Capital Sun Group

SOLAR ENERGY SYSTEMS AND ELECTRICITY

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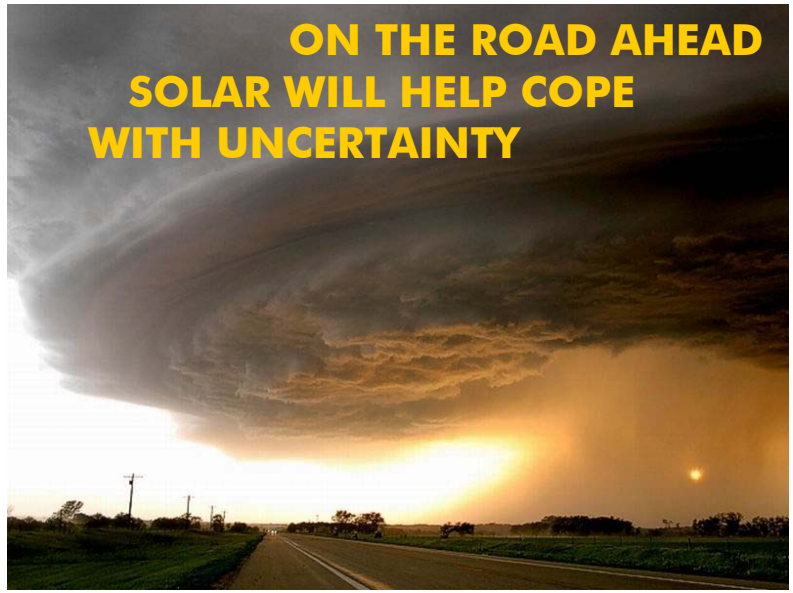


US Air Force is largest federal purchaser of solar energy systems

WHY ISN'T SOLAR ENERGY MORE PROMINENT?

- Sun rises every day, it's everywhere and a known resource
- Technology has been in the U.S. market since the 1890s.
- Systems are fabricated from mass-produced materials
- It heats, cools, refrigerates, and makes electricity
- Federal government provides financial incentives to lower first costs
- Most state governments have incentives
- Panels recover the energy it takes to make them in 1 to 2.5 years
- It does not pollute while working [PV disposal needs to be regulated]
- Solar energy systems are almost totally silent, no noise pollution
- Its cheaper than utility electricity for heating on a life cycle basis
- Its cheaper than oil and natural gas on a life-cycle basis
- It can make electricity for less than utility peak power rates
- Certain applications have simple paybacks of 2 to 7 years
- Some photovoltaic applications have zero year paybacks
- Solar stabilizes future energy costs
- Solar industry is creating new jobs
- Generates higher tax income compared to fossil energy systems
- Raise gross domestic product more than fossil energy based systems

SOLAR RADIATION AVAILABLE IN GERMANY V. VIRGINA

Solar Collector tilted at an angle equal to the latitude delivers most energy over 12 months.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
1.38	2.19	2.84	3.82	4.45	4.02	4.13	3.94	3.16	2.32	1.48	1.18	**2.91 kwh/m2/day**

Tilt 52 deg, Northern Germany

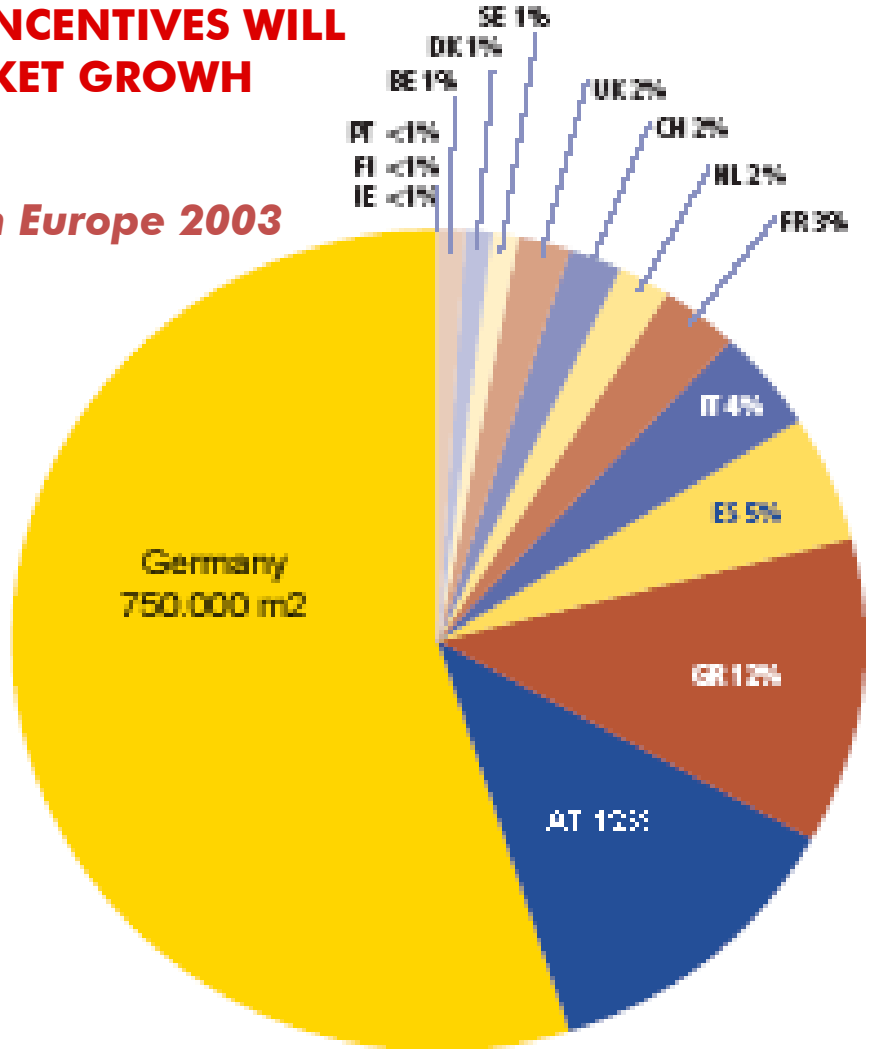
Tilt 39 deg Sterling, VA

3.5	4.2	4.8	5.3	5.5	5.7	5.6	5.5	5.1	4.6	3.6	3.1	**4.7 kwh/m2/day**

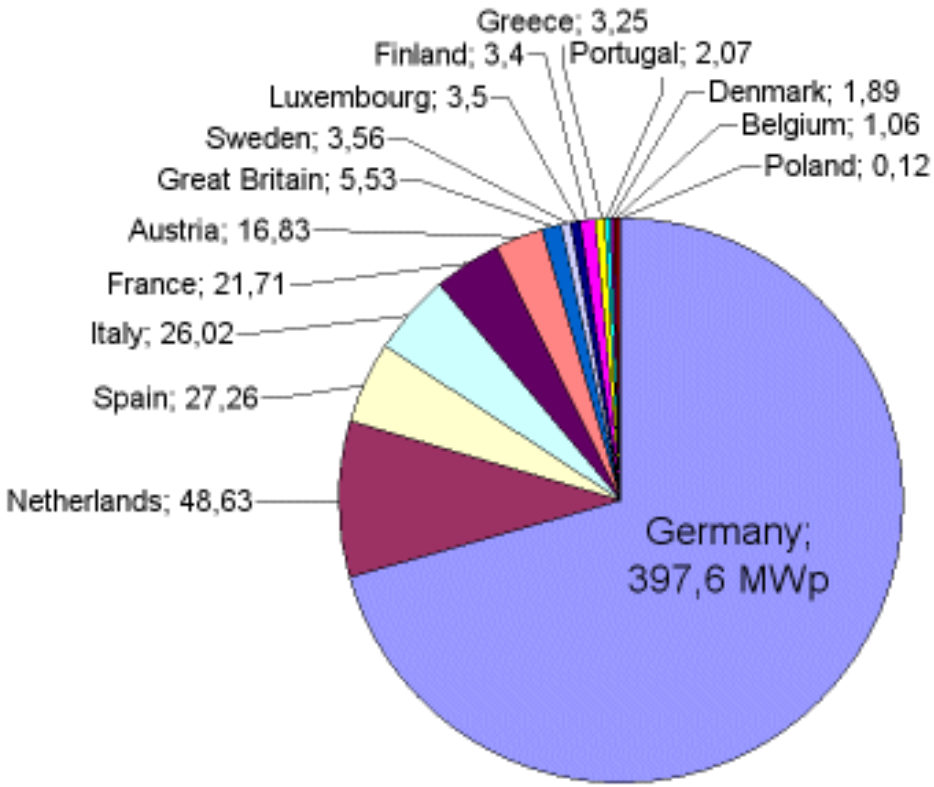
		Location 136.5 degrees E Longitude, 47.5 degrees N. Latitude											
		Solar Radiation on a Tilted Surface in kwh/m2/day											
		Method is one used by RETScreen for Solar Performance Estimating											
Tilt from Horizontal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg
Tilt 47 deg	3.37	4.59	5.37	4.62	4.64	4.53	4.28	3.81	3.55	3.38	3.16	3.08	4.03
Tilt 62 deg	3.81	5.23	5.58	4.71	4.34	4.76	4.24	4.28	3.8	4.27	4.01	3.48	4.38
Tilt 90 deg	3.61	4.69	4.52	3.39	2.9	3.04	2.8	2.97	2.93	3.68	3.76	3.36	3.47
			Monthly Averaged Daylight Cloud Amount (%										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg
10-year Average	52.4	49.1	61.4	81.3	78.9	73.9	74.4	78.5	76.8	71.4	66.6	52	
	Monthly Averaged Air Temperature At 10 m Above The Surface Of The Earth (° C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg
10 Yr Avg	-23.4	-17.2	-7.77	2.43	9.21	15.4	18.8	18.6	11	1.35	-12	-22.9	-0.54
Source:	NASA EOS, Langley Research Center												

