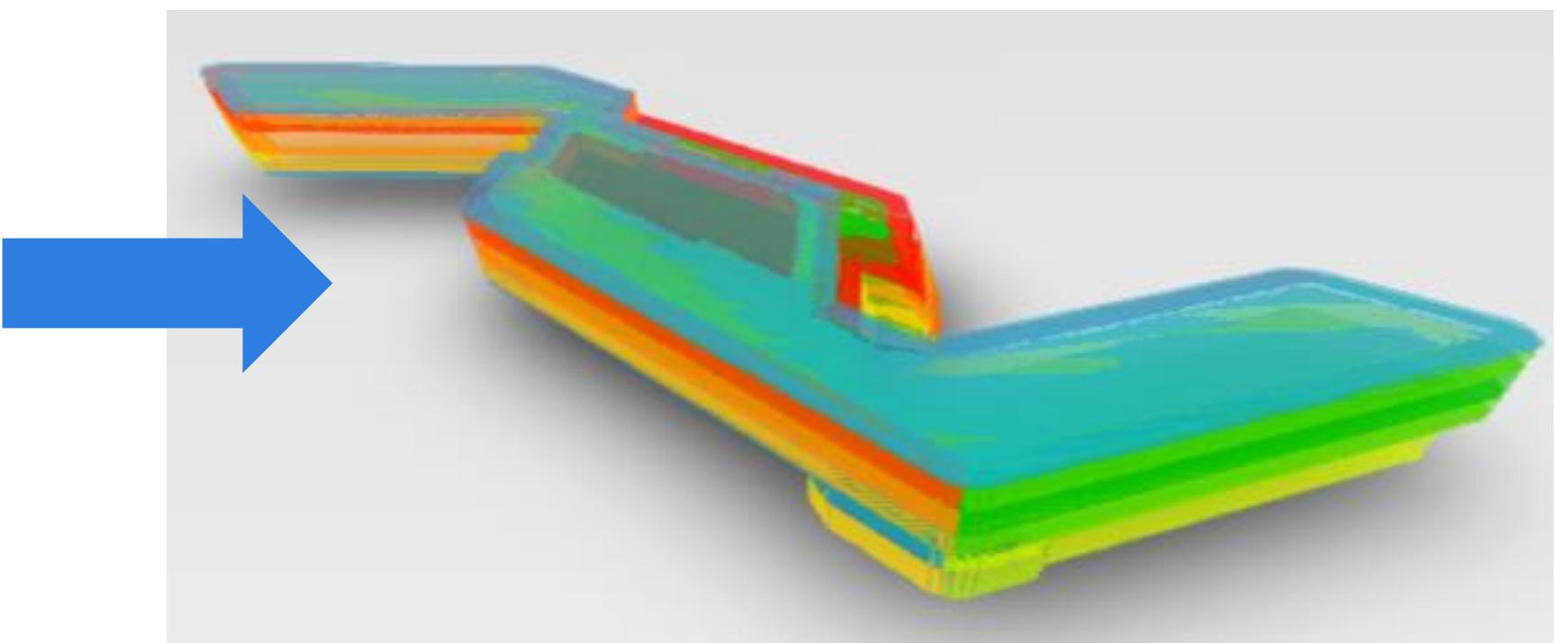
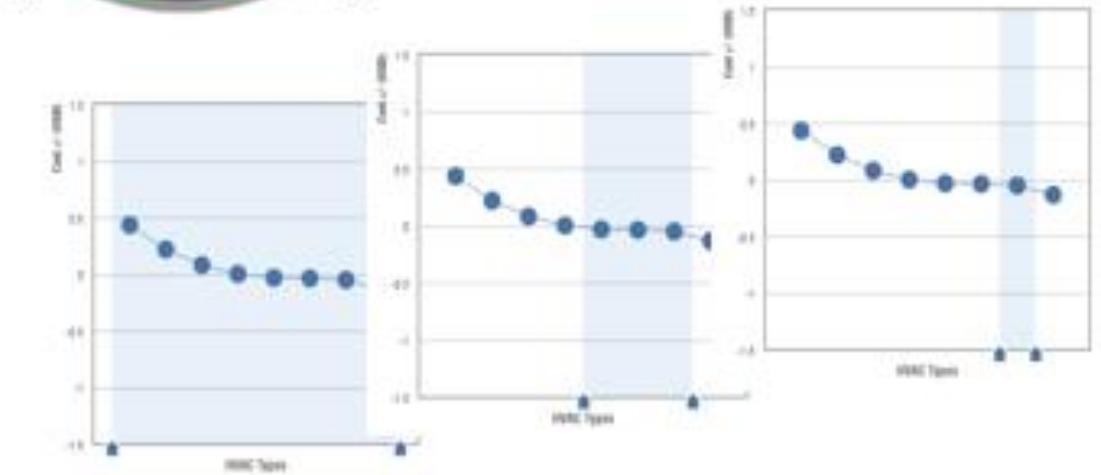
Better Design Insight = Better Building Performance!



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+ ASHRAE 140 validation



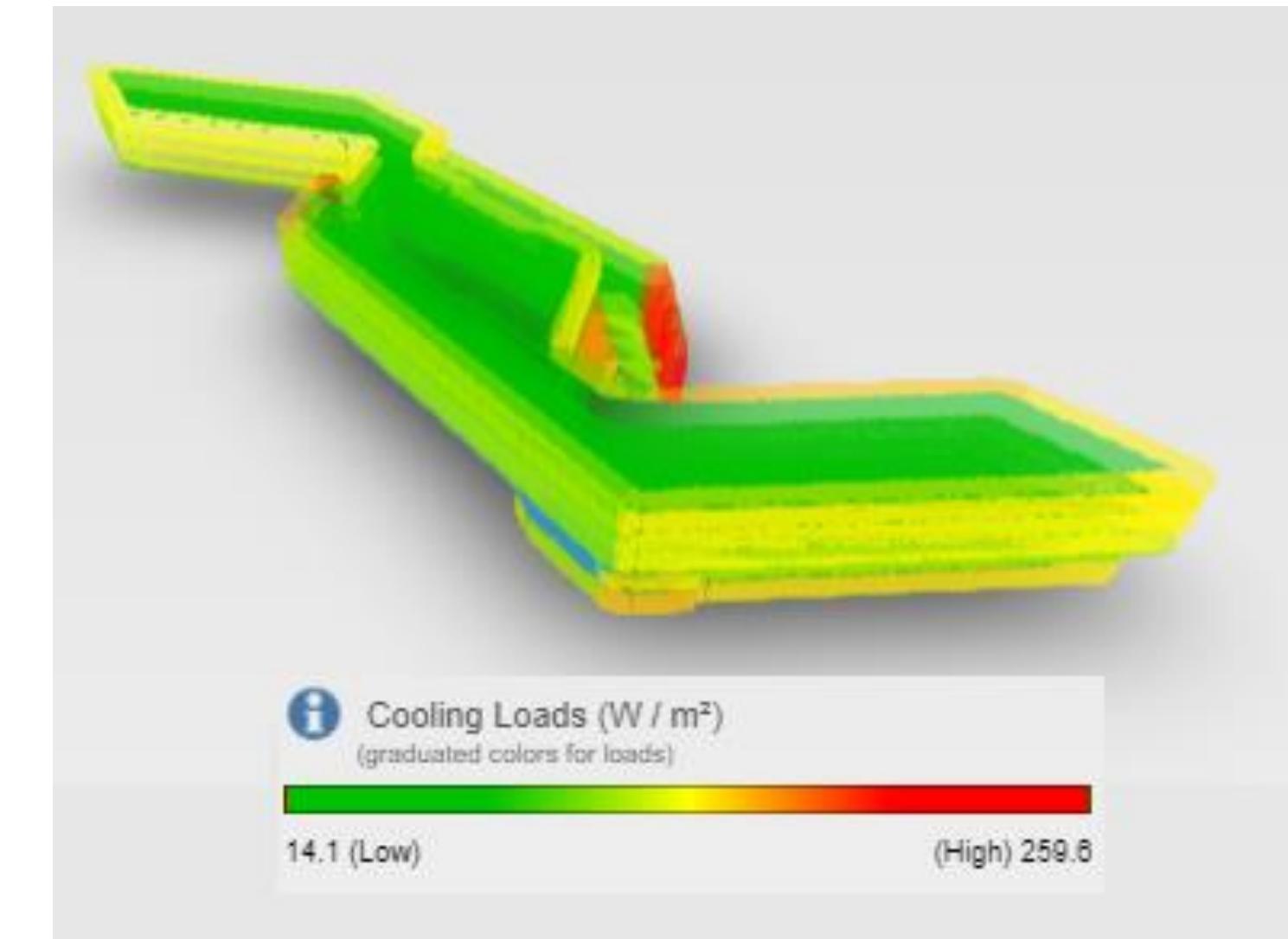
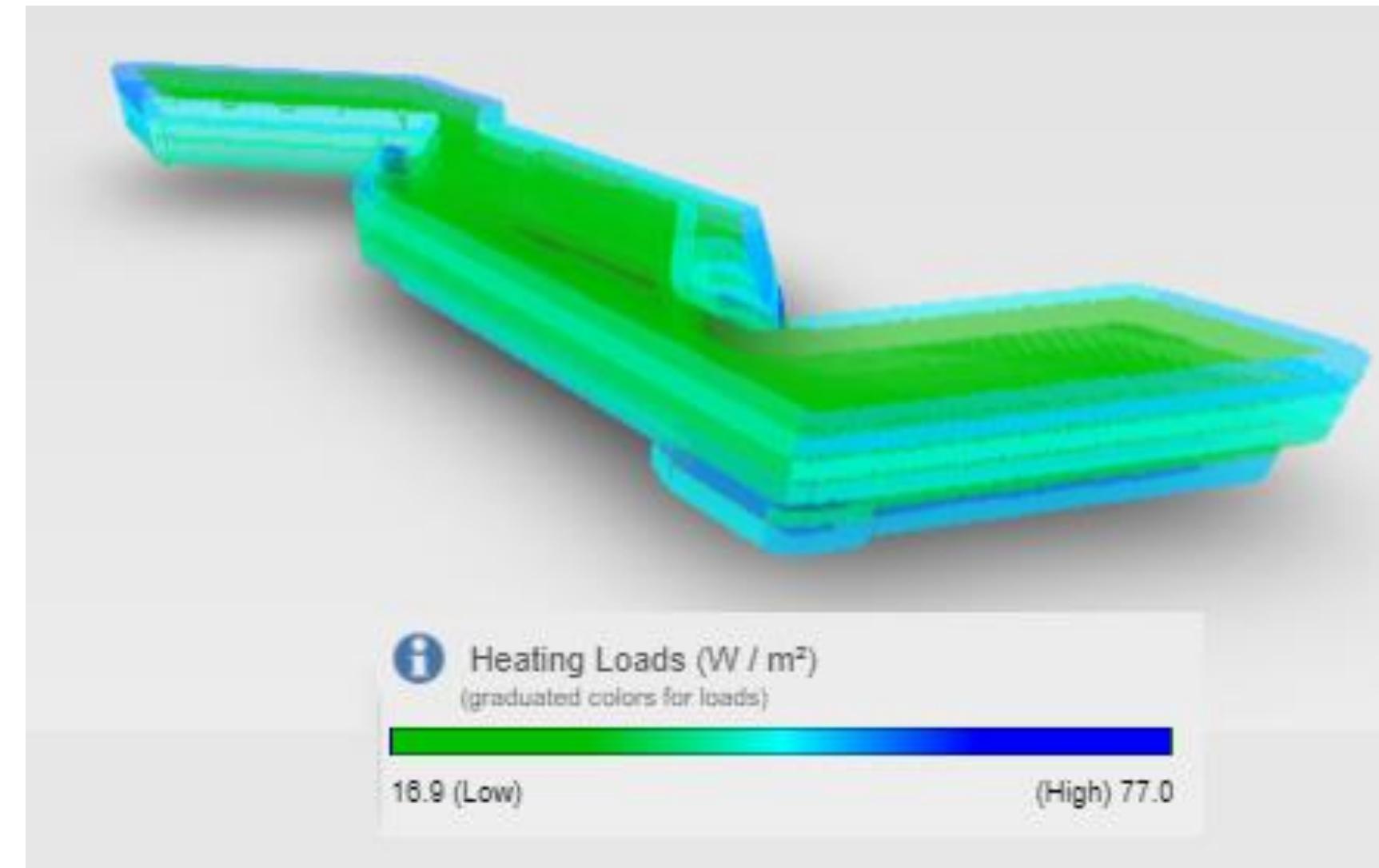
*Hundreds of full whole building energy simulations automatically performed.
Providing you with an interactive range of potential design scenarios*

JCI Heating / Cooling Loads Table and Visual

The heating and cooling loads in the baseline model are calculated using EnergyPlus hourly simulation engine for design days.

Building summary

Inputs	
Area (SF)	406421.03
Volume (CF)	6393672.00
Calculated Results	
Peak Cooling Total Load(Btu/h)	6095364.00
Peak Cooling Month and Hour	7/21 16:00:00
Peak Cooling Sensible Load(Btu/h)	5801523.50
Peak Cooling Latent Load(Btu/h)	293837.91
Peak Heating Load(Btu/h)	-4129501.25
Checksums	
Cooling Load Density (Btu/(h·ft ²))	15.00
Heating Load Density (Btu/(h·ft ²))	-10.16



Components	Cooling		Heating	
	Loads(Btu/h)	Percentage of Total	Loads(Btu/h)	Percentage of Total
Wall	-877618.12	-14.40	-864756.19	-14.91
Window	3576154.50	58.67	3366379.25	58.03
Door	0.00	0.00	0.00	0.00
Roof	-768840.94	-12.61	-780564.94	-13.46
Partition	-1016701.31	-16.68	-1016701.31	-17.53
Floor	-509786.25	-8.36	-500759.12	-8.63
Infiltration	257194.95	4.22	212966.80	3.67
Ventilation	0.00	0.00	0.00	0.00
Lighting	2447163.25	40.15	2422644.50	41.76
Power	2181914.00	35.80	2168716.25	37.38
People	805882.75	13.22		
Other	0.00	0.00	0.00	0.00
Total	6095364.00	100.0	5801042.00	100.0

In the default color-coding scheme, blue indicates higher heating loads and green indicates lower heating loads. For the cooling loads, red indicates higher cooling loads and green indicates lower cooling loads.

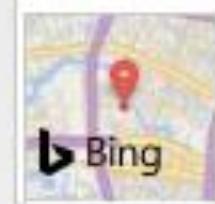
JCI Findings

Building Form

99.3
kWh / m² / yr

8.83
USD / m² / yr

Location



Benchmark Comparison kWh / m² / yr

133.3

99.3

51.8

ASHRAE 90.1 (228.3)

