



GROW SOLAR

ST. LOUIS

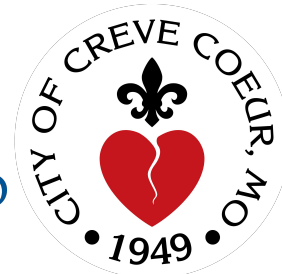
Welcome to Our Solar Power Hour!

- Introduction to Zoom
- Sign up for a free site assessment by following the link in the chat



GROW SOLAR

ST. LOUIS



Today's Agenda

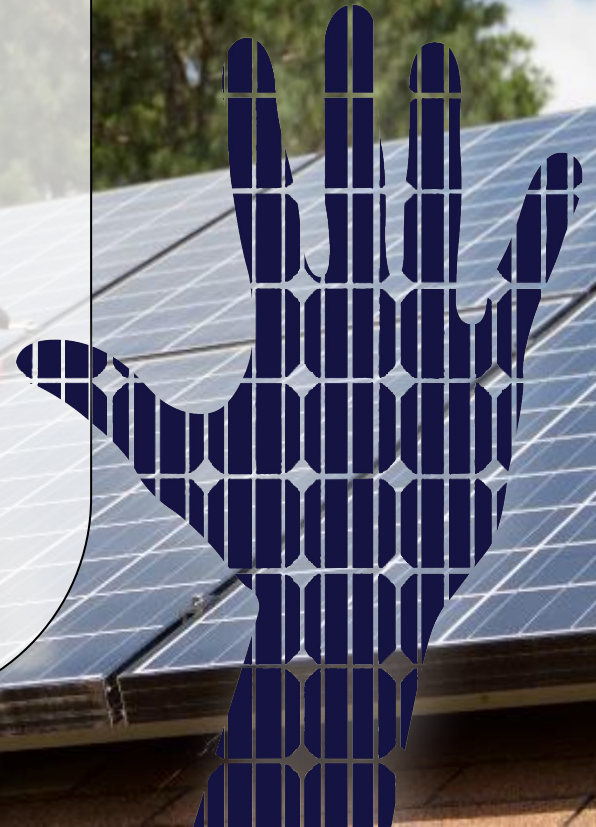
- What is Grow Solar STL?
- How does Solar Power work?
- Costs and incentives
- How to begin your solar journey

What is a Group Buy?

A Model for Lower Prices Through:

- Economy of Scale
- Education/Outreach About Solar
- Organize A Group Buy
- Competitive Contractor Selection
- Deadline: **limited time offer ending August 31, 2020**

Everyone wins!



Outreach & Education:



23
Solar Power
Hours



640
St. Louisians
learned about
solar

Solar Outcomes:



71
Homes
went solar



424
kW of solar
contracted



724
Average utility
savings in year
one per customer

Environmental Benefits

Equivalent to:



407,518
Pounds of coal
negated



439
Annual carbon
sequestration from
a 439 acre forest

How Does Solar Work?



Photovoltaic Solar Resource : United States and Germany


GROW SOLAR
ST. LOUIS

Is there Enough Sunlight?

St. Louis = 92% of Miami's Sunshine!



kWh/m²/Year



Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska are derived from a 40-km satellite and surface cloud cover database for the period 1985-1991 (NREL, 2003). The data for Germany were acquired from the Joint Research Centre of the European Commission and is the yearly sum of global irradiation on an optimally-inclined surface for the period 1981-1990.

This map was produced by
the National Renewable Energy Laboratory
for the U.S. Department of Energy
May 30, 2008



0 250 500 1,000 Miles



GROW SOLAR

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



KILOWATT HOUR (kWh)

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



KILOWATT (kW)

a measurement of capacity: how big your array is.



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

Configuration: How It Works...



PHOTONS — from the sun shine onto solar panels

1

SOLAR PANELS — solar energy is absorbed by panels to excite electrons, generating DC power

2



3

INVERTER — DC power is converted to AC power, which is commonly used in homes and businesses



4

ELECTRIC METER — tracks the power produced, consumed, and sold back to your utility

5

UTILITY GRID





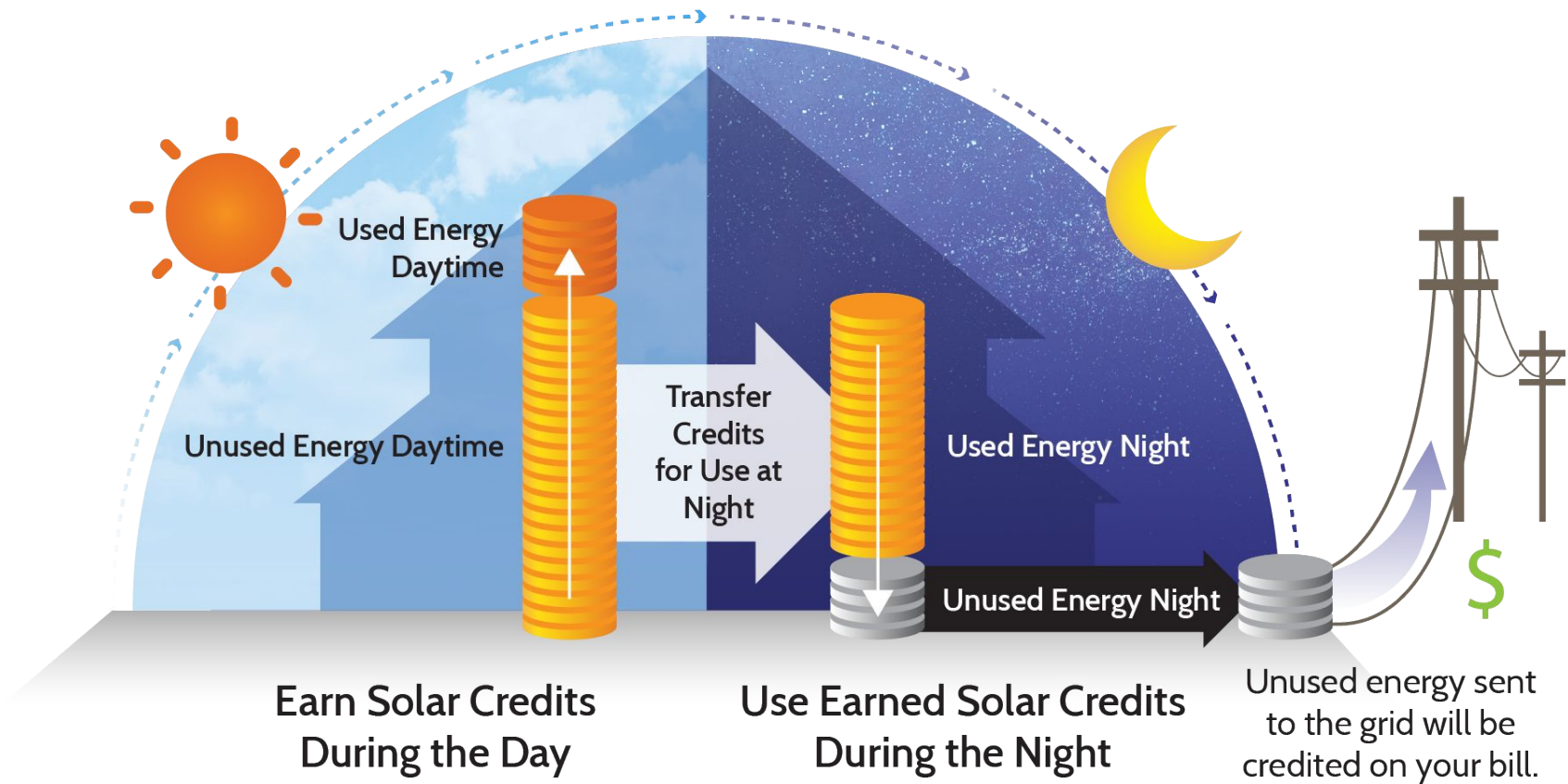
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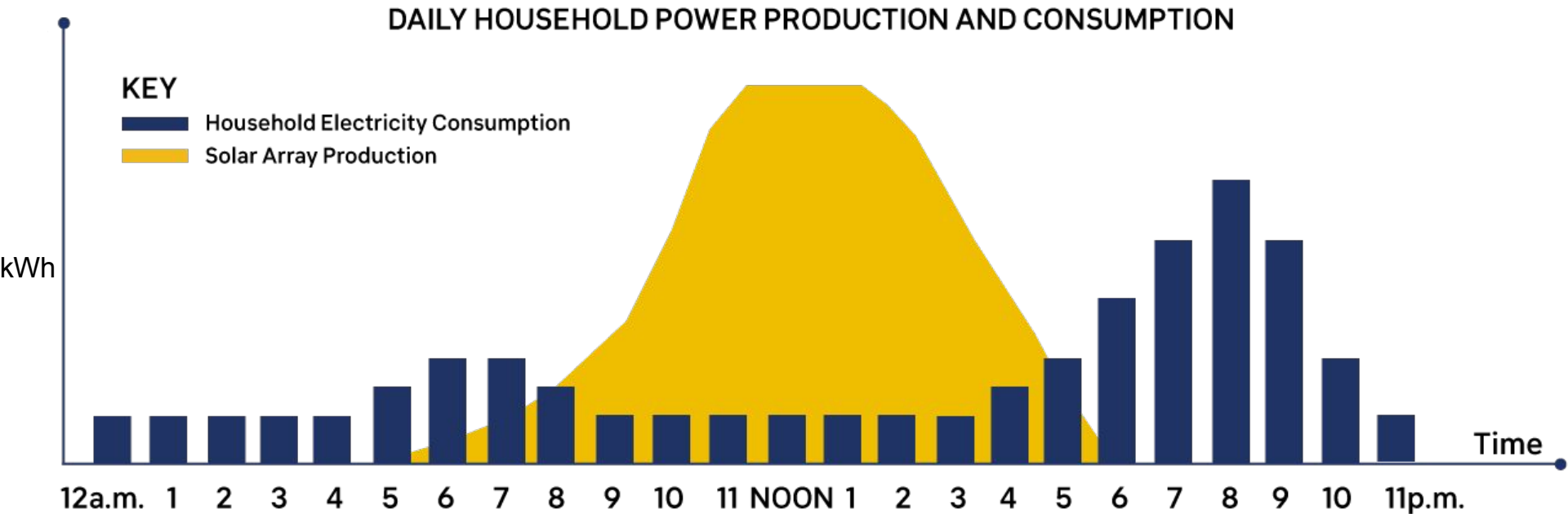
“Grid-Tied” “Net-Metered”

