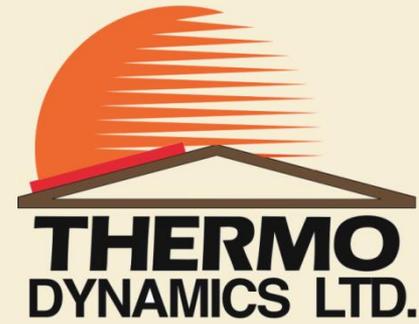


Congratulations!
Your unique solar monitor ID is located on your monitoring unit as seen on this page.

To access your solar monitoring website, go to Thermo-Dynamics.com and follow the Halifax Solar City link. Your four digit WEL ID can be found on your unit as seen here.





This document explains the graphs and data displayed on your solar monitoring website. It will give you a better understanding of its function and importance within your home.

Glossary

Auxiliary Heater – The secondary means of heating your water load, aside from solar. This is typically electric or gas.

DHW - Domestic hot water. The water that exits your auxiliary heater and enters the home.

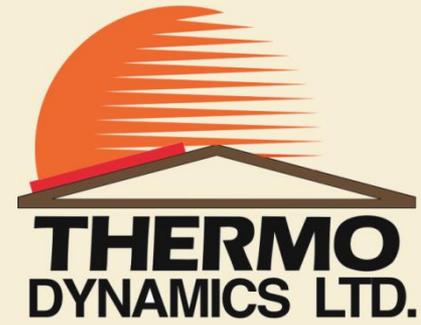
e-Mag – e-Mag Solar Pump. The e-Mag consists of a rotary vane pump driven by a photovoltaic powered DC motor and controller. The e-Mag pumps heat transfer fluid throughout the Solar Boiler and collectors.

HTF – Heat transfer fluid. Thermo-Dynamics Ltd uses a mix of food grade propylene glycol (40%) and distilled water (60%)

kWh – Kilowatt-hour. A unit of energy equivalent to one kilowatt of power expended for one hour of time.

PV module - Photovoltaic module. The photovoltaic module converts radiation from the sun into power. This provides proportional power to the e-Mag.

SDHW – Solar domestic hot water. The water that has been heated through the Solar Boiler.



Basic Information

The Dynamics Solar Boiler™



The current time and date.
The solar monitor logs data every minute.

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² **Solar Power**
26.9°C **Roof Temperature**

Photovoltaic Module

15.3	volts
1.03	amps
15.8	watts

Solar Boiler™ Solar Water Heater

Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

50.5°C
Solar Collector

Solar Collector

Domestic Hot Water OUT

47.6°C

Solar Hot Water

51.4°C

The power rating of your auxiliary heater.

20.00 kW

Off

Oil Fired Heater

The current status of your auxiliary heater.

Your type of auxiliary heater.

The number of hours your auxiliary heater has been operating and the kWh used. This data is logged daily, monthly and yearly.

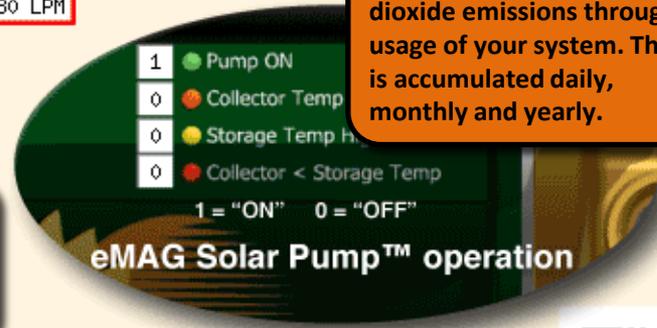
	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

If your auxiliary heater is oil fired, the litres of oil consumed are logged here.

40.8°C
Solar Storage Tank

Solar Loop Flowrate

1.80 LPM



Reduction of carbon dioxide emissions through usage of your system. This is accumulated daily, monthly and yearly.

Summary

Solar energy on collectors
Solar energy to storage
Solar energy to hot water
Total energy to hot water
Solar Fraction
DHW Consumption

	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water			4 kWh	207 kWh
Solar Fraction			6 %	64 %
DHW Consumption			8 liters	4938 liters

The amount of money saved, based on available energy in your solar storage tank. This is accumulated daily, monthly and yearly.

Savings (all taxes included)

Dollars (based on oil at \$1.20 per liter)

kg CO₂ (based on 2.6 kg CO₂/liter oil at 60% eff)

	Today	This Month	This Year
Dollars	1.88 \$	1.88 \$	30 \$
kg CO ₂	4.07 kg	4.1 kg	41 kg

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September 19, 2013

The date your system began to log data.

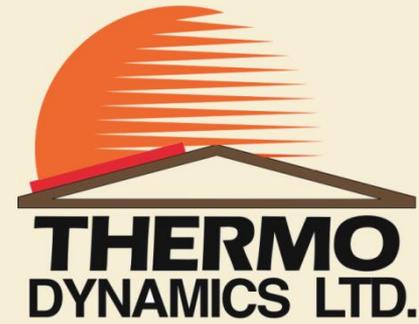
Cold Water IN
0.0 LPM Flowrate

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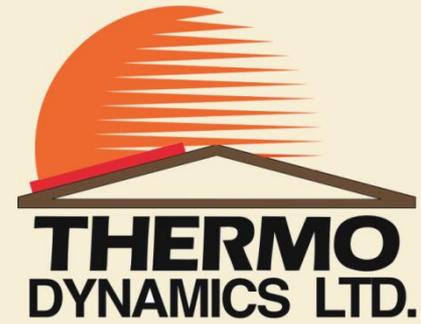
101 Frazee Avenue
Dartmouth, Nova Scotia
Canada, B3B-1Z4

Tel: (902) 468-1001
www.thermo-dynamics.com





The graphs that accompany your solar data will be explained in the order you see them on your solar monitoring website. Terms will be defined and common trends will be highlighted.



Water Temperature Data

Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power

26.9°C Roof Temperature

Photovoltaic Module

Solar Collector	50.5°C	15.3	volts
		1.03	amps
		15.8	watts

Collector Slope and Orientation	
26°	from horizontal
35°	from south ("+" is west "-" is east)

DHW temperature supplied to your home.
47.6°C

SDHW temperature exiting your solar storage tank and entering your auxiliary heater.
51.4°C

SDHW temperature exiting your Solar Boiler and entering your solar storage tank.
55.0°C

Summary

Solar energy on collectors
Energy to storage
Energy to hot water
Energy to hot water
Solar Fraction
DHW Consumption

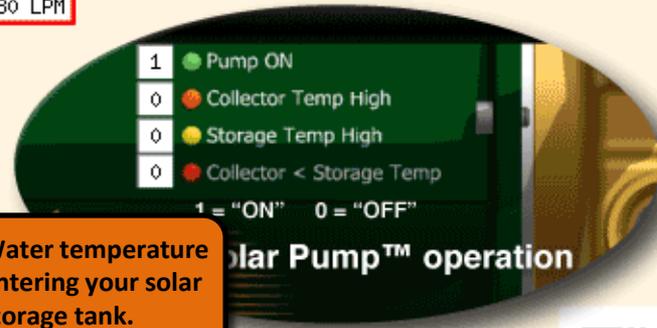
	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters

Savings (all taxes included)

	Today	This Month	This Year
Dollars (based on oil at \$1.20 per liter)	1.88 \$	1.88 \$	30 \$
kg CO ₂ (based on 2.6 kg CO ₂ /liter oil at 60% eff)	4.07 kg	4.1 kg	41 kg

Solar Loop Flowrate

1.80 LPM

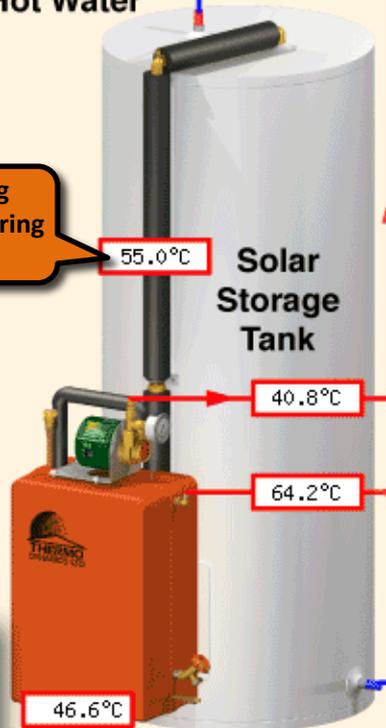


Water temperature entering your solar storage tank.
64.2°C

Solar Pump™ operation

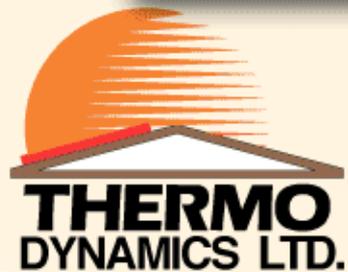
- 1 ● Pump ON
 - 0 ● Collector Temp High
 - 0 ● Storage Temp High
 - 0 ● Collector < Storage Temp
- 1 = "ON" 0 = "OFF"

	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22



Cold Water IN
25.8°C
0.0 LPM Flowrate

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Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power

26.9°C Roof Temperature

Photovoltaic Module

Solar Collector	50.5°C	15.3	volts
		1.03	amps
		15.8	watts

Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Domestic Hot

T_WATER_HOT
47.6°C

Solar Collector
T_WATER_SOLAR
51.4°C

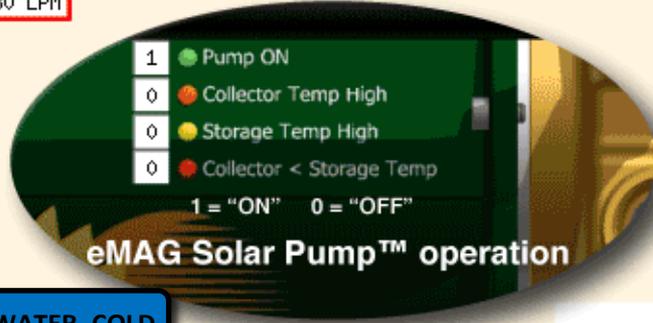
Solar Hot Water



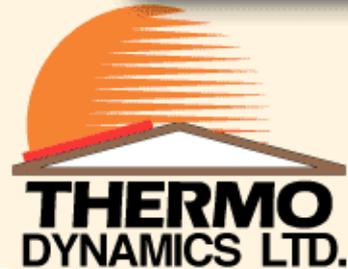
Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

