



# SB 2030 ENERGY STANDARD

## SB 2030 Updates: Using the Energy Standard Tool's New Features

Patrick Smith, Senior Research Fellow, Center for Sustainable Building Research, University of Minnesota

October 21, 2020

# Overview

- Logistics: Webinar and Education Credits
- SB 2030 2020 Update (Pat Smith)
  - Overview of project's path through the program
  - Hierarchy of renewables
- SB 2030 Tool Walkthrough (Ryan Schwartz)
  - Energy Model Used
  - Navigating the Tool
  - Using the Analysis Manager
  - Building a SB 2030 Model
  - Space Asset Areas
  - Using Detailed Inputs
  - Modifying Geometry
  - Characterizing Systems
  - Modifying Geometry
  - Rating User Interface
- Q&A Responses and Discussion



# Logistics

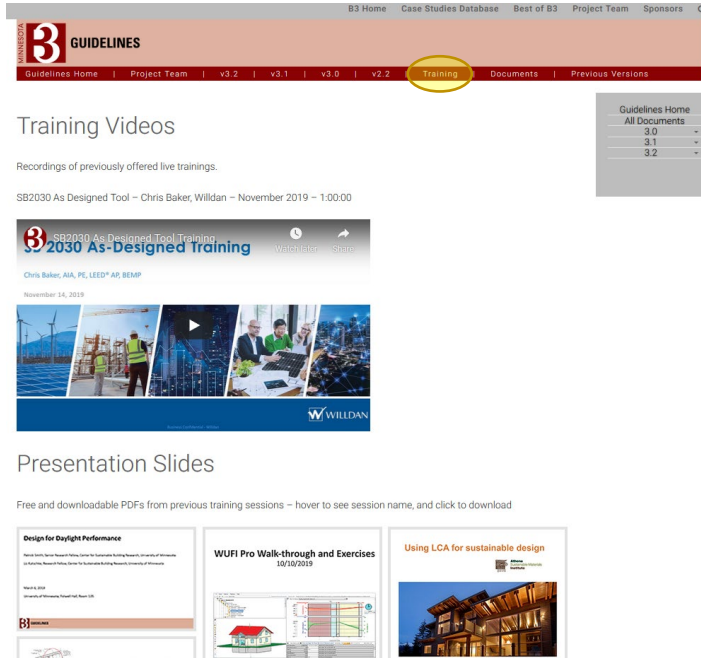
- Trainings are recorded, will be posted on our training site at [b3mn.org](http://b3mn.org)
- Those needing AIA credit – please send your AIA # in the chat, or via email to [patsmith@umn.edu](mailto:patsmith@umn.edu)
- Due to the number of attendees we'll be keeping non-presenters on mute
- Please note questions in the Q&A chat as they come up; we'll leave time at the end to address them.



# B3 News

## B3 Training Website

- Recordings of previous live training sessions
- Slide decks from previous live training sessions



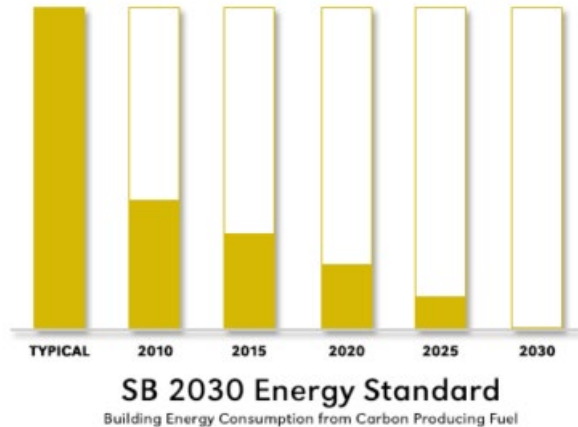
The screenshot shows the 'B3 GUIDELINES' website. The top navigation bar includes links for 'B3 Home', 'Case Studies Database', 'Best of B3', 'Project Team', and 'Sponsors'. A secondary navigation bar highlights 'Training' among other options like 'Guidelines Home', 'Project Team', and version numbers (v3.2, v3.1, v3.0, v2.2). On the right, a dropdown menu for 'Guidelines Home' shows 'All Documents' with versions 3.0, 3.1, and 3.2. The main content area is titled 'Training Videos' and contains the text 'Recordings of previously offered live trainings.' Below this, a specific training session is listed: 'SB2030 As Designed Tool – Chris Baker, Willdan – November 2019 – 1:00:00'. A video player interface is shown with the title 'SB2030 As Designed Tool Training' and a 'Watch later' button. The video thumbnail features a collage of images related to sustainable building, including wind turbines, construction workers, and a modern building at night. The Willdan logo is visible in the bottom right corner of the video player. Below the video player, the section 'Presentation Slides' is introduced with the text 'Free and downloadable PDFs from previous training sessions – hover to see session name, and click to download'. Three slide thumbnails are displayed: 'Design for Daylight Performance' by Sarah Smith, 'WUFI Pro Walk-through and Exercises' dated 10/10/2019, and 'Using LCA for sustainable design' featuring a modern building at night.



**SB 2030  
ENERGY STANDARD**

# Introduction

SB 2030 is a progressive energy and carbon reduction program, modeled on the Architecture 2030 program; customized to better fit Minnesota's buildings, climate, and policies, and expanded to allow the inclusion of more building types.



# SB 2030 and B3 Programs



# Tools – Tracking Tool and SB 2030 Energy Standard Tool

MINNESOTA

3

GUIDELINES TRACKING TOOL

Welcome Pat Smith  
My Account | Sign Out

Home

Projects

Reports

About

Administrator

OCCUPANCY

Construction Mode

Occupancy Mode

FILTER

Expand the grid to display:

My Action Items

LEGEND

Action Item

Completed

Variance

Not applicable

Current Phase

Required

Actual Phase

Transition to Operations

123 Fake Street, Minneapolis, MN 55455

General

Team

Roles

Actions

Schedule

Notes

Admin

Predesign Phase

In Process

You have 1 open action item(s)

Guideline	Responsible Role	Person	Action	PD*	D	FD	CO
Phase Summary Reports:							
				19%			
PERFORMANCE MANAGEMENT				PD*	D	FD	CO
P.0. Performance Management Information				Read the Guideline			
P.1. Design and construction process				Read the Guideline			
P.2. Operations process				Read the Guideline			
SITE AND WATER				PD*	D	FD	CO
S.0. Site and Water Strategies				Read the Guideline			
S.1. Site and Water Connections				Read the Guideline			

MINNESOTA

SB 2030

Intro

Building

HVAC

Results

MENU

First, define the building's parameters

Building Definition

Unlock

Building Type

Office

Gross Building SF

200,000

ft²

Location

Minneapolis

Space Asset Areas

Add Area

Scale All To Fit

Summary

Office

Type: Office

Area: 200,000 ft² (100%)

Floors: 4

Arrangement: Adjacent

Construction Type: New

Edit

# Energy Standard Tool

This tool produces an energy model that simulates the energy use of a 2003 average building of the same function and operation as the SB 2030 project.

This modeled baseline is aligned with the CBECS 2003 Dataset, permitting a wider array of variables to be considered.

The reduction (60%, 70%, 80%, or 90% depending on the year) is then taken from that baseline to determine the SB 2030 Standard.

The screenshot displays the 'Energy Standard Tool' interface. At the top, a navigation bar includes the 'MINNESOTA 3 SB 2030' logo and a menu with icons for 'Intro', 'Building', 'HVAC', and 'Results'. A 'MENU' button is also present. Below the navigation bar, a yellow banner contains a building icon and the text 'First, define the building's parameters'. The 'Building Definition' section features an 'Unlock' button and three input fields: 'Building Type' (set to 'Office'), 'Gross Building SF' (set to '200,000' with a 'ft²' unit selector), and 'Location' (set to 'Minneapolis'). The 'Space Asset Areas' section includes buttons for '+ Add Area', 'Scale All To Fit', and 'Summary'. A detailed view of the 'Office' area is shown, listing: Type: Office, Area: 200,000 ft² (100%), Floors: 4, Arrangement: Adjacent, and Construction Type: New. An 'Edit' button is located at the bottom of this view.

MINNESOTA 3 SB 2030

Intro Building HVAC Results MENU

First, define the building's parameters

Building Definition [Unlock](#)

Building Type: Office

Gross Building SF: 200,000 ft²

Location: Minneapolis

Space Asset Areas [+ Add Area](#) [Scale All To Fit](#) [Summary](#)

Office

Type: Office

Area: 200,000 ft² (100%)

Floors: 4

Arrangement: Adjacent

Construction Type: New

Edit



## Overview of a project's path in the program

Projects participating in the SB 2030 program follow these steps, tracked at several phases through the B3 Guidelines Tracking Tool.

- During Predesign an initial Energy and Carbon Standard is set for the project. Preset defaults for typical building type are included in the tool as often in early design these more detailed values may not be known.
- Through Schematic and Design Development the project performs initial design energy modeling.
- At the construction documents phase (called Final Design in the tracking tool) project teams submit a final energy model for the project and upload construction documents and related documentation, project reviewed by the SB 2030 Review Team.
- During operation – annual submission and as needed updates to the Energy Standard Tool (e.g. updating schedules if changed).

## If needed—projects implement efficiency and renewable energy based on hierarchy

Projects not cost-effectively able to achieve the SB 2030 Energy and Carbon Standards with only energy efficiency measures are then required to provide sufficient carbon-neutral renewable energy (RE) to achieve the standards.

This is aligned with the NREL classification system (though with some considerations based on the type of buildings and ownership organizations that participate in the SB 2030 Program).

# Hierarchy of renewables

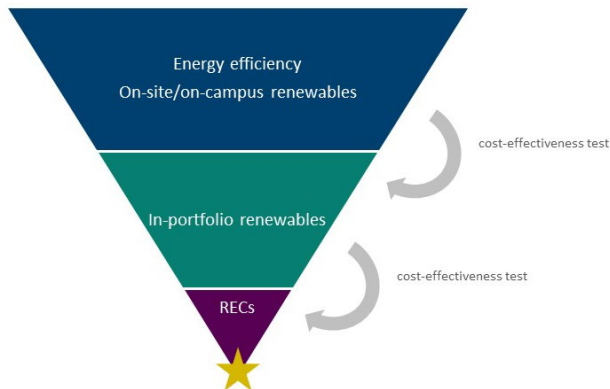
## SB 2030 Program Energy Efficiency and Renewable Energy Supply Options Hierarchy

Option Number	NZEB Supply-Side Options	Examples
0	Reduce site energy use through energy efficiency and demand-side renewable building technologies.	Daylighting; insulation; passive solar heating; high-efficiency heating, ventilation, and air-conditioning equipment; natural ventilation, evaporative cooling; ground-source heat pumps; ocean water cooling
<b>On-Site Supply Options</b>		
1	Use RE sources available within the building footprint and connected to its electricity or hot/chilled water distribution system.	PV, solar hot water, and wind located on the building
2	Use RE sources available at the building site and connected to its electricity or hot/chilled water distribution system.	PV, solar hot water, low-impact hydro, and wind located on parking lots or adjacent open space, but not physically mounted on the building
<b>Off-Site Supply Options</b>		
3	Use RE sources available off site to generate energy on site and connected to the building's electricity or hot/chilled water distribution system.	Biomass, wood pellets, ethanol, or biodiesel that can be imported from off site, or collected from waste streams from on-site processes that can be used on site to generate electricity and heat
4	Purchase recently added off-site RE sources, as certified from Green-E (2009) or other equivalent REC programs. Continue to purchase the generation from this new resource to maintain NZEB status.	Utility-based wind, PV, emissions credits, or other "green" purchasing options. All off-site purchases must be certified as recently added RE. A building could also negotiate with its power provider to install dedicated wind turbines or PV panels at a site with good solar or wind resources off site. In this approach, the building might own the hardware and receive credits for the power. The power company or a contractor would maintain the hardware.

