



Welcome to:

# ***Solar Energy Systems (1 AIA HSW/SD CEU)***

***Presenter: Donald Myers of Solar Energy World***

Photovoltaic and Thermal Commercial Analysis Manager

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benefits (photovoltaic and thermal)

# Learning Objectives...

2. Understanding the federal, state and local subsidies (residential and commercial)

3. How to estimate the production of a solar system

4. Understanding the monetary ROI of Grid Tied Solar Systems (residential and commercial)





SolarEnergyWorld

Tomorrow's Energy Today





SolarEnergyWorld

Tomorrow's Energy Today

# Solar 101: Power and Energy Conservation

- How solar power, solar thermal and energy conservation can work for you.
- In less than an hour, enough solar energy hits the earth to meet the world's energy needs for an entire year. By harnessing just a small portion of this abundant energy source, solar power technology significantly reduces the financial and environmental costs of generating and using conventional electricity.





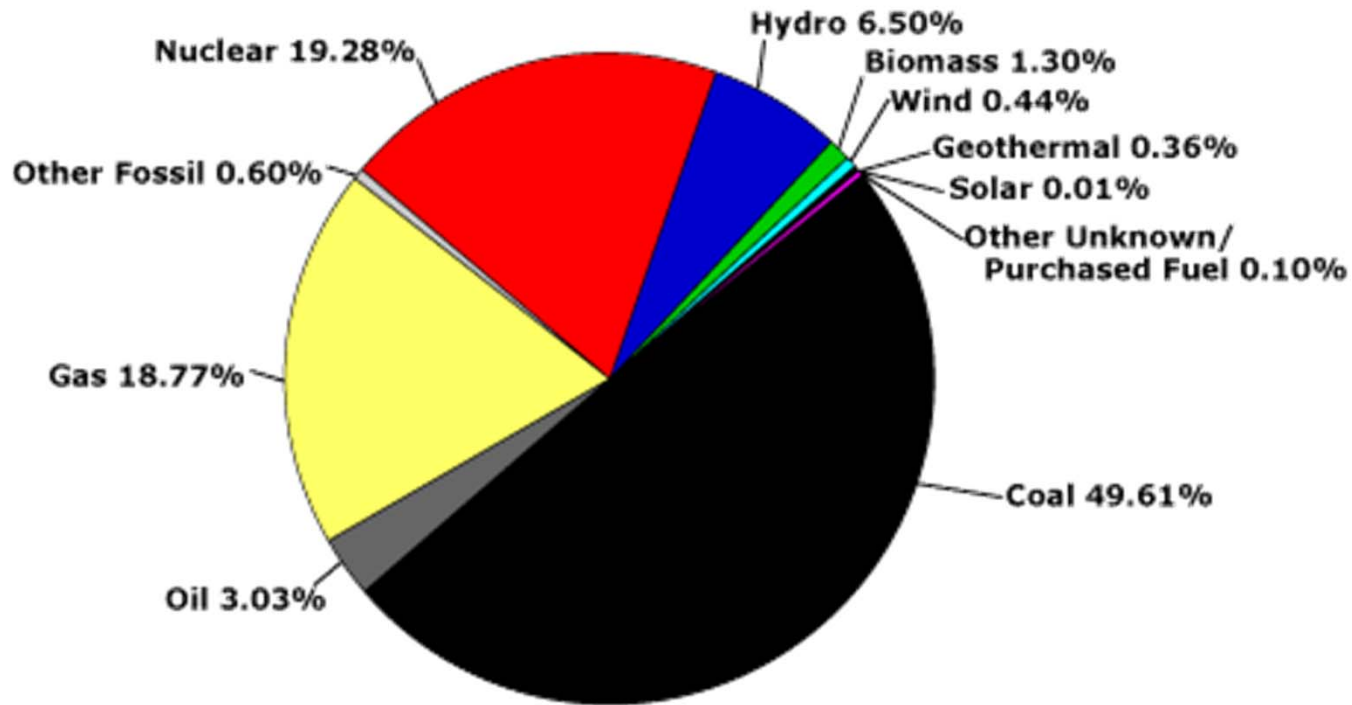
# Agenda

- Why Renewable Energy
- Understanding Solar Systems
- Subsidies: Federal, State, Local
- Savings and Earnings (SREC)
- Monetary Valuation
- Solar System Production
- Questions and Comments





