Community Energy Resilience

Renewable Energy

Solar and Wind Electricity

League of Women Voters Leelanau County

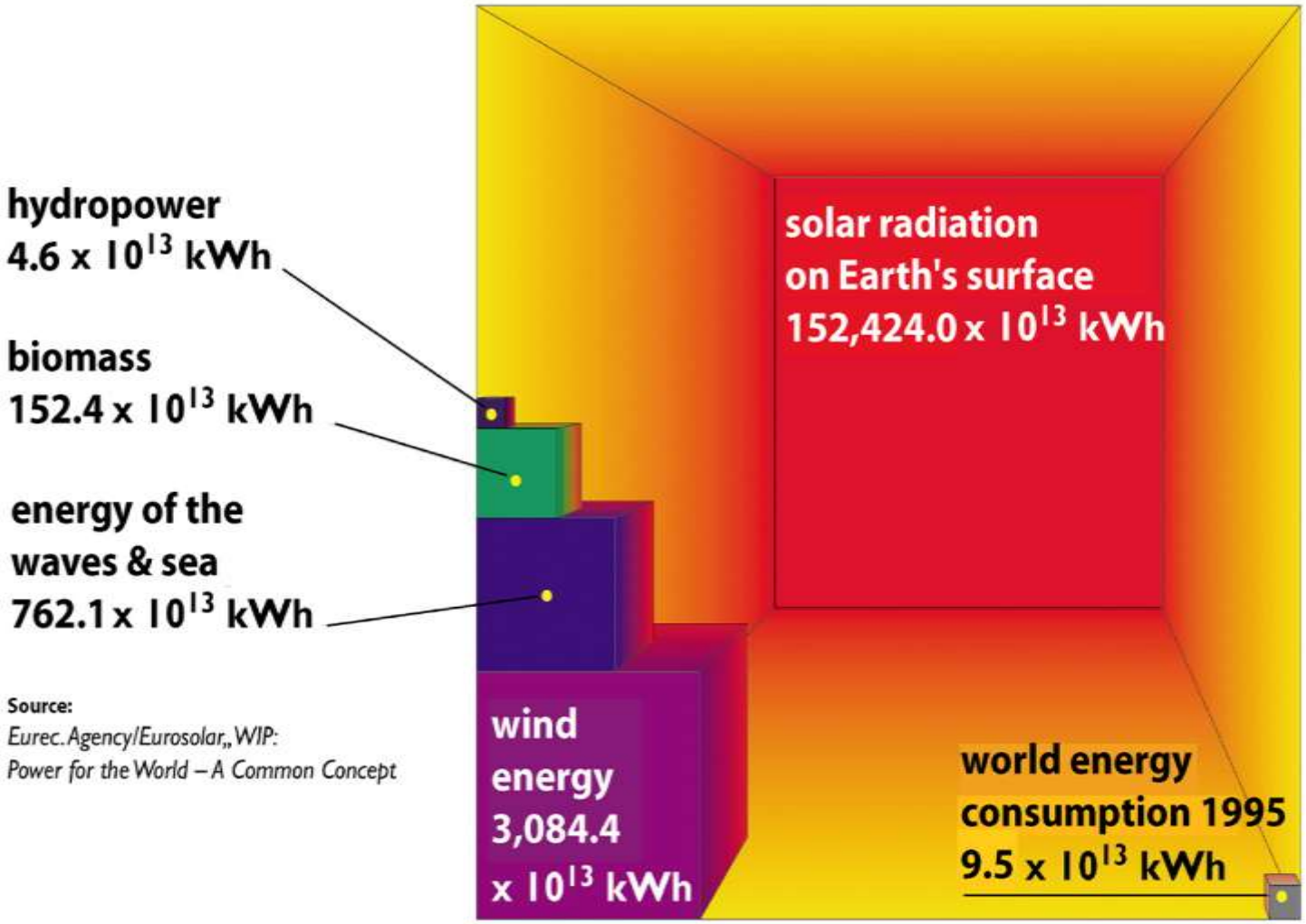
February 25, 2014

Steve Smiley – (231) 883-4850
smiley27@earthlink.net

The Three Myths About Solar and Wind Energy

- There are not enough solar & wind energy resources
- Solar & Wind energy costs too much
- The technology is not ready

The Potential of Renewable Energies Worldwide



Solar Energy:
The Solar Resource in Leelanau County

- Annual solar energy falling on the county: 1 trillion kW-hrs/year (over 10 times the energy generation of the state).
- Capturing a tiny fraction of this can provide 100% net annual energy supply
- Average home electric use can be covered by 500 sq. ft. of solar panels (8,500 kW-hrs/yr, approximately $85/month or $1,000/yr electric bill)
- For Leelanau Township; Preliminary estimates are a 450 acre solar array would generate roughly 100% of net annual electric supply.

