

M2.1 – Towable Solar Energy System

Colton Marek, Jay Osmond, Michael Herrera, Jacob Nicoson, Preston Waterman

Sponsor: Mike LeFevre

Project Description

- ❖ Conventional mobile electricity sources have been gasoline or diesel powered.
- ❖ These systems are noisy, emit CO2 and require maintenance. With solar power, these issues are abated.
- ❖ Off-grid areas, festivals, job sites, and disaster relief applications.
- ❖ The Manufacturing team will be configuring a supplied trailer and solar components to supply an uninterrupted electricity source.

Current Competitor's Design

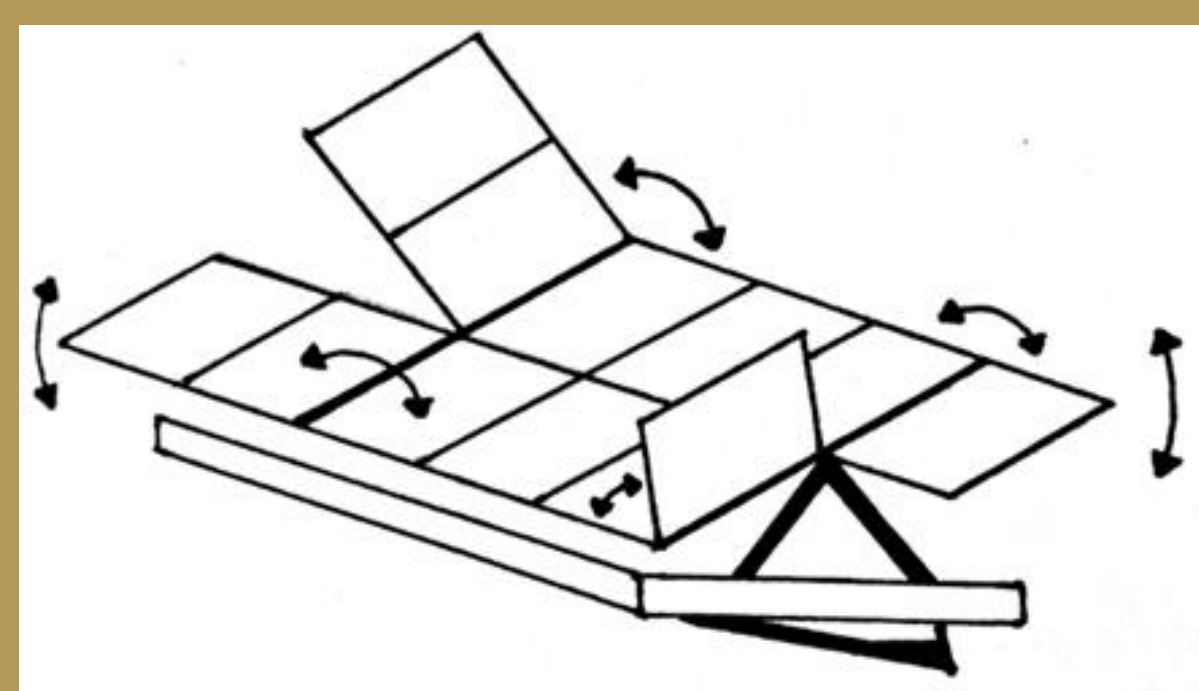
- ❖ Heavy weight
- ❖ Requires Larger Tow Vehicle
- ❖ Underpowered Energy Equipment
- ❖ Poor Sun Exposure
- ❖ Expensive



