PSU GridSTAR Center: Net Zero Tiny House Trailer Team 2

Overview
PSU GridSTAR Center is part of an initiative by Penn State’s Architectural Engineering Department to encourage sustainable design. Dr. David Riley, Director of the GridSTAR Smart Grid Experience Center, wished to construct a portable tiny house for annual summer trips to Montana. In addition to providing shelter during inclement weather, the unit will serve as a kitchen and storage area for his group. The trailer will act as a food truck and model of sustainable design at various exhibitions. It will be able to operate off-grid if necessary, but will still be grid-accessible.

Objectives
The objective of this project was to design a tiny home according to sponsor needs. The requirements for the tiny home were that it serve as a support vehicle for volunteer trips, incorporate elements of space saving design, minimize electrical usage, and utilize as much reclaimed or recycled material as possible.

Approach
- Sponsor needs were assessed in a series of initial meetings.
- Based on sponsor needs, concepts were discussed and selected for systems such as framing, electrical design, rain catchment, and plumbing.
- A concept map was created, linking the various interconnected systems.
- Other tiny home designs were reviewed to gather ideas and fuel concept generation.
- Frequent meetings with the sponsor and the sponsor’s colleagues allowed for design iterations, which improved the quality of the design.
- Designs were assessed for structural stability, as well as fuel economy and drag during towing.
- Models were created in SketchUp and AutoCAD to visualize the design and create dimensionally accurate drawings.
- The construction of the steel frame was subcontracted to Volstrukt, who shipped the frame in pieces for assembly by the team.
- The frame was assembled in a series of workdays from April 23-27.
- The designs and current framework will be passed on to another group, which will complete construction by July 2017.

Outcomes
- The sponsor has a frame for a tiny home, which exceeded the original project goal of only completing design work.
- The designs, once implemented, will allow for a mobile workstation to support volunteer efforts in Montana.
- The process of design and construction will be used in the future as an educational tool.
- Materials and plans are ready to be used by follow-up group to finish construction over the coming months.