Solar for Homeowners

Discover solar technologies for your home

Center for Sustainable Energy™


Our Mission:
Accelerate the transition to a sustainable world powered by clean energy
Center for Sustainable Energy™

What We Do

Information Resource & Expert Implementation Partner

Energy Programs

Technical Assistance

Training & Education

Center for Sustainable Energy™

Areas of Expertise

Building Performance

Clean Transportation

Distributed Generation

Energy Efficiency

Energy Storage

Renewable Energy

CSE Disclaimer

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- **The Center for Sustainable Energy does not endorse any particular product, manufacturer or service** mentioned and does not represent that any goods or services are fit for any purpose or use.

- Along the same lines, this is an informational workshop designed for homeowners. **If you are in the energy efficiency or solar market, please refrain from pitching your products or services in this workshop.**

Agenda

1. Energy use in the home
2. Learn about Solar Water Heating and Rebates
3. Learn about Solar PV
4. Estimate your Solar PV system size
5. Understand your Solar PV financing options
6. Find a contractor
7. Solar Storage
8. Your questions

California Solar Initiative

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Solar Photovoltaics vs. Solar Water Heating

- Solar Photovoltaic (PV) Systems
  - use light from the sun to produce electricity for your home.

- Solar Water Heating Systems
  - use the sun's heat to provide hot water for your home.

Energy use in the home

Part 1

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What's a Watt?

1 Light Bulb

= **100 Watts (W)**

10 Light Bulbs

= **1,000 Watts (W)**

or

1Kilowatt (kW)

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If you keep 10 bulbs turned on for 1 hour…

1 Kilowatt

1 Hour

1 Kilowatt-hour (kWh)

What is a Therm?

A therm is the unit of measurement for the natural gas you consume

1 Therm = 100,000 BTUs.

Source: www.capital-cooking.com

SDG&E tracks and bills for natural gas usage in therms

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What's your energy use?

California is changing the way utilities bill for electricity. To learn about these changes, and ways to save on your energy bill, visit sdge.com/RateReform.

Account Summary

Previous Balance			$16.02
Payment Received	06/15/15	THANK YOU	- 16.02
Current Charges			+ 42.21
Total Amount Due			**$42.21**

Summary of Current Charges

(See page 2 for details)

	Billing Period	Usage	Amount($)
Gas	May 22, 2015 - Jun 23, 2015	12 Therms	15.43
Electric	May 22, 2015 - Jun 23, 2015	145 kWh	26.78
Total Charges this Month			**$42.21**

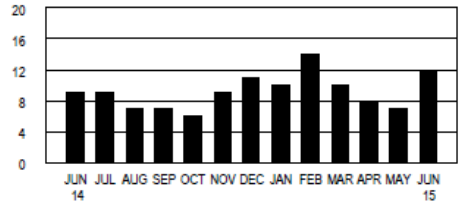
Regulatory Notices

- All customers are required to pay a Competition Transition Charge as part of the charges above, including those who choose an electric service provider other than SDG&E.

Know your energy use before contacting contractors.

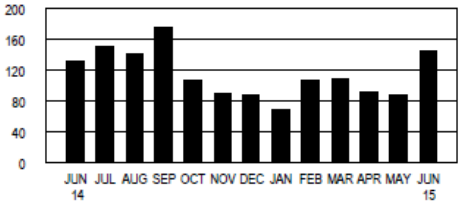
DATE DUE	Jul 14, 2015
AMOUNT DUE	$42.21

Gas Usage History *(Total Therms used)*



	Jun 14	May 15	Jun 15
Total Therms used	9	7	12
Daily average Therms	.3	.2	.4
Days in billing cycle	30	29	32
Change in daily average from last month			+ 100.0%
Change in daily average from last year			+ 33.3%

Electric Usage History *(Total kWh used)*



	Jun 14	May 15	Jun 15
Total kWh used	132	87	145
Daily average kWh	4.4	3.0	4.5
Days in billing cycle	30	29	32
Change in daily average from last month			+ 50.0%
Change in daily average from last year			+ 2.3%

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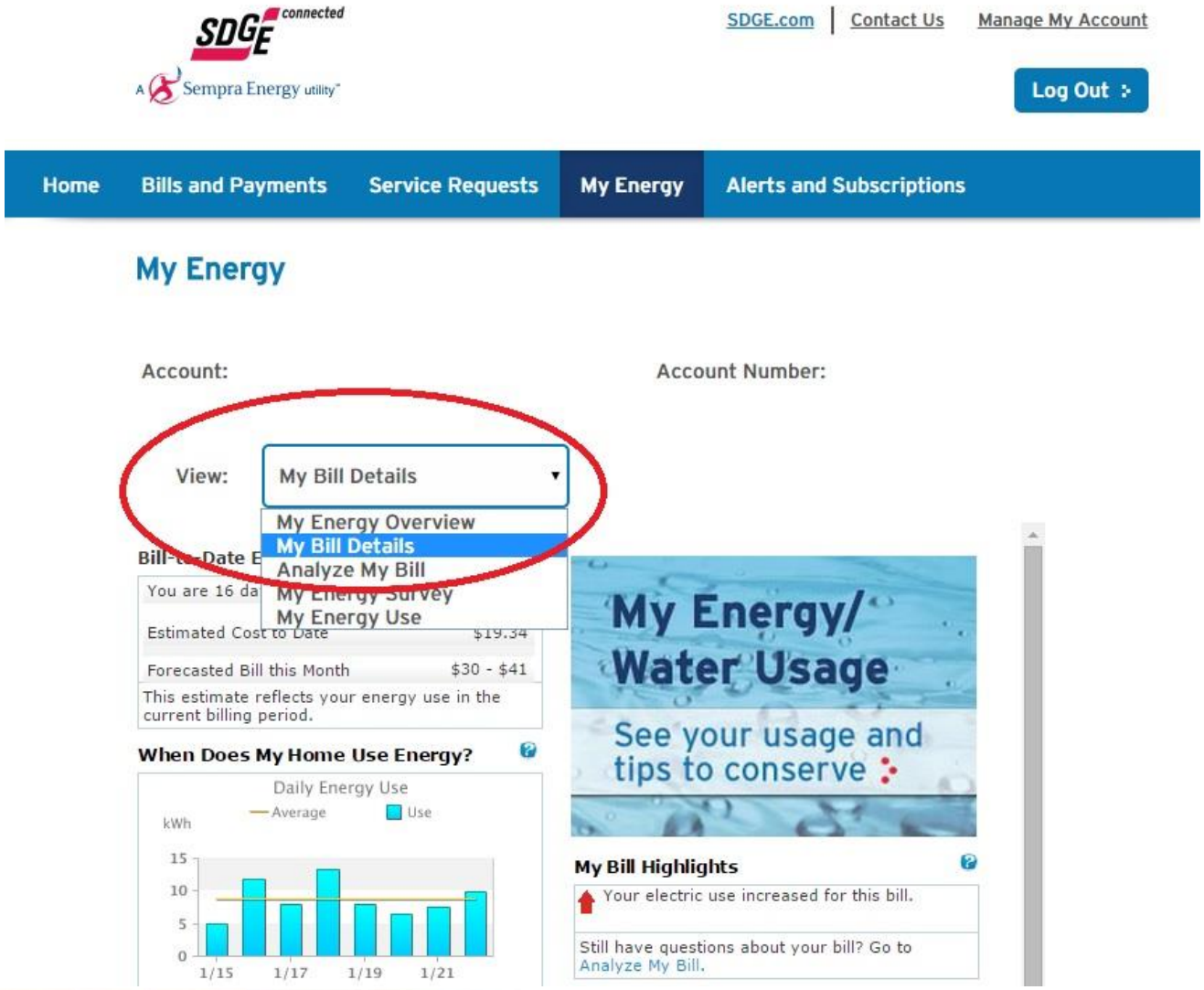
What's your energy use?



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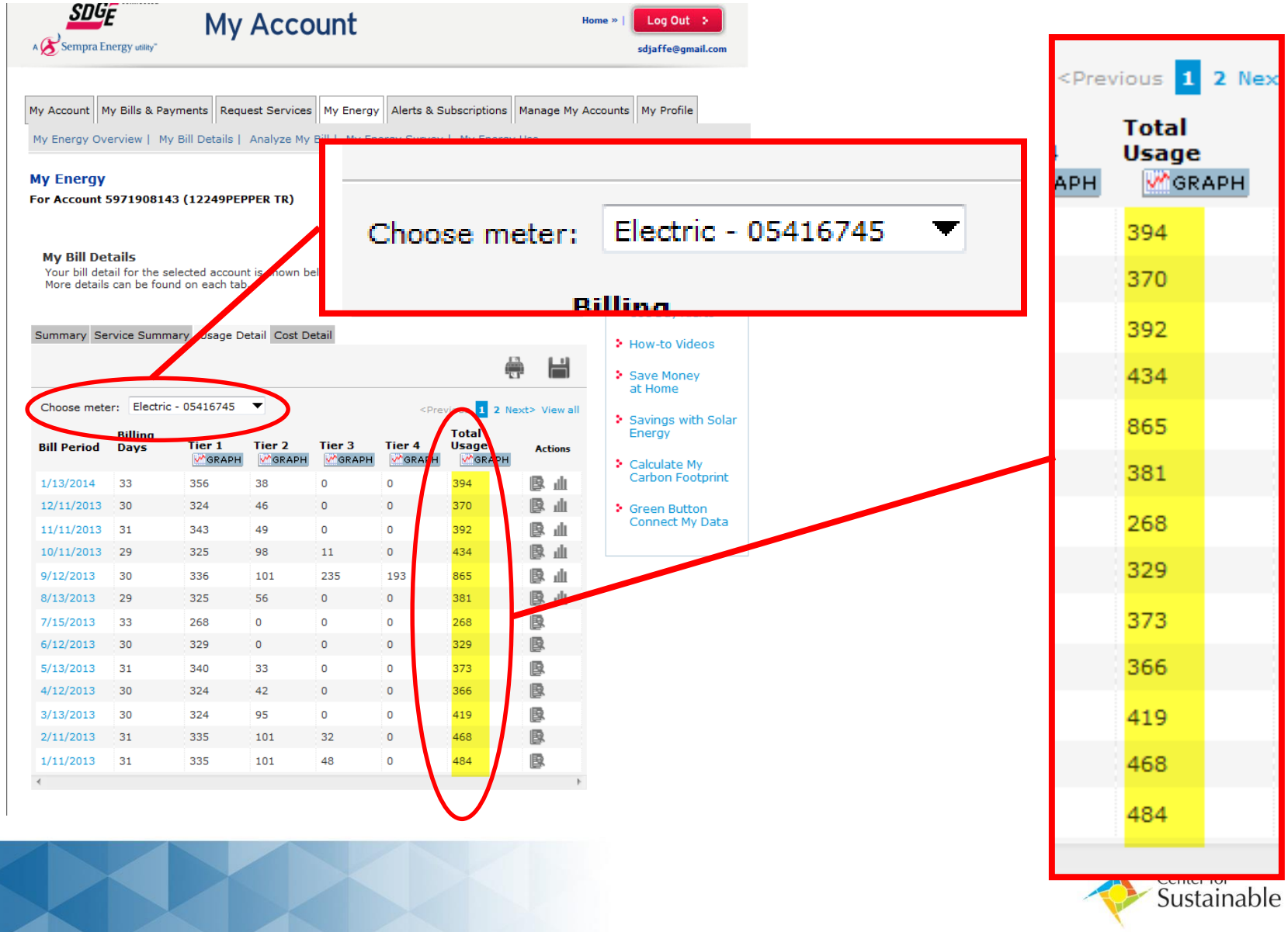
What's your energy use?



Bill Period	Billing Days	Tier 1 GRAPH	Tier 2 GRAPH	Tier 3 GRAPH	Tier 4 GRAPH	Total Usage GRAPH	Actions
1/13/2014	33	356	38	0	0	394	
12/11/2013	30	324	46	0	0	370	
11/11/2013	31	343	49	0	0	392	
10/11/2013	29	325	98	11	0	434	
9/12/2013	30	336	101	235	193	865	
8/13/2013	29	325	56	0	0	381	
7/15/2013	33	268	0	0	0	268	
6/12/2013	30	329	0	0	0	329	
5/13/2013	31	340	33	0	0	373	
4/12/2013	30	324	42	0	0	366	
3/13/2013	30	324	95	0	0	419	
2/11/2013	31	335	101	32	0	468	
1/11/2013	31	335	101	48	0	484	

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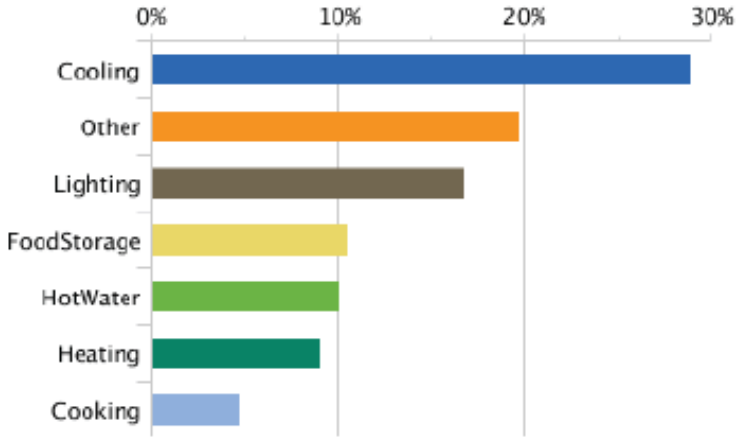
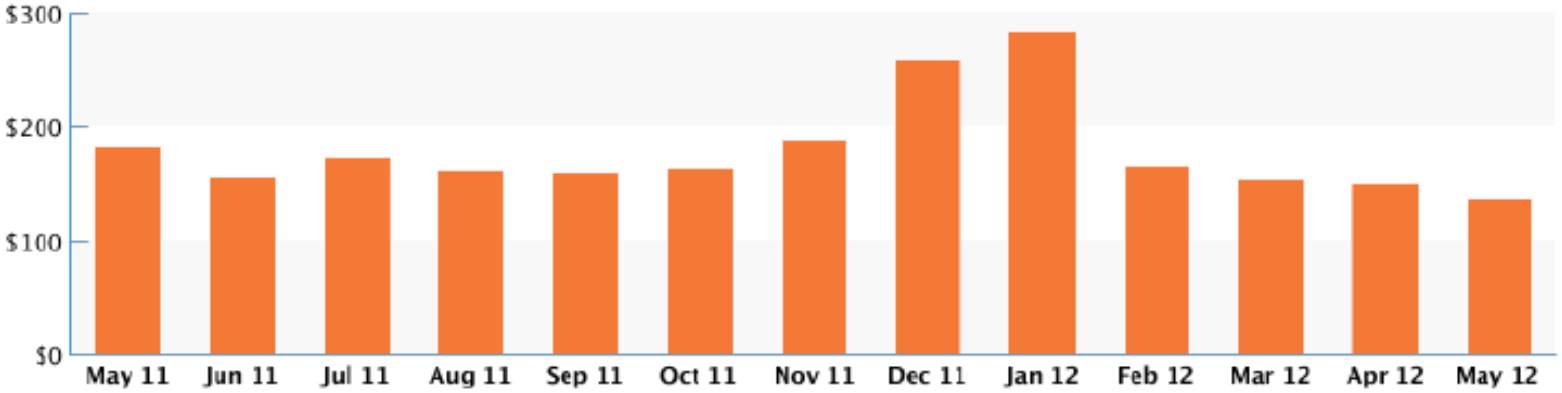
Energy = Money