Grid Off = Solar Off

How Net Metering Works

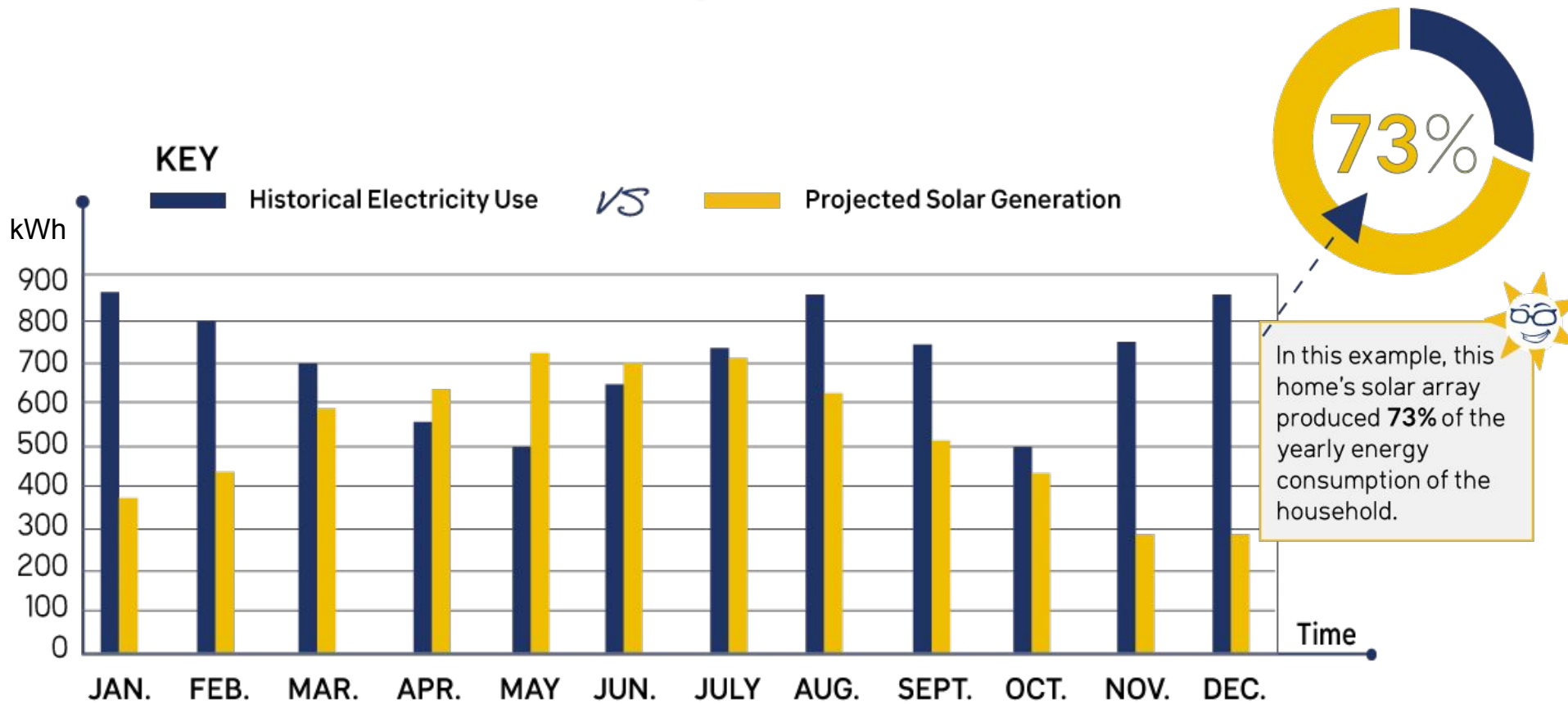


“A Day in the Life” of a Grid-Tied / Net Metered Home



- 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





■ AmerenMissouri.com
 ■ 1.877.426.3736
 ■ PO Box 88068 Chicago, IL 60680-1068  
 Ameren payment processing center

FOCUSED ENERGY. *For life.*

Electric Service Details

Service from 03/27/2019 - 04/28/2019 (32 days)

Electric Meter Read

METER NUMBER	SERVICE FROM - TO	NO. DAYS	USAGE TYPE	READING TYPE	CURRENT READING	PREVIOUS READING	READING DIFFERENCE	MULTIPLIER	USAGE
16247997	03/27 - 04/28	32	Total kWh	Actual	36368.0000	36014.0000	354.0000	1.0000	354.0000
16247997	03/27 - 04/28	32	kWh Out	Actual	24261.0000	23799.0000	462.0000	1.0000	462.0000

