

Solar Energy in the Sunshine State

Lee Hayes Byron
Sarasota County Sustainability



Outline

- Efficiency First!
- Benefits & Barriers
- What Sarasota County is doing
- Types of Solar and How it Works
 - Pool
 - Hot Water
 - Photovoltaic
- Return on Investment
- Incentives, Financing and Other Models
- Policies affecting solar adoption



ENERGYupgrade

Know More. Do More. Save More.

Thank you!

These organizations provided significant help with this presentation

- Florida Solar Energy Center
- Brilliant Harvest & Region Solar
- UF/IFAS Extension- Program for Resource Efficient Communities



FLORIDA SOLAR ENERGY CENTER®
Creating Energy Independence

INDUSTRY



What Made You Interested in this Class?



Efficiency First!

- **Don't waste your solar \$s on wasted energy**
- **Reduce use as much as possible, then consider solar**



Making Change Community-Wide: Energy Upgrade Campaign



Host an Energy Upgrade Workshop: 45 minute workshops available to neighborhood, faith, civic groups around the county. Step by Step Energy & Water Saving Tips.

→ **Free DIY Energy Saving Kit for All Attendees**

Since Sept. 2012:

- >50 workshops
- >1300 households
- >\$218,000 in annual energy savings just from kit items



ENERGYupgrade

Know More. Do More. Save More.

Benefits of Solar

- Energy independence
- Environmental
- Fuel (sunlight) is free
- Lock in prices
- Opportunity for distributed power generation
- Increase property values
- No noise or pollution is created from operating PV systems
- In general, require minimal maintenance and have long service lifetimes



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Know More. Do More. Save More.

Barriers to Solar

- High up front cost of PV modules and equipment
- Low cost of energy in FL
- Economic value realized over many years
- Surface area requirements
- Shading/ trees
- Interim production/ storage



ENERGYupgrade

Know More. Do More. Save More.

County Operations: Renewable Energy

Solar Hot Water

- Twin Lakes Park
- Fire Stations: 1, 3, 10, 12, 14, 15, 16, 17, 21, 22, 23 & 26.
- Ed Smith Stadium
- Emergency Operations Center



To conserve energy,
locker room water
is heated by on-site
solar energy



County Operations: Renewable Energy

Solar Photovoltaic Systems

- Operations Center
 - 57.12 KW System
 - Annual Savings est. \$7,362
 - 86,194 kWh (5.5% of use)
- Twin Lakes Extension
 - 22 KW System
 - Annual Savings est. \$4,800



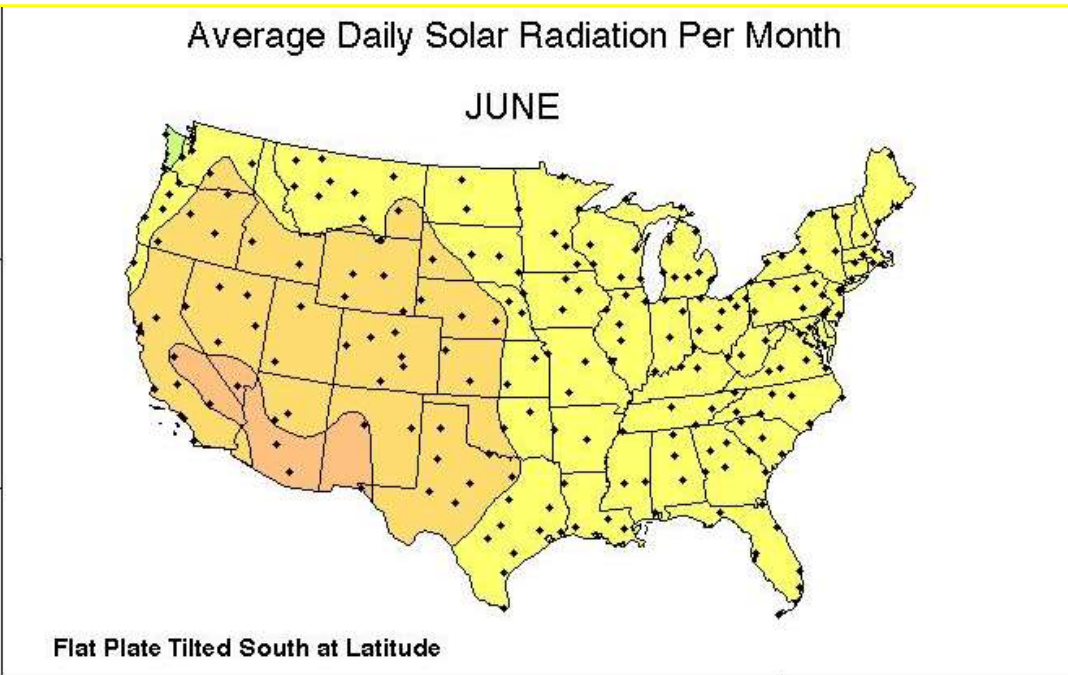
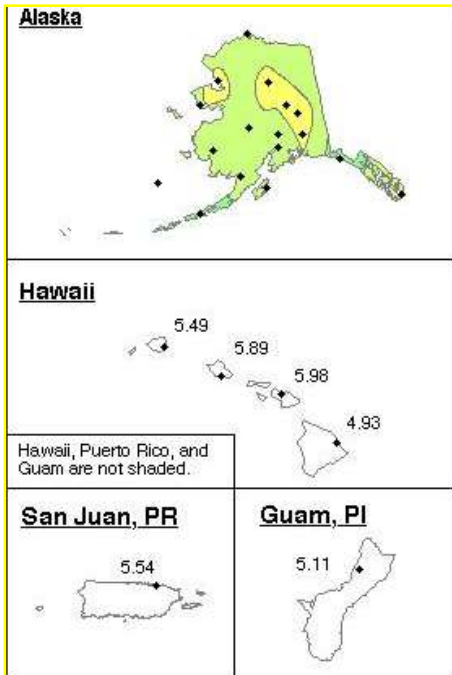
Solar Photovoltaic Systems

- Rothenbach Park
 - 250 KW System
 - Largest in FL at the time
 - Greening the Grid
 - Partnership with FPL



U.S. Solar Radiation Data

June - South-Facing, Latitude Tilt



Collector Orientation


Flat-plate collector facing south at fixed tilt equal to the latitude of the site: Capturing the maximum amount of solar radiation throughout the year can be achieved using a tilt angle approximately equal to the site's latitude.

This map shows the general trends in the amount of solar radiation received in the United States and its territories. It is a spatial interpolation of solar radiation values derived from the 1961-1990 National Solar Radiation Data Base (NSRDB). The dots on the map represent the 239 sites of the NSRDB.

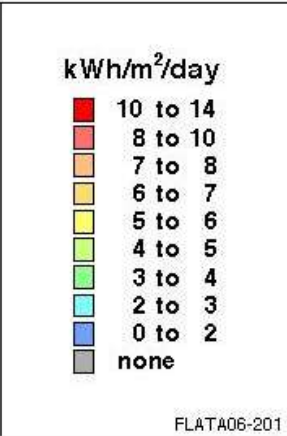
Maps of average values are produced by averaging all 30 years of data for each site. Maps of maximum and minimum values are composites of specific months and years for which each site achieved its maximum or minimum amounts of solar radiation.

Though useful for identifying general trends, this map should be used with caution for site-specific resource evaluations because variations in solar radiation not reflected in the maps can exist, introducing uncertainty into resource estimates.

Maps are not drawn to scale.