ARCHITECTURE 2030 - 59.0

51.8

627

ASHRAE 90.1

ASHRAE 90.1 - 228

194

44

Benchmark Comparison USD / m² / yr

\$12.53

\$8.83

\$4.27

\$46.2

\$16.0

\$3.7

ASHRAE 90.1

ASHRAE 90.1 - \$15.3

\$4.4

ARCHITECTURE 2030

194
kWh / m² / yr

16
USD / m² / yr

Location



Benchmark Comparison kWh / m² / yr

627

194

44

ASHRAE 90.1

ASHRAE 90.1 - 228

194

59

\$46.2

\$16.0

\$3.7

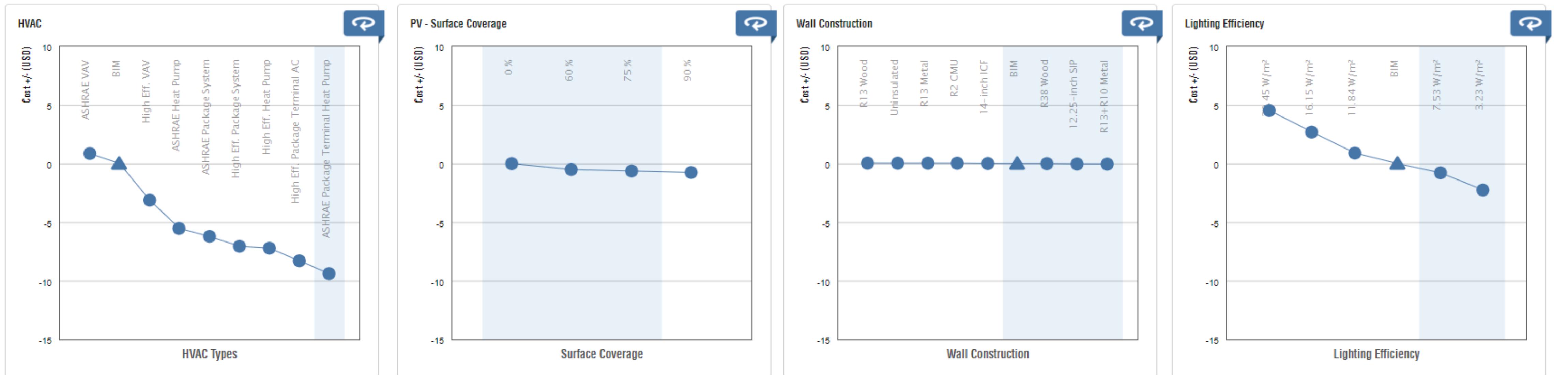
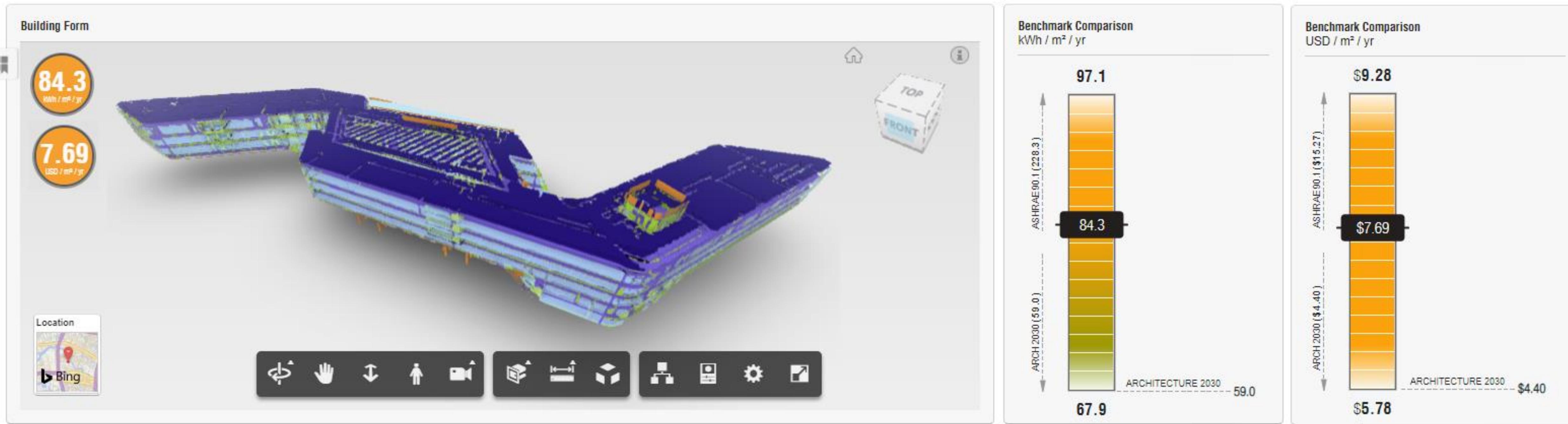
ASHRAE 90.1

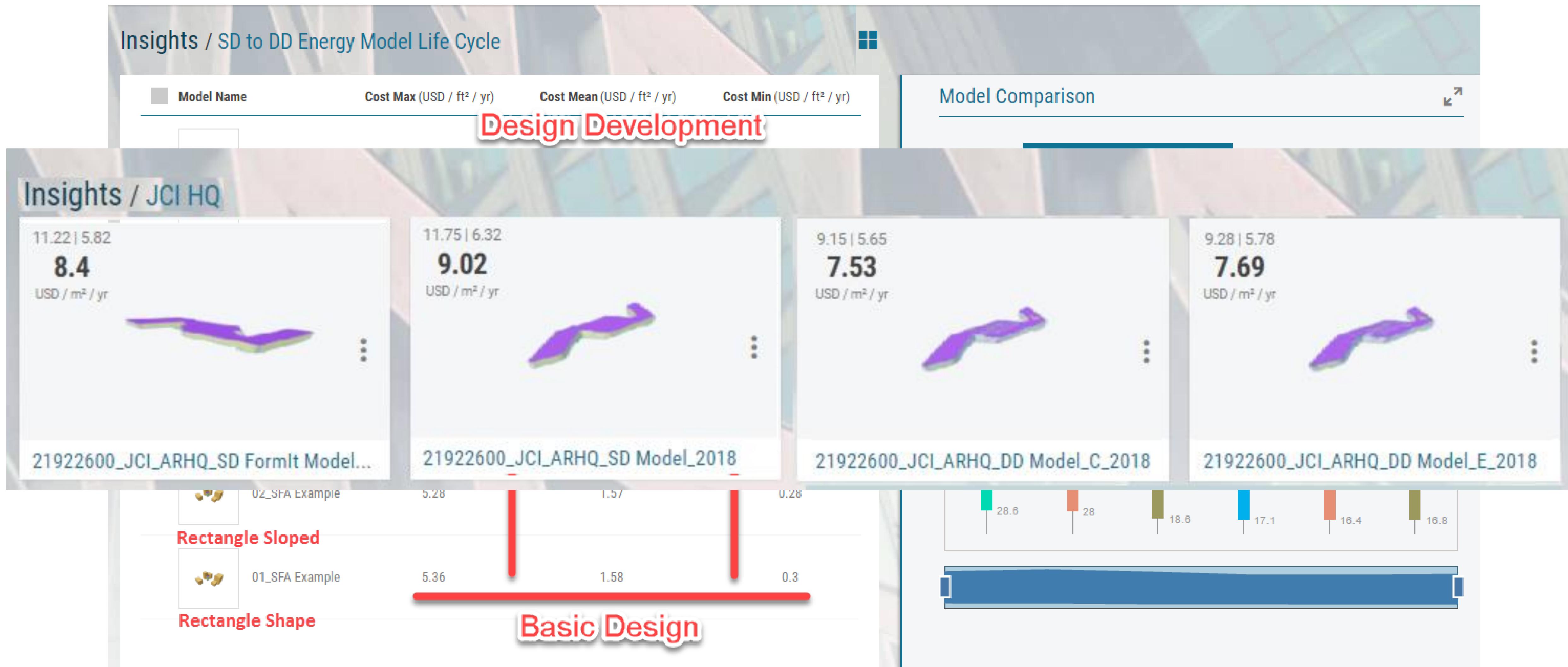
ASHRAE 90.1 - \$15.3

\$4.4

ARCHITECTURE 2030

JCI Findings





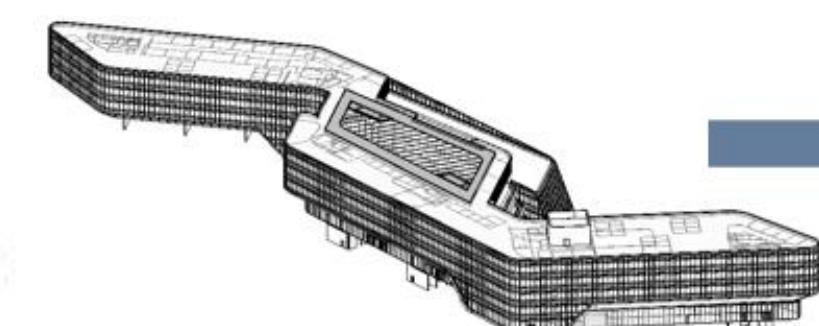
Energy performance—as a range

JCI – Summary

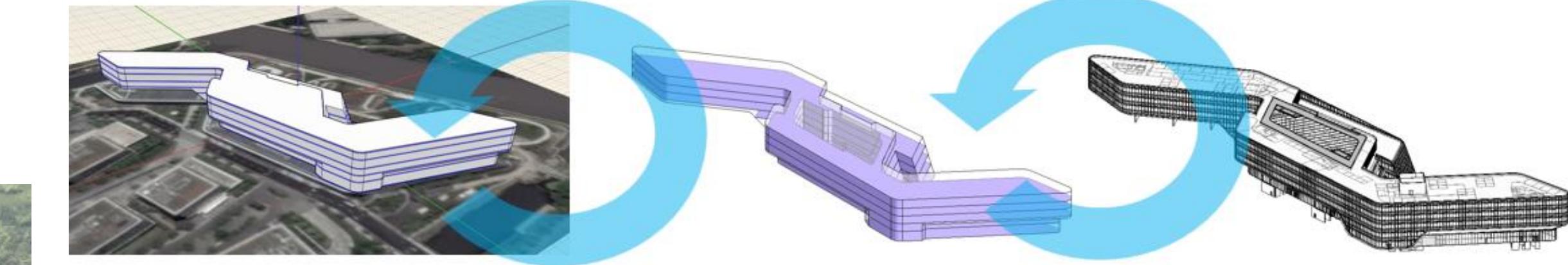
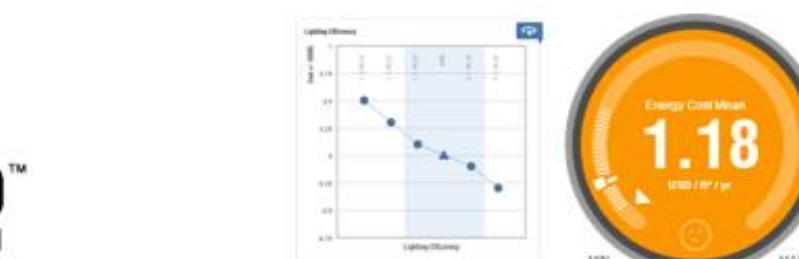
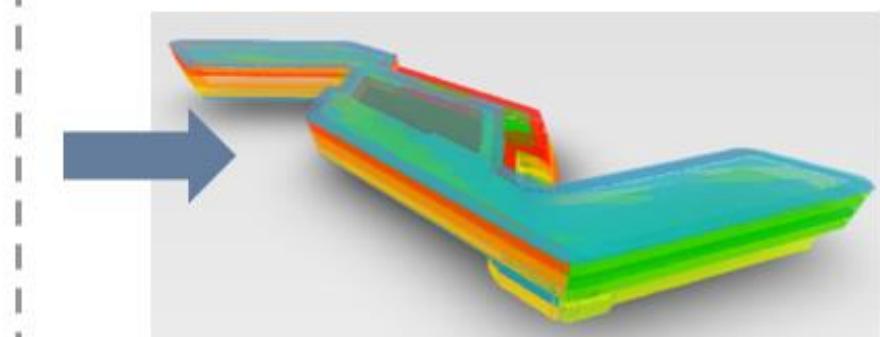


Clay Nesler • 1st

VP, Global Energy and Sustainability at Johnson Controls
Johnson Controls • University of Illinois at Urbana-Champaign

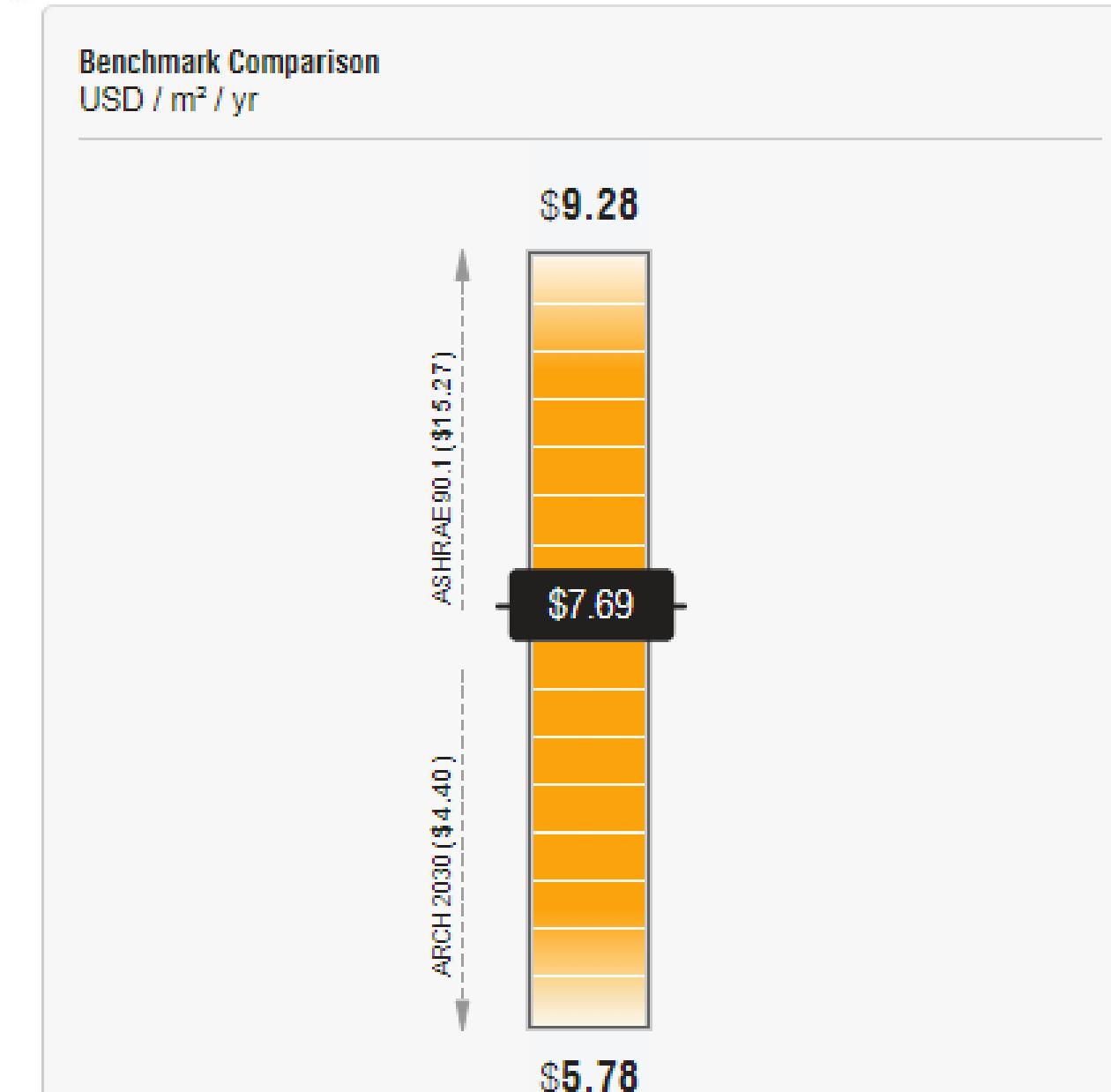


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+ ASHRAE 140 validation



FormIt →

→ Revit



Perkins + Will

Converting existing Grasshopper, Rhino, EnergyPlus, Ladybug, Honeybee, and OpenStudio workflow

Goals

- Alternative Generation
 - Minimize Energy Consumption
 - Maximize Daylight
 - Maximize View Quality
-
- Sprout Space [LINK](#)
 - acadia Conference [LINK](#)



John Haymaker • 1st
Educator, Researcher, Technologist
Perkins+Will • Stanford University

Director of Research
Perkins+Will
2013 – Present • 5 yrs
Greater Atlanta Area

The workflow that is shown is based on a Perkins + Will relocatable classroom building (Sprout Space). This was first presented at the ACADIA conference by John Haymaker called “Design Space Construction”

