Update on the *Renewable Heat NY* Program

Webinar presented in support of
Renewable Heat NY

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presented by:

Sue Dougherty - RHNY project manager at NYSERDA
John Siegenthaler, P.E., Appropriate Designs - consulting engineer

Agenda

- RHNY program updates
- RHNY incentives
  - Small Biomass Boiler Program
  - Large Biomass Boiler Program
  - Residential Pellet Stove Program
- Additional funding opportunities
  - PON 3694: Coop Advertising and Training
  - Clean Heating and Cooling Community Campaigns
  - Home Energy Efficiency: HPwES, AHP, Empower
- Design Assistance Manual (John Siegenthaler)

Renewable Heat NY (PON 3010)

Renewable Heat NY (RHNY) provides incentives toward the installed costs of high-efficiency, low-emission wood heating systems for homeowners and businesses not currently using natural gas.

Benefits of High-Efficiency, Low-Emission Wood Heating Systems

- New high-efficiency systems are automated and cleaner burning
- More efficient combustion means less fuel is required

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RHNY Program Update

(Updated August 2018)

- Extended program through December 2021
- Increased incentive levels for small and large biomass boilers
- Revised all program manuals:
  - Small Biomass Boiler Program
  - Large Biomass Boiler Program
  - Residential Pellet Stove Program
- Simplified small biomass boiler program participation
  - Less paperwork: PON 3010 Documents
  - Reduced steps / requirements to become participating contractor
- Updated large biomass boiler program to reduce project risks
  - Eligible projects receive free site assessment
  - Approved projects receive technical support for system design and commissioning
- Summary or Revisions is here: PON 3010 Summary of Revisions

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Residential / Small Commercial Boilers (≤300,000 Btu/h)

System Type / Technology	Incentive amount
Advanced Cordwood Boiler with Thermal Storage	25% of installed cost up to $7,000
Small Pellet Boiler with Thermal Storage	45% of installed costs up to $36,000

An additional $5,000 for the recycling of old outdoor/indoor wood boiler or $2,500 for recycling a whole house wood furnace

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Large Commercial Boilers (>300,000 Btu/h)

System Type / Technology	Incentive amount
Large Pellet Boiler with Thermal Storage	65% of total installed cost up to $325,000
Tandem Pellet Boiler with Thermal Storage	75% of total installed cost up to $450,000

Sizing ≤ 60% design day load, thermal storage, careful system integration with existing heating system and heat distribution system and controls.

Receive a site assessment and support from NYSERDA technical consultant during system design and commissioning.

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Residential Pellet Stoves

The following incentives are available toward the purchase of a new pellet stove for use in a primary residence, not currently using natural gas:

Qualification	Incentive Amount
Market Rate with Recycling	$1,500
Income Qualified (No Recycling)	$2,000
Income Qualified, add optional Recycling	$2,500

Pellet Stoves must be listed on the US EPA Certified Wood Stoves list as having a particulate matter output of 2.0 grams per hour (PM 2.0 g/h) or less and an actual measured efficiency of 70% efficient or greater.

https://www.nyserda.ny.gov/All-Programs/Programs/Renewable-Heat-NY

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Coop Advertising and Training (PON 3694)

- Increase awareness and education of eligible heat pump and biomass technology
- $2 million is available on a first-come, first-served basis through Dec. 31, 2020
- Up to 50% cost-share – NYSERDA may cost-share less than 50% depending on cost-effectiveness, reach, or educational content
- Installers must be NYSERDA participating installers (i.e. in RHNY)
- HVAC Manufacturers – Eligible for cost-sharing of training-related activities only

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Coop Advertising and Training (PON 3694)

Advertising and Marketing

- Newspapers, magazines
- Billboards
- Direct mail or email blast (purchase of lists)
- TV, radio, online
- Collateral materials (flyers, brochures, posters)
- Trade show or conferences (includes showroom displays)

Training

- Sales, installation

https://portal.nyserda.ny.gov/CORE_Solicitation_Detail_Page?SolicitationId=a0rt000000AH0ZZAA1

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Clean Heating and Cooling Community Campaigns

- Funding for local outreach, education, and bulk procurement for clean heating and cooling (CH&C) technologies:
  - Ground Source Heat Pumps
  - Air Source Heat Pumps
  - Solar Thermal
  - High-Efficiency, Low-Emission Biomass
- Increase consumer education and awareness of CH&C technologies
- Reduce purchase and installation costs
- Grow the CH&C workforce
- Increase participation of low- to moderate-income (LMI) households

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Clean Heating and Cooling Community Campaigns

Round 1 (PON 3723)

- Campaigns started in 2018/2019
- 8 communities

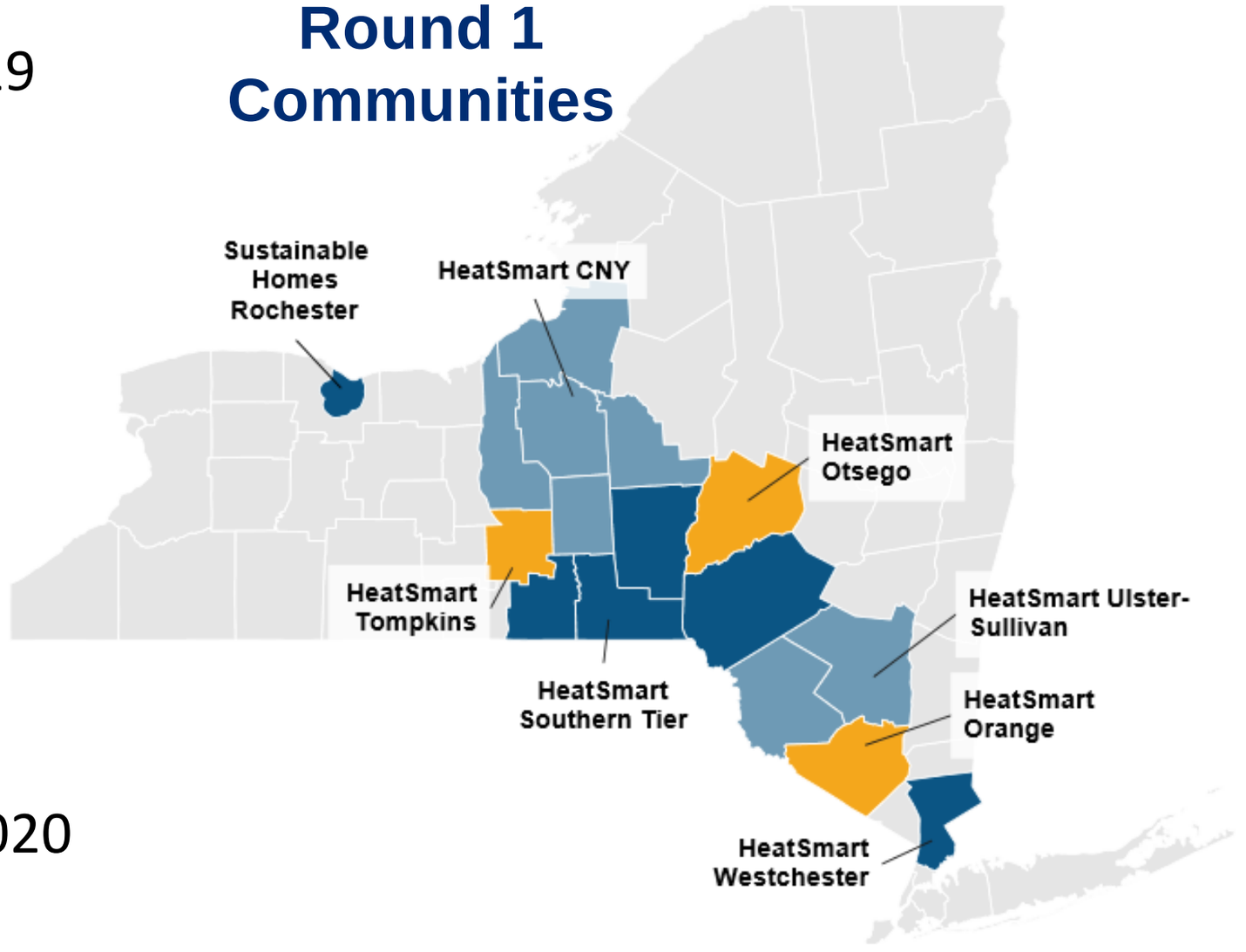
Round 2 (PON 3922)

- Campaigns will start in 2019
- 7 communities

Round 3

- New solicitation – 2019 Q2
- Campaigns will start in 2019/2020

Round 1 Communities



https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Heating-and-Cooling-Communities

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Energy Efficiency Programs

- Free/reduced cost energy assessments (audits)
- Work is performed by NYSERDA approved, BPI accredited contractors using diagnostic equipment, building science principals and the whole house approach

Energy Efficiency Program	Customers	Benefit
Home Performance with Energy Star	< 200% AMI	Loan interest rate 6.99-7.49%
Assisted Home Performance with Energy Star	between 60% SMI and 80% AMI	50% of cost of eligible work, up to $4,000 for single family home or $8,000 for 2-4 family home, Loan interest rate 3.49-3.99%
Empower	<60% SMI	No cost energy improvements up to $7,000

https://www.nyserda.ny.gov/All-Programs/Programs/Home-Energy-Efficiency-Upgrades

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Thank you

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www.nyserda.ny.gov/renewableheatny