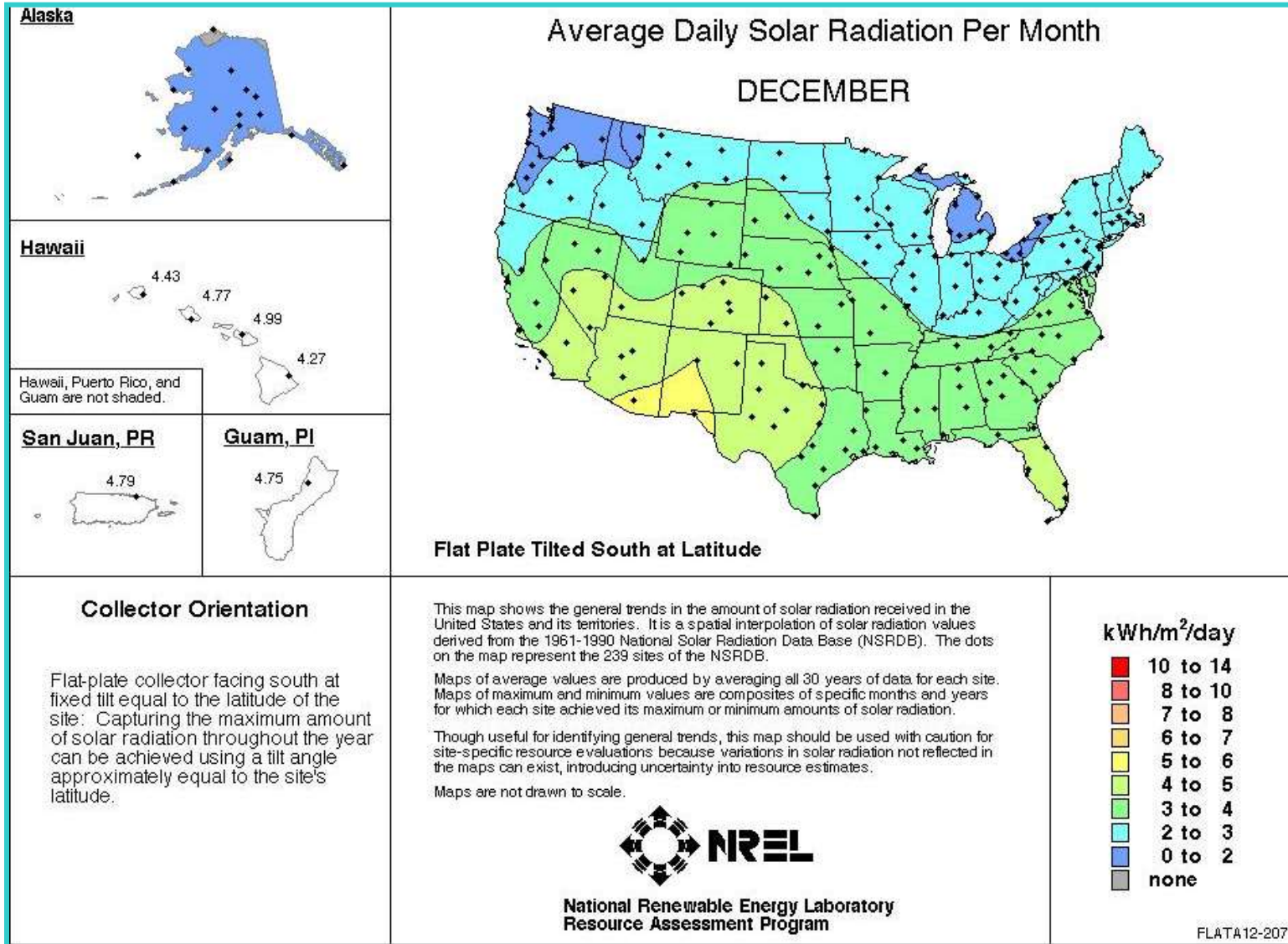


NREL
National Renewable Energy Laboratory
Resource Assessment Program



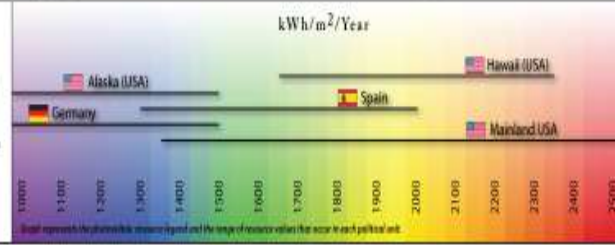
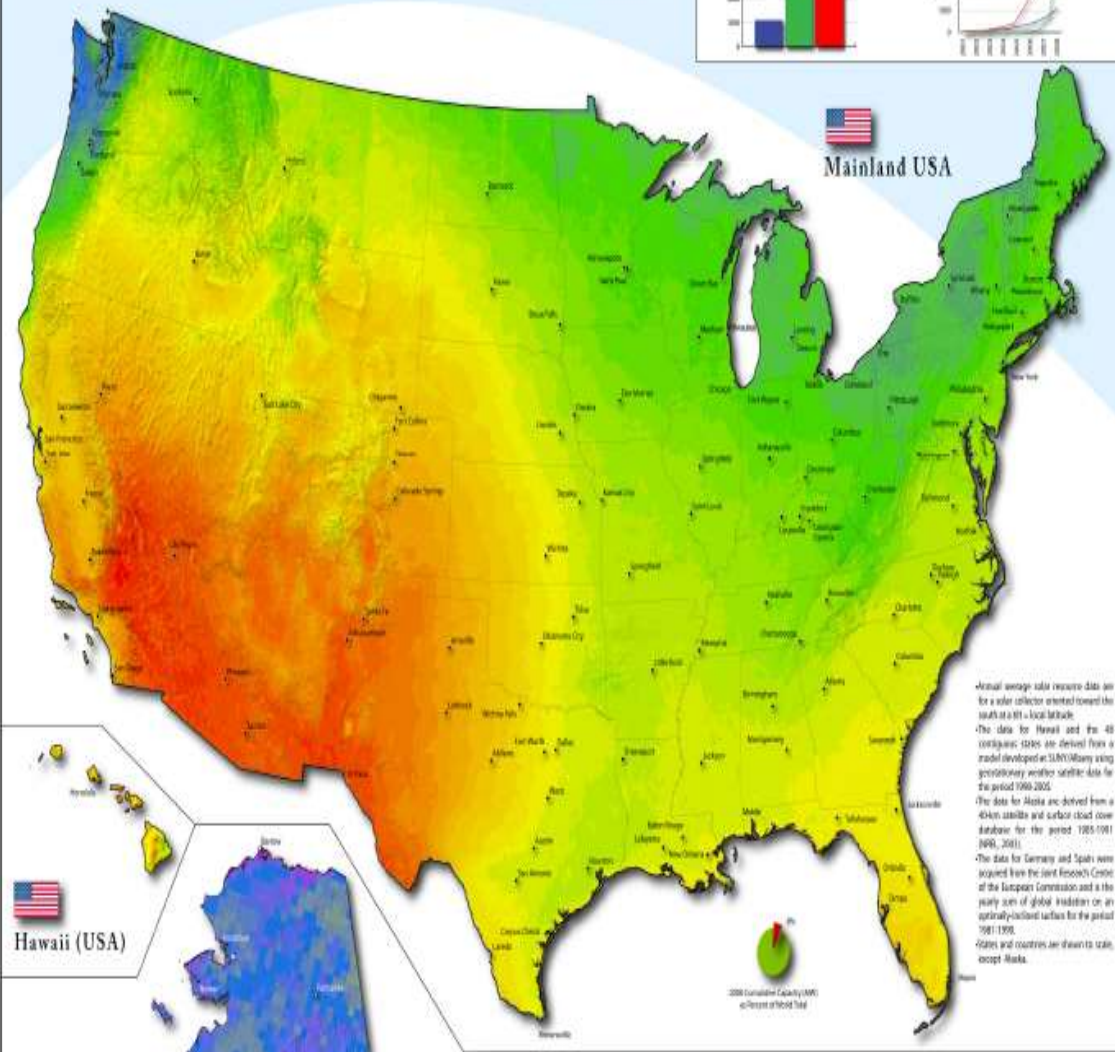
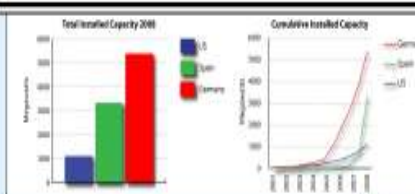
U.S. Solar Radiation Data

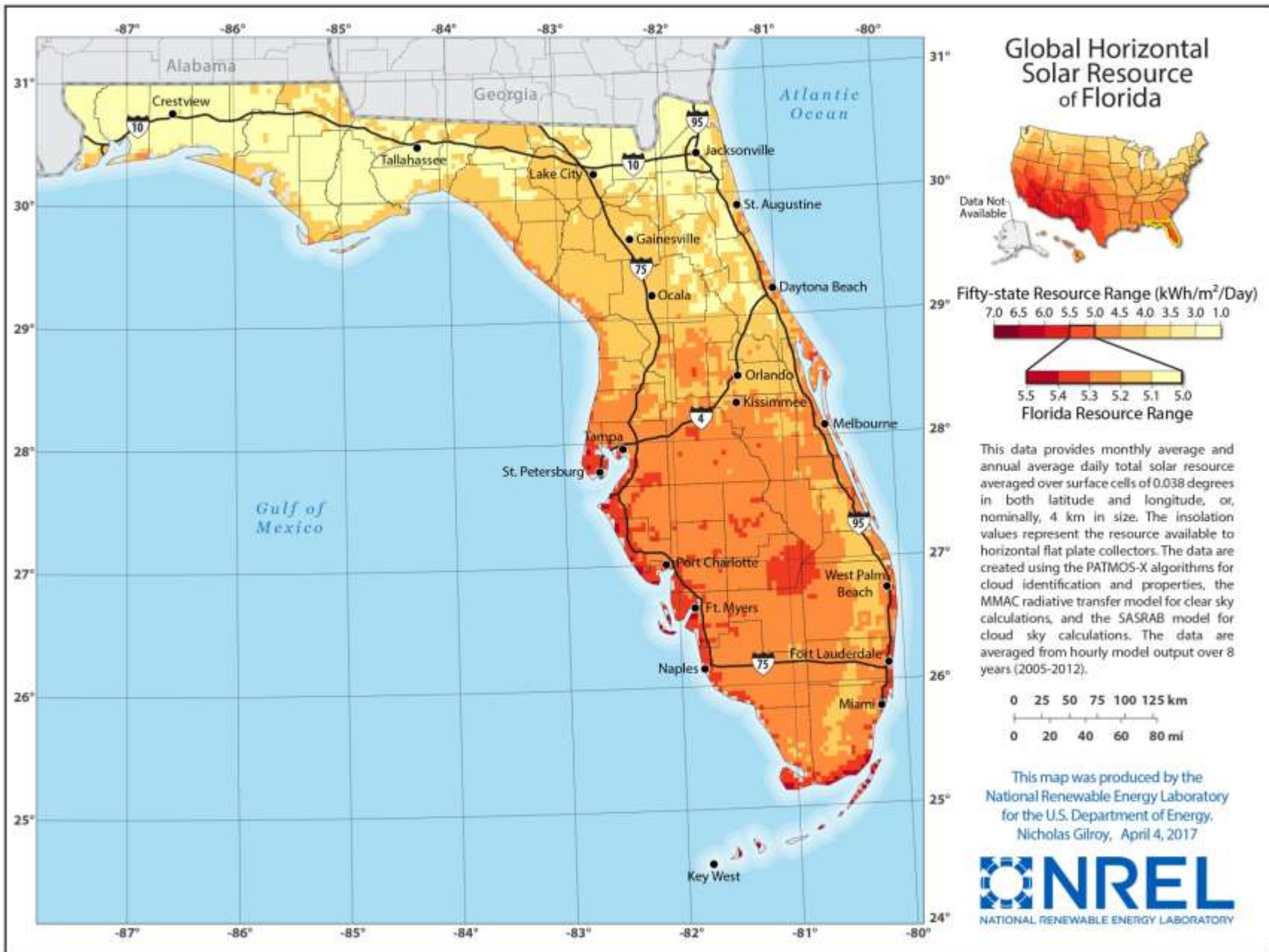
December - South-Facing, Latitude



Photovoltaic Solar Resource

The United States of America, Spain and Germany





Global Horizontal Solar Resource of Florida



Fifty-state Resource Range (kWh/m²/Day)

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 1.0



Florida Resource Range

5.5 5.4 5.3 5.2 5.1 5.0

This data provides monthly average and annual average daily total solar resource averaged over surface cells of 0.038 degrees in both latitude and longitude, or, nominally, 4 km in size. The insolation values represent the resource available to horizontal flat plate collectors. The data are created using the PATMOS-X algorithms for cloud identification and properties, the MMAC radiative transfer model for clear sky calculations, and the SASRAB model for cloud sky calculations. The data are averaged from hourly model output over 8 years (2005-2012).