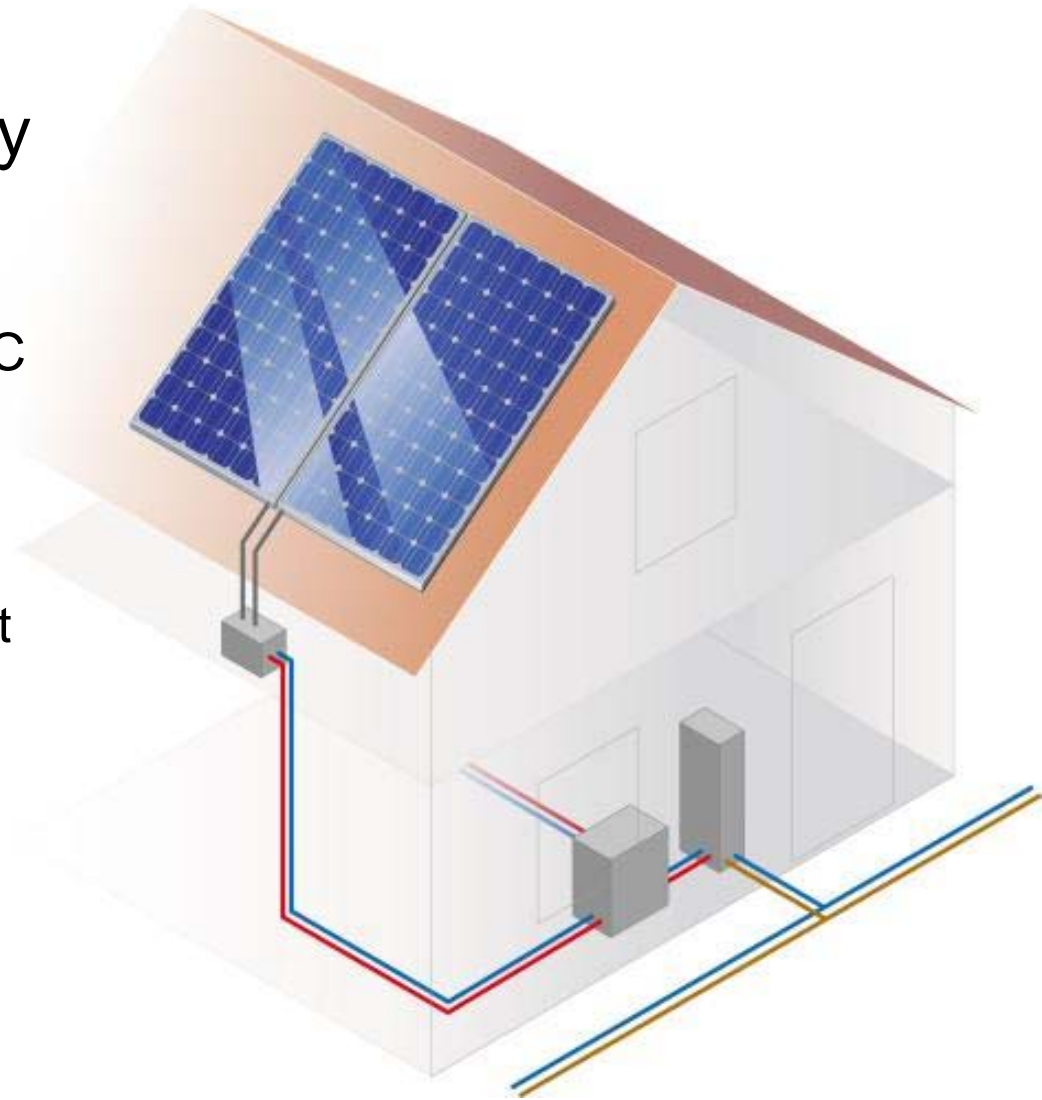
# Why Renewable Energy





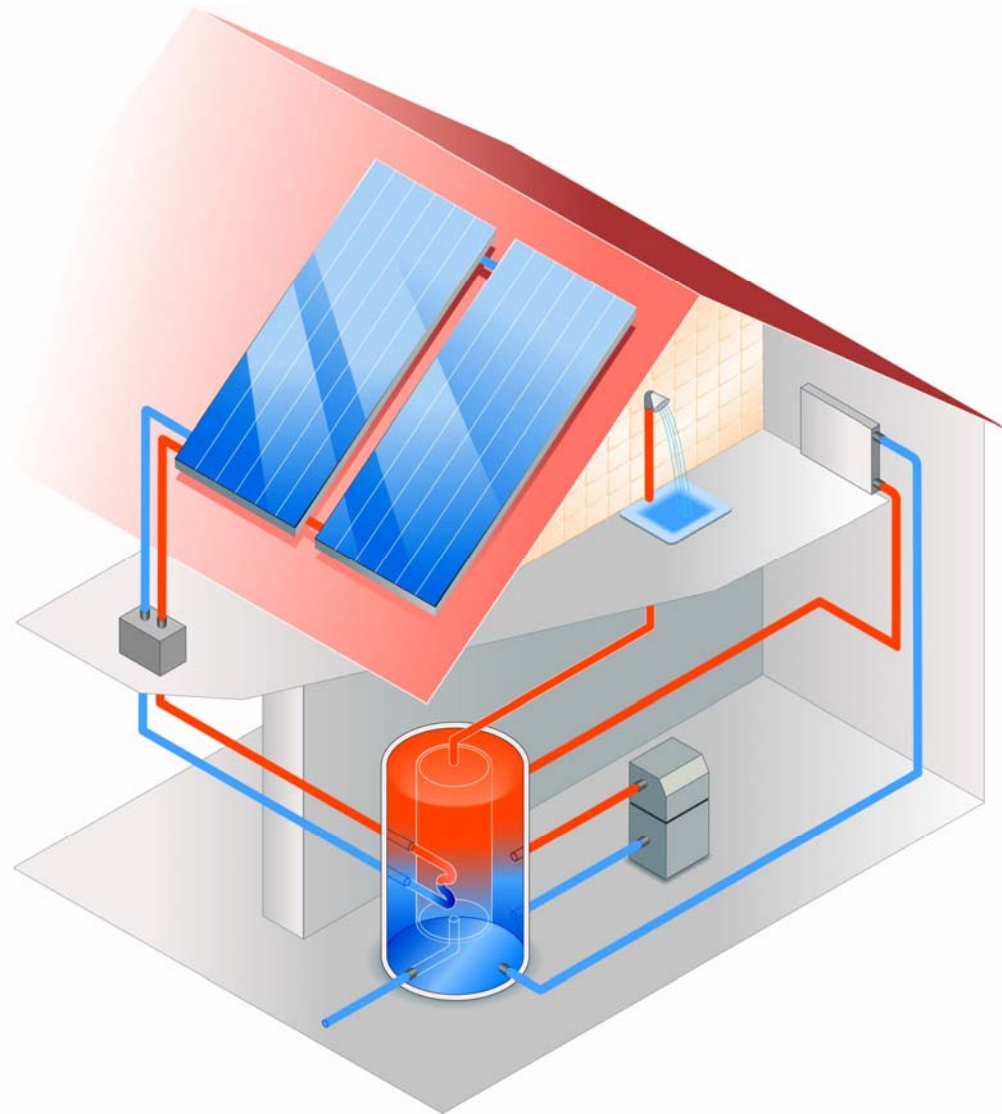
# Understanding Solar Power

- Solar Electric uses light from the sun to generate electricity
  - Sunlight + solar panels = electricity
  - Flows into an inverter where it is converted into useable electricity (DC to AC power)
  - Any excess power is sent to the grid
  - You are only billed the difference between what you produce and what you consume
  - Off-grid system
  - Grid tied system



