

HOUSE

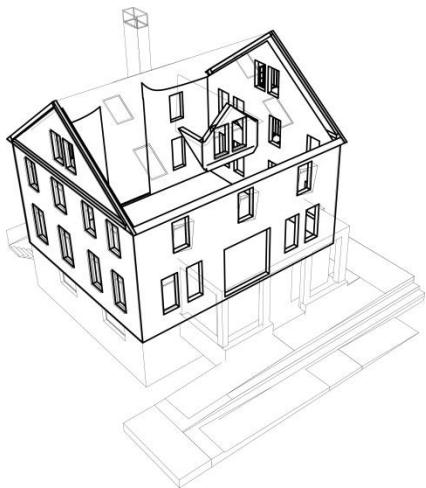
ZERO

LCA

<https://bit.ly/2RXXICQ>

G. Findings

The house



External wall

Assembly area: 204.8m²(+5.9m² 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%
Total	252	

* 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



Roof

Assembly area: 126.6m²(+13.8m² dormer)

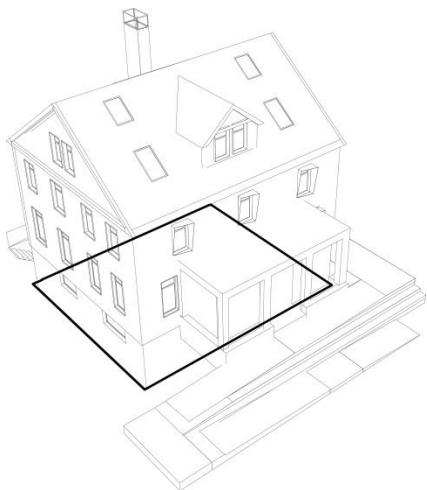
	Depth [mm]	Area (%)
Gypsum board	13	100
Vapor retarder	1	100
2"x7" rafters (existing)	175	13
175 mm min wool	175	87
100 mm rigid min wool insulation	100	100
Combined membrane (wind + water)	1	100
Air	28	72
Impr. wood 28x120 mm	28	18
Total	318	

Roof BIPV

Assembly area: 126.6m²

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

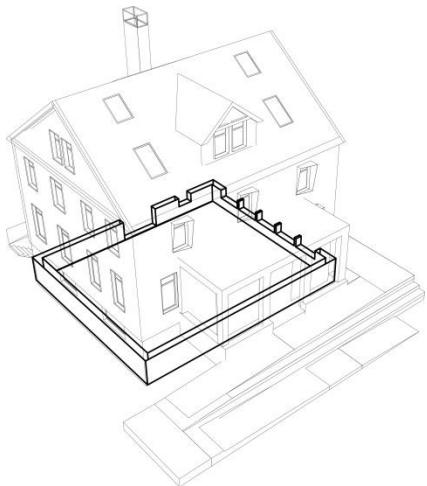
* Fthenakis, Vasilis, Rick Betita, Mark Shields, Rob Vinje, and Julie Blunden. "Life cycle analysis of high-performance monocrystalline silicon photovoltaic systems: energy payback times and net energy production value." In 27th European Photovoltaic Solar Energy Conference and Exhibition. 2012.



Basement floor

Assembly area: 96.9m²

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



Basement wall below grade

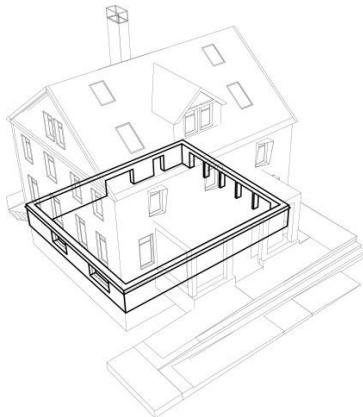
Assembly area: 35.7m²

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

Horizontal insulation subterranean brim 1.5m

Assembly area: 68.3m²

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

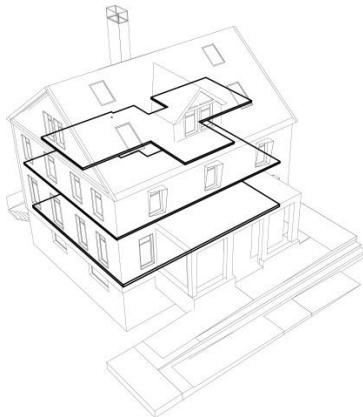


Basement wall above grade

Assembly area: 50m²

*Combine with sub-grade wall

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



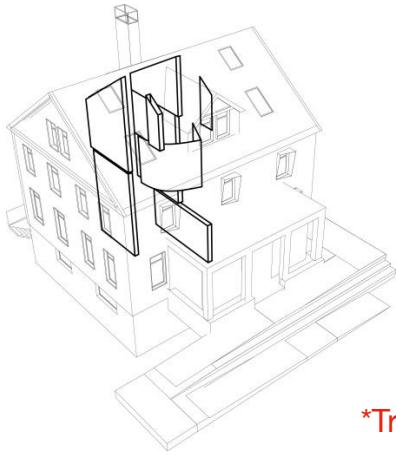
Internal floors

Assembly area: 252.2m²

	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%
Total	102	

*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.

