



CERTs: Minnesotans building a clean energy future

Fritz Ebinger, J.D.

**Rural Energy Program Manager
UMN Extension – RSDP**

**UMN - WCROC
Morris, MN**

CERTs: Minnesotans Building a Clean Energy Future



Mission: We connect individuals and their communities to the resources they need to identify and implement community-based clean energy projects

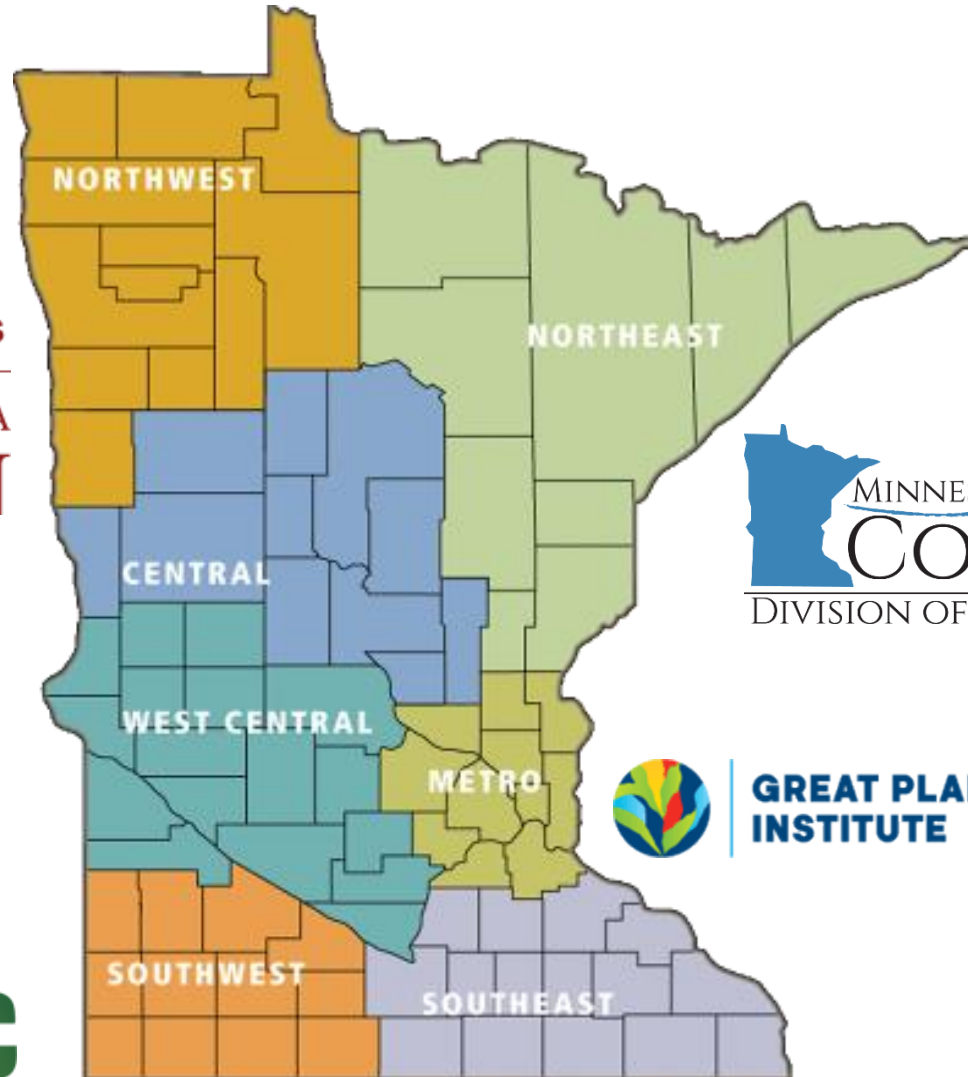


Statewide Partnership & Collaboration



Regional Sustainable
Development Partnerships

UNIVERSITY OF MINNESOTA
EXTENSION



**GREAT PLAINS
INSTITUTE**

Better Energy.
Better World.



What CERTs Does

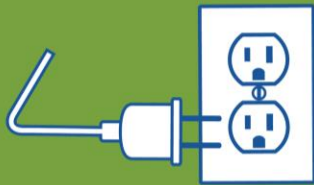


LEARN



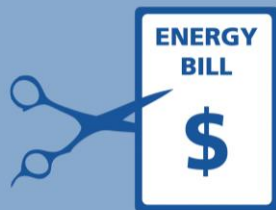
Write blog posts & case studies
Create educational guides
Manage diverse web-based tools

CONNECT



Host events, tours, and conferences
Help with community organizing
Connect people to technical resources

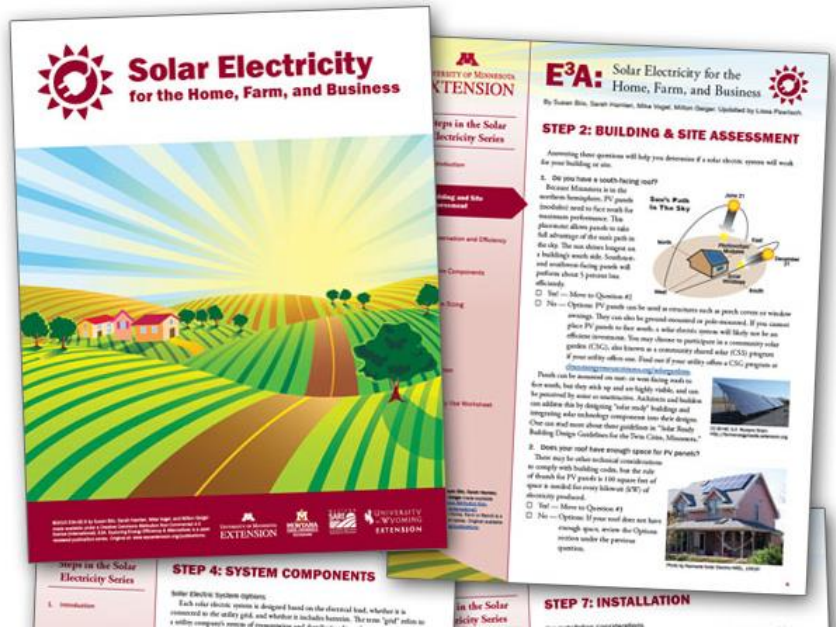
ACT



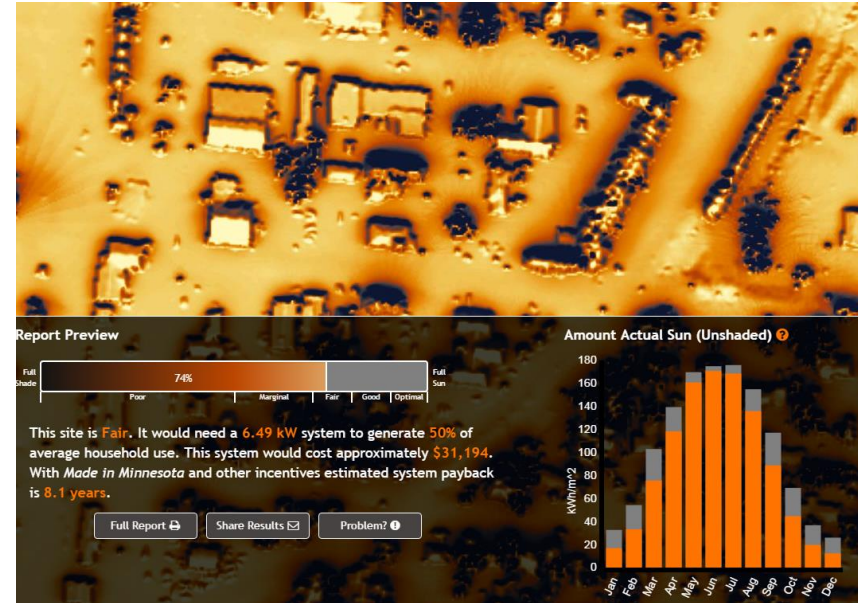
Provide seed grant funding and more
Deliver research-based campaigns
Spur other statewide programs

www.mncerts.org

Download the Guide



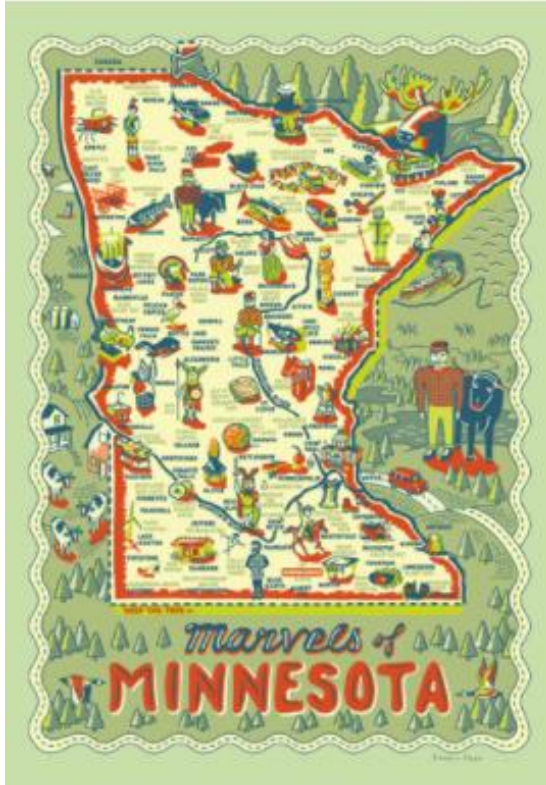
Resource Library



MN Solar Suitability App

[Mn.gov/solarApp](https://mn.gov/solarApp)

