

NET-ZERO EMERGING LEADER INTERNSHIP

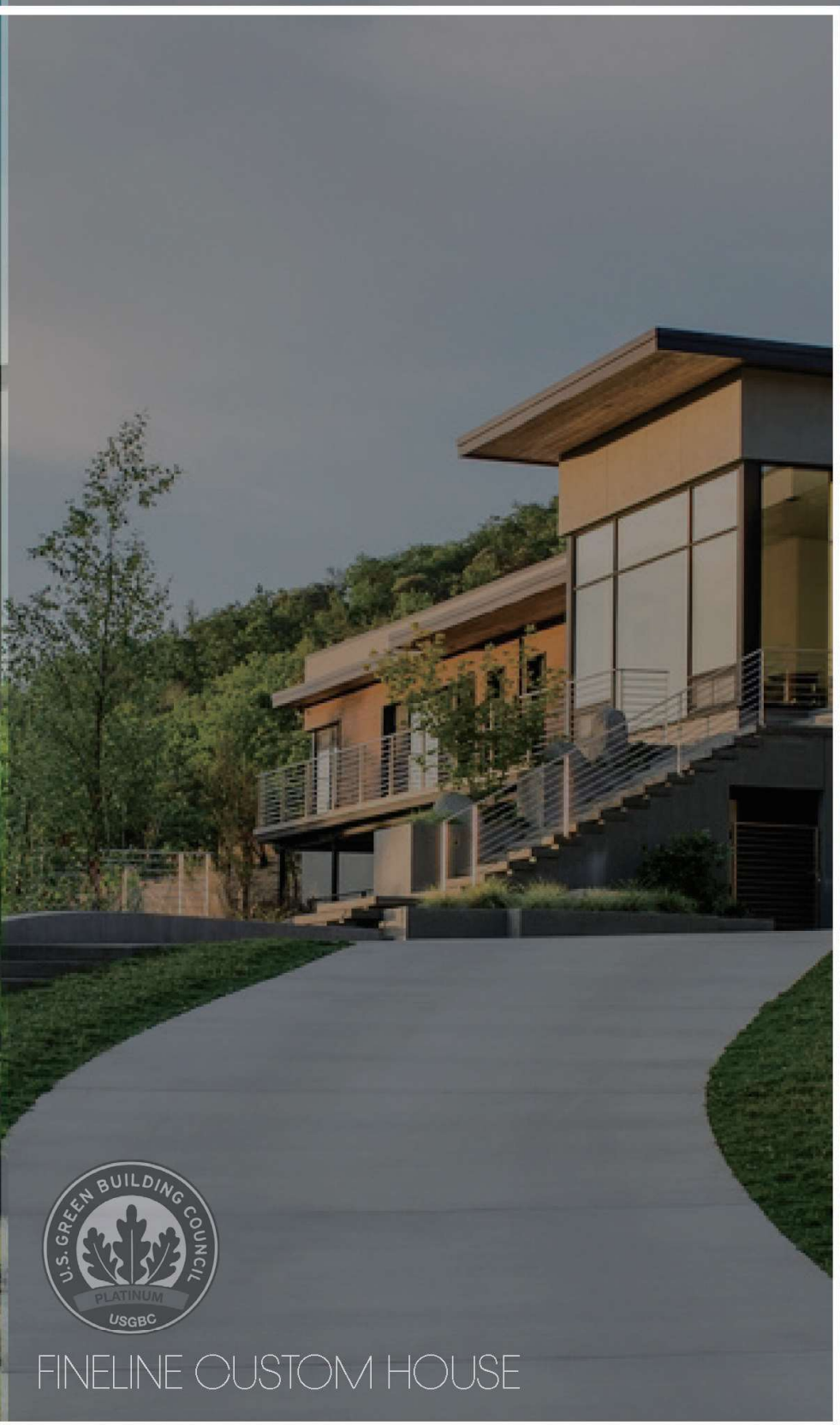
GREEN HAMMER | MICHELLE MONTIEL



STEELE RESIDENCE

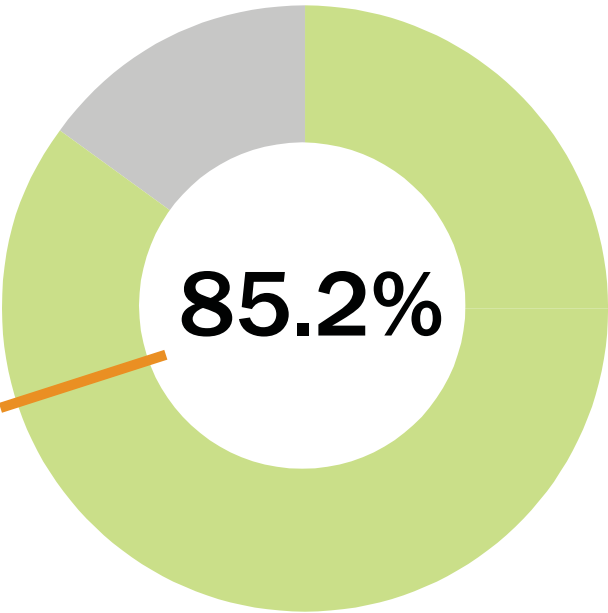
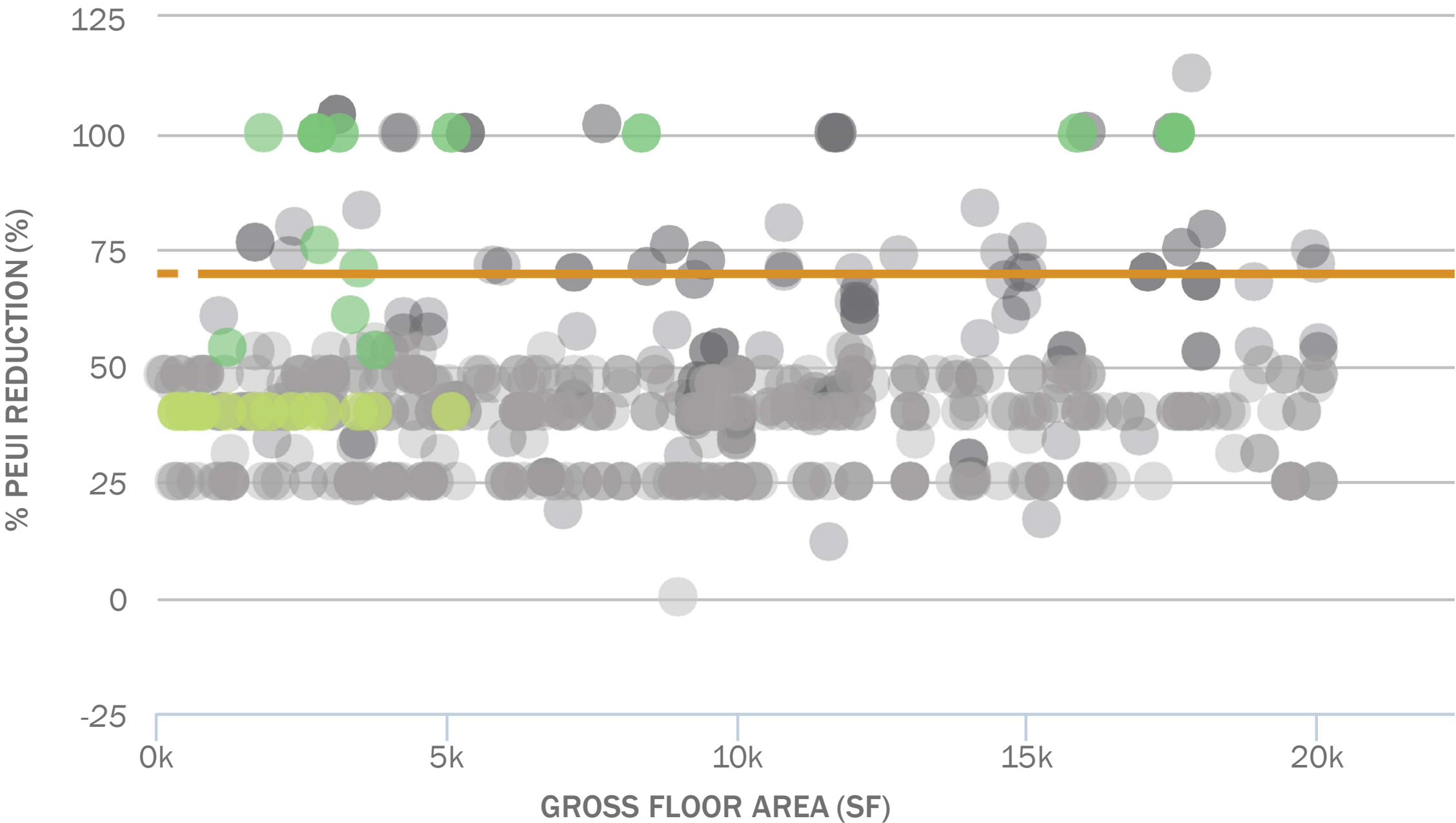


SUNSET RESIDENCE



