

Case Study / Operational Analysis Report



EDC Technologies, Inc.
50 Executive Drive
Rohnert Park, CA 94928
949.388.2753

Date: March 25, 2009

Client: Garden Communities

Property: South Tower, Costa Verde

Purpose: To perform a three way control comparison,

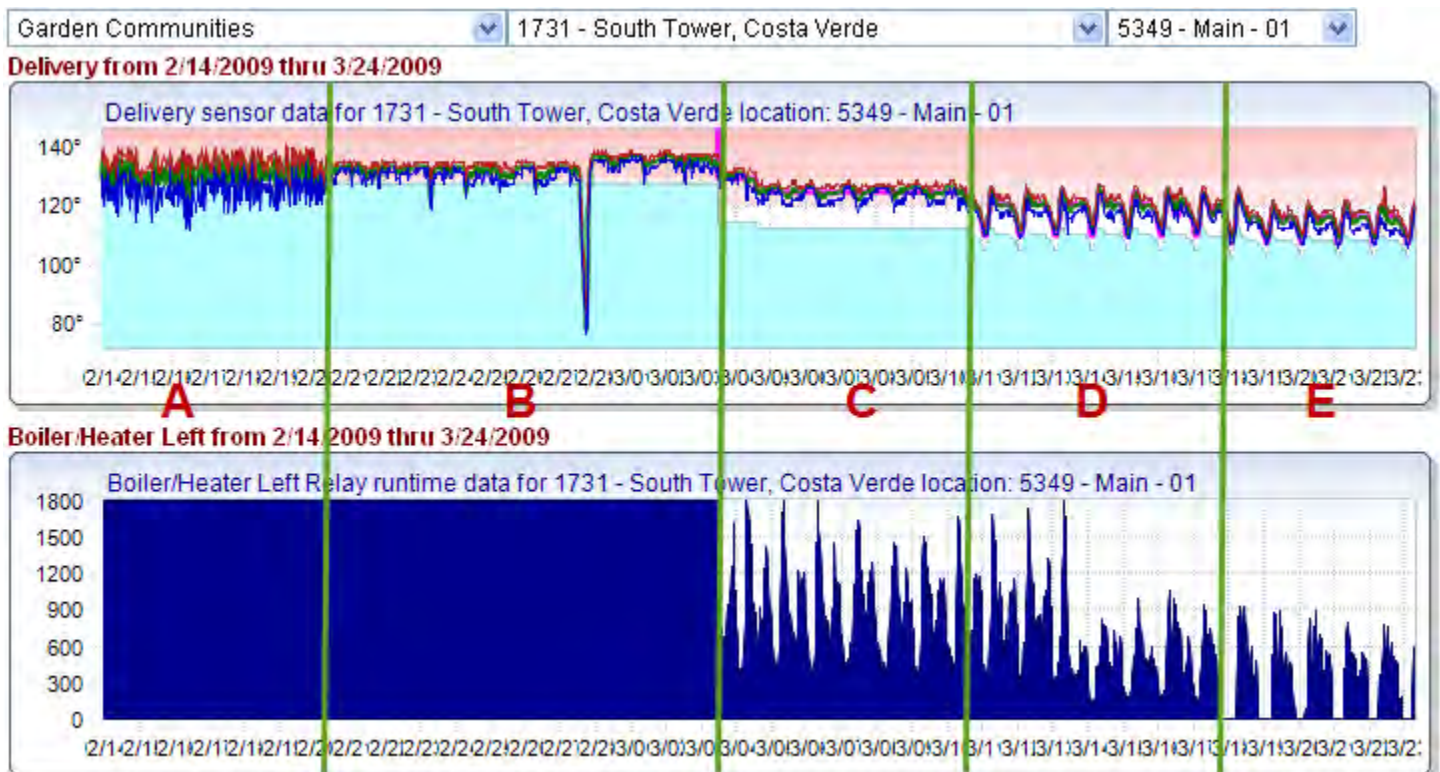
1. Monitor the existing environment as is: (boilers controlled with ProTemp "Smart" controller)
2. Monitor the environment without any controller
3. Monitor the environment with boilers being controlled by EDC Technologies.

Analysis Summary:

This is an overall view of the testing as it progressed from ProTemp controller to standard operation to EDC Control and then the EDC Control process refined to where it is today.