Road Map

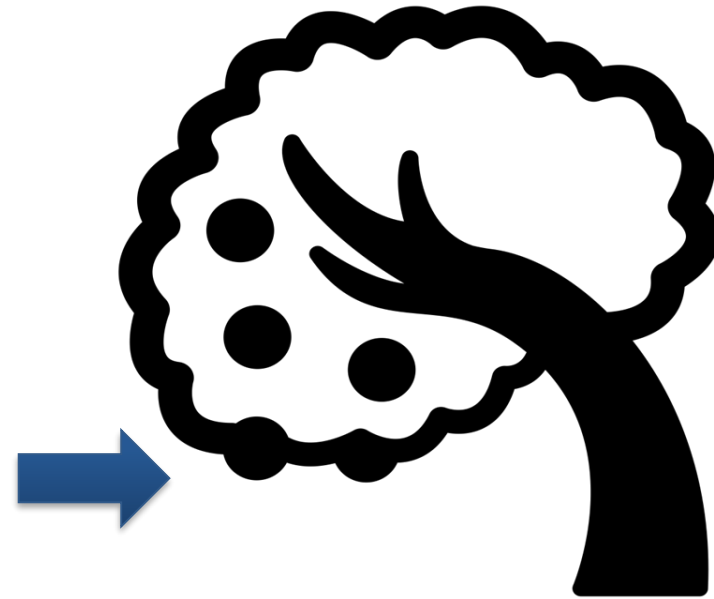


- 1. Efficiency, then Solar**
- 2. Net Metering**
- 3. Fees & Costs**
- 4. Electricity Load**
- 5. Taxes & Depreciation**
- 6. Example Pro Formas**
- 7. Funding Mechanisms**

Efficiency: Your Best Friend



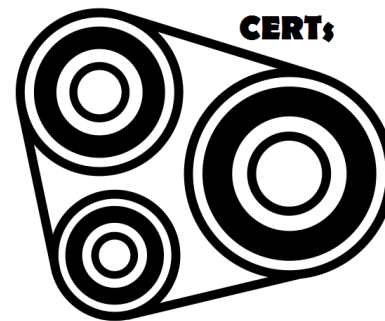
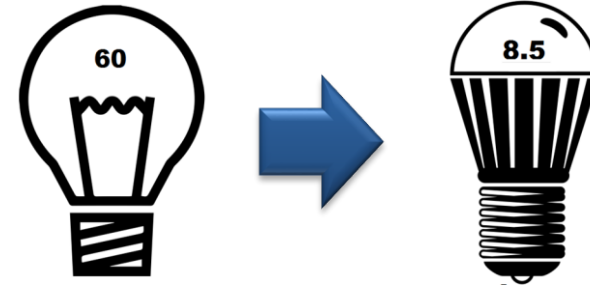
- Always the lowest cost option
- Every dollar invested in efficiency saves \$3.00 - \$5.00 in renewable energy costs
- Serves fellow coop/muni members by reducing peak load days
- Easier to finance



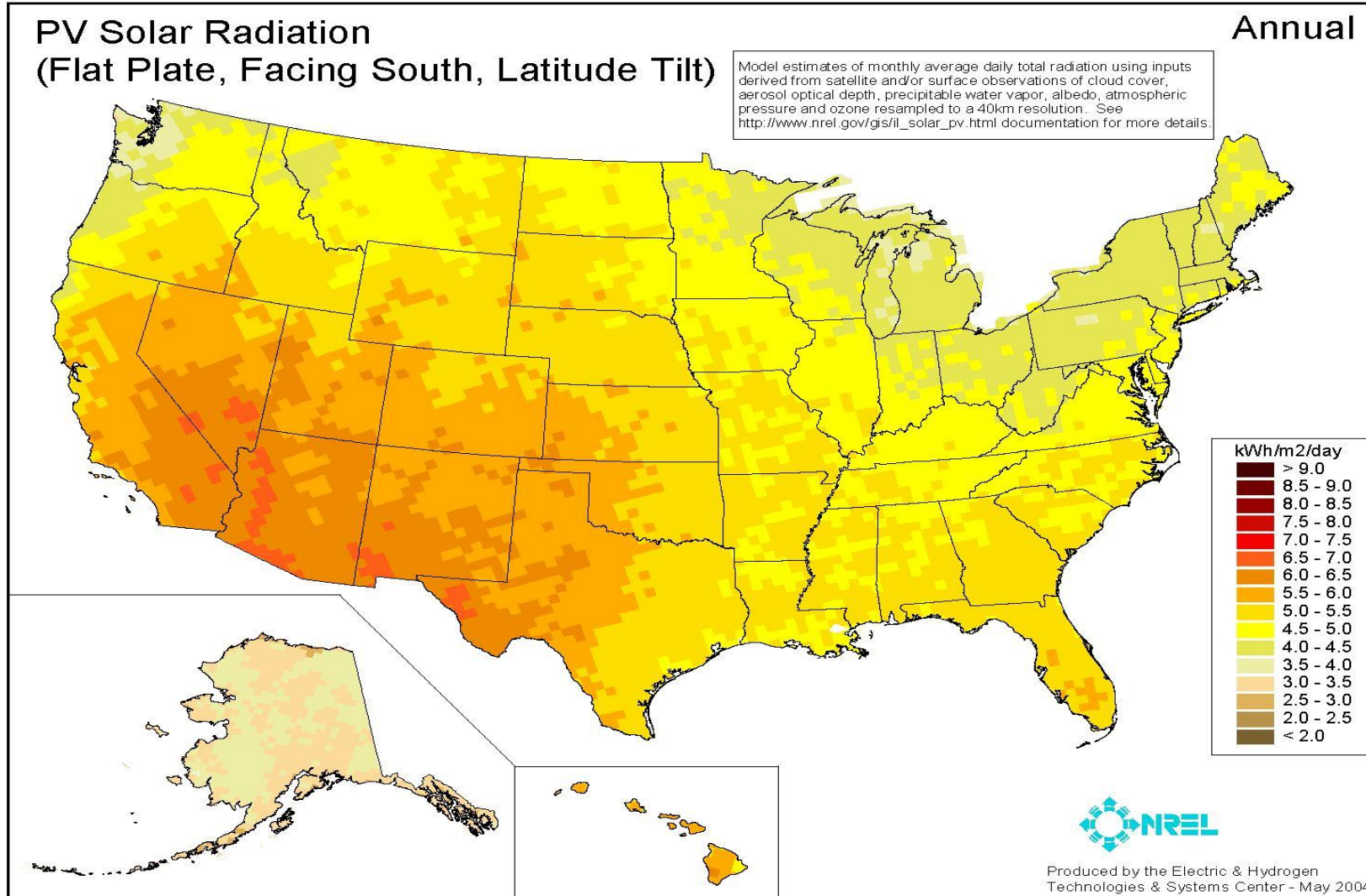
Efficiency First



- Mostly heavily-used lighting
- Basic fan and motor maintenance
- Occupancy sensors and timers
- Efficient Ventilation
- Behavior change



Minnesota is Sunny Enough!



- **MN as sunny as Tallahassee, FL**
- **MN is cooler, which means less electron resistance...and generally awesome people**