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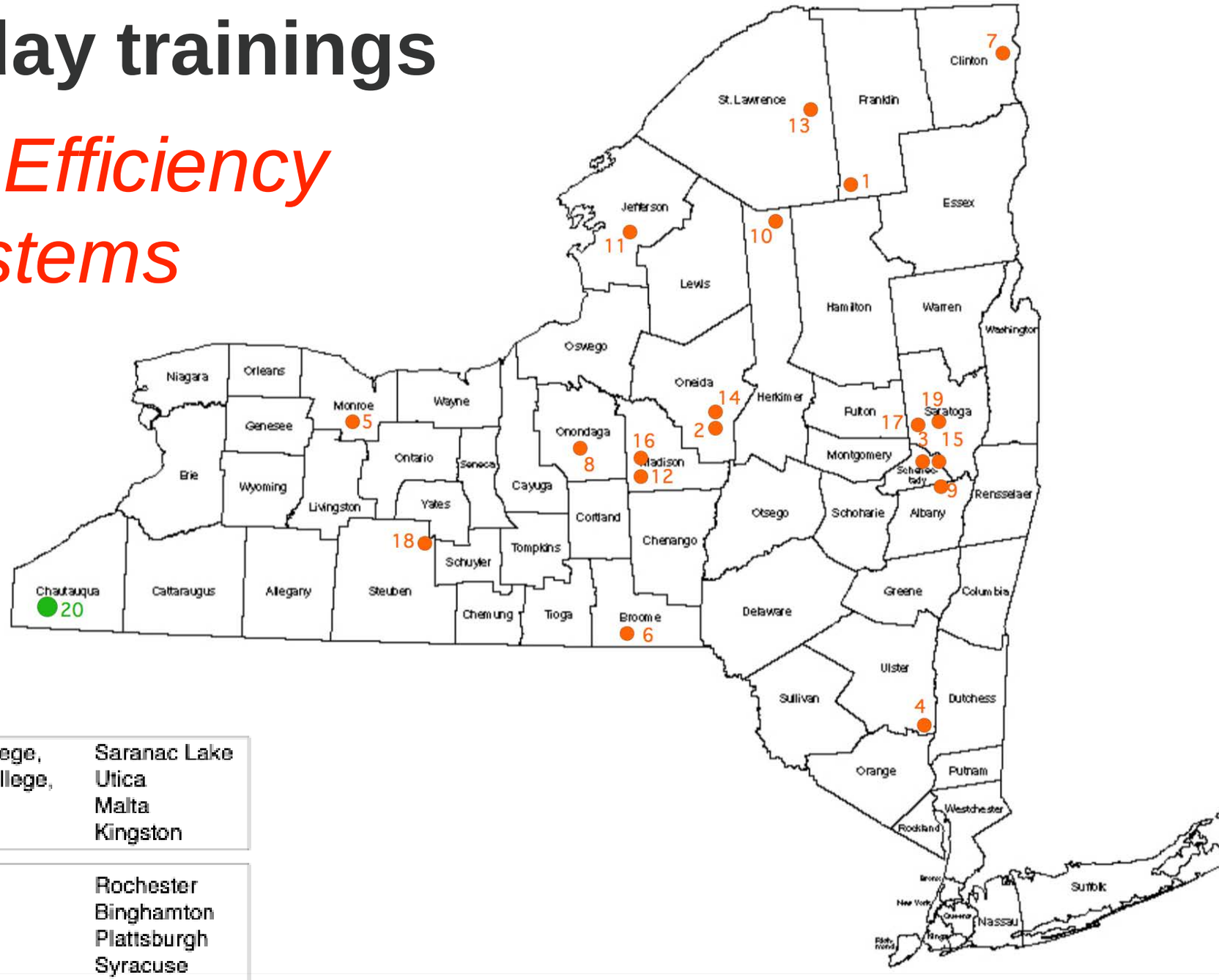
Locations of full day trainings

Hydronics for High Efficiency Biomass Boiler Systems

June 2014 - present

19 training sessions

Over 300 attendees



2014	June 19	North Country Community College,	Saranac Lake
	September 9	Mohawk Valley Community College,	Utica
	September 16	TEC-SMART	Malta
	November 20	Kingston, NY	Kingston
2015	February 19	Rochester, NY	Rochester
	April 8	Binghamton, NY	Binghamton
	May 20	Clinton Community College	Plattsburgh
	June 16	SUNY ESF	Syracuse
	September 17	Johnstone Supply	Troy
	October 15	Wild Center	Tupper Lake
2016	January 13	Jefferson Community College,	Watertown
	March 14	SUNY Morrisville,	Morrisville
	March 23	SUNY Canton,	Canton
	June 13	SUNY Polytechnic Institute,	Utica
2017	March 30	TEC-SMART,	Malta
	October 10	SUNY Morrisville,	Morrisville
	October 24	Clean Energy Economy Conference	Glens Falls
2018	March 30	Cornell Cooperative Extension,	Ithaca
	October 23	Clean Energy Economy Conference	Glens Falls

Since the program began in 2014, **49 pellet boilers** and **36 cordwood gasification boilers** have been incentivized through NYSERDA's Renewable Heat NY program.

Those installations, as well as earlier and concurrent NYSERDA research installations, have provide a wealth of information on what works, and what to avoid.

"LESSONS LEARNED" is the operative phrase…

These lessons are an extremely valuable outcome of research projects.

These lessons have allowed for continuous upgrades to RHNY training programs and webinars.

The lessons are summarized in NYSERDA's recently released Design Assistance Manual for High Efficiency Low Emissions Biomass Boiler Systems manual.

Design Assistance Manual

for High Efficiency Low Emissions Biomass Boiler Systems

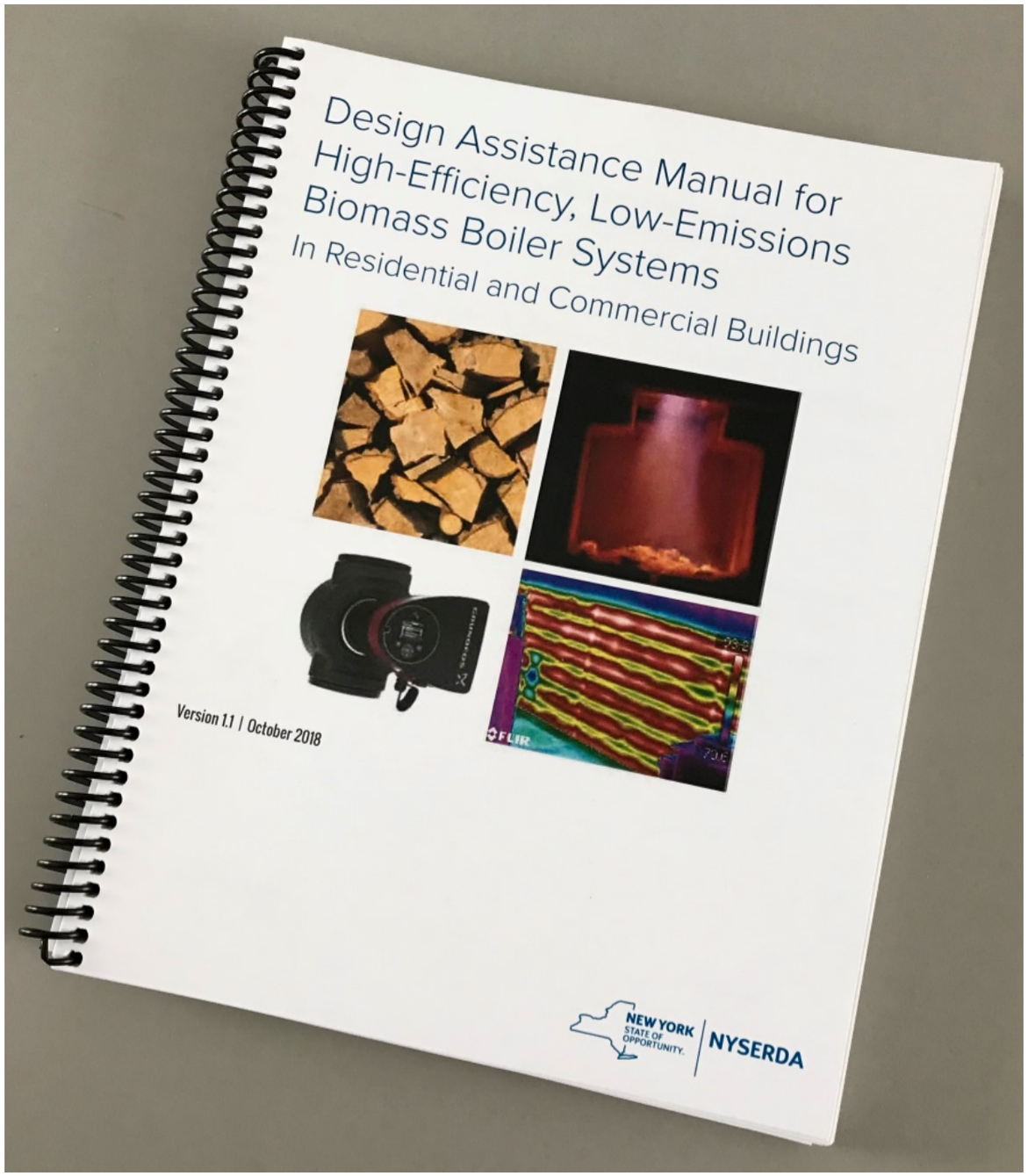


Table of Contents:

It's available as a FREE downloadable PDF at:

https://www.nyserda.ny.gov/-/media/Files/EERP/Renewables/Biomass/Design-Assistance-Biomass-Boiler.pdf

What's covered in the Design Assistance Manual?

Things to avoid:

plateless staple up floor heating

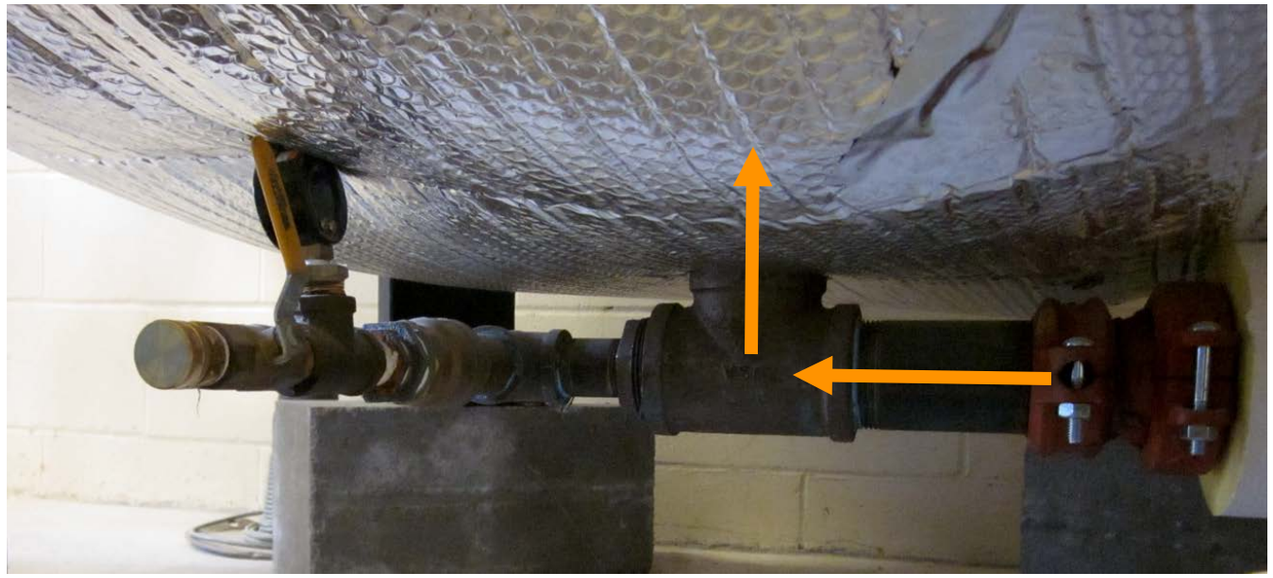
gooped-on RTV silicon caulk

standard barometric dampers

poorly mounted temp. sensors

poor underground piping practices

What is covered?