NZEB Supply Options 0, 1, and 2 must be considered first and implemented if cost-effective. On-campus development of Supply Option 2 is included in this evaluation and considered equivalent to on site Supply Option 2.

If the SB 2030 Standard cannot be met cost-effectively using supply options above, additional RE should be developed from within the project owner's portfolio (note that this in-portfolio RE development is not listed as a supply option number here). NZEB Supply Option 3 is also permitted, subject to evaluation by the SB 2030 Project Team.

The remainder of RE needed to meet the SB 2030 Standard shall be procured through Renewable Energy Credits (RECs).



# Program Update 2020: Cost effective method reevaluation

## From 2009:

- Used a societal test, participant test, and utility test perspectives – determined that a simple payback threshold of longer than **15 years** would likely lead some individual building projects not being cost-effective.
- Initially was performed using a parametric analysis of 115 buildings to find this cost effective boundary.

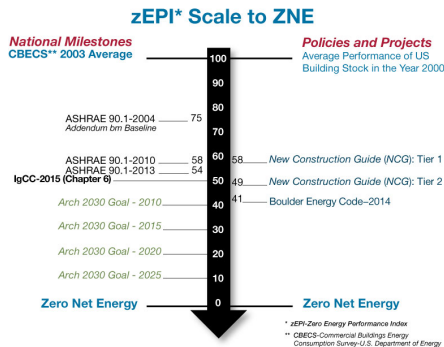
## From 2019:

- Updated analysis concludes that a payback period of **12 years** is now the cost-effective boundary for measures under the SB 2030 program.



# Program Update: Hold Renovations to the Same Standard

- Major Renovations were previously held to a more relaxed standard than new construction, consisting of half of the required reduction for energy consumption from the 2003 baseline building.
- The cost-effectiveness hierarchy will be more fully integrated in the program software and tools, including the Energy Standard Tool, permitting projects to achieve an adjusted standard and compliance with the program.
- National programs such as the AIA 2030 Commitment currently use the same standard for major renovations as for new construction.
- Projects which had already begun predesign are allowed use the more relaxed standard (at 80%-better)
- Durability and historic considerations can be noted as rational to not pursue some potential strategies, in particular for legacy masonry structures.



## SB 2030 Program – Alternative paths

- ***Small Buildings Method:*** Projects (currently under 20,000 sf) are permitted to use the Small Buildings Method, which uses prescriptive approach in lieu of a comprehensive building energy simulation.
- ***Partial Mechanical Upgrades:*** Major renovation projects that are not replacing the full mechanical systems have fewer opportunities to achieve improved performance and limited system design opportunities.
- ***Wastewater Treatment Facilities:*** Wastewater Treatment Facilities required to meet SB 2030 are asked to follow a process which evaluate and benchmark existing facility (if any), document energy conservation measures considered for the project and provide anticipated performance metrics.
- ***Cost-Effective Adjusted Standard (pre-2020):*** As SB 2030 is required to be achieved cost-effectively some projects may request to document the limit of this cost-effectiveness in order to adjust the SB 2030 Standard EUI. This process has been adapted into the process for setting the On-Site SB 2030 Target for projects needing to access off-site resources to hit their targets.



# SB 2030 As-Designed Training

Ryan Schwartz, LEED® Green Associate

October 21, 2020



# Learning Objectives

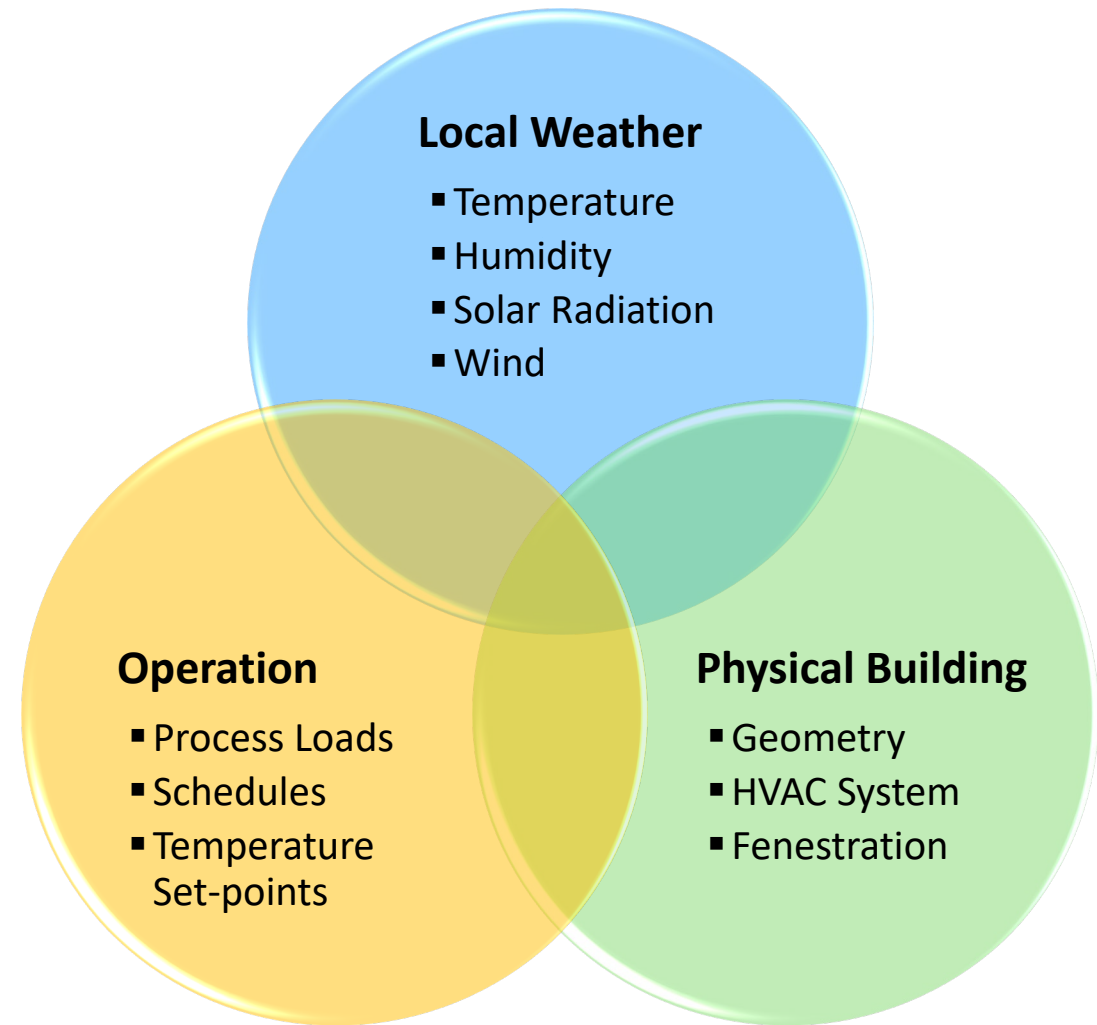
- 01 Use the SB 2030 tool to set an energy standard for a building.
- 02 Calculate expected Energy Use Intensity (EUI) and carbon emissions for a building.
- 03 Describe when the 'As-Designed' tool is appropriate for modeling a project.
- 04 Explain the difference between Space Types and Space Asset Types.



# SB 2030 Tool

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- SB 2030 Tool uses DOE-2, a simulation engine developed by the Department of Energy
- DOE-2 performs an hour-by-hour analysis of the building accounting for
  - Physical building
  - Operation
  - Local weather



- Each hour of the year, DOE-2 accounts for the following things:
  - Outdoor weather conditions
  - Sun position
  - Number of people in the building
  - Amount of lighting turned on
  - Infiltration
  - Ventilation requirements
  - Wall/roof insulation levels
  - Window properties
  - HVAC efficiencies and controls
  - And more!



## ■ Default Building Characteristics

- Industry data to set defaults for building and space characteristics
- Standards such as ASHRAE 90.1, COMNET, ASHRAE Fundamentals, AIA Healthcare Guide, ASHRAE 62.1, and more...
- Where industry standards lack data, SB 2030 pulls data from nearly 2,500 real buildings

## ■ Web Based Simulation Tool

- HTML5 and AngularJS technologies
  - Compatible with most browsers and devices. IE11, Edge, Chrome, FireFox, Safari
  - No need for iOS or Android apps!
- Responsive web design automatically responds to window size and screen size
- Touch-friendly design can be used on laptops or tablets down to 7.8" x 5.3" in size

# Navigating SB 2030

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# Navigating to SB 2030 Tool

Navigating SB 2030

- Access full version of tool from B3 Guidelines Tracking Tool
- Goal Setting version (v3.0 EST) available at <https://www.b3mn.org/2030energystandard/>

The screenshot shows the 'Project Manager' interface of the 'B3 GUIDELINES TRACKING TOOL'. The browser address bar shows the URL 'https://trackingtool.b3mn.org/ProjectManager'. The page header includes the B3 logo and a welcome message for 'Chris Baker' with links for 'My Account' and 'Sign Out'. A navigation bar contains links for 'Home', 'Projects', 'Reports', 'About', and 'Administrator'. On the left, a 'FILTER' sidebar allows users to filter projects by 'Current Phase', 'Project Group', 'Project SubGroup', 'Status', and 'State Funded', with 'Submit' and 'Reset' buttons. Below the filter is an 'EXPORT' section with an 'Export To Excel' button and an 'ADD' section with a 'Create a New Project' button. The main content area, titled 'Project Manager', displays a list of 448 projects. The first four projects are visible in the table below.