Usage Summary

Total Energy Consumed

Total Energy Generated

Total kWh 354.0000
 Net Billable kWh 0.0000

Customer kWh to Utility 462.0000
 Net Excess Gen kWh -108.0000

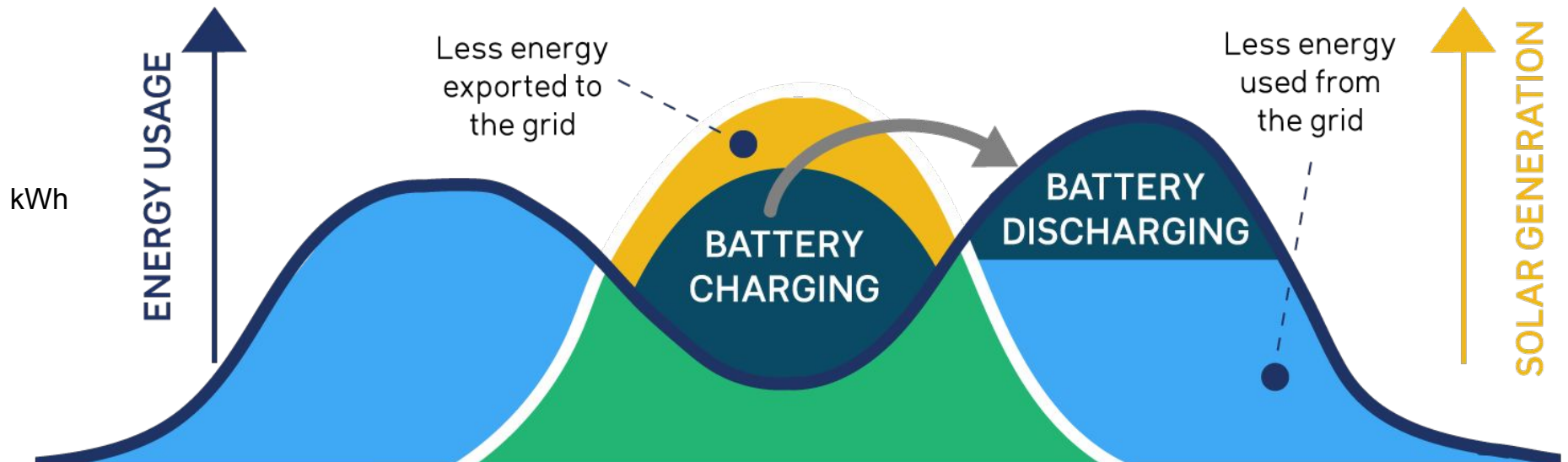
Rate 1M Res Elect Service

Net Metering

Net Energy (Billed)

DESCRIPTION	USAGE	UNIT	RATE	CHARGE
Total Energy Charge	0.00	kWh	@ \$ 0.08760000	\$0.00
Customer Charge				\$9.04
Energy Efficiency Program Charge	0.00	kWh	@ \$ 0.00020000	\$0.00
Net Metering Purchase Credit	-108.00	kWh	@ \$ 0.02900000	\$-3.13
Total Service Amount				\$5.91
DESCRIPTION	USAGE	UNIT	RATE	CHARGE
Ballwin Annex Municipal Charge - Service	\$9.04		@ \$ 0.07527000	\$0.68
Total Tax Related Charges				\$0.68
Total Electric Charges				\$6.59

Solar + Storage



FINANCIAL CASES FOR BATTERIES:

- **TIME OF USE (TOU)**— If your utility charges you different rates depending on the time of day that electricity is being used.
- **NET METERING** — If the excess generation from your solar array is credited at avoided cost rates (i.e. wholesale electricity prices).
- **DEMAND CHARGES** — Sometimes utilities have demand charges, meaning your electricity rate varies based on your peak demand, which is the period of time during the billing cycle that you use the greatest amount of electricity (usually calculated in 15 minute increments).

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



Why Go Solar?



Environmental Equivalencies for a 7.2 kW array (1 Year)

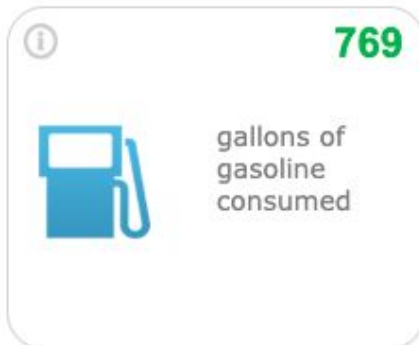
Greenhouse gas emissions from



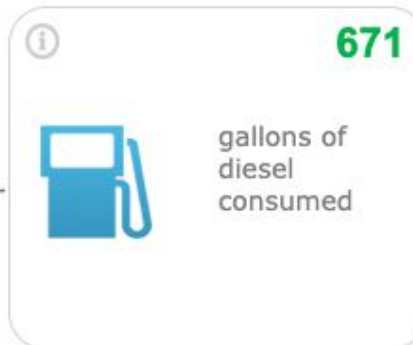
-or-



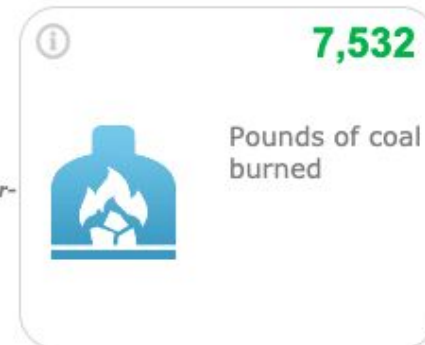
CO₂ emissions from



-or-



-or-



Source: PVWatts & EPA Greenhouse Gases Equivalencies Calculator
<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

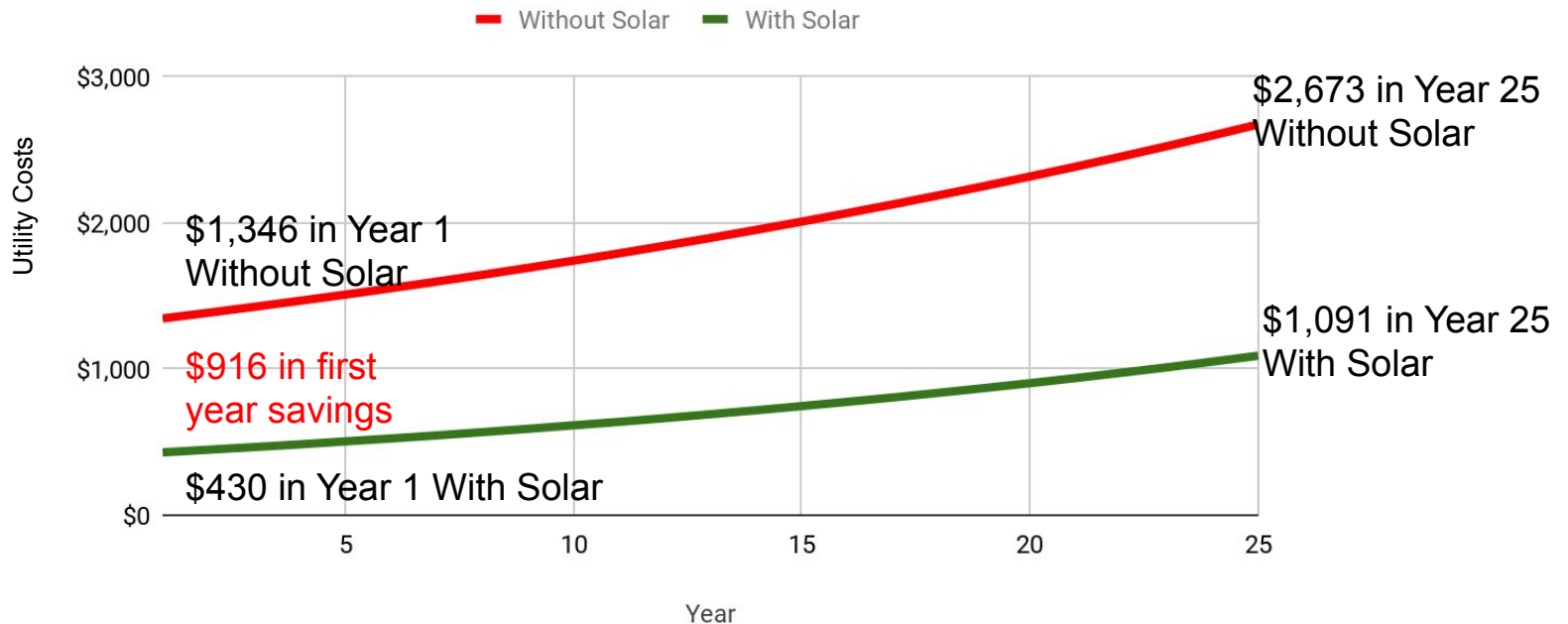
Solar Power is Surging!