Five Solar Electric System Types

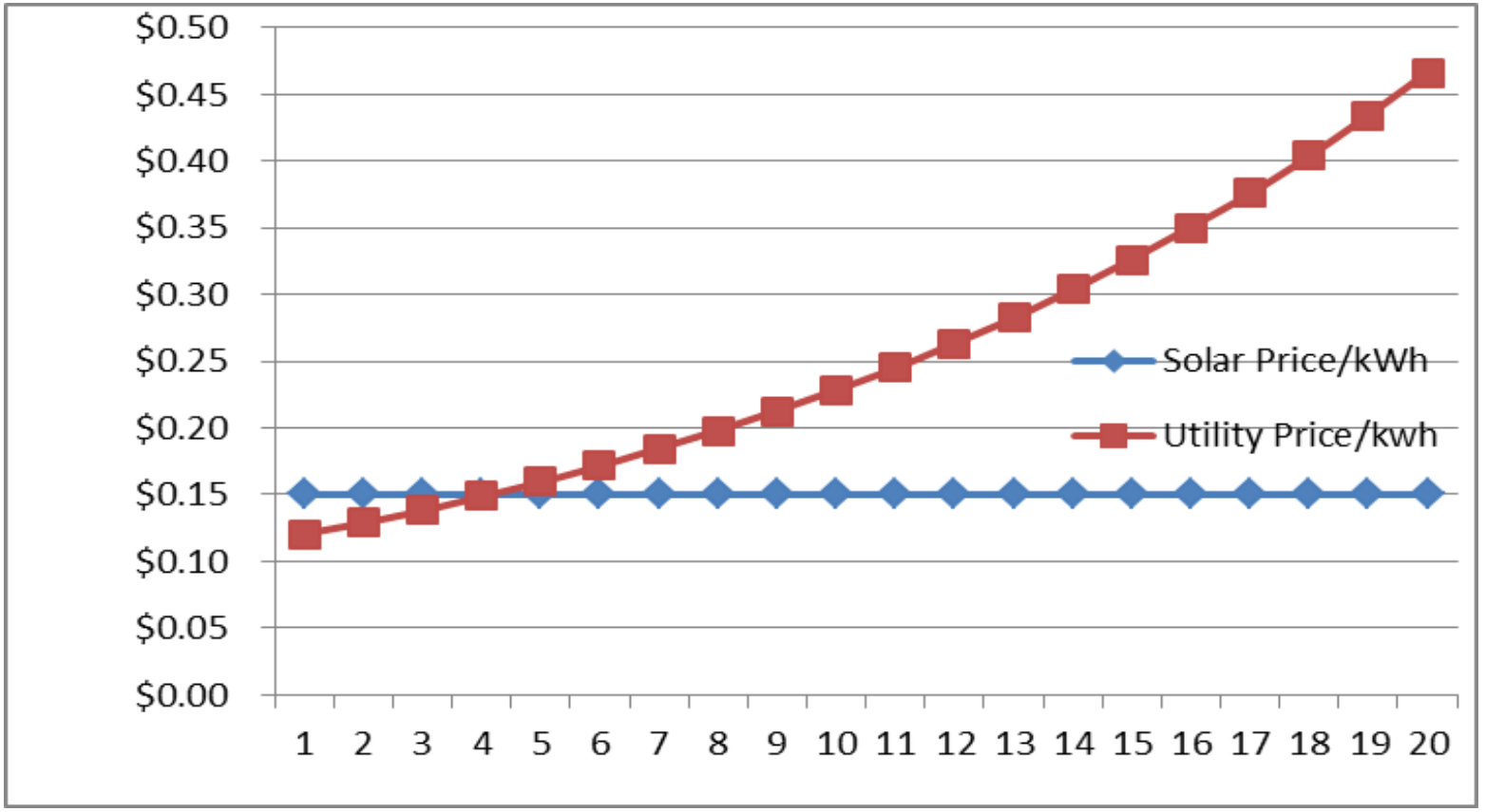
- Fixed Ground Mount
- Adjustable Single Axis Ground Mount
- Roof Top
- Building Integrated Solar Systems
- Dual Axis Tracking

- Plus:
  - Grid intertie with net metering + daytime solar back-up advanced technology
  - Off grid – with battery storage & back-up
  - Hybrid – on grid/off grid option

Solar Electric Energy Costs With recent rapid cost declines:

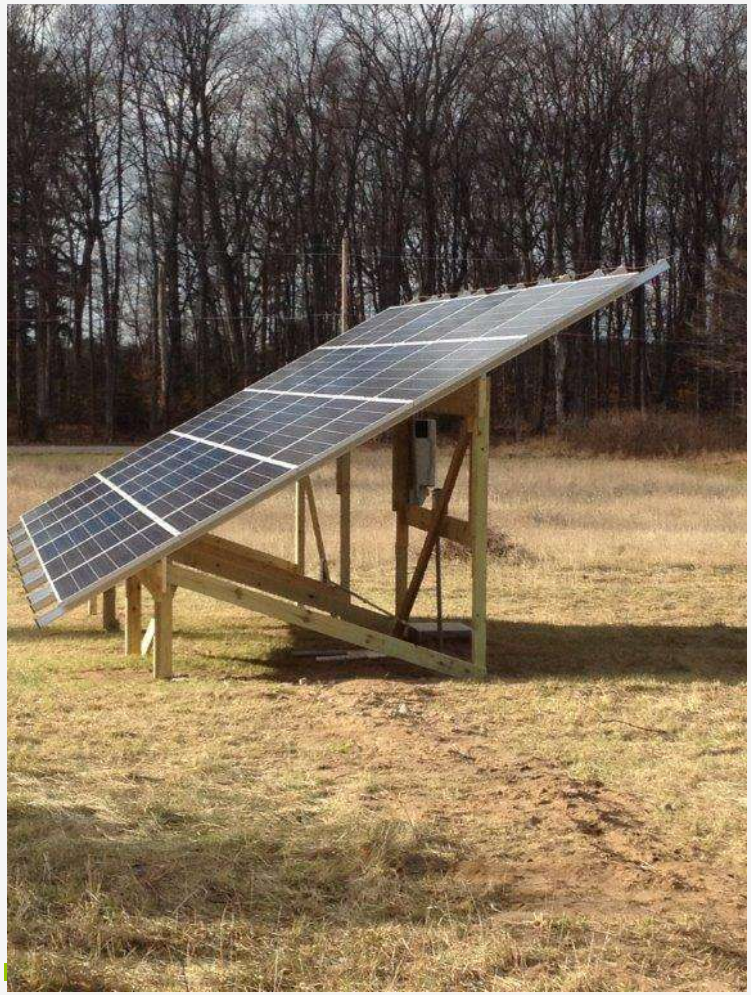
- Competitive with present electric prices – 10 – 14 cents per kW-hr, depending on site and application.
- Immediate positive cash-flow if financed in a mortgage or long-term loan
- 10% or more return on investment – one of the best retirement annuities available.

Owning Solar Saves Money



- **Fixed Ground Mount**
  - Lowest installed cost if roof access is limited.
  - No moving parts or maintenance – virtually maintenance free
  - Easy snow removal for better winter performance
  - Any open unshaded area works
  - Wood or steel frame options