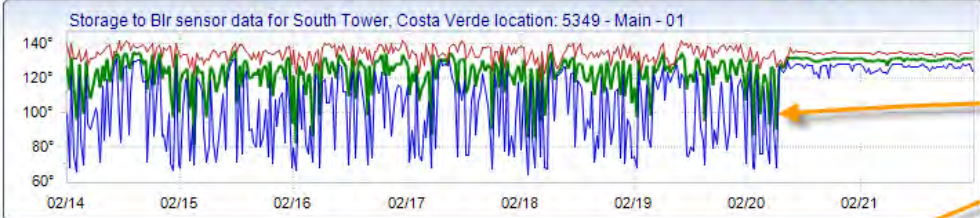
Period A	02/14/09 - 02/19/09	ProTemp Controlling
Period B	02/20/09 - 03/02/09	Standard Operation
Period C	03/03/09 - 03/10/09	EDC Schedule 1
Period D	03/11/09 - 03/17/09	EDC Schedule 3
Period E	03/18/09 - 03/23/09	EDC Staged and tuned in for max savings

Minimum Net Economics: 24.23% therm savings
128.5 therms per day before EDC Technologies
81.0 therms per day after EDC Technologies

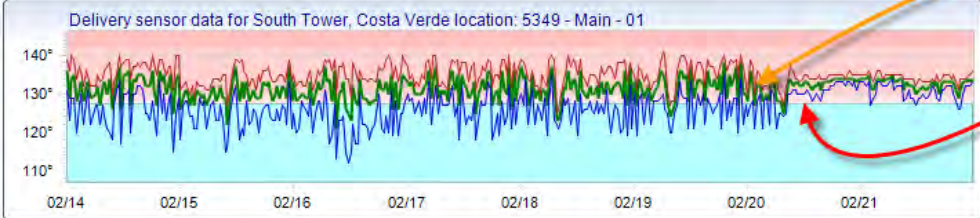


Test Detail – Period A – Boilers under control of ProTemp Controller

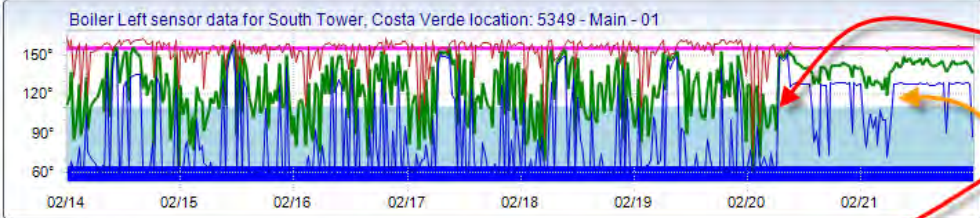
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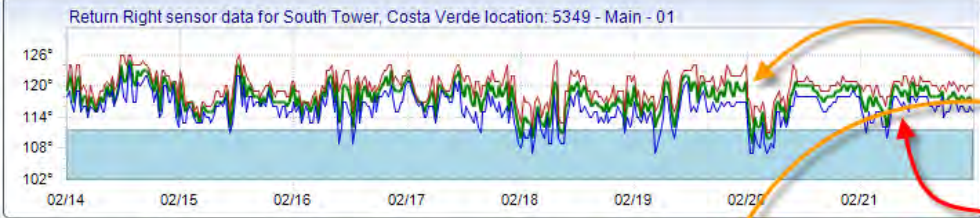
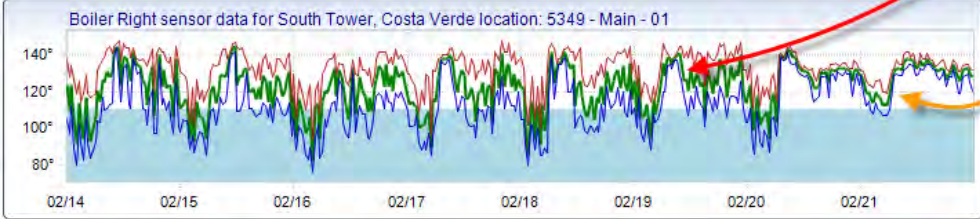
This first set of charts is showing the system under the control of the ProTemp controller. The EDC Equipment is on over ride and is only monitoring the