Solar Loop Flowrate

1.80 LPM



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September 19, 2013



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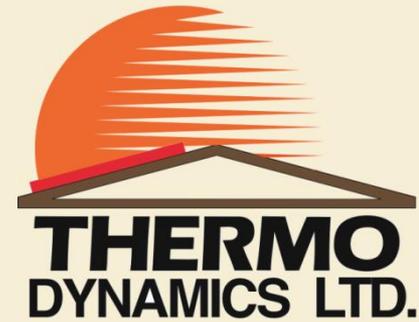
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www.thermo-dynamics.com



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

T_WATER_COLD

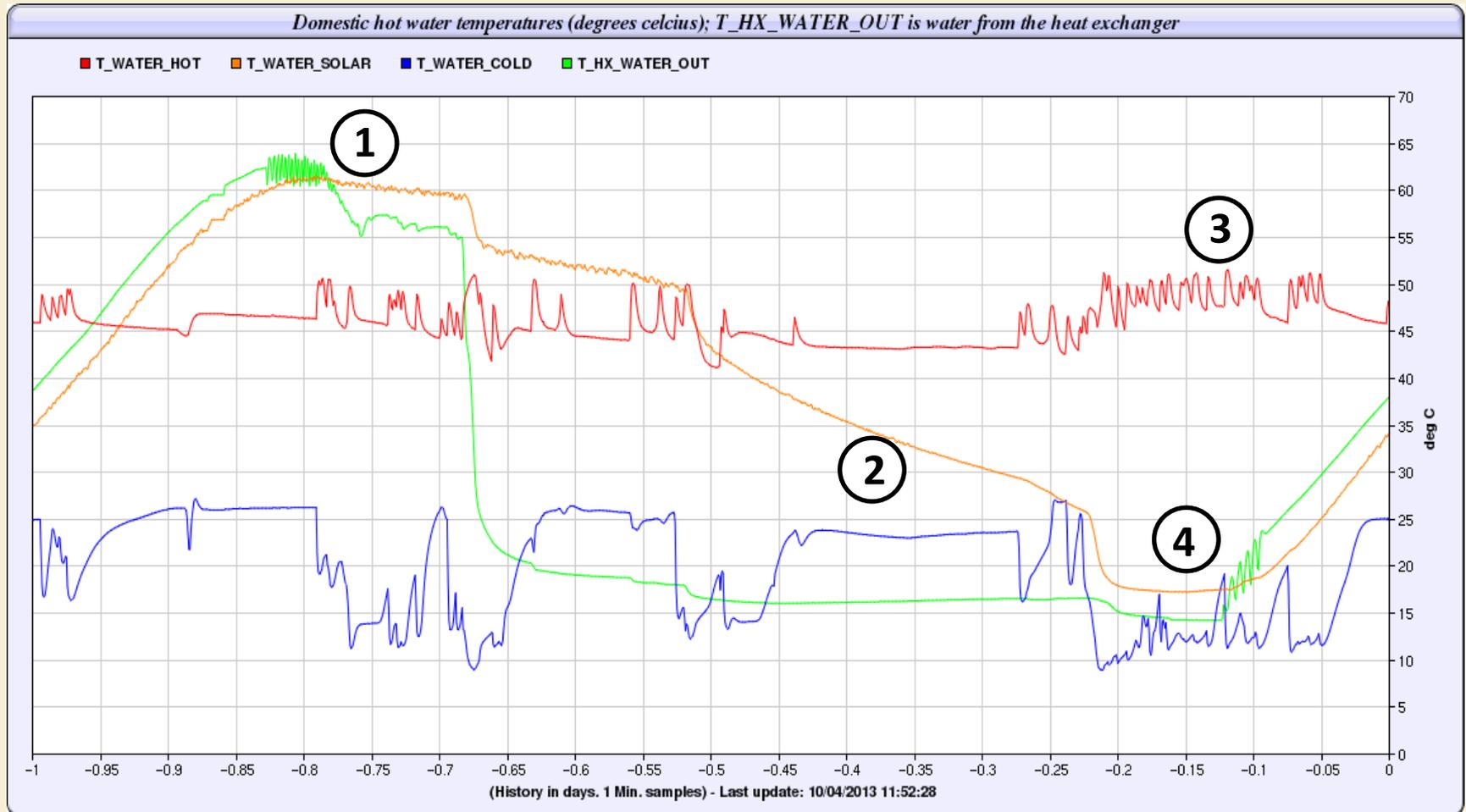
Cold Water IN
25.8°C
0.0 LPM Flowrate



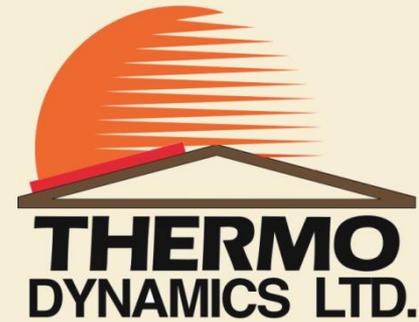
The horizontal axis shows the time of day with current data on the far right, and data from 24 hours ago on the far left. Each notch represents 1.2 hours. The graph is currently posting data for approximately 12 noon, so notch -0.05 represents 10:48 am. The data is logged every minute.

The vertical axis represents water temperature measured in degrees Celsius (deg c).

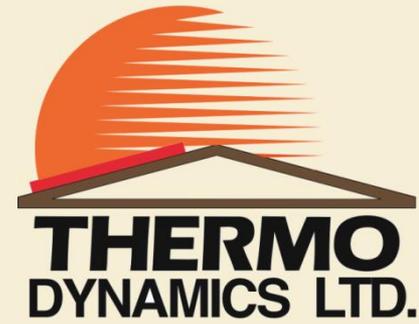
Water Temperature Data



Common Trends



1. At about 5:00 PM, the collector temperature is now lower than the solar storage tank temperature, signaling the e-Mag to shut off. It fluctuates on and off for the next hour until the sunlight is no longer strong enough to heat your water any further.
2. As you can see, the solar storage tank can hold enough SDHW to fulfill the need of a typical family during the night. The temperature is about 30° C at 6:30 AM when the family wakes to shower for the day ahead. The solar storage tank temperature quickly drops at this time.
3. The DHW temperature supplied to your home stays relatively constant, due to the assistance from your auxiliary heater. The spikes are due to the sensor being mounted on the pipe rather than inside your auxiliary tank.
4. At about 9:30 AM, the sun has risen and the HTF in your collectors have begun to heat. The collected energy is transferred to your SDHW through the Solar Boiler.



Cumulative and Averaged Daily Water Data

Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power

26.9°C Roof Temperature

Domestic Hot Water OUT
47.6°C



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

Photovoltaic Module

50.5°C	15.3	volts
	1.03	amps
	15.8	watts



Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Summary

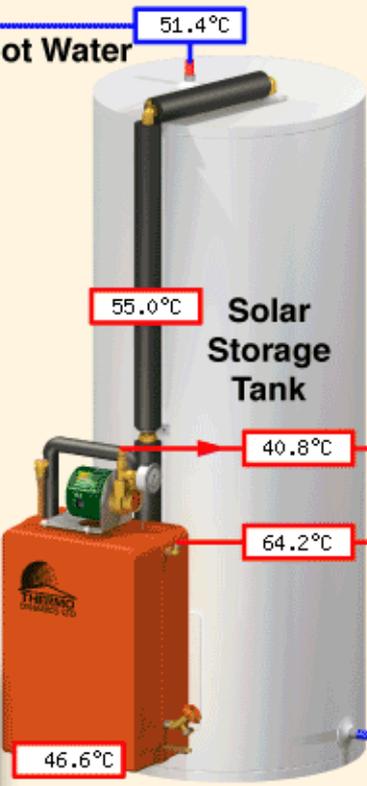
	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh		
Solar energy to storage	2703 watts	9.7 kWh		
Solar energy to hot water	0 watts	0.8 kWh		
Total energy to hot water	0 watts	6.2 kWh		
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters

Savings (all taxes included)
Dollars (based on oil at \$1.20 per liter)
kg CO2 (based on 2.6 kg CO₂/liter oil at 60% eff)

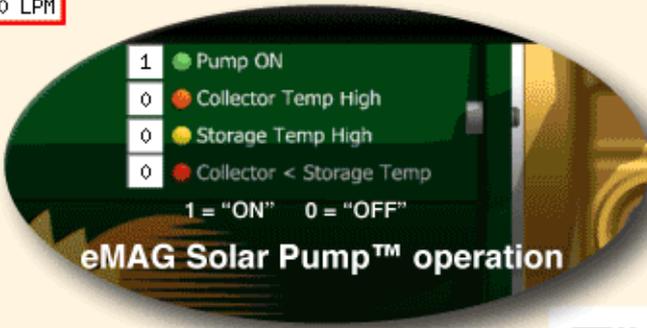
Commissioned
September 19, 2013

The daily percentage of DHW that has been heated by your Solar Boiler. Resets to zero at midnight.

Cumulative DHW consumption. Reset to zero at midnight.



Solar Loop Flowrate
1.80 LPM



Cold Water IN
25.8°C
0.0 LPM Flowrate



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 www.thermo-dynamics.com

Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power

26.9°C Roof Temperature

Domestic Hot Water OUT
47.6°C



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

Photovoltaic Module

50.5°C	15.3	volts
	1.03	amps
	15.8	watts



Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Summary

	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	1.0 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	7.2 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters

Savings (all taxes included)
Dollars (based on oil at \$1.20 per liter)
kg CO2 (based on 2.6 kg CO₂/liter oil at 60% eff)

	Today	This Month	This Year
Dollars	1.88 \$	1.88 \$	30 \$
kg CO2	4.07 kg	4.1 kg	41 kg



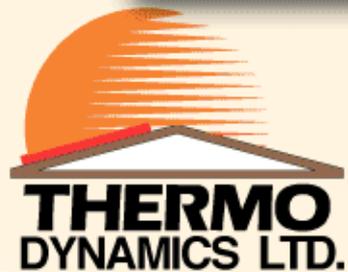
Solar Loop Flowrate
1.80 LPM

eMAG Solar Pump™ operation

- 1 ● Pump ON
- 0 ● Collector Temp High
- 0 ● Storage Temp High
- 0 ● Collector < Storage Temp

1 = "ON" 0 = "OFF"

Commissioned
September 19, 2013

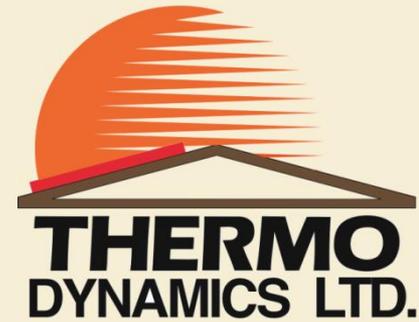


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Cold Water IN
25.8°C
Flowrate
0.0 LPM

