

Solar Combi-systems: Active Solar Space Heating plus DHW How to Do It

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SOLARLOGIC

Solar Heating Simplified



Solar Combi-systems: Active Solar Space Heating plus DHW How to Do It

PART 1: THE FOUNDATION

Bristol's Prime Directive and Six Principles

SolarLogic's Philosophy

Combi-system Design and Control Overview

PART 2: DETAILS AND EXAMPLES

Following the Prime Directive and Six Principles

PART 3: NOW YOU DO IT

Design a solar thermal combi-system

PART 4: BATTLING STICKER SHOCK



Bristol's Stickney's **PRIME DIRECTIVE**



Bristol Stickney
Chief Technical Officer
SolarLogic

“It must
feel like an
upgrade.”



Bristol's Six Principles of Good Solar Thermal Design

(roughly in order of their importance)

- 1. Reliability**
- 2. Effectiveness**
- 3. Compatibility**
- 4. Elegance**
- 5. Serviceability**
- 6. Efficiency**



Bristol's Six Principles of Solar Thermal Systems

RELIABILITY

**If it doesn't work all the time,
nothing else matters.**

Bristol's Six Principles of Solar Thermal Systems

EFFECTIVENESS

**Measured by the comfort
of the user**

Bristol's Six Principles of Solar Thermal Systems

COMPATIBILITY

**With the rest of the
building industry**

Bristol's Six Principles of Solar Thermal Systems

ELEGANCE

Simple is better.





Bristol's Six Principles of Solar Thermal Systems

SERVICEABILITY

**When service is required, it's easy,
efficient and inexpensive.**



Bristol's Six Principles of Solar Thermal Systems

EFFICIENCY

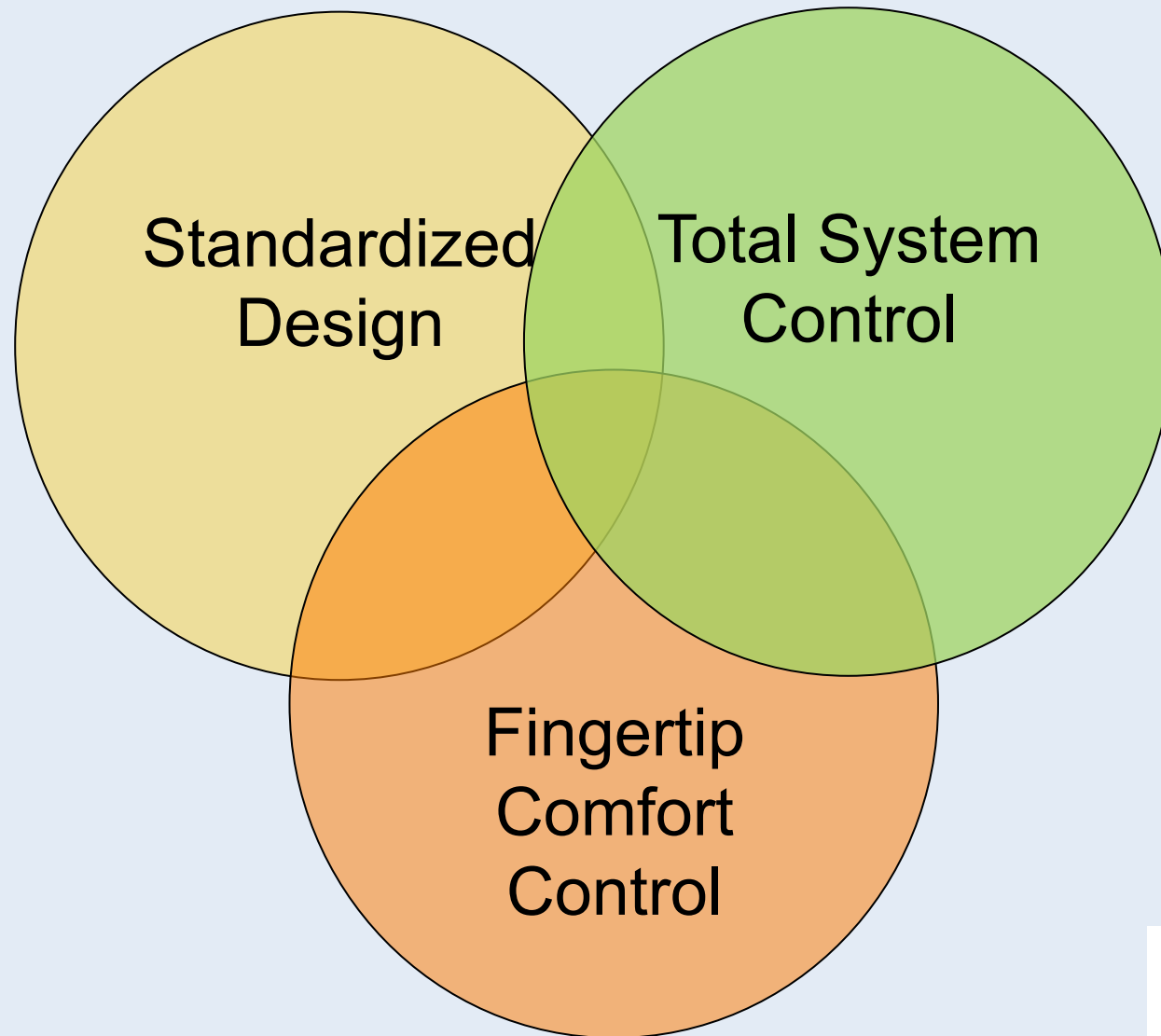
**Optimal use of solar energy is
important, but its relative importance
is up to the client.**

After 40 Years, why is
the Solar Thermal
Industry not
mainstream?

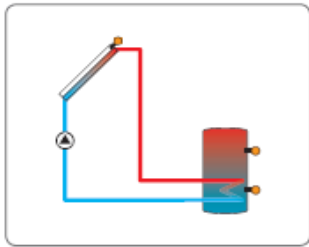
**We're not following the prime
directive and the six principles**



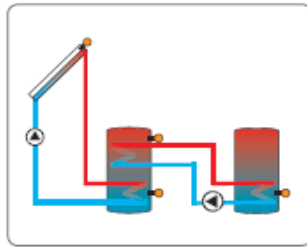
The SolarLogic Approach



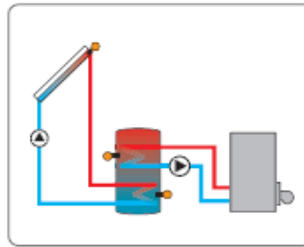
The Solar Design Dilemma



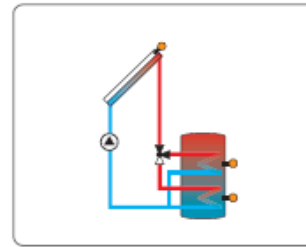
Solar system with 1 tank



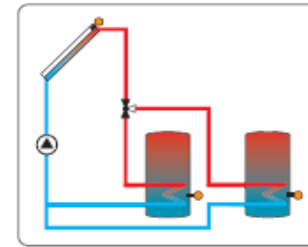
Solar system with 1 tank and heat exchange controller



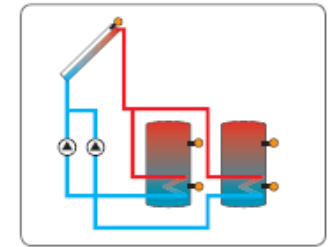
Solar system with 1 tank and thermostatic backup heating



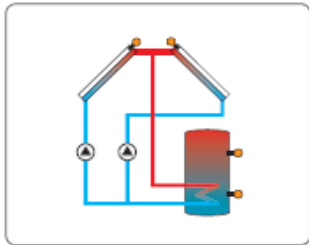
Solar system with tank loading in layers



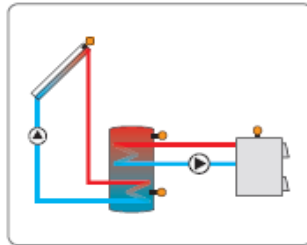
Solar system with 2 tanks, valve logic



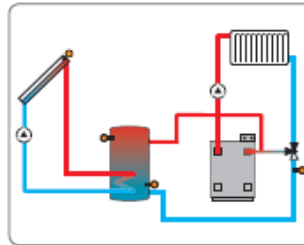
Solar system with 2 tanks, pump logic



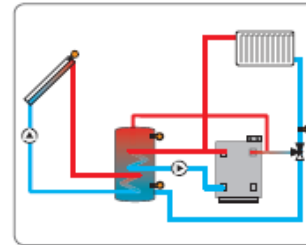
Solar system with east-/west collectors and 1 tank



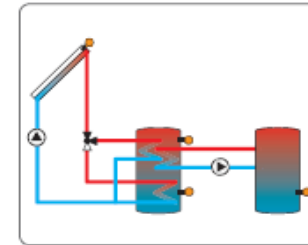
Solar system with 1 tank and solid fuel boiler



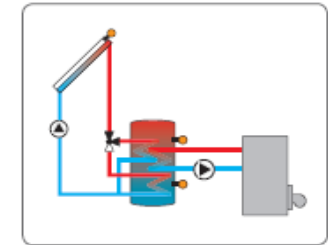
Solar system with 1 tank and heating circuit return preheating



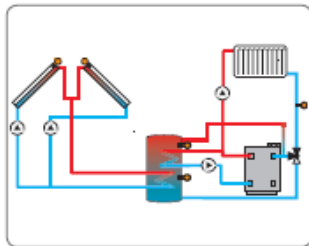
Solar system with 1 tank, heating circuit return preheating and thermostatic backup heating



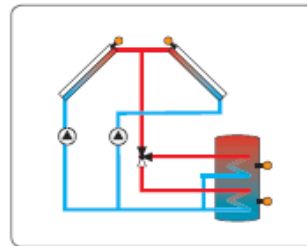
Solar system with tank loading in layers and heat exchange controller



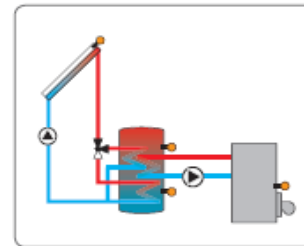
Solar system with tank loading in layers and thermostatic backup heating



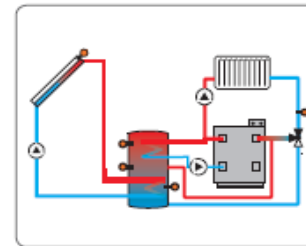
Solar system with east-/west collectors, heating circuit return preheating and thermostatic backup heating



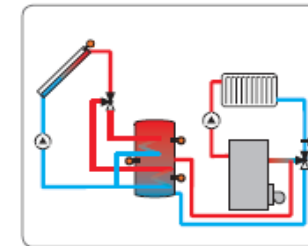
Solar system with east-/west collectors and tank loading in layers



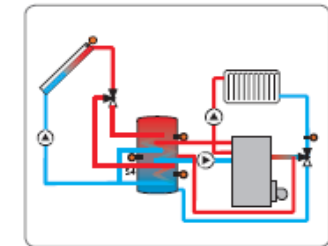
Solar system with tank loading in layers and solid fuel boiler



Solar system with 1 tank, heating circuit return preheating and thermostatic backup heating



Solar system with multi-layer tank and heating circuit return preheating



Solar system with multi-layer tank and heating circuit return preheating and thermostatic backup heating

Plenty of Choices from Suppliers

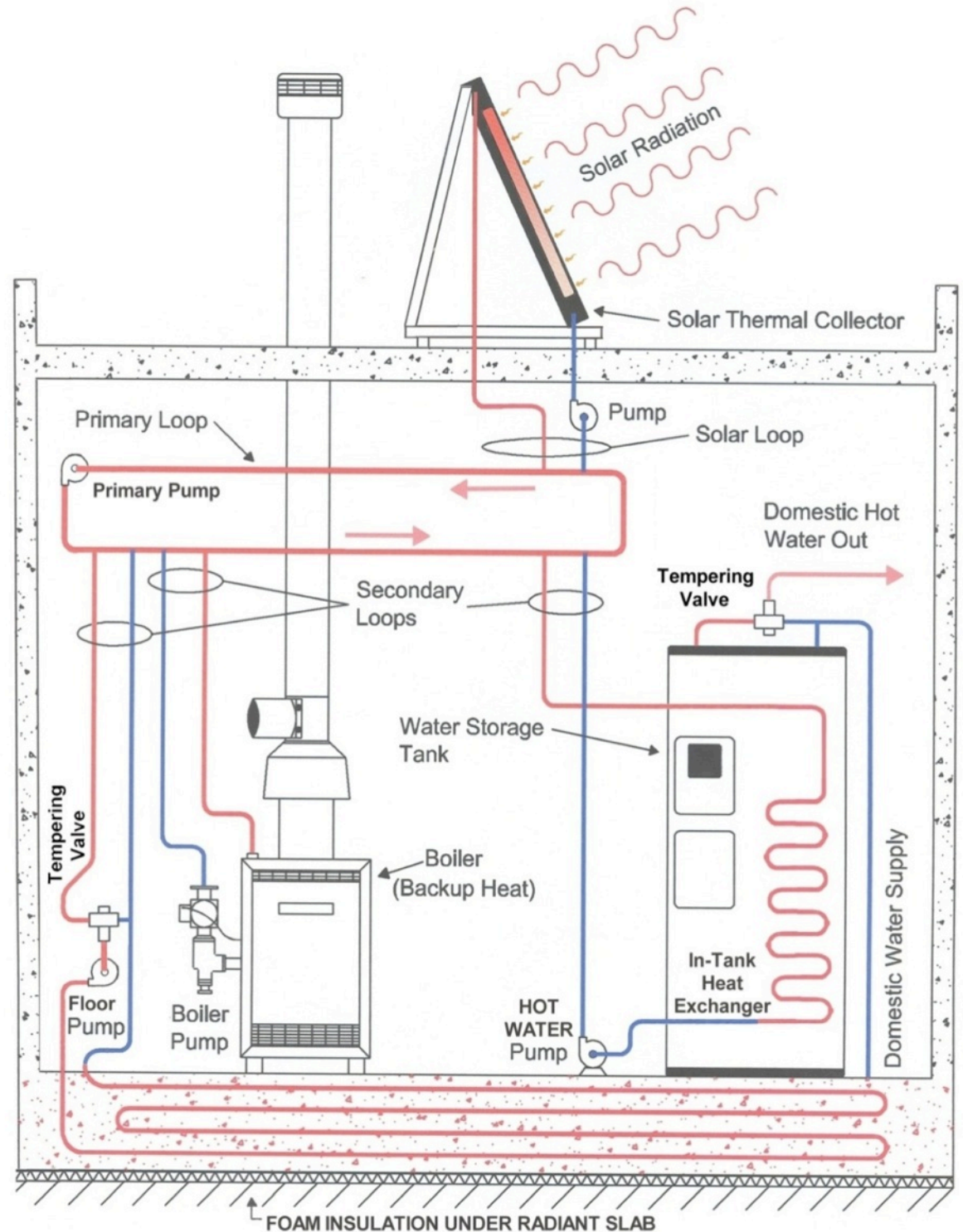
There are more things the same between individual solar thermal heating jobs than there are things different.

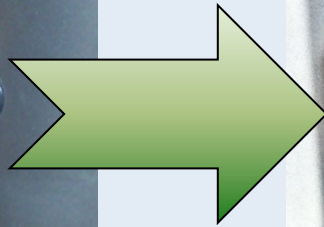
Until we focus on common plumbing design and control principles, we will be stuck where we are.



