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Engineered Hydronic Solutions Since 1929

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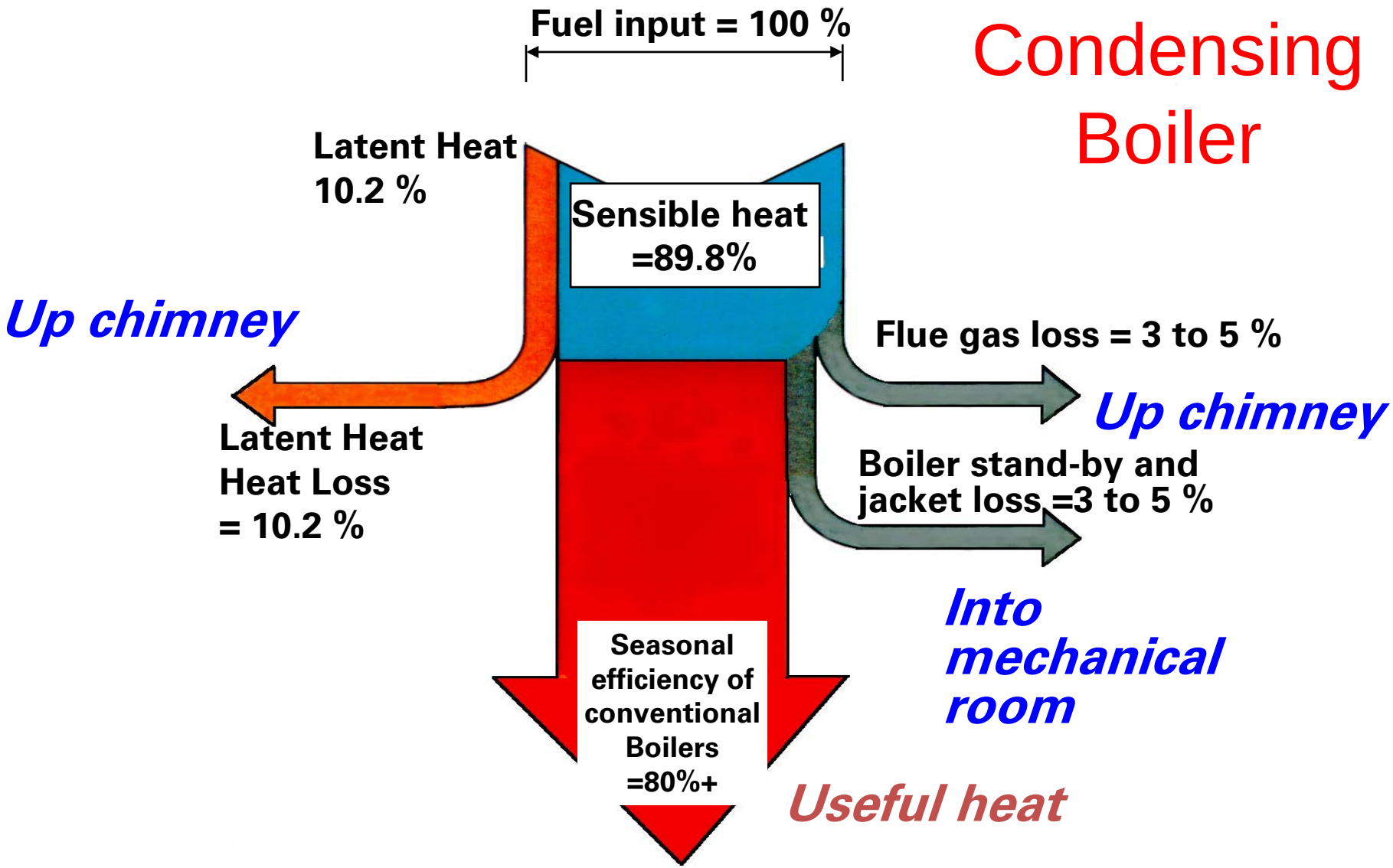
Welcome

- Mike Comstock & Eric Scharff
- Condensing boiler basics
- Introduce the boiler controls hardly used, yet offer significant benefits
- How to decipher what the boiler controls are telling and what data received from boiler controls can teach you about your system.
- Site Visits (Intake/Venting)

Non Condensing Boiler



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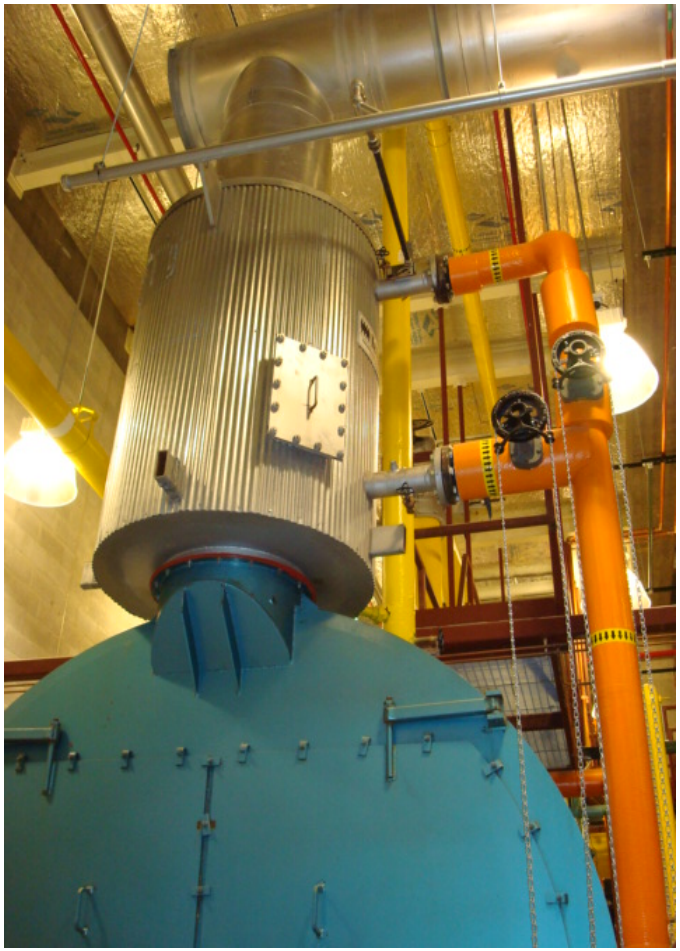
Economizer

- Use Wasted Heat – Non-Condensing Boiler
  - Cylindrical- up to 300 HP
  - Rectangular- up to 2200 HP
  - Improves boiler Efficiency from 2% up to 8% (or greater) with our condensing version
  - Takes waste heat from the stack – heats the boiler feed water
  - Pressure drops of less than 1”
    - Eliminates the need for oversized burner or blower



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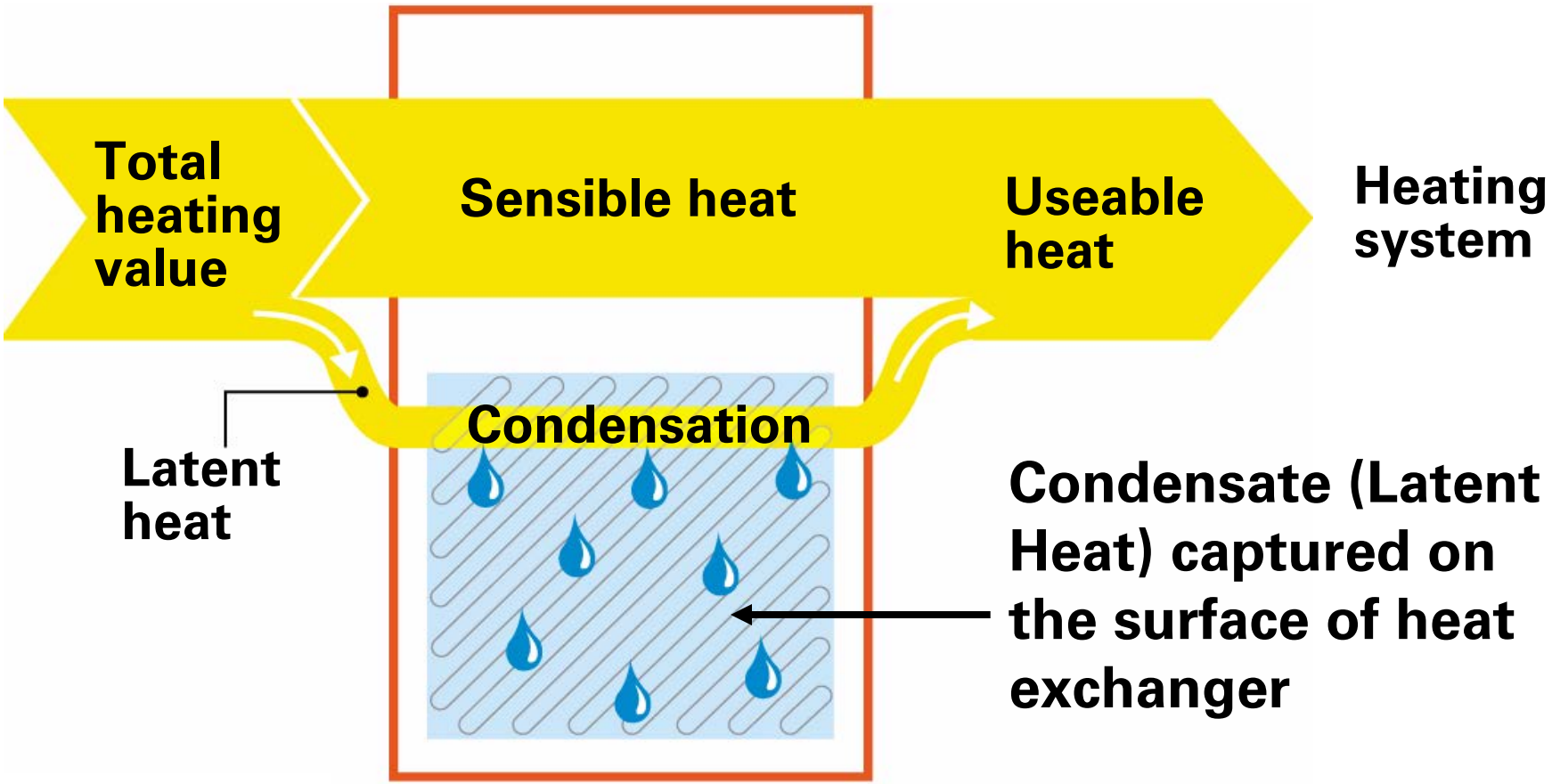
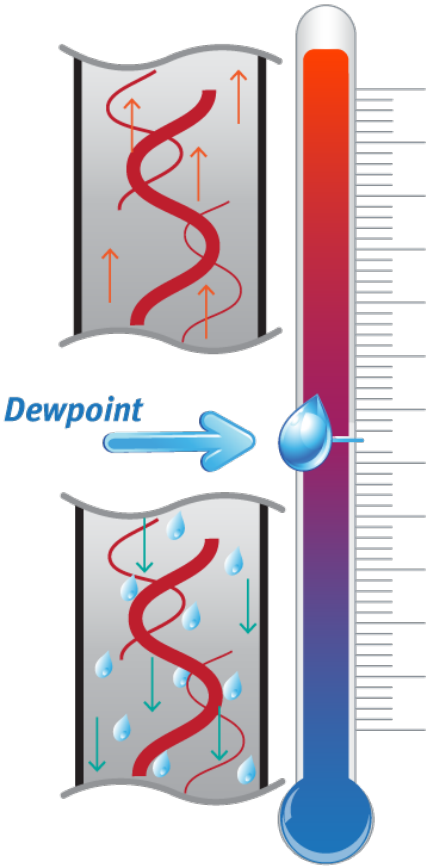
Condensing boiler