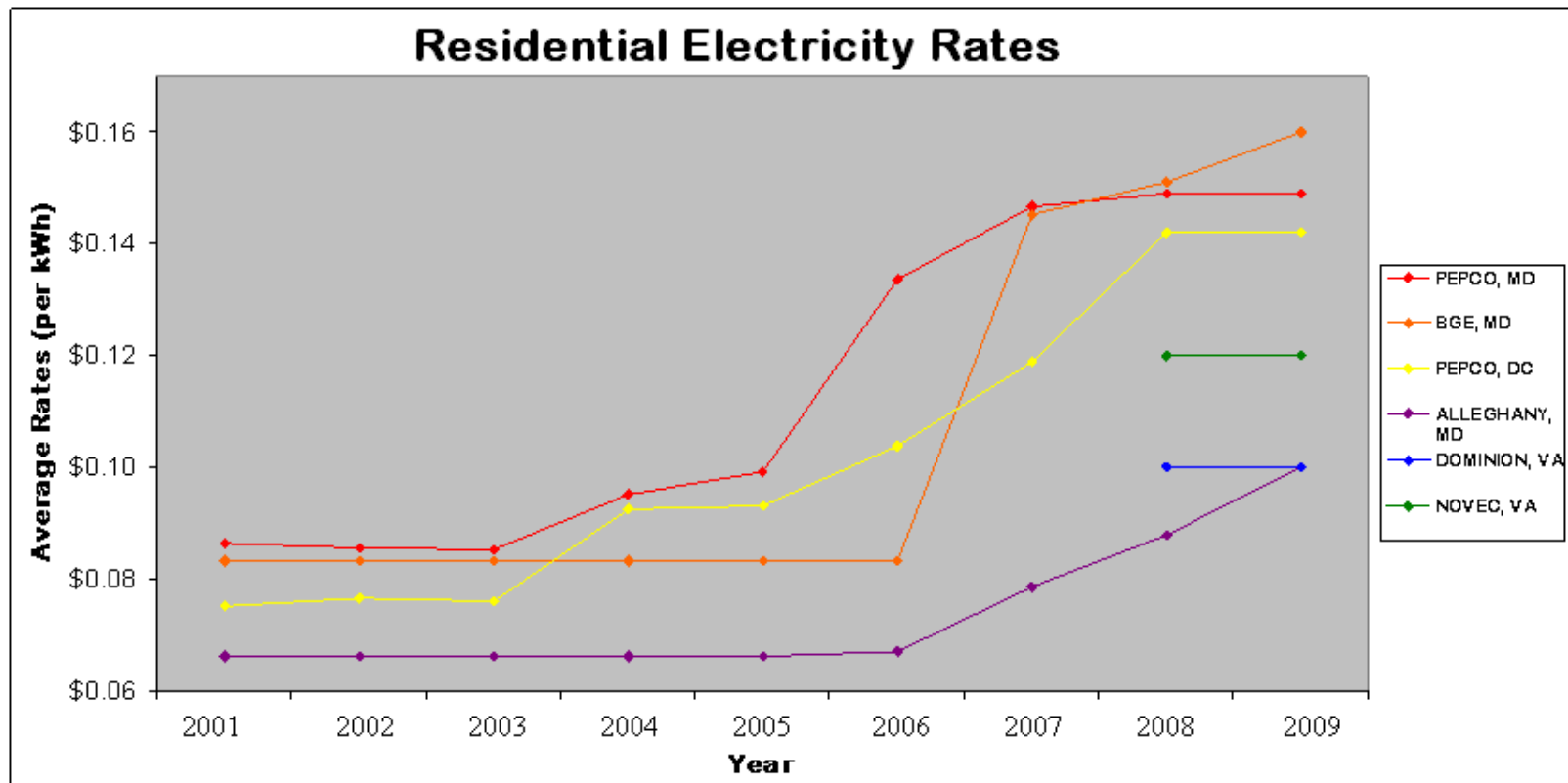
# Understanding Solar Thermal

- Solar Thermal uses heat from the sun to heat household water
  - Sunlight + solar panels = hot water
  - Sun heats a non-toxic solar fluid in a solar collector
  - A pump in the solar station pumps solar fluid from the collector to the hot water tank
  - Solar fluid flows through a coil inside the tank, and heats the water
  - Hot water is available for home use



# Control Your Cost

- ☉ Taxes, utility bills, home repair and maintenance all make up the Cost-Of Ownership of your home.
- ☉ These are bills that do not go away, and in some cases rise much faster than inflation.



# Is solar for everyone?

Homes with *un-shaded* southward facing roofs are ideal for solar, however southwest, southeast, east, or west facing roofs are viable for a solar array as well.