Fixed Ground Mount

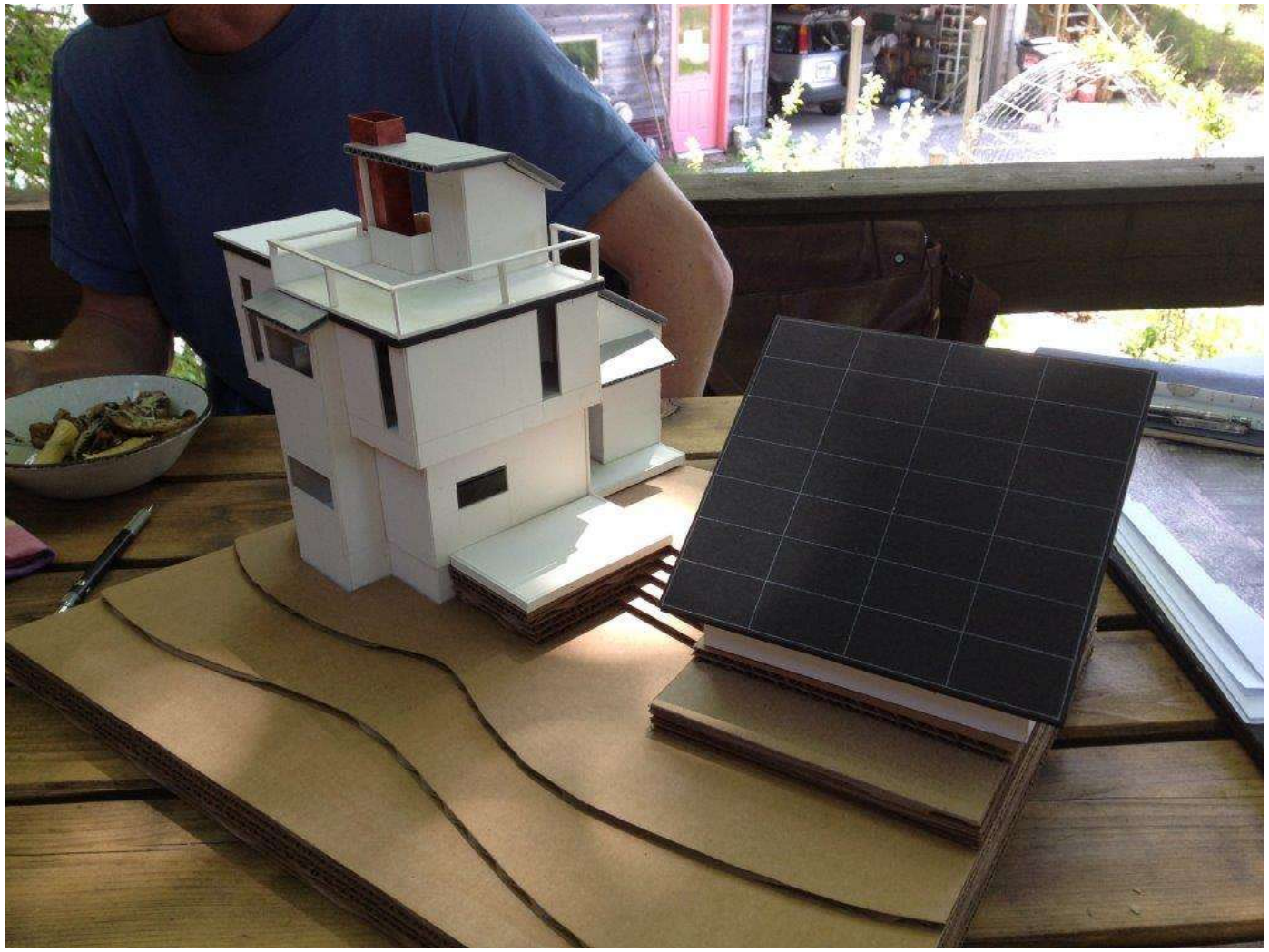


Adjustable Ground Mount – Single Axis

- Best production for limited space areas.
- Easy manual vertical tilt adjustment for each season
- Easy snow removal
- Winter tilt sheds most snow
- Flexible sizing options

Roof Top Light of Day Organics

Building Integrated Solar



Dual Axis: Maximum Energy Generation When Space Available

- Most kilowatt-hours per solar array
- GPS control for orientation
- Internet daily production logging and reporting