vertical flow jets in tanks

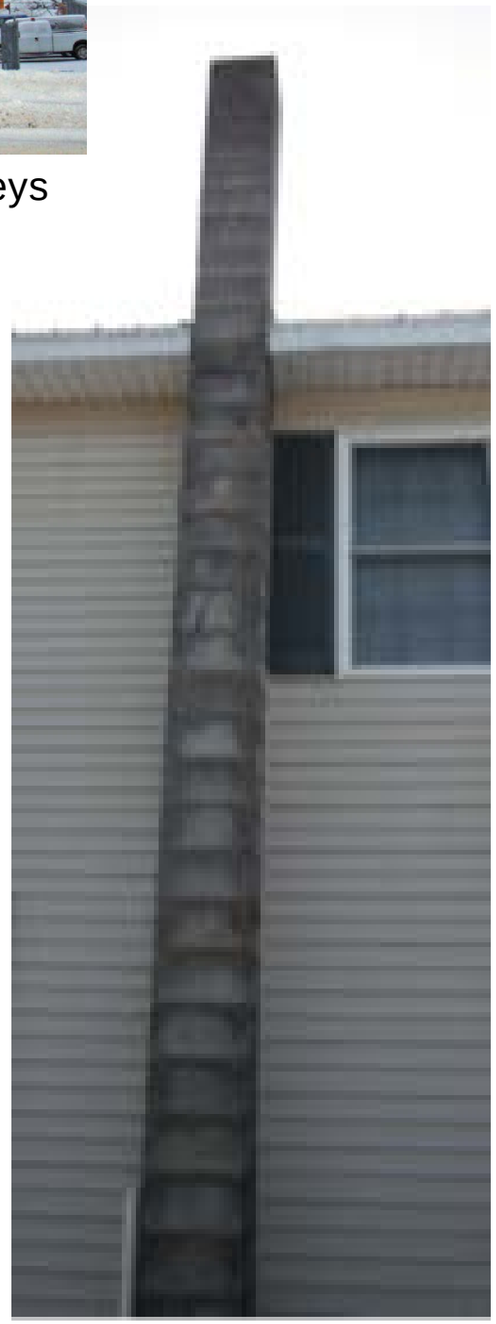
poor tank piping connections

MORE Things to avoid:

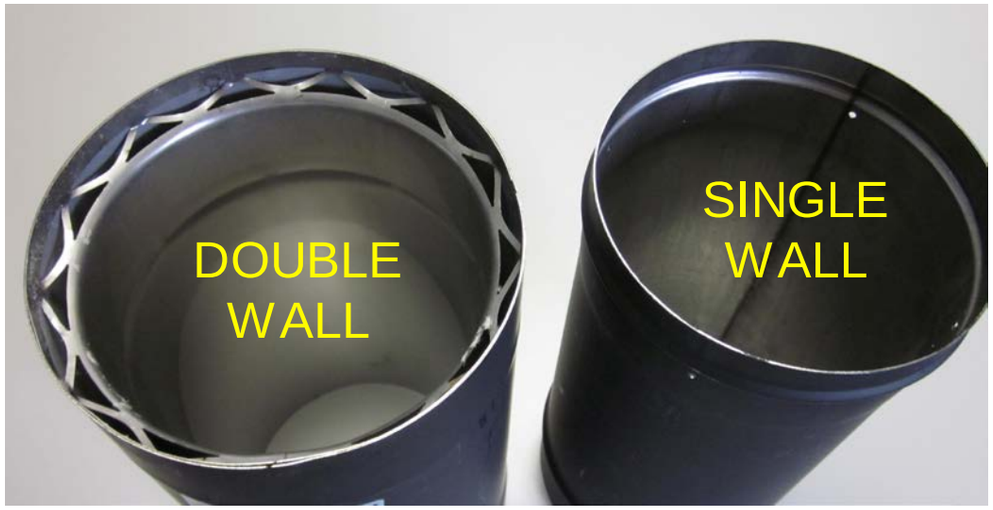
inadequate chimneys

inadequate vent connectors

poor tank placements

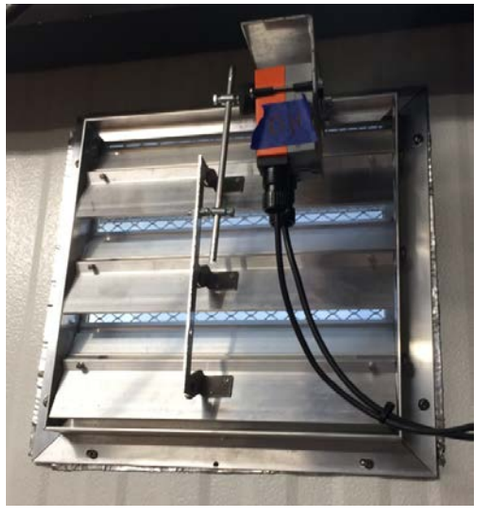


What is covered? **Details that work:**



proper vent connectors

outside pellet storage

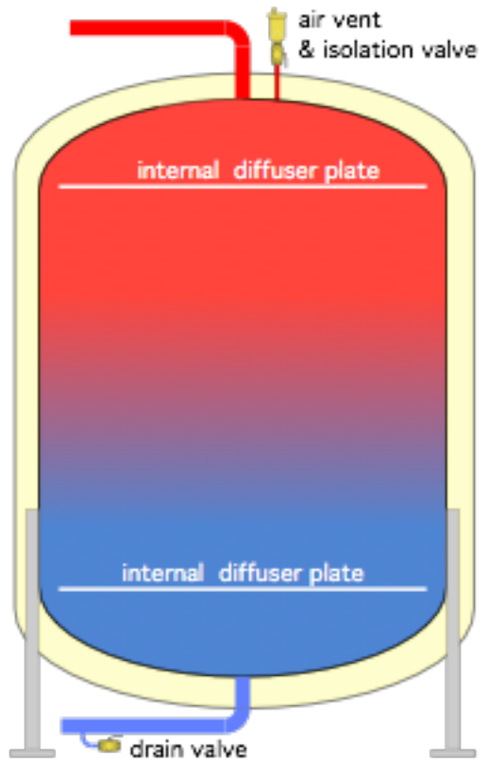


proper combustion air

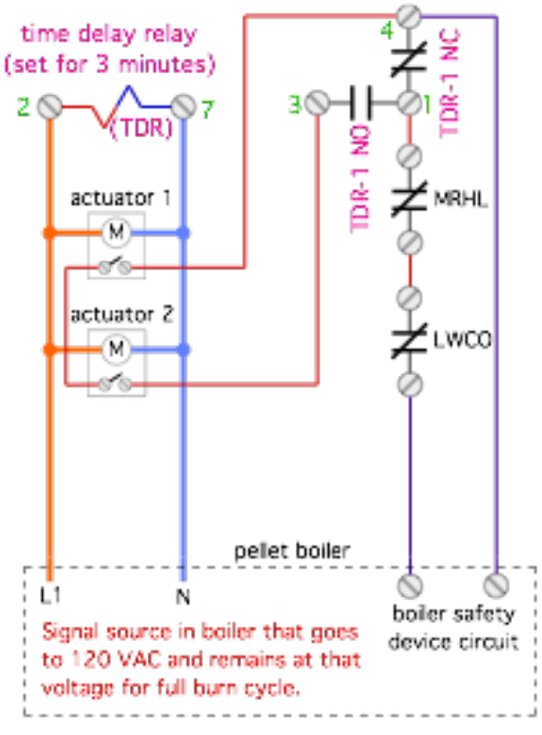
stratification enhancements

positive pressure sealing draft regulators

proper chimneys

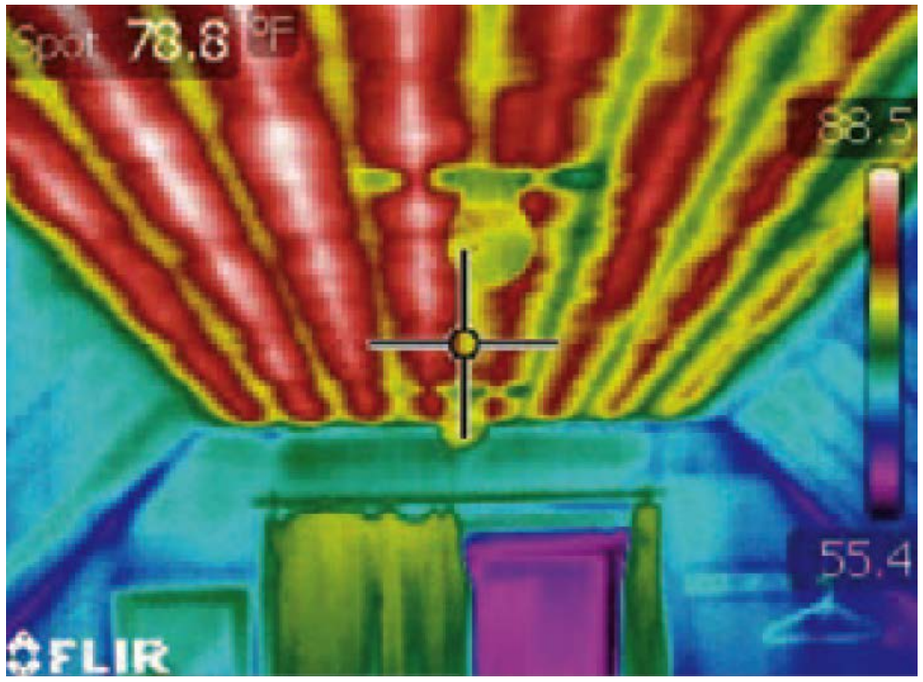


stratification enhancements



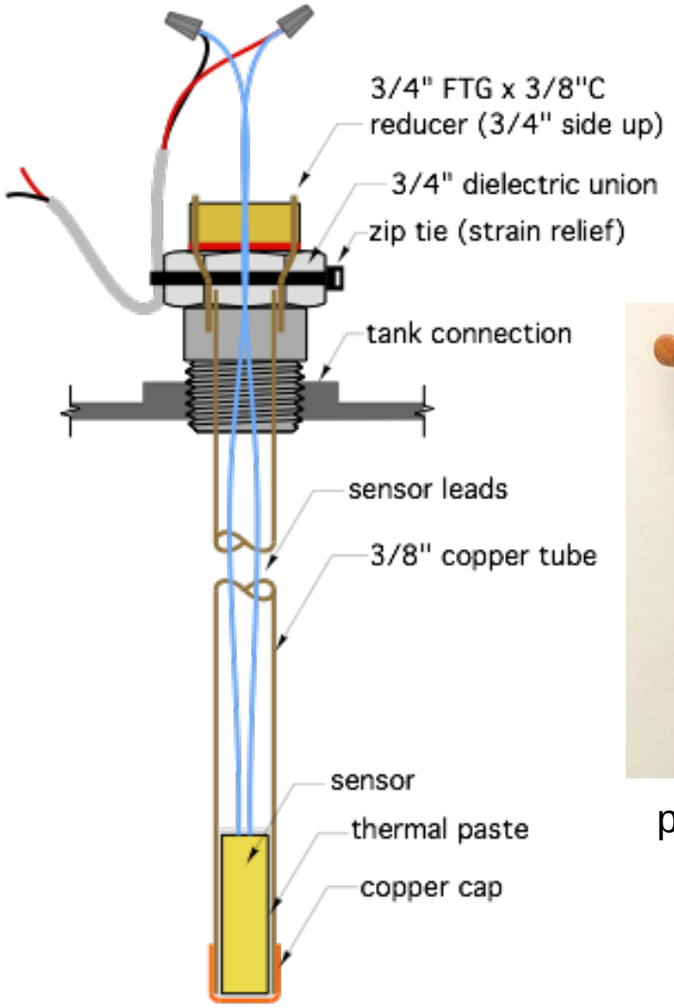
control circuits

What is covered? **More details that work:**

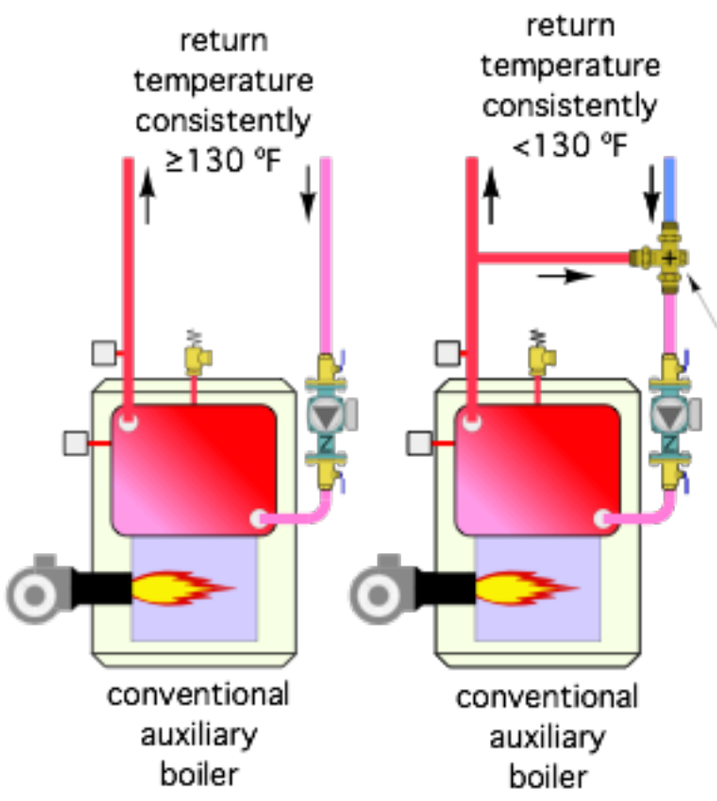


low temp. heat emitters

where to install draft regulator



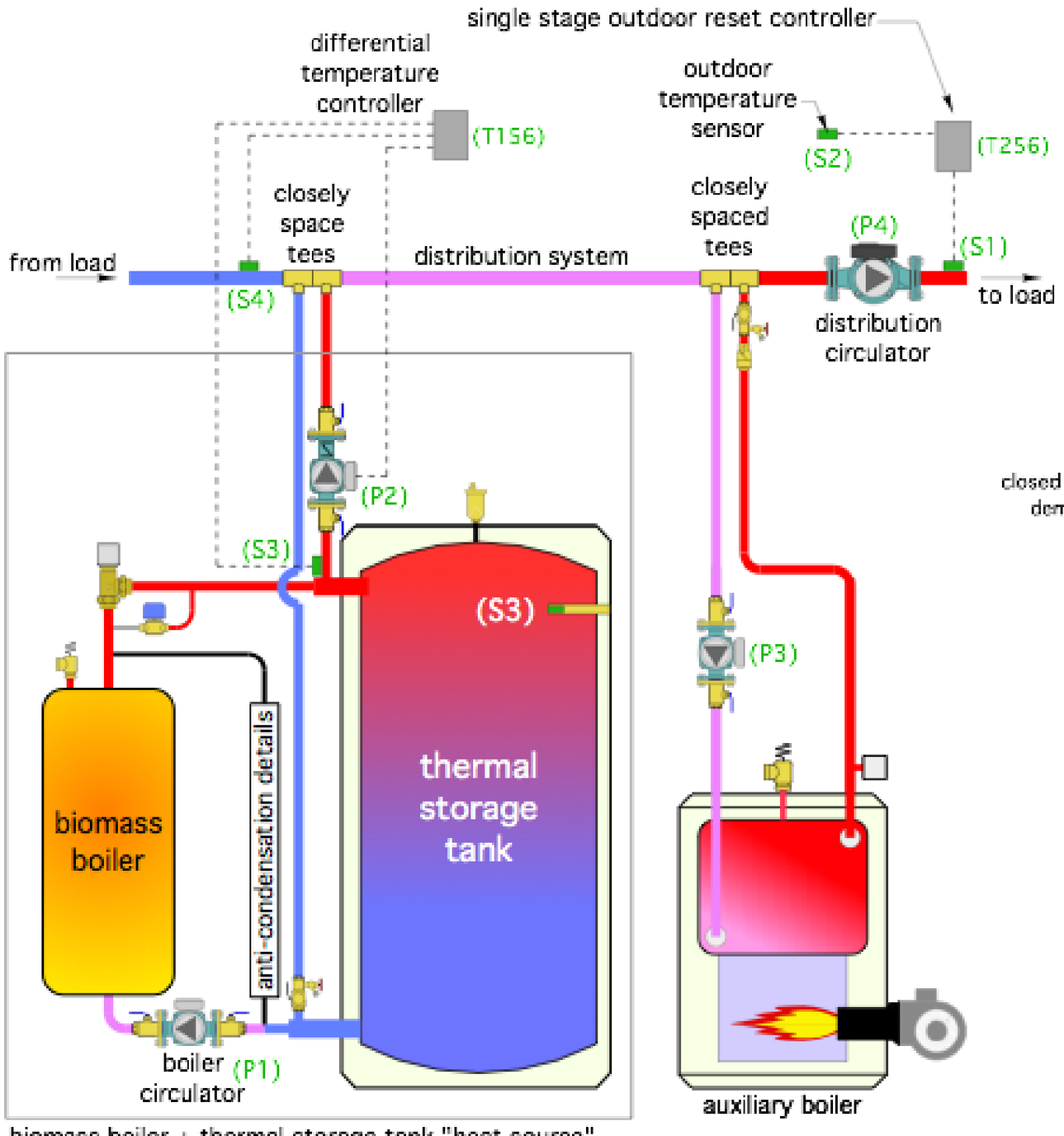
proper sensor mounting



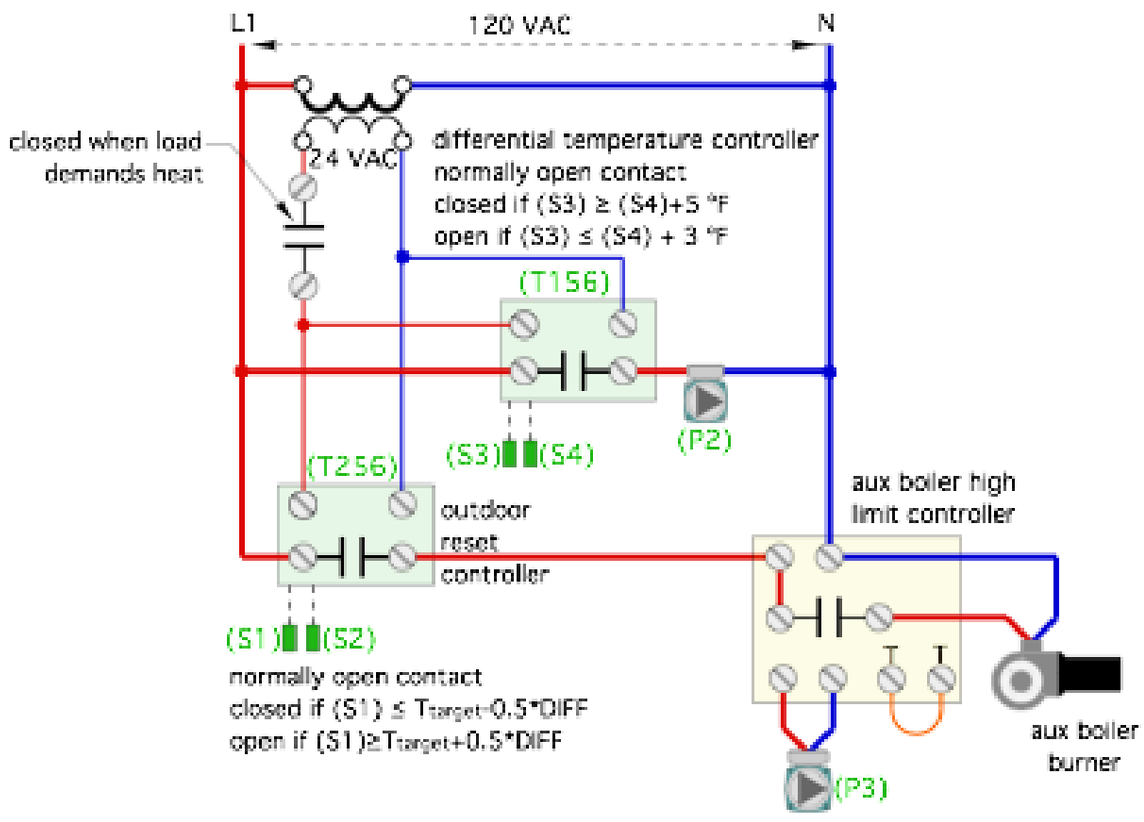
boiler anti-condensation control

What's covered in the Design Assistance Manual?