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy. Nicholas Gilroy, April 4, 2017

NREL
 NATIONAL RENEWABLE ENERGY LABORATORY

Incentives

<http://www.dsireusa.org/>

The screenshot shows the DSIRE website interface. At the top, there is a navigation menu with links for Home, Programs, Resources, Help/Support, About Us, Contact Us, and Legal Notice. Below the menu is a red search bar with the text "Find Policies & Incentives Near You" and a "Search" button. A "Zip Code" input field is also present. The main content area features a map of the United States titled "Find Policies & Incentives by State". The state of Florida is highlighted in yellow, and a tooltip box over it displays "Florida" and "Policies & Incentives: 69". At the bottom of the page, there are buttons for "US Territories" and "Federal".

Incentives


<http://www.dsireusa.org/>

DSIRE[®]



[Home](#) [Programs](#) [Resources](#) [Help/Support](#) [About Us](#) [Contact Us](#)



 Programs

[Overview](#) [Summary Maps](#) [Summary Tables](#) [News](#)

Programs

We've found 23 programs that match your filters

Filter Options

State/Territory: Florida ×

Technology Category: Solar Technologies ×

Zip Code: 34239 ×

- A large market in Florida
- Plastic panels attached to roof
- Retrofit to existing pool piping/pump
- Only an energy savings if replacing a heater, otherwise just for comfort
- Replacing heater= Excellent economics

Solar Pool Heating

Fossil fuel replaced	Solar savings	System cost of \$2500	System cost of \$3000
Natural gas @\$1.39/therm	\$1612	1.6 years	2.2 years
Propane & LPG @\$1.75/kWh	\$2223	1.1 years	1.6 years
Electricity @\$0.089/kWh	\$2270	1.1 years	2.9 years
Fuel oil @\$1.50/gal	\$1243	2.0 years	2.8 years

Solar Pool Heating



Solar Pool Heating



Solar Pool Heating



Solar Pool Heating




FSEC Pool Collector Ratings

Pool certification (Q-Z) - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.fsec.ucf.edu/solar/testcert/collectr/tpoolqz

Mail AIM Home Radio My Netscape Search Bookmarks MyUCF Portal Front Porch Google



Pool Certification (Q-Z)

| [Education & Training](#) | [Environment](#) | [Homes & Buildings](#) | [Photovoltaics](#) | [Solar Energy](#) |
[Solar Energy](#) > [Testing & Certification](#) > [Pool Collector](#) > [Ratings Q-Z](#)

Certified Pool Collectors (Q-Z)

Manufacturer	Model	FSEC #	Glazing		Absorber		Gross Area Sq Ft	Thermal Performance	
			No	Type	Material	Coating		Btu/Day	Btu/Sq Ft
Sealed Air Corporation	FP-32	95019C	0	None	UV stabilized plastic polymer	None	31.04	29400	948
Sealed Air Corporation	FP-40	95020C	0	None	UV stabilized plastic polymer	None	38.82	36800	948
Sealed Air Corporation	FP-48	94009	0	None	UV stabilized plastic polymer	None	46.92	44500	948
Sealed Air Corporation	FS-32	95021C	0	None	UV stabilized plastic polymer	None	31.44	29700	943
Sealed Air Corporation	FS-40	95022C	0	None	UV stabilized plastic polymer	None	39.32	37100	943

FSEC Web site information



The screenshot shows a Netscape browser window titled "Solar pool heating - Netscape". The address bar contains the URL "http://www.fsec.ucf.edu/solar/apps/poolhtg/poolhtg.htm". The browser's menu bar includes File, Edit, View, Go, Bookmarks, Tools, Window, and Help. The toolbar features navigation buttons (back, forward, home, stop), a search box, and various utility icons. The website content is displayed below the browser interface.



Solar Pool Heating

| [Education & Training](#) | [Environment](#) | [Homes & Buildings](#) | [Photovoltaics](#) | [Solar Energy](#) |

Applications

- [Water heating](#)
- Pool Heating**
 - [Pool Heating Q&A](#)
 - [Collector Sizing and Economics](#)
 - [Approved Systems](#)
 - [Performance Rating \(Pool\)](#)
 - [Industry Directory](#)
 - [Solar Tax Exemption](#)
- Commercial**


[Solar Heating of Swimming Pools: A Question & Answer Primer](#)
This document helps answer the most frequently asked questions concerning solar pool heating in Florida.


[Solar Swimming Pool Heating in Florida: Collector Sizing and Economics](#)
This publication presents a simple method that can be used to determine the solar collector area needed to heat a pool.


[FSEC Approved Solar Energy Systems: Domestic Hot Water and Pool Heating](#)
This document provides a listing of solar water and pool heating systems that were evaluated and found to meet the minimum standards established by FSEC.

Solar Water Heating

- Uses a solar collector to heat water instead of electricity
- Uses a water heater tank to store the heated water and provide back-up
- Not a new technology
 - Has been used for decades throughout Florida and the United States

Solar Water Heating

Climax Solar-Water Heater

UTILIZING ONE OF NATURE'S GENEROUS FORCES

THE SUN'S HEAT { Stored up in Hot Water for Baths,
Domestic and other Purposes.

**Price Of No. 1 Heater for
1892 Reduced to \$15.00 Net**



GIVES HOT WATER at all HOURS
OF THE DAY AND NIGHT.

NO DELAY.

FLOWS INSTANTLY.

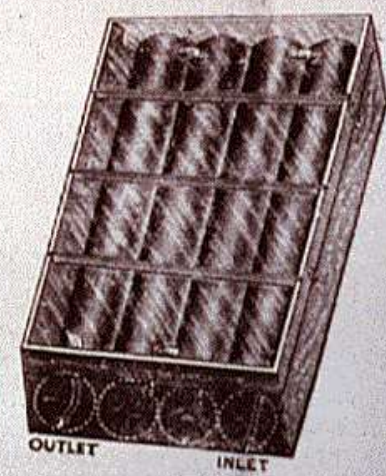
NO CARE. NO WORRY.

ALWAYS CHARGED.
ALWAYS READY.

THE WATER AT TIMES
ALMOST BOILS.

Price, No. 1, \$25.00

This Size will Supply sufficient
for 3 to 8 Baths.



CLARENCE M. KEMP, BALTIMORE, MD.

Solar Water Heating



1930s

Solar Water Heating

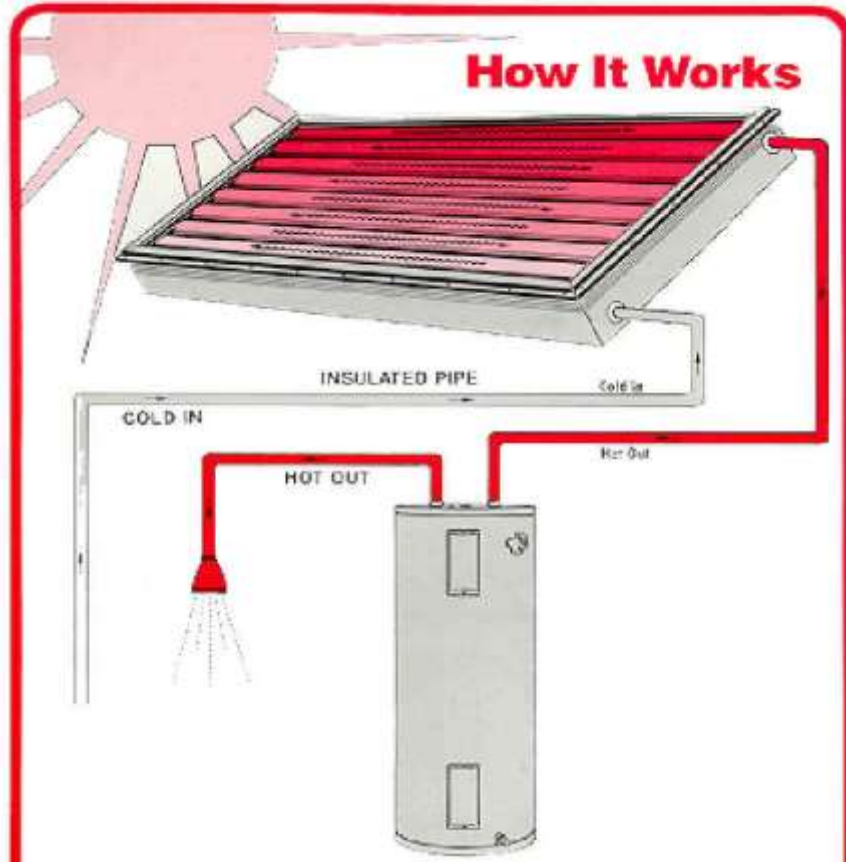


21st Century

Solar Water Heating



Solar Water Heating



Solar Water Heating

- Hot Water: 15% – 20% of total household energy consumption
- Size tank with FSEC table
- All have a conventional energy back-up
 - No consumer action is required to activate the back-up
 - Needed for periods of excessive hot water use or inadequate solar resource

Persons	Gallons used	Solar tank size
1	20	20
2	40	40
3	55	52
4	70	80
5	85	80
6	100	100
7	115	120

Solar Water Heating

Incentives

- Federal tax credit-
30% of cost
(Reduces in 2020;
ENERGY STAR
SWHs qualify)
- Exempt from Sales
and Use Tax

FPL Rebate- No longer available



The advertisement features a photograph of two solar water heating panels installed on a red-tiled roof. To the right of the image, the text reads "Residential Solar Water Heating". Below the image, a red message states: "Applications are no longer being accepted. All reservations have been issued." At the bottom, there is a blue play button icon followed by the text "Learn More".

