NZEL INTERNSHIP WITH ANKROM MOISAN

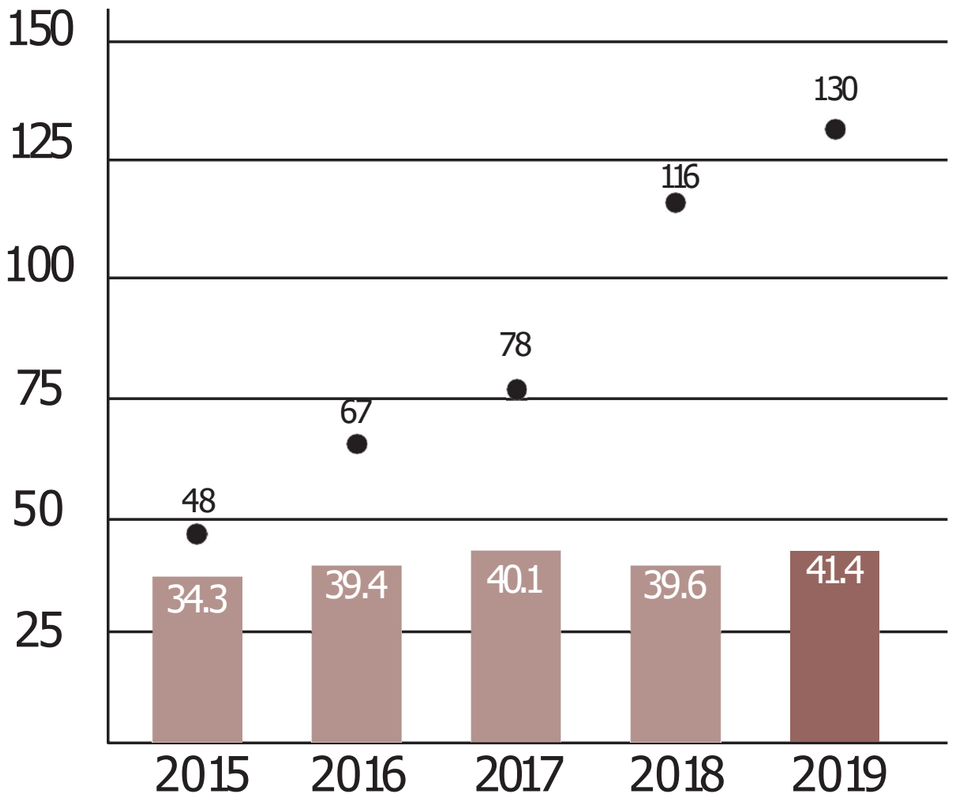
ALYSSA BIRUM

GOALS

-Understanding the basics of EUI
    -Sharing that knowledge with others
    -Helping teams use EUI to inform their projects
-Inputting projects into the DDx
-Researching the basic impact our projects have
    -How do we decrease that impact?
-Understanding what steps need to be taken to reach our energy goals

AMA RESULTS

-130 projects input
-41.2% EUI reduction (up 1.5%)
-33/130 projects energy modeled



Sustainability Target Certification

-Living Building Challenge: 2
-Passive Haus: 1
-Earth Advantage: 2
-LEED Silver: 8
-LEED Gold: 8
-LEED Platinum: 1

17% of all projects achieved certification

THE PROCESS OF REPORTING

-Encourage large firm-wide participation
  -More knowledgeable
  -More accountable
-Start by updating previously reported projects
-Using our reporting guide, teams are asked to input their project
  -91 people available to input
  -Input every project
-Meet with teams
-Review projects
  -Look for EUIs that appear off
  -Any other inconsistencies
-Submit!

DDx REPORTING GUIDE

INTRODUCTION

REPORTING PROCESS

1. Read this Reporting Guide in its entirety before starting.
2. Gather project information and resources.
3. Calculate Baseline & Target EUI with the Zero Tool.
4. Enter project data and Zero Tool EUI information into AIA 2030 Commitment Recording and Data Management tool (DDx).
5. Save results to your project directory.

Which Projects Are Reported?

- All projects in Design, Construction Administration, or Closeout each year, looking back at the previous year.
- If your project has multiple buildings or a mix of renovation and new construction, use the naming and scope defined by your jurisdiction's permitting authority. Often mix reno/new buildings require MEP or other code related upgrades that bring whole-building energy use into consideration.

RESOURCES

Zero Tool Target Finder - Online tool used to define Baseline and Target EUI

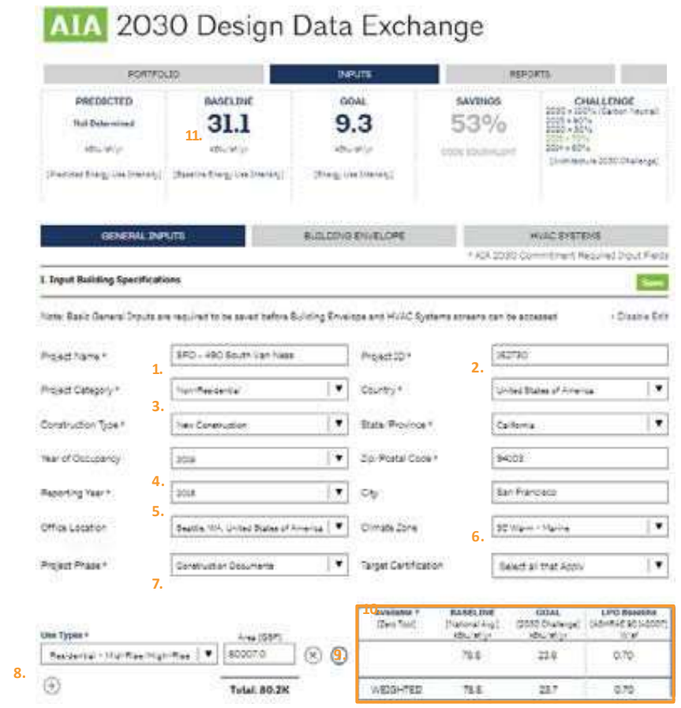
- Utilizes the Commercial Building Energy Consumption Survey (CBECS) Database
- Defines Median or Average energy use for various building types based on site EUI
- Scores buildings on a scale of 1-100 Performance Percentile

User Guide: https://zerotool.org/user-guide/
Tool: https://zerotool.org/zerotool/

AIA DDx - Online database of project data.
Need a profile? Start at: http://2030ddx.aia.org/users/sign_in

2. 2030 DESIGN DATA EXCHANGE

http://2030ddx.aia.org/users/sign_in



NOTES

1. PROJECT NAME - Here we use a particular naming convention for organization: Office (PDX, SEA, SFO) - Project Name, for example: "PDX - 1000 E. Broadway"
2. Project ID - This is the AMA Project Number.
3. Project Category - Use Residential category if the building is only housing and parking. If it is mixed-use, use Commercial category.
4. Year of Occupancy - year when project reached or will reach substantial completion.
5. Reporting Year - the last complete year, 2019.
6. Climate Zone automatically populates when the Zip Code is entered.
7. Home office of the Project Manager.
8. **DO NOT include parking in this value. Enter parking as its own use/line.**
9. Click the information icon here to be directed to the Zero Tool.
10. Shows NATIONAL AVERAGE. Input more detailed information below.
11. Numbers will match data in #10 until more detailed information is input.

EUI REPORT CARD

-Goal: Encourage the use of EUI as a tool to inform design through early energy modeling and sustainable methods.

Ankrom Moisan

PROJECT NAME / ID

CONCEPT DESIGN

BASELINE EUI	PREDICTED EUI	EUI GOAL

WHAT TO CONSIDER:

-DAYLIGHTING STRATEGIES (AIM FOR 20-40% WWR)

-PASSIVE STRATEGIES

--THERMAL MASS, NATURAL VENTILATION, SHADING, SOLAR, WINDOW ORIENTATION, ETC.

-LOOK AT WAYS TO REDUCE LOADS (EXTERNAL, INTERNAL, VENTILATION, PEAK)

--IMPROVE ENVELOPE, EXAMINE SIZE AND LOCATION OF GLAZING, EVALUATE SHADING OPTIONS, REDUCE INSTALLED LIGHTING AND EQUIPMENT POWER

-PROGRAMMING EFFICIENCIES (ADJACENT PROGRAMMING)

-DESIGNING WITH AWARENESS OF THE CLIMATE (LOOK AT CLIMATE DATA SHEETS)

-DETERMINE AN EFFECTIVE ENVELOPE DESIGN (THIS CAN ELIMINATE 70-80% OF ENERGY CONSUMPTION)

--THERMAL PERFORMANCE, R-VALUE, U-VALUE, AIR-TIGHT, CONTINUOUS INSULATION, ETC.

-BEGIN EARLY ENERGY MODELING TO HELP ACHEIVE YOUR GOALS

--THE ONLY WAY TO GET A PREDICTED EUI IS THROUGH EARLY ENERGY MODELING!!

-BEGIN WORKING WITH MECHANICAL ENGINEER (PRPOPER SIZING FOR MECHANICAL)

SUSTAINABLE STRATEGIES YOU ARE USING:

SUSTAINABLE STRATEGIES YOU ARE LOOKING INTO:

ARE YOU ON TRACK TO MEET YOUR GOALS:

INSIGHT 360-

MODEL SETUP:

- ☐ CREATE MODEL IN REVIT
  - -LINKED FROM WORKING MODEL IN NEW ENERGY MODEL FILE
  - -TRACE WALLS
  - -CREATE FLOOR SLABS
  - -TRACE ROOF SHAPE
- ☐ SET MODEL LOCATION
- ☐ SET ENERGY SETTINGS
  - -"USE CONCEPTUAL MASSES AND BUILDING ELEMENTS"
  - -CAN ADD ADVANCED OPTIONS IF KNOWN
- ☐ GENERATE ENERGY MODEL
- ☐ CHECK FOR GAPS IN ANALYTICAL SURFACES

*ENTER IN ANY KNOWN INFORMATION TO THE INSIGHT WIDGETS
*BOOKMARK SCENARIOS TO KEEP A BASE
*EACH REVIT REVISION NEEDS TO BE A SEPARATE FILE TO COMPARE TO PAST VERSIONS
*INSIGHT ARRANGES WIDGETS FROM GREATEST IMPACTS TO LEAST DEPENDING ON YOUR PROJECT

MOST SIGNIFICANT FACTORS THAT CAN BE CHANGED:

(LOOK AT INSIGHT 360 WIDGETS: WINDOW-WALL-RATIO, SHADING, BUILDING ORIENTATION, CONSTRUCTION, ETC.)

EUI REPORT CARD

Ankrom Moisan

PROJECT NAME / ID

DESIGN DEVELOPMENT

BASELINE EUI	PREDICTED EUI	EUI GOAL

WHAT TO CONSIDER:

-WHAT SYSTEMS WORK MOST EFFICIENTLY IN THE DETAILED MODELS?

-IS THE MECHANICAL EQUIPMENT SIZED CORRECTLY?

--SIZED SPECIFICALLY FOR THIS PROJECT, NOT JUST A BROAD ESTIMATE

-HOW IS ENERGY BEING MANAGED DURING BUILDING OPERATIONS AND PEAK LOADS?

-DO THE MODELING INPUTS ACCURATELY REFLECT THE DESIGN?

-WILL OCCUPANT COMFORT BE MAINTAINED BASED ON PROJECT SPECIFICS?

--OPPORTUNITIES OF FLEXIBILITY / TO ADJUST BASED ON THERMAL NEEDS

-OPTIMAL THERMAL ZONE AND SPACE CONFIGURATION DESIGN TO MEET EUI GOAL

-OUTSOURCE PROJECT FOR A MORE COMPLEX ENERGY MODEL (IF POSSIBLE)

-WHAT IS THE SOLAR HEAT GAIN? (EXTRA CREDIT)

--IF TOO HIGH, CAN IT BE REDUCED THROUGH SHADING OR OTHER MEANS?

-EVALUATION OF SPECIFIC DESIGN OPTIONS AND DECISIONS AND HOW THEY AFFECTED THE ENERGY MODEL (EXTRA CREDIT)

SUSTAINABLE STRATEGIES YOU ARE IMPLEMENTING:

ARE YOU ON TRACK TO MEET YOUR GOALS:

INSIGHT 360-

MODEL INPUTS SHOULD INCLUDE:

- ☐ UPDATED MODEL
- ☐ BUILDING SITE AND ORIENTATION
- ☐ SHADING AND DAYLIGHTING
- ☐ BUILDING PROGRAM
- ☐ EXTERIOR ASSEMBLY
- ☐ GLAZING SIZE AND LOCATION
- ☐ OTHER MODELS (DAYLIGHT, LIGHTING, ETC.)
- ☐ THERMAL ZONE AND SPACE CONFIGURATION
- ☐ ALL SYSTEMS THAT ARE EASILY INPUT

*OUTSOURCE TO ENERGY MODELER FOR BEST RESULTS
*COMPARE YOUR INSIGHT MODEL TO COMPLEX ENERGY MODEL

MOST SIGNIFICANT FACTORS THAT CAN BE CHANGED:

ENERGY MODELING

-A predicted EUI cannot be found without energy modeling
-How can we increase the use of energy modeling within our projects?
    -EUI Report Cards
    -Training team members
    -Firm measures
-What is the best energy modeling tool for AMA?
    -Insight 360
        -Revit plug in
        -In house ability

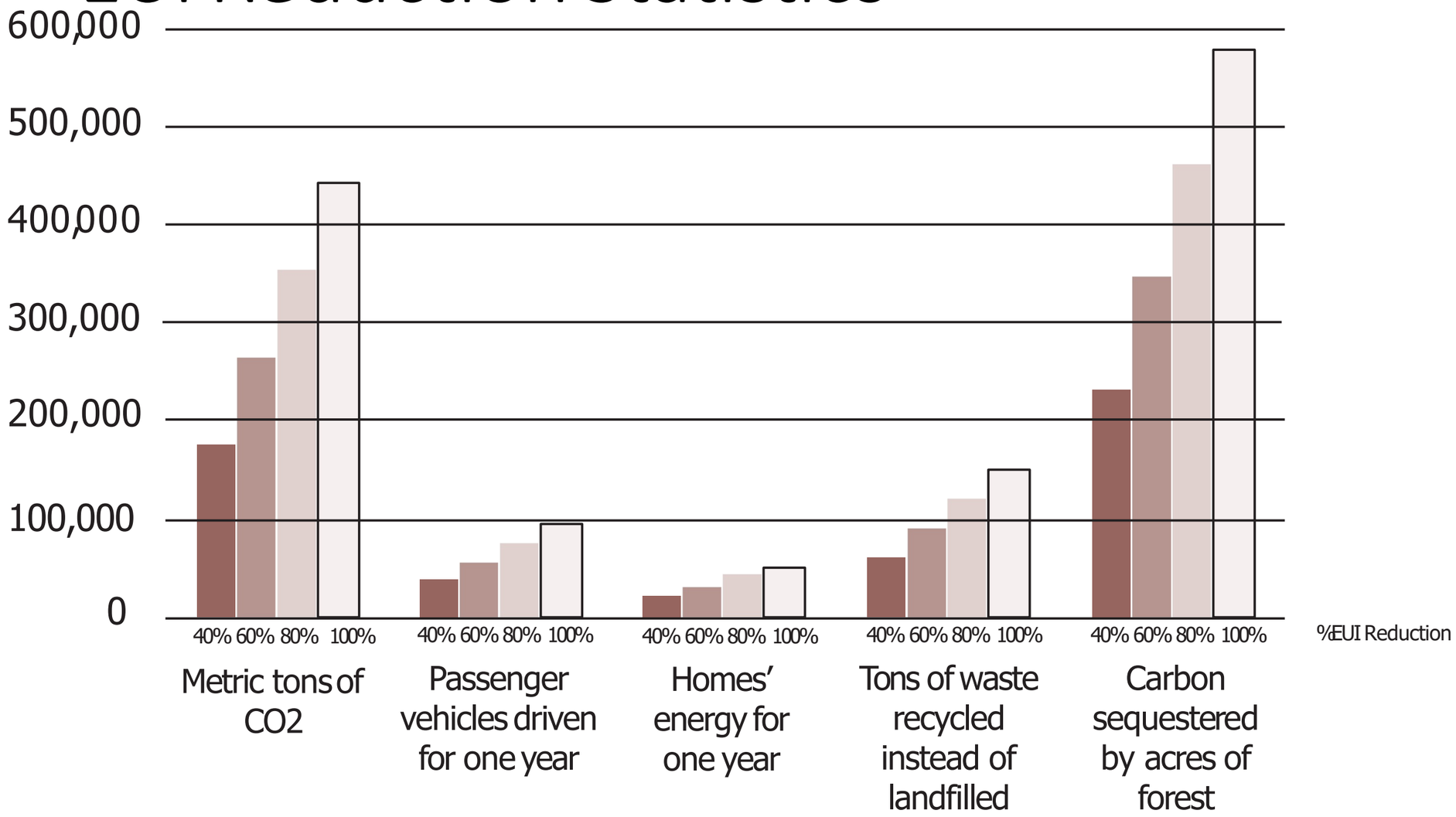
AUTODESK® INSIGHT

UNDERSTANDING OUR IMPACT

-Multi-family projects on the boards
  -110 projects on the boards
  -Minimum of 24,206,930 sf
  -Over 21,000 units

UNDERSTANDING OUR IMPACT

EUI Reduction Statistics



AMA PROJECT: ALBETINAKERR

New construction
Gresham, OR

-A net-zero, passive haus, affordable housing

-Zero energy discussions began in early design stages, energy modeling began in schematic design

-Envelope, electric heat pump for hot water, tempered air approach, tenant education

-56% EUI reduction

AMA PROJECT: AEGIS OF LAKE UNION

New construction
Seattle, WA

-Living Building Challenge Petal Certification in a senior living development

-Achievement of the Place, Energy, and Beauty Petals

-Careful selection of systems, materials, assemblies, and design concepts

-63% EUI reduction

AMA PROJECT: CCC EASTSIDE BLACKBURN

New construction
Portland, OR

-Multi-family housing

-Focus on LEED and WELL ideas

-Constant communication with consultants

-Air tightness, continuous insulation, energy modeling, high performance equipment and materials

-51% EUI reduction

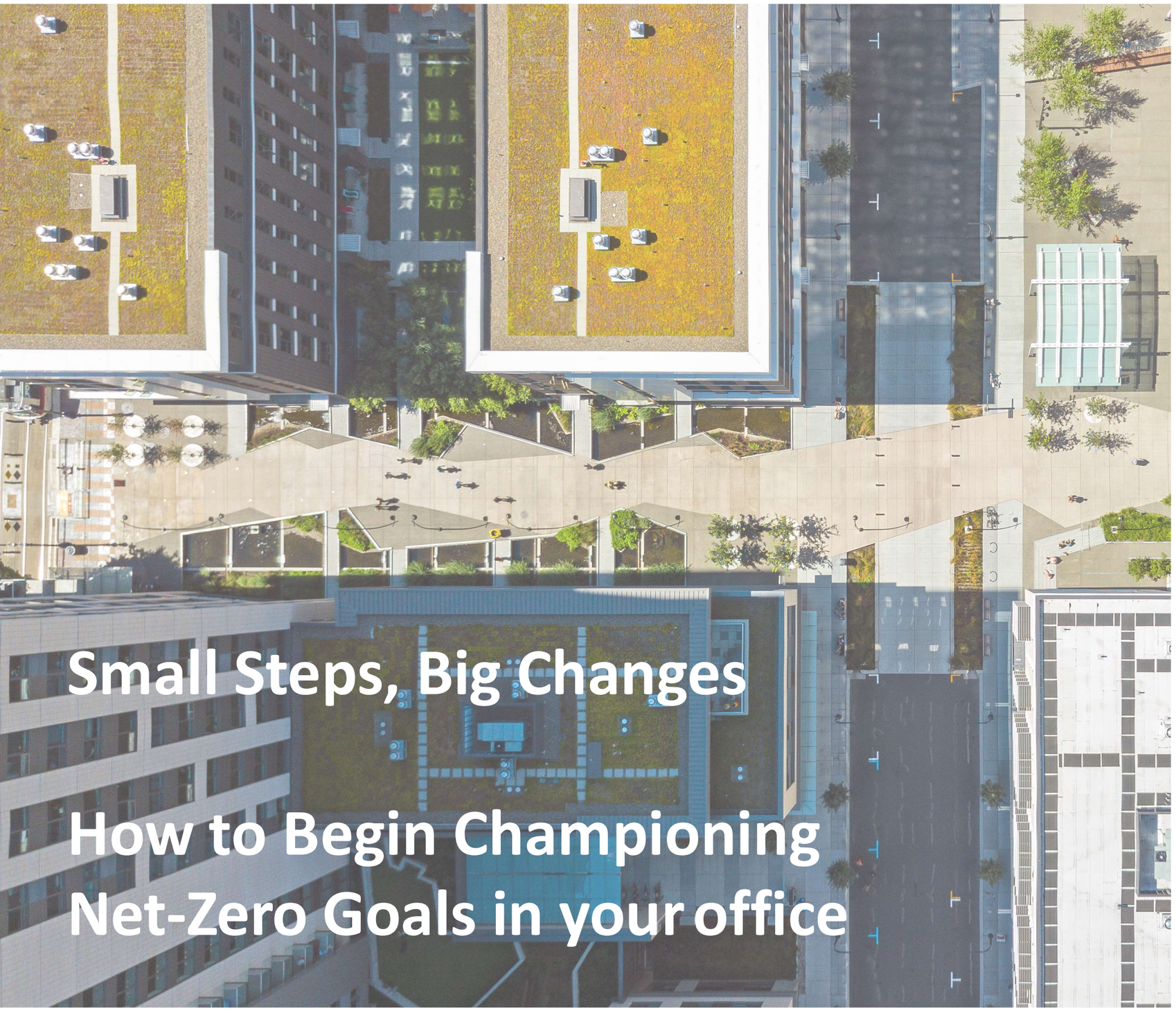
CODES

-Why are many firms in the area hovering at 40% EUI reduction?
-Baseline: CBECS 2003 Data Set
-To achieve a higher EUI reduction we must do more than just meet code

FOCUSING ON THE FUTURE

-Firm measures
-Using EUI as a tool for design
-Holding ourselves to a higher standard

THANK YOU



Small Steps, Big Changes

How to Begin Championing Net-Zero Goals in your office

NET ZERO EMERGING LEADER INTERNSHIP

GBD ARCHITECTS | ENERGY TRUST OF OREGON

GBD

The urban built environment is responsible for ***75%*** of annual global GHG emissions: buildings alone account for ***39%***.