FINELINE CUSTOM HOUSE

RESIDENTIAL PROJECTS, CLIMATE 4C



PREDICTED EUI REDUCTION
FROM AVERAGE EUI

GSF VALUES

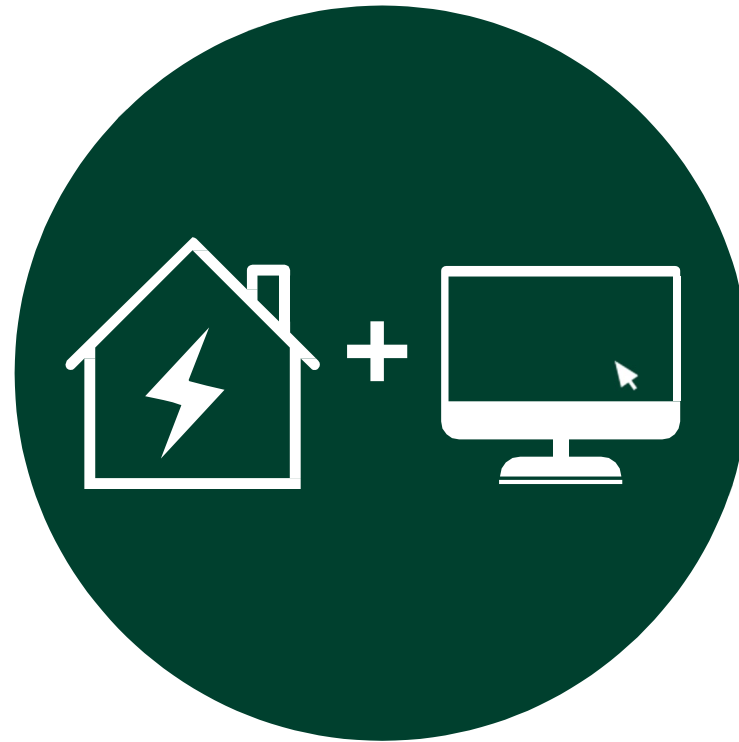
Total =	111,083
Meeting Target =	83,913
% Meeting Target =	75.5 %