- Reduce your use before you produce

SDGE Home Energy Audit

- Accessed through My Account on the SDG&E website using your log-in ID and password
- Uses data from your account
- Analyzes the energy use at the home based on survey responses and makes customized recommendations to save energy and water





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Energy Efficiency Rebates

- SDG&E's Home Upgrade offers incentives between $1,000 and $5,500
  - Insulation, air sealing and duct sealing/replacement
  - High efficiency heating, cooling and/or water heating systems
  - Cool roofs, high efficiency windows, etc.
- It also offers third-party quality assurance
- You must work with a participating contractor
- Contact SDG&E to participate

https://www.sdge.com/residential/savings-center/rebates/energy-upgrade-california-home-upgrade

Learn about Solar Water Heating

Part 2

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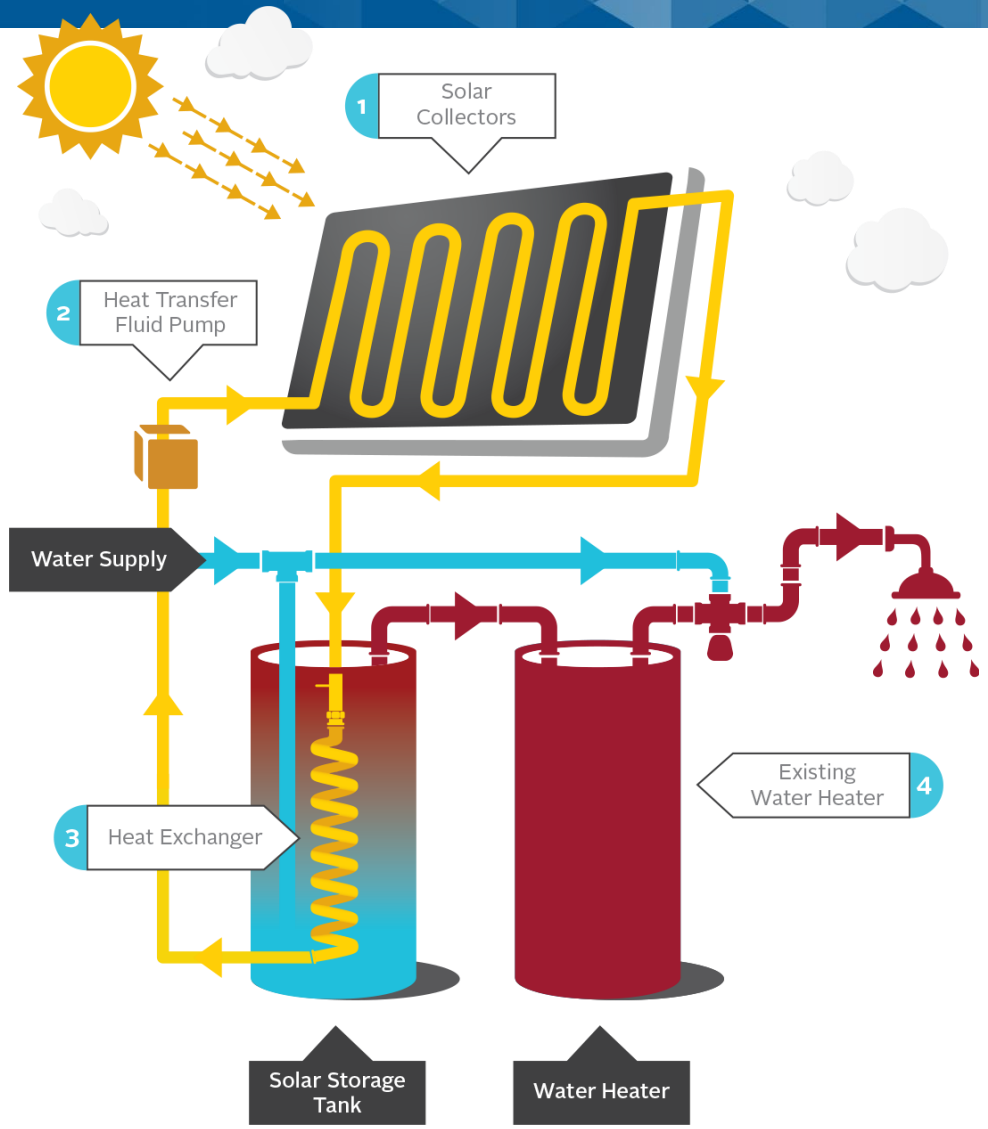
How Does Solar Water Heating Work

- Technology that captures the sun's heat to create hot water
- Pre-heat system for your existing water heater



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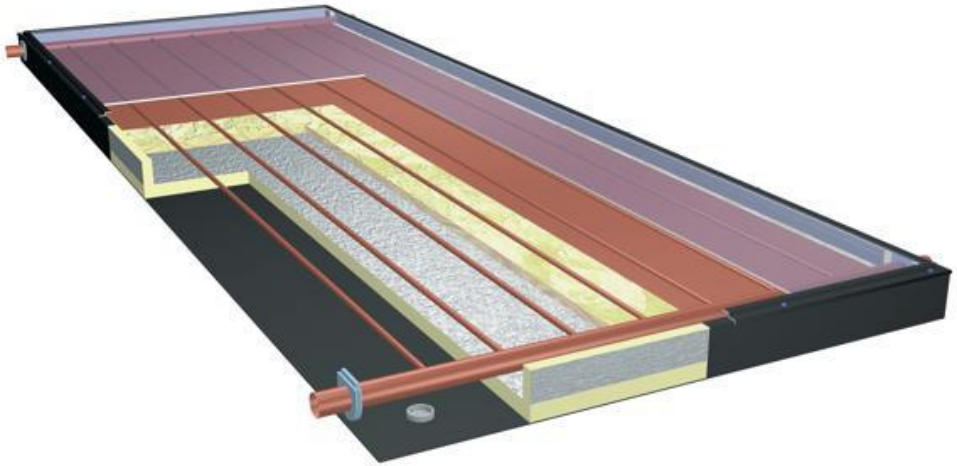
Flat Plate Collectors

- Most common solar water heating collector
- Heat is then transferred to water or to a heat exchange fluid flowing through the collector
- Long track record of reliability



Courtesy of Sunearth inc.

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Other Collector Types

Evacuated Tube Collectors

Unglazed Collectors
(Generally for Pool Heating)

Solar Storage Tanks

- All solar water heating systems have a storage component
- Solar storage is separate from your existing tank or tankless water heater

Roof mounted storage

Solar storage tank next to existing water heater

Solar Water Heating – General Considerations

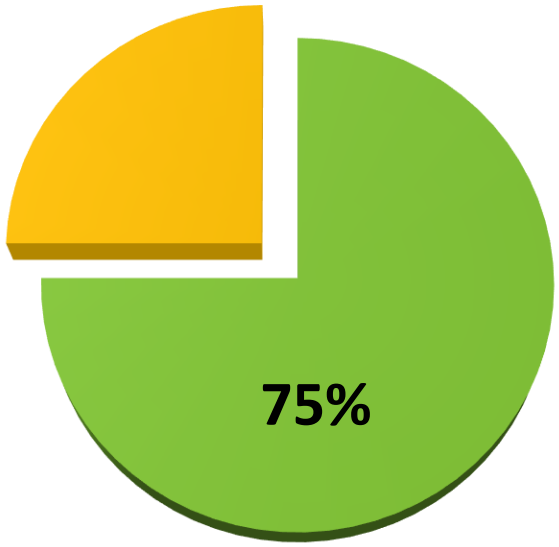
- Works with any backup (natural gas, electric, propane)
- Not required to replace existing water heater
- Can be compatible with tankless
- 1-3 collectors on your roof (32-120 sq. ft.)

Average Savings

Solar water heating reduces the energy needed to heat your water.

You save $$$ on your utility bill

Save up to 75% of water heating costs!



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Solar Water Heating Systems

Part 3

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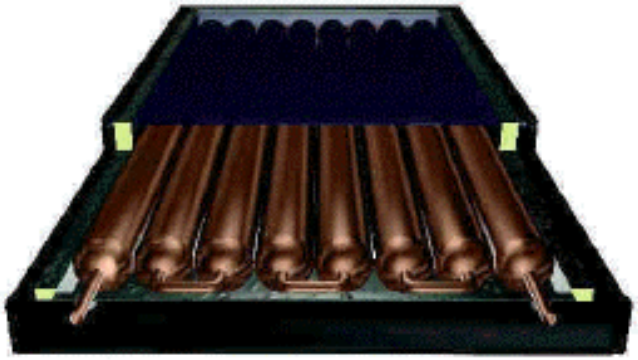
Passive vs. Active Systems

- Passive Systems
  - Require no pumps
  - Simple design
  - Solar storage is on the roof
- Active Systems
  - Use a pump and a heat exchange fluid
  - The heat exchange fluid is heated in the collectors and then pumped into the storage tank to heat water
  - Fluid may be either glycol or water

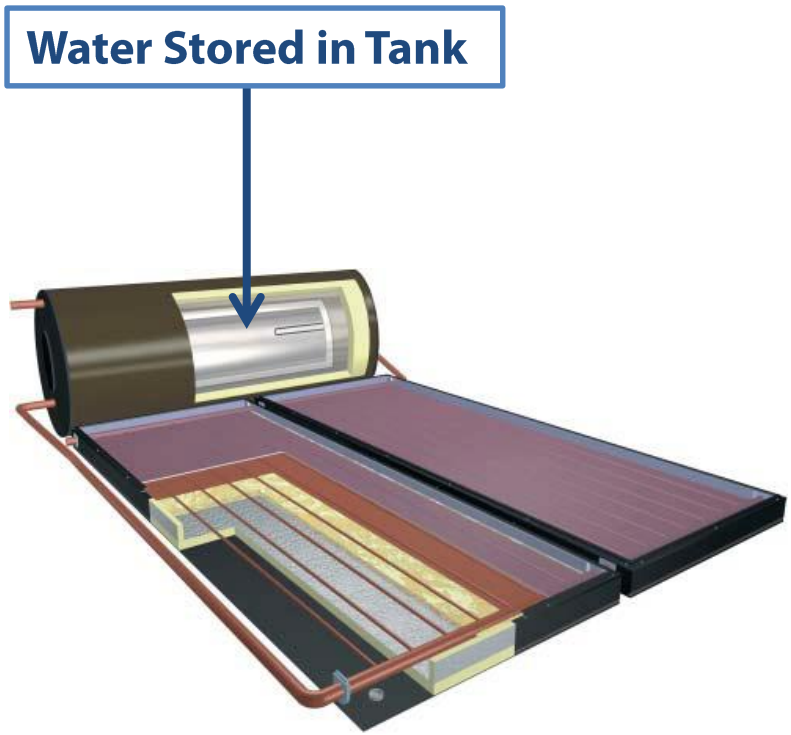
Passive Systems

Integral Collector Storage System - Passive

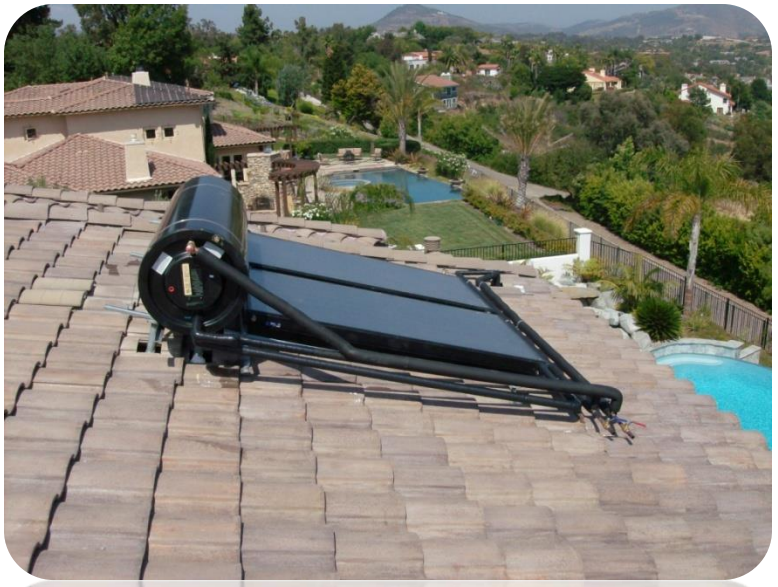


Water stored in the collectors

Thermosyphon System - Passive



Source: SunEarth



CleanTech

Example Passive System

Active Systems

Indirect Forced Circulation - Active

Two Types

- Glycol
- Drainback

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Example Glycol System

Example Drainback System

General Considerations

- Freeze Protection
  - Systems are designed to function in cold conditions
  - All eligible types discussed here have freeze protection
- Overheat Protection
  - Glycol systems only
  - Your contractor should ensure protection from overheating

Alternative Systems

Alternative Systems

- Systems that use PV instead of traditional thermal collectors
  - Not integrated into your PV system to offset house electricity

Get Solar Water Heating for Your Home

Part 4

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California Solar Initiative-Thermal Program

- Single Family Homeowners
- Multi-Family Homeowners
- Commercial Properties
- Solar Pools

  (not single family)
- Industrial Process Heating

California Solar Initiative-Thermal Program

ELIGIBLE	
Gas water heating customers of SDG&E, PG&E, or SoCalGas	Retrofit New Construction
NOT ELIGIBLE	
Pool & Spa Systems, Space heating/cooling, Radiant Floor Heating	

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CSI-Thermal Program Background

- Launched in 2010
- Natural Gas program through 2019
- Ratepayer funded program for customers of the large investor owned utilities

How the rebate works

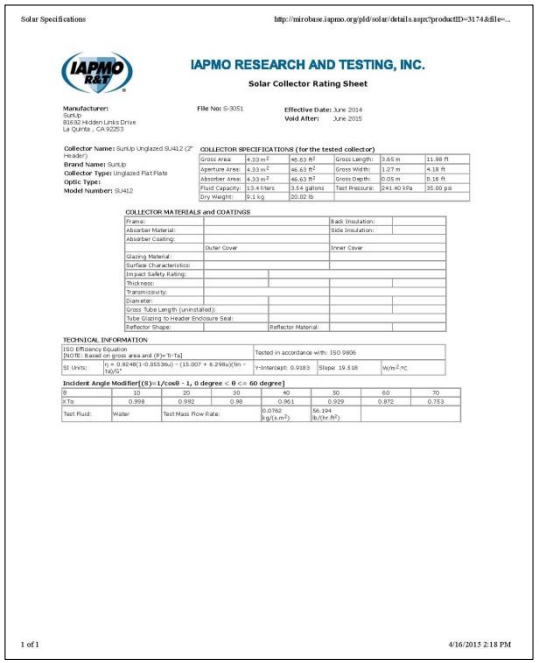
- One time payment
- Your contractor applies for you (self-installers apply for themselves)
- Apply for the rebate once the project is completely installed & has been inspected by the city or county

Rebate Based on Expected Performance

- Expected annual energy savings (OG-300 rating)
- Current incentive level for natural gas
- Surface orientation
- Shading analysis

System Rating

- Residential systems are certified and rated
  - Solar Rating Certification Corporation (SRCC)
  - International Association of Plumbing and Mechanical Officials (IAPMO)



Solar Specifications

IAPMO R&T

IAPMO RESEARCH AND TESTING, INC.

