MODULAR SOLAR DESIGN FOR RANCH APPLICATIONS

PROJECTS GOALS
Design a cost-effective modular solar generating unit
- Composed of a pre-manufactured structure, with little onsite assembly
- A payback period of 2 to 5 years
- Capable of withstanding local Wyoming and climate conditions.

TARGETED END USER
The targeted users of the module are the local Wyoming ranchers and other residents with open rural spaces. Although other solar generation set-ups are available, their usefulness is restricted by price and ease of installation.

ECONOMIC ANALYSIS
Using a detailed approach to wide range of options, the most cost-effective solution is a 2.1 kW system.

Initial Cost $1128.90
- Solar Panels : LONGi 350 W x 6
- Inverters: SolarEpic 1300 W Grid-Connect coupled w/ 1000 W.
- Controller: SolarEpic Epever MPPT
- Structure: Constructed from 1.25” square tubing 6063-T3 Aluminum
- Estimated Cost Excludes Construction Labor

Return $6459.40
- ROI: 23% per year averaged over 25 years
- Annual Income: $ 300.00
- IRR: 27%
- Payback Period: 3.7 years
- Calculations based on REAP Grant and ITC Tax Credit.

STRUCTURAL DESIGN
Following the components suggested by the economic analysis, we completed a preliminary design.

- Main structure is a truss frame of welded aluminum and joiners
- Solar panel set elevated at 2.5 ft above the base of the frame
- 41° inclination to the ground, the effective solar panel orientation to the local latitude
- Capable of withstanding Laramie wind, rain, and snow loads

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