Operating Engineers Seminar 2020

Building Care & Energy Savings

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Presenters

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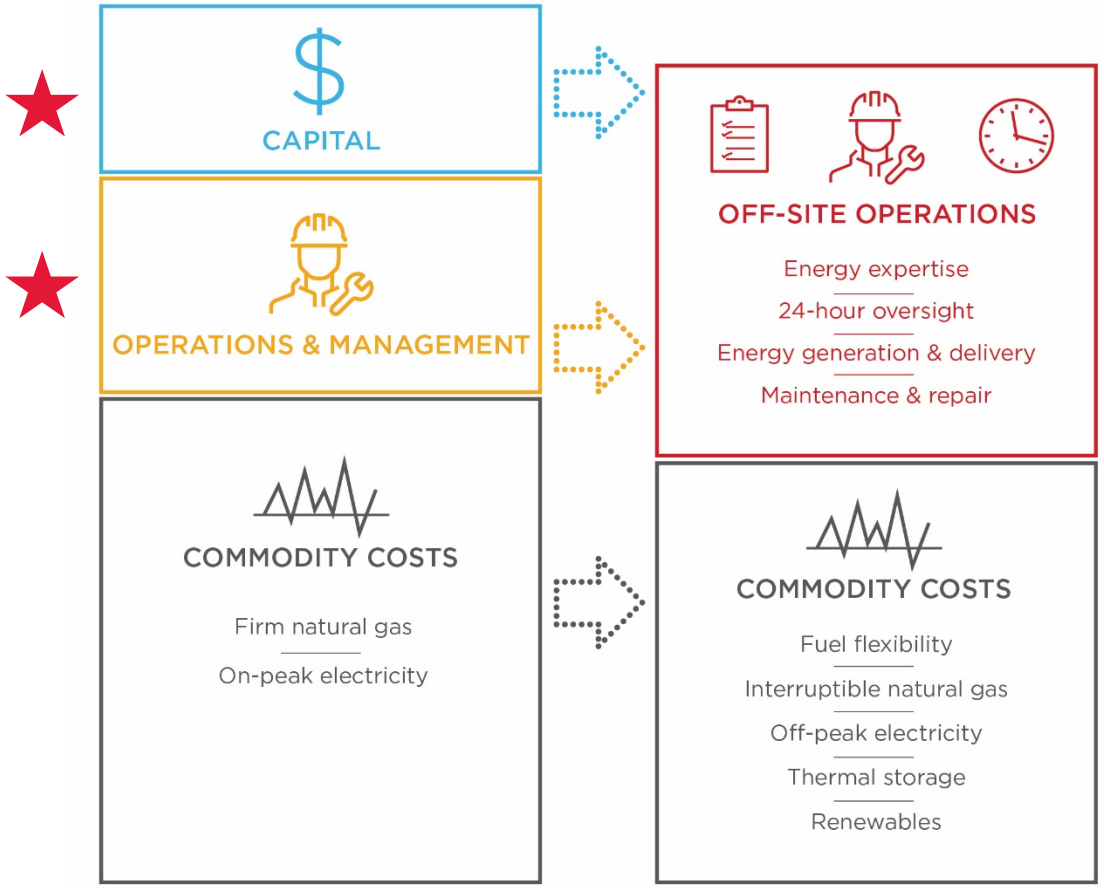
Overview

- How building energy use translates to costs
- How to access data about your energy use
- Customer resources
- Questions and answers
- Raffle
- 12 – 12:30 PM Optional question and answer time with the District Energy team

How building energy use translates to costs

Energy budget on-site vs District Energy



- Reliability rate of 99.99%
- Stable Rates
- Simplified operations
- Less mechanical space required
- Customer-driven nonprofit partner
- Flexible energy sources
- Sustainable solutions

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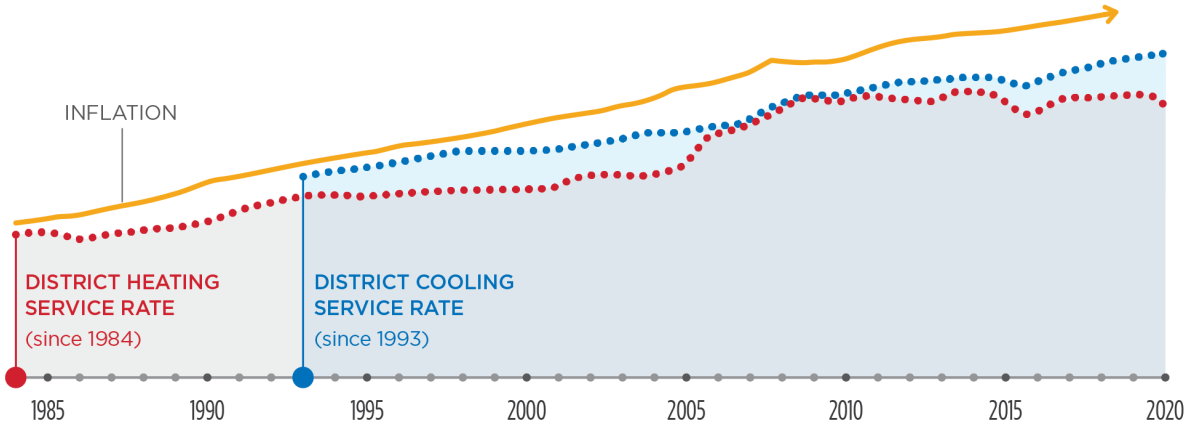
37 years or rate stability



- Rates are cost based
- When adjusted for inflation, District Energy customers are paying less for services today than when the system started.
- $800,000 in rebates to cooling customers since 2016.