Solar Collector Rating Sheet

Manufacturer: Suntup
81632 Hidden Links Drive
La Quinta , CA 92253

File No: S-3051
Effective Date: June 2014
Void After: June 2015

Collector Name: Suntup Unglazed SU412 (2" Header)
Brand Name: Suntup
Collector Type: Unglazed Flat Plate
Optic Type:
Model Number: SU412

COLLECTOR SPECIFICATIONS (for the tested collector)

Gross Area:	4.33 m²	46.63 ft²	Gross Length:	3.65 m	11.98 ft
Aperture Area:	4.33 m²	46.63 ft²	Gross Width:	1.27 m	4.16 ft
Absorber Area:	4.33 m²	46.63 ft²	Gross Depth:	0.05 m	0.16 ft
Fluid Capacity:	13.4 liters	3.54 gallons	Test Pressure:	241.40 kPa	35.00 psi
Dry Weight:	9.1 kg	20.02 lb			

COLLECTOR MATERIALS and COATINGS

Frame:		Back Insulation:	
Absorber Material:		Side Insulation:	
Absorber Coating:			
	Outer Cover:	Inner Cover:	
Glazing Material:			
Surface Characteristics:			
Impact Safety Rating:			
Thickness:			
Transmissivity:			
Diameter:			
Gross Tube Length (uninstalled):			
Tube Glazing to Header Enclosure Seal:			
Reflector Shape:		Reflector Material:	

TECHNICAL INFORMATION

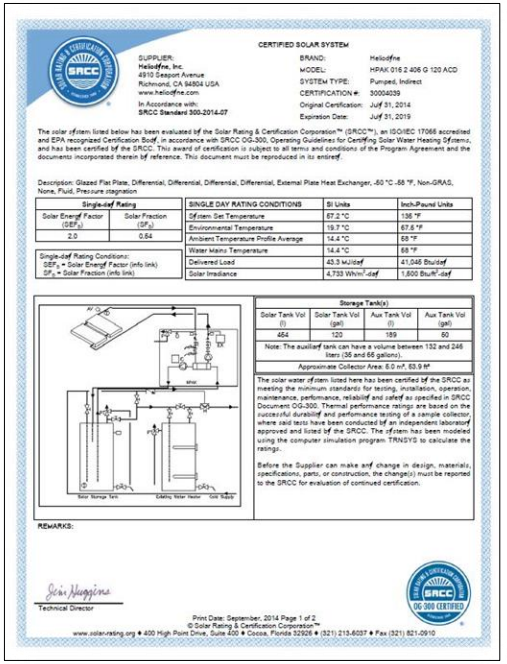
ISO Efficiency Equation [NOTE: Based on gross area and (Tf>Ti-Ta)]		Tested in accordance with: ISO 9806	
SI Units:	η = 0.924[1-0.853(36u) - (15.007 + 6.298u)(Ki - 50)/G*]	Y-Intercept: 0.9183	Slope: 19.838 W/m²-°C

Incident Angle Modifier[(θ)=1/cosθ - 1, 0 degree < θ <= 60 degree]

θ	10	20	30	40	50	60	70
KTa	0.998	0.992	0.98	0.961	0.929	0.872	0.753

Test Fluid:	Water	Test Mass Flow Rate:	0.0762 kg/(s·m²)	56.194 lb/(hr·ft²)

1 of 1 4/16/2015 2:18 PM



CERTIFIED SOLAR SYSTEM

SUPPLIER: Heliofine, Inc.
4910 Seaport Avenue
Richmond, CA 94804 USA
www.heliofine.com

BRAND: Heliofine
MODEL: HPAK 016 2 406 G 120 ACD
SYSTEM TYPE: Pumped, Indirect
CERTIFICATION #: 30004039
Original Certification: Jul 31, 2014
Expiration Date: Jul 31, 2019

In Accordance with: SRCC Standard 300-2014-07

The solar system listed below has been evaluated by the Solar Rating & Certification Corporation™ (SRCC™), an ISO/IEC 17065 accredited and EPA recognized Certification Body, in accordance with SRCC OG-300, Operating Guidelines for Certifying Solar Water Heating Systems, and has been certified by the SRCC. This award of certification is subject to all terms and conditions of the Program Agreement and the documents incorporated therein by reference. This document must be reproduced in its entirety.

Description: Glazed Flat Plate, Differential, Differential, Differential, External Plate Heat Exchanger, -50 °C -58 °F, Non-GRAS, None, Fluid, Pressure stagnation

Single-def Rating	
Solar Energy Factor (SEF)	Solar Fraction (SF)
2.0	0.64

Single-def Rating Conditions:
SEF = Solar Energy Factor (info link)
SF = Solar Fraction (info link)

SINGLE DAY RATING CONDITIONS	SI Units	Inch-Pound Units
Offset Set Temperature	87.2 °C	136 °F
Environmental Temperature	19.7 °C	67.6 °F
Ambient Temperature Profile Average	14.4 °C	58 °F
Water Mains Temperature	14.4 °C	58 °F
Delivered Load	43.3 MJ/def	41,046 Btu/def
Solar Irradiance	4,733 Wh/m²-def	1,500 Btu/ft²-def

Storage Tank(s)

Solar Tank Vol (l)	Solar Tank Vol (gal)	Aux Tank Vol (l)	Aux Tank Vol (gal)
454	120	189	60

Note: The auxiliary tank can have a volume between 132 and 246 liters (36 and 66 gallons).

Approximate Collector Area: 8.0 m², 83.9 ft²

The solar water system listed here has been certified by the SRCC as meeting the minimum standards for testing, installation, operation, maintenance, performance, reliability and safety as specified in SRCC Document OG-300. Thermal performance ratings are based on the successful durability and performance testing of a sample collector, where said tests have been conducted by an independent laboratory approved and listed by the SRCC. The system has been modeled using the computer simulation program TRNSYS to calculate the ratings.

Before the Supplier can make any change in design, materials, specifications, parts, or construction, the change(s) must be reported to the SRCC for evaluation of continued certification.

REMARKS:

Technical Director

Print Date: September, 2014 Page 1 of 2
© Solar Rating & Certification Corporation™
www.solar-rating.org ♦ 400 High Point Drive, Suite 400 ♦ Cocoa, Florida 32926 ♦ (321) 213-6037 ♦ Fax (321) 821-0910

- Testing is performed to determine how much energy a system can be expected to offset in therms per year
- This rating is used to calculate your rebate

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Incentives: Natural Gas

Steps	$ per Therm Saved	Single Family Cap
Step 1	$29.85	$4,366
Step 2	$25.37	$3,710

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Example: Incentive Formula
(Natural Gas)

Average Energy Savings	115 Therms
x $/Therm	x $29.85
x Surface orientation factor	x 1.0
x Shade factor	x 1.0
= $ Rebate	= $3,433

Average Energy Savings	115 Therms
x $/Therm	x $29.85
x Surface orientation factor	x 1.0
x Shade factor	x 0.9
= $ Rebate	= $3,090

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Rebate Summary

	Average System Cost	Average Rebate	Out-of-Pocket Cost
Gas	$ 7,300	$ 3,300	$ 4,000

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Higher low income rebates

- The CSI-Thermal Program offers higher incentives to qualifying single-family, low income customers

Low Income Natural Gas-Displacing Single-Family System Incentive Steps

Step	1
Incentive per annual therm displaced	**$36.90**
Maximum Incentive	$5,397

Average Energy Savings	115 Therms
x $/Therm	x $36.90
x Surface orientation factor	x 1.0
x Shade factor	x 1.0
= $ Rebate	= $4,244

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Federal Solar Investment Tax Credit

- 30% of the net system cost thru 2019
- 26% in 2020
- 22% in 2021
- IRS Form 5695
  (Renewable Energy Credit)

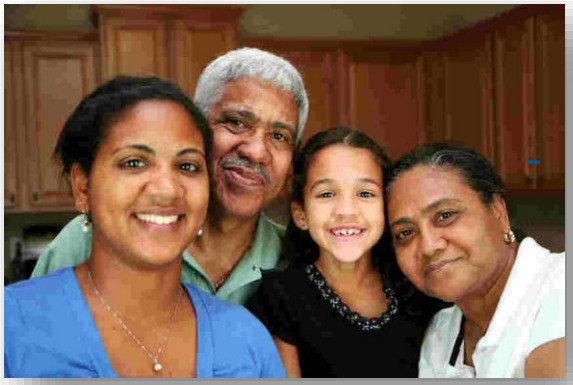
Talk to your tax professional!

http://www.energystar.gov/about/federal_tax_credits

Average Costs

	Initial Investment	Cost After Rebate	Fed Tax Credit (30%)	Net Cost
Gas	$7,300	$4,000	$1,200	$2,800
Electric	$7,300	N/A	$2,190	$5,110

Contract Structure Options - $7,300



$ 7300

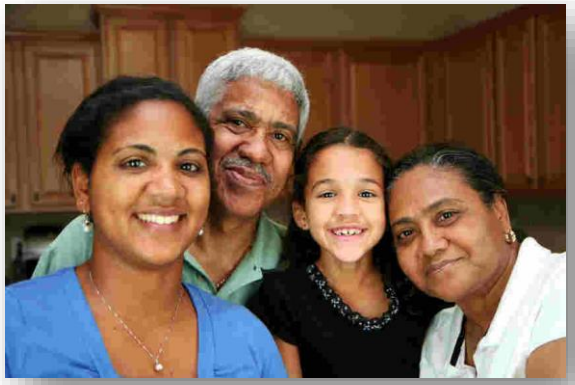
$ 3300

rebate

$ 4000

$ 0

Rebate $ goes to you



$ 4000

$ 3300

rebate

Rebate $ goes to contractor

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Solar Water Heating Contractors must be eligible

- Contractors participating in the CSI Thermal Rebate Program must:
  - have an active license
    - Class A
    - Class B
    - Class C-4
    - Class C-36
    - Class C-46
  - have attended a CSI Thermal eligibility workshop

To find an active Solar Water Heating contractor near you visit **energycenter.org/swhcontractors**

Basic Questions to Ask Solar Water Heating Contractors

1. Are you an “eligible” contractor through the CSI-Thermal Program?
2. Is the SWH system OG-300 certified?
3. What type of insulation will be used on the pipes?
4. What type of freeze protection does this SWH system have?
5. What type of heat protection does this SWH system have?

Learn About Solar PV

Part 5

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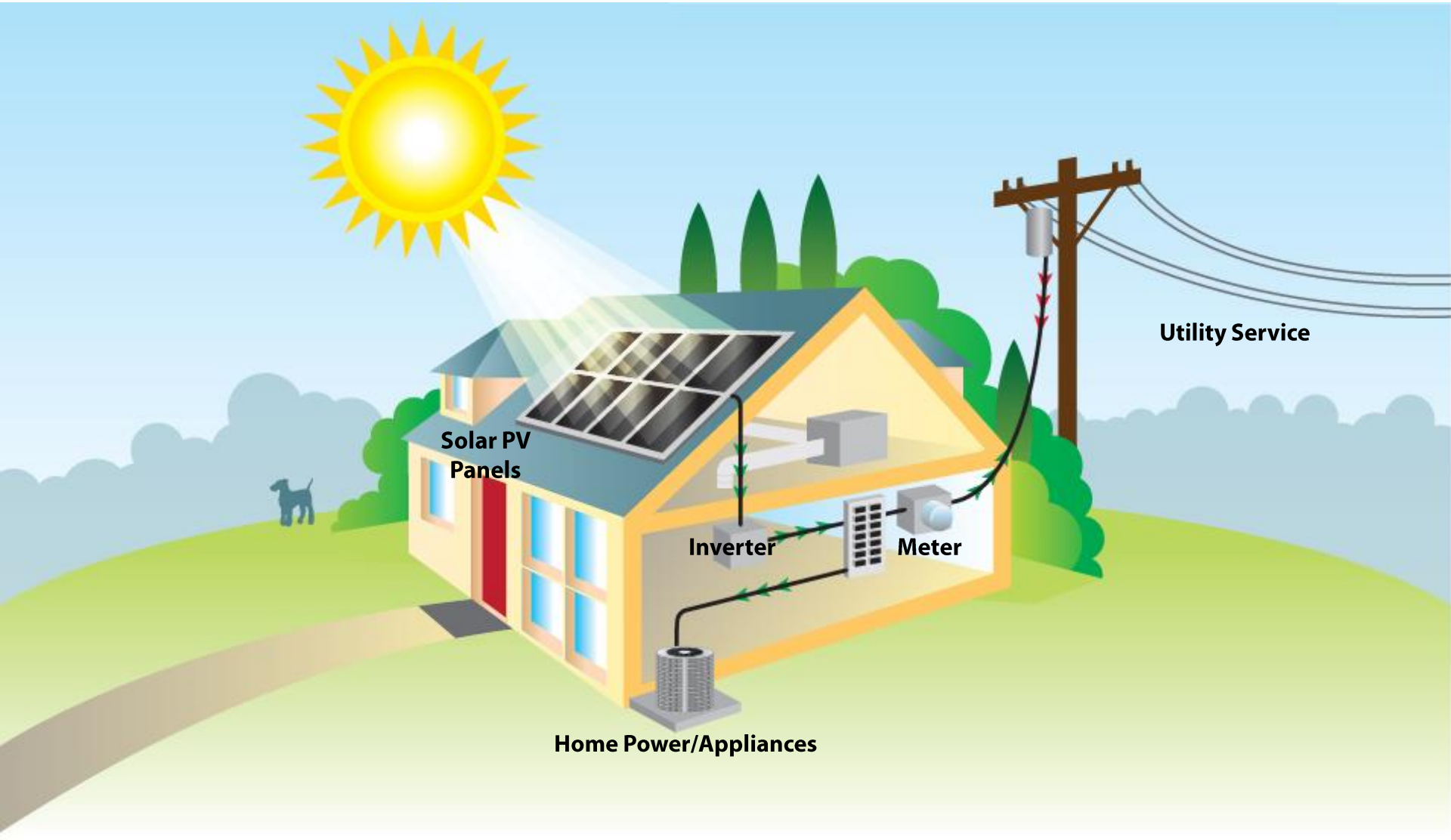
How does solar PV work?



