



Design Data

Northeast Solar LLC

Bringing Your Home/Business Into The Future

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Note: This is not an Invoice

TO **Contractors *******
Glycol or Drain Back System

AET Solar Systems
Made in The USA
30,000+ installations
30+ years experience

JOB	PAYMENT TERMS	DUE DATE
DHW, pool heating and limited space heating		N/A

QTY	DESCRIPTION	UNIT PRICE	LINE TOTAL
	<p><u>Design Data for DHW *****</u> Yearly solar supply to DHW load data below:</p> <p>Size of panels 4X8, other sizes are available Panels must have Thermafin Technology for optimal efficiency Assuming all individuals below shower once a day for an average shower time. Panels are mounted and oriented properly to southern exposure.</p> <p>Glycol Design Data 1. Glycol flow rates: between .05GPM/SF of collector area and 1.8GPM/SF of collector 2. Glycol pressure: 30PSI+1PSI /2.3 feet from the bottom of the tank to the collectors. Collector PSI Relief valve set @ 75PSI Good working pressure when HOT 50 to 65PSI max 2. Expansion Tank: Two gallon expansion tank for glycol up to six gallons and four gallon expansion tank for glycol up to 12.5 gallons 3. Remove spring on spring check valve when using a DC pump</p> <p>Drain Back Design Data: One gallon per every 40SF of collector area and three gallons for every 100 feet of 3.4" pipe</p>		

and five gallons for every 100 feet of one inch pipe.

One person load one panel 80 gallon tank
Two person load two panels 120 gallon tank
Three person load two panels 120 gallon tank
Four person load three panels 120 gallon tank
Five person load four panels State Tax cap is now up to \$15,00.00
120 gallon tank and an 80 gallon tank
Federal tax credit 30% no cap of the total job
State cap 25% of \$7,000 under 125SF of panel area

Note: A four person four panel system is more economical than a three panel four person system because of the additional State tax credit.

Pool design data *****

1/2SF of the pool area in panel area will bring the pool up 8 degrees F

Fixed cost associated with *****

- One, two or three panels
1. Tank (120 gallon tank up to three panels) and or plumbing redirecting cold water to solar tank and then back to conventional system
 2. Lines to and from the roof or ground mounting to pool area

More than three panels an additional 80 gallon tank is required
1.2 or 1.5 gallons/SF per collector area

Limited Space Heating *****

Is only possible in the winter months if the output of the panels exceed daily DHW load. This is more likely to occur in the beginning and ending warm winter months. For example a system is designed for five people and only one person is living in the house.

Limited winter Solar Space Heating is less likely to occur in the severe winter months because of the lack of BTU'S available on a horizontal surface in the Northeast.

Slide show presentation

All solar panels for residential use are required to be SRCC tested to qualify for tax credits.

This is why:

One of the Laws of Thermodynamic (physics) states that energy can not be created nor destroyed. This law applies to solar energy and solar panels.

All solar delivery devices convert solar radiation into thermal or electrical energy and are limited by the amount of Solar radiation converted into BTU'S or KWH that penetrate the earth's atmosphere. **A solar energy delivery system can not deliver more BTU'S than what is available per square foot on the earth's surface.** If you increase the square footage of collector area you increase the output of the delivery system. Other variables

also increase or decrease the BTU or KWH output of a solar energy system such as angle of inclination, efficiency of solar energy delivery system, weather conditions, shading and southern exposure. Solar radiation for solar thermal panels is present even on cloudy days. If you can see your shadow chances are you are making hot water to some degree that day with a solar thermal delivery system.

Types of Heat transfer:

Conduction, one object in contact with another (U factor or $R=1/U$, $U=1/R$)

Convection, air movement (CFM)

Radiation, how the earth is heated relative to: emissivity is the ability of an object on the earth to reflect or absorb radiation.

Conservation before renewable energy (the most economical to date to reduce energy bills)

Most economical because it cost three to five dollars to generate one BTU of renewable energy as compared to one dollar per BTU from energy conservation.

Conservation includes thermal and electrical

New Windows, insulation to include insulating copper FHW pipes in your basement doors, boilers, air conditioners (Energy Star appliances) etc.

Wood, clean and abundant but labor intensive

Pellets, clean and abundant less labor intensive however fossil fuel price dependent.

Solar Thermal Radiation:

Latitude, monthly and weather dependent:

Low grade heat on the earths surface rated in BTU'S per SF per day

Solar Radiation is directly proportional to weather conditions, time of year and day. For example more solar radiation daily averages are higher in June verses December

Solar Radiation Analysis:

Adequate free supply of solar radiation during the warm six months in RI. Limited free amount of solar radiation available during the winter six months. Free unlimited energy source any time of the year after installation cost.

Environmentally friendly energy source not subject to price swings and shortages.

Solar radiation is available anywhere in the US and when used properly yields an acceptable return on investment.

Can be placed in cities or just about anywhere depending on southern exposure and or aesthesis.

Design life of an average installation is 30 plus years for flat plate collectors.

Design output to load during the month of June

Fossil Fuels

Not latitude, monthly and weather dependent:

Some are considered to have a limited supply, All are Unstable in price, and all are not environmentally friendly.

High grade heat/cooling source usually rated in BTU'S/hour

Available all the time warm or cold weather conditions.

All fuels are rated in CMBTU

Electric \$49.00 CMBTU @ .17KWH 3,413 BTU'S per KWH

Geothermal is electric divided by COP 4.0 to 5.0 with eclectic back up when system operates close to design temperature.

AC COP also improves with geothermal however ambient AC efficiency improvements systems are closing in on the gap.

Street Gas, \$18.00/CMBTU @ \$1.50/therm, 100,000BTU'S/therm \$85% Eff

Oil for heating and hot water \$22.00 CMBTU @ 140,000 Buts'/gallon @ 80% eff

Propane in Bulk \$24.00 CMBTU @ 92,000 Buts'/gallon

Solar Free also extends the life of your conventional hot water making system

Further analysis of the below energy sources:

Nuclear:

Clean efficient inexpensive energy source.

High upfront cost per KWH

Nuclear waste disposal?

Not in my back yard

Wind:

Clean efficient unlimited free energy source.

Moderate to High upfront cost per KWH depending on size and location of installation.

Portsmouth, RI in my back yard

Solar:

Efficiency of Solar Energy Delivery Devices

Thermal 50% to 70%

Low to moderate upfront cost per KWH

Available anywhere in the US

Long design life

Photovoltaic's less than 20%

High upfront cost per KWH

Fossil Fuels:

Efficiency of Fossil Fuels delivery devices:

All greater than 80% except electric

Moderate up front cost per KWH

All not clean (CO2 output) and limited supply.

Natural gas:

Cleanest and most US abundant of all fossil fuels.

Coal:

No such thing as clean coal.

Toxic ash disposal