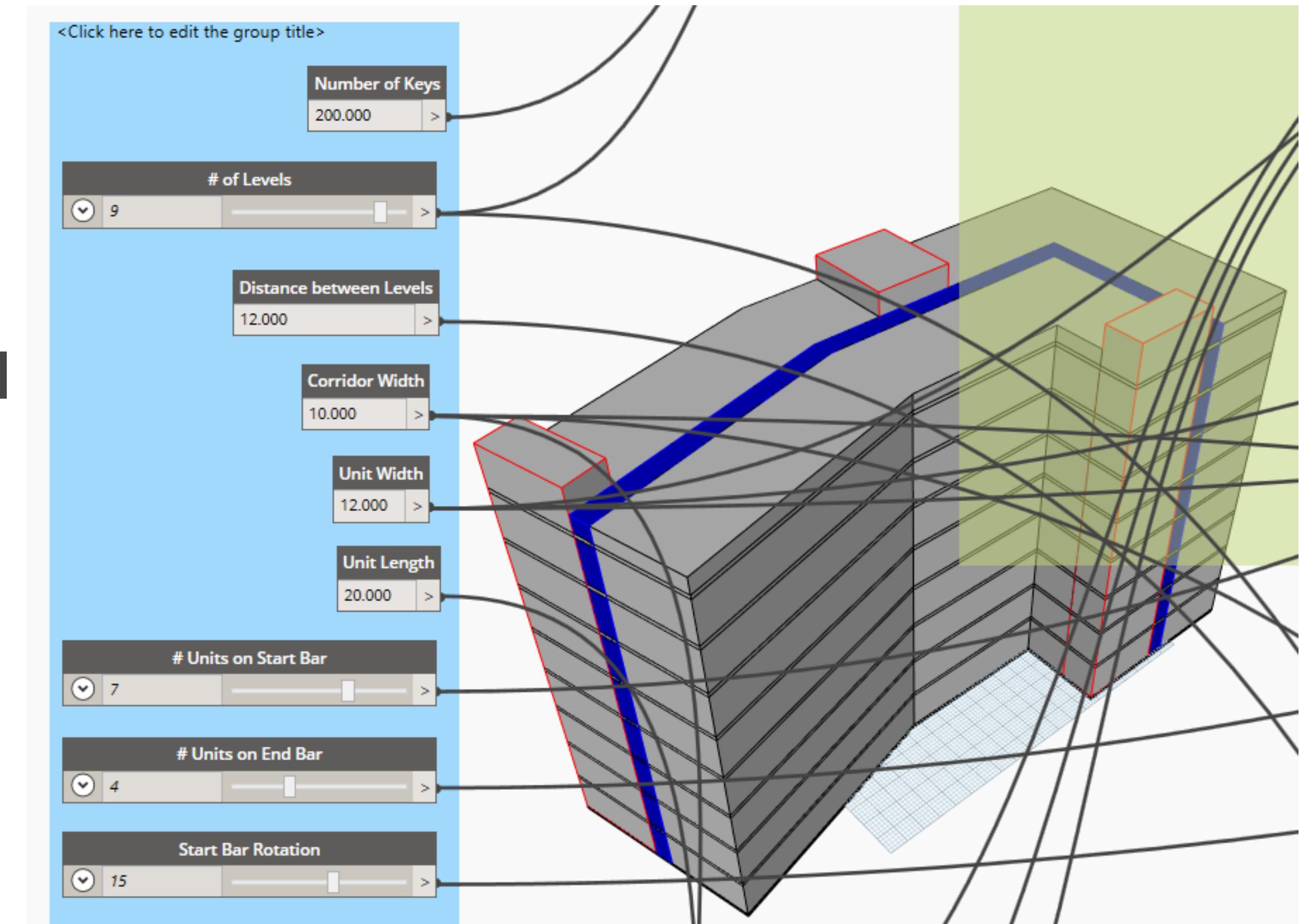
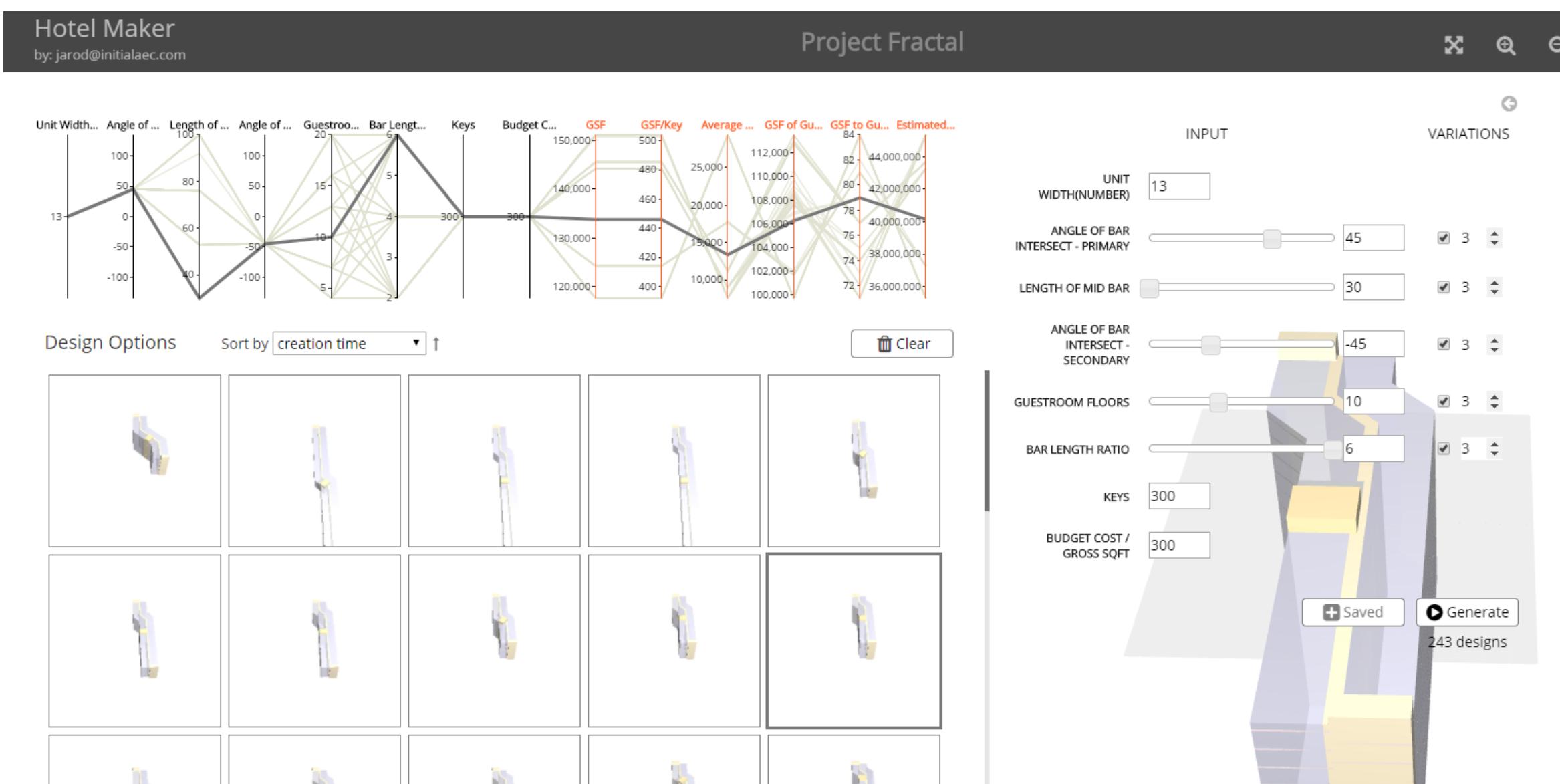


A screenshot of the Autodesk Insights interface. At the top, there is a grid of triangular plots showing relationships between various building parameters like Length, Width, Height, Offset, Orientation, Roof Angle, and Clerestory dimensions. Below this, there is a section titled "Add Models" and a list of five design variations labeled SSG_Design-1 through SSG_Design-5. Each design is represented by a small 3D model and its energy performance metric: -9.86 USD/m²/yr, -10.2 USD/m²/yr, -10.3 USD/m²/yr, -9.99 USD/m²/yr, and -9.37 USD/m²/yr. The bottom part of the interface shows a detailed input form for creating new variations, with sliders for Length, Width, Height, and Offset, and dropdown menus for Orientation, Roof Angle, and Clerestory dimensions.

Perkins + Will

Dynamo, Fractal - Informed Decisions about Designs

- Rapid design iteration and broad interoperability
- Lightweight scripting interface
- Fractal – Automating “What If” Decisions
- Sprout Space: 9.5 million Design Alternates



Alternative Generation [LINK](#)

Sprout Space Fractal [LINK](#)

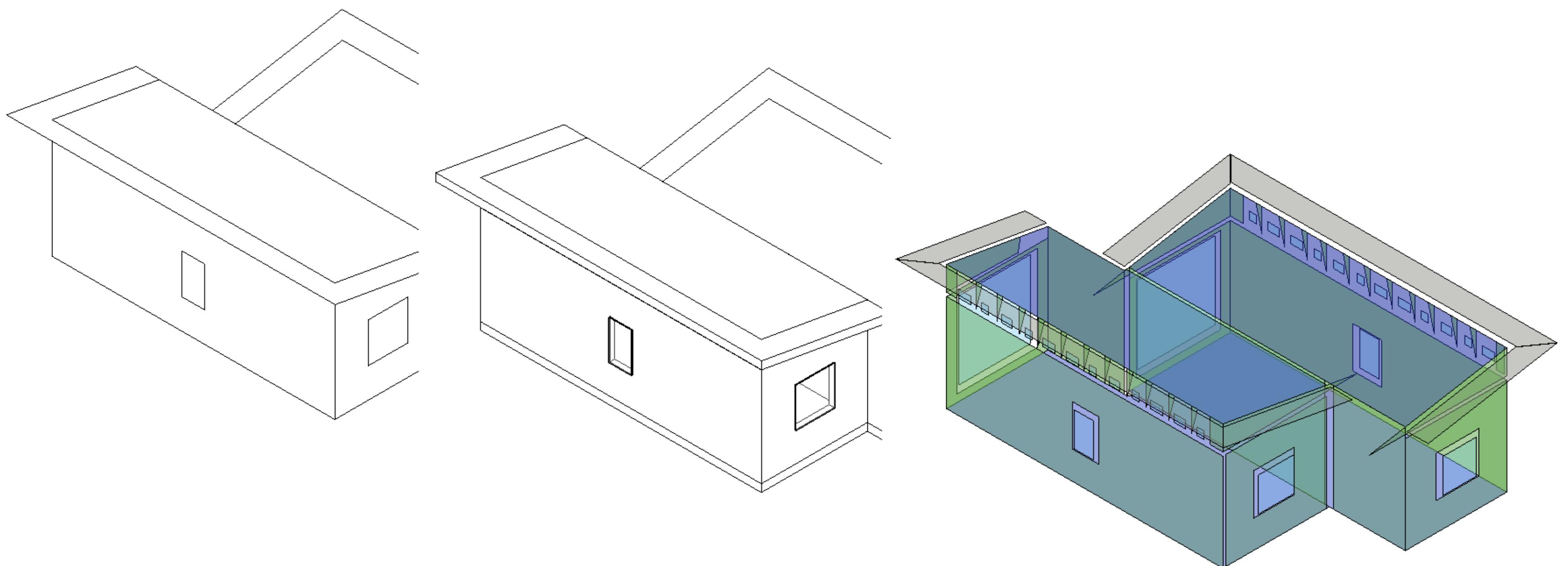
Building Maker [LINK](#)

Perkins + Will

Fractal to Revit Mass to Building Elements

Goals

- Revit Centric, didn't want to use FormIt
- Energy Consumption
- Daylight
- View Quality
- Solar Analysis
- Insight [LINK](#)



Perkins + Will

View Analysis

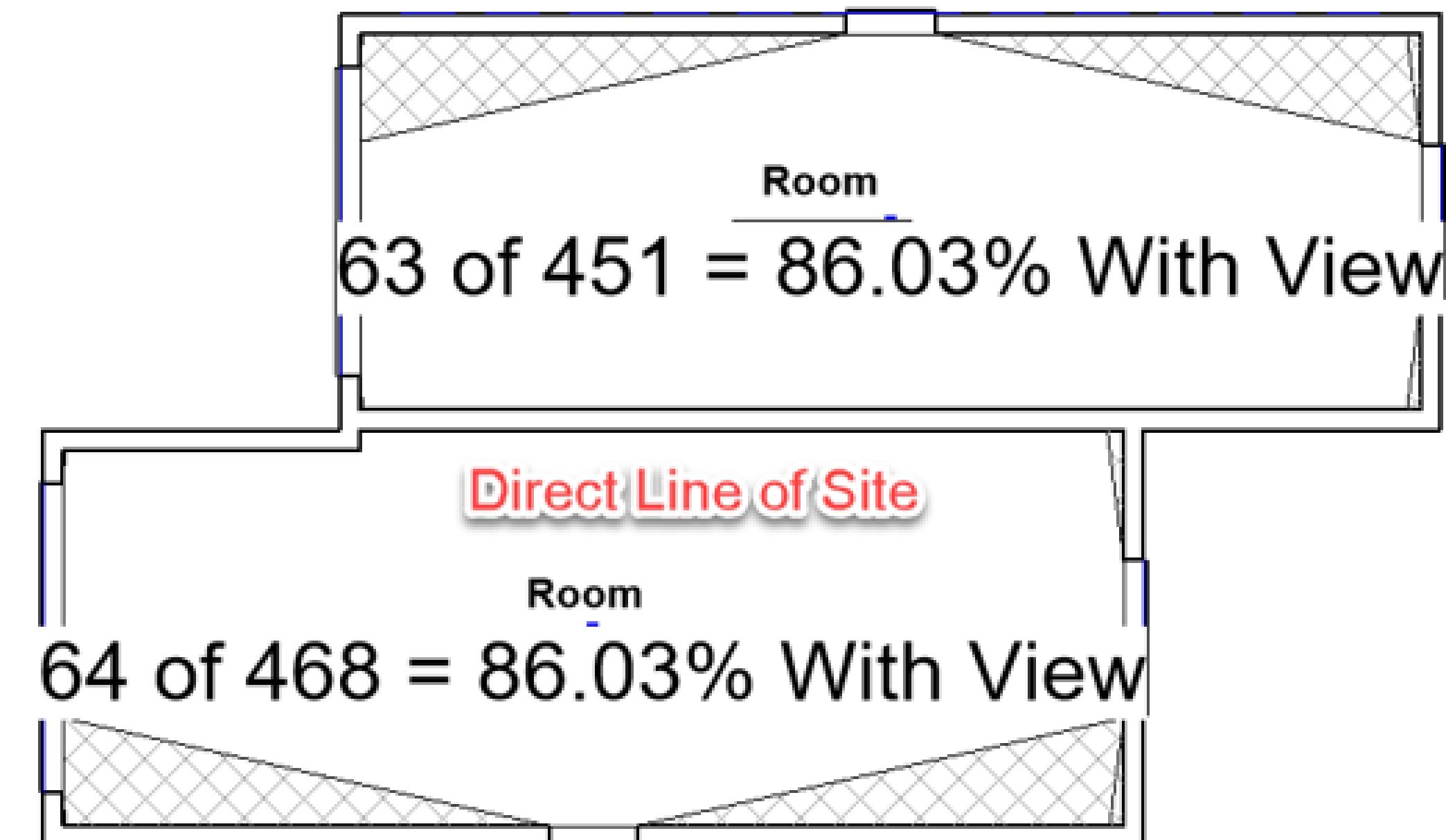
The Direct Line of Sight (DLS) that calculates the percentage of the floor area of the building with exterior view

The Dark Areas

The extent of glazing, as viewed in plan, is used to determine the 'areas with no views'. This concept is taken from LEED 4.0:

"Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area. View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance."

The method that calculates the floor area, is taken from LEED 2009 IEQ Credit 8.2 Daylight and views. In this method, the plan view angle through the glazed area considers the actual wall thickness for punched windows. In plan, two diagonal lines are drawn, one connecting the exterior left wall opening corner to the interior right wall opening corner, and the other connecting the exterior right wall opening corner to the interior left wall opening corner. This is done for each glazed opening. These two diagonal lines are extended towards the interior. Wherever diagonal lines of adjacent windows intersect, the area contained within these diagonal lines and the associated wall or walls is regarded as an 'area with no view' or dark area. The DLS indicator of this case study is 0.830265, or 85%, which is above the recommended reference of 75.



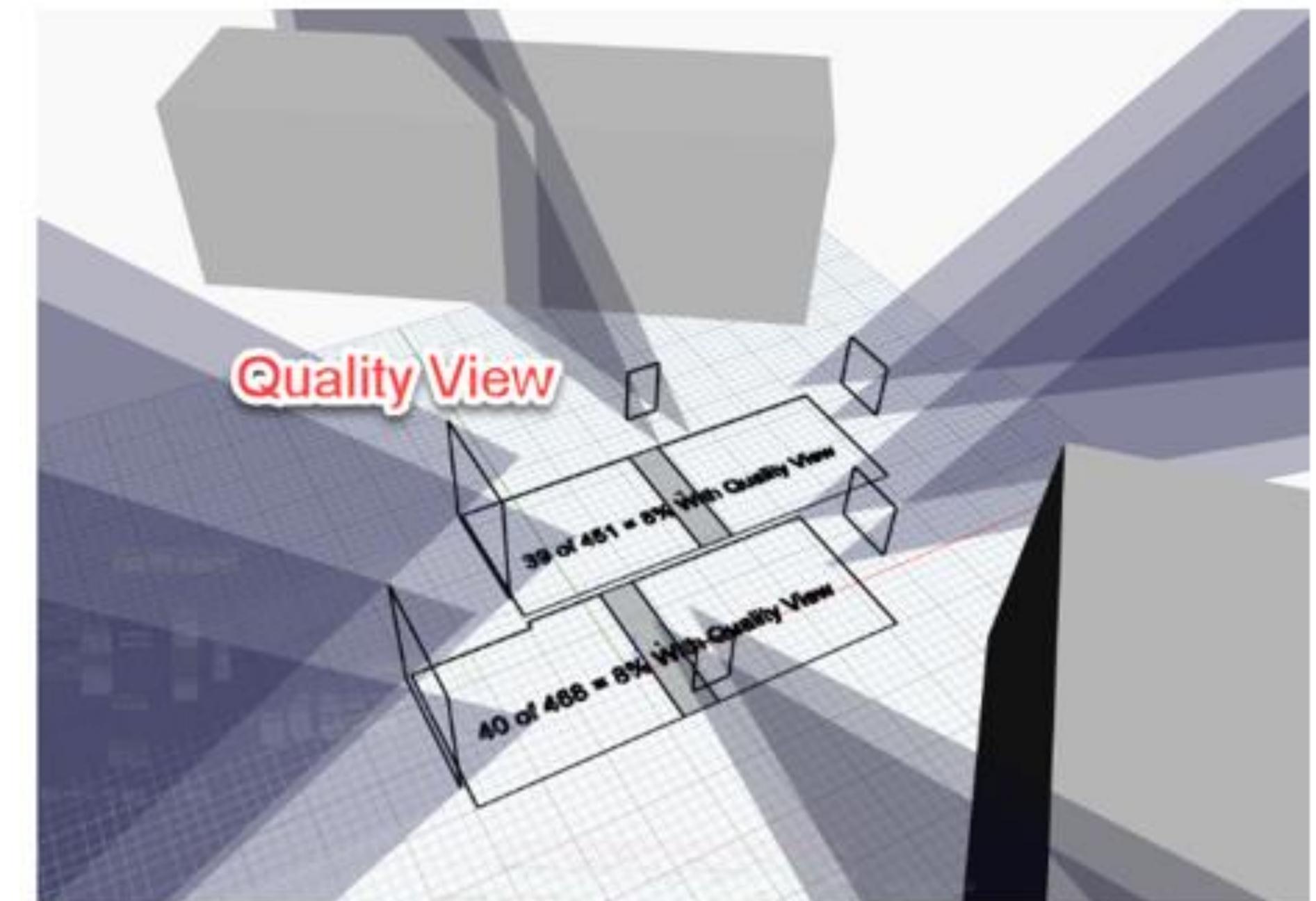
Perkins + Will

View Analysis

Quality View (QV) that calculates the percentage of the area that allow the view of some relevant elements of the landscape.