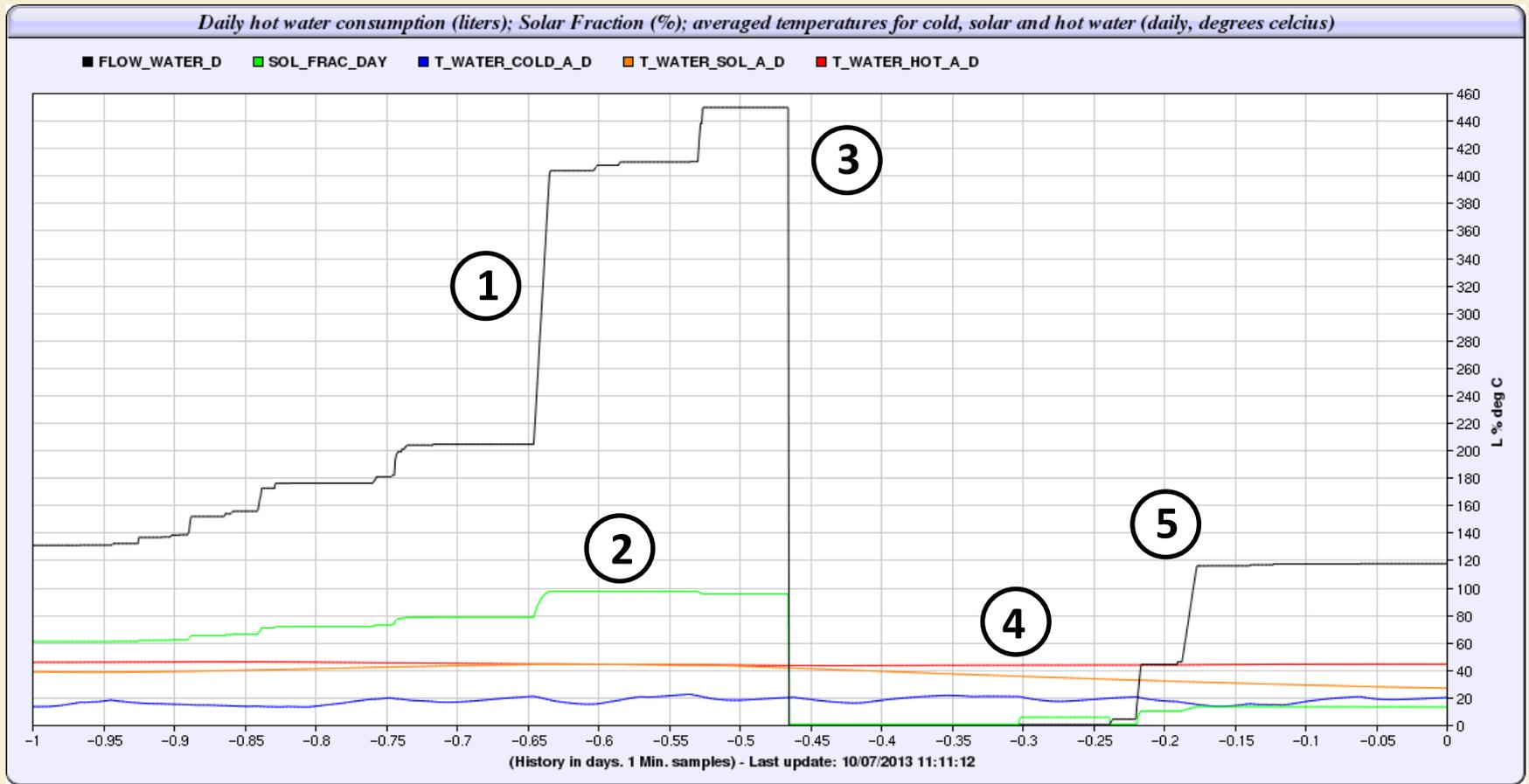




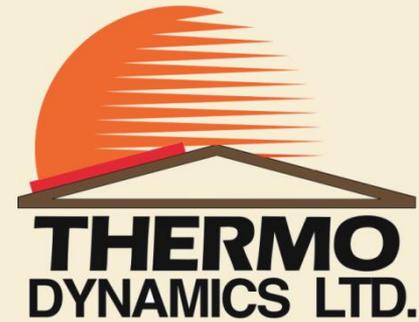
The horizontal axis shows the time of day with current cumulative and averaged data on the far right. Data from 24 hours ago is displayed on the far left. Each notch represents 1.2 hours. The graph is currently posting data for approximately 12 noon, so notch -0.05 represents 10:48 am. The data is logged every minute and resets at midnight.

The vertical axis represents water temperature measured in degrees Celsius (deg c), volume of DHW used in litres (L), and solar fraction (%).

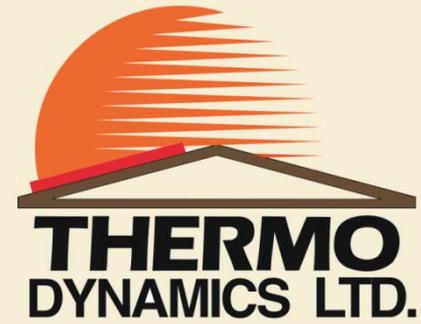
Cumulative and Averaged Daily Water Data



Common Trends



1. The DHW usage slowly increases during the day due to dishes and laundry. In the evening, this usage increases rapidly due to filling the bathtub and showers.
2. By midnight, the Solar Boiler have been used to heat 98% of the DHW need for this household.
3. At midnight, this household has used 450 litres of DHW throughout the day. This value resets to zero, along with the solar fraction, and starts accumulating for another day's worth of data.
4. The temperature of the auxiliary heater stays relatively constant at 60°C. The solar storage tank temperature is higher during the night as compared to the morning, due to heating all day.
5. This household wakes at around 6:30 AM and begins to shower, using 120 litres of DHW.



HTF and Collector Temperature Data

Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

Collector temperature, used by e-Mag controls.

839 W/m² Solar Power

26.9°C Roof Temperature

Roof temperature. Hot

50.5°C

15.3 volts
1.03 amps
15.8 watts

Solar Collector

Solar Collector

Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Summary

Solar energy on collectors
Solar energy to storage
Solar energy to hot water
Total energy to hot water
Solar Fraction
DHW Consumption

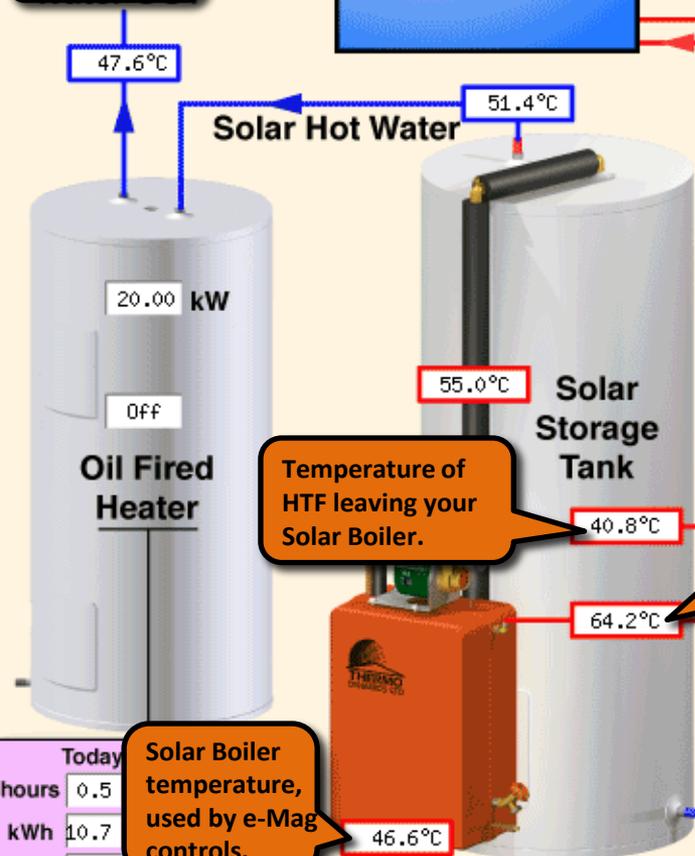
	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters

Savings (all taxes included)

Dollars (based on oil at \$1.20 per liter)

kg CO₂ (based on 2.6 kg CO₂/liter oil at 60% eff)

	Today	This Month	This Year
Dollars	1.88 \$	1.88 \$	30 \$
kg CO ₂	4.07 kg	4.1 kg	41 kg



Temperature of HTF leaving your Solar Boiler.

Temperature of HTF entering your Solar Boiler.

Solar Boiler temperature, used by e-Mag controls.

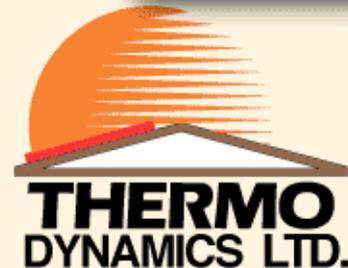
Solar Loop Flowrate

1.80 LPM



eMAG Solar Pump™ operation

Commissioned
September 19, 2013



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Today
hours 0.5
kWh 10.7
liters 1.3

25.8°C Cold Water IN Flowrate
0.0 LPM



Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

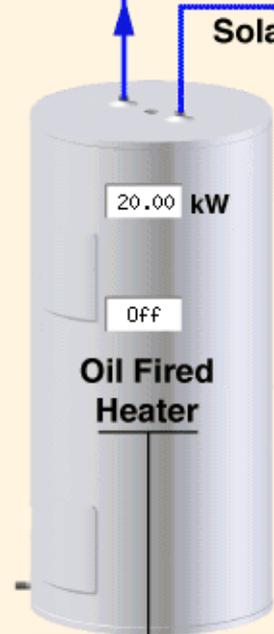
839 W/m² Solar Power

26.9°C Roof Temperature

T_AIR_OUTSIDE

Water OUT

47.6°C



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7		
liters	1.3	4	22

T_COLLECTOR

Solar Collector

50.5°C

15.3	volts
1.03	amps
15.8	watts



T_HX_GLY_OUT 40.8°C

T_HX_GLY_IN 64.2°C

Basic Module

Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Summary

	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters

Savings (all taxes included)

	Today	This Month	This Year
Dollars (based on oil at \$1.20 per liter)	1.88 \$	1.88 \$	30 \$
kg CO ₂ (based on 2.6 kg CO ₂ /liter oil at 60% eff)	4.07 kg	4.1 kg	41 kg