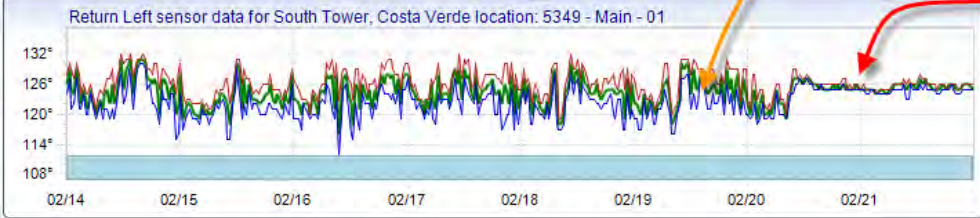
2/14/09-2/20/09... Erratic temperature fluctuations under Protemp control.
On 2/20/09 the Protemp control was disabled and system was allowed to run on it's own. EDC Equipment is still bypassed at this point.



Left Boiler (Boiler #2) Extremely erratic under Protemp Control.
Right Boiler (Boiler #1) Not operational at this point.
After returning system to normal control Boiler #1 still not operational. Boiler #2 is better but still has temperature fluctuations that indicate a pump turning on/off and cool water running through heat exchanger



Return loop Temperatures reflect the erratic fluctuations seen on the delivery temps
Again, after returning system to regular operation, the return temperatures smooth out in relation to the deliver temperature

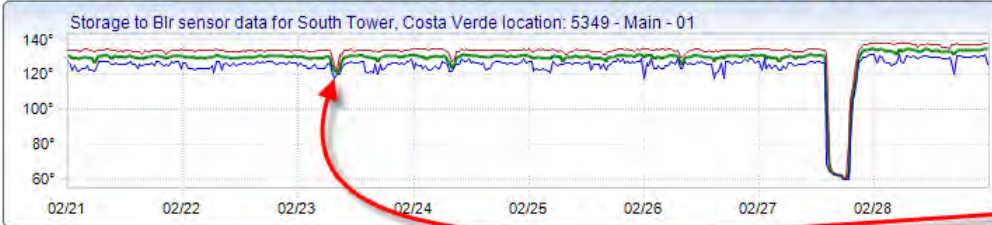


EDC Relay Readings are pegged at 1800 seconds per 1/2 hour time period, indicating that the control is indeed on override.

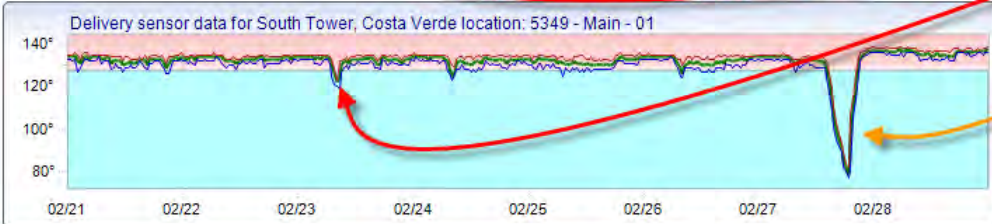


Test Detail – Period B – Boilers under Standard Operation, i.e. No Controller

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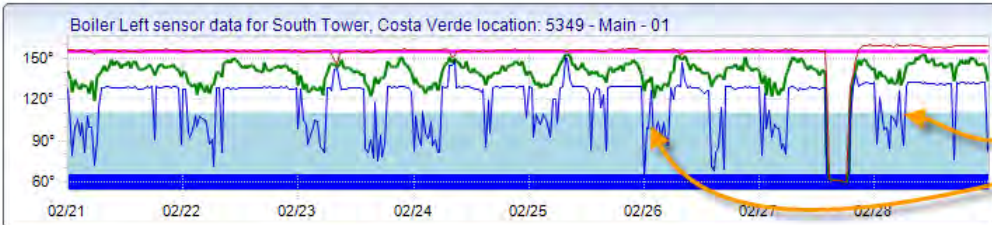


This set of charts shows, the system under it's own control. There is no influence from ProTemp or EDC. The Right (#1) boiler is still not being used