The Big Drop

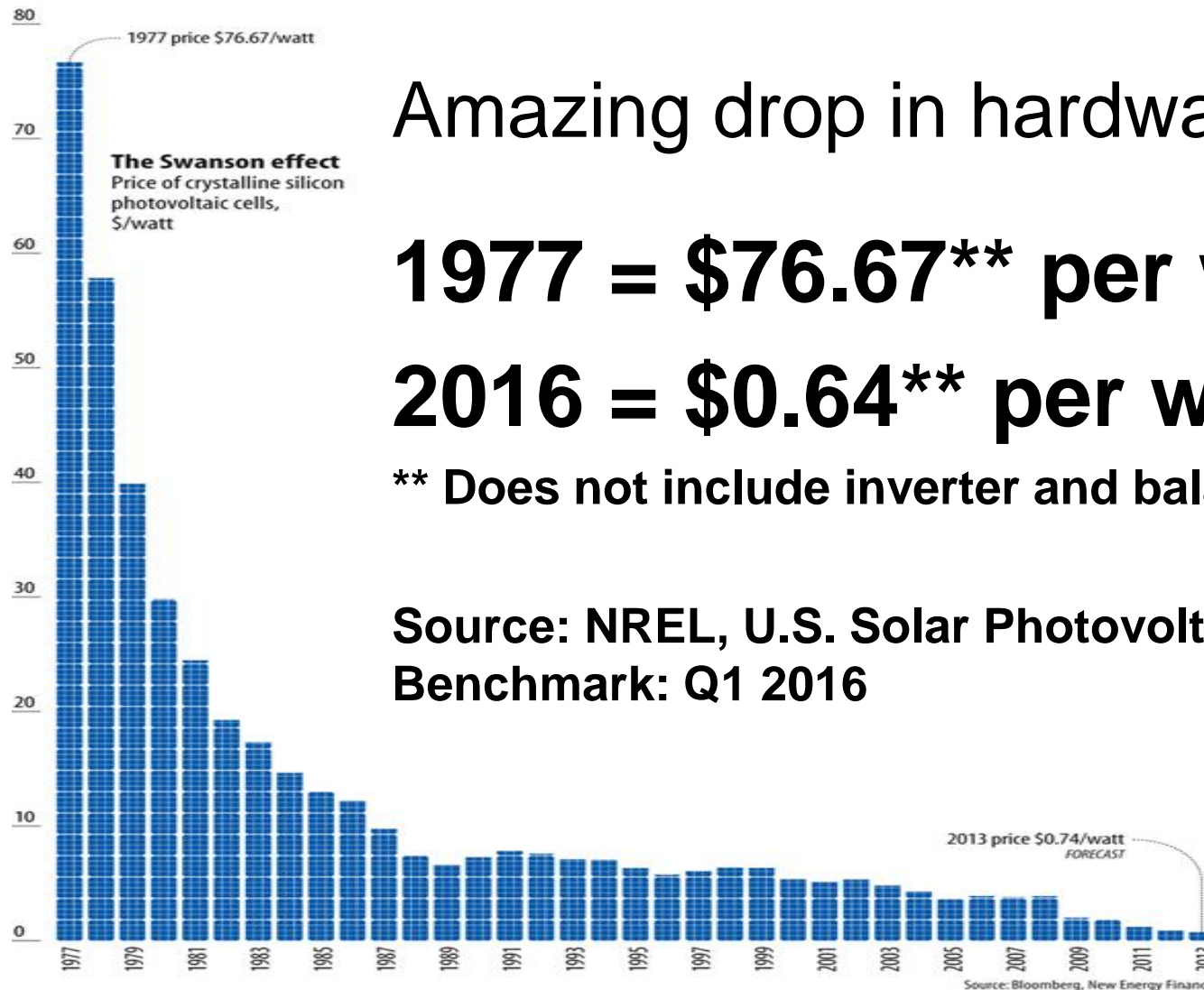
Amazing drop in hardware cost

1977 = \$76.67 per watt/module**

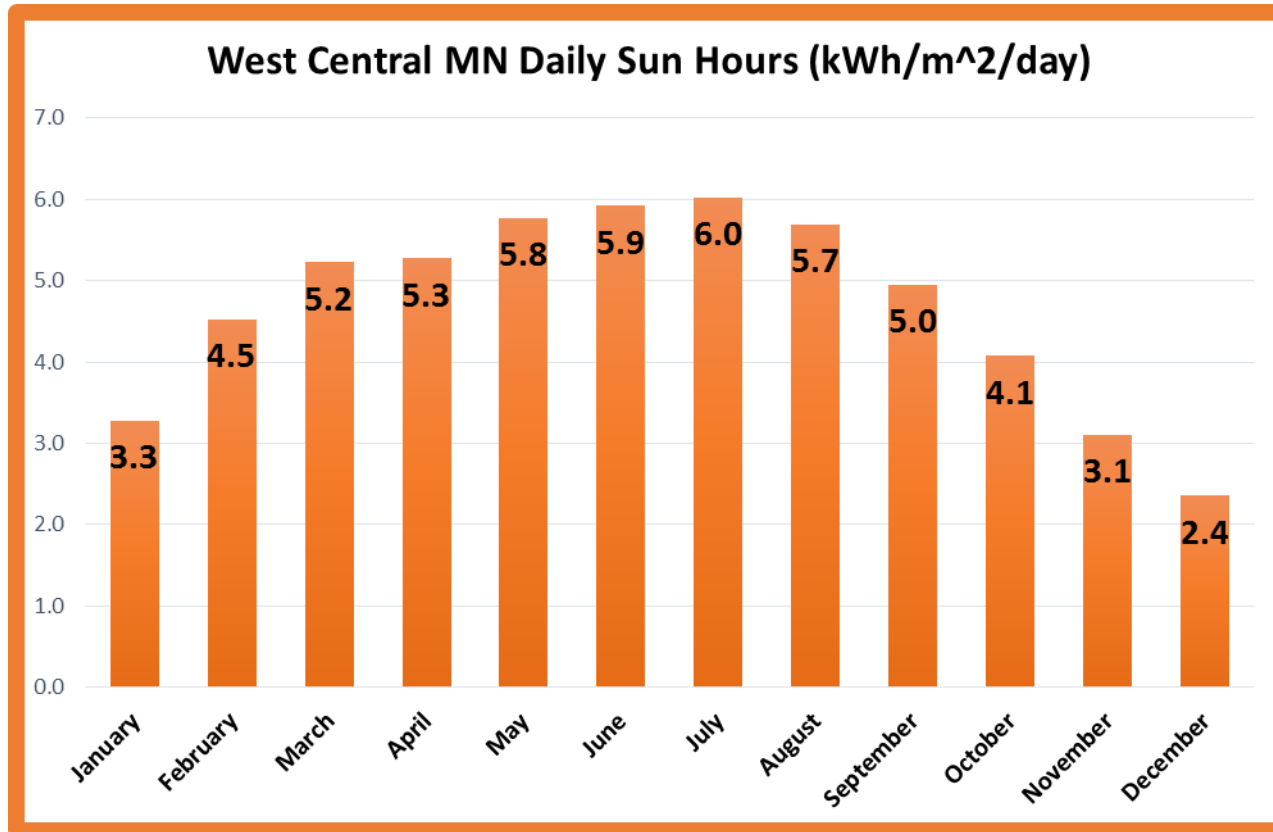
2016 = \$0.64 per watt/module**

** Does not include inverter and balance of system

Source: NREL, U.S. Solar Photovoltaic System Cost
Benchmark: Q1 2016



West Central MN Solar Radiation



Summer \approx 5.9 hrs

Winter \approx 3.4 hrs

Annual Avg = 4.7 hrs



Net Metering: **Batteries Not Included

- Public Utility Regulatory Policy Act of 1978 (PURPA)
- Requires utilities to purchase excess power from grid-tied solar PV systems
- MN law allows electric coops and muni electrics to recover fixed costs through a grid access fee (Minn. Stat. § 216B.164)

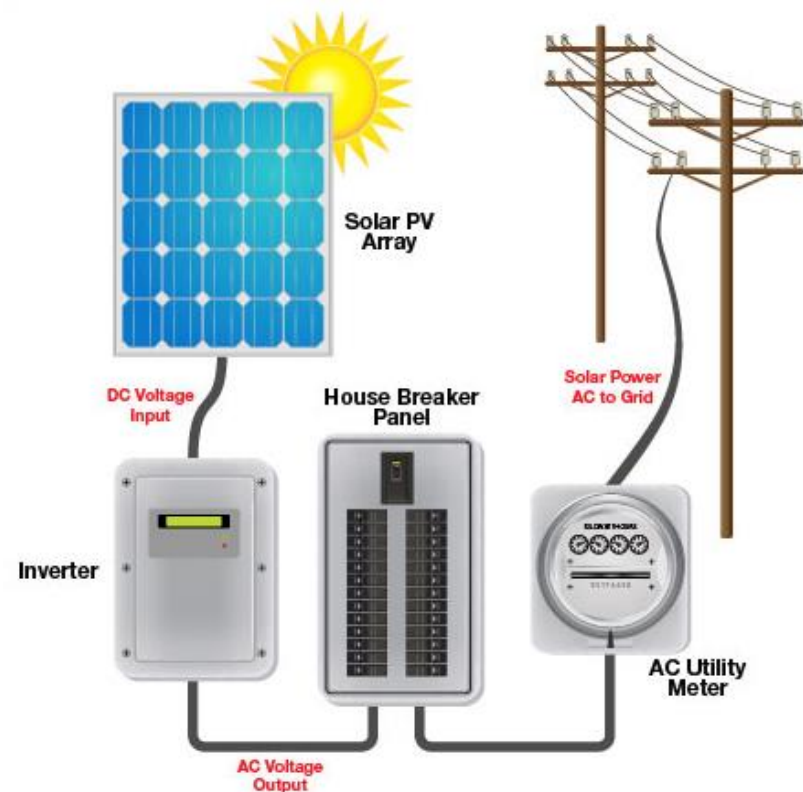


Image Credit: Cosuper.com

Net Metering



- **Minn. Stat. § 216B.164 and Rule 7385**
- Requires utilities to buy back excess generated electricity at the applicable retail rate for facilities under 40 kW DC
 - Typically “Farm/Residential” Rate for ag
- Must meet Interconnection Standards
- Communicate early and often with your electric utility



39.9 kW DC = Tennis Court



Formula for Grid Access Fee

First 3.5 kW is exempt, then monthly fee is \$_____ per installed kW

- Ranges from \$3.00 to \$5.00 per kW by Board

Capped at \$37...\$55...\$83, etc. determined by the Municipal or Cooperative Electric Board along with basic service charge.

Grid Access Fee



Example: 10 kW DC array
10 kW – 3.5 kW exempt = 6.5 kW charge
6.5 kW x \$3.54 = \$23.01/month plus
basic service charge



Runestone: \$3.54 per kW
capped at \$43.00

Agralite: TBD in near future
(formula likely)



Grid Access Fee



Reasonable and Appropriate Fee:

Democratically elected board determines what is fair for all coop members to recover lost revenue for fixed costs (wires, poles, labor) from members who cogenerate.

New 2017 Law: Fee may be appealed to the Electric Coop or Muni Board.

If no settlement, member appeals to a 3rd Party Neutral (faster resolution process than PUC).

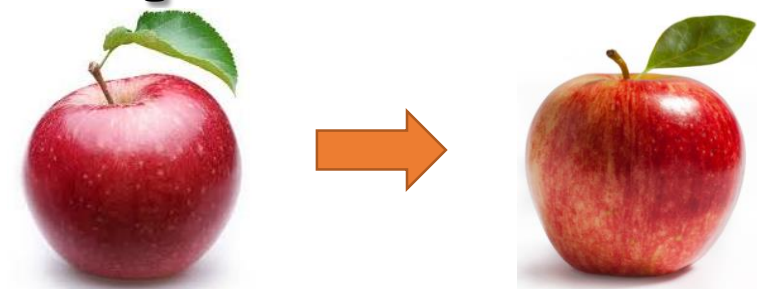




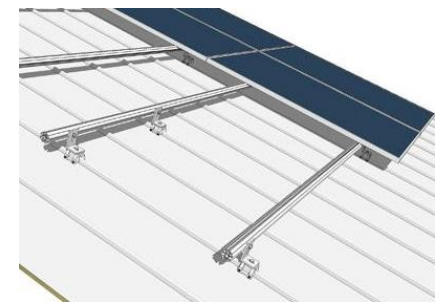
Cost per kW

Full Cost includes:

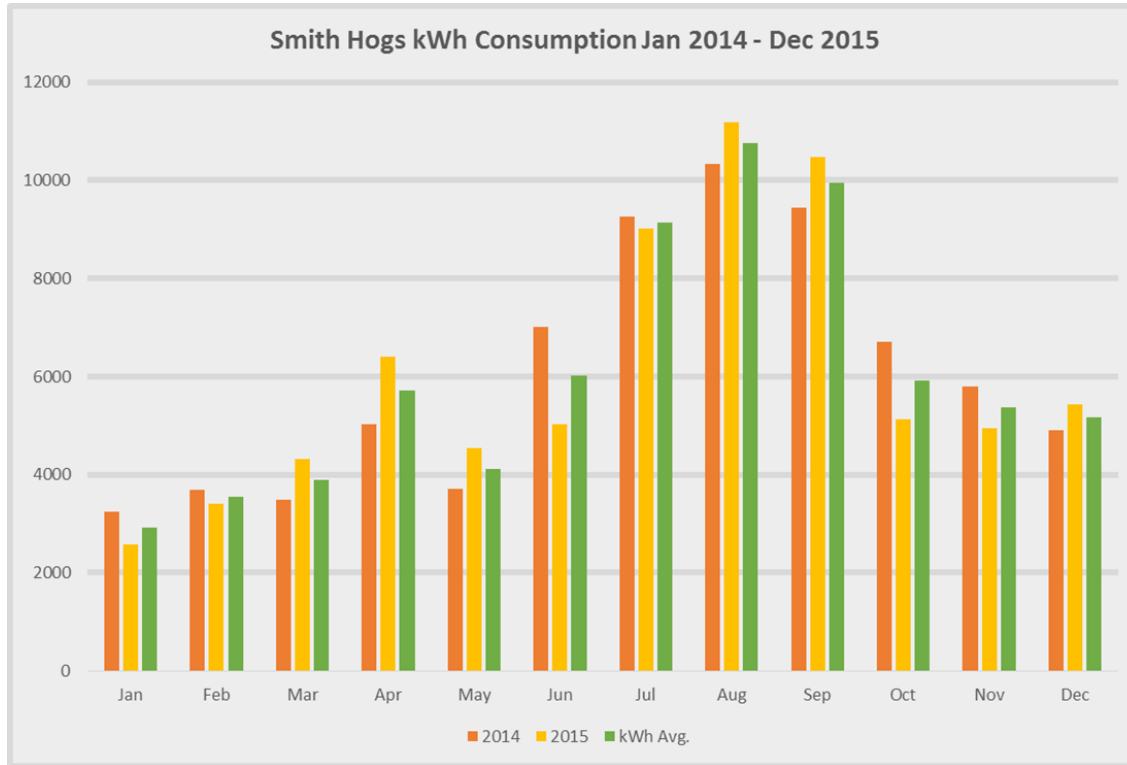
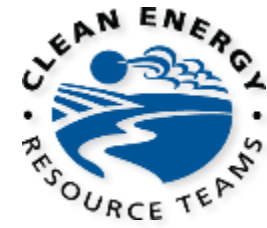
- Racking
- Inverters
- Conduit
- Wire
- Labor
- Permitting
- Interconnection



\$2.00 - \$4.00 per installed watt



Consumption Load



72,527 kWh/year; 2,400 head finisher barn

Important Note: Solar will not eliminate Demand Charges

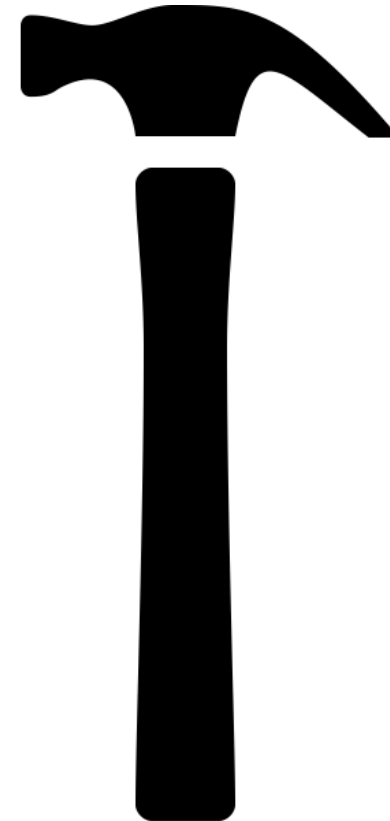
To reduce demand spikes, focus on energy efficiency and behavior change, maybe smart batteries

Space motors out by 15 minutes to avoid instantaneous draw



Financial Tool #1: The 30% ITC

- **30% Federal Business Energy Investment Tax Credit (the “ITC”)**
- **Recapture period of 5 years – can spread it out**
- **Extended at 30% through 2019**
 - 2020 = 26%**
 - 2021 = 22%**
 - 2022 and on = 10%**

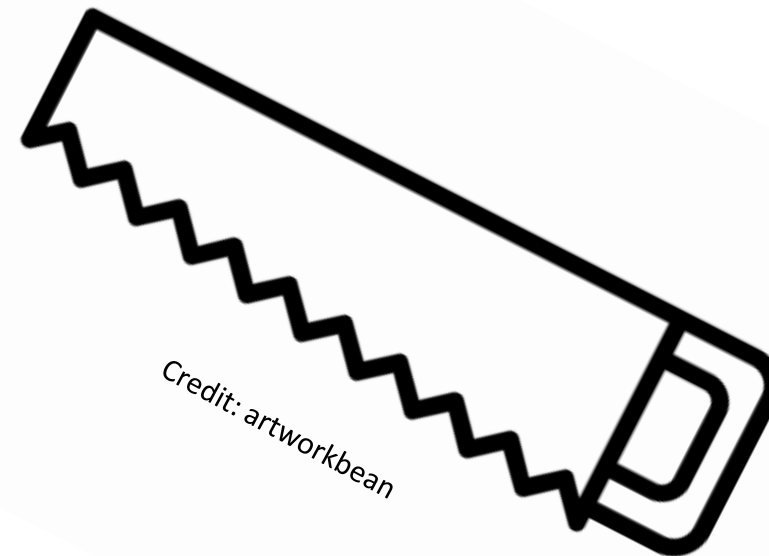


Credit: Edward Boatman



Financial Tool #2: MACRS Depreciation

- Income tax deduction which allows farm biz to recover the cost of income-producing property
- 5-year Property Schedule (IRS Pub. 946)
- Taxable basis reduced by half of 30% Investment Tax Credit, Example: 85% of \$100,000 or \$85,000
- 50% bonus depreciation in 2017!





Financial Tool #2: MACRS Depreciation



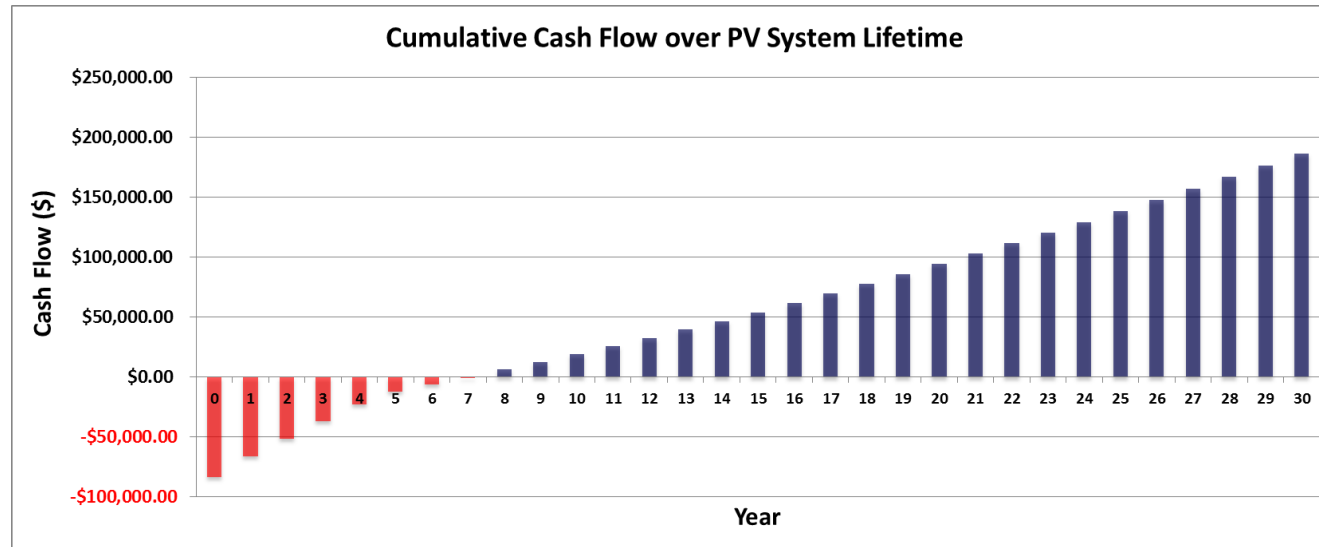
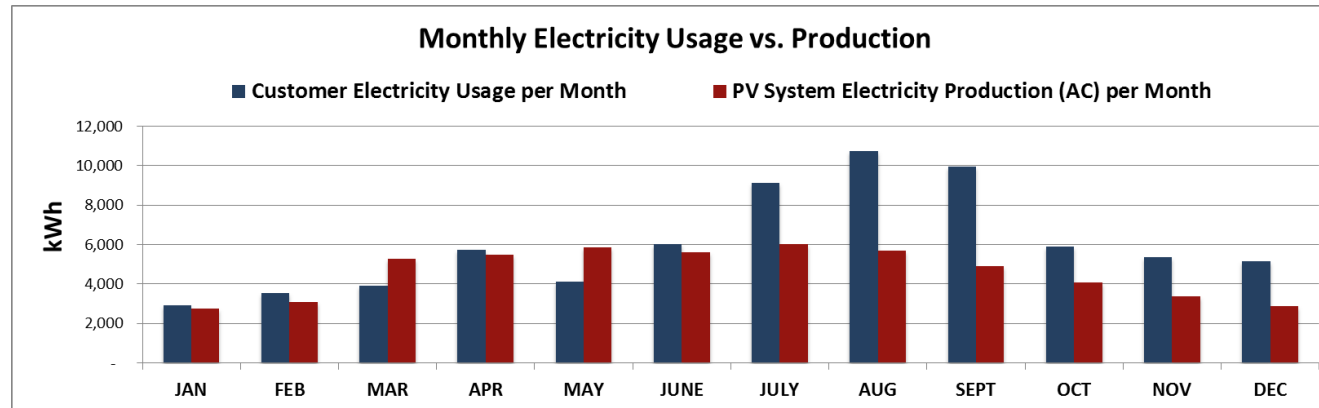
Year with a LARGE TAX APPETITE?