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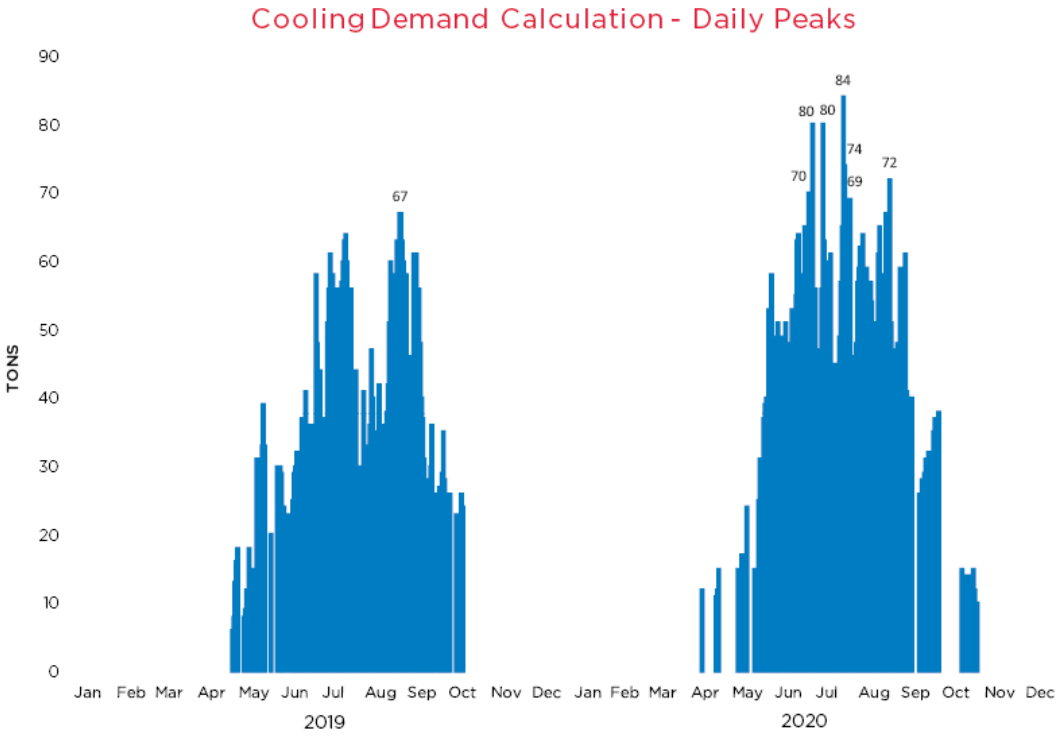
Rates – the basics

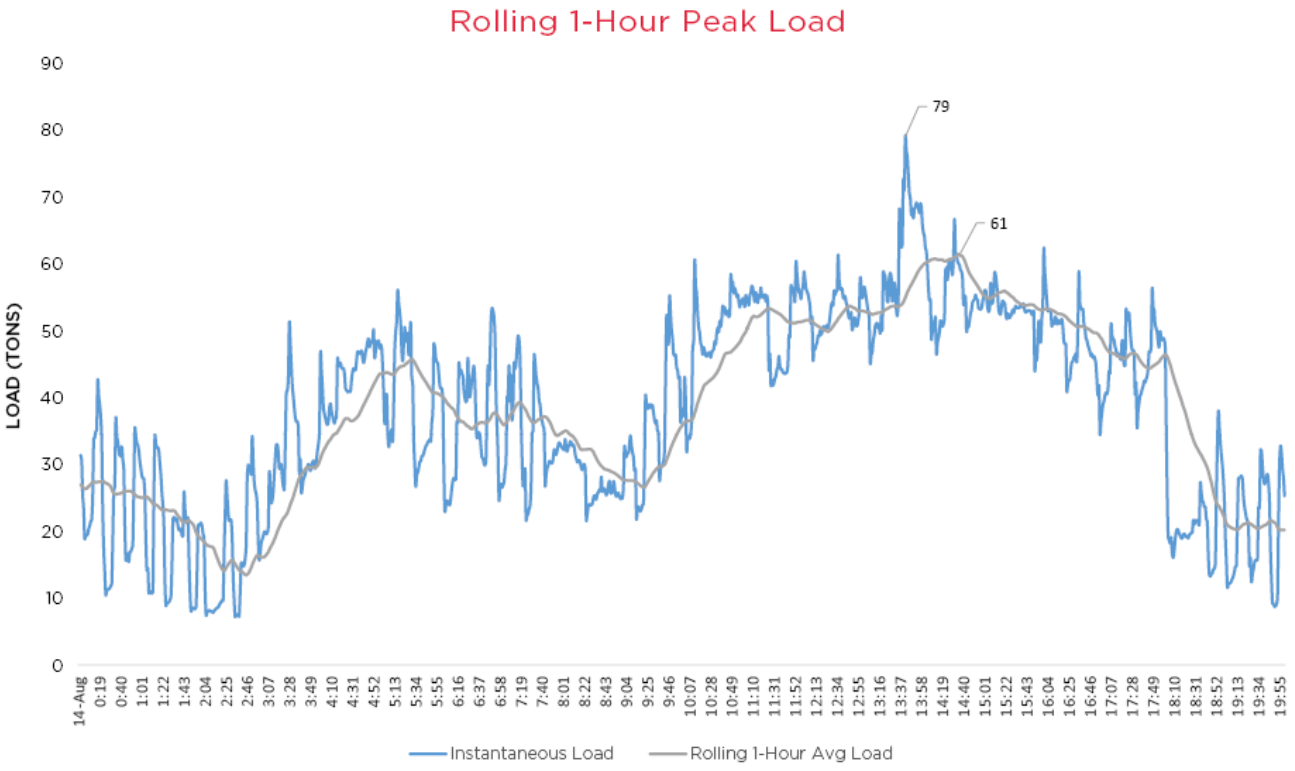
- District Energy use a two part rate structure with energy and demand as the primary two components
  - Total Costs = Energy + Demand + Surcharges + City Fee + Sales Tax