DLS assures people can see out of the building, but this says nothing about the quality of that view. The QV indicator is inspired by the Quality View definition in LEED V4. It is based on a two-dimensional interpretation of the building. It represents a 2D viewing angle from each sampled view point inside the building, as it would be represented in a section, and computes the intersection of these 2D fields with relevant elements of the landscape, see Figure 3.0 / 3.7.

For the purpose of this case study, the triangular meshes representing the 2D viewing angles are used to intersect elements in the context model of two buildings masses of visual interest. When an intersection is found, it is counted towards a quality view area, represented as a blue area on the center of the space. This method requires a mesh representation of the relevant elements of the landscape. The QV indicator of this case study is 0.237862 that corresponds to almost 24% of the floor plan area of the building.



Direct Line of Sight Data

	A	B	C	D	E
1					
2		Room	Dark Area	Room Area	Percentage with View
3	Room 1	81.24487918	433.7777778		82
4	Room 2	81.63543519	452.8888889		82

Quality of View Data

	A	B	C	D	E
1					
2		Room	Area with View	Room Area	Percentage with Quality View
3	Room 1		32	433.7777778	7
4	Room 2		34	452.8888889	7
5					

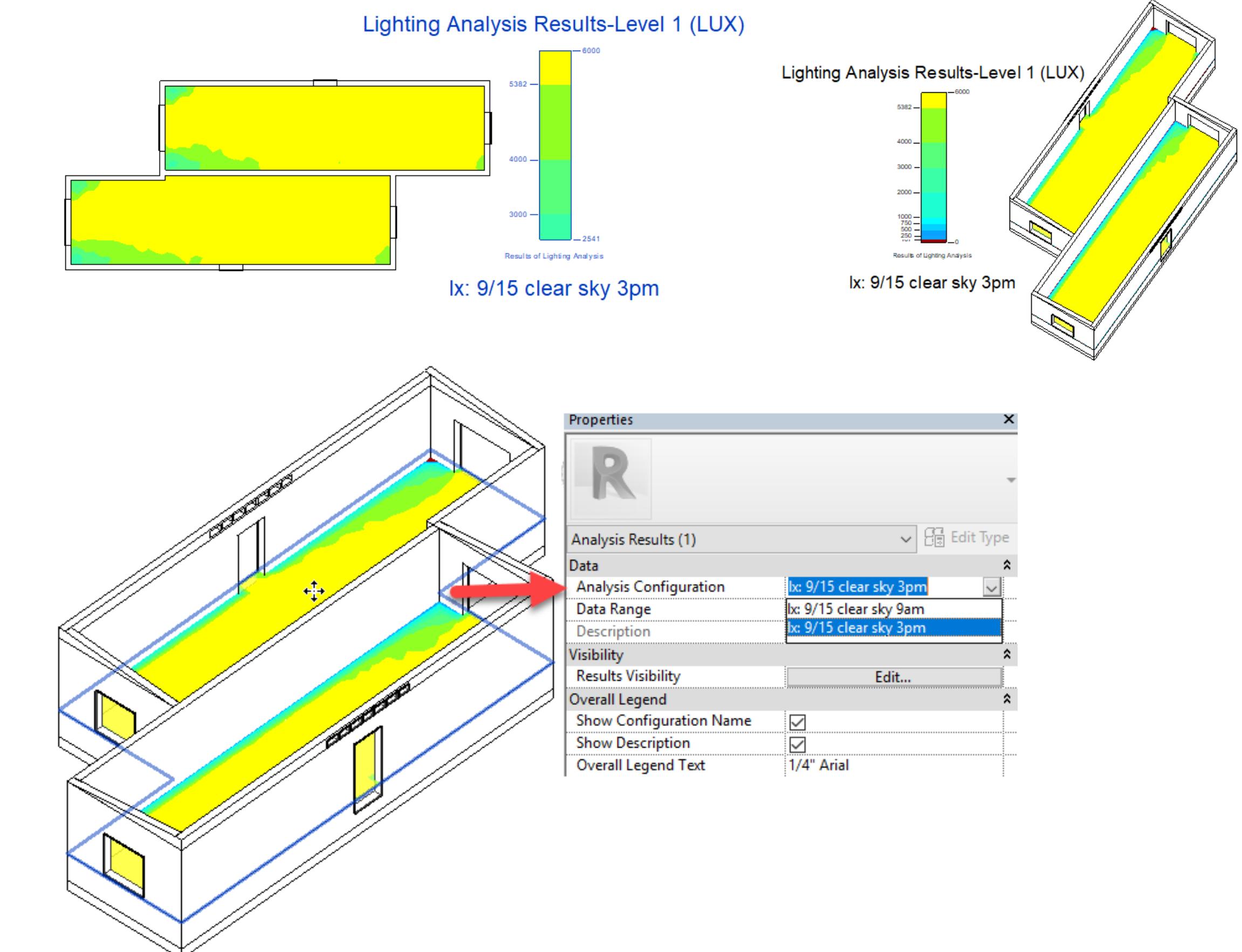
Perkins + Will

Lighting Analysis

The daylight simulation calculates the daylighting quantity and quality within the spaces of the building. This analysis calculates the Daylight Factor - the ratio between the interior and exterior illuminance levels of natural lighting. This plug-in provides “LEED IEQc8.1 2009” and “LEED v4 EQc7 opt2” results for most models in less than 15 minutes once the analysis is started.

Analysis Type	Description
Illuminance Analysis	Full custom control over date, time, threshold, and analysis plane height
Daylight Autonomy (sDA preview)	Sample calculation for LEED v4 EQc7 opt1 (sDA & ASE) Reduced cost & calculation time
LEED 2009 IEQc8 opt1	Automated settings for LEED 2009 IEQc8 opt1 settings
LEED v4 EQc7 opt1	Automated settings for LEED v4 EQc7 opt1 (sDA & ASE) settings
LEED v4 EQc7 opt2	Automated settings for LEED v4 EQc7 opt2 settings
Solar Access	Customizable hours of sun study

< Lighting Analysis Room Schedule >																																																																																																												
LEED v4 EQc7 opt2 Whole Building Results: 16315 Grevillea Ave, Lawndale, CA 90260																																																																																																												
9am: 1% within & 3pm: 0% within thresholds																																																																																																												
Solar Values (W/m ²): 9/21 9am GHI: 486, DNI: 641, DHI: 89 & 9/21 3pm GHI: 454, DNI: 619, DHI: 88																																																																																																												
<table border="1"> <thead> <tr> <th rowspan="2">A</th> <th rowspan="2">B</th> <th rowspan="2">C</th> <th rowspan="2">D</th> <th rowspan="2">E</th> <th rowspan="2">F</th> <th rowspan="2">G</th> <th rowspan="2">H</th> <th rowspan="2">I</th> <th rowspan="2">J</th> <th rowspan="2">K</th> <th rowspan="2">L</th> <th rowspan="2">M</th> <th rowspan="2">N</th> <th rowspan="2">O</th> <th rowspan="2">P</th> <th rowspan="2">Q</th> <th rowspan="2">R</th> </tr> <tr> <th colspan="4">9am threshold results</th> <th colspan="4">3pm threshold results</th> </tr><tr> <th colspan="2">within threshold</th> <th colspan="2">above threshold</th> <th colspan="2">below threshold</th> <th colspan="2">within threshold</th> <th colspan="2">above threshold</th> <th colspan="2">below threshold</th> </tr> <tr> <th>Level</th> <th>Name</th> <th>Number</th> <th>Area</th> <th>Include In Daylighting</th> <th>Automated Shades</th> <th>%</th> <th>Area</th> <th>%</th> <th>Area</th> <th>%</th> <th>Area</th> <th>%</th> <th>Area</th> <th>%</th> <th>Area</th> <th>%</th> <th>Area</th> </tr> </thead> <tbody> <tr> <td>Level 1</td> <td>Room</td> <td>1</td> <td>434 SF</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td>2</td> <td>7 SF</td> <td>99</td> <td>427 SF</td> <td>0</td> <td>0 SF</td> <td>1</td> <td>2 SF</td> <td>100</td> <td>432 SF</td> <td>0</td> <td>0 SF</td> </tr> <tr> <td>Level 1</td> <td>Room</td> <td>2</td> <td>453 SF</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td>1</td> <td>5 SF</td> <td>99</td> <td>448 SF</td> <td>0</td> <td>0 SF</td> <td>0</td> <td>2 SF</td> <td>100</td> <td>451 SF</td> <td>0</td> <td>0 SF</td> </tr> </tbody> </table>																	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	9am threshold results				3pm threshold results				within threshold		above threshold		below threshold		within threshold		above threshold		below threshold		Level	Name	Number	Area	Include In Daylighting	Automated Shades	%	Area	Level 1	Room	1	434 SF	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	7 SF	99	427 SF	0	0 SF	1	2 SF	100	432 SF	0	0 SF	Level 1	Room	2	453 SF	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	5 SF	99	448 SF	0	0 SF	0	2 SF	100	451 SF	0	0 SF										
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Perkins + Will

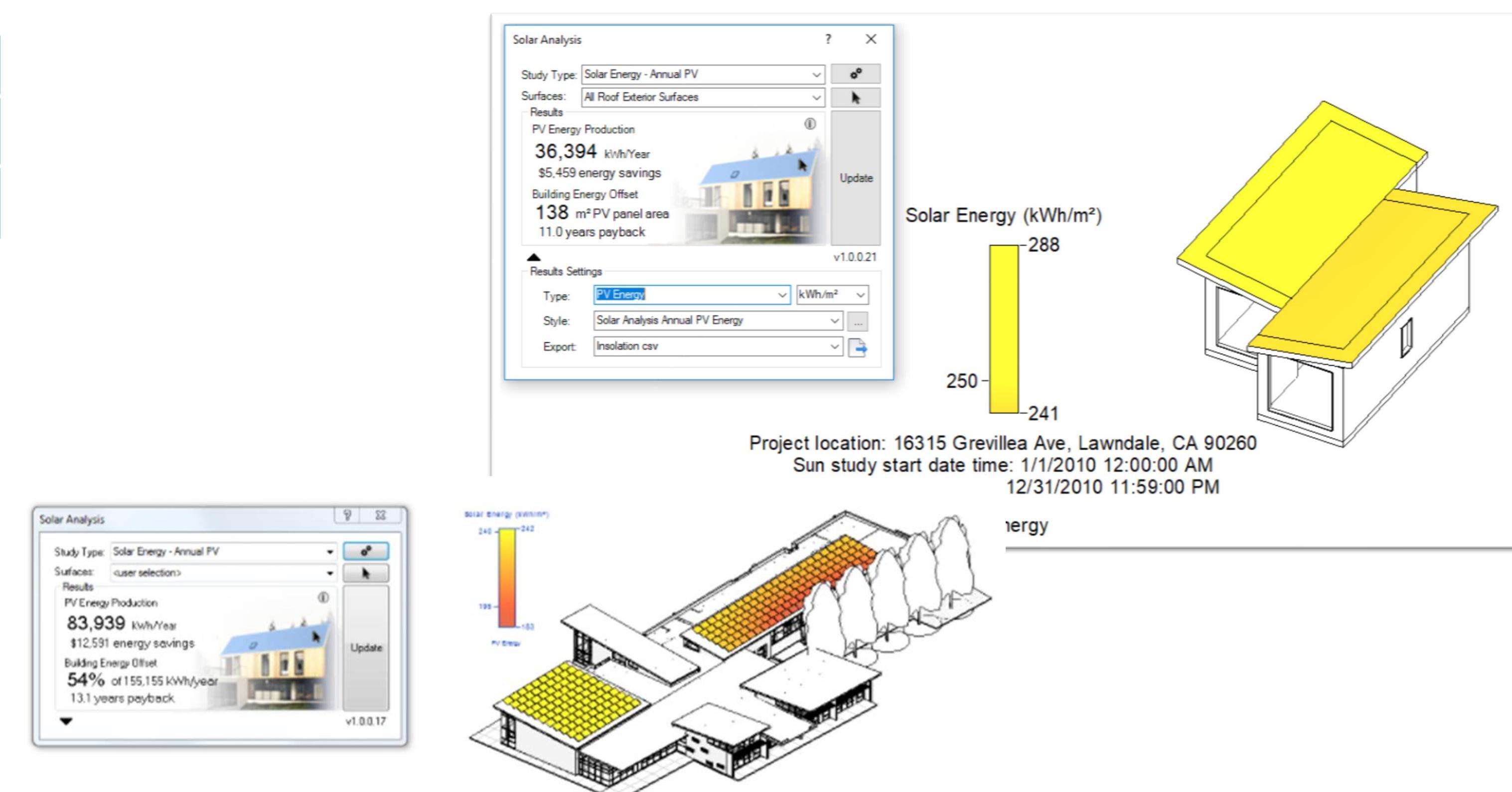
Solar Analysis

Insight Solar Analysis provides in context solar radiation analysis results to help you track solar energy throughout your design. Insight Solar Analysis with Revit uses the Perez Solar Model. For solar analysis studies you can use a conceptual mass, detailed building element model, or even a hybrid of the two.

This model is used by the National Renewable Energy Lab (NREL) and their PVWatts® tool. Results from Insight Solar Analysis have been validated directly by NREL and findings conclude that differences between the results were less than 1% for surfaces oriented horizontal, east facing vertical, and south facing with latitude tilt angle.

Analysis Type	Description
Solar Energy – Annual PV	Annual simulation for determining PV energy production estimates
Custom	Customizable simulation for general solar insolation studies

It's important to note that Revit uses a variety of weather data for analysis, not just typical meteorological year (TMY) data. When comparing Insight Solar Analysis results to those from other tools, consider weather data sources and varying calculation methods when comparing results.