Solar Loop Flowrate

1.80 LPM



eMAG Solar Pump™ operation

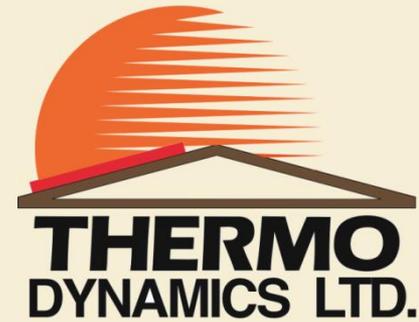
Cold Water IN 25.8°C

Flowrate 0.0 LPM

Commissioned
September 19, 2013

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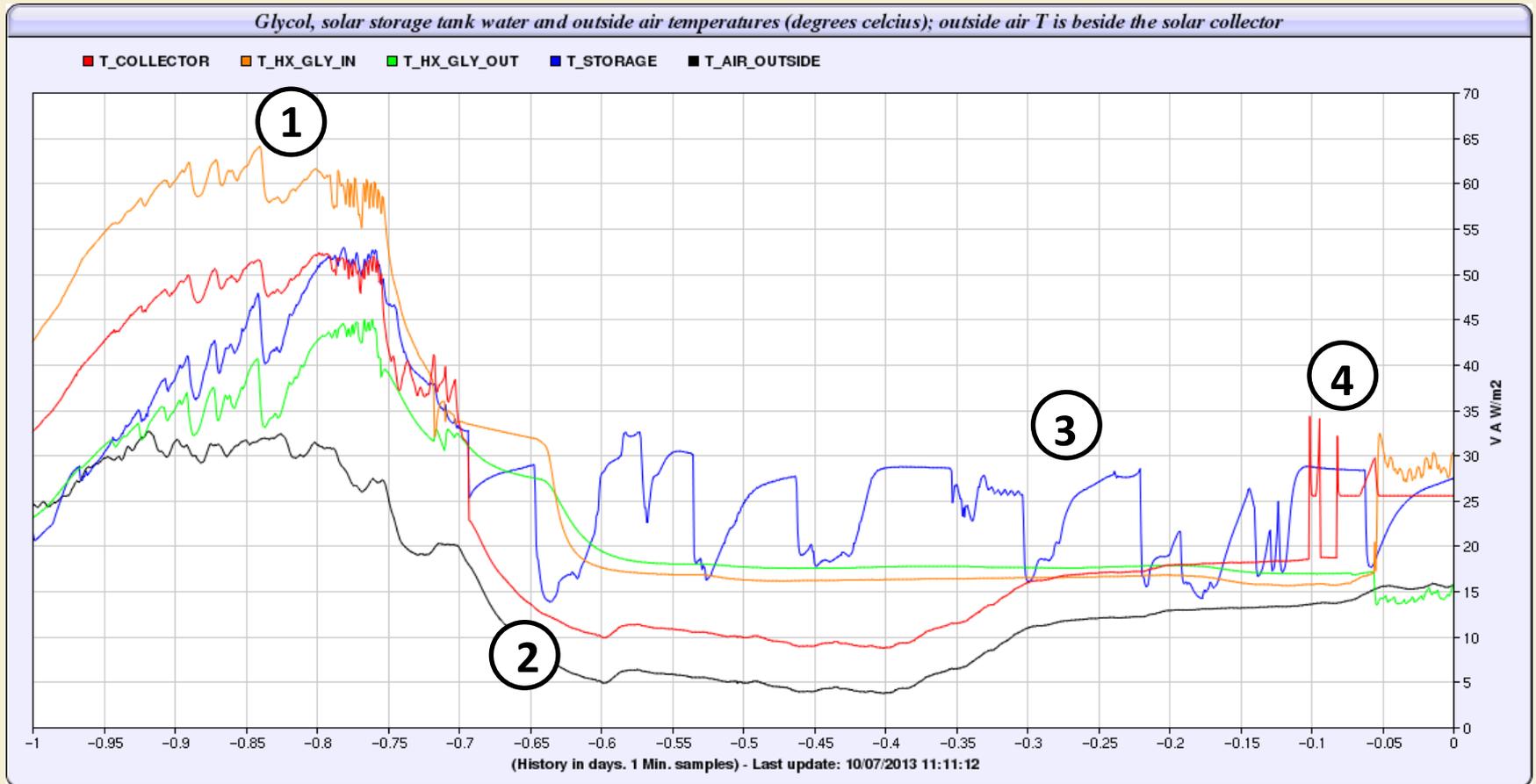




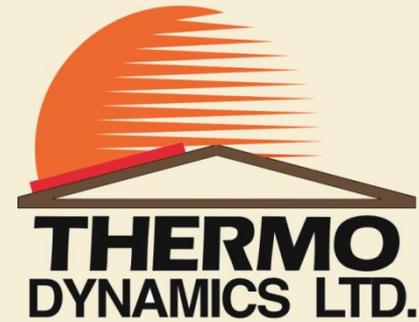
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The vertical axis represents temperatures measured in degrees Celsius (deg c).

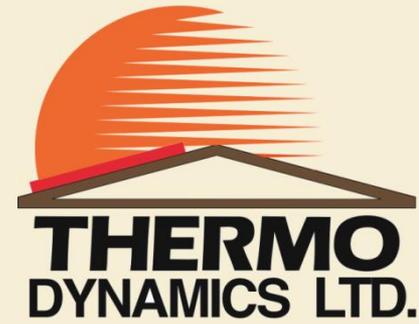
HTF and Collector Temperature Data



Common Trends



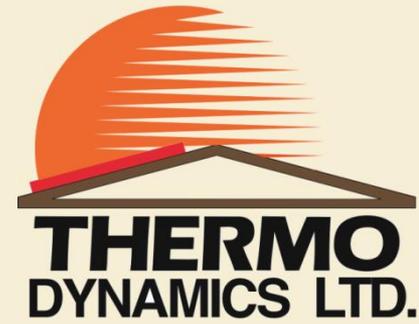
1. Your HTF temperature increase throughout the day. In this example, at about 5:00 PM, the HTF entering your Solar Boiler is at a temperature of nearly 60°C. It exits at about 45°C transferring energy to cold water running through your Solar Boiler system.
2. The outside and collector temperatures will decrease throughout the evening and during the night. This will cause your e-Mag to shut off and any heating needs throughout the night will be done by your auxiliary heater.
3. Your solar storage tank temperature will fluctuate throughout the day, due to usage of DHW in your home. When you draw DHW from your tap, the solar storage tank temperature will decrease and will have to be replenished. It will be replenished during the day by your Solar Boiler and during the night by your auxiliary heater.
4. The collector temperature can fluctuate throughout the day due to passing clouds. This was the case for this system at around 9:30 AM.



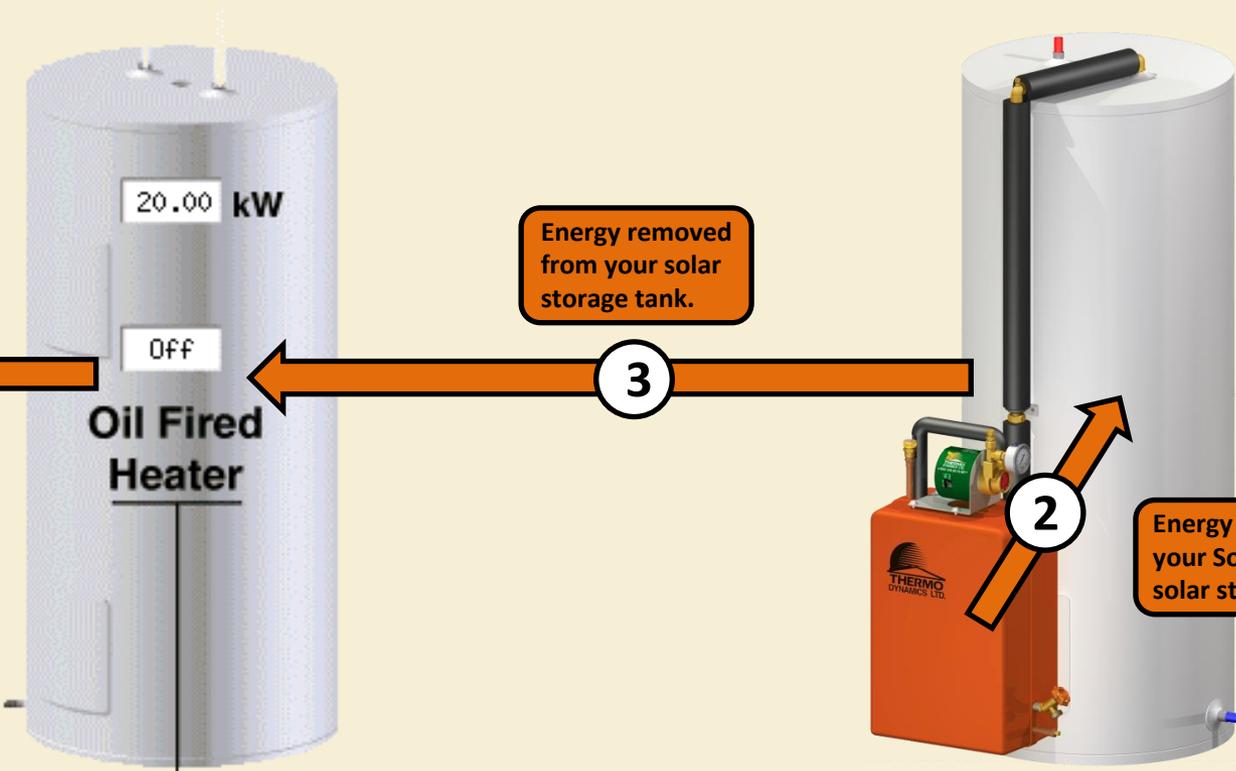
Weekly Energy Data

(Use the following energy flow diagram to better understand the next three graphs)

Energy Flow Diagram



Amount of solar energy radiated from the sun onto your collectors.



Total energy transfer involved, between the cold water entering your home and the DHW exiting your auxiliary heater.

Energy removed from your solar storage tank.

Energy transferred from your Solar Boiler to your solar storage tank.

