

Welcome to



**GROW SOLAR**

TWIN CITIES

**Solar Power Hour!**

We will begin our presentation shortly, starting with  
a brief introduction to zoom.



# GROW SOLAR

TWIN CITIES



 Resilient Cities & Communities  
Visionary People. Vibrant Places. Regenerative Futures.

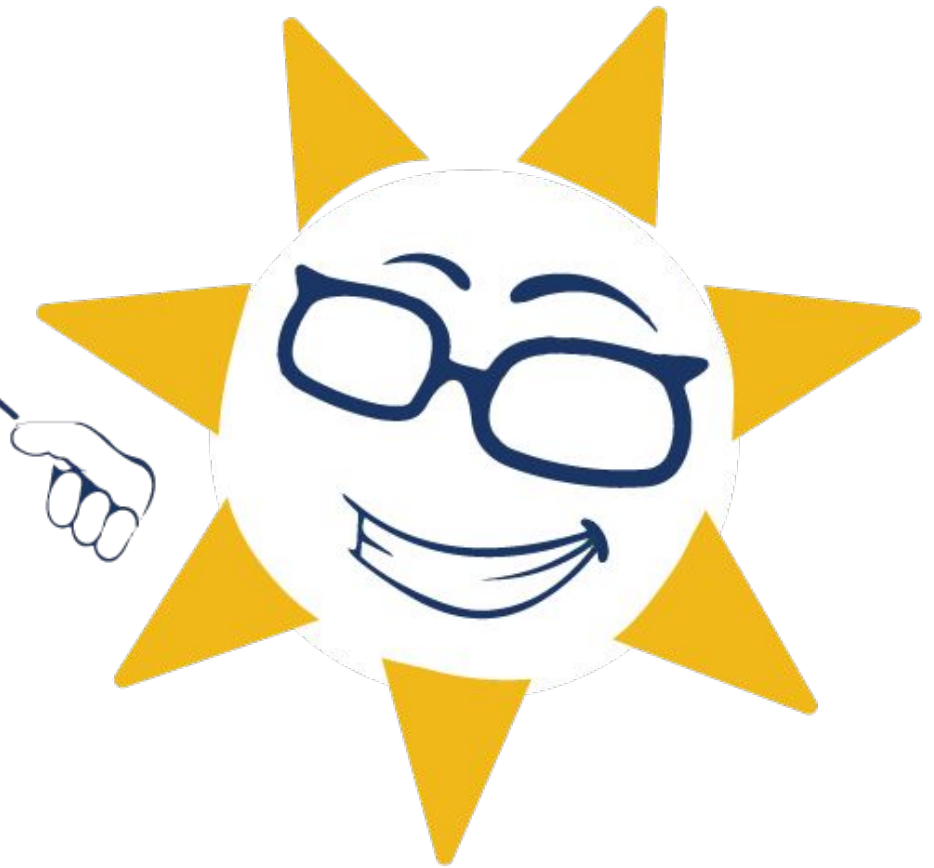


## Today's Agenda

1. What is the Grow Solar Twin Cities group buy program?
2. How does solar power work?
3. Solar options & considerations
4. Costs and cost-saving incentives
5. How to begin your solar journey

GOAL: Simplify a complex topic and make it easier and more affordable to go solar.

**It's time  
for a  
poll!**





## Why are we here?

There are problems with the way you currently buy electricity.

1. Unpredictable rate increases
2. Not building equity
3. Pollution

POWERED BY





## Who is the MREA?

- Founded in 1990 with the first Energy Fair
- Promote renewable energy through educational courses in solar PV, solar thermal and small wind
- 42 Solar group buys, 1,946 properties, 14,000 kW of solar