Condensing/Non-Condensing

- What makes a condensing appliance condense?
  - **Entering water temp/ <130°**



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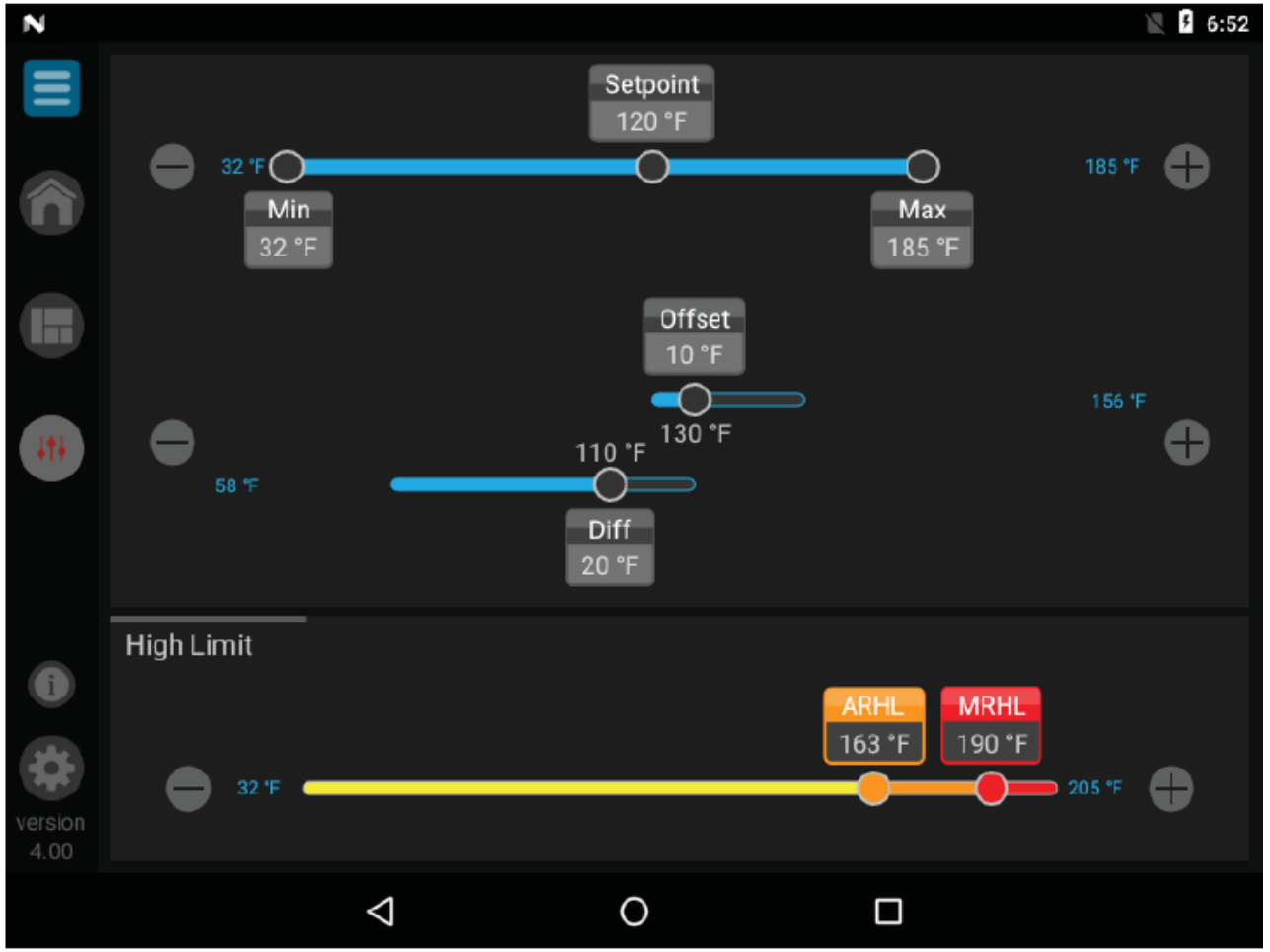
Boiler controls are very complex, no doubt about it. However, there are some very important “settings” that I would like to pay extra attention to and show how a little “tweaking” or allowing more boiler authority can save an owner money and ultimately make the boilers last longer.

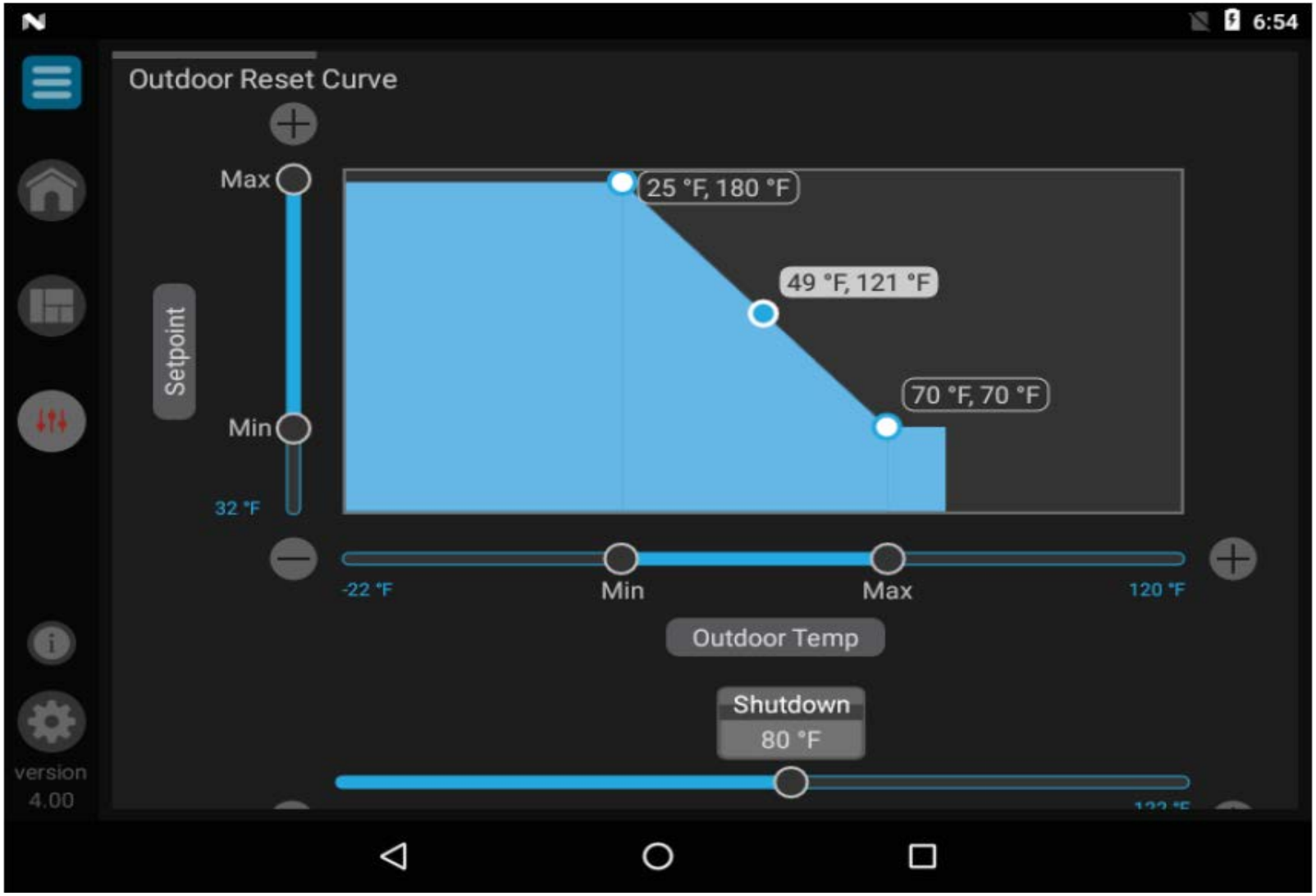
Offset and Differential are the over/under amounts the boiler is allowed to fire. This is a “key” setting when a boiler is oversized or during low demand times of year. The higher this number, the longer a boilers cycle will last. Less cycling increases efficiency and reduces boiler wear.



As you can see there is more than just a “setpoint” to change.

