Solar Energy for Hogs

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Clean Energy Resource Teams (CERTs)
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CERTs is a statewide partnership
## What Does CERTs Do?

### 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
CERTs partners with utilities and other groups to do outreach and education about farm programs for energy efficiency and renewable energy.
Gobbling Up Savings in Turkey Barns

15 FARMS

25 BARRNS
4 brooder, 8 finish
13 egg laying

4,183 BULBS
167 per barn

ANNUAL IMPACT:

$58,165 Saved
$2,327 per Barn

553,023 kWh Saved
22,121 kWh per Barn

WHY UPGRADE?

- Reduce costs by $1,000s each year
- Save up to 85% on lighting energy
- Pay for project in 3 yrs or less
- Reduce maintenance
- Federal & utility funding

mncerts.org/turkeys
Renewable Energy for Greater MN

We offer FREE assistance to Farmers and Small Businesses for:

• Solar site assessments and financial modeling
• Application support for grants and loans
• Guidance on federal tax credits, depreciation
• Financing opportunities: Property-Assessed Clean Energy (PACE)

mncerts.org/greatrenewables
Sharing farm case studies

Zumbrota Farm harvesting solar power to reduce energy costs

Ronningen Dairy Farm adds solar PV to their West Concord operation

Jorgenson Hog Farm in Westbrook, MN cashes in with wind, solar PV

Family farm invests in renewable energy, saves barn

Learning about solar energy at Featherstone Farm

Solar exceeds expectations at Guentzel Family Farms in Eagle Lake

Hoffman Farms near Chatfield saves money with utility rebates

The Popps are harvesting solar and wind energy on their farm

Turkey farmers learn about solar air and LED lighting technologies

Langmo Bros. Farm pilots LED lighting for turkey barns
SOLAR & SWINE
Solar Window

Summer Solstice
Equinox
Winter Solstice

Annual Average Range of 4.7 to 3.7 Sun Hours per Day
Solar PV Curriculum & Simple Steps

Before you begin...

Energy efficiency is the cheapest energy of all. It's more reliable and always available. Weather and time are not factors when you want to use energy. If you want to reduce the amount of energy you use, this is a great place to start.

1: GET EDUCATED

Understand what sort of system is right for you. Solar technologies are evolving quickly. As a consumer, you will want to work with a reputable provider and understand the details of your own system.

2: START PLANNING

Consider your own expenses, budget, and roof life and structure.

Roof Types

There are many different types of roofs that can accommodate solar panels. Some of the most common are flat roofs, standing-seam metal roofs, and shingles. These are just a few of the many options available. Consider the type of roof you have before deciding on a system.

Roof Orientation

The orientation of your roof can greatly affect the amount of energy that you can generate. South-facing roofs are ideal for maximum sunlight exposure.

Roof Size

The size of your roof is important in determining how much energy you can generate. A larger roof can accommodate more panels and generate more energy.

Roof Compatibility

Some roofs may not be compatible with solar panels. It's important to consult with your installer to ensure that your roof is suitable for a solar system.

Roof Access

The accessibility of your roof is also important. If your roof is difficult to access, it may be more expensive to install a system.
WHAT DOES THE HARDWARE COST?
Hardware - The Swanson Effect: 1977

- Star Wars breaks box office
- Elvis dies at 42
- Apple II is best computer
- Solar cell costs $76.67 per watt
Hardware - The Swanson Effect: 2018

- Star Wars: The Last Jedi on Netflix
- Apple iPhone X is best seller
- Elvis lives!
- Solar cell costs $0.34 per watt

Source: NREL, Q4 2017 / Q1 2018 Solar Industry Update May 2018
WHAT IS THE TURNKEY COST?
“Installed cost per watt”

- Commercial Rooftop Fixed Tilt: $2.40 - $2.60 per watt
- Ground-mount Commercial Fixed Tilt: $1.90 - $2.40 per watt
- Ground-mount Commercial Tracking: $5.10 - $5.30 per watt
- Residential Rooftop Fixed Tilt: $2.50 - $4.00 per watt