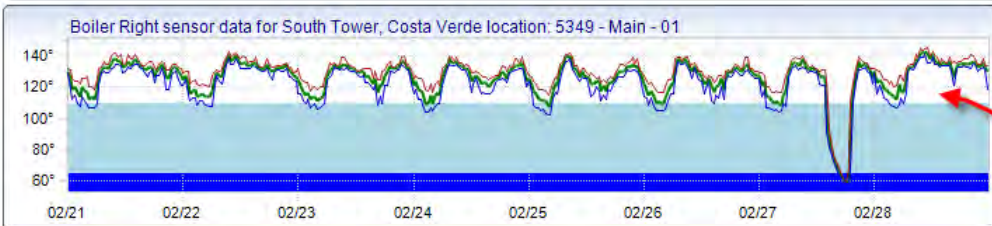
Delivery and storage loop temperatures are much more stable. Small dips at peak times indicate system is reaching capacity using only one boiler.

Large Dip indicates system was brought down for maintenance or had a failure and was reset.

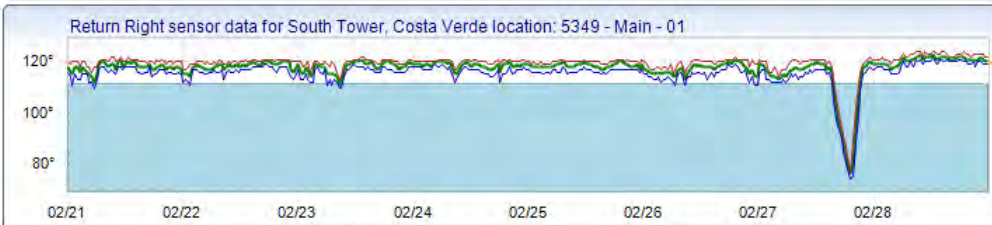


Left Boiler (#2) Still being used as the primary boiler. During peak periods it is just barely keeping up.

Dips in blue line indicate that the boiler pump is turned off between cycles, this allows the heater to cool and for cool water to enter heat exchanger which can cause condensation and shorten boiler life.



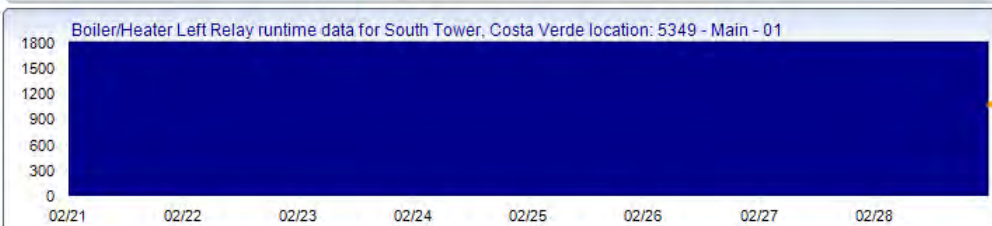
Right Boiler (#1) Still not being used at this point.



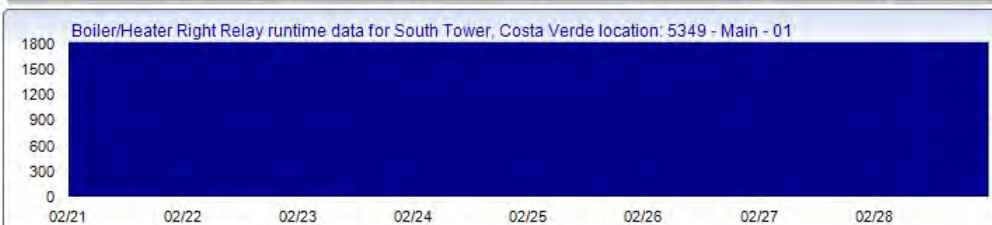
Return line temperatures look good.



The dips in temperature reflect the dips in delivery temperatures as would be expected.



EDC Relays remain on Over ride



Test Detail – Period C – EDC Schedule 1 (we began controlling by mimicking standard thermostat operation for the purpose of gathering use cycle operation)



These charts portray a combination of the system in standard operation and the beginning of EDC Controlled operation.

On 3/3/09 The system was switched to EDC Controlled operation. Note we immediately reduced the temperatures to 130 degrees and then reduced them further to 125 on 3/4/09. The EDC schedule being used is Schedule 1. It is a single temperature 24hrs per day

Left Boiler (#2) The dips in temperature on this boiler have been reduced, but still remain during periods of low use.
Right Boiler (#1) Still not being used at this point.

