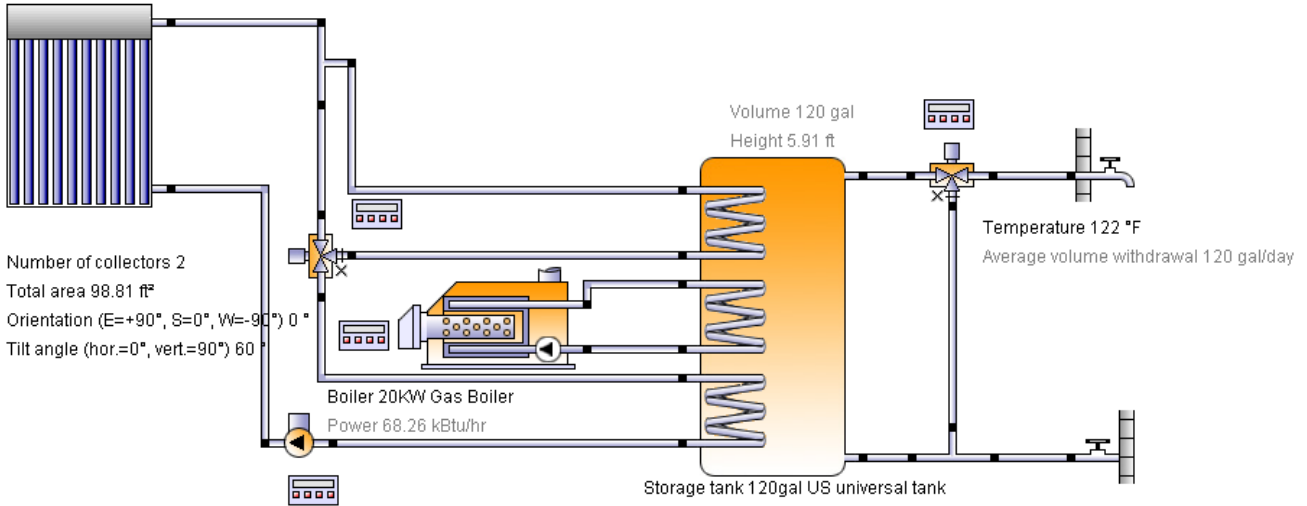


Financial Report

Project

8be: Hot water (solar thermal, low-flow)



Location of the system

Map section

Saskatoon
 Longitude: -106.721°
 Latitude: 52.147°
 Elevation: 0 ft

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This report has been created by:

William Elliott
 303 47 Str.E
 S7K 5H2 Saskatoon

System overview (annual values)

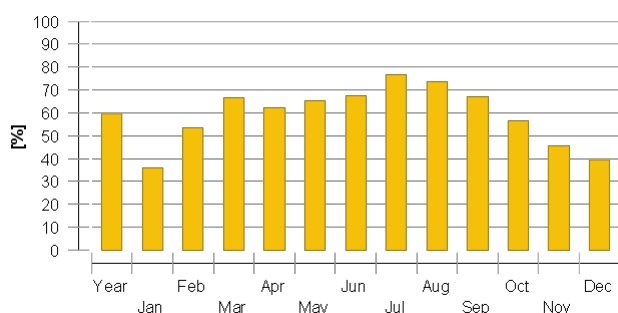
Total fuel and/or electrical energy consumption of the system [Etot]	25,373.1 kBtu
Total energy consumption [Quse]	27,546.3 kBtu
System performance (Quse / Etot)	1.09
Comfort demand	Energy demand covered

Financial Report

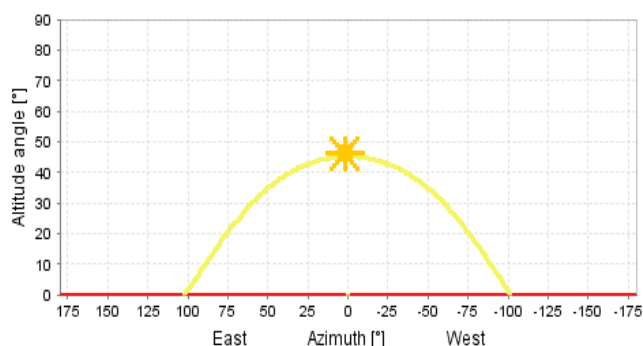
Overview solar thermal energy (annual values)