POLITICAL WILL ENACTING EFFECTIVE INCENTIVES WILL HAVE A SIGNIFICANT IMPACT ON MARKET GROWH

Solar Thermal Markets in Europe 2003
(source: ESTIF)

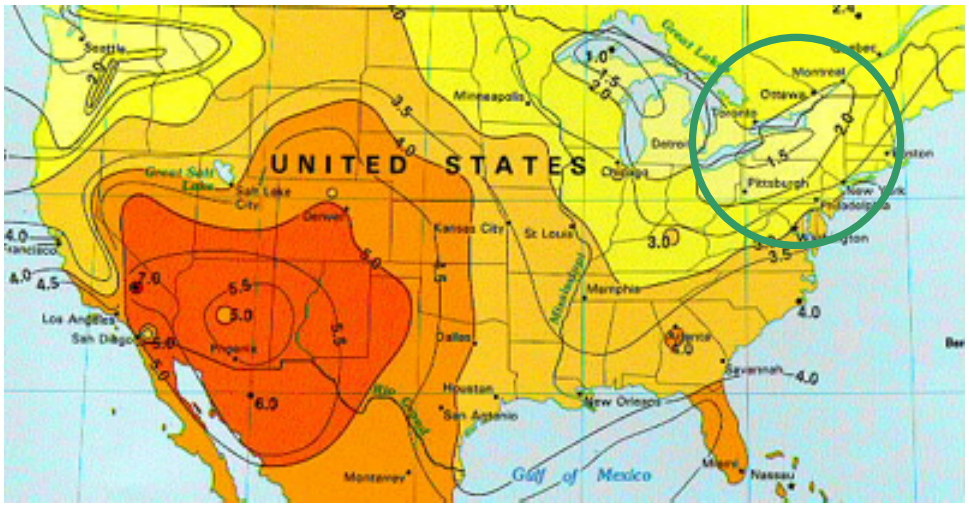


Photovoltaic Markets in Europe 2003
Source: EurObserv'ER 2004)



ENERGY PRICES DETERMINE WHERE SOLAR COMPETES

BUT IN TODAY'S MARKET INCENTIVES CAN MATTER MORE



SOLAR COMPETITIVENESS DEPENDS ON ANNUAL SUNSHINE AND ENERGY COSTS

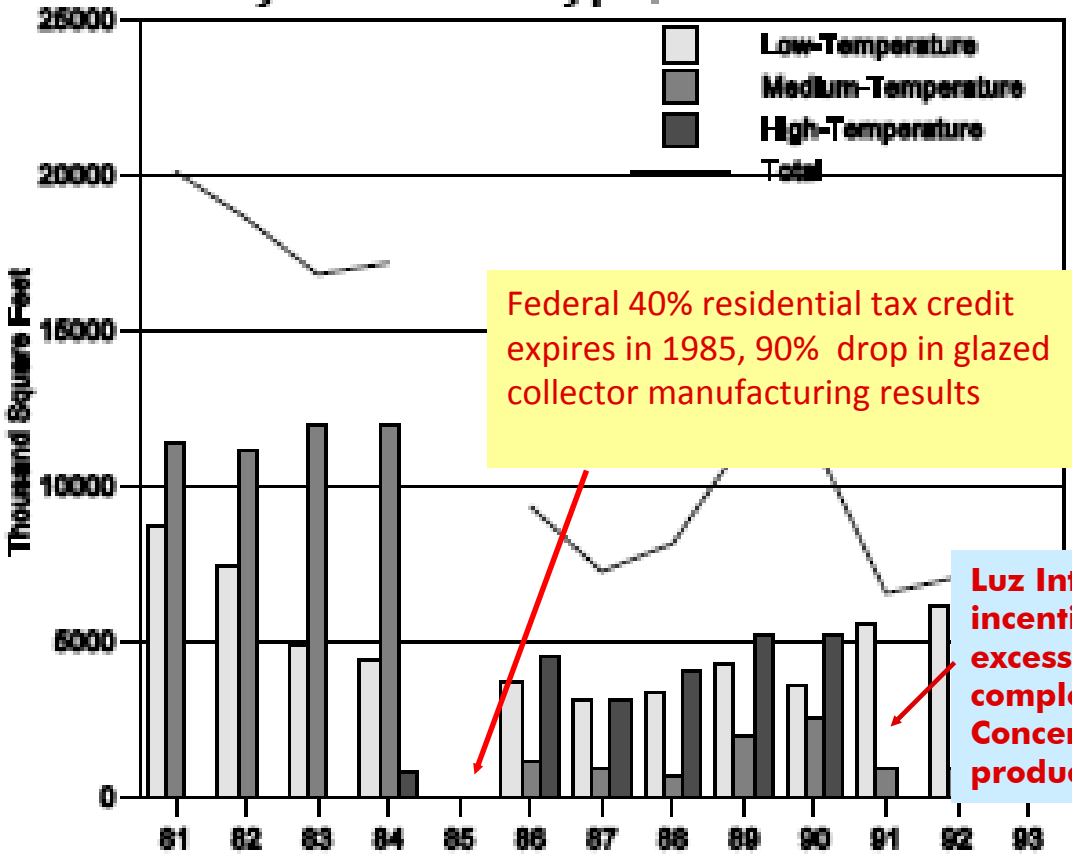
		Arizona	New Jersey
Natural gas	2005	$7 to $8 /mmbtu	$10 to $11 / mmbtu
Electricity	Industrial 2005	$15.45 / mmbtu	$25.14 / mmbtu
Annual Insolation fixed tilt=latitude		7 to 8 kwh/m2/yr	4 to 5 kwh/m2/yr
June Insolation tilt=Latitude		18 MJ/m2/day	10 - to 12 MJ/m2/day

New Jersey has 40% less global radiation annually as Arizona.

Natural Gas in New Jersey is 40% more expensive per mmbtu as in Arizona
Electricity in New Jersey is 63 % more expensive per kWh as in Arizona

HISTORY SHOWS HOW IMPORTANT SOLAR TAX INCENTIVES CAN BE

Figure H1. Solar Thermal Collector Shipments by Collector Type, 1981-1993

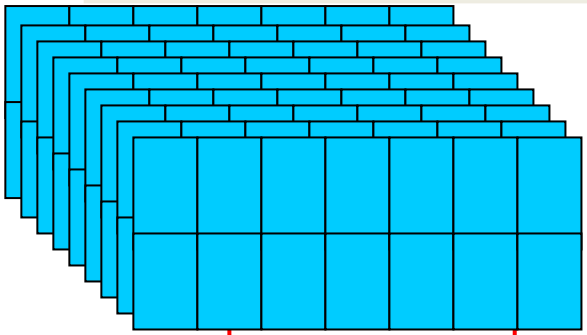


Note: Data for 1985 are incomplete and are not shown.