Name	Code	Group	Type	Status	State Funded	Current Phase	Created
<b>DEED Perham Area Family &amp; Wellness Center</b> 620 3rd Avenue SE, Perham Perham, MN 56573	G126	Department of Employment and Economic Development (DEED)	New Construction/Renovation	Active	Yes	Predesign In Process (0%)	3/14/20
<b>Rolf 3.0 Test Project</b> 123 Fake Street Minneapolis, MN 55455		Testing	New Construction	Active	Unspecified	Predesign In Process (0%)	3/6/20
<b>DEED KSMQ Public Television Station</b> 107 West Oakland Avenue Austin, MN 55912			New Construction	Active	Unspecified	Predesign In Process (53%)	2/6/20
<b>Hennepin County Triage</b> 1800 Chicago Avenue Minneapolis, MN 55404	PS06	Hennepin County	Renovation	Active	Yes	Predesign In Process (50%)	12/21/

# Navigating to SB 2030 Tool

- Tool is under E1A
- Separate instances of tool for each phase

MINNESOTA

3

GUIDELINES TRACKING TOOL

Welcome Ryan Schwartz

My Account | Sign Out

HomeProjectsReportsAboutAdministrator

OCCUPANCY

This project is not defined for occupancy. [Click here to set an occupancy date](#)

FILTER

Expand the grid to display:

My Action Items

LEGEND

Action Item

Completed

Variance

Not applicable

Current Phase

Required

Actual Phase

SB2030 Demo Project

5800 Baker Rd, Minnetonka, MN 55345

GeneralTeamRolesActionsScheduleNotesAdmin

You have no open action items for this project

Predesign Phase In Process

Guideline	Responsible Role	Person	Action	PD*	D	FD	CO
Phase Summary Reports:				0%			
PERFORMANCE MANAGEMENT				PD*	D	FD	CO
SITE AND WATER				PD*	D	FD	CO
ENERGY AND ATMOSPHERE				PD*	D	FD	CO
E.0. Energy and Atmosphere Strategies				<a href="#">Read the Guideline</a>			
E.1. Energy Use				<a href="#">Read the Guideline</a>			
E1A. Meet SB 2030 Energy Standards	Energy Leader	(Unassigned)	Required				
E1B. Document predicted energy use by type	Energy Leader	(Unassigned)	Required				
E1C. Submetering and end-load disaggregation	Electrical Leader	(Unassigned)	Required				
E1D. Advanced Submetering	Electrical Leader	(Unassigned)	Optional				
E1E. Real-time energy metering	Electrical Leader	(Unassigned)	Optional				
E.2. Renewable Energy				<a href="#">Read the Guideline</a>			
E.3. Efficient Equipment and Appliances				<a href="#">Read the Guideline</a>			
E.4. Atmospheric Protection				<a href="#">Read the Guideline</a>			



- Manage analyses across a project's phases
- Set active analysis for each phase, Rename, Clone, and Delete analyses

**Design**  
Energy Leader

E.1 En  
E1A. Meet


☐ Warning.


Fields in yell

If you are re  
process to v  
programs w

E1A2A. Click

E1A3B. Whic



 Manage A

E1A5K. SB 20

Note: Design  
before atter







E1A6. Design

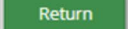
E1A7. Design

E1A8E. SB 20

E1A8M. Design

**Analysis Manager**  
Phase: PD  
3 analyses.

Active	Name	Created	Modified	NEO Version	Assigned Phase	Actions
<input type="radio"/>	D Phase: SB2030 Demo Project	10/16/2020 9:46 AM	10/16/2020 9:53 AM	3.5.0	D	 
<input checked="" type="radio"/>	SB2030 Demo Project	10/07/2020 2:07 PM	10/16/2020 9:45 AM	3.5.0	PD	 
<input type="radio"/>	TEST- D Phase: SB2030 Demo Project	10/16/2020 9:50 AM	10/16/2020 9:53 AM	3.5.0	-	 

 Return



# Creating SB 2030 Models

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# USER INTERFACE OVERVIEW

- New User Interface
  - Single path for Target and Design results

The screenshot displays the 'SB 2030 Phase PD - Test Project' interface. At the top, there's a header with the '3 SB 2030' logo, the project name 'Phase PD - Test Project' with a dropdown arrow, and navigation icons for 'Building', 'HVAC', and 'Rating'. A 'Save' button and a 'MENU' icon are on the right. Below the header, a message states: 'We've imported these analysis settings. Update them and submit to get started.' The main form area contains two input fields: 'Building Type' with a dropdown menu showing 'Office' and a 'Submit' button below it; and 'Total Area' with a text input showing '50,000' and a unit selector 'ft²'. Below these fields are three buttons: '+ Add Area', 'Scale All to Fit', and 'Summary'. A large dashed box contains the instruction: 'Submit the Building Definition above, and then you can start adding areas here.' followed by a definition: 'An Area is a part of your building that has a specific and dedicated function, like a Kitchen or Laboratory.' A 'Help' button is located in the bottom left corner of the dashed box.

# SB 2030 Navigation Overview

Creating SB 2030 Models

- Top menu shows steps
  - Building
  - HVAC
  - Rating – “NEW”
- Color indicates status
  - Red – error
  - Light gray – not complete
  - Dark gray – complete
  - Bold – indicates location
- Enable Detailed Inputs for
  - Schedules
  - Setpoints and ventilation
  - Geometry
  - Constructions
  - Plug/process loads

MINNESOTA **3** SB 2030 Phase PD - Test Project ▾

Building HVAC Rating

We've imported these analysis settings. Update them and submit to get started.

Building Type Total Area

Office 50,000 ft²

Submit

Space Asset Areas + Add Area Scale All to Fit Summary

Submit the Building Definition above, and then you can start adding areas.

An Area is a part of your building that has a specific and dedicated function, like a Kitchen.

Help

Test Project

Analysis Info >

☐ Enable Detailed Inputs

Support

Settings

Unit Converter

Sign Out as RSchwartz@willdan.com


**W** WILLDAN

Version 3.5.0 Build 091820.0110PM.75714

# User Interface Overview

## Error Messaging

Creating SB 2030 Models

 Next, define the building's mechanical system

### Define central equipment

Service Water Heating Fuel Type  
None ▼

Heating Plant  
None ▼

Cooling Plant  
None ▼

Water to Air Heat Pump Plant  
None ▼

Dedicated Outside Air System  

Not Installed

Installed


### Define each HVAC system

+ Add System

System 1

Conditioning: **Heating and Cooling**

System Type:

 **No areas are currently assigned**

Edit

- Watch out for red error messaging...
- Hovering over the warning will expand it
- Red outlines or underlines will guide you to the issue

# User Interface Overview

## Help and Definitions

Creating SB 2030 Models

SB 2030 Phase PD - Test Project

Building HVAC Rating

Save MENU

First, define your new building.

Building Definition [Unlock](#)

Building Type: Office

Total Area: 50,000 ft<sup>2</sup>

[Modify Details](#)

**Space Asset Areas** [Add Area](#) [Scale All to Fit](#) [Summary](#)

Office

Type: Office Area: 50,000 ft<sup>2</sup> (100%) Floors: 1 Arrangement: Adjacent

Edit

Help HVAC >

- Help is indicated by lines under headings and are located throughout the tool – use them!



# **BUILDING A SB 2030 ENERGY MODEL**

# Starting a SB 2030 Model

## Building Type

- Users start by reviewing the building
- This creates defaults as starting points for the model
- User is able to modify as many defaults as known to further refine the model

The screenshot shows a web interface for the SB 2030 Phase PD - Test Project. At the top, there is a header with the Minnesota logo, the text 'SB 2030', and 'Phase PD - Test Project' with a dropdown arrow. To the right of the header are three icons: a building icon labeled 'Building', a fan icon labeled 'HVAC', and a circular arrow icon labeled 'Rating'. Below the header, a message states: 'We've imported these analysis settings. Update them and submit to get started.' The main form area contains two input fields. The first is labeled 'Building Type' and has a dropdown menu with 'Office' selected. The second is labeled 'Total Area' and has a text input field containing '50,000' and a unit selector 'ft²'. A 'Submit' button is located at the bottom left of the form.

MINNESOTA **3** SB 2030 Phase PD - Test Project ▼

Building HVAC Rating

*We've imported these analysis settings. Update them and submit to get started.*

Building Type

Office ▼

Total Area

50,000 ft²

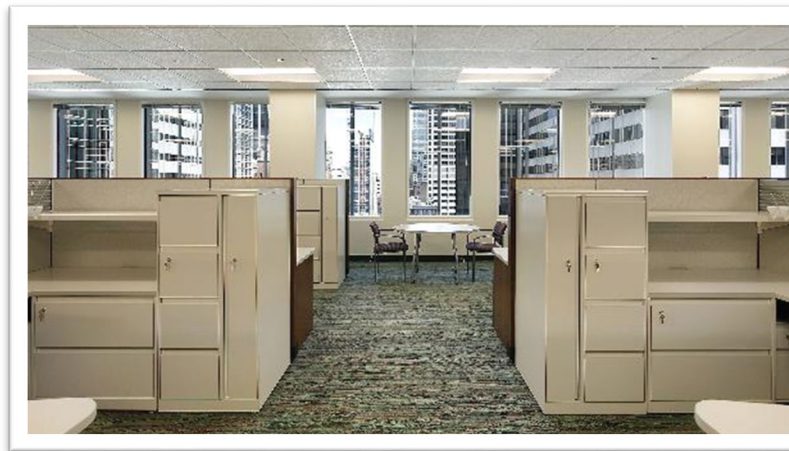
Submit



# Available Building Types

Creating SB 2030 Models

- Automotive Facility
- Bank
- Broadcast Facility
- Computer Center
- Convention Center
- Core and Shell
- Corrections Facility
- Courthouse
- Data Center
- Dining – Bar  
Lounge/Leisure
- Dining – Cafeteria/  
Fast Food
- Dining - Family
- Dormitory
- Education – College/  
University
- Education – Elementary
- Education – High School
- Education – Middle School
- Fire Station
- Gymnasium
- Healthcare Clinic
- Hospital
- Hotel
- Laundry
- Library
- Mall
- Manufacturing Facility
- Multifamily
- Museum
- Nursing home
- Office
- Other
- Parking – Enclosed Garage
- Police Facility
- Post Office
- Religious Building
- Retail – Big Box
- Retail – Convenience Store
- Retail – Supermarket
- Senior Housing
- Strip Mall
- Student Union
- Theater/Auditorium
- Town Hall
- Transportation
- Warehouse – Active
- Workshop





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# CREATING THE UNIQUE BUILDING

# Space Asset Areas

Creating the unique building

- Building blocks to create the unique building
- Represent different programmatic functions within a building
- Users can build custom buildings from the collection of available types
- Definitions are based on ASHRAE, COMNET and past experience
  - Some details are editable by the user
- Additional Space Asset Areas can be used to represent different building conditions
  - Original Apartment Units with PTACs
  - 2010 addition with air source heat pump
  - Building would have two Apartment Space Asset Areas