- Florida
 - FSEC Simplified Residential Solar Hot Water System Calculator
- Will provide you with savings and other information

www.fsec.ucf.edu/en/consumer/solar_hot_water/homes/calculator/index.htm

[Home](#) > [Consumer](#) > [Solar Hot Water](#) > [For Homes](#) > [Simplified Residential Solar Hot Water System Calculator](#)

Simplified Residential Solar Hot Water System Calculator

This calculator provides consumer information on the energy, cost and environmental savings potential of residential solar hot water systems in Florida. The calculations and assumptions were modeled on the solar system calculator tool ([SHW-calculator_simplified.xls](#), 204k) available for Microsoft Excel and developed by FSEC's Deputy Director, Philip Fairrey.

To use this calculator, answer the two questions under the heading "Basics Solar System Information" using the pull-down menus provided. For the input "Florida Climate Zone," if your home is north of Volusia County, select "North" and if your home is south of St. Lucie County, select "South." Otherwise, select "Central."

The calculator depends on a number of pre-selected assumptions. To view and change these assumptions, select the checkbox below and the additional input fields will appear. If you choose to not change these assumptions, simply uncheck the box below anytime.



Basic Solar System Information

Of People Living In Home: Florida Climate Zone:

I'd like to refine the assumptions used by this calculator.

Solar Savings Results

Annual Energy Cost Savings:	<input type="text" value="\$262"/> \$/year	Annual CO2 Savings:	<input type="text" value="3215"/> lb/year
Annual Solar Energy Savings:	<input type="text" value="2373"/> kWh/year	Annual Solar Fraction:	<input type="text" value="75"/> %

Economic Results

Internal Rate of Return:	<input type="text" value="13.3"/> % per annum	Simple Payback Period:	<input type="text" value="9"/> years
Cost of Solar Energy:	<input type="text" value="6.2"/> cents/kWh	Net Present Value:	<input type="text" value="83546"/> present \$'s

[Privacy Policy](#) | [Terms and Conditions](#) | [Legal Notice](#)

© 2007 Florida Solar Energy Center (FSEC), a research institute of the University of Central Florida. For more information about FSEC, please contact us at info@fsec.ucf.edu.

System savings- w/ tax credit

At an ave. rate of \$.10 per kWh, a \$4,000 SHW system in a household with 4 people in our region will save:

- \$234/year
- 3,235 lbs CO2/ year
- Simple Payback- 11 Years (with tax credit of \$1,200; \$2,800 net system cost)

Solar Savings Results

Annual Energy Cost Savings: \$/year

Annual CO2 Savings: lb/year

Annual Solar Energy Savings: kWh/year

Annual Solar Fraction: %

Economic Results

Internal Rate of Return: per annum

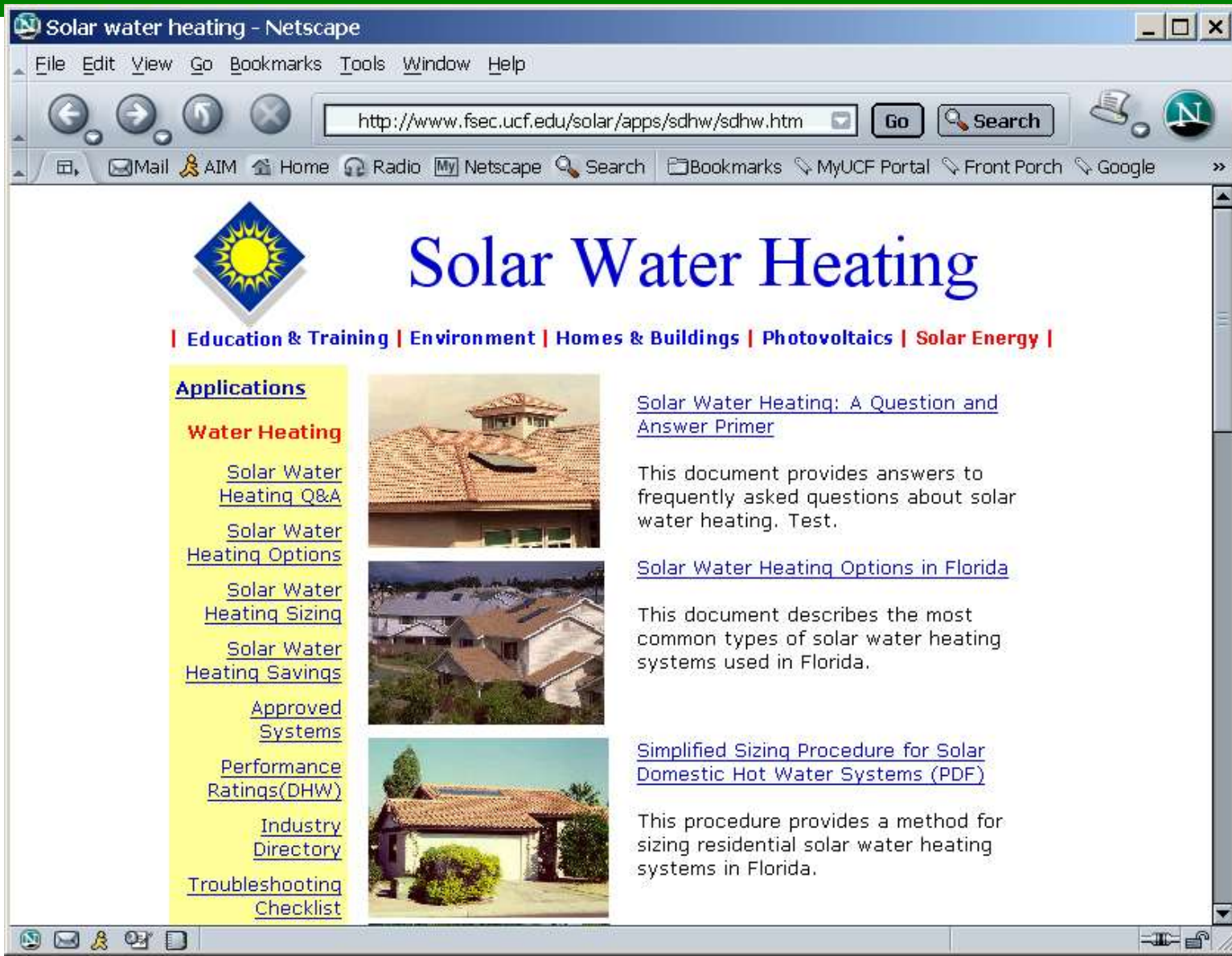
Simple Payback Period: years

Cost of Solar Energy: cents/kWh

Net Present Value: present \$'s

FSEC Web site information


Sarasota County
scgov.net | 941.861.5000 | TV




The screenshot shows a Netscape browser window titled "Solar water heating - Netscape". The address bar contains the URL "http://www.fsec.ucf.edu/solar/apps/sdhw/sdhw.htm". The browser's menu bar includes File, Edit, View, Go, Bookmarks, Tools, Window, and Help. The toolbar features navigation buttons (back, forward, home, stop), a search box, and various utility icons. The website content includes a logo of a sun in a diamond, a main heading "Solar Water Heating", and a navigation menu with links to Education & Training, Environment, Homes & Buildings, Photovoltaics, and Solar Energy. A sidebar on the left lists "Applications" such as Water Heating, Solar Water Heating Q&A, Solar Water Heating Options, Solar Water Heating Sizing, Solar Water Heating Savings, Approved Systems, Performance Ratings(DHW), Industry Directory, and Troubleshooting Checklist. The main content area features three articles, each with a photograph of a house with solar panels and a brief description.

Solar Water Heating

| [Education & Training](#) | [Environment](#) | [Homes & Buildings](#) | [Photovoltaics](#) | [Solar Energy](#) |

Applications

- [Water Heating](#)
 - [Solar Water Heating Q&A](#)
 - [Solar Water Heating Options](#)
 - [Solar Water Heating Sizing](#)
 - [Solar Water Heating Savings](#)
 - [Approved Systems](#)
 - [Performance Ratings\(DHW\)](#)
 - [Industry Directory](#)
 - [Troubleshooting Checklist](#)


[Solar Water Heating: A Question and Answer Primer](#)
This document provides answers to frequently asked questions about solar water heating. Test.


[Solar Water Heating Options in Florida](#)
This document describes the most common types of solar water heating systems used in Florida.


[Simplified Sizing Procedure for Solar Domestic Hot Water Systems \(PDF\)](#)
This procedure provides a method for sizing residential solar water heating systems in Florida.

