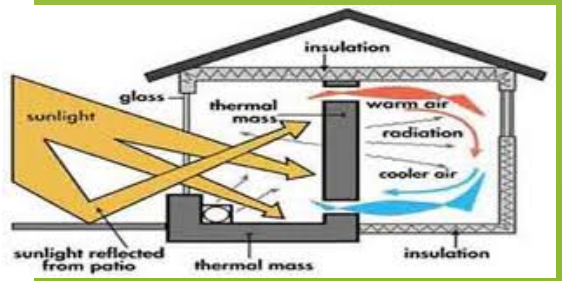
# Solar Energy

As we said before, it is a house that produces its own energy. A ZEH uses renewable sources to produce energy. Those renewable sources for our ZEH are active & passive solar and wind energy is 4.55 kW for our ZEH. Misc. electric appliances and major electric appliances consume most of the energy produced (60%). Our house faces 45 south to gain maximum sunlight. Passive solar system and windows heat 558 sq. ft. of the home.



# Wind Energy

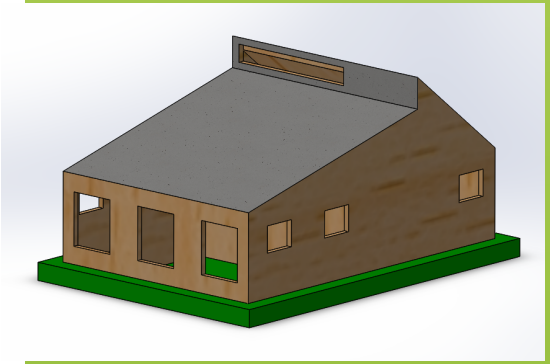
The wind power system provides energy when in a low sun light situation. The turbines will see a decent amount of use because the average wind speed around our house is 12 mph. The 2 wind turbines are provided by Solar Installers Company and produce 1967 kWh.

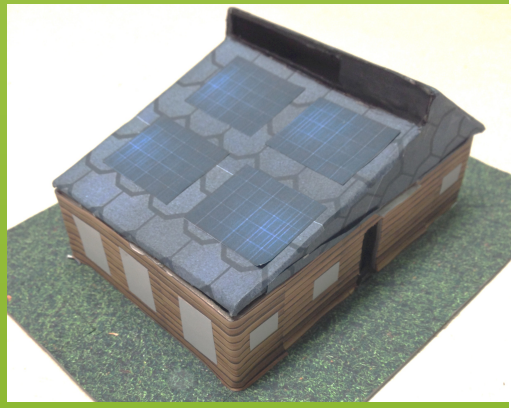
## EDSGN 100

Bryce Connelly
Chris Campbell
Yigit Ozsahin
Shelby Mychayliw
Penn State, Class of 2017

# ZEH Home

## The home that loves the family and the environment

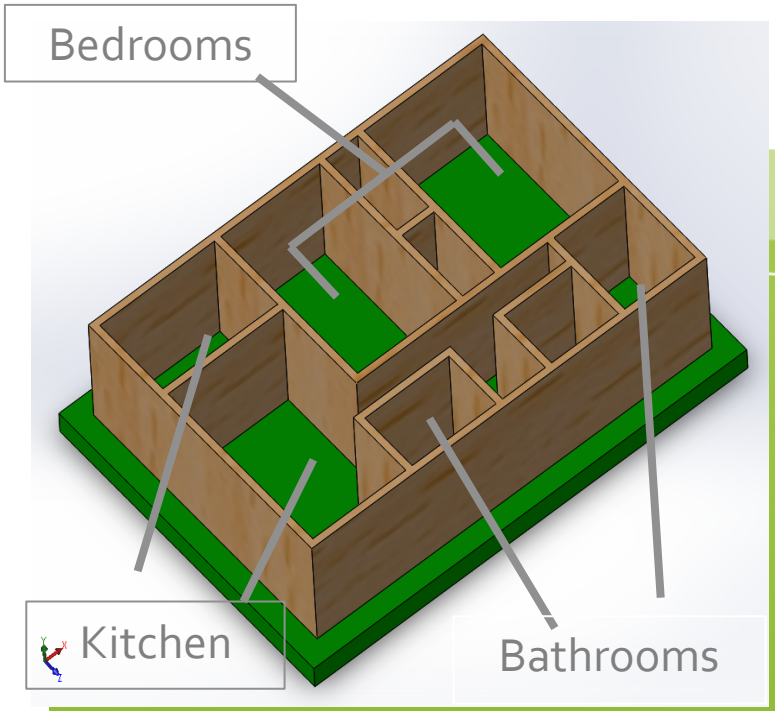




*Think of a house that produces its own energy, isn't it amazing? Here some facts about saving electricity and energy sources of our ZEH.*

PENNSTATE

# Our Home in It's Fullest




## Specs

Our ZEH is located on Allenstown, PA. It is a one-story home. It utilizes renewable energy sources and produces ~6000 kWh per year. It supports a 4-person family with two bedrooms with one large master bedroom, 324sq. ft. kitchen, 546 sq. ft. bedroom and closet area and 125 sq. ft. bathroom space. Our zero energy home is designed specially for a 4-person family. The ZEH has 2 Bedrooms and 2 baths, a kitchen and a living space. Though it is a small house it is practical and designed for maximum space efficiency.

## Pros

- ZEH
- Supports small family
- Affordable for property virgins
- New potential market for environment lovers
- Offers full functionality of house
- Easy to maintain

Our asking price: $240,000

# Budget & Costs

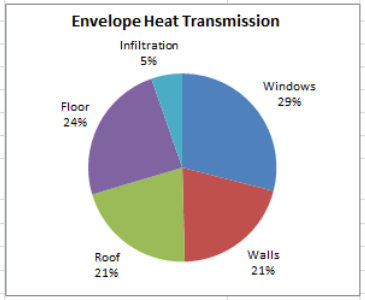
**Penn State Center for Sustainability**

| General Info | |
|---|---|
| Location | Allentown |
| Electricity cost ($/kwh) | 0.077 |
| House type | 1 story |
| Conditioned floor area (sq.ft.) | 1080 |
| Number of bedrooms | 2 |
| **Envelope Details** | |
| Wall construction | Double 2x4 with 10" foam |
| Ceiling Insulation | R40 |
| Window type | Triple low-e |
| Upper floor ceiling area (sq.ft.) | 1080 |
| North wall area (gross) (sq.ft.) | 270 |
| East wall area (sq.ft.) | 400 |
| South wall area (sq.ft.) | 270 |
| West wall area (sq.ft.) | 400 |
| North window area (sq.ft.) | 24 |
| East window area (sq.ft.) | 36 |
| South window area (sq.ft.) | 131 |
| West window area (sq.ft.) | 48 |
| Air tightness | Tight with heat recovery |
| **Appliances** | |
| Refrigerator | Energy Star |
| Clothes Washer | Energy Star |
| Dishwasher | Energy Star |
| 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) | 4.55 |
| Solar water heater | Yes |
| **Behavior** | |
| Water conservation | A lot |
| Uses clothesline | A lot |
| Thermostat setback | Some |
| Heat thermostat setting (F) | 72 |
| Cool thermostat setting (F) | 72 |

**Results**




| | | |
|---|---|---|
| **Base House Cost** | $ | 124,863 |
| **PV Cost** | $ | 22,770 |
| **Upgrade Costs** | $ | 19,321 |
| **Total House Cost** | $ | 166,954 |