
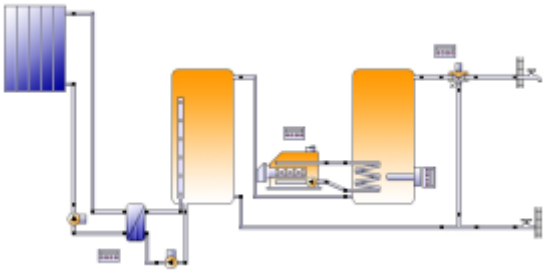


Summary report

	<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: 220187 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: 383.88406 ft² Total absorber area: 356.24237 ft² Volume of tanks: Volume: 396.3 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>75253.9 kBtu/Year</p>
<p>Fraction of solar energy to system (net)</p>	<p>65.9 %</p>
<p>Solar fraction hot water (SF_nHw)</p>	<p>-</p>
<p>Solar fraction building (SF_nBd)</p>	<p>-</p>
<p>Annual fuel savings</p>	<p>139507.2 ft³: [Natural gas] Gas boiler, large / -</p>
<p>Annual energy savings</p>	<p>141532.5 kBtu: Gas boiler, large / 0 kBtu: Electric resistance heater element 3</p>
<p>Annual reduction in CO₂ emissions</p>	<p>21177.8 pound: [Natural gas] Gas boiler, large / 0 pound : [Electricity] Electric resistance heater element 3</p>
<p>Collector field yield of collector fields</p>	<p>116124 kBtu/Year</p>
<p>Collector field yield relating to gross area</p>	<p>302 kBtu/ft²/Year</p>
<p>Collector field yield relating to aperture area</p>	<p>326 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			776.4 gal/d	122 °F	150368.4 kBtu/Year

Definition of the solar system

Element	Cat. n.	Name	Properties, Value, unit
Collector North America	9171	12x 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	2	Plate heat exchanger, medium size	Transfer capacity: 10000 W/K, Number of heat exchanger plates: 30
Storage tank 2	576	1200l buffer master tank	Volume: 317 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

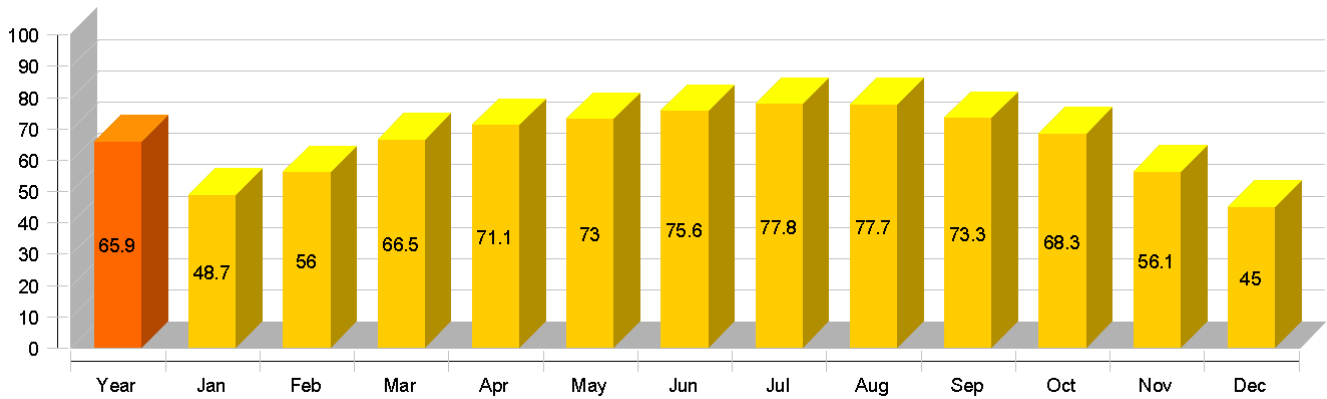
Results overview

Fraction of solar energy to system (net)

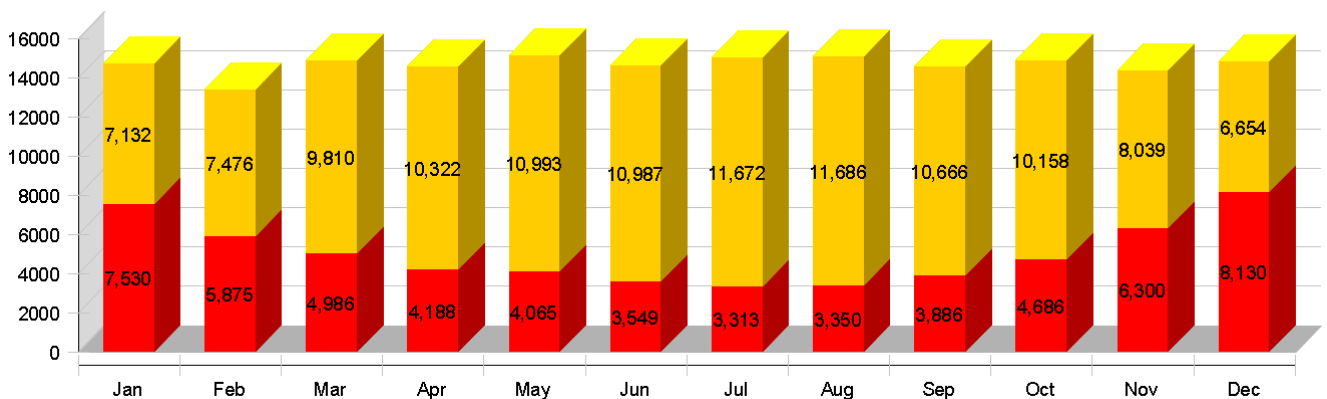
Symbol	Unit	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SFn	%	65.9	48.7	56	66.5	71.1	73	75.6	77.8	77.7	73.3	68.3	56.1	45
Qsol	kBtu	116124	7174	7519	9871	10379	11042	11029	11713	11725	10712	10204	8075	6680
Saux	kBtu	59858	7530	5875	4986	4188	4065	3549	3313	3350	3886	4686	6300	8130
Qdem	kBtu	150368	14127	13644	15432	14619	14127	12373	11444	10466	9812	10466	11075	12785
Qdef	kBtu	1764	269	214	220	87	67	72	97	76	121	173	141	227

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]