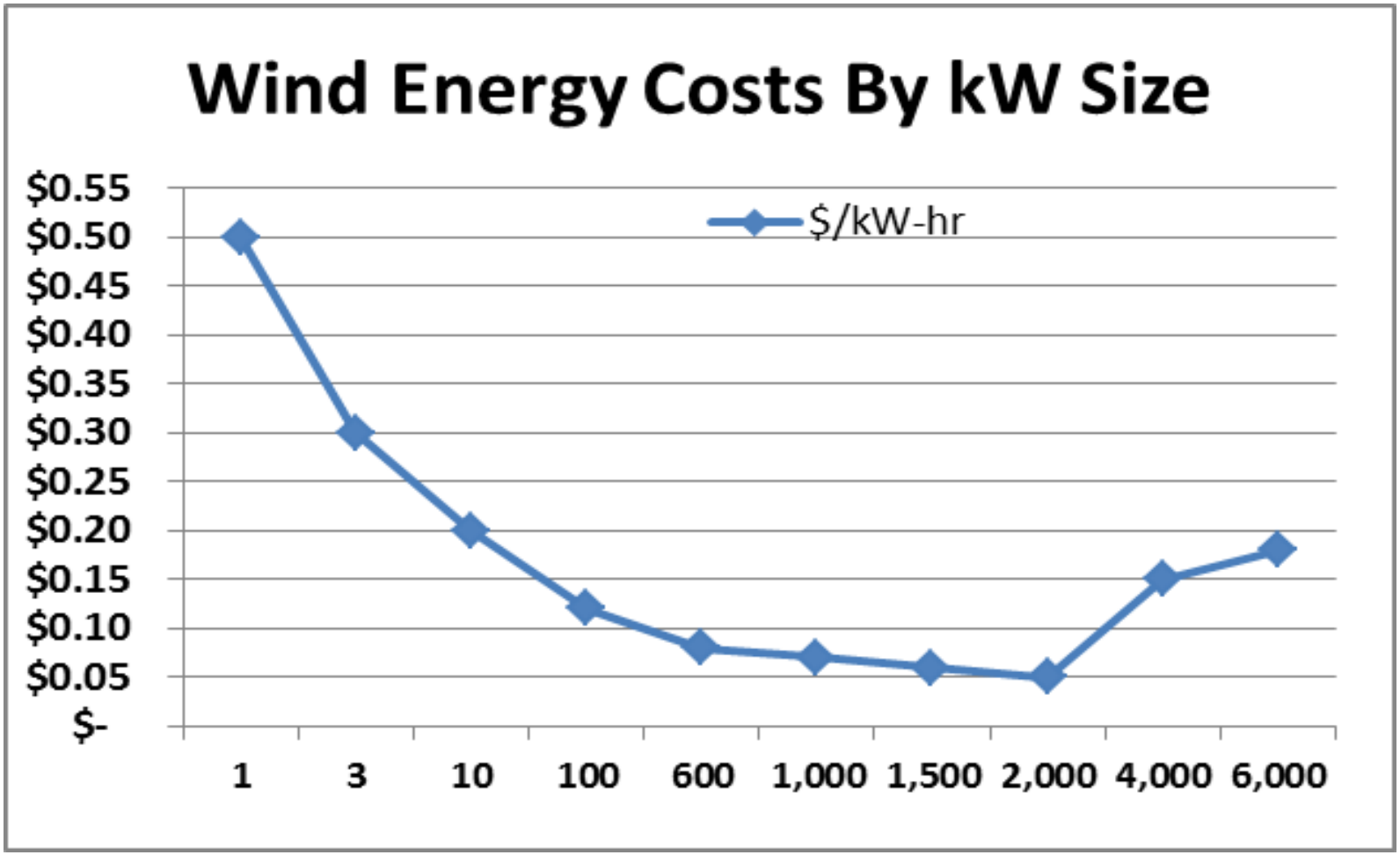
Wind Energy:
Wind Energy Resources

- Extensive studies show excellent wind energy resources
- Depending on size, 4 to 8 wind turbines per township, appropriately located can make the county 100% wind powered

Wind Energy Costs

- Recent technology advances make commercial wind power the lowest cost new electric generation
- The trend toward large rotor diameters and tall towers have lowered the cost to 4 – 6 cents per kW-hr, depending on the site
- With high capacity factors (40% – 60%) using "low specific power-high specific area wind turbines, the need for expensive storage and transmission capacity is reduced. This lowers overall cost further.

Wind Energy Costs: Size Matters



Wind Energy Logistics
83.5 m (275 ft.) Danish blade heading to Samsung - Korea

Case Study:

Leelanau Community Energy, LLC Wind Project at Northport-Leelanau Township Waste Water Plant; First Michigan community wind project -120 kW wind turbine supplying 50% of energy for waste water plant