\$100,000 Array, 85% Adjusted Basis

50% Bonus Depreciation in year placed in service

DEPRECIATION COST RECOVERY: 5-Year Property Schedule									
Full Cost	\$	100,000							
Adj. Basis	\$	85,000							
Depreciation Year			0	1	2	3	4	5	Total
Adjusted Basis (85% of full cost)	\$	85,000							
Depreciation Basis	\$	42,500	(after 50% bonus depreciation)						
Depreciation %		15.0%	25.5%	17.8%	16.6%	16.6%	8.5%	100%	
Depreciation Expense	\$	6,375	\$ 10,838	\$ 7,565	\$ 7,055	\$ 7,055	\$ 3,613		
Start Year 50% Bonus Deprec.	\$	42,500							
Yearly Depreciation Tax Benefit	\$	48,875	\$ 10,838	\$ 7,565	\$ 7,055	\$ 7,055	\$ 3,613	\$ 85,000	

2,400 Finisher Barn – All Tax Benefits



Size: 39.9 kW DC Array

Rate: \$0.109 per kWh

Production: 55,049 kWh/year
(76% ann. offset)

Initial Cost: \$119,700 (\$3/watt)

Less 30% ITC: - \$35,910

Net Cost: \$83,790

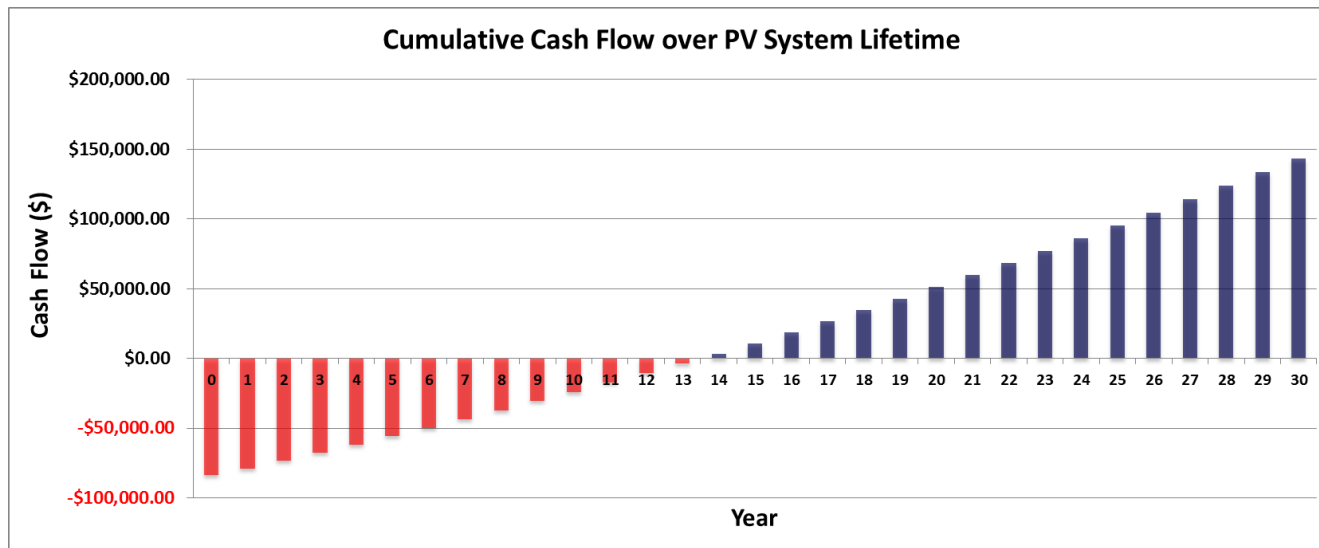
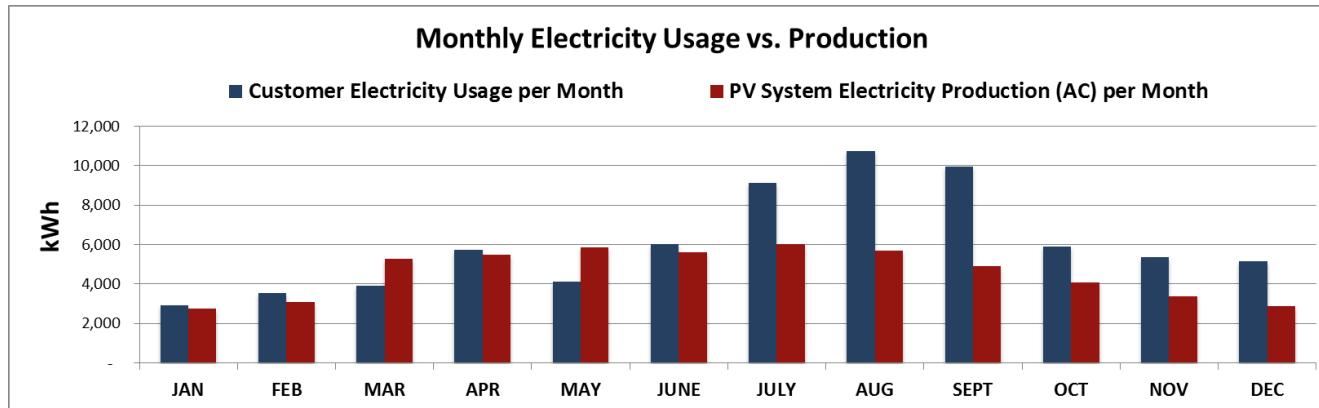
Cost Recovery: 8 Years

Simple Payback 14 Years

Net Pres. Value: \$61,911

Cum. Cash Flow: \$186,540

2,400 Head Hog Finisher – No MACRS



Size: 39.9 kW DC Array

Rate: \$0.109 per kWh

Production: 55,049 kWh/year
(76% ann. offset)

Initial Cost: \$119,700 (\$3/watt)

Less 30% ITC: - \$35,910

Net Cost: \$83,790

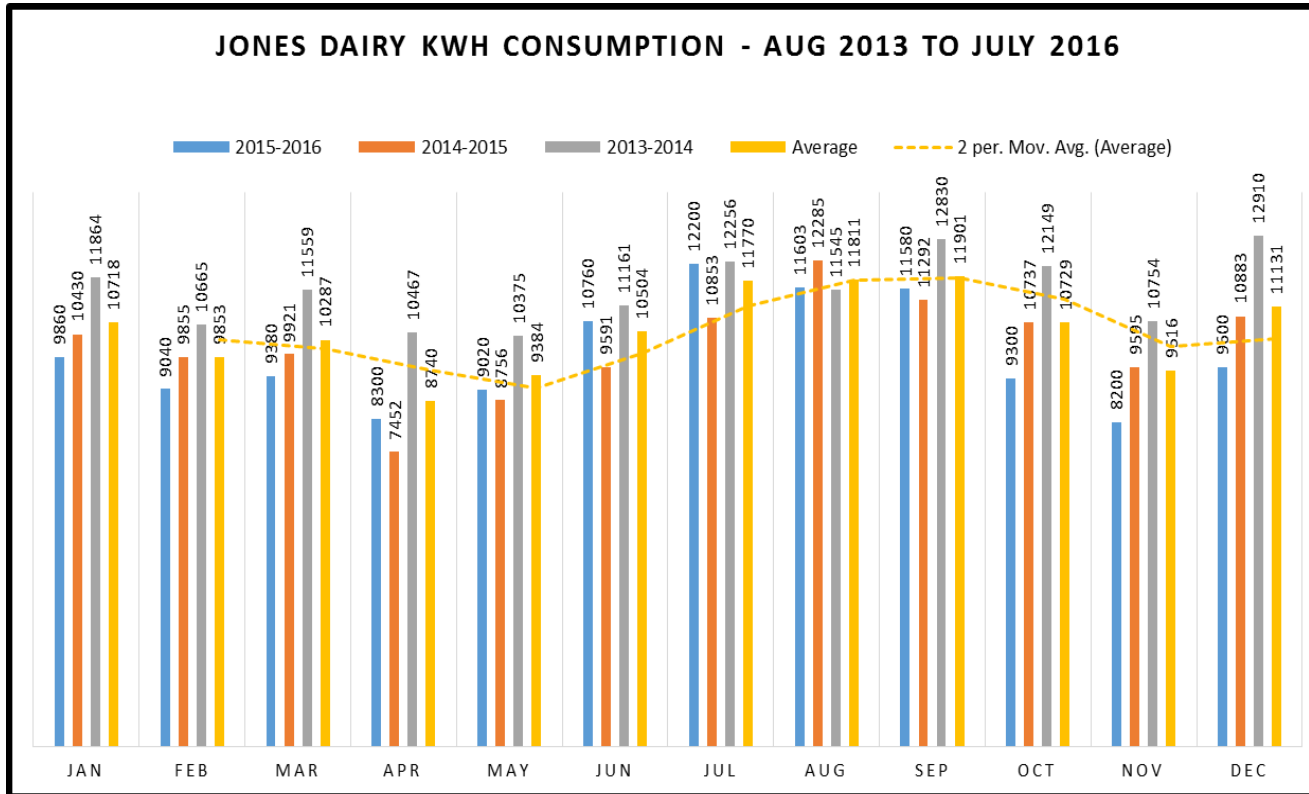
Cost Recovery: 14 Years

Simple Payback: 14 Years

Net Pres. Value: \$23,712

Cum. Cash Flow: \$143,298

Jones Dairy: 75 Milking Cows



Total

126,300 kWh yearly avg.