Sources: 1981-1984: Energy Information Administration, Form EIA-63, "Annual Solar Thermal Collector Manufacturers Survey." 1985-1993: Energy Information Administration, Form CE-63A, "Annual Solar Thermal Collector Manufacturers Survey."

USPS MERRIFIELD P&DC SOLAR ELECTRICAL CONFIGURATION

14-module series array
(#1 of 15) 2912 Watts,
401.94 VDC
At max power point 7.25 amps



16 circuit
Combiner Box
for
15 strings of
14 panels /string
401.94 VDC
108.75 Amps
Output

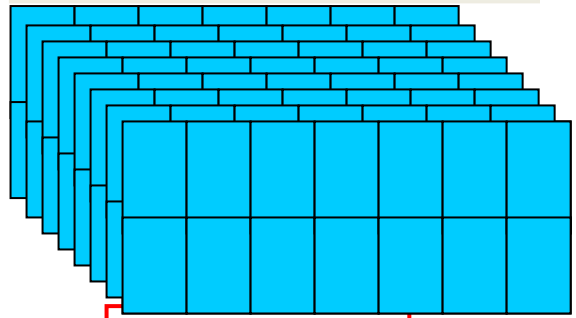
Solectria PV-SC-16 Combiner Box

- Rated for 120 amp output current
- Combines sixteen 15 amp fused circuits, ATM-5 fuses
- Compact NEMA 4 enclosure.

SATCON 75kW
Inverter
Output 210 Amps,
For 277/480 3 phase

Distribution Box

14-module series array
(#1 of 14) 2912 Watts,
401.94 VDC
At max power point 7.25 amps



16 circuit
Combiner Box for
14 strings of
14 panels /string
401.94 VDC
101.5Amps Output

The system consists of a group of fifteen arrays consisting of 14 PV panels connected in series to Combiner Box 1 and another group of fourteen arrays consisting of 14 PV panels connected in series to Combiner Box 2. Each 14 panel series string connects to a single 15-Amp fused breaker in the combiner box.

A 75kW / 75kVA PowergateTM PCS can connect all commercially available solar panels directly to common utility voltages. The standard power-conditioning system output is three-phase for 208, 240, 480 or 600 Vac at 60Hz operation. It includes an an integral isolation transformer for North American applications.

USPS MERRIFIED P&DC PHOTOVOLTAIC SYSTEM

USPS Merrifield P&DC – Racking and Mounting Installation

SunLink Materials, Processes & Components

• ASTM B209-04 Aluminum and Aluminum-Alloy Sheet and Plate

• ASTM B221-02 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire Profiles and Tubes

• Module mounting system assembly fasteners are AISI Type 18-8 stainless

Steel (Group 1) manufactured to ASTM specification or to applicable SAE grade

SunLink Row Spacing Guide up to 42º N. latitude

SHARP ND-205U1, 20 Deg tilt, space rows 66“ apart

All modules are in landscape orientation

Repeat spacing is the projected width of the module plus the aisle spacing

Lateral spacing between modules is 1.25" inches

SUNLINK 4 X 1 ROW

To facilitate roof cleaning/maintenance, each 4 x 1 row can be tilted to a vertical position by simply removing two fasteners (bolts).

Basic SunLink building block holds four PV panels, is termed a “4 x 1 row”.

Three rows linked “fore and aft” (usually north-south to face the sun) comprise a 12-module electrical string.

Primary structural elements of the 4 x 1 row are the “spars” – two long aluminum pieces attached to the north and south sides of the modules and spanning over 90% of their combined length

The “Tilt Brackets are the feet and hold the panels at the desired angle

The “Link” attaches to two Tilt Brackets

Ballast pans are attached to the Links.

MERRIFIED PV SYSTEM OPERATIONAL DATA
FIRST FULL DAY OF OPERATION, FEBRUARY 21, 2008

13-Aug	1500 h		
	AC Output	50	kW
	PV Volts		V
	PV Amps		A
	DC Power	63	kW
	Overall Calc effic	79.37%	PV DC to AC
21 days Jul 23 - Aug 13	7545.54	kWh AC delivered	
Avg per day	359.3	Avg kWh per day	

Between the PV system and 200 kW fuel cell, alternative energy systems reduced morning power demand on one of two main feeds in the building by 40%

A POLICY FLAW

STATES AND UTILITY REGULATORS GIVE MORE SUPPORT TO SOLAR ELECTRIC TECHNOLOGY THAN THEY DO TO MORE COMPETITIVE SOLAR THERMAL TECHNOLOGIES

PHOTOVOLTAIC TECHNOLOGY GETS THE HYPE, BUT, *IN ONE YEAR*
A 1500Watt DC PV Array
Will Generate Between
1215 and 1975 kWhs of AC Electricity in New York City
INSTALLED COST: ~$14,000

SOLAR THERMAL GETS IT DONE MORE COST EFFECTIVELY

IN ONE YEAR

A 40 Square Foot Solar Water Heater Will Offset 2000 – 2500 kWhs of Electricity

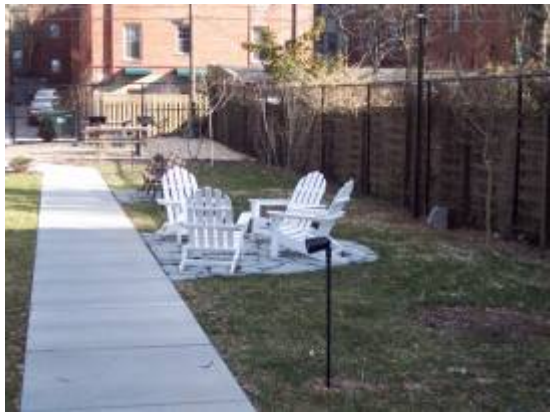
INSTALLED COST: $6,800

12.6 square feet 200W PV panel
rated at 1000 Watts/m2
CEC rating, 182 peak Watts DC
Wholesale: $963.90
$/sq foot =$76.50
Output CEC rating 14.4W/ft2
CEC 6 hour day output* =
86.4 Watt hours/ft2
*** 6 hour output at the rating is generous**

32 square feet, glazed panel
Wholesale $640.00
$/sq ft = $20.00

Rated at Delta T 36 deg F, clear day, 1040 Btu/ft2/day
Output panel per day = 33,280 Btu = 9.75 kWh
= 304 Watt hours/ft2

What helps PV is the inefficiency of the electric power sector, so one kWh of load offset replaces ~3 kWh of primary energy, however, the same applies to solar water heaters that displace electricity.



Cathedral Cono, Washington DC

Capital Sun also designs and engineers solar systems for the following:

- **Solar water and pool heating**
- **Solar water pumping**
- **Solar parabolic troughs**
- **Solar electric for residence**
- **Solar electric for commercial**

REDUCE PEAK DEMAND
LOWER UTILITY BILLS

REBATES AVAILABLE
TAX CREDITS AVAILABLE

6503 81ST STREET
CABIN JOHN, MARYLAND 20818
Tel: 301 229-0671
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NO POWER - NO PROBLEM

LED Retrofit, Arlington County Schools

- **NO UTILITY BILL**
- **NO POWER LINES**
- **NO POWER OUTTAGES**
- **NO DIGGING UP STREET**

Capital Sun Group

SOLAR OUTDOOR LIGHTING

Motion Sensor Security Lighting
Solar Powered LED Street Lights
Greenmount West, Baltimore

- **CUSTOM SIGN LIGHTING**
- **STREET LIGHTING**
- **BUS STOP LIGHTING**
- **BILLBOARD LIGHTING**
- **LANDSCAPE LIGHTING**

COMPETITIVENESS OF UNGLAZED SOLAR PANELS

Start Baseline 1042 Btu/ft2/day -- Highest rated, polymer olefin solar panel

Mid-Atlantic Region Assumptions
Panel output = 900 Btu/ft2/day

April – November Insolation = 5.5 peak hours per day
Operate 270 days = 243,000/Btu/ft2/partial year