- U.S. has 77.7 gigawatts of solar power, enough to power over 14.5 million homes. (SEIA -2019 data)
- Over 2 million solar installations across the U.S.
- A new solar project installed about every 2.5 minutes.



Reduce Your Energy Bill

Energy Costs for 7.2kW Array



Estimated electric bill over 25 Years: 10.4 cents/kwh + 2.9% annual increase

25-year electricity cost post-solar: 5.5 cents/kWh

Estimated 25-Year Savings: \$30,541!

Home Values

Homes with solar panels **sell for +4.1% more** than their non-solar counterparts. - Zillow Economic Research

A National Renewable Energy Laboratory study found that **homes with solar sold faster and for more** than equivalent non-solar homes. - NREL (National Renewable Energy Laboratory)



Home Energy Efficiency



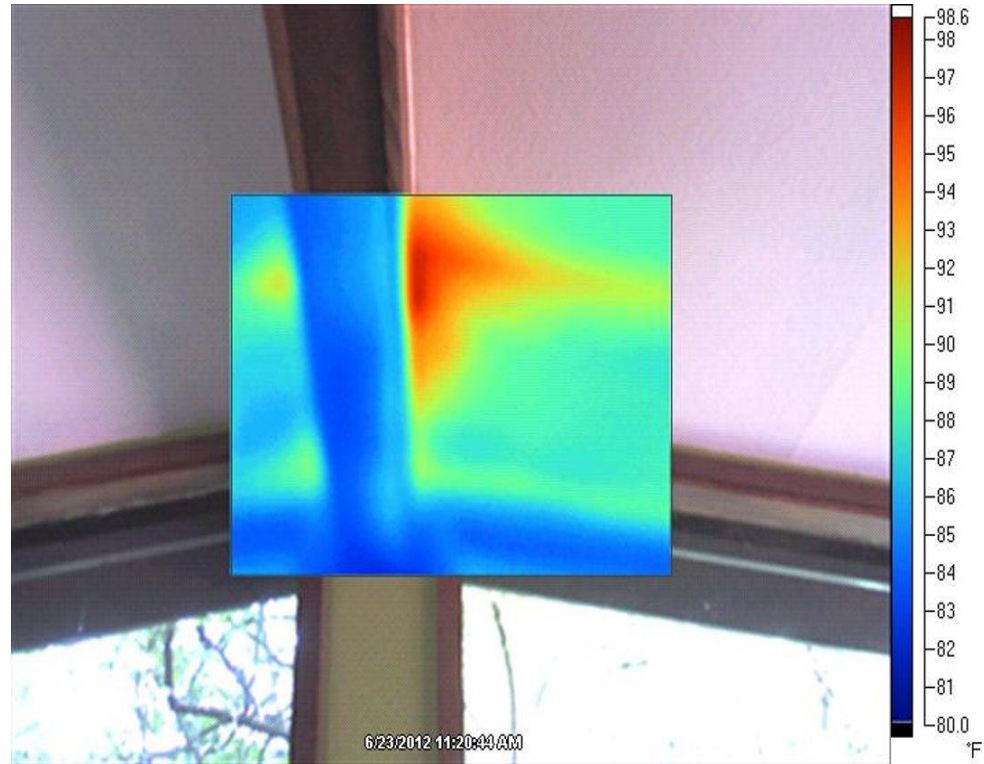
Energy Efficiency

- LED lighting
- Dimmer switches -- saves energy and allows your spaces to evolve with the day
- Heat pump hot water heater
- Low-flow showerheads and sink aerators
- Energy Star appliances
- Insulating crawl spaces
- Programmable thermostats and smart thermostats
- Replace HVAC filters
- High Efficiency Heating and Cooling (HVAC)
- Power strips
- Air sealing & insulation
- Electricity usage habits (turning off lights, unplugging devices, etc)



Incentives

- Ameren's efficiency incentive program can be found at AmerenMissouriSavings.com
- StraightUp Solar will reimburse customers \$150 for completing an energy audit prior to installation*.



This thermal image, taken during an energy audit, shows a roof with an energy leak.

** Energy efficiency auditor must be certified by Home Performance with ENERGY STAR. See **Missouri Botanical Garden's Sustainable Living At Home** webpage for approved contractors.*

About StraightUp Solar



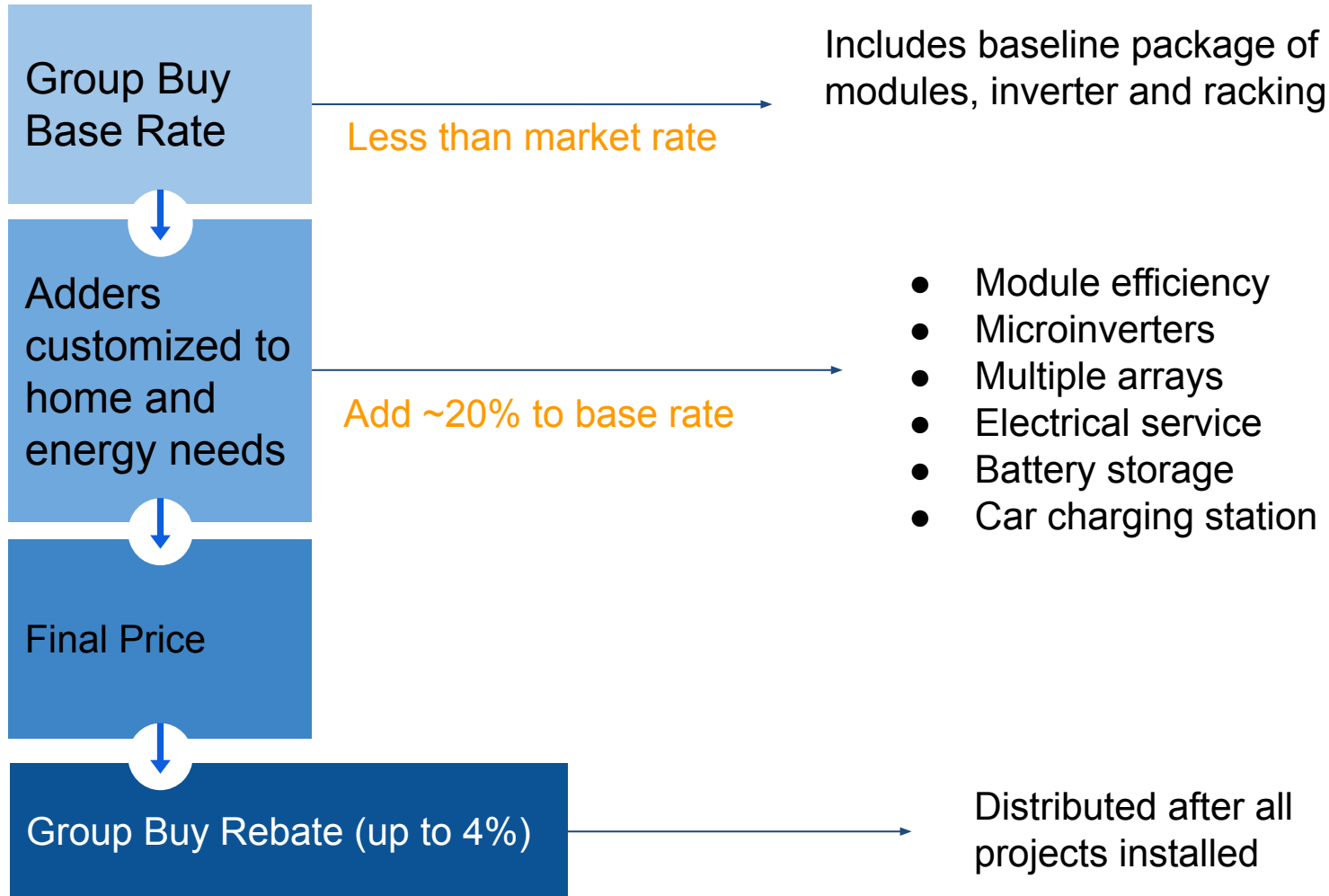
- Founded in 2006, Serves IL & MO
- Winner of 12 Midwest Renewable Energy Association group buy programs
- 1300+ Installations to Date
- Part of Amicus Solar Cooperative
- Certified B Corporation
- 75+ Employees; more than 25% with NABCEP Certification
- Tesla Powerwall and REC Premium Installer
- 10 Year Workmanship and Production Warranty