Peak Load

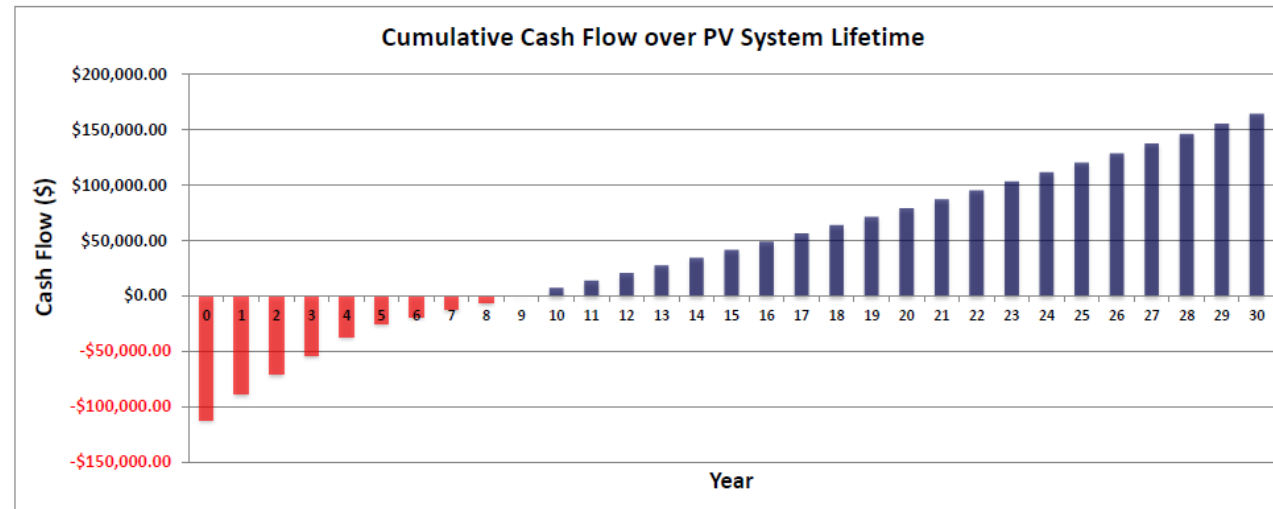
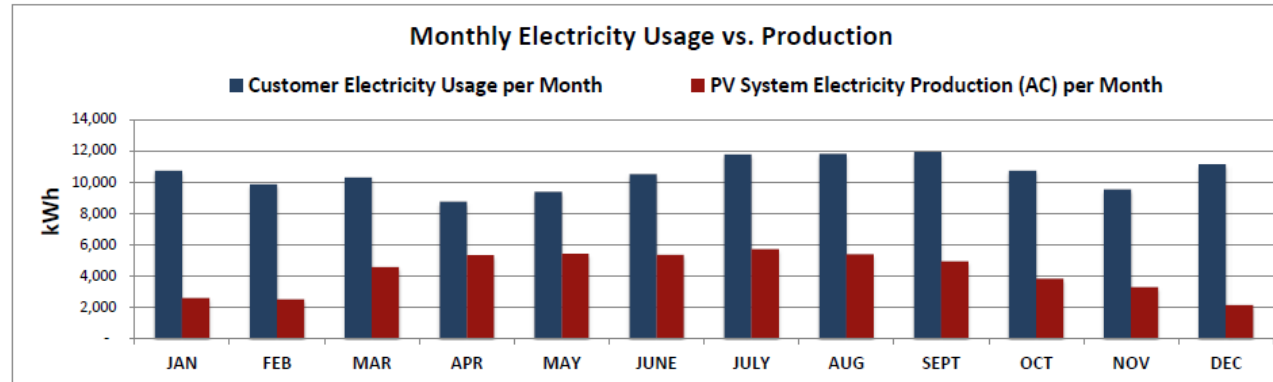
**July, Aug., Sept. about
10,800 – 12,800 kWh**

Electric Rates

\$0.1165 kWh summer

\$0.1065 kWh all other mos.

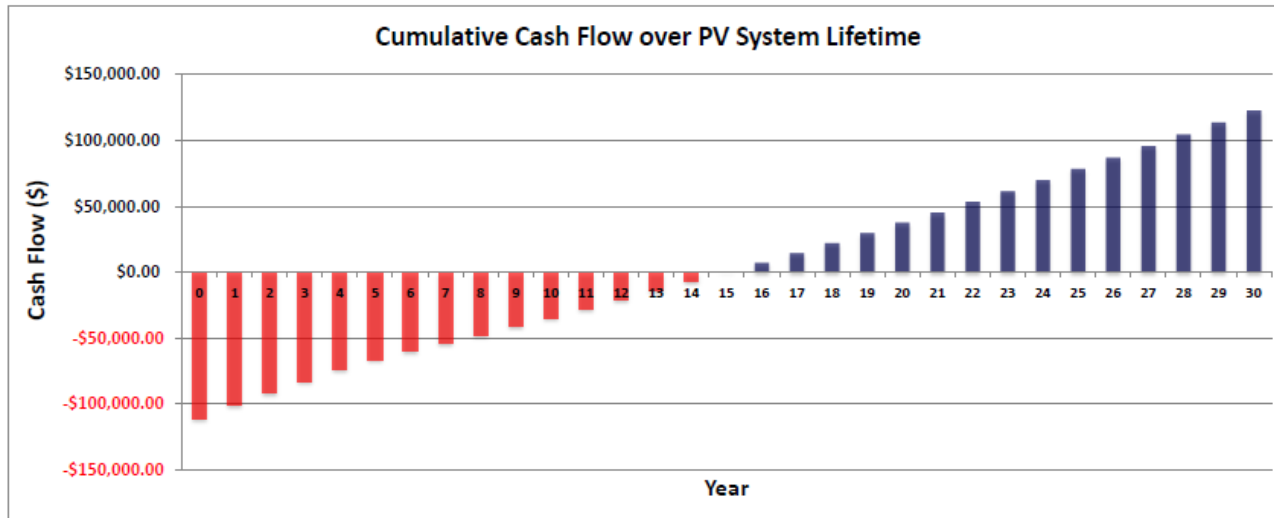
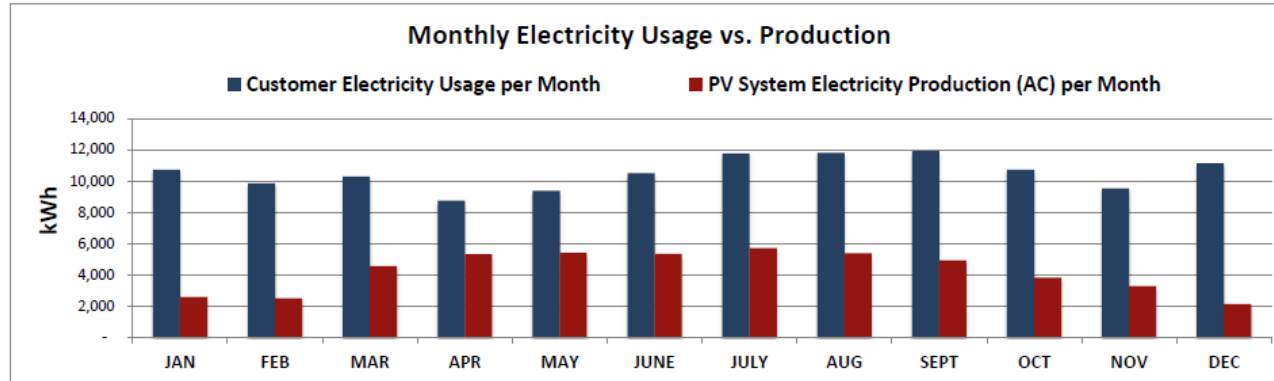
Jones Dairy – All Tax Benefits



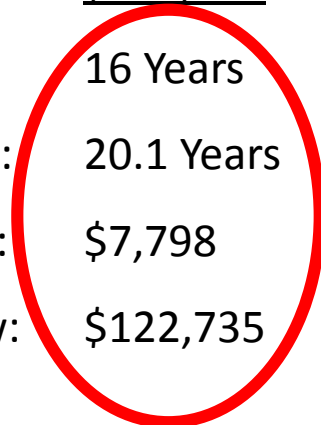
Size:	39.9 kW DC Array
Rate:	\$0.109 per kWh
Production:	51,108 kWh/year (40% ann. offset)
Initial Cost:	\$159,600 (\$4/watt)
Less 30% ITC:	- \$47,880
Net Cost:	<u>\$111,720</u>
Cost Recovery:	9 Years
Simple Payback	20.1 Years
Net Pres. Value:	\$44,689
Cum. Cash Flow:	\$164,496



Jones Dairy – No MACRS



Size:	39.9 kW DC Array
Rate:	\$0.109 per kWh
Production:	51,108 kWh/year (40% ann. offset)
Initial Cost:	\$159,600 (\$4/watt)
Less 30% ITC:	- \$47,880
Net Cost:	<u>\$111,720</u>
Cost Recovery:	16 Years
Simple Payback:	20.1 Years
Net Pres. Value:	\$7,798
Cum. Cash Flow:	\$122,735



Commercial PACE Financing



Property Assessed Clean Energy (PACE) is a new way to finance energy efficiency and renewable energy upgrades to the buildings of commercial property owners.



Energy-saving measures pursued by the owners receive project financing and are repaid as a separate item on their property tax assessment for a set period.

PACE eliminates the burden of upfront costs by providing low-cost, long-term financing.

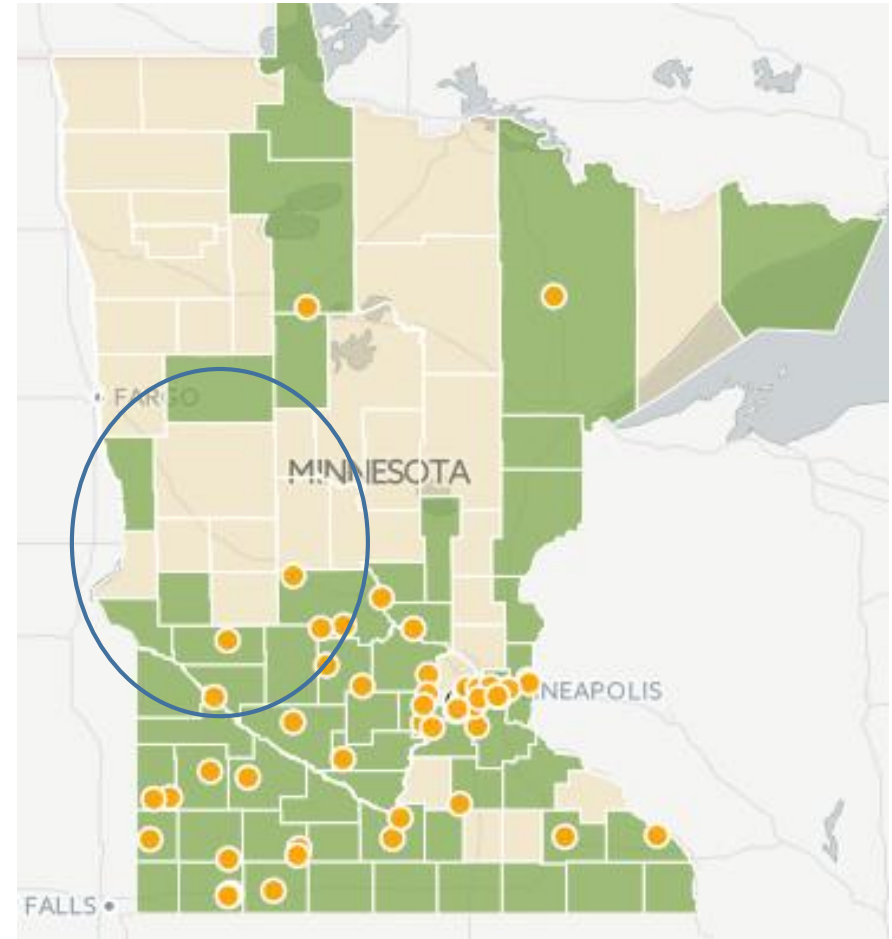
CleanEnergyResourceTeams.org/PACE

Financing tool: PACE!