- Energy = (Flow) * (Supply Temp – Return Temp) * Conversion Factor
  - **Hot water energy** is measured in **Megawatt-hours (MWh).**
  - **Chilled water energy** is measured in **Ton-hours**.

- Demand – 12 equal monthly installments throughout fiscal year
  - **Hot water demand** is measured in **Kilowatts (kW)**.
  - **Chilled water demand** is measured in **Tons**.

Cooling demand – what you can control





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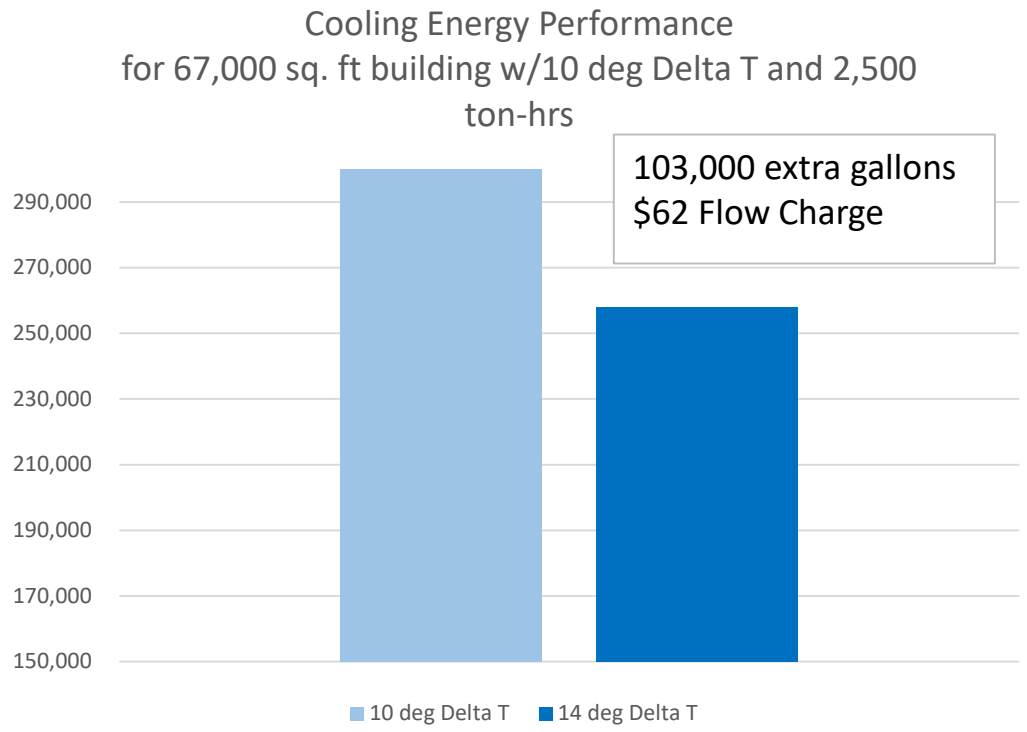
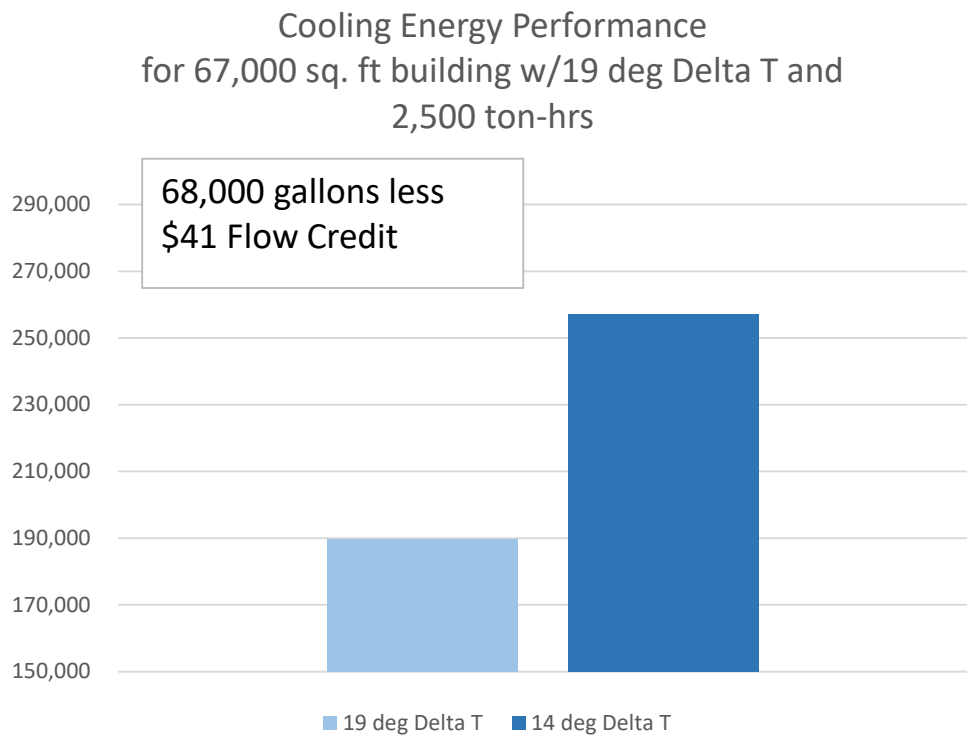
Cooling Delta T – what you can control