# Space Asset Areas vs. Space Type



- SAAs were developed primarily by assigning Building-Type level characteristics
- Most SAAs are applied broadly across areas of the building
- Some Space Asset Area (SAA) characteristics are more representative of a specific space type
- Practice called for some SAAs to be more specific
  - AIA Healthcare ventilation requirements
  - Space-type lighting power densities



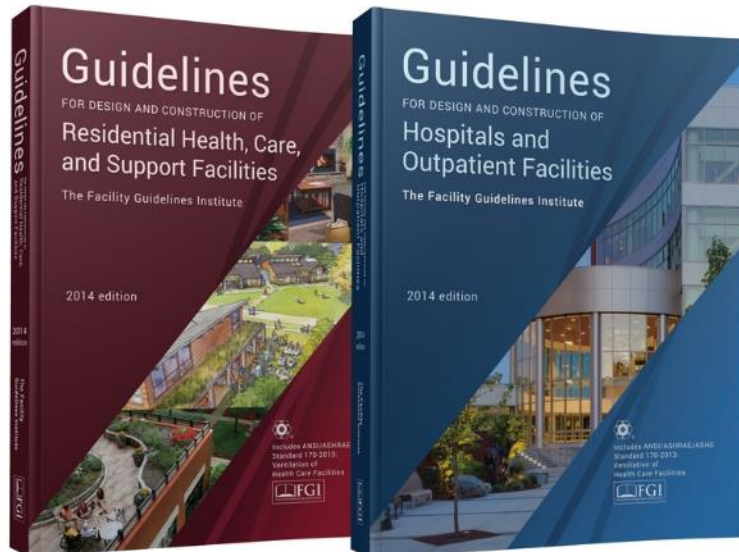


# Space Asset Areas vs. Space Type

Space Asset Areas that can fall in this SAA/Space Type gray area

## ■ Healthcare Ventilation

- Emergency Departments
- Laboratory
- Operatory
- Patient Room
- Treatment



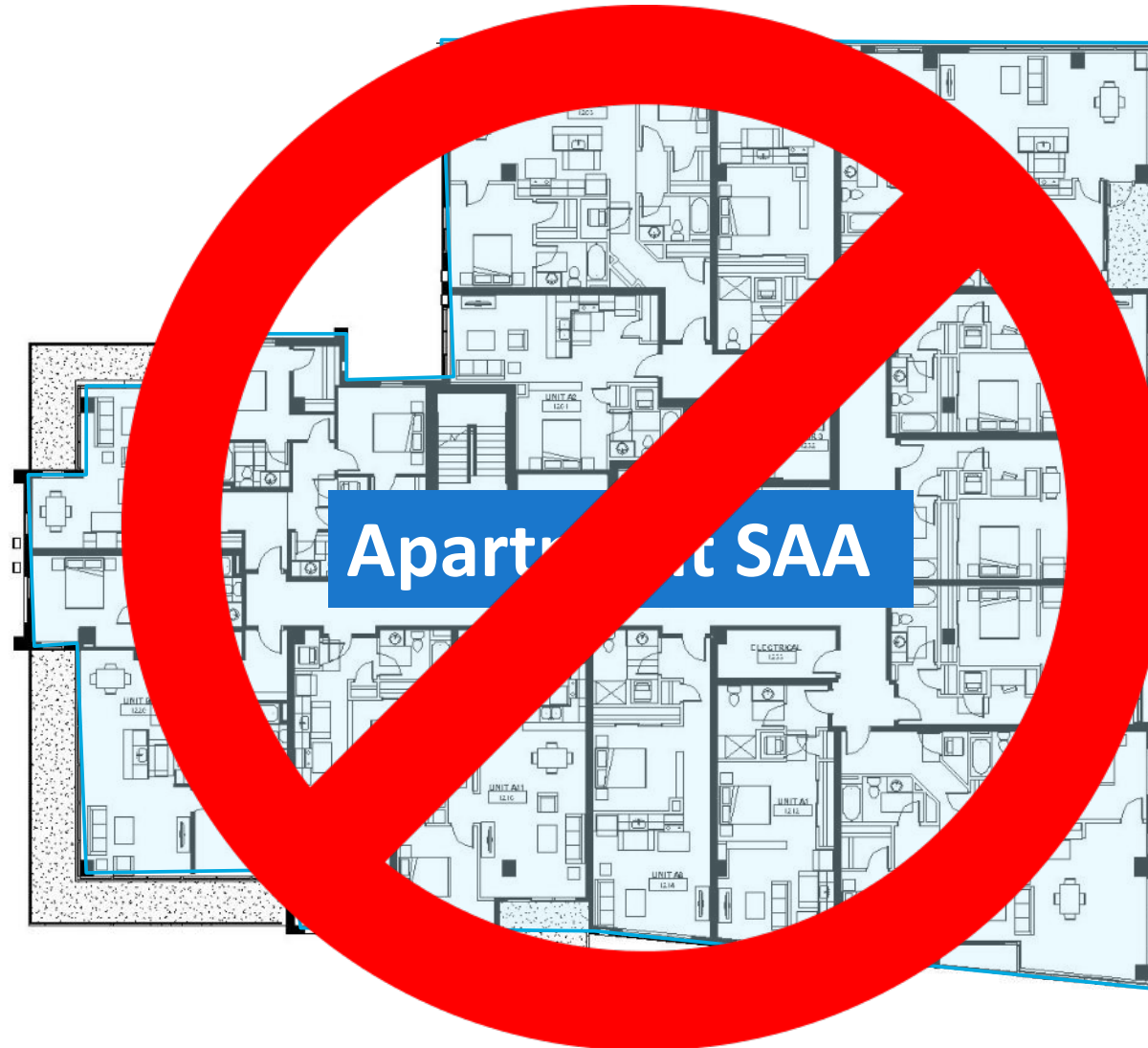
# Space Asset Areas vs. Space Type

Space Asset Areas that can fall in this SAA/Space Type gray area

- Space-Type loads
  - Apartments
  - Laboratory
  - Computer Center
  - Kitchen
  - Laundry
  - Locker Rooms
  - Convention Center
  - Conference/Meeting area
- Not an exact science
  - Do not overthink
  - If using drawings, take in large chunks
    - Model is an abstraction based on a typical building; as such, SAA areas should be developed similarly



# Example Area Take-offs: Apartments

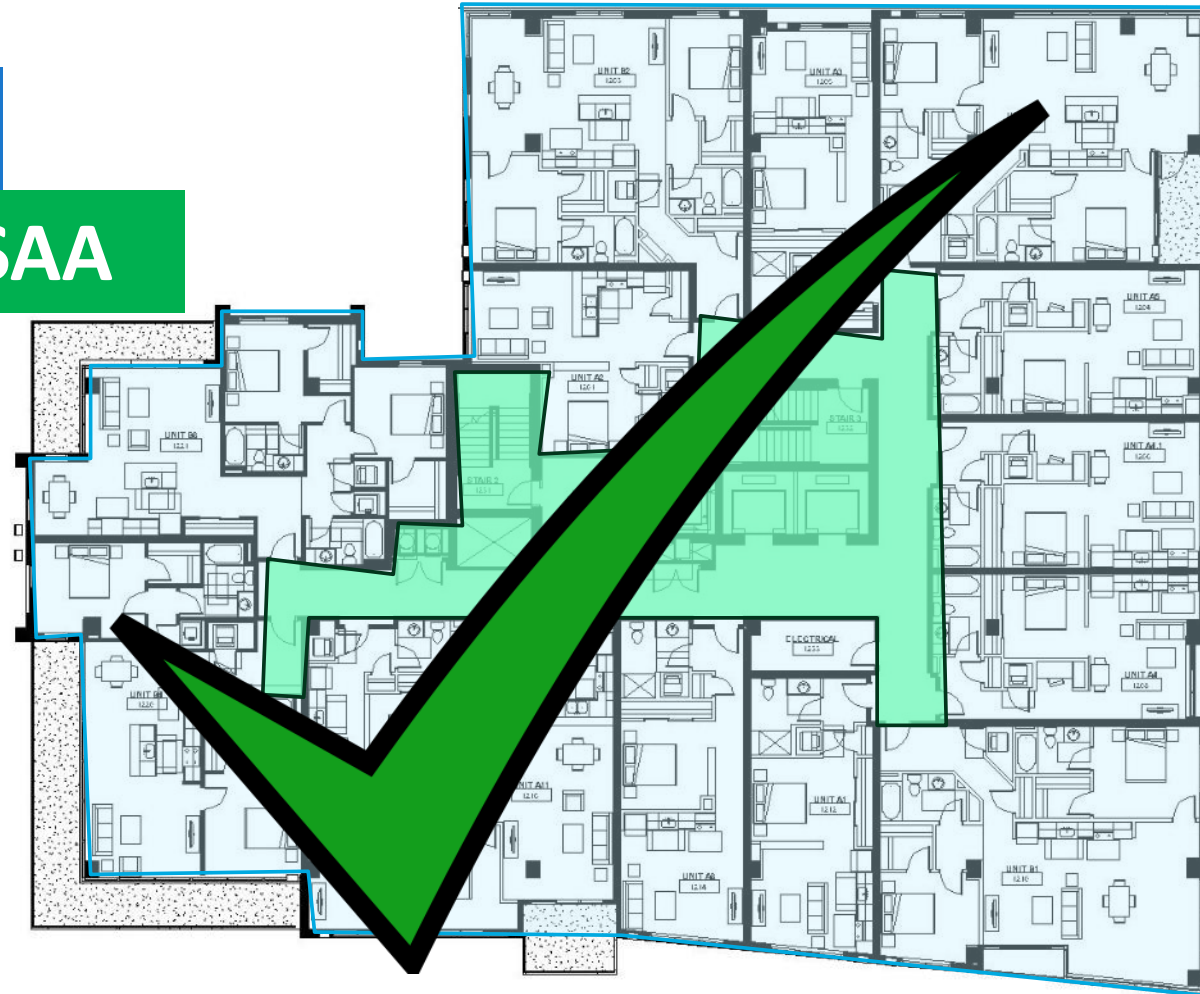




# Example Area Take-offs: Apartments

Apartment SAA

Common Areas SAA





# Example Area Take-offs: Hospital



## Example Area Take-offs: Hospital



# Patient Room SAA

## Common Areas SAA

# Current Available Space Asset Types

Creating SB 2030 Models

- Apartment – Low Rise
- Apartment – Mid/High Rise
- Auto Repair
- Classrooms
- Common Areas – Multifamily
- Computer Center
- Conference/Meeting Area
- Convention Center
- Courtrooms
- Core and shell
- Data Center
- Dining
- Dorm Rooms
- Exhibit Space and Archives
- Fitness
- Garage – Emergency Vehicle
- Garage – Enclosed
- Guest rooms
- Gymnasium
- Jail Holding Area
- Kitchen
- Laboratory – Educational
- Laboratory – Research
- Laundry
- Locker rooms
- Maintenance/Repair
- Manufacturing
- Office
- Operatory
- Patient Room
- Retail
- Retail – Refrigerated
- Stacks and Reading
- Tenant Shell
- Theater/Auditorium
- Treatment
- Warehouse – Active
- Workshop
- Worship Area



# Starting a SB 2030 Model

## Building Definition

Creating SB 2030 Models

### ■ Define the Space Asset Areas

- Default based on building type
- Add with 'add area' button
- Delete with 'trash can'
- Scale area to fit
- More than one of the same SAT can be used within the building

The screenshot shows the 'Space Asset Areas' interface. At the top, there are three buttons: '+ Add Area', 'Scale All To Fit', and 'Summary'. Below these are four asset area cards arranged in a 2x2 grid. Each card has a title, type, floors, area, arrangement, and an 'Edit' button. Annotations with blue lines and dots point to specific features: a dot on the '+ Add Area' button points to the first list item; a dot on the 'trash can' icon in the 'Retail' card points to the third list item; a dot on the 'Scale All To Fit' button points to the fourth list item; and a dot on the 'East Apartments' card points to the fifth list item. Arrows also point from the 'Add Area' button to the 'Retail' card, from the 'trash can' icon to the 'Retail' card, and from the 'Scale All To Fit' button to the 'Retail' card.