Return loops look good. The amount of loss in the system has been reduced slightly by decreasing the temperature of the delivery water. The loop loss has been reduced by 5 degrees...

EDC relays showing runtime information indicating that the EDC controller is controlling the environment.
Note: Maxed out runtimes indicate that the system is having trouble keeping up at Peak periods.
The right boiler is not yet being used at this point although the control is calling for it to be on, it is physically shut off at property

Test Detail – Period D – EDC Schedule 3 (Allows efficient control based on use cycle data that was gathered in Period C)



This set of charts shows the remainder of the EDC Schedule 1 time period and begins an energy saving profile on 3/10/09. On 3/13/09 the Right (#1) boiler is turned on by the property at the request of EDC Technologies.

EDC begins controlling the environment in an energy saving profile on 3/10/09.

Left Boiler (#2) Still primary boiler until 3/13/09.

Right Boiler (#1) was turned on by property at the request of EDC Technologies

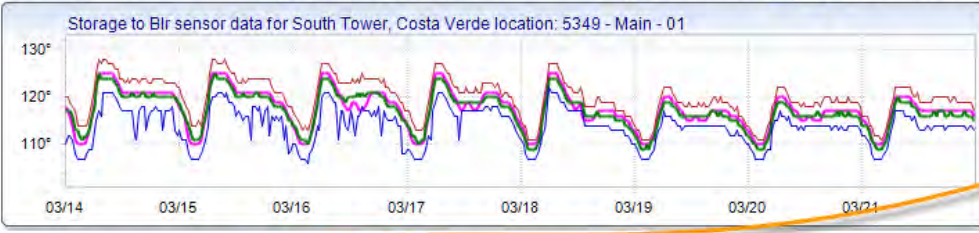
Return lines stable and following delivery temperature profile as expected

Relay Runtime drops dramatically with the introduction of the 2nd boiler. The left boiler on it's own ran ~1800 seconds per 1/2 hour during peak times.

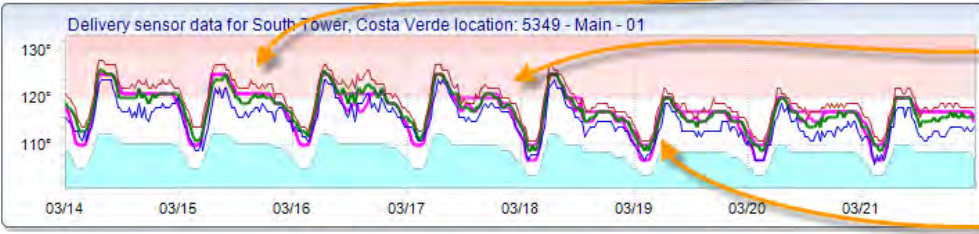
With both boilers running the combined runtime for the same period is ~1200-1500 seconds

Test Detail – Period E – EDC Schedule 3 boilers staged and tuned for maximum savings and efficiency

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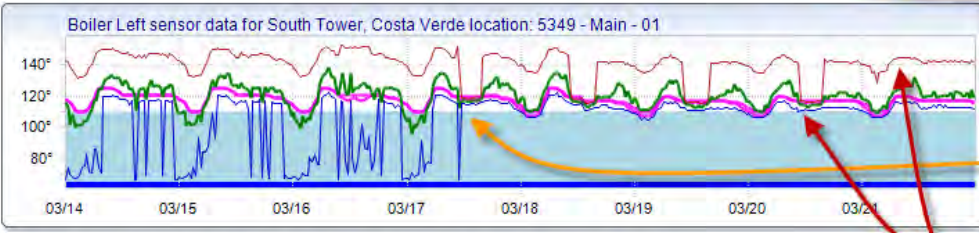
EDC Staging for additional savings. On 3/17/09 the property wired the boiler pumps to run continuously



