

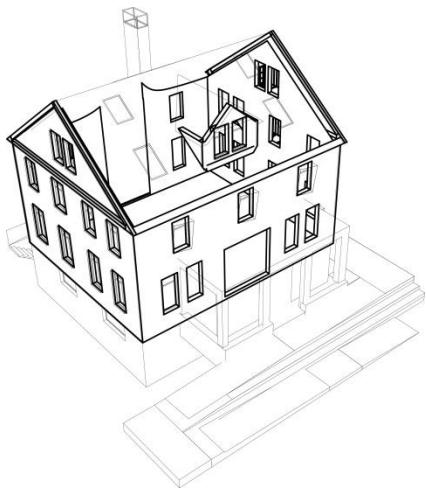
# HOUSE

# ZERO

# LCA

## G. Findings

### The house



### **External wall**

Assembly area: 204.8m<sup>2</sup>(+5.9m<sup>2</sup> dormer)

	Depth (mm)	Area (%)
Clay plaster *	30	100%
Board (also vapor retarder)	25	100%
2x4 wood studs (existing structure)	100	13%
100 mm optimized min wool	100	87%
High density rockwool **	50	100%
Tyvek	1	100%
Air	11	100%
Board	15	100%
Shingle siding	20	100%
<b>Total</b>	<b>252</b>	

\* Melià, Paco, Gianluca Ruggieri, Sergio Sabbadini, and Giovanni Dotelli. "Environmental impacts of natural and conventional building materials: a case study on earth plasters." *Journal of Cleaner Production* 80 (2014): 179-186.

\*\* Environmental product declaration: Rolan rockwool insulation board,  
[environdec.com/en/Detail/epd532#.VqKEcfmrRaQ](http://environdec.com/en/Detail/epd532#.VqKEcfmrRaQ)



### **Roof**

Assembly area: 126.6m<sup>2</sup>(+13.8m<sup>2</sup> dormer)

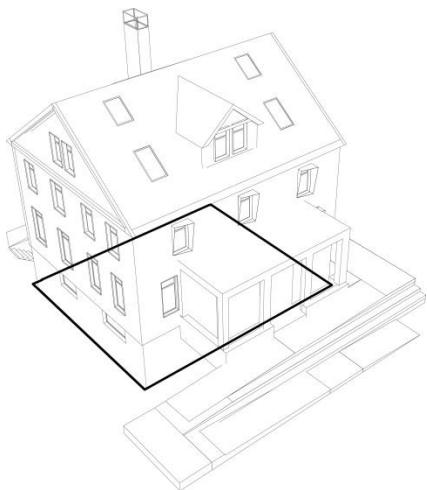
	Depth [mm]	Area (%)
Gypsum board	13	100
Vapor retarder	1	100
2"x7" rafters (existing)	175	13
175 mm min wool	175	87
100 mm rigid min wool insulation	100	100
Combined membrane (wind + water)	1	100
Air	28	72
Impr. wood 28x120 mm	28	18
<b>Total</b>	<b>318</b>	

### **Roof BIPV**

Assembly area: 126.6m<sup>2</sup>

	Depth [mm]	Area (%)
PV (SunPower crystalline Si module)*	10	100

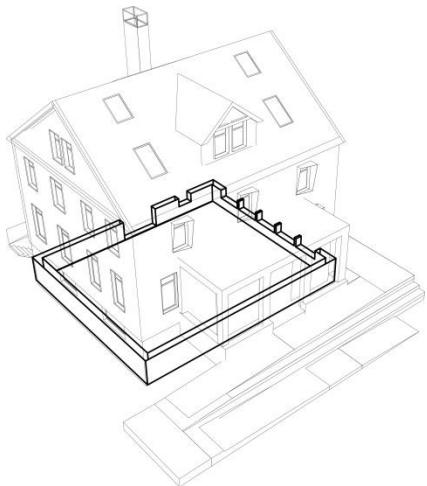
\* Fthenakis, Vasilis, Rick Betita, Mark Shields, Rob Vinje, and Julie Blunden. "Life cycle analysis of high-performance monocrystalline silicon photovoltaic systems: energy payback times and net energy production value." In 27th European Photovoltaic Solar Energy Conference and Exhibition. 2012.