- Aim for Delta T 14 °F or higher





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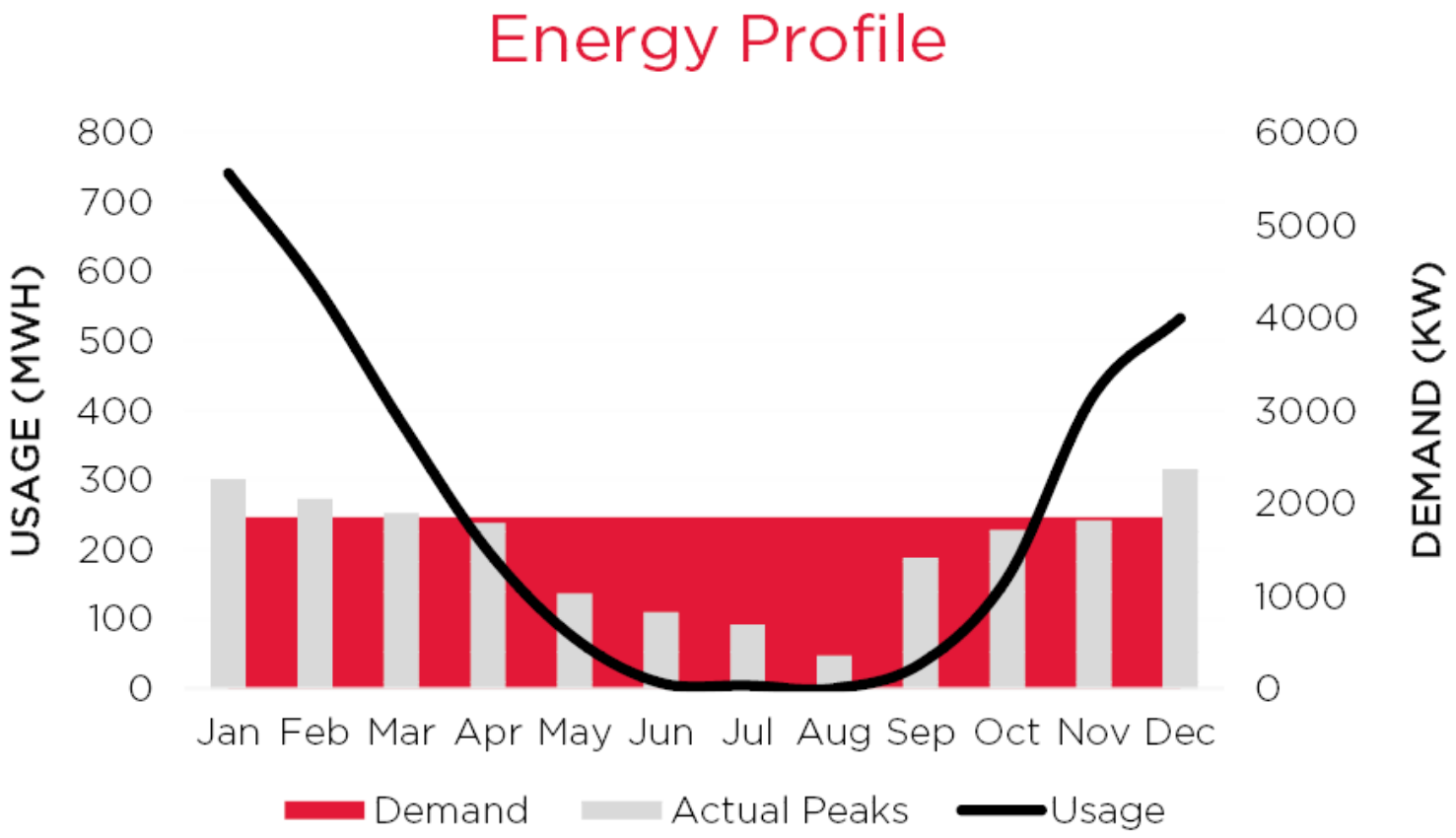
Heating demand – what you can control