System thermal losses of 10% reduces yield to 218,700 Btu/ft2/ partial yr

Install at $8.00 per square foot, collector only, no BOS

Delivered energy in year 1 costs = $36.58 per million Btu

Two years of production lowers cost to $18.29 per million Btu

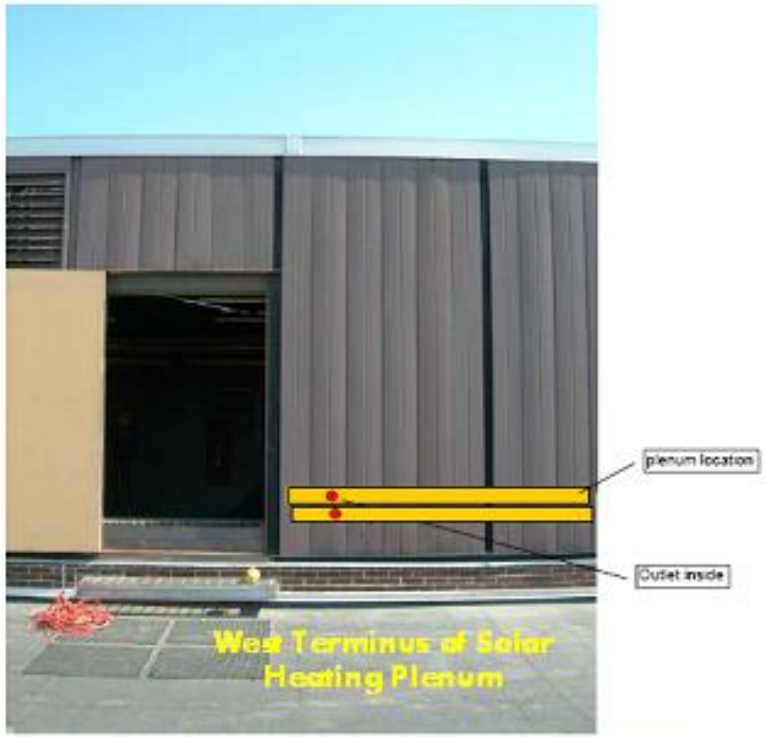
Over fifteen years, cost is $2.44 per million Btu delivered by the solar collector.
Overall costs will be slightly higher when including pumping and control, and if storage is purchased.

Solar thermal system applications include:

- **Boiler Make-Up Water Heating**
- **Boiler Combustion Air Heating**
- **Process Water or Air Heating**
- **Ventilation Air Pre-Heating**
- **Building Heating, Ventilating and Air Conditioning**
- **Backup Generator Heating**

MINING EXISTING WALLS FOR SOLAR SPACE HEATING

South Dock Area
To Be Solar Heated



Over Dock Door
Heating Ducts

Dock Ceiling
Duct Outlets

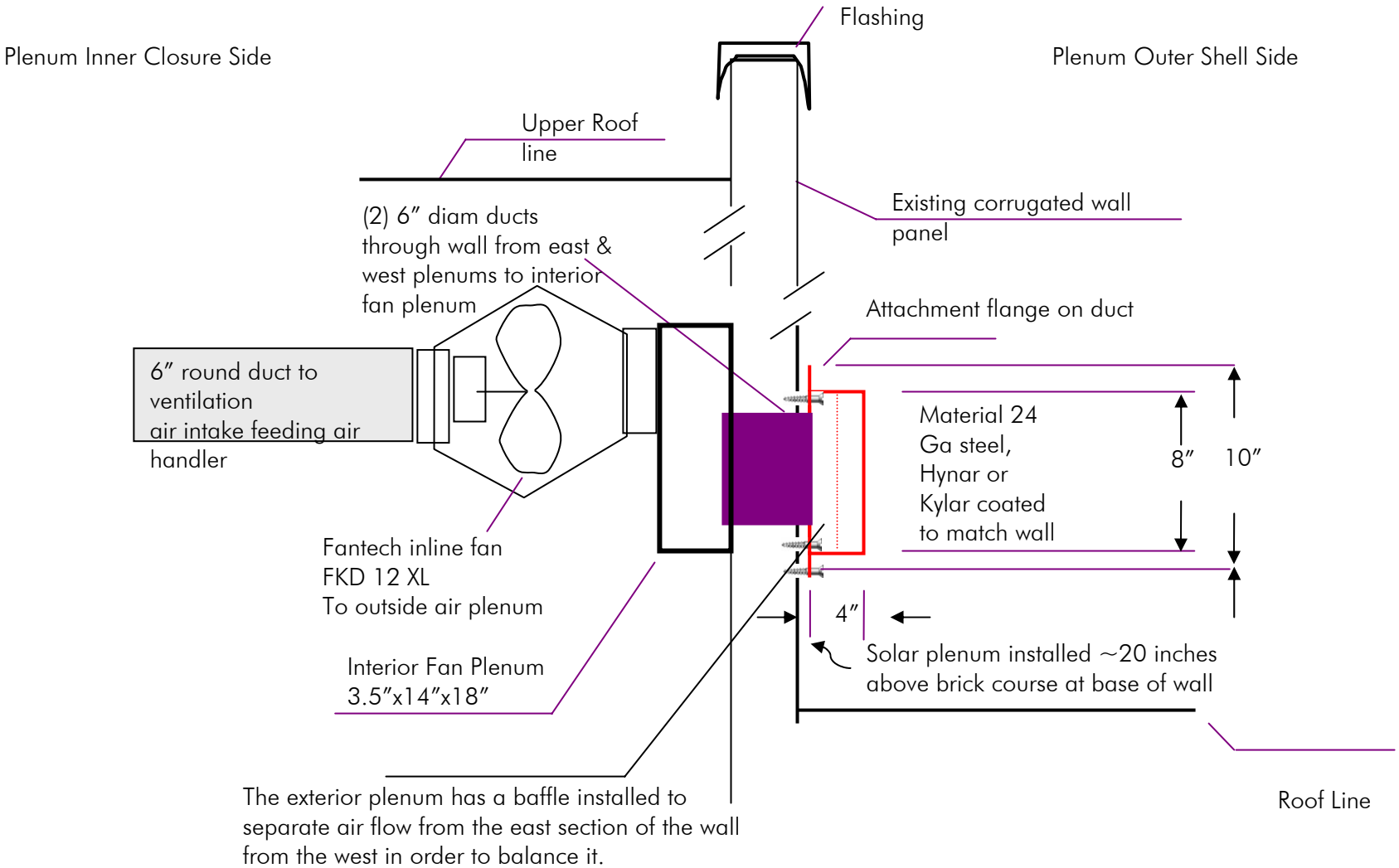
Capital Sun Group

Submission June 6, 2007

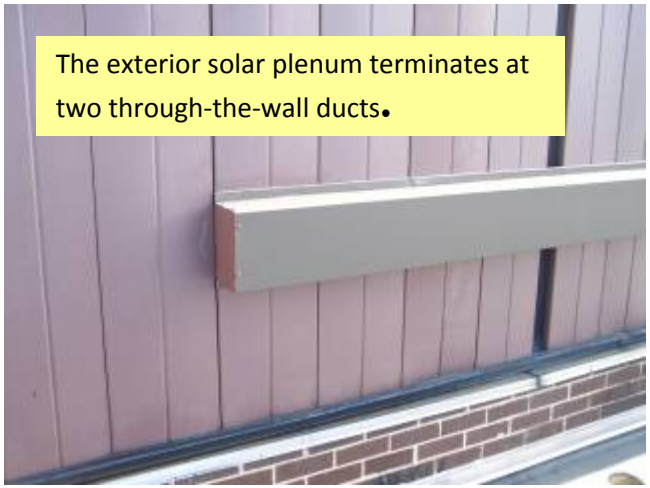
Interior Plenum Outlets

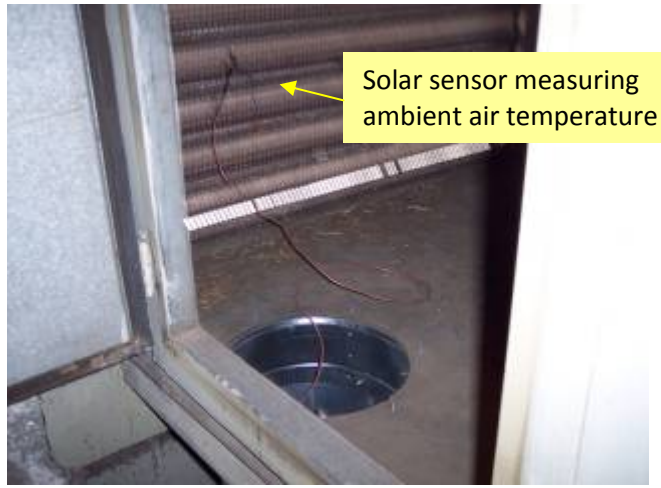
Job #433-16702
Contract #1AUTL06-C-0021
Merrifield Solar Space Heating