Eliminating these emissions is the key to addressing climate change and meeting Paris Climate Agreement targets.

https://architecture2030.org/2030_challenges/2030-challenge/

GAUGING WHERE YOUR FIRM IS AT:

QUICK SELF - CHECK

Are you using the AIA Design Data Exchange?

Do you keep a LEED Portfolio?

Do you have and use a Sustainability Action Plan?

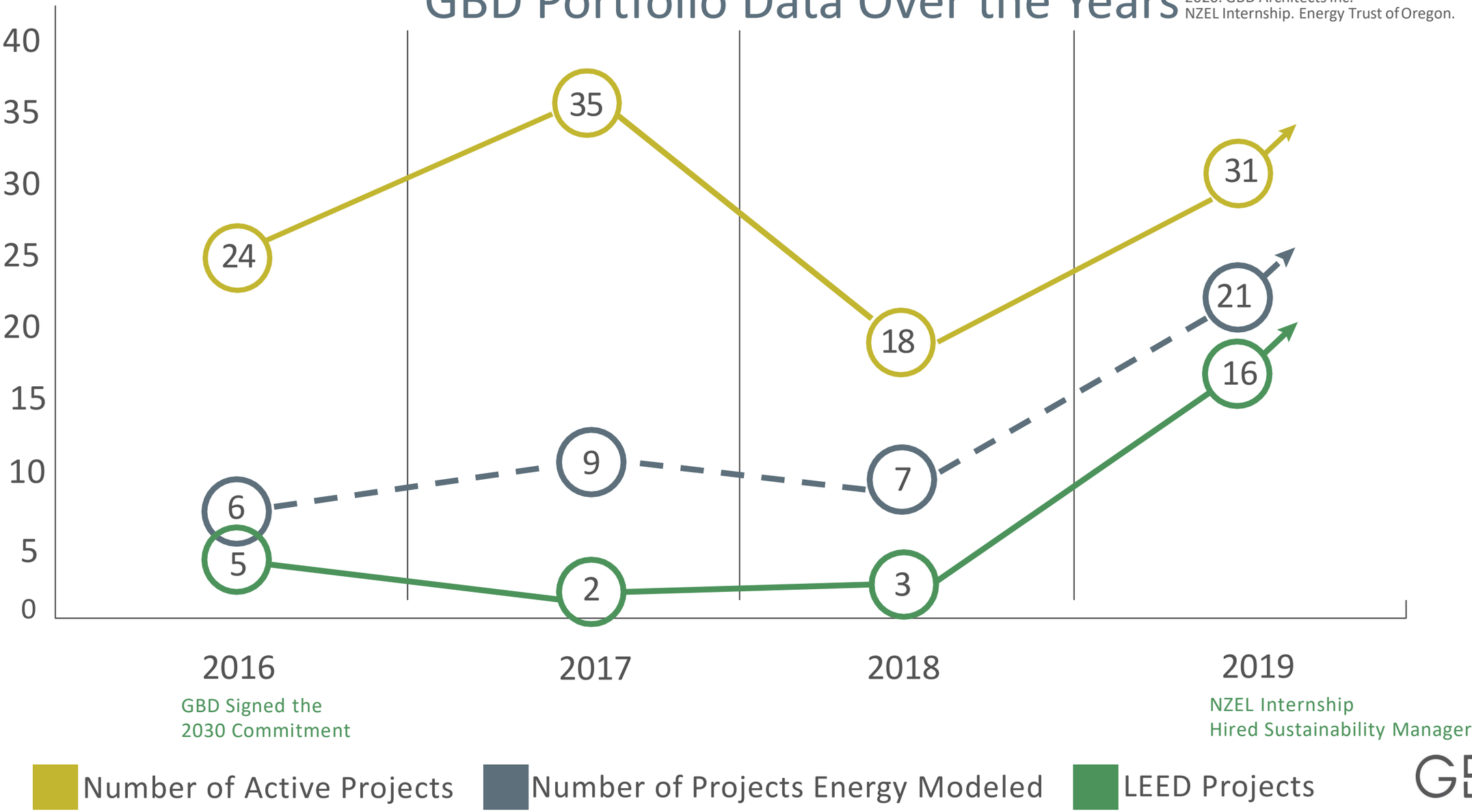
Building codes are changing - are you ready?

What are your daily office practices for sustainability?

What are you wanting to learn more about?

INTERPRETING WHAT IS ALREADY BEING ACCOMPLISHED...

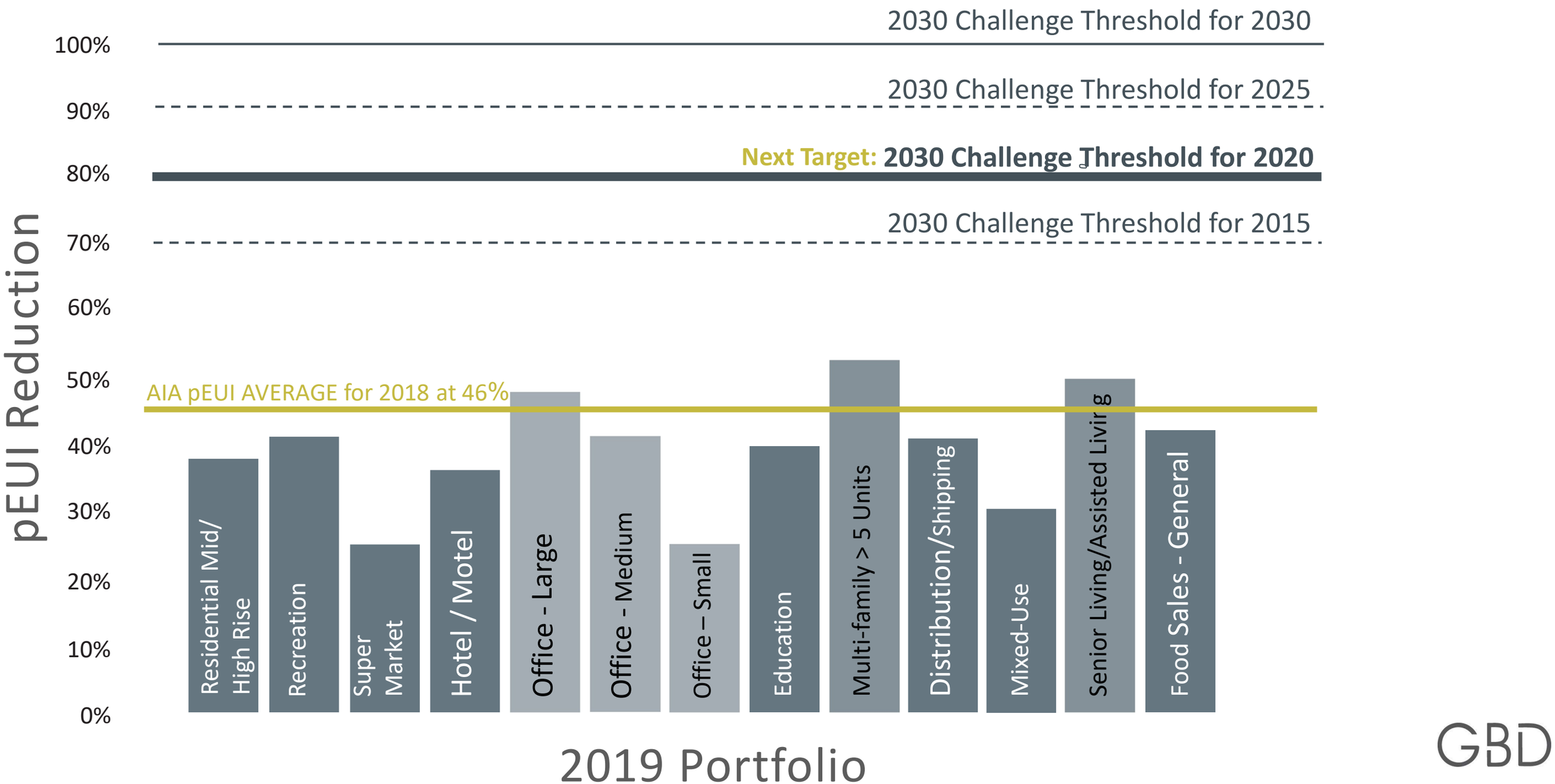
GBD Portfolio Data Over the Years



GBD

WHAT DOES THE DATA TELL US? CLOSING THE GAPS

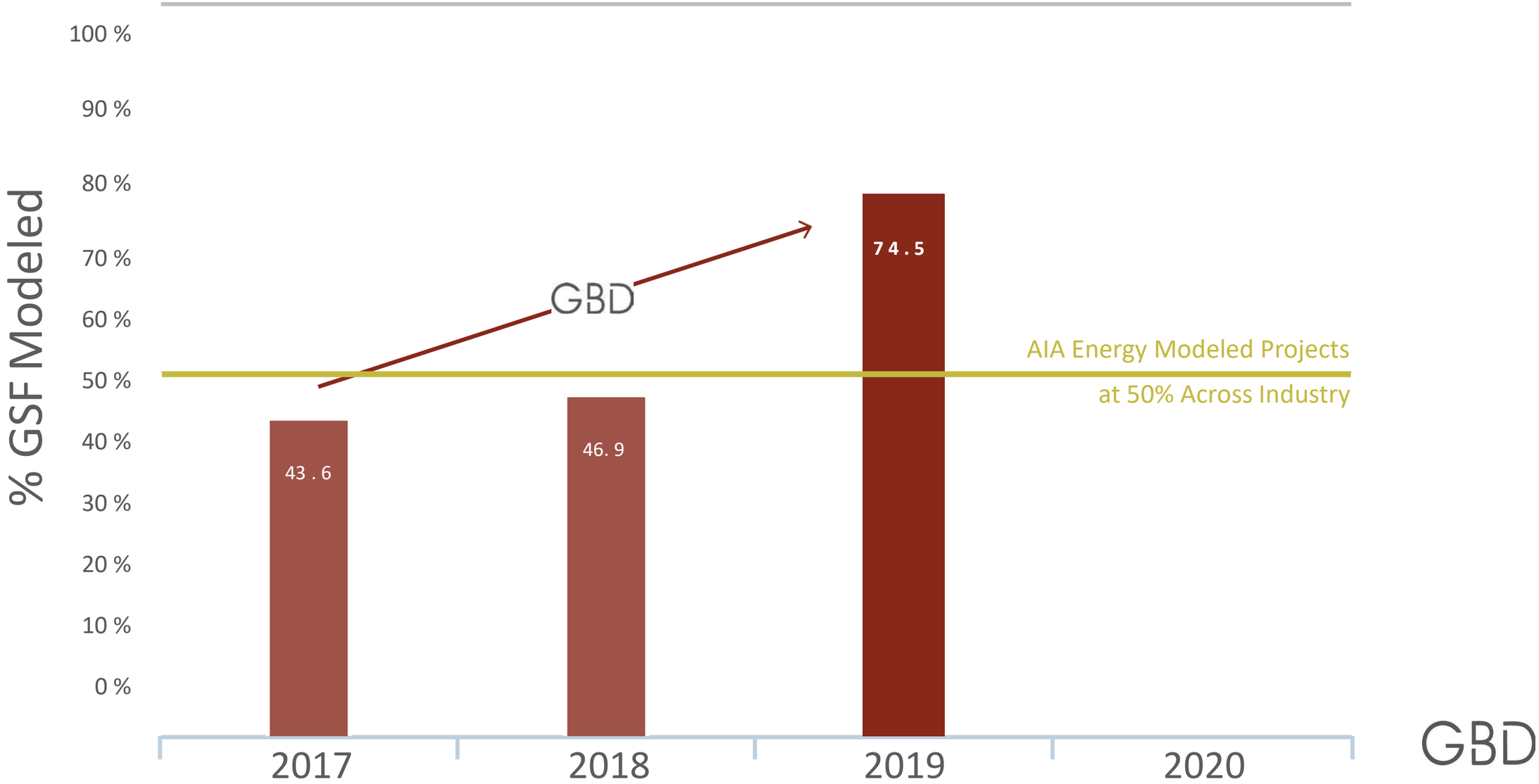
Predicted EUI Reduction x GBD 2019 Portfolio



GBD

WHAT DOES THE DATA TELL US? CLOSING THE GAPS

GBD Portfolio GSF% Modeled Over Years



UTILIZE YOUR TOOLBOX

What tools do we have to succeed?

- Design Data Exchange (DDX)
- Energy Trust of Oregon
- Sustainability Action Plan
- Energy Modeling
- Project Phase Report Card
- Sustainability Team
- LEED Archives
- Continuing Education + Certification opportunities for staff

Design Data Exchange (DDX)

- Cross Industry Comparison
- Open Source Resource

Energy Trust of Oregon

- Can provide funding for Energy Modeling
- Early Design Assistance

Sustainability Action Plan

- Goal setting tool that fosters best practice
- An educational tool to communicate with clients
- Industry wide commitment

Energy Modeling

- eQuest (Quick + Free)
- IES Virtual Environments (Most Popular)
- TRACE 700 (Load Design + Energy)
- Insight 360 (Autodesk, Revit Plug-in)
- Climate Consultant (site analysis/conditions)
- COMFEM (windows + daylighting analysis)
- 2030 Palette - 2030 challenge precedent examples

GBD

CULTIVATING PORTFOLIO TRANSPARENCY ACROSS FIRM + INTO DESIGN PROCESS

Tracking and reporting can not only bring transparency to a firm but also serve as a platform for friendly in-house competition.

Project teams can compete with one another to meet and exceed sustainability goals set by the office.

GOING BEYOND THE STATUS QUO

At the forefront of the National Resilient Cities' trend, GBD pushed the boundary of what is possible with the design of the Lloyd Eco-District of Hassalo on 8th. ***The project was the first to globally achieve (LEED V4 ND) Platinum certification for neighborhood development.***

59.5%
Increase in Project Energy Modeling From 2018.

67.7%
Of Active Projects In 2019 had been Energy Modeled.

3,448,720 GSF
Is the total floor area Energy Modeled for Active Projects In 2019.

47.4%
Average Predicted EUI Reduction for 2019
46% is the AIA pEUI avg.

Image of the rain water collection system at Hassalo on 8th. The project collects and treats 100% of wastewater on site for re-use. GBD

CELEBRATE MILESTONES

The DDX serves as both an in-house tool and an industry wide open-source resource that firms can use to gauge progress.

PRACTICE, BEST PRACTICE.

NEXT STEPS + CONTINUED MOMENTUM

- Regularly review goals set with Sustainability Action Plan

- In depth project case study followed by deep analysis

- Educate clients and encourage/support staff certifications

- Engage Office in Sustainability Challenges

- Set a sustainability framework for each new project on Day 1

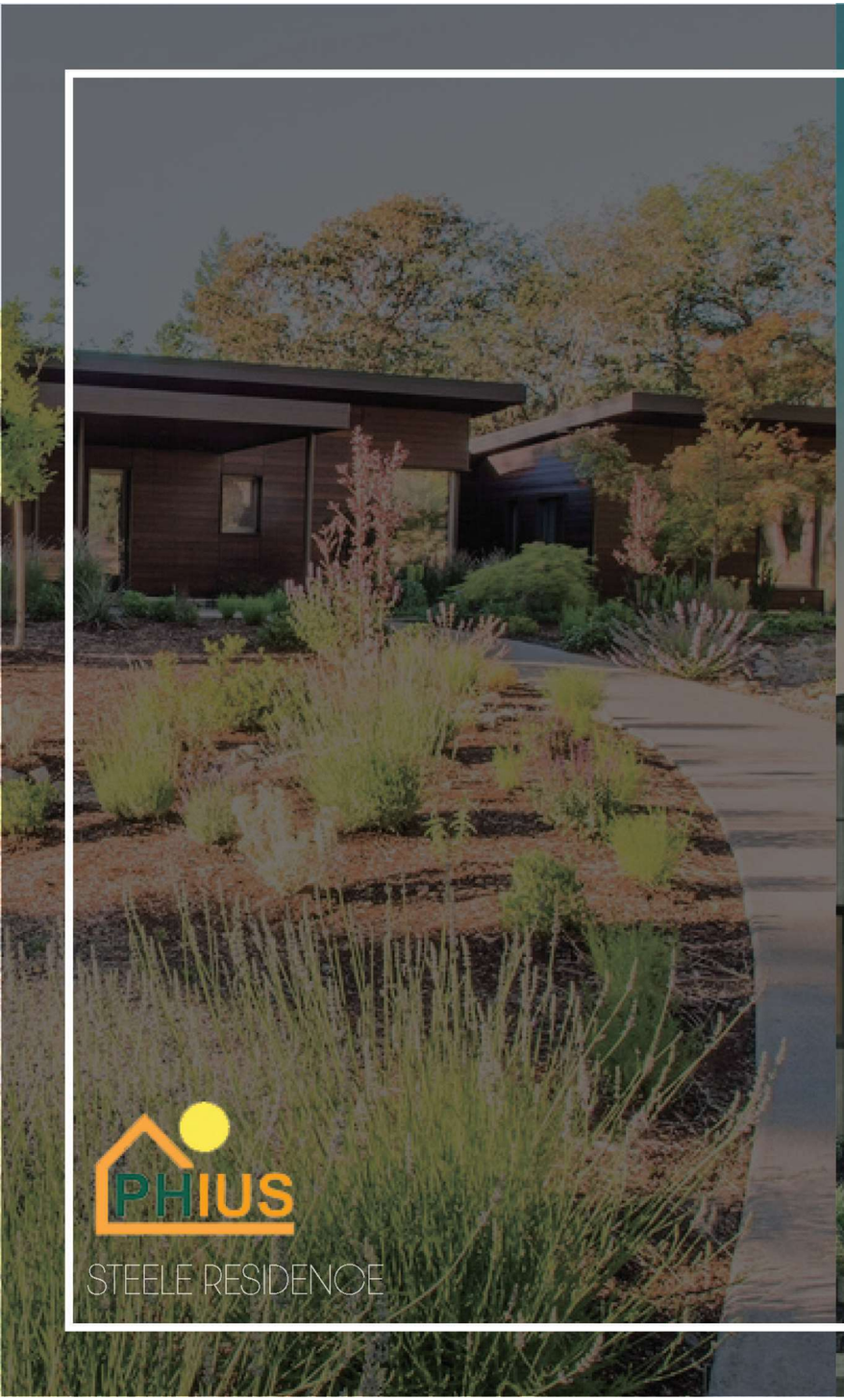
- Have office Sustainability Champion keep portfolio organized

- Conduct an office Sustainability P.O.E. or Waste Audit

THANK YOU. LET’S KEEP WORKING TOGETHER.

