

Solar at the Depot

A Net-Zero Housing Development
by Habitat for Humanity Grand Traverse

Designed and Installed by Leelanau Solar LLC and Northport Energy

Tom Gallery

- ▶ Owner of Leelanau Solar
- ▶ Engineer, 40+ years
- ▶ Automotive, research, design, analysis, production
- ▶ Wind energy analysis
- ▶ Solar design, installation

Steve Smiley

- ▶ Partner - Leelanau Solar
- ▶ Smiley Energy Services
- ▶ Energy Economist
- ▶ Renewables Project Devel.
- ▶ Energy Efficiency Analyst

Northport Energy

- Provided 40 hours of skilled solar PV labor to the Depot Project
- aka Northport Energy Action Task Force (NEAT)
- A non-profit 401(c)3 that promotes energy efficiency and renewable energy in the Grand Traverse region.
- Primary focus is in Leelanau Township where the goal is 100% renewable energy

Depot Project

Ten high efficiency, All-Electric homes powered by Solar PV



First three homes to be completed in October 2014



Solar PV System Overview

Panels / Mounting

- ▶ 27 - 275 watt modules (7.4 kW)
- ▶ Black frame, black back-sheet
- ▶ 7/12 Roof pitch (30 degrees - optimum)
- ▶ “Step Down” mounting to promote snow shedding
- ▶ Black perimeter racking

Electrical / Interconnection

Two Inverters (3 kW, 4 kW SMA)

- ▶ Four independent MPPT strings
- ▶ Through-the-roof feed - no visible electrical feed
- ▶ Two “Daytime Backup” circuits provide 1500 watts (each) during day in case of grid outage
- ▶ Net metered with Traverse City Light and Power