Menu	Parameter Name (as shown on the LCD screen)	Min Value	Max Value	Default Value
SET POINTS	Space Heat 1 Set point: Set point	32	185	120
	Space Heat 1 Set point: Min	32	185	32
	Space Heat 1 Set point: Max	32	185	185
	Space Heat 1 Set point: Offset	0	36	9.9
	Space Heat 1 Set point: Diff	0	72	19.8
	System Pump Anti-Seize Time	0	40	0.33
	High Limit: ARHL	32	200	199.4
	High Limit: MRHL	0	90	0
	HW Boiler Set point: Set point	N/A	N/A	N/A
	HW Boiler Set point: Offset	N/A	N/A	N/A
	HW Boiler Set point: Differential	N/A	N/A	N/A
	HW Tank Set pont: Set point	N/A	N/A	N/A
	HW Tank Set point: Min	N/A	N/A	N/A
	HW Tank Set point: Max	N/A	N/A	N/A
	HW Tank Set point: Diff	N/A	N/A	N/A

OUTDOOR RESET

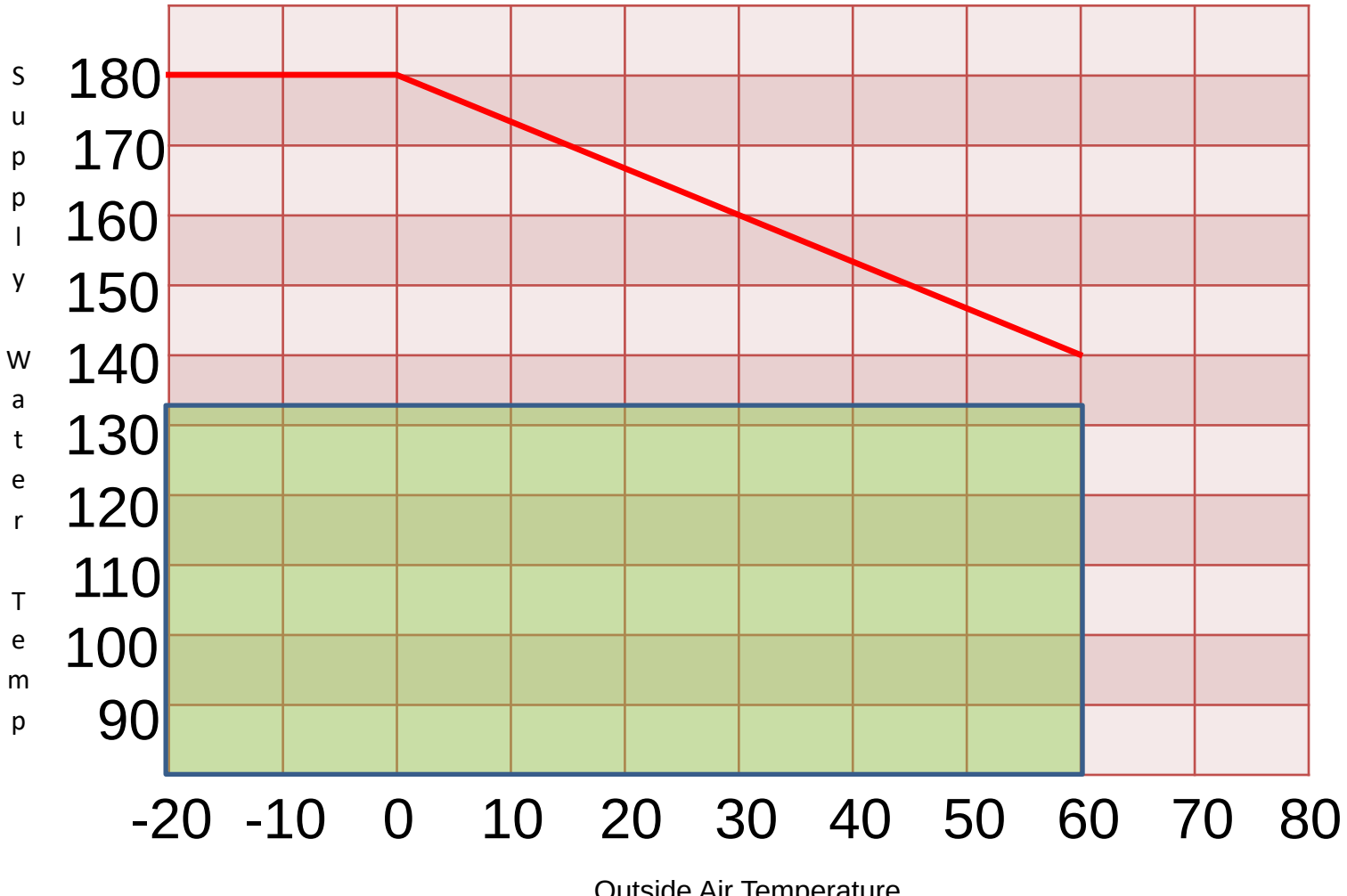


Menu	Parameter Name (as shown on the LCD screen)	Min Value	Max Value	Default Value
OUTDOOR RESET	Set point Max	32	185	180
	Set point Min	32	185	68
	Outdoor Temperature: Min	-22	86	23
	Outdoor Temperature: Max	-22	86	86
	Outdoor Temp: Shutdown	32	122	79.7
	Outdoor Temp: Diff	32	122	79.7
	Shift OA Reset Curve	-27	27	0
	Boost Time	0	250	20
	Boost Temperature	0	25	0