# What makes a good solar installation?

## Pre-Installation

- Preliminary System Design
  - System Size/Production Determined
- Sign Contract with Installation Company
- Engineering Plans drawn and stamped by State Certified Engineer
- Submit Pre-Qualification Form for State Grant
- Submit Application Form for State Grant
- Submit for County/City Electrical and Building Permits

## Installation

- After Permits Received, Schedule Installation
- Create System Bill of Materials and verify that products are available
- Sent Utility Interconnection Pre-Approval
- System Installed, Wired & Tested
- Homeowner System Training

## Post-Installation

- Inspection by Local Authority Having Jurisdiction (County/City)
- Utility Notification of Completion

## 3-5 Weeks after Utility Notification

- Utility Installs Net-Meter
- Apply to earn Solar Renewable Energy Credits (S-RECs)
- Submit Final Grant Forms
- Complete Federal Tax Forms for Federal ITC





# State, Local & Federal Incentives in Maryland!

- In April 2007 Maryland Passed its Renewable Energy Portfolio Standard (RPS), effective January 1, 2008. This placed yearly quotas on utility companies and created a market for Solar Renewable Energy Credits (S-RECs)
- In July 2008 Maryland Energy Administration (MEA) introduced Residential Solar Energy Grant Program
- In July 2008 County Property Tax Credit Programs introduced in Montgomery, Howard, Harford, Anne Arundel and Prince Georges Counties.
- In 2009 Federal Income Tax Credit (ITC) limit removed from \$2,000 to 30% no cap
- The National Association of Appraisers in conjunction with the National Renewable Energy Laboratory (NREL) states that for every:
  - dollar you save on your electric bill, you add \$20 in value to the home.
  - a \$1000 savings approximates to a \$20,000 increase in value!



## DSIRE™

Database of State Incentives for Renewables & Efficiency

U.S. DEPARTMENT OF ENERGY

Energy Efficiency & Renewable Energy



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### FEDERAL Incentives/Policies for Renewables & Efficiency

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#### Resources

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#### Financial Incentives

##### Corporate Deduction

- [Energy-Efficient Commercial Buildings Tax Deduction](#)

##### Corporate Depreciation

- [Modified Accelerated Cost-Recovery System \(MACRS\) + Bonus Depreciation \(2008-2012\)](#)

##### Corporate Exemption

- [Residential Energy Conservation Subsidy Exclusion \(Corporate\)](#)

##### Corporate Tax Credit

- [Business Energy Investment Tax Credit \(ITC\)](#)
- [Energy-Efficient New Homes Tax Credit for Home Builders](#)
- [Renewable Electricity Production Tax Credit \(PTC\)](#)

##### Federal Grant Program

- [Tribal Energy Program Grant](#)
- [U.S. Department of Treasury - Renewable Energy Grants](#)
- [USDA - High Energy Cost Grant Program](#)
- [USDA - Rural Energy for America Program \(REAP\) Grants](#)

##### Federal Loan Program

- [Clean Renewable Energy Bonds \(CREBs\)](#)
- [Energy-Efficient Mortgages](#)
- [Qualified Energy Conservation Bonds \(QECBs\)](#)
- [U.S. Department of Energy - Loan Guarantee Program](#)
- [USDA - Rural Energy for America Program \(REAP\) Loan Guarantees](#)

##### Industry Recruitment/Support

- [Energy-Efficient Appliance Manufacturing Tax Credit](#)

##### Personal Exemption

- [Residential Energy Conservation Subsidy Exclusion \(Personal\)](#)

##### Personal Tax Credit

- [Residential Energy Efficiency Tax Credit](#)
- [Residential Renewable Energy Tax Credit](#)

#### Rules, Regulations & Policies

##### Appliance/Equipment Efficiency Standards

- [Federal Appliance Standards](#)

##### Energy Standards for Public Buildings

- [Energy Goals and Standards for Federal Government](#)

##### Green Power Purchasing

- [U.S. Federal Government - Green Power Purchasing Goal](#)

##### Interconnection

- [Interconnection Standards for Small Generators](#)



## MARYLAND Incentives/Policies for Renewables & Efficiency



- [See Federal Incentives](#)
- [See All Summaries](#)
- [See Residential Incentives Only](#)