Collector area	98.8 ft ²
Solar fraction total	59.5%
Total annual field yield	17,730.4 kBtu
Collector field yield relating to gross area	179.4 kBtu/ft ² /Year
Collector field yield relating to aperture area	206.6 kBtu/ft ² /Year
Max. fuel savings	29,127.8 ft ³ : [Natural gas H]
Max. energy savings	29,550.7 kBtu
Max. reduction in CO2 emissions	4,421.7 pound

Solar fraction: fraction of solar energy to system [SF_n]



Horizon line



Meteorological data-Overview

Average outdoor temperature	37.7 °F
Global irradiation, annual sum	429.3 kBtu/ft ²
Diffuse irradiation, annual sum	159.3 kBtu/ft ²

Financial analysis - Solar thermal

Purchase costs	2,850 CAD
Life span	35 years
Proportional incentives	0 %
Incentives per area	0 CAD
Fixed incentives	0 CAD
Inflation	3 %
Interest	0 %
Increase of energy prices	6 %
Natural gas H	0.031 CAD/ft ³ ; 0.031 CAD/kBtu
Effective purchase cost after grants	2,850 CAD
Annual fuel cost savings	907.934 CAD
Solar energy cost per kWh	0.01 CAD

Financial Report

Financial analysis - Solar thermal

Payback period	3 years
Present value of the system	209,948.266 CAD
Net present value	207,098.266 CAD

Component overview (annual values)

Boiler	20KW Gas Boiler	
Power	kBtu/hr	68.26
Total efficiency	%	48.4
Energy from/to the system [Qaux]	kBtu	12,067.7
Fuel and electrical energy consumption [Eaux]	kBtu	24,935.9
Energy savings solar thermal	kBtu	29,550.7
CO savings solar thermal	pound	4,421.7
Fuel savings solar thermal	ft ³	29,127.8

Collector North America	WSE58ST	
Data Source		u138368
Number of collectors		2
Number of arrays		1
Total area	ft ²	98.81
Total aperture area	ft ²	85.81
Total absorber area	ft ²	85.81
Tilt angle (hor.=0°, vert.=90°)	°	60
Orientation (E=+90°, S=0°, W=-90°)	°	0
Collector field yield [Qsol]	kBtu	17,730.4
Irradiation onto collector area [Esol]	kBtu	56,686.9
Collector efficiency [Qsol / Esol]	%	31.3
Direct irradiation after IAM	kBtu	45,082.9
Diffuse irradiation after IAM	kBtu	23,947

Hot water demand	Constant	
Volume withdrawal/daily consumption	gal/d	120.4
Temperature setting	°F	122
Energy demand [Qdem]	kBtu	30,300

Pump Solar loop pump	Pump, small	
Circuit pressure drop	psi	0.341
Flow rate	gpm	0.5
Fuel and electrical energy consumption [Epar]	kBtu	437.2