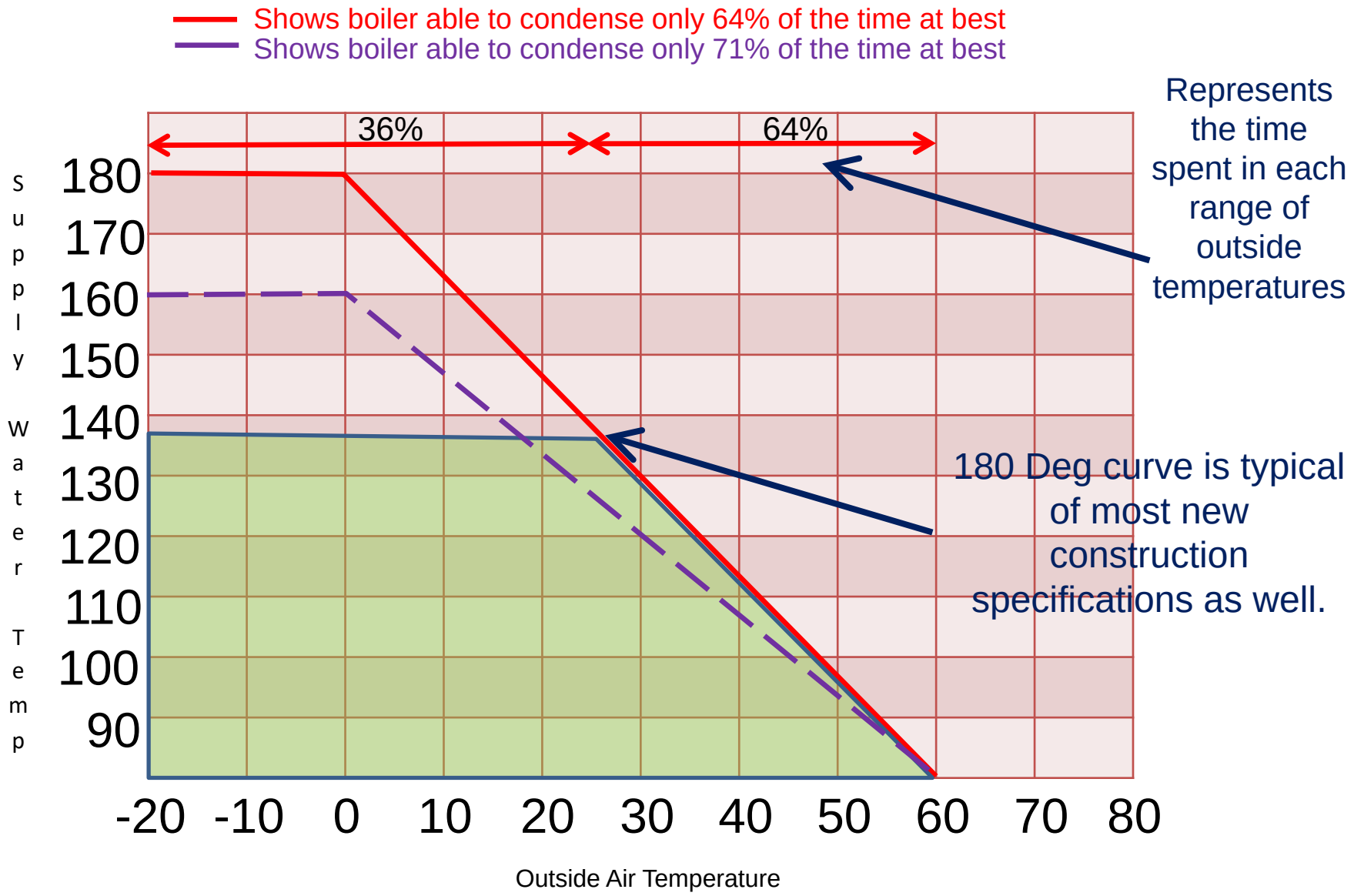
Outdoor Reset Parameters

Old Building
Hi Temperature Coils & Radiation
Non Condensing Boiler

Ensures the boiler never condenses based on curve below



Retrofit Building
Equipment Design 180 deg. F supply temperature



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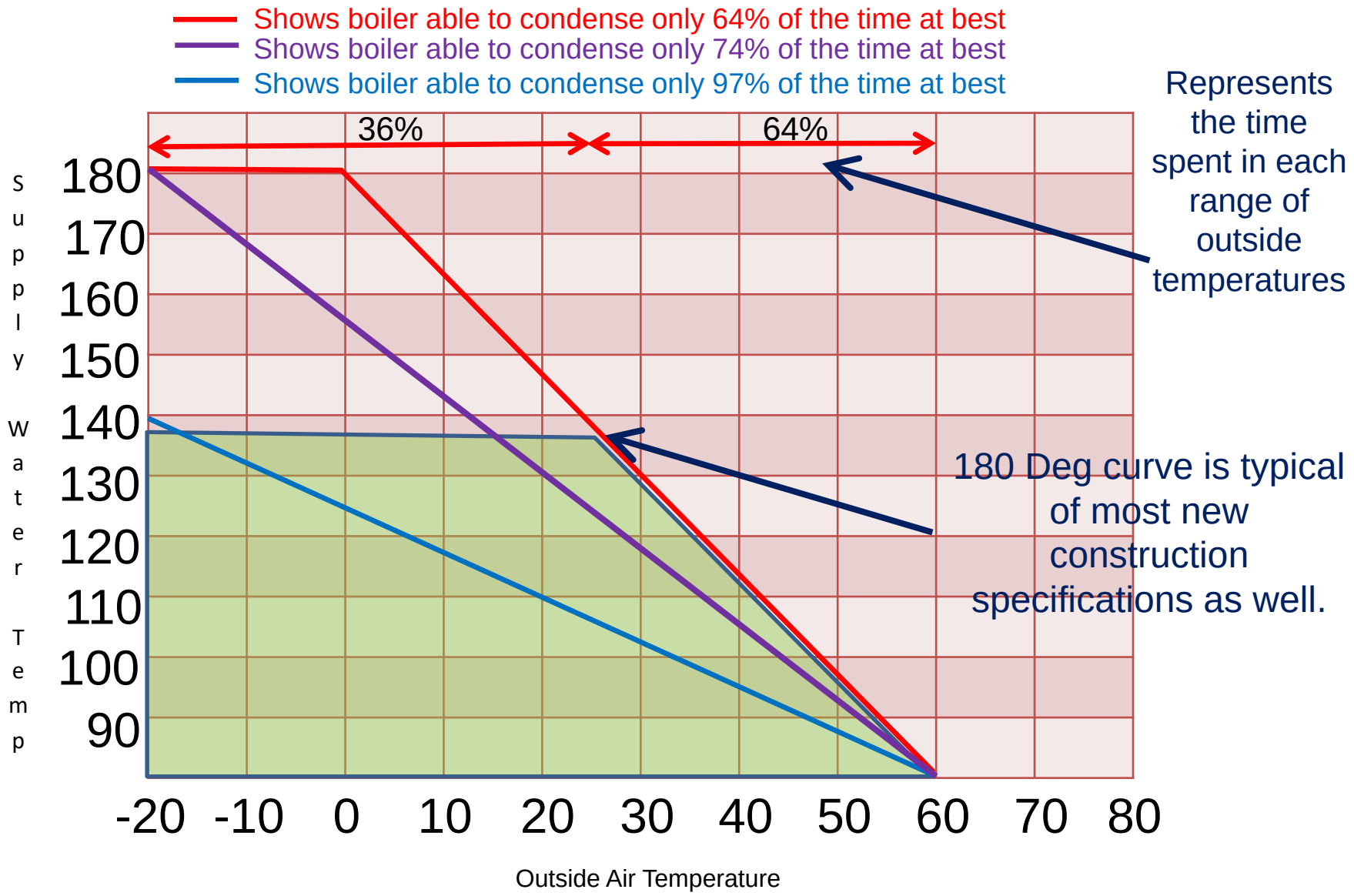
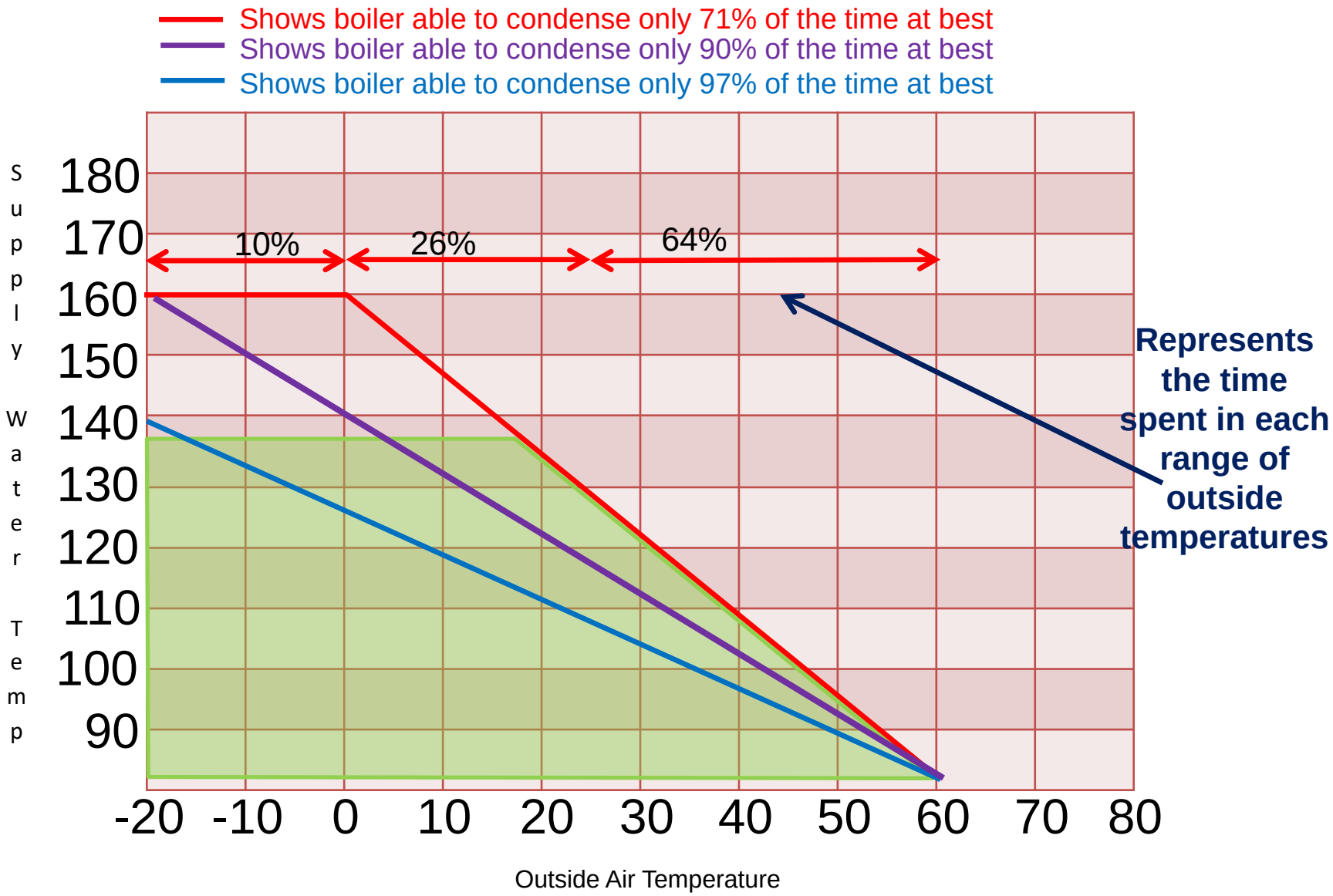


New Building
Low Temperature Coils & Radiation



Heat Transfer Output

- The most significant factor is ***average air temperature vs. average water temperature*** (Coil or radiation)
- Having the control valve modulate to the load is not going to happen
  - In the end what results is an on off system with poor return water temperature
- What is the biggest impact on boiler efficiency?
  - Resetting the boiler water is the simple solution

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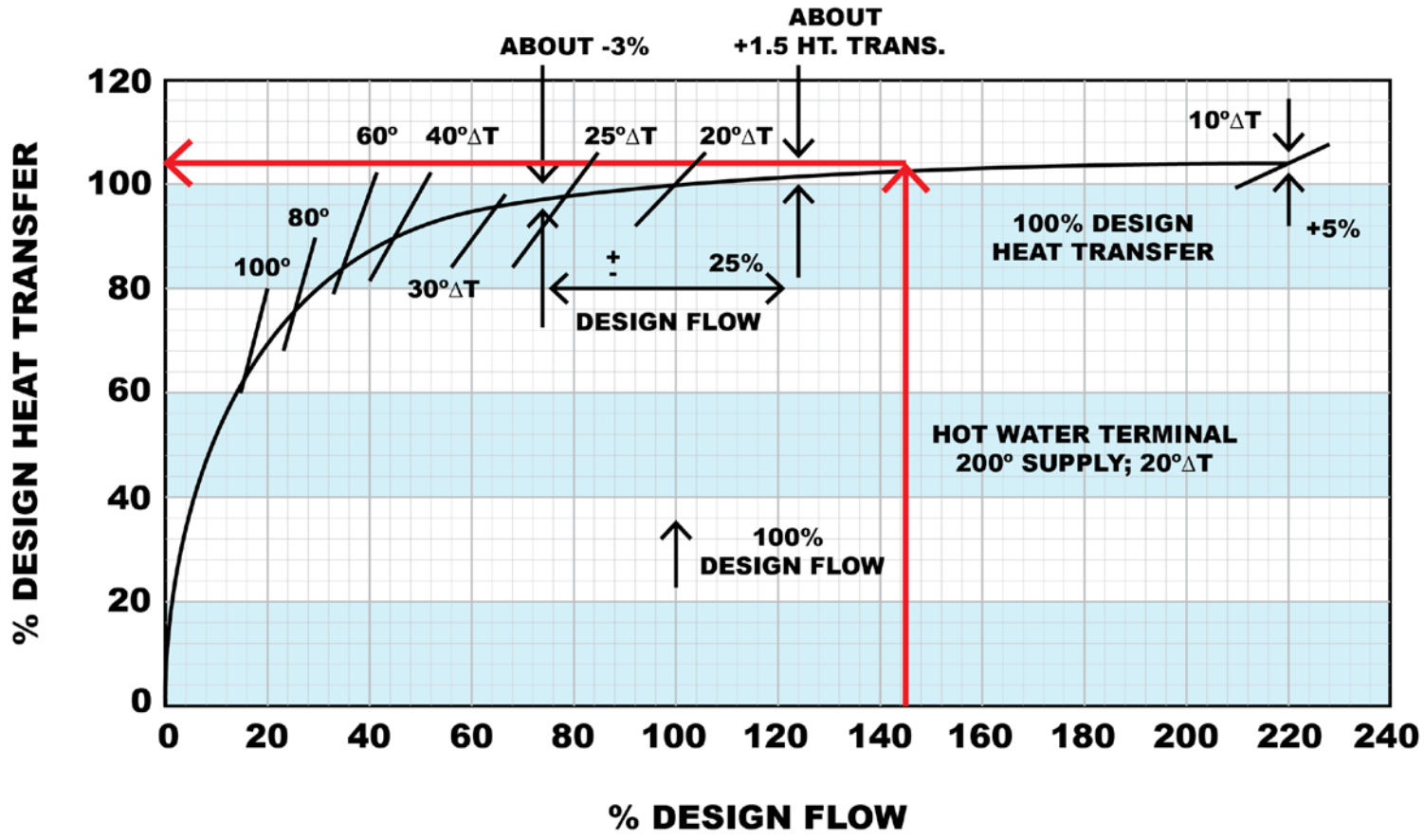
Change in Flow vs. Output