Area Name	Type	Floors	Area (ft²)	Area (%)	Arrangement
Retail	Retail	1	8,250	11%	Adjacent
Common areas	Common areas	3	9,000	12%	Hosted
East Apartments	Apartments	2	27,750	37%	Adjacent
West Apartments	Apartments	3	30,000	40%	Adjacent

# Starting a SB 2030 Model

## Refining Space Asset Areas

### ■ Edit Space Asset Areas

- Use the Edit Button under the SAT
- Give a custom name
- Adjust type
- Select # of floors
- Adjust the size
- Adjust the geometry
  - Adjacent – SAT is next to another
  - Stacked - SAT is on top of another
  - Hosted – SAT if fully contained in another

The screenshot shows a form titled 'Apartments - Med/High Rise'. It contains the following fields and controls:

- Space Asset Type**: A dropdown menu currently showing 'Apartments - Med/High Rise'. A blue arrow points to this dropdown from the 'Adjust type' instruction.
- Number of Floors**: A text input field containing the value '1'. A blue arrow points to this field from the 'Select # of floors' instruction.
- Arrangement**: A dropdown menu currently showing 'Adjacent / Grade'. A blue arrow points to this dropdown from the 'Adjust the geometry' instruction.
- Area**: A text input field containing '13,200' with a unit selector set to 'ft²'.
- Number of units**: A text input field containing the value '12'.
- Buttons**: 'Done' and 'Modify Details' (with a gear icon) are at the bottom.

Blue arrows from the instructions on the left point to the corresponding fields in the form: 'Give a custom name' points to the title bar, 'Adjust type' points to the Space Asset Type dropdown, 'Select # of floors' points to the Number of Floors input, and 'Adjust the geometry' points to the Arrangement dropdown.



# Starting a SB 2030 Model

## Refining Space Asset Areas

### ■ Help Me Choose

- Space Asset Type descriptions available to assist in selection
- Select Space Asset Type Selection pop-up window

The screenshot shows a form titled 'Apartments - Med/High Rise'. The form includes fields for 'Space Asset Type' (set to 'Apartments - Med/High Rise'), 'Area' (13,200 ft²), 'Number of Floors' (1), and 'Arrangement' (Adjacent / Grade). A 'Help Me Choose' button is visible next to the 'Space Asset Type' field. A blue line connects this button to a 'Space Asset Type Selection' pop-up window. The pop-up window displays a list of space asset types, with 'Apartments - Med/High Rise' selected. The description for 'Apartments - Med/High Rise' is: 'Dwelling units with kitchen and laundry. Excludes public corridor and other common areas. Assumes typical steel construction.' The pop-up window also has 'Select' and 'Cancel' buttons.

**Apartments - Med/High Rise**

Space Asset Type: Apartments - Med/High Rise

Area: 13,200 ft²

Number of Floors: 1

Arrangement: Adjacent / Grade

**Space Asset Type Selection**

The Space Asset Type specifies the building function or use of your area. Select the type you're interested in below to see a description.

**Apartments - Med/High Rise**

Dwelling units with kitchen and laundry. Excludes public corridor and other common areas. Assumes typical steel construction.

Select Cancel



---

# **MODIFYING SPACE ASSET AREA DETAILS**

# Starting a SB 2030 Model

## Refining Space Asset Areas

Creating SB 2030 Models

- Edit space asset area, select
- Sets additional parameters when known
- Not required to complete a model
- Details include
  - Schedules
  - Geometry
  - Floor to floor heights
  - Space temperatures
  - Ventilation rates
  - Plug and process loads
  - Service hot water loads
- Each Space Asset Area can be different

Office

Space Asset Type  
Office

Area  
60,000 ft²

Number of Floors  
3

Arrangement  
Stacked

Stacked On  
Dining

Done Modify Details

Details for *Office*

Operations Mechanical Architectural SHW & Other Loads



# Starting a SB 2030 Model

## Operational details

- Make a SAA unoccupied
- Adjust the # of people in a SAA
- Typically, defaults are fine here

### People

Area Occupancy

Occupied

Unoccupied

People Density

200.0

ft<sup>2</sup>/person

# Starting a SB 2030 Model

## Operational details

- Select use by day
  - None, partial, full
- Define Full and Partial Days
  - Hours of Core Use per Full Day
  - Core Use Start Time
  - Fan Hours per Full Day
  - Hours of Core User per Partial Day
  - Max Use Fraction during Partial Day
- Choose the months for which this schedule applies
- Add a 2<sup>nd</sup> schedule if needed
- Schedules impact lights, plugs, people and fans
- Default schedules are from ASHRAE

### Schedules

Add 2nd Schedule

#### Schedule 1

#### Daily Use

Sun	None	Partial	Full
Mon	None	Partial	Full
Tue	None	Partial	Full
Wed	None	Partial	Full
Thu	None	Partial	Full
Fri	None	Partial	Full
Sat	None	Partial	Full

#### Applicable Months

<input checked="" type="checkbox"/> January	<input checked="" type="checkbox"/> February
<input checked="" type="checkbox"/> March	<input checked="" type="checkbox"/> April
<input checked="" type="checkbox"/> May	<input checked="" type="checkbox"/> June
<input checked="" type="checkbox"/> July	<input checked="" type="checkbox"/> August
<input checked="" type="checkbox"/> September	<input checked="" type="checkbox"/> October
<input checked="" type="checkbox"/> November	<input checked="" type="checkbox"/> December

#### Hours of Core Use per Full Day

Hours

#### Core Use Start Time

#### Fan Hours per Full Day

Hours

#### Hours of Core Use per Partial Day

Hours

#### Max Use Fraction during Partial Day

# Starting a SB 2030 Model

## Mechanical details

- Adjust thermostat setting
  - Separate heating and cooling
  - Separate occupied and unoccupied
  - Settings carry forward, no operation strategies at this time to adjust for savings
- Ventilation
  - Ability to set on air change or flow rate basis
  - Defaults to ASHRAE 62.1

Operations

Mechanical

Architectural

Electrical

Thermostat

Cooling Set Point, Occupied

75°F

Cooling Set Point, Unoccupied

80°F

Heating Set Point, Occupied

70°F

Heating Set Point, Unoccupied

60°F

Ventilation Requirements

Air Changes

Flow

Minimum Air Changes, Unoccupied

ACH

Minimum Air Changes, Occupied

ACH

Outside Air Fraction

Outside Air Per Person

10.0

ft<sup>3</sup>/min/person

Outside Air Per Area

0.12

ft<sup>3</sup>/min/ft<sup>2</sup>

Exhaust Flow Per Area

0.00

ft<sup>3</sup>/min/ft<sup>2</sup>


# Starting a SB 2030 Model

## Architectural details

- Geometry
  - Covered later
- Envelope Construction
  - Hover over underlined name to gain additional information or see defaults
  - Floor to Floor Height –
    - Enter specific value
- Infiltration
  - Include or excluded

### Envelope Construction

Floor to Floor Height

ft 

---

### Infiltration

Air Sealing Blower Door Test, Pressure Boundary

☒ Included ☐ Excluded

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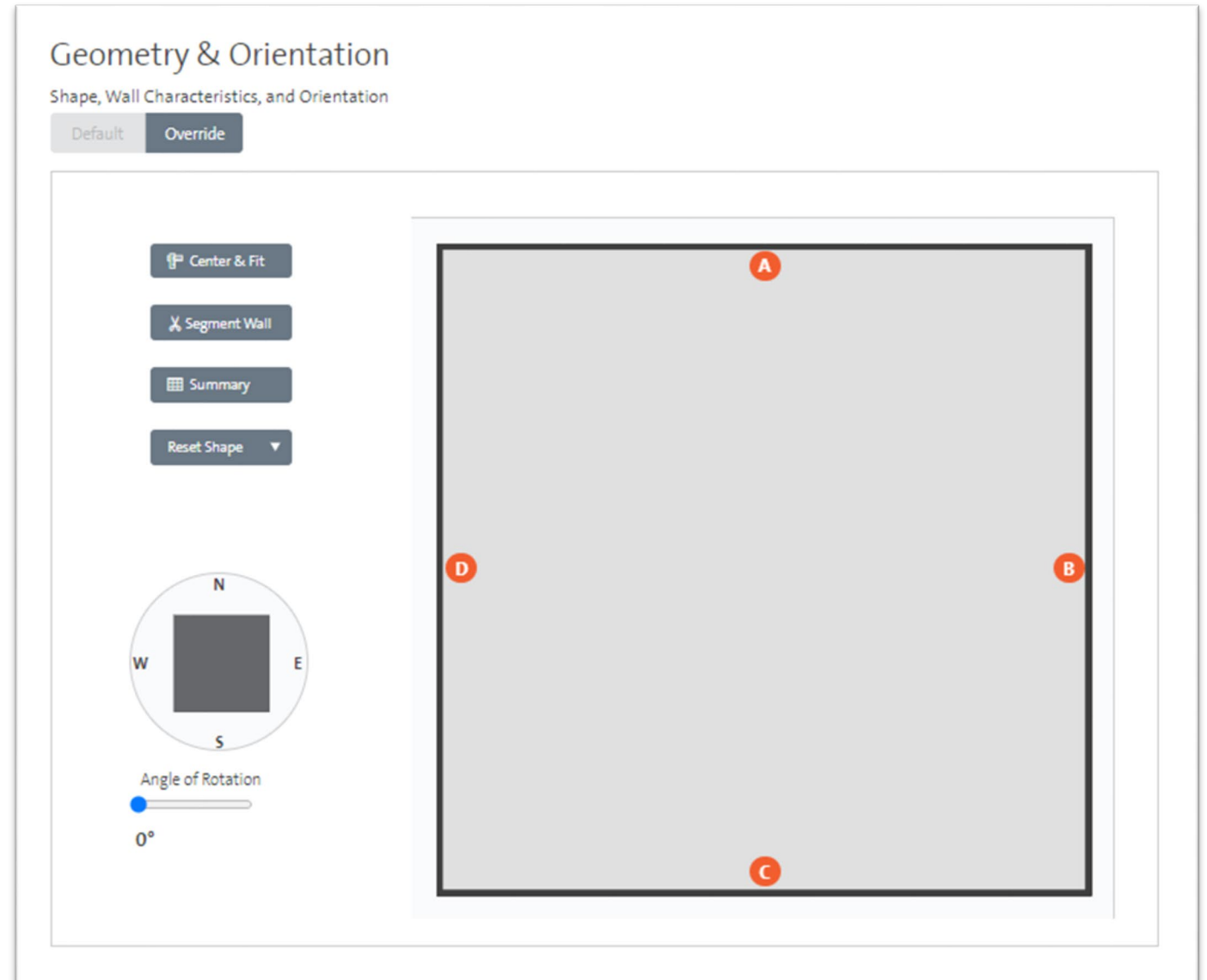
---