Primary Loop “Flow Center” Approach

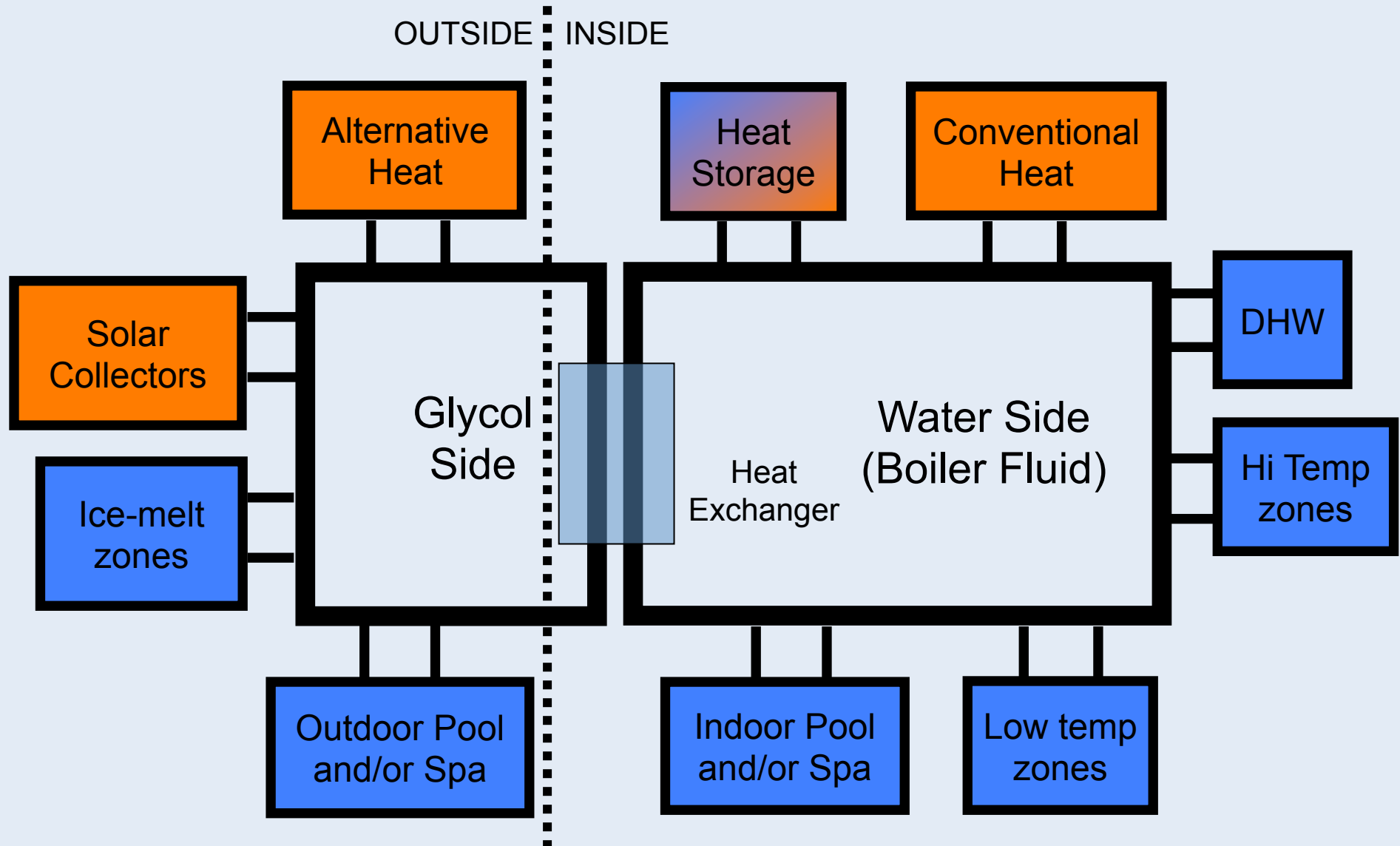
Example: Glycol Direct



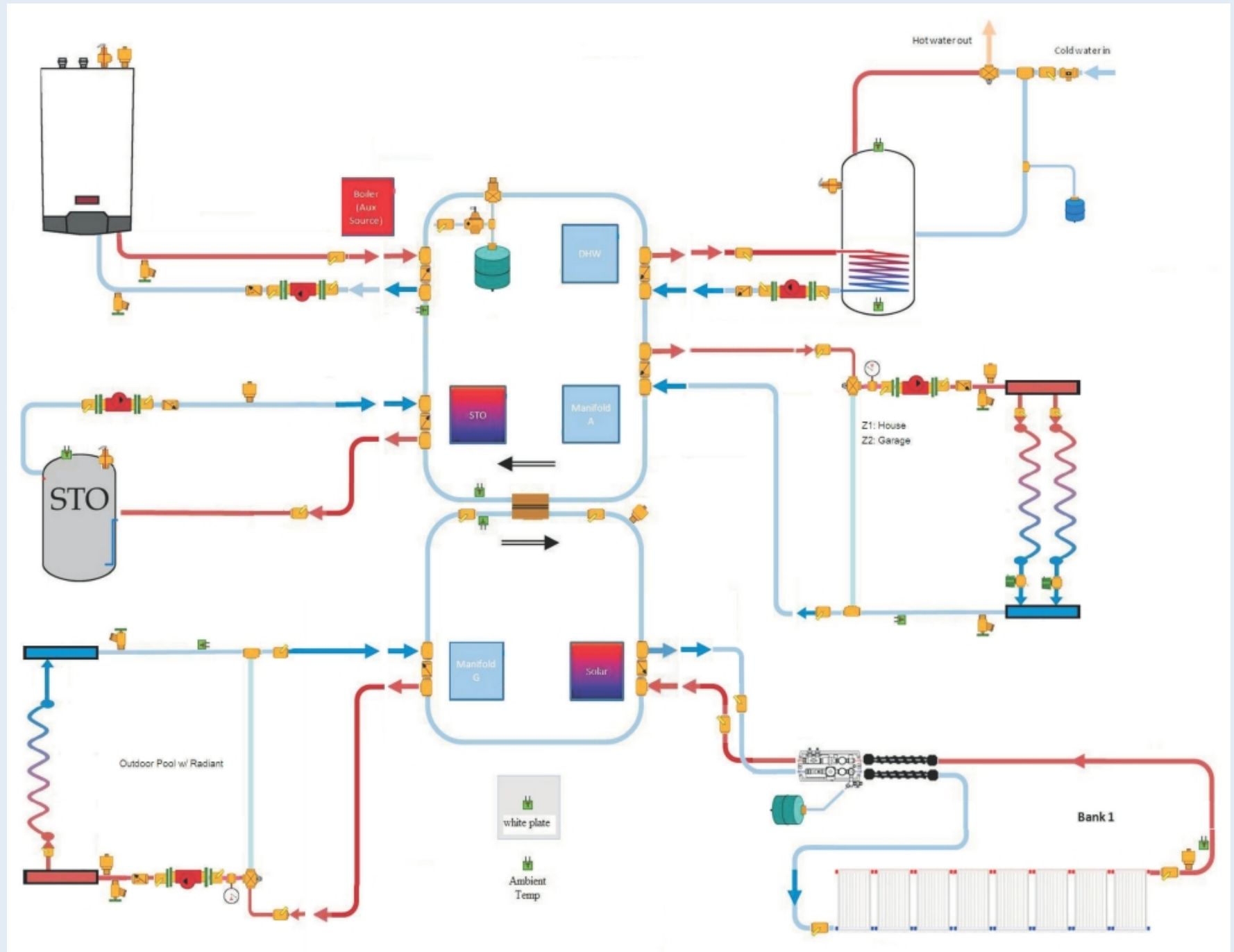


Standardized
Plumbing

THE STANDARD PLUMBING CONFIGURATION is a DUAL PRIMARY LOOP – SIMPLE, YET REMARKABLY ADAPTABLE



SLASH-D Software Output Sample



The SolarLogic Philosophy

Good plumbing design is useless without good controls. Plumbing and controls must be thought of as two parts of the same task. Controls are not an afterthought.



Total System
Control:
We need to be
controlling and
monitoring all
aspects of heat
generation and
distribution.



Total
System
Control

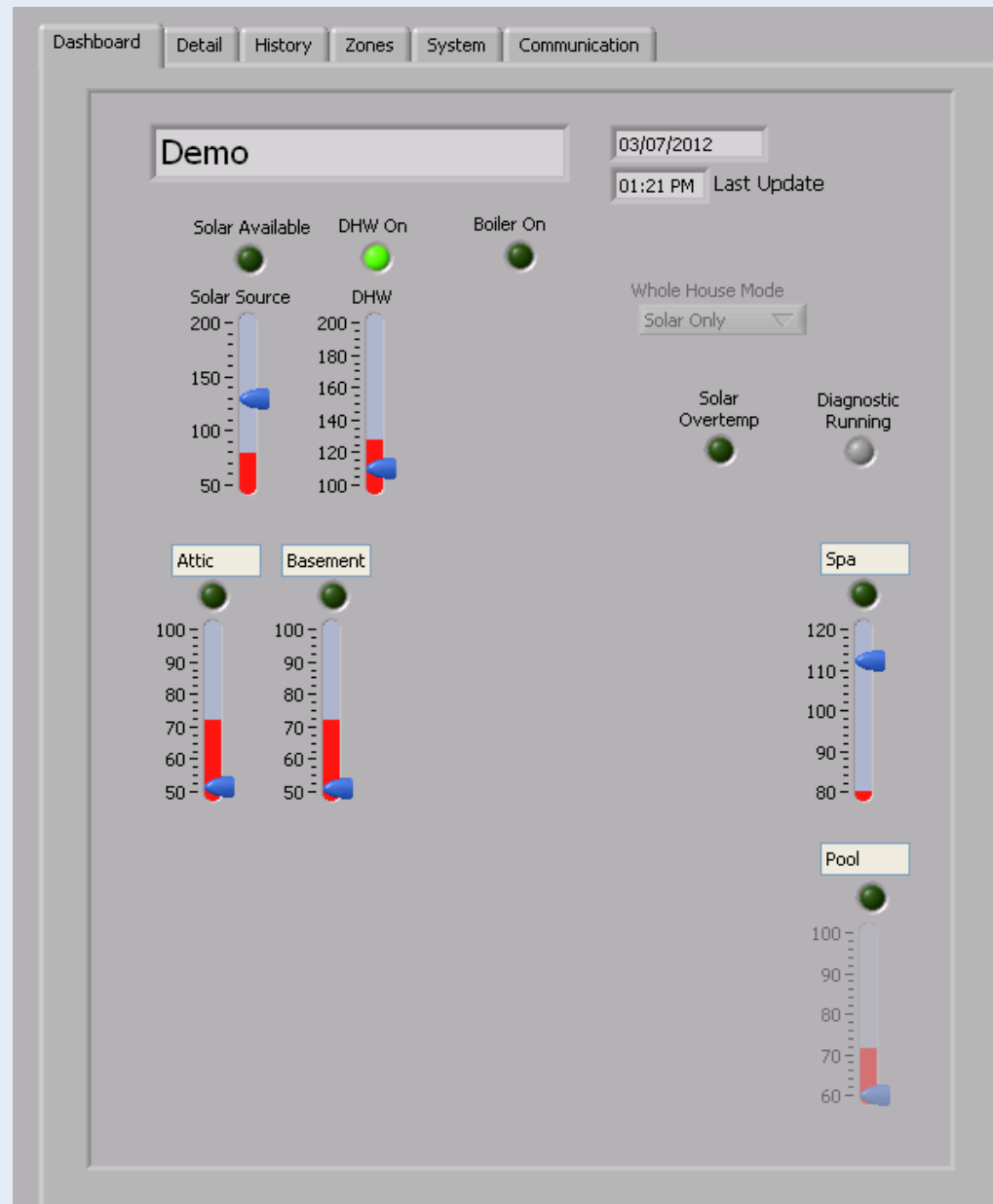
SolarLogic Generation II SLIC

A Complete System Control in One Box



- Controls ALL the heat sources and ALL the heat loads
- Accessible from anywhere on the internet, but not dependent on the internet
- Sophisticated software algorithms for the highest efficiency
 - Simple to install – no programming, no wiring diagram
- Logs system history automatically from the moment you turn it on - over 250 data points every 5 minutes

Profitability is Enhanced by Remote Monitoring, Control and Diagnostics



Fingertip
Comfort
Control

A Familiar Thermostat for the Homeowner



- Straightforward comfort control in each room
- Prioritize for energy savings, precise temperature control, or a balance between the two
- Control the system with or without a computer

What does Monitoring and Control mean for the Solar Thermal Industry?

Demonstrable Results.

Happy Clients.

Happy, Profitable Installers :)



PRIME DIRECTIVE:

“It must feel like an upgrade.”

Six Principles of Good Solar Thermal Design

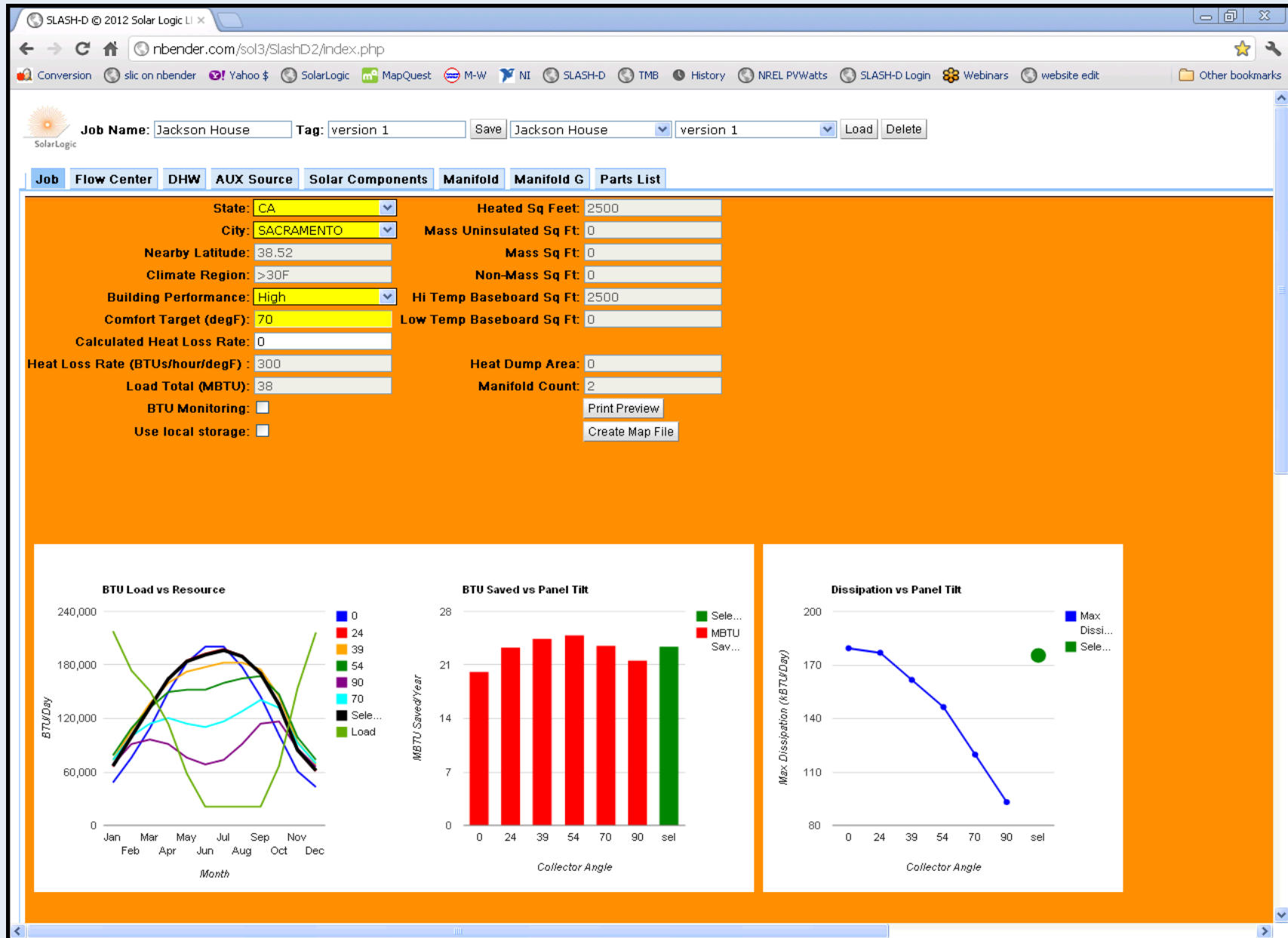


- 1. Reliability**
- 2. Effectiveness**
- 3. Compatibility**
- 4. Elegance**
- 5. Serviceability**
- 6. Efficiency**

SolarLogic's Flagship Products: The SLASH-D Design Aid Website and the SLIC Controller

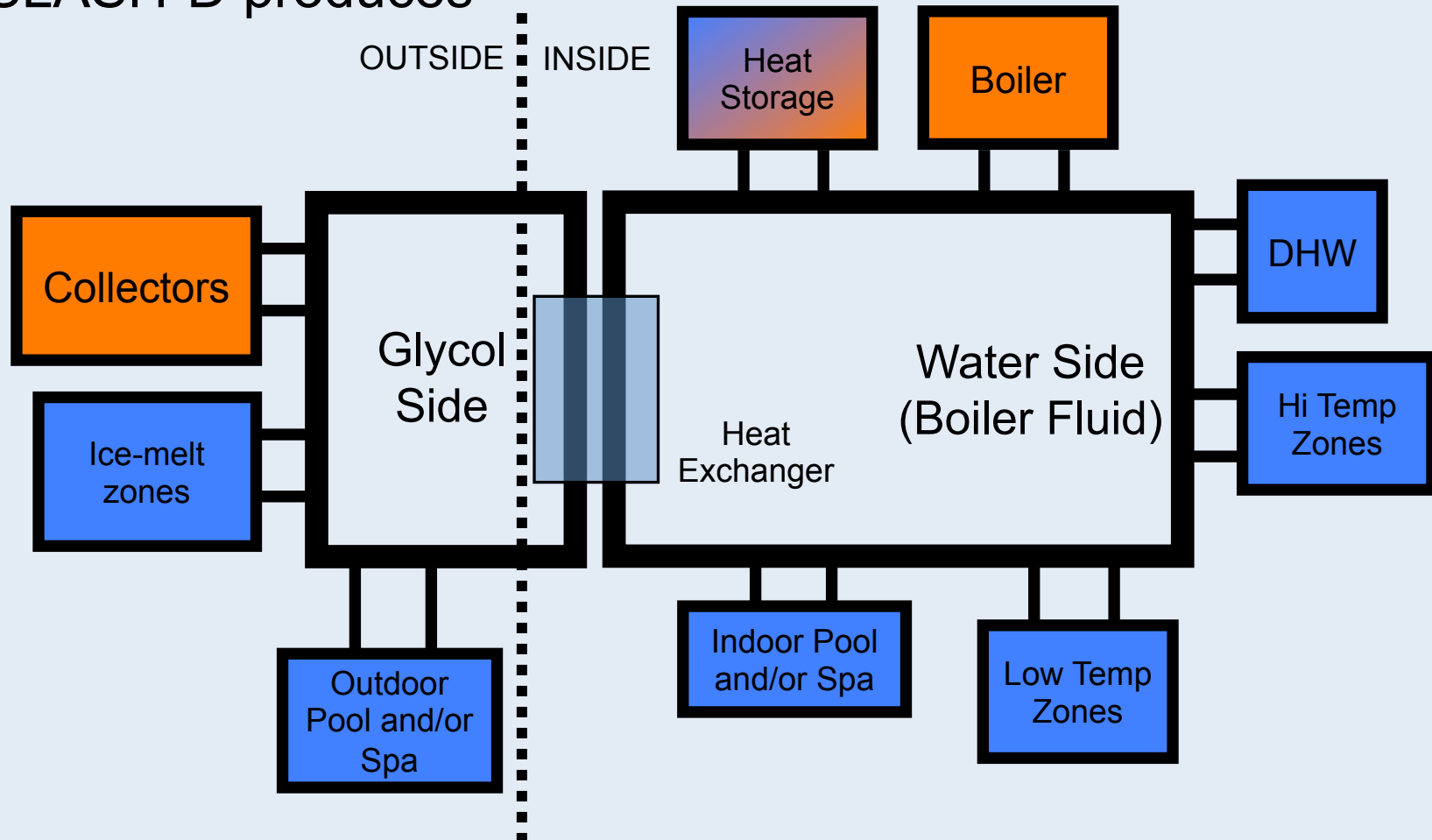
Overview – How the SLIC and the SLASH-D are Related

This is the SLASH-D, a design aid website: energy analysis, options exploration, system sizing, plumbing design and diagrams, parts lists

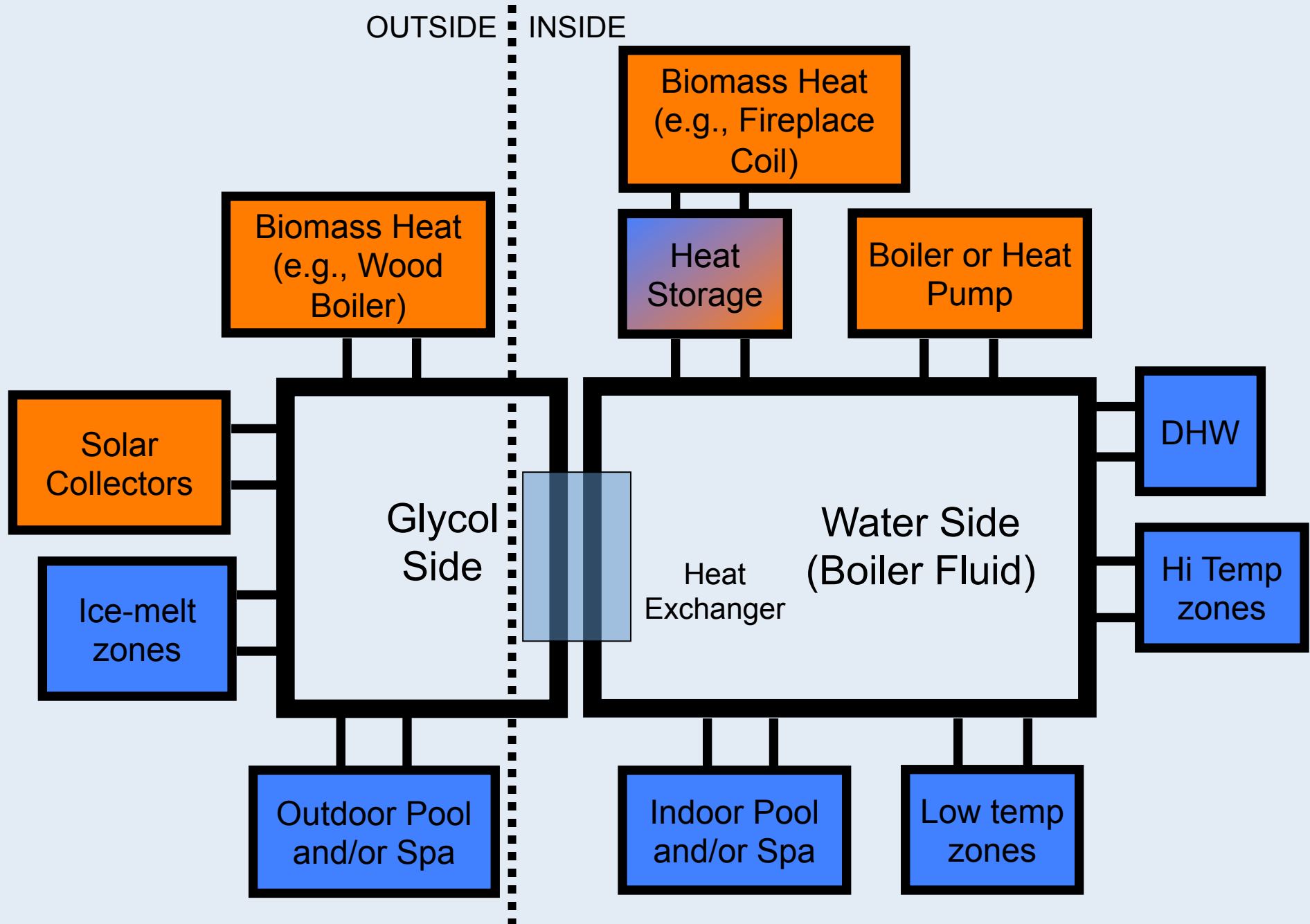


SolarLogic has Standardized the Combi-system Plumbing to a Primary/Secondary Configuration

1. The SLASH-D Always Designs a (Dual) Primary Loop System
2. The SLIC knows how to control Any System that the SLASH-D produces