- Micro inverter PV's

Case Study: Doug & Ann McInnis 7.7 kW Solar Electric

$261 Credit on electric utility bill

Case Study:
Phil & Barb Voigtlander: Solar- Plug-in Hybrid Car

Micro-inverter Solar PV

Plug-in Hybrid

Case Study: Garthe Farms – Adjustable Array

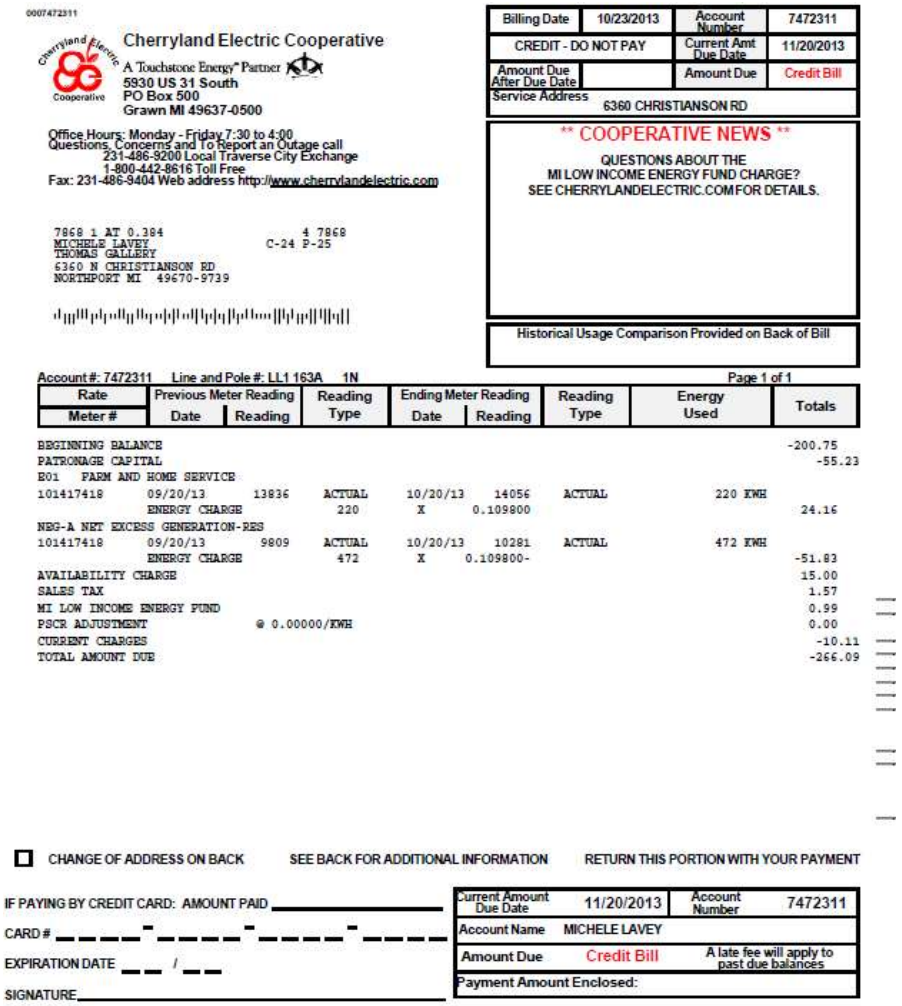
- 13.7 kW Solar
- 18,000 kW-hrs/year
- 80% of Annual electric consumption
- 25% REAP Grant
- Cost before incentives: $2.70/watt
- Cost after incentives; $1.40 / watt

Case Study:
Brengman Brothers Crain Hill Vineyards – 100% electric HVAC and power

- Three – 6.24 kW "All Sun" dual axis tracking systems for total of 18.72 kW DC peak output.
- 72 solar panels at 260 watts each
- Three 6000 watt (6 kW) SMA "Sunny Boy" DC to AC inverters (18 kW total) direct grid intertie
- Estimated annual production – 30,000 kW-hrs
- Cost: $3.75 / watt or $2.30 / kW-hr/yr (without incentives)
- $2.60 With Incentives
- $2.00 / watt with REAP Grant

Case Study: Gallery/Lavey Residence

- 2 kW windmill
- 4.9 kW Solar PV
- 100% wind and solar electric power
- Zero annual electric payment to utility **($266 credit on October bill)**



0007472311

Cherryland Electric Cooperative
A Touchstone Energy® Partner
5930 US 31 South
PO Box 500
Grawn MI 49637-0500

Office Hours: Monday - Friday 7:30 to 4:00
Questions, Concerns and To Report an Outage call
231-486-9200 Local Traverse City Exchange
1-800-442-8616 Toll Free
Fax: 231-486-9404 Web address http://www.cherrylandelectric.com

7868 1 AT 0.384 4 7868
MICHELE LAVEY C-24 P-25
THOMAS GALLERY
6360 N CHRISTIANSON RD
NORTHPORT MI 49670-9739

Billing Date	10/23/2013	Account Number	7472311
CREDIT - DO NOT PAY		Current Amt Due Date	11/20/2013
Amount Due After Due Date		Amount Due	Credit Bill
Service Address	6360 CHRISTIANSON RD		

** COOPERATIVE NEWS **
QUESTIONS ABOUT THE
MI LOW INCOME ENERGY FUND CHARGE?
SEE CHERRYLANDELECTRIC.COM FOR DETAILS.

Historical Usage Comparison Provided on Back of Bill

Account #: 7472311 Line and Pole #: LL1 163A 1N Page 1 of 1

Rate / Meter #	Previous Meter Reading Date	Previous Meter Reading	Reading Type	Ending Meter Reading Date	Ending Meter Reading	Reading Type	Energy Used	Totals
BEGINNING BALANCE								-200.75
PATRONAGE CAPITAL								-55.23
E01 FARM AND HOME SERVICE								
101417418	09/20/13	13836	ACTUAL	10/20/13	14056	ACTUAL	220 KWH	
ENERGY CHARGE		220		X	0.109800			24.16
NEG-A NET EXCESS GENERATION-RES								
101417418	09/20/13	9809	ACTUAL	10/20/13	10281	ACTUAL	472 KWH	
ENERGY CHARGE		472		X	0.109800-			-51.83
AVAILABILITY CHARGE								15.00
SALES TAX								1.57
MI LOW INCOME ENERGY FUND								0.99
PSCR ADJUSTMENT		@ 0.00000/KWH						0.00
CURRENT CHARGES								-10.11
TOTAL AMOUNT DUE								-266.09