NET-ZERO EMERGING LEADER INTERNSHIP

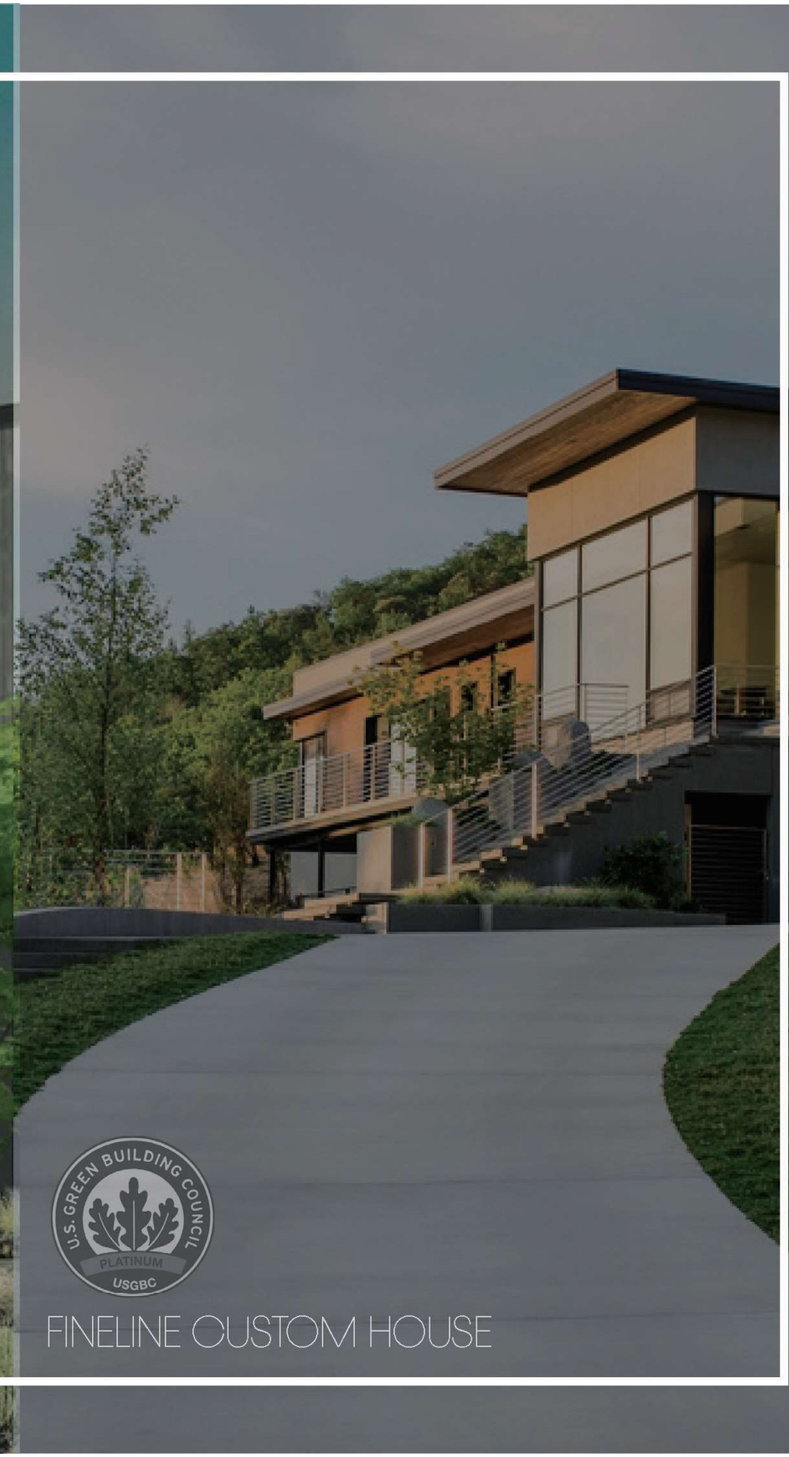
GREEN HAMMER | MICHELLE MONTIEL


PHIUS

STEELE RESIDENCE

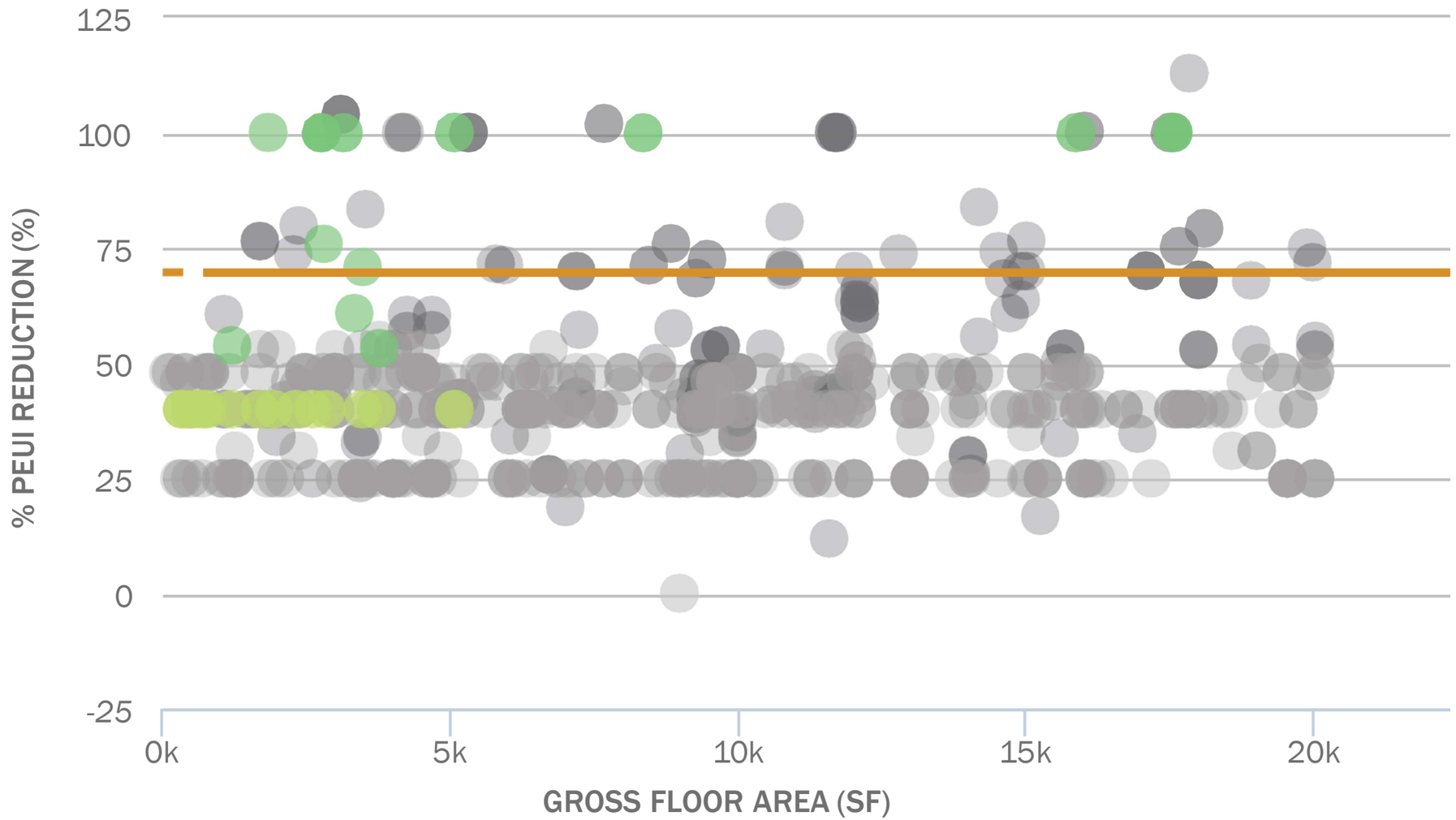

earth advantage

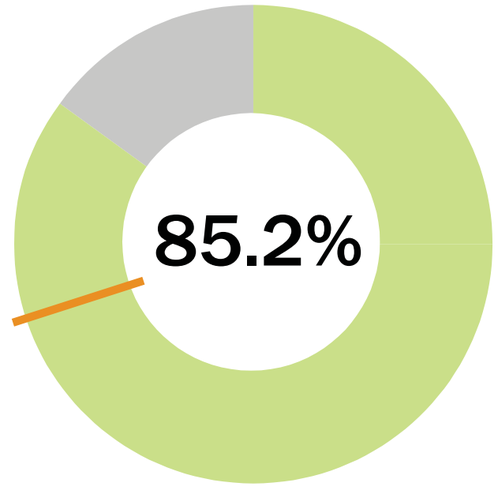
SUNSET RESIDENCE


U.S. GREEN BUILDING COUNCIL PLATINUM USGBC

FINELINE CUSTOM HOUSE

RESIDENTIAL PROJECTS, CLIMATE 4C





PREDICTED EUI REDUCTION
FROM AVERAGE EUI

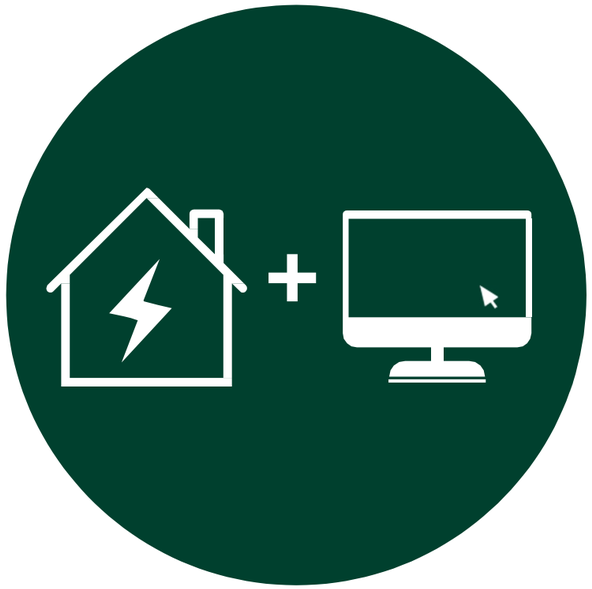
GSF VALUES

Total =	111,083
Meeting Target =	83,913
% Meeting Target =	75.5 %

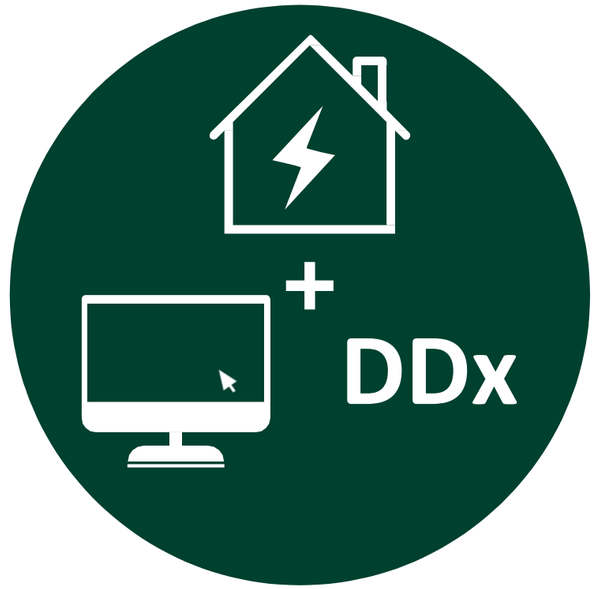
- **Green Hammer** Modeled
- **2030 Portfolio** Modeled
- **Green Hammer** Not Modeled
- **2030 Portfolio** Not Modeled

REPORTED PROJECTS DDx

ENERGY MODELING RESEARCH



ENERGY MODELING INTEGRATION IN WORKFLOW



DDx INTEGRATION IN WORKFLOW

Software	Company/Organization	Interface	Works for single family?	Consider for SD tool?	Consider for In-Depth tool?
PHPP	PHI	Sketchup through Plugin	Yes	No	Yes
WUFI Passive	PHIUS	Sketchup Model Import	Yes	Maybe	Yes
PlanIT Impact		Sketchup Model Import	Maybe	Yes	Maybe
Cove Tool		Revit/Sketchup/Rhino Plugin	Maybe	Yes	No
Open Studio	DOE	Sketchup Plugin	Yes	No	Yes
Sefaira	Trimble	Revit/Sketchup Plugin	Yes	Yes	Maybe
Insight	Autodesk	Revit tool	Yes	Yes	No
BuildSim Hub		Accepts EnergyPlus Models and BIM exported files gbXML	No	Maybe	Maybe
DesignBuilder		BIM, CAD	No	Maybe	Maybe
IES Virtual Environment		3D Model Import	Maybe	Yes	Yes

https://www.buildingenergysoftwaretools.com/software-listing?keywords=&field_catagory_tid%5B%5D=201&field_platform_tid=All&field_price_tid=All&field_last_updated_value%5Bvalue%5D%5Byear%5D=2010&field_language_tid=All&keys=&building-type=&sort_by=field_rating_rating&sort_order=DESC&items_per_page=40

ENERGY MODELING RESEARCH

Software	Company/Organization	Interface	Works for single family?	Consider for SD tool?	Consider for In-Depth tool?
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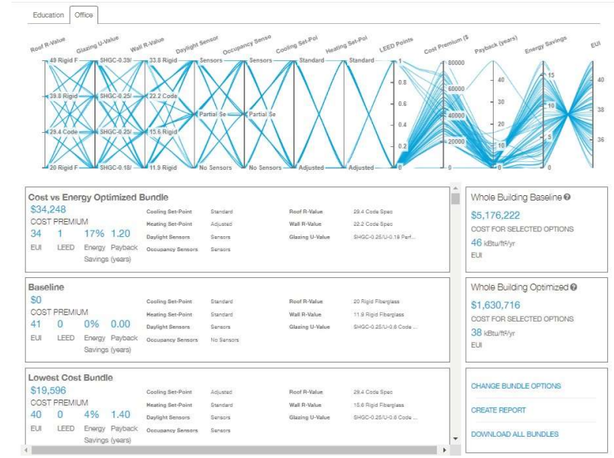
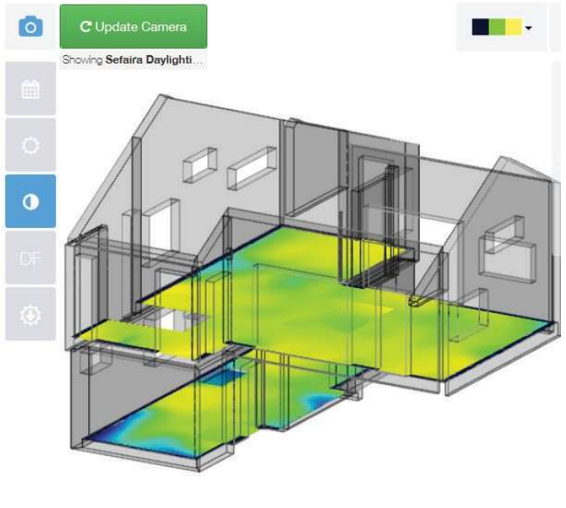
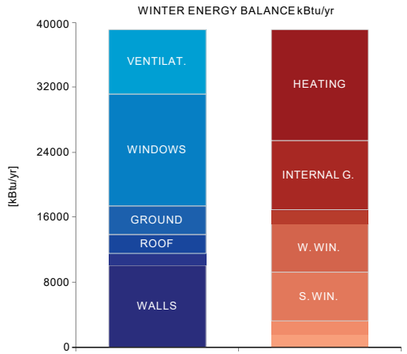
Sefaira	Trimble	Revit/Sketchup Plugin	Yes	Yes	Maybe
Insight	Autodesk	Revit tool	Yes	Yes	No
BuildSim Hub		Accepts EnergyPlus Models and BIM exported files gbXML	No	Maybe	Maybe
DesignBuilder		BIM, CAD	No	Maybe	Maybe
IES Virtual Environment		3D Model Import	Maybe	Yes	Yes

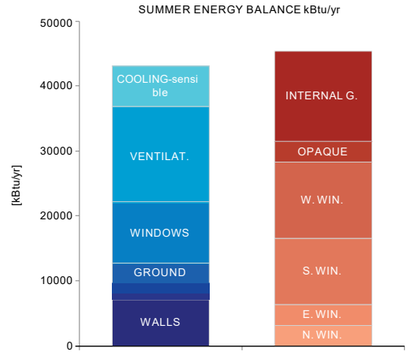
https://www.buildingenergysoftwaretools.com/software-listing?keywords=&field_catagory_tid%5B%5D=201&field_platform_tid=All&field_price_tid=All&field_last_updated_value%5Bvalue%5D%5Byear%5D=2010&field_language_tid=All&keys=&building-type=&sort_by=field_rating_rating&sort_order=DESC&items_per_page=40

ENERGY MODELING RESEARCH

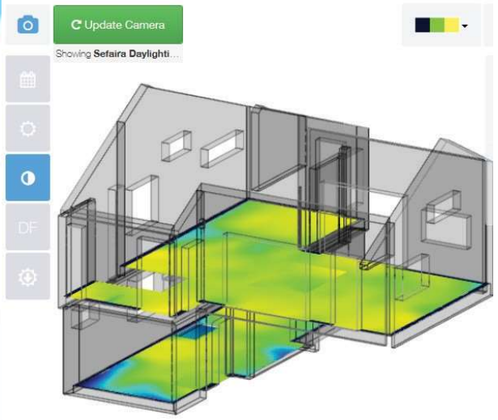








ENERGY MODELING RESEARCH



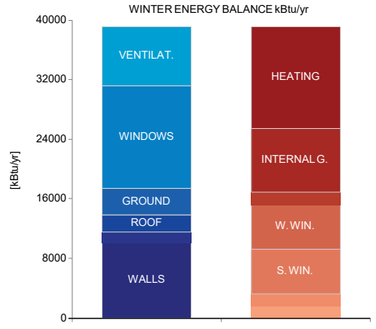
VS

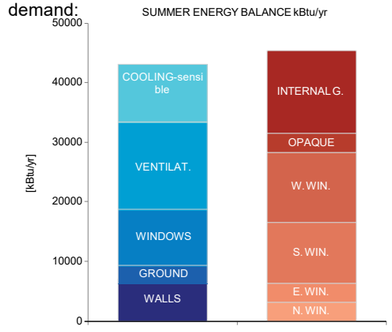
ANNUAL HEAT DEMAND

Transmission losses :	**34,309** kBtu/yr
Ventilation losses: Total heat losses:	**7,909** kBtu/yr
Solar heat gains:	**42,218** kBtu/yr
Internal heat gains: Total heat gains:	**22,757** kBtu/yr
Utilization factor: Useful heat gains:	**11,469** kBtu/yr
Annual heat demand:	**34,227** kBtu/yr
Specific annual heat demand:	**74.4** %
	25,471 kBtu/yr
	16,747 kBtu/yr
	10,306.7 Btu/ft²yr

ANNUAL COOLING DEMAND

Solar heat gains:	**31,497** kBtu/yr
Internal heat gains: Total heat gains:	**13,816** kBtu/yr
Transmission losses :	**45,313** kBtu/yr
Ventilation losses: Total heat losses:	**57,247** kBtu/yr
Utilization factor: Useful heat losses:	**34,620** kBtu/yr
Cooling demand - sensible:	**91,867** kBtu/yr
Cooling demand - latent: Annual cooling demand:	**42.5** %
Specific annual cooling demand:	**38,998** kBtu/yr
	6,315 kBtu/yr
	9 kBtu/yr
	6,324 kBtu/yr
	3.9 kBtu/ft²yr





SEFAIRA

WUFI PASSIVE

ENERGY MODELING RESEARCH

PROS:

Easy interface

Graphic display of

data Connectivity

with DDx

Plug-in to SketchUp and Revit

CONS:

Limitations in R-Value

Inconsistent numbers from one interface to another

Limitations in Mechanical Systems

High fluctuations due to HVAC selection

SEFAIRA

VS

PROS:

Reliable data

Plug-in to SketchUp

Potential use for SD

PHIUS connectivity

More range for Mechanical Systems

Assembly analysis

CONS:

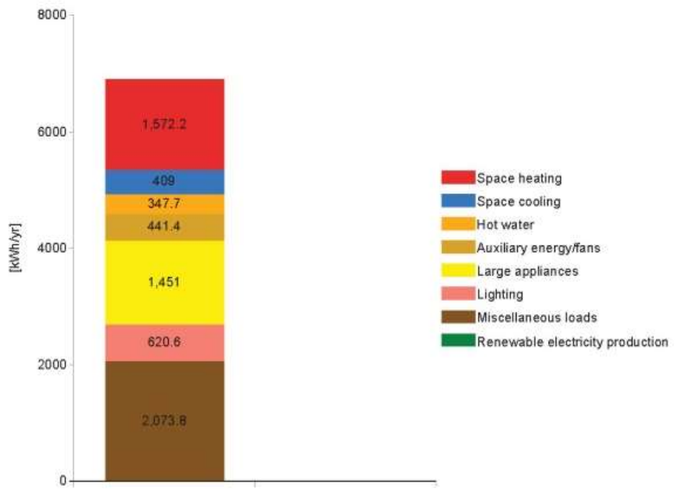
May require more data in early stages of design.

Interface harder to navigate

WUFI PASSIVE

ENERGY MODELING RESEARCH

TOTAL ENERGY USE BY TYPE



Type	Site Energy [kWh/yr]	Specific site energy [kWh/ft² yr]	Site Energy [kBtu/yr]	Specific Site Energy [kBtu/ft² yr]
Space heating	1,572.2	1	5,364	3.3
Space cooling	409	0.3	1,395.5	0.9
Hot water	347.7	0.2	1,186.3	0.7
Auxiliary energy/fans	441.4	0.3	1,506	0.9
Large appliances	1,451	0.9	4,950.6	3
Lighting	620.6	0.4	2,117.4	1.3
Miscellaneous loads	2,073.8	1.3	7,075.4	4.4
Renewable electricity production	0	0	0	0
Total	**6,915.8**	**4.3**	**23,595.3**	**14.5**

HEATING/COOLING DEMAND

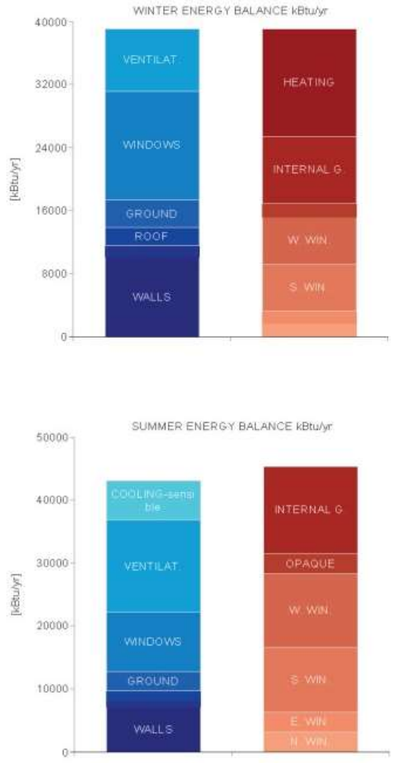
DEMAND PER MONTH

ANNUAL HEAT DEMAND

Transmission losses :	34,309	kBtu/yr
Ventilation losses:	7,909	kBtu/yr
Total heat losses:	42,218	kBtu/yr
Solar heat gains:	22,757	kBtu/yr
Internal heat gains:	11,469	kBtu/yr
Total heat gains:	34,227	kBtu/yr
Utilization factor:	74.4	%
Useful heat gains:	25,471	kBtu/yr
Annual heat demand:	16,747	kBtu/yr
Specific annual heat demand:	10,306.7	Btu/ft²yr

ANNUAL COOLING DEMAND

Solar heat gains:	31,497	kBtu/yr
Internal heat gains:	13,816	kBtu/yr
Total heat gains:	45,313	kBtu/yr
Transmission losses :	57,247	kBtu/yr
Ventilation losses:	34,620	kBtu/yr
Total heat losses:	91,867	kBtu/yr
Utilization factor:	42.5	%
Useful heat losses:	38,998	kBtu/yr
Cooling demand - sensible:	6,315	kBtu/yr
Cooling demand - latent:	9	kBtu/yr
Annual cooling demand:	6,324	kBtu/yr
Specific annual cooling demand:	3.9	kBtu/ft²yr



HEATING/COOLING LOADS

ENERGY MODELING RESEARCH

UNIFIED DESIGN BUILD PROCESS

We believe a cohesive team produces the best results. Our team of individual experts works dynamically in a unified effort to engage our clients in creating healthy and inspiring buildings.

PHASE 1
ENGAGE

Our Integration Champions usher Clients from initial inquiry to signing of an agreement. **During Client Engagment, Integration Champions work closely with Clients to understand their values, the desired scope of work, and the related budget.** We ensure each project is a good match for Green Hammer and vise-versa.