LESS COMMON HEAT SOURCES ARE EASILY ACCOMODATED



This is the SLIC, an entire combi-system control in one box

Outside



Inside

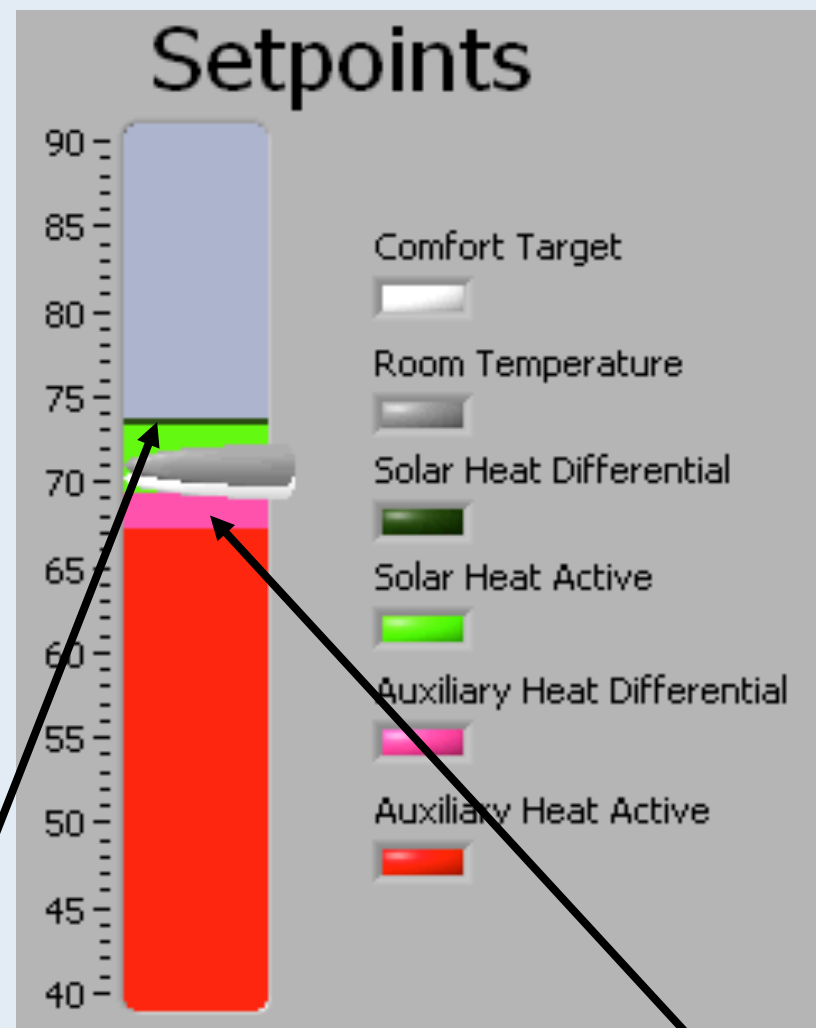


- Sophisticated software algorithms for every control decision
- Logs over 250 data points every 5 minutes automatically and keeps them forever

- Separately fused, pluggable relays
- Home run wiring
- Accessible on the internet but not dependent on the internet

The SLIC only works with SolarLogic Thermostats

Two-stage Heating is about Heat Banking in Mass (Masonry) Floors



Solar heat banking in the mass floor

Boiler called only when room is colder

Systems Tour

Pictures

Features

Real-time visit

Data

Interesting Investigations

Canyoncito, NM

FIGURE 49-1: Solar Combisystem in Canoncito, NM.



Diagram

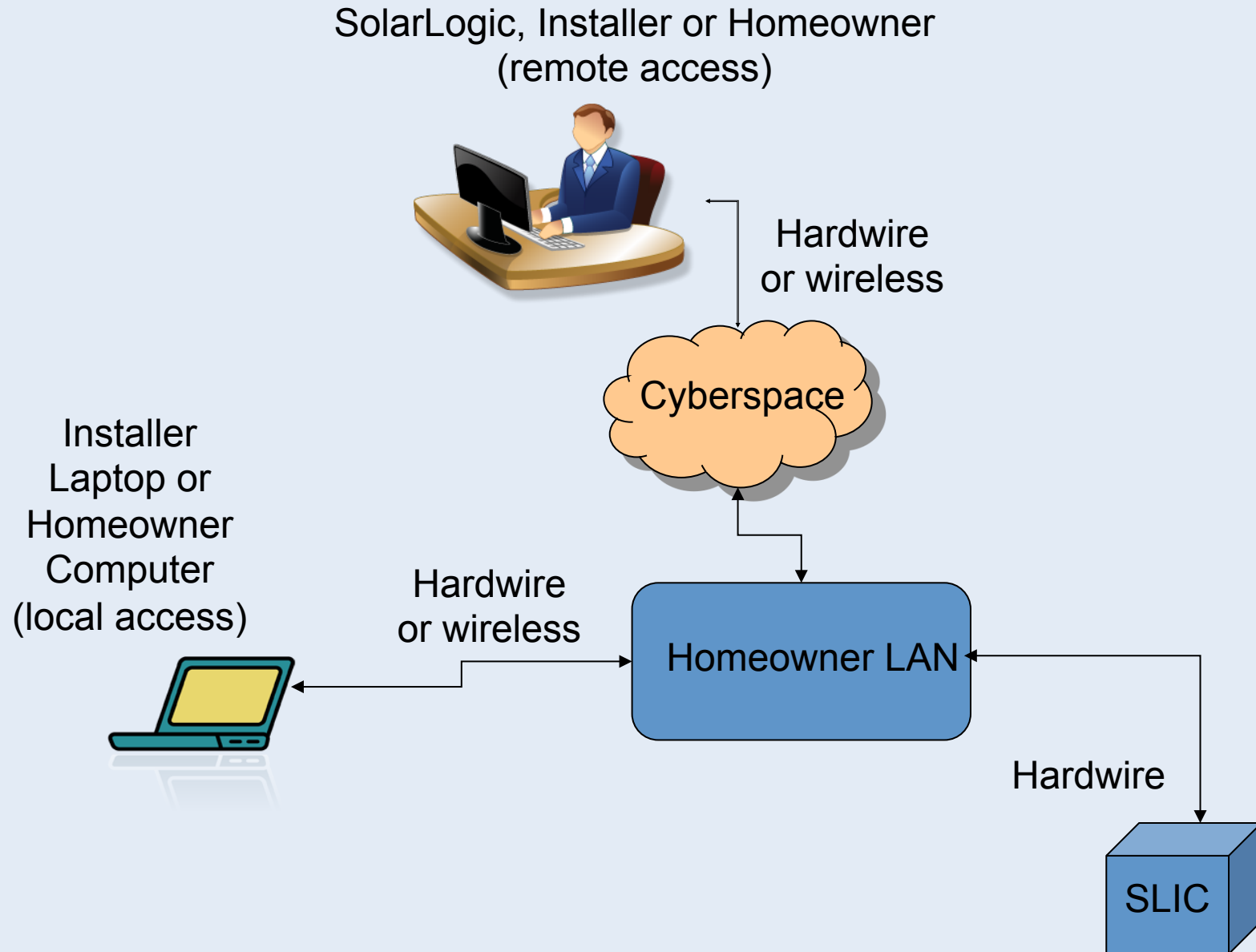


Self-cooling Fins for Flat Plate Collectors

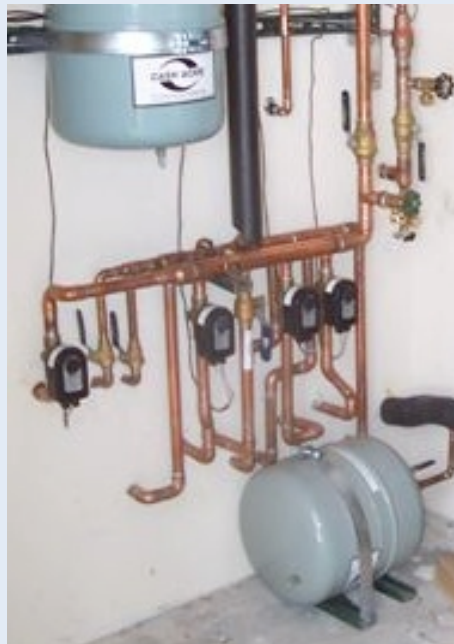
Fail-safe Overheat Protection



SLIC Access using the VSLIC program (Virtual SLIC)



Compact Dual Primary Loop Example: Warm Concrete and DHW, Primary Loop on the Ceiling





Barboursville, VA

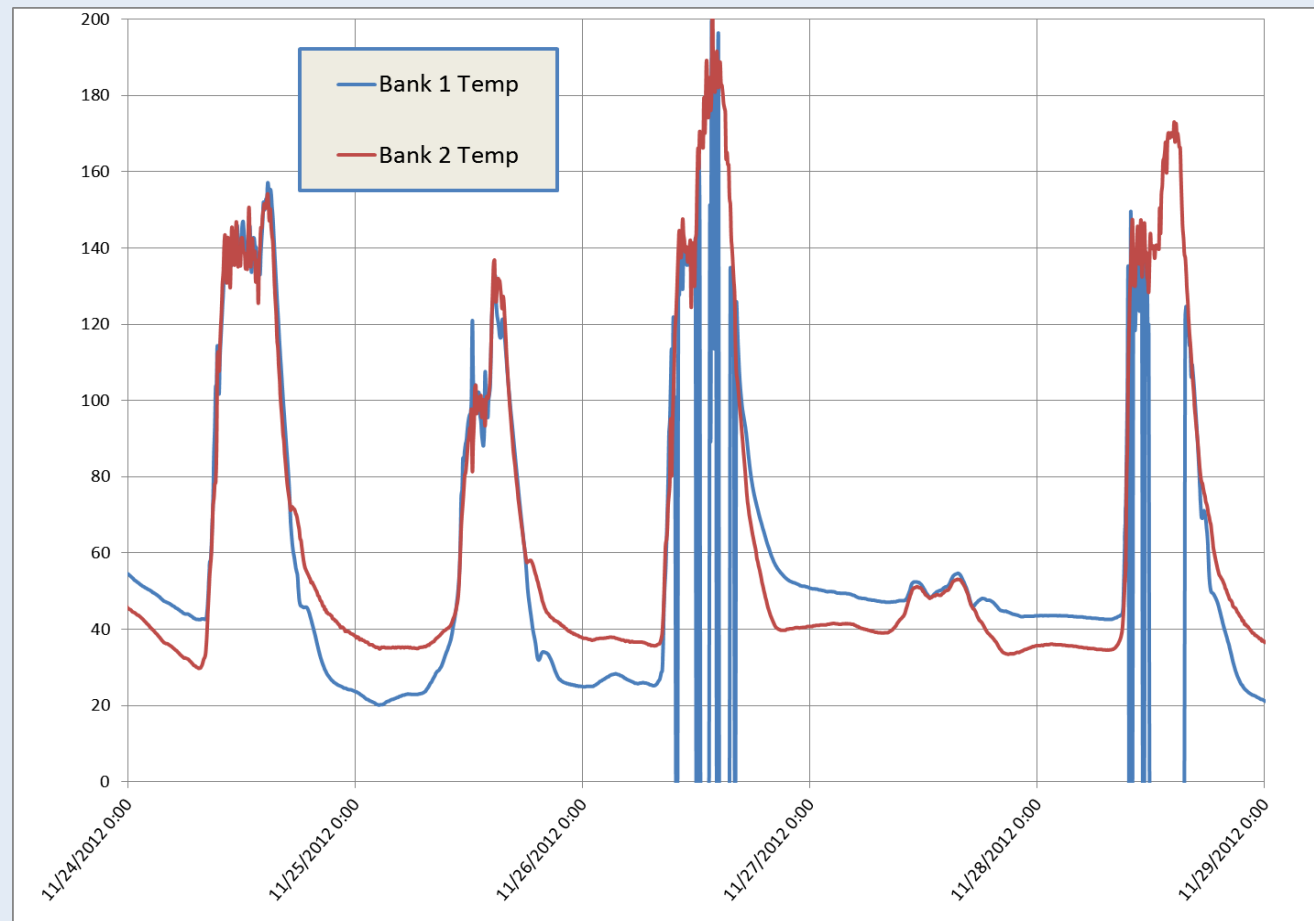
Diagram



When the client calls and thinks there is a problem with the system:

1. Your first response is always to log on.
2. The next step is to analyze the log files.
3. If necessary, try the Diagnostic Mode.
4. If you still don't have an answer, call SolarLogic.
5. Your last resort is going to the site.

In this example, the customer thought there was a problem with one of his solar bank thermistors. He was right.



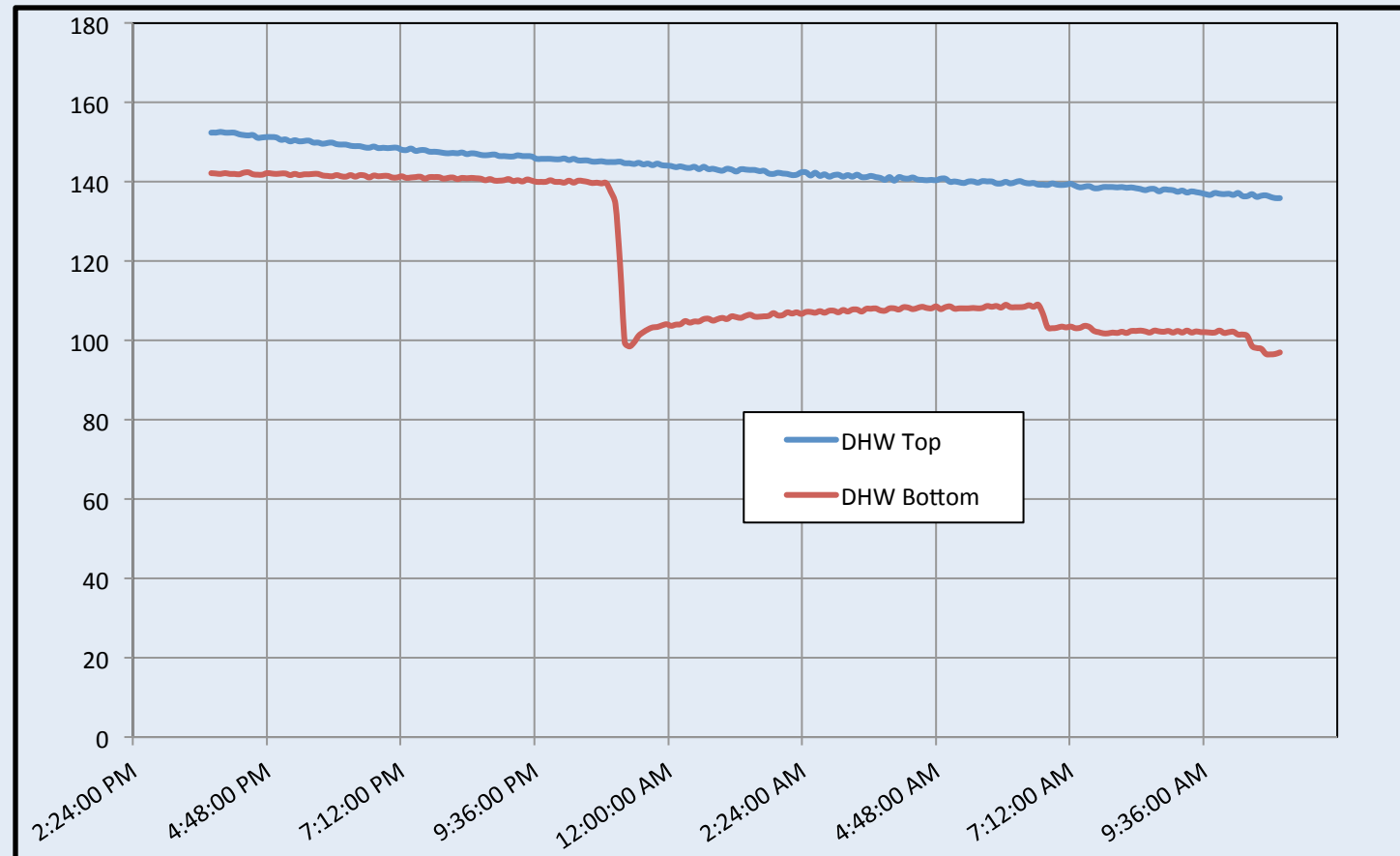
Santa Fe, NM



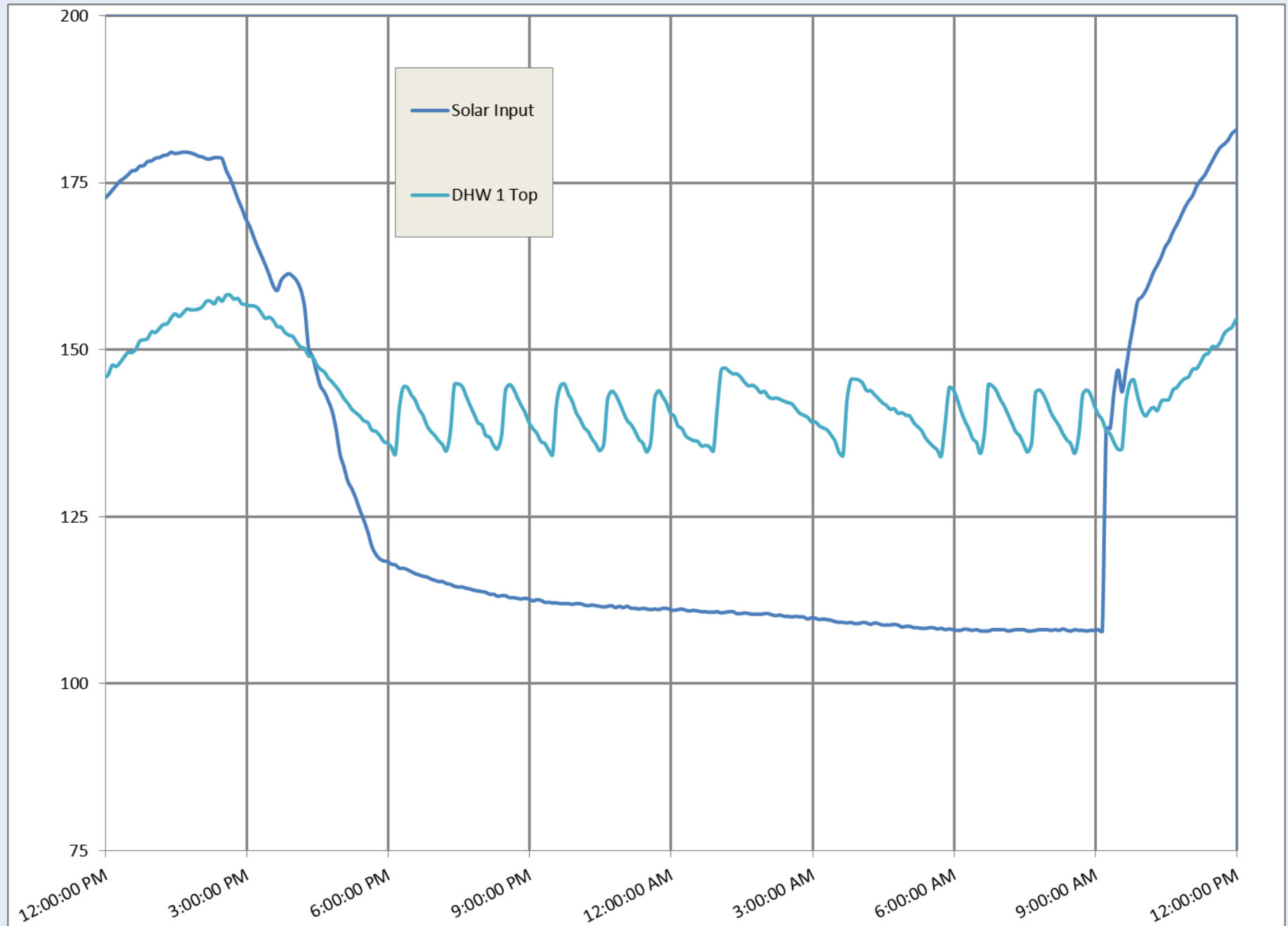
Sometimes the client is wrong, but you can still help them.

In this example, the customer thought there was a problem with the DHW production. He was wrong.

But, we were able to suggest where the plumber might look for the problem.



DHW Recirculators Cost Money. The Owners Rarely Realize How Much or Why.



