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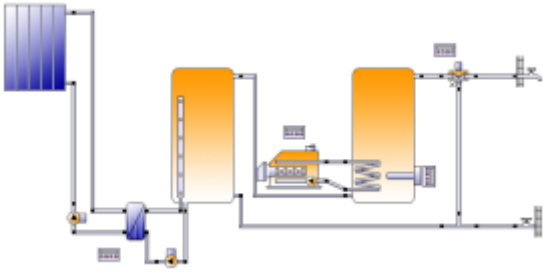
Summary report

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: 220187 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: 383.88406 ft² Total absorber area: 356.24237 ft² Volume of tanks: Volume: 475.5 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)	42057 kBtu/Year
Fraction of solar energy to system (net)	80.1 %
Solar fraction hot water (SFnHw)	-
Solar fraction building (SFnBd)	-
Annual fuel savings	144998.4 ft³: [Natural gas] Gas boiler, large / -
Annual energy savings	147103.4 kBtu: Gas boiler, large / 0 kBtu: Electric resistance heater element 3
Annual reduction in CO2 emissions	22011.4 pound: [Natural gas] Gas boiler, large / 0 pound : [Electricity] Electric resistance heater element 3
Collector field yield of collector fields	110054 kBtu/Year
Collector field yield relating to gross area	287 kBtu/ft²/Year
Collector field yield relating to aperture area	309 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	508.8 kBtu/ft²
Diffuse irradiance	216.7 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			500.4 gal/d	145 °F	131653 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	3	Plate heat exchanger, large	Transfer capacity: 17000 W/K, Number of heat exchanger plates: 30
Storage tank 2	577	1500l buffer master tank	Volume: 396.3 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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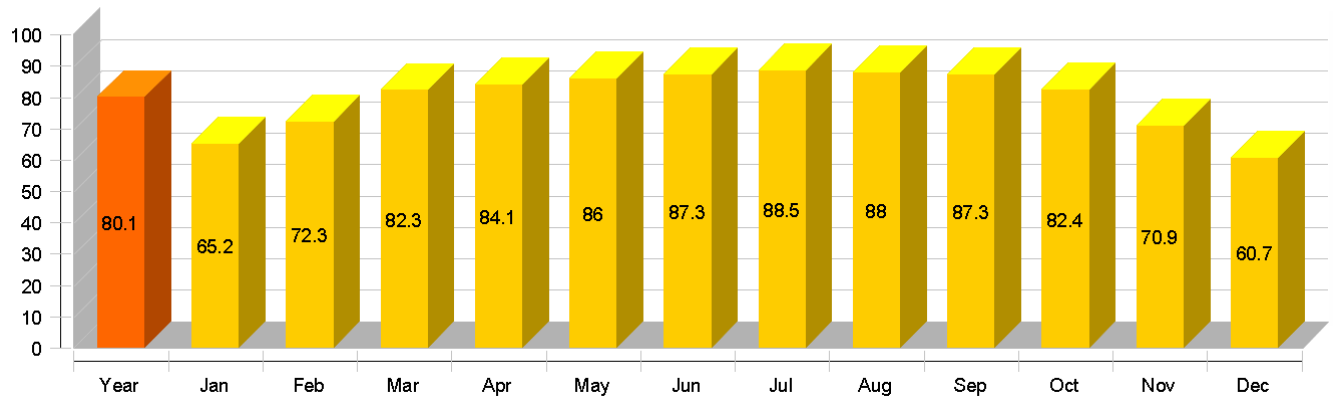
Results overview

Fraction of solar energy to system (net)

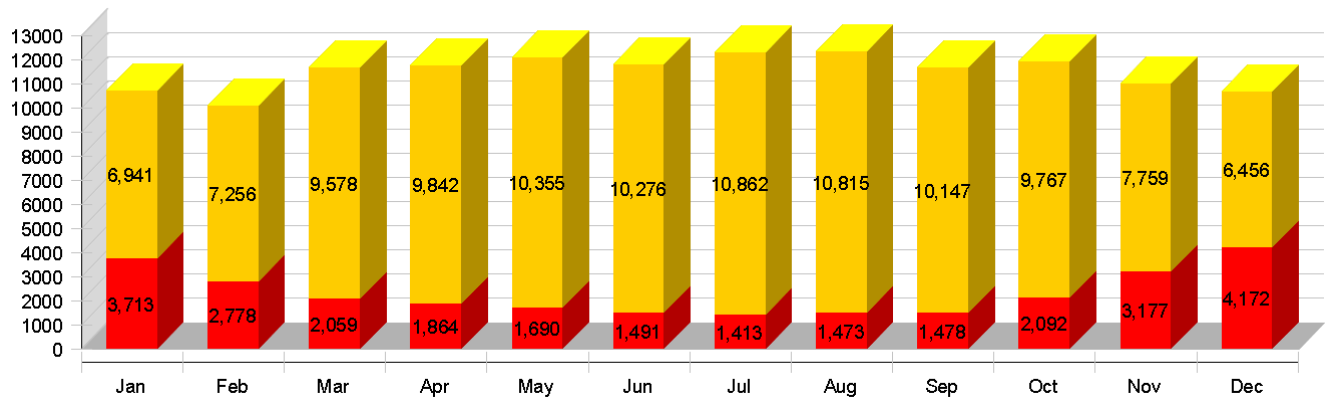
Symbol	Unit	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SFn	%	80.1	65.2	72.3	82.3	84.1	86	87.3	88.5	88	87.3	82.4	70.9	60.7
Qsol	kBtu	110054	6941	7256	9578	9842	10355	10276	10862	10815	10147	9767	7759	6456
Qaux	kBtu	27401	3713	2778	2059	1864	1690	1491	1413	1473	1478	2092	3177	4172
Qdem	kBtu	131653	12055	11459	12897	12277	12055	10830	10326	9696	9179	9696	9993	11191
Qdef	kBtu	12433	1878	1438	1106	684	759	615	531	542	725	907	1318	1928

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]