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### Financial Incentives

#### Corporate Tax Credit

- [Bio-Heating Oil Tax Credit \(Corporate\)](#)
- [Clean Energy Production Tax Credit \(Corporate\)](#)

#### PACE Financing

- [Local Option - Clean Energy Loan Program](#)

#### Performance-Based Incentive

- [Maryland Public Service Commission - Solar Renewable Energy Certificates \(SRECs\)](#)

#### Personal Tax Credit

- [Bio-Heating Oil Tax Credit \(Personal\)](#)
- [Clean Energy Production Tax Credit \(Personal\)](#)

#### Property Tax Incentive

- [Anne Arundel County - High Performance Dwelling Property Tax Credit](#)
- [Anne Arundel County - Solar and Geothermal Equipment Property Tax Credits](#)
- [Baltimore County - Property Tax Credit for High Performance Buildings and Homes](#)
- [Baltimore County - Property Tax Credit for Solar and Geothermal Devices](#)
- [Carroll County - Green Building Property Tax Credit](#)
- [Harford County - Property Tax Credit for Solar and Geothermal Devices](#)
- [Howard County - High Performance and Green Building Property Tax Credit](#)
- [Howard County - Residential Solar and Geothermal Property Tax Credit](#)
- [Local Option - Property Tax Credit for High Performance Buildings](#)
- [Local Option - Property Tax Credit for Renewables and Energy Conservation Devices](#)
- [Montgomery County - High Performance Building Property Tax Credit](#)
- [Montgomery County - Residential Energy Conservation Property Tax Credit](#)
- [Prince George's County - Solar and Geothermal Residential Property Tax Credit](#)
- [Property Tax Exemption for Solar and Wind Energy Systems](#)
- [Special Property Assessment for Renewable Heating & Cooling Systems](#)

#### Sales Tax Incentive

- [Sales and Use Tax Exemption for Renewable Energy Equipment](#)
- [Sales and Use Tax Exemption for Residential Solar and Wind Electricity Sales](#)
- [Sales Tax Holiday for Energy-Efficient Appliances](#)
- [Wood Heating Fuel Exemption](#)

#### State Loan Program

- [DHCD - Be SMART Business Efficiency Loan Program](#)
- [DHCD - Be SMART Home Efficiency Loan Program](#)
- [DHCD - Be SMART Multi-Family Efficiency Loan Program](#)
- [Jane E. Lawton Conservation Loan Program](#)
- [MARBIDCO Rural Business Energy Efficiency Improvement Loan Program](#)
- [Maryland Clean Energy Center - Home Energy Loan Program](#)
- [State Agency Loan Program](#)

#### State Rebate Program

- [Clean Energy Grant Program - Commercial Solar](#)
- [Clean Energy Grant Program - Geothermal Heat Pumps](#)
- [Clean Energy Grant Program - Residential Solar](#)
- [Clean Energy Grant Program - Windswept](#)
- [Home Performance with Energy Star Rebates](#)

# Residential Solar Analysis Breakdown

27 Solar Panels ~ 450sq'

5.13kW System Installed in Anne Arundel County

PV System	
Base System Cost	\$23,085
Federal Tax Credit	(\$6,925)
State Grant	(\$1,000)
County Property Tax Credit	(\$2,500)

Savings and Earnings	
Avoided cost of electricity	\$1,015
Solar Renewable Energy Credits	\$1,343
Annual Savings and Earnings	\$2,358
<b>Avg monthly sav/srec</b>	<b>\$196</b>
Payback	5.4 years

Household Details	
Annual kWh usage	15,000
Actual Utility Rate	.1550
Annual Electricity Costs	\$2,325
Monthly Average	\$193

Loan Calculator	
Subsidy Loan	\$10,425
Loan Amount	\$12,660
Interest Rate	7.9%
Loan Term	120 months
Est. Monthly Payment	\$153



**AC ENERGY  
&  
COST SAVINGS**



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Baltimore
State:	Maryland
Latitude:	39.18° N
Longitude:	76.67° W
Elevation:	47 m
PV System Specifications	
DC Rating:	5.1 kW
DC to AC Derate Factor:	0.800
AC Rating:	4.1 kW
Array Type:	Fixed Tilt
Array Tilt:	39.2°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	15.5 ¢/kWh