Summary	Now	1 Today	This Month	This Year
Solar energy on collectors	5034	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	1 liters	533 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg



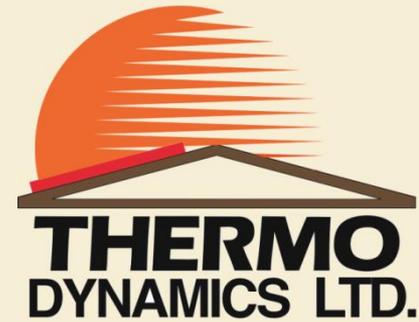
Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	270	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water		0.8 kWh	4 kWh	132 kWh
Total energy to hot water		6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	%	16 %	64 %
DHW Consumption	0.0 Lpm	liters	533 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

HEAT_SUN_D

HEAT_HX_D

HEAT_WATER_SOL_D

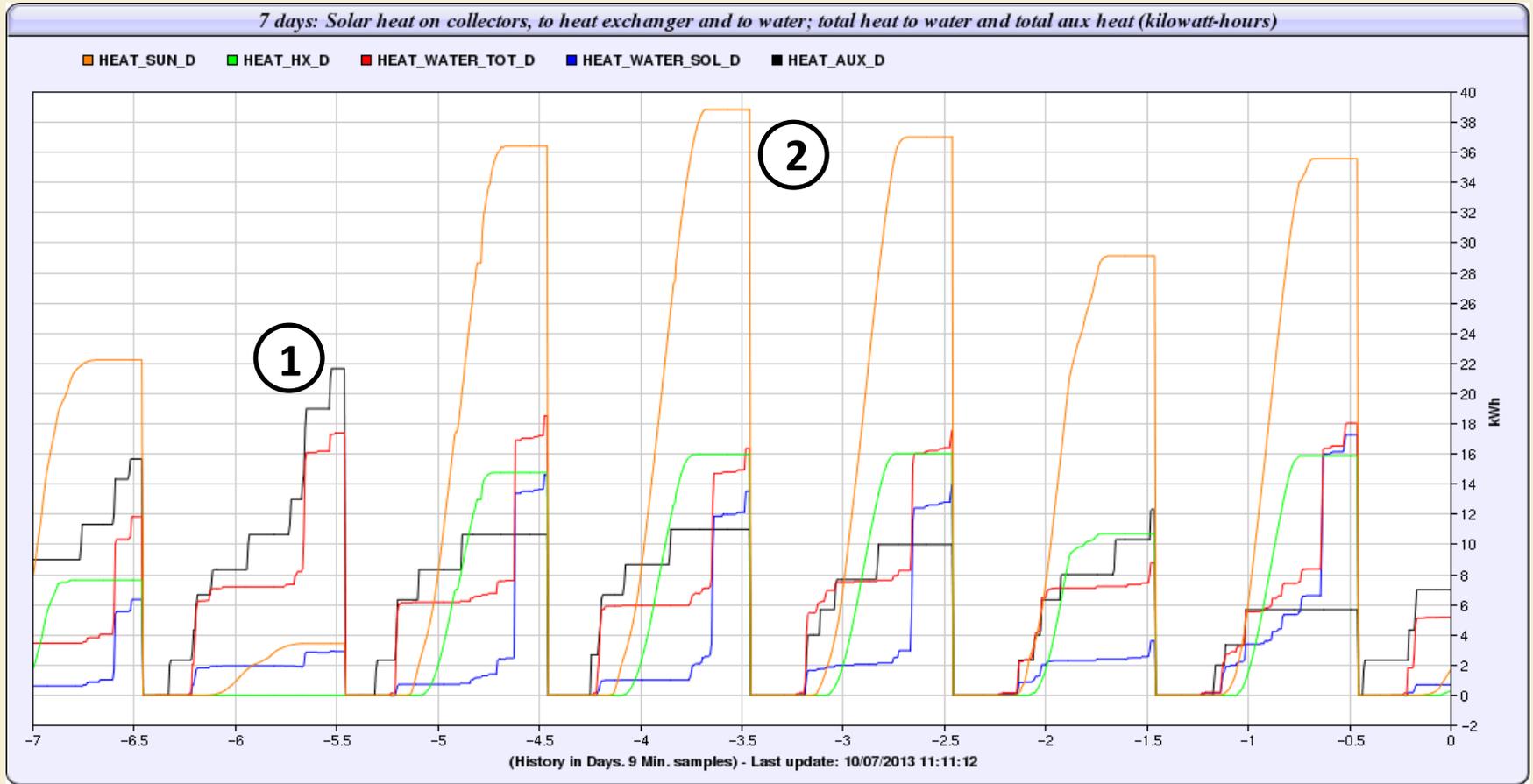
HEAT_WATER_TOT_D



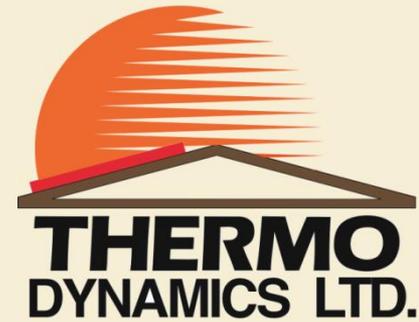
The horizontal axis shows the time of day with current data on the far right, and data from 7 days ago on the far left. Each notch represents 12 hours. The graph is currently posting data for approximately 12 noon. Notch (-0.5) represents 12 midnight and (-1) represents 12 noon the previous day. The data is logged every minute.

The vertical axis represents energy data measured in kilowatt hours (kWh).

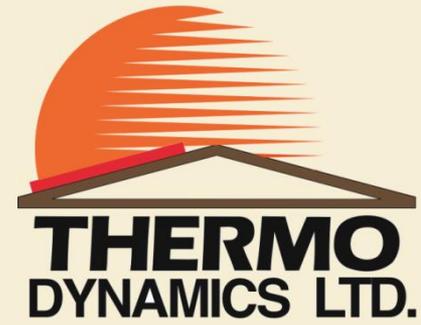
Weekly Energy Data



Common Trends



1. Six days ago there was a reduction in solar energy collected due to bad weather. This is apparent on the graph because the energy radiated on your collectors from the sun was low as compared to other days. Because of this, your auxiliary heater was the main source of energy to heat your DHW.
2. On a hot sunny day in October, the amount of energy radiated on your collectors from the sun can reach 40 kWh, resulting in high savings.



Monthly Energy Data

Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	133 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

1

2

3

4

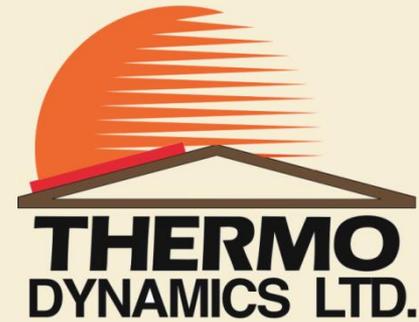
Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.1 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	10.9 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	17 %	64 %
DHW Consumption	0.0 Lpm	141 liters	141 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

HEAT_SUN_M

HEAT_HX_M

HEAT_WATER_SOL_M

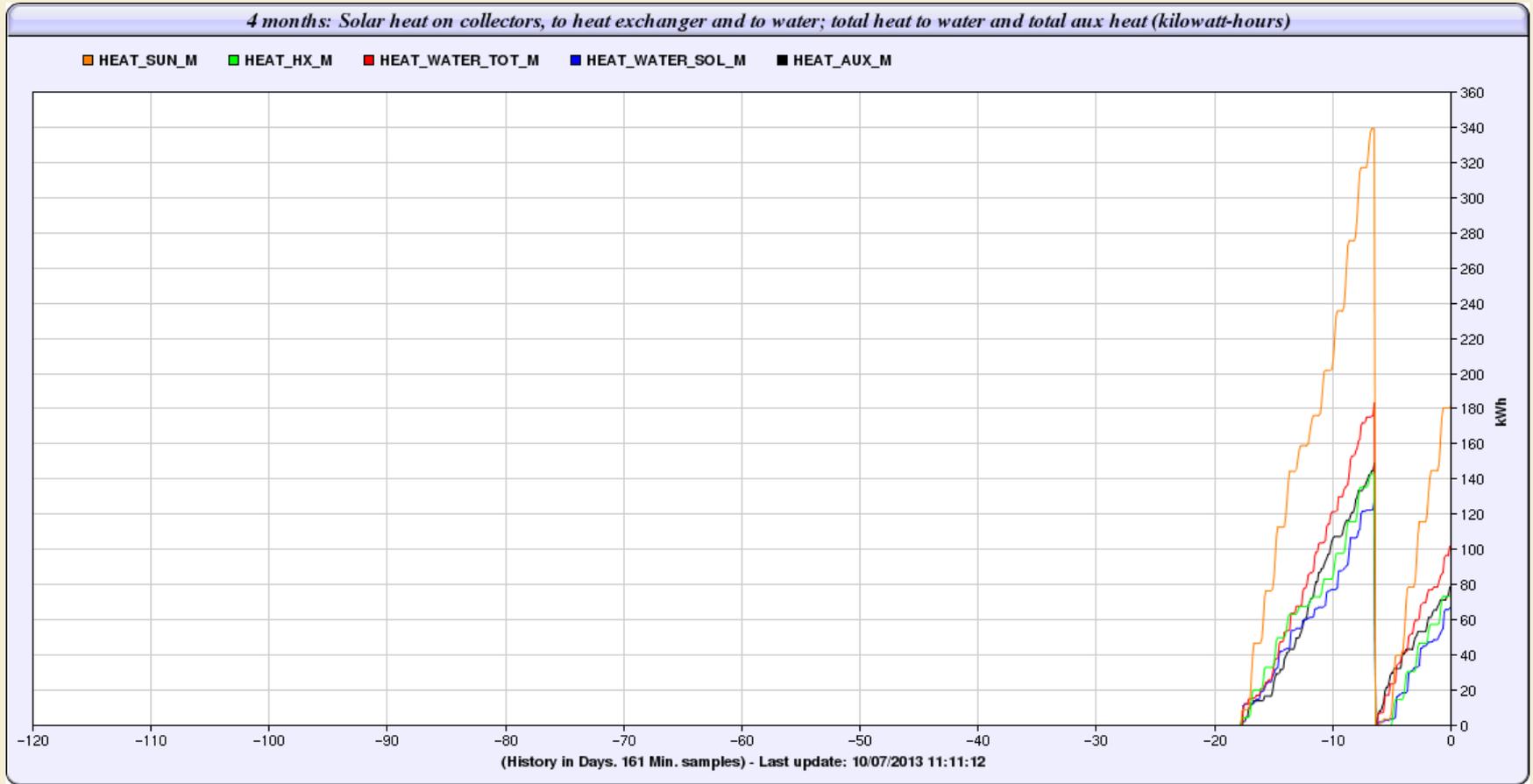
HEAT_WATER_TOT_M

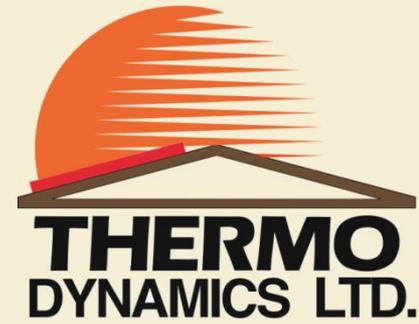


The horizontal axis shows the time of day with current data on the far right, and data from one month ago on the far left. Each notch represents 2.5 days, based on a 30 day month. The graph is currently posting data for approximately 12 noon of a given day. Notch (-10) represents 2.5 days ago at noon. The data is logged every minute.