#### **Basement floor**

Assembly area: 96.9m<sup>2</sup>

	Depth [mm]	Area (%)
Concrete floor (existing)	120	100%



#### **Basement wall below grade**

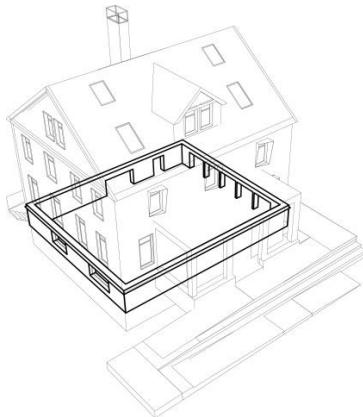
Assembly area: 35.7m<sup>2</sup>

	Depth [mm]	Area (%)
Concrete (existing)	200	100%
Rigid insulation Roxul/ PIR or similar	150	100%
<b>Total</b>	<b>350</b>	

#### **Horizontal insulation subterranean brim 1.5m**

Assembly area: 68.3m<sup>2</sup>

	Depth [mm]	Area (%)
Rigid insulation Roxul/ PIR or similar	150	100%

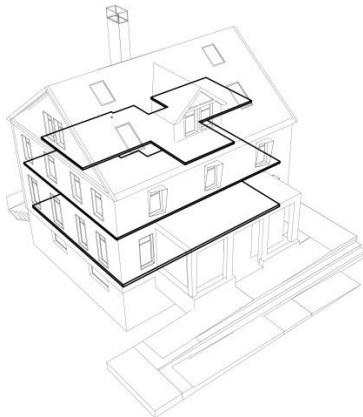


#### **Basement wall above grade**

Assembly area: 50m<sup>2</sup>

\*Combine with sub-grade wall

	Depth [mm]	Area (%)
Concrete (existing)	200	100%
Rigid insulation Roxul/ PIR or similar	150	100%
<b>Total</b>	<b>350</b>	



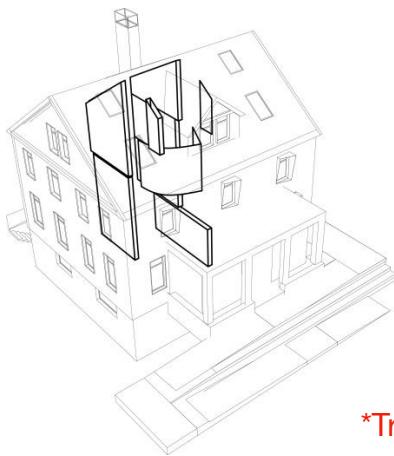
#### **Internal floors**

Assembly area: 252.2m<sup>2</sup>

	Depth [mm]	Area (%)
Chelmsford granite tiles (Cradle-to-gate)*	20	100%
Cement screed (1:2:9 cement-lime-sand mix)**	25	100%
Rigid min. wool	30	100%
Plywood floorplate	22	100%
<b>Total</b>	<b>102</b>	

\*Chishna, Naeeda, Suzy Goodsir, Phil Banfill, and Keith Baker. "Embodied Carbon in Natural Building Stone - Historic Scotland Technical Conservation Group." (2010).

\*\*Hammond, Geoff, and Craig Jones. Inventory of carbon & energy: ICE. Bath, UK: Sustainable Energy Research Team, Department of Mechanical Engineering, University of Bath, 2008.