Shows full flow or what we would consider design day flow

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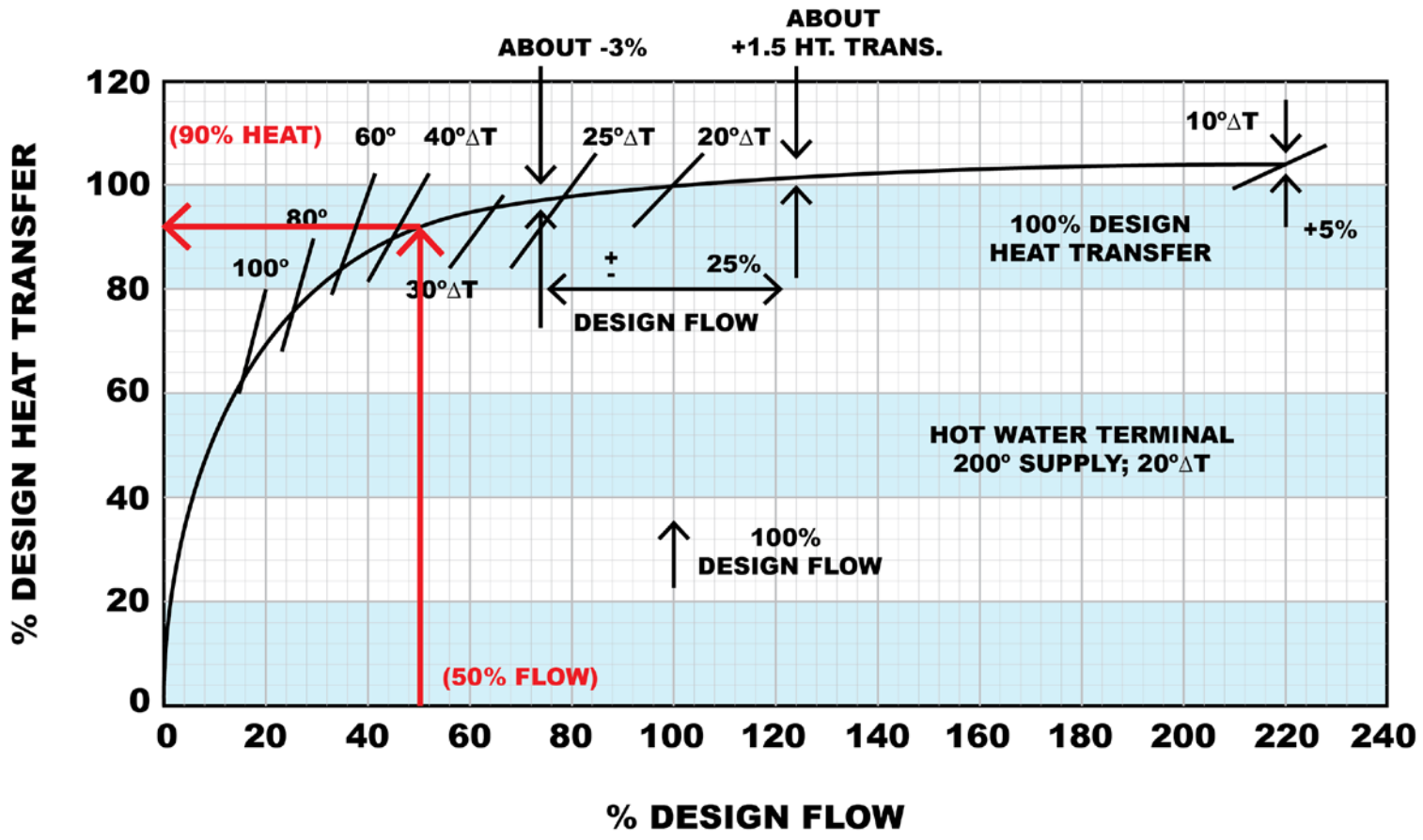
Change in Flow vs. Output



Shows reduced flow of what we would typically see in a shoulder month

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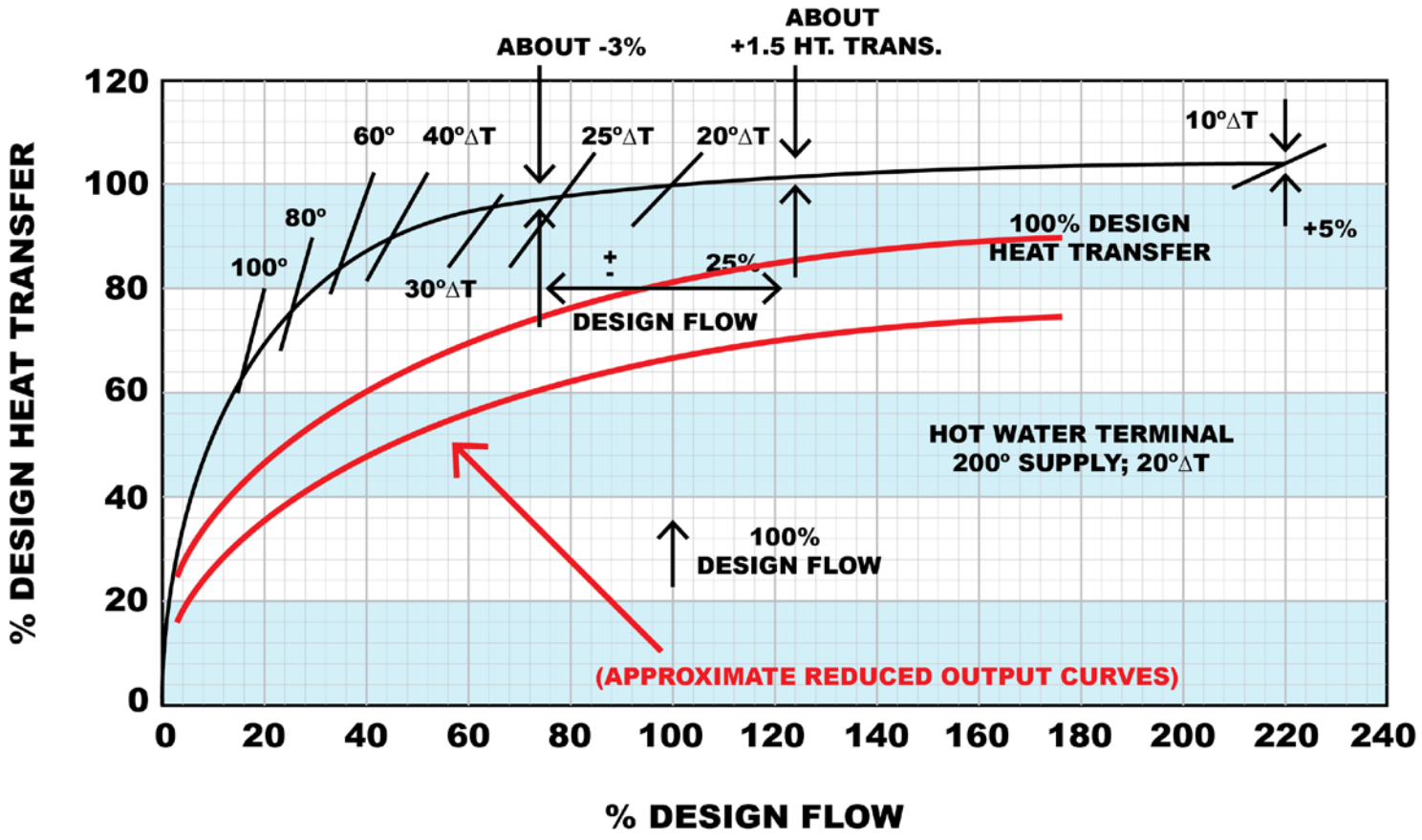
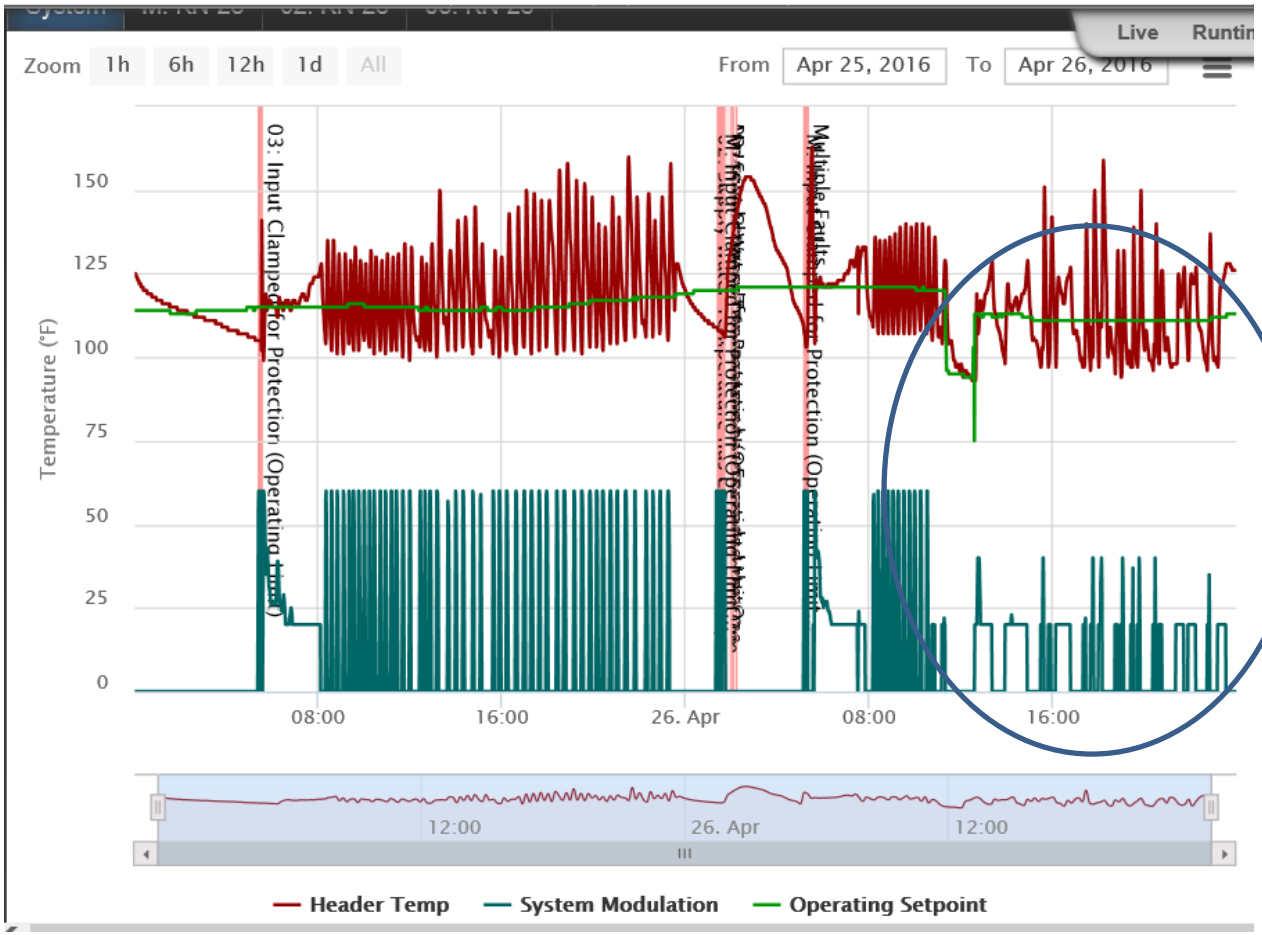
Change in Flow vs. Output