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

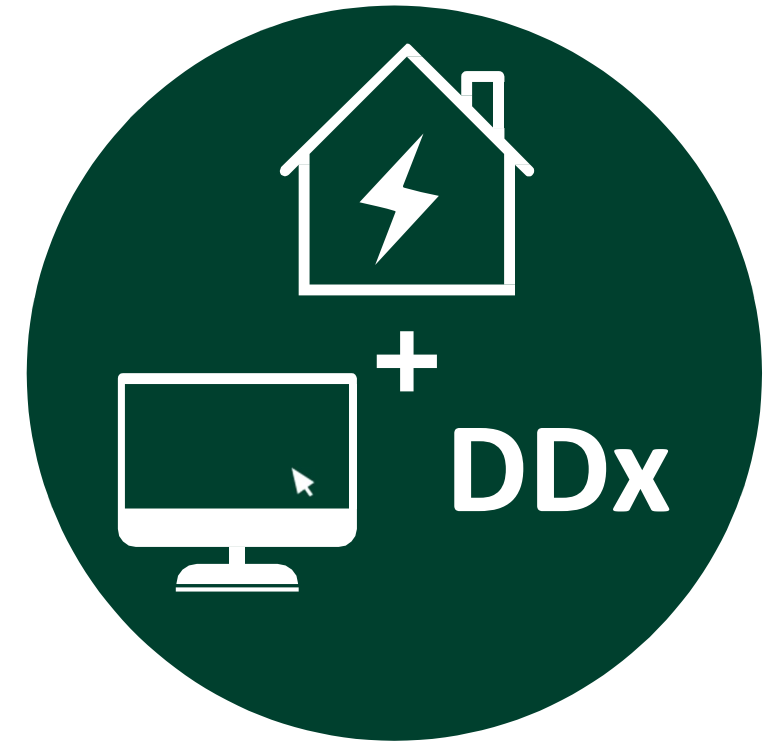
REPORTED PROJECTS DD_x



**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

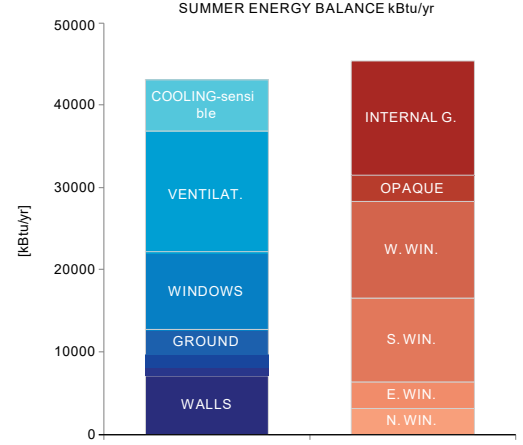
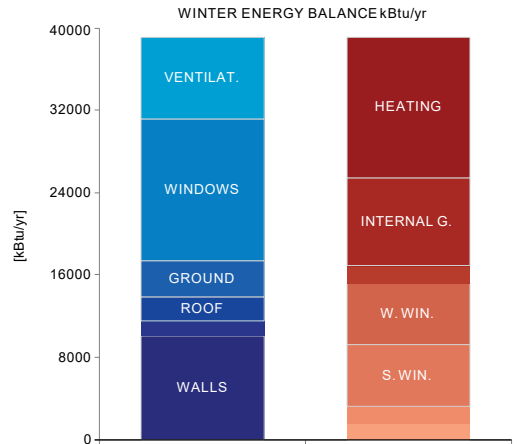
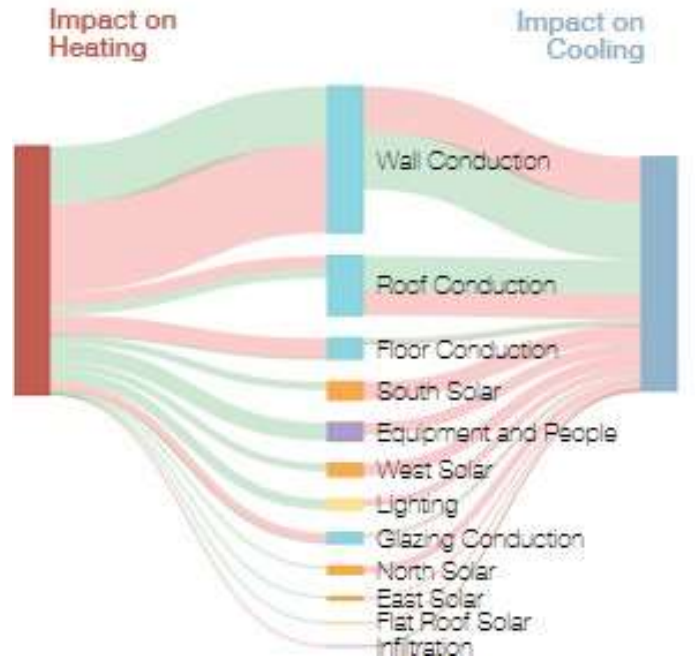
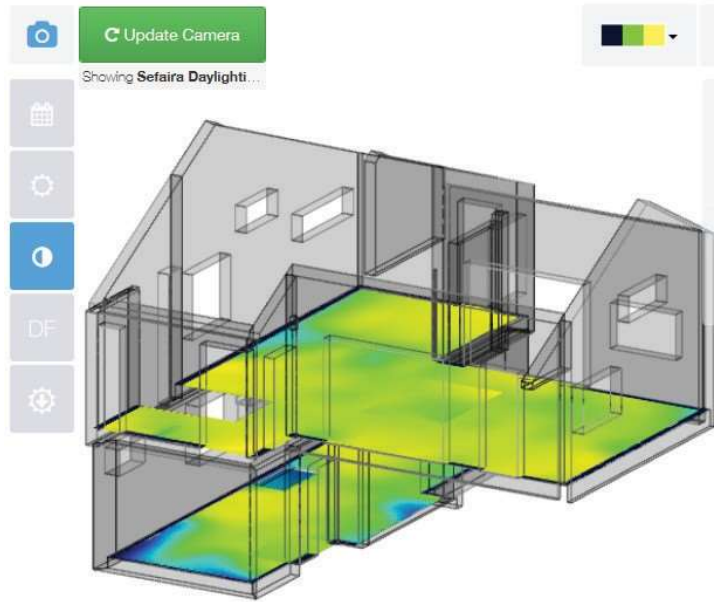