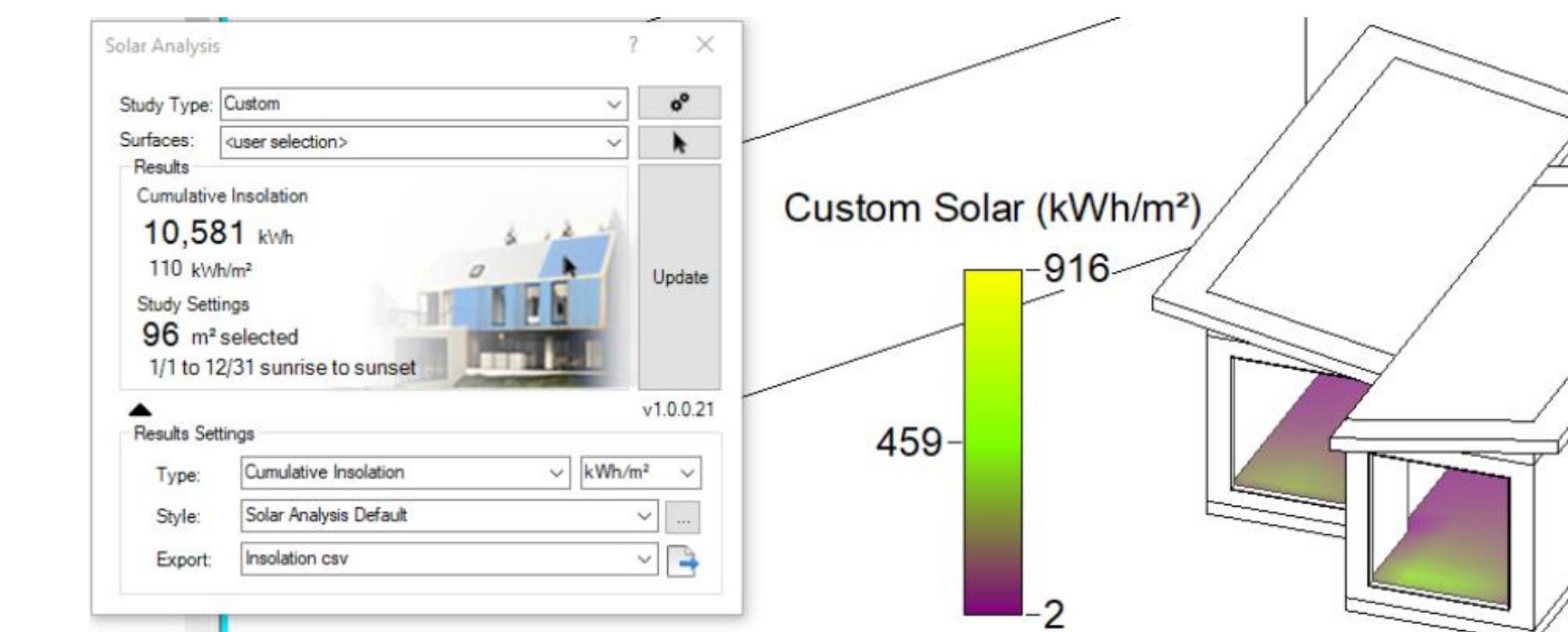
Perkins + Will

Louver Analysis

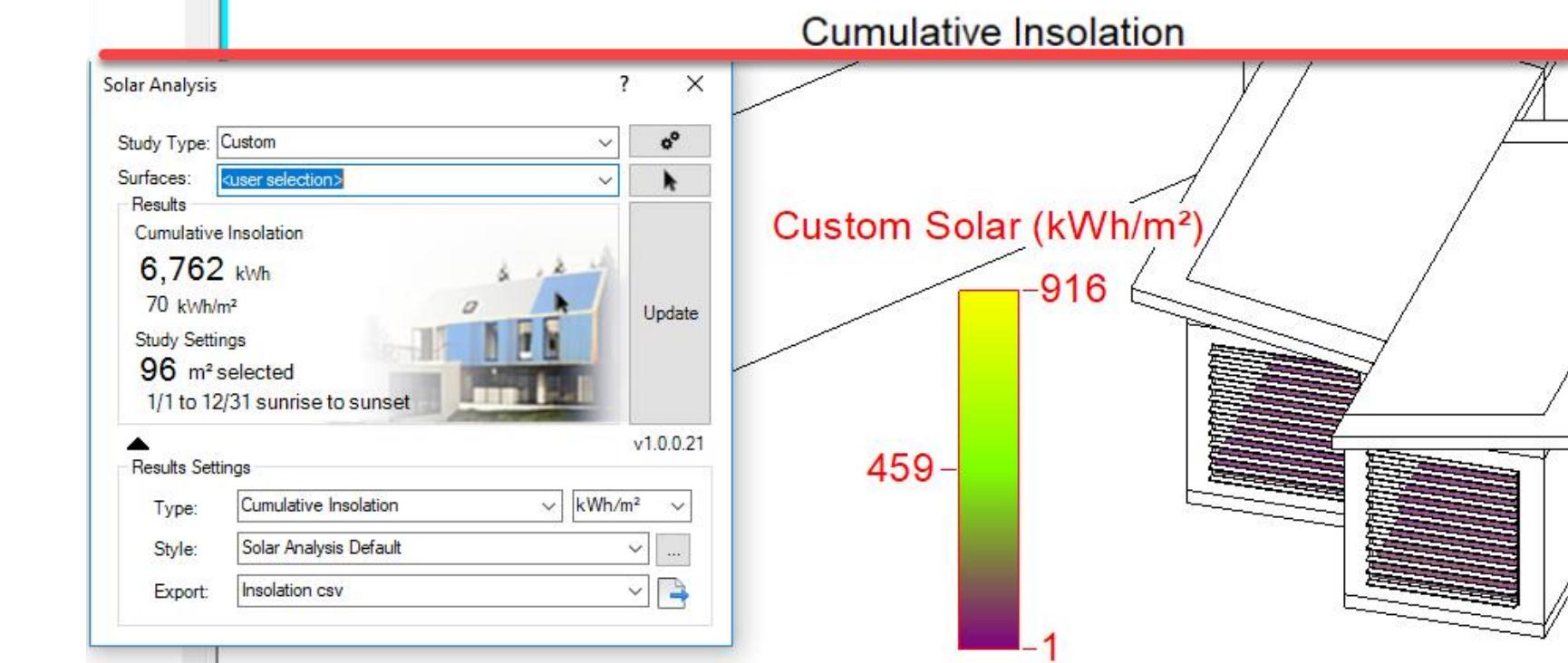
Below is an example of using the "user selection" option to select the inside floor surface to see how the "Model In-Place" shade device is affecting that surface.

Currently some firms use curtain mullions to represent shade devices but if you are wanting to see how the solar analysis is affecting the interior surfaces that process won't work. Hopefully a future release will fix this but for today we will need to use a "Model In-Place" component to represent the shade device.

Surface Selection	Description
All Roof Exterior Surfaces	When selected for a model with building elements, this option automatically selects all Roof elements
All Mass Surfaces	When selected for a model with conceptual masses, this option automatically selects all mass faces
User Selection	This option allows you to select your own mass and building element surfaces for analysis



Project location: 16315 Grevillea Ave, Lawndale, CA 90260
Sun study start date time: 1/1/2010 12:00:00 AM
Sun study end date time: 12/31/2010 11:59:00 PM



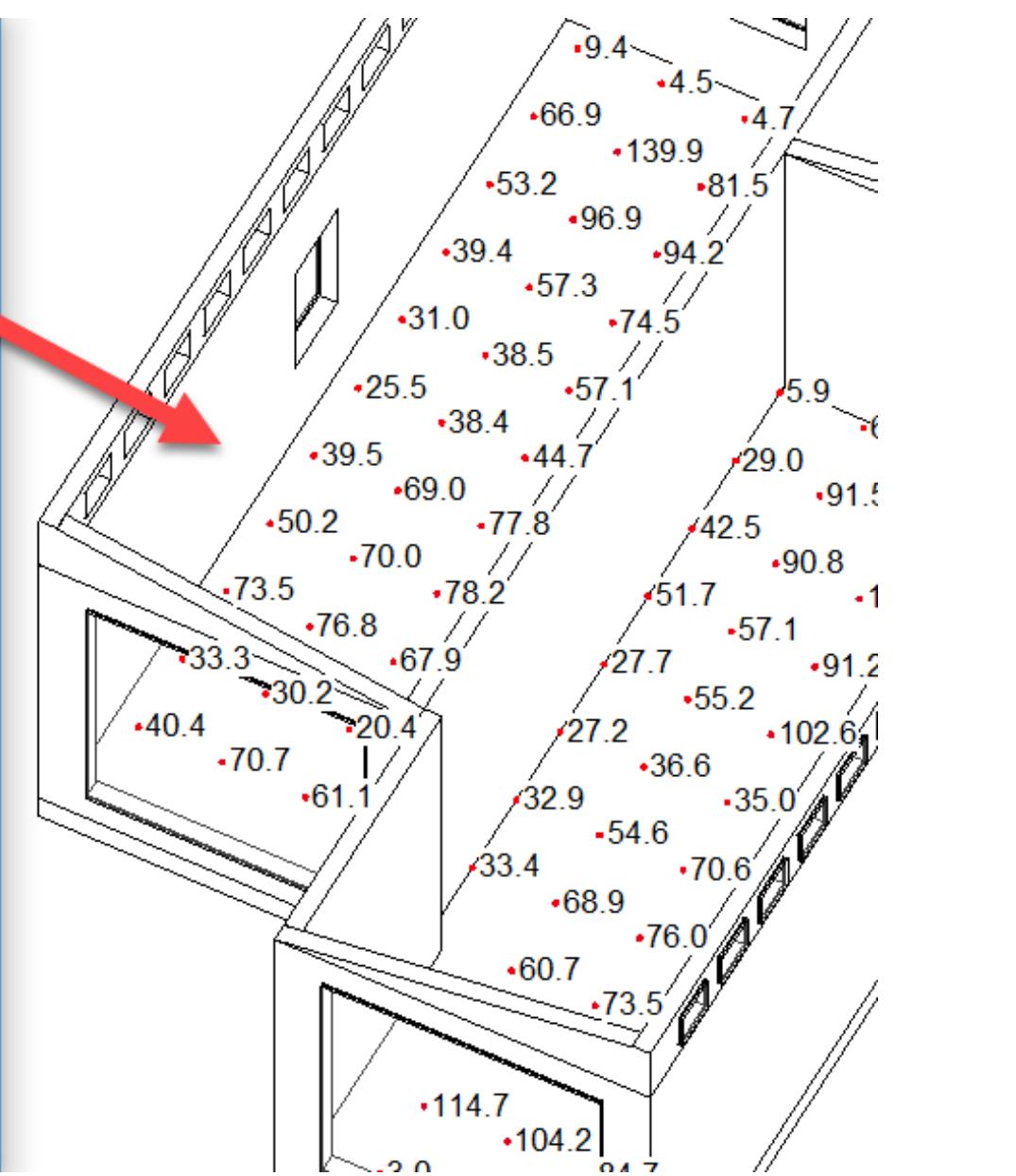
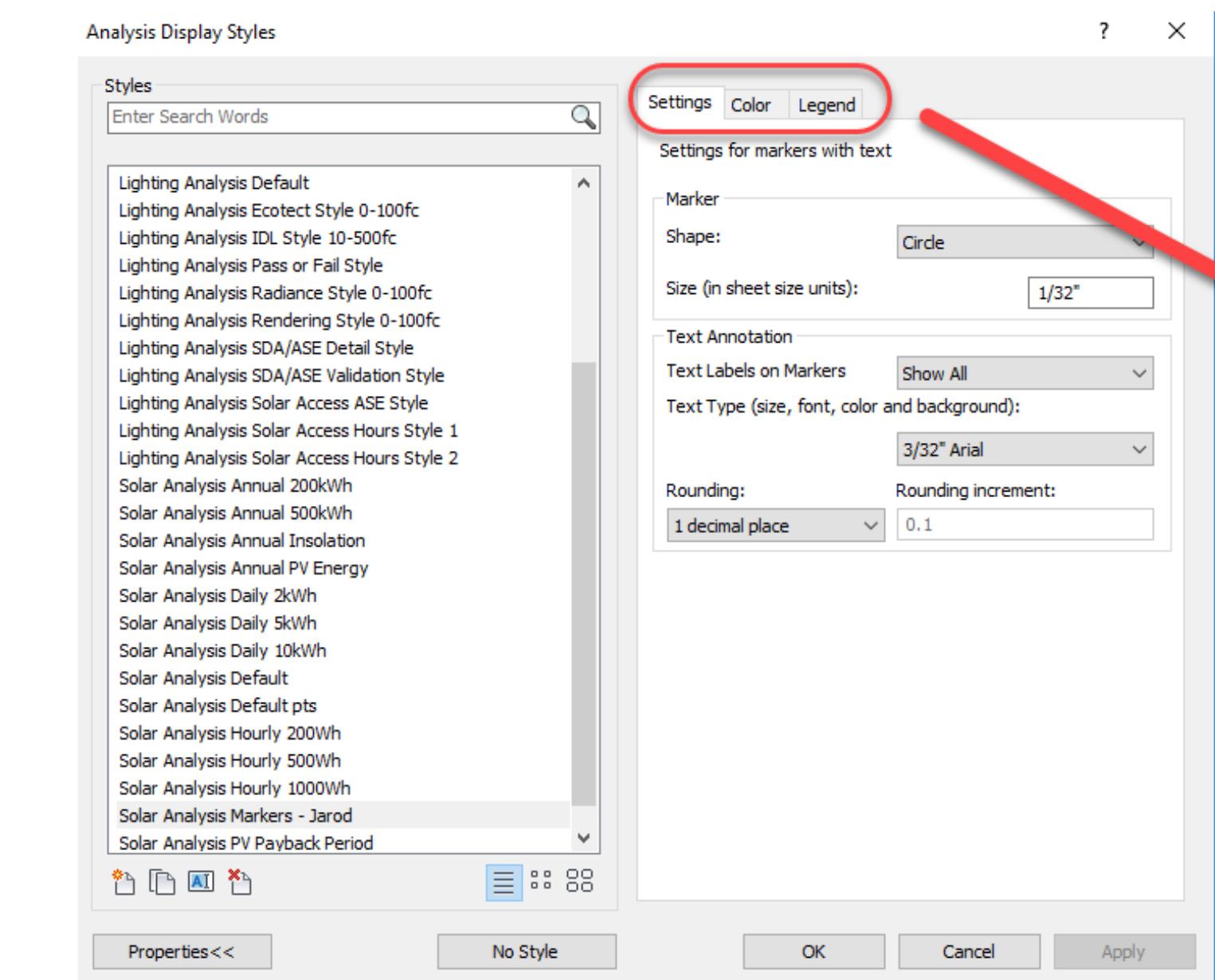
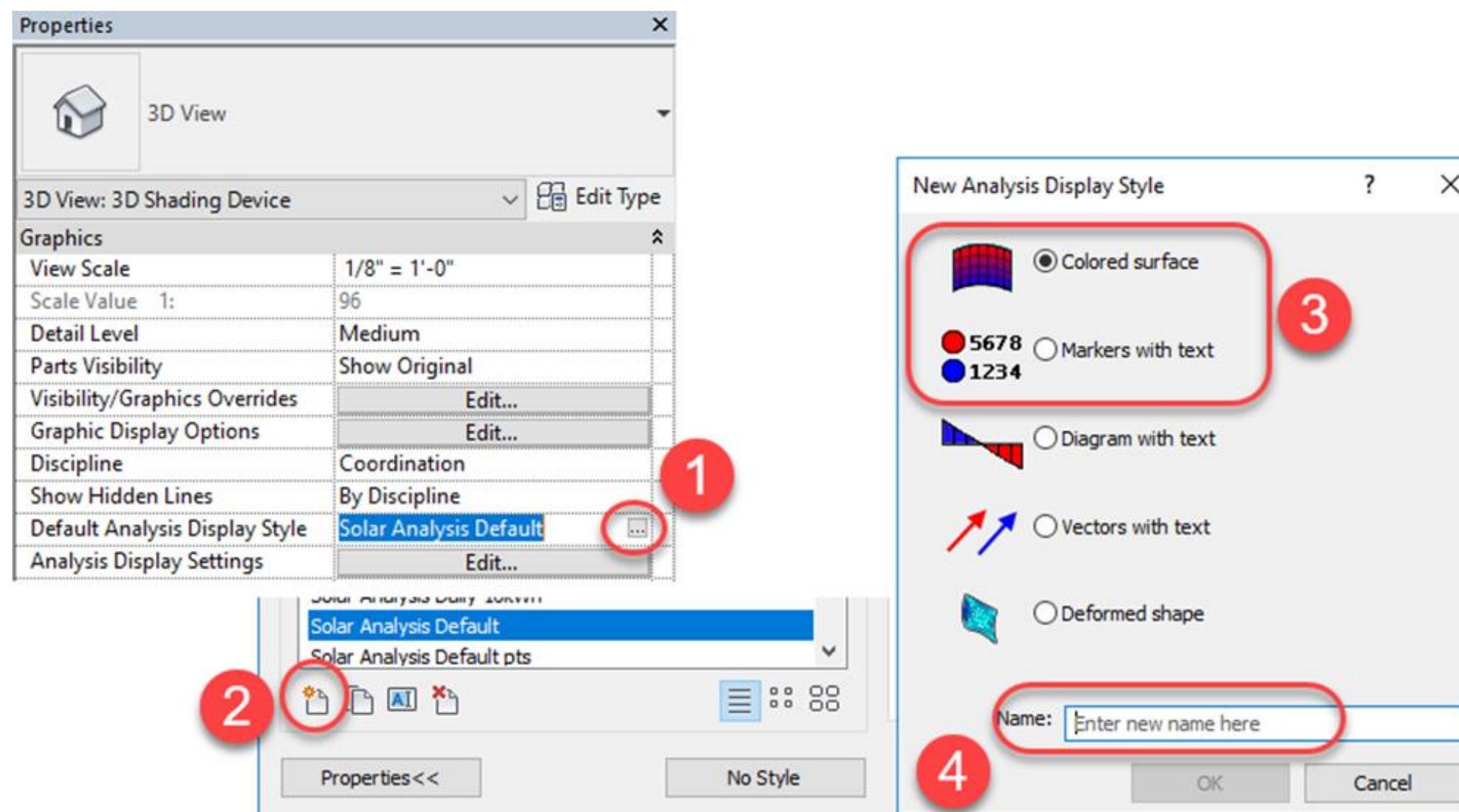
Project location: 16315 Grevillea Ave, Lawndale, CA 90260
Sun study start date time: 1/1/2010 12:00:00 AM
Sun study end date time: 12/31/2010 11:59:00 PM

Cumulative Insolation

Perkins + Will

Analysis Visual Styles

For all analysis types, default analysis display styles are used to visualize results. Control the "Settings", "Color", and "Legend" in the respective tabs. Adding values associated with specific colors will allow you to highlight specific thresholds



Once results have been generated in your 3D view, you can export analysis point location and associated data as a CSV. The resulting CSV will produce a summary of the simulation and list values of individual analysis points and their location in the model.

The screenshot shows an Excel spreadsheet titled 'Shade Device Analysis Results.csv - Excel'. The 'Results Settings' pane indicates 'Type: Cumulative Insolation' and 'Style: Solar Analysis Markers - Jarod'. The 'Export' dropdown is set to 'Insolation.csv'. The main table has columns for Source, Date, Time, Model, Analysis Surface, Parent object type, Category, Parent object ID, Type, Average Surface Insolation Value, Surface Area, Total Surface Insolation Value, and normal x, normal y, normal z. A red arrow points from the 'Export' dropdown in the Results Settings pane to the 'Insolation.csv' file in the table.