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PV Terminology

Cell

Module / Panel

Array

Crystalline Silicon PV Panels

Roof Mounted

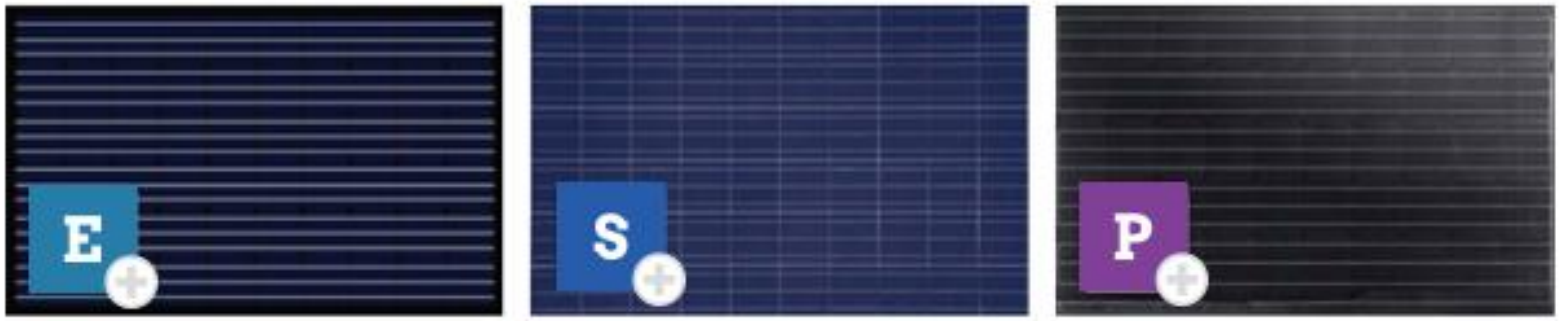
- Rigid crystals
- Longest track record, over 50 years
- Most common, over 93% of the market
- Extreme heat reduces performance
- Shade highly reduces performance

Ground Mounted

How to compare PV panels?

energysage

Solar Panel Classification



Economy Standard Premium

https://www.energysage.com/solar/buyers-guide/types-of-solar-panels/

Inverters

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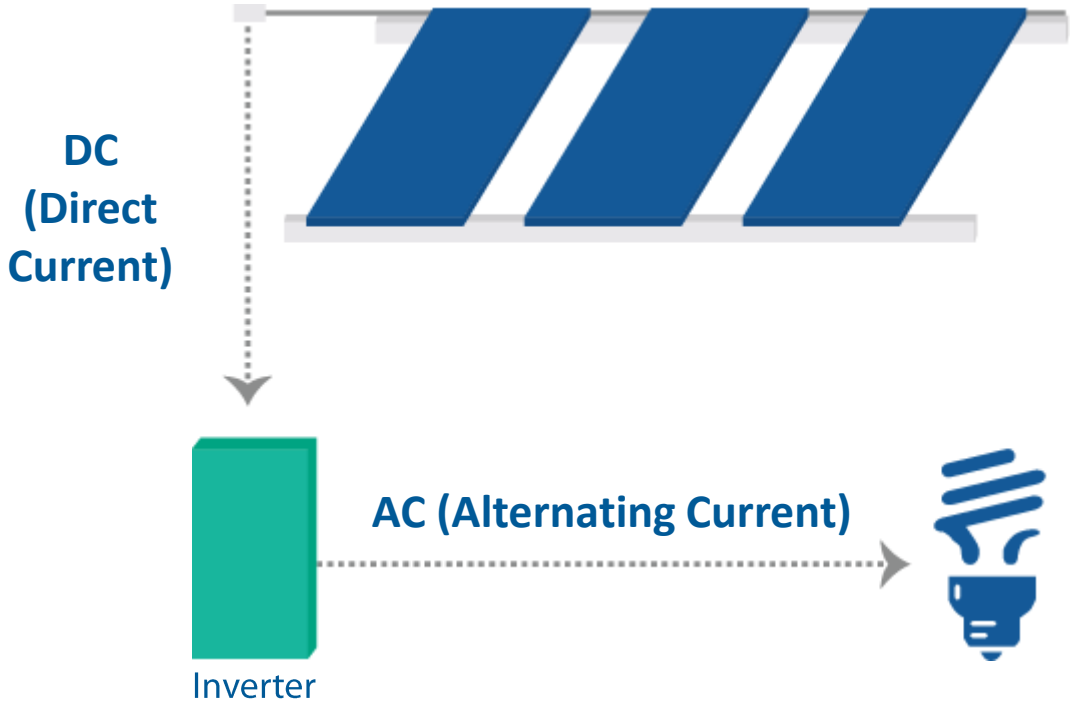
Inverters

Inverters change DC electricity from panels to AC electricity for use in your home

Two Types

- Central Inverters
- Micro Inverters



Central Inverters

One individual inverter per array

Central Inverters

Benefits:

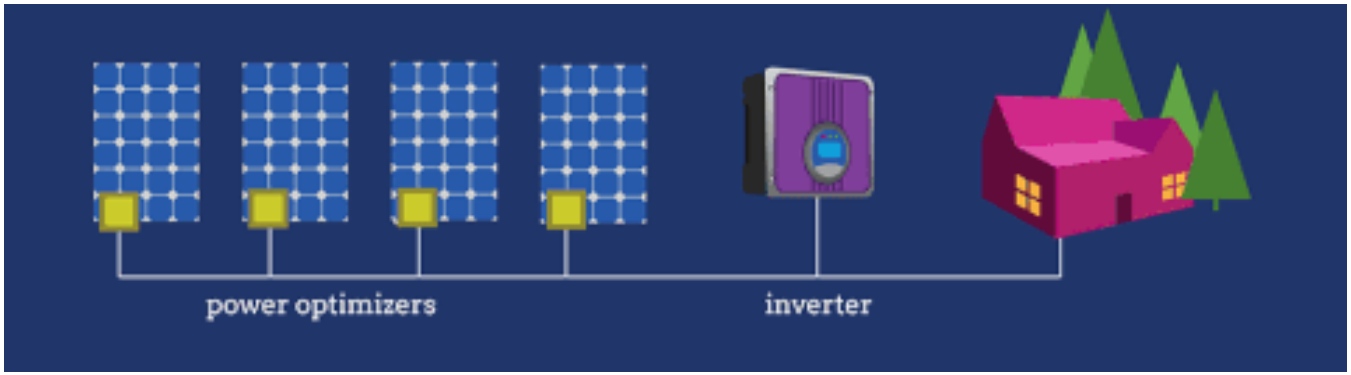
- Central point of failure
- Lower cost

Disadvantage:

- Shading can affect power output dramatically
- Does not allow for easy system size increases

DC Power Optimizers

- Power optimizers work with central inverters to bypass a shaded panel to avoid a lower power output
- Power optimizers are located at each individual panel, usually integrated into the panels themselves



Micro Inverters

One individual inverter per panel

Micro Inverters

One individual inverter per panel.

Benefits:

- More tolerant to shading
- Allows flexibility in design and for future additions

Disadvantage:

- Shorter track record

What is Net Metering?

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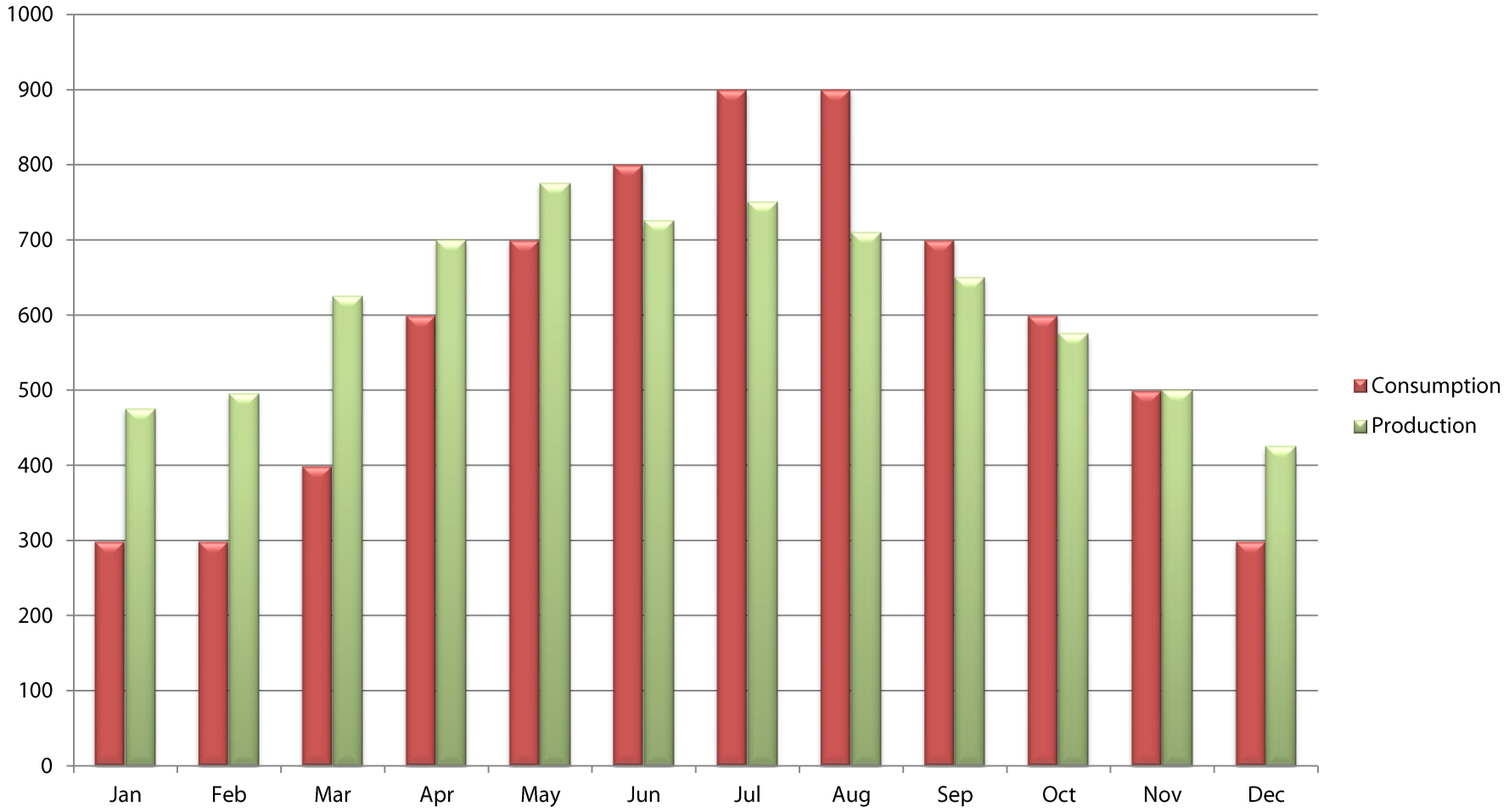
Consumption/Production Patterns



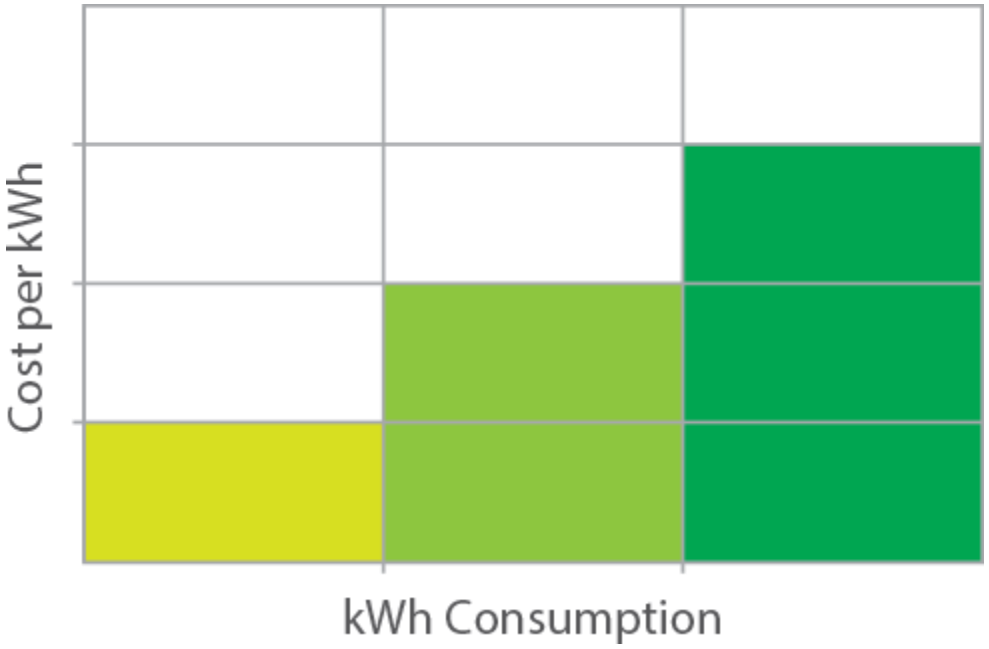
The California Solar Surplus Act

- AB 920 requires the utility to purchase annual over generation by net metered utility customers.
- Purchase price is ≈$0.03/ kWh

  Note - If you offset more than 100% of your kWh usage, you will receive a minimum charge of $10/month.