Piping & controls to optimized heat transfer to distribution system from pellet boiler & auxiliary boiler

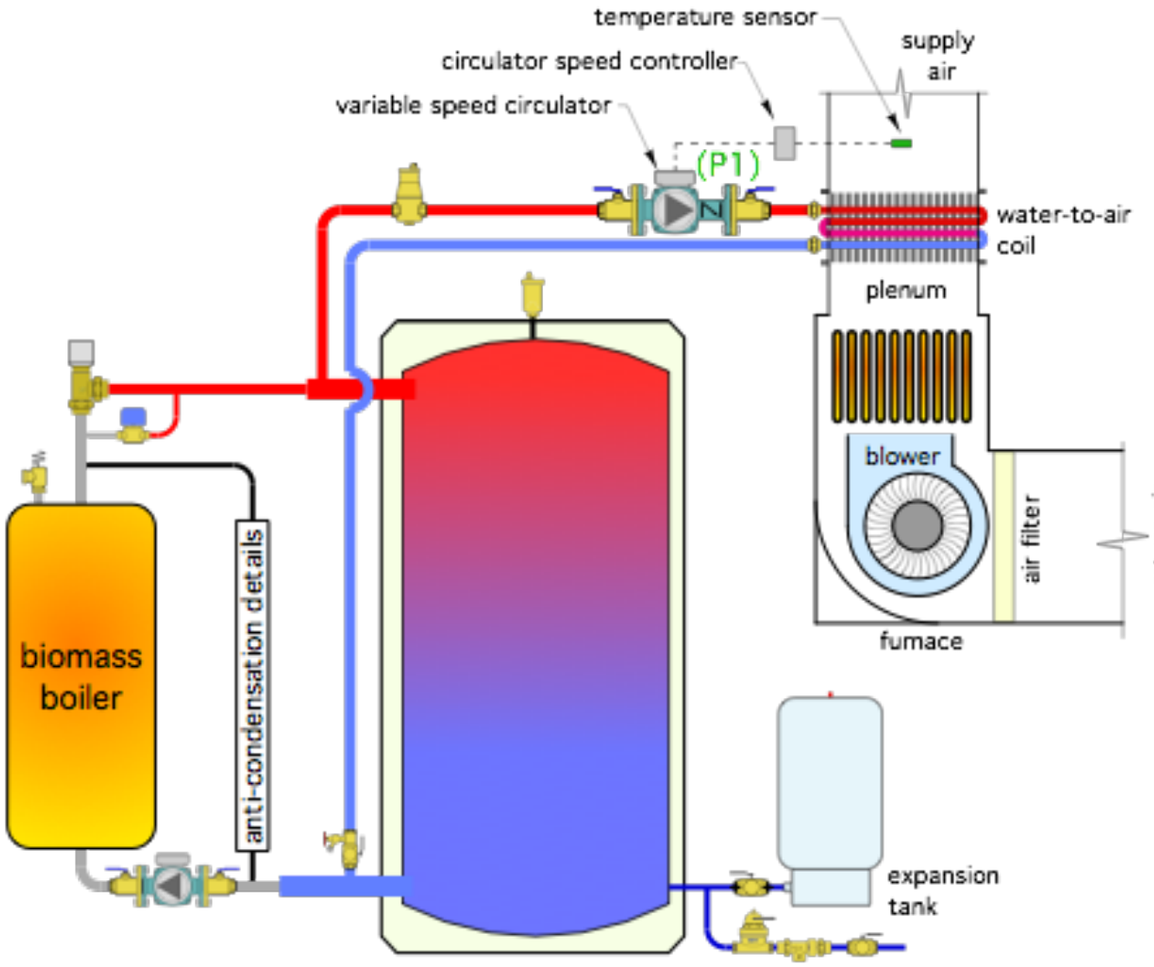


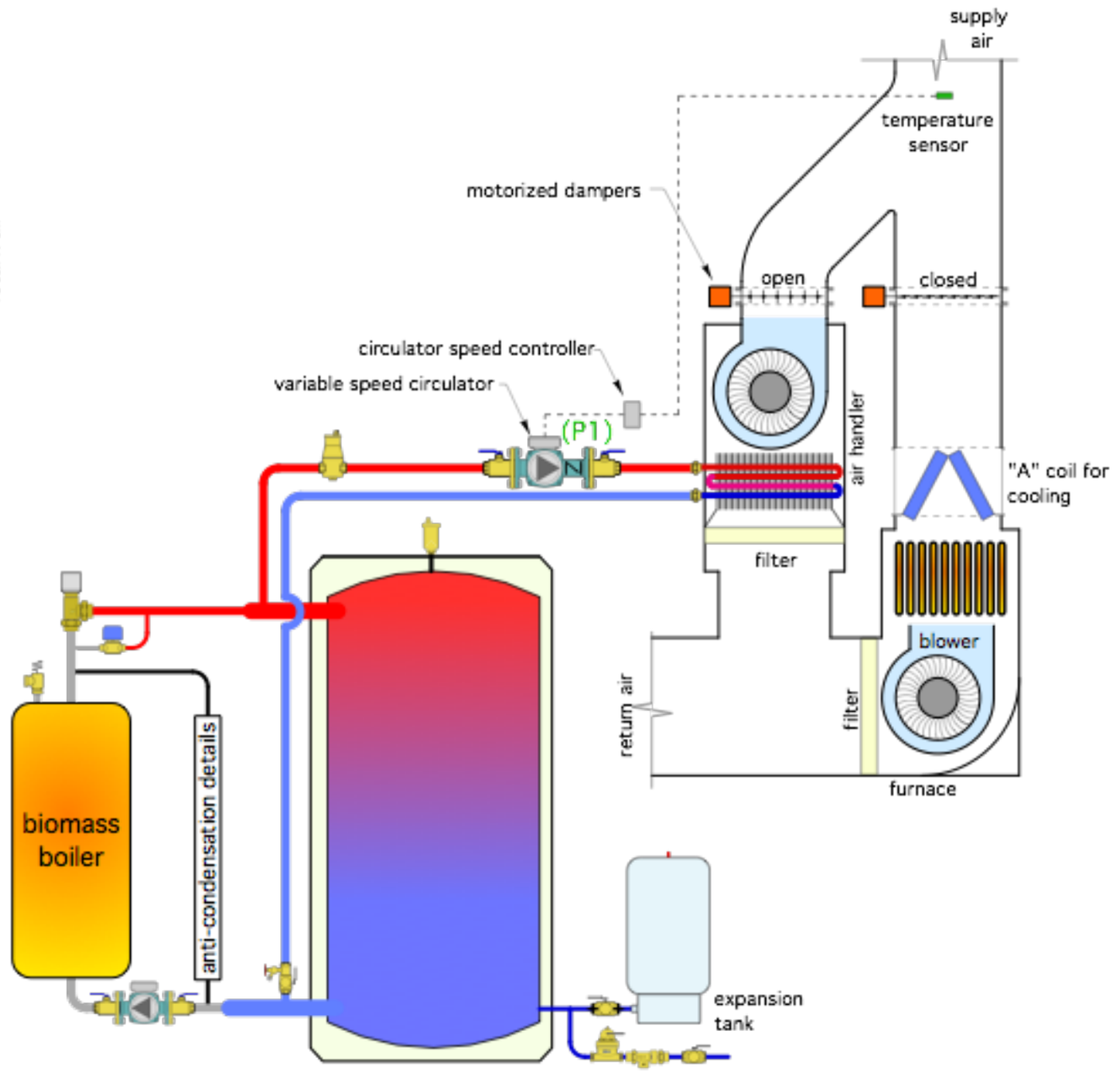
biomass boiler + thermal storage tank "heat source"



What's covered in the Design Assistance Manual?