What Are The Costs?



Solar Pricing Structure



Group Buy

How It Works

The more people go solar, the lower the price:

Total KW	>50 kW	>150 kW	>300 kW	>500 kW	>1,000 kW	>1,500 kW
# Homes	7-10 homes	21-30 homes	40-55 homes	70-100 homes	140-200 homes	210-300 homes
Total Rebate	.5%	1%	1.5%	2%	3%	4%

Solar System Price Spectrum



\$20,000
One Array; Garage, 5-6kW



\$40,000
Two Arrays, Two Roofs, 10+kW

\$10,000
One Array <4kW



\$30,000
Two Arrays,
One Roof, 7-9kW



What Are The Incentives?



Residential & Commercial Renewable Energy Tax Credit (Federal)

- **Federal Renewable Energy Tax Credit available on qualified expenditures in 2020**
 - **26%** of costs of solar PV system
 - 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, but requires you have tax appetite
- A home must be owned by the taxpayer but does not have to serve as the principal residence
- Incentive details at energystar.gov or irs.gov

Ameren Missouri \$.25/W Rebate

Systems operational starting July 1, 2019 - December 31, 2023 are eligible for a \$0.25 per watt rebate.

- Maximum solar system size for a solar rebate for a Residential customer is 25 kW
- Maximum solar system size for a solar rebate for a Commercial or Industrial customer is 150 kW.
- Maximum solar system size to qualify for net metering is up to the load of the facility or 100 kW.

7.2 KW Residential System

Grow Solar Price

vs

Market Price

7.2 KW St. Louis Resi Roof Array

Base Cost (\$2.81/Watt)	\$20,232
Estimated Adders	\$4,000
Ameren MO 25-cent rebate	- \$1,800
26% Federal Tax Credit (Post-Ameren rebate)	-\$5,832
Max group buy savings (~4%)	-\$969
Net Cost	\$15,631

7.2 KW Market Price Resi Roof Array

Base Cost (\$3.55/ Watt)	\$25,560
Estimated Adders	\$4,000
Ameren MO 25-cent rebate	- \$1,800
26% Federal Tax Credit (Post-Ameren rebate)	-\$7,217
Group buy savings	\$0
Net Cost	\$20,543

A large, stylized yellow sun with a bright yellow center and a lighter yellow outer ring with pointed rays, positioned in the upper right background.

Solar Finance

Solar Financing Options

Clean Energy Credit Union

- 100% clean energy loans -
1st of its kind launched 2017
- Wholly-owned by Amicus Solar members
- 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



PACE Financing

- Financing through Ygrene Energy Fund
- Up to 20-year loan
- Voluntary tax assessment placed on property
- Transfer assessment to next property owner



Five Easy Steps to Solar

1

Get Started

Share basic information about your home with a Solar Support Specialist to start the process.

2

Set Custom Plan

Receive a customized system layout, proposal, and contract from a Project Developer.

3

Project Guidance

Work with your Project Manager through the engineered design and permitting process

4

Install & Energize

Set a date for our highly-trained installation crew to build, inspect, and energize your system.

5

Enjoy!

Enjoy your new solar array!

StraightUp
SOLAR



KEY INFO TO REMEMBER:

- **August 31**: Deadline to sign a contract for this reduced rate!
- Consider an energy audit for your home.
- Sign up for a free site assessment today!

When there's a huge
solar energy spill, it's just
called "*A really nice day!*"

Like the presentation? Refer a Friend!

Learn More:

- Visit our learning modules

Schedule a Site Assessment:

- Contact **Steve Sommers** for an appointment at steve.sommers@straightupsolar.com

Sign Up:

- GrowSolarSTL.org

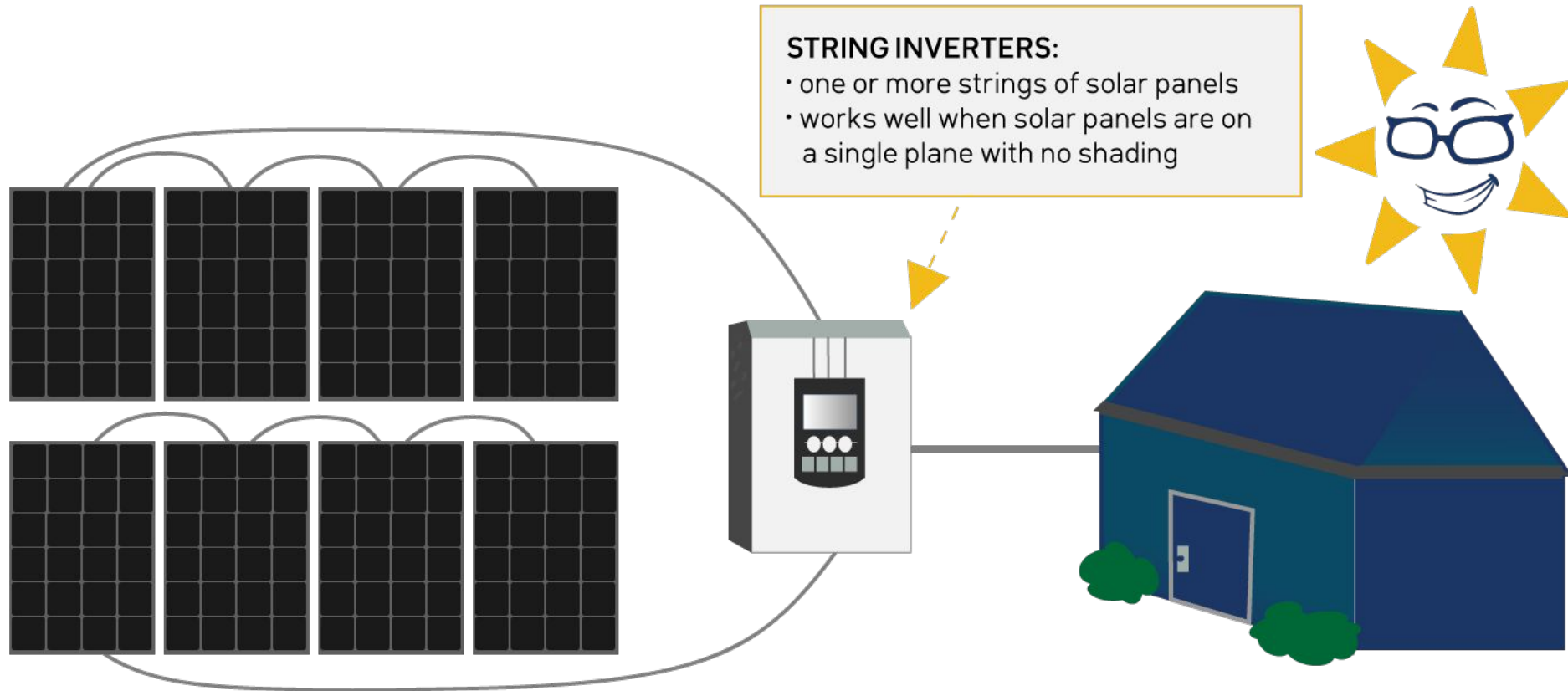
Follow Us On Facebook!