Sunmodule[®] Plus SW 275 mono black



TUV Power controlled:
Lowest measuring tolerance in industry



Every component is tested to meet
3 times IEC requirements



Designed to withstand heavy accumulations of snow and ice



Sunmodule Plus:
Positive performance tolerance



25-year linear performance warranty and 10-year product warranty



Glass with anti-reflective coating



Solar World

American Manufacturer

“Step-Down” Feature



Each row is
 $\frac{1}{2}$ inch lower
to promote
snow shedding

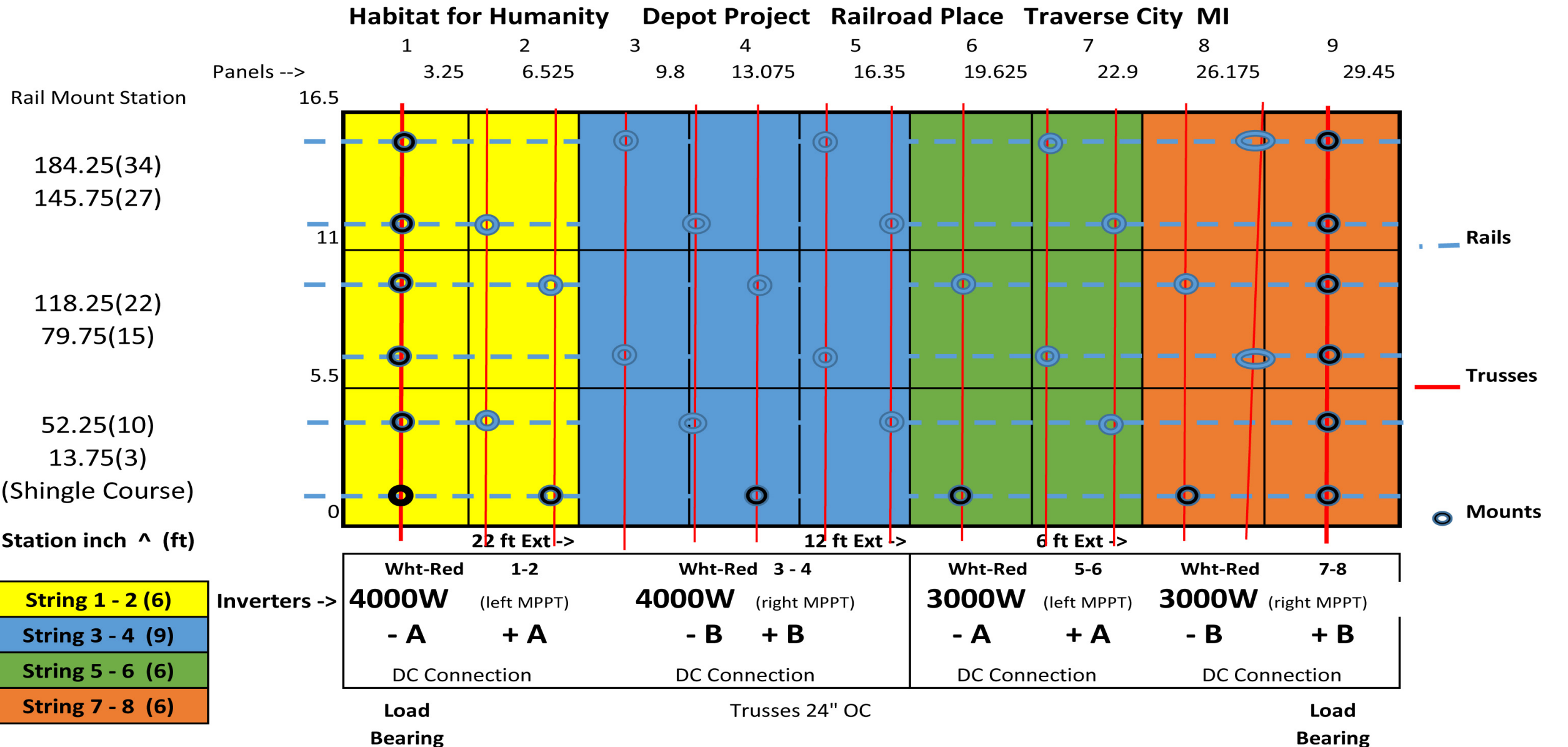


Two SMA TL Inverters
(3 kW & 4 kW)
with Daytime Backup

Two independent
strings per inverter

Roof Mounting







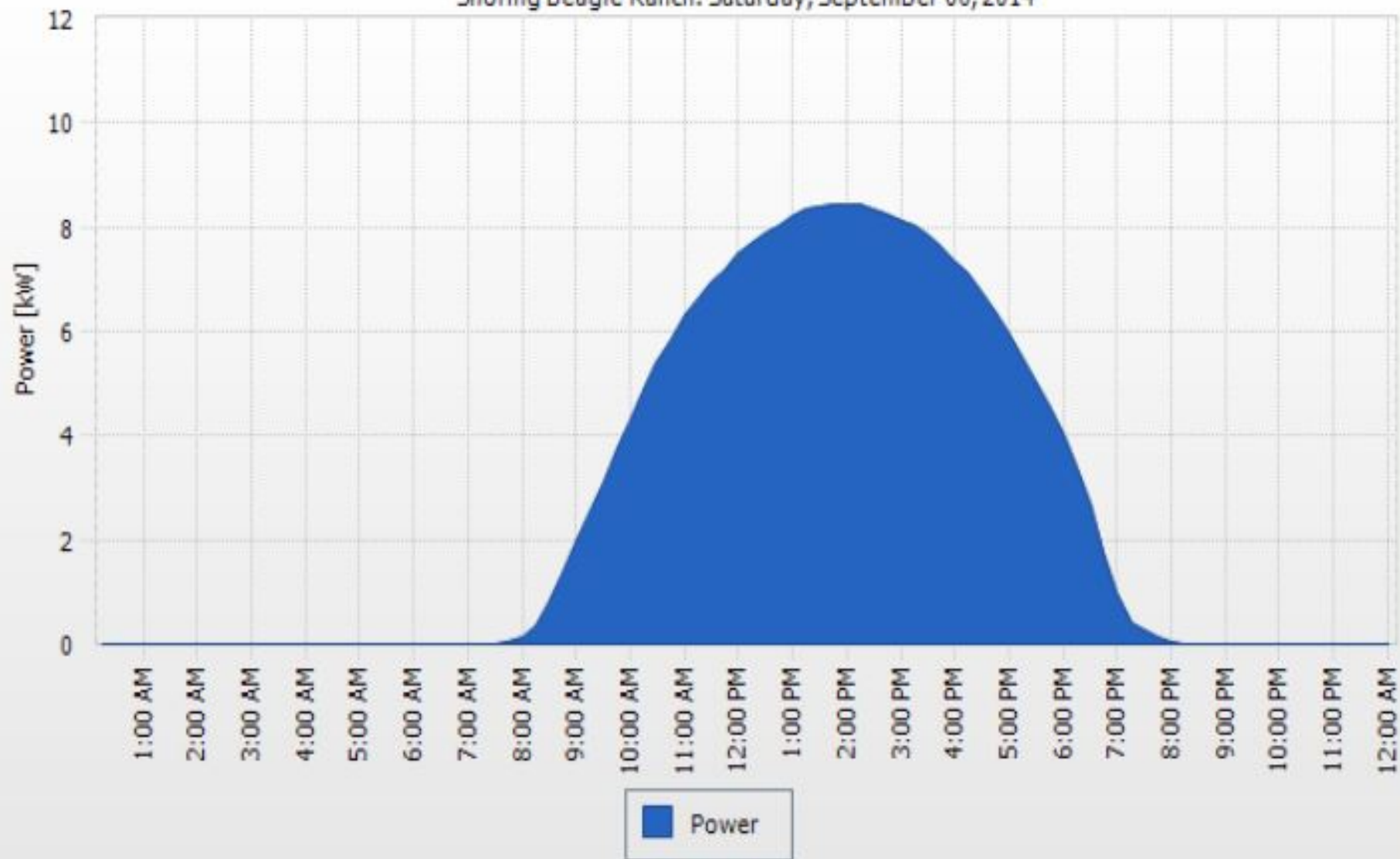
Day

Month

Year

Total

Snoring Beagle Ranch: Saturday, September 06, 2014



9/6/2014



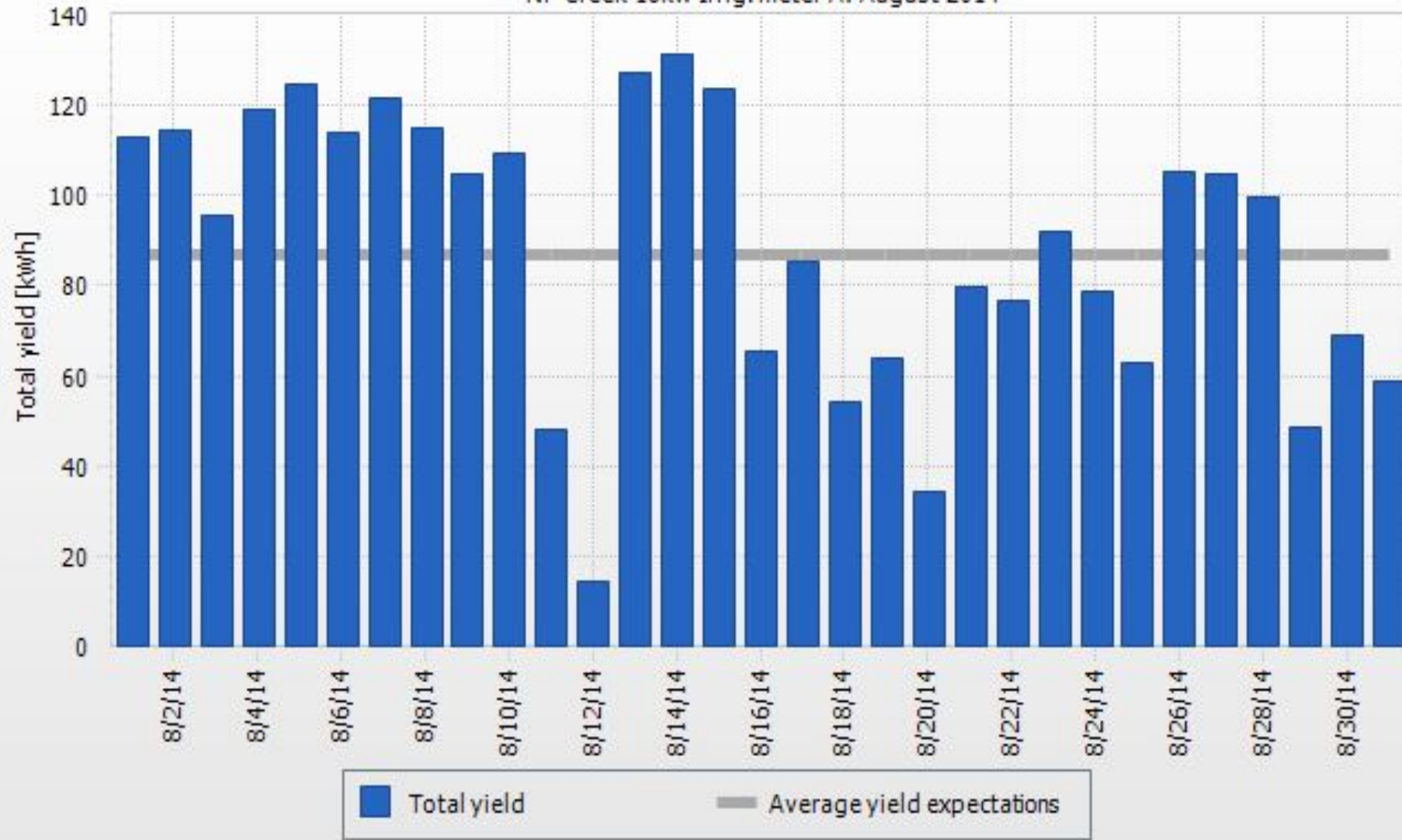
Day

Month

Year

Total

NP Creek 18kw Irrig. meter A: August 2014

☒ Display the prediction *

Aug



2014



Energy Estimate

- ▶ 8000 - 8500 kWh / year (including snow cover loss)
- ▶ Annual solar variation = $\pm 8\%$ (10 yr average)
- ▶ Inverter manufacturer's estimate: 9,220 kWh / yr !!

Snow Loss

- Snow loss can vary from 3% to 10% per year (vs ideal)
- 2013-14 snow loss was 10% (zero production on low-slope roofs Dec, Jan, Feb)
- 21 ft of snow in Leelanau County
- Dec, Jan, Feb potential production is 10% of annual

Costs

Simple Payback

- ▶ \$16,675 per home
- ▶ \$2.24 per watt
- ▶ \$2.00 per kWh / year
- ▶ \$1.40 per kWh / year after 30% tax credit
- ▶ \$1.40 / kWh / year after 30% tax credit
- ▶ \$0.14 per kWh average over 10 years
- ▶ $1.4 / 0.14 = 10 \text{ years}$

Tom Gallery / Steve Smiley
Leelanau Solar, LLC

habitatgtr.org