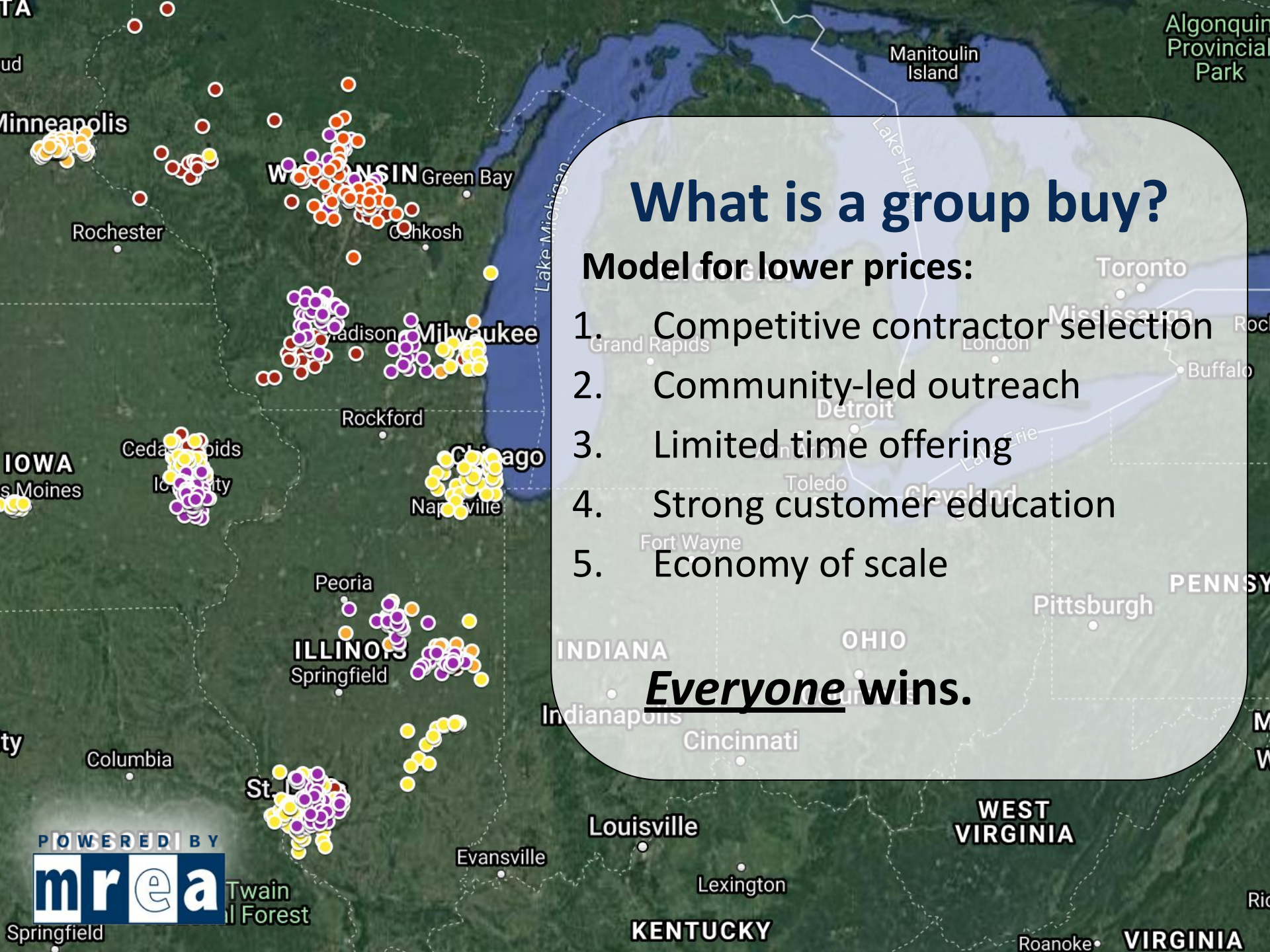


# Training Scholarships

- MREA recently provided training scholarships to trainees at **Renewable Energy Partners** based in North MPLS
- MREA trainees will have an opportunity to intern with TruNorth Solar for more hands-on experience
- **Help support more trainings like this by donating to the scholarship fund**  
**Avenues for Youth** will receive solar installations courtesy of Hammond Climate Solutions and Grow Solar Twin Cities







# What is a group buy?

## Model for lower prices:

1. Competitive contractor selection
2. Community-led outreach
3. Limited time offering
4. Strong customer education
5. Economy of scale

**Everyone wins.**

POWERED BY



Twain  
Forest

Springfield



## Grow Solar Twin Cities

- 15 Educational sessions throughout the summer and fall
- Open to all **Twin Cities** residents, businesses, farms, and nonprofits
- Start with a free, no-obligation site assessment
- **Turnkey system:** program Pricing includes design, permitting, components, installation (all-in cost), and warranties
- Financing available; American-made modules tier 1 offering

# INSTALLER PROFILE

- **One of Minnesota's most experienced and trusted solar installers.** Experts in every division of the company.
- TruNorth takes pride in delivering turnkey solutions, from design to interconnection, from incentives to materials and construction...we handle EVERYTHING!
- The **TruNorth Solar** team will construct your array in a safe and professional manner with some of the nicest and most passionate individuals in the industry.
- 10+ years experience serving the Twin Cities Metro as well as locations all over Minnesota.



# ***How Does Solar Work?***

## ***Part 2 of 5***





# What's a Kilowatt Hour (kWh) and a Kilowatt (kW)?



## **KILOWATT HOUR (kWh)**

a unit of energy used or produced. This is what shows up on your bill.

**Energy**



## **KILOWATT (kW)**

a measurement of capacity: how big your array is.

**Power**

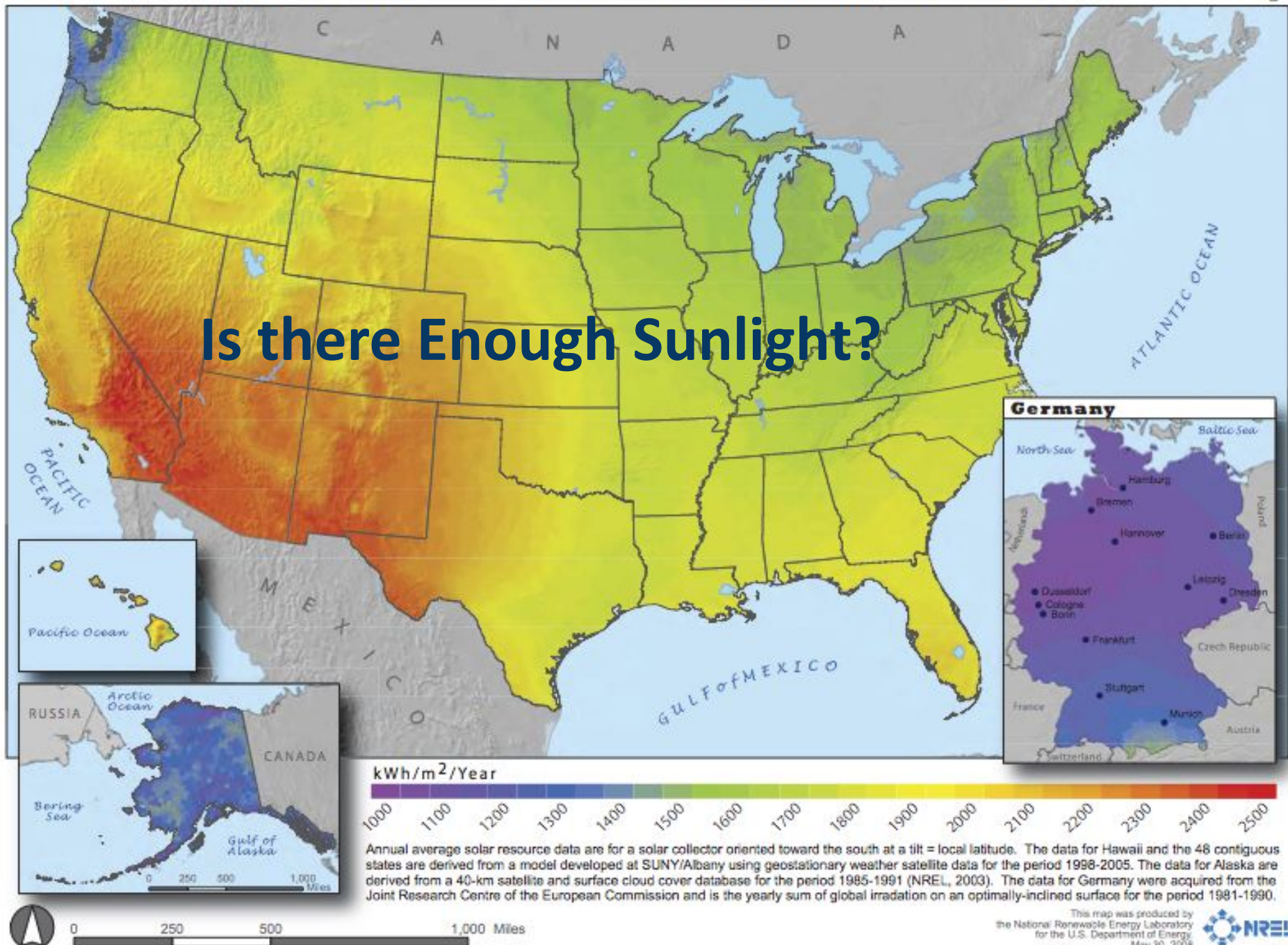


Every home's system size and energy use is different.