PHASE 2
DESIGN

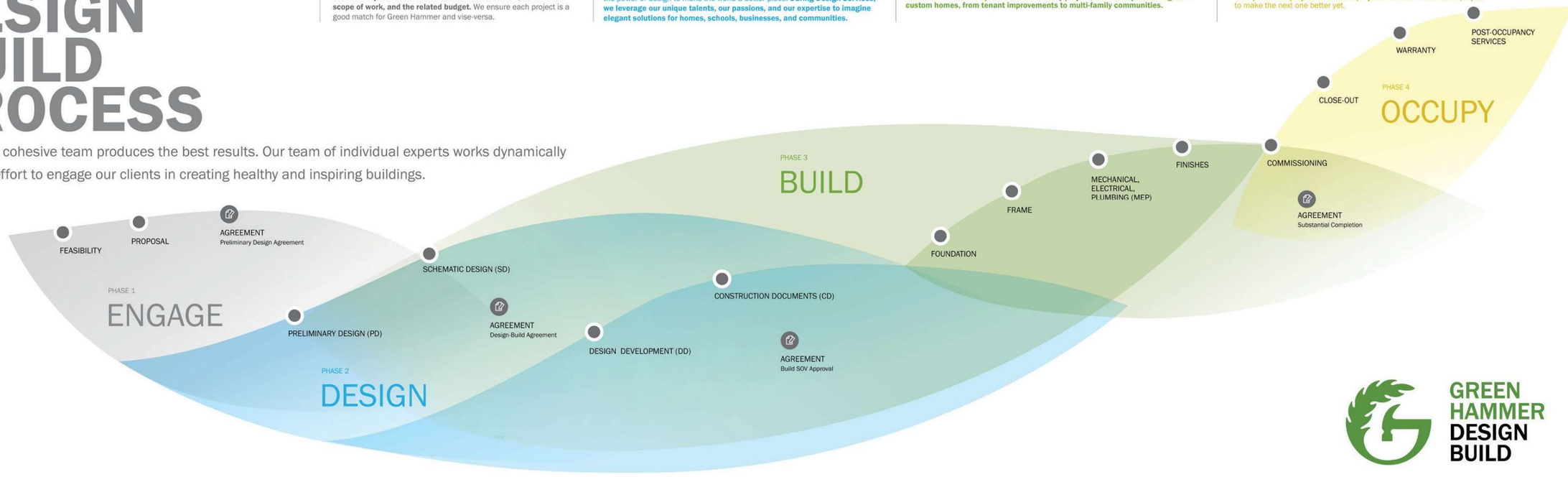
We are architects, designers, fine artists, doodlers, craftspeople, and all around lovers of design. We aim to inspire and rise to a creative challenge. We believe in the power of design to make the world a better place. **During Design Services, we leverage our unique talents, our passions, and our expertise to imagine elegant solutions for homes, schools, businesses, and communities.**

PHASE 3
BUILD

We are master carpenters, cabinet makers, tinkers, craftspeople, weekend DIY warriors, and all-around lovers of building. We solve problems with creative solutions and believe in the power of building to make the world a better place. **Collectively our Build Team has the expertise to take on any project, from backyard cottages to custom homes, from tenant improvements to multi-family communities.**

PHASE 4
OCCUPY

Turning a project over to a client is reason for celebration, reflection, and recalibration. **Once the Client occupies the space, we learn how it's actually performing, which provides critical feedback we can use to improve this project and future projects.** We learn from each project to make the next one better yet.



GREEN HAMMER DESIGN BUILD

ENERGY MODELING WORKFLOW INTEGRATION

ENERGY MODEL MILESTONES

SALES

- Intake
- **FEASIBILITY**
  Initial assumptions are made by Integration Champion in SOV development:
  Floor area
  Assemblies
  Glazing area
  Roof area and Solar array size
- Design Commitment

PRELIMINARY DESIGN

- Internal Kick-off
- PD01 Owner's Criteria Charrette
- Site Visit + As-built Measurments
- Code Review
- **SUSTAINABILITY CHARRETTE**
  Project Targets for:
  Air Tightness
  Energy Use Intensity
  Energy Production
- Boundary Conditions
- Report

SCHEMATIC DESIGN

- SD01 Site Development
- SD02 Building Charrette
- Net Zero Energy Charrette
- SD03 Design Refinements
- **SD ALIGNMENT MEETING**
- SD04 Final Presentation

DESIGN DEVELOPMENT

- DD01 Exterior Development
- DD02 Interior Development
- DD03 MEP
- **DD ALIGNMENT MEETING**
- DD04 Final Presentation

CONSTRUCTION DOCUMENTS

- Buy-Out Preparation
- Bidding Alignment Meeting
- **ENVELOPE BIDSET REVIEW MEETING**
- CD01 Finishes & Fixture
- Complete Permit Set
- CD Alignment Meeting
- CD02 Final Presentation
- Buy-Out Alignment Meeting

BUILD PHASE

- Mobilization
- Site + Foundation
- Framing
- MEP Rough-In
- Envelope
- Finishes
- Commisioning

OCCUPPANCY

- Close-Out
- Warranty
- Post-Occupancy Services

TARGETS

Set energy modeling approach, and set specific energy targets for the project for: ● Air Tightness ● Energy Use Intensity ● Energy Production	Start and update energy model at these key stages: ● Initial massing + space planning ● Site placement / orientation ● Window/glazing development	Update energy model to check progress and help make decisions related to: ● Insulation type and amount in each assembly ● Window type, placement, and performance ● Mechanical system selection and design ● Lighting, Appliances, Equipment	Consider using energy modeling to help make decisions for: ● Insulation, Windows, Mechanical Systems, ● Lighting, Appliances, Equipment ● Identify any significant thermal bridges or air tightness challenges ● During bid package review process, check each package for energy impacts		After 1 year of full occupancy: ● Compare total energy use and production for the project to predicted annual ● Check for general performance, knowing that models are a broad approach for a "typical" year with "typical" use. ● If collected, look at key end use categories vs predicted (ie. Water heater) ● Identify if any "tune ups" might be needed ● Identify lessons learned for future projects and energy models
DDx Project Architect adds the project to the AIA DDx.	DDx Project Architect updates the AIA DDx for project.	DDx Project Architect updates the AIA DDx for project.	DDx Project Architect updates the AIA DDx for project.	DDx Update the AIA DDx entry if any significant changes to mechanical system or envelope were made since last entry.	

ENERGY MODELING WORKFLOW INTEGRATION


THANK YOU

Energy Trust of Oregon

Net Zero Emerging Leaders 2020 Report

By Alex Smith

Otak Signed the AIA 2030 Commitment in 2011

Formed Green Otak (GO) Committee

GO Operations

- Office Energy Use
- Waste Reduction and Supplies
- Transportation

Amy Scheckla-Cox

ARCHITECTURE

Zaq Dohallow

ARCHITECTURE

GO Training

- Promoting Staff Accreditation
  - LEED
  - WELL
  - ECO Districts
  - Envision

GO Practice

- Improving Design Process To Make "Greener" Work
  - AIA 2030 Design Data Exchange

- Net Zero Emerging Leader (NZEL)

Net Zero Emerging Leaders 2020 Report Agenda

- Energy Modeling Software
- Preparing Architectural Model
- Method for Energy Modeling
- MEP Integration/Advanced Analysis
- The Road Forward…

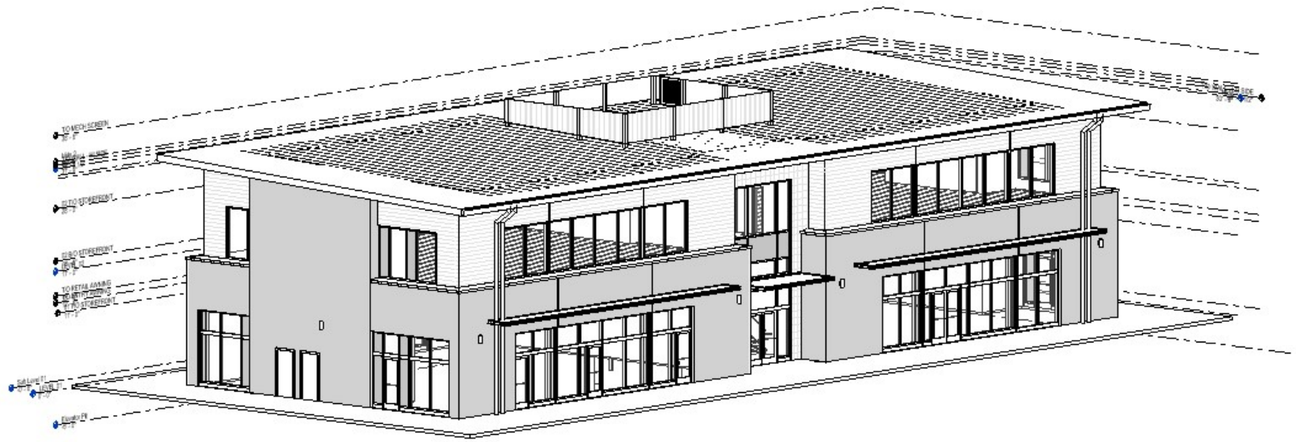
Why Revit?

- BIM Management
- EnergyPlus/Insight Energy Modeling
- Widely Used
- Future Standards Integration Potential
- MEP Integration

Otak

Preparing Architectural Model for Energy Modeling

- Join wall assemblies to roof and floor
- Add slab edge assemblies
- Correct building location and orientation
- Make sure proper BIM model information is loaded



Method For Energy Modeling
R-Value Creation

Assembly

ily:	Basic Wall
e:	XT.01-2X8 WD-NR
l thickness:	0' 10 5/16"
istance (R):	0.0000 (h·ft²·°F)/BTU
rmal Mass:	0.0000 BTU/°F

yers

	Function	Material	EXTERIOR SIDE
	Finish 2 [5]	Siding - Board & Batten 12"	0' 1 1/16
	Finish 1 [4]	Wood - Furring	0' 0 3/4"
	Membrane Layer	WRB (Weather Resistive Barrier)	0' 0"
	Substrate [2]	Wood - Sheathing - Plywood	0' 0 5/8"
	Core Boundary	**Layers Above Wrap**	**0' 0"**
	Structure [1]	Wood - Stud Layer with Batt Insulation	
	Core Boundary	**Layers Below Wrap**	**0' 0"**
	Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"

INTERIOR SIDE

Input thermal values for walls, windows, doors, roofs, etc.

	Glass - Standard	Thermal	Solid	Solid: Glass
	Glass Block	Thermal	Solid	Solid: Glass
	Glass Fiber - Foil-Faced	Thermal	Solid	Solid: Insulation-Fibers
	Glass Fiber Batt	Thermal	Solid	Solid: Insulation-Fibers
	Glass Fiber Board - Organic Bonded	Thermal	Solid	Solid: Insulation-Fibers
	Glass Foam	Thermal	Solid	Solid: Insulation-Fibers
	Granite	Thermal	Solid	Solid: Stone
	Gravel	Thermal	Solid	Solid: Earth

Identity | Graphics | Appearance | Thermal

Glass Fiber Batt

Information

Properties

Transmits Light	☐
Behavior	Isotropic
Thermal Conductivity	0.0480 btu/(hr·ft·°F)
Specific Heat	0.2197 btu/(lb·°F)
Density	2.00 pound per cubic foot
Emissivity	0.90
Permeability	17.4784 grain/(ft²·hr·inHg)
Porosity	0.01
Reflectivity	0.00
Electrical Resistivity	1.0000E+10 Ω·m

- Thermal Values can be generated using Revit's custom options or by using a BIM manager to create assemblies.
- Check all assemblies in structure. Do not assume Revit default values are correct.
- Always compare with as many data sources as possible.

Before and After Thermal Input – R Value Generated

Assembly

ily: Basic Wall
e: XT.01-2X8 WD-NR
l thickness: 0' 10 5/16"
istance (R): 0.0000 (h·ft²·°F)/BTU
rmal Mass: 0.0000 BTU/°F

NO R-Value

yers

EXTERIOR SIDE

	Function	Material	
	Finish 2 [5]	Siding - Board & Batten 12"	0' 1 1/16
	Finish 1 [4]	Wood - Furring	0' 0 3/4"
	Membrane Layer	WRB (Weather Resistive Barrier)	0' 0"
	Substrate [2]	Wood - Sheathing - Plywood	0' 0 5/8"
	Core Boundary	**Layers Above Wrap**	**0' 0"**
	Structure [1]	Wood - Stud Layer with Batt Insulation	0' 7 1/4"
	Core Boundary	**Layers Below Wrap**	**0' 0"**
	Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"

INTERIOR SIDE

Edit Assembly

Family: Basic Wall
Type: XT.01-2X8 WD-NR
Total thickness: 0' 10 5/16"
Resistance (R): 14.7358 (h·ft²·°F)/BTU
Thermal Mass: 0.2652 BTU/°F

Accurate R-Value

Sampl

Layers

EXTERIOR SIDE

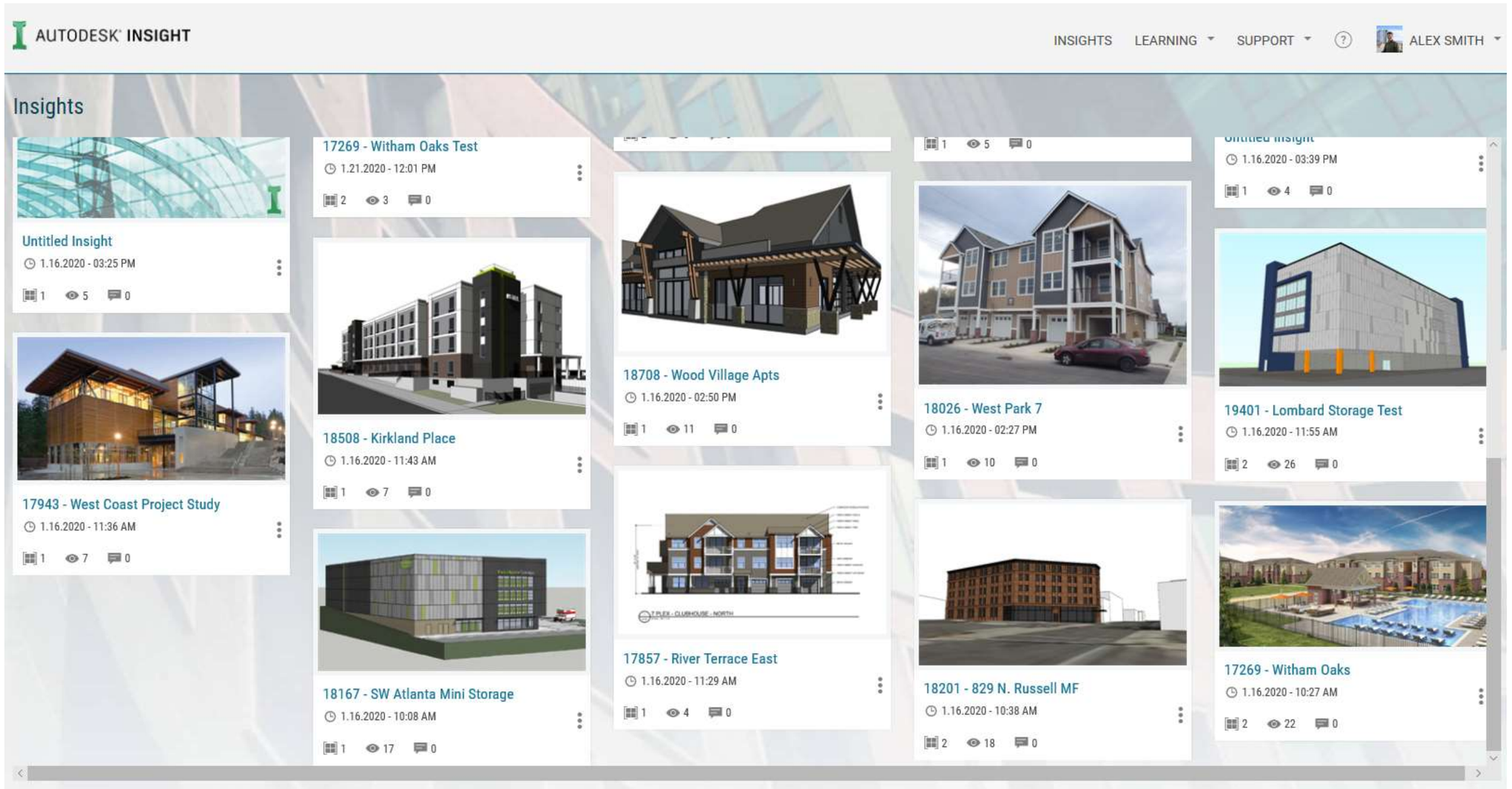
	Function	Material	Thickness	Wraps
1	Finish 2 [5]	Siding - Board & Batten	0' 1 1/16"	☑
2	Finish 1 [4]	Wood - Furring	0' 0 3/4"	☑
3	Membrane Layer	WRB (Weather Resistive	0' 0"	☑
4	Substrate [2]	Wood - Sheathing - Plyw	0' 0 5/8"	☑
5	**Core Boundary**	**Layers Above Wrap**	**0' 0"**	
6	Structure [1]	Wood - Stud Layer with	0' 7 1/4"	☐
7	**Core Boundary**	**Layers Below Wrap**	**0' 0"**	
8	Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"	☑

INTERIOR SIDE

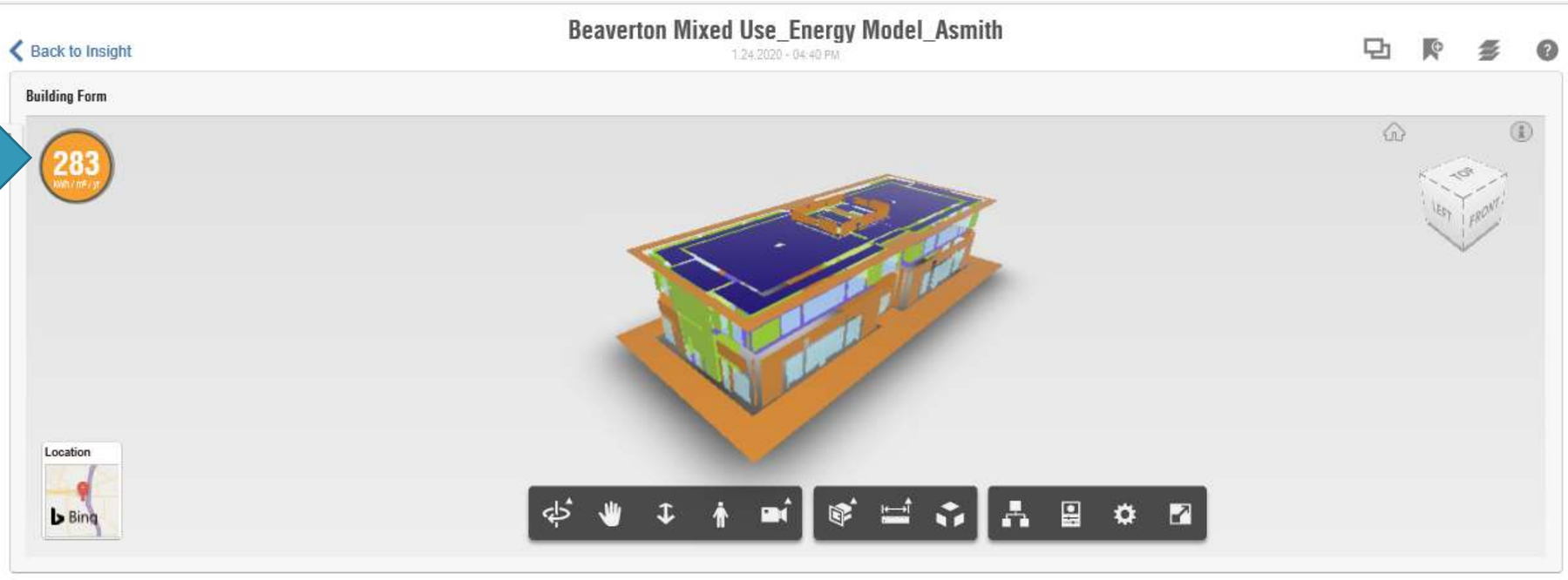
Insert Delete Up Down

Create R-Values for all thermal elements and generate energy model.