- Search for "Grow Solar St. Louis"

Issues, Comments, Questions?

- jenn.derosé@BlackrockConsulting.org

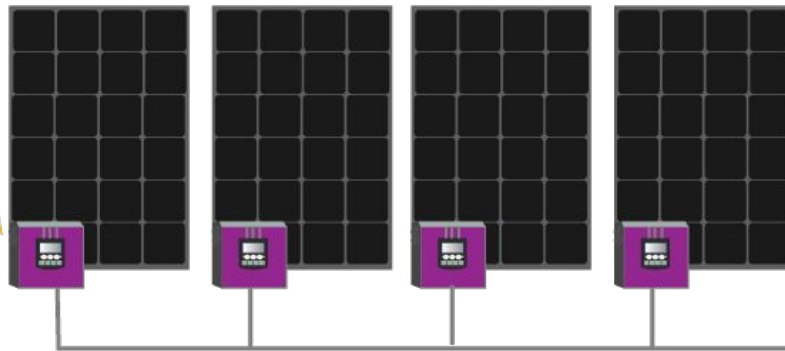
Inverter: The heart of the solar array



Inverter, the heart of the array.

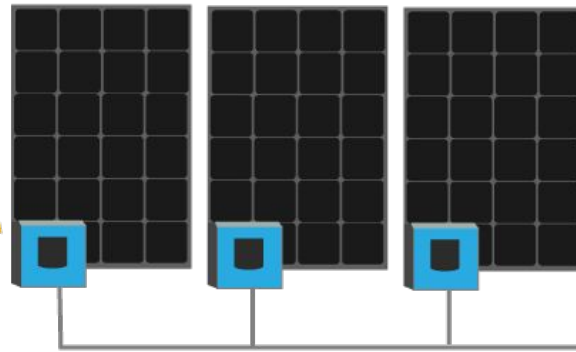
MICRO INVERTERS:

- 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



Grow Solar St. Louis 2019 Base Price: \$2.99/W
Avg price paid by participants: \$3.45/W

Why?

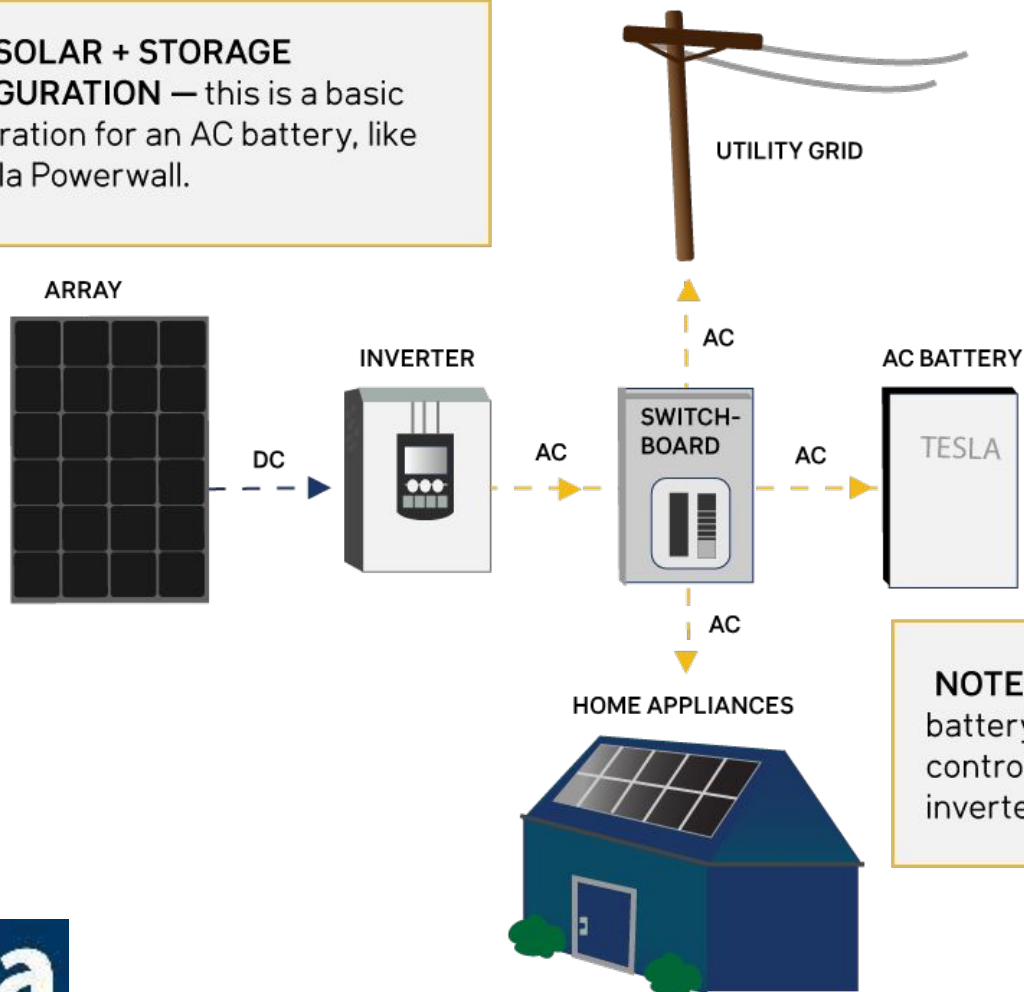
Very common adders in St. Louis area:

- 1. Line Side Tap or Supply Side Interconnection**
- 2. Multiple Roofs and Arrays**
- 3. Trenching**
- 4. Enphase Micro Inverters**
- 5. Two-Storyed Roof**

Grow Solar St. Louis 2020 Base Price: \$2.81/W
Expected avg price paid by participants: \$3.34/W

