
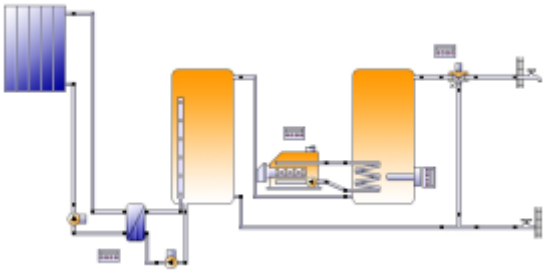


Summary report

	<p>This report has been created by: Dan Gretsch SolarHot Ltd. 233-O E. Johnson Street, 27513 Cary, US</p>
<p>Variant (Hot water)</p>	<p>Project Restaurant</p>
	<p>NC Raleigh Site: Clear Country: USA Longitude: -78.78° Latitude: 35.87° Elevation: 350 ft Average outdoor temperature 59.8 °F Radiation collector fields: 770655 kBtu/Year Collector field (facing south) Orientation: 0° Tilt angle: 37°</p>
	<p>Solar system (predefined Vela Solaris template) 8d: Hot water (solar thermal, 2 tanks) System</p> <p>Collector area: 1343.5944 ft² Total absorber area: 1246.8483 ft² Volume of tanks: Volume: 607.6 gal (2 Tank) Auxiliary heating power: Power: 249.1 kBtu/hr (2 Auxiliary heating) Total piping length: Length: 134.514 ft (15 Piping)</p>
<p>Consumption demand</p>	<p>Energy demand covered</p>
<p>Total end energy supplied to the reference system (consumed fuel and electricity from the grid)</p>	<p>-</p>
<p>Total end energy supplied to the system (consumed fuel and electricity from the grid)</p>	<p>72433.3 kBtu/Year</p>
<p>Fraction of solar energy to system (net)</p>	<p>83.5 %</p>
<p>Solar fraction hot water (SFnHw)</p>	<p>-</p>
<p>Solar fraction building (SFnBd)</p>	<p>-</p>
<p>Annual fuel savings</p>	<p>337801.2 ft³: [Natural gas] Gas boiler, large / -</p>
<p>Annual energy savings</p>	<p>342705.2 kBtu: Gas boiler, large / 0 kBtu: Electric resistance heater element 3</p>
<p>Annual reduction in CO2 emissions</p>	<p>51279.7 pound: [Natural gas] Gas boiler, large / 0 pound : [Electricity] Electric resistance heater element 3</p>
<p>Collector field yield of collector fields</p>	<p>283580 kBtu/Year</p>
<p>Collector field yield relating to gross area</p>	<p>211 kBtu/ft²/Year</p>
<p>Collector field yield relating to aperture area</p>	<p>227 kBtu/ft²/Year</p>
<p>Consumption demand</p>	<p>Energy demand covered</p>
<p>User defined components/materials</p>	<p>None. Only Vela Solaris-controlled elements are simulated.</p>
<p>Explanations</p>	<p>http://www.polysun.ch/</p>

System overview

Meteorological data

Properties	Value, unit	Properties	Value, unit
Outdoor temperature	59.8 °F	Global irradiance	508.9 kBtu/ft ²
Diffuse irradiance	216.8 kBtu/ft ²	Long wavelength irradiance	918.7 kBtu/ft ²
Wind speed	0.84 ft/s	Air humidity	70 %
Outdoor temperature 24-h-mean	59.8 °F	Standard outdoor temperature	12.2 °F
Normal direct irradiance	523.9 kBtu/ft ²		

Definition of the consumers

Consumer	Cat. n.	Name	Description	Temperature setting	Energy consumption
Presence	1	always present	Presence days: 365	-	-
Hot water			1507.9 gal/d	122 °F	292032.2 kBtu/Year

Definition of the solar system

Element	Cat. n.	Name	Properties, Value, unit
Collector North America	9171	42x Solarhot S-SC-126P32	Data Source: SRCC
Boiler	3	Gas boiler, large	Power: 238.91 kBtu/hr, Efficiency value: 90%
Pipe 16	32	Copper pipe 22x1	-
External heat exchanger	4	Plate heat exchanger, huge	Transfer capacity: 30000 W/K, Number of heat exchanger plates: 40
Storage tank 2	1040	Tank 40	Volume: 528.3 gal, Thickness of insulation: 3.15 in
Storage tank 3	564	300l potable water tank	Volume: 79.3 gal, Thickness of insulation: 3.15 in
Mixing valve controller			Definition temperature setting: Variable value, Temperature shift: 3.6 R
Pump controller solar loop			Maximum tank temperature: 190 °F, Cut-in temperature difference: 10.8 R, Cut-off temperature difference: 3.6 R, Definition flow rate setting: Specific flow rate
Auxiliary heating controller 2			Reference for temperature sensors 1: Variable value, Minimum operation time: 10 min, Minimum downtime: 0 min
Auxiliary heating controller 3			Reference for temperature sensors 1: Fixed value, Minimum operation time: 0 min, Minimum downtime: 0 min