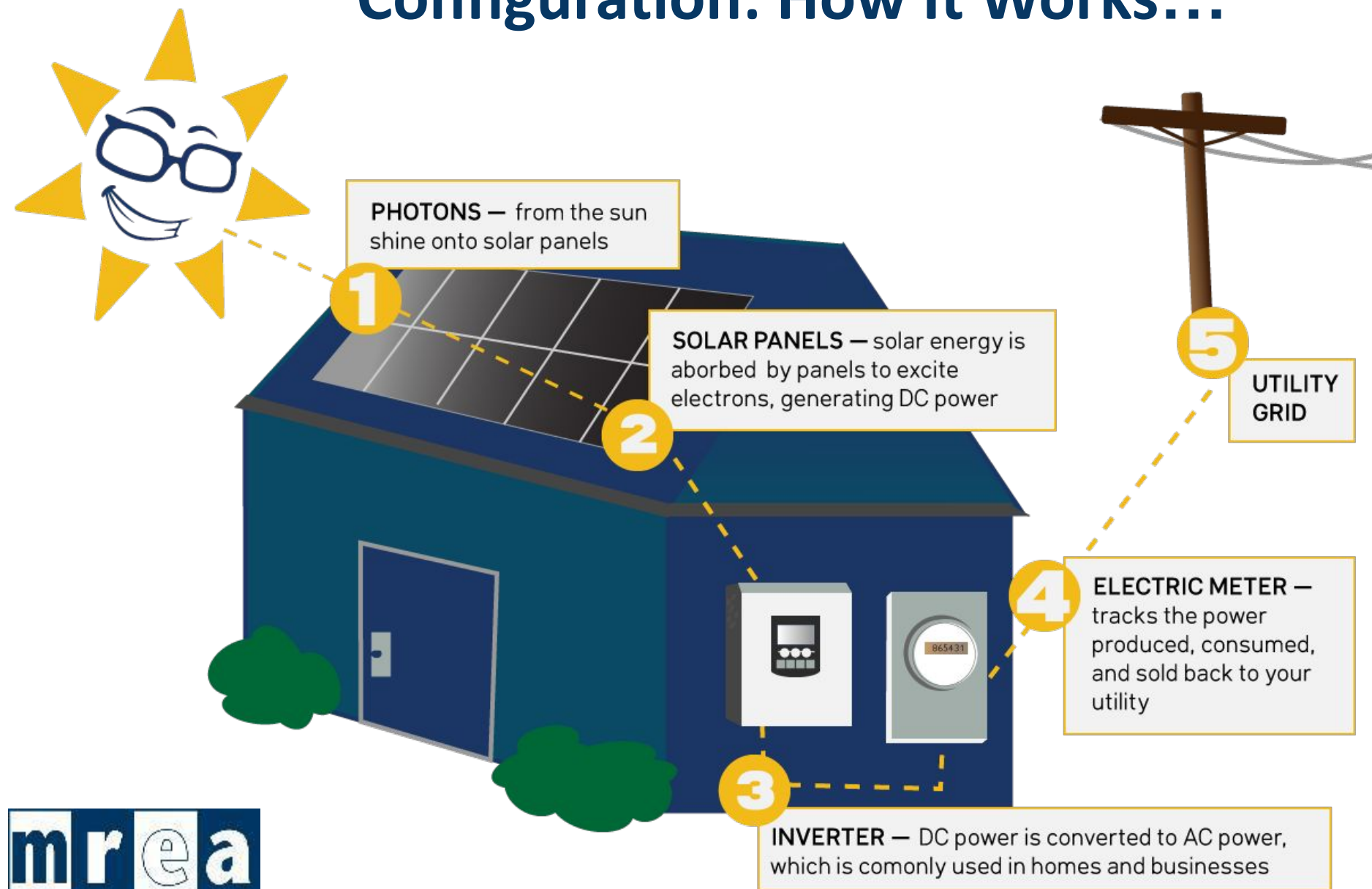


# Photovoltaic Solar Resource : United States and Germany

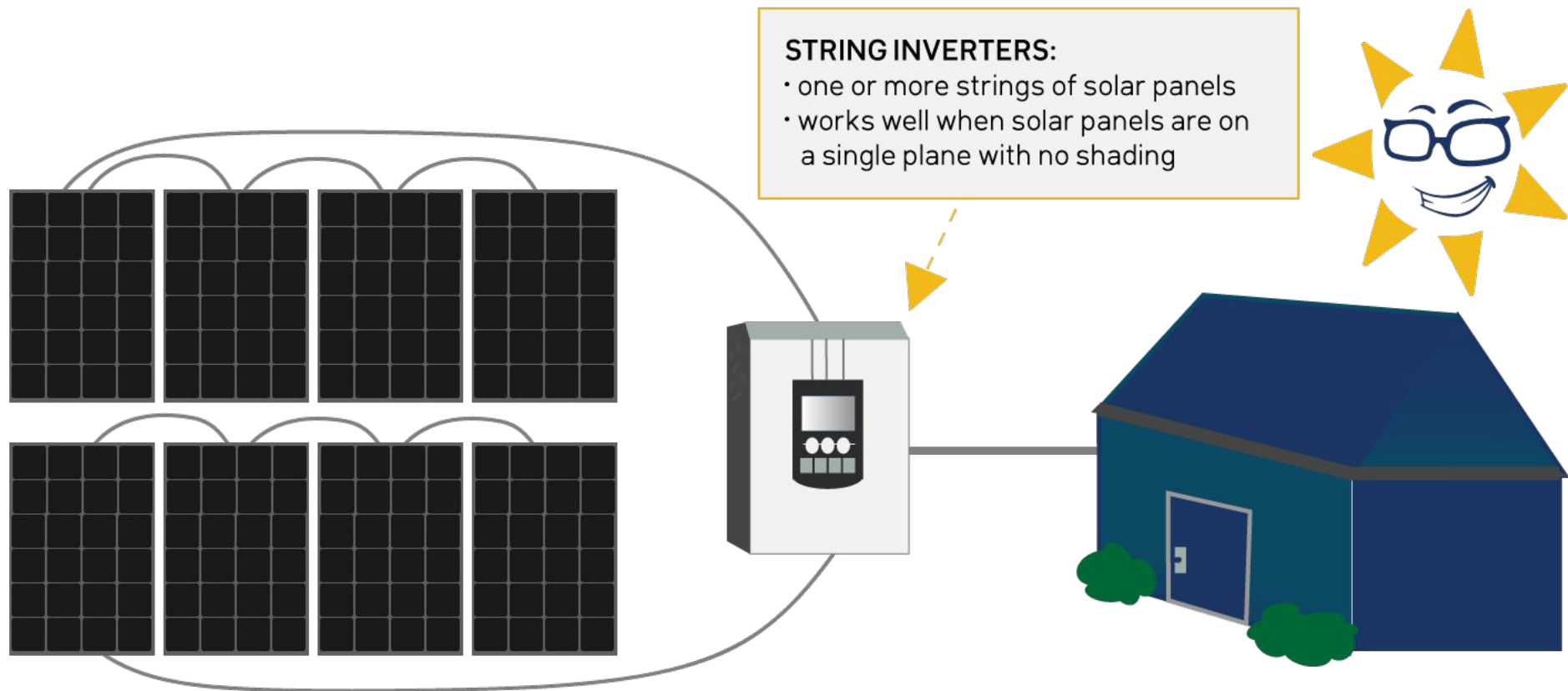
Is there Enough Sunlight?



# Configuration: How It Works...



# Inverter, the heart of the array.

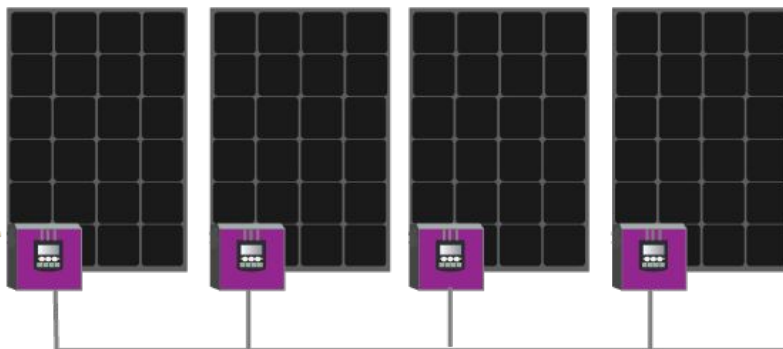




# Inverter, the heart of the array.

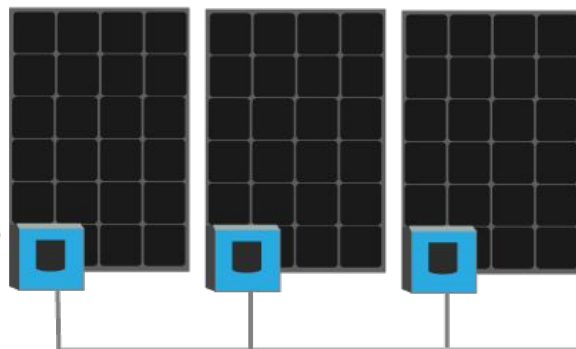
## MICRO INVERTERS:

- one microinverter per panel
- function well on roofs with shade or multiple panel orientations