L35	A	B	C	D	E	F	G	H
1	Source	Date	Time	Model	Type	Study Average Insolation Value	Total Study Surface Area	Total Study Insolatic
2	Revit 2016	3/9/2018	2:28 PM	SSG_Design-1_Solar Analysis.rvt	Cumulative	70.28638151	96.247508	676
3								
4	Analysis Surface	Parent object type	Category	Parent object ID	Average Surface Insolation Value	Surface Area	Total Surface Insolation Value	
5	-840939580	Floor	Floors	336052	70.28638151	1036	72816.69124	
6								
7	Analysis point index	Insolation value	Parent surface	point x	point y	point z	normal x	normal y
8	1	9.401633789	-840939580	29.98786914	20.85350087	0	0	
9	2	4.467899414	-840939580	29.98786914	17.74238976	0	0	
10	3	4.728354492	-840939580	29.98786914	14.63127865	0	0	
11	4	7.204072266	-840939580	29.98786914	11.52016754	0	0	

Perkins + Will

Converting existing Grasshopper, Rhino, EnergyPlus, Ladybug, Honeybee, and OpenStudio workflow

Goals

- Alternative Generation
 - Minimize Energy Consumption
 - Maximize Daylight
 - Maximize View Quality
-
- Sprout Space [LINK](#)
 - acadia Conference [LINK](#)



John Haymaker • 1st
Educator, Researcher, Technologist
Perkins+Will • Stanford University

Director of Research
Perkins+Will
2013 – Present • 5 yrs
Greater Atlanta Area

The workflow that is shown is based on a Perkins + Will relocatable classroom building (Sprout Space). This was first presented at the ACADIA conference by John Haymaker called “Design Space Construction”

A screenshot of the Autodesk Insights interface. At the top, there is a grid of triangular plots showing relationships between various design parameters like Length, Width, Height, Offset, Orientation, Roof Angle, and Clerestory dimensions. Below this, there is a section titled "Add Models" with a plus sign icon. To the right, there are four cards showing energy performance metrics for different designs:

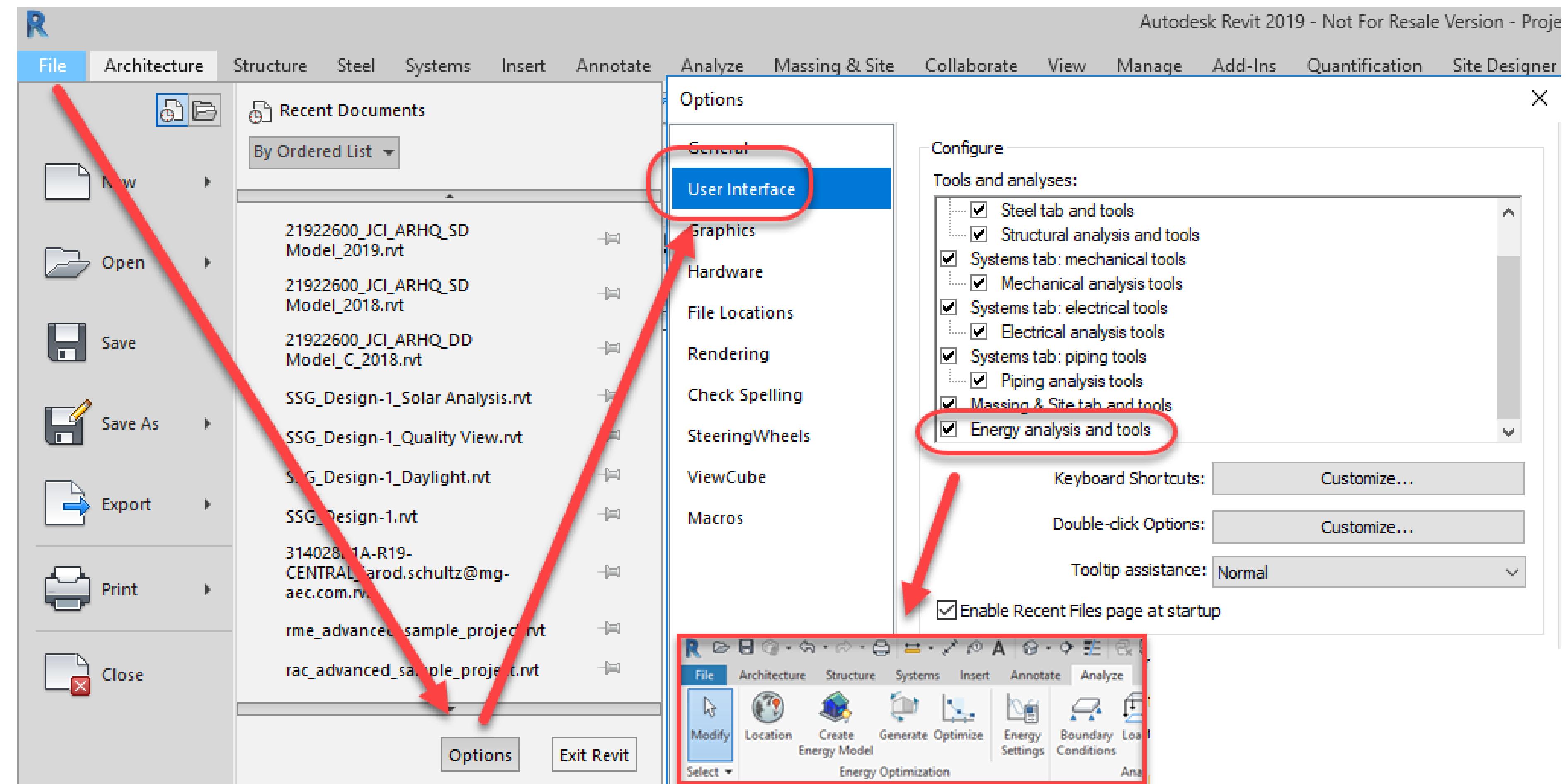
- SSG_Design-5: -10.2 USD / m² / yr
- SSG_Design-4: -9.86 USD / m² / yr
- SSG_Design-3: -9.37 USD / m² / yr
- SSG_Design-2: -10.3 USD / m² / yr
- SSG_Design-1: -9.99 USD / m² / yr

Each card displays a small 3D model of the building design and its energy performance value.

How To Get Started

Best Practices to get started with Insight

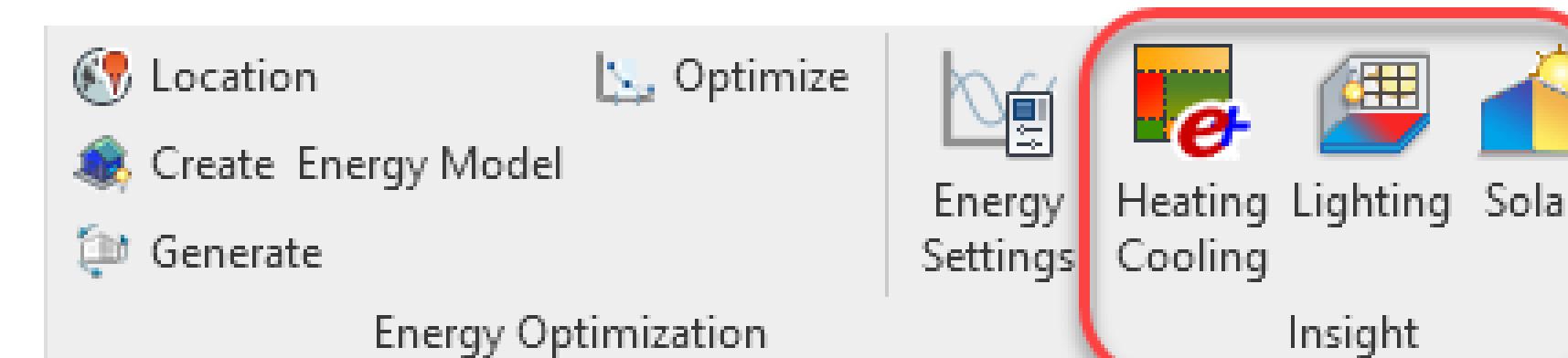
- Check Energy Analysis is enabled



How To Get Started

Best Practices to get started with Insight

- Check Energy Analysis is enabled
- Check if you have the plugin OR download and install



Or Go to: <https://insight.autodesk.com>

Pre-requisites:

- Revit 2016 R2
- Revit 2017

- Revit 2016 R2 Installation Instructions
- Revit 2016 R2 Download

Recommended Browsers:

- Chrome
- Firefox
- Safari

Download Revit 2016 Plug-in

Download Revit 2017 Plug-in

Download Revit 2018 Plug-in

Download Revit 2019 Plug-in

INSIGHTS LEARNING SUPPORT

SUPPORT DOWNLOAD RELEASE NOTES SUPPORT FORUM

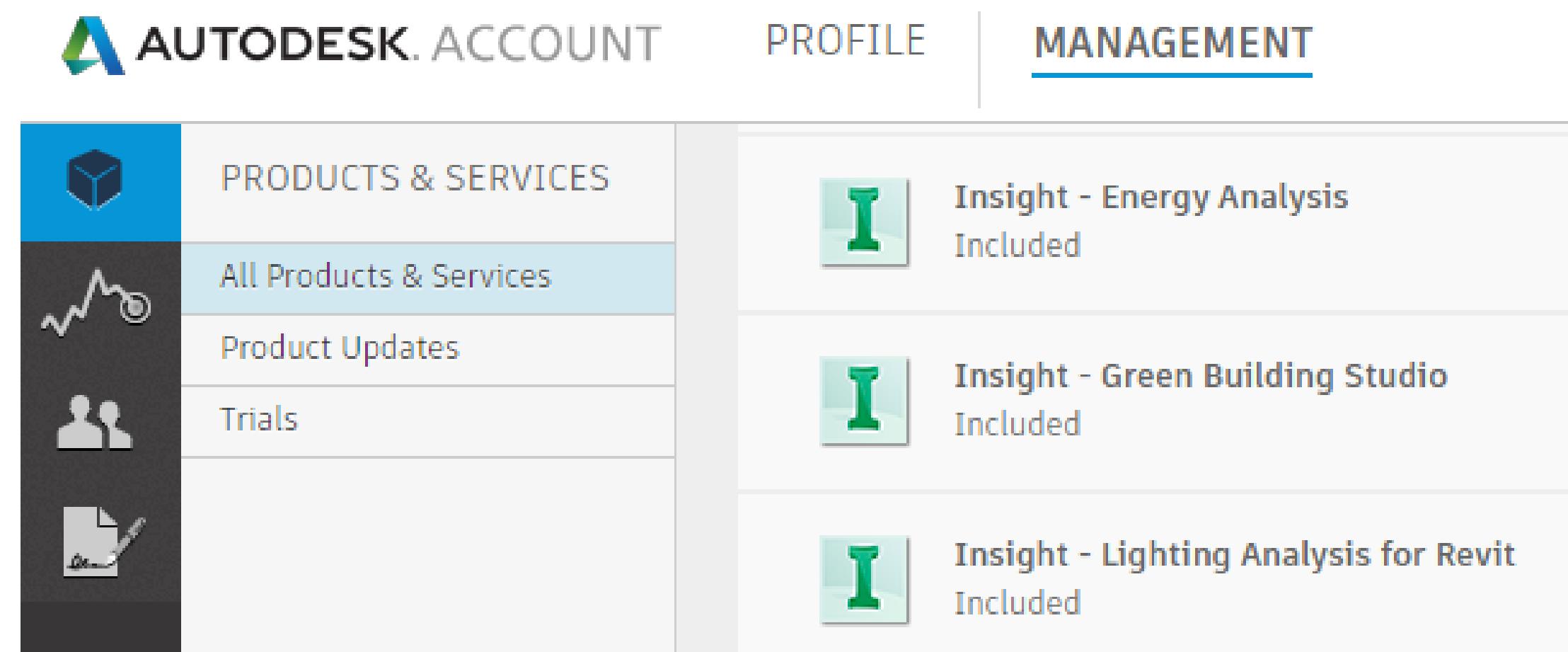
Better Building Performance

How To Get Started

Best Practices to get started with Insight

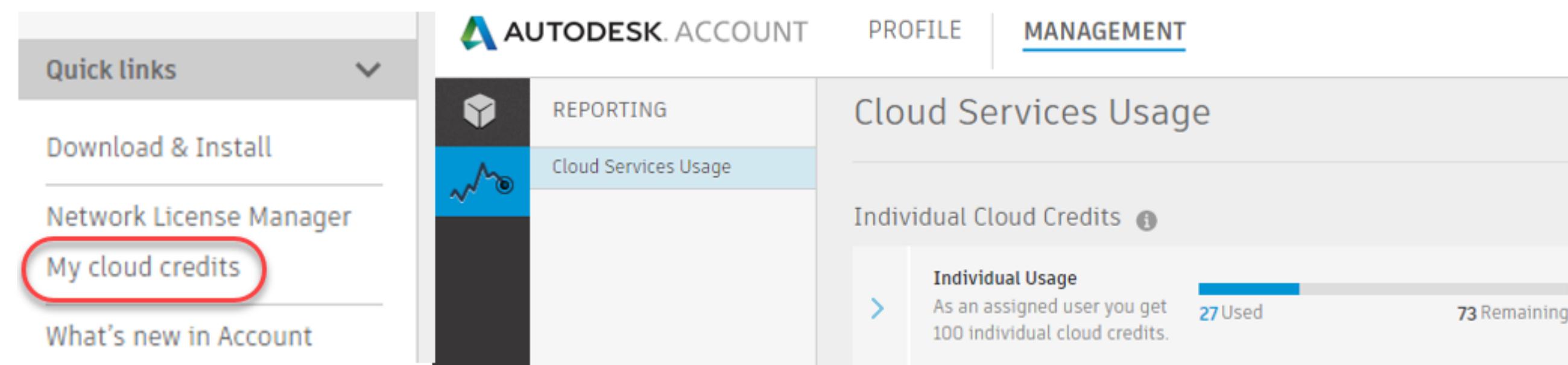
- Check Energy Analysis is enabled
- Check you have the plugin OR download and install
- Check you have entitlements (and cloud credits for Lighting Analysis)

Go to: <https://manage.autodesk.com>



The screenshot shows the Autodesk Account Management interface. At the top, there are tabs for PROFILE and MANAGEMENT, with MANAGEMENT being the active tab. On the left, a sidebar menu includes icons for a cube, a line graph, two people, and a document, followed by sections for PRODUCTS & SERVICES, All Products & Services, Product Updates, and Trials. The main content area lists three products under the MANAGEMENT tab: "Insight - Energy Analysis" (Included), "Insight - Green Building Studio" (Included), and "Insight - Lighting Analysis for Revit" (Included).

For Lighting Analysis Only:

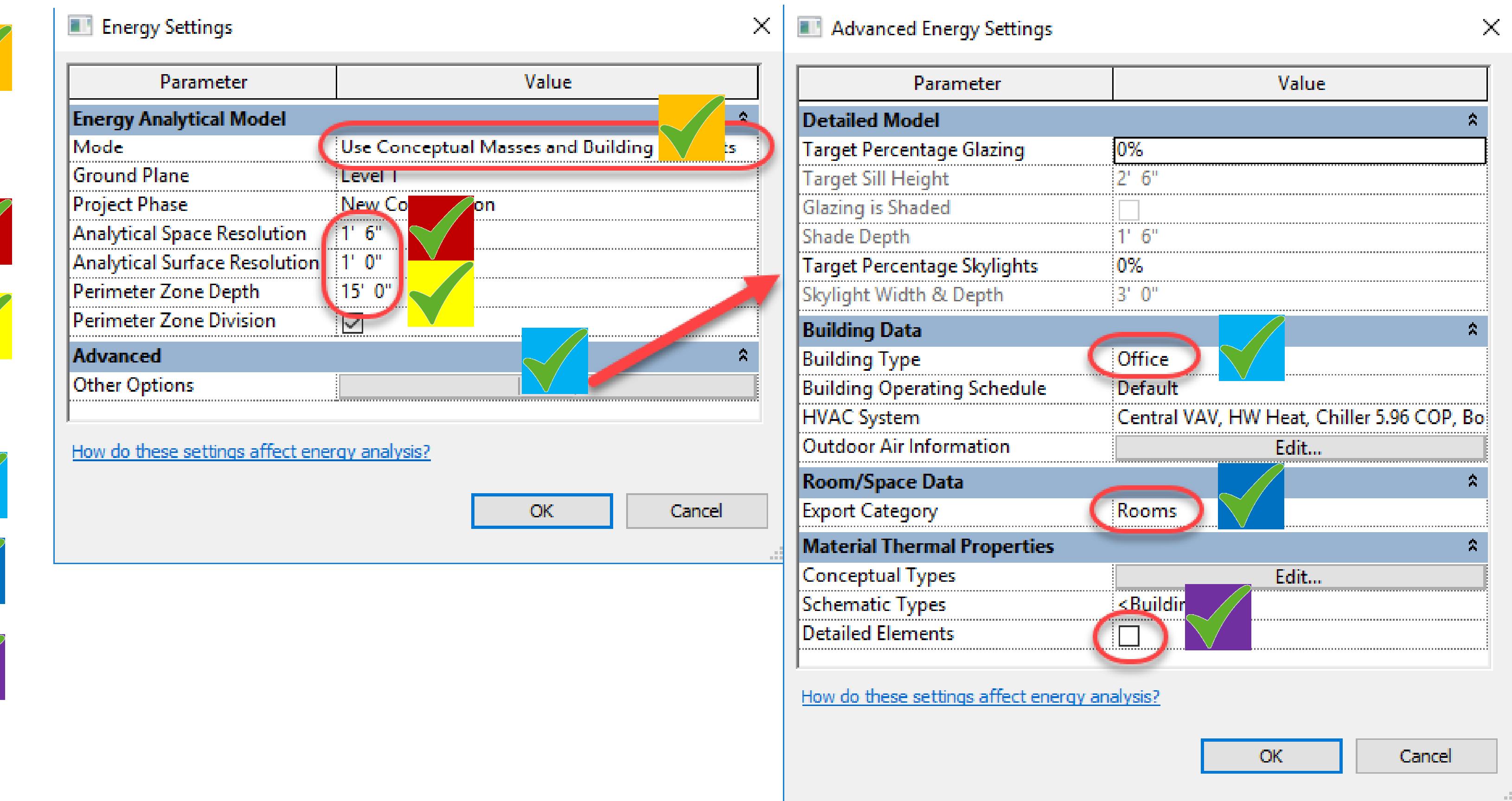


The screenshot shows the Autodesk Account Management interface. In the Quick links sidebar, the "My cloud credits" link is highlighted with a red oval. The main content area is titled "Cloud Services Usage" and displays "Individual Cloud Credits" with a progress bar showing 27 Used and 73 Remaining. Below this, a section for "Individual Usage" states: "As an assigned user you get 100 individual cloud credits."