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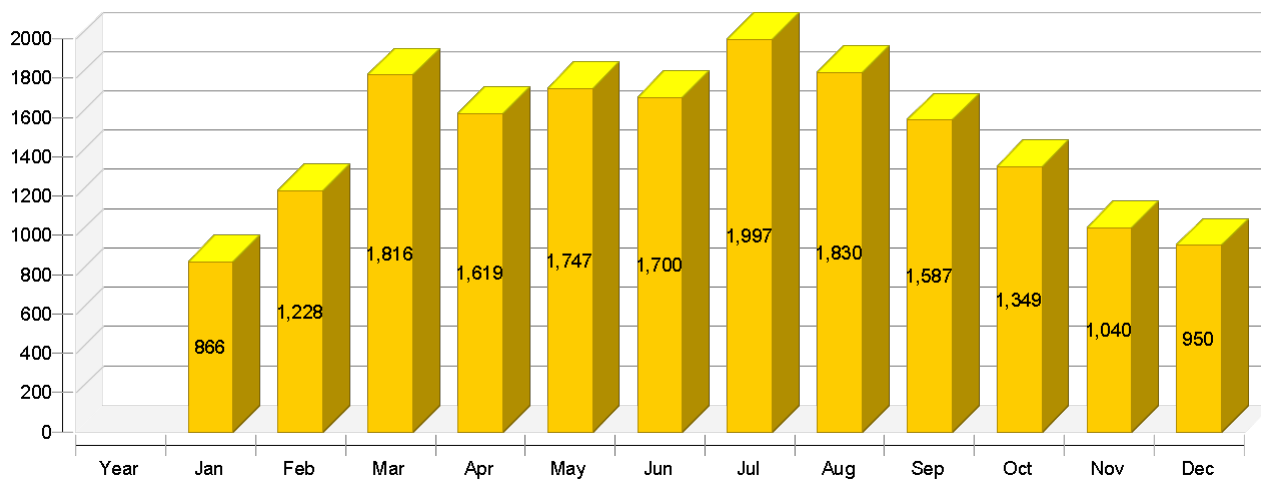
Storage tank 3	120gal US universal tank	
Volume	gal	120
Height	ft	5.91
Material		Enameled steel
Insulation		Flexible polyurethane foam
Thickness of insulation	in	4
Heat loss	kBtu	512.1
Connection losses	kBtu	566.9

Loop

Solar loop		
Fluid mixture		Ethylene mixture
Fluid concentration	%	33.3
Fluid domains volume	gal	7.6
Pressure on top of the circuit	psi	58.016

Solar thermal energy to the system [Qsol]