Questions about:

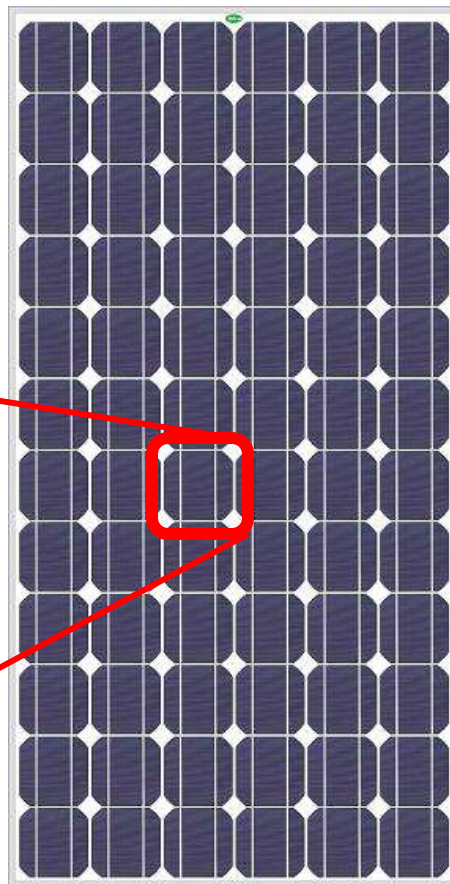
- Types of Solar and How it Works
 - Pool
 - Hot Water



- A third solar technology
- Photovoltaic modules generate electricity from the sun
- The photovoltaic system can be
 - Stand-alone
 - Utility interactive

the cell

is a basic building block of the module



composed of
semi-conductor
material =
conductor *and*
insulator properties

PV Applications

Small Scale:

1. Solar indoor lights (desk and floor lamps)
2. Outdoor landscape lights
3. Solar chargers for electronics (cell phone, laptop)
4. Solar signs



PV Applications

Water Pumping



Lighting



Residential Photovoltaic

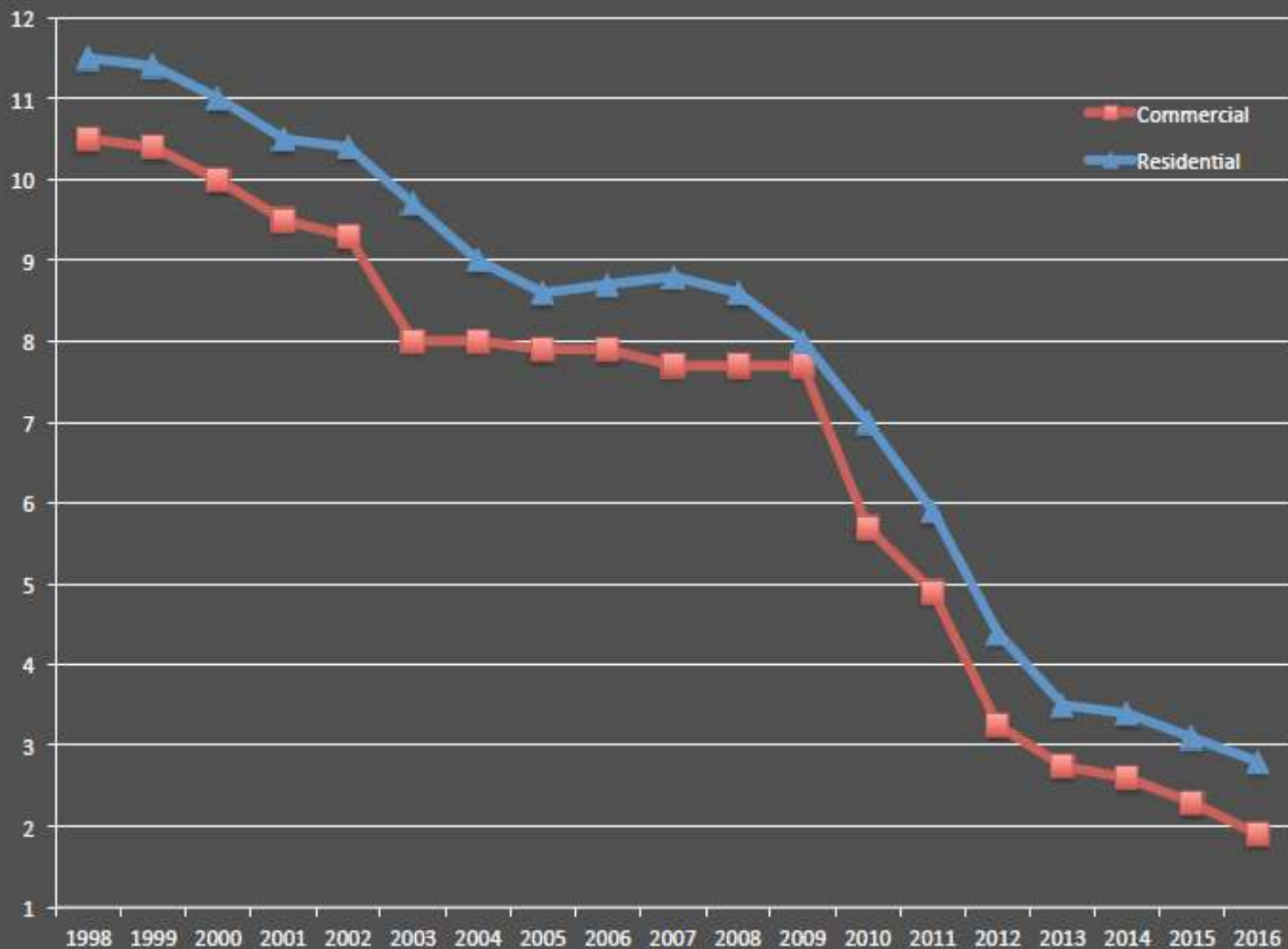




Beautiful
Solar!!