Wall & Fan Plenum Section
West Elevation



Solar Wall System Details

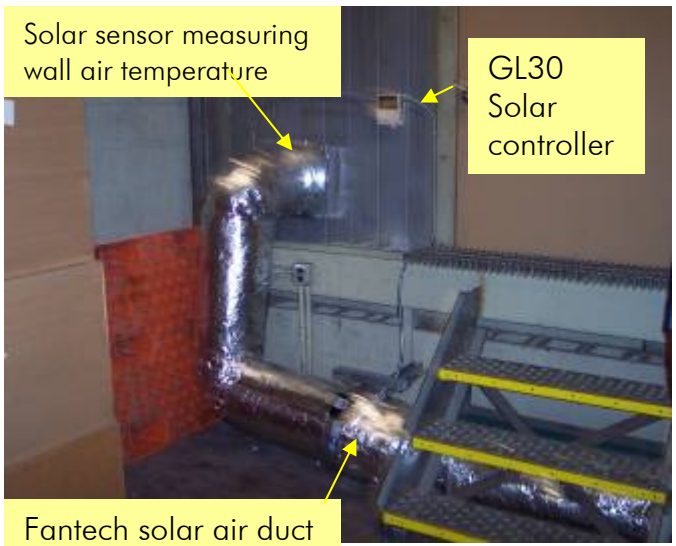




The solar GL30 differential controller has two temperature sensors. The "Tank" sensor for the load is mounted in the ventilation air intake right where the outside air enters the louvers.

The "Solar" sensor for the collector is mounted inside the wall in the solar plenum duct. When the outside air ("tank") is 12 degrees colder than the wall heated air (solar collector), then the controller turns on the solar fan to draw air from the wall and feed it into the air intake duct that feeds the space heating air handler.

A Honeywell T6031 Refrigeration Temperature Controller (Not Shown) interrupts the solar collector sensor input to the GL30 solar controller when the ambient temperature is above 60 degrees F. This prevents the solar wall from sending hot air when the building has no heating load.