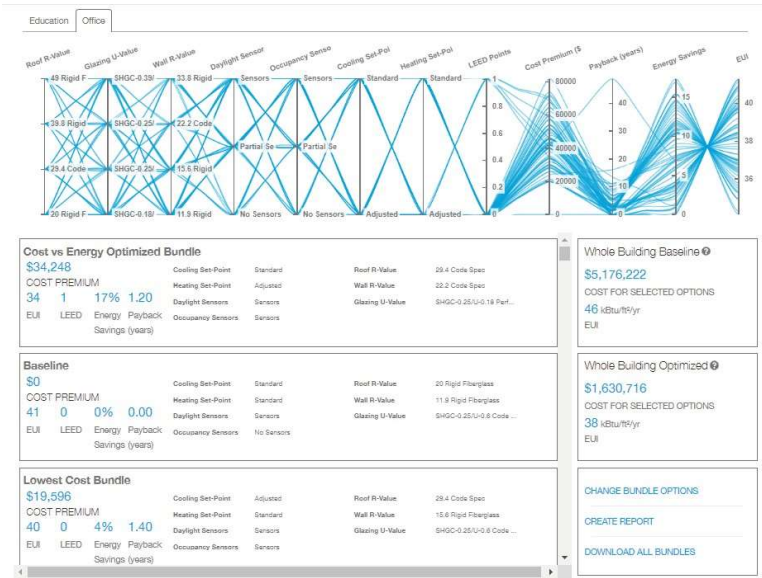
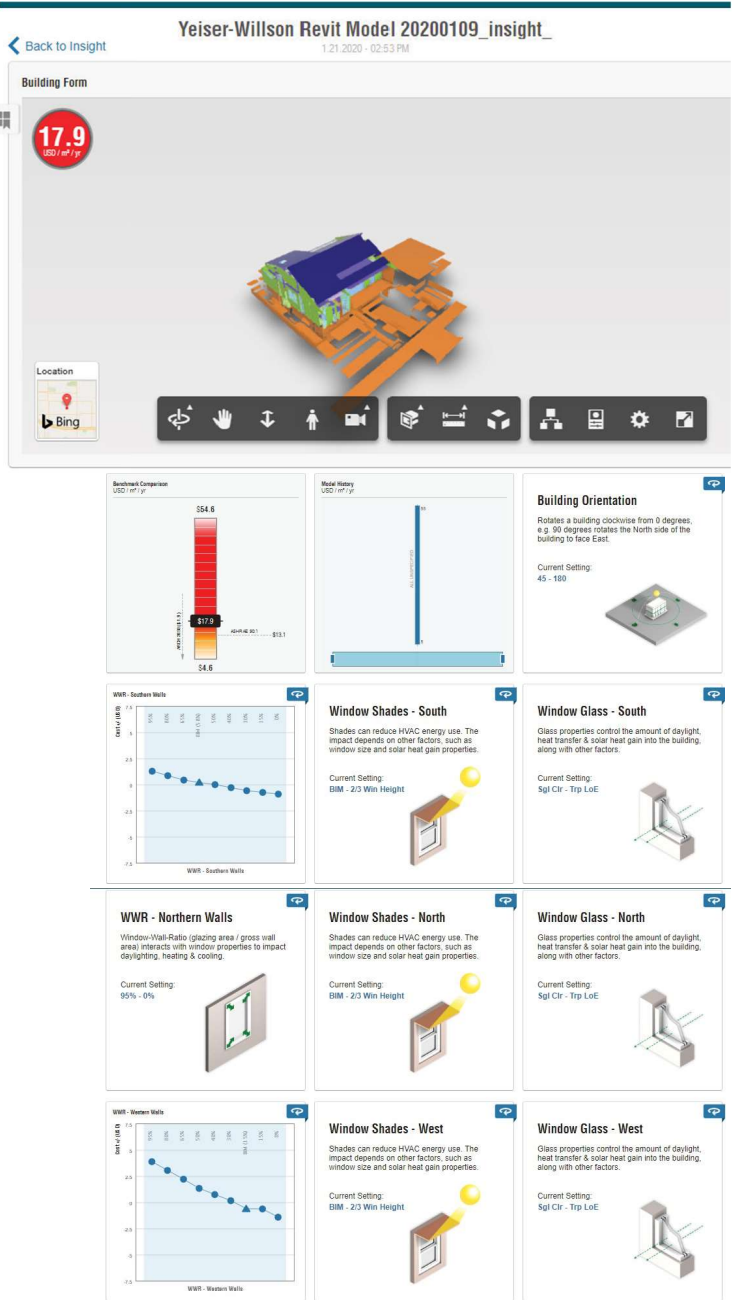
https://www.buildingenergysoftwaretools.com/software-listing?keywords=&field_catagory_tid%5B%5D=201&field_platform_tid=All&field_price_tid=All&field_last_updated_value%5Bvalue%5D%5Byear%5D=2010&field_language_tid=All&keys=&building-type=&sort_by=field_rating_rating&sort_order=DESC&items_per_page=40