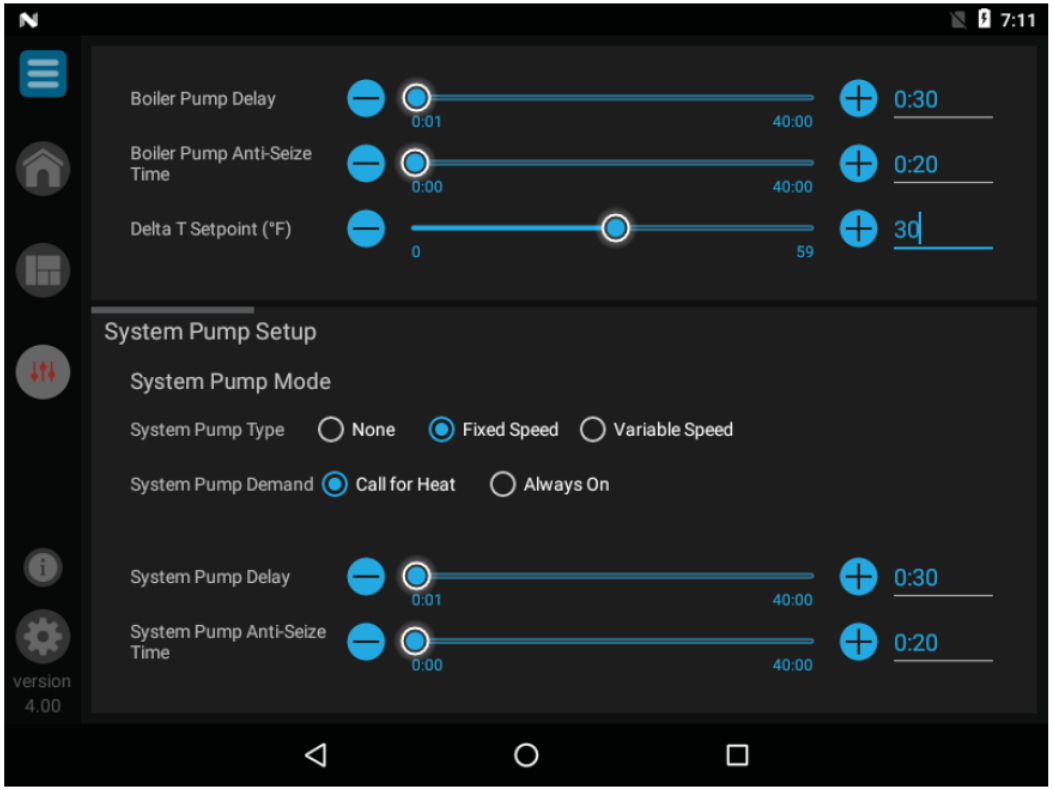
Shows reduced water temperature of what we would typically see in a shoulder month

Metro State – Reheat Load

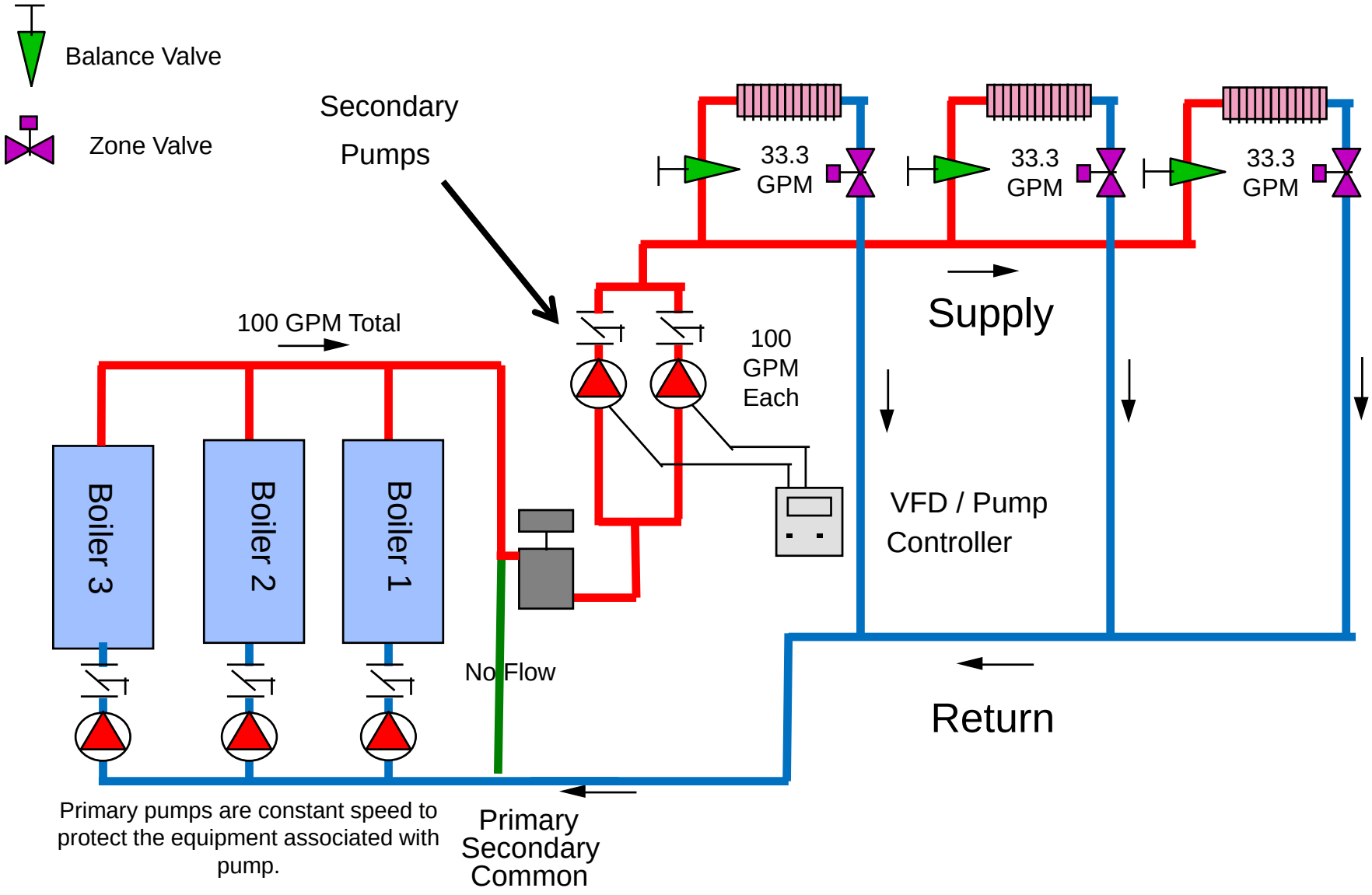


5 Degree Drop in Set Point

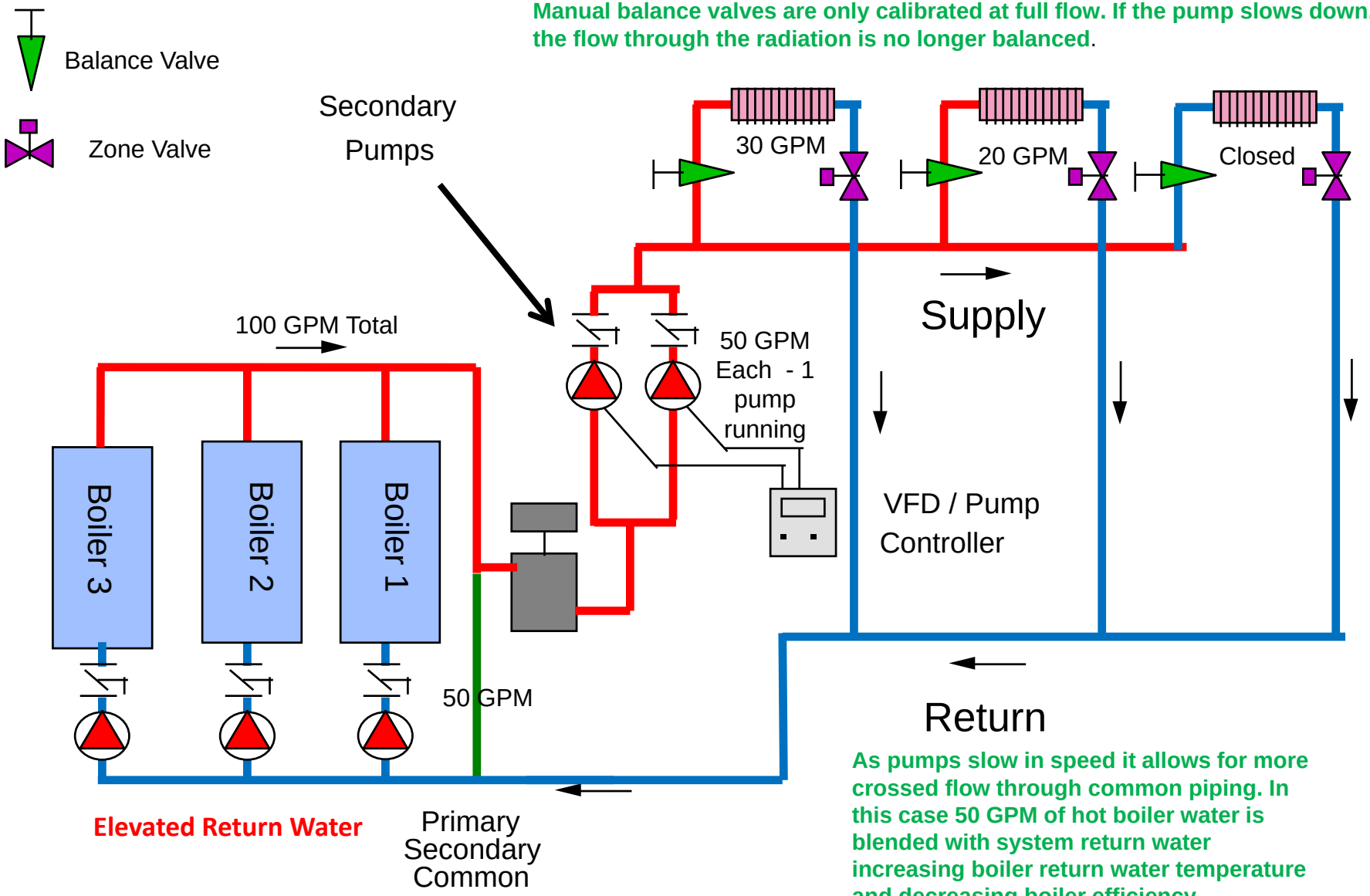
Primary secondary always ensures the boiler will have the proper flow at any given time. However, in a traditional primary secondary arrangement the boiler pump is oversized anytime the boiler is not at high fire. This setting sends a modulating signal to the pump to maintain a set dT.