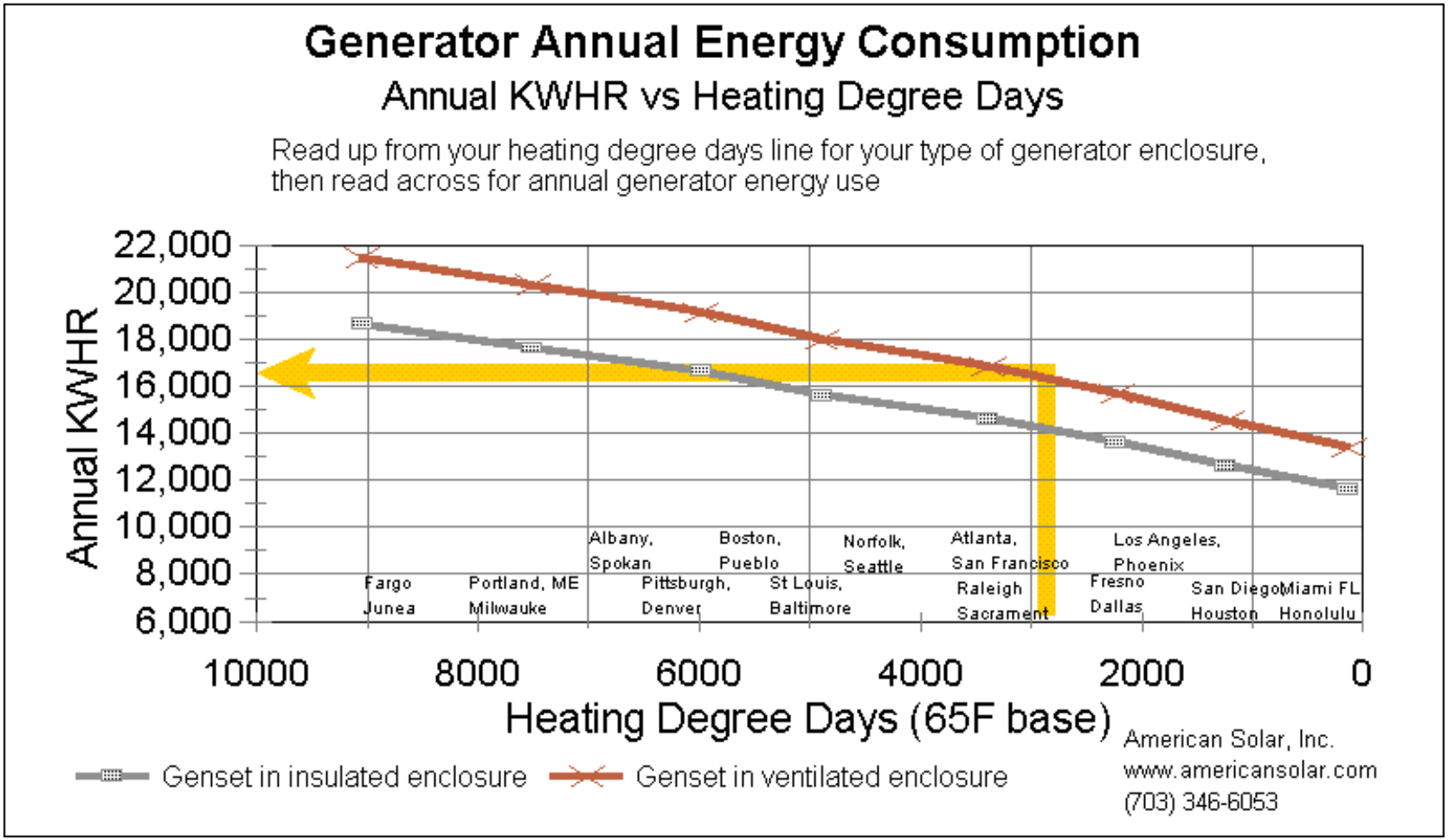


MERRIFIELD SOLAR WALL HEATING SYSTEM

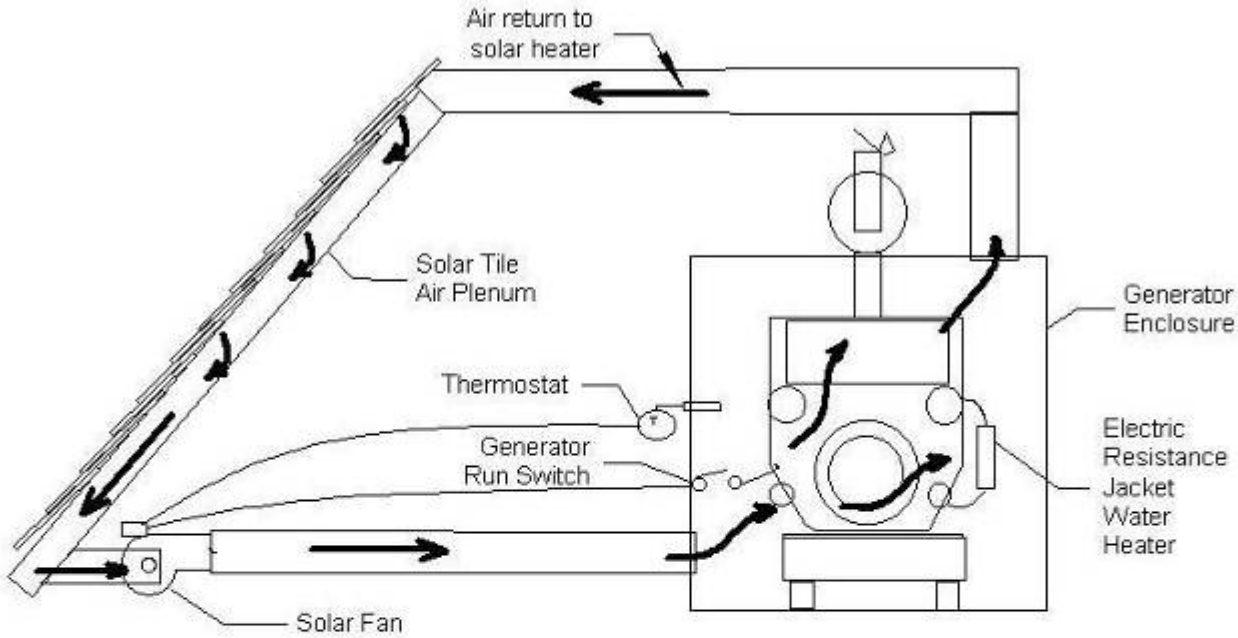
- **Solar Collecting Wall Dimensions: 86 feet by ~12 feet**
- **Energy Delivery: 15 metal panels, each 68.75in wide by 12ft long.**
- **The total collection area of 1031 square feet should be capable of delivering 100 Btu/ft^2/hour, or 103,000Btu/hour.**
- **Nominal Air Flow: 1000 cfm**
- **Fan: Fantech Model FKD 12 XL**
- **Independent Energy GL30 Differential Controller, w 10,000 ohm sensors**
- **Solar Plenum Materials: 24 gauge galvalume steel, pre-painted with Kynar or Hylar to match building color from Metfab or MBCI, 8" x 3.75"**
- **Outdoor Plenum located 15 to 24 inches above the brick concourse at the base of the metal wall**
- **Draft Loss: 1.00 inch H_2O**

- **Preconstruction April 07 test extracted air from wall cavity at 120 degrees F.**

GENSET ANNUAL ELECTRICITY CONSUMPTION FOR HEATING



SOLAR HEATING GENSET WATER JACKETS



Operation:
The thermostat senses the temperature of the air within the generator enclosure.
When the thermostat senses a temperature below the set point (~110 deg F),
and the generator is not running, the solar fan is activated.
The solar fan moves solar heated air from the solar tile air plenum through the
enclosure, with the hottest air targeted just below the diesel engine.
Warm air from the enclosure may be recycled
back to the solar thermal tile system.
The existing electric resistance jacket water heater, only operates to
raise the jacket water temperature from ~110 deg F to a setpoint temperature
of about ~130 deg F.
When the solar fan is disengaged, the electric resistance heater
handles the full heating load.
Optional thermal storage, beyond the mass of generator set itself,
can provide night time and cloudy day heating.

American Solar, Inc.
8703 Chippendale Court Annandale, Va.
(703) 346-6053 www.americansolar.com

TITLE
Solar Air Heating of Emergncy Generators

SIZE	DWG NO	REV
A		
SCALE	DATE	SHEET

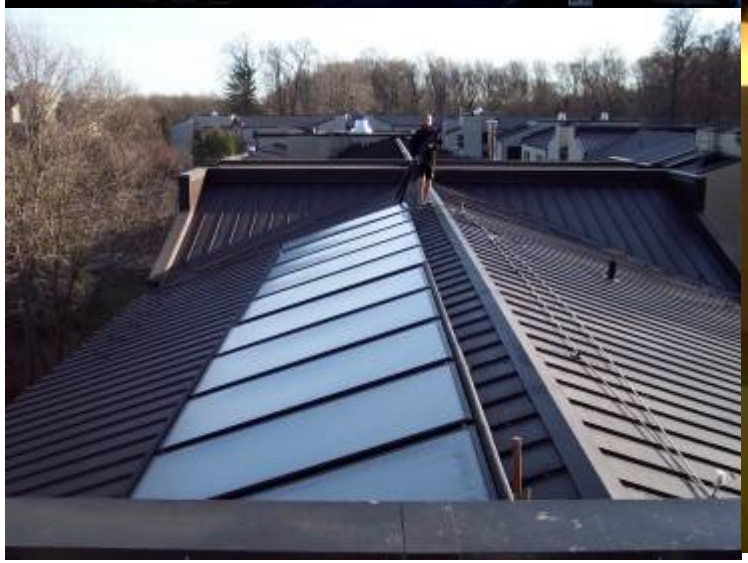
Genset Heating Solar Panels Can Be Either Polymer or Metal

Paybacks can be as short as 4 years

USPS Bolger Center Indoor Pool Heating System Offsets Natural Gas

The pool heating system consists of 30 Harter Industries Hi-Temp EPDM solar collector panels. The 4,800 square foot array serves as the primary source for heating the pool from the late spring to early fall. The manufacturer's performance estimate says this array will produce up to 4.8 million Btu per day, enough to heat 29000 gallons 20 degrees F.

USPS WILLIAM F. BOLGER CENTER
LAUNDRY SOLAR WATER HEATING SYSTEM
GUEST BUILDING E



320 SQUARE FOOT ARRAY, DRAIN BACK CONFIGURATION AT ATMOSPHERIC PRESSURE PREHEATS WATER FOR TWO GAS HEATERS VIA HEAT EXCHANGERS IN 470 GALLON SOLAR STORAGE TANK

FLAT PLATE SOLAR SYSTEM INCENTIVE EFFECT

Array size	2289 Sq Feet
Panels	SunEarth EC 40
Solar Energy Delivered per Year	5563.35 mmBtu (Illinois)
Estimated Installed Cost	$63.00 $/ft2
Installed cost for system	$144,207
10 Year Natural Gas Cost Avg	$1.00 per therm

System cost		$144,207.00
Fed Tax Credit Incentive		$ 43,262.10
Net		$100,944.90
Depreciation Basis		$122,575.95
Net cost with depreciation		$ 59,692.70
$ 24,515.19	Year one depreciation	
$ 39,224.30	Year two depreciation	
$ 23,534.58	Year three depreciation	
$ 14,120.75	Year four deprecation	
$ 14,120.75	Year five depreciation	
$ 5,814.43	Year six depreciation	
$ 121,330.00	Sum depreciation	
0.34	Business income tax rate	
$ 41,252.20	Value of depreciation	

FLAT PLATE SOLAR SYSTEM ECONOMIC ANALYSIS
Federal Solar Investment Tax Credit Only

Glazed Flat Plate Array 2289 Sq Feet

553.35	mmBtu delivered to load year 1
100,000	Btu/therm
$ 1.25	Cost / therm
5533.5	Solar therms to load per year
0.7	Gas heating system annual efficiency
7905	Gas therms replaced
$ 9,881.25	Annual savings, uninflated gas cost
$ 59,692.70	Estimated net installed cost
6.0	Years to incentive based payback

IMPACT OF A GRANT ON FEDERAL TAX INCENTIVES

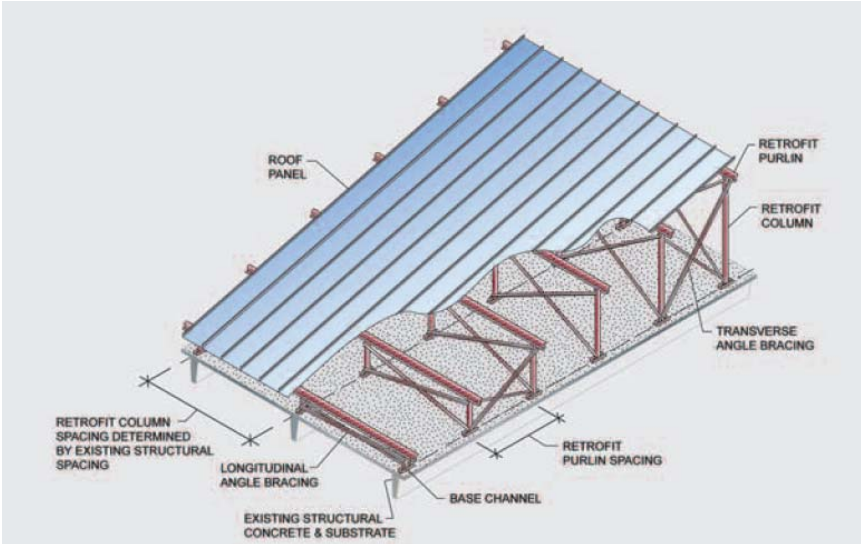
The basis for the federal tax credit is reduced by the amount of any additional incentives a solar project receives.

