

Zero Energy House

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Summary



Mission Statement



External Research



House of Quality



Final House Design

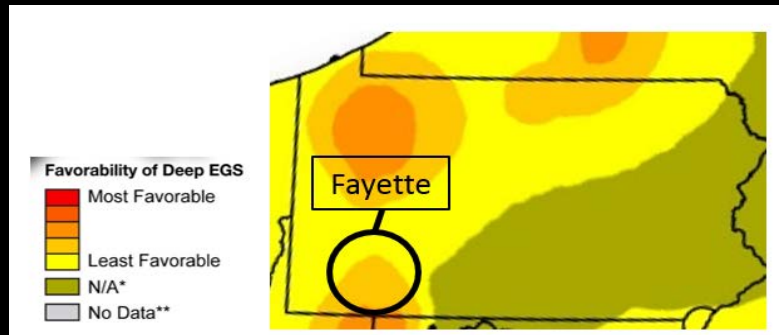


Conclusion and Final Cost

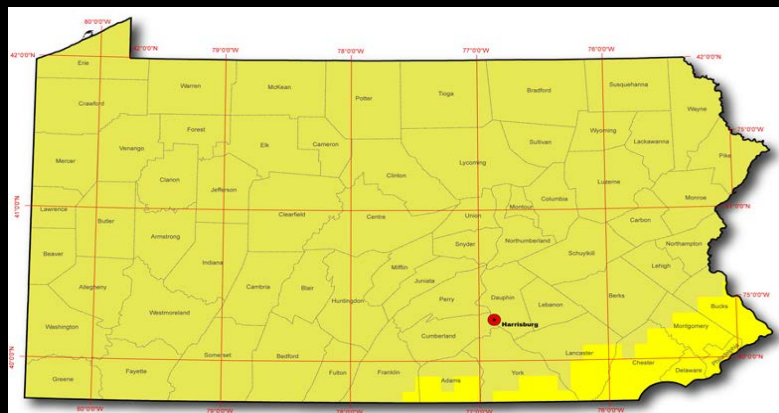
Our design is mainly focusing on building a self-sustained zero energy home with optimized function, value and visually appealing



Based on the solar map and geothermal map, Fayette County, PA becomes our choice of location for zero energy home and is designed by referring to different zero energy home benchmarking in US