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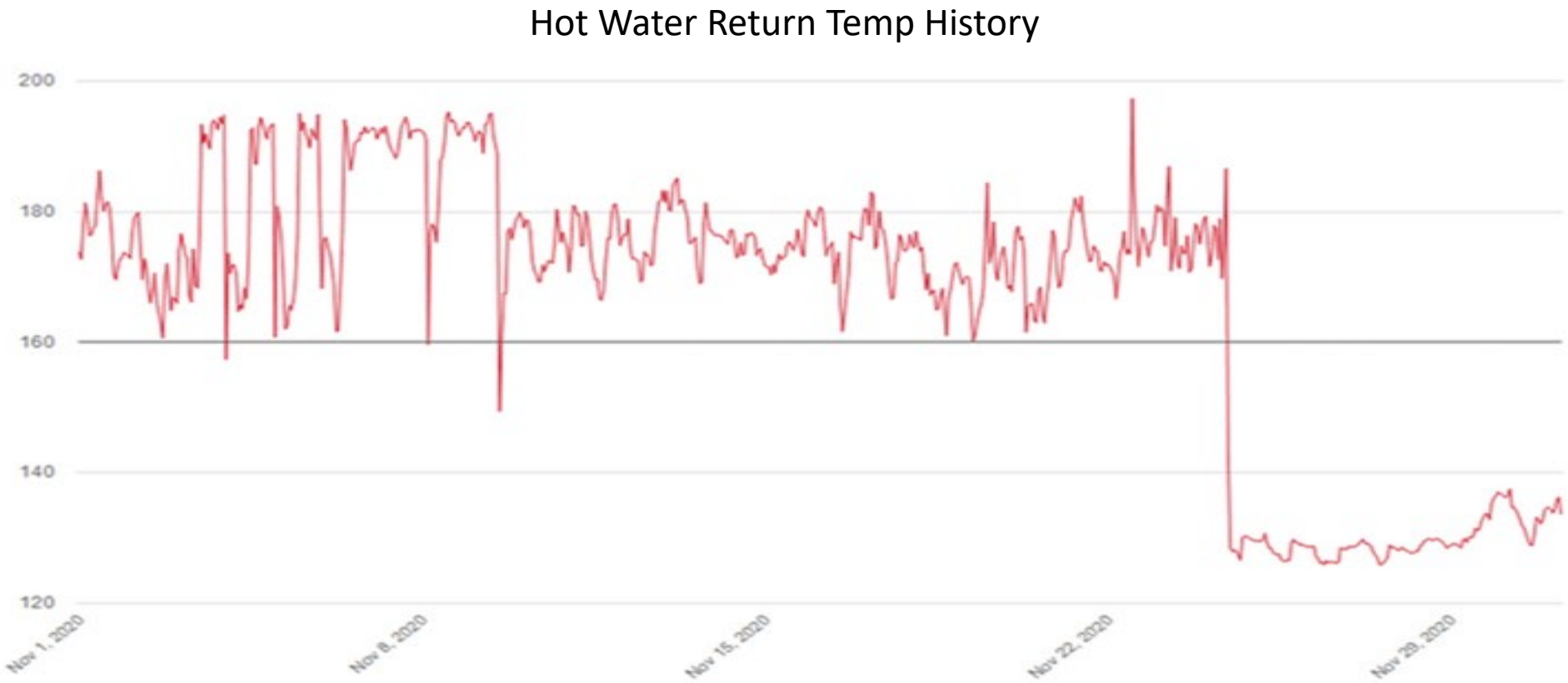
Heating return temp – what you can control

- Aim for hot water return temperature at or below 160 °F



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How to access data about your energy use

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Your meter is your friend

- Real time confirmation
- Flow, temp, energy; NOTE Cubic M/hr*4.4 = GPM
- Alerts and failures

- To reset this message press the “Enter” button

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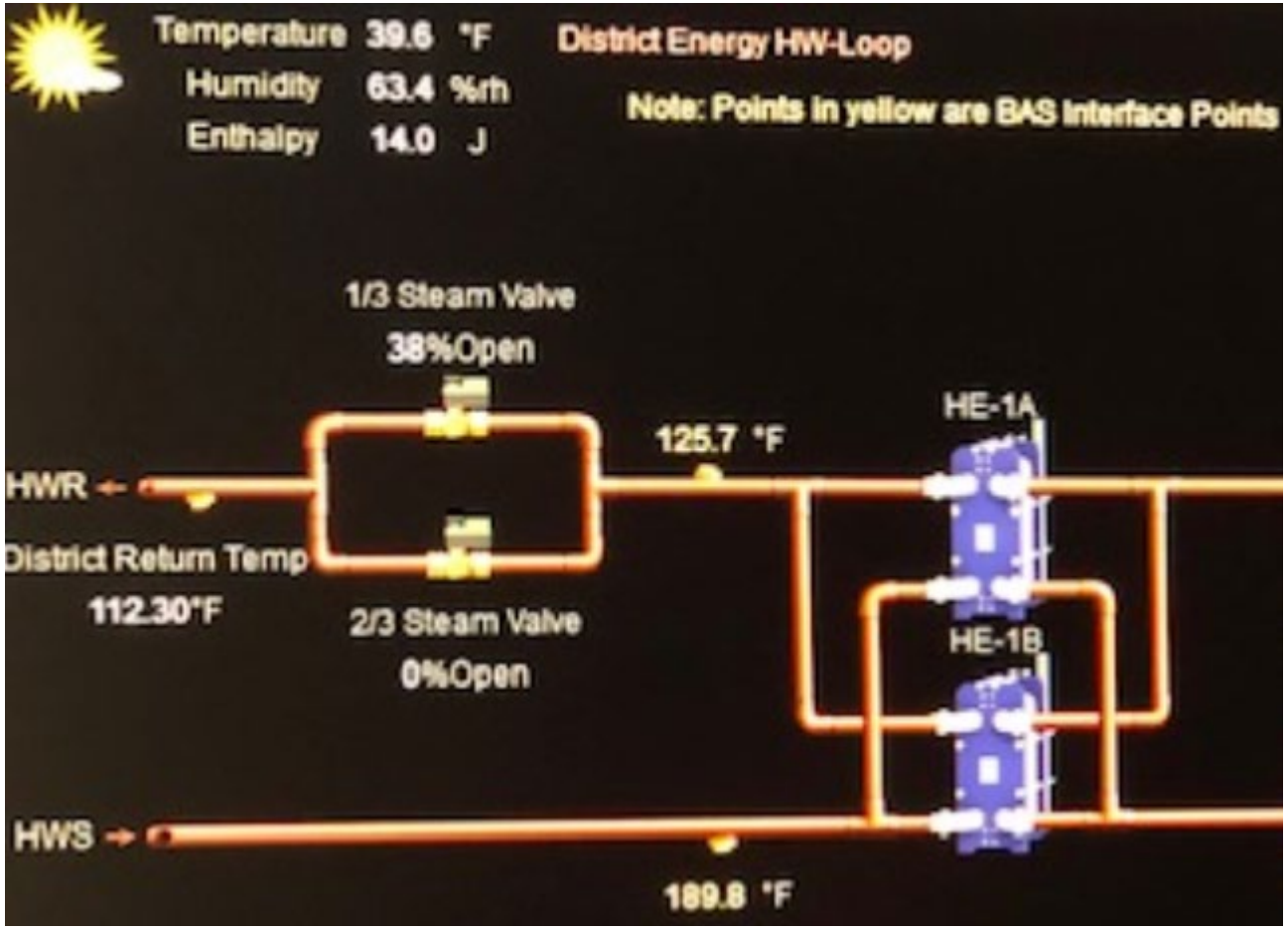
Integrating data points into your BAS