Set up / Operation on design day

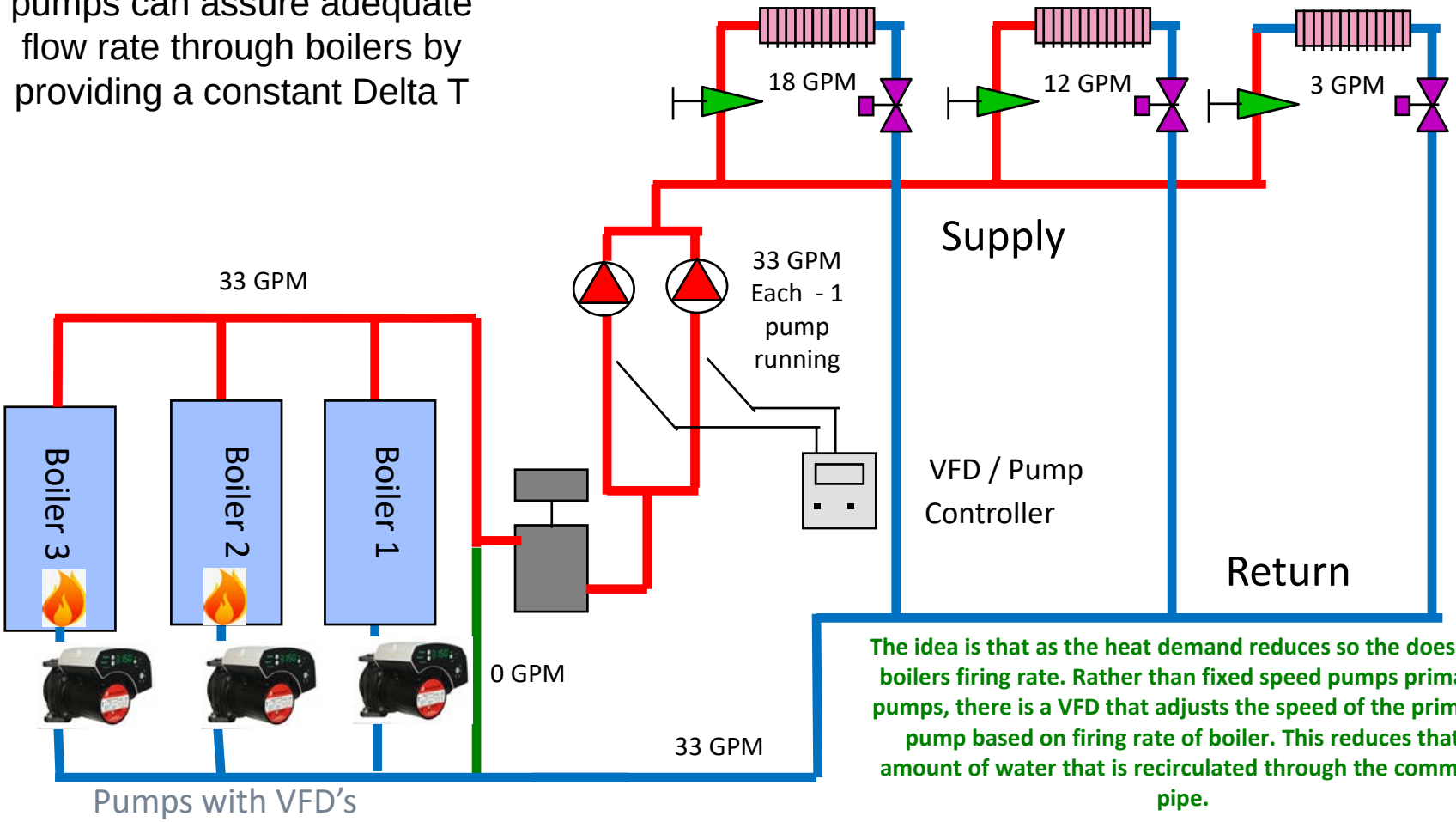


Anything less than design day



Look at it from a water temperature point of view.

Adding VFD's to the primary pumps can assure adequate flow rate through boilers by providing a constant Delta T

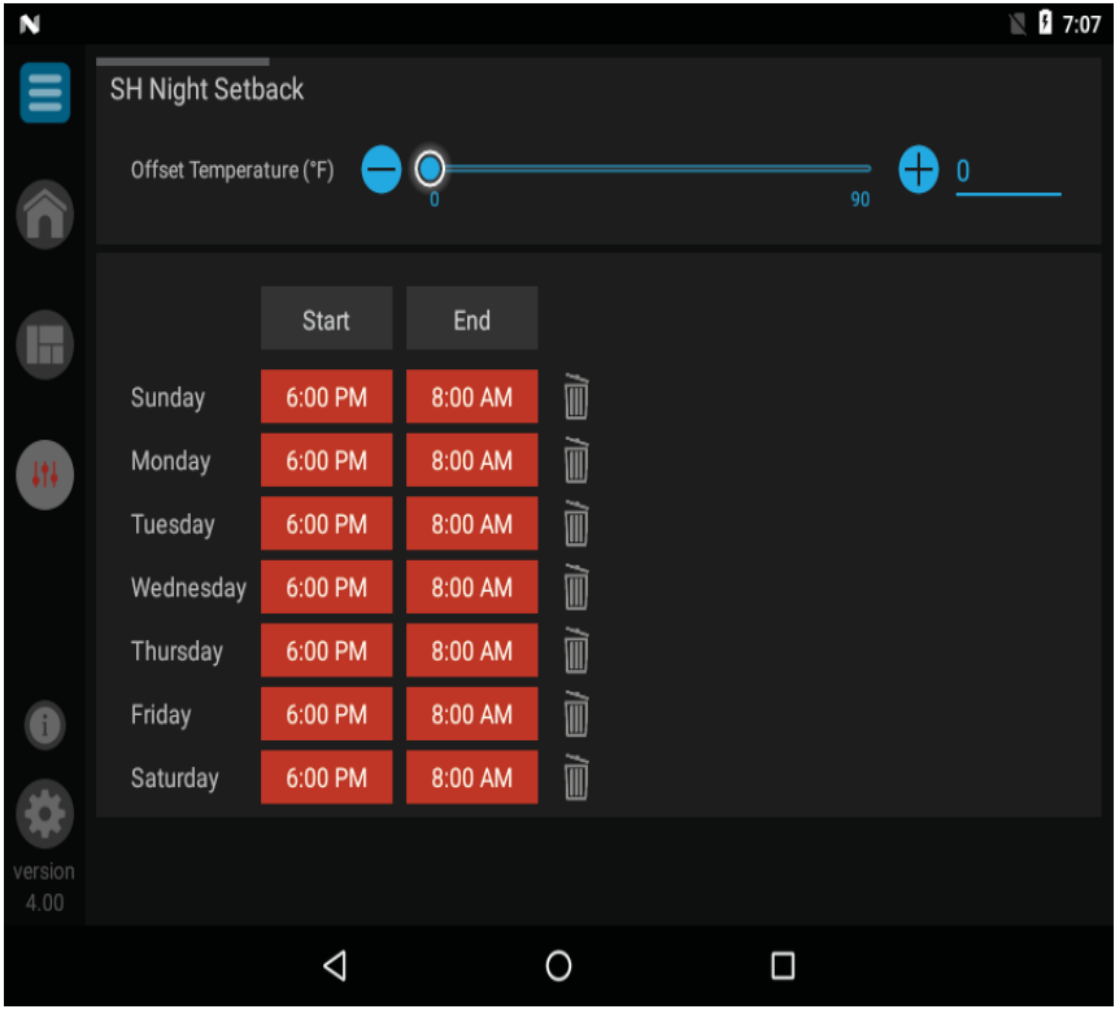


The idea is that as the heat demand reduces so the does the boilers firing rate. Rather than fixed speed pumps primary pumps, there is a VFD that adjusts the speed of the primary pump based on firing rate of boiler. This reduces that amount of water that is recirculated through the common pipe.