# MODIFYING DETAILED GEOMETRY

# Starting a SB 2030 Model

## Architectural details

- Adjust geometry beyond default SAT arrangement
  - Do only if unique
  - Done on a SAA-by-SAA basis
  - Can segment or note shared walls
  - Can set window to wall ratio by orientation
- May impact heat pump or VRF systems more than central systems
- Intended to be high level geometry; **DO NOT** include every cut out and corner!

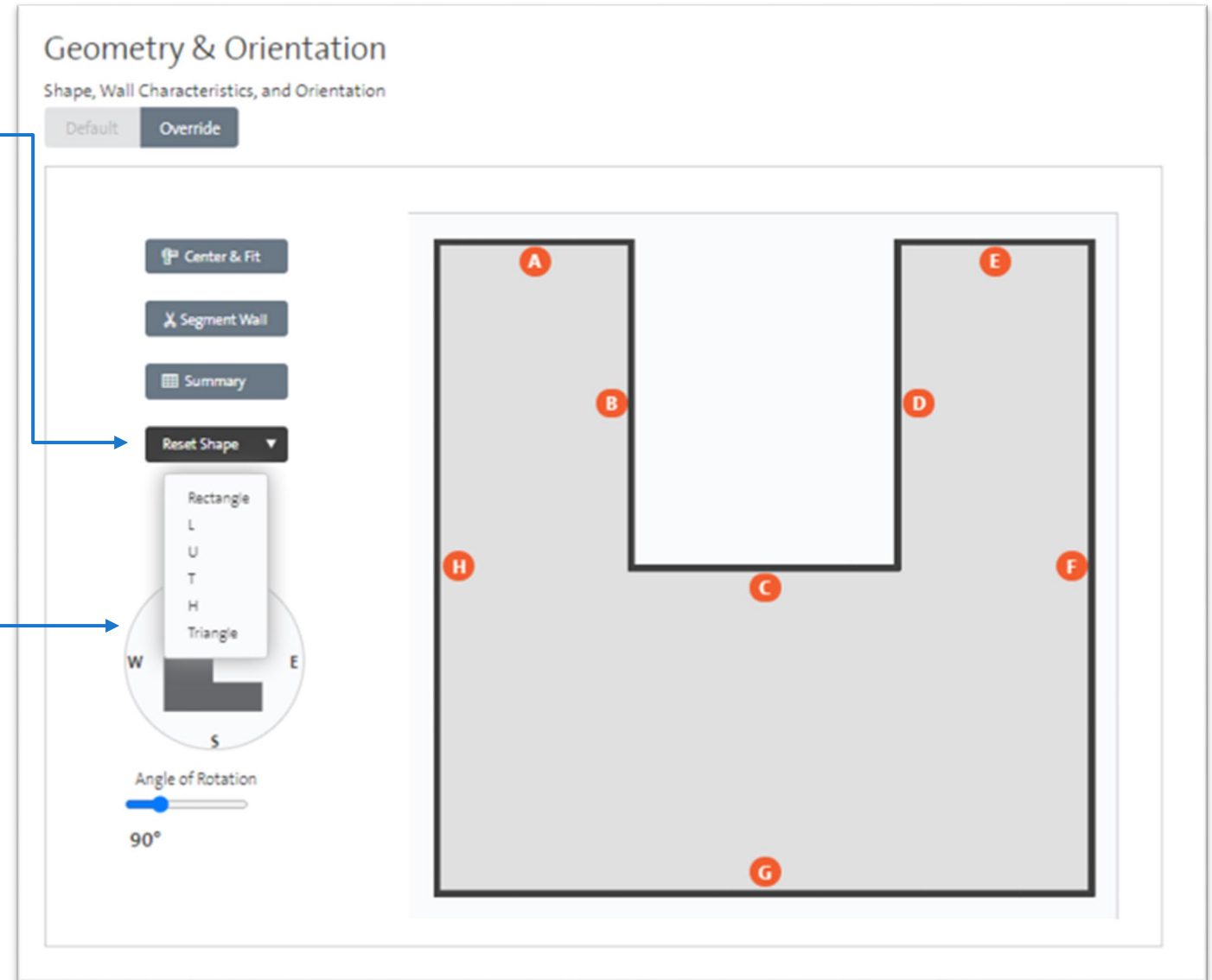


# Starting a SB 2030 Model

## Architectural details

### ■ Custom Geometry

- Choose from standard shapes
- Rotate building
  - Note rotation only shown here
- Segment wall to further change shape





# Starting a SB 2030 Model

## Architectural details

### ■ Custom Geometry

- Summary
  - Note shared walls with another SAA based on width and height of shared portion
  - Exit Summary table by clicking “Done”

### Geometry & Orientation

Shape, Wall Characteristics, and Orientation

DefaultOverride

Center & Fit

Segment Wall

Done

Reset Shape

	Whole Wall Shared	Shared Wall Width (ft)	Shared Wall Height (ft)
A	<input type="checkbox"/>	0.0	0.0
B	<input type="checkbox"/>	0.0	0.0
C	<input type="checkbox"/>	0.0	0.0
D	<input type="checkbox"/>	0.0	0.0

Walls reference



---

# HVAC SYSTEMS

# Starting a SB 2030 Model

## HVAC details

- Define Proposed HVAC system
  - New “Use a Template” feature lists pre-defined HVAC scenarios
  - “Define My Own”
- Define any central plant
- Then define system and zone level HVAC components
- HVAC systems are defined and one or more SAAs can be added to a system
- Red triangles let you know a system is not fully defined

The screenshot shows the SB 2030 software interface. At the top, there's a header with the Minnesota logo, 'SB 2030', and 'Phase PD - Test Project'. Below this are icons for 'Building', 'HVAC', and 'Rating'. A 'Save' button and a 'MENU' icon are on the right. A notification bar at the top says 'Next, define mechanical system scenarios for comparison.' with two red triangles. Below this is a 'Proposed' tab with an 'Edit' button. The main content area asks 'How would you like to define Proposed?' and offers two options: 'Use a Template' (Choose from a list of pre-defined HVAC Scenarios.) and 'Define My Own' (Specify central HVAC equipment and systems.). At the bottom, there's a 'Rating' button with a right arrow.



---

# CENTRAL PLANT EQUIPMENT

# Starting a SB 2030 Model

## HVAC details – central plant

- Select service water heating system fuel type
  - Select none if SWH is not a factor in the project
- Select heating plant type
  - Boiler
  - District
  - None if no central equipment
- Select cooling plant type, if no chiller select none
  - District cooling
  - Air-cooled chiller
  - Water-cooled chiller
  - None if no central equipment

The screenshot displays the SB 2030 software interface for a project named "Phase PD - Test Project". The interface is divided into three main sections: Building, HVAC, and Rating. The HVAC section is currently active, indicated by a red 'X' icon. A "Save" button and a "MENU" icon are located in the top right corner. A notification bar at the top of the HVAC section states: "Next, define mechanical system scenarios for comparison." Below this, a "Proposed" tab is selected, and an "Edit" button is visible. The main content area is titled "Define central equipment" and contains several dropdown menus and buttons. The "Service Water Heating Fuel Type" dropdown is set to "None". The "Heating Plant" dropdown is also set to "None". The "Cooling Plant" dropdown is set to "None". The "Water to Air Heat Pump Plant" dropdown is set to "None". The "Dedicated Outside Air System" section has two buttons: "Not Installed" (which is highlighted) and "Installed". A "Modify Details" button with a gear icon is located at the bottom of the section.

# Starting a SB 2030 Model

## HVAC details

- Dedicated outside air systems set at this level
  - If selected as Installed, specify additional details
- Select cooling option
  - DX
  - Heat pump
  - VRF
  - Central plant
- Select heating option
  - Furnace
  - Heat pump
  - VRF
  - Central plant
  - Electric resistance

The screenshot displays the SB 2030 software interface for a project named "Phase PD - Test Project". The interface is divided into sections for "Building", "HVAC", and "Rating". The "HVAC" section is active, showing a "Proposed" status and a "Next, define mechanical system scenarios for comparison." instruction. Below this, the "Define central equipment" section contains several dropdown menus: "Service Water Heating Fuel Type" (set to None), "Heating Plant" (set to None), "Cooling Plant" (set to None), "Water to Air Heat Pump Plant" (set to None), "Dedicated Outside Air System" (with "Not Installed" and "Installed" options, where "Installed" is selected), "DOAS Cooling Option", and "DOAS Heating Option". A "Modify Details" button is located at the bottom left of the HVAC section. The interface also includes a "Save" button and a "MENU" icon in the top right corner.



