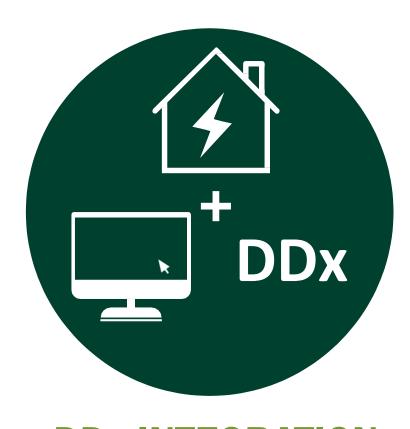


ENERGY MODELING
INTEGRATION IN
WORKFLOW



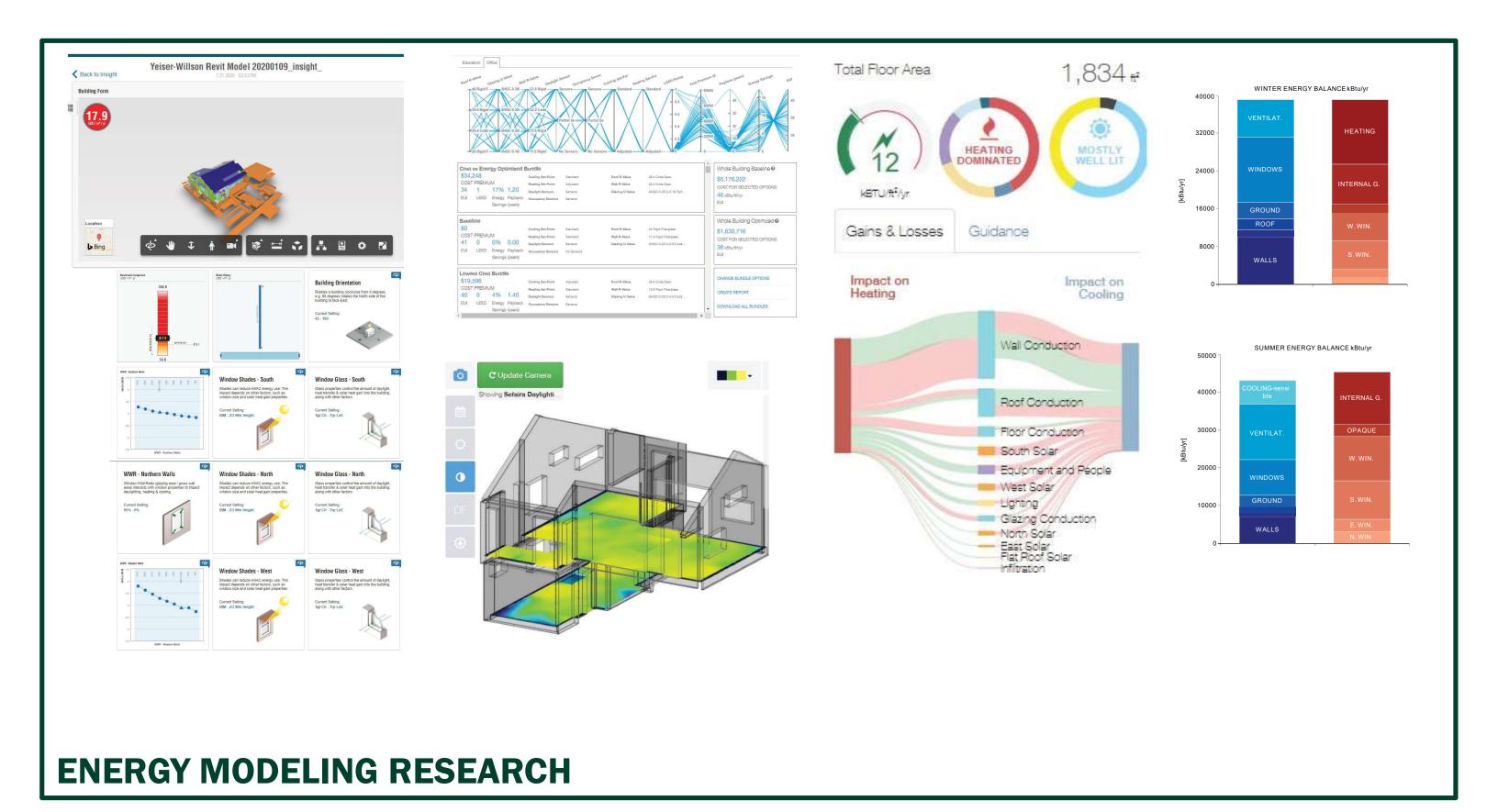
DDx INTEGRATION IN WORKFLOW

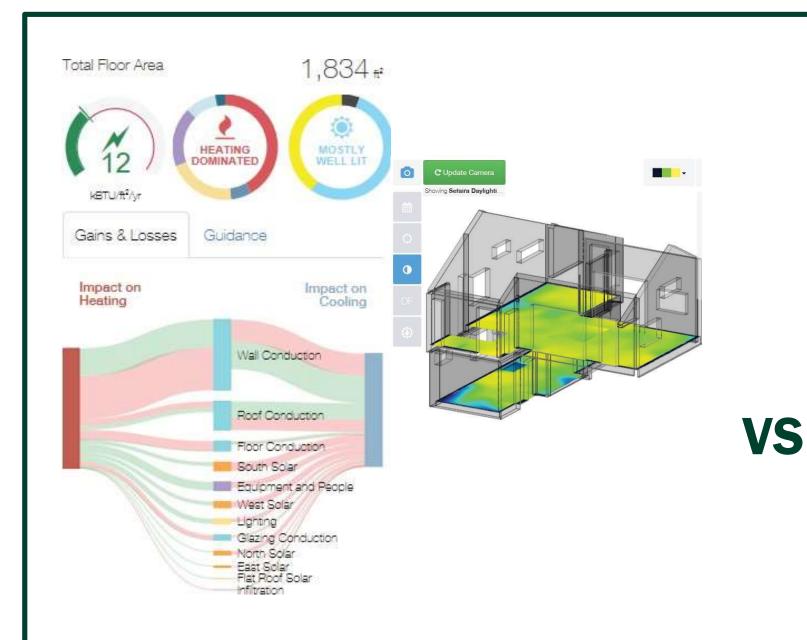
Software	Company/Organization	Interface	Works for single family?	Consider for SD tool?	Consider for In-Depth tool?
PHPP	PHI	Sketchup through Plugin	Yes	No	Yes
WUFI Passive	PHIUS	Sketchup Model Import	Yes	Maybe	Yes
PlanIT Impact		Sketchup Model Import	Maybe	Yes	Maybe
Cove Tool		Revit/Sketchup/Rhino Plugin	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

Software	Company/Organization	Interface	Works for single family?	Consider for SD tool?	Consider for In-Depth tool?
PHPP	РНІ	Sketchup through Plugin	Yes	No	Yes
WUFI Passive	PHIUS	Sketchup Model Import	Yes	Maybe	Yes
PlanIT Impact		Sketchup Model Import	Mavbe	Yes	Mavbe
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