- Two (2) 4-20 mA points exist on each meter.
- Connection allows for local trending and alarms
- No cost for integration



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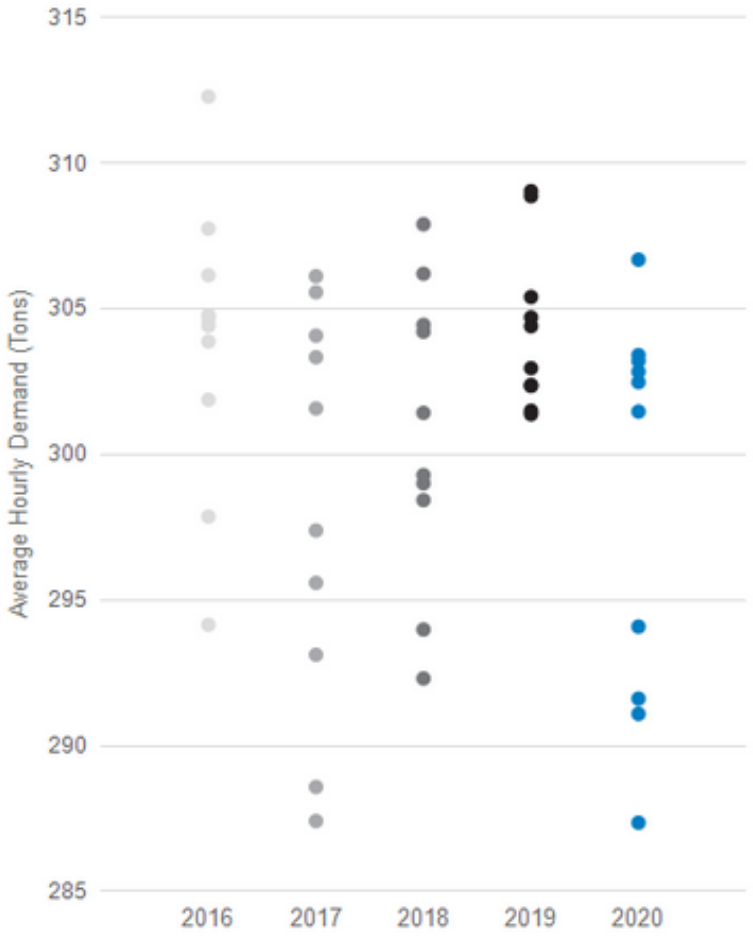
Customized building energy reports

Summer Cooling Peaks History



	2016		2017		2018		2019		2020	
1	Jul 21	312	Jul 17	306	Jul 12	308	Jul 19	309	Aug 25	307
2	Jul 20	308	Sep 22	306	Jun 29	306	Jul 15	309	Jul 18	303
3	Aug 3	306	Jul 5	304	Jul 11	304	Aug 5	305	Jul 24	303
4	Aug 10	305	Jul 12	303	Jun 30	304	Jul 16	305	Jul 8	303
5	Jul 11	305	Jul 6	302	Aug 13	301	Jul 18	304	Aug 26	302
6	Aug 2	304	Jun 13	297	Jul 9	299	Jul 3	303	Jul 17	301
7	Aug 9	304	Jul 18	296	Aug 8	299	Jul 26	302	Jul 2	294
8	Jul 19	302	Jul 20	293	Jun 15	298	Jul 17	302	Jul 7	292
9	Jul 26	298	Jun 10	289	Jun 17	294	Sep 19	301	Jul 25	291
10	Aug 29	294	Sep 14	287	Aug 14	292	Sep 20	301	Aug 21	287

What is Trending?