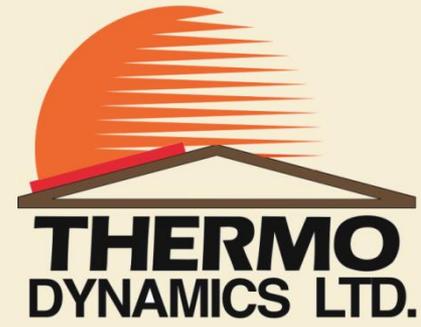
The vertical axis represents energy data measured in kilowatt hours (kWh).

Monthly Energy Data





The common trends are the dips in data as the solar monitoring resets every month.



Yearly Energy Data

Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	178 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

1

2

3

4

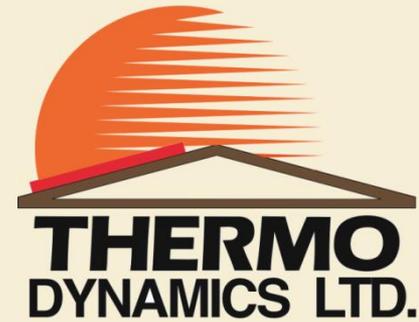
Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	10 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	%
DHW Consumption	0.0 Lpm	141 liters	533 liters	1550 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

HEAT_SUN_Y_D

HEAT_HX_Y_D

HEAT_WATER_SOLY_D

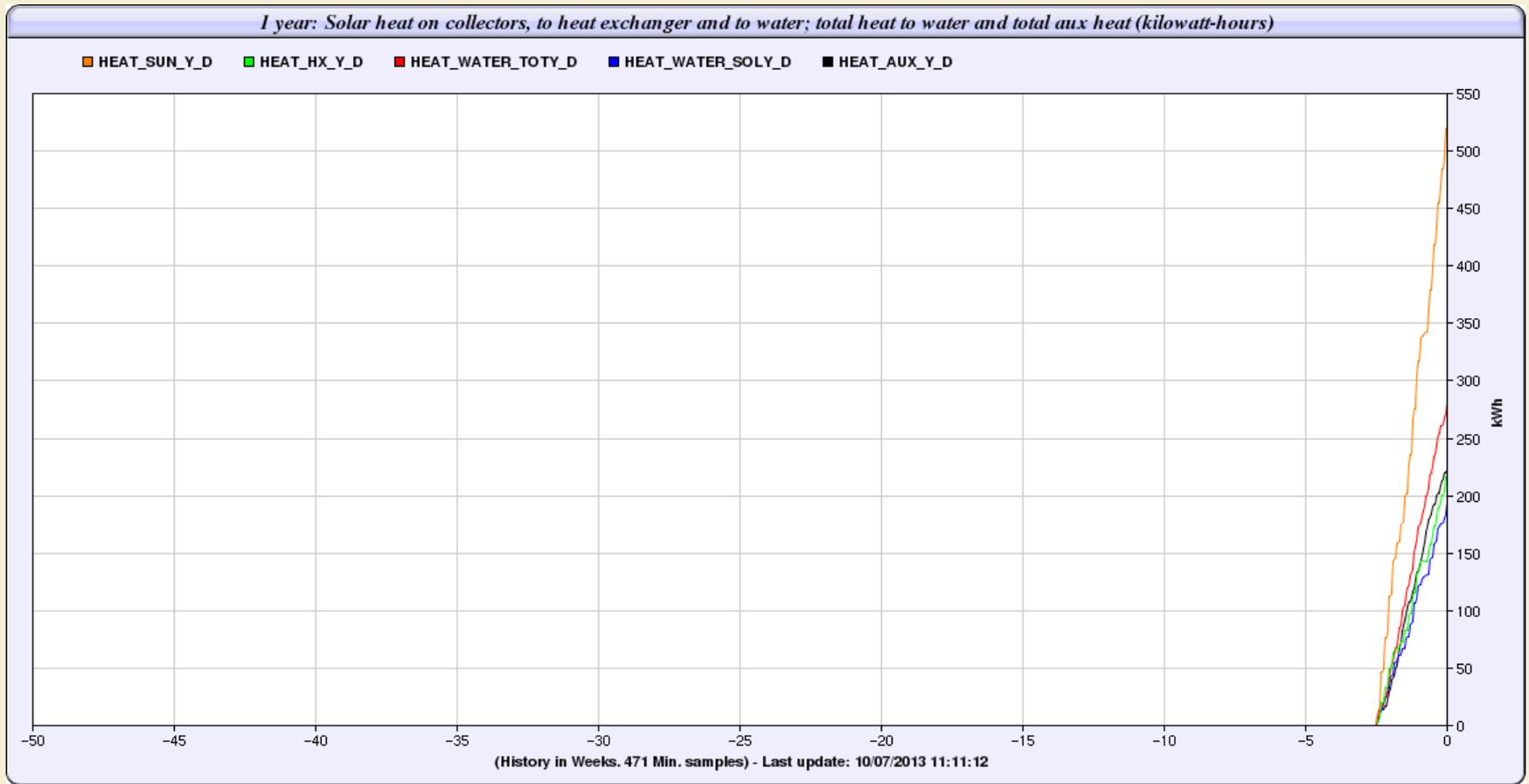
HEAT_WATER_TOTY_D

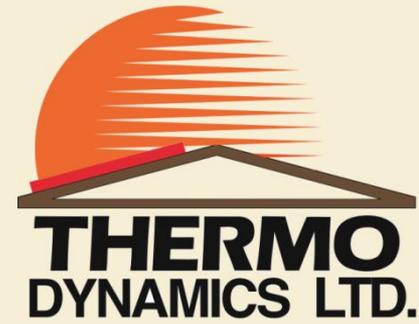


The horizontal axis shows the time of day with current data on the far right, and data from one year ago on the far left. Each notch represents 1.2 months. The graph is currently posting data for approximately 12 noon of a given day. If today is October 1st, then notch (-5) represents August 22nd. The data is logged every minute.

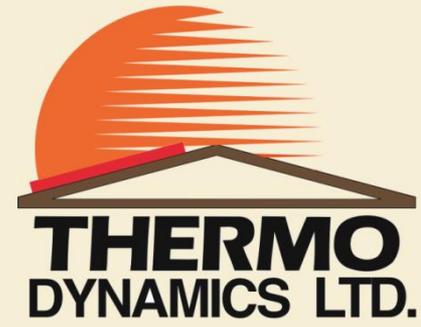
The vertical axis represents energy data measured in kilowatt hours (kWh).

Yearly Energy Data





The common trends are the dips in data as the solar monitoring resets every year.



PV Module Data

Thermo Dynamics Solar Boiler™



Time: 14:21:01 ADT
Date: 10/02/2013

Amperage supplied by your PV module to your e-Mag. This value is scaled by a factor of 10 on graph.

Voltage supplied by your PV module to your e-Mag.

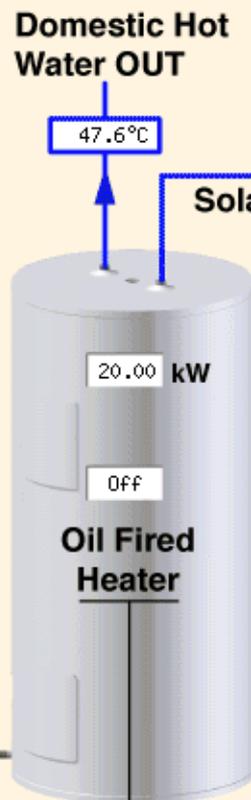
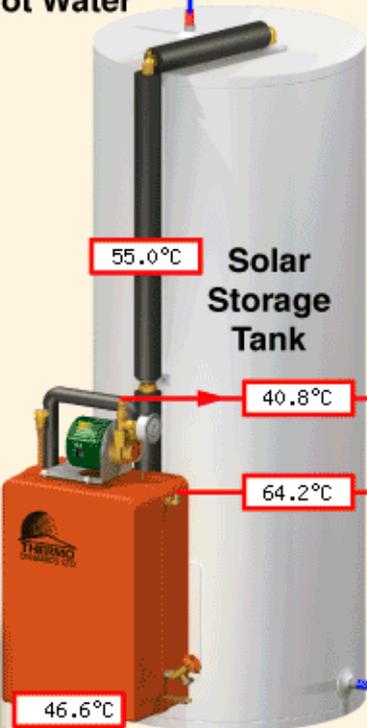
839 W/m² Solar Power

26.9°C Roof Temperature

Photovoltaic Module	15.3	voltage
	1.03	amps
	15.8	watts

Orientation	26°	from horizontal
	35°	from south ("+" is west "-" is east)

Power supplied by your PV module to your e-Mag.