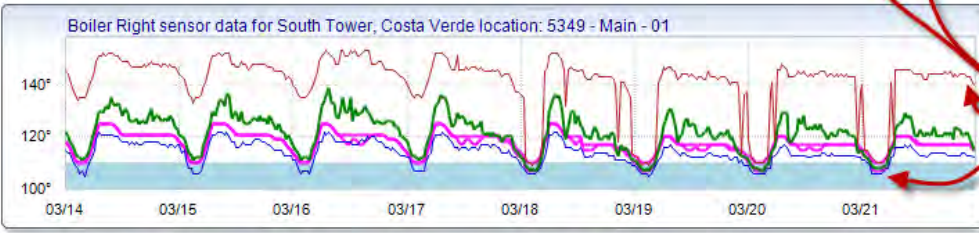
3/14 - 3/16: EDC is controlling both boilers at the same temp (boilers working together at all times)

3/16 - Current: EDC is controlling both boilers in staged mode, (boilers staged as needed during off peak periods and working together in unison during on peak periods)

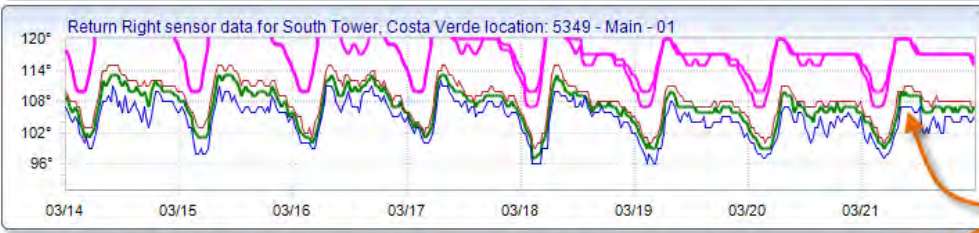
3/19: because of the stability now present in the system, peak temps were reduced to 120 degrees



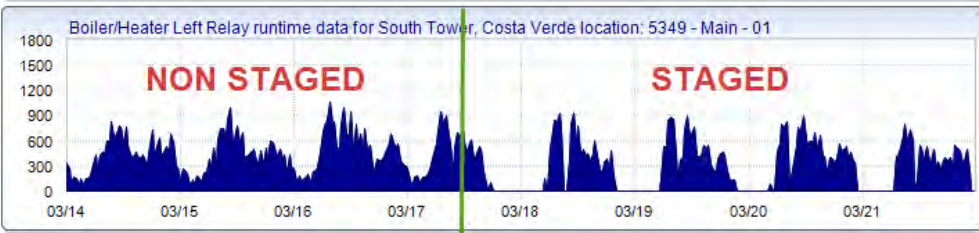
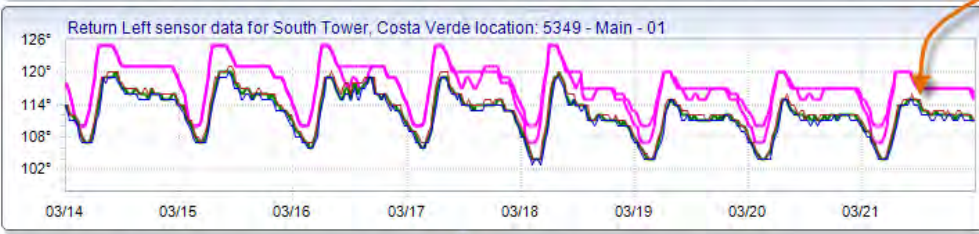
Boiler pumps wire to run continuously by the property at the recommendation of EDC Technologies. Note the decrease in temperature dips after this point



Definitive On/Off cycles and temperature changes on the boilers indicate proper staging and correct operation

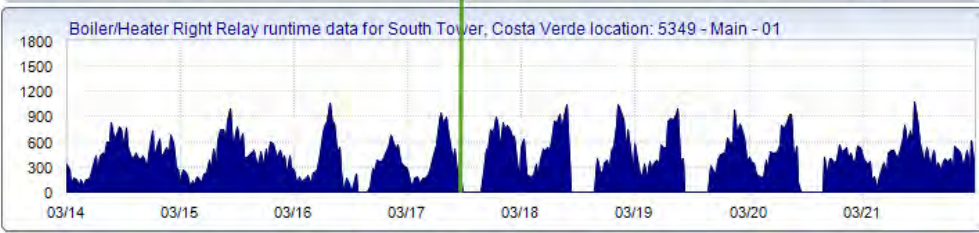


Return Temperatures are stable and following delivery temperature profile as would be expected



Relay runtimes show the difference between nonstaged and staged operation

Staged boiler get equal runtime throughout the day and operate together to meet peak demand periods more efficiently



3/14 - 3/17 Non Staged
3/17 - 3/21 Staged

Test Economics:

In order to perform an accurate savings analysis, meter reads were conducted by the property at the start of the EDC technologies control period and recorded again at the end. These meter reads were converted into a therms consumed per day calculation. To make a comparison of the consumption prior to the EDC test, SDG&E meter reads were also gathered and converted to therms consumed per day.