- Historical peaks
- Monthly energy
- Temperature
- Budget against actual

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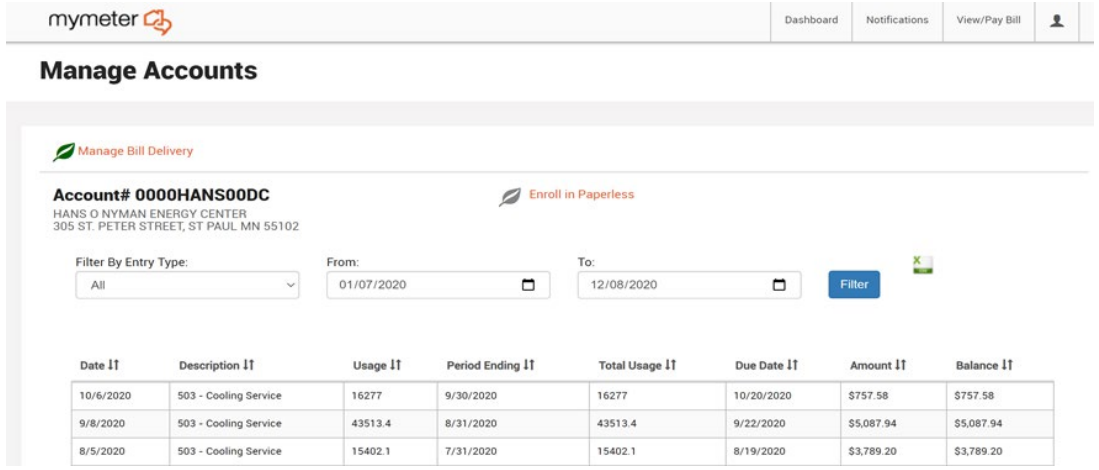
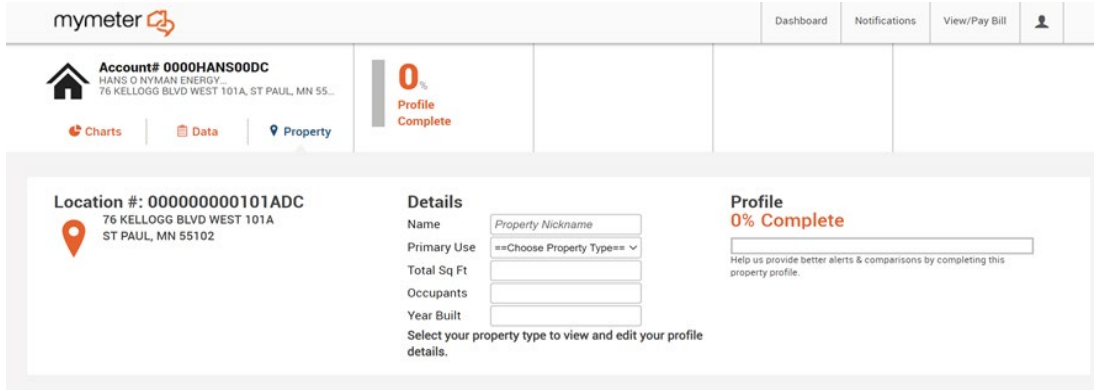
Future customer portal

- What?
  - Access to near real-time usage and past billing information 24/7
- When?
  - Currently targeting March 1, 2021 for full customer rollout
- Why?
  - Get data in the hands of the end user to inform and ultimately improve efficiency





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City's benchmarking requirement

- 100,000 square feet and larger by June 1, 2020
- 50,000 - 99,999 square feet by June 1, 2021
- Request District Energy spreadsheet to upload to Energy Star (until Customer Portal is online)