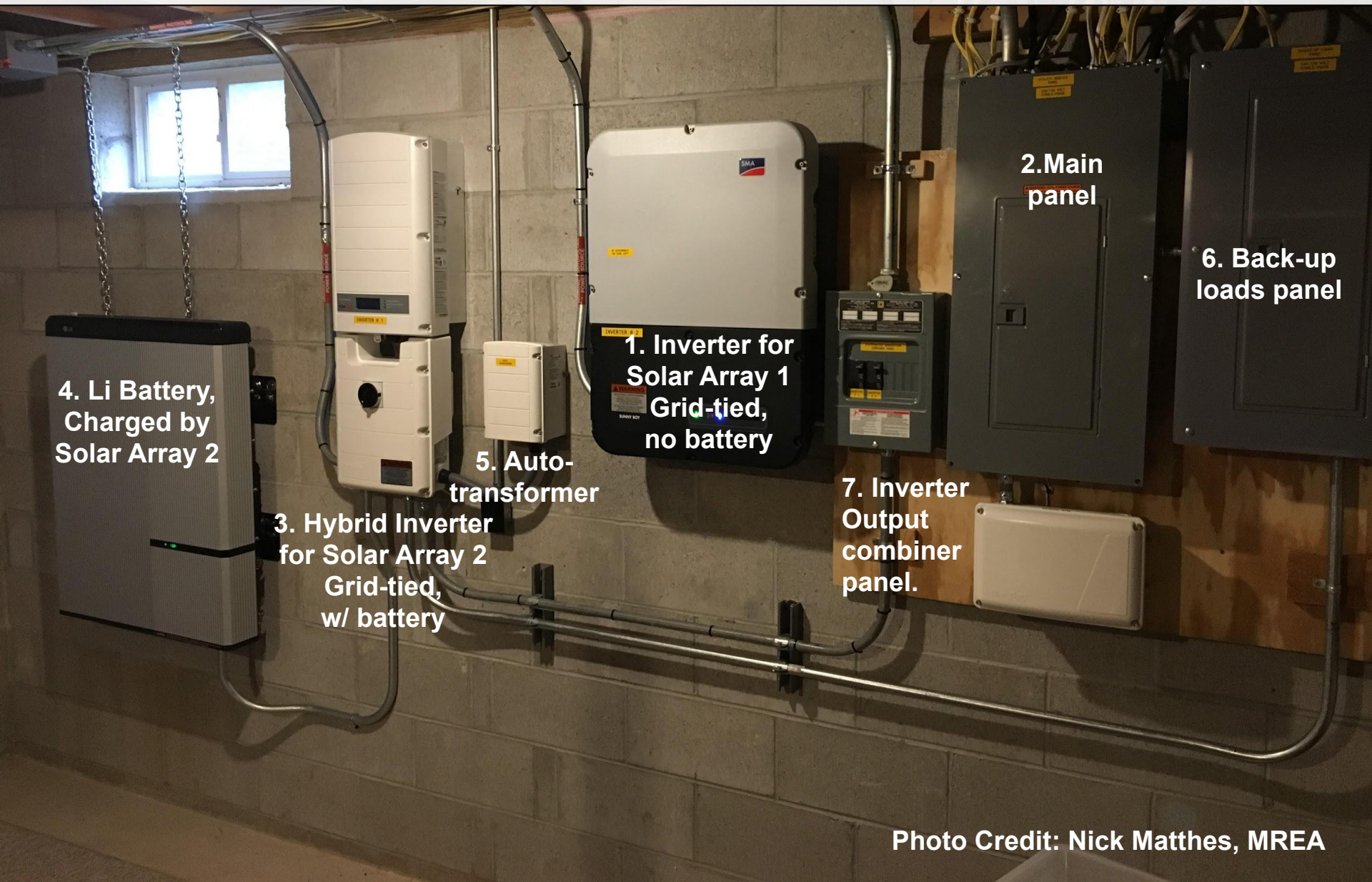
Solar + Storage

BASIC SOLAR + STORAGE CONFIGURATION — this is a basic configuration for an AC battery, like the Tesla Powerwall.



NOTE: On most battery systems, the battery will be connected to a charge controller on the dc side of the inverter.

Solar + Storage



4. Li Battery,
Charged by
Solar Array 2

3. Hybrid Inverter
for Solar Array 2
Grid-tied,
w/ battery

5. Auto-
transformer

1. Inverter for
Solar Array 1
Grid-tied,
no battery

2. Main
panel

6. Back-up
loads panel

7. Inverter
Output
combiner
panel.

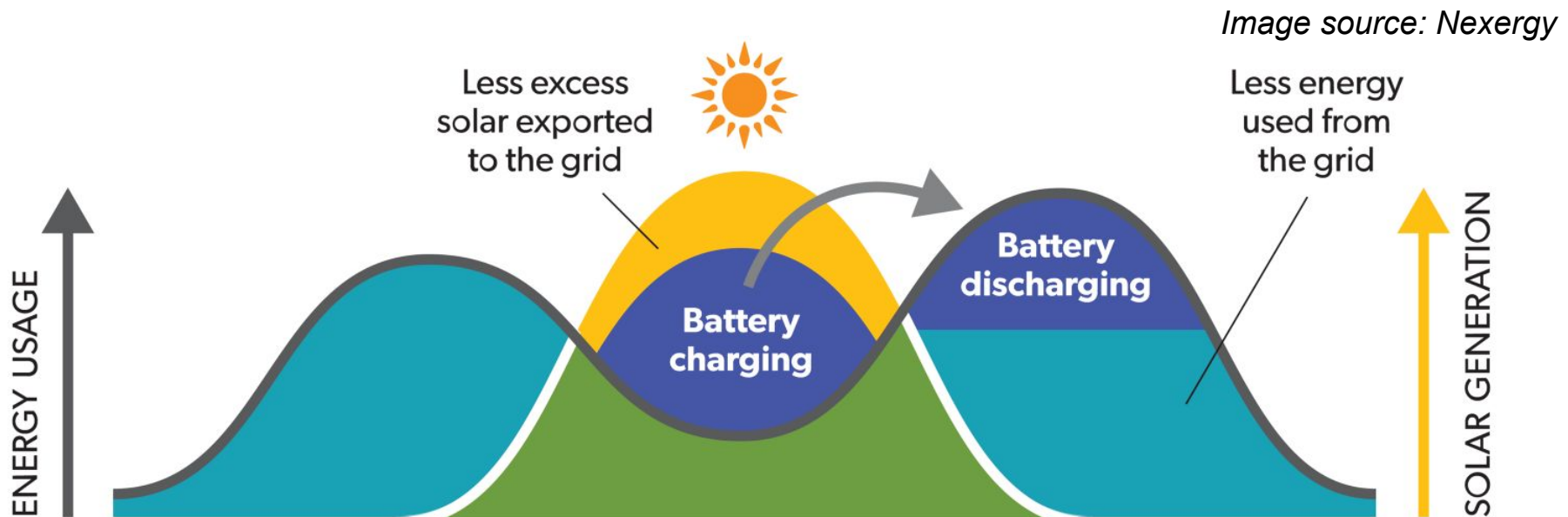
Reasons to add batteries (or not)

1. Do you pay a high price for electricity?
2. Do you pay for electricity based on Time of Use?
3. Do you pay demand charges?
4. Do you want to be even more energy-independent?
5. Do you have devices or equipment that cannot be without power?

If yes, then solar + storage might be a good fit.

Financial cases for batteries

- **Time of Use (TOU)** If your utility charges you different rates depending on the time of day that electricity is being used...
- **Demand Charges** Some utilities have demand charges, meaning your electricity rate varies based on your peak demand, which is the period of time during the billing cycle that you use the greatest amount of electricity (usually calculated in 15 minute increments).
- **Net Metering** If the excess generation from your solar array is credited at avoided cost rates (i.e. wholesale electricity prices)....