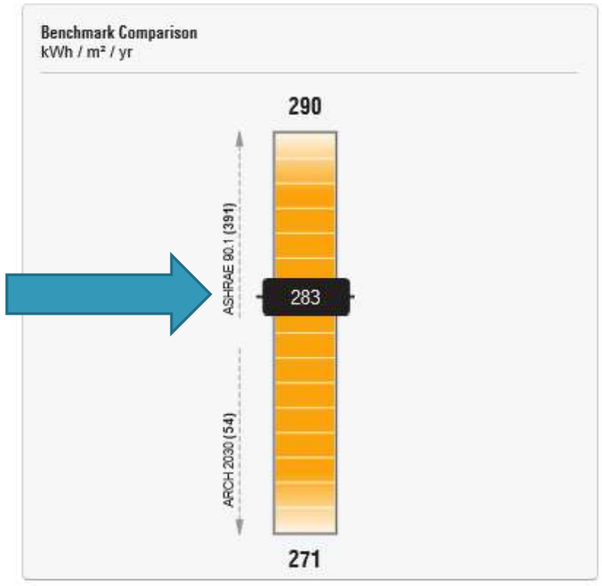
Loading Energy Model To Insight Database

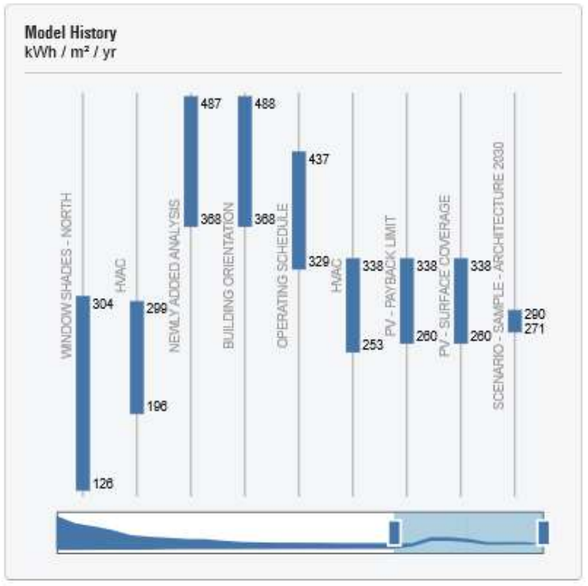


Predicted EUI

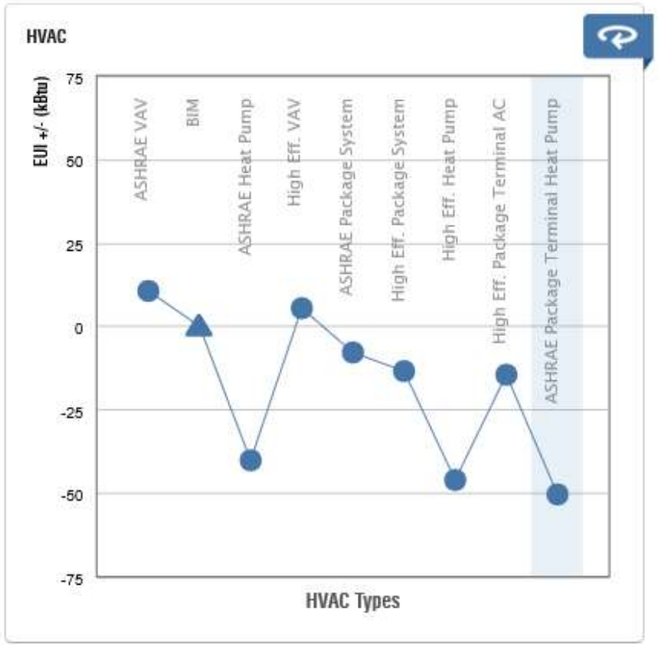


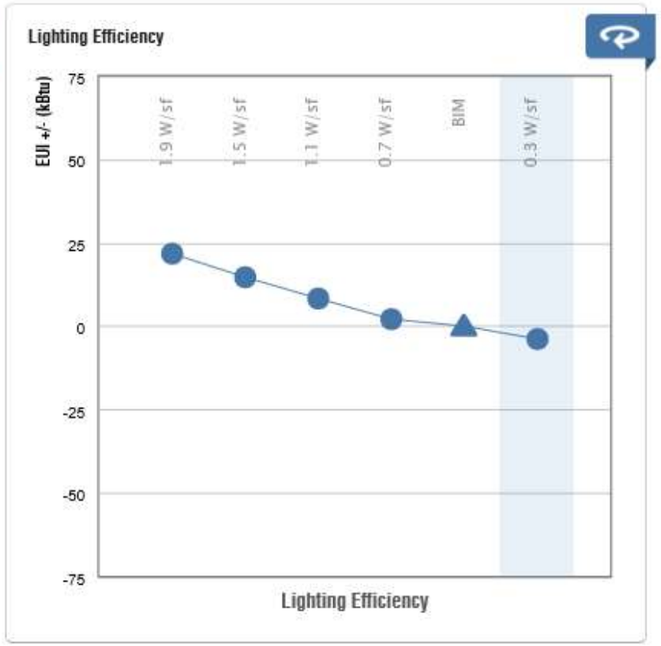
Benchmark Comparison

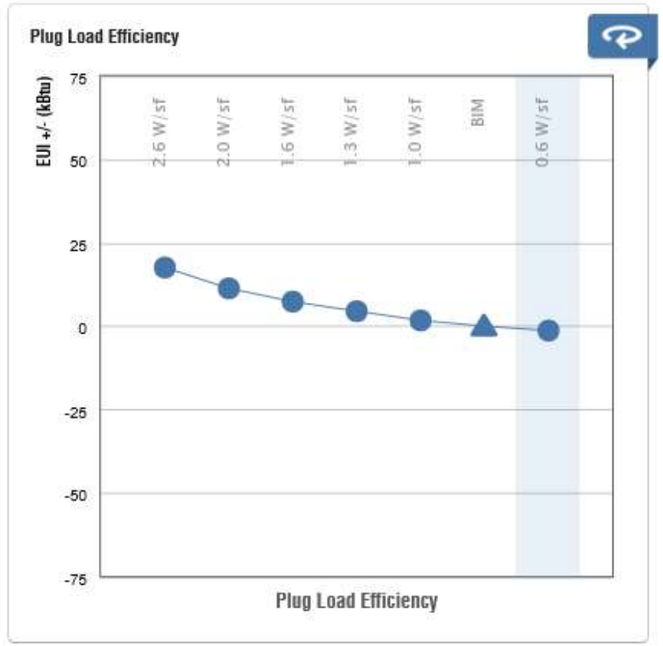


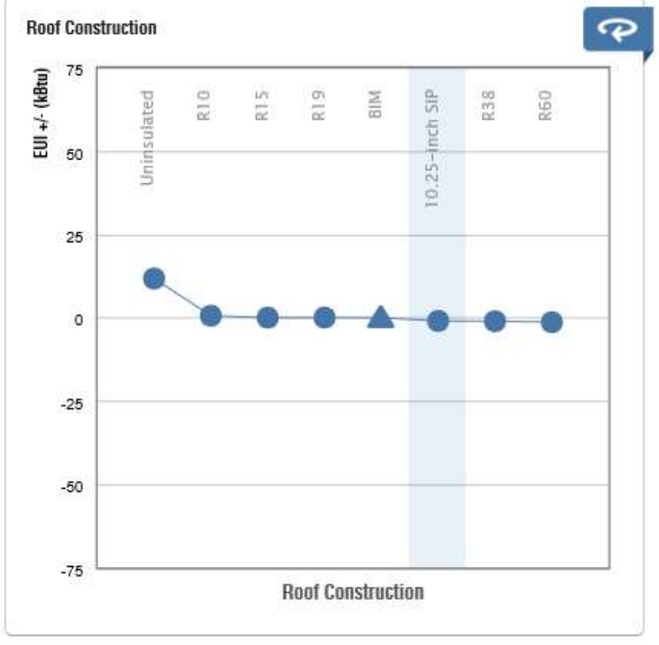


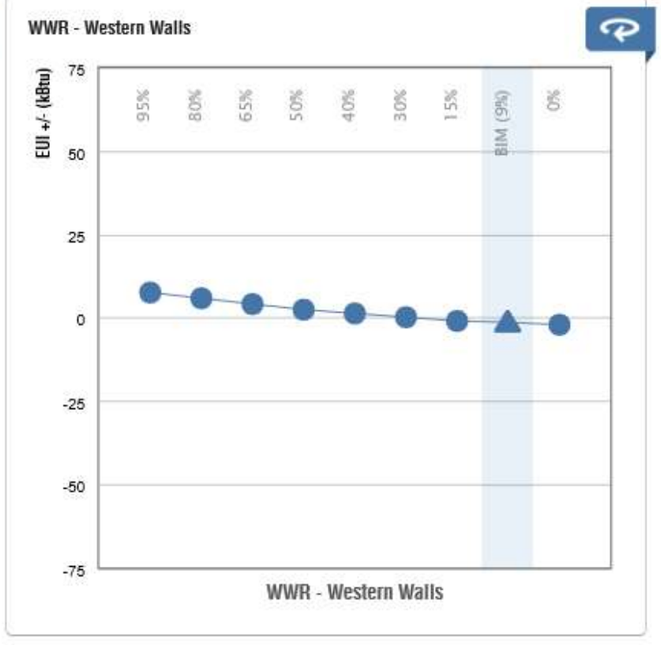
Insight provides a visual aid analysis tool that allows for easy data analysis and variable manipulation.











Just a few of the variables you can change with Insight

- HVAC
- Lighting Efficiency
- Plug Load Efficiency
- Roof, Wall, Window Insulation
- Orientation

Create Custom Scenarios

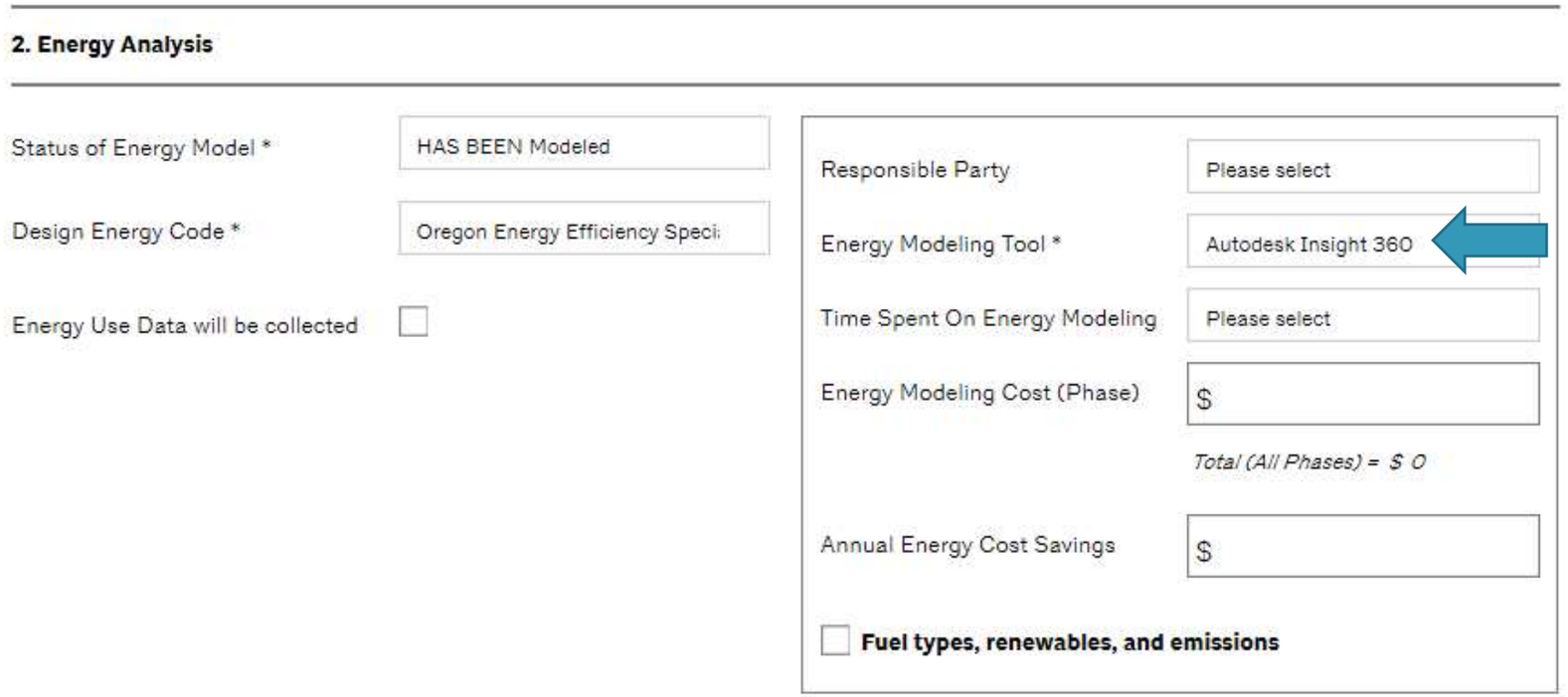
- AIA 2030
- Net Zero
- Local Requirements

Insight will automatically change insulation values, orientations, HVAC, etc. in order to provide a closest possible match to custom scenarios.

Otak

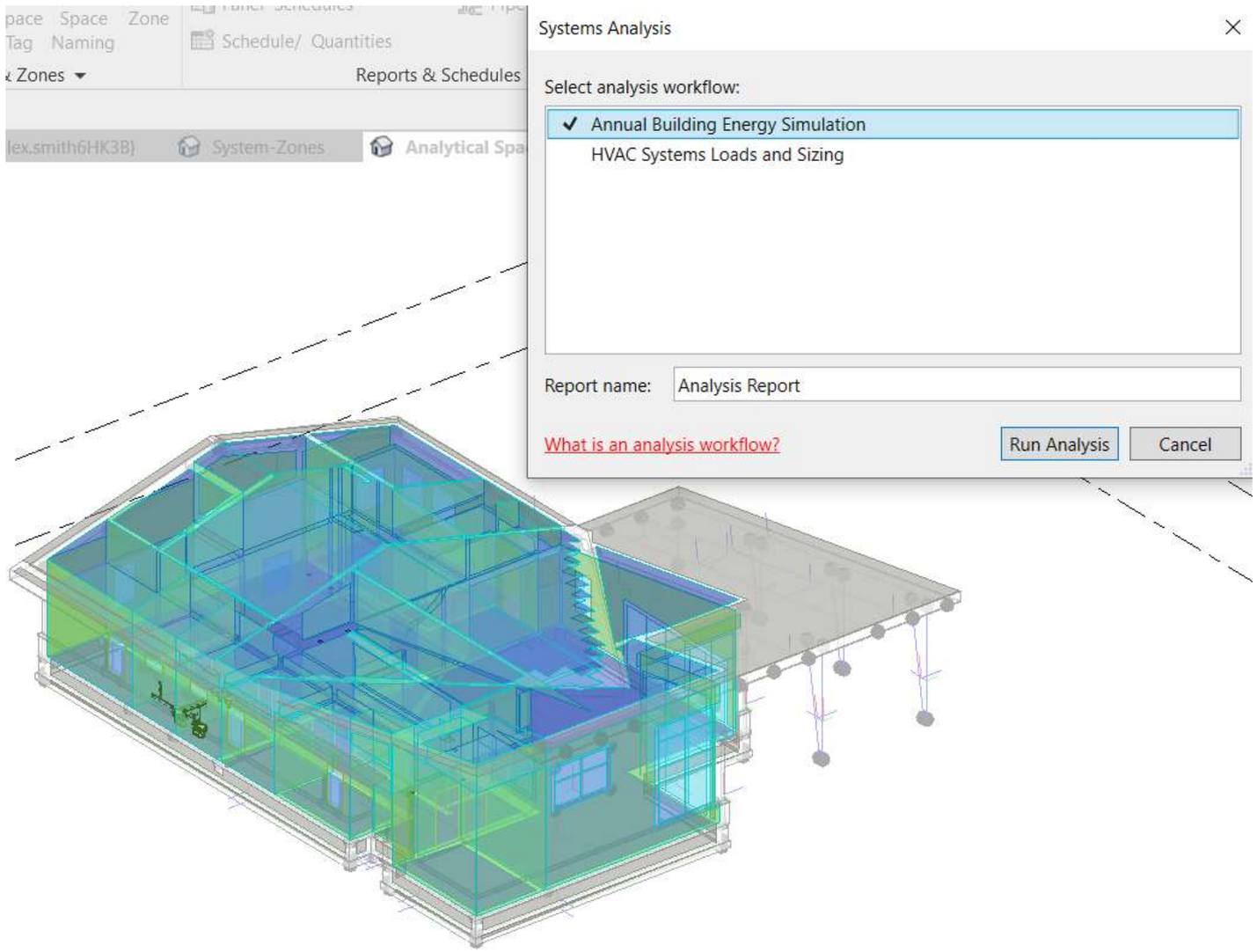
AIA 2030 Design Data Exchange

- DDX allows for Energy Modeling Tool data entry
- Define source and enter predicted EUI from energy modeling software
- Very small percentage of data so far has been generated using Energy Models



MEP Integration/Advanced Analysis

- Increase communication with MEP teams
- Allows for early design changes
- Faster COMcheck
- State/Federally accepted energy modeling reports

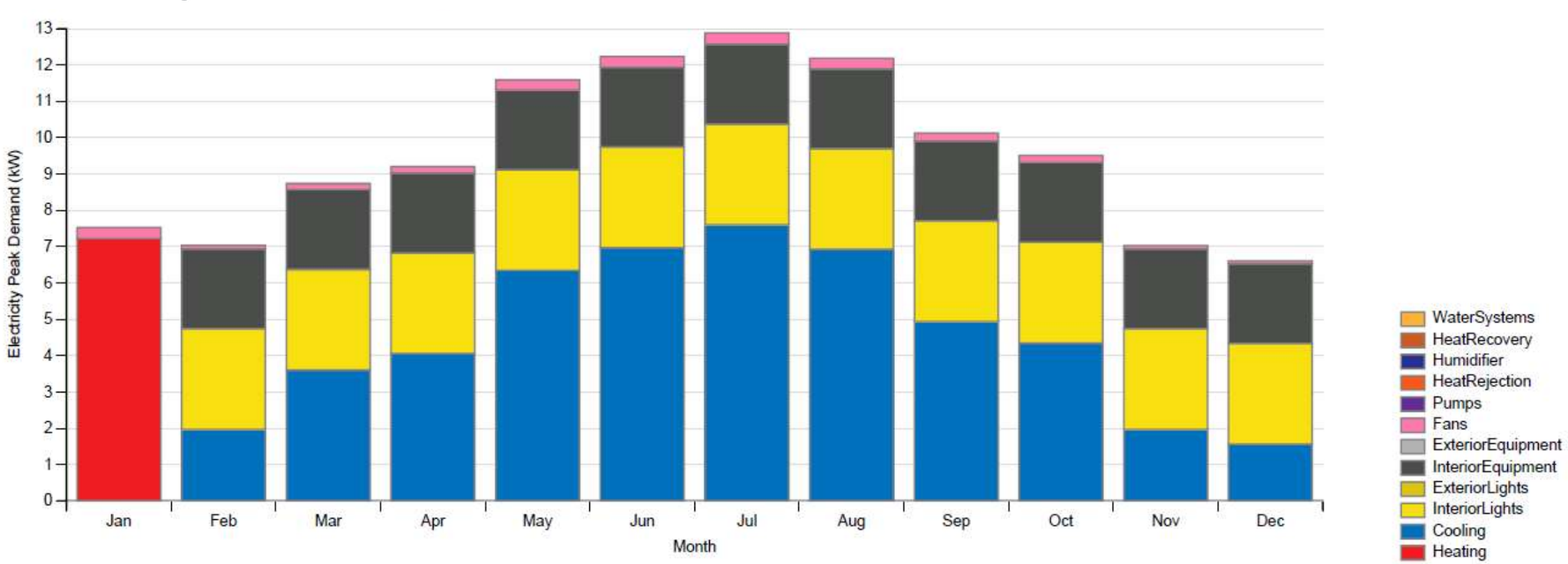


Detailed Report Example Data

Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [ft2]	3376.42	923.48	853.66	986.48	612.79
Above Ground Wall Area [ft2]	3376.42	923.48	853.66	986.48	612.79
Window Opening Area [ft2]	727.92	334.52	286.58	52.93	53.91
Gross Window-Wall Ratio [%]	21.56	36.22	33.57	5.37	8.80
Above Ground Window-Wall Ratio [%]	21.56	36.22	33.57	5.37	8.80

Electricity Peak Demand (kW)



The Road Forward

- Increased collaboration on federal, state and local levels
- Standardization of energy modeling practice
- Increased regulation and implementation of energy code
- Demand from tenants will play a huge role

01

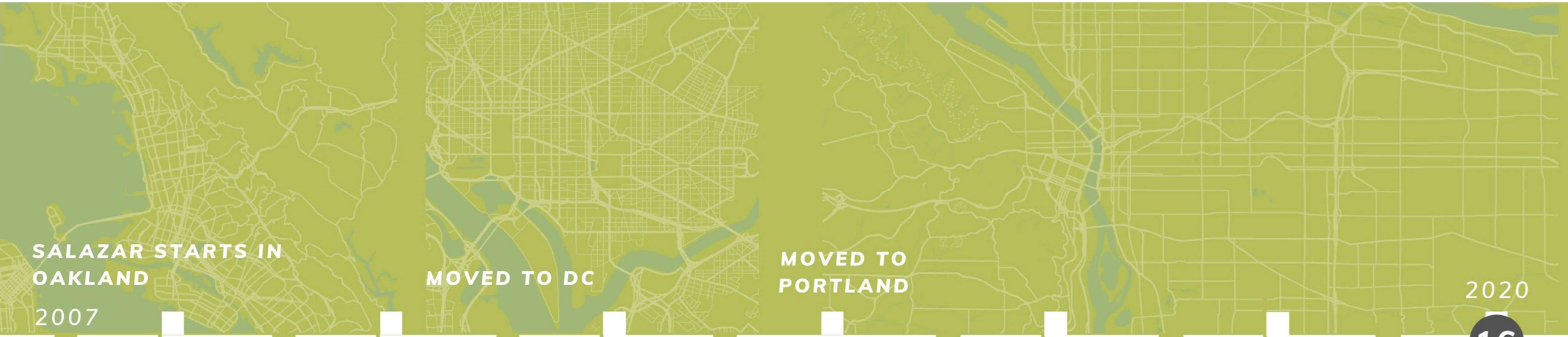
April 23, 2020

Salazar Architect Inc.

Discovering a Prototypical Sustainable Design Process

Energy Trust of Oregon Net-Zero Emerging Leader: Emily Waldinger

Salazar Architect Inc. *creates high-impact* ***public interest architecture*** *through thoughtful client, resident and* ***community involvement****, innovative design and creative interiors.* ***Environmental stewardship****,* ***economic stability*** *and* ***social empowerment*** *are integrated concepts and by being responsive to these needs we design unique, meaningful places that are* ***rich in architectural character and affordable to build.***


SALAZAR STARTS IN OAKLAND
2007
MOVED TO DC
MOVED TO PORTLAND
2020
Wood Street
Fox Courts
Oak to 9th
Fruitvale Gateway
Kenneth Henry Courts
Yosemite Village
Zygmunt Arendt
CHP Headquarters
Keller Plaza
Highland 24
Westlake Terrace
Liberty Garden Apartments
Vibrant!
Kateri Park
Right 2 Root
Cascadian Terrace
Dos Rios Station
Heirloom
Mutual on the Blvd
Williams Plaza
PSU RBD
Fourth Plain
Mutual on 46th
Small Homes NW
Dahlke Manor
Fountain Place
AIA 2030 COMMITMENT
ETO NZEL
1
3
2
4
11
16
FIRM SIZE

04

Firm Structure

Salazar Architect's staff are organized in three Design Labs, spending 10% of their time on activities that advance our firm's community-based mission.

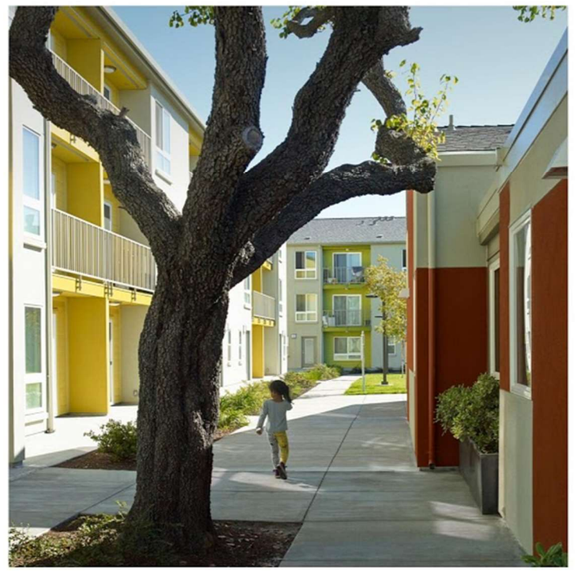
- Design reviews of ongoing work
- Conferences / Trainings
- Invited Speakers
- Pro-Bono work (One+)

We coordinate the Design Labs and project staffing so that knowledge is holistically integrated into the design work that we do.