How To Get Started

Best Practices to get started with Insight

1. ALWAYS set model to 'Use Conceptual Masses and Building Elements' 
2. Start with the default Analytical Space and Surface Resolution 
3. Set Perimeter Zone Depth Y/N? 
4. 'Advanced' Options:
 - a) Set Building Type 
 - b) Room/Space Data 
 - c) Disable Detailed Element Material Thermal Properties 



The screenshot displays two dialog boxes side-by-side: 'Energy Settings' and 'Advanced Energy Settings'.

Energy Settings Dialog:

Parameter	Value
Mode	Use Conceptual Masses and Building Elements 
Ground Plane	Level 1
Project Phase	New Construction
Analytical Space Resolution	1' 6" 
Analytical Surface Resolution	1' 0" 
Perimeter Zone Depth	15' 0" 
Perimeter Zone Division	<input checked="" type="checkbox"/> 
Advanced	
Other Options	

[How do these settings affect energy analysis?](#)

OK Cancel

Advanced Energy Settings Dialog:

Parameter	Value
Detailed Model	
Target Percentage Glazing	0%
Target Sill Height	2' 6"
Glazing is Shaded	<input type="checkbox"/>
Shade Depth	1' 6"
Target Percentage Skylights	0%
Skylight Width & Depth	3' 0"
Building Data	
Building Type	Office 
Building Operating Schedule	Default
HVAC System	Central VAV, HW Heat, Chiller 5.96 COP, Bo
Outdoor Air Information	Edit...
Room/Space Data	
Export Category	Rooms 
Material Thermal Properties	
Conceptual Types	<input type="checkbox"/>
Schematic Types	<input checked="" type="checkbox"/> 
Detailed Elements	<input type="checkbox"/> 

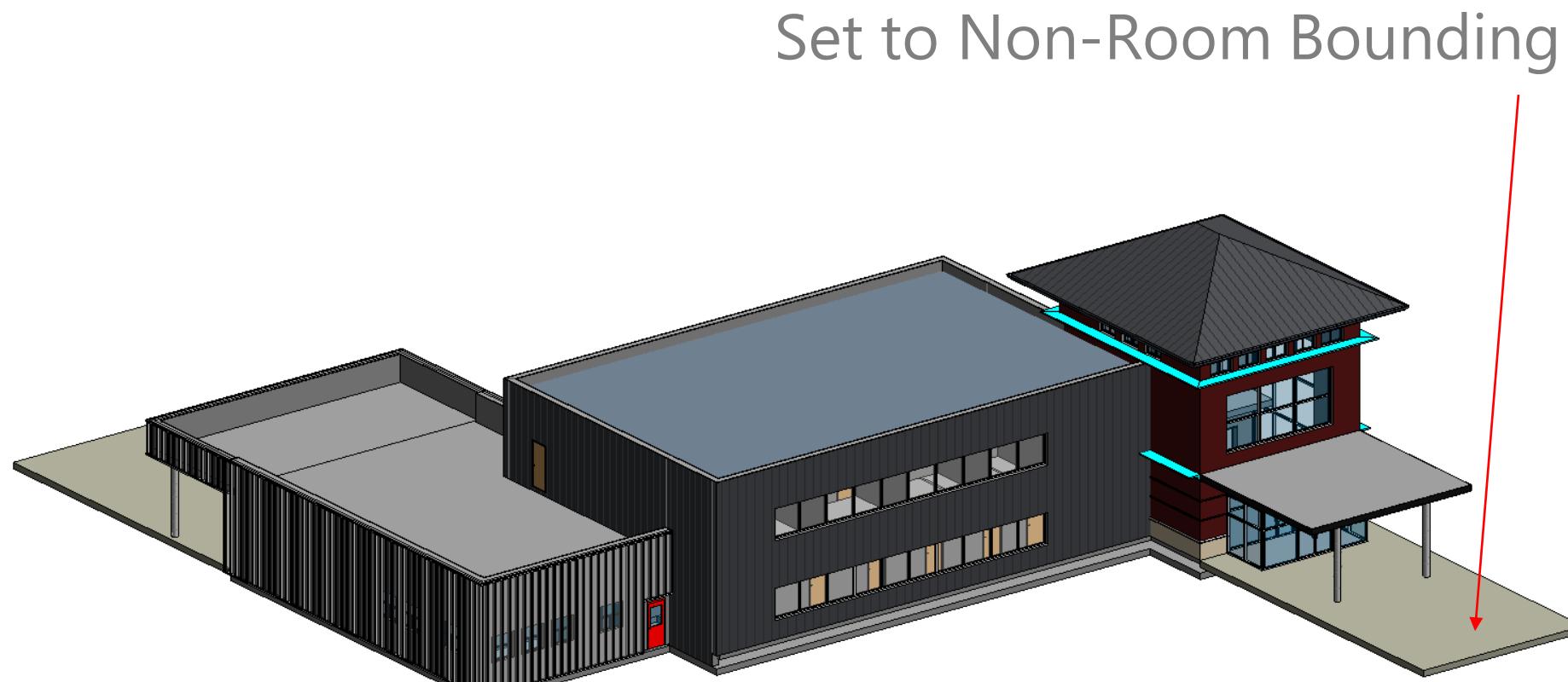
[How do these settings affect energy analysis?](#)

OK Cancel

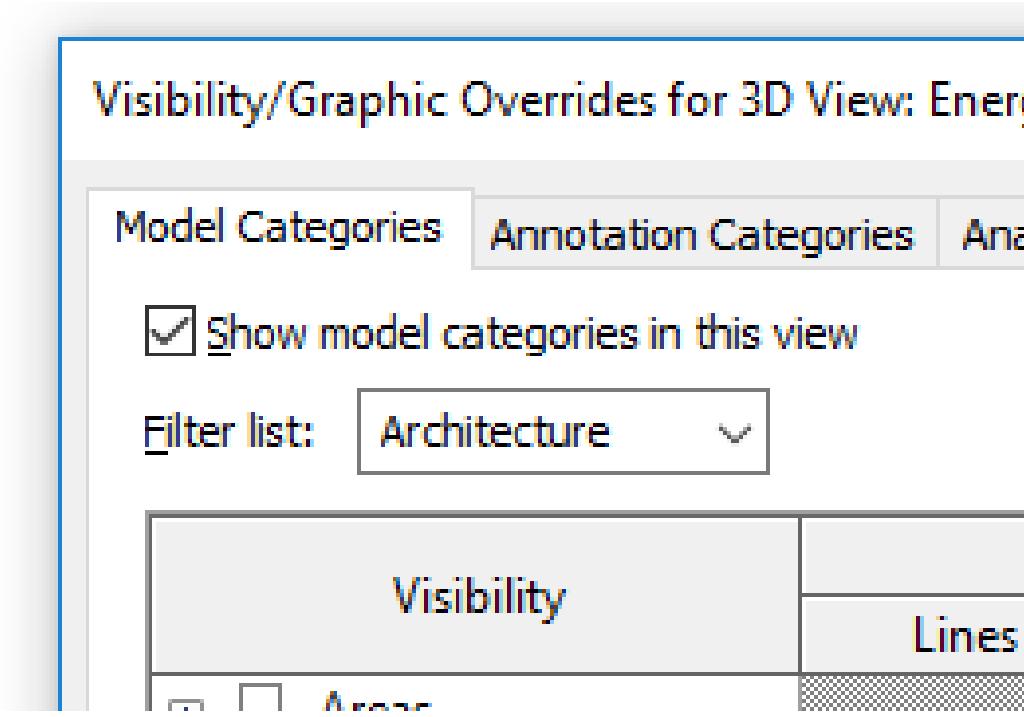
How To Get Started

Best Practices to get started with Insight

1. Create a new 3D view and isolate key architectural elements used
2. Disable unnecessary elements (optional but faster processing)
3. [LINK](#)



The purpose of the view is to enable a visual check.

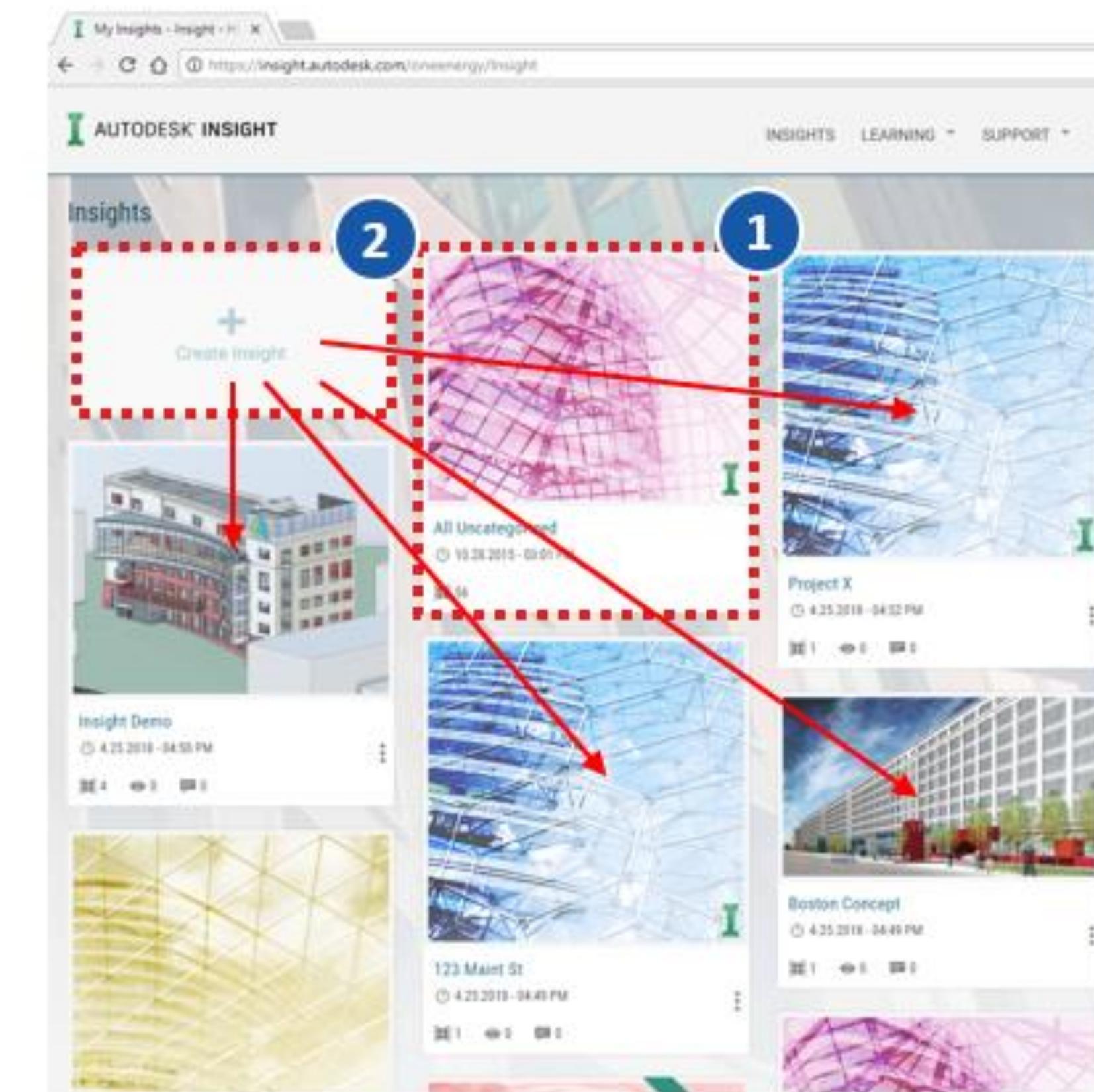


- ✓ Ceilings
- ✓ Columns
- ✓ Curtain Panels
- ✓ Curtain Wall
- Mullions
- ✓ Doors
- ✓ Floors
- ✓ Mass
- ✓ Roofs
- ✓ Shaft Openings
- ✓ Site: Pads
- ✓ Structural Columns
- ✓ Walls
- ✓ Windows

How To Get Started

Best Practices to get started with Insight

- ‘Uncategorized’ vs ‘New Insight’ 
- Model Menu → Rename, Move etc. 
- Use Energy Cost or Energy Use (EUI)?
- Benchmark Comparison
- The ‘BIM’ Setting and Energy Range Paradigm
- Explore Opportunity & Embrace Uncertainty!
- Use Scenarios and Scenario Compare
- Use Model Compare – Settings, Members, Comments & Scenarios
- Export options incl. AIA 2030 DDX

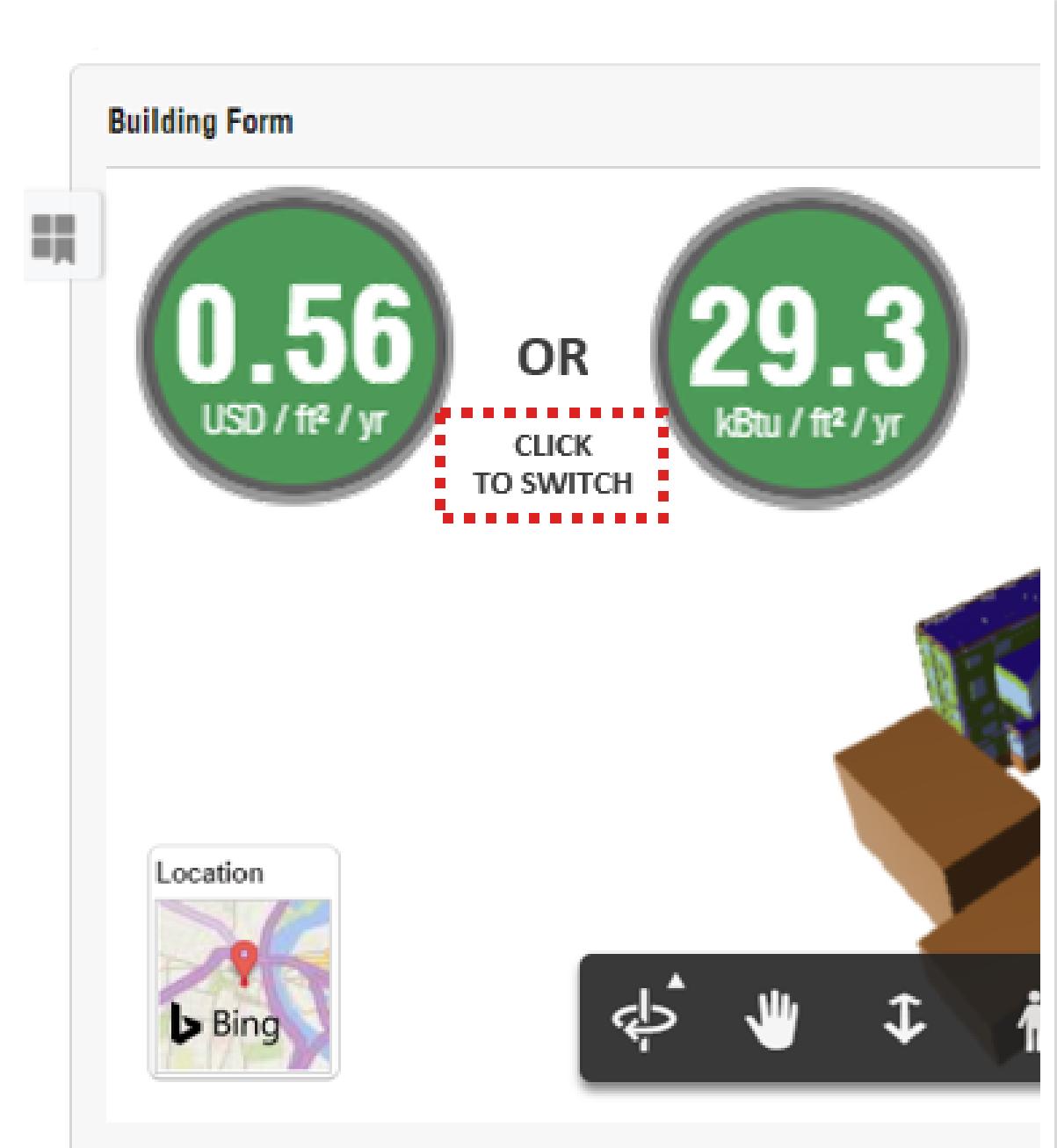


- 1 New Models go to ‘Uncategorized’ by Default
- 2 Use ‘New Insight’ to Store as Required e.g. by Project or Design Stage