- Solar map

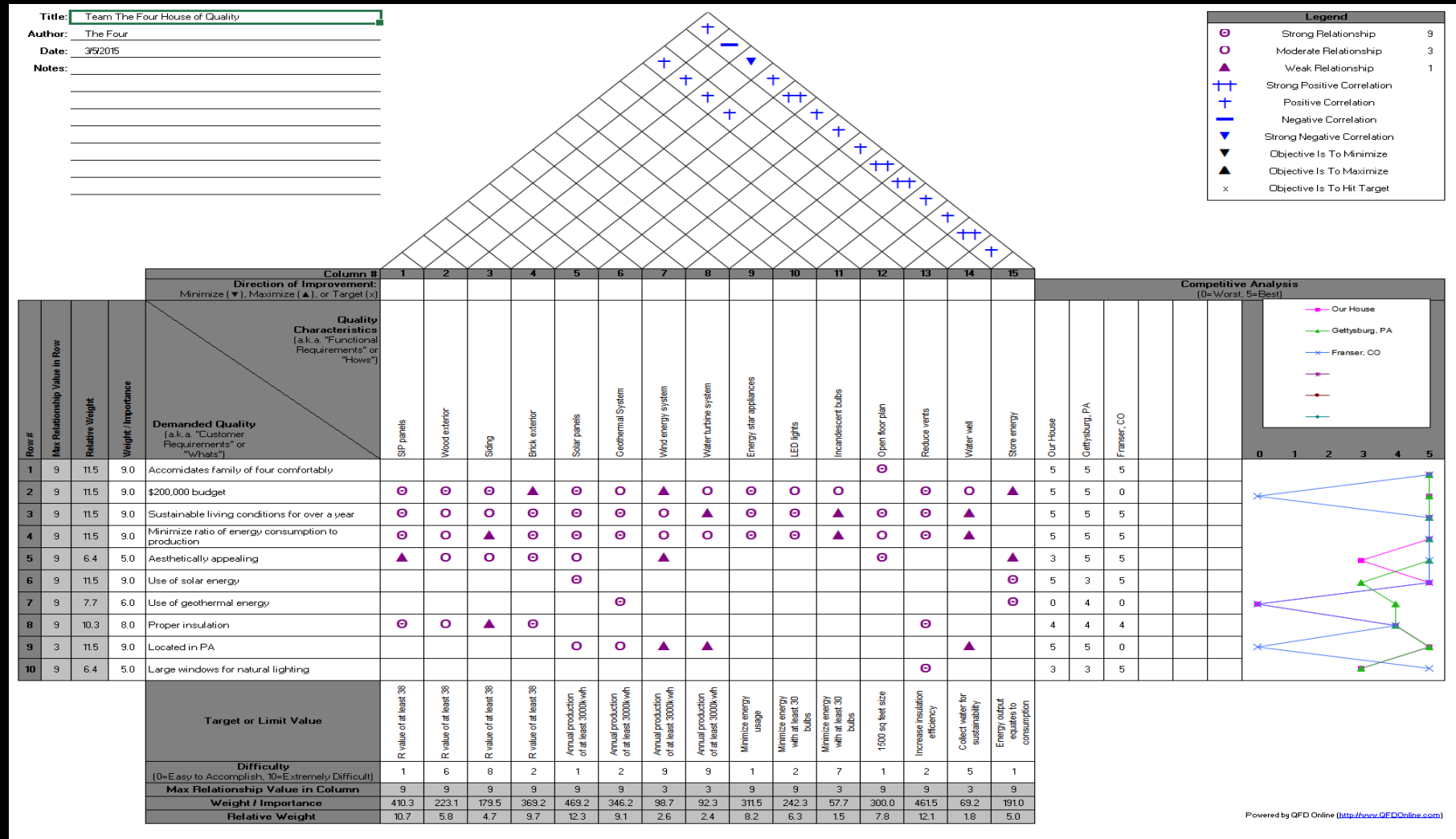


- Geothermal map

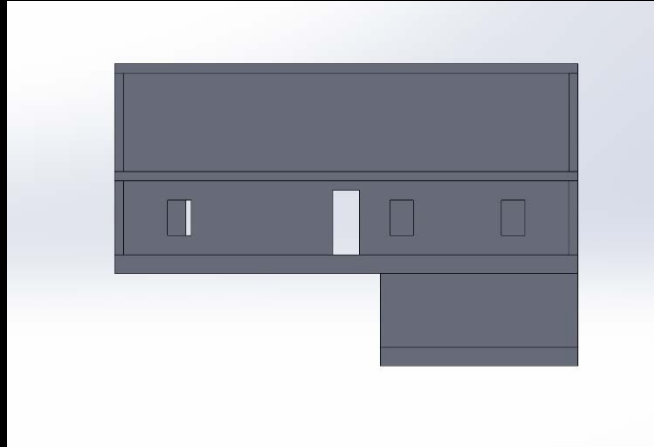
Location	Gettysburg, PA
URL	http://www.hphpa.com/floorplans/nice
House Size	1,942 sq. ft.
Number of Floors	1
Number of Bedrooms	3
Number of Baths	2
Type of Heating System	Geothermal
Solar Panels	Yes
Insulation	SIP's
Other Key Information	Air Filtration is also used

- Benchmarking of house in Gettysburg, PA

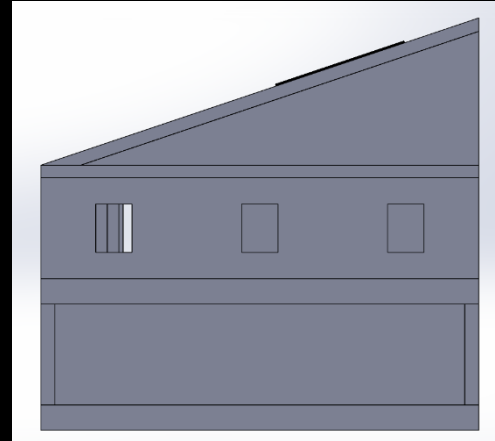
In house of quality, we have included concept screening, concept scoring and target specification which show their relevant importance with customer needs