## POWER OPTIMIZERS:

- one optimizer per panel, plus central string inverter
- function well on roofs with shade or multiple panel orientations





# Off-Grid

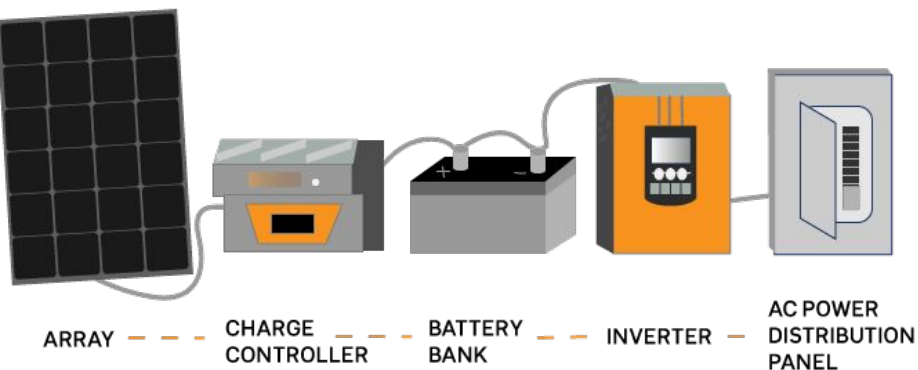
VS.

# Grid-Tied

## OFF-GRID DESIGN:

A stand-alone PV system that operates autonomously and supplies power to electrical loads independent of the utility grid.

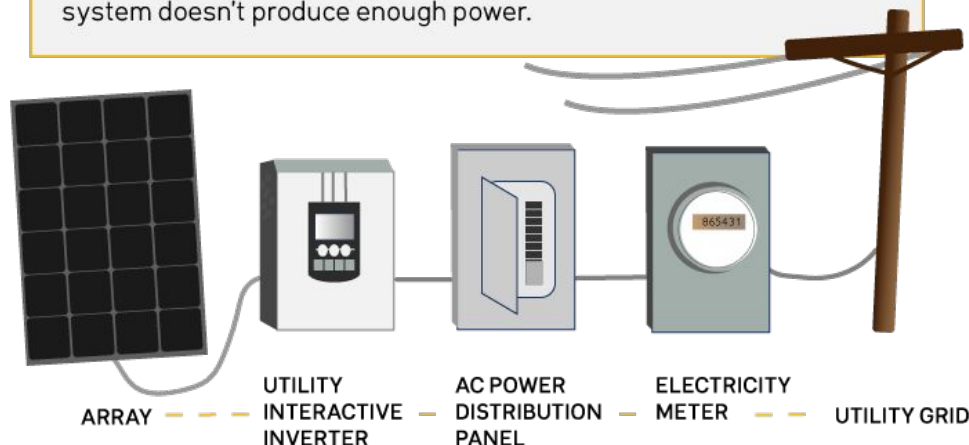
- Requires Batteries & Charge Controller
- Not Connected to the Grid
- Grid Off = Solar On