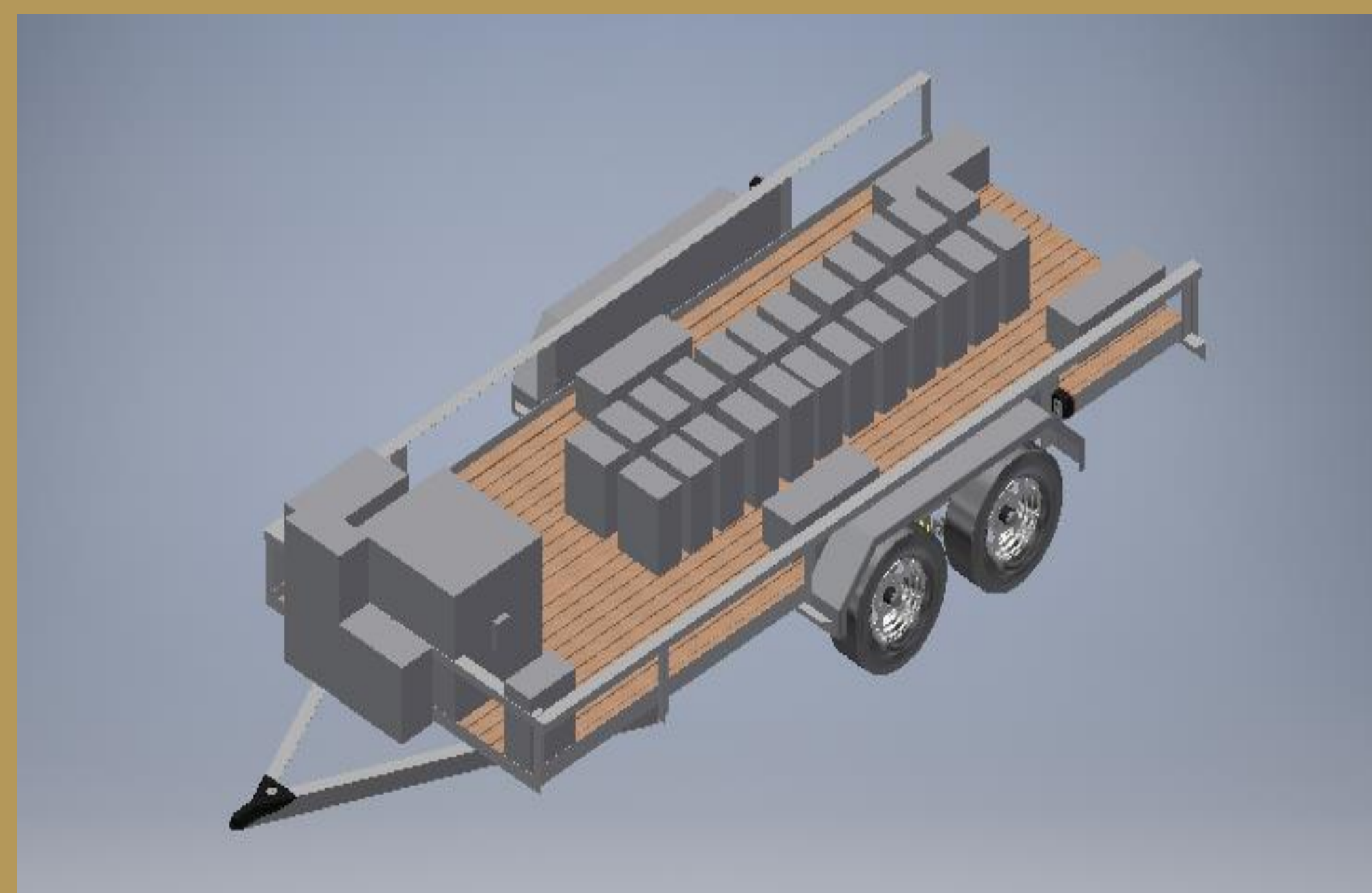
Process

6-3-5 Concept Generation

- ❖ A frame support or post support
- ❖ Folding panels for transport
- ❖ Sun exposure from 30° to 45°



Final Design



- ### Layout
- ❖ 10 panels
 - ❖ Mass producibility
 - ❖ Single user operation
 - ❖ Towable and easily adjustable



Constraints

- ❖ Incorporate at least 10 panels
- ❖ Utilize 24 batteries
- ❖ Maintain a tongue weight of 10-15% of the gross trailer weight
- ❖ Do not exceed max cargo weight
- ❖ Follow a 60-40 percent weight distribution (60 % front, 40 % back)
- ❖ Proper spacing for opening doors and panels (10-inch clearance for Powerbox)

Weight Constraints

❖ Trailer GVWR	7000 lbs.
❖ Trailer capacity	5440 lbs.
❖ Trailer weight	1560 lbs.
❖ Supplied solar equipment	4107 lbs.
❖ Added structure	674.44 lbs.
❖ Total	4781.44 lbs.
❖ Surplus capacity	658.56 lbs.

Manufacturing/Assembly

- ❖ Standardize material for ease of assembly.
- ❖ Framing designed to be built using standard tools.
- ❖ Heavy duty, greaseable hinges for safe, ageless use of moving components.
- ❖ Linear actuators for ease of deployment.
- ❖ Heavy duty rubber dampeners create safe environment for panels during transportation.
- ❖ Panels bolted to wings for secure placement.



Final Design

- ❖ Due to real-world building constraints, original 12 panel design had to be reduced to 10 panels. However, this allowed for a ~5min setup and takedown time.
- ❖ Panels can achieve angles from 0° to 55°, allowing for use in all of North America.

Testing

- ❖ performed in 30MPH wind
 - ❖ Minimal fluctuation of wings
 - ❖ Able to deploy and retract

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