CAVEAT: Non-scientific data! These are just recent quotes to cross my desk
Financial Tool: Federal Income Tax Credit

- 30% Fed. Energy Investment Income Tax Credit (the 30% ITC)
- 1 year carry-back, 20 year carry-forward period (26 U.S.C. §39)
- Extended at 30% through 2019, then tapers to 26%...22%...10%

www.mncerts.org/taxcredits
Accelerated Depreciation (MACRS)

- Cost of doing business expense taken as a tax credit over the life of the equipment
- 5-year Property Schedule (IRS Pub. 946)
- Depreciable adjusted basis is 85% of total cost (not 70% after the 30% ITC, hmmm...)**
- Trump Tax Bill allows for 100% bonus depreciation in year placed in service (waiting for IRS).

www.mncerts.org/macrs

Example: 40 kW Array at $2.50/Watt

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Cash Flow Chart: 40 kW Array at $2.50/Watt
--All Tax Benefits Included--
Consumption – 2,000 head

2,000-head Finisher Barn kWh Consumption 9/2015 - 10/2017

- 59,880 kWh/yr avg
- 24 months data
Sizing Up Solar – 2,000 head

Monthly Electricity Usage vs. Production

Customer Electricity Usage per Month

PV System Electricity Production (AC) per Month

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

59,880 kWh/yr avg consumption

53,488 kWh/yr solar production
Efficiency first!

Benefits:
• Always the lowest cost option
• Every $1 invested saves $3-5 in a renewable energy project
• Reduce peak loads
• Easier to finance

Opportunities:
• Mostly heavily-used lighting
• Basic fan and motor maintenance
• Occupancy sensors and timers
• Efficient Ventilation/ECM motors
• Behavior change
Access to a subpanel or the service drop

180° south or close
2,400 Head Finisher
Structural Considerations

Snow load

Do not install solar on shingles that are 10+ years old!
Where to put it?

Ground: Unlimited square feet, less labor.
Less heat, easier maintenance
Farm Electrical Infrastructure

- Bus bar spaces for hosting capacity
- NO fuses

Net Metering

Communicate early and often with your electric utility

• Minn. Stat. § 216B.164 and Rule 7385 govern compensation
• Must meet Interconnection Standards (recently updated)

39.9 kW DC = Tennis Court
Grid Access Fee

Usually:
• First 3.5 kW exempt
• $2.50-$6.00 per kW monthly
  - Depends on the individual REA’s CoSS!
• Added to basic service fee
• Has a cap

Example: 10 kW – 3.5 kW = 6.5 kW x $7.30 = $47.45
plus basic service charge

South-Central: $77.35 cap – single-phase, $5.87 per kW
BENCO: $38.00 cap – single-phase, $1.70 per kW
Grid Access Fee

• Based on the COST OF SERVICE (Form 7 Study – same equation for all REAs)

• Determined by an engineering study; calculates costs of wires, poles, transformers, hardware, generation costs, labor...

• Form 7 Study gauges financial health of the REA
Finance energy efficiency and renewable energy upgrades for commercial or agricultural property owners

- Project cost is repaid as a separate item on property taxes
- Eliminates the burden of upfront costs

mncerts.org/pace
How does PACE work?

1. Landowner evaluates and selects projects that reduce energy costs (site assessment or energy audit)
2. St. Paul Port Authority or Rural MN Energy Board provides financing to the landowner following application approval
3. Local government adds the property tax assessment to tax rolls
4. Landowner pays the assessment for up to 20 years
Qualifying Industries - PACE

- Industrial/manufacturing
- Housing - limited
- Agriculture
- Nonprofit
- Places of Worship
Hurdles & Benefits

• Hurdles
  • Financing limited to 20% of current assessed property value
  • Must be current on mortgage and property tax payments
  • Davis-Bacon Act may apply

• Benefits
  • Low origination fee
  • Cash flow positive
  • Job creator and maintainer
  • 5% rate for 10 Year Term or Less
Want to Follow Up?

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