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

Summary	Today	This Month	This Year	
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)	1.88 \$	1.88 \$	30 \$	
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)	4.07 kg	4.1 kg	41 kg	

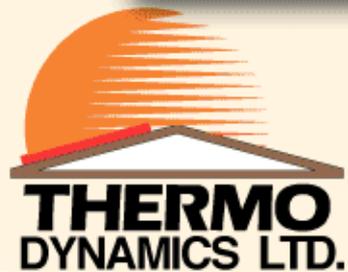
Solar Loop Flowrate

1.80 LPM



eMAG Solar Pump™ operation

Commissioned
September 19, 2013



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Dartmouth, Nova Scotia
Canada, B3B-1Z4

Tel: (902) 468-1001
www.thermo-dynamics.com



Cold Water IN Flowrate
0.0 LPM

46.6°C

25.8°C

64.2°C

40.8°C

55.0°C

51.4°C

47.6°C

20.00 kW

Oil Fired Heater

Off

Solar Collector

Solar Storage Tank

Solar Hot Water

Domestic Hot Water OUT

Savings (all taxes included)

Dollars (based on oil at \$1.20 per liter)

kg CO2 (based on 2.6 kg CO₂/liter oil at 60% eff)

Today

This Month

This Year

Summary

Solar energy on collectors

Solar energy to storage

Solar energy to hot water

Total energy to hot water

Solar Fraction

DHW Consumption

5034 watts

2703 watts

0 watts

0 watts

118 %

0.0 Lpm

22.4 kWh

9.7 kWh

0.8 kWh

6.2 kWh

13 %

141 liters

26 kWh

10 kWh

4 kWh

24 kWh

16 %

533 liters

365 kWh

153 kWh

132 kWh

207 kWh

64 %

4938 liters

1.88 \$

4.07 kg

1.88 \$

4.1 kg

30 \$

41 kg

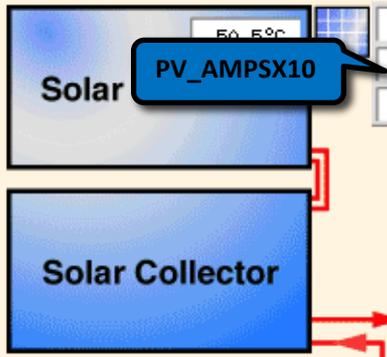
- 1 ● Pump ON
 - 0 ● Collector Temp High
 - 0 ● Storage Temp High
 - 0 ● Collector < Storage Temp
- 1 = "ON" 0 = "OFF"

Thermo Dynamics Solar Boiler™



Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power
26.9°C Roof Temperature



Photovoltaic Module

PV_VOLTS
15.3 volts
1.03 amps
15.8 watts

Collector Slope and Orientation
26° from horizontal
35° from south ("+" is west "-" is east)

SOLAR_POWER_100

Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg

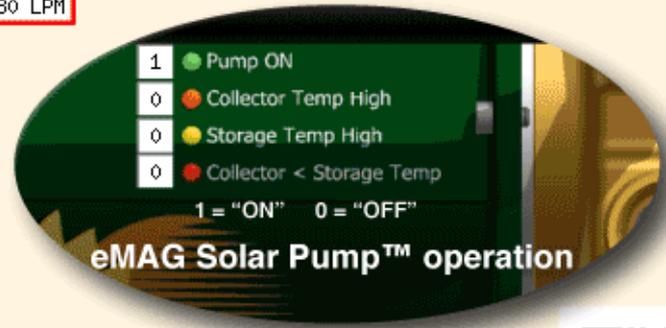
Domestic Hot Water OUT
47.6°C



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

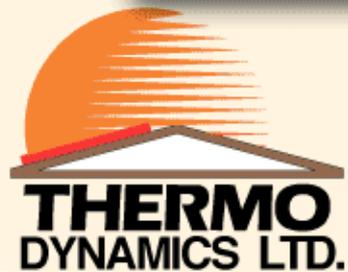
Solar Loop Flowrate

1.80 LPM



eMAG Solar Pump™ operation

Commissioned
September 19, 2013



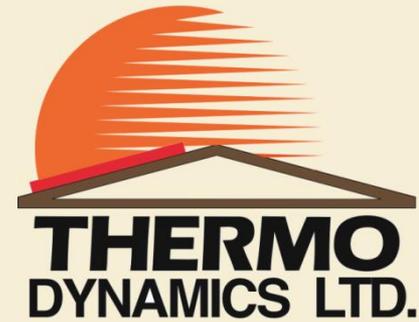
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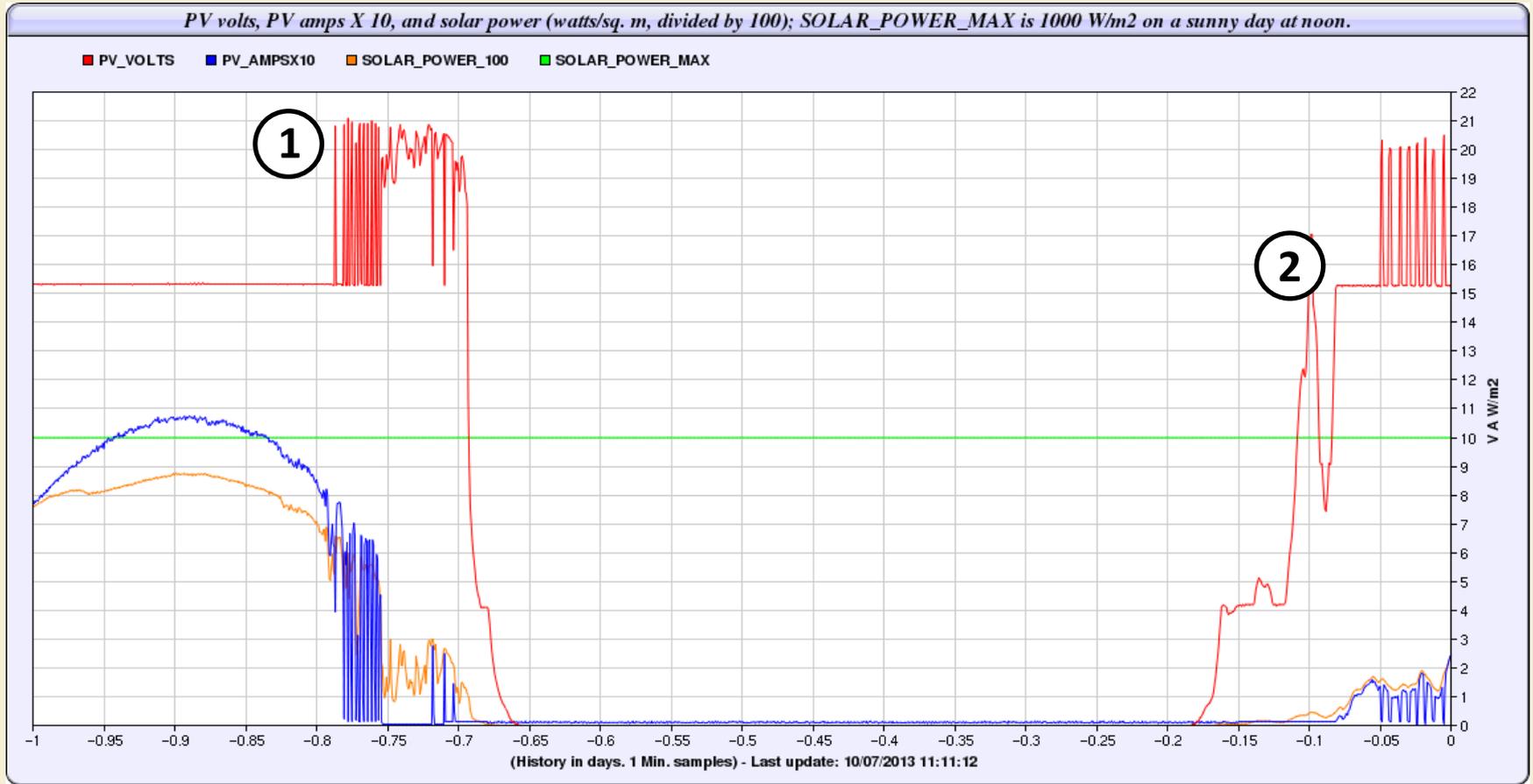
Cold Water IN
25.8°C
0.0 LPM Flowrate



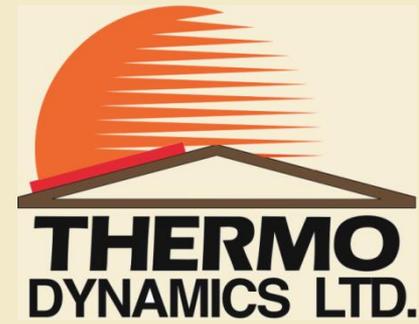
The horizontal axis shows the time of day with current data on the far right, and data from 24 hours ago on the far left. Each notch represents 1.2 hours. The graph is currently posting data for approximately 12 noon, so notch -0.05 represents 10:48 am. The data is logged every minute.

The vertical axis represents voltage (V), amperage (A) and solar flux (W/m^2). The amperage is scaled up on the graph by 10 and the solar power scaled down by 100. The maximum solar power is typically $1000 \text{ W}/\text{m}^2$ on a sunny day at noon.

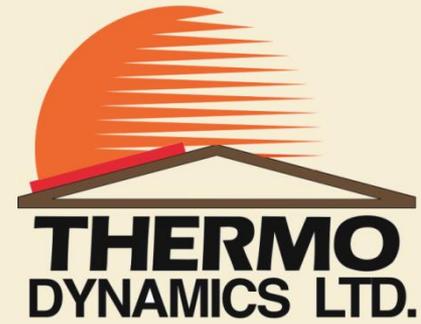
Photovoltaic Module Data



Common Trends



1. The voltage supplied to your e-Mag climbs rapidly when your PV module is exposed to sunlight. The maximum voltage supplied to your e-Mag you can reach 21 Volts.
2. On a typical sunny day, the PV module voltage averages at about 15 Volts.



Flow Rates and e-Mag Status

Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power

26.9°C Roof Temperature

Domestic Hot Water OUT
47.6°C

Solar Hot Water
51.4°C

Solar Collector
50.5°C

Solar Collector

Photovoltaic Module

15.3	volts
1.03	amps
15.8	watts

Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Summary

Solar energy on collectors
Solar energy to storage
Solar energy to hot water
Total energy to hot water
Solar Fraction
DHW Consumption

	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters

Savings (all taxes included)

Dollars (based on oil at \$1.20 per liter)

kg CO₂ (based on 2.6 kg CO₂/liter oil at 60% eff)

	Today	This Month	This Year
Dollars	1.88 \$	1.88 \$	30 \$
kg CO ₂	4.07 kg	4.1 kg	41 kg

HTF flow rate through your collector and Solar Boiler.

Solar Loop Flowrate

1.80 LPM

Storage Tank

40.8°C

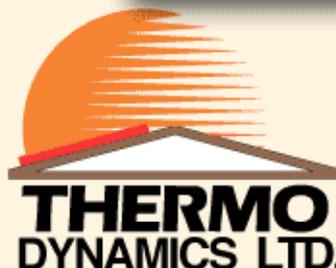
64.2°C

46.6°C



eMAG Solar Pump™ operation

Commissioned
September 19, 2013



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Cold water flow rate into your solar storage tank.
0.0 LPM

25.8°C

	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

Oil Fired Heater
20.00 kW
Off

Thermo Dynamics Solar Boiler™



Solar Boiler™ Solar Water Heater

Time: 14:21:01 ADT
Date: 10/02/2013

839 W/m² Solar Power

26.9°C Roof Temperature

Domestic Hot Water OUT
47.6°C



	Today	Month	Year
hours	0.5	1.6	9
kWh	10.7	32.3	181
liters	1.3	4	22

Photovoltaic Module

50.5°C	15.3	volts
	1.03	amps
	15.8	watts



Collector Slope and Orientation

26°	from horizontal
35°	from south ("+" is west "-" is east)

Summary	Now	Today	This Month	This Year
Solar energy on collectors	5034 watts	22.4 kWh	26 kWh	365 kWh
Solar energy to storage	2703 watts	9.7 kWh	10 kWh	153 kWh
Solar energy to hot water	0 watts	0.8 kWh	4 kWh	132 kWh
Total energy to hot water	0 watts	6.2 kWh	24 kWh	207 kWh
Solar Fraction	118 %	13 %	16 %	64 %
DHW Consumption	0.0 Lpm	141 liters	533 liters	4938 liters
Savings (all taxes included)				
Dollars (based on oil at \$1.20 per liter)		1.88 \$	1.88 \$	30 \$
kg CO2 (based on 2.6 kg CO ₂ /liter oil at 60% eff)		4.07 kg	4.1 kg	41 kg



Solar Loop Flowrate
1.80 LPM



Cold Water IN
25.8°C
Flowrate
0.0 LPM

Commissioned
September 19, 2013

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This sensor indicates the status of your e-Mag. ON is indicated with a 4 on the graph, OFF is indicated with 0.