Counties sign a JPA with the St. Paul Port Authority (SPPA) to allow PACE project funding

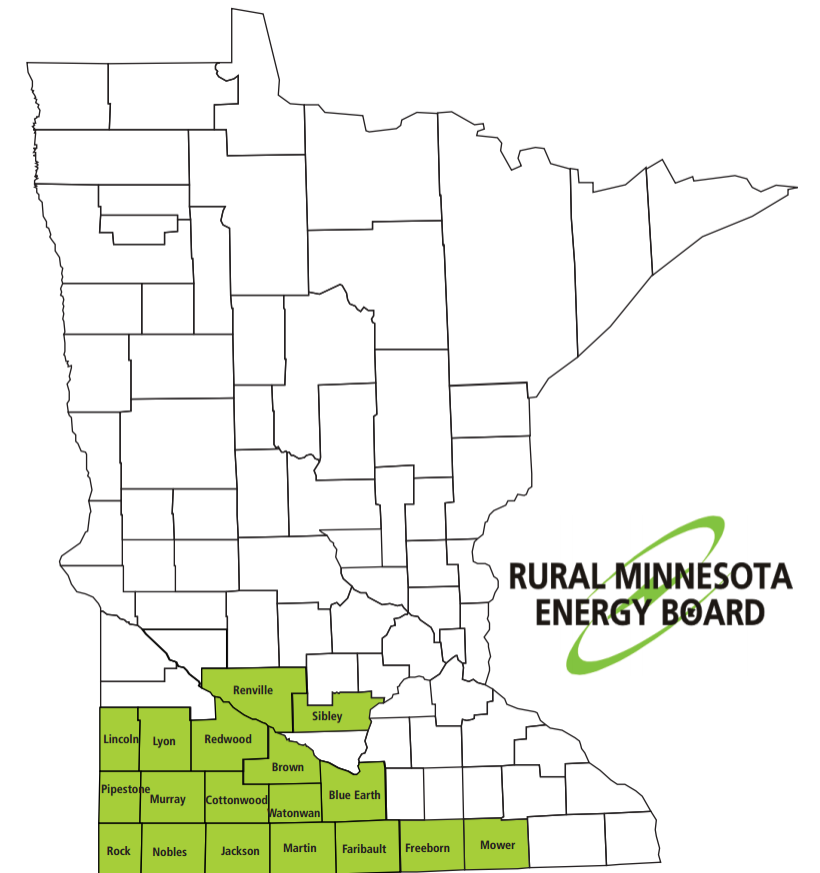
If counties belong to the Rural Minnesota Energy Board (RMEB), they already have access to PACE!

Not yet in Traverse, Grant, Douglas, Pope & Otter Tail Counties, but will be...



Financing tool: PACE!

- SPPA or RMEB approves financing, assigns tax assessment
- Property owner requests a special tax assessment – assigned by SPPA or RMEB
- Loan is connected to property, not the owner.



Financing tool: PACE!

- Interest rate usually under 5% for a term of less than 10 years
- Terms available up to 20 years.
- Limited to 20% of assessed property value up to \$100,000
- Serves energy efficiency and renewable energy projects



More Benefits!



- **Assessment transfers to the new property owner if sold**
- **Low interest rates due to the high security of repayment (~5%)**
- **Term is often longer than a traditional bank loan**
- **Does not require a personal guarantee; property is collateral**

Project Steps

1

- Complete an Energy Audit and/or get Project Bids

2

- Submit Application with Lender Consent Form and Financial History (3 yrs)

3

- PACE Administrator Approves Application & Assessment is Assigned

4

- Property Owner Completes Project

5

- Property Owner Uses Savings to Repay the Assessment (Revolving Loan Fund)

USDA Rural Development



Rrural

Energy for

America

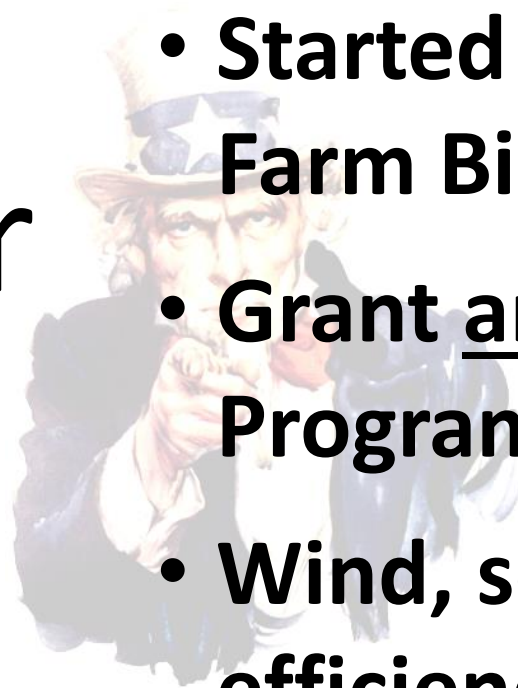
Program

- Started way back in 2002

Farm Bill

- Grant and Guaranteed Loan Program

- Wind, solar, biomass, biogas, efficiency (lighting, pumps, motors, fans, dryers...)



USDA REAP



Grant Program

25% of eligible project costs

- Labor, equipment, fees, permits...
- Competitive: 1 in 4 odds

Eligibility:

- Farms
- Rural Small Businesses
- Rural Electric Cooperatives
- Tribal Entities



Created by Oksana Latysheva
from Noun Project

USDA REAP: GRANT

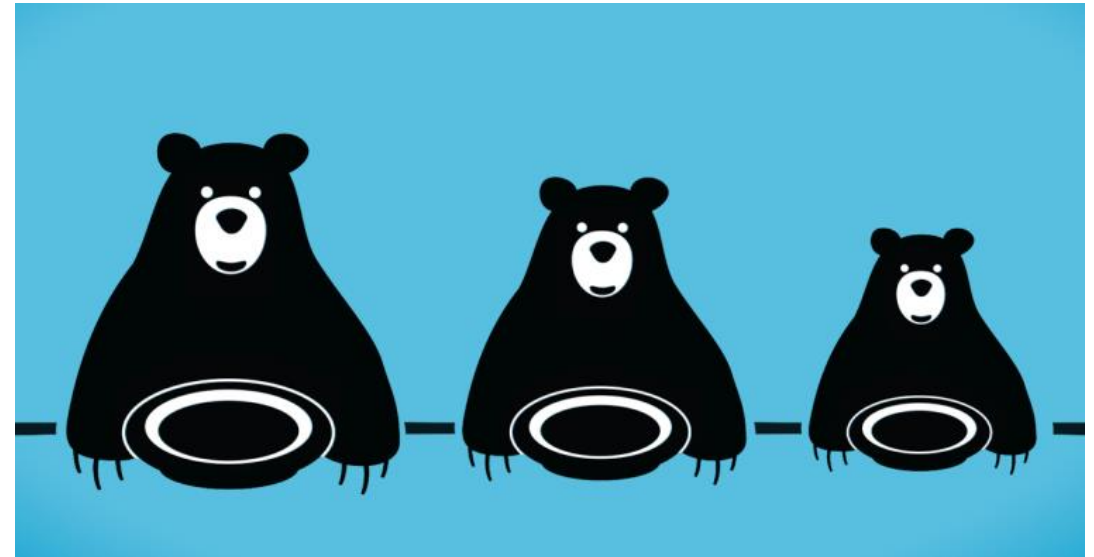


Three Project Size Tiers:

Small: ≤ \$80,000 - vendor estimates accepted

Medium: \$80,001 - \$250,000 - RE site assessment or EE energy audit & feasibility study

Large: Over \$250,001 - Engineering studies, attorneys, bankers and more!



Credit: LifeHacker.com

USDA REAP: GRANT



Deadlines:

Oct. 31, 2017 (small projects)

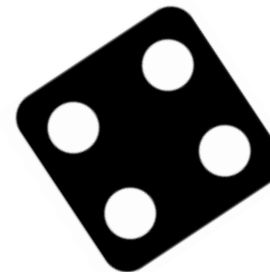
March 31, 2018 (all sizes)

Green Light – once application is submitted, you can start the project

Icing on the Cake: Project can be complete when you 25% comes in



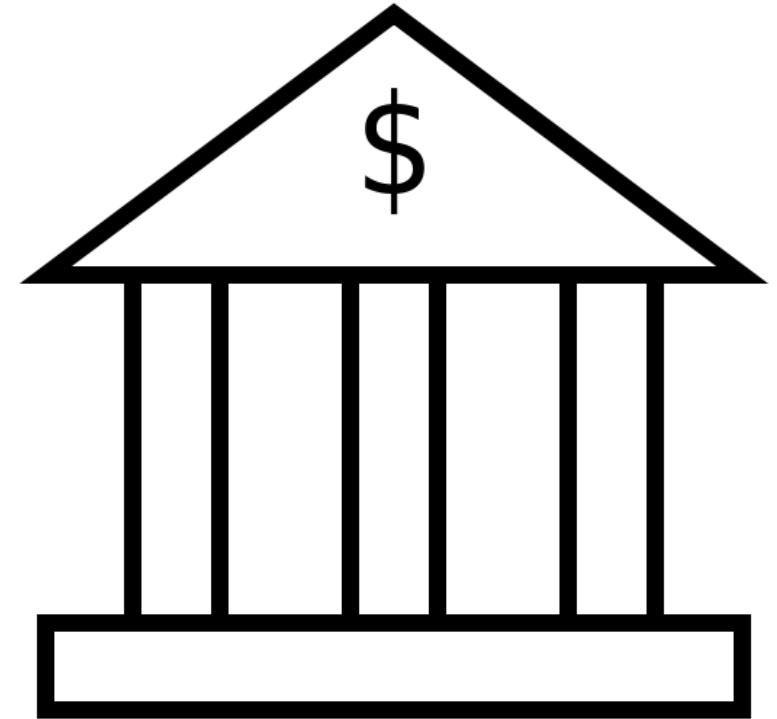
The Odds: 1 in 4



USDA: GUARANTEED LOAN



- **Up to 75% backing of private bank loan**
- **Guarantee reduces bank risk: brings loan rate down**
- **Not competitive!!!**