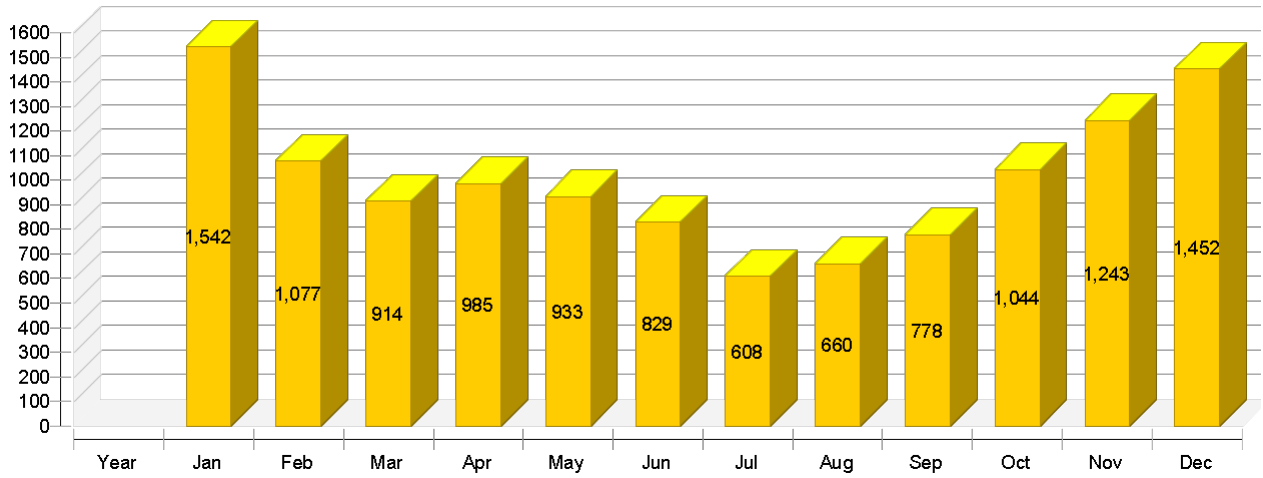
kBtu



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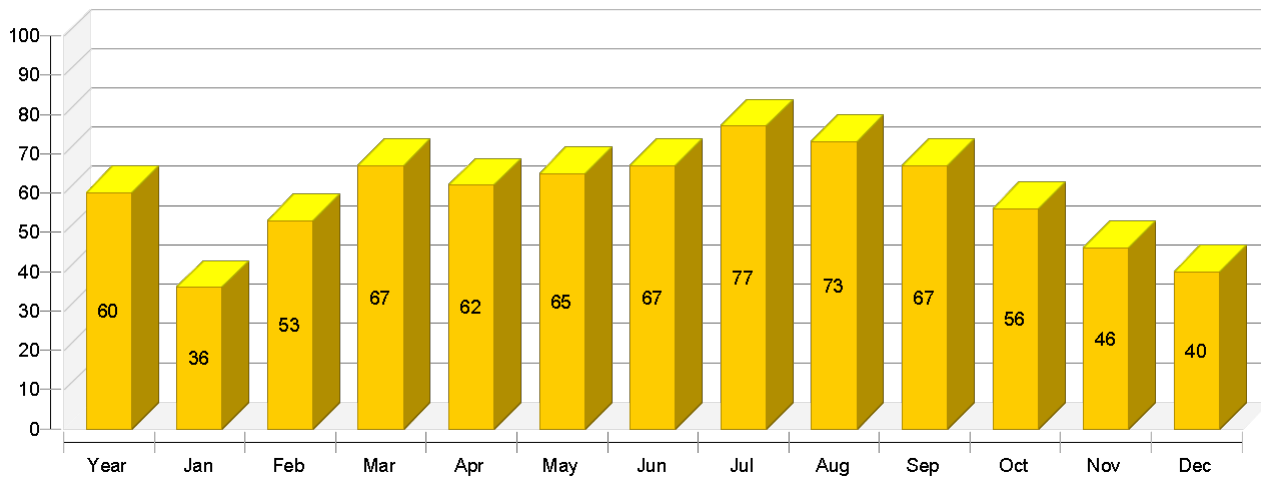
Heat generator energy to the system (solar thermal energy not included) [Qaux]

kBtu



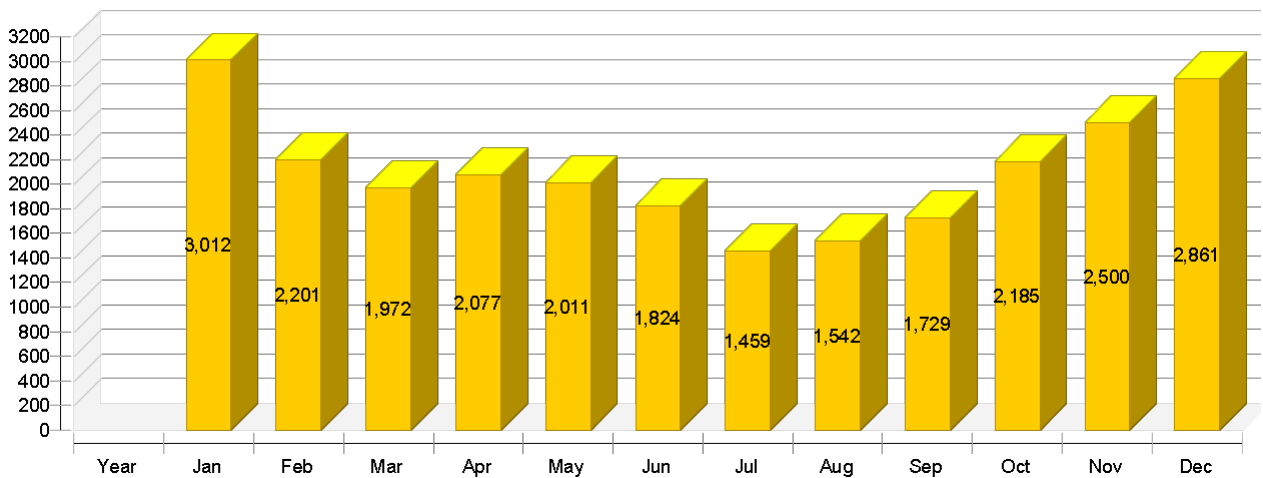
Solar fraction: fraction of solar energy to system [SFn]