Understanding your utility bill

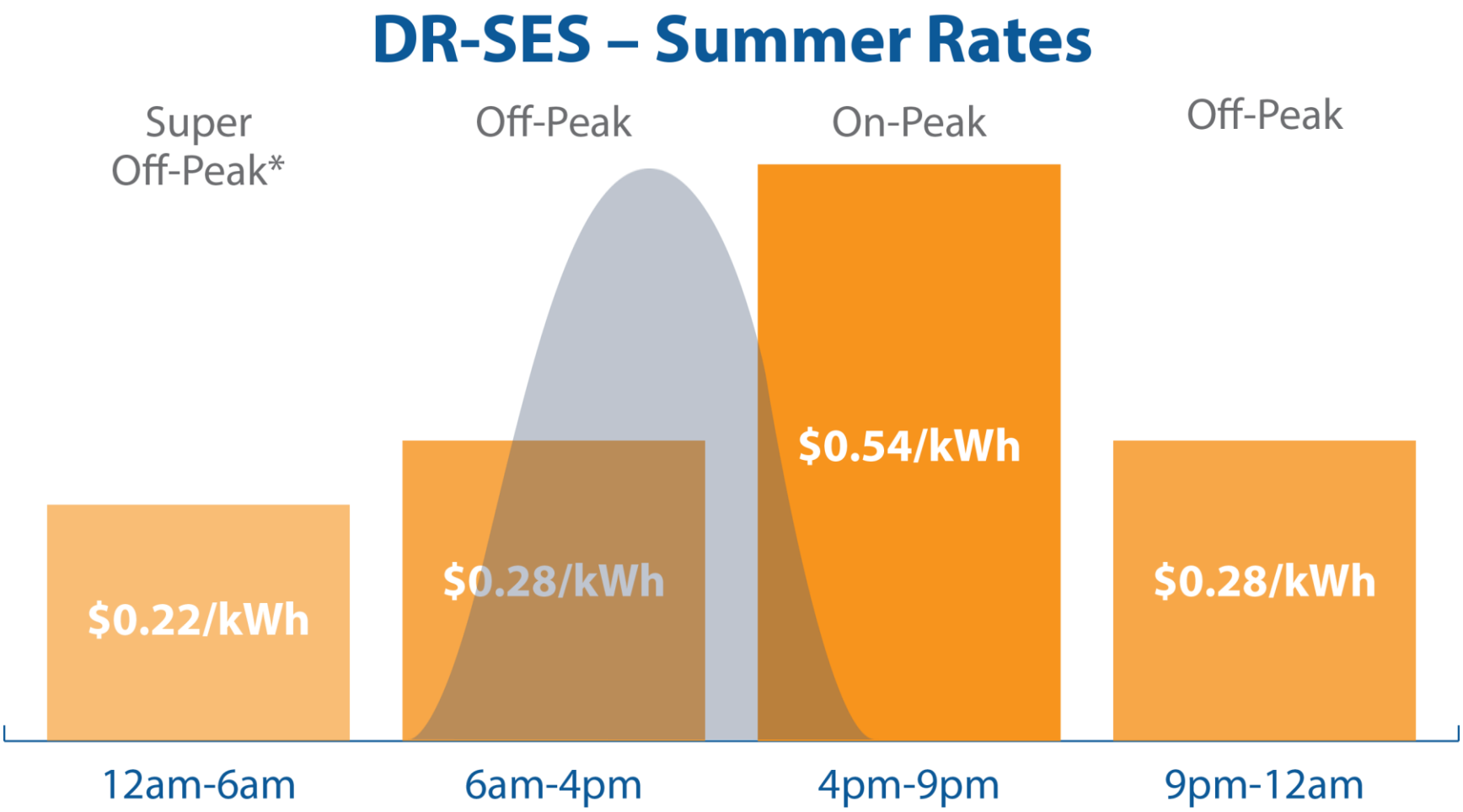
- **Tiered rate** – You are charged the rate of various tiers. Each tier has a designated amount of kWh that can be consumed before being charged at the next higher tier. The rates increase with each tier.



Understanding your utility bill

- **Time-of-use (TOU) rate** – The rate you pay per kWh is based on the time of consumption, with designated peak and off-peak times.
- SDG&E has various time of use rates:
    - DR-SES
    - TOU-DR

DR-SES



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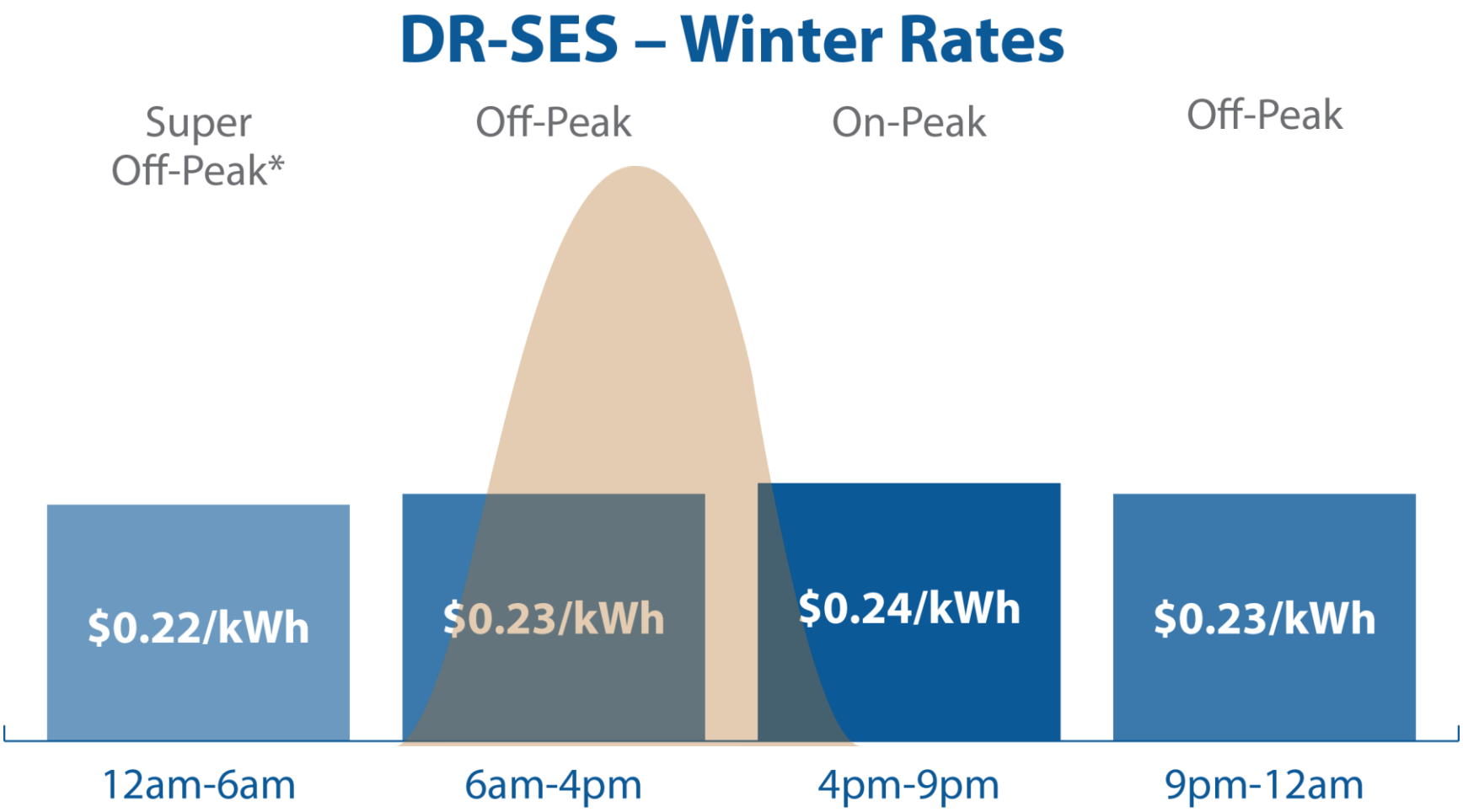
DR-SES



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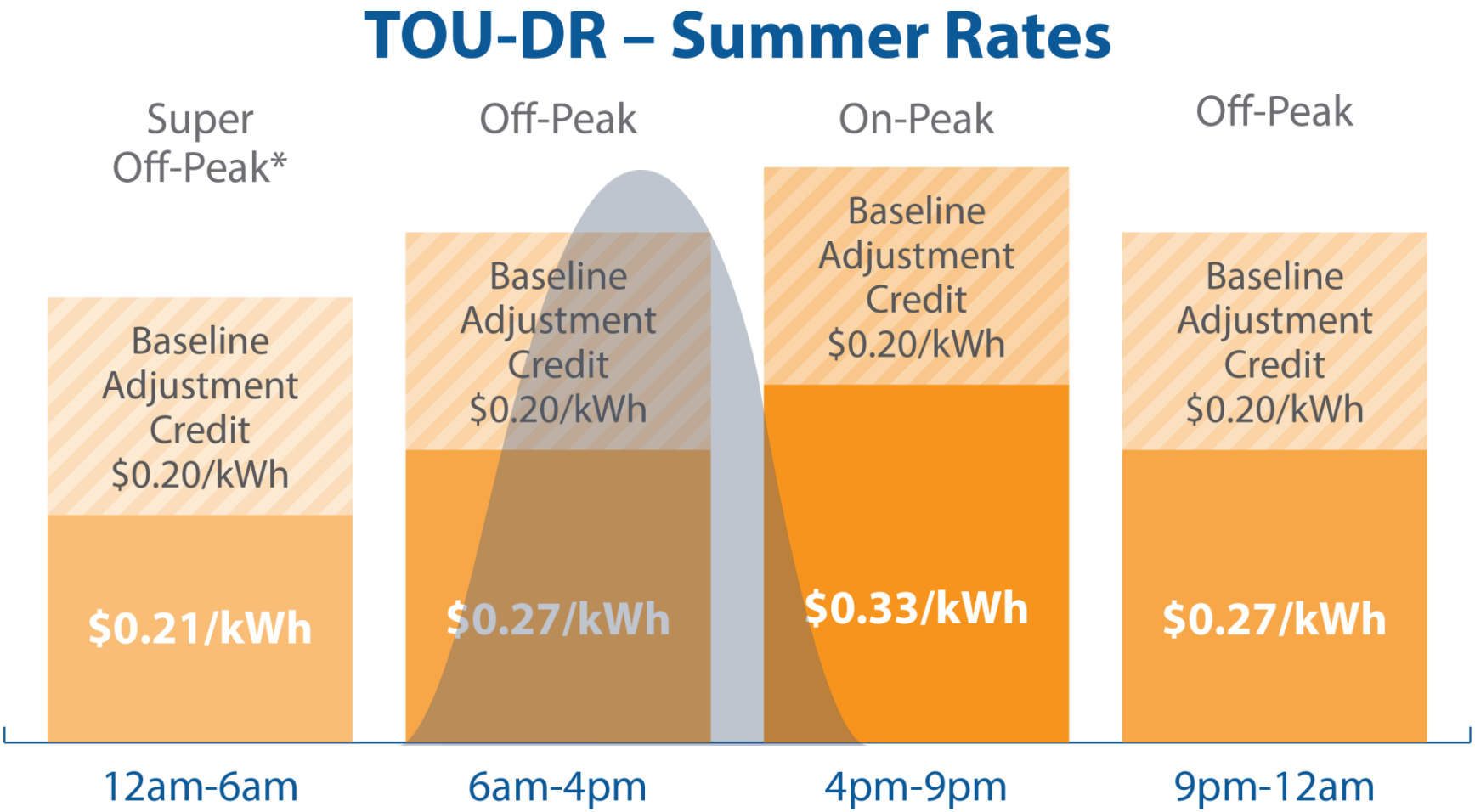
TOU-DR



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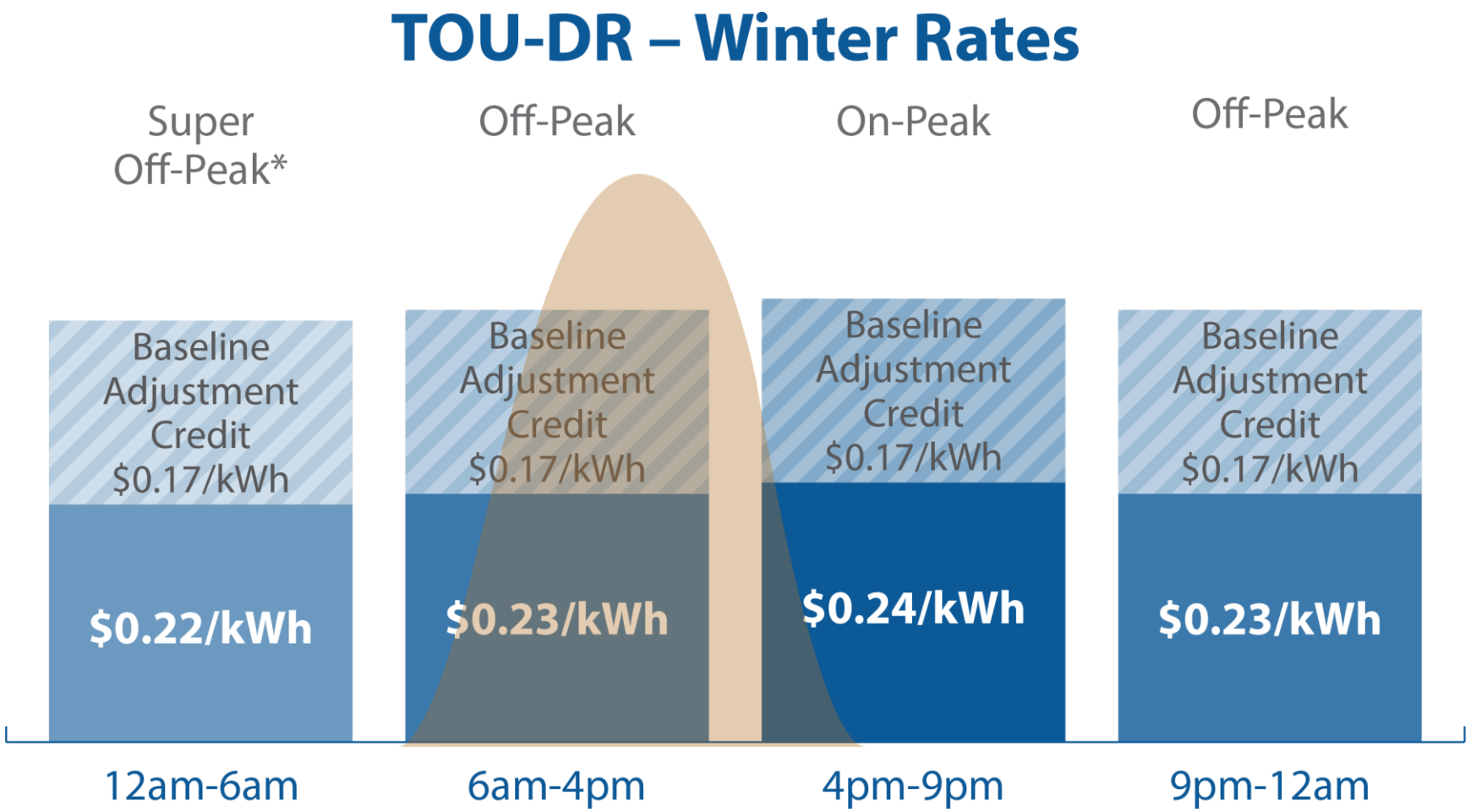
TOU-DR



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PV System Sizing- How much electricity do you need?

