Otak **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

- - Exchange



GO Practice

 Improving Design **Process To Make** "Greener" Work AIA 2030 Design Data

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







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

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

	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"
Structure [1]	Wood - Stud Layer with Batt Insulation	
Core Boundary	Layers Below Wrap	J. O.
Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"

INTERIOR SIDE



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

	8	Glass - Standard	Thermal	Solid	Solid: Glass	Identity Graphics App	earance The
ł						I Glass Fiber Batt	
		Glass Block	Thermal	Solid	Solid: Glass	Information	
		Glass Fiber - Foil-Faced	Thermal	Solid	Solid: Insulation-Fibers	Properties	Transmits
		Glass Fiber Batt	Thermal	Solid	Solid: Insulation-Fibers	Behavior Thermal Conductivity	Isotropic
		Glass Fiber Board - Organic Bonded	Thermal	Solid	Solid: Insulation-Fibers	Specific Heat	0.2197 btu/(I
		Glass Foam	Thermal	Solid	Solid: Insulation-Fibers	Density Emissivity	2.00 pound p 0.90
		Granite	Thermal	Solid	Solid: Stone	Permeability Porosity	17.4784 grai
		Gravel	Thermal	Solid	Solid: Earth	Reflectivity	0.00
						Electrical Resistivity	1.0000E+10

- 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.



ermal +
light
Light
hr·ft·°F)
lb·°F)
per cubic foot
n/(ft²·hr·inHg)
Ω·m

Before and After Thermal Input – R Value Generated

Edit Assembly

Assembly

nily: e: al thickness: istance (R): rmal Mass:	Basic Wall XT.01-2X8 WD- 0' 10 5/16" 0.0000 (h·ft²·°F 0.0000 BTU/°F	NR NO R-Valu	Je	Famil Type: Total Resist Thern	y: Basic Wall XT.01-2X8 W thickness: 0' 10 5/16" tance (R): 14.7358 (h·ff nal Mass: 0.2652 BTU/ ars		urate R-	Valuesa	mp
yers				Luye	15	EXT	ERIOR SIDE		
		EXTERIOR SIDE			Function	Material	Thickness	Wraps	
	Function	Material		1	Finish 2 [5]	Siding - Board & Batten	0' 1 1/16"	\checkmark	
Finish 2	[5]	Siding - Board & Batten 12"	0' 1 1/16	2	Finish 1 [4]	Wood - Furring	0' 0 3/4"	\checkmark	
Finish 1	[4]	Wood - Furring	0' 0 3/4"	3	Membrane Layer	WRB (Weather Resistive	0' <mark>0"</mark>	V	
Membra	ane Laver	WRB (Weather Resistive Barrier)	0' 0"	4	Substrate [2]	Wood - Sheathing - Plyw	0' 0 5/8"		
Substrat	te [2]	Wood - Sheathing - Plywood	0' 0 5/8"	5	Core Boundary	Layers Above Wrap	0' 0"	1	
Core Be	undary	Lavers Above Wran	0' 0"	6	Structure [1]	Wood - Stud Layer with	0' 7 1/4"		5
Core bo			0 0	7	Core Boundary	Layers Below Wrap	0' 0"		
Structur	e [1]	Wood - Stud Layer with Batt Insulation	0 7 1/4	8	Finish 2 [5]	Gypsum Wall Board	0' 0 5/8"		
Core Bo	oundary	Layers Below Wrap	0. 0.						
Finish 2	[5]	Gypsum Wall Board	0' 0 5/8"						
					1	INTERIOR SIDE			
:					Insert Delete	u Up Do	วพก		

INTERIOR SIDE

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



Loading Energy Model To Insight Database

T AUTODESK' INSIGHT











다 振 Ø 6

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



Roof, Wall, Window Insulation



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.



AIA 2030 Design Data Exchange

2. Energy Analysis

- 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

Status of Energy Model *	HAS BEEN Modeled	Responsible Party	Please select
Design Energy Code *	Oregon Energy Efficiency Specia	Energy Modeling Tool *	Autodesk Insight 360
Energy Use Data will be collected		Time Spent On Energy Modeling	Please select
		Energy Modeling Cost (Phase)	\$
			Total (All Phases) = \$ 0
		Annual Energy Cost Savings	\$
		Fuel types, renewables, and 	emissions



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	6 <mark>1</mark> 2.79
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	<mark>33.57</mark>	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