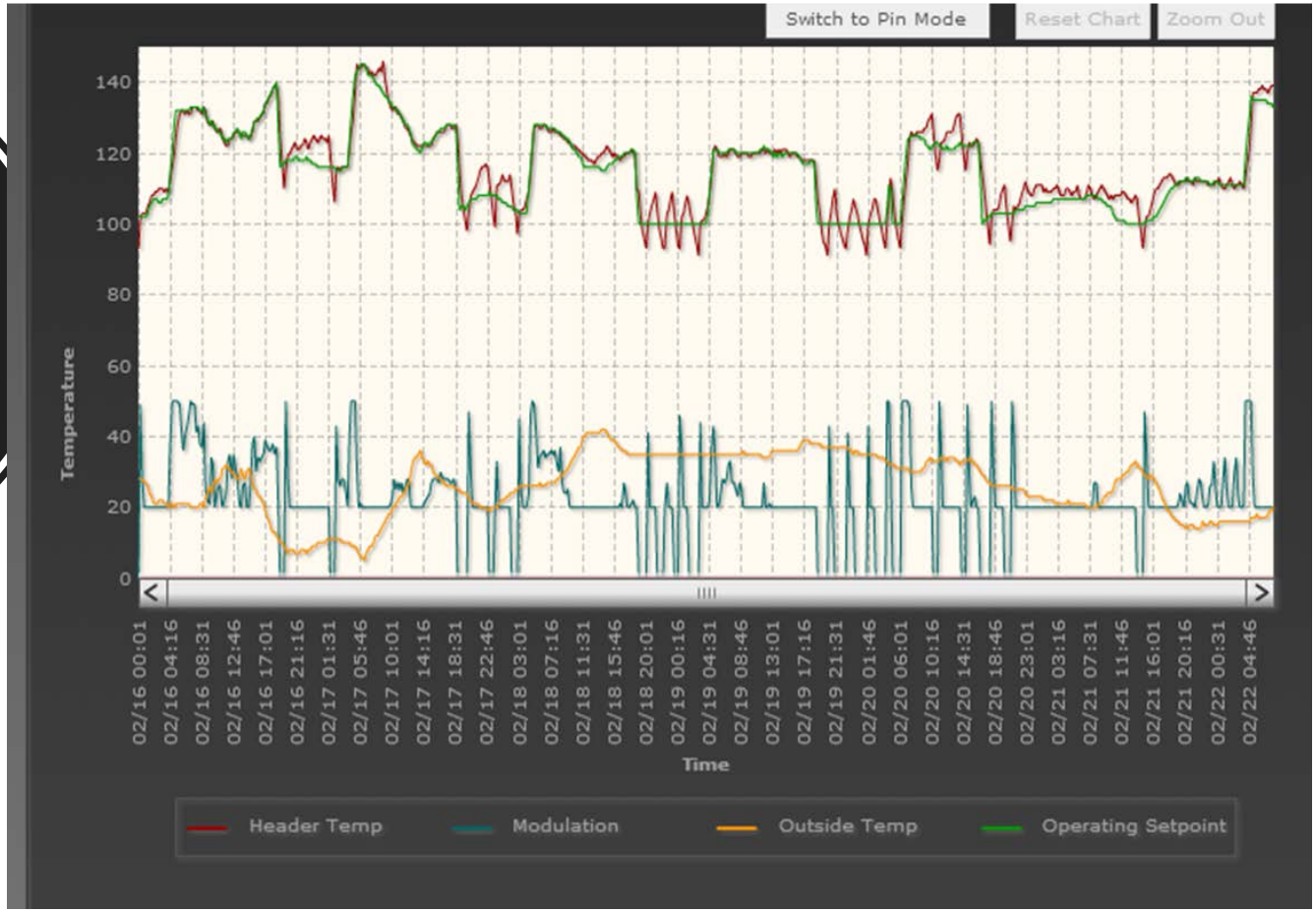
How a DELTA T Driven Boiler Pump Works

DELTA T Driven Pumps Over a Weeks Time.

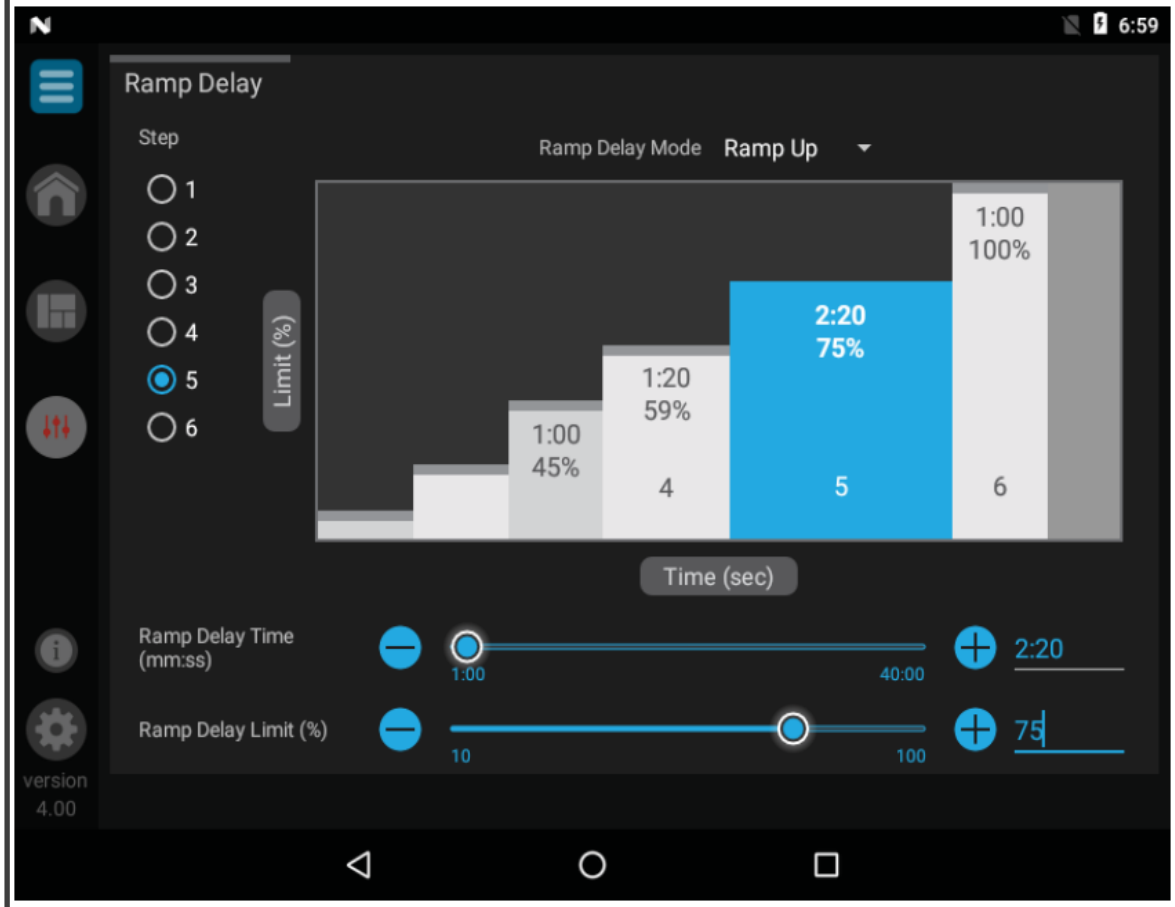
Night setback has huge value benefits to energy reduction and boiler operation. Think about it, what happens at night? Temperature outside drops, water temperature therefore rises and the BMS has the room stats in a setback mode ultimately at the near closed position. Why heat water up when the building is unoccupied. Let the water temperature cool the space.



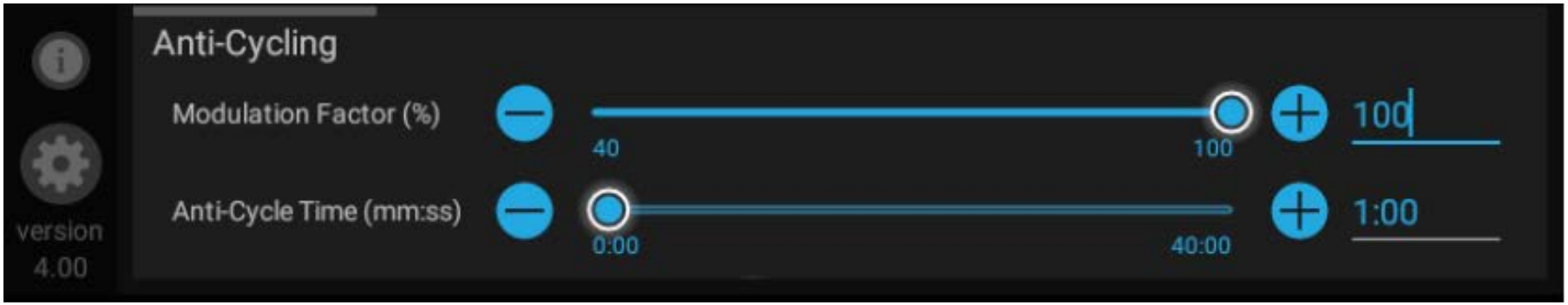
Notice the drop in temperature every night. Still has too much energy!



This is where we tell a boiler how to make it run! This is also something that may require time to really dial in correctly. We can make some assumptions at start up by asking a few questions to get close, but to really do it right, the system must be “learned” .

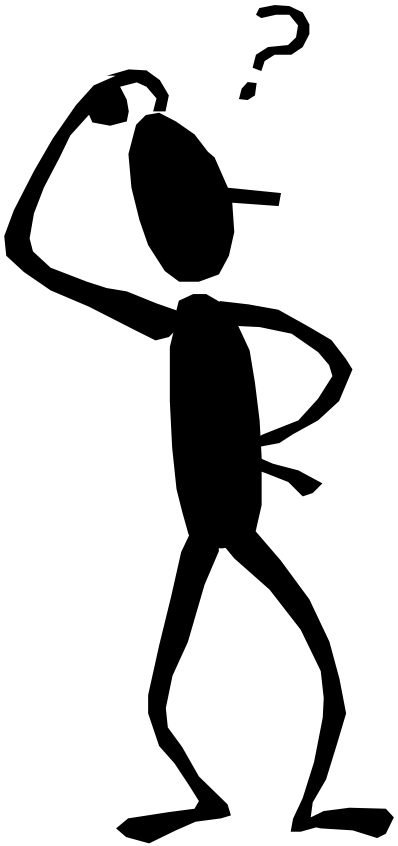


Additional settings used to really tune in the boilers behavior.



Fine tuning of a boilers control is a very important aspect of its ability to reach maximum efficiency for a given installation and maximized its life expectancy

An Almost Ideal Case Example



Questions?

Vent-Intake - NW Corner

- No Fire- Looks Good

Now: Firing – Recirc.

Flue Gases & Snow

- Phone Call!!!!!
- Emergency!!!!
  - Screens
    - 3” snow
    - Frost

Northwest Building Corner

- Boilers – Vent Solution

- Recirculation

Intake Issues

- Intake 3ft of snow on roof


901

- Side-Wall??