Energize Saint Paul

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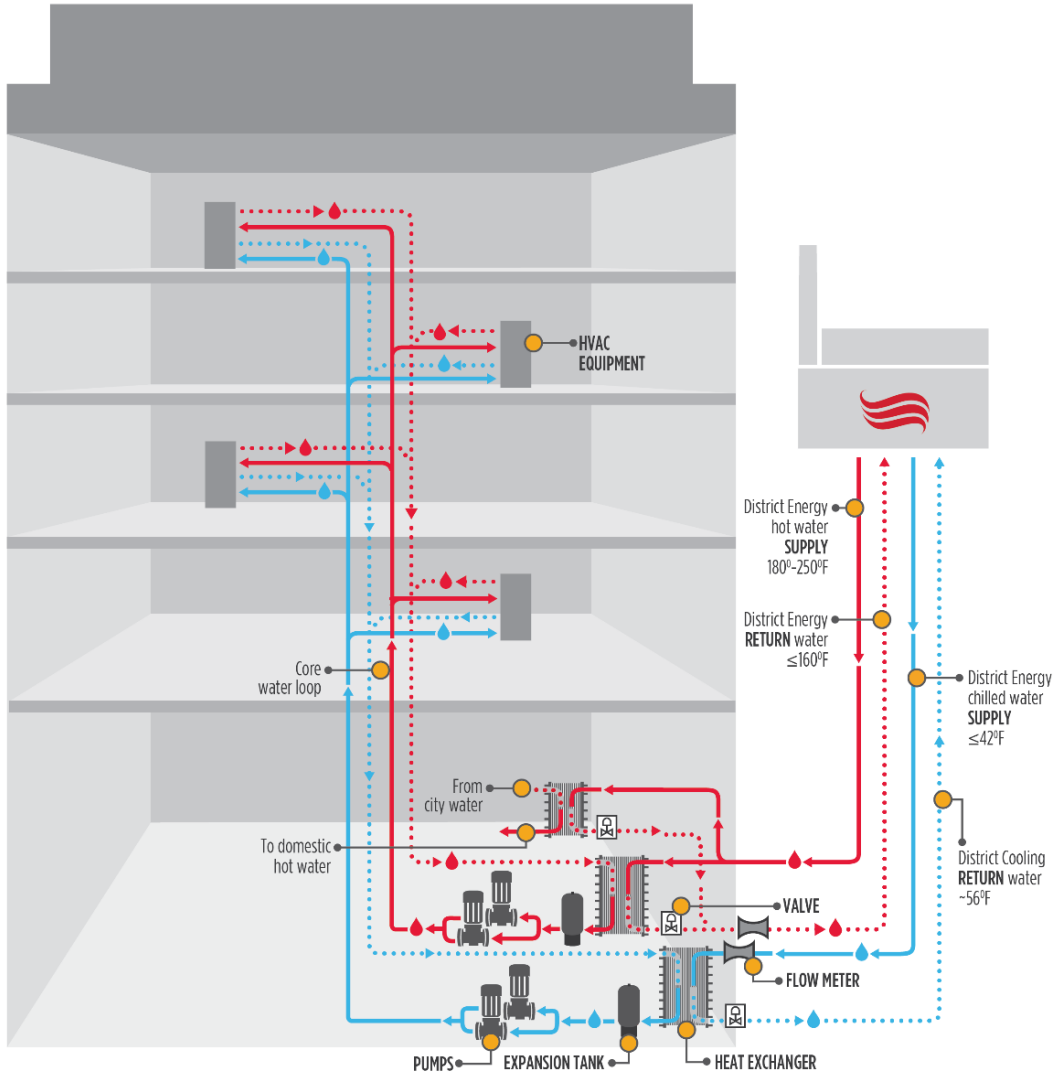
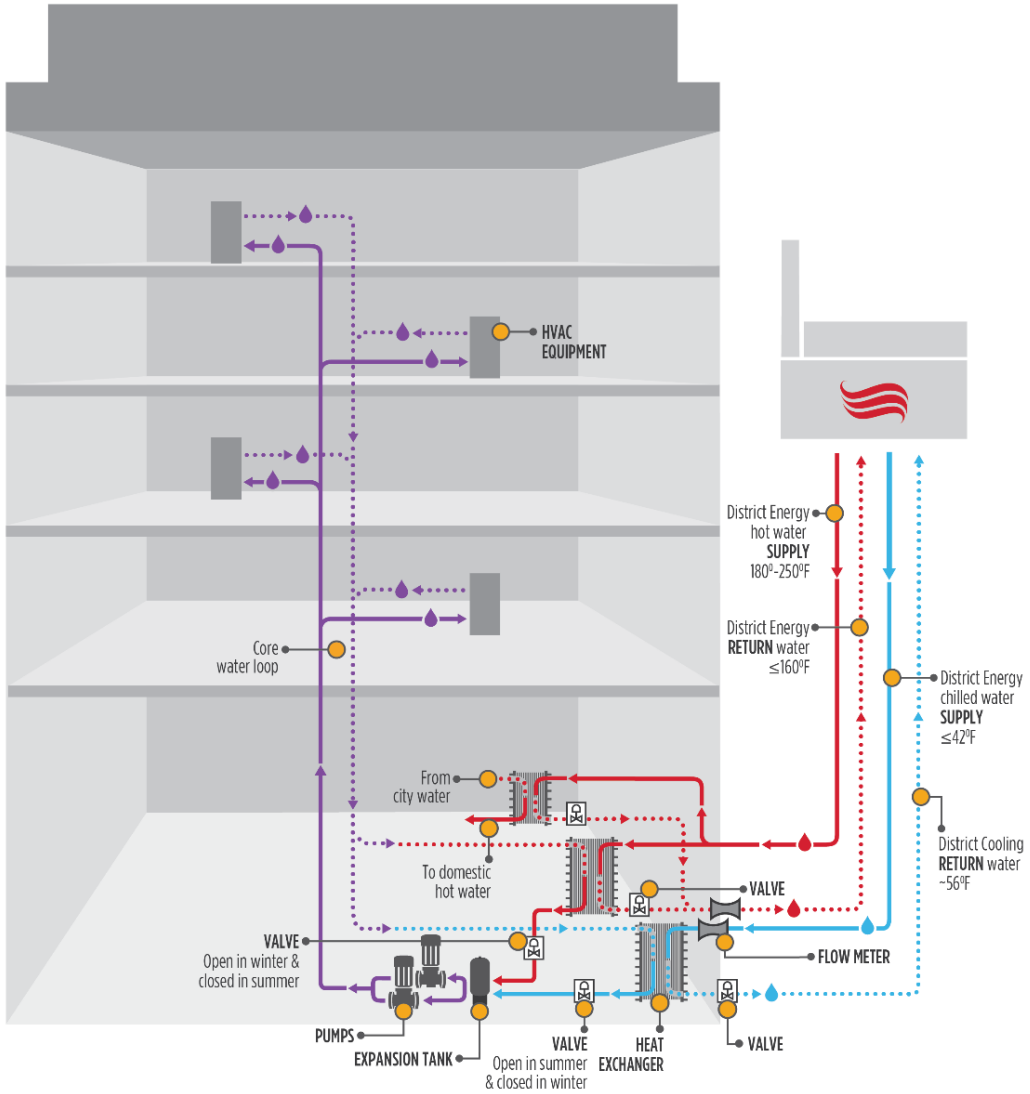
Customer resources

We can help you save

- Add our experts to your projects
  - Knowledge and advice to integrate project with your service connection
  - Support to avoid issues that can result in additional costs and downtime
- Improve your cooling Delta T or hot water return temperature
- Building Walk-Throughs – Invite the District Energy team to evaluate your building for savings opportunities
- There are financing programs available for energy efficiency projects, including District Energy programs

Customer mechanical interface and metering





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