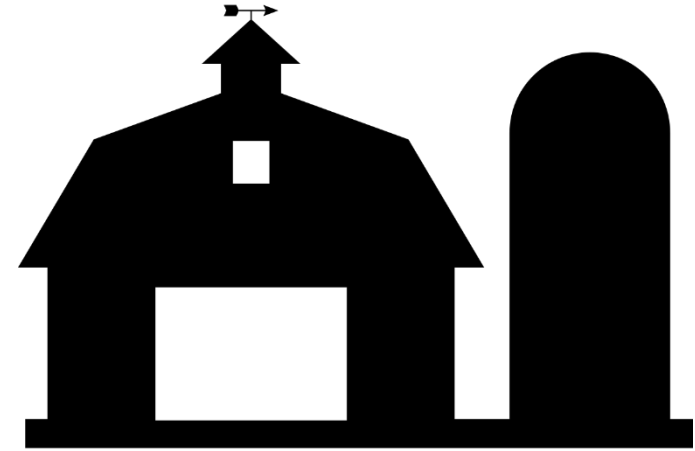


Created by Prasad
from Noun Project

USDA: GUARANTEED LOAN



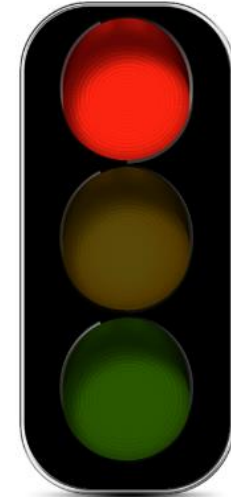
- **\$5,000 minimum loan amount.**
- **Rates and terms negotiated with the lender and subject to USDA approval**
- **Rolling applications accepted**



MDA Livestock Investment Grant



- Grant 10% of project cost (5% for solar PV)
- Min investment of \$4,000
- Any improvements, including energy efficiency
- Funding cycle once per year
- Deadline: December 16, 2016
- Covers project costs NOT started or purchased prior to the grant award.
- ≈50%-60% success rate!!!!



Take a look:

[www.mda.state.mn.us/
livestockinvestmentgrant](http://www.mda.state.mn.us/livestockinvestmentgrant)

CERTs: Minnesotans Building a Clean Energy Future



Learn more: Visit the CERTs website, attend an upcoming event, or connect with a member of our staff.

www.CleanEnergyResourceTeams.org

Contact me:

Fritz Ebinger

Rural Energy Program Manager

612-626-1028

ebing007@umn.edu

Quantifying Your Solar Resource

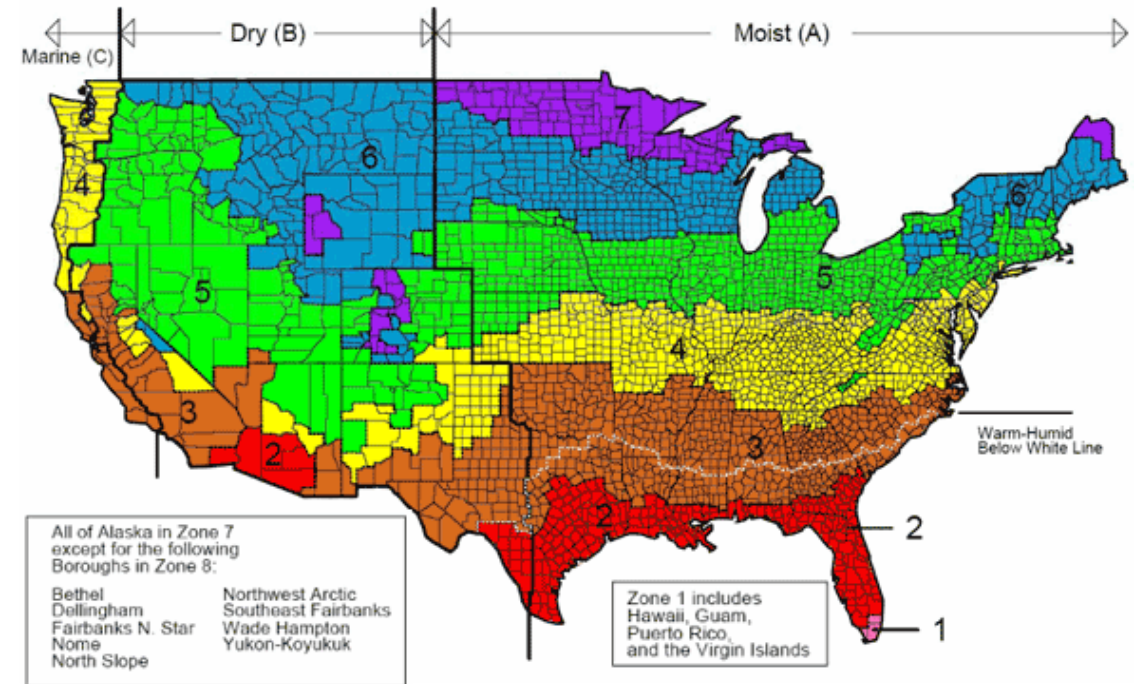


- 1. Get Efficient**
- 2. Roof Condition/Ground**
- 3. Wiring and Breaker Box**
- 4. Shady spots?**
- 5. Load Profile**
- 6. Financial Estimates**

Step Two: Building and Roof



- Roof support? Snow load?



Do not install solar on shingles that are 10+ years old!

Set it on the ground, dummy!



- Preferably **on the ground**
- Unlimited square footage, less labor.
- Less heat!



Photo Credit: Green Energy Products



Photo Credit: Farm Market News

Step Three: Electrical Infrastructure

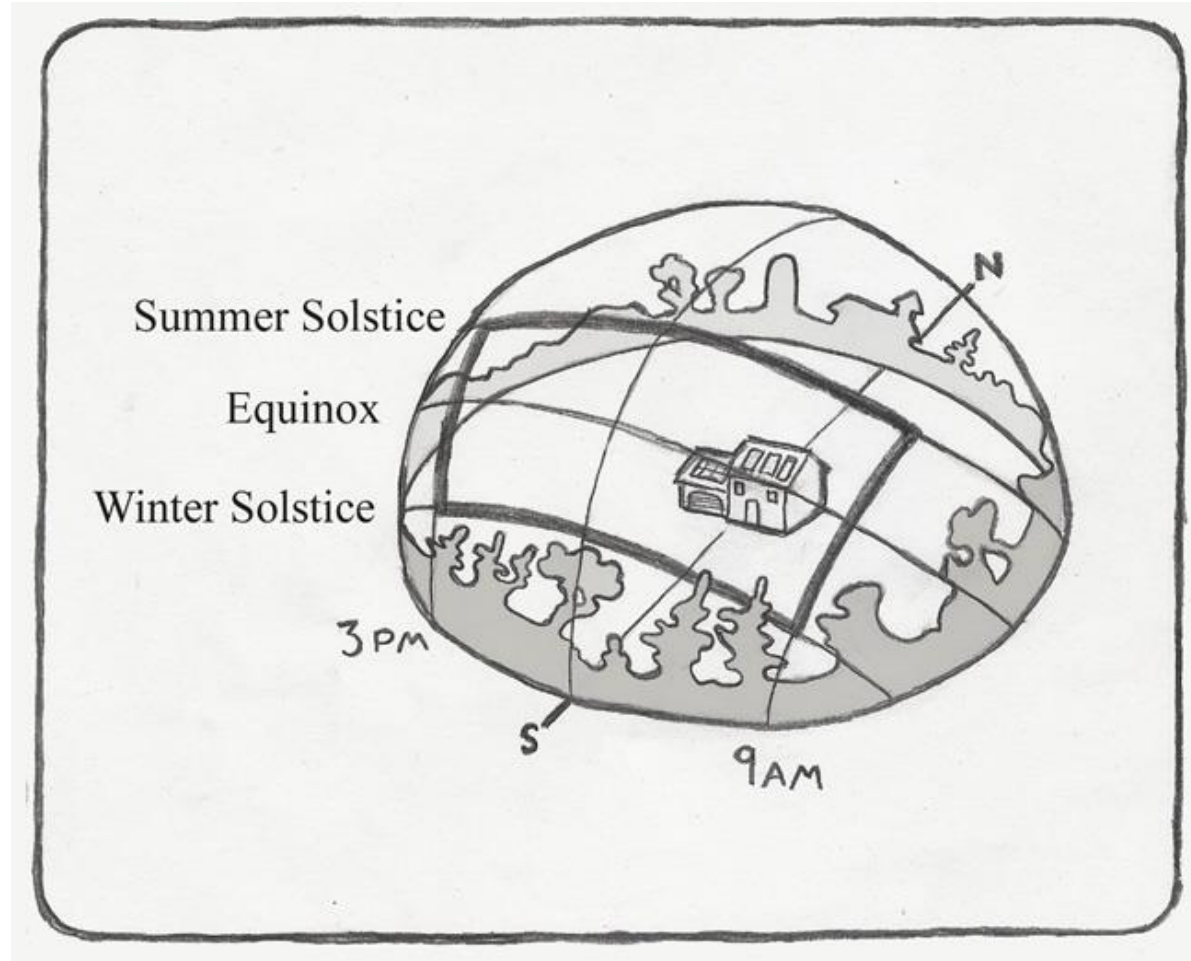


- Need a breaker box
- Bus bar openings
- NO fuses



Source: Camelblog. "Fuse box." www.camelblog.com.; The Fuse Company. "Fuses." www.thefusecompany.net.

Step Four: Solar Window



Source: Ramlow, B and Nusz, B. 2010. *Solar Water Heating: A Comprehensive Guide to Solar Water and Space Heating Systems*. Second Edition. New Society Publishers: B.C., Canada.