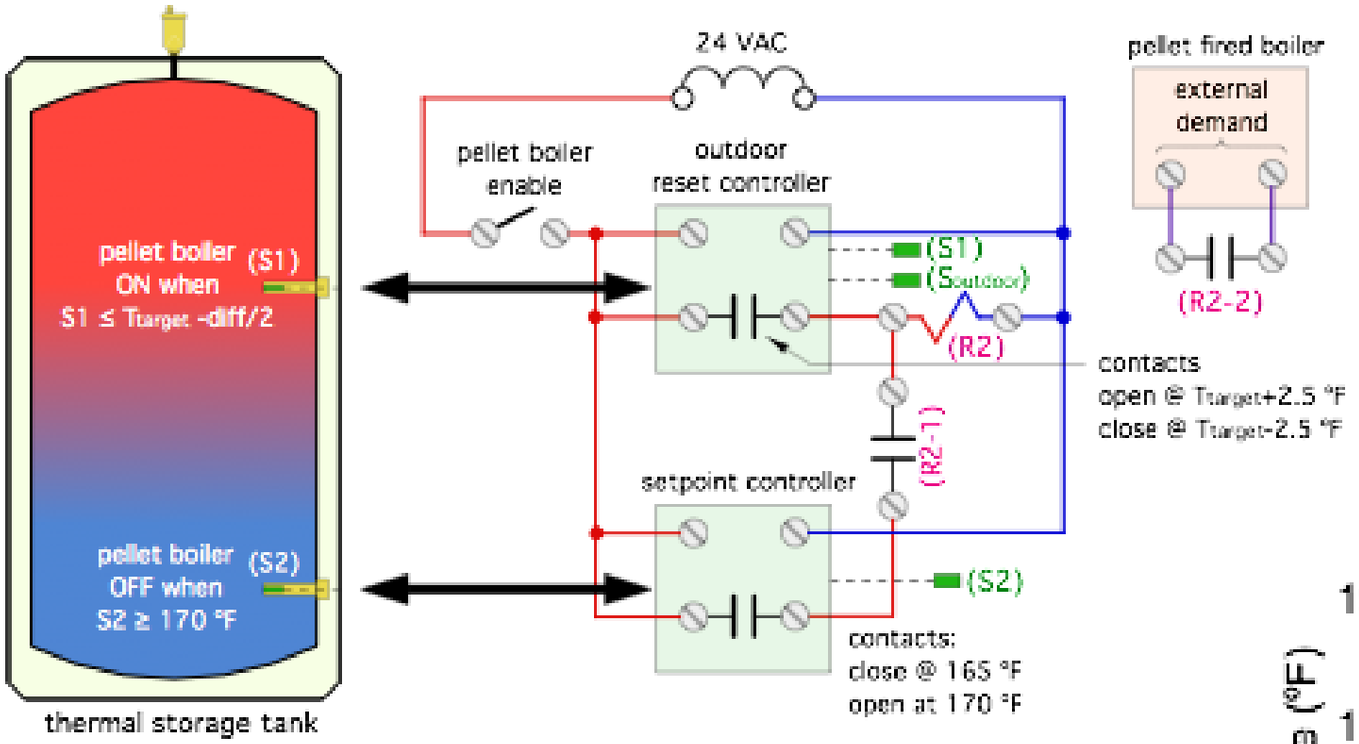
Pellet boiler interfaced to forced air system w/ furnace

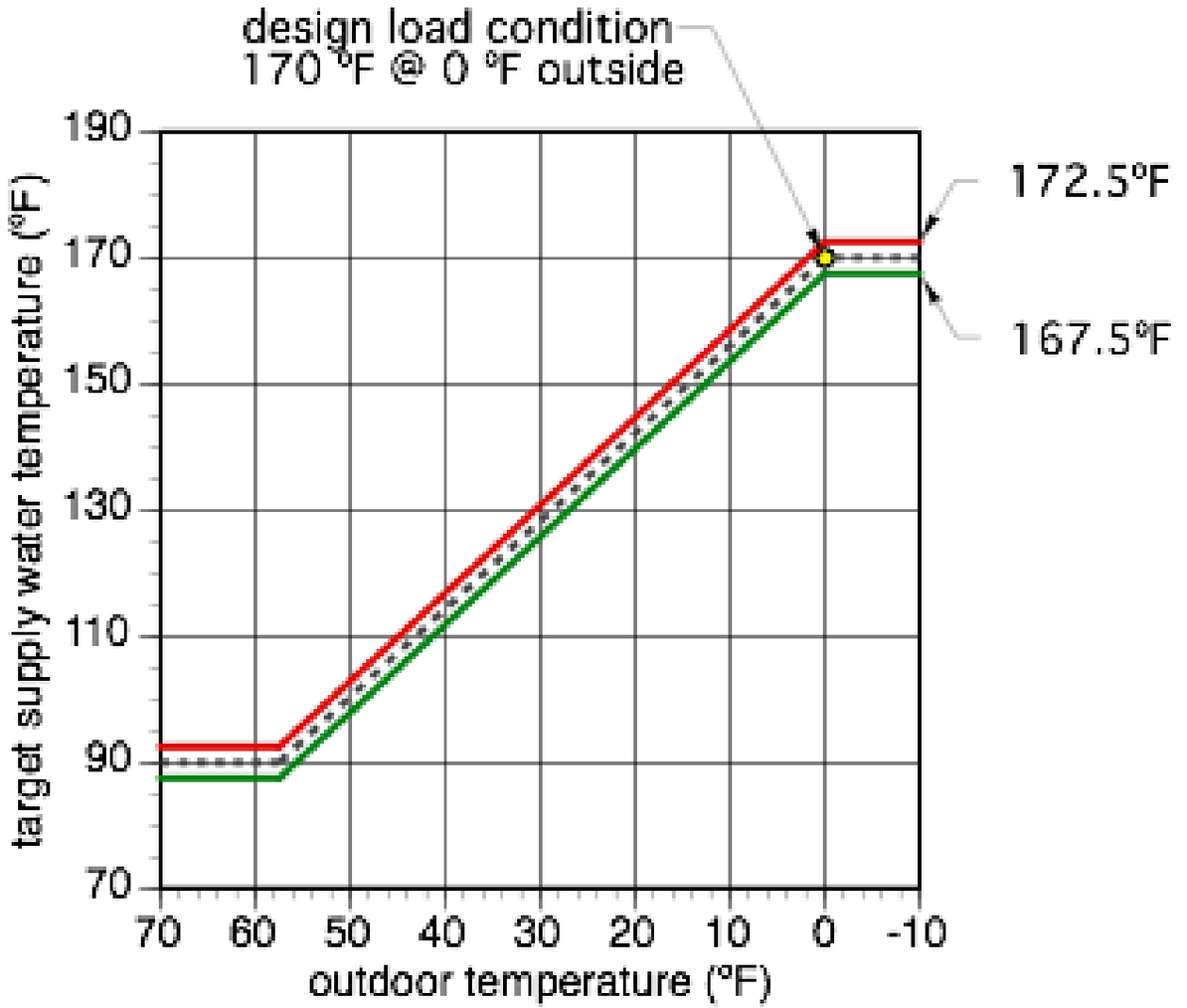




What's covered in the Design Assistance Manual?

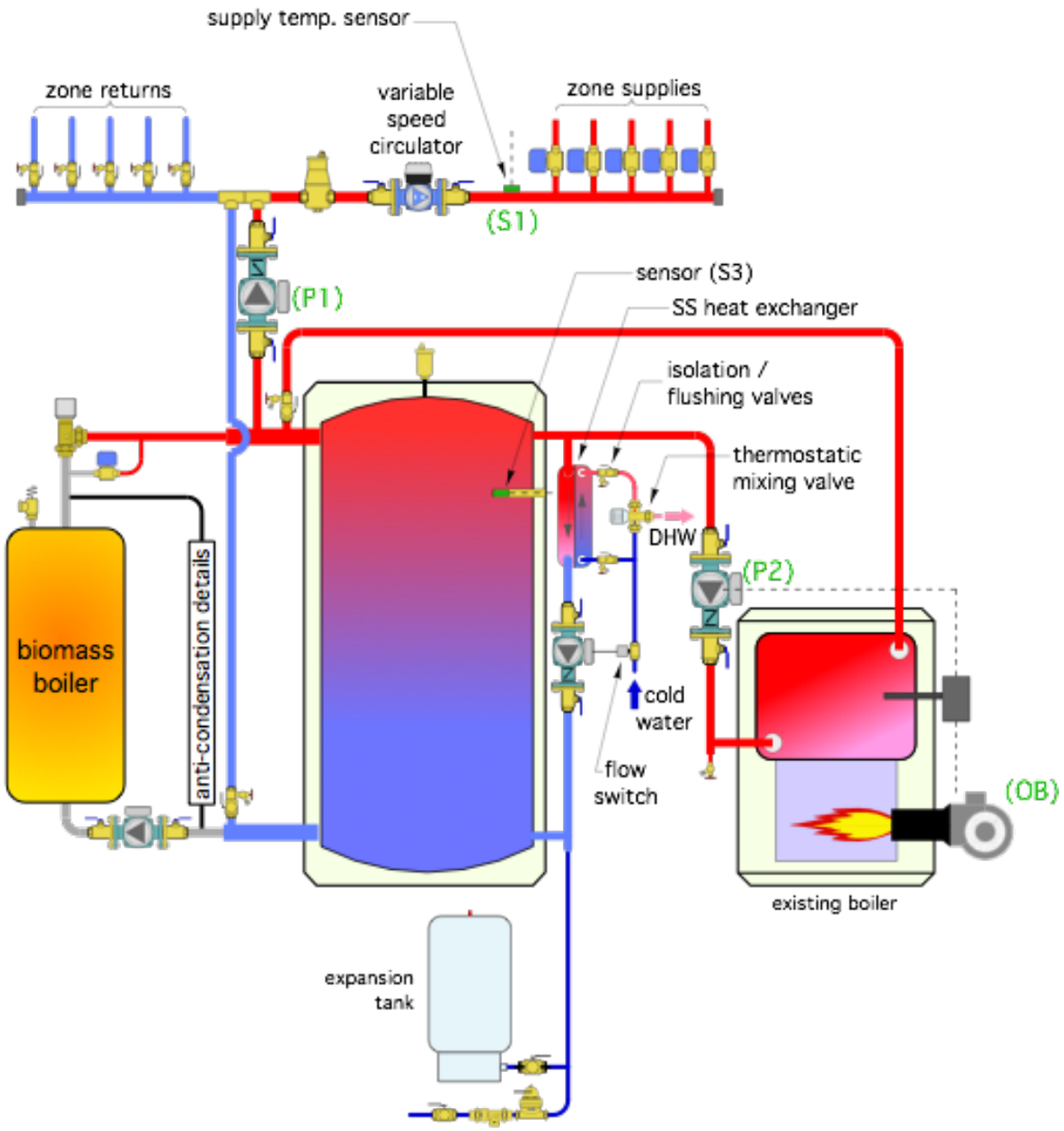
Temperature stacking control of pellet boiler