%



Total fuel and/or electrical energy consumption of the system [Etot]

kBtu

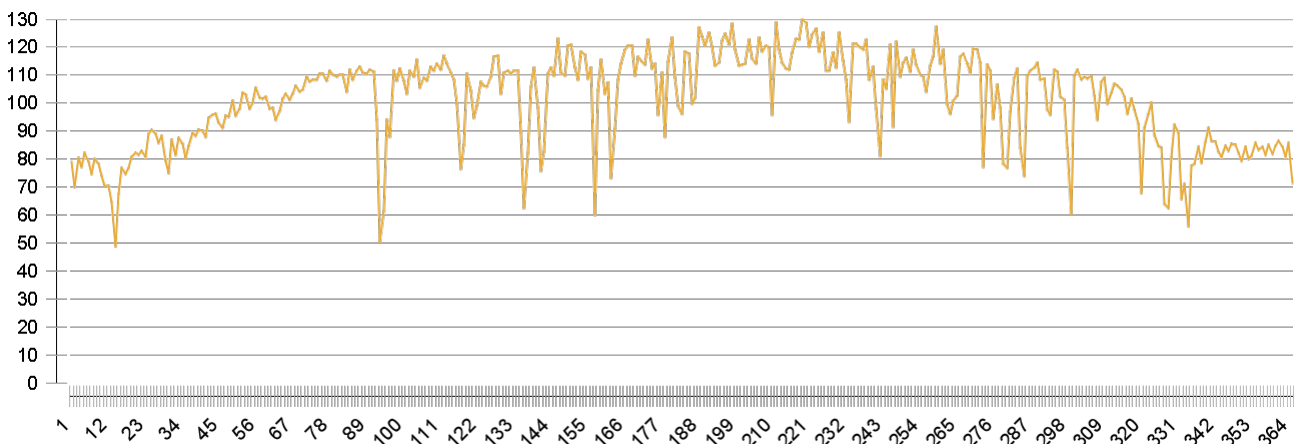


Financial Report

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar thermal energy to the system [Qsol]													
kBtu	17730	866	1228	1816	1619	1747	1700	1997	1830	1587	1349	1040	950
Heat generator energy to the system (solar thermal energy not included) [Qaux]													
kBtu	12068	1542	1077	914	985	933	829	608	660	778	1044	1243	1452
Heat generator fuel and electrical energy consumption [Eaux]													
kBtu	24936	2987	2171	1934	2039	1965	1779	1412	1499	1691	2151	2473	2836
Solar fraction: fraction of solar energy to system [SFn]													
%	59.5	36	53.3	66.5	62.2	65.2	67.2	76.7	73.5	67.1	56.4	45.6	39.6
Total fuel and/or electrical energy consumption of the system [Etot]													
kBtu	25373	3012	2201	1972	2077	2011	1824	1459	1542	1729	2185	2500	2861
Irradiation onto collector area [Esol]													
kBtu	56687	3346	4409	6250	5117	5117	4820	5659	5394	5019	4481	3590	3484
Electrical energy consumption of pumps [Epar]													
kBtu	437	26	30	38	39	46	45	47	44	38	33	27	25
Heat loss to indoor room (including heat generator losses) [Qint]													
kBtu	15052	1535	1211	1196	1219	1223	1170	1081	1110	1153	1302	1367	1485
Heat loss to surroundings (without collector losses) [Qext]													
kBtu	505	47	54	68	42	35	31	33	33	38	42	41	40
Total energy consumption [Quse]													
kBtu	27546	2293	2161	2523	2436	2495	2322	2337	2235	2133	2183	2141	2287

Collector North America

Daily maximum temperature [°F]



Financial Report

Energy flow diagram