So What Does Instant Hot Water Cost?

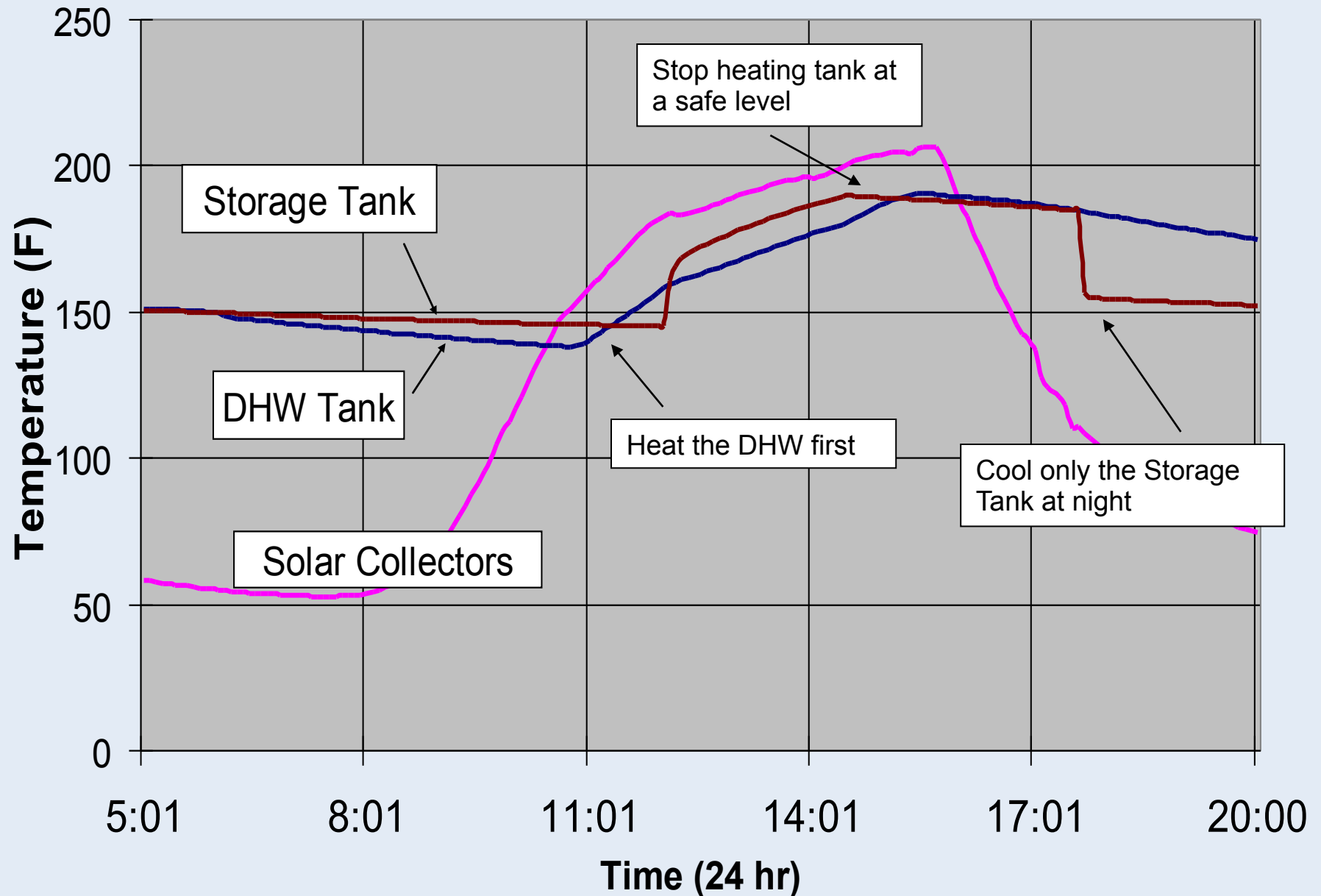
	24/7	timer (off midnight - 6AM)	timed- temp	demand- temp	no recirc
added cooling AC KWH	\$ 155.54	\$ 108.86	\$ 133.41	\$ 59.98	\$ -
propane to maintain DHW temp	\$ 948.29	\$ 746.46	\$ 593.46	\$ 309.18	\$ 141.00
boiler and DHW pump cost KWH	\$ 56.65	\$ 42.49	\$ 31.74	\$ 27.44	\$ 8.36
recirc pump cost KWH	\$ 72.48	\$ 54.36	\$ 27.18	\$ 7.55	\$ -
total cost of convenience	\$ 1,232.95	\$ 952.17	\$ 785.78	\$ 404.16	\$ 149.36

Heating Fuel \ Recirc Control	24/7	timer	timed- temperature	demand- temperature	no recirc
Propane	\$ 1,233	\$ 952	\$ 786	\$ 404	\$ 149
Electricity	\$ 1,207	\$ 932	\$ 770	\$ 396	\$ 146
Fuel Oil	\$ 1,155	\$ 891	\$ 737	\$ 379	\$ 138
Natural Gas	\$ 568	\$ 429	\$ 370	\$ 187	\$ 51

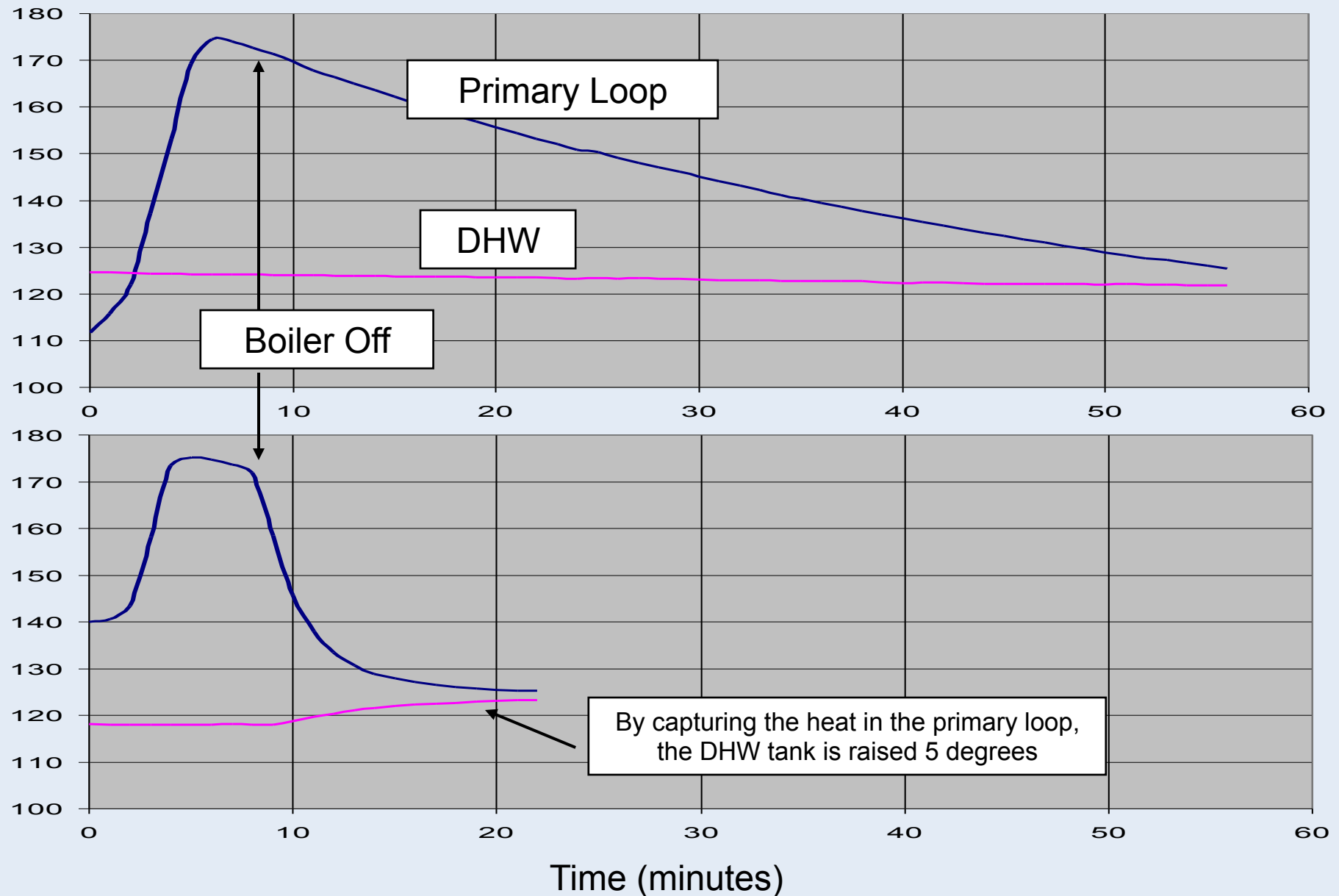
What does a Log File Look Like?

K8 fx 71.8												
	A	B	C	D	E	F	G	H	I	J	K	
1	GMT	Local Time	Bank 1 Temp	Bank 2 Temp	Solar Input	Cooling Panels	White Plate	Ambient	Post HX	FC	Pre HX (BTU)	DH
2	3/1/2012 0:03	2/29/2012 17:03	99.9	-6.1	101.2	-6.1	53.8	52.9	104	92.8	72.6	
3	3/1/2012 0:09	2/29/2012 17:09	96.1	-6.1	98	-6.1	53	52.5	102.4	92.1	72.4	
4	3/1/2012 0:14	2/29/2012 17:14	92.1	-6.1	94.9	-6.1	52.2	51.9	100.6	91.4	72.3	
5	3/1/2012 0:19	2/29/2012 17:19	87.4	-6.1	92.3	-6.1	51.7	51.5	99.1	90.9	72.2	
6	3/1/2012 0:25	2/29/2012 17:25	87.4	-6.1	90.2	-6.1	51.1	50.9	97.7	90.3	72	
7	3/1/2012 0:30	2/29/2012 17:30	86	-6.1	88.1	-6.1	50.3	50	96.4	89.8	71.9	
8	3/1/2012 0:35	2/29/2012 17:35	85.1	-6.1	86.5	-6.1	49.8	49.6	95.1	89.3	71.8	
9	3/1/2012 0:41	2/29/2012 17:41	81.2	-6.1	84.9	-6.1	49.1	49	93.8	88.8	71.6	
10	3/1/2012 0:46	2/29/2012 17:46	77.6	-6.1	83.5	-6.1	48.5	48.2	92.7	88.3	71.4	
11	3/1/2012 0:51	2/29/2012 17:51	73.9	-6.1	82.3	-6.1	47.8	47.5	91.6	87.8	71.1	
12	3/1/2012 0:57	2/29/2012 17:57	70.6	-6.1	81.2	-6.1	47.2	46.7	90.6	87.3	70.9	
13	3/1/2012 1:02	2/29/2012 18:02	64.8	-6.1	80.2	-6.1	46.5	45.9	89.6	86.8	70.7	
14	3/1/2012 1:07	2/29/2012 18:07	62.5	-6.1	79.3	-6.1	45.8	44.8	88.7	86.4	70.5	
15	3/1/2012 1:13	2/29/2012 18:13	64.2	-6.1	78.5	-6.1	45.3	44.6	87.7	85.9	70.2	
16	3/1/2012 1:18	2/29/2012 18:18	60.8	-6.1	77.7	-6.1	44.7	43.5	86.9	85.4	70	
17	3/1/2012 1:24	2/29/2012 18:24	58.1	-6.1	77.1	-6.1	44	42.8	86	84.9	69.8	
18	3/1/2012 1:29	2/29/2012 18:29	55.8	-6.1	76.4	-6.1	43.3	41.1	85.2	84.5	69.6	
19	3/1/2012 1:34	2/29/2012 18:34	54.6	-6.1	75.8	-6.1	42.6	40.3	84.4	84	69.3	
20	3/1/2012 1:40	2/29/2012 18:40	52.7	-6.1	75.3	-6.1	42	39.9	83.6	83.6	69.1	
21	3/1/2012 1:45	2/29/2012 18:45	51.1	-6.1	74.7	-6.1	41.5	40.6	82.9	83.2	68.8	
22	3/1/2012 1:51	2/29/2012 18:51	49.4	-6.1	74.2	-6.1	41.1	40.3	82.2	82.7	68.7	
23	3/1/2012 1:56	2/29/2012 18:56	47.8	-6.1	73.8	-6.1	40.6	38.7	81.6	82.3	68.5	
24	3/1/2012 2:01	2/29/2012 19:01	46.2	-6.1	73.3	-6.1	40.2	39.1	80.9	81.9	68.3	
25	3/1/2012 2:07	2/29/2012 19:07	44.9	-6.1	72.9	-6.1	40	38.1	80.3	81.5	68.2	
26	3/1/2012 2:12	2/29/2012 19:12	43.9	-6.1	72.6	-6.1	39.6	38.9	79.7	81.1	68	
27	3/1/2012 2:18	2/29/2012 19:18	43	-6.1	72.2	-6.1	39.5	39.3	79.1	80.6	67.8	
28	3/1/2012 2:23	2/29/2012 19:23	42.2	-6.1	71.9	-6.1	39.3	39.4	79.1	80.5	67.6	
29	3/1/2012 2:29	2/29/2012 19:29	41.4	-6.1	71.6	-6.1	38.9	38.5	110.9	124.2	67.5	
30	3/1/2012 2:32	2/29/2012 19:32	41	-6.1	71.4	-6.1	38.7	37.5	108.7	120.3	67.5	

Log file analysis showing fine control of heating and cooling of the DHW and Storage tanks during the summer



Log file analysis showing stranded heat recapture. For this system, 2000 BTUs can be captured every time the boiler turns off.



Santa Fe, NM



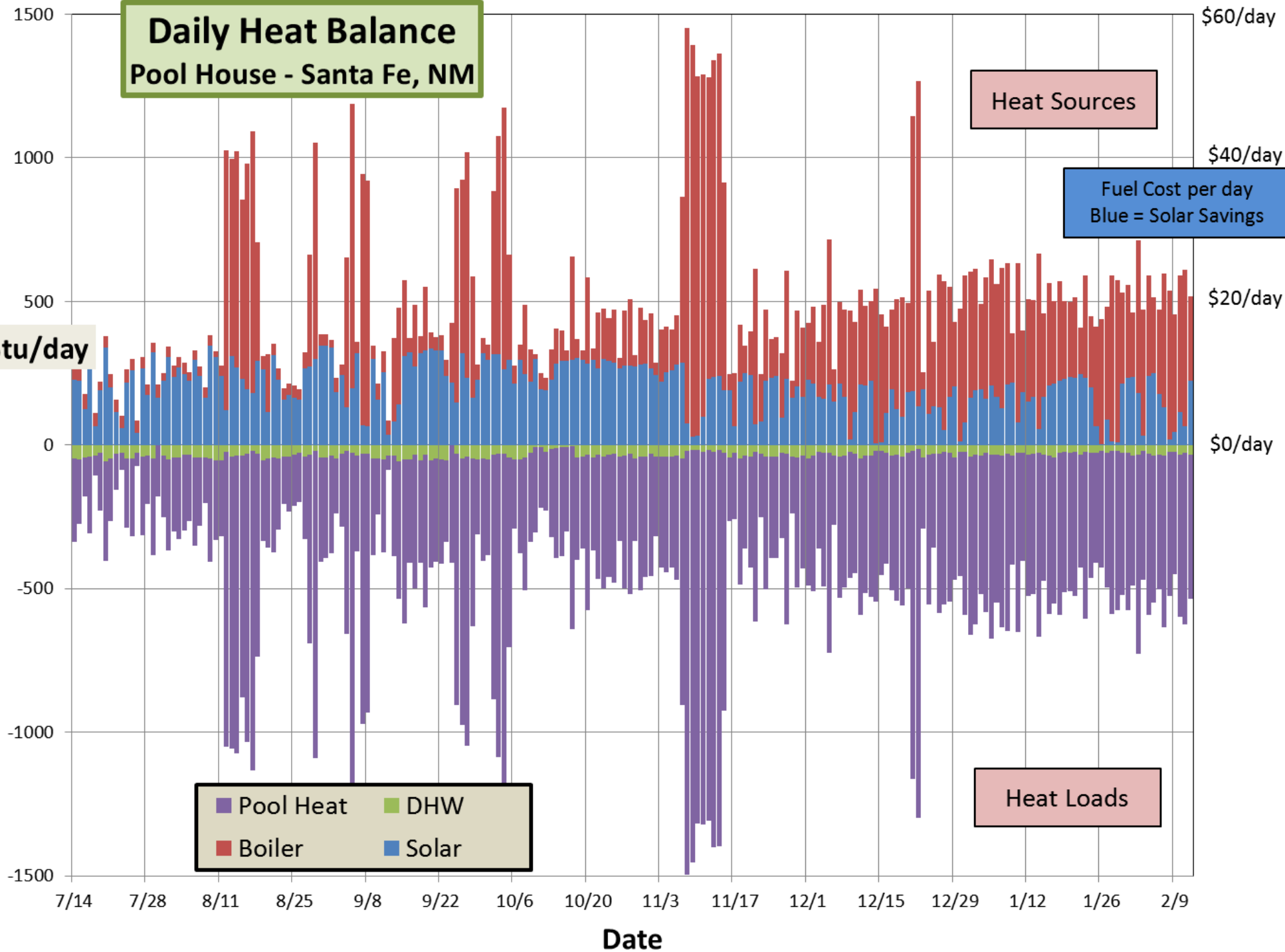
[Diagram](#)

[Diagram](#)

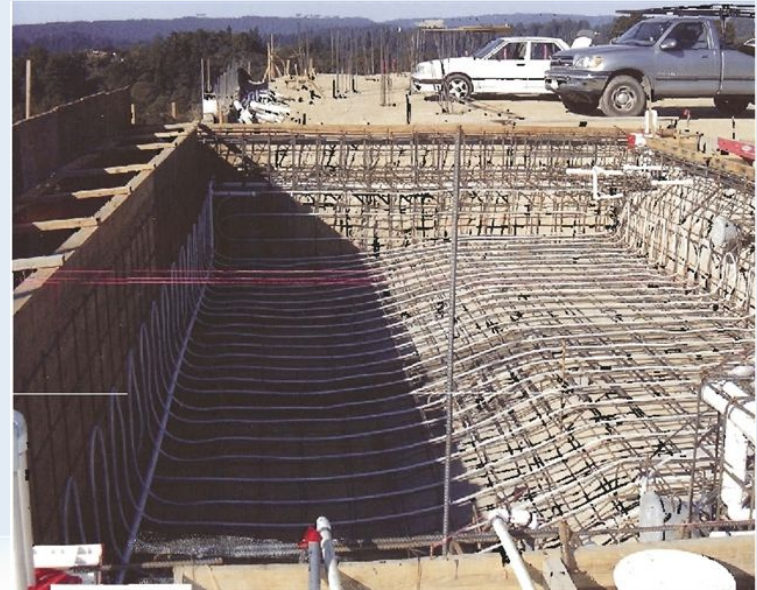


Daily Heat Balance Pool House - Santa Fe, NM

KBtu/day



Single Primary Loop Example: Warm Concrete, DHW, Radiant Pool in a “District” Design