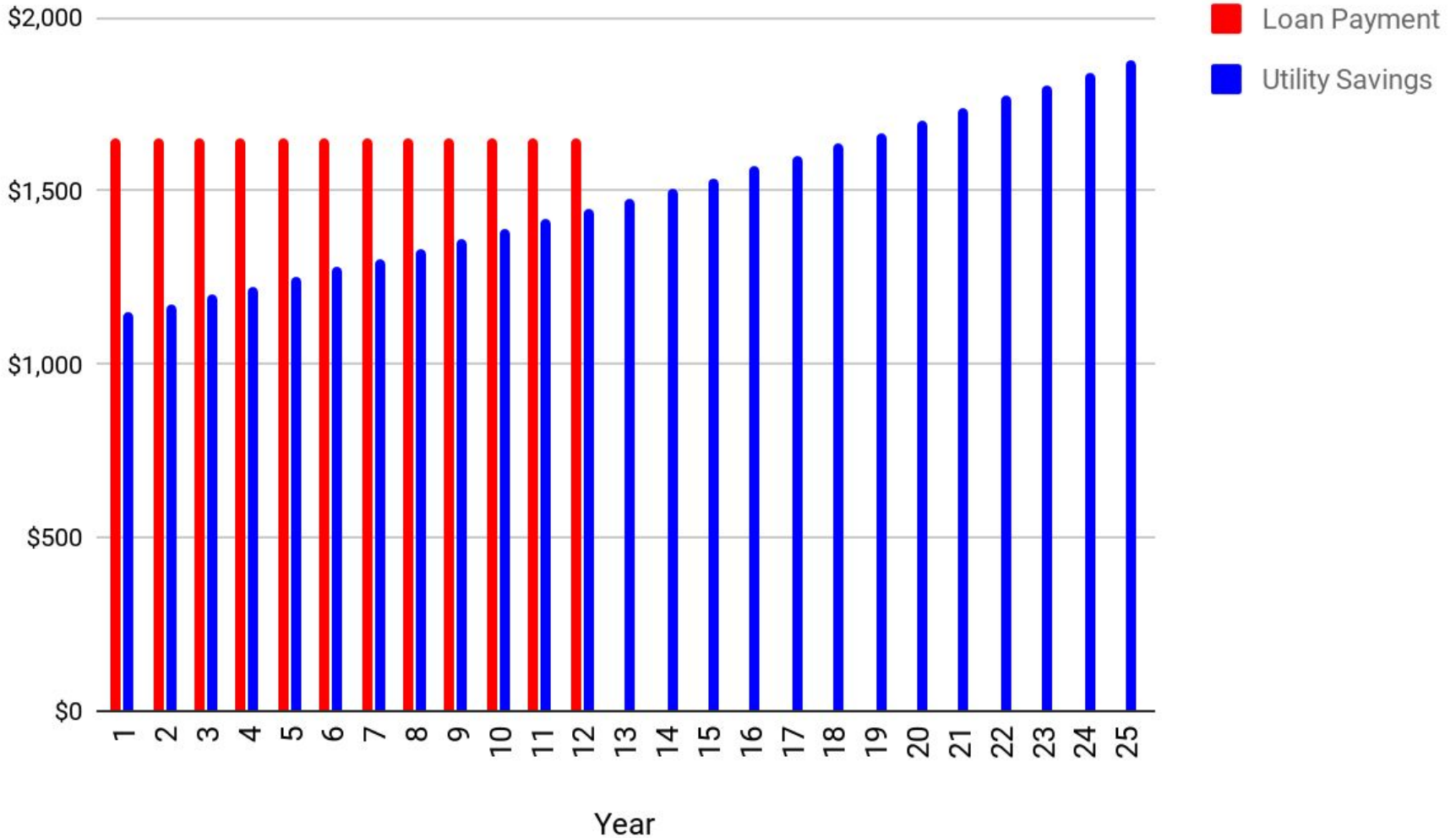


Price and expected lifespan of batteries

In Grow Solar St. Louis, batteries start at around \$10,000 for a Tesla Powerwall 2, (13.5 kWh of available power)

Cycle Life: A cycle is a complete charge/discharge, and battery warranties are expressed over time and/or cycle life. Say your Li battery is warrantied for 10 years and/or 10,000 cycles. If you are discharging it to 50% per “cycle” you should essentially be able to do that 20,000 times on a 10,000 cycle battery.

Financing Schedule



On-Site Assessment - Technical Design

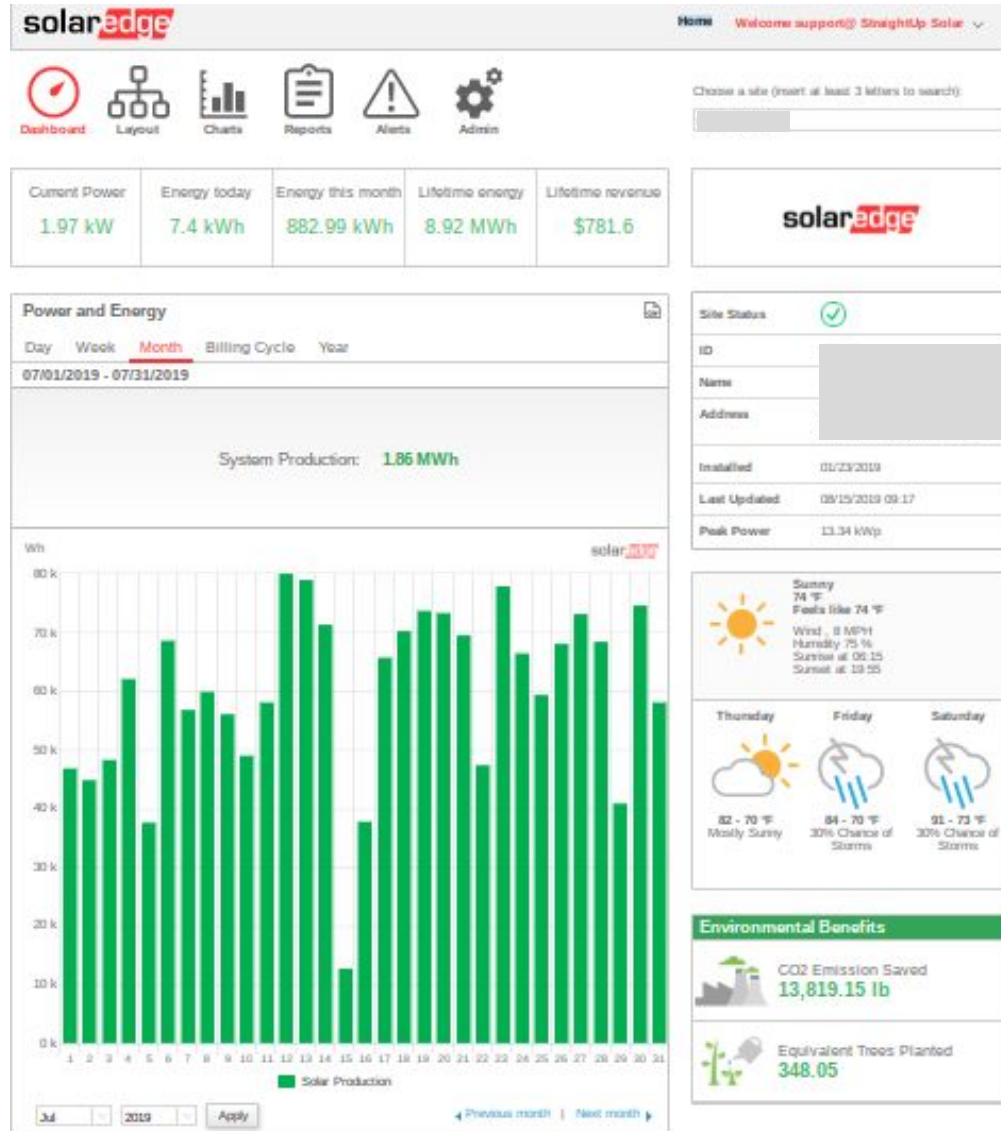


- (46) REC 290 WATT MODULES
- (1) SOLAREDGE 11400 W INVERTER

Installation Time!



Home Energy Report



STEPS TO GOING SOLAR WITH AN INSTALLER

1. Accomplish a free site assessment, receive a proposal, review and sign purchase agreement
2. Installer designs system & receives utility & permit approvals
3. Materials ordered & received
4. Your array is installed and energized
5. Start saving!