## GRID-TIED DESIGN:

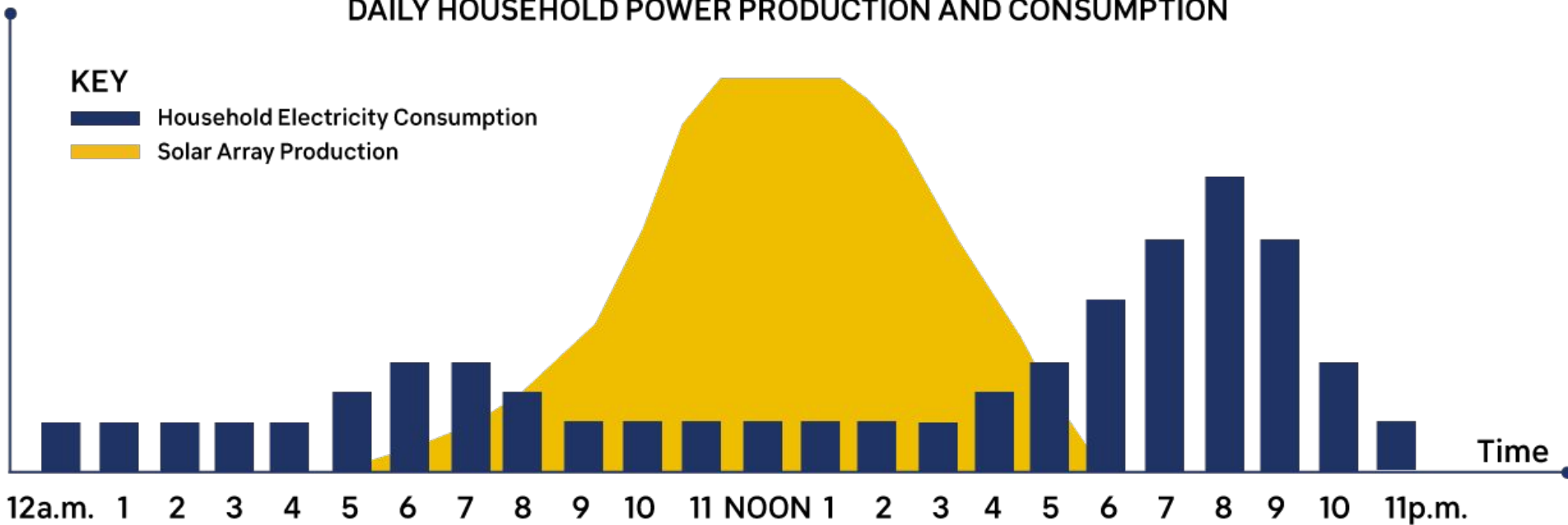
Excess electricity can be delivered to the utility grid, **AND** you can use electricity from the utility grid when your system doesn't produce enough power.

- Least Expensive Option
- Allows for Net Metering
- Grid Off = Solar Off



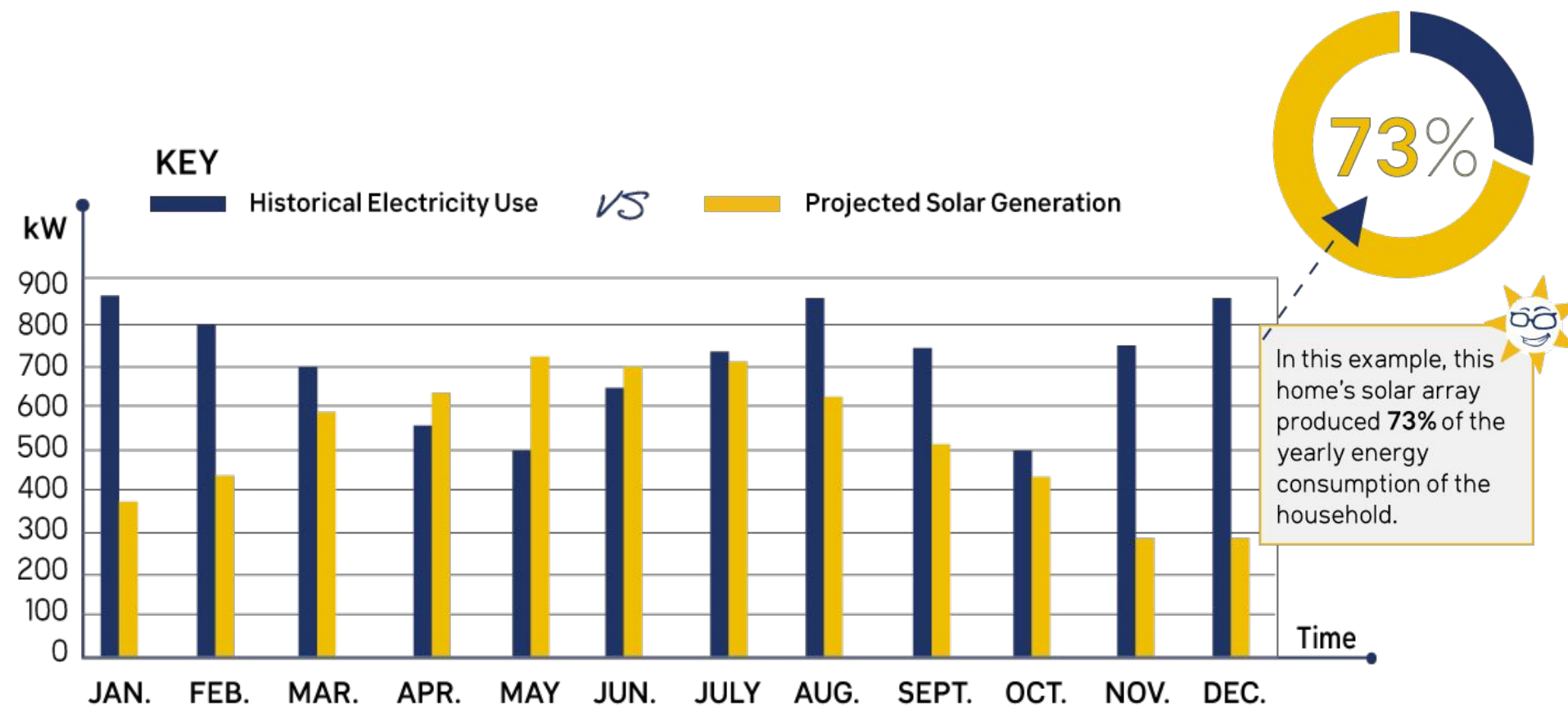
# *“A Day in the Life”* of a Grid-Tied / Net Metered Home