Part 6

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System Sizing

12 month electricity consumption (kWh) / **1,700 kWh (average annual production of 1 kW in San Diego)** = **# of kW that would offset your electricity use**

System Sizing Example

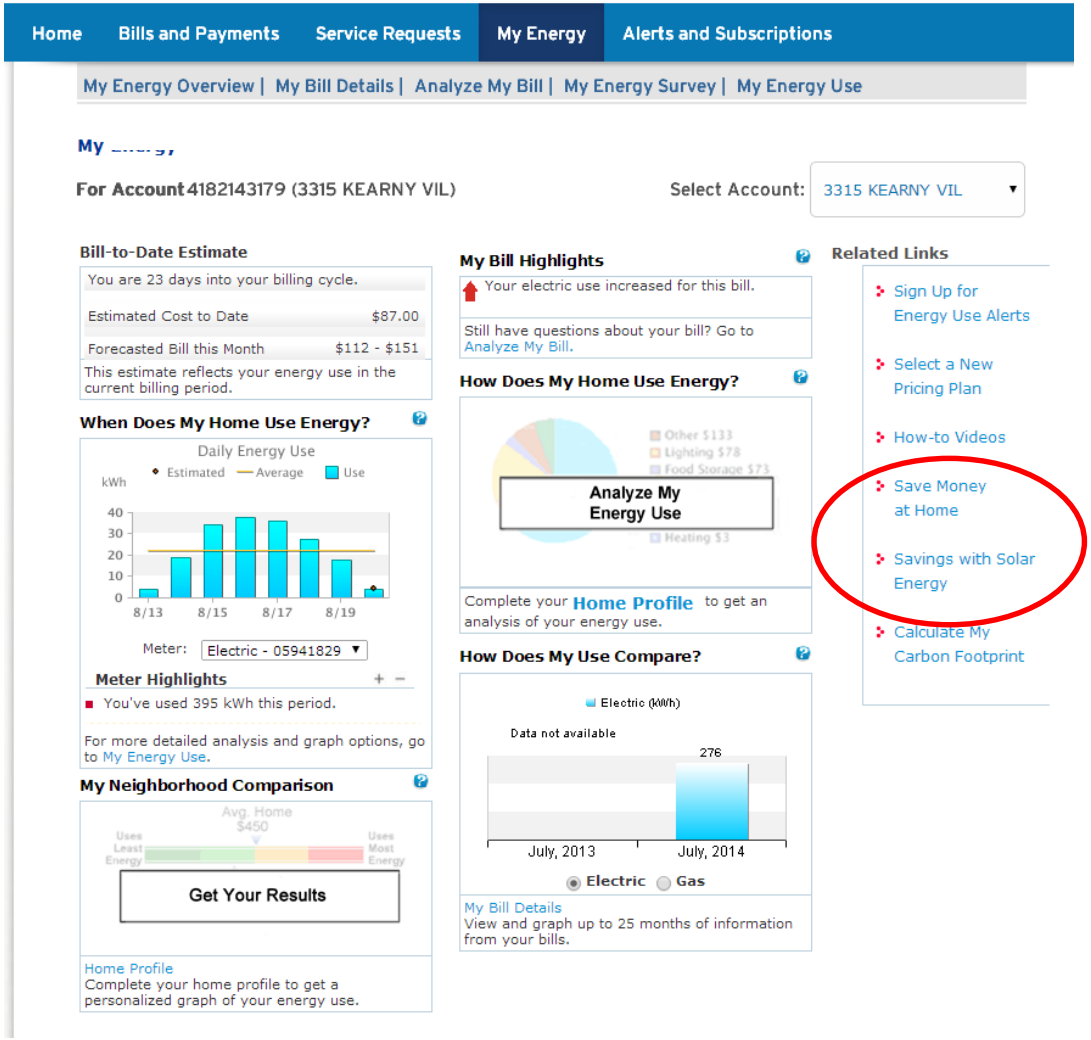
7,000 kWh / **1,700 kWh** = **4.1 kW PV System**

12 month electricity consumption (kWh)

average annual production of 1 kW in San Diego

kW that would offset your electricity use

SDG&E Solar PV Calculator



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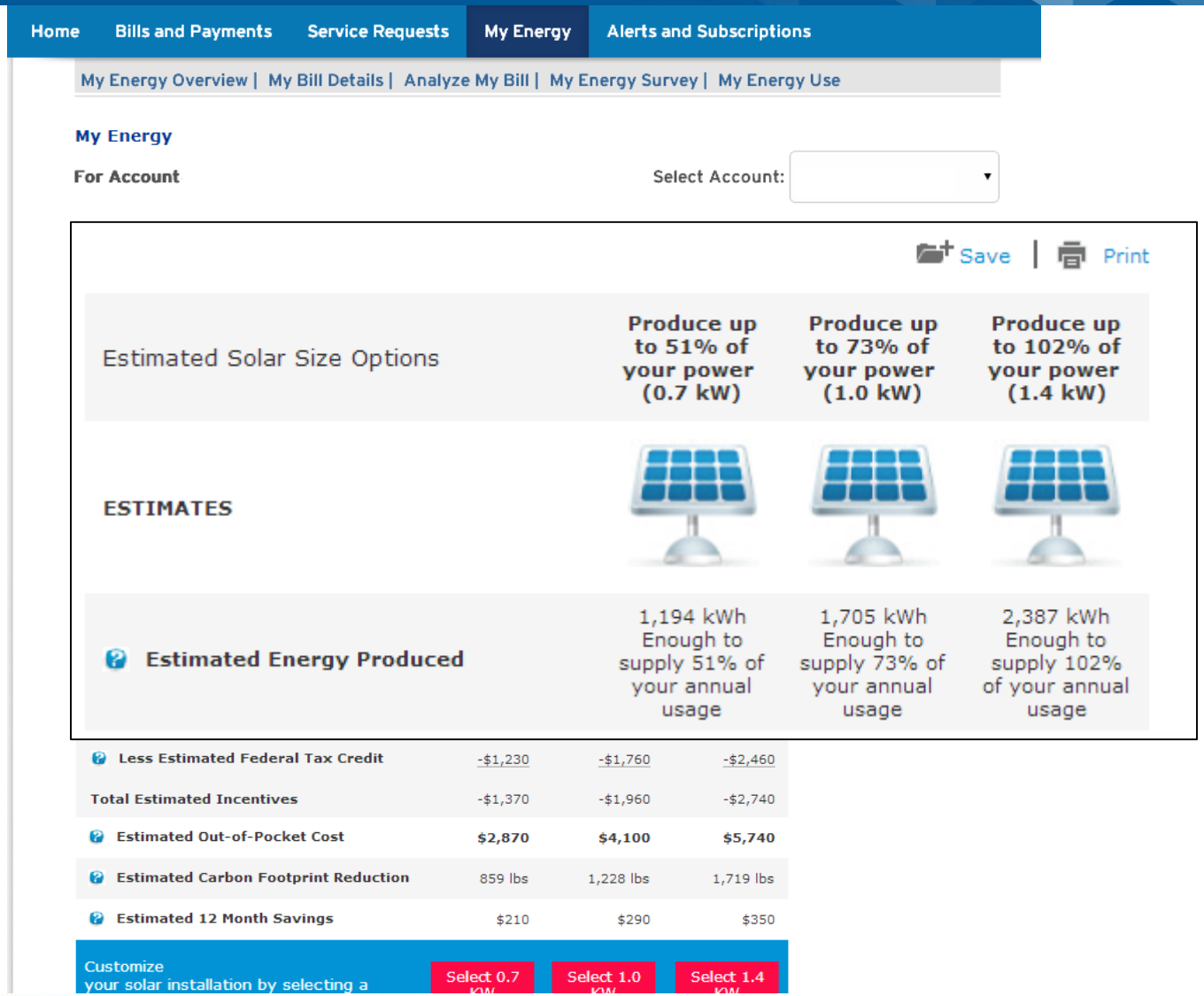
SDG&E Solar PV Calculator



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CSE Solar Calculator

Residential Solar Electric Bill Calculator

SDG&E Territory

Thinking about going solar? Once you connect your solar PV system to the grid, you receive credit for electricity you provide to the grid – a system called net energy metering. Your electric rate structure also changes so that you are charged (or credited) differently depending on the time of day. Kilowatt-hours used (or produced) from 4pm-9pm would have a higher value than those used (or produced) at other times.

Use this calculator to estimate your new electric bills after going solar.

1. ENTER YOUR ADDRESS

THIS WILL ALLOW US TO ESTIMATE SOLAR PRODUCTION AT YOUR EXACT LOCATION.

123 Main St., Sunny, CA 99999 | FIND

http://research.energycenter.org/solarcalc/

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CSE Solar Calculator

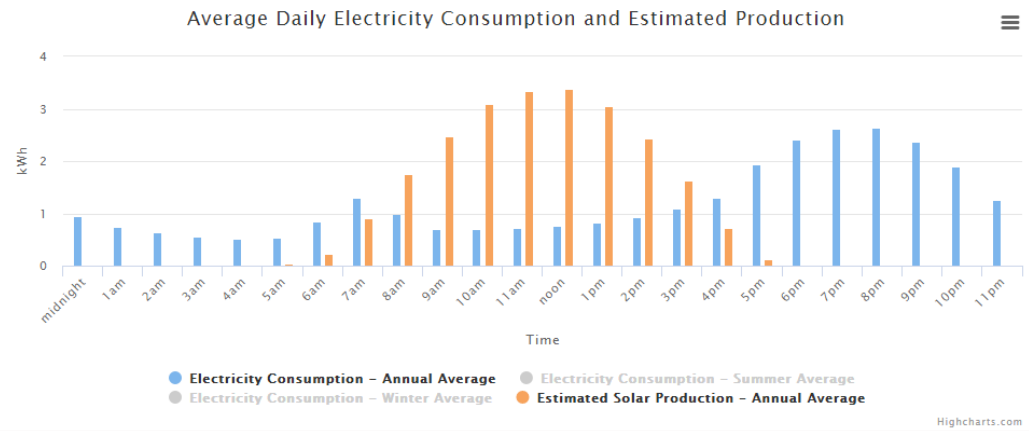
2. Upload your greenbutton data (XML File)

Your Green Button data shows your energy consumption patterns over time. You can download it by accessing your SDG&E account. Instructions

Choose File SDGE_Electr…7_2017.zip

Done!

3. See your current consumption and potential solar production



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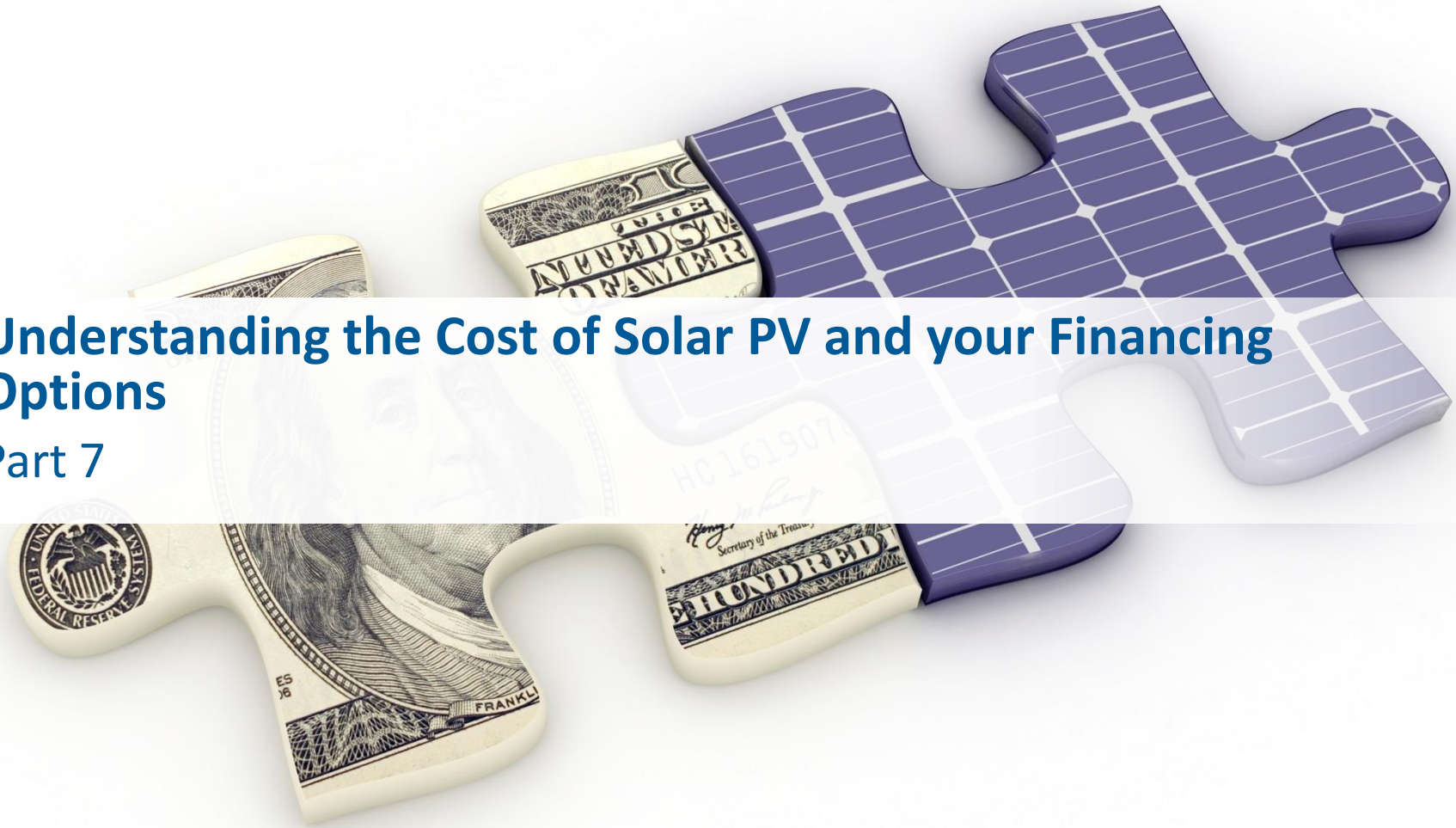

Understanding the Cost of Solar PV and your Financing Options

Part 7

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Financing Options

Two avenues for financing:

Purchased	Third Party Owned
• Cash • Loan	• Lease • Power Purchase Agreement (PPA)

Financing Options

What is included in the purchase?

Purchased

Generally will not include:
- Inverter replacement
- Operations & Maintenance
- Insurance

May include:
- Monitoring

Third Party Owned

Generally includes:
- Inverter replacement
- Operations & Maintenance
- Insurance
- Monitoring

Financing Options

What are the tax implications?

Purchased	Third Party Owned
Need to have the tax liability to make use of the federal investment tax credit (ITC)	Solar services provider has the tax liability for the federal investment tax credit (ITC) **and** the commercial tax depreciation

Financing Options

What are the risks?

Purchased	Third Party Owned
Building owner responsible for operation and maintenance	Longevity of the solar services provider

Financing Options

What happens if I move?

Purchased	Third Party Owned
New homeowner buys the asset	Can transfer payments to new homeowner **or** must buy out the remainder of the contract at 'fair market value'

Financing Options

What are the financial benefits?