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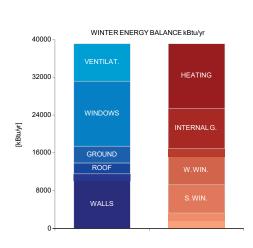


ANNUAL HEAT DEMAND

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

heat gains: Annual heat demand: 16,747 kBtu/yr 10,306.7 Btu/ft²yr Specific annual heat

demand:



ANNUAL COOLING DEMAND

gains: Total heat	45,313 kBtu/yr
gains: Transmission	57,247 kBtu/yr
losses :	34,620 kBtu/yr
Ventilation	91,867 kBtu/yr
losses: Total	42.5 %
heat losses:	38.998 kBtu/vr

31,497 kBtu/yr

13,816 kBtu/yr

38,998 kBtu/yr

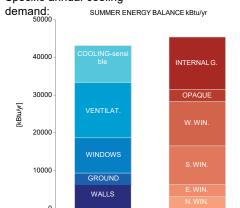
Utilization factor:

Solar heat gains:

Internal heat

6,315 kBtu/yr Osefingาฮล_์mand - sensible: Cooling demand -9 kBtu/yr **6,324** kBtu/yr latent: Annual cooling 3.9 kBtu/ft²yr demand:

Specific annual cooling



SEFAIRA

WUFI PASSIVE

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

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.