## DAILY HOUSEHOLD POWER PRODUCTION AND CONSUMPTION



- Net Metering is generally calculated on a monthly basis
- Net Metering policies vary based on utility

# *“A Year in the Life”* of a Grid-Tied / Net Metered Home



# Environmental Benefits

Over the life of a 5 kW system, the electricity produced is equivalent to 163 tons of carbon dioxide (CO<sub>2</sub>).

That's the CO<sub>2</sub> equivalent of any one of these:



**Planting 3,798 trees.**



**Driving reduced by 326,000 auto miles, or 16,626 gallons of gasoline.**



**Recycling 515 tons of waste instead of sending it to landfill.**



**158,831 pounds (79.4 tons) of coal burned.**



**and you will help avoid the use of up to 3,975,500 gallons of water by Thermoelectric Powerplants.**



# *Options & Considerations*

## *Part 3 of 5*



# Location and Siting

- South-facing with 9am-3pm sun exposure is ideal
- Avoid shading: trees, buildings, poles
- East or West-facing roofs are also workable options





# Mounting: Roof Mounted Solar

- Roof is most common
- Need good solar window
  - South is ideal, but E/W only reduce ~20%
  - Trees can partially shade





## Mounting: Ground Mount

- Good for larger arrays and for properties where house roof is shaded
- Require large un-shaded area
- Take advantage of best solar window
- Anchor to ground mounts
- Easy to remove snow, dust
- Static, but may have a summer/winter adjustment