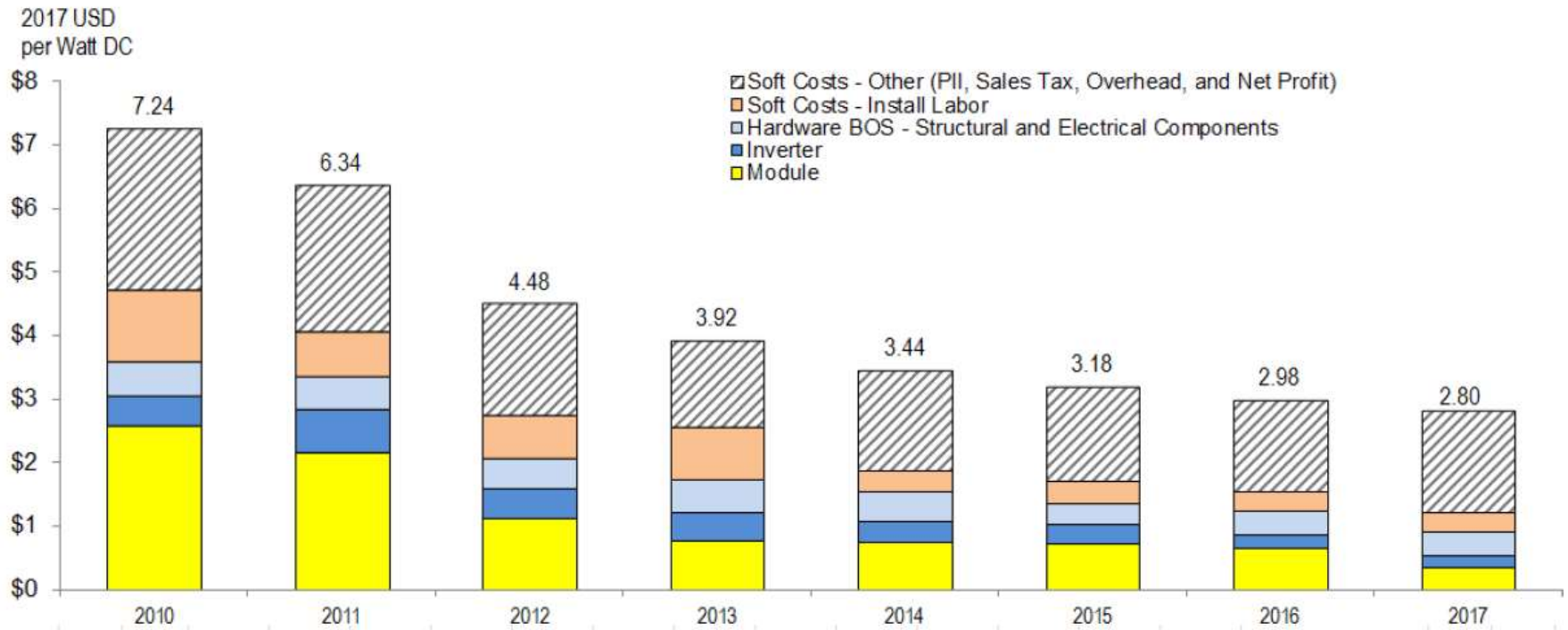


Distributed Solar Photovoltaics Installed Price History



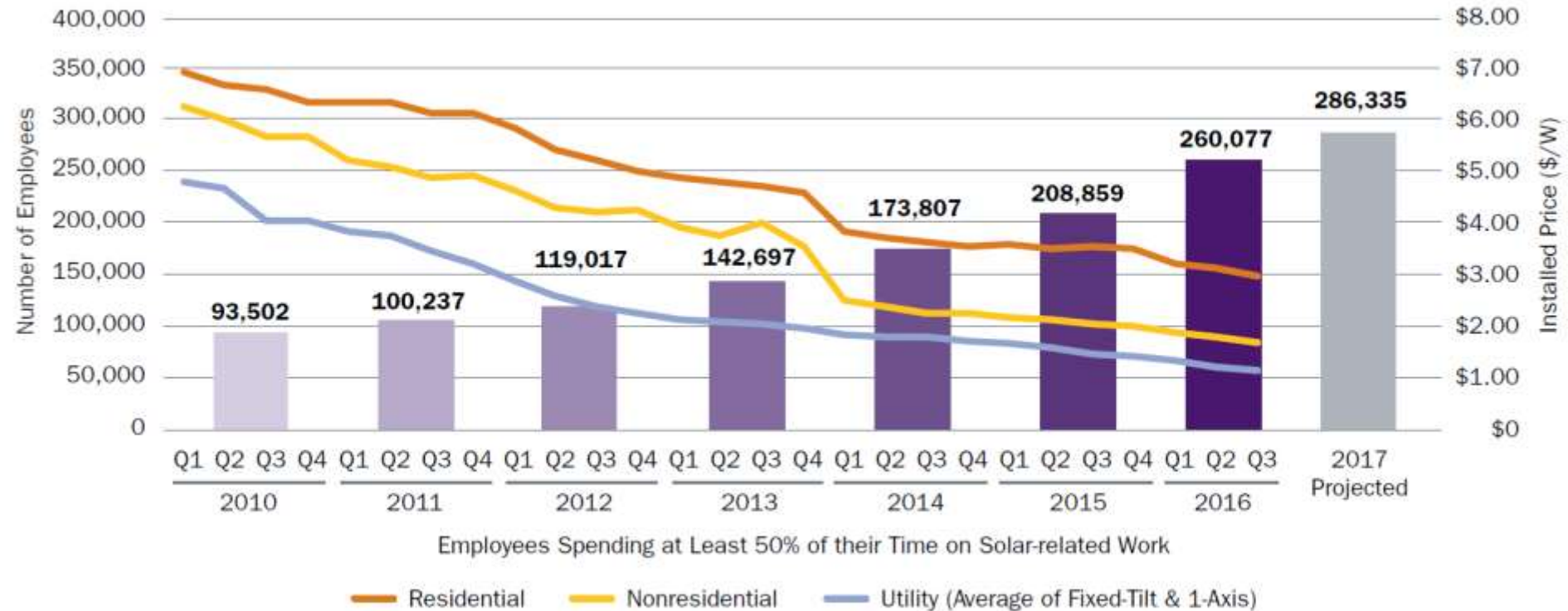
Source: NREL SUNSHOT 2012: Photovoltaic (PV) Pricing Trends

Residential PV: Capital Cost Benchmark Historical Trends



Solar as an Economic Engine

Installed Solar PV Costs by Segment Compared to Solar Employment Growth, 2010–2016²⁰



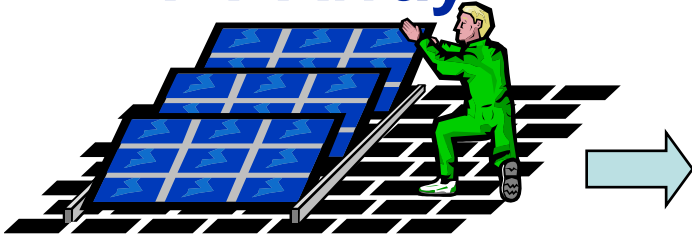
SOURCE OF COST DATA: GTM RESEARCH, A WOOD MACKENZIE BUSINESS/SEIA U.S. SOLAR MARKET INSIGHT*

FL Solar Jobs: 8,260 in 2016
 National Solar Jobs: 260,077 (2x coal jobs)

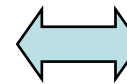
Utility Interactive System

Inverter

PV Array



Service Panel



Distribution System



Loads in Home

Inverter

- Converts direct current (DC) generated by PV into alternating current (AC) for use in homes.
- Either:
 - String Inverter: one inverter converts the electricity generated by all of the modules;
 - Micro-inverters attached to each individual module, allowing independent operation of each panel. Beneficial with different roof orientations or shading.
- 10-15 year Warranty;



PV Panels: 20-25 year warranty for 80% production

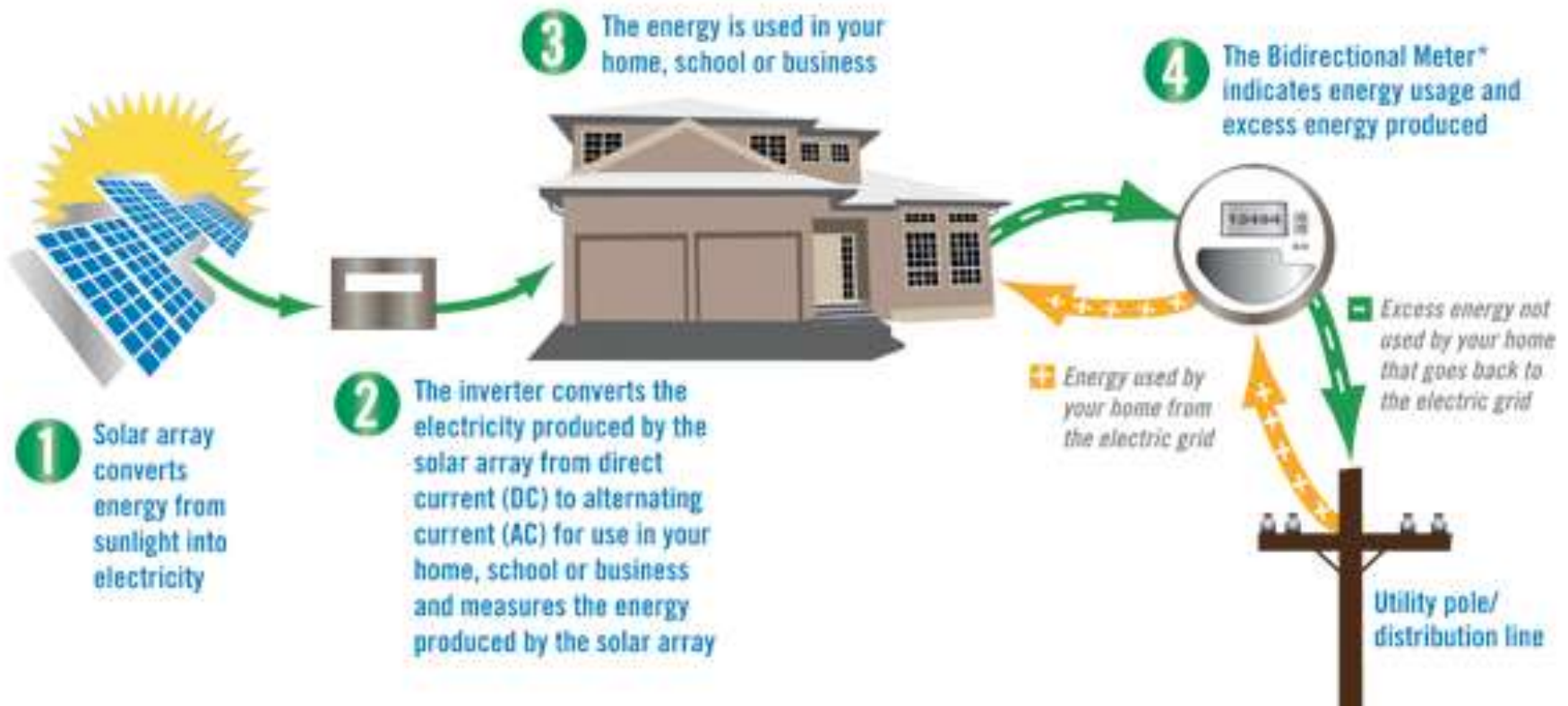
Net Metering

- Generation offsets the electric bill
 - $\text{Bill} = [\text{Amount electricity used}] - [\text{Amount electricity produced}]$
 - If produce > electricity than consumed on site, carries forward to next bill.
- After 12 months, utility pays credit at the “average annual cost of generation” (utility’s cost of producing at its own facilities)
- Lesson: → Don’t install more capacity than will be consumed onsite

Utility Interactive System

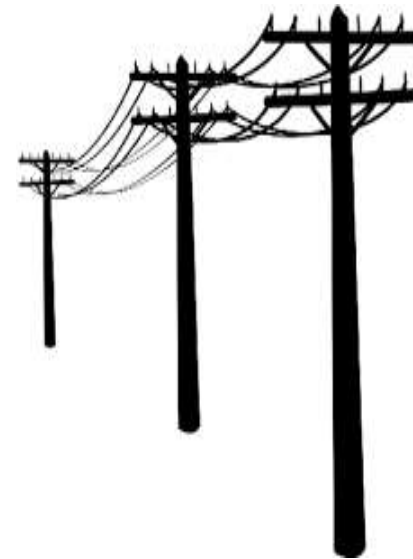


Understanding NET METERING Solar Photovoltaic Array Example



What if the Power Goes Out?

- When grid is down, solar shuts off
- Utility safety strategy
- Need batteries if want power during outages



source: www.pixgood.com

What if the Power Goes Out?

- **Interconnection agreement with FPL:** [Net Metering Guidelines website:](#)
 - “Renewable generator systems connected to the grid without batteries are not a standby power source during an FPL outage. The system must shut down when FPL's grid shuts down in order to prevent dangerous back feed on FPL's grid. This is required to protect FPL employees who may be working on the grid.”
- **Battery Back Up: “Days of autonomy”**
 - The Art of Sizing: What electric loads do you *need*? For how long? What is your budget?
 - Recent improvements in size, safety, and maintenance needs of batteries; Future price reductions expected

What if the Power Goes Out?