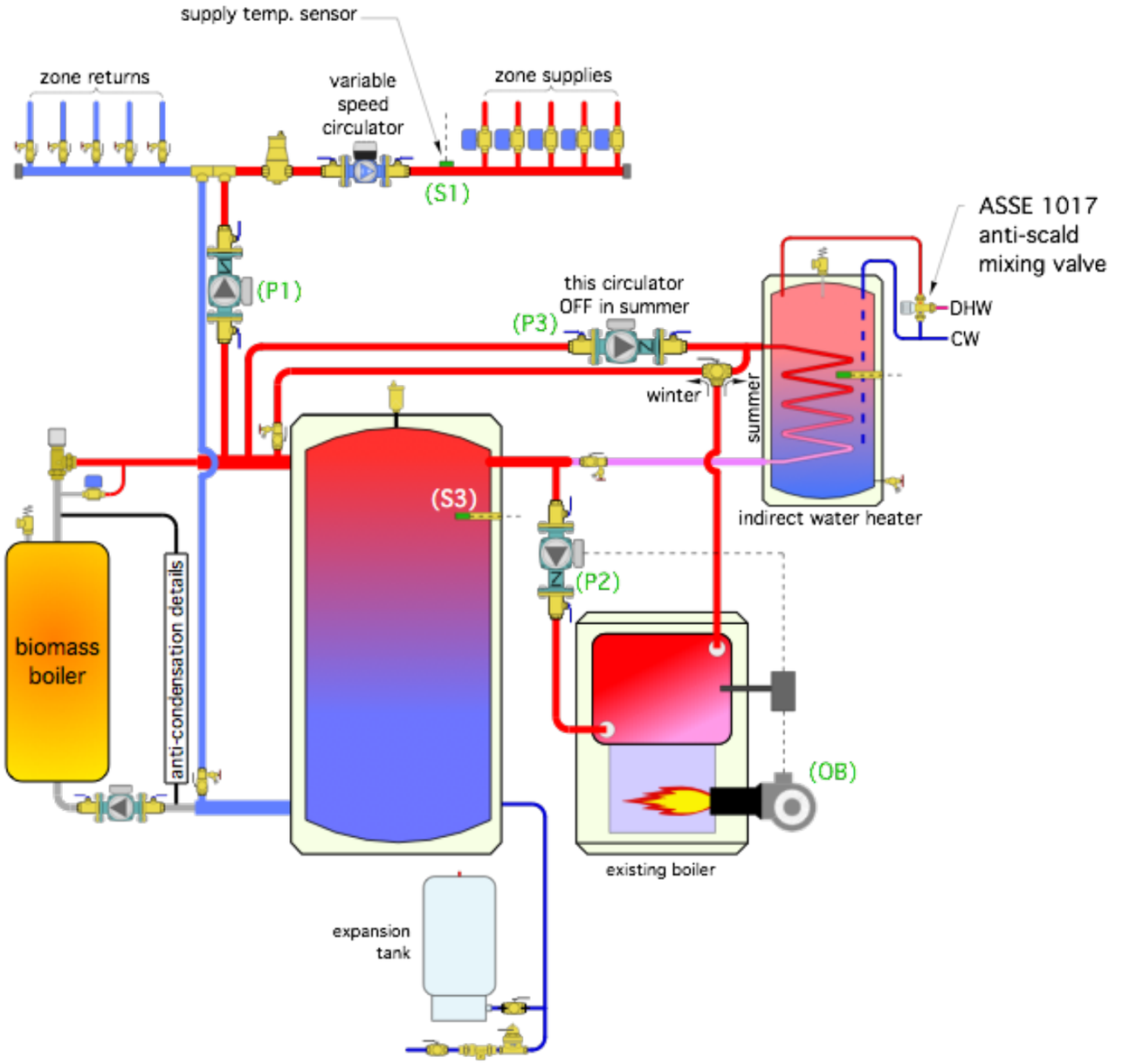




What's covered in the Design Assistance Manual?

Options for domestic water heating





SECTION 8: System templates 8 system configurations

- **System description**
- **Piping schematic**
- **Electrical schematic**
- **Description of operation**
- **Suggested initial control settings**

Templates serve as "**starting points**" for designers.

Templates integrate the details discussed in sections 1-7.

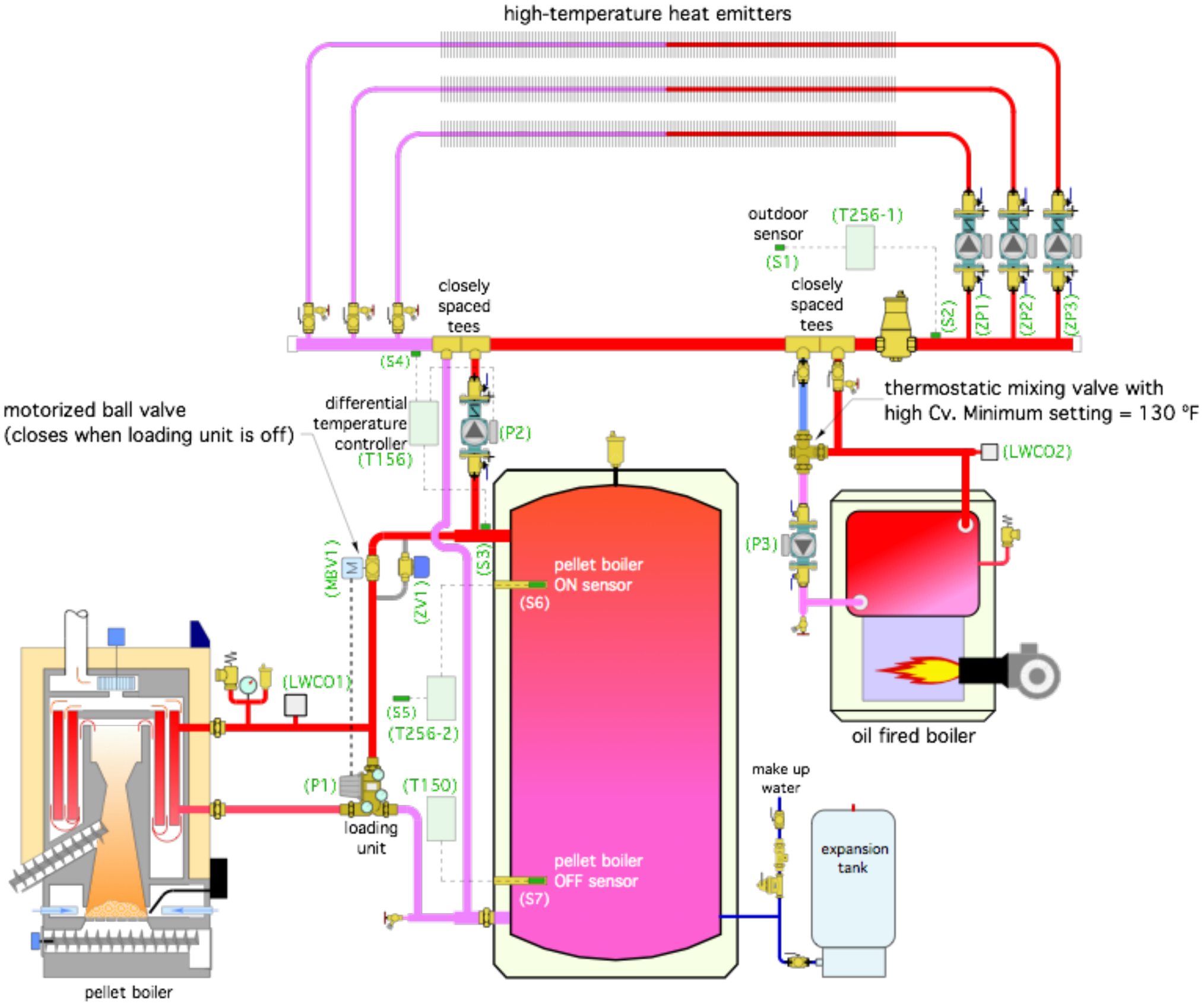
Piping, electrical, descriptions all cross-referenced.

Designers are responsible for component selection and sizing.

Template use a variety of subsystems:

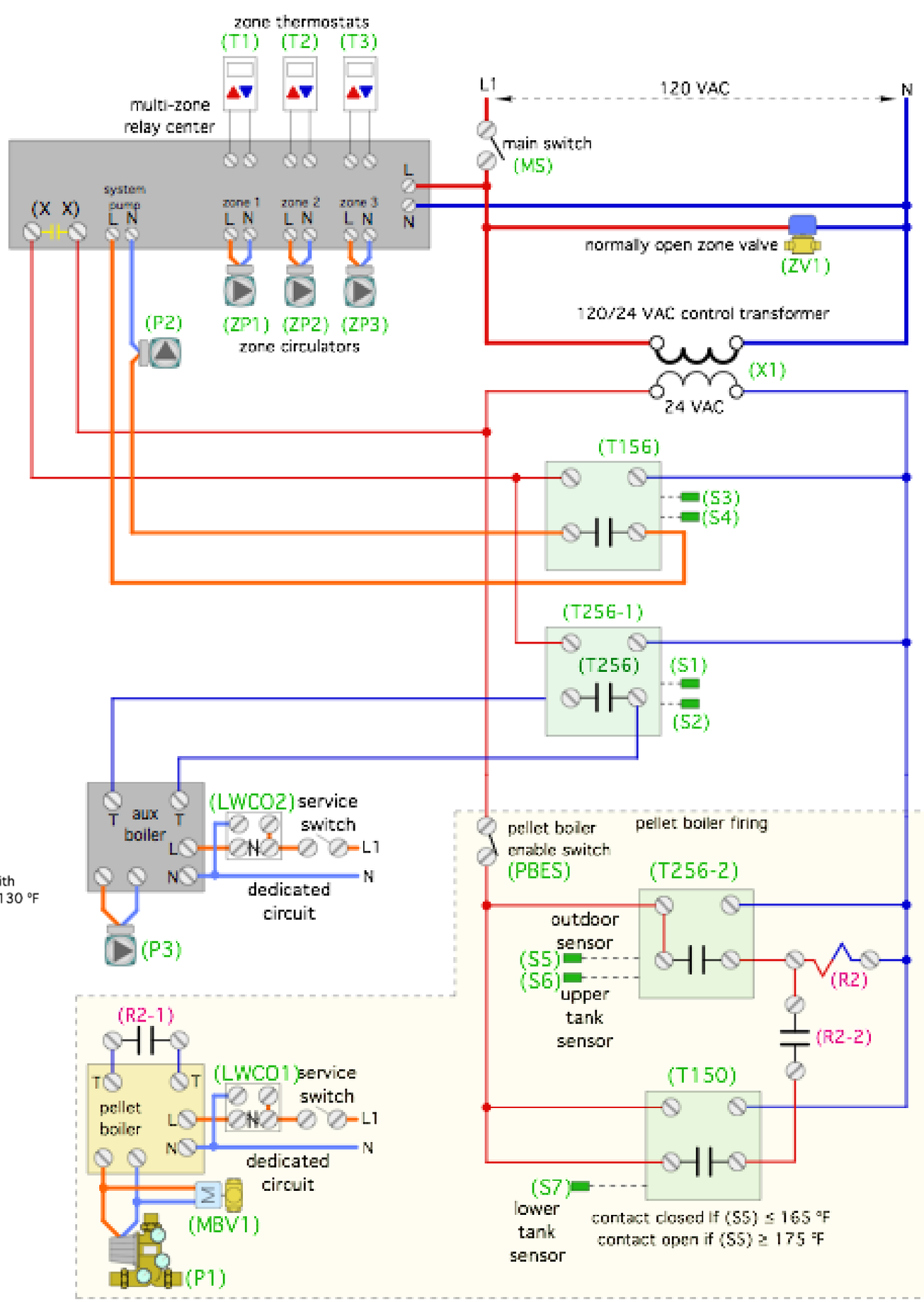
pellet / cordwood boilers
open/closed thermal storage
different heat emitters