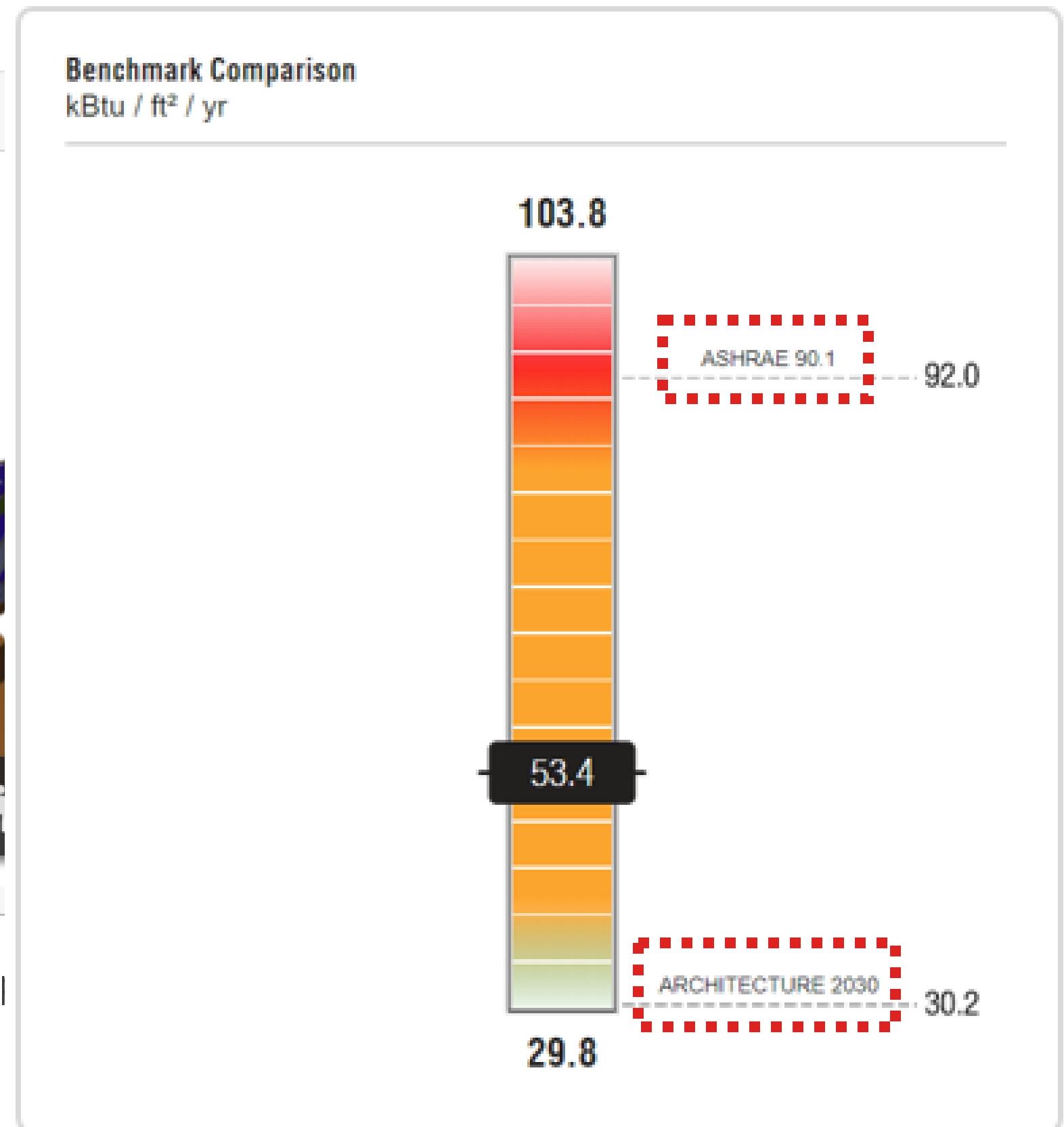
How To Get Started

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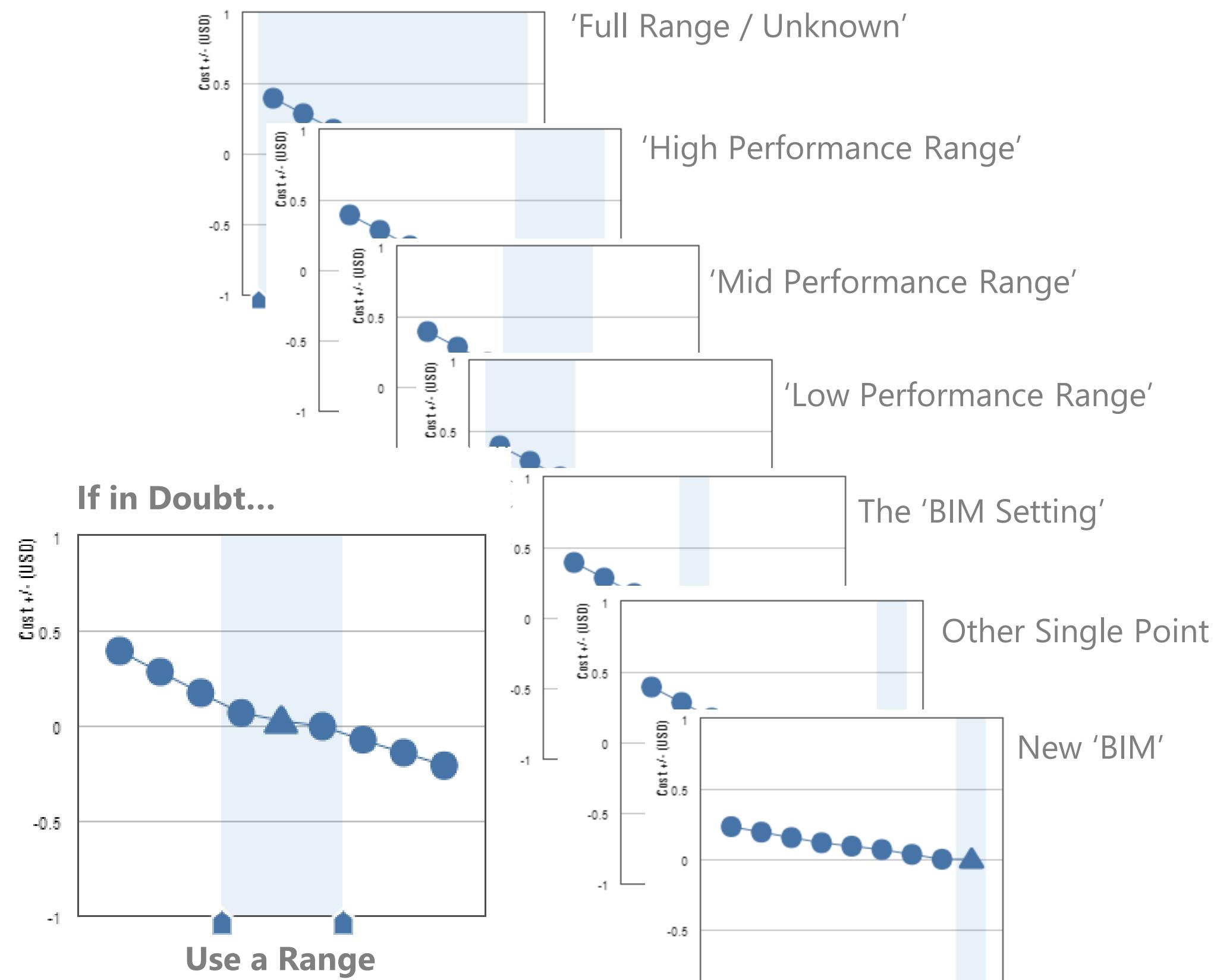
Cost is More Tangible and Represents Actual Value to the Building



How To Get Started

Best Practices to get started with Insight

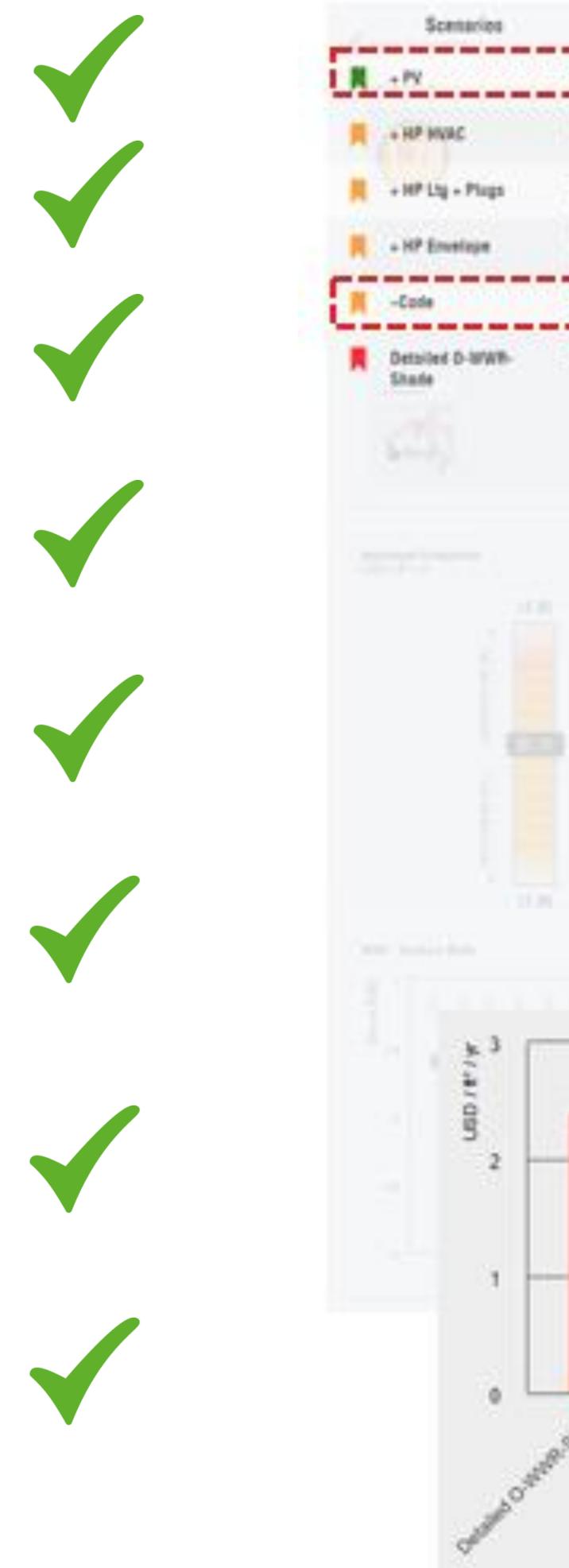
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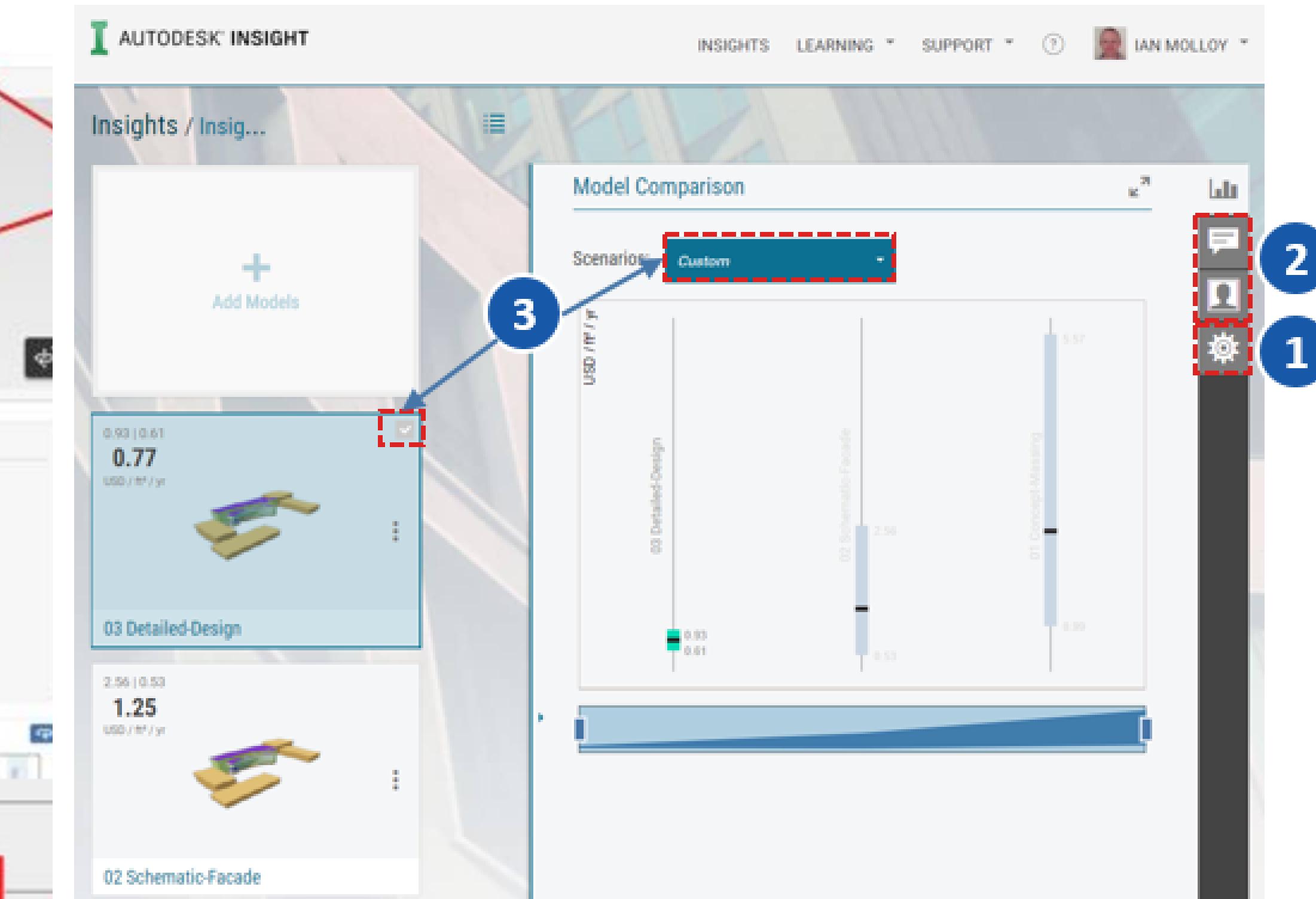
How To Get Started

Best Practices to get started with Insight

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A 'Scenario' is a Saved Combination of Factor Settings



1 Units, Currency, Utility Rates, Sorting

2 Share Insights (by email) and Commenting

3 Apply Scenarios to Models

How To Get Started

Best Practices to get started with Insight

- ‘Uncategorized’ vs ‘New Insight’
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- Use Scenarios and Scenario Compare
- Use Model Compare – Settings, Members, Comments & Scenarios
- Export options incl. AIA 2030 DDX

AIA DDx Configuration

Firm Key

User Key

Email 2030commitment@aia.org for your firms key (free)

AIA 2030 Design Data Exchange

PROJECT VIEW: 2017-OC (Predicted Energy Use Intensity) / (Baseline Energy Use Intensity) / (Energy Use Intensity)

PREDICTED: 28.84 / BASELINE: 99.5 / GOAL: 29.8 / STATUS: 71%

GENERAL INPUTS / BUILDING ENVELOPE

Project Name: New Insight Demo / Project ID: / Status: Non-Residential / Country: /

QUESTIONS???



Sustainability Case Studies: Perkins + Will and Johnson Controls



Jarod Schultz

Director of Research and Development



<https://www.linkedin.com/in/jarodschultz/>



<http://www.jarodschultz.com/>



<https://twitter.com/JarodJSchultz>





Make anythingTM

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