Results			
Month	Solar Radiation (kWh/m <sup>2</sup> /day)	AC Energy (kWh)	Energy Value (\$)
1	3.47	452	70.06
2	4.40	515	79.83
3	4.79	596	92.38
4	5.12	603	93.47
5	5.28	618	95.79
6	5.70	620	96.10
7	5.61	629	97.50
8	5.28	592	91.76
9	4.95	546	84.63
10	4.90	587	90.98
11	3.58	433	67.11
12	2.85	361	55.95
Year	4.66	6552	1015.56

Output Hourly Performance Data

Output Results as Text

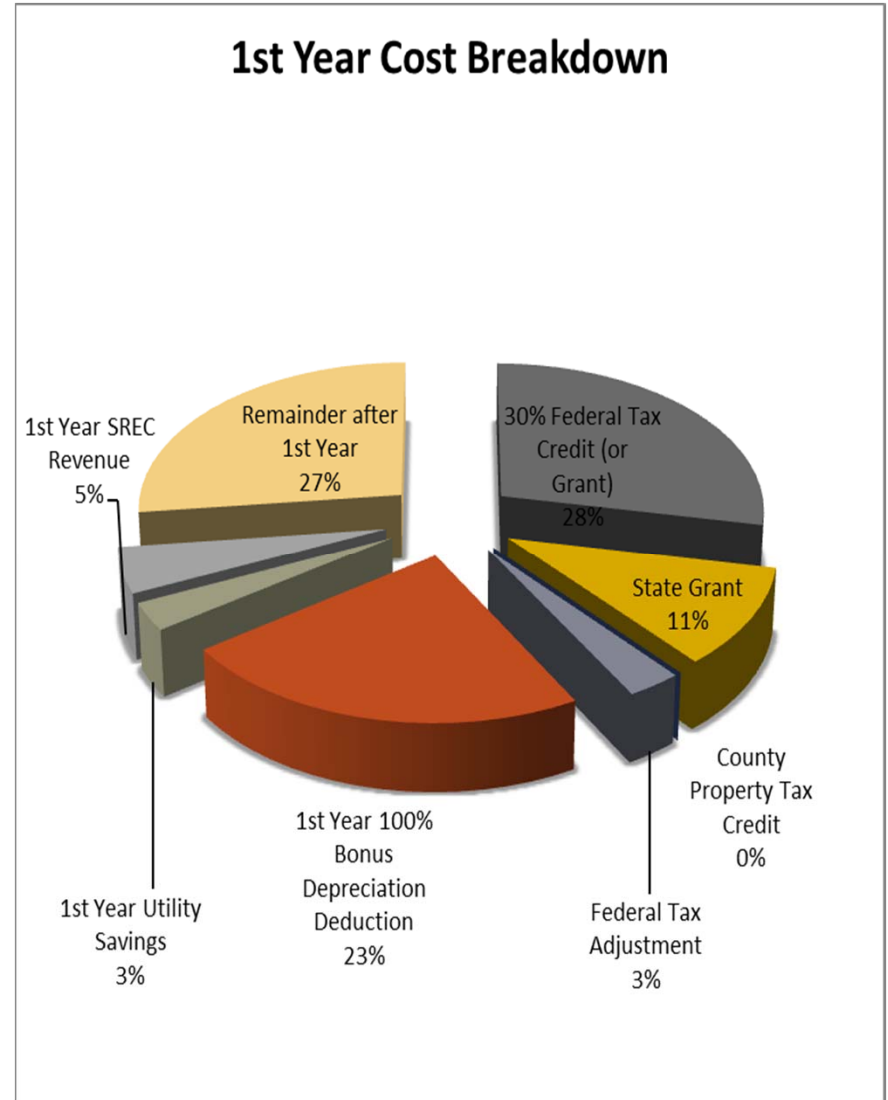
[ABOUT THE HOURLY PERFORMANCE DATA](#)

[SAVING TEXT FROM A BROWSER](#)