# CREATING HVAC SYSTEMS



# Starting a SB 2030 Model

## HVAC details - systems


- Define each system
  - Provide system name
    - Default is System 1
- Add space asset areas; can be 1 or many
- Complete drop-downs for other choices
  - Conditioning type
  - System type
  - Cooling source
  - Heating source
  - Zone heating source
- Use DOAS is only available if DOAS was selected in the plant section
- Repeat for additional systems

Define each HVAC system used in *Scenario A* + Add System

System 1

Associated Space Asset Areas

Assign Area ▼

 No areas are currently assigned

Conditioning Type ▼

System Type ▼

Cooling Source ▼

Use DOAS (defined above) No Yes

System Heating Source ▼

Zone Heating Source ▼

Done ⚙️ Modify Details



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# Rating User Interface

# New User Interface

Mechanical Viewer

Click here for analysis info or to "Return" to Guidelines

Visualizations

Configure Widgets

Click to add multiple strategies at one time

New Widget Summary Section with EUI and CO2e Intensity

The screenshot displays the 'SB 2030 Phase PD - Test Project' interface. At the top, there are tabs for 'Building', 'HVAC', and 'Rating'. Below these, a 'Calculate' button and a 'MENU' icon are visible. The main area features two horizontal bar charts. The left chart, titled '2030 Energy Standard', shows 'Energy Use Intensity (kBtu/ft²/yr)' on the x-axis (0 to 300) with a green bar and a red bar. The right chart, also titled '2030 Energy Standard', shows 'CO2e Intensity (lbm/ft²/yr)' on the x-axis (0 to 80) with a green bar and a red bar. Below these charts, the current values are displayed: 'Energy Use Intensity (kBtu/ft²/yr) 101.0' and 'CO2e Intensity (lbm/ft²/yr) 21.0'. At the bottom, there is a 'Strategy Selection' section with a '+ Add' button and tabs for 'Mechanical', 'Architectural', 'Lighting', 'Plug/Process', 'Refrigeration', and 'Service Water Heating'. A 'Filter' button is also present.

# Adding Measures

Navigate between strategy category tabs

Click Done to complete process

Click here to clear all default strategies

Click the strategy toggle to apply strategy to design

Not applied

Applied

SB 2030 Phase PD - Test Project

2030 Energy Standard

Add or remove strategies

Energy Use Intensity (kBtu/ft<sup>2</sup>/yrs)

CO2e Intensity (lbm/ft<sup>2</sup>/yrs)

Done

Strategy Selection

Mechanical Architectural Lighting Plug/Process Refrigeration Service Water Heating

Strategy Facility

Reduced air infiltration

Blower Door Test Measurement 0.36 ft<sup>3</sup>/min/ft<sup>2</sup>

Test Pressure (in Pascals) 75

Office

Increased wall assembly R-value

R-value 20.00 R (hr-ft<sup>2</sup>\*F/Btu)

Increased roof assembly R-value

R-value 30.00 R (hr-ft<sup>2</sup>\*F/Btu)

White roof

As-designed glazing

Unit U-factor 0.38 U (Btu/hr-ft<sup>2</sup>\*F)

Center of Glass U-factor 0.25 U (Btu/hr-ft<sup>2</sup>\*F)

SHGC 0.37

Visible Transmittance (VT) 0.70

Window to Wall Area Ratio 10.00 %

Dining

Help

R-value

# Strategy Summary

Summary & Key Parameter Views can be toggled to view strategy results and inputs

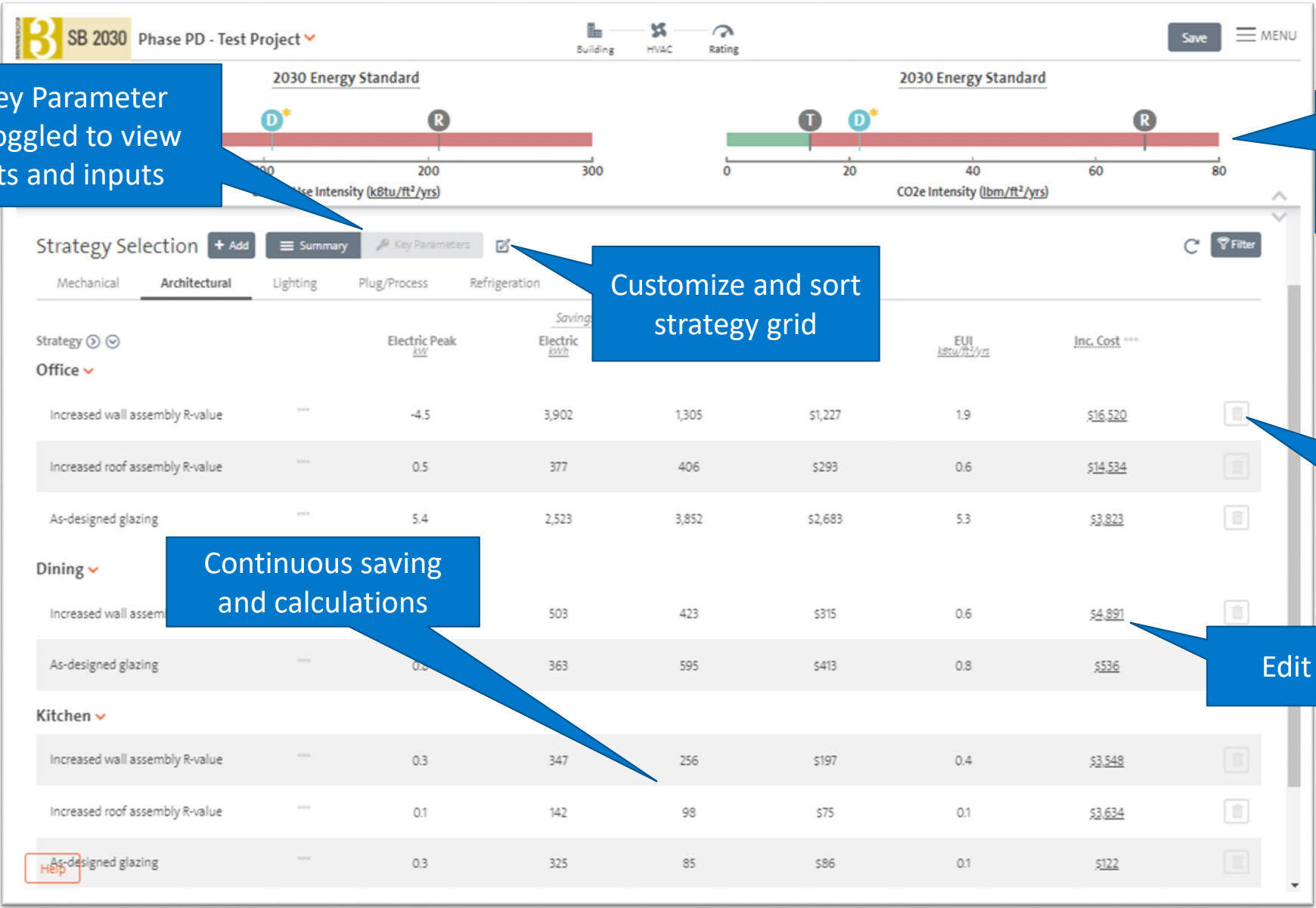
Design summary results condense at the top

Customize and sort strategy grid

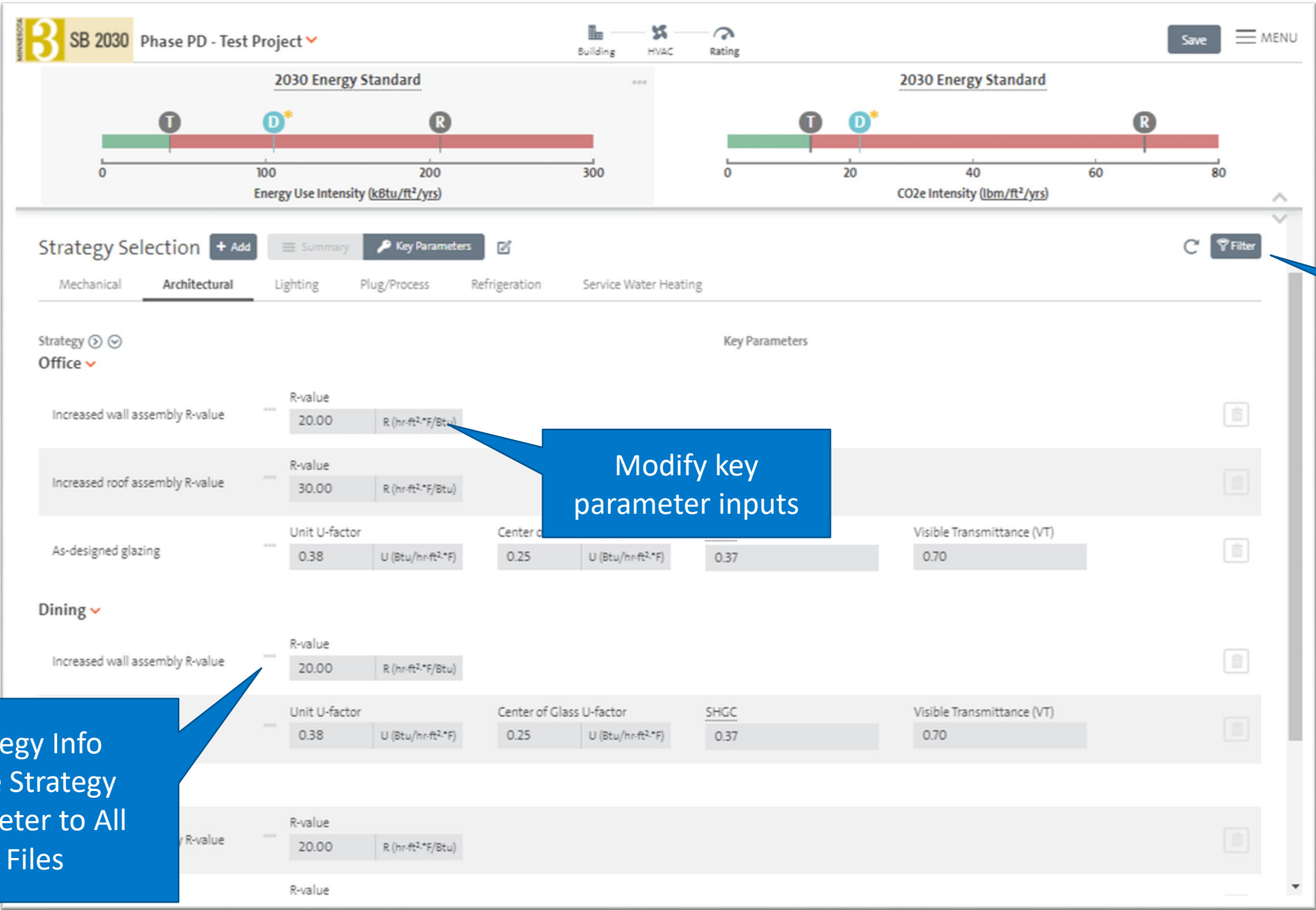
Click to remove strategy

Continuous saving and calculations

Edit costs



# Strategy Key Parameters



Filter strategies

Modify key parameter inputs

Show Strategy Info  
Re-calculate Strategy  
Apply Parameter to All  
Get Sim Files

# Slide-in Pane

SB 2030

Phase PD - Test Project

Building

HVAC

Rating

Save

MENU

2030 Energy Standard

T

D

R

Energy Use Intensity (kBtu/ft<sup>2</sup>/yrs)