Purchased	Third Party Owned
Return on investment in the form of lower electricity bills	Little or no upfront cost, usually cash positive or neutral in the first year

Purchase Options

- Cash Purchase
- Loans
  - Home Equity Loan: bank loan secured with equity from the house (if available)
  - Energy Efficient / Solar Loan
    - San Diego Metropolitan Credit Union
    - Point Loma Credit Union
- Property Assessed Clean Energy (PACE) Loan

  http://pacenation.us/
- Loan from solar contractor

Third Party Options

- Lease
  - Fixed $ per Month
  - May be pre-paid or monthly
- Power Purchase Agreement (PPA)
  - Fixed $ per kWh produced by system
  - Customer buys ***all*** power produced by system

California Residential Solar Costs: SDG&E territory

Average Residential PV Cost:

$3 to $5 per Watt (AC)

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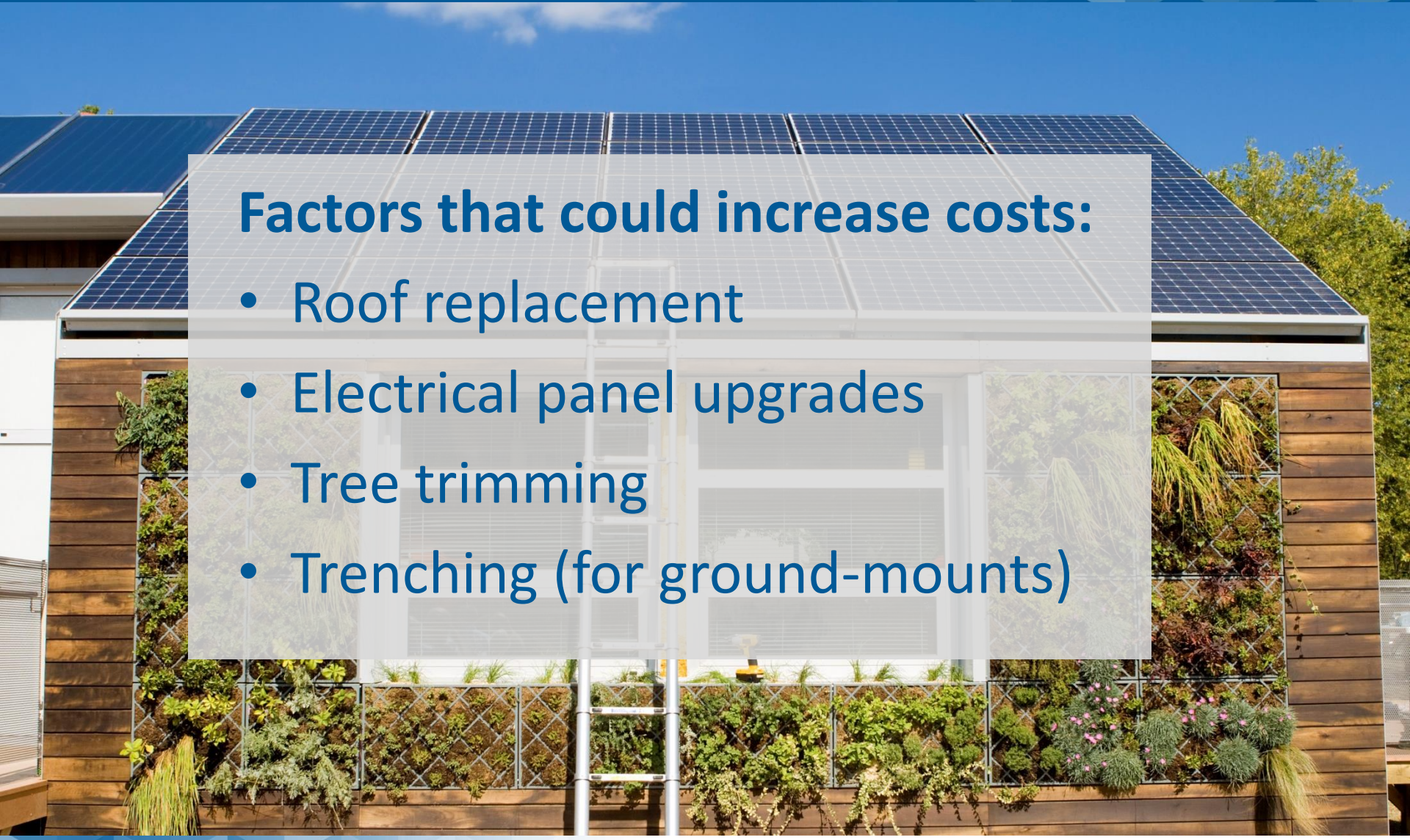
How much does solar PV cost?



Factors that could increase costs:

- Roof replacement
- Electrical panel upgrades
- Tree trimming
- Trenching (for ground-mounts)

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Federal Solar Investment Tax Credit

- 30% of the eligible system cost available through 2019
- 26% in 2020
- 22% in 2021
- One-time credit, but may be carried over
- IRS Form 5695 (Renewable Energy Credit)

Talk to your tax professional!

www.dsireusa.org

Purchased PV System Example

Home consumes 8,500 kWh/year	8,500 kWh / 1,700 kWh	5 kW system
System Cost	5,000W x $4.00/Watt	$20,000
Federal Tax Credit	30% x $20,000	$6,000
Total Cost After Tax Credit	$20,000 - $6,000	$14,000

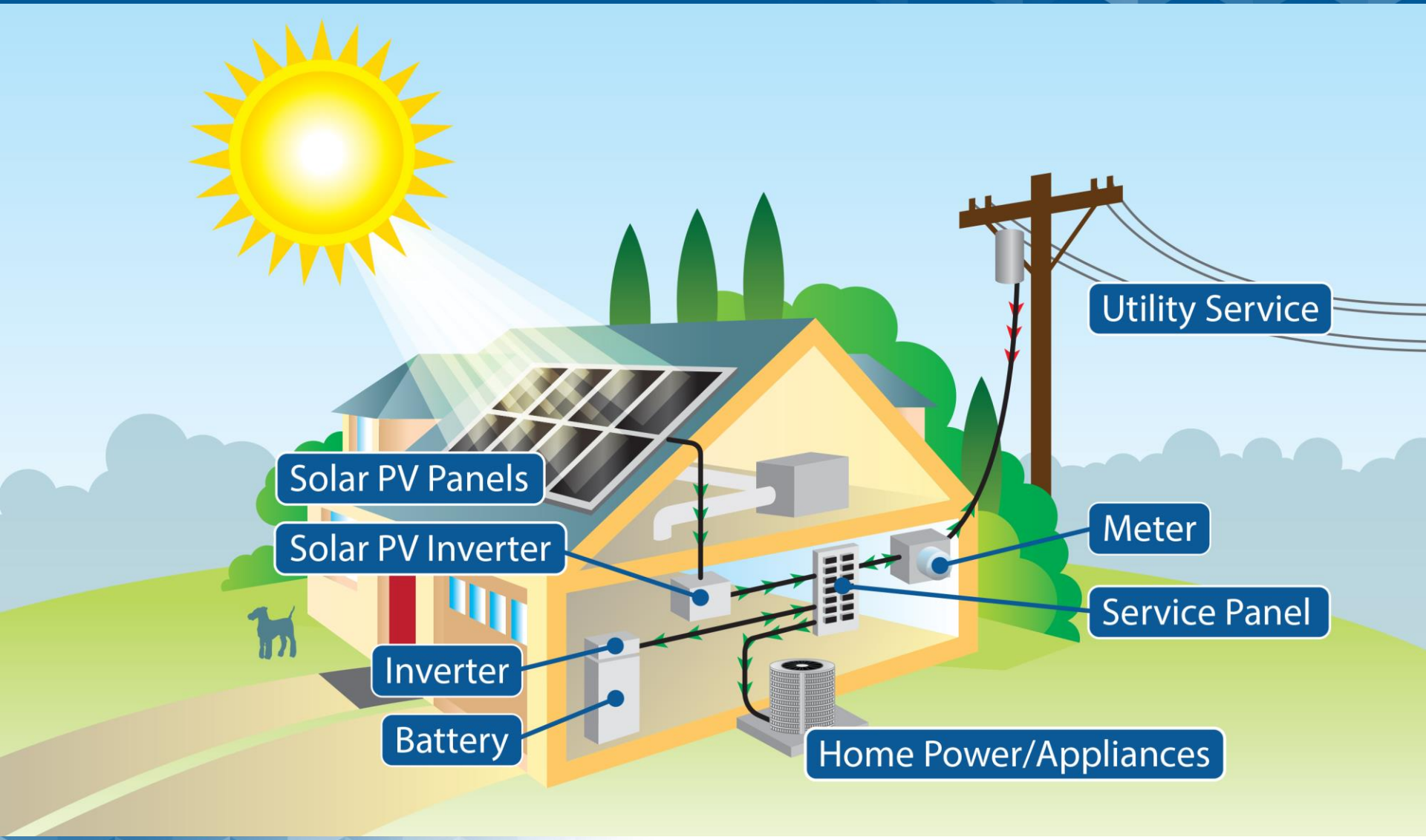
Introduction to Energy Storage

Part 8

What is Energy Storage?

- Energy storage is a technology that is capable of:
  - **absorbing** energy
  - **storing** it for a period of time
  - **dispatching** the energy at a later time.
- Batteries are a common form of energy storage.

Solar + Storage



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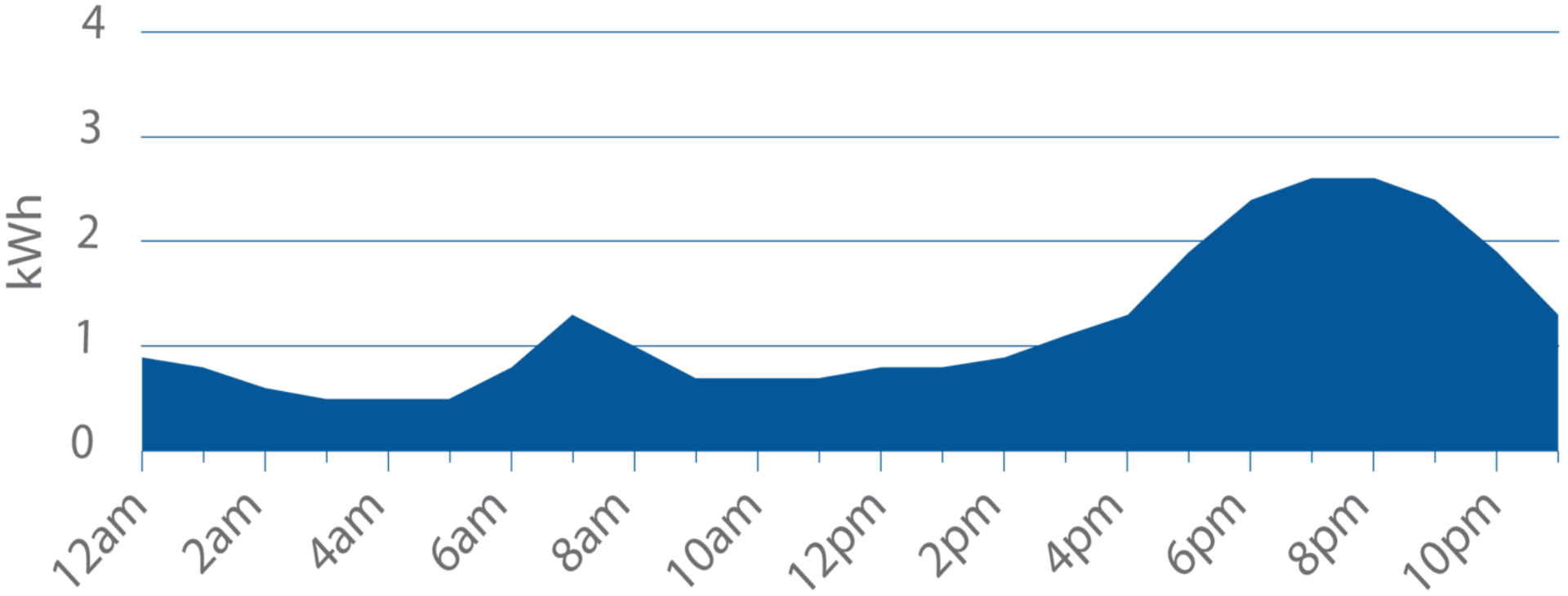
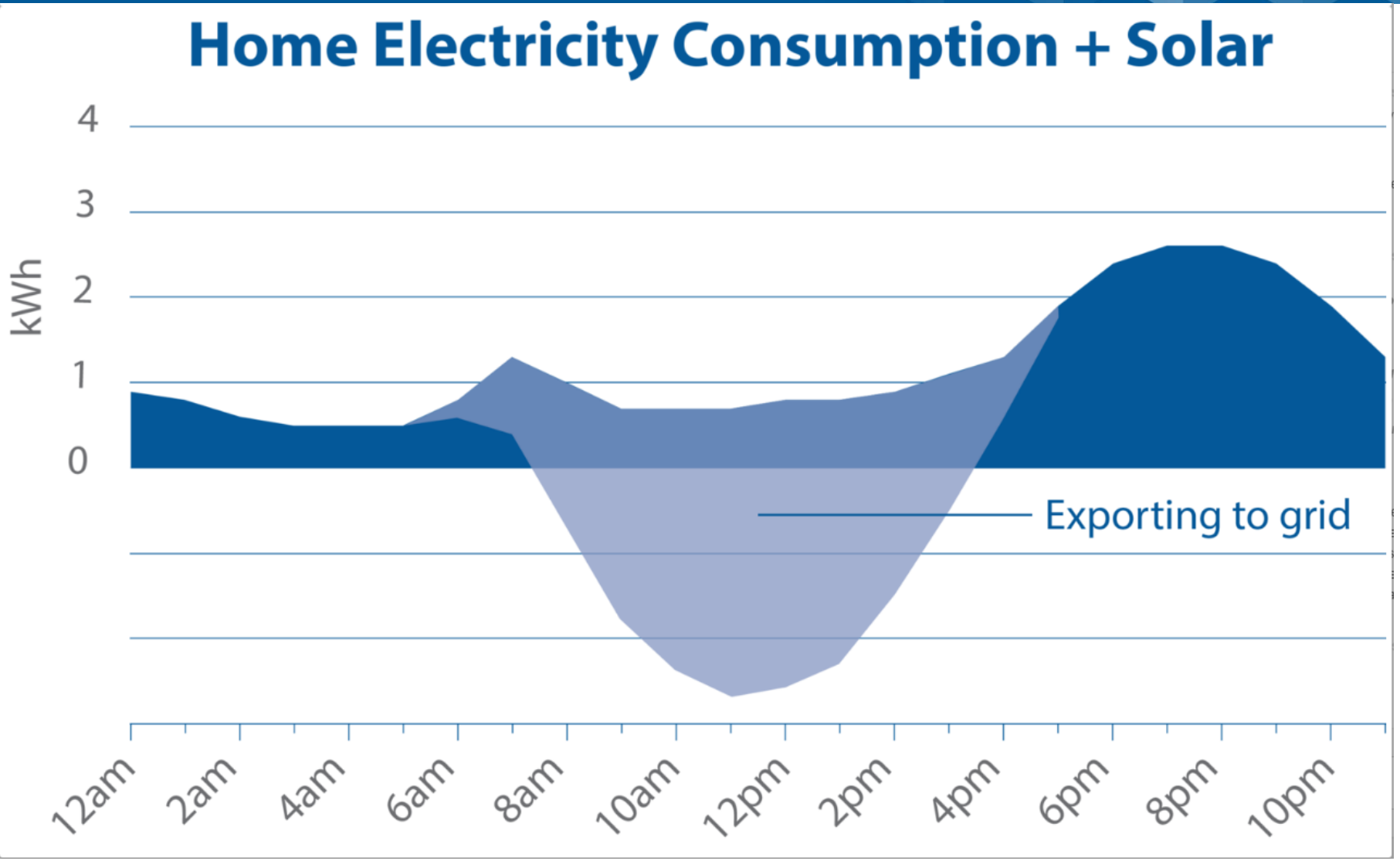
Home Electricity Consumption