- Alex Salazar - Community Design Lab
- Jennifer Nye - Well-being Design Lab
- Matt Bokar - Sustainable Design Lab

COMMUNITY DESIGN LAB

public interest • process not product • participatory • engaging • empowering • civil rights • equity

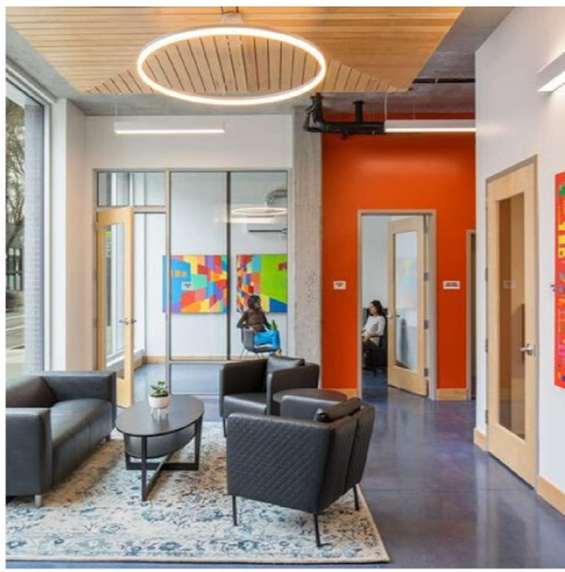


WELL-BEING DESIGN LAB

community health • trauma informed • wellness • natural systems • biophilic

SUSTAINABLE DESIGN LAB

energy modeling • minimized carbon footprint • environmentally sound materials • HVAC systems analysis • LEED • Earth Advantage

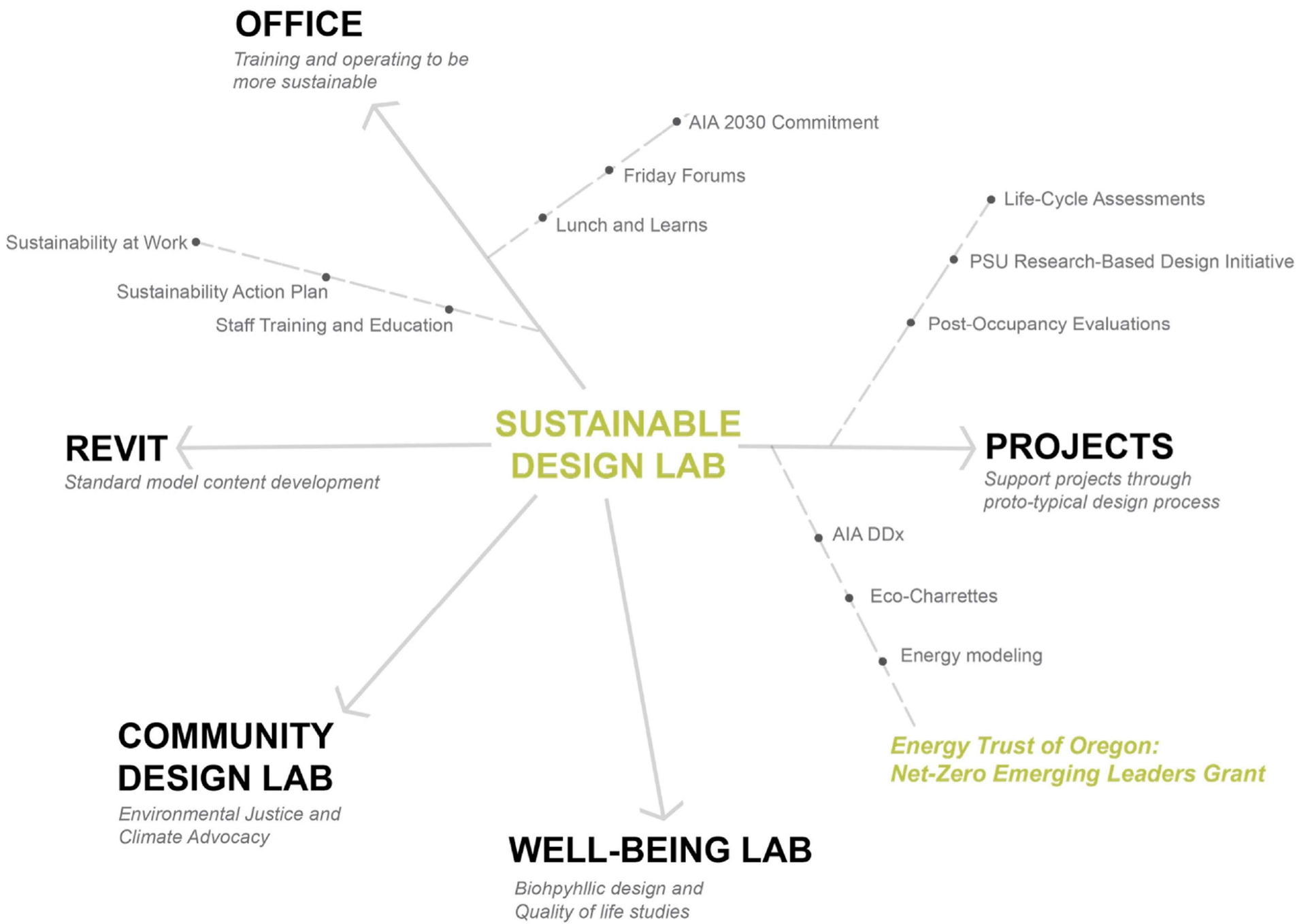


05

Salazar Organizational Diagram

06

Sustainable Design Lab Organizational Diagram



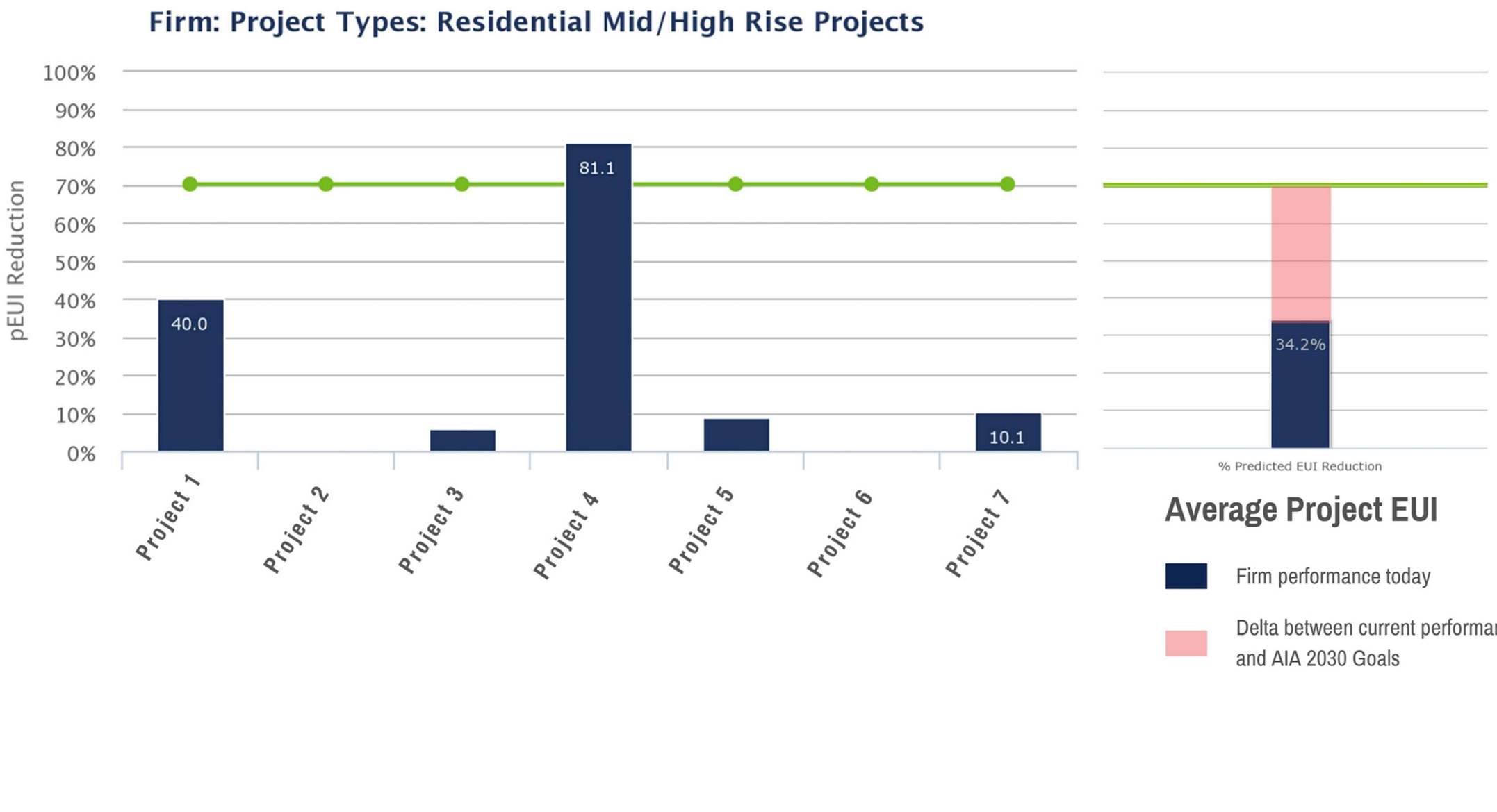
07

Energy Trust: Net-Zero Emerging Leaders Internship Scope

GETTING STARTED / FORMALIZING APPROACH

- AIA DDX
- ENERGY MODELING
- PROTO-TYPICAL DESIGN PROCESS

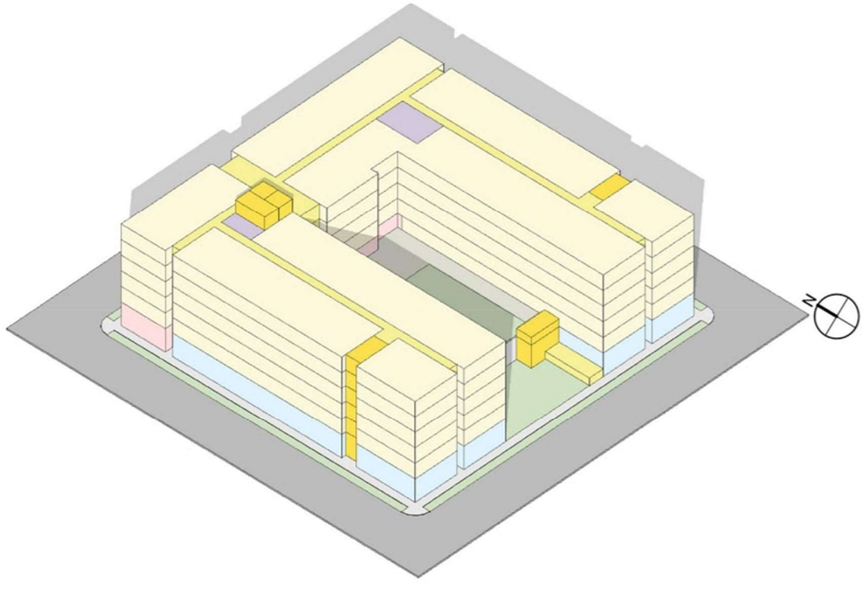
AIA 2030 CHALLENGE: GETTING STARTED / WHERE ARE WE NOW?

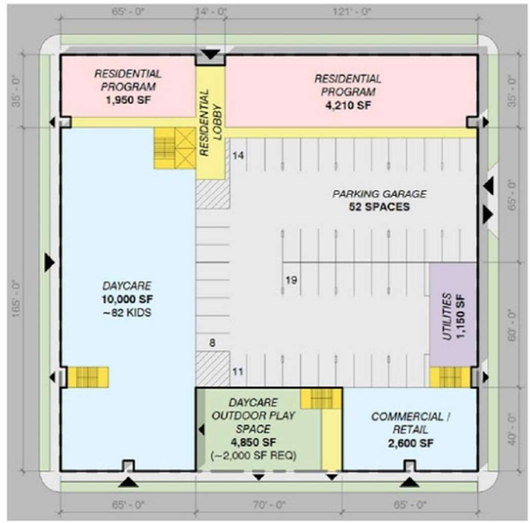


09

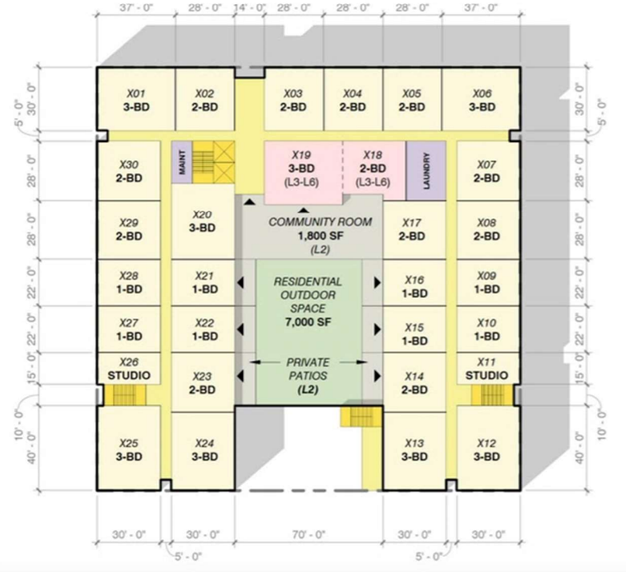
Case Study: Mixed-use affordable housing

- Project Info :
  - podium, 5 over 1, child development center, parking garage, residential amenities, podium courtyard, small retail space
- Test how to integrate energy modeling in the Conceptual and Schematic Design Phase
- Energy Focused Design Process:
  - Internal project kickoff meeting to discuss opportunities to meet 2030 Goals
  - Eco-charrette with Sustainability Lab
  - Take mass models and ideas from Eco-charrette into Sketch-Up and Sefaira
  - Compare scenarios through energy modeling tools

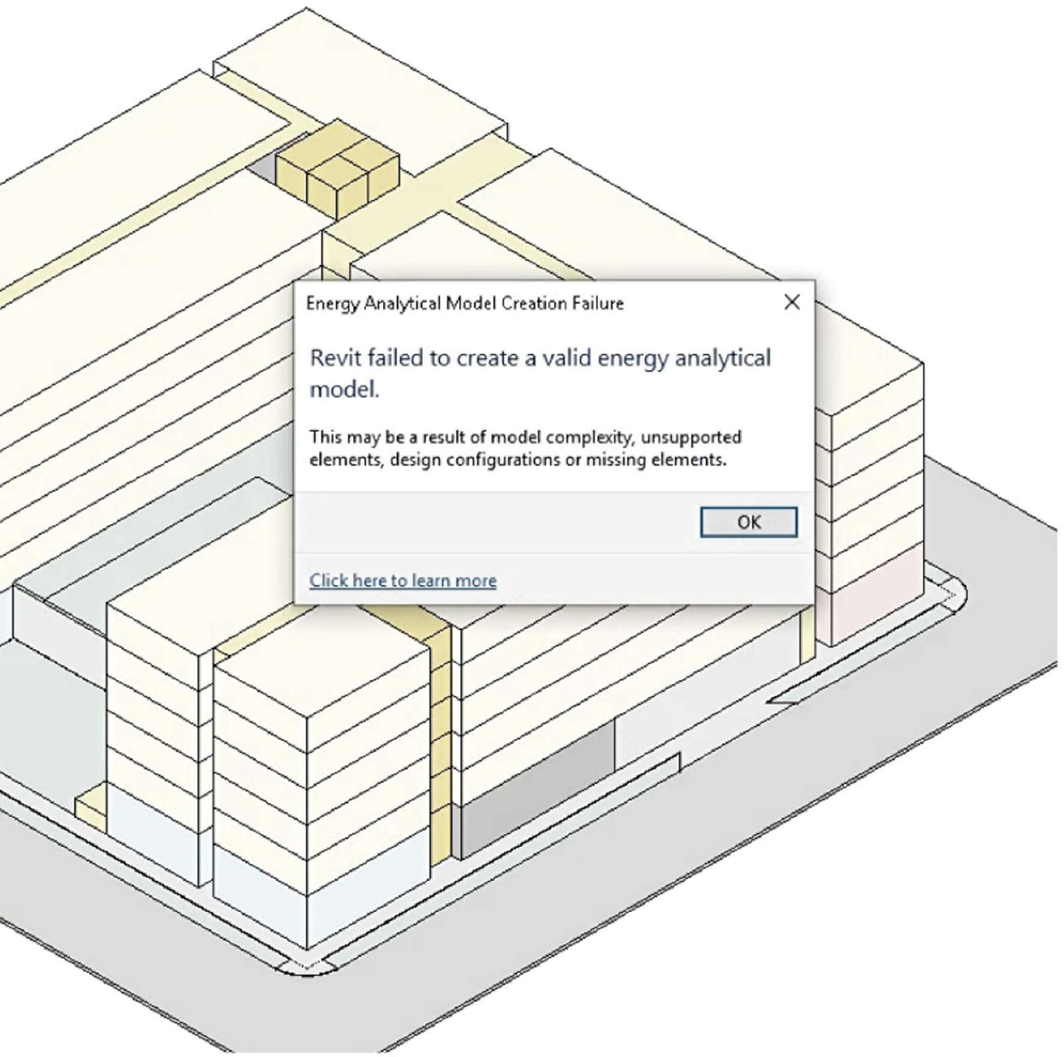




GROUND FLOOR PLAN



PODIUM LEVEL PLAN

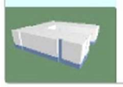


Challenges

Energy Modeling is messy

- Affordable housing programming constraints
  - Effectively modeling a complicated program
- Accounting for human behavior
- Integrating new systems that best fit into our current design process
- Sefaira and Insight 360 have different inputs and outputs
  - No perfect solution
  - Which modeling system works best?

11

Group of Baseline Concept & Baseline Concept HVA... 387,640 ft²			15,258 (cfm)	372.9 ton	18 kBTU/ft²/yr	$175,753
	Baseline Concept 193,820 ft² Clone Del Export Idf	HVAC System Type Fan Coil Units and Central Plant	7,629	166.2	18	$87,186
	Baseline Concept HV... 193,820 ft² Clone	HVAC System Type Package Terminal AC (System 1)	7,629	206.7	18	$88,567
Group of Ext. Hallways Concept & Ext. Hallways H...			16,630 ··· 8%	480.3 ··· 28%	18 ··· 0%	$191,976 ··· 9%
	Ext. Hallways Concept	Fan Coil Units and Central Plant	8,315	213.4	18	$95,239
	Ext. Hallways HVAC test	Package Terminal AC	8,315	266.9	18	$96,737
Group of Balconies Concept & Balconies Concept H...			16,034 ··· 5%	373.4 ··· 0%	17.5 ··· 2%	$182,865 ··· 4%
	Balconies Concept	Fan Coil Units and Central Plant	8,017	166.4	17	$90,786
	Balconies Concept HVAC t...	Package Terminal AC	8,017	207.0	18	$92,079
Group of Jagged Walls Concept & Jagged Walls Con...			5,700 ··· 62%	218.8 ··· 41%	19.5 ··· 8%	$69,358 ··· 60%
	Jagged Walls Concept	Fan Coil Units and Central Plant	2,850	88.1	19	$34,405
	Jagged Walls Concept HV...	Package Terminal AC	2,850	130.7	20	$34,953
	Wavy wall concept	Fan Coil Units and Central Plant	7,356 ··· 51%	159.2 ··· 57%	18 ··· 0%	$84,167 ··· 52%
	Clone of Wavy wall concept	Package Terminal AC	7,356 ··· 51%	202.1 ··· 45%	18 ··· 0%	$85,471 ··· 51%
	Clone of Balconies Concept	Fan Coil Units and Central Plant	8,017 ··· 47%	166.4 ··· 55%	17 ··· 5%	$90,786 ··· 48%

Facade Glazing

Assembly U-Value 0.11 BTU/h·ft²·°F

Solar Heat Gain Coefficient (SHGC) 0.4

Override Glazing Ratio Turn on

Window to Wall Ratio 0.30

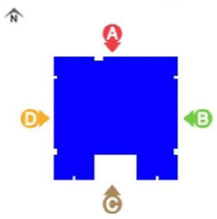
⚠ If this override is applied, the fixed glazing on your 3D model will be considered operable.