2030 Energy Standard

T

D

R

CO<sub>2</sub>e Intensity (lbm/ft<sup>2</sup>/yrs)

Strategy Selection

Architectural

Increased wall assembly R-value

Increased roof assembly R-value

As-designed glazing

Dining

Increased wall assembly R-value

As-designed glazing

Kitchen

Increased wall assembly R-value

Help

Increased wall assembly R-value

Parameters

Savings

Name	Design	Units
R-value	20.00	R (hr-ft <sup>2</sup> ·°F/Btu)
Incremental Cost	<div>Default</div> <div>Override</div>	\$16,520 Dollars (US)

Notes

Close

Click strategy name to view "Slide-in" pane for all strategy info

Modify Key Parameter

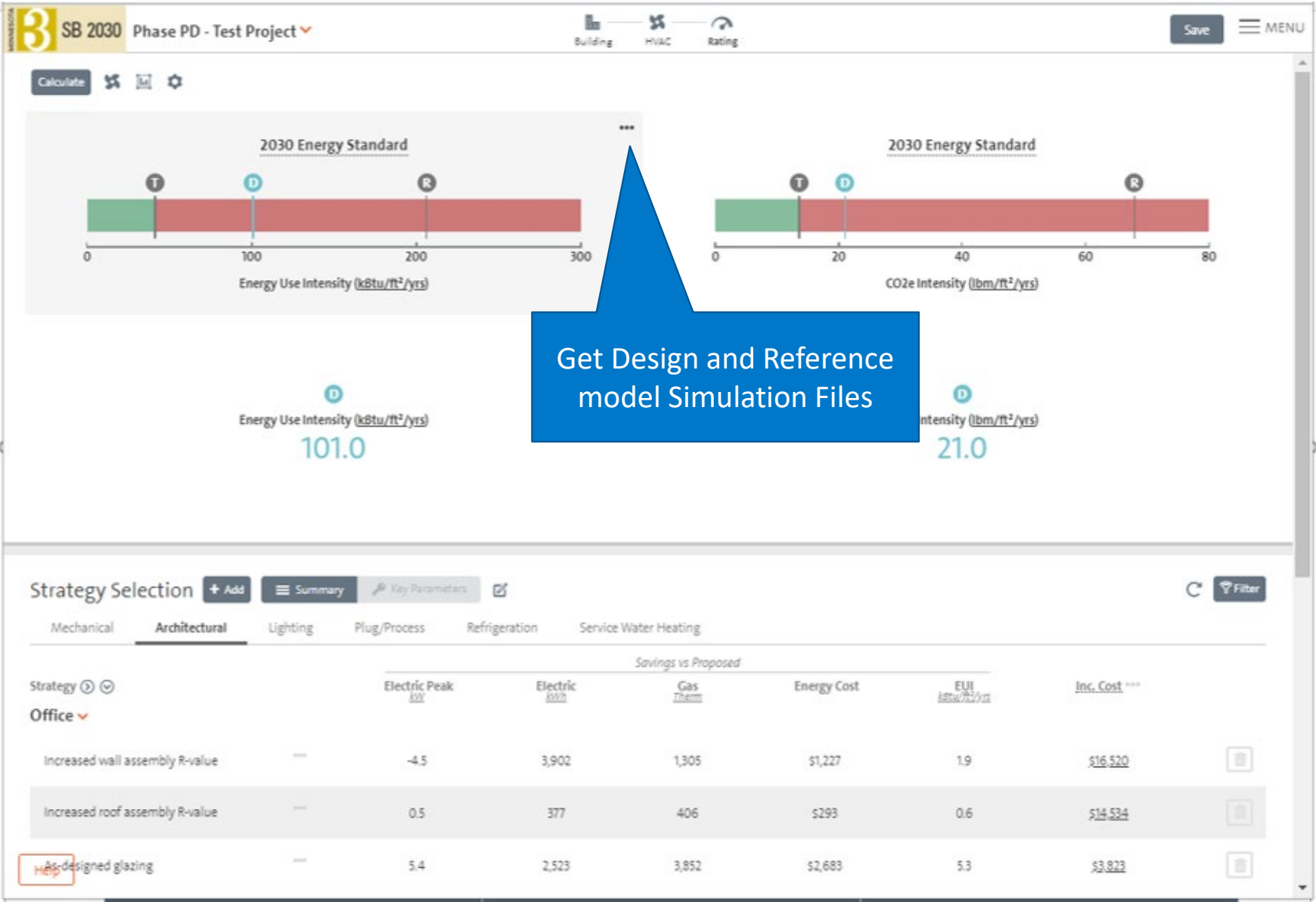
Apply parameter to all spaces or systems

Override/edit costs

Add strategy notes



# Design and Reference Simulation Files



# Widgets Feature

Click when edits are complete

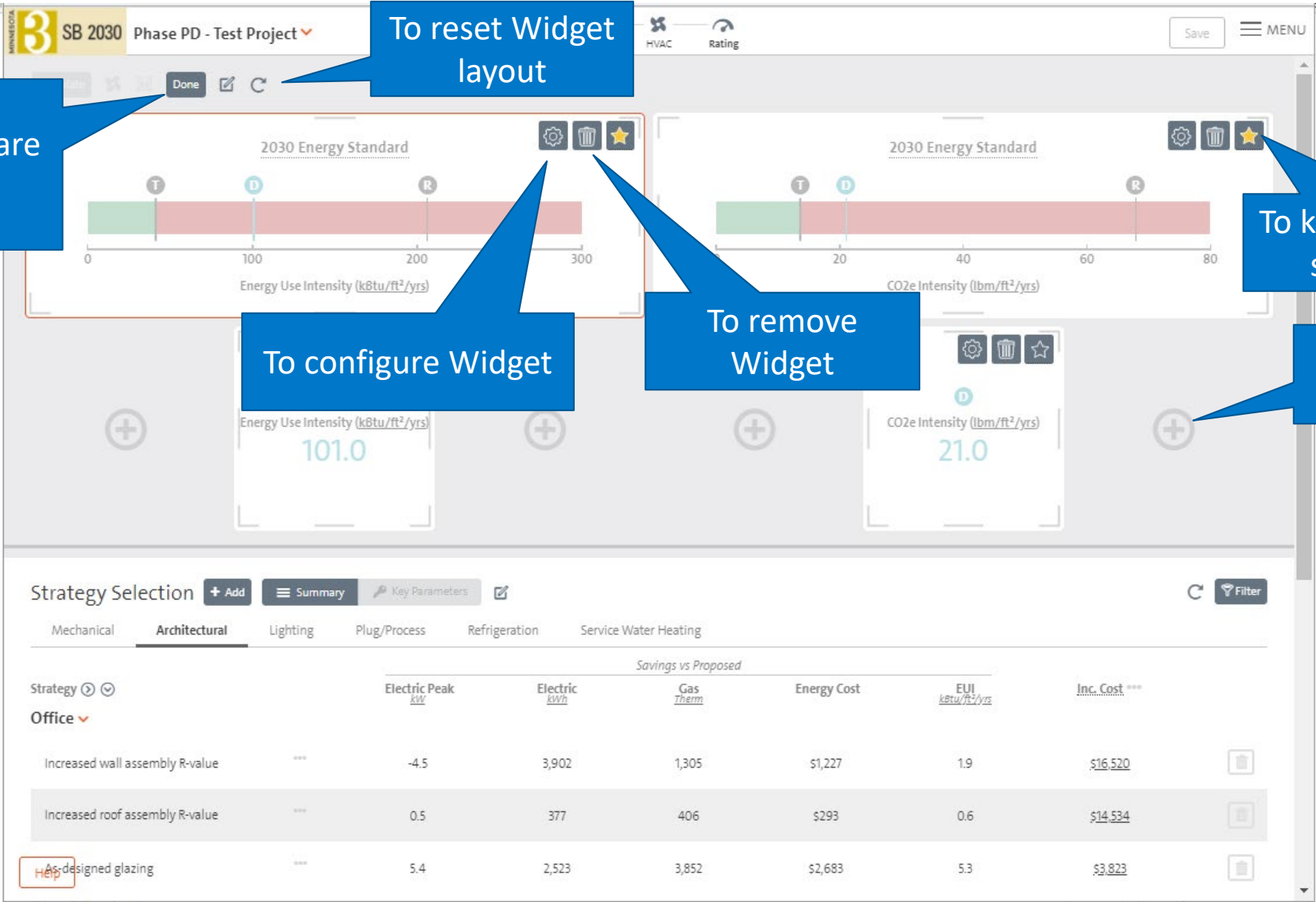
To reset Widget layout

To configure Widget

To remove Widget

To keep Widget when scrolling down

To add a new Widget



- Mechanical
  - Facility
    - Equipment efficiencies
    - Pump controls
    - Pump power reductions
    - DOAS related strategies
  - System
    - Equipment efficiencies
    - Motor efficiencies
    - Fan power reductions
    - Fan controls
    - Heat recovery
  - Space Asset Area
    - Ventilation controls
    - Thermostat setback controls

- Architectural
  - Facility
    - Infiltration
  - System
    - None
  - Space Asset Area
    - Wall insulation
    - Roof insulation
    - Roof reflectivity
    - Improved glazing characteristics

- Lighting
  - Facility
    - Exterior lighting power reduction
    - Exterior lighting controls
  - System
    - None
  - Space Asset Area
    - Interior lighting power reductions
    - Occupancy/Vacancy controls
    - Daylighting controls

- Plug/Process
  - Facility
    - Snow melt system efficiency
    - Elevator efficiency
  - System
    - None
  - Space Asset Area
    - Office plug load controls
    - Residential ENERGY STAR<sup>®</sup> appliances
    - Commercial ENERGY STAR appliances

- Refrigeration
  - Facility
    - None
  - System
    - None
  - Space Asset Area
    - Casework lighting
    - Casework antisweat heat controls
    - Casework door improvements
    - Refrigeration heat reclaim



- Service Water Heating
  - Facility
    - System efficiency
    - On-demand water heater
    - Heat Pump water heater
  - System
    - None
  - Space Asset Area
    - Residential low-flow showerheads



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## UPDATES FOR 2020

## Updates To Come

- Updates to come
  - Solar PV to SB 2030 As-Designed Tool



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# SB 2030 SUPPORT

## ■ Resources

- 'How NEO® Works' videos at: <https://netenergyoptimizer.com/how-it-works>
- [sb2030@b3mn.org](mailto:sb2030@b3mn.org)

## ■ Helpful information to provide when reporting an issue

- Brief description of error or issue and when it occurred
- Brief description of the building and model
- Provide screenshots if available

# Acknowledgements

## ■ Clients



## ■ Partners



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# QUESTIONS?



# Thank You

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