ENERGY MODELING RESEARCH

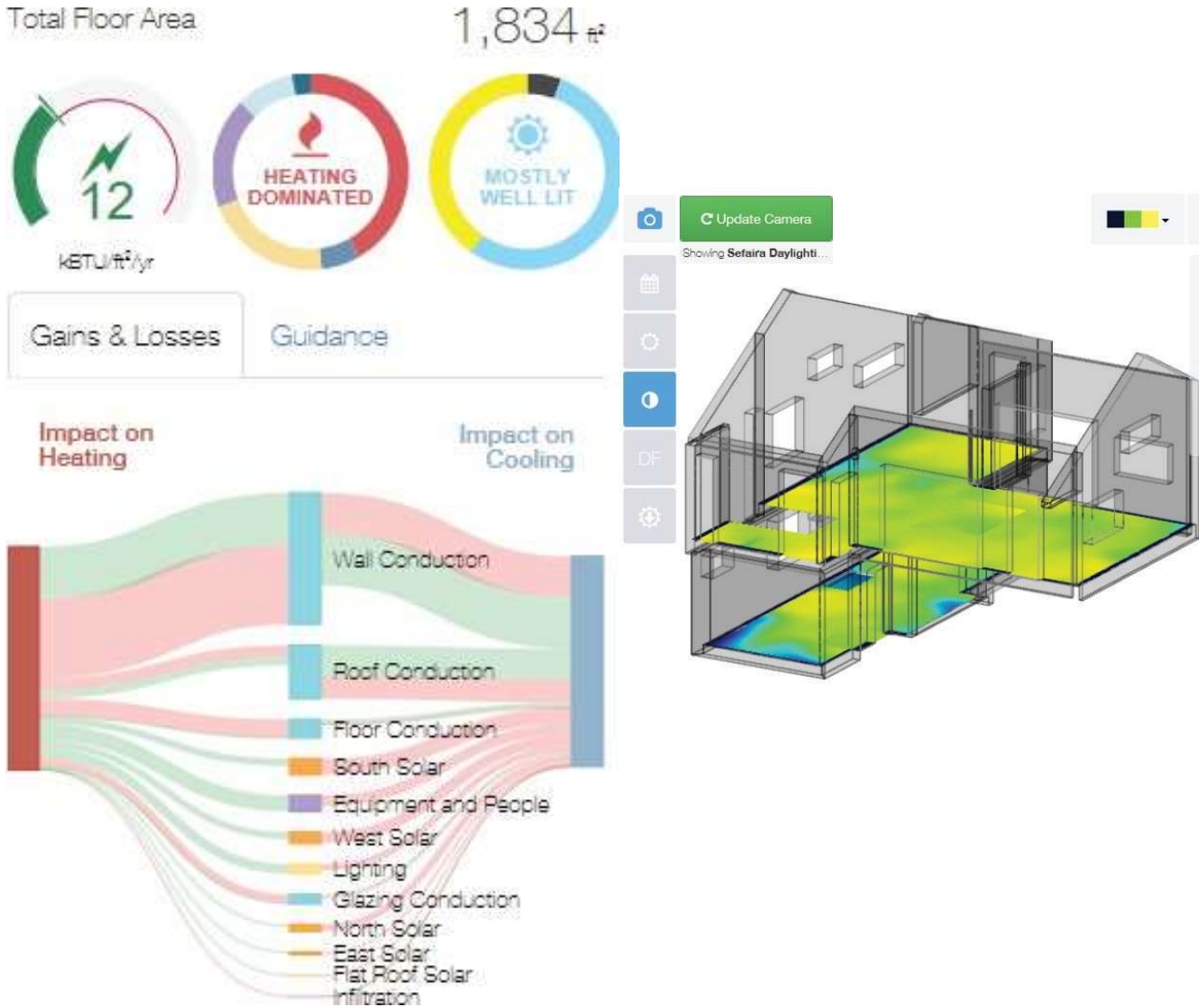
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https://www.buildingenergysoftwaretools.com/software-listing?keywords=&field_catagory_tid%5B%5D=201&field_platform_tid=All&field_price_tid=All&field_last_updated_value%5Bvalue%5D%5Byear%5D=2010&field_language_tid=All&keys=&building-type=&sort_by=field_rating_rating&sort_order=DESC&items_per_page=40