☐ CHANGE OF ADDRESS ON BACK SEE BACK FOR ADDITIONAL INFORMATION RETURN THIS PORTION WITH YOUR PAYMENT

IF PAYING BY CREDIT CARD: AMOUNT PAID _____
CARD # ____-____-____-____
EXPIRATION DATE __ / __
SIGNATURE _____

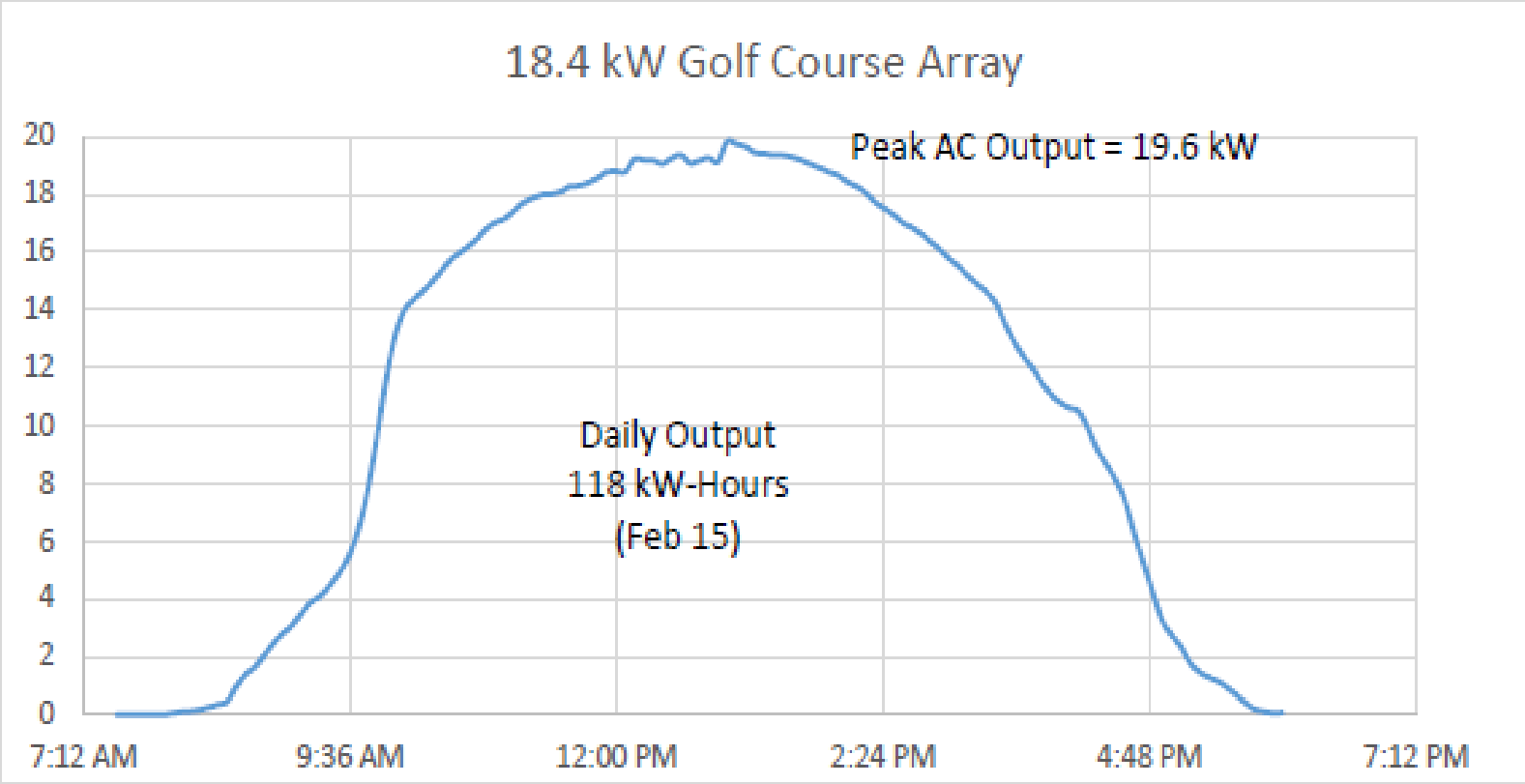
Current Amount Due Date	11/20/2013	Account Number	7472311
Account Name	MICHELE LAVEY		
Amount Due	Credit Bill	A late fee will apply to past due balances	
Payment Amount Enclosed:			