The basis reduction must include any subsidized energy financing calculated with a tax law formula.

The federal tax credit drops from $1053 to $526.50 and basis for depreciation falls to $1228.50

System cost		3510
State Grant Incentive		1755
Net Basis for Fed ITC		1755
Fed 30% Inv Credit		526.5
Net		1228.5
Net with Depreciation		982.8
245.7	Year one depreciation	
393.12	Year two depreciation	
235.872	Year three depreciation	
141.5232	Year four deprecation	
141.5232	Year five depreciation	
70.7616	Year six depreciation	
1228.5	Sum depreciation	
0.2	Effective tax rate	
245.7	Value of depreciation	

PROJECT EXAMPLE - METAL SOLAR ROOF HEATING SYSTEM



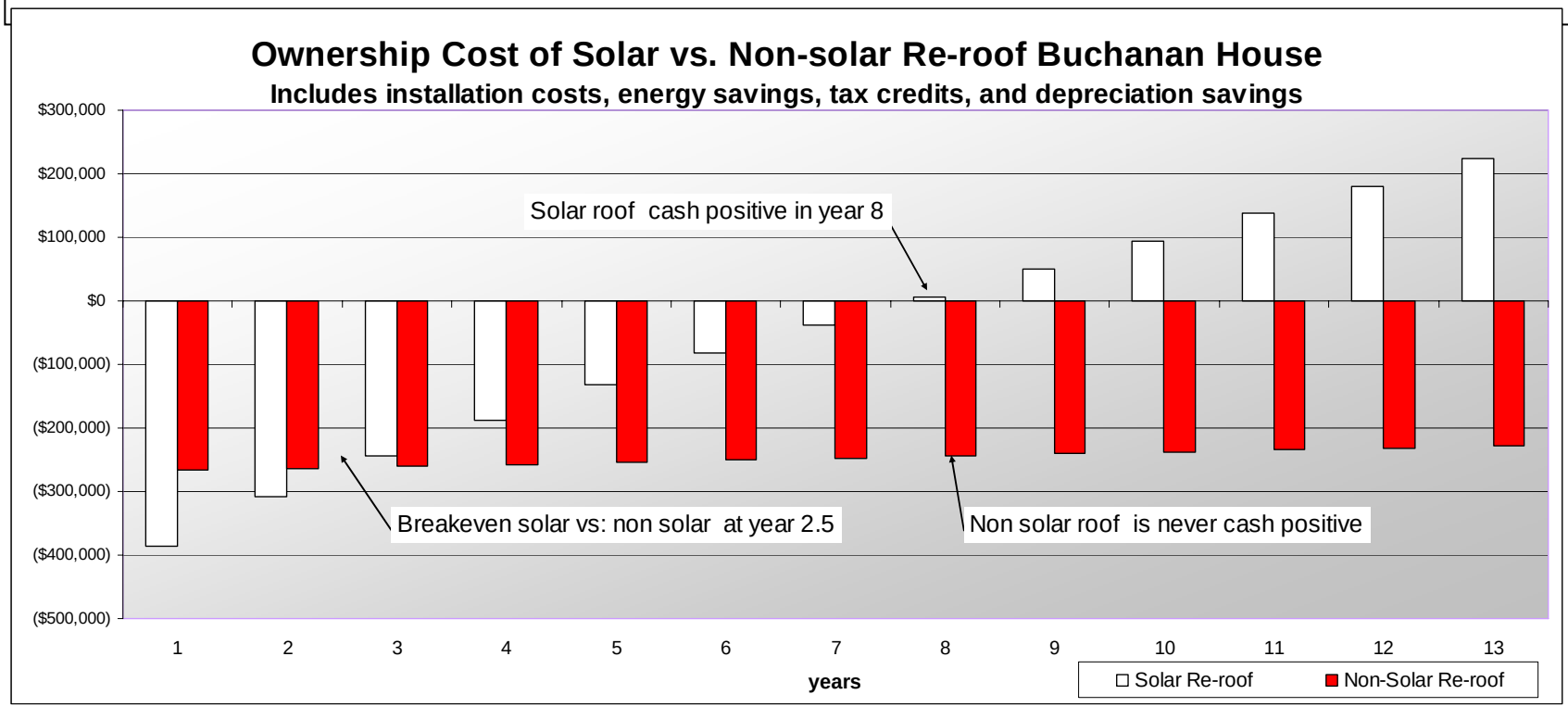
Parallel Framing Over Structural Concrete

- Solar metal re-roof over central portions of roof
- Conventional metal roof panels retrofit over membrane
- New membrane around perimeter and equipment
- Vents and fans carried up through new roof or replace vents with shorter vents to fewer fans

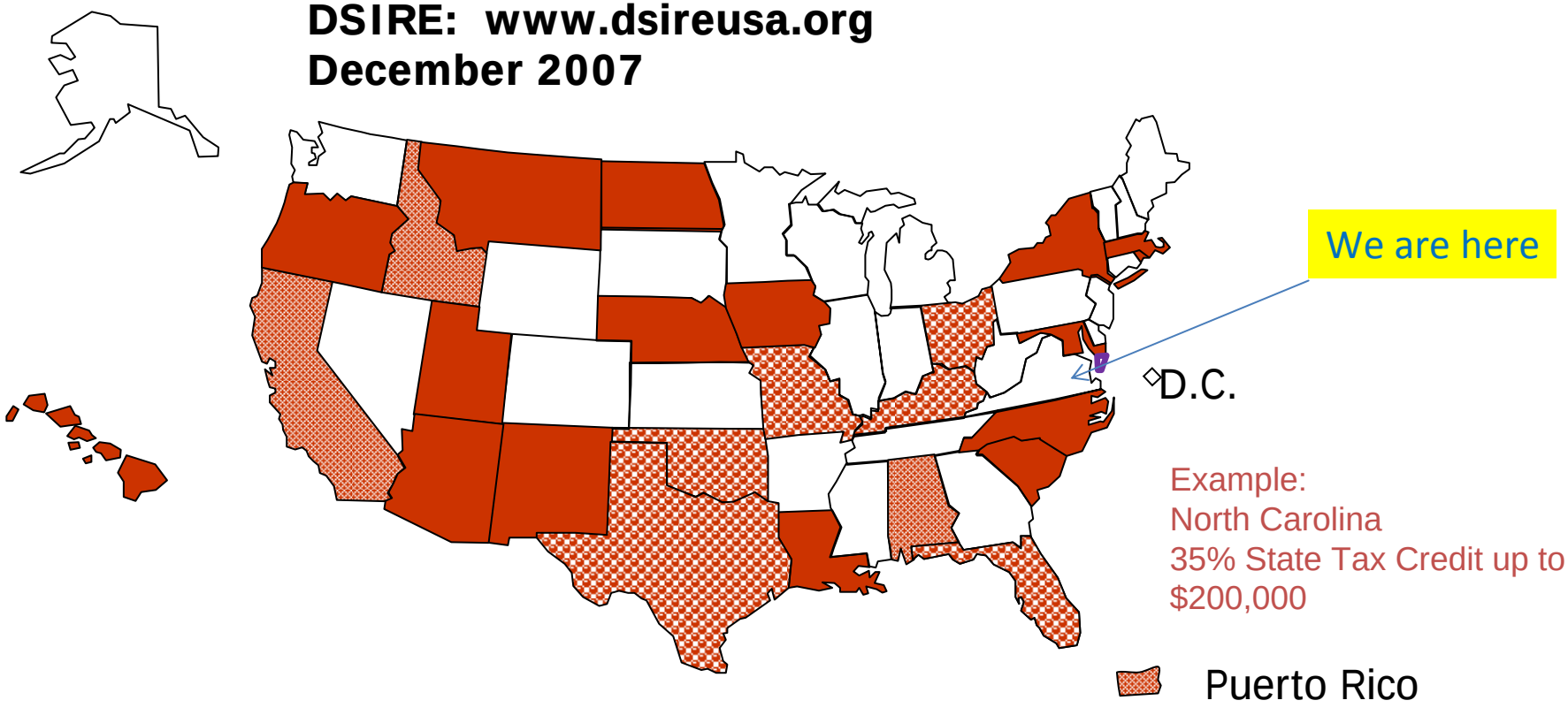
American Solar

VIRGINIA APARTMENT BUILDING SOLAR AIR HEATING ROOF

- **~$600,000 installed cost of solar roof, before taxes**
- **$260,000 total tax savings**
- **$40,000 per year energy savings**
- **Breakeven in 2.5 years vs non-solar option**
- **Roof pays for itself in 8 years from energy and tax savings**