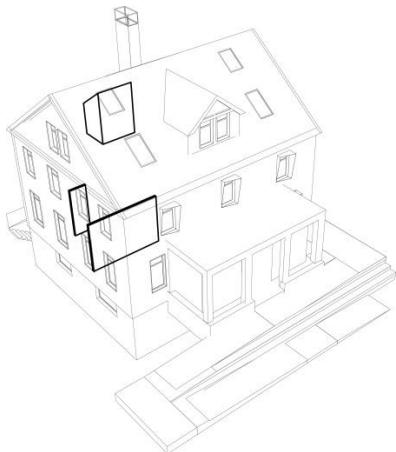


*Treat thermal walls as solid partitions

Thermal wall

Assembly area: 98m²

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

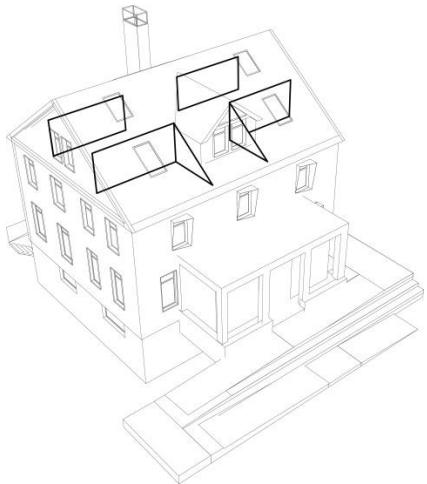


Solid partition walls

Assembly area: 45.1m²

	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%
Total	265	

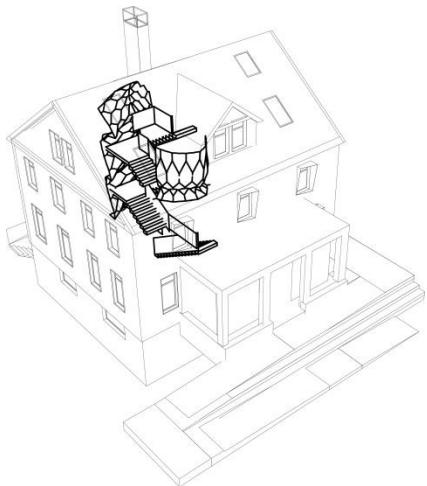
* Melià, Paco, Gianluca Ruggieri, Sergio Sabbadini, and Giovanni Dotelli. "Environmental impacts of natural and conventional building materials: a case study on earth plasters." *Journal of Cleaner Production* 80 (2014): 179-186.



Glazed partition walls

Assembly area: 63.5m²

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



Acoustic booth and stair well surfaces

Assembly area: 84.3m²

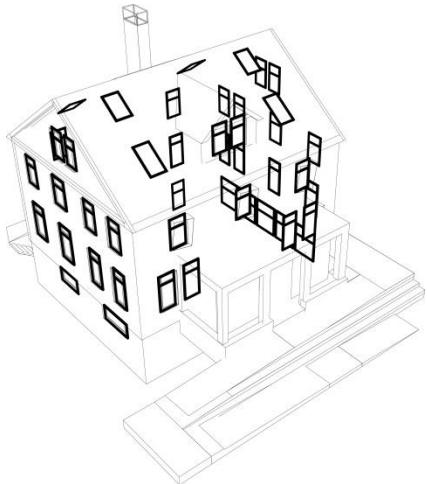
	Depth [mm]	Area (%)
Reclaimed American white oak*	50	100%

Staircase

Assembly area: 22.61m²

	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).

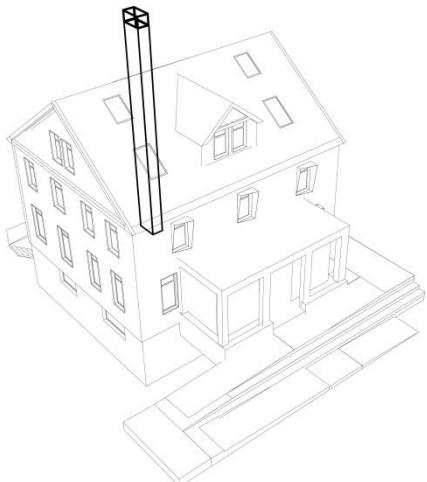


Windows and skylights

Assembly area: 53.55m²

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

Solar chimney



	Depth [mm]	Area (m ²)
Glazing: double pane (air insulation)	20	34.20
Steel framing	10	1.95
100 mm reclaimed brick from existing chimney	100	11.40
Translucent aerogel glass panel*	30	4.00
Total		

*Double pane glazing + Spaceloft aerogel insulation EPD