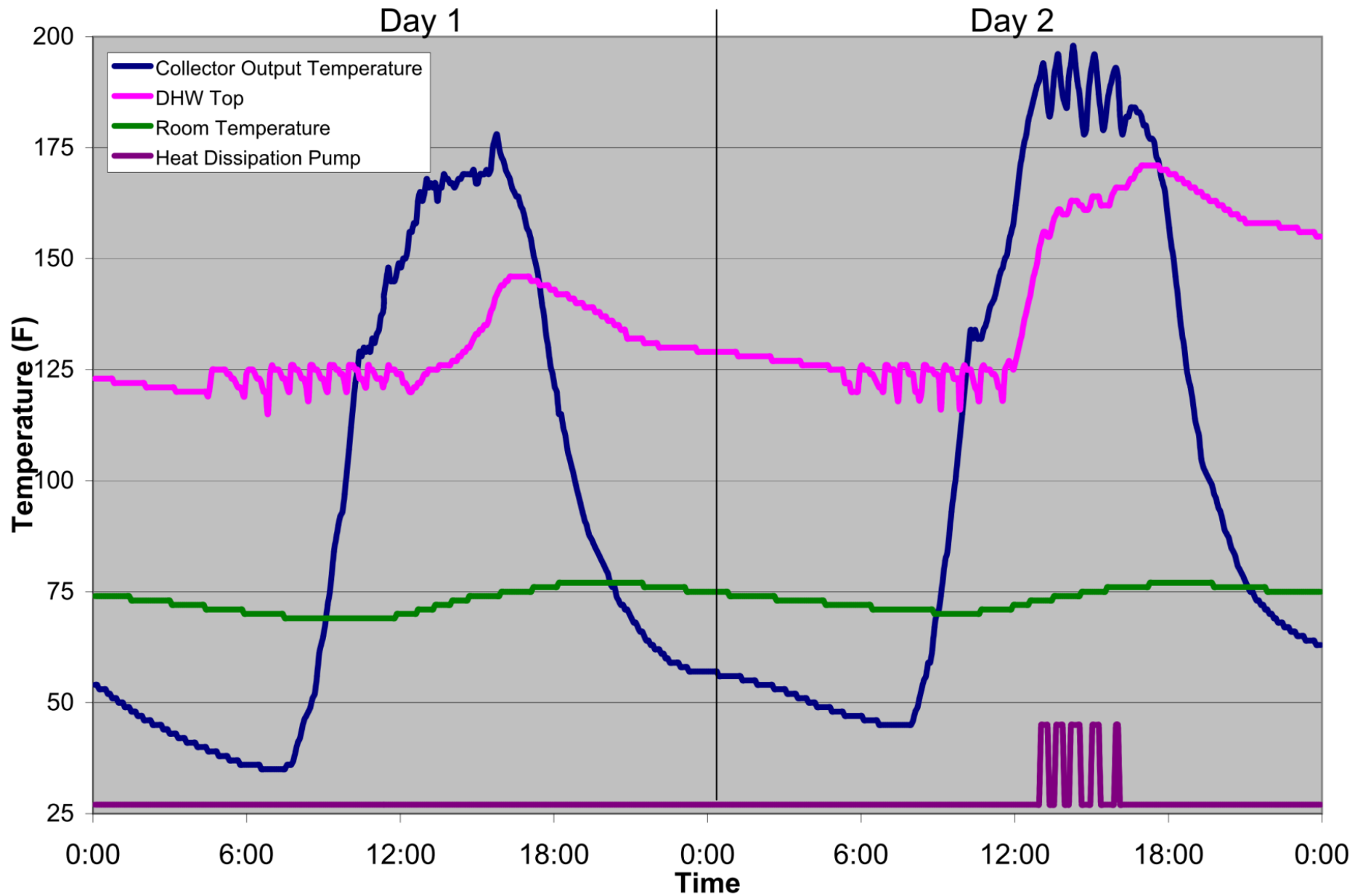


Placitas, NM

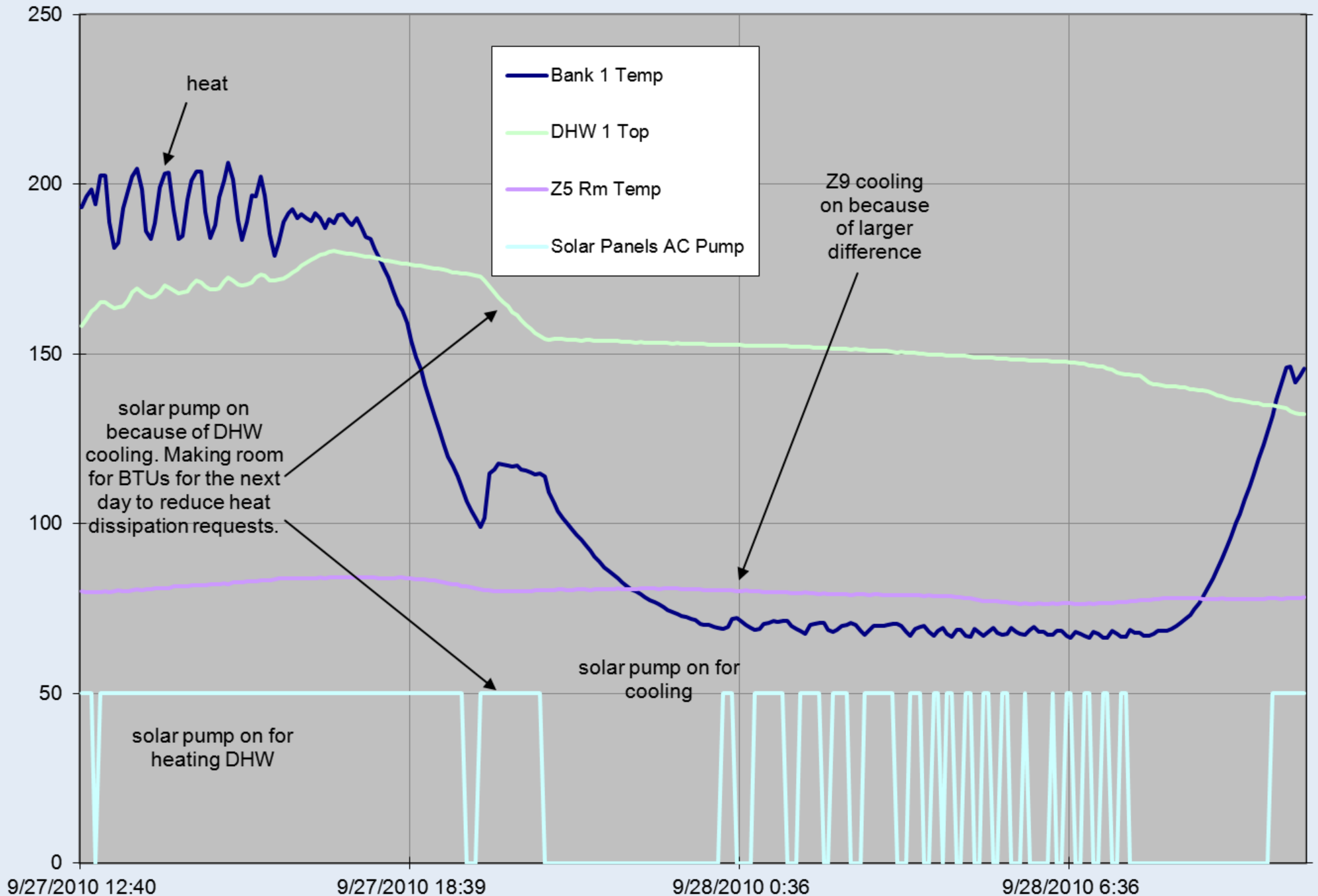
[Diagram](#)



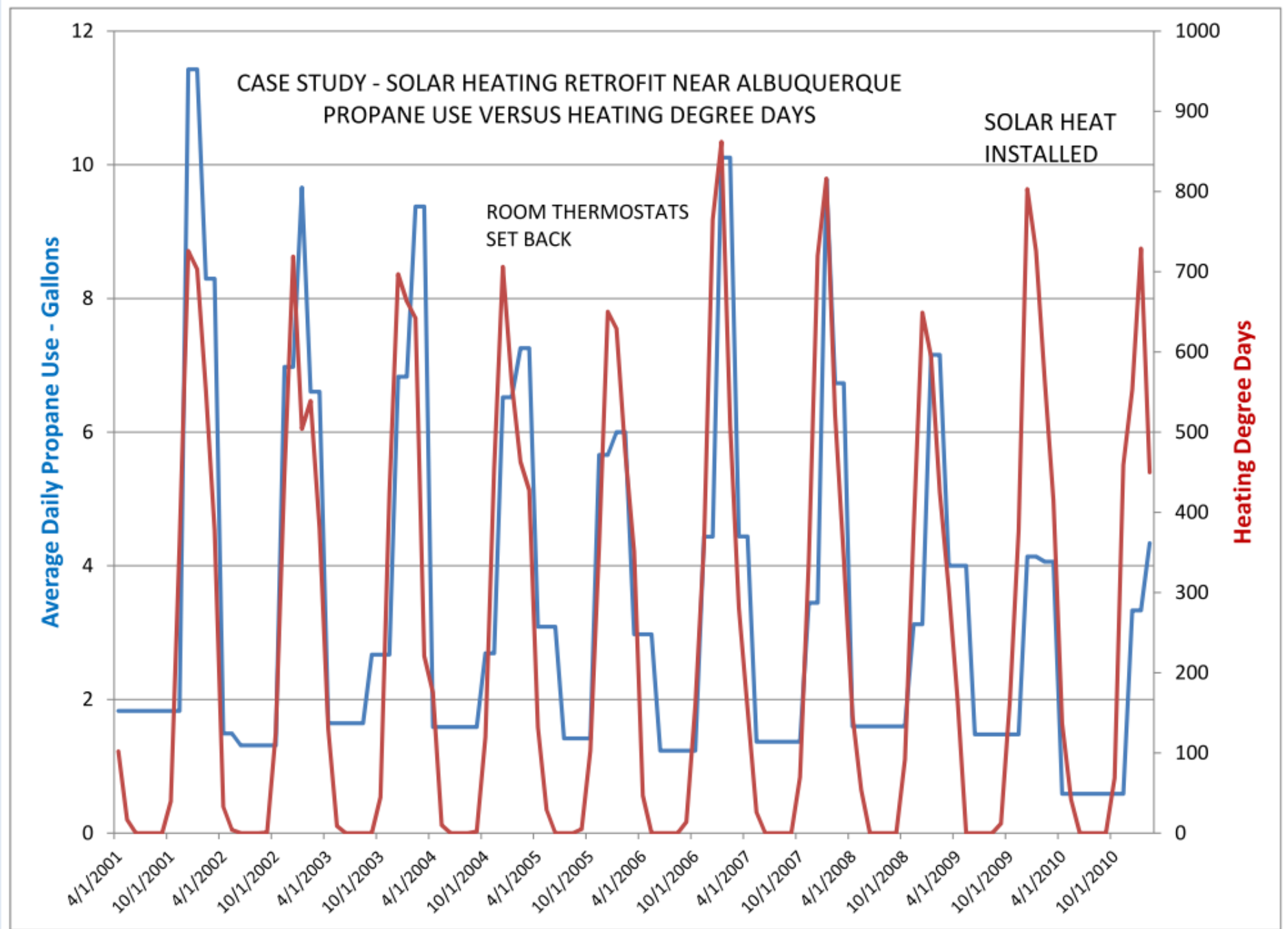
Another Method for Overheat Protection: Intelligent Heat Dissipation



NSRC: DHW Pre-cooling for Heat Buffering and Zone Cooling



Owner's Own Analysis: System Saves 50% of Annual Propane Plus Lowers A/C by 20% in Summer



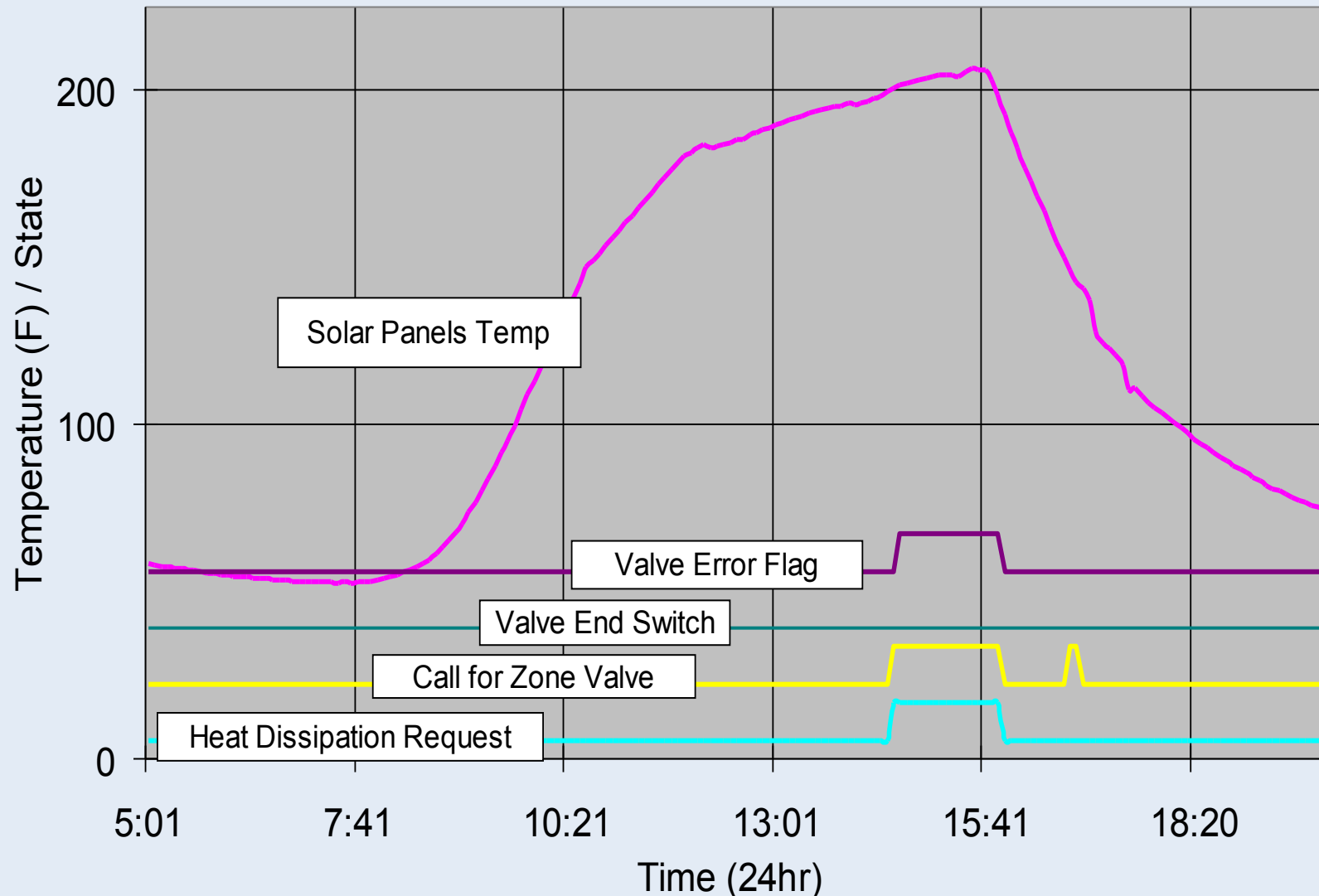


Award-Winning Los Alamos
County Eco-station
Los Alamos, NM

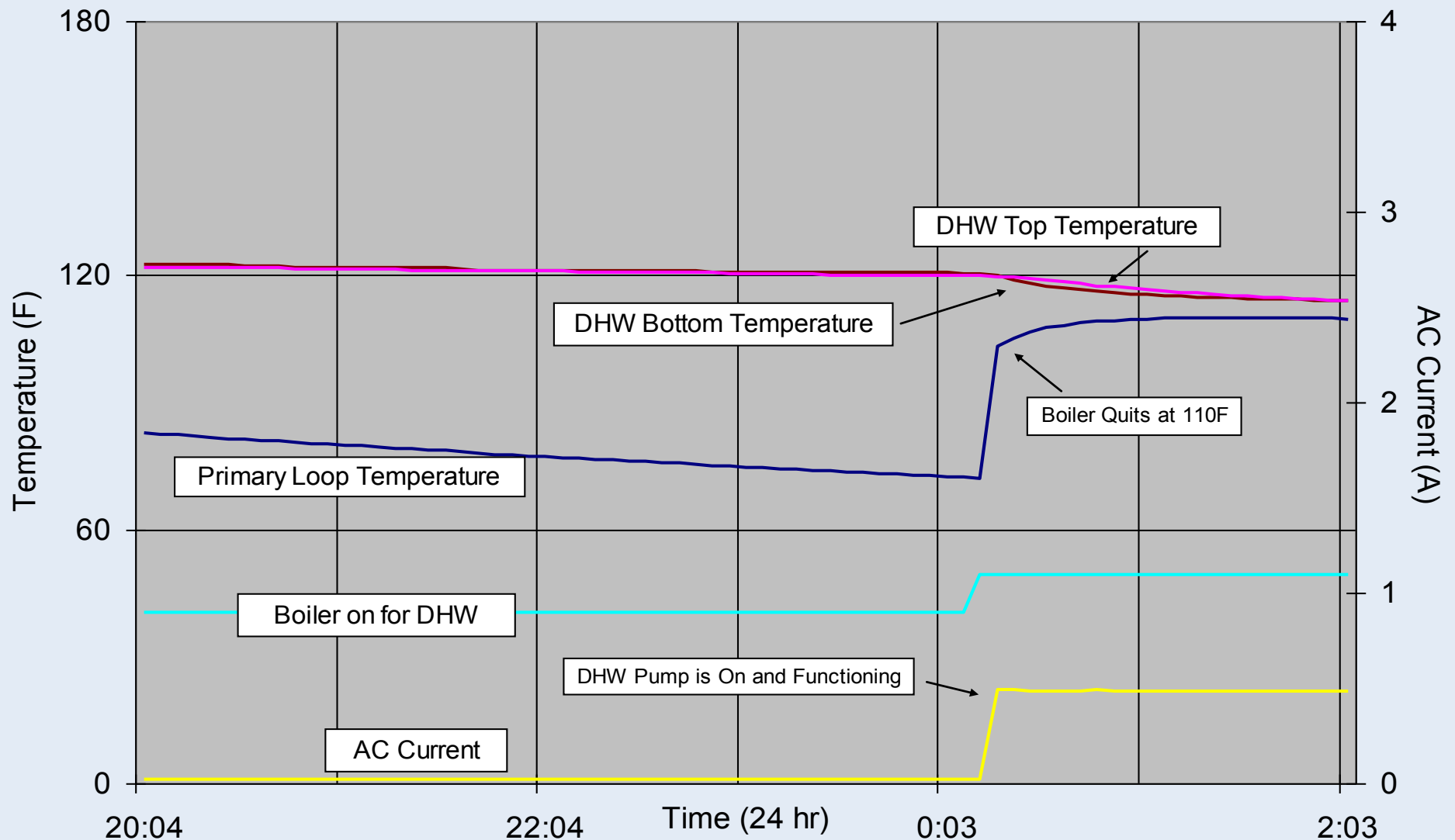
[Diagram](#)



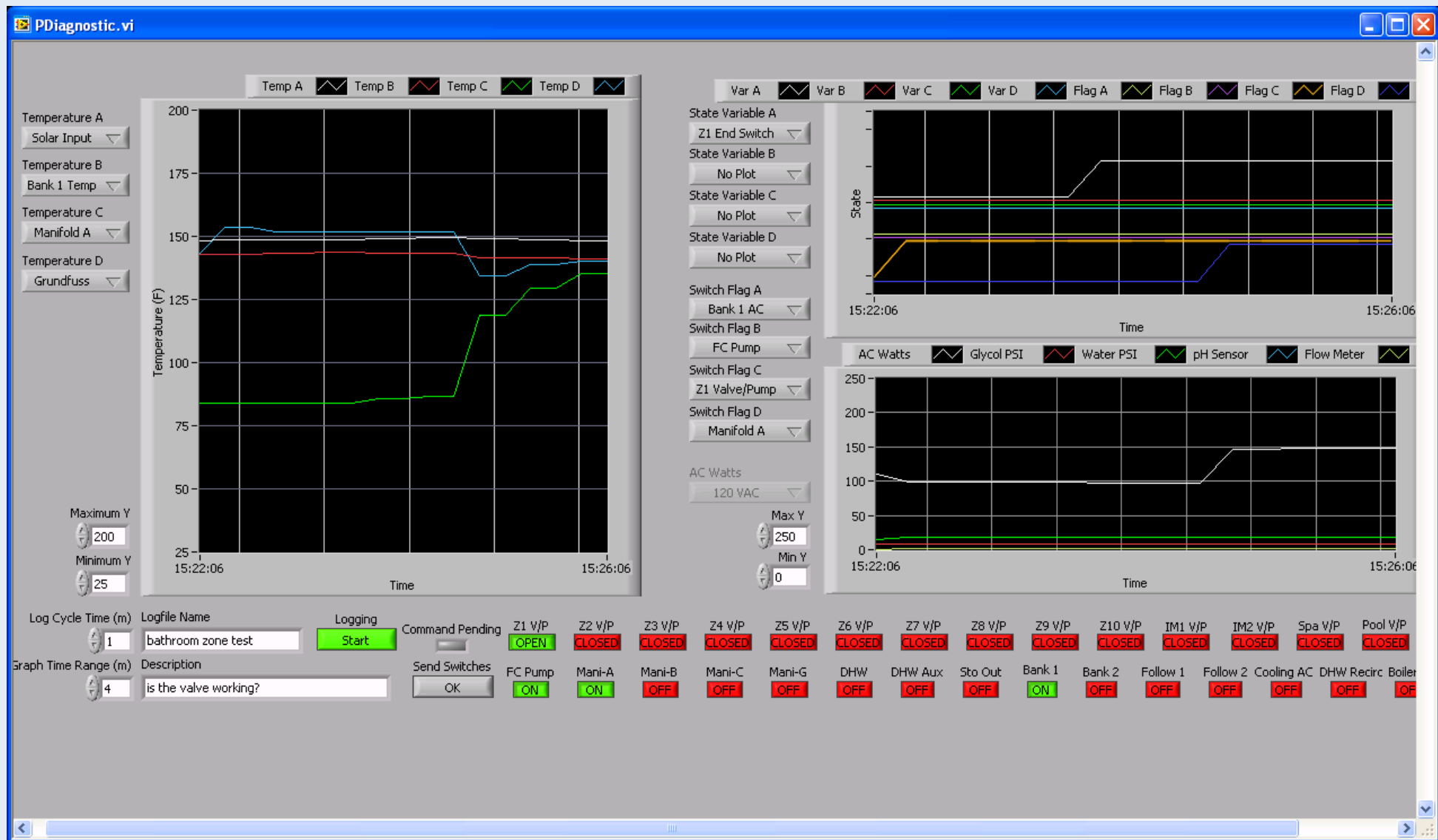
The SolarLogic Central Server will send an “Alert” email when a valve failure occurs. Log file analysis showing a valve failure captured by the lack of an end switch signal after a wait time of 5 minutes.