- Stand-Alone Inverter:
 - Up to 2,000 watts direct from solar system; One plug/ extension cord to charge phones, run mini-fridge, etc, but only while sunny; E.g. SMA's [Secure Power Supply](#)
 - SMA is a string inverter, though, so need same orientation/ shading
- Solar Generator: Quieter and safer than gas, but more expensive. Limited capacity.
 - \$2,000: 1,500 Watt AC Inverter, 135 Watt solar panel; recharges in 10 hours of sunlight;
 - Powers: phone, refrigerator, lights.
- Direct Solar Charging: Charge USB items while sunny; \$200: 20Watt panel



Incentives

- Federal tax credit- 30% of cost (Reduces in 2020; must pay enough taxes)
- Exempt from Sales & Use Tax
- Residential Property Assessment Exemption
- Tangible Personal Property Tax Exemption

FPL Rebate- No longer available



Residential PV

Standby List

Next to receive reservation:

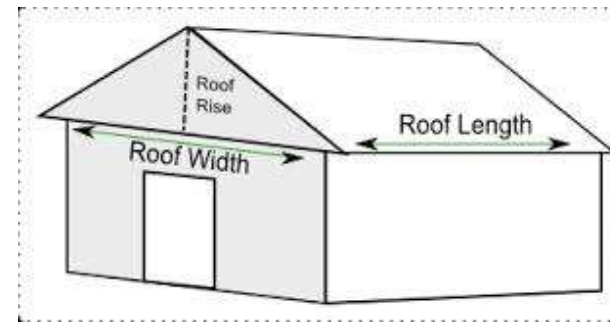
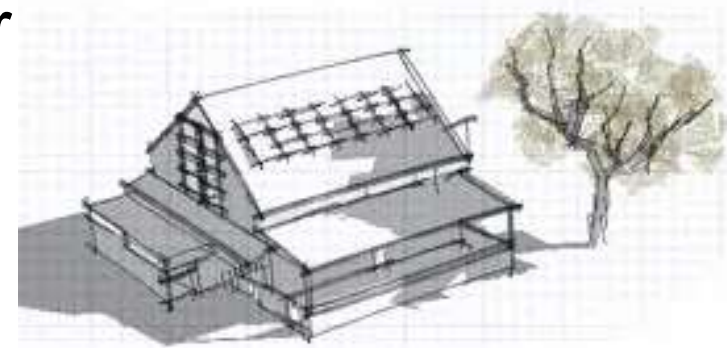
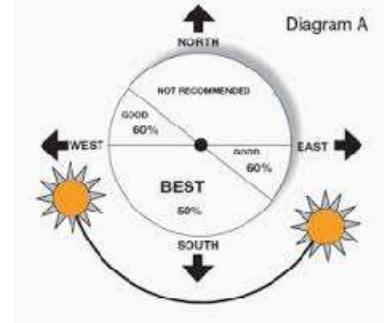
#016

Applications are no longer being accepted. All reservations have been issued.

[Learn More](#)

Site Considerations

- Roof Orientation
- Roof space & shape
- Shading
- Energy use on single meter
- Expect to stay in home



Online Tools- Project Sunroof

Google Project Sunroof

Enter an address

✓ Analysis complete. Your roof has:

- ☀️ 1,820 hours of usable sunlight per year
Based on day-to-day analysis of weather patterns
- 🏠 2,622 sq feet available for solar panels
Based on 3D modeling of your roof and nearby trees

\$300 savings
Estimated net savings for your roof over 20 years

[FINE-TUNE ESTIMATE](#) [SEE SOLAR PROVIDERS](#)

Wrong roof? Drag the marker to the right one.

Shade

©2016 Google - Map data ©2016 Google - Terms of

Fine-tune your information to find out how much you could save.

What's your average monthly electric bill? ⓘ

We use your bill to calculate how much electricity you use based on typical utility rates in your area.



Your recommended solar installation size ⓘ

This size will cover about 99% of your electricity usage. Solar installations are sized in kilowatts (kW).

14.75 kW
(1039 square feet)

SYSTEM INFO

Modify the inputs below to run the simulation.

DC System Size (kW):	<input type="text" value="5"/>	
Module Type:	Standard	
Array Type:	Fixed (roof mount)	
System Losses (%):	<input type="text" value="14"/>	
Tilt (deg):	<input type="text" value="20"/>	
Azimuth (deg):	<input type="text" value="180"/>	
+ Advanced Parameters		

INITIAL ECONOMICS

Modify the inputs below to provide an initial rough estimate of the cost of energy produced by the system. The system will produce the cost of energy produced by the system using this amount. Note that complex utility rates and third-party financing can significantly change these values

System Type:	Residential	
Average Cost of Electricity Purchased from Utility (\$/kWh):	<input type="text" value="0.10"/>	

RESULTS

Print Results

7,322 kWh per Year *

System output may range from 7,010 to 7,638kWh per year near this location.
Click [HERE](#) for more information.

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)	Energy Value (\$)
January	4.28	522	54
February	4.99	542	56
March	5.65	668	69
April	6.62	736	77
May	6.16	706	73
June	5.84	643	67
July	5.69	644	67
August	5.83	663	69
September	5.31	586	61
October	5.23	605	63
November	4.56	524	54
December	3.95	481	50
Annual	5.34	7,320	\$ 760



NREL's PVWatts® Calculator

Estimates the energy production and cost of energy of grid-connected photovoltaic (PV) energy systems throughout the world. It allows homeowners, small building owners, installers and manufacturers to easily develop estimates of the performance of potential PV installations.

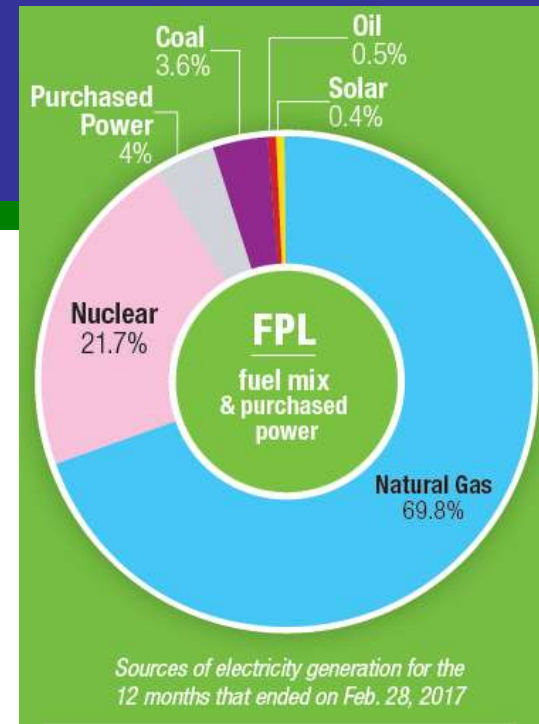
PV Watts: <http://pvwatts.nrel.gov/pvwatts.php>

Selecting Contractors

- Years of experience
 - # of local installations
 - Solar Contractors License:
www.myfloridalicense.com
 - NABSEP Solar PV or Heating Installer Certifications
 - Reputation & Reviews
 - Workers comp & Liability insurance
 - Equipment
- Get Multiple Quotes



State of Solar PV in Sarasota County



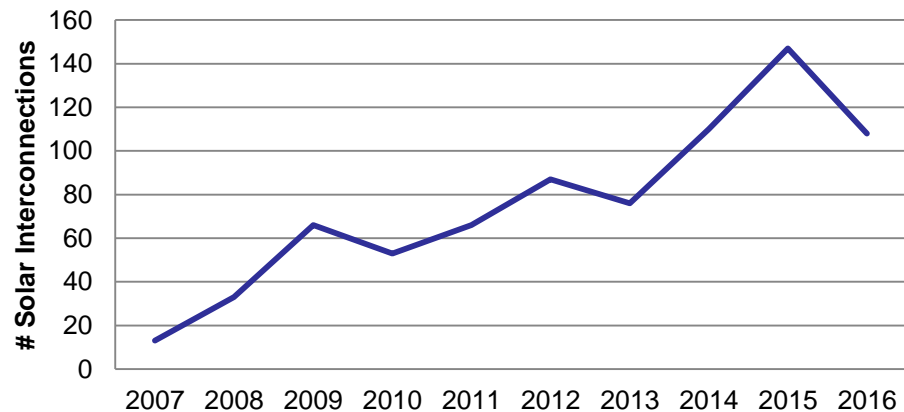
FPL Grid

- By 2018: 674 MW utility scale solar at 11 solar energy centers
- Solar was 0.4% of FPL's fuel source 2016-2017

Solar PV Interconnections

- FPL Territory: 5,694
- Sarasota Co: 791 (7.16 MW)
 - Ave size: 8.9 kW
 - 85% below 10kW
 - Largest # per capita (#2 total)
 - Ave. new each year: ~121

Number of Solar PV Installations By Year (2007-2016)





FLSUN
Florida Solar United Neighborhoods

In partnership with:



LEAGUE OF WOMEN VOTERS®
OF FLORIDA

WHO WE ARE LEARN ABOUT SOLAR GO SOLAR SOLAR POLICY NEWS

SARASOTA SOLAR CO-OP



CONNECT TO SOLAR SUPPORTERS

Join the Florida solar conversation

Sign up for the FL SUN email list and newsletter

Get involved

Sign up to be notified about volunteer opportunities with FL SUN



Sarasota Solar Co-op

Homeowners across Sarasota are forming a solar co-op! Co-op members will use their group buying power to get a discounted price for solar panels. If you've ever wanted to go solar and live in Sarasota, now is your chance! The co-op is sponsored by the [League of Women Voters Florida](#).