Walls

Assembly Type Stud

Assembly R-Value 30.00 ft²·h·°F/BTU

Building Orientation



Building Rotation 0.0 °

Floors

Floor Finish Carpet

Ground Floor R-Value 19.58 ft²·h·°F/BTU

Infiltration

Infiltration Type Air Changes

Design Infiltration Rate 0.2 ACH

Roof Glazing

Assembly U-Value 0.42 BTU/h·ft²·°F

Solar Heat Gain Coefficient (SHGC) 0.6

Roofs

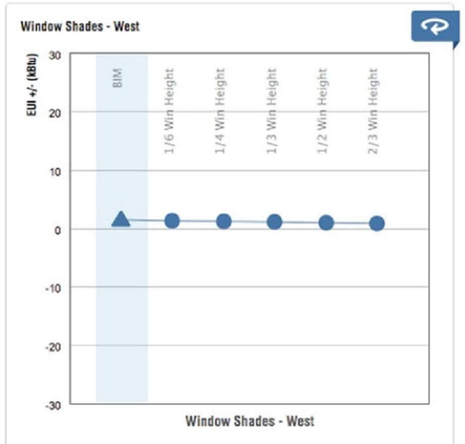
Roof Type Wood Deck

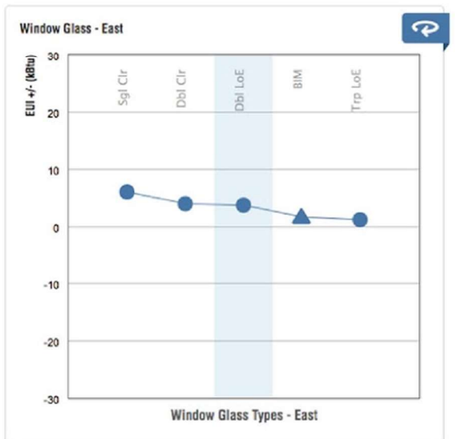
Roof R-value 31.55 ft²·h·°F/BTU

Case Study Project: Testing Sefaira in Conceptual Design

Small Impact

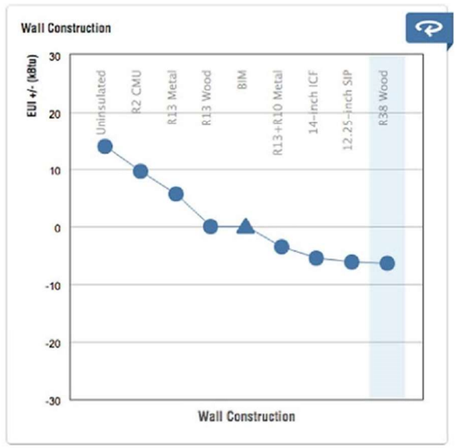
EXTERIOR / MASSING INTERVENTIONS

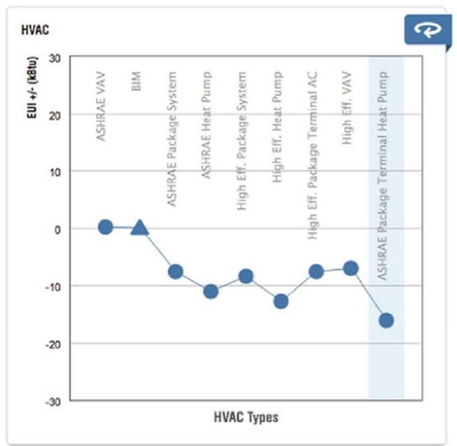


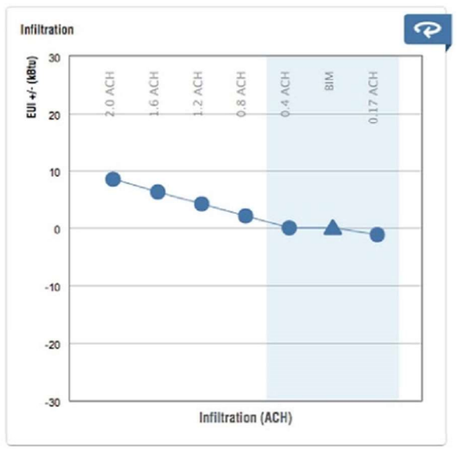


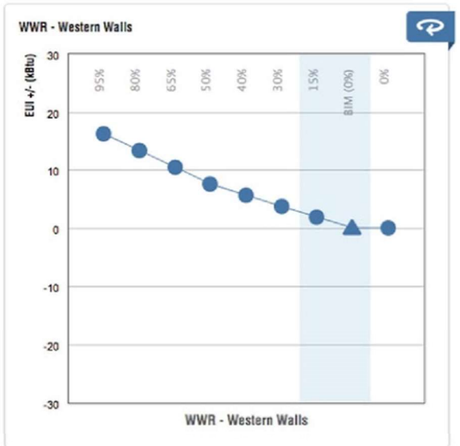
Big Impact

ENVELOPE INTERVENTIONS







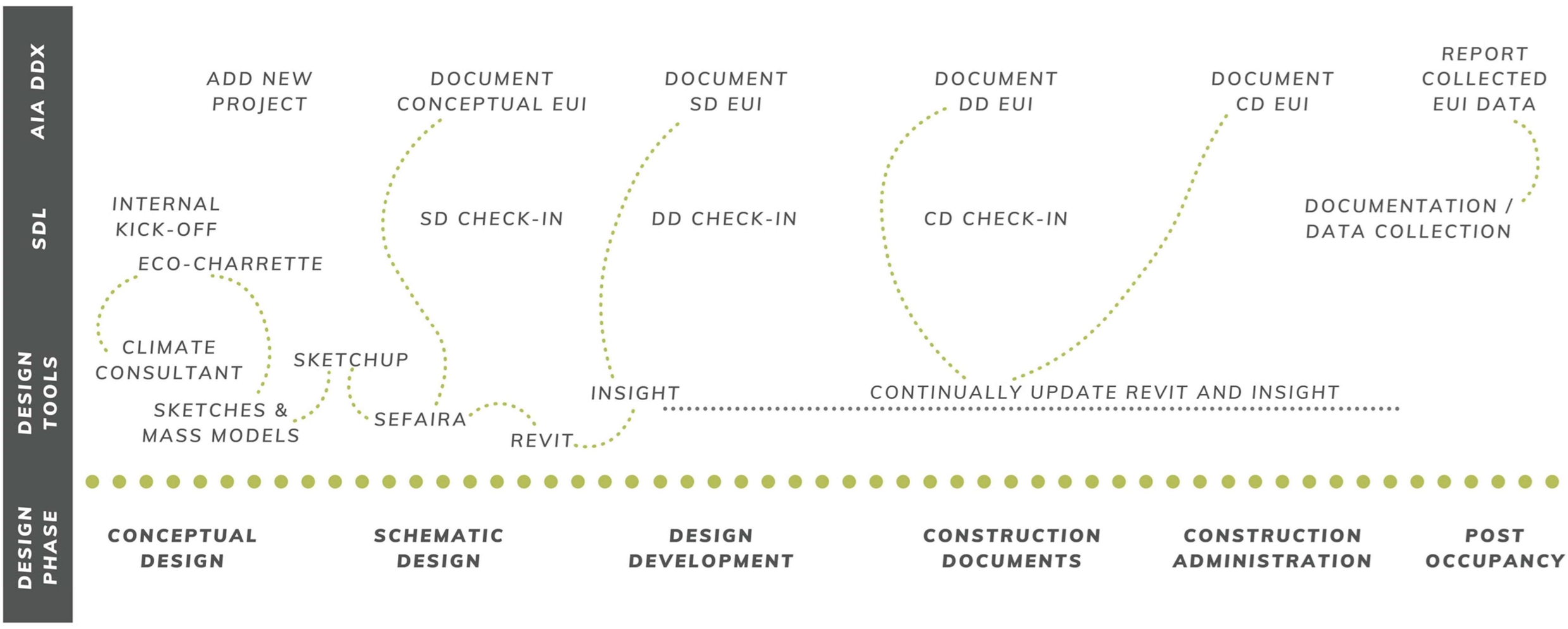


Case Study Project: Testing Insight in Design Development

13

Takeaways

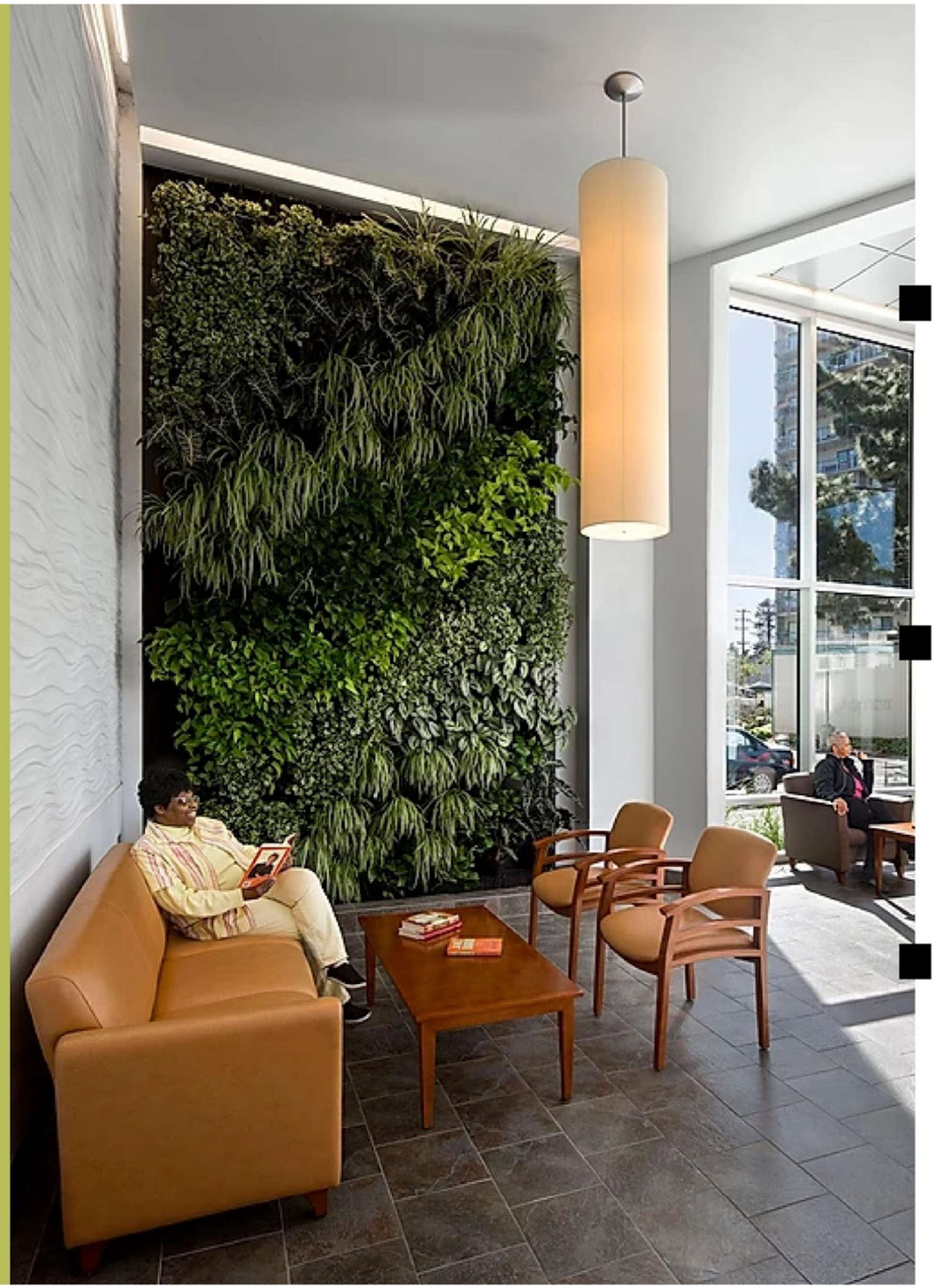
- For affordable housing: Prioritize efficient envelope over massing and exterior shading
- Sefaira best integrates into Conceptual and Schematic Design Phases
- Insight 360 is more helpful in Design Development and Construction Documents Phase
- Use one tool to fill in the gaps of the other



Prototypical Design Process

15

Next Steps



STANDARDIZING REPORTING PROTOCOL

CONTINUING TO TEST ENERGY MODELING TOOLS (COVE TOOL)

POST-OCCUPANCY EVALUATIONS

Thank you!

Emily Waldinger, NZEL Intern
Matt Bokar, NZEL Mentor

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SERA

SUSTAINABLE DESIGN FOR THE BUILT ENVIRONMENT

Net-Zero Emerging Leadership Internship

SERA Architects | Energy Trust of Oregon

Introduction |

Large Firm | 184+

Portland, Or. Office
Oakland, CA. Office

Across 6 Studios |

Education

Workplace

Hospitality

Housing

Sustainability

Urban Design

Established in 1968

100% Employee Owned

Reporting for over 10 years

SERA Architects |

LEED NC Platinum Certified

Blanchet House of Hospitality incorporates one of the city's largest rainwater harvesting systems, energy-efficient lighting, extra insulation, thermally-broken low-e windows, and a 2,500 sf eco-roof that, together with the rainwater tank, allows for 100% of the stormwater to be managed on site and used for toilet flushing.

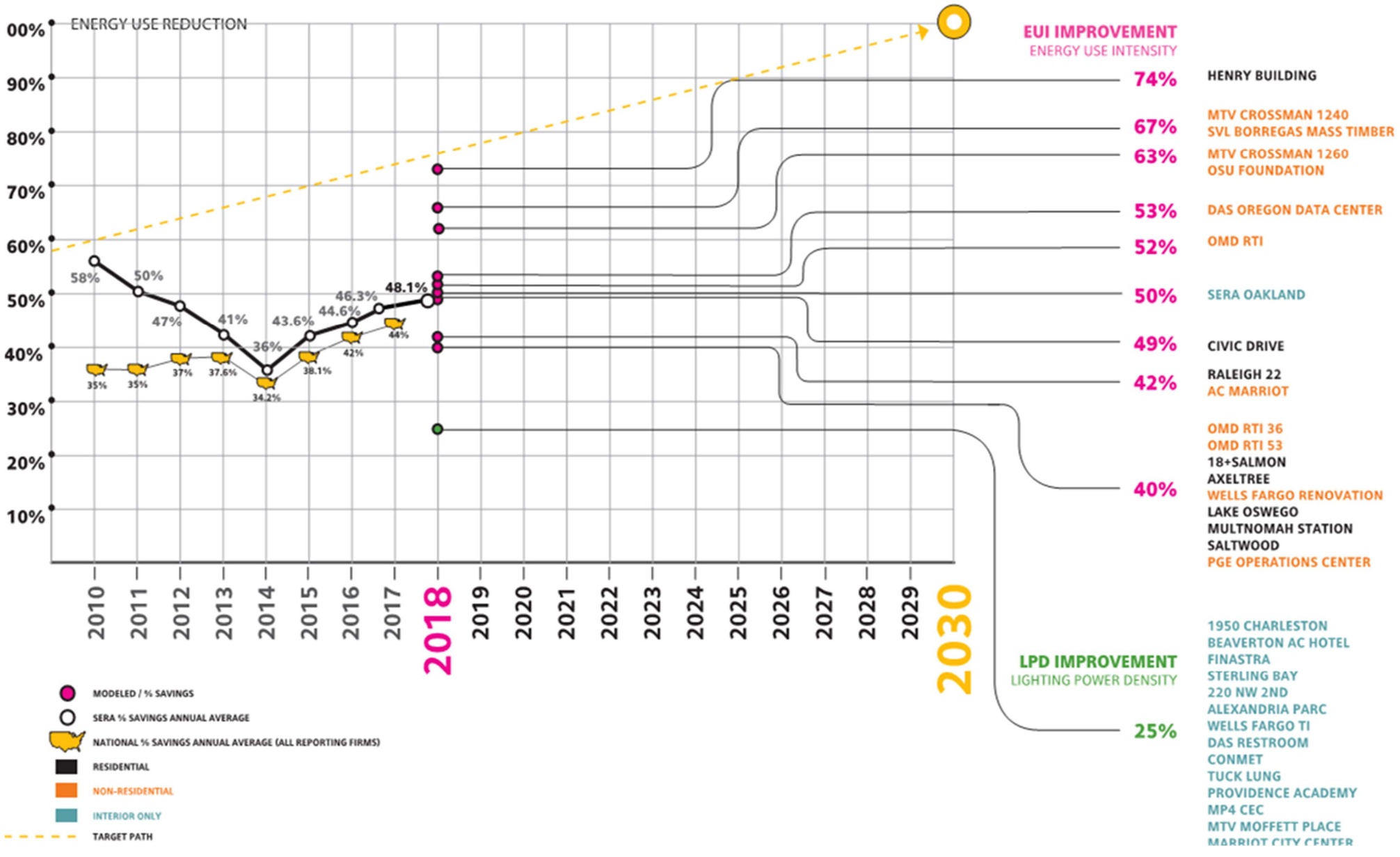
Certified LEED NC Platinum 2013 and Certified LEED EB Platinum 2016

Edith Green Wendell Wyatt is LEED Platinum certified and will use 60-65% less energy than a typical office building. Combined with a unique rain water harvesting system, which is estimated to achieve greater than 65% potable water savings.

Targeting Earth Advantage Platinum certification

Orchards of 82nd features a mix of 48 one-, two- and three-bedroom units ideal for young families, and supports ROSE's Baby Booster Initiative aimed at improving quality of life for children in their first 1,000 days. The ground floor is activated by a community lounge and learning space, as well as a multicultural event space owned and managed by APANO.

Where are we? |



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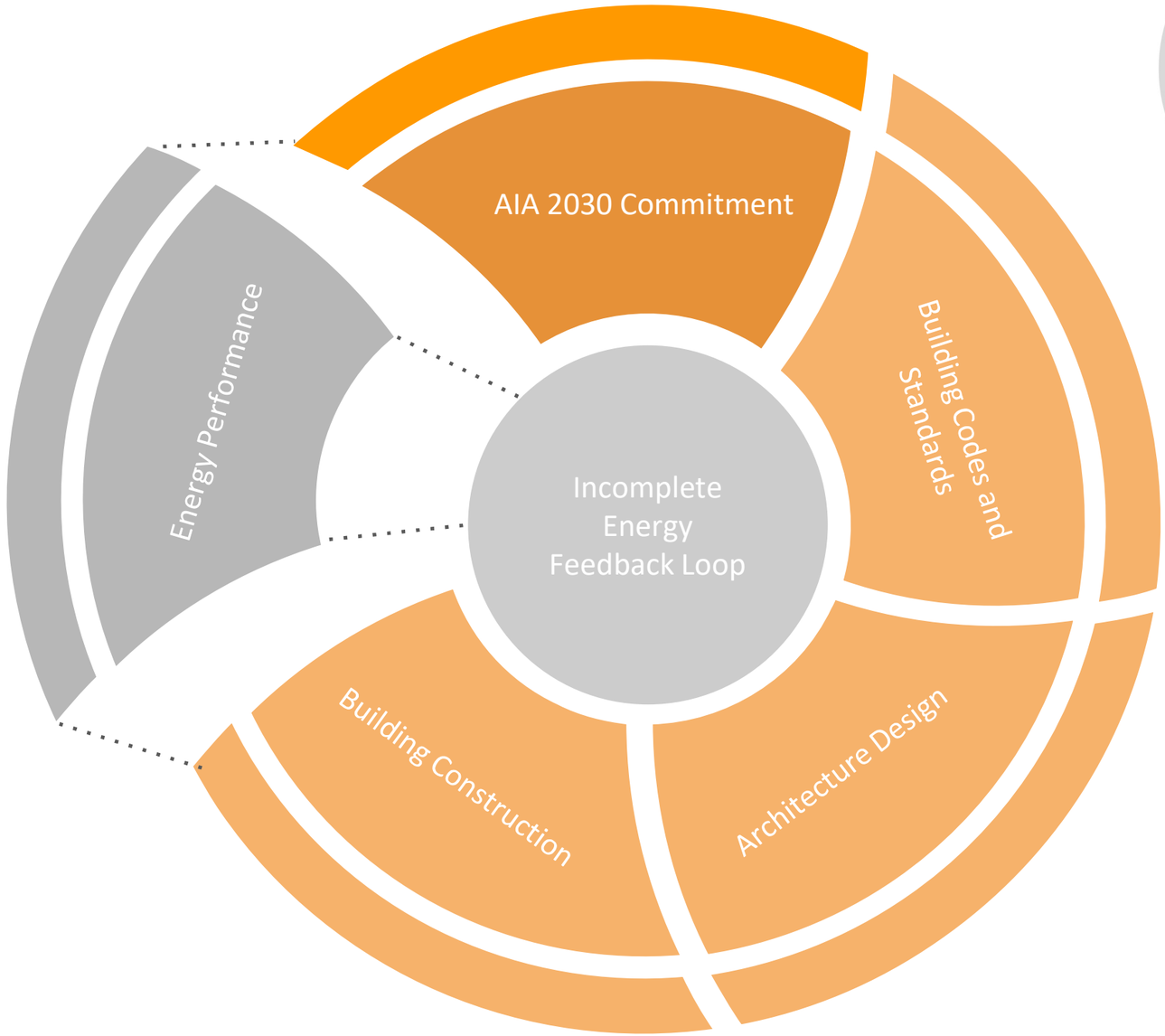
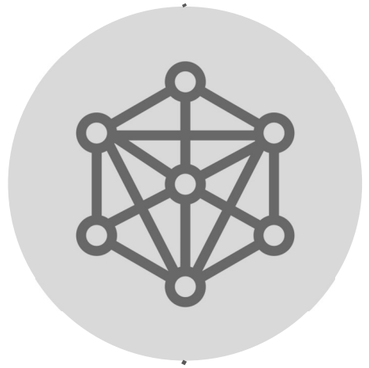
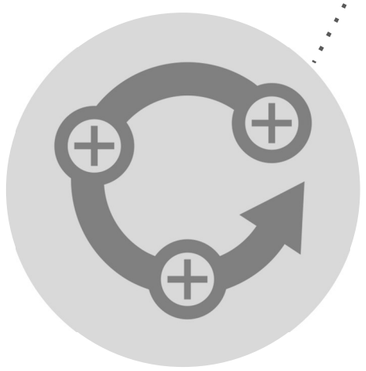
Why? |



Buildings account for 40% of energy consumption



Data is a powerful communicative language



Firms can use data for Design Processes

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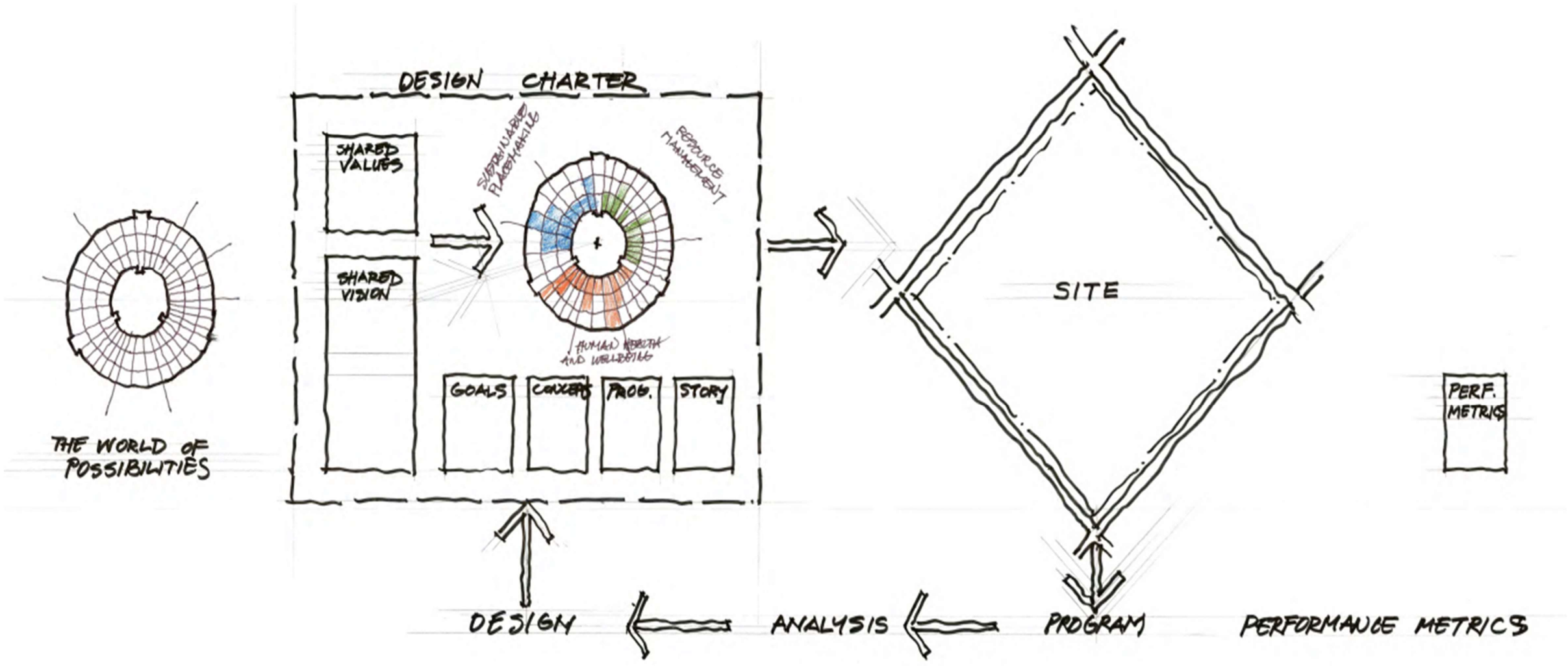

