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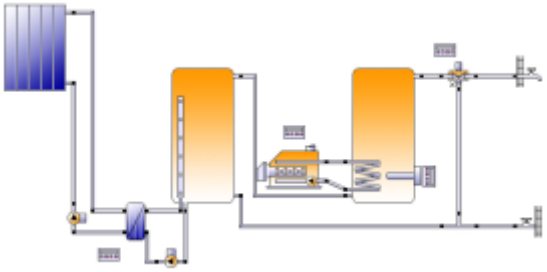
Summary report

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: 110094 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: 191.94203 ft² Total absorber area: 178.12119 ft² Volume of tanks: Volume: 290.6 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)	29172.1 kBtu/Year
Fraction of solar energy to system (net)	74 %
Solar fraction hot water (SFnHw)	-
Solar fraction building (SFnBd)	-
Annual fuel savings	76677.1 ft³: [Natural gas] Gas boiler, large / -
Annual energy savings	77790.2 kBtu: Gas boiler, large / 0 kBtu: Electric resistance heater element 3
Annual reduction in CO2 emissions	11639.9 pound: [Natural gas] Gas boiler, large / 0 pound : [Electricity] Electric resistance heater element 3
Collector field yield of collector fields	55491 kBtu/Year
Collector field yield relating to gross area	289 kBtu/ft²/Year
Collector field yield relating to aperture area	312 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			250.4 gal/d	145 °F	65870.6 kBtu/Year

Definition of the solar system

Element	Cat. n.	Name	Properties, Value, unit
Collector North America	9171	6x 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	569	800l potable water master tank	Volume: 211.3 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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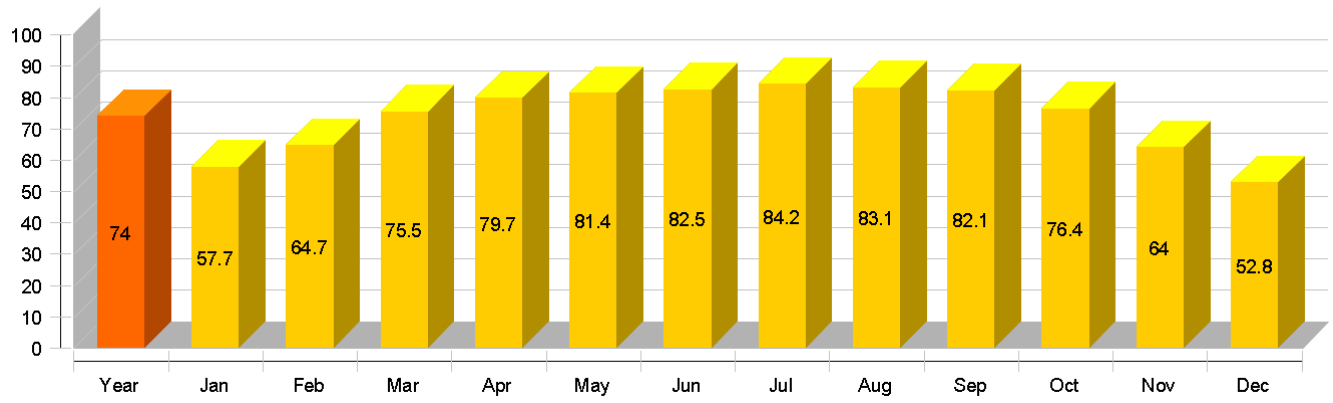
Results overview

Fraction of solar energy to system (net)

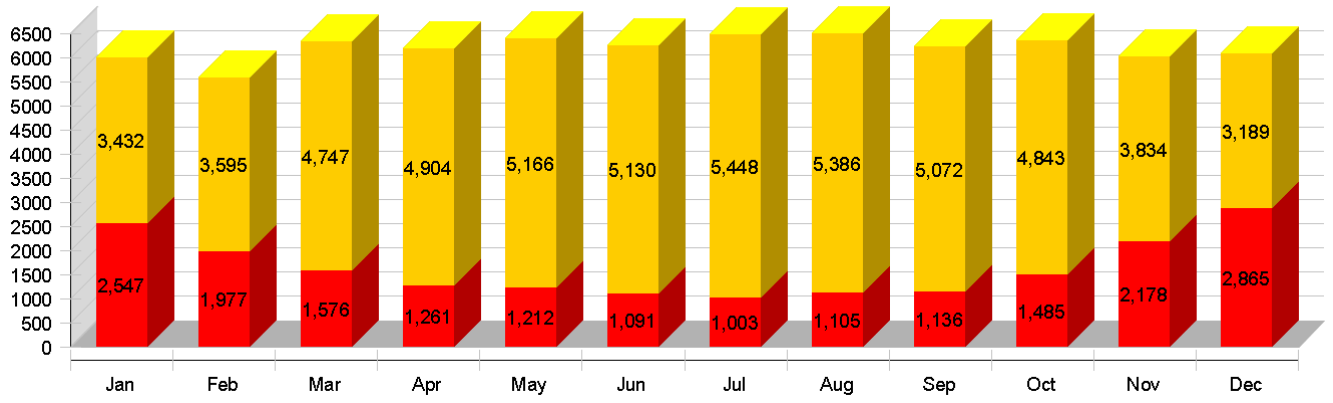
Symbol	Unit	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SFn	%	74	57.7	64.7	75.5	79.7	81.4	82.5	84.2	83.1	82.1	76.4	64	52.8
Qsol	kBtu	55491	3480	3649	4819	4979	5237	5196	5514	5456	5139	4910	3884	3227
Saux	kBtu	19437	2547	1977	1576	1261	1212	1091	1003	1105	1136	1485	2178	2865
Qdem	kBtu	65871	6032	5733	6453	6143	6032	5418	5166	4851	4593	4851	5000	5599
Qdef	kBtu	3264	480	350	268	221	228	187	169	159	189	247	328	438

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]