Home Electricity Consumption + Solar



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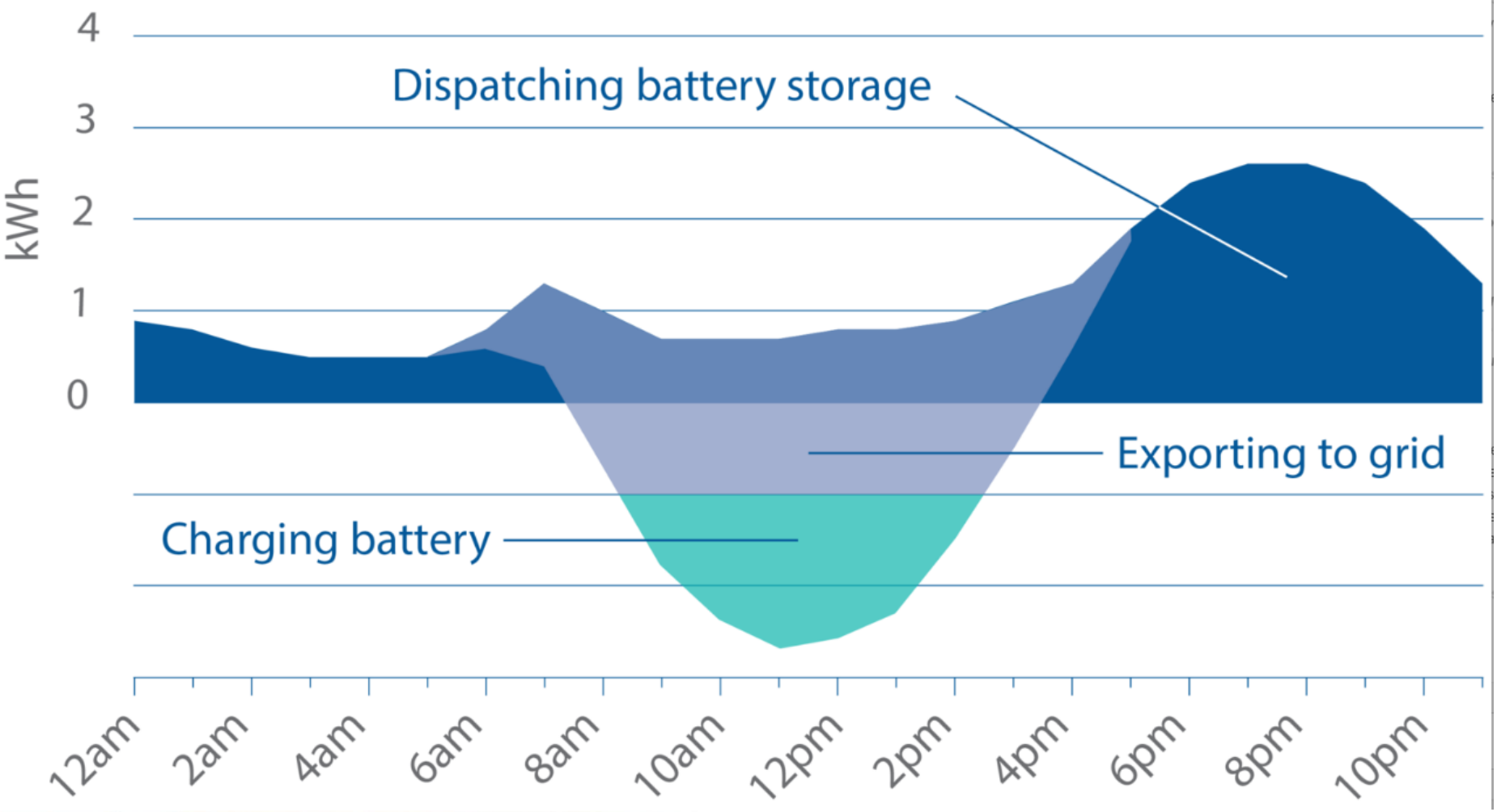
Home Electricity Consumption + Solar + Storage



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Self-Generation Incentive Program (SGIP)

- Self-Generation Incentive Program

Andrea Woodall
Project Manager
andrea.woodall@energycenter.org
(858) 429-5137

Find your solar contractor

Part 8

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The Three Steps

1. Research contractors
2. Compare your options
3. Negotiate bidding/contracting

Research Contractors

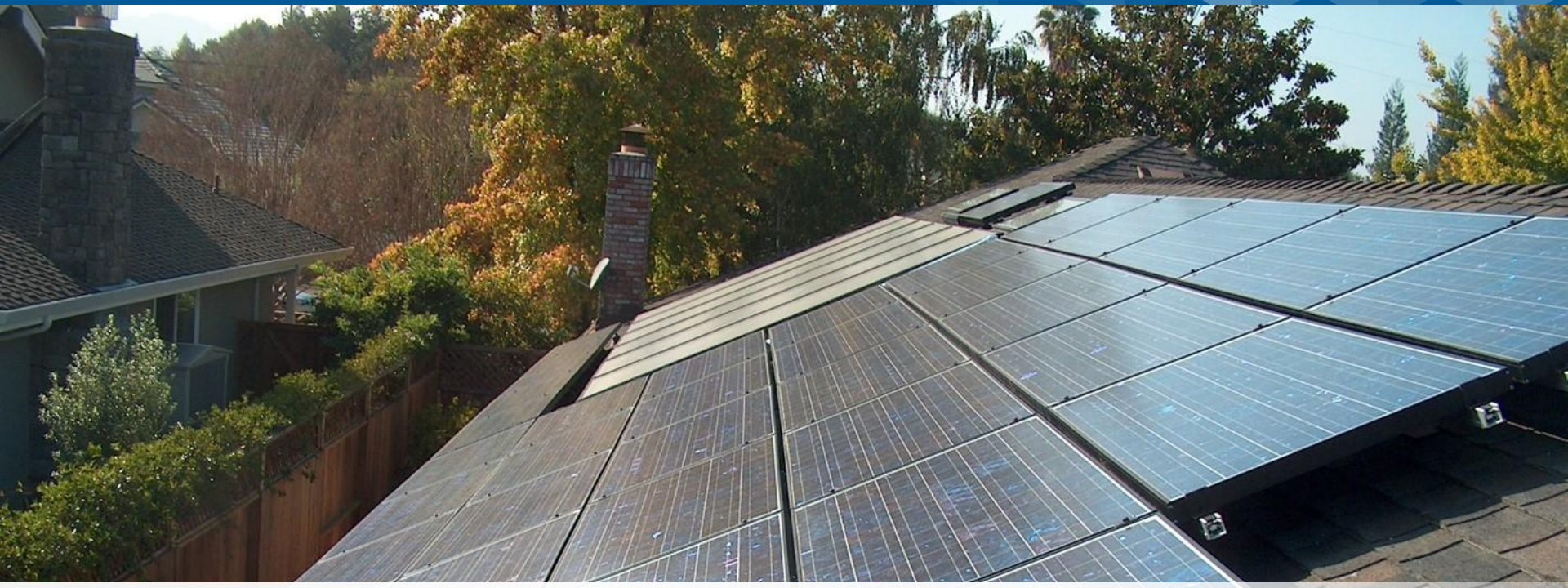
- Find solar contractors:
  - Referrals from friends, family, neighbors, co-workers
  - www.californiasolarstatistics.com
  - www.gosolarcalifornia.ca.gov
  - www.sdgehomeupgrade.com
  - www.energycenter.org/swhcontractors
- Contact a minimum of 3 contractors and ask for quotes

Make sure to use a licensed contractor. Go to cslb.ca.gov to check a license number.

Things to Consider

- Is your home as energy efficient as possible?
- What are your HOA restrictions? (Civil code 714)
- Do you have space for PV panels? Solar water heating collectors?
- Will you have shading on your roof?
- Future load growth?

Which technology is right for you?



- Solar PV and Solar Water Heating systems:
  - are designed to last twenty years or more
  - provide protection from rising energy costs
- Solar Water Heating has a significantly lower upfront capital cost
  - Rebates are at their highest levels
- Solar PV will save you more money in the short term

Electric Vehicle - Available Rebates

Clean Vehicle Rebate Project

Vehicle Type	Rebate Amount
Fuel-Cell	$5,000
All-Battery or Range Extended	$2,500
Plug-in Hybrid	$1,500
Neighborhood Electric Vehicle	$900
Zero-Emission Motorcycle	$900

Federal Tax Credit

Vehicle Type	Rebate Amount
All Battery or Range Extended	$7,500
Plug-in Hybrid	Up to $7,500

Questions? Contact cvrp@energycenter.org

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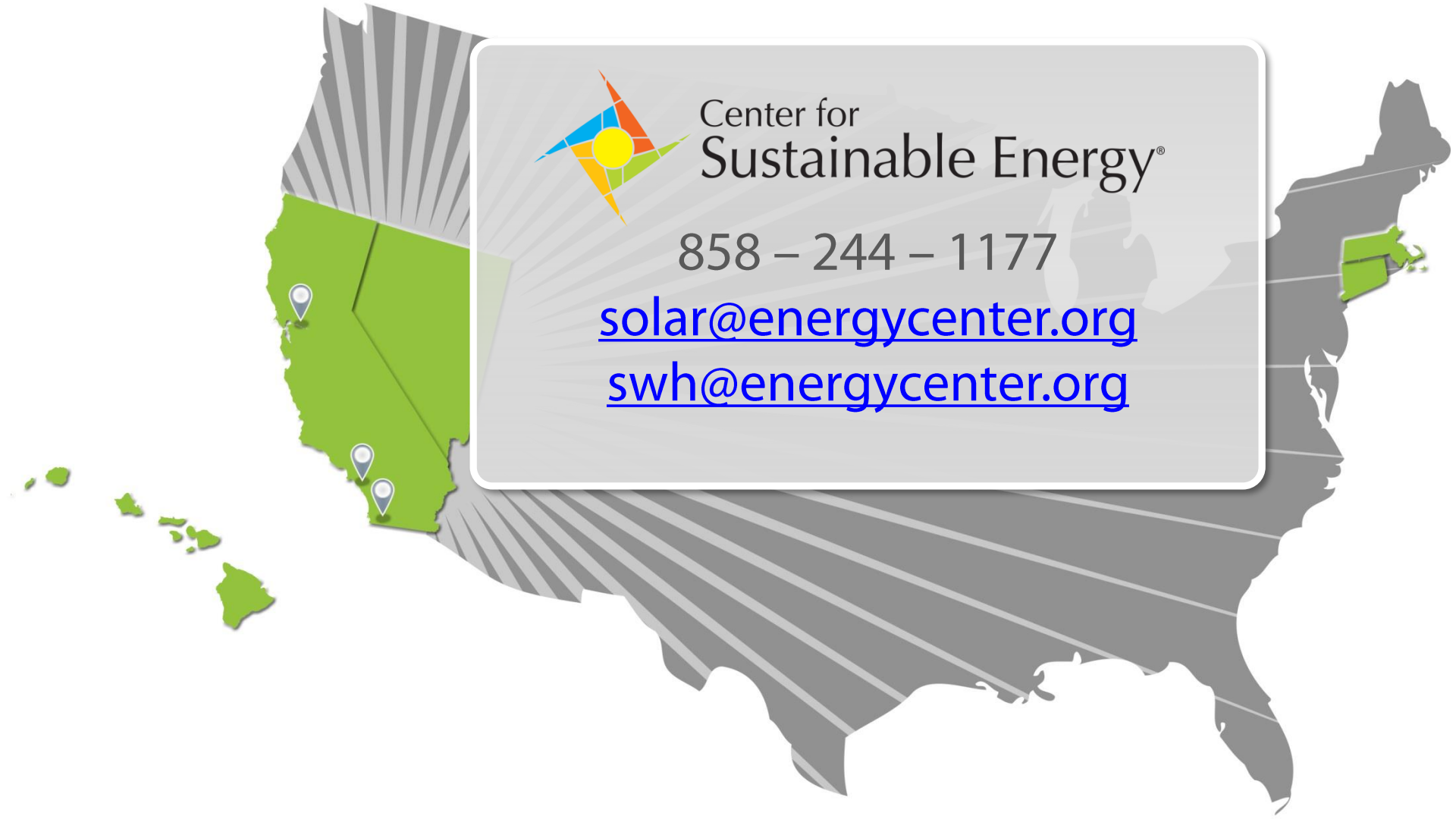

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Online Resources

- www.energycenter.org – CSE Website
- www.cslb.ca.gov – Contractor State License Board
- www.bbb.org – Better Business Bureau
- www.yelp.com - Customer Reviews
- www.californiadgstats.ca.gov – Statewide DG Data
- www.sdgehomeupgrade.com – SDG&E Home Upgrade
- www.energycenter.org/solarwater – Solar Water Heating Program

Follow up – Question/Answer

Question: What happens in the event of a power outage? Will I have power from my solar PV system?

Answer: With a solar **PV-only system**, when the grid goes down, your PV system will be shut off. This is to prevent your system from sending power back to the grid, and potentially injuring linemen that may be repairing electrical lines.

With a **battery storage system**, installation will include a "critical load panel" that designates all loads to be served by your battery in the case of an outage. The critical load panel will not necessarily power your entire home, rather, only loads included on the designated subpanel.

With a **solar PV + battery storage system**, your solar PV system will be isolated from the grid, but will be able to send power to your home via the critical load panel and/or charge your battery, assuming the battery is not already fully charged.

So why not set up a critical load panel with a solar PV-only system, so your PV can provide power during an outage? The answer is that your inverter that changes DC current from your panels to AC current requires its own external AC power supply to operate. The power supply would be supplied by the battery during an outage, but cannot be supplied directly by your panels.

Pairing energy storage with solar PV is an emerging field. If you're interested in this capability, we recommend you discuss your options with solar contractors when getting quotes. If you have any questions, feel free to reach out to us.

Follow up – Question/Answer

Question: Are there any resources available for homeowners who would like to self-install their solar panels?

Answer: Grid Alternatives has resources for self-installers. You can visit their website here: https://gridalternatives.org/sandiego. If you are looking for discounted panels + equipment, I suggest you google “wholesale solar panels”. There are many stores (like Costco) that will sell PV panels + the rest of the equipment close to wholesale prices.

Follow up- Question/Answer

Question: Are there any best practices/tips available on what homeowners should be doing to maintain their panels?

Answer: Energy Sage has some information on what homeowners should be doing to maintain their panels. You can learn more here: https://www.energysage.com/solar/101/solar-panel-maintenance/. We recommend hiring a contractor to perform maintenance on the panels and do not recommend attempting to go on the roof and clean the panels yourself.