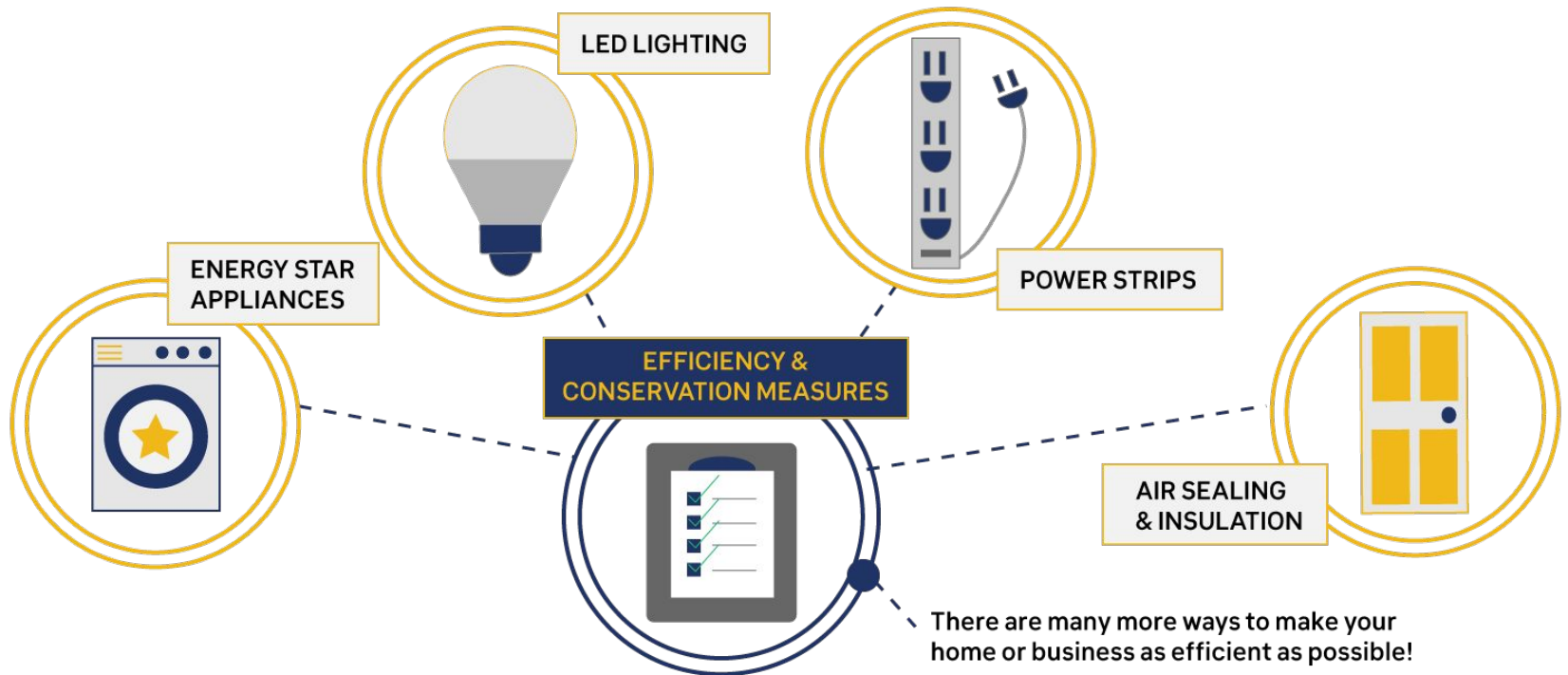


# Considerations

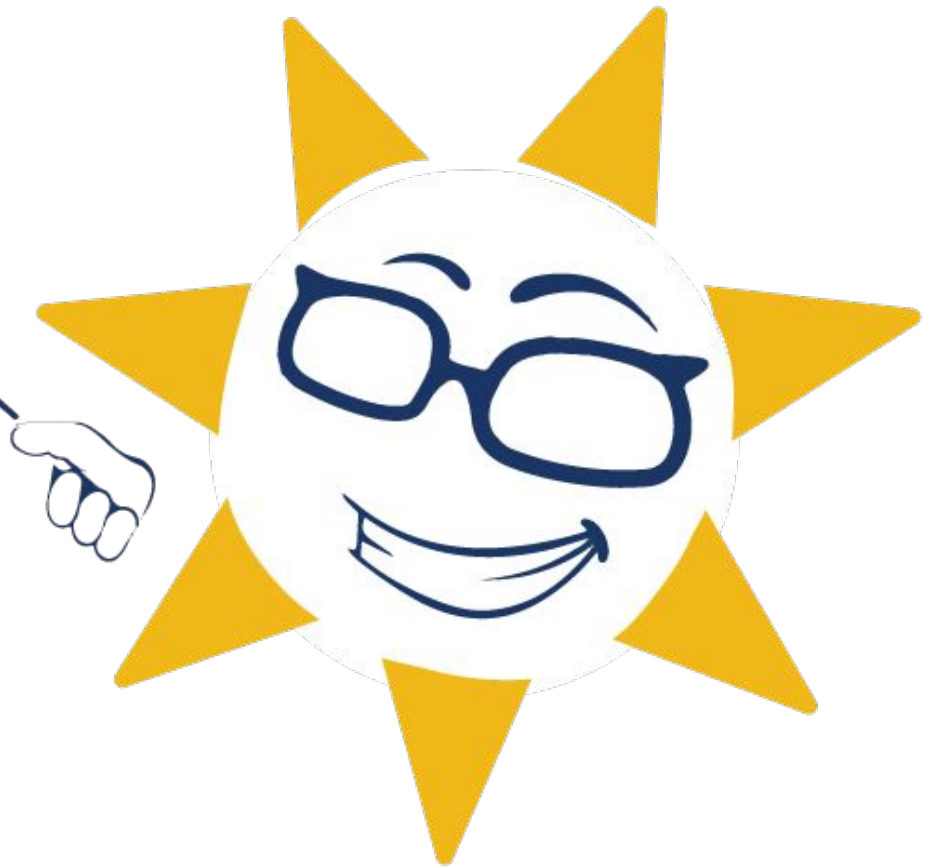
- System size and design
- Module type
- Inverter type
- Slope, height of roof
- Complexity of electrical interconnection
- Age & type of roof
- Multiple PV arrays
- Need good solar “window”
  - South is ideal, but East + West only reduces production ~20%
- Environment
  - Shading
  - Snow / Hail
  - Wind Loading
  - Squirrels

# Energy Efficiency

The cheapest kWh is the one that's never used.



It's time  
for a  
poll!





## Is my home well-suited for solar?

- ☐ Do I have a south facing roof?  
(or clean East / West facing roof)
- ☐ Are there shade issues?
- ☐ When do I anticipate re-roofing?
- ☐ Is my roof structurally sound?
- ☐ Is my home energy efficient?



# *Solar Costs*

## *Part 4 of 5*



# Home Values

Zillow has released a report stating that homes with solar panels sell for 4.1% more than their generation-naked counterparts.

*Zillow Economic Research*

A study by the National Renewable Energy Laboratory found that homes with solar sold faster and for more than equivalent non-solar homes.

*NREL (National Renewable Energy Laboratory)*

In a study across six states, Berkeley National Lab found that home buyers will pay a premium for solar homes.

*Lawrence Berkeley National Laboratory*





# Every Home Is Different

Your PV system will be tailor-made to fit your needs.



## Pricing Varies by Site and Needs:

- System Design and Size
- Age and Type of Roof
- Panel Type
- Dual Fuel/Off-Peak Metering
- Inverter Type
- Height and Pitch of Roof
- Complexity of Electrical Interconnection
- Multiple PV Arrays
- Energy Storage
- Transformer & Electric Service Upgrade

# **INSTALLATION TIMELINE (approximate)**

<b>Day 1</b>	<b>Sign Contract</b>
<b>Week 1-3</b>	<b>System engineering and design by TruNorth Solar; Permit and interconnection applications submitted</b>
<b>Week 4-9</b>	<b>Obtain approval for interconnect from Utility Company</b>
<b>Week 10-12</b>	<b>Order materials for completely customized system and schedule Installation</b>
<b>Week 12-13+</b>	<b>Waiting for inspection/approval and Utility Company Permission to Operate</b>
<b>Final Day</b>	<b>“Closing Meeting” System &amp; service Q&amp;A with customer</b>



## Value Solar Panel



powered by  
**Q.ANTUM / DUO**

**Q.PEAK DUO BLK-G6+**  
**330-345**  
ENDURING HIGH PERFORMANCE





**Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY**  
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.5%.

**INNOVATIVE ALL-WEATHER TECHNOLOGY**  
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

**ENDURING HIGH PERFORMANCE**  
Long-term yield security with Anti LID and Anti PID Technology<sup>1</sup>, Hot-Spot Protect and Traceable Quality Tra.Q™.

**EXTREME WEATHER RATING**  
High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

**A RELIABLE INVESTMENT**  
Inclusive 25-year product warranty and 25-year linear performance warranty<sup>2</sup>.

**STATE OF THE ART MODULE TECHNOLOGY**  
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

<sup>1</sup> APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168h)  
<sup>2</sup> See data sheet on rear for further information



THE IDEAL SOLUTION FOR:



Engineered in Germany

**Q CELLS**

## High Efficiency Panel



powered by  
**Q.ANTUM / DUO / Z**

**Q.PEAK DUO BLK ML-G10+**  
**385-405**  
ENDURING HIGH PERFORMANCE





**BREAKING THE 20% EFFICIENCY BARRIER**  
Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

**THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY**  
Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

**INNOVATIVE ALL-WEATHER TECHNOLOGY**  
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

**ENDURING HIGH PERFORMANCE**  
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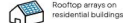
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High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

**A RELIABLE INVESTMENT**  
Inclusive 25-year product warranty and 25-year linear performance warranty<sup>2</sup>.

<sup>1</sup> APT test conditions according to IEC/TS 62804-1:2015, method A (-1500V, 96h)  
<sup>2</sup> See data sheet on rear for further information



THE IDEAL SOLUTION FOR:



Engineered in Germany

**Q CELLS**

## Sample Project



Pictured above is a 26 module, or 8.84 kW DC, solar array.  
Estimated annual solar production = **11,200 kWh**



## How Group Buys Work

The more properties that go solar, the lower the price:

Q Cell 400 watt Panel Price:

**\$3.19/Watt**

All panel prices are lower than TruNorth Solar's market rate.