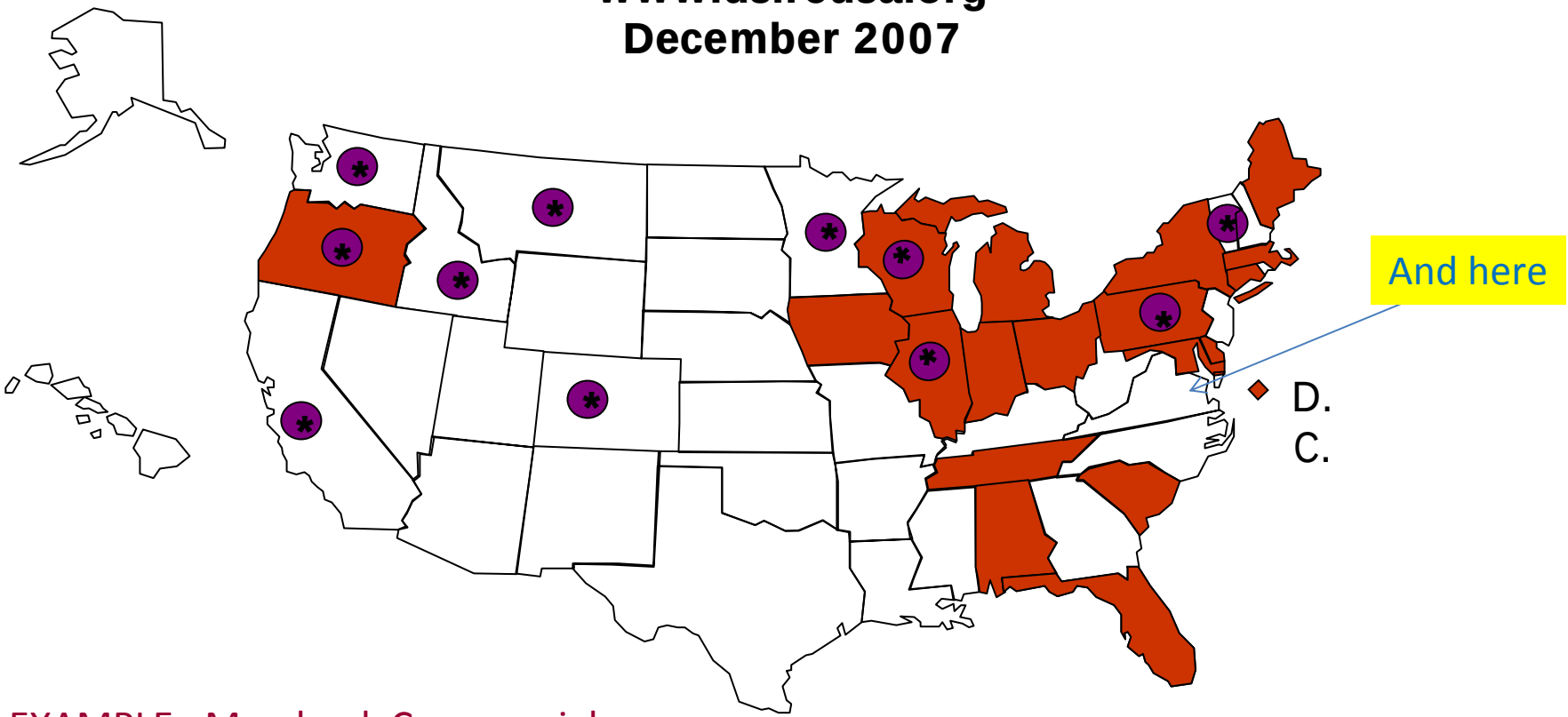


State Tax Credits & Deductions for Renewables



Grants for Renewable Energy Technologies

www.dsireusa.org
December 2007



EXAMPLE: Maryland Commercial, Residential, Nonprofit, Local Government
PV Incentive Amount: $2.50/Watt up to maximum incentive of $10,000
Solar water heating 30% of system cost up to $3,000 maximum grant amount

State offers at least one grant program

Private, utility and/or local program

SAMPLE UTILITY SOLAR INCENTIVE PROGRAMS

Solar Water Heating

Hawaii Electric Company
Solar Water Heating
Residential rebate: $1,000 for retrofits or systems installed on new construction
Commercial custom rebate: case-by-case basis, $125 per deferred kilowatt (kW) coincident with peak electric demand, plus $0.05 per kilowatt-hour (kWh) for retrofits or $0.06 per kWh for new construction

Gainesville Regional Utilities Solar Water Heating
$500 grant, passive and active, certified systems and licensed installers.

Sacramento Municipal Utility District
Solar Domestic Hot Water Program
Rebate $1500 per solar water heating system replacing an electric water heater. 100% loan financing to cover the remaining costs with a ten-year repayment period.

Arizona Public Service
Residential/small solar water heating: $0.50/kWh of estimated first-year savings:
Commercial/large solar water heating: $0.07/kWh-equivalent for 10 years
Maximum Incentive:
SWH: $10,000 for residential/small systems; maximum of 50% of system costs for commercial/large systems.

Photovoltaic Systems

New Jersey
Renewable portfolio standard (RPS) requires each electricity supplier serving retail customers to include in the electricity it sells 22.5% qualifying renewables by 2021, of which 2.12% shall be solar electricity, an estimated 1,500 megawatts (MW)

Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
NJ Renewable Energy Certificates
Amount:Approximately $200 per MWh ($0.20 per kWh)
Maximum Incentive:Approximately $300 per MWh ($0.30 per kWh). Generators must register with the BPU to participate in this program and all utilities must use it.

Arizona
Arizona Public Service Rebate Program
Eligible: Solar Water Heat, Photovoltaics, Solar HVAC
Applicable Sectors: Commercial, Residential
Incentives: Grid-tied residential PV: $3/watt DC;
Off-grid (less than 5 kW): $2/watt DC;
Grid-tied commercial PV: $2.50/watt DC or production-based incentive;
Maximum Incentive: PV: $500,000; system expansions are eligible for up to 50% of project costs

LOOK TO OPERATE WHERE CAN-DO STATE GOVERNMENTS PREVAIL

Support a consistent policy agenda

- Include thermal solar applications in renewable portfolio standards
- Use incentives – RECs, off-sets, emissions trading, supplemental environmental projects, carbon trading -- to spur investment
- Base incentives on performance rather than cost
- Establish demand-side management programs for natural gas and reward gas utilities for customer efficiency gains and solar systems they support
- Make certain that air regulations, state building codes, utility regulation, and permitting do not unduly impede solar
- Encourage industrial, commercial and multi-family residential projects for greater impact and more cost-effective allocation of state resources to gain more solar output
- Demonstrate a wide variety of uses and publish performance results of large systems
- Welcome out-of-state designers and installers to establish the market quickly
- Contract directly with solar companies on system procurements for state facilities

BE IN THE SOLAR INDUSTRY FOR THE LONG HAUL

• Expect the current Renewable Energy.Com investment hype to run a similar course to the 1990s dot.com internet business boom and bust.

• There will be winners and losers. The overall solar “ship” should rise with the tide and remain on higher ground at the end.

• Capital will be coming in, take advantage of it, but invest your own corporate resources in marketing sound technologies and projects.

• Sell reality, not fanciful thinking. For 120 years the oil industry has undergone large price rises and falls, it’s the normal way it operates. More fossil energy resources will come on line, it is just that oil depletion is decades closer, perhaps in sight. Climate change policies may still take many years to come into effect.

• Try to make industrial projects as large as possible to ensure the energy delivered becomes essential for the customer and the systems generate enough income to ensure maintenance.

• Be capable of providing maintenance services for systems to offset manufacturer concerns about taking care of new, unknown technology.