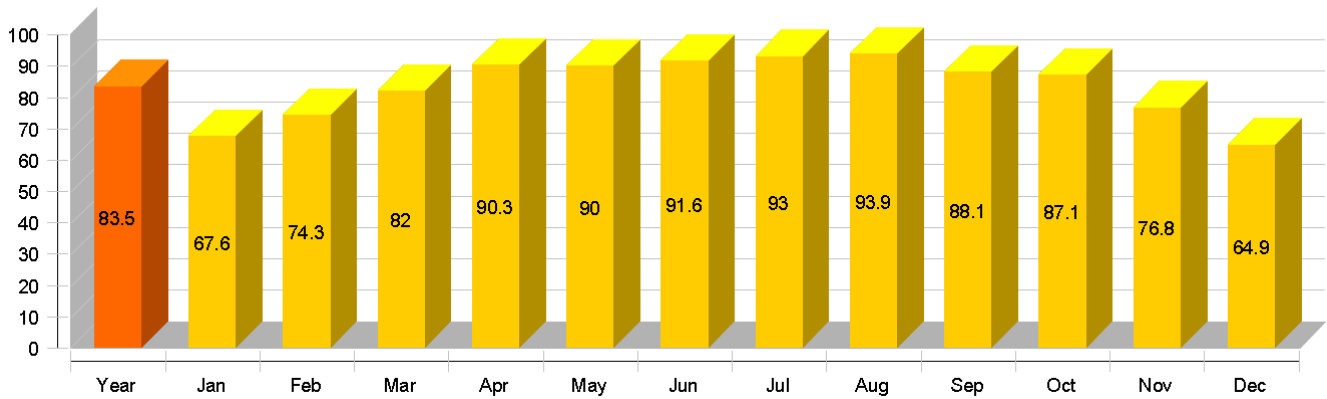
Results overview

Fraction of solar energy to system (net)

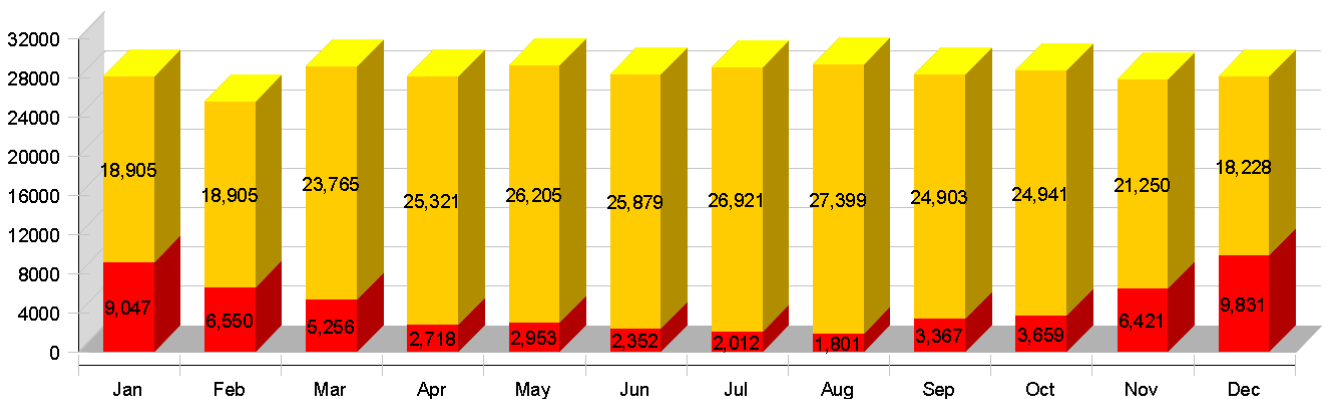
Symbol	Unit	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SFn	%	83.5	67.6	74.3	82	90.3	90	91.6	93	93.9	88.1	87.1	76.8	64.9
Qsol	kBtu	283580	18968	18976	23882	25424	26307	25957	27006	27478	24996	25028	21311	18248
Saux	kBtu	55968	9047	6550	5256	2718	2953	2352	2012	1801	3367	3659	6421	9831
Qdem	kBtu	292032	27436	26498	29971	28391	27436	24029	22225	20325	19057	20325	21508	24830
Qdef	kBtu	4251	978	699	374	177	172	71	117	115	219	261	452	615

SFn: Fraction of solar energy to system (net), Qsol: Solar energy to the system, Saux: Auxiliary energy in tank, Qdem: Energy demand, Qdef: Energy deficit

Fraction of solar energy to system (net) [%]



Solar yield and auxiliary energy [kBtu]



Daily maximum collector temperature [°F]