Solar Co-Op

- Deadline was May 1
- 196 people signed up; 71 signed contract
- Not scheduled here again yet

Local Case Study



Local Case Study- with FPL Rebate & tax credit

Calculation- 2014-2015

- 10 Kwh system total cost about \$37,000
- FPL Rebate (\$20,000)
- Federal tax credit (\$10,000)
- Net out of pocket homeowner cost \$7,000
- Savings per year about \$1800
- Payback period is about 3.8 years
- System life span = 25 years
- Therefore over 21 years of "free electricity" or about \$37,800 system lifetime savings on electricity costs (at current electricity rates)
- **\$17,800 savings without Rebate**

Impact of system/fun facts

- In 2 year, 8 months, system has generated about 45 mega-watt hours of electricity
- The CO₂ savings = planting about 810 trees
- Electricity produced so far:
 - 15 million AA batteries
 - Run a refrigerator for 27 years
- November 2014 & March/ April 2015, consumed < produced, so monthly FPL bills were \$9.80 (still have to pay fees, charges and taxes)

Local Case Study

Usage Comparison

Compare your energy usage using two different date or time ranges.

Print | Close

Comparison for Sep.2014 to Aug.2015 vs. Sep.2013 to Aug.2014

Month Day Hour



Avg. Temp

- Usage from Sep.2014 to Aug.2015
- Usage from Sep.2013 to Aug.2014
- Temperature from Sep.2014 to Aug.2015
- Temperature from Sep.2013 to Aug.2014

First Year

- Savings: \$1,800 in 1st year
- Reinvested in Energy Efficiency
 - Insulation: \$1900 → comfort & additional \$350/yr savings (5.5 yr payback)
 - New Washer/ Dryer → ~\$200-300/ yr savings
- Total: ~\$2,500 savings
- May 2016= best production month yet- 1.73 MWh

Your **Carbon Offset** for this month: 1.19 tons

You have offset the equivalent of: **30 Trees**



Local Case Study- Cash purchase with tax credit only



Quote -2017 (Tile Roof, premium system)

- 14 KW system \$30,800
- Federal tax credit (\$9,240)
- Net out of pocket homeowner cost \$21,560
- Savings per year about \$2,415
- Payback period is about 9 years
- System life span = 25 years
- Therefore about 16 years of "free electricity" or about \$38,000 system lifetime savings on electricity costs (at current electricity rates)
- FPL approved for 12% increase in electric rate by 2019
→ Shorter payback and increased savings

Local Case Study- Home Equity Financing



Quote -2017 (ave. system; shingle roof)

- 10 KW system \$22,000
- Federal tax credit (\$6,600)
- Net actual costs \$15,400
- Savings per year about \$1,725
- Finance initial value at 4.25% interest. 25 year term. No closing costs.
 - Pay down loan when receive tax credit
 - Annual loan payments between \$862-\$1,486 (always < savings)
 - Net savings after ten years ~\$12,000
 - Home Equity Loan: Equity and income restrictions apply

Local Case Study- Solar w. Tesla Powerwall Battery Backup

Quote -2017 (ave. system; shingle roof; batteries)

- 8 KW PV system w/ Powerwall 2.0 \$30,000
- Federal tax credit (\$9,000)
- Net actual costs \$21,000
- Savings per year about \$1,380
- Payback period is about 15 years
- Tesla Powerwall 2.0 Battery Backup:
 - 7kW peak, 5kW continuous;
 - Enough power to run: Refrigerator, Lights, Fans, TV, Internet
 - Add batteries to run Air Conditioning, whole house.
 - Replaces small backup generator;
 - No maintenance or fuel.
 - 10 Year Warranty



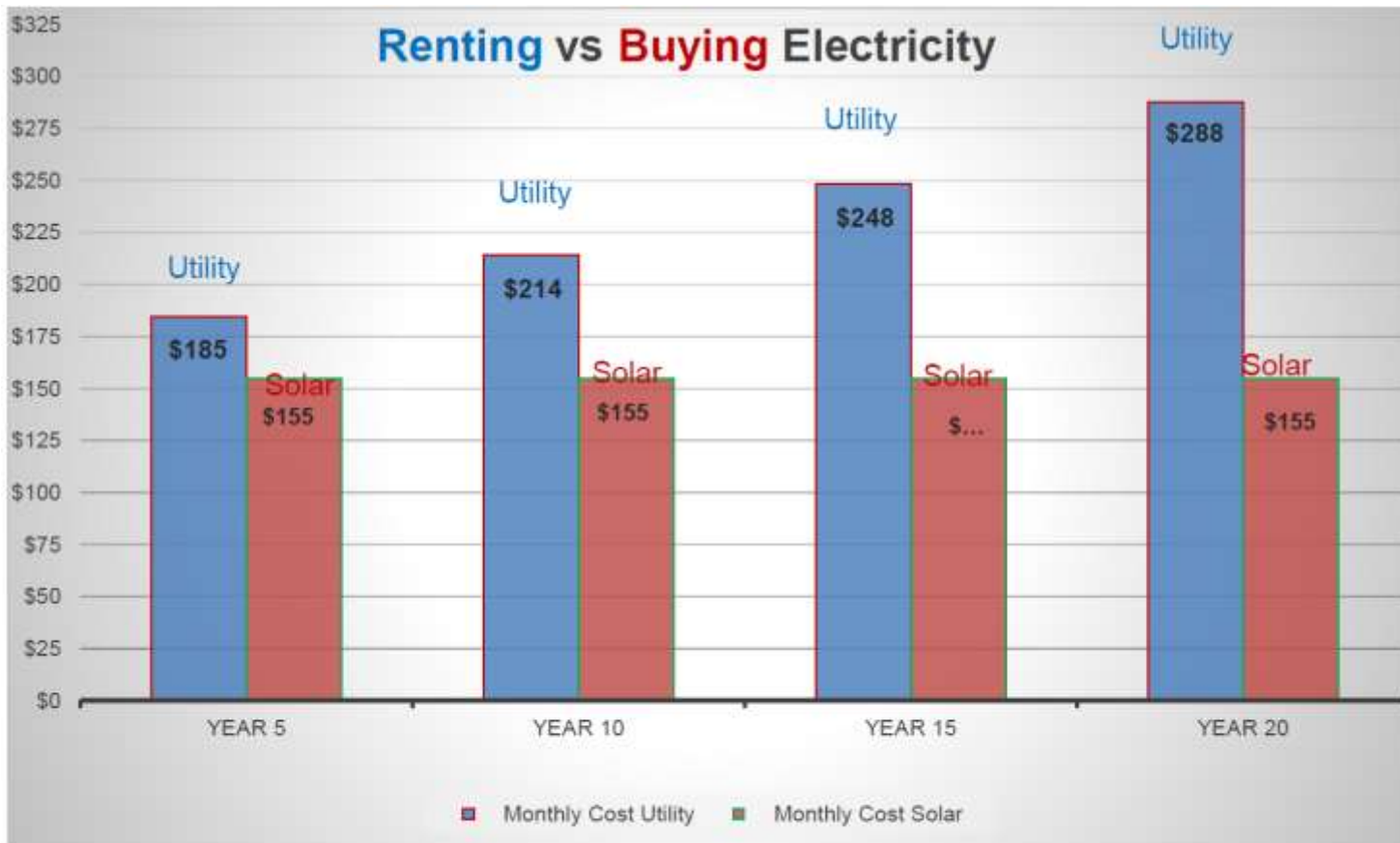
Local Case Study- Home Equity Financing



Quote -2016

- 10 KW system \$32,000
- Federal tax credit (\$9,600)
- Net actual costs \$22,400
- Savings per year about \$1,750
- Finance value of system minus tax credit and first year's savings (\$20,650) at 4.25% interest. 20 year term. No payments or interest for first 18 months.
 - Monthly: loan payments \$115 < \$146 savings
 - Total Savings \$15,649 (20 yrs)

Local Case Study- Home Equity Financing



Based on inflation rate of 3%

Monthly Solar payment based on 4.25% loan

Integrated Solar Panels, Battery Storage, EV charging, Time of Use Pricing, etc...



\$91,300	Value of energy
-\$93,100	Cost of roof
-\$7,000	Cost of Powerwall battery
+\$19,400	Tax credit
<hr/>	
\$10,600	Net earned over 30 years

Increase in Property Value

2016 Study:

- Compared appraisals of 43 pairs of homes with and without solar in 4 states.
- Ave. system: 3.78kW, 2.7 years old
- National Results: Solar homes were appraised at a 3-6% higher value → price boost of \$10,000-\$22,000
- Florida-Gulf Coast:
 - 4 pairs (incl. North Port and Lakewood Ranch)
 - Average premium: \$12,760; 6.39% of the sale price; \$3.45/W of the installed PV system



Do you own or rent your power source? It's an investment in your home.

https://emp.lbl.gov/sites/all/files/lbnl-1002778_0.pdf

- Ownership Model
 - Cash
 - HomeStyle Energy: Refinance or First Mortgage: up to 15% of the appraised value may be used for energy improvements if energy report determines “cost-effective.”
 - Home Equity ~4-9% (Requires equity in home)
 - Unsecured Consumer Loan ~9-13% plus fees
 - Property Assessed Clean Energy (coming soon) ~6-9%, repaid on property taxes
- Other Model: FPL SolarNow
 - Voluntary solar partnership program
 - Contribution of \$9 a month
 - Solar canopies in local public areas

FPL SolarNow™



Florida

Pro

- Residential sales tax, property assessment, and tangible personal property tax exemptions
- Solar Rights: [FS 163.04](#)
“A deed restriction, covenant, declaration, or similar binding agreement may not prohibit or have the effect of prohibiting solar collectors, clotheslines, or other energy devices based on renewable resources from being installed...”
- Property Assessed Clean Energy (PACE) enabled

Con

- No Renewable Portfolio Standard
- No Power Purchase Agreements
- Utilities not required to incentivize solar by Public Service Commission

Questions about:

- Types of Solar and How it Works
 - Photovoltaic
- Return on Investment
- Incentives, Financing and Other Models
- Policies affecting solar adoption
- Others



Thank you!

Please Complete Your Evaluation.

**Sarasota County Sustainability Website:
www.scgov.net/Sustainability**

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