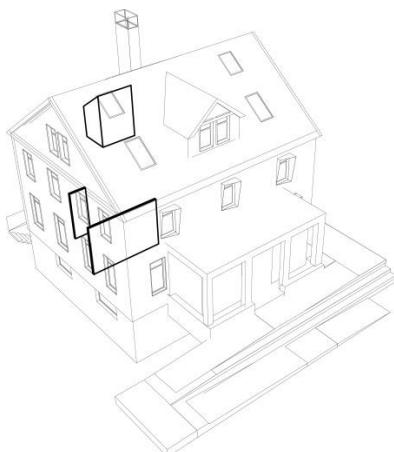


\*Treat thermal walls as solid partitions

#### **Thermal wall**

Assembly area: 98m<sup>2</sup>

	Depth [mm]	Area (%)
Wood (massive / CLT)	100	100%
Clay plaster *	50	100%
<b>Total</b>	<b>150</b>	

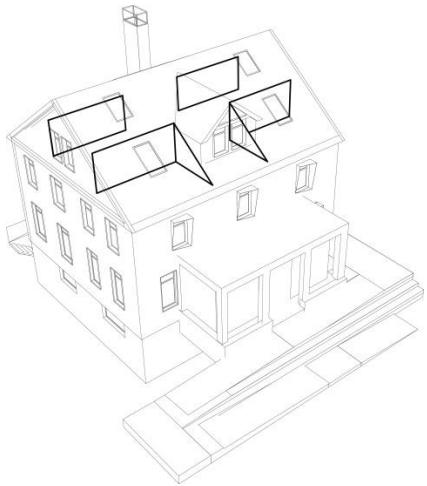


#### **Solid partition walls**

Assembly area: 45.1m<sup>2</sup>

	Depth [mm]	Area (%)
Gypsum board	13	100%
2x4 studs	100	13%
100 mm min wool	100	87%
OSB Board	22	100%
Clay plaster *	30	100%
<b>Total</b>	<b>265</b>	

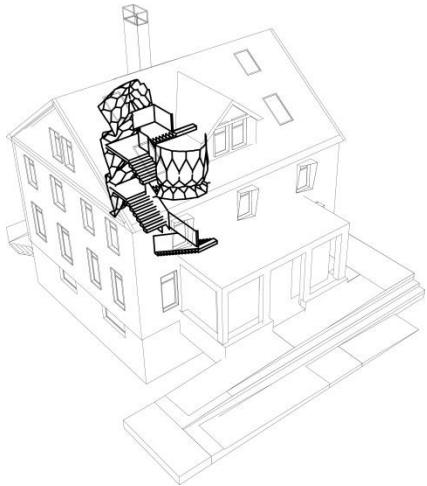
\* Melià, Paco, Gianluca Ruggieri, Sergio Sabbadini, and Giovanni Dotelli. "Environmental impacts of natural and conventional building materials: a case study on earth plasters." *Journal of Cleaner Production* 80 (2014): 179-186.



### **Glazed partition walls**

Assembly area: 63.5m<sup>2</sup>

	Depth [mm]	Area (%)
Single pane tempered glass	8	100%



### **Acoustic booth and stair well surfaces**

Assembly area: 84.3m<sup>2</sup>

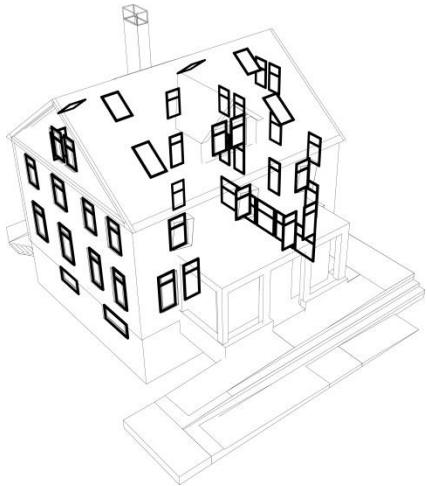
	Depth [mm]	Area (%)
Reclaimed American white oak*	50	100%

### **Staircase**

Assembly area: 22.61m<sup>2</sup>

	Depth [mm]	Area (%)
Reclaimed American white oak*	50	100%

\*Bergman, Richard D., Hongmei Gu, Robert H. Falk, and Thomas R. Napier. "Using reclaimed lumber and wood flooring in construction: measuring environmental impact using life-cycle inventory analysis." Series: Journal Articles (2010).



### Windows and skylights

Assembly area: 53.55m<sup>2</sup>

	Depth [mm]	Area (%)
Glazing: triple pane IGU, low-E	36	100%
Wood window frame, aluminum fitting	252	100%
<b>Total</b>	<b>252</b>	