The SolarLogic Central Server will send an “Alert” email when DHW is more than 15 degrees below the “DHW Minimum” for more than 20 minutes. Log file analysis showing boiler failure when there was a call to make boiler DHW.

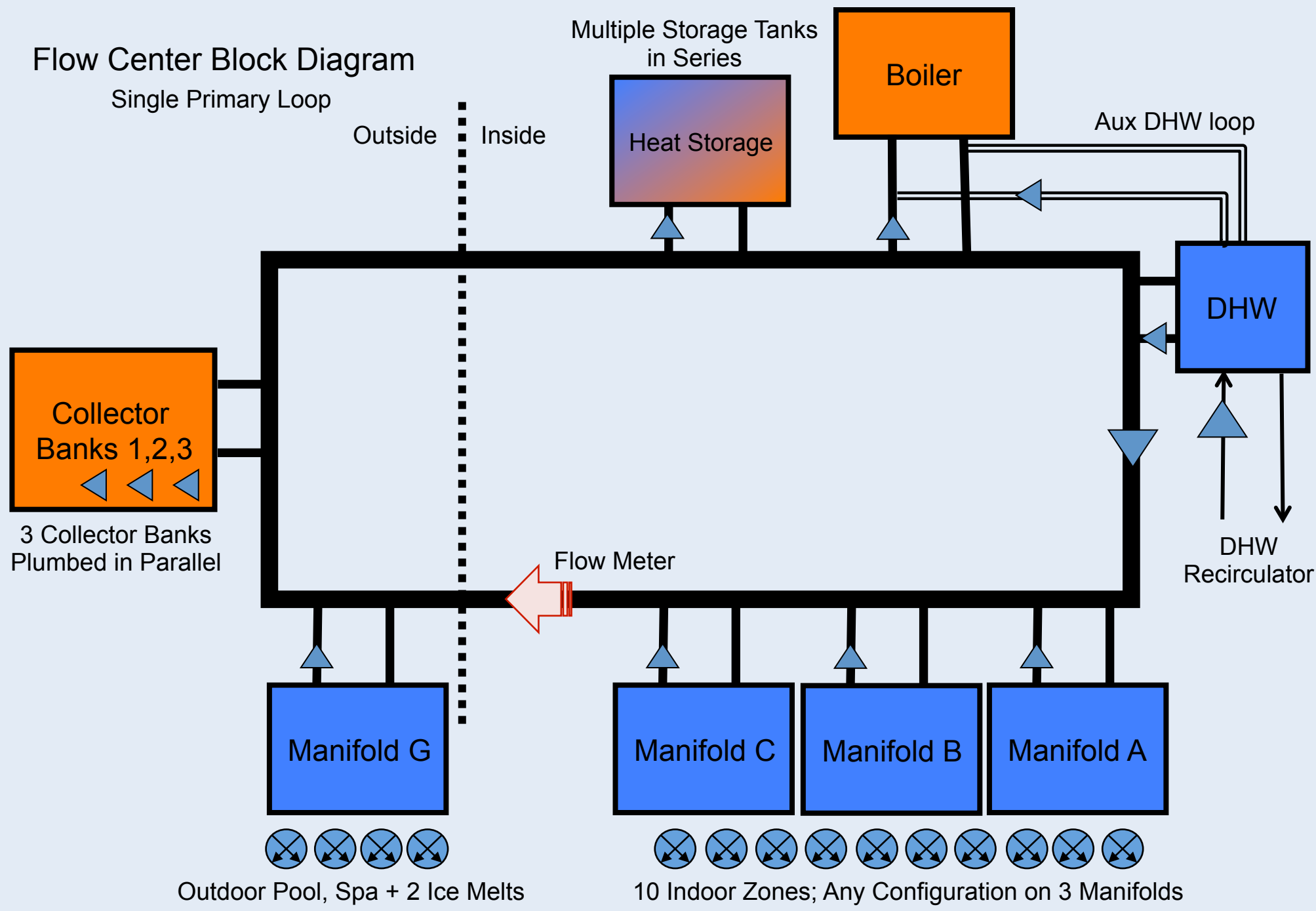


The Diagnostic Mode is used for Commissioning and Troubleshooting



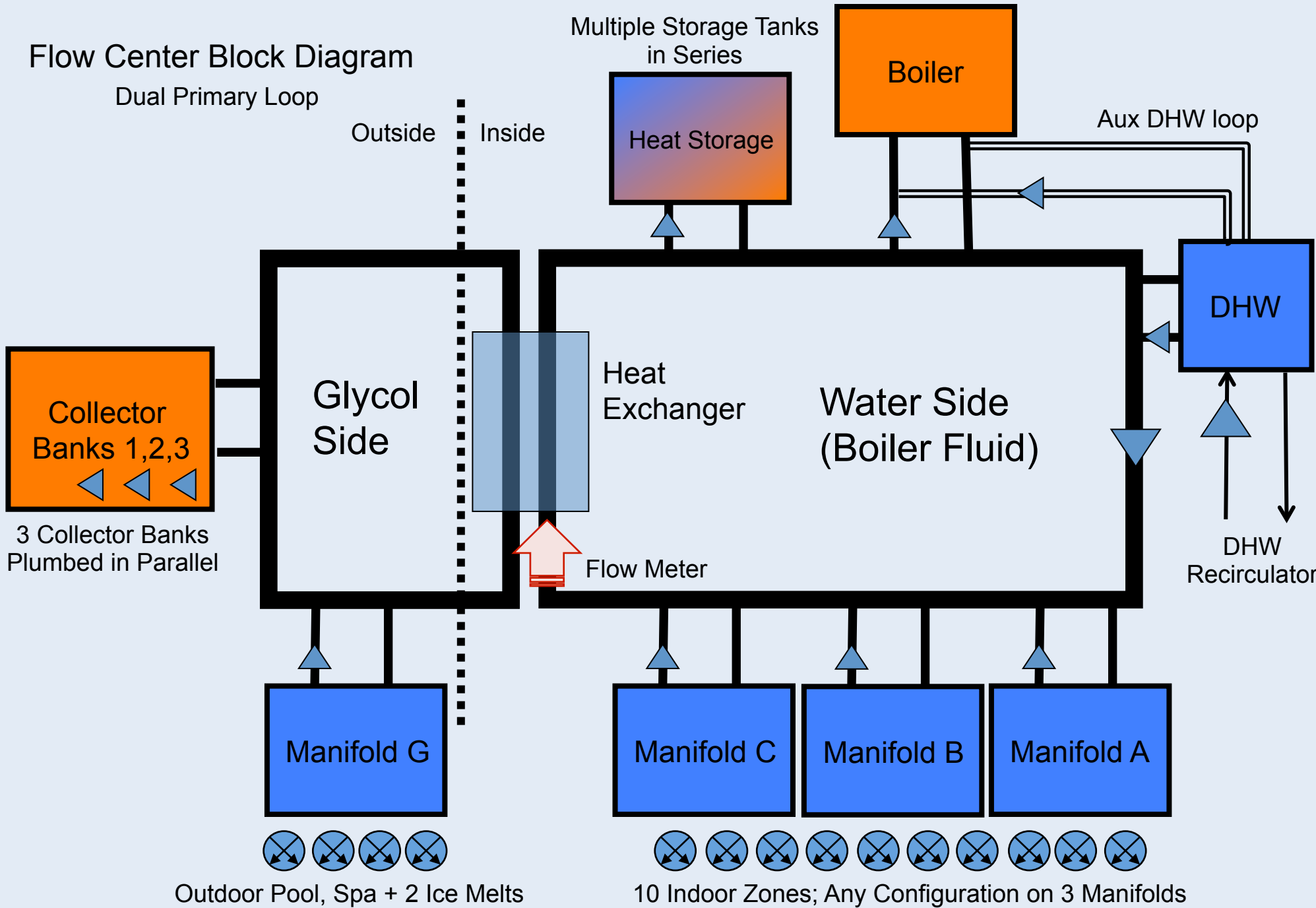
Designing the Solar Heating System: the SLASH-D

SLASH-D and SLIC Maximum Configuration: Glycol Direct



Zone Valves or Circulators: 120VAC or 24VAC

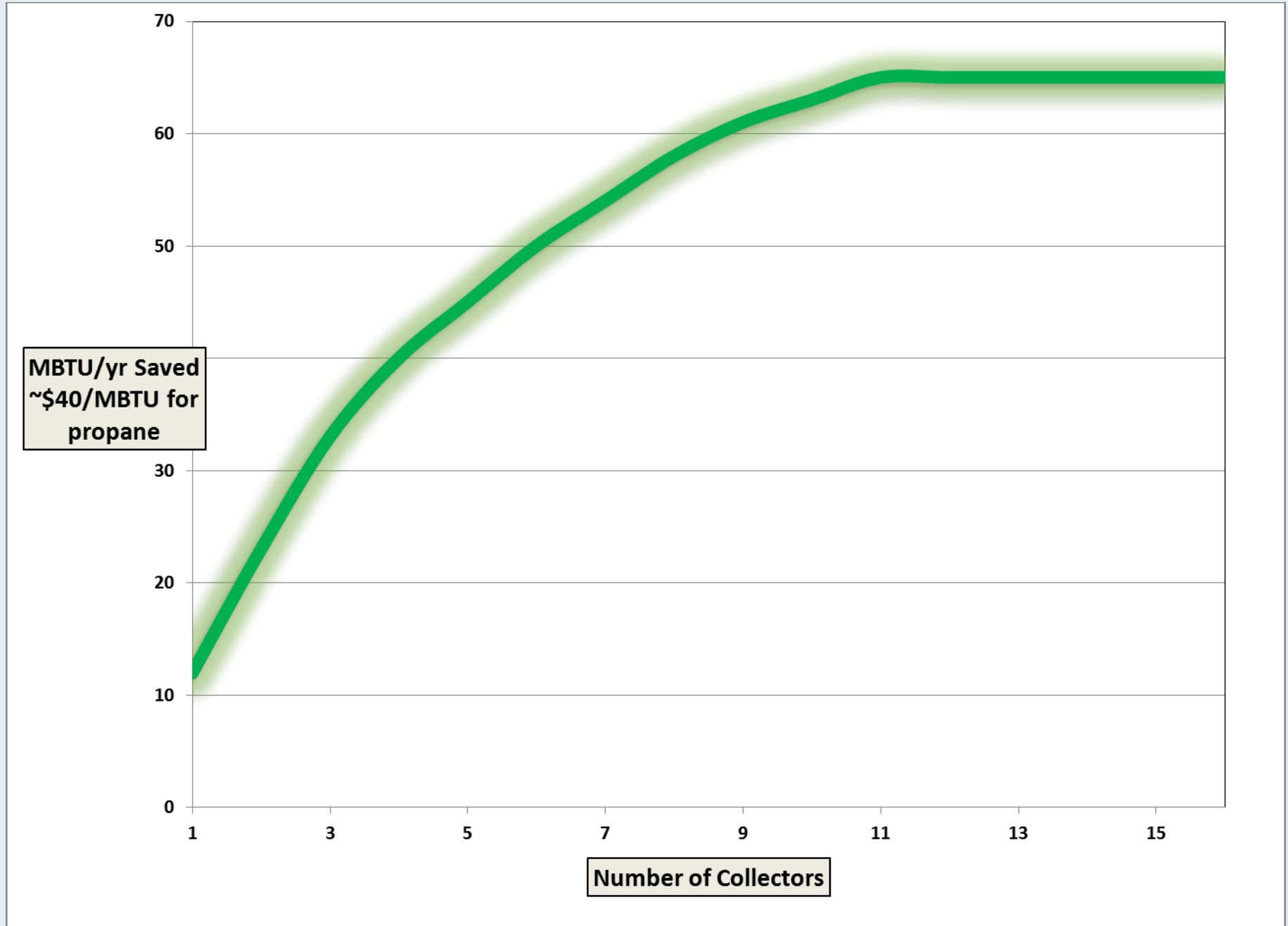
SLASH-D and SLIC Maximum Configuration: Dual Primary Loop



Zone Valves or Circulators: 120VAC or 24VAC

Live Demonstration: Using the SLASH-D

By Overriding the SLASH-D Recommended Number of Panels, you can Study the Cost/Benefit of Adding More



SLASH-D Exercise

(Individual or Small Group)

- Design the example homes in the SLASH-D Exercise Handout

Selling Solar Combisystems: Battling “Sticker Shock”

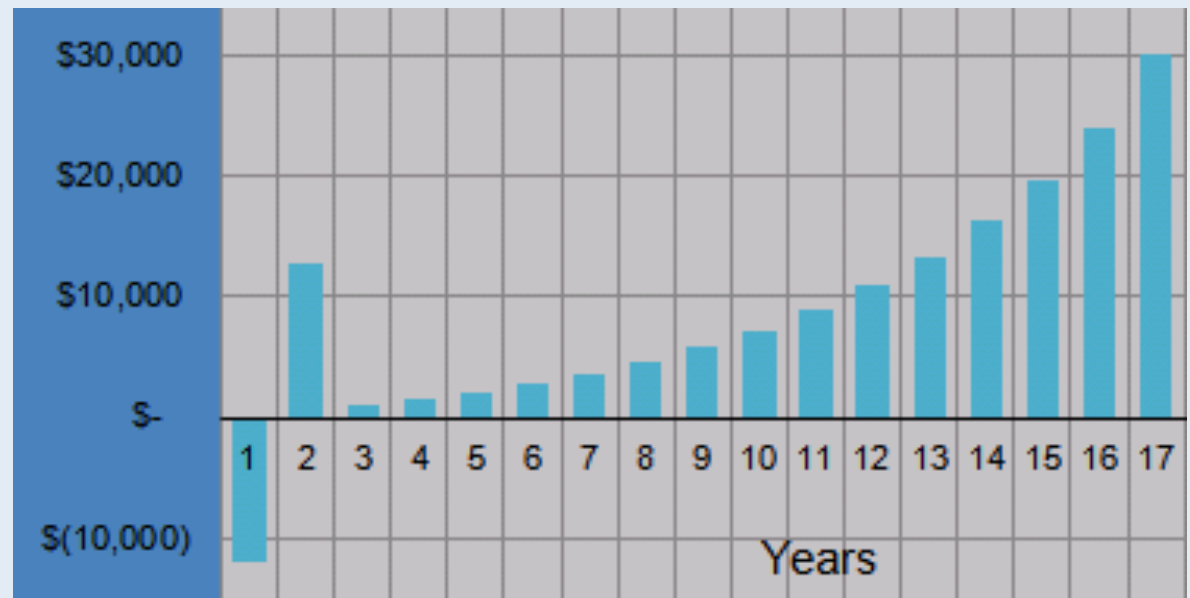
Customers have been trained to ask the Financial Question: How many years until Payback? They should be looking at Cashflow and Financing the System

Years 1 & 2: Net outlay balanced by tax rebates.

Thereafter: Net cash into their pockets every year – **Including servicing the loan payments!**

Enormous savings that pile up year after year.

Energy prices are not stable.



Actual 20-year average annual price of fuel increases:

Fuel oil & propane – 20%

Electricity – 3%

Natural gas – 7%

**Figure 1a. Payback Analysis using
Present-day Fuel Prices**

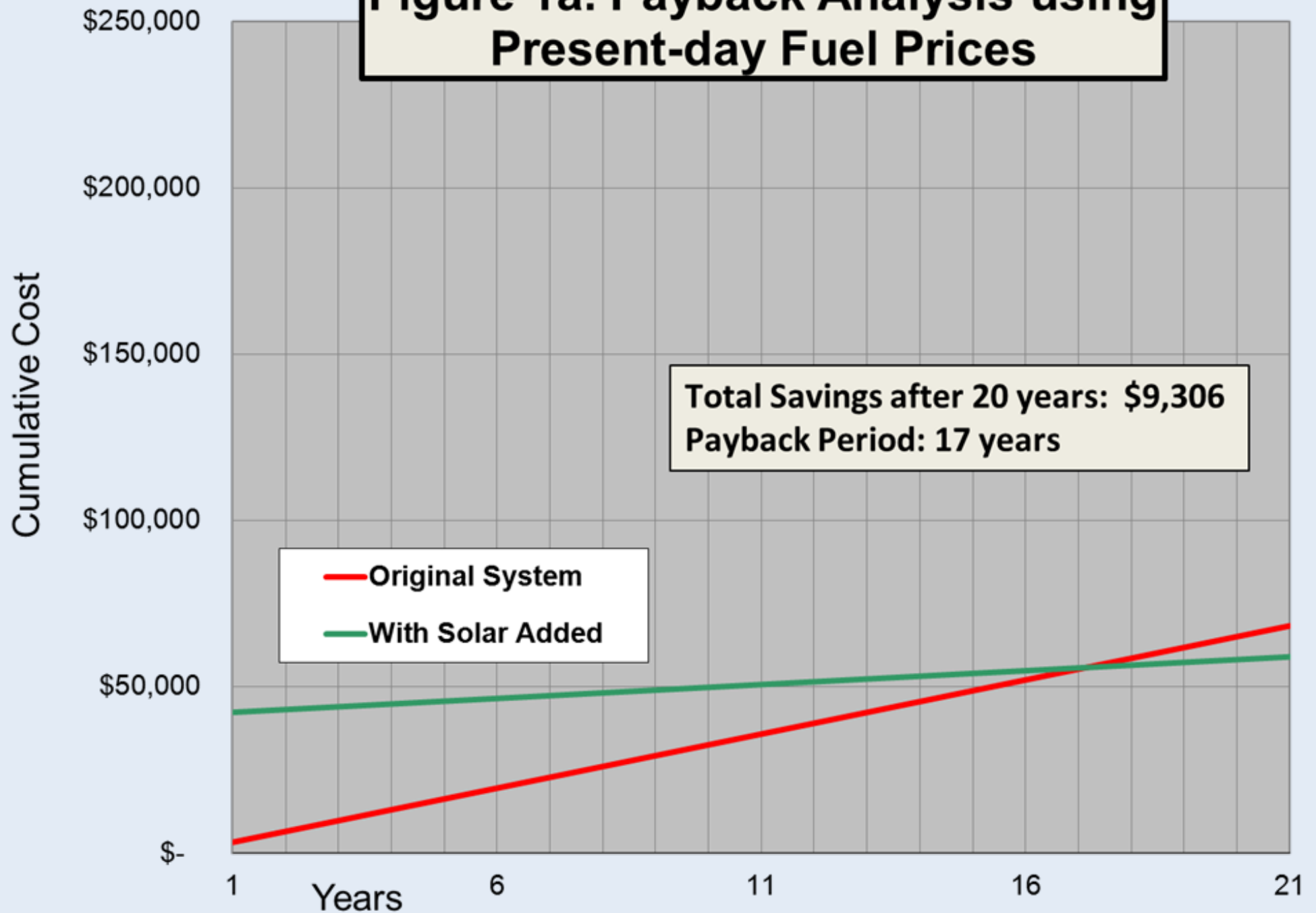
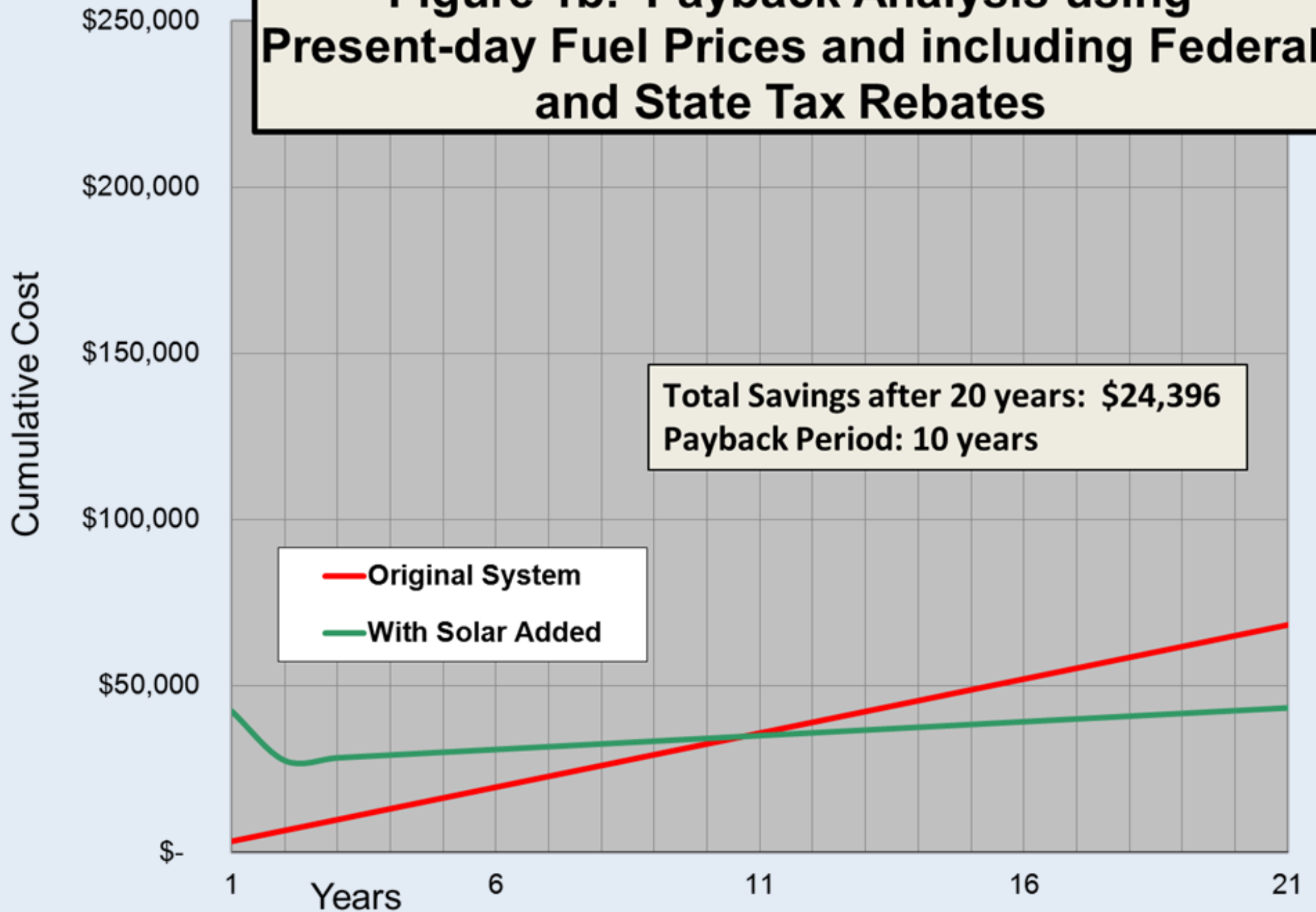


Figure 1b. Payback Analysis using Present-day Fuel Prices and including Federal and State Tax Rebates



**Figure 1c. Payback Analysis using
Fuel Price Inflation and including
Federal and State Tax Rebates**

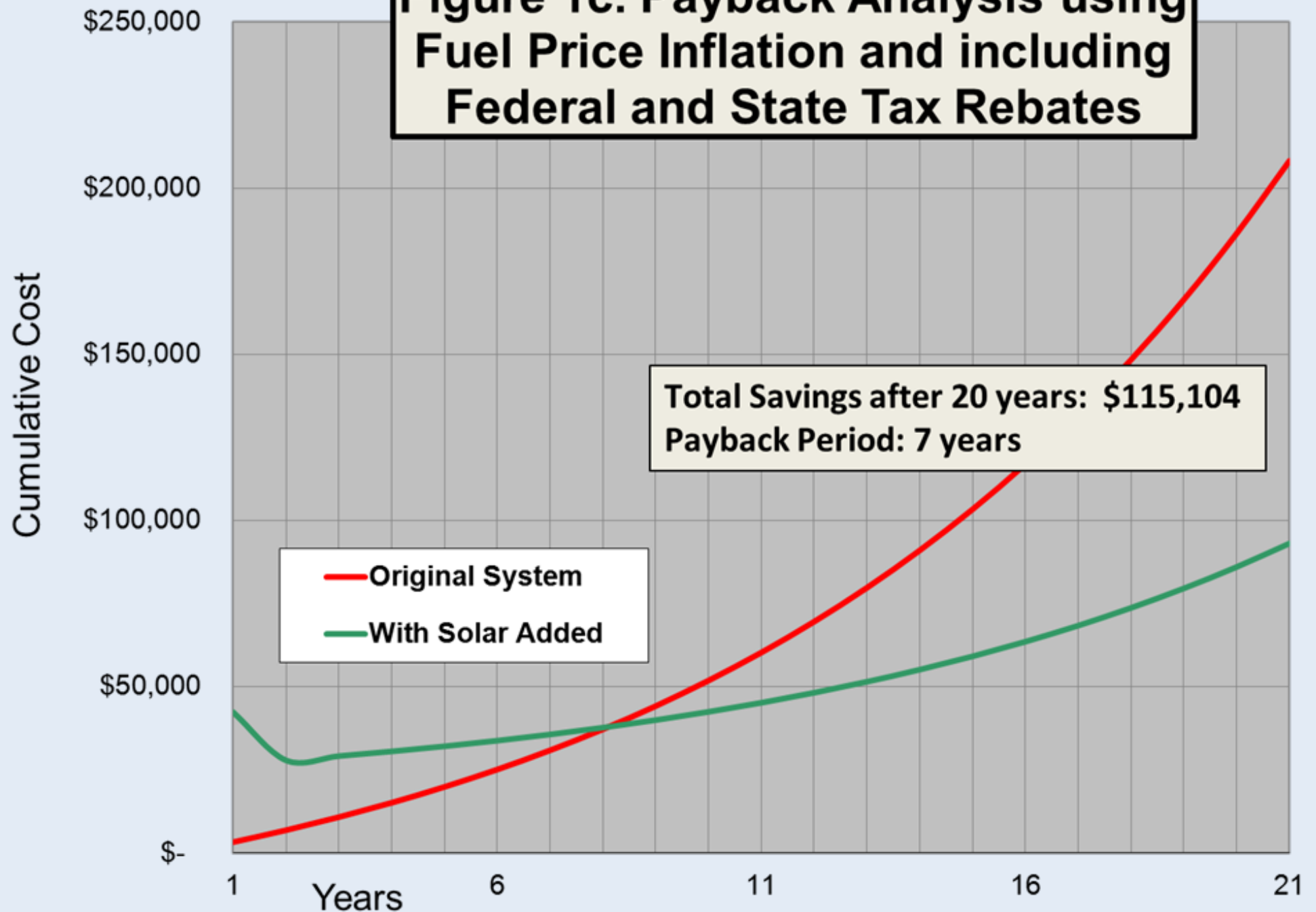
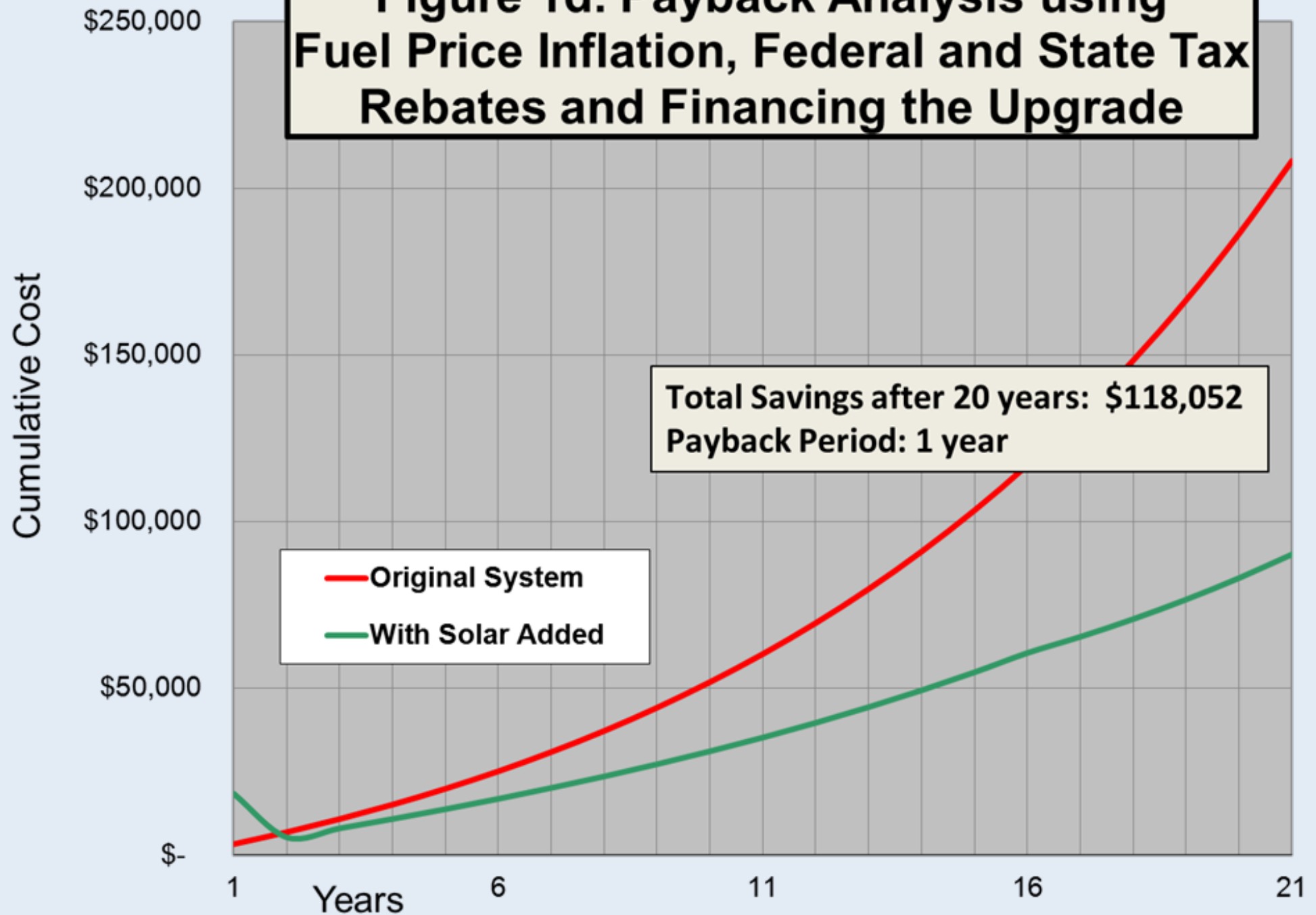


Figure 1d. Payback Analysis using Fuel Price Inflation, Federal and State Tax Rebates and Financing the Upgrade



Finance Exercise

(Individual)

Take your results from the SLASH-D exercises and put them into the Excel finance model spreadsheet.

1. Try different backup fuels
2. Try different baseline fuel prices
3. Try different loan scenarios

80% of US energy use

is transportation, electricity and heat.

Renewables

are already successfully transforming
two of the three areas.

Transportation

1

Hybrid and
electric vehicles

Electricity

2

PV and
wind power



Heat & Hot Water

3

The New Solar Thermal

Appendix:

Screen Shots of the VSLIC Tabs

- Dashboard
- Detail
- History
 - Energy Usage
 - Parameter Profiles
 - Log Access
- Zones
 - Indoor Zones
 - Pool/Spa
 - Ice Melt Zones
 - DHW Minimum
 - Setback Groups
 - DHW Recirculator
- System
 - Solar Available
 - DHW
 - Storage
 - Panels
- Communication

Log on at the Communication tab

Dashboard

Detail

History

Zones

System

Communication

Username

installer

Password

Log

System Startup.
1:09:57 PM - Central Server Login Accepted
1:10:00 PM - Listening for SLIC...
1:10:04 PM - Local SLIC Found
1:10:04 PM - Demo Local Access Granted
1:10:09 PM - Local SLIC Found
1:10:09 PM - SL Lab Local Access Granted
1:10:58 PM - System Configuration Received
1:21:33 PM - Data Updated

ID Nums

none
Demo; 12346
SL Lab; 12348

ID

12346

Address

192.168.1.6

Access Level

Installer

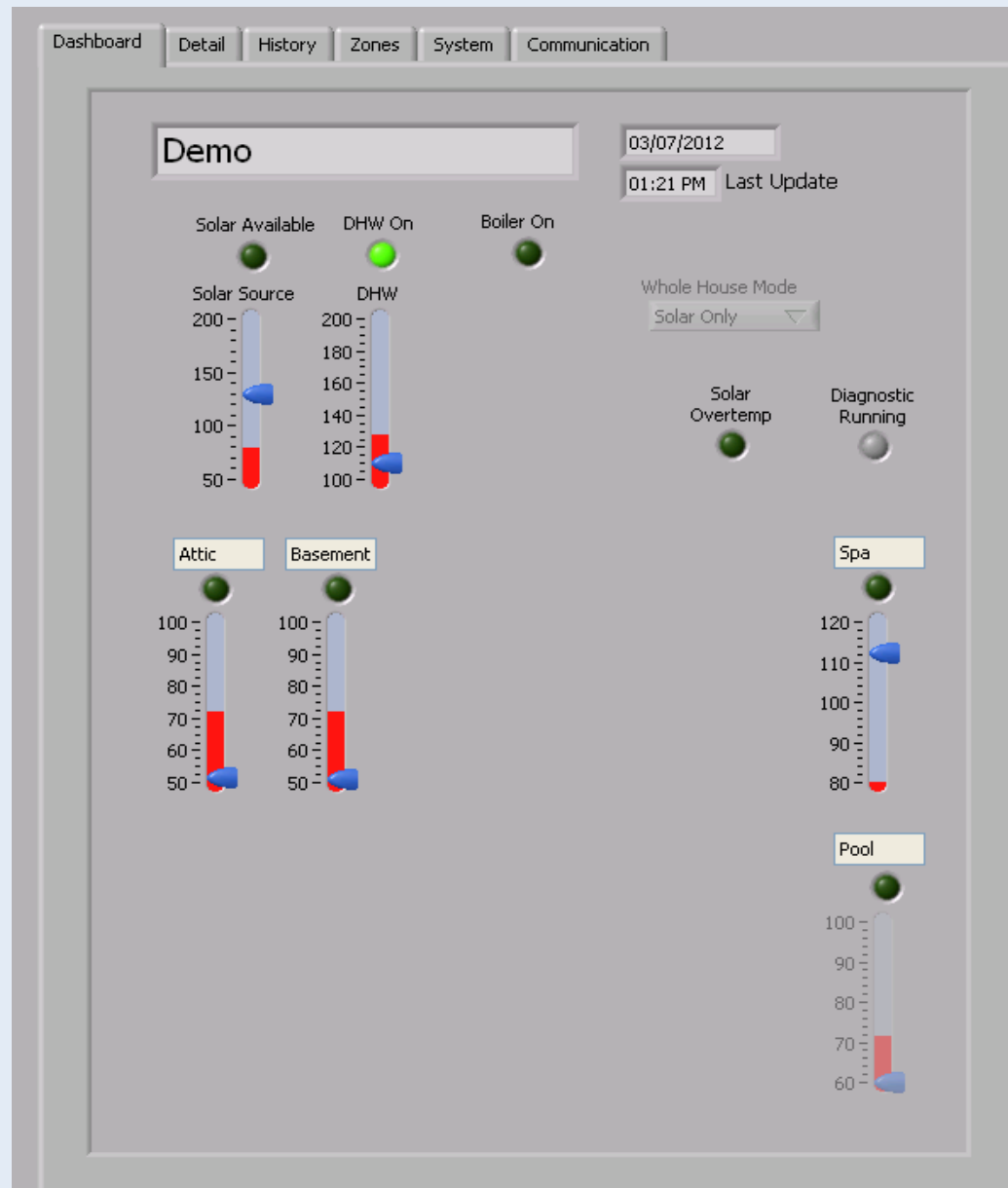
Mode

Local

Login

OK

Dashboard is a top level snapshot of the whole system



Detail tab shows all pumps, system inputs and valve statuses

The screenshot displays a control panel interface with a top navigation bar containing tabs: Dashboard, Detail (selected), History, Zones, System, and Communication. An 'Adjust' button is located in the top right corner.