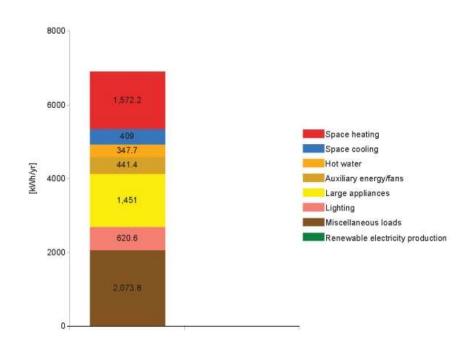
Interface harder to navigate

SEFAIRA

ENERGY MODELING RESEARCH

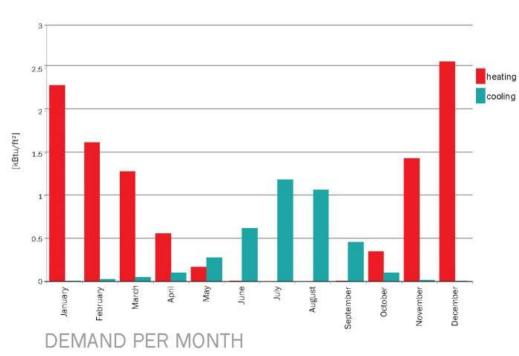
WUFI PASSIVE

TOTAL ENERGY USE BY TYPE



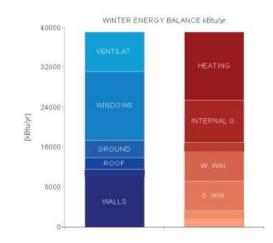
Туре	Site Energy [kWh/yr]	Specific site energy [kWh/ft² yr]	Site Energy [kBtu/yr]	Specific Site Energy [kBtu/ft² yr]
Space heating	1,572.2	1	5,364	3.3
Space cooling	409	0.3	1,395.5	0.9
Hot water	347.7	0.2	1,186.3	0.7
Auxiliary energy/fans	441.4	0.3	1,506	0.9
Large appliances	1,451	0.9	4,950.6	3
Lighting	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

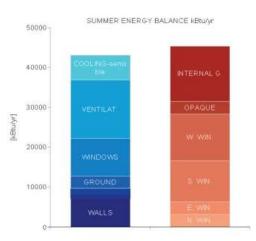
HEATING/COOLING DEMAND



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

IAL COOLING DEMAND at gains: 31,497 kBtu/yr eat gains: 13,816 kBtu/yr 45,313 kBtu/yr at gains: sion losses : 57,247 kBtu/yr 34,620 kBtu/yr on losses: at losses: 91,867 kBtu/yr factor: 42.5 % 38,998 kBtu/yr demand - sensible: 6,315 kBtu/yr lemand - latent: 9 kBtu/yr Annual cooling demand: 6,324 kBtu/yr Specific annual cooling demand: 3.9 kBtu/ft2yr





HEATING/COOLING LOADS



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.

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 of Build Team has the expertise to take on any project, from backyard cottages to custom homes, from tenant improvements to multi-family communities.

OCCUPY

FINISHES

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

2

AGREEMENT



POST-OCCUPANCY

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



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

DDx Project Architect updates the AIA DDx for project.

Update the AIA DDx entry if

any significant changes to

envelope were made since

mechanical system or

last entry.

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

Project Architect adds the project to the AIA DDx.



Project Architect updates the AIA DDx for project.



Project Architect updates the AIA DDx for project.

TARGETS

ENERGY MODELING WORKFLOW INTEGRATION