DESIGN CHARTER
SHARED VALUES
SHARED VISION
GOALS
CONCEPTS
PROG.
STORY
SUSTAINABLE PRACTICES
RESOURCE MANAGEMENT
HUMAN HEALTH AND WELLBEING
SITE
PERF. METRICS
THE WORLD OF POSSIBILITIES
DESIGN
ANALYSIS
PROGRAM
PERFORMANCE METRICS

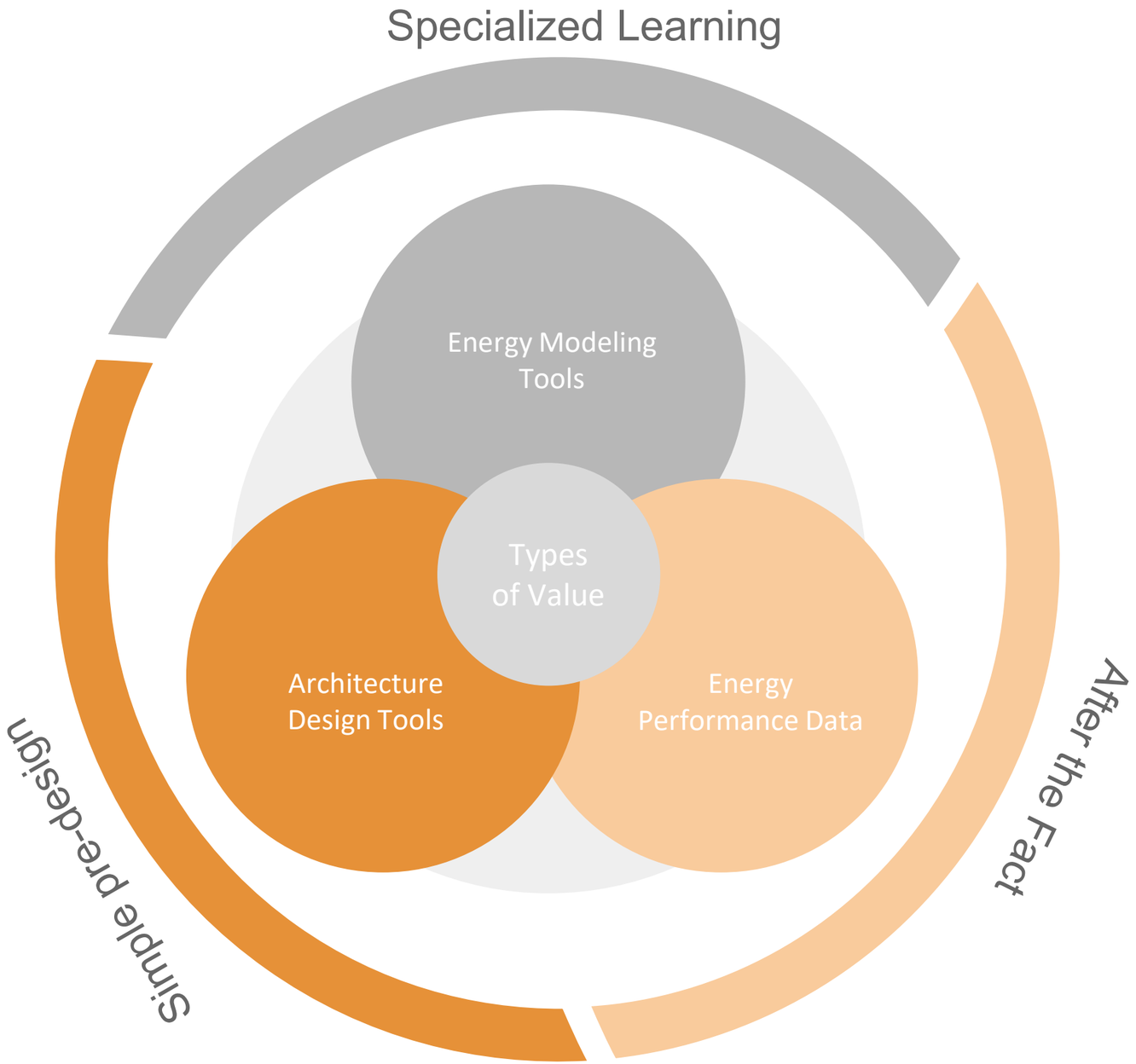
Research Goals |

Challenges |

- Communicating and maintaining sustainable efforts within a large firm.
- Energy tools can be dense and require specific training.
- Energy performance is typically after the fact reporting or considerations.

Goals |

- Bolster workflow efforts for DDx reporting firm-wide.
- Create simple architecture design tools to determine early energy metrics.
- Establish ways of thinking about energy metrics in pre-design efforts.



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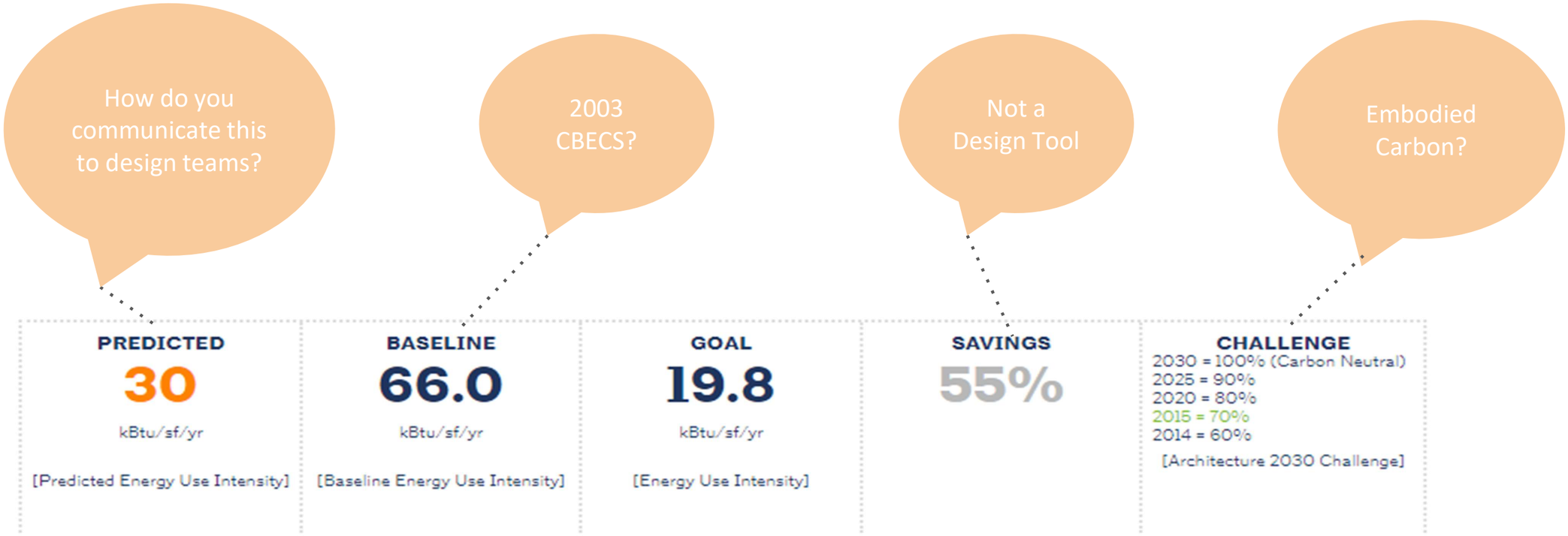
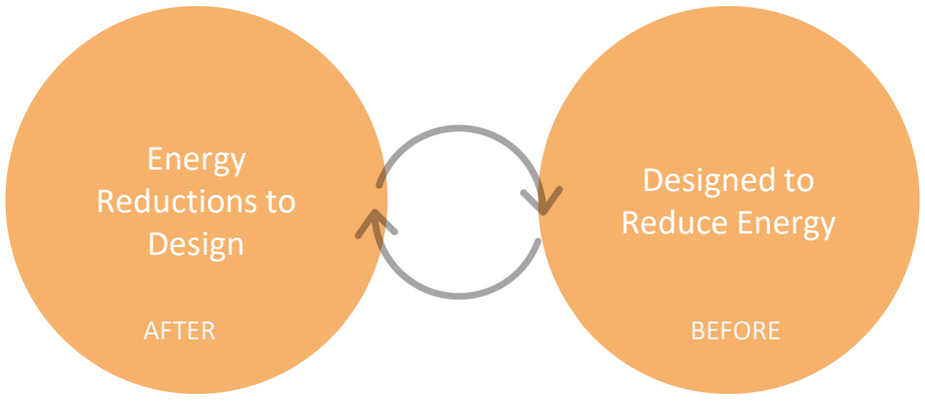
AIA Design Data Exchange |



Needed Paradigm Shift |



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STEP #3:	STEP #4:		STEP #5:
Select the applicable building typology of the Project. *Building Typology must be same for National and Regional for comparisons.	Select the applicable building typology based on the region. *Building Typology must be same for National and Regional for comparisons		Determine your target EUI
DISCRIPTION: The National EUI is an average EUI that changes with different building typologies. The National EUI is based on the CBECS -2003 building standards and is what the 2030 Commitment Goal EUI numbers are compared to. *Selected building typology should be the same between National and Regional as to get equal comparison. In some cases National EUI might be lower than Zero Tool, use the lower of the two outputs.	DISCRIPTION: The Regional EUI number is a prediction of energy consumption based off of regional climate conditions. This is a more accurate indication of energy consumption. *Selected building typology should be the same between National and Regional as to get equal comparison. In some cases National EUI might be lower than Zero Tool, use the lower of the two outputs.		DISCRIPTION: Identify your project goal based on Project Compass goals for energy consumption (Better, Best, Ememplary). This EUI should provide a metric and goal for the buildings energy use leading toward Net-Zero Energy. If you plan on building to energy code what can be done to lower the projects EUI in an attempt to build better than code?
BASELINE EUI (kBTU/ft2/yr)			**TARGET EUI (kBTU/ft2/yr)**

NATIONAL EUI (2030 GOAL)	REGIONAL EUI (ZERO TOOL)	ENERGY CODE	2030 CHALLENGE	ZERO TOOL
Courthouse	COURTHOUSE (Portland, OR)	*IMPROVED*	*BETTER*	*EXEMPLARY*
118	76	78	35	23
118	76	78	35	23
118	76	78	35	23
118	76	78	35	23
118	76	78	35	23
118	76	78	24	15
118	76	78	24	15
118	76	78	24	15
118	76	78	24	15
118	76	78	24	15

Batch Upload for a Large Firm |

(~40 Questions) x (~40 Projects)
= 1,600 data points

Challenges |

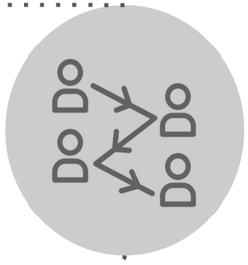
- Engage studio leaders about the energy use of their projects.
- Simplify data entry and human error.
- Develop firm wide approach to 2030 Reporting.

B	C	D	E	F	G	H
Project Name	Project ID	Project Categor	Construction Type	Reporting Year	Project Phase	Reporting Status
Project 1	PCGSP143(	Interior Only	New Construction	2014	Construction Docume	Submitted
Project 2	PGQKV143	Non-Residential	New Construction	2014	Construction Administ	Submitted
Project 3	PIKBK1436	Non-Residential	New Construction	2014	Construction Administ	Submitted
Project 4	PJFFL1436	Non-Residential	New Construction	2014	Construction Docume	Submitted
Project 5	PKEAX143(	Non-Residential	New Construction	2014	Construction Docume	Submitted
Project 6	PIZYW143(	Residential	New Construction	2014	Construction Administ	Submitted
Project 7	PLQXL143(	Residential	New Construction	2014	Construction Administ	Submitted
Project 8	PTHGT143(	Residential	New Construction	2014	Construction Administ	Submitted
Project 9	PQAXZ143	Interior Only	New Construction	2014	Construction Administ	Submitted

Batch Upload for a Large Firm Continued |

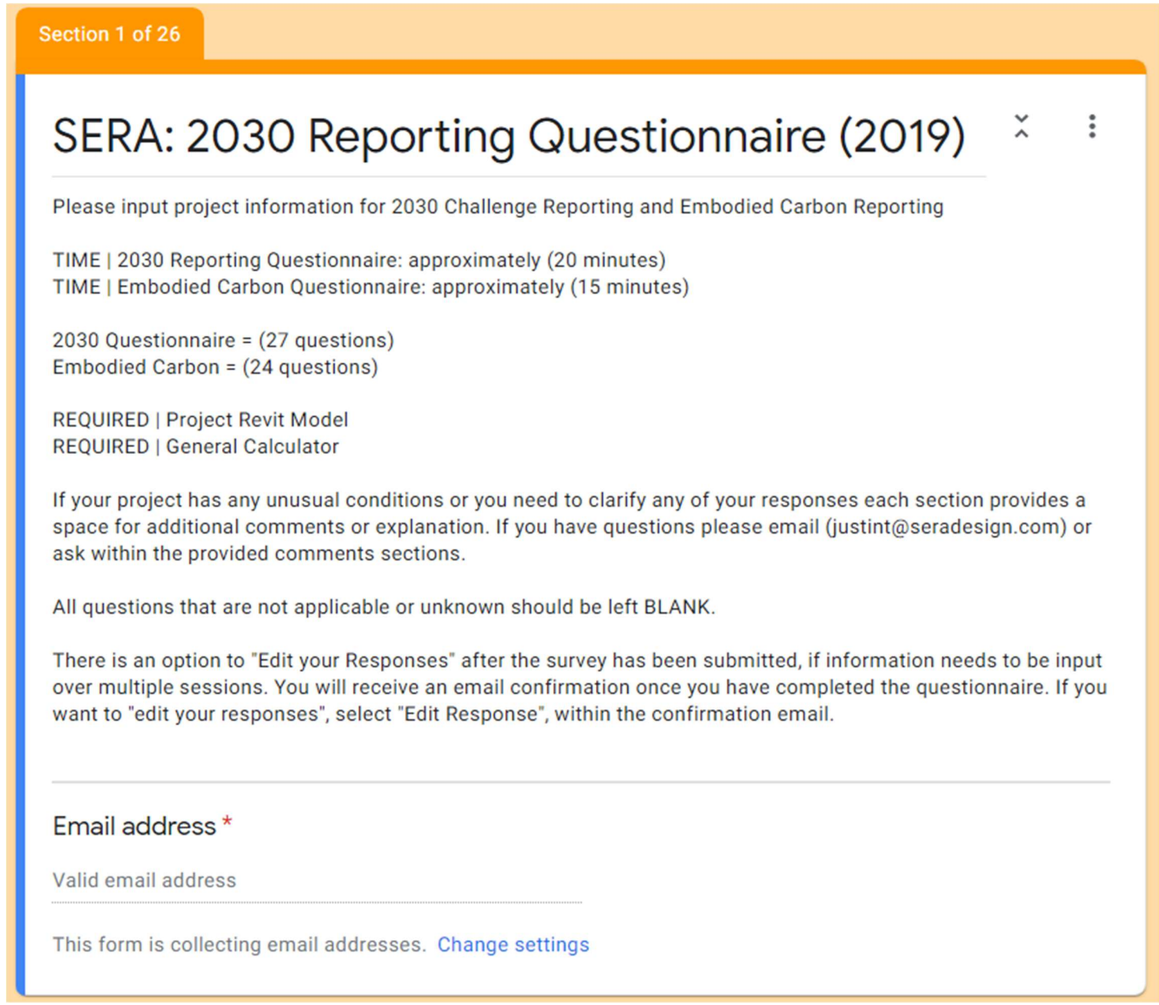
Engage Energy Performance Awareness

Increase Workflow Procedures



Reduce Data Entry Process

Gain additional Internal Data



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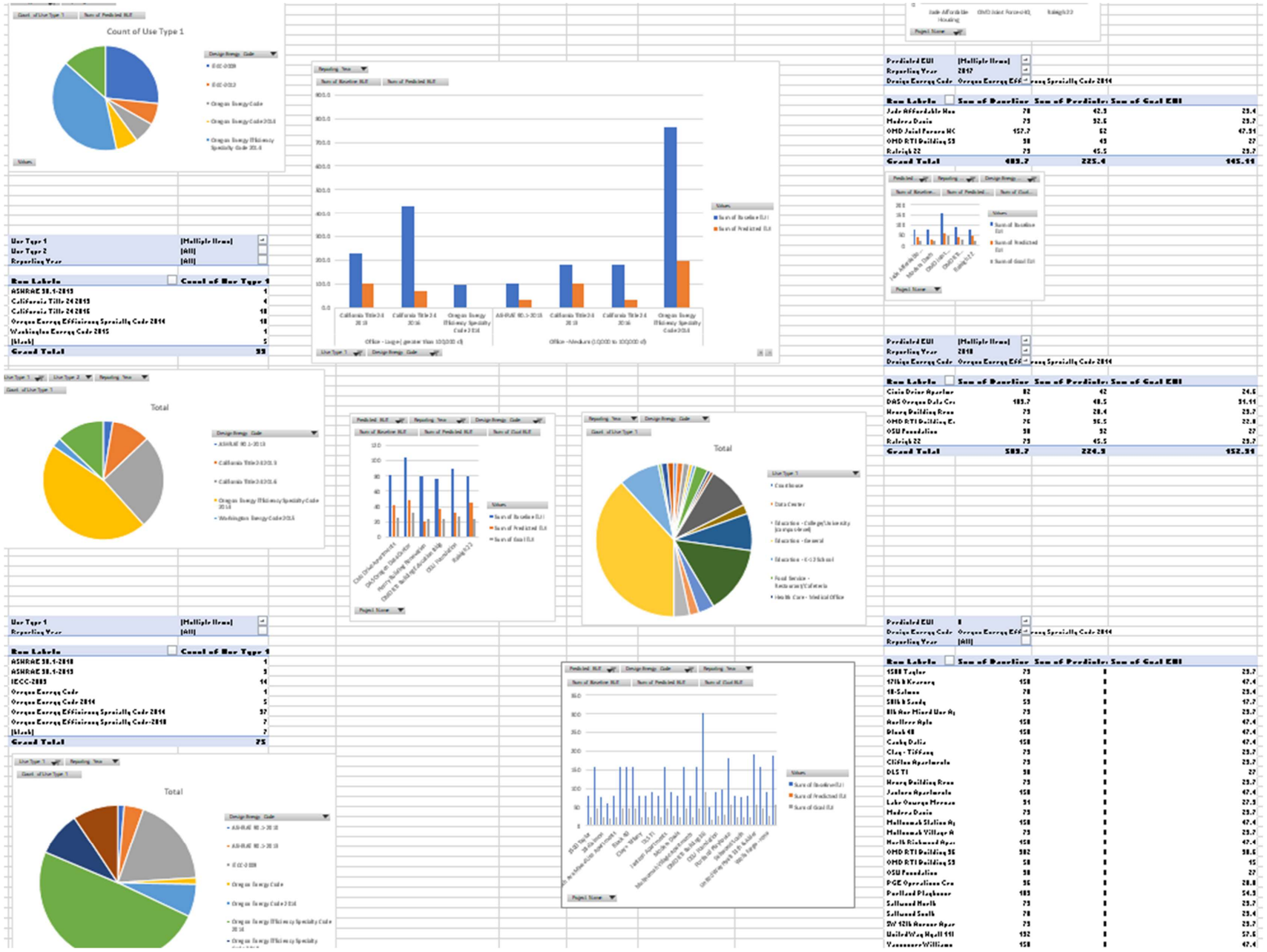
Learning Outcomes |

Better Analysis

Better informed Design Process



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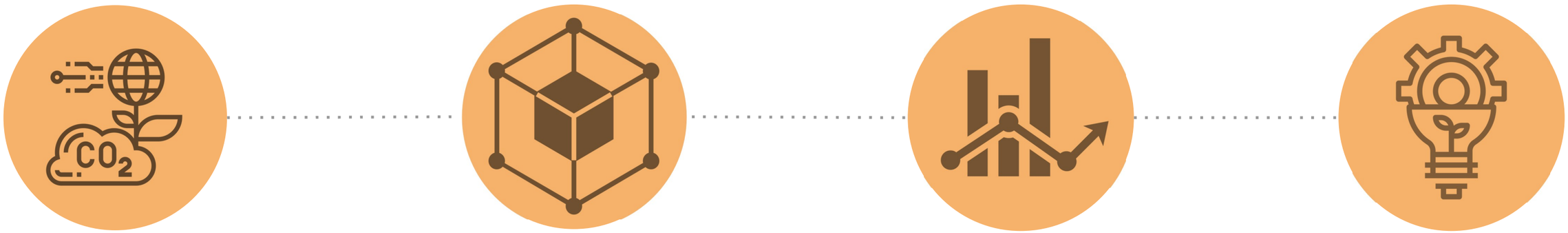
Steps Forward |



Embodied Carbon Tracking

Integrated Energy Modeling Tools

Internal Firm Reporting

Continued Knowledge Resourcing

SUSTAINABLE DESIGN FOR THE BUILT ENVIRONMENT

Thank you!

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