ENERGY MODELING RESEARCH



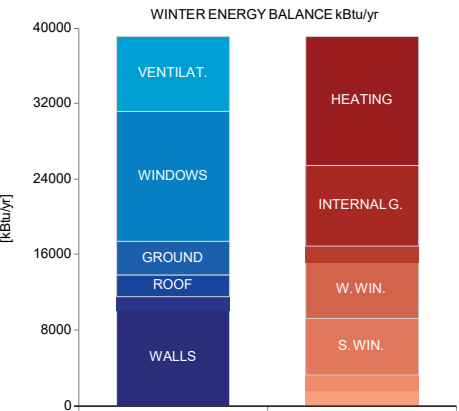
ENERGY MODELING RESEARCH



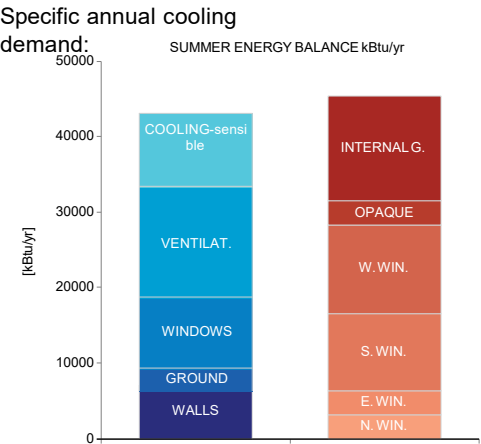
SEFAIRA

VS

ANNUAL HEAT DEMAND	
Transmission losses :	34,309 kBTu/yr
Ventilation losses: Total	7,909 kBTu/yr
Solar heat gains: heat losses:	42,218 kBTu/yr
Internal heat gains: Total heat	22,757 kBTu/yr
Internal heat gains: Utilization factor: Useful	11,469 kBTu/yr
heat gains: 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/ft²/yr



ANNUAL COOLING DEMAND	
Solar heat gains:	31,497 kBTu/yr
Internal heat gains: Total heat	13,816 kBTu/yr
Transmission losses :	45,313 kBTu/yr
Ventilation losses: Total	57,247 kBTu/yr
Internal heat gains: Utilization factor: Useful	34,620 kBTu/yr
heat gains: Annual cooling demand:	91,867 kBTu/yr
Specific annual cooling demand:	42.5 %
	38,998 kBTu/yr
	6,315 kBTu/yr
	9 kBTu/yr
	6,324 kBTu/yr
	3.9 kBTu/ft²/yr



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

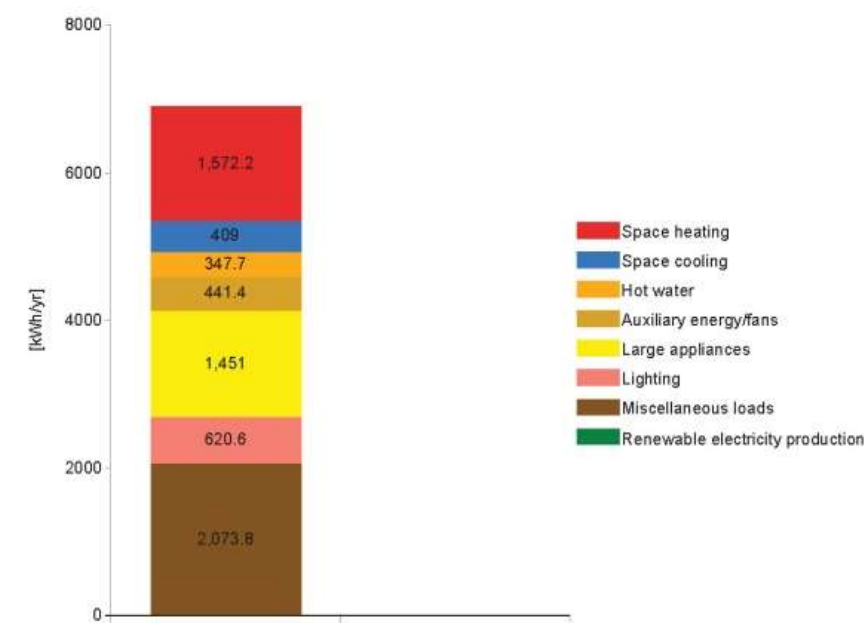
Assembly analysis

CONS:

May require more data in early
stages of design.
Interface harder to navigate

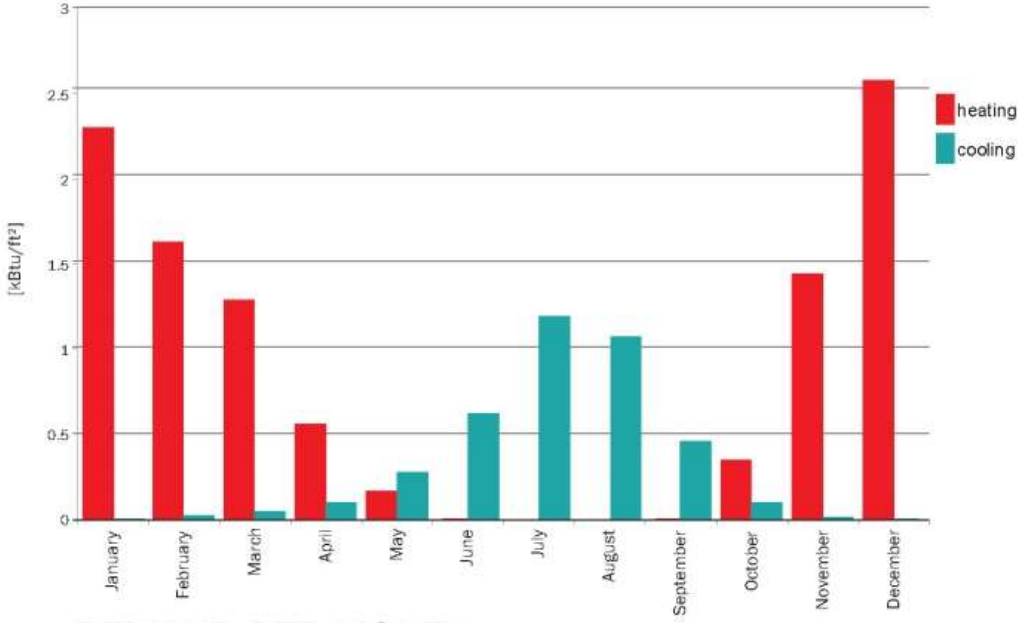
WUFI PASSIVE

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

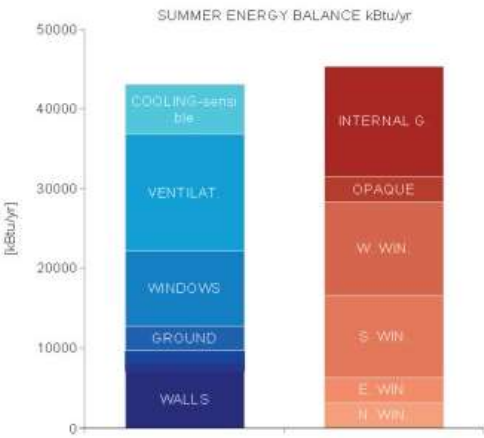
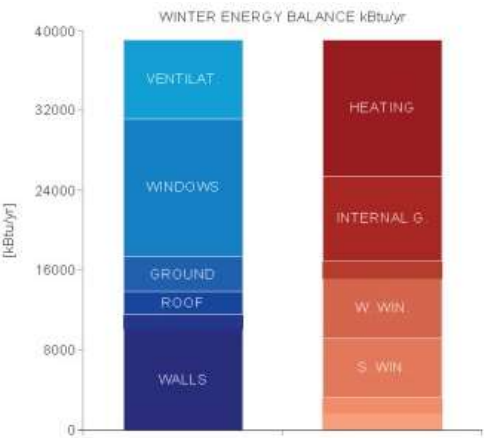
Transmission losses :	34,309 kBtu/yr
Ventilation losses:	7,909 kBtu/yr
Total heat losses:	42,218 kBtu/yr
Solar heat gains:	22,757 kBtu/yr
Internal heat gains:	11,469 kBtu/yr
Total heat gains:	34,227 kBtu/yr
Utilization factor:	74.4 %
Useful heat gains:	25,471 kBtu/yr