Group Buy Volume Discounts

Collective kW	>50 kW	>150kW	>250kW	>350kW
Cumulative Discount per watt	\$.06/W	\$.12/W	\$.18/W	\$.24/W
Cumulative Discount per kilowatt	\$60/kW	\$120/kW	\$180/kW	\$240/kW
Approx. # of Homes	>6 homes	15 -24 homes	25-34 homes	35+ homes



# Sample 8.8kW Project

## Grow Solar Price

<u>8.8 kW Twin Cities Residential Roof Array</u>	
System Cost w Q-Cell 400 (\$3.19 / Watt)	<b>\$28,072</b>
Estimated Adders	\$0
Solar Rewards	-\$3,425
26% Federal Tax Credit	-\$7,298
Max group buy savings (~7.5%)	-\$2,105
<b>Net Cost</b>	<b>\$15,244</b>

## Market Price

<u>8.8 kW Market Price Residential Roof Array</u>	
System Cost w Q-Cell 400 (\$3.32 / Watt)	<b>\$29,216</b>
Estimated Adders	\$0
Solar Rewards	-\$3,425
26% Federal Tax Credit	-\$7,596
Group buy savings	\$0
<b>Net Cost</b>	<b>\$18,195</b>

**Savings \$2,951**

# Residential & Commercial Renewable Energy Tax Credit (Federal)

- Tax credit of **26%** on qualified expenditures
  - Includes labor costs, system installation, interconnection wiring
  - Does not include new roof unless roof reinforcement is necessary to support the solar panels
- No maximum credit
- Res: The home must be owned by the taxpayer but does not have to serve as the principal residence
- Steps down to 22% in 2023. Goes away completely for residential in 2024 (remains at 10% for commercial)



# Minnesota Incentives

- All Incentives are subject to change until your application is accepted, for most incentives you have one year.
- Xcel Energy (21' Full, establishing a queue for 22')
  - 2022 Solar Rewards - \$.03 to \$.04 per kWhr produced for 10 years
  - Income Qualified: \$1 or \$2 per watt upfront + Solar Rewards
  - Dakota Electric
  - Energy Wise - \$.08/kWh produced over 10 year up to \$4000
- City of St. Louis Park - Solar Sundown - Installation Cost Reimbursement
  - 4% for City Residents
  - 6% for Income Qualified Residents
- Chaska Residents - \$250 / AC kW Installed up to \$2500
- MN Power - Solar Sense
  - \$.56 / kWh Average Projected Annual Production (21' Full)

# *Next Steps*

## *Part 5 of 5*





# Financing Solar

## Clean Energy Credit Union

- 100% clean energy loans - first of its kind launched 2017
- Not for profit
- **Choose one or both of these loan types:**
  - 12-18 month loan for 26% of system cost (covers the 26% Federal Tax Credit)
  - 12-year fixed rate loan up to the remaining 74% solar electric system cost

2021

# CENTER FOR ENERGY AND ENVIRONMENT

Minneapolis, MN

Jim Hasnik & HES

Director of Lending Services



# Center for Energy and Environment

- Services offered at CEE
  - Research
  - Engineering for Efficiency
  - Programs
  - Policy
  - Engagement and Education
  - Lending
    - In support of the CEE mission, our loan programs are designed to promote energy efficiency and to help reduce the burden of government.
    - We have been improving residential and commercial properties in Minnesota through Energy Efficiency and Home Improvement project financing for over 30 years.

# Lending Center Partners

- CEE administers programs in partnership with:
  - MN Department of Commerce
  - MN Housing Financing Agency
  - 17 Cities
    - Anoka, Blaine, Brooklyn Center, Brooklyn Park, Coon Rapids, Crystal, Edina, Elk River, Fridley, Minneapolis, Minnetonka, Mounds View, New Hope, Richfield, Roseville, St. Paul and St. Louis Park
    - Hennepin and Ramsey Counties
  - Utilities
    - CenterPoint Energy, Xcel Energy and Great River Energy





CEE delivers Home Energy Squad for CenterPoint Energy and Xcel Energy.

The visit may also include:

- Installations of products like door weather stripping, high-efficiency water fixtures, LED bulbs and a programmable or smart thermostat.
- A blower door test to measure your home for air leaks.
- An insulation inspection of your attic and walls using an infrared camera.
- A safety check of your home's heating system and water heater.
- Energy Fitness Plan with a list of recommendations, financing and rebate information.

# Signing up for a Home Energy Squad visit

**To schedule:**

Call 651-328-6220 or  
visit [mncee.org/hes](https://mncee.org/hes)



Visits are no more than \$100. Many cities pay ½ the cost for residents.

Visits are free to Minneapolis residents as funds allow.

Mention **Solar Power Hour** to get an additional \$30 off!



# THANK YOU!

Jim Hasnik  
612-335-5885  
[jhasnik@mncee.org](mailto:jhasnik@mncee.org)



## Next Steps

1. **Fill out the form** we're sending to you in the chat AND in a follow-up email right after this webinar.
2. TruNorth Solar will follow up to get started on a free, no obligation preliminary Solar Analysis. **Prepare to supply a copy of your recent utility bill along with the last 12-months of your electrical usage data.**
3. TruNorth Solar will set an appointment to review your **free, no obligation preliminary Solar Analysis**. This report can be delivered via online meeting, phone or in person. Keep in mind, it is completely normal for some homes to NOT be a great fit for solar...and that's "OK", regardless, we promise transparency.
4. **Request a detailed site assessment.** TruNorth Solar will verify your design, update your quote and give you your contract.
5. **Sign contract and pay down payment** with TruNorth Solar by **October 31, 2021**, to participate in Grow Solar Twin Cities.
6. Celebrate and enjoy clean energy! Tell your neighbors and friends to participate!

**[TwinCities.GrowSolar.org](https://TwinCities.GrowSolar.org)**

# Stay Informed:

## Become a Member of the MREA!



**Promoting renewable energy, energy efficiency,  
and sustainable living through education and demonstration.**

- \$20 Off All Courses
- Invite to Virtual Membership Meeting
- Access to Clean Energy Credit Union
- Subscription to Newsletter
- Free Online Tutorials
- Discounts to professional courses

Everyone who goes solar through the program gets a **FREE Basic Family Membership!**





## MREA Contacts

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