



Net Zero Building Design

Group names

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Abstract

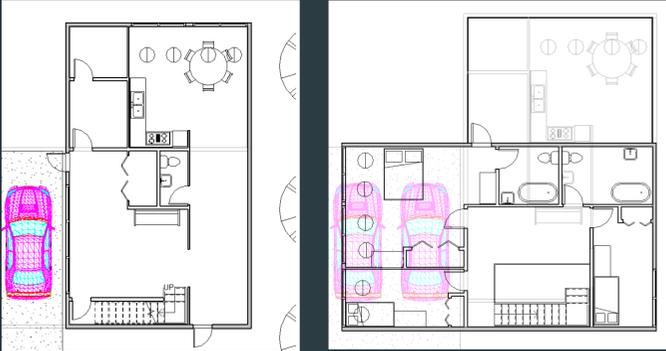
One of the greatest limits on today's society is the environmental impact our ever increasing demand for energy. Everyday millions of gallons of fossil fuels and natural gas are used to satiate this demand; the problem with this is these are limited resources. Nuclear energy while it may produce more power is no cure for this problem. The uranium and plutonium ions expended during nuclear fission in a power plant are as rare as diamonds or platinum and are more expensive to mine. Renewable resources need to be implemented to continue the advancement of society. These renewable forms of energy are currently being implemented by homeowners with an impressive savings to power. For this project a team consisting of Jake Drouse, Connor Stewart, Felipe Navaro and Nikolas Maimas with Dr. Michael Emmer as an advisor, will be designing a net zero residence. It is our belief that a home can be constructed for a MFI of \$100,000 that is both green and affordable (in this income bracket)

Location

The theoretical location for our house will be 1401 Bishops Lodge Rd, Santa Fe NM. This location provides lost cost property and home taxes while also allowing for the instillation of solar cells if the budgets allows. This area receives constant solar radiation for the majority of the year making it the idea area for the use of solar cells



Floor plan



The envelope of our building is to be constructed using recycled shipping containers. The floor plan of the residence was designed to reduce modifications to the containers and retain the bulk of the material. All vertical walls shown in is plan are original walls from the containers

Power Consumption Reduction

One of the main goals of the project is to reduce the overall power consumption. To reduce the power consumption the house design is going to include all ENERGY STAR products. This means that all appliances should be ENERGY STAR approved. The heating and cooling of the house also requires a lot of the power consumption. By having efficient insulation and low consumption cooling and heating products, the power consumption can be reduced.

Envelope Construction

40' GP

	L	W	H
External	40'0"	8'0"	8'6"
	12.19m	2.44m	2.59m
Internal	39'6"	7'8"	7'1"
	12.03m	2.35m	2.39m
Door Opening	39'6"	7'8"	7'6"
	12.03m	2.35m	2.28m
Max Capacity	2390-2397 (cu ft)		58820-60740 (lbs)
	67.70-37.80 (m)		28860-27550 (kgs)
Tare Weights	6460-8380 (lbs)		
	2390-3800 (kgs)		

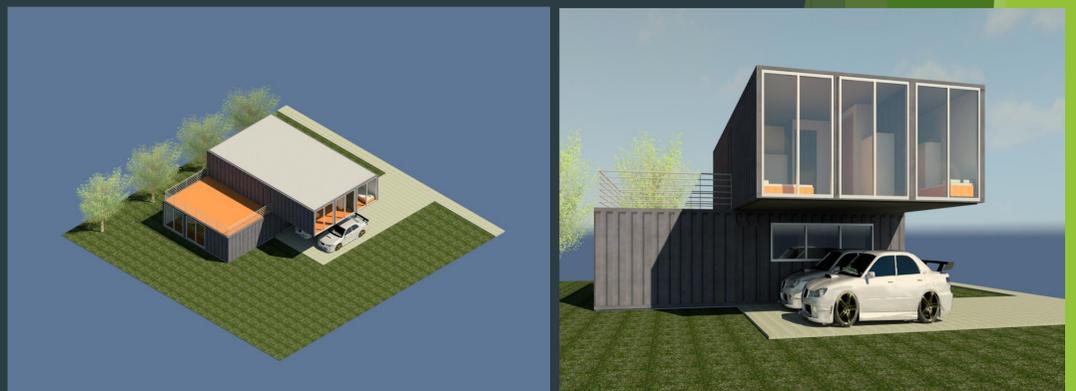
The home will be constructed from 6 forty foot shipping containers. The idea was pioneered by the military for forward command bases. The 6 shipping containers provide us with the area needed for the home while also being low cost compared to conventional framing. This method also has the added benefit of being recyclable

What is ENERGY STAR?



"ENERGY STAR certified new homes are designed and built to standards well above most other homes on the market today, delivering energy efficiency savings of up to 30 percent when compared to typical new homes. A new home that has earned the ENERGY STAR label has undergone a process of inspections, testing, and verification to meet strict requirements set by the U.S. Environmental Protection Agency (EPA), delivering better quality, better comfort, and better durability".

House Renderings



Power Systems



Option 1: Solar power generated by the home

Advantages

- Can produce all power needs
- Long life expectancy
- Tax breaks for home owner

Disadvantages

- VERY expensive
- Requires large battery bank
- Susceptible to changes in weather



Option 2: Purchase electricity from a green source

Advantages

- No upfront cost
- No large storage banks
- No maintenance required

Disadvantages

- Monthly cost
- Power outages
- Slightly more expensive then conventional power sources



Insulation

For our residence we will be using a rigid cellulose based expanding foam. This product allows us the benefit of being organic and biodegradable while still providing an R value of 4.4 per inch. The construction plans call for a framed 2x4 wall on the inside of all exterior walls providing an R value of aprox. 17.6. this coupled with a thermal barrier directly on the steel will provide more then sufficient insulation and protection from the daytime sun.

Economic Analysis

Median Family Income	\$100,000.00
Total amount for house(year)	\$33,000.00
Total amount for house(month)	\$2,750.00
utility costs	\$262.03
property tax	\$250.00
insurance	\$780.00
down payment	\$20,000.00
mortgage insurance	\$208.33
monthly household dept	\$41.67
financing	4.50%
Monthly Mortgage Payment	\$1,249.63
total house value (purchase price)	\$280,000.00
Non-Construction Costs	\$113,680.000
Construction Costs	\$166,320.000