Case Study: Northport Creek Golf Course

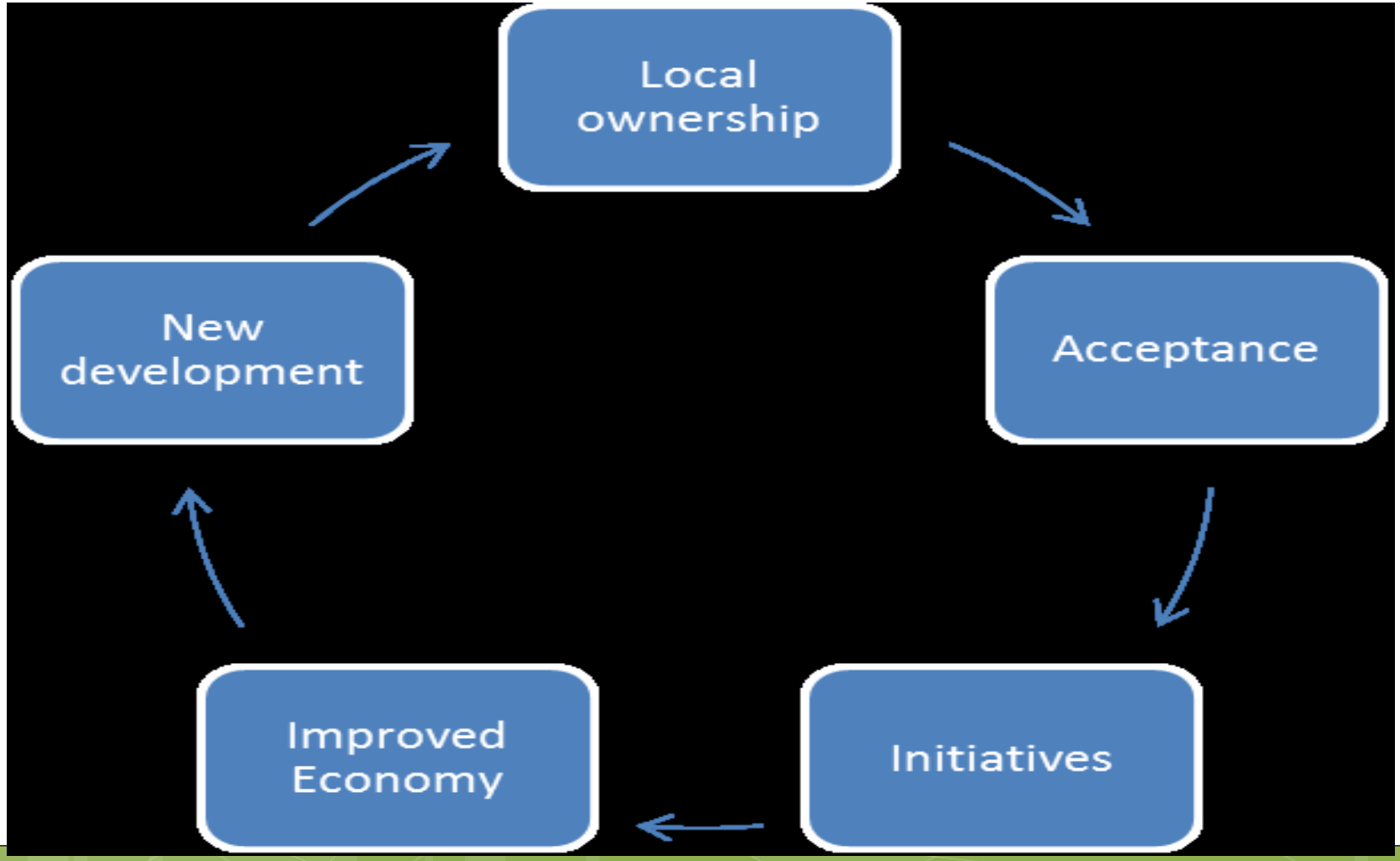
- First 100% Solar Powered Golf Course in Michigan
- 62 kW Solar PV
- 196 solar modules on 16 adjustable arrays – 49 kW for irrigation and water pumping
- Two, All Sun Solar Trackers 13 kW, at club house for golf cart charging, etc.

Solar Works! Even in the Winter

Array producing 108% of rated output



Community Resilience can be built with renewable energy and local ownership!



Thanks for listening ☺