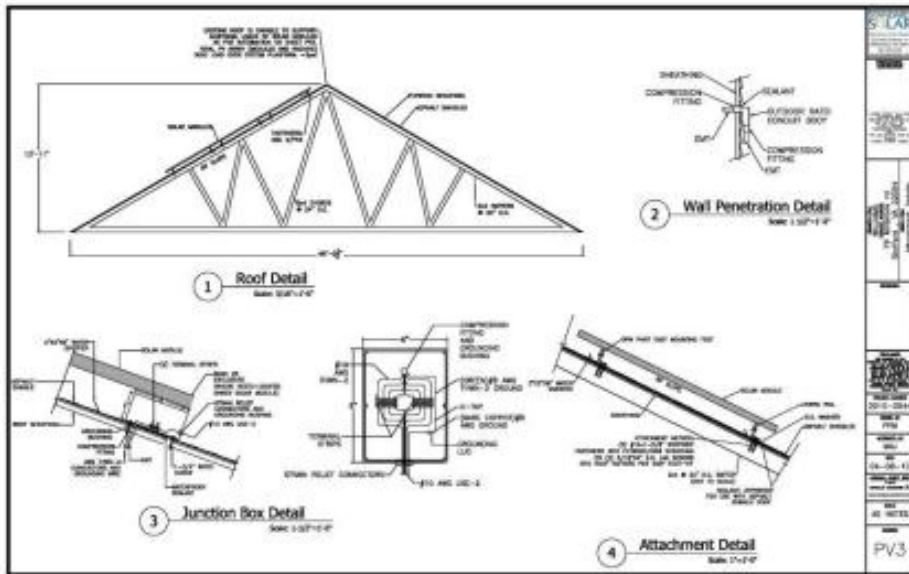
# Commercial: 1<sup>st</sup> Year Cost Analysis

Simple Cost Breakdown	
<b>System Cost (Gross) Total</b>	<b>\$ (109,620)</b>
30% Federal Tax Credit (or Grant)	\$ 32,886
State Grant	\$ 12,600
County Property Tax Credit	\$ 0
Federal Tax Adjustment	\$ (3,528)
1st Year 100% Bonus Depreciation Deduction	\$ 26,879
1st Year Utility Savings	\$ 3,526
1st Year SREC Revenue	\$ 5,877
<b>Remainder after 1st Year</b>	<b>\$ (31,380)</b>
2nd Year Utility Savings	\$ 3,666
2nd Year SREC Revenue	\$ 5,847
<b>Remainder after 2nd Year</b>	<b>\$ (21,867)</b>
3rd Year Utility Savings	\$ 3,812
3rd Year SREC Revenue	\$ 5,818
<b>Remainder after 3rd Year</b>	<b>\$ (12,237)</b>
4th Year Utility Savings	\$ 3,964
4th Year SREC Revenue	\$ 5,789
<b>Remainder after 4th Year</b>	<b>\$ (2,484)</b>
<b>Rate of Return of Investment</b>	<b>23.1%</b>
<b>Payback Period</b>	<b>4 4/12</b>
<b>20 Years Levelized Cost of Electricity (LCOE)</b>	<b>\$ 0.07</b>
<b>System Resale Value</b>	<b>\$ 70,520</b>





# The Process



## Engineering

- Physical size of system
- Angle/Tilt of panels
- System Output
- System efficiency
- Utility rates and programs

## Design

- Location (latitude) of property
- Roofing materials
- Roof pitch
- Determining the “sweet spot”
- Shading





# The Best Solar Panels and Warranties in the Industry

- Highest efficiency panels in the world
- 10 year product warranty with 25 or 30 year performance guarantee!
- World's largest suppliers with US Manufacturing facilities



# Local projects



# Local projects



# Contact us and learn more about solar

- Donald Myers
- [dfmyers@solareworld.com](mailto:dfmyers@solareworld.com)
- (410)579-2009
- (202)207-5103 (cell)
- [www.solarEworld.com](http://www.solarEworld.com)

## Solar On The Go!

Scan this with your smart phone  
and schedule an appointment!



# Thank you for your time!

## Questions??



Donald Myers  
Photovoltaic and Thermal  
Commercial Analysis Manager  
[DFMyers@solareworld.com](mailto:DFMyers@solareworld.com)  
410.579.2009



**Karen L. Pitsley, AIA**  
[Karen@TransformingArchitecture.com](mailto:Karen@TransformingArchitecture.com)  
[www.TransformingArchitecture.com](http://www.TransformingArchitecture.com)  
301.776.2666