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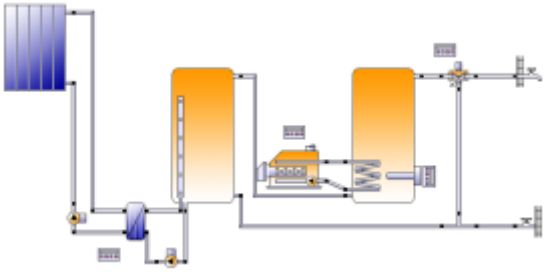
Summary report

solarHOt	**This report has been created by:** Dan Gretsch SolarHot Ltd. 233-O E. Johnson Street, 27513 Cary, US
Variant (Hot water)	Project Restaurant
	NC Raleigh — Site: Clear — Country: USA Longitude: -78.78° — Latitude: 35.87° — Elevation: 350 ft Average outdoor temperature 59.8 °F Radiation collector fields: 440374 kBtu/Year Collector field (facing south) — Orientation: 0° — Tilt angle: 37°
	**Solar system (predefined Vela Solaris template)** 8d: Hot water (solar thermal, 2 tanks) **System** Collector area: 767.7681 ft² Total absorber area: 712.48474 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)
Consumption demand	Energy demand covered
Total end energy supplied to the reference system (consumed fuel and electricity from the grid)	-
Total end energy supplied to the system (consumed fuel and electricity from the grid)	76407.5 kBtu/Year
Fraction of solar energy to system (net)	78.9 %
Solar fraction hot water (SFnHw)	-
Solar fraction building (SFnBd)	-
Annual fuel savings	260754.7 ft³: [Natural gas] Gas boiler, large / -
Annual energy savings	264540.2 kBtu: Gas boiler, large / 0 kBtu: Electric resistance heater element 3
Annual reduction in CO2 emissions	39583.7 pound: [Natural gas] Gas boiler, large / 0 pound : [Electricity] Electric resistance heater element 3
Collector field yield of collector fields	210905 kBtu/Year
Collector field yield relating to gross area	275 kBtu/ft²/Year
Collector field yield relating to aperture area	296 kBtu/ft²/Year
Consumption demand	Energy demand covered
User defined components/materials	None. Only Vela Solaris-controlled elements are simulated.
Explanations	http://www.polysun.ch/

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System overview

Meteorological data

Properties	Value, unit	Properties	Value, unit
Outdoor temperature	59.8 °F	Global irradiance	508.9 kBtu/ft²
Diffuse irradiance	216.8 kBtu/ft²	Long wavelength irradiance	918.7 kBtu/ft²
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/ft²		

Definition of the consumers

Consumer	Cat. n.	Name	Description	Temperature setting	Energy consumption
Presence	1	always present	Presence days: 365	-	-
Hot water			1000.3 gal/d	145 °F	263162.5 kBtu/Year

Definition of the solar system

Element	Cat. n.	Name	Properties, Value, unit
Collector North America	9171	24x 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

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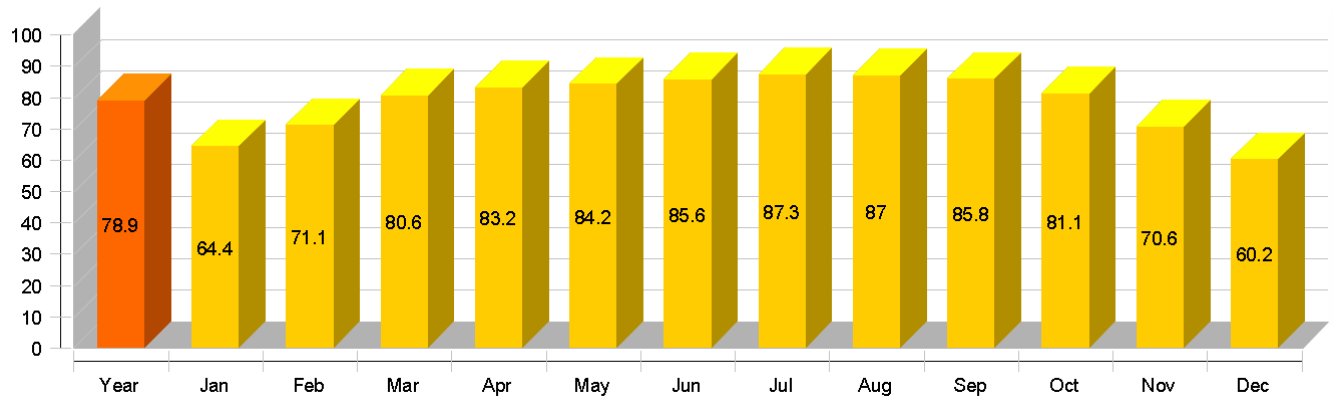
Results overview

Fraction of solar energy to system (net)

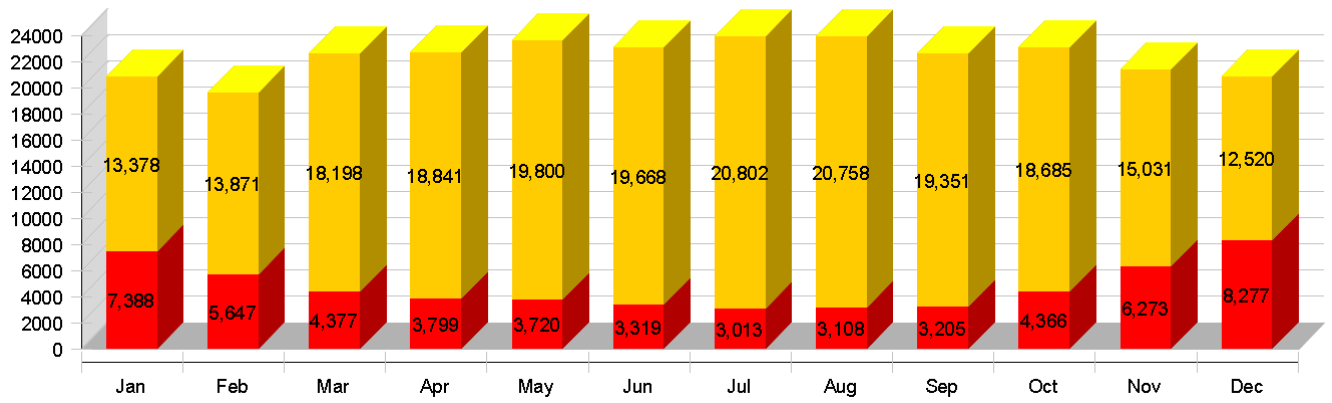
Symbol	Unit	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SFn	%	78.9	64.4	71.1	80.6	83.2	84.2	85.6	87.3	87	85.8	81.1	70.6	60.2
Qsol	kBtu	210905	13378	13871	18198	18841	19800	19668	20802	20758	19351	18685	15031	12520
Qaux	kBtu	56491	7388	5647	4377	3799	3720	3319	3013	3108	3205	4366	6273	8277
Qdem	kBtu	263163	24098	22905	25779	24541	24098	21647	20641	19380	18349	19380	19975	22369
Qdef	kBtu	28120	4081	3116	2548	1733	1688	1389	1430	1310	1803	2106	2849	4069

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

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



Solar yield and auxiliary energy [kBtu]



Daily maximum collector temperature [°F]