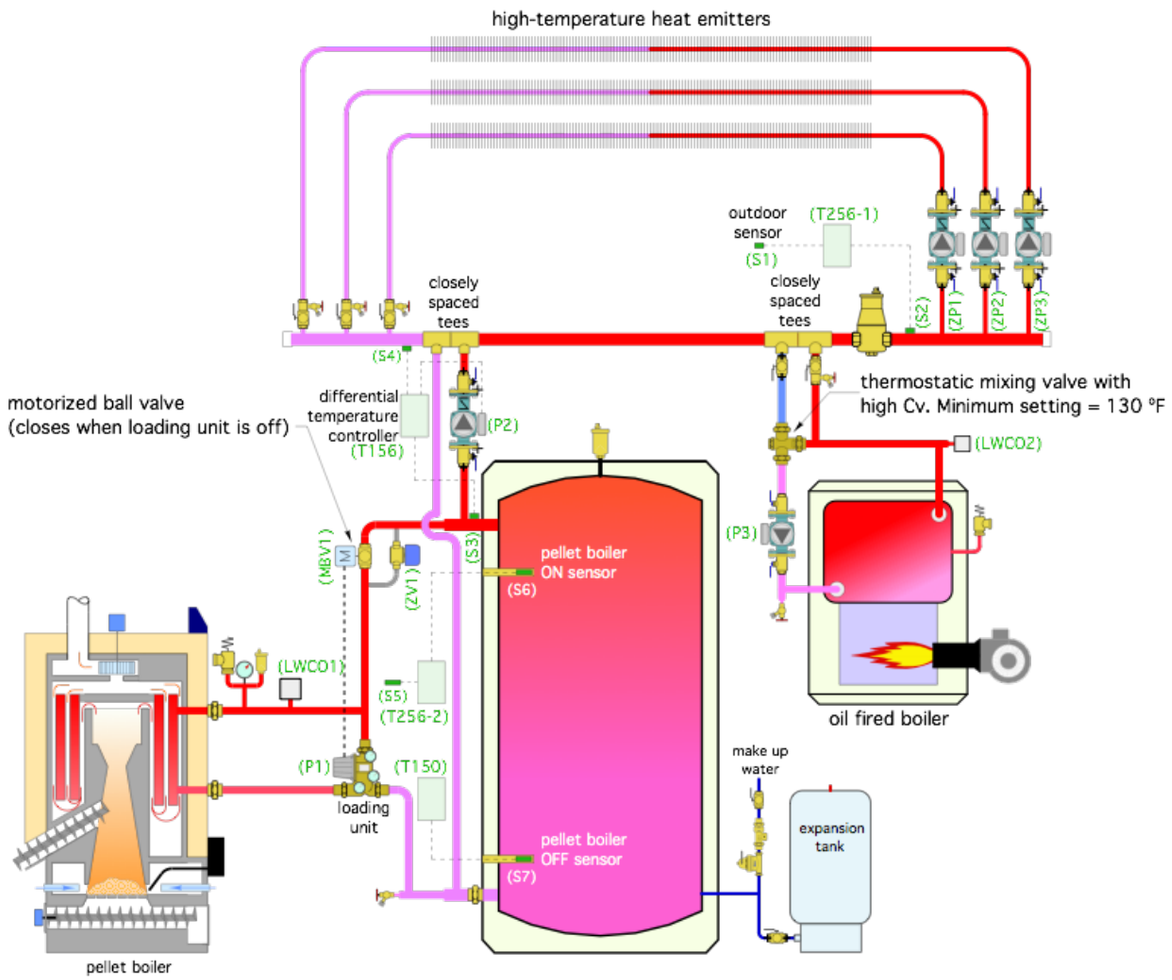
- Piping schematic



- Electrical schematic

Cross referencing between piping & electrical schematics





•Suggested initial controller settings

read later if you like

- T256-2 outdoor reset controller—monitors upper tank sensor (S6)
  - Outdoor design temperature = 0ºF
  - Supply water temperature at outdoor design temperature = 180ºF
  - Maximum supply water temperature = 180ºF
  - Minimum supply water temperature = 100ºF
  - Outdoor temperature at no-load condition = 70ºF
  - Supply water temperature at no-load condition = 70ºF
  - Differential = 8ºF (centered on target temperature)
- T256-1 outdoor reset controller—monitors supply temperature sensor for distribution system (S2)
  - Outdoor design temperature = 0ºF
  - Supply water temperature at outdoor design temperature = 180ºF
  - Maximum supply water temperature = 180ºF
  - Minimum supply water temperature = 100ºF
  - Outdoor temperature at no-load condition = 70ºF
  - Supply water temperature at no-load condition = 70ºF
  - Differential = 20ºF (centered on target temperature)
- T150 setpoint controller—monitors lower tank temperature sensor (S7)
  - Setpoint = 170ºF
  - Differential = 10ºF (centered on target temperature)
- T156 differential temperature controller
  - Contacts close if high-temperature sensor ≥ 5ºF above low-temperature sensor
  - Contacts open if high-temperature sensor ≤ 3ºF above low-temperature sensor
- Pellet Boiler high-limit temperature = 200ºF
- Oil-fired boiler high-limit temperature = 200ºF
- Oil-fired boiler differential = 5ºF (below target temperature)

•Description of operation

read later if you like

Power supply: Power for the pellet boiler is 120 VAC and supplied from a dedicated circuit. The service switch for the pellet boiler must be closed, and the low-water cutoff (LWCO1) must detect water for the pe

Power for the auxiliary boiler is 120 VAC and supplied from a dedicated circuit. The service switch for the auxiliary boiler must be closed, and the low-water cutoff (LWCO2) must detect water for the auxiliary boi

Power for the zone circulators (ZP1, ZP2, ZP3), 24 VAC transformer, normally open zone valve (ZV1), and controllers (T156, T256-1, T256-2, T150) is supplied through another 120 VAC dedicated circuit. The r

Pellet boiler operation: The pellet boiler enable switch must be closed for the pellet boiler to operate. This switch would typically be closed at the start of the heating season and opened at the end of the seaso
on. The target temperature for this controller is shown on the graph in Figure 8-1c. When the temperature at the upper tank sensor (S6) drops to 4ºF below the target temperature, the normally open contacts in
the (T256-2) controller close. This passes 24 VAC to the coil of relay (R2). Relay contact R2-1 closes across the external demand terminal of the pellet boiler. The pellet boiler initiates is startup sequence. After
pellet boiler and thermal storage tank. Relay contact (R2-2) also closes. 24 VAC passes through the closed contacts of the setpoint controller (T150) and through the closed contacts (R2-2) to provide another pa
4ºF above the target temperature, the contacts in the outdoor reset controller (T256-2) open. However,
24 VAC continues to pass through the closed contacts in controller (T150) and closed contacts (R2-2) until the lower tank sensor (S7) reaches 175ºF. At that point, the contacts in setpoint controller (T150) open

The pellet boiler is equipped with a loading unit (P1) which contains a thermostatic mixing valve that recirculates water through the pellet boiler when necessary to allow the temperature of the pellet boiler
to quickly climb above the dewpoint of the exhaust gases and thus avoid sustained flue gas condensation.

During a power outage, the normally open zone valve (ZV1) opens to allow an unblocked thermosiphon piping path between the pellet boiler and thermal storage tank. A thermosiphon flow will occur that dissipa

If the pellet boiler switch (PBES) is opened, such as at the end of the space heating season, the pellet boiler, its associated controllers, and its circulator (P1) will not operate.

Distribution system: On a call for heating from any zone thermostat (T1, T2, T3), the associated zone circulator (ZP1, ZP2, ZP3) is turned on. The “system pump” terminals in the multizone relay center also ar
close. This allows 120 VAC to reach circulator (P2) to inject heat from the upper tank header into the distribution system.

The (T256-1) controller measures outdoor temperature at sensor (S1) and calculates a target supply water temperature for the distribution system. This is the same target temperature calculated by controller
(T256-2). If the temperature of the water passing sensor (S2) on the supply side of the distribution system
is 10ºF or more below the target supply water temperature the contacts in the (T256-1) controller close across the terminals (T T) of the auxiliary boiler enabling it and circulator (P3) to operate. Heat from the oil-
open, turning off circulator (P2). Heat from the oil-fired boiler continues to flow into the distribution system until the supply water temperature reaches 10ºF above the target temperature. At that point,
the oil-fired boiler and circulator (P3) turn off. Assuming the heating demand from one or more zones continues, the water temperature at sensor (S2) will eventually drop to 10ºF below the target temperature,
at which time the oil-fired boiler and circulator (P3) will turn on. Note: The high limit controller on the oil-fired boiler should be set relatively high (200 ºF suggested) so that it will not interfere with operation of the

Thanks for attending today's webinar

Upcoming RHNY training opportunities

Full day Training Workshops:

Hydronics for High Efficiency Biomass Boiler Systems
April 25, 2019, Jamestown Community College, Jamestown, NY
7.0 AIA / PDH continuing education credits
link posted at Renewable Heat NY website

Hydronics for High Efficiency Biomass Boiler Systems
October, 2019, Ray Brook, NY
7.0 AIA / PDH continuing education credits
TENTATIVE: Watch for link to be posted at Renewable Heat NY website

https://www.nyserda.ny.gov/All-Programs/Programs/Renewable-Heat-NY

Webinars:

May 14, 2019 1:00 PM
Title: *Simplified method for controlling heat delivery from biomass boilers and auxiliary boilers.*

Additional trainings & webinars will be scheduled for 2019 & 2020

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QUESTIONS ?