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

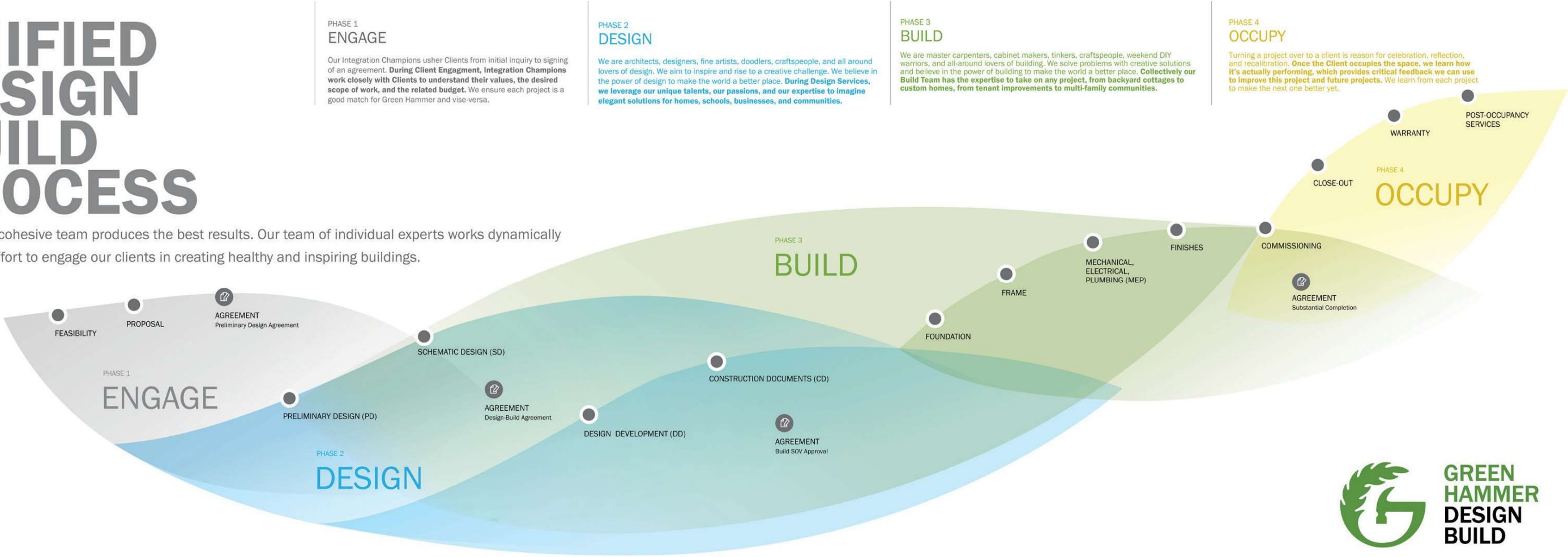


HEATING/COOLING LOADS

ENERGY MODELING RESEARCH

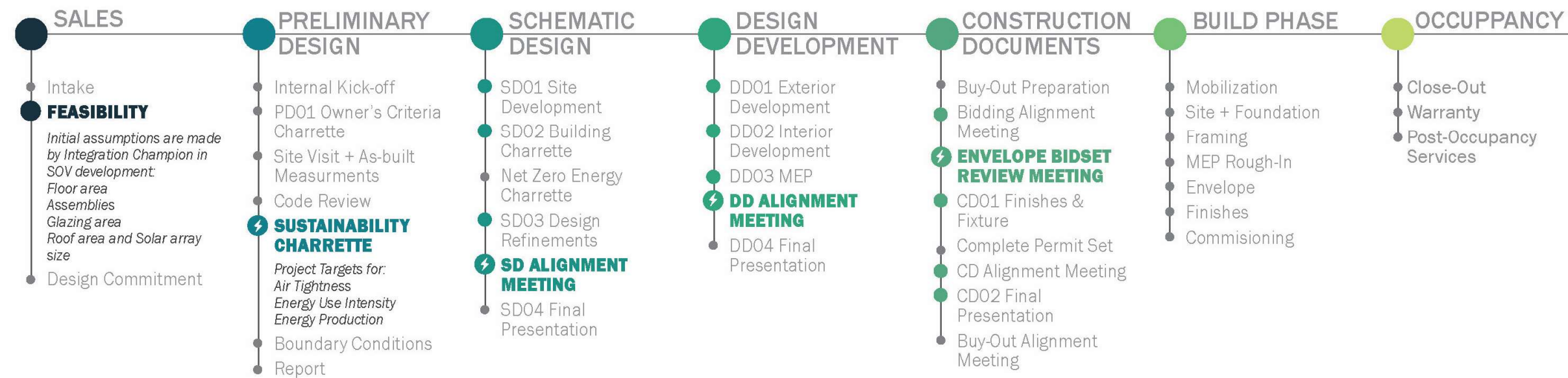
UNIFIED DESIGN BUILD PROCESS

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.

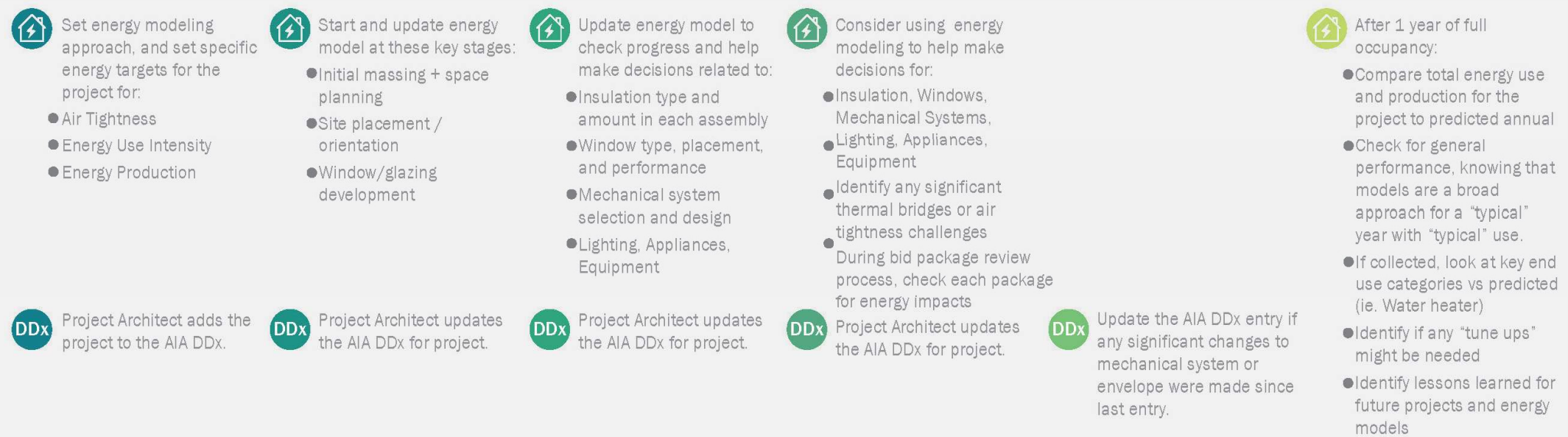


ENERGY MODELING WORKFLOW INTEGRATION

ENERGY MODEL MILESTONES



TARGETS



ENERGY MODELING WORKFLOW INTEGRATION



THANK YOU