This sensor indicates that your collector temperature has surpassed 112°C (234°F). If this happens, it will be indicated on the graph with a 3 and the e-Mag will shut off. Otherwise it will read 0.

This sensor indicates that your solar storage tank temperature has surpassed 70° (158°F). If this happens, it will be indicated on the graph with a 2 and the e-Mag will shut off. Otherwise, it will read 0.

This sensor indicates that your storage tank temperature is higher than your collector temperature. If this is the case, the e-Mag will shut off, as it is inefficient to pump colder water into your solar storage tank. If this happens, it will be indicated with a 1 on the graph. Otherwise, it will be indicated with a 0.

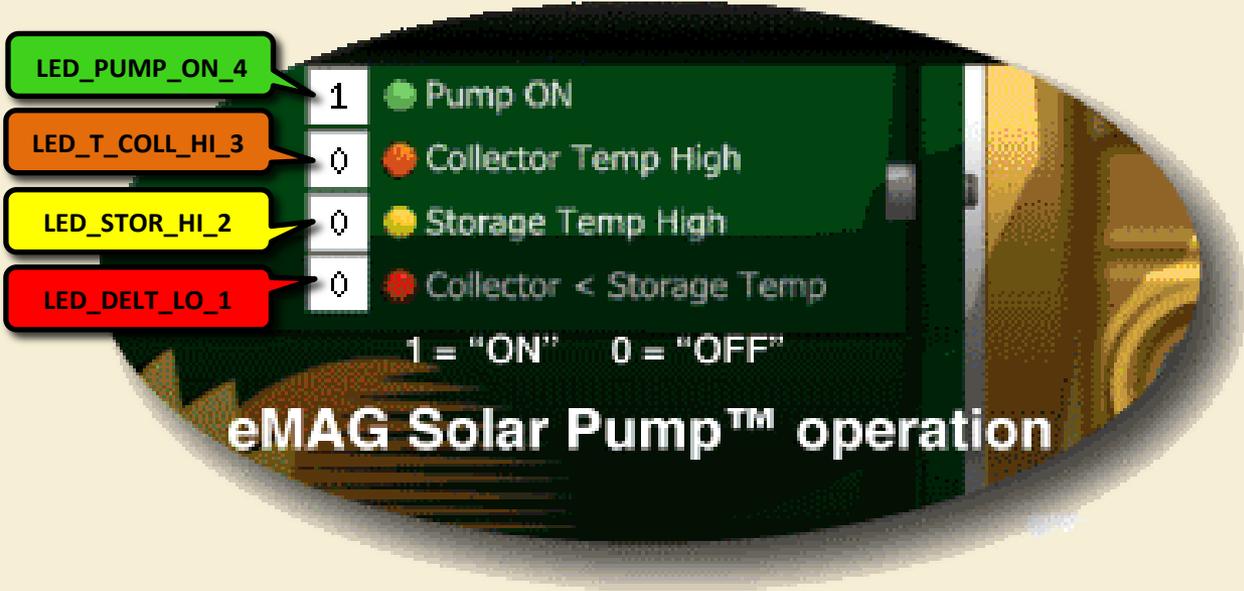


The image shows a control panel for the AG Solar Pump™. It features a green background with four status indicators, each consisting of a small circle and a text label. To the left of these indicators is a vertical column of four white boxes, each containing a binary value (1 or 0). Below the indicators, the text '1 = "ON" 0 = "OFF"' is displayed. The panel is set against a background of a solar collector and storage tank.

1	● Pump ON
0	● Collector Temp High
0	● Storage Temp High
0	● Collector < Storage Temp

1 = "ON" 0 = "OFF"

AG Solar Pump™ operation



LED_PUMP_ON_4

1

● Pump ON

LED_T_COLL_HI_3

0

● Collector Temp High

LED_STOR_HI_2

0

● Storage Temp High

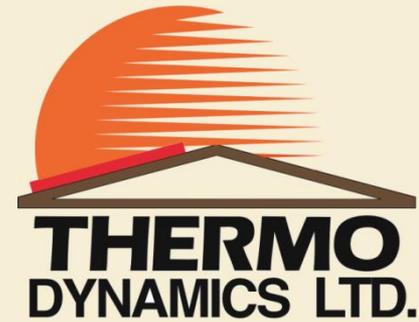
LED_DELT_LO_1

0

● Collector < Storage Temp

1 = "ON" 0 = "OFF"

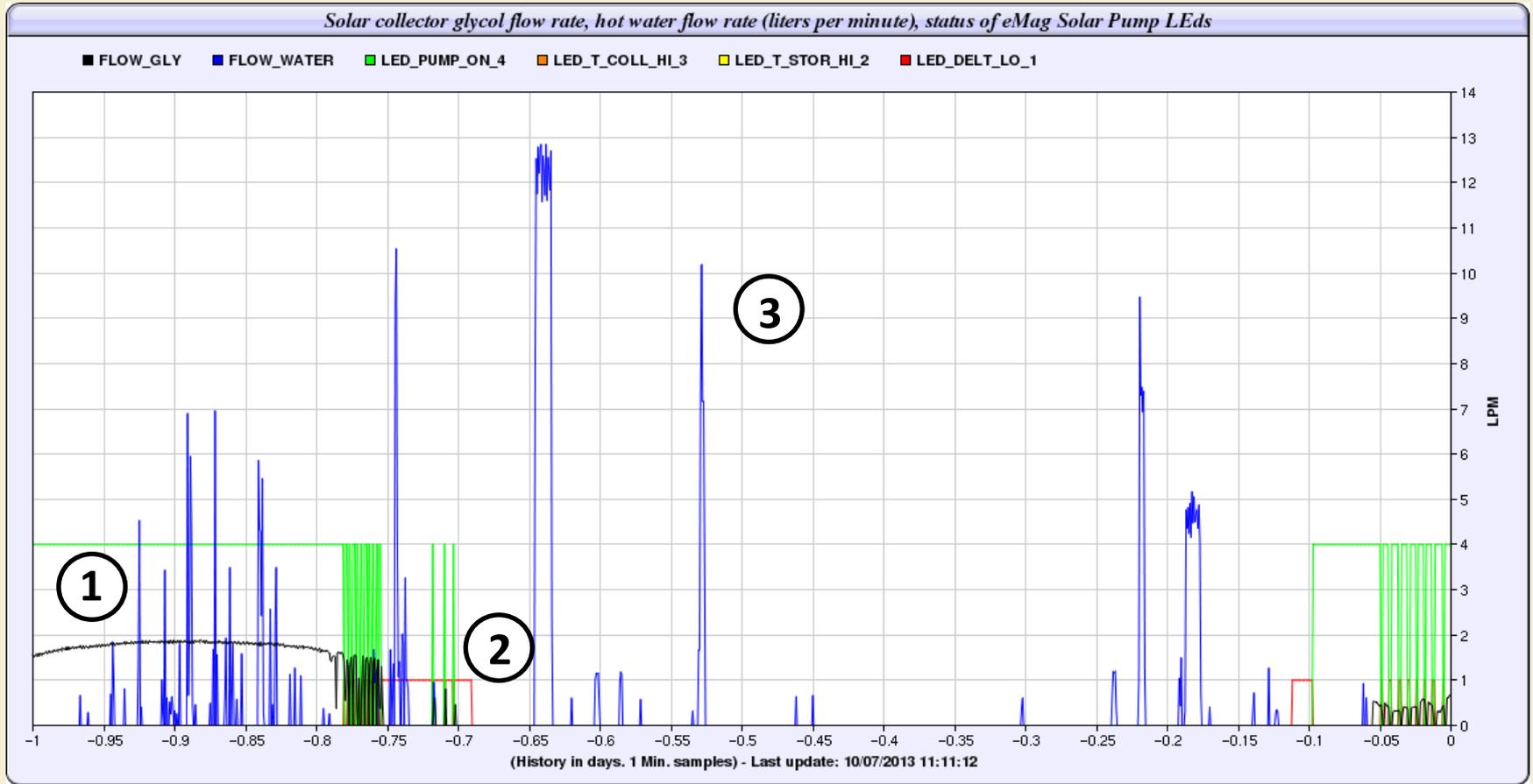
eMAG Solar Pump™ operation



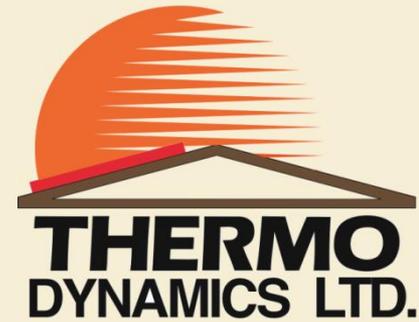
The horizontal axis shows the time of day with current data on the far right, and data from 24 hours ago on the far left. Each notch represents 1.2 hours. The graph is currently posting data for approximately 12 noon, so notch -0.05 represents 10:48 am. The data is logged every minute.

The vertical axis represents water and HTF flow rates measure in litres per minute (LPM).

Flow Rates and Pump Status



Common Trends



1. Your e-Mag runs at a speed proportional to the amount of sunlight available. If there is a lot of sunlight, the HTF will heat faster, so the e-Mag will move it through the system quicker. If there is minimal sunlight, the e-Mag will run slower, allowing the HTF to heat up sufficiently.
2. In the evening at around 7 PM, the temperature of your solar panels is lower than your solar storage tank temperature. Because of this, your “Collector < Storage Temp” alarm will be activated and the e-Mag will shut off.
3. When you draw water, you will notice a sharp jump in city water flow rate. The city water is flowing into your solar storage tank to replenish it.
4. The collector temperature can fluctuate throughout the day due to passing clouds. This was the case for the system at around 9:30 AM.