SDG&E Meter Reads from the System BEFORE EDC Technologies:

Begin	End	Days	Therms	Therm/day
11/20/08	12/22/08	33	3538	107.212
12/22/08	01/22/09	31	3682	118.77
01/22/09	02/23/09	32	4112	128.5

Meter Reads conducted by the Property for the EDC test period

Begin	End	Days	Therms	Therm/day
03/10/09	03/23/09	13	1056	81.23

Comparison: EDC vs. Non EDC

Begin	End	Saved Therms/Day	% Saved
11/20/08	12/22/08	25.98	24.23%
12/22/08	01/22/09	37.54	31.61%
01/22/09	02/23/09	47.27	36.79%

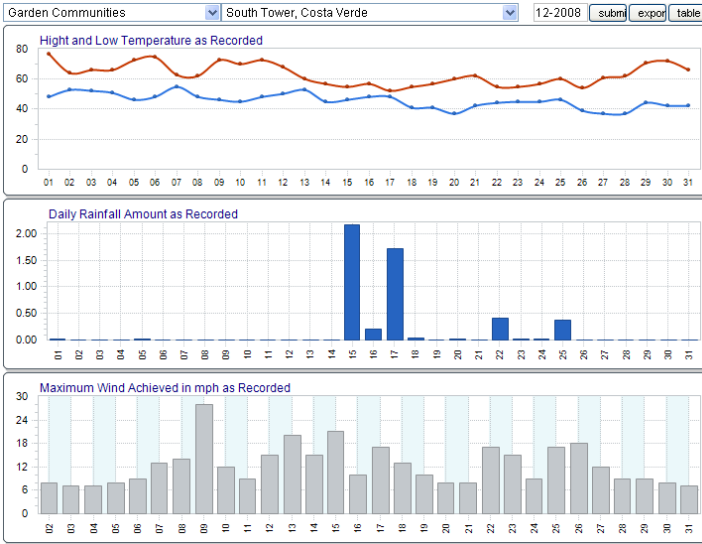
Minimum expected savings will be 20-25% which will be both ongoing and sustained.

Other Factors:

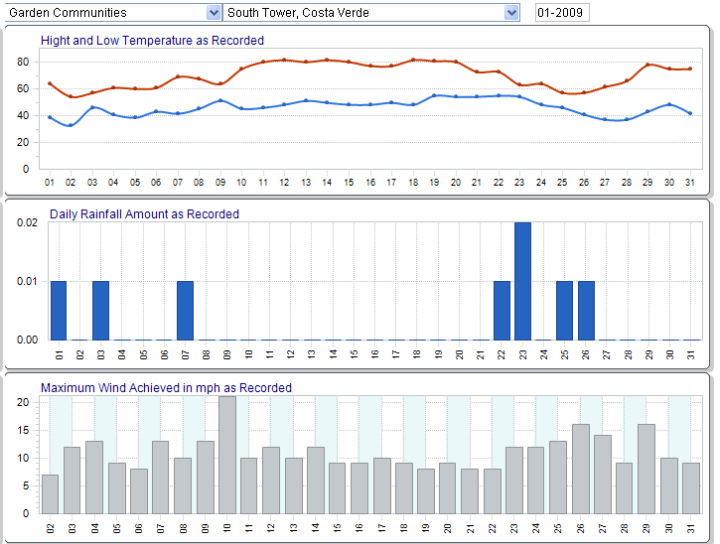
Occupancy: The occupancy was stable throughout the test period

Weather Normalization: The weather was actually comparable for all data periods and as a result was not an influencing factor on the test results. See the following page for details

Weather for December



Weather for January



Weather for February



Weather for March