System Inputs and Pumps:

- Solar Available: ☐
- DHW Pump: ☒
- Manifold A Pump: ☒
- Boiler On for Zone Heat: ☒
- Boiler On for DHWP: ☒
- Primary Pump: ☒
- StO Pump: ☒
- Bank 1 Pump: ☒
- Manifold G Pump: ☒
- Diagnostic Running: ☐
- Solar Overtemp: ☒

Temperature and Pressure Readings:

- Solar Hot Pipe: 78
- White Plate: 49
- Solar Bank 1: 162
- DHW Top: 128
- DHW Bottom: 91
- Storage Top: 122
- Storage Bottom: 151
- FC Hot (post boiler): 101
- FC Cool (post HX): 85
- AC Current: 0.03
- Glycol Pressure: 26
- Manifold A: 76
- Water Pressure: 23
- Flow Meter: 0.0
- Manifold G: 74
- Flow Meter Temperature: 152

Zone and Valve Statuses:

Zone	Call for Valve Open	Call for Manifold Pump	Valve Error	Valve Status	Included in Heat Dissipation
Attic	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open	<input checked="" type="checkbox"/>
Basement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open	<input type="checkbox"/>
Spa	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Closed	<input checked="" type="checkbox"/>
Pool	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open	<input checked="" type="checkbox"/>

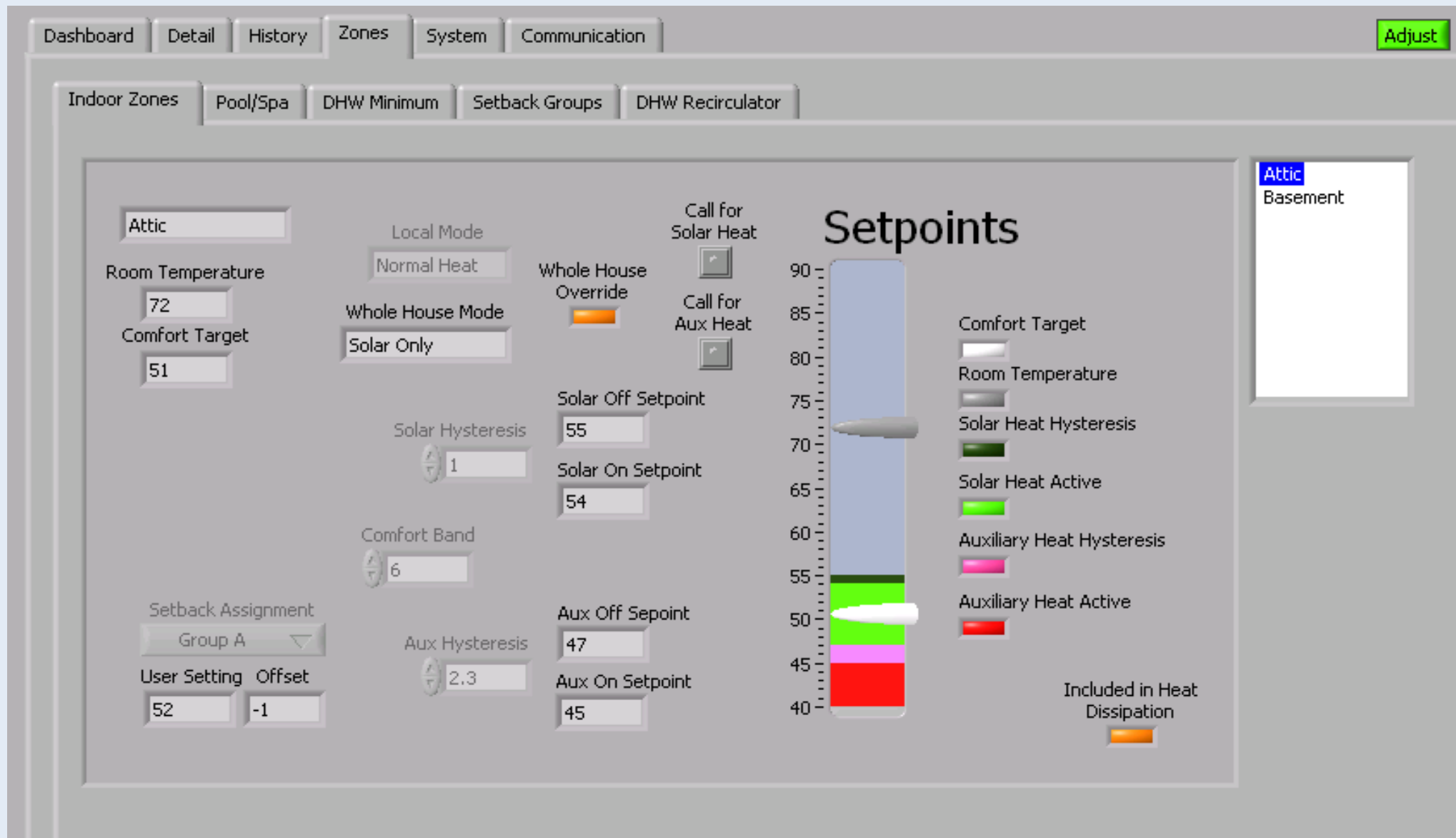
History: Parameter Profiles is for saving,
loading and deleting an entire parameter set
with two clicks



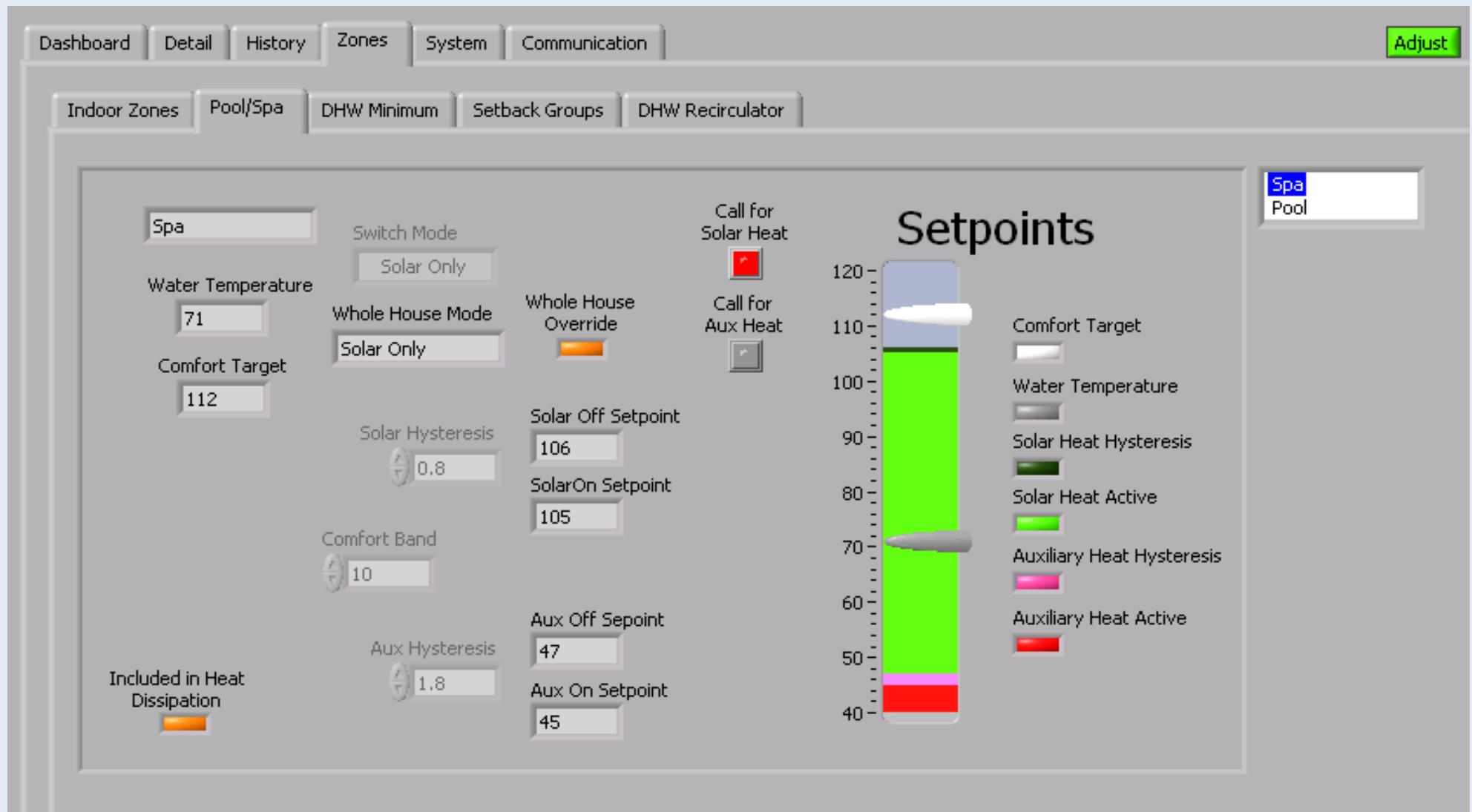
History: Log Access includes history log data recorded every 5 minutes and a complete history of all parameter changes



Zones: Indoor Zones shows the complete settings of each zone thermostat



Zones: Pool/Spa functions are very similar to the indoor zones (there are a few exceptions)

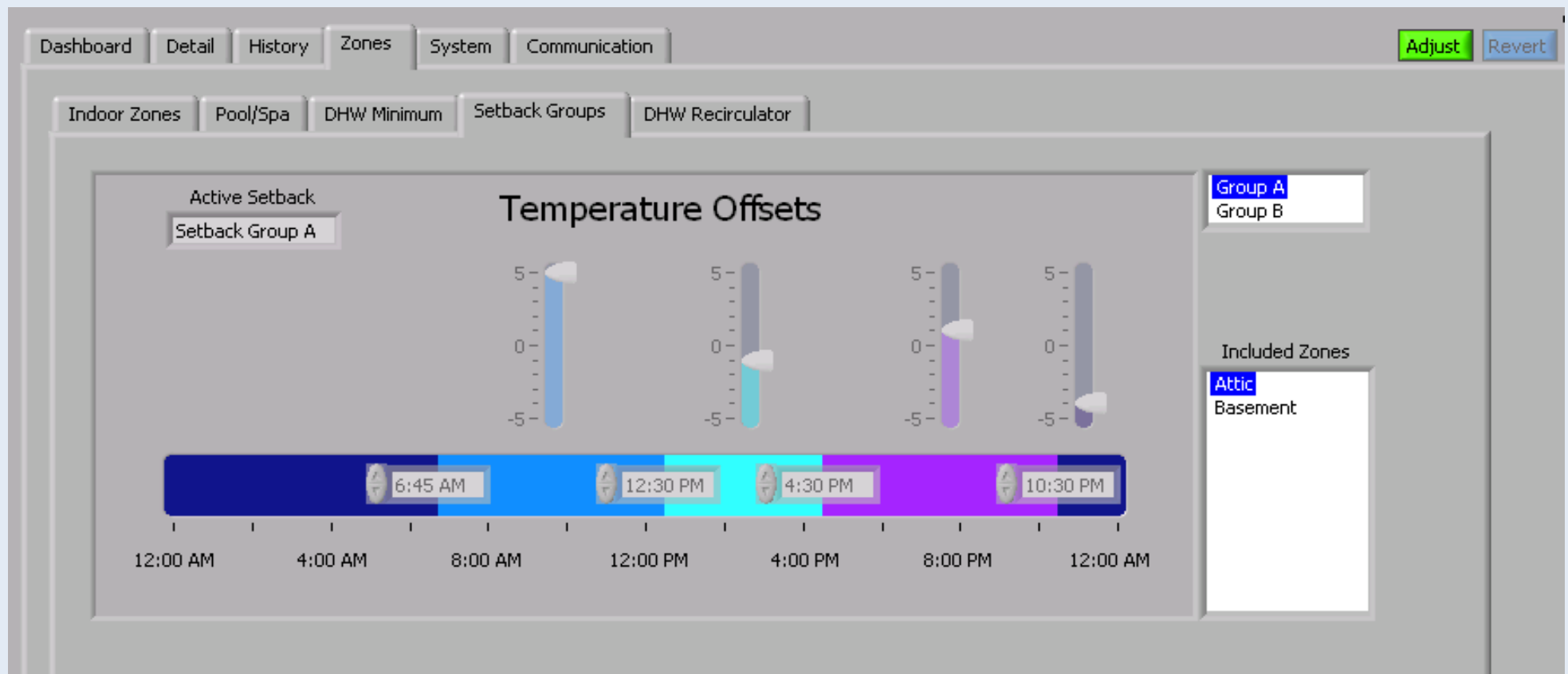


Zones: DHW Minimum is the temperature at which the backup heat will be used to make DHW

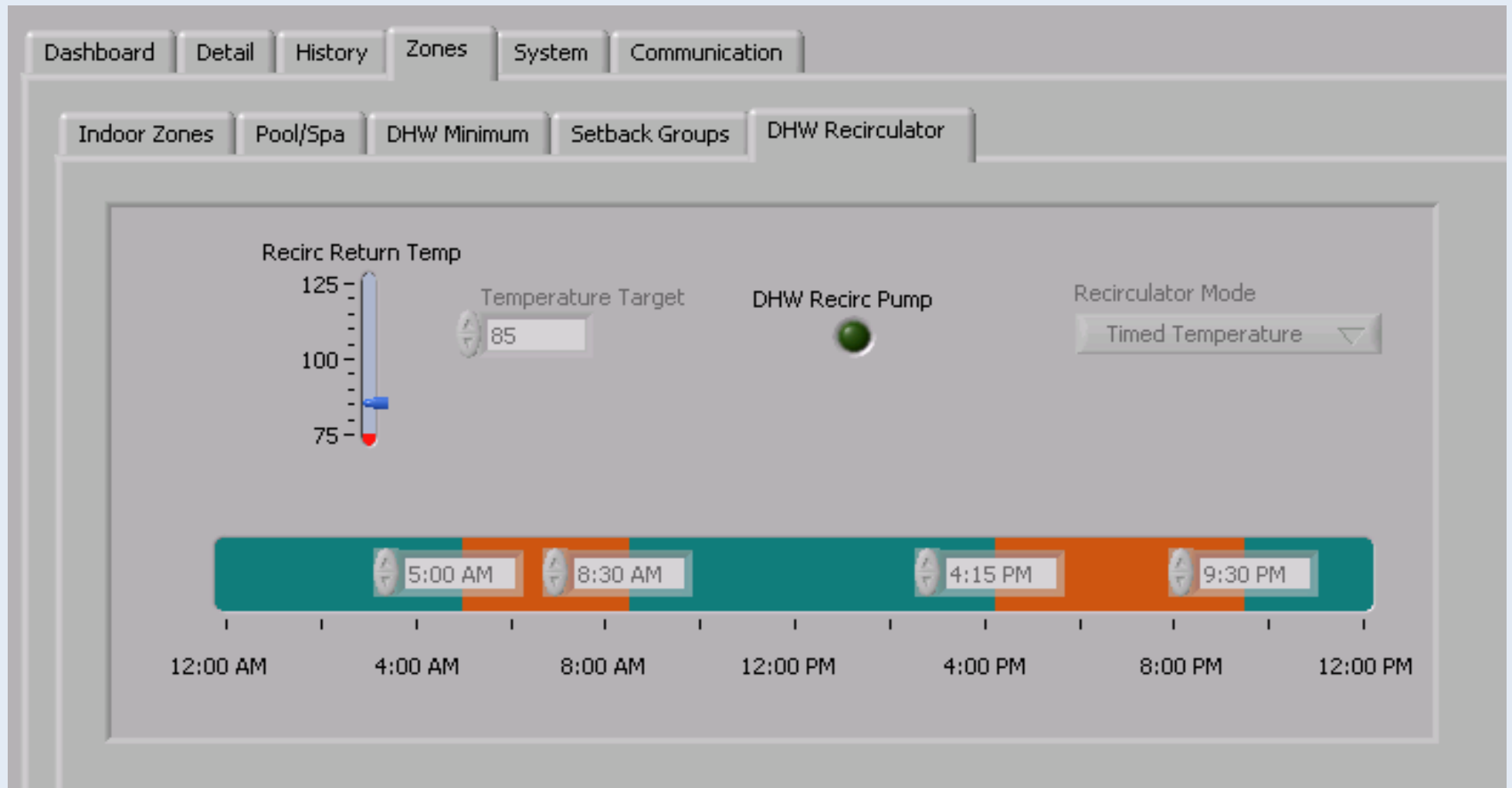
The screenshot shows a control interface with a top navigation bar containing tabs: Dashboard, Detail, History, Zones, System, and Communication. Below this is a sub-navigation bar with tabs: Indoor Zones, Pool/Spa, DHW Minimum, Setback Groups, and DHW Recirculator. The 'DHW Minimum' tab is selected. The main content area contains a panel with the following settings:

Parameter	Value
DHW Top	128
Hysteresis	2
On Setpoint	110
Call for Heat	<input type="checkbox"/>
Off Setpoint	112
On Setpoint	110

Zones: Setback Groups governs “programmable” thermostats



Zones: DHW Recirculator can be set in 5 different modes



System: Solar Available is all about the heating priorities

DashboardDetailHistoryZonesSystemCommunication

AdjustRevert

Solar AvailableDomestic Hot WaterStorage OutPanels

Solar Hot Pipe78

Aux Call Blocks Solar CallTrue

DHW PriorityTrue

Solar Available Blocks BoilerTrue

Storage For DHW Transfer (Heating Modes Only)True

Zone Solar On SP130

Zone On Setpoint130

Indoor Zones Solar Available

Zone Solar Hyst5

Zone Off Setpoint125

DHW Solar On SP125

DHW On SP125

DHW Solar Available

DHW Solar On5

DHW Off SP120

Spa Solar On SP110

Spa Solar On SP110

Spa Solar Available

Spa Hysteresis5

Spa Solar Off SP105

Pool Solar On SP100

Pool Solar On SP100

Pool Solar Available

Pool Solar Hyst5

Pool Solar Off SP95

Pool Diff Hyst6

Pool Diff On SP11

Pool Solar Diff OK

Pool Diff Off SP5

Pool Solar Diff (Hot Pipe - Pool Temp)7

Pool Diff Off SP5

Storage Solar On SP140

Storage Solar On SP140

Storage Solar Available

Storage Hyst2

Storage Solar Off SP138

White Plate Temp49

Cooling Controls

Zone Cooling Hyst20

Zone Cooling Off SP105

Zone Cooling On SP85

Zone Cooling On SP85

Indoor Zones Cooling Available

Zone Cool Diff Hyst20

Zone Cooling Diff On22

Zone Cool Diff Off SP2

Zone Cooling Diff Off2

DHW and Storage Tanks

Tank Cooling Hyst10

Tank Cooling Off SP110

Tank Cooling Available

Tank Cooling On100

Tank Cooling On SP100

System: Domestic Hot Water controls solar heating and night sky cooling of the DHW tank

Dashboard Detail History Zones System Communication

Solar Available Domestic Hot Water Storage Out Panels

Solar Hot Pipe Solar/DHW Differential

78 -12 **DHW Solar Heating**

DHW Tank Top
128

DHW Tank Bottom
91

Diff Hyst 4

Diff Off Setpoint 6

Diff On Setpoint 10

Diff Off Setpoint 6

Hot Pipe Min On SP* 125

Hot Pipe Min Off SP* 120

Tank High Limit SP 190

Tank High Limit Hyst 5

DHW Call for Solar Heat

Differential OK

Hot Pipe OK

Tank OK

Tank Heating Allowed

White Plate Temp 49 **DHW Night Sky Cooling**

Tank High Limit 190

DHW Cooling Gap 25

Cooling Gap Hyst 5

Cooling On Setpoint 165

Cooling Off Setpoint 160

White Plate Min Off SP* 110

White Plate Min On SP* 100

DHW Call for Radiant Cooling

Heating Mode OK

Tank Needs Cooling

White Plate Temp OK

*For adjustment of these parameters, reference Solar Available tab

System: Storage Out controls all functions regarding storing heat and uses of stored heat

DashboardDetailHistoryZonesSystemCommunication

AdjustRevert

Solar AvailableDomestic Hot WaterStorage OutPanels

Solar Input78Solar/Storage Differential-72

Storage Tank Top122

Storage Tank Bottom151

Differential On Setpoint+10Differential OK

Differential Off Setpoint+6

Hot Pipe Min On SP*140Hot Pipe OK

Hot Pipe Min Off SP*138

Tank High Limit+190Tank OK

Tank Heating Allowed+185

Storage Solar Heating

Storage Call for Solar Heat

DHW Solar Priority SP140DHW Solar Priority OK

DHW Priority On SP140

DHW Solar Priority Hyst5DHW Priority Off SP135

Boiler Preheat

Diff Hyst8Diff On SP20Storage > FC Cool

Diff Off Setpoint12Diff Off SP12Storage - FC Cool38

Storage to DHW Transfer

Transfer Diff Hyst5Transfer Diff On SP15Storage Top > DHW Bot

Transfer Diff Min10Transfer Diff Off SP10Transfer Difference32

White Plate Temp49Tank High Limit190

Storage Cooling Gap30Cooling On Setpoint160Tank Needs Cooling

Cooling Gap Hyst5Cooling Off Setpoint155

White Plate Min Off SP*110White Plate Temp OK

White Plate Min On SP*100Heating Mode OK

Storage Call for Radiant Cooling

+For adjustment of these parameters, reference DHW tab*For adjustment of these parameters, reference Solar Available tab

System: Panels controls the AC solar collector pumps and overheat protection

Dashboard

Detail

History

Zones

System

Communication

Solar Available

Domestic Hot Water

Storage Out

Panels

Controller Type:
Setpoint

Solar Bank 1 Pump On

130

Solar Bank 1 Hyst

10

Bank 1 Pump On

130


Bank 1 Pump Off

120

Bank 1 Temp

162

Bank 1 Pump



Min Temp (Bank & HP)

78

Pre HX

152

Solar Bank 2 Pump On

160

Solar Bank 2 Hyst

10

Bank 2 Pump On

160


Bank 2 Pump Off

150

Bank 2 Temp

-9

Bank 2 Pump



SOT Setpoint

195

On Setpoint

195


SOT Hyst

5

Off Setpoint

190

Solar Overtemp



Solar Bank 3 Pump On

155

Solar Bank 3 Hyst

10

Bank 3 Pump On

155

Bank 3 Pump Off

145

Bank 3 Temp

-9

Bank 3 Pump