Our zero energy home design with its drawings is made by Solidworks



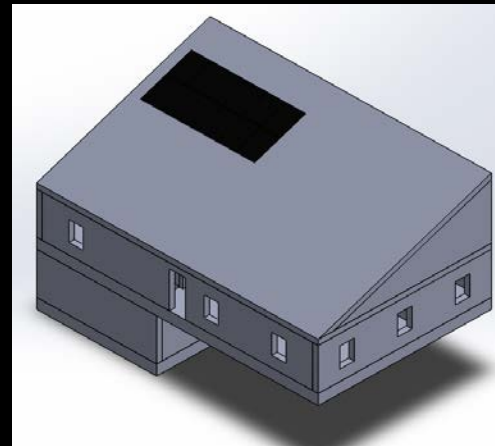
- Back view



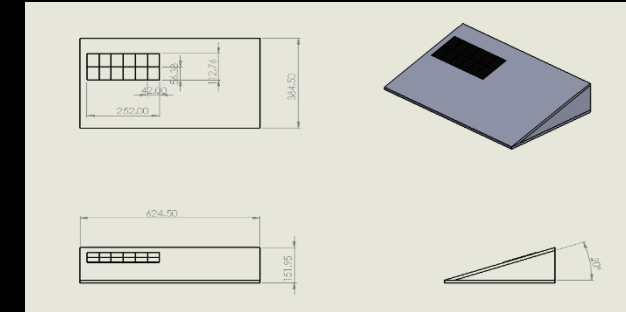
- Right view



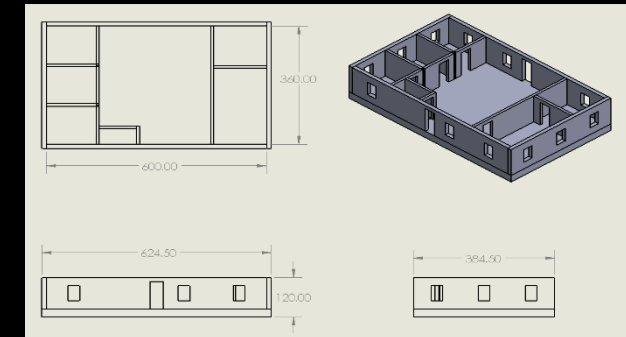
- Front view



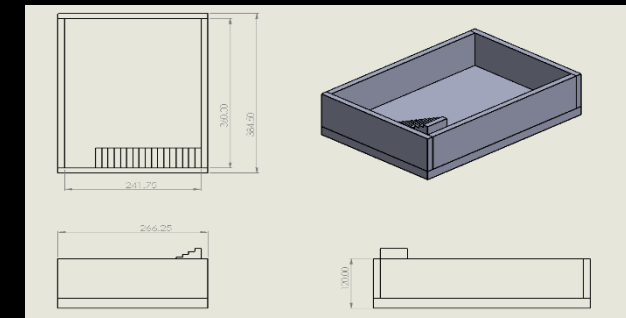
- Isometric view



- Roof design



- First floor design



- Basement design

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Conclusion and
Final Cost

Our total estimated cost, including construction materials, electrical appliances, and solar panel, is based on reliable online resources

Penn State Center for Sustainability

General Info	
Location	Fayette
Electricity cost (\$/kwh)	0.07
House type	1 story

Base House Cost = \$ 152,630.00

Wall construction	SIPIs 12.25" foam
Ceiling Insulation	R60
Window type	Triple low-e
Upper floor ceiling area (sq.ft.)	1500
North wall area (gross) (sq.ft.)	800
East wall area (sq.ft.)	360
South wall area (sq.ft.)	
West wall area (sq.ft.)	
North window area (sq.ft.)	
East window area (sq.ft.)	
South window area (sq.ft.)	
West window area (sq.ft.)	30.67
Air tightness	Tight with heat recovery

Appliances	
Refrigerator	Best
Clothes Washer	Best
Dishwasher	Best

Small Appliance Input

Extras	
Garage	a. None
Hot Tub	a. None
Pool	a. None

Zero Energy Home Calculator

Heating & Cooling	
Type of heating & cooling system	Electric geothermal heat pump

Solar Technologies	
Size of PV system (kw)	3.39
	Yes
	A lot
Uses clothesline	A lot
Thermostat setback	A lot
Heat thermostat setting (F)	68
Cool thermostat setting (F)	75

Results	
Envelope Heat Transmission	

Total cost = \$ 185,956.00

Roof 44.7%
Walls 24%

Upgrade Cost = \$16,363.00

Base House Cost	
PV Cost	\$ 16,962
Upgrade Costs	\$ 16,363
Total House Cost	\$ 185,956

Estimated Operating Costs with Solar Heat and Electricity Contributions

Category	Annual Cost (\$)
Net	\$24
Solar	\$97
PV	\$134
Lights	\$6
Major appliances	\$19
Misc electric loads	-\$37
Hot water	\$14
Heating	-\$43
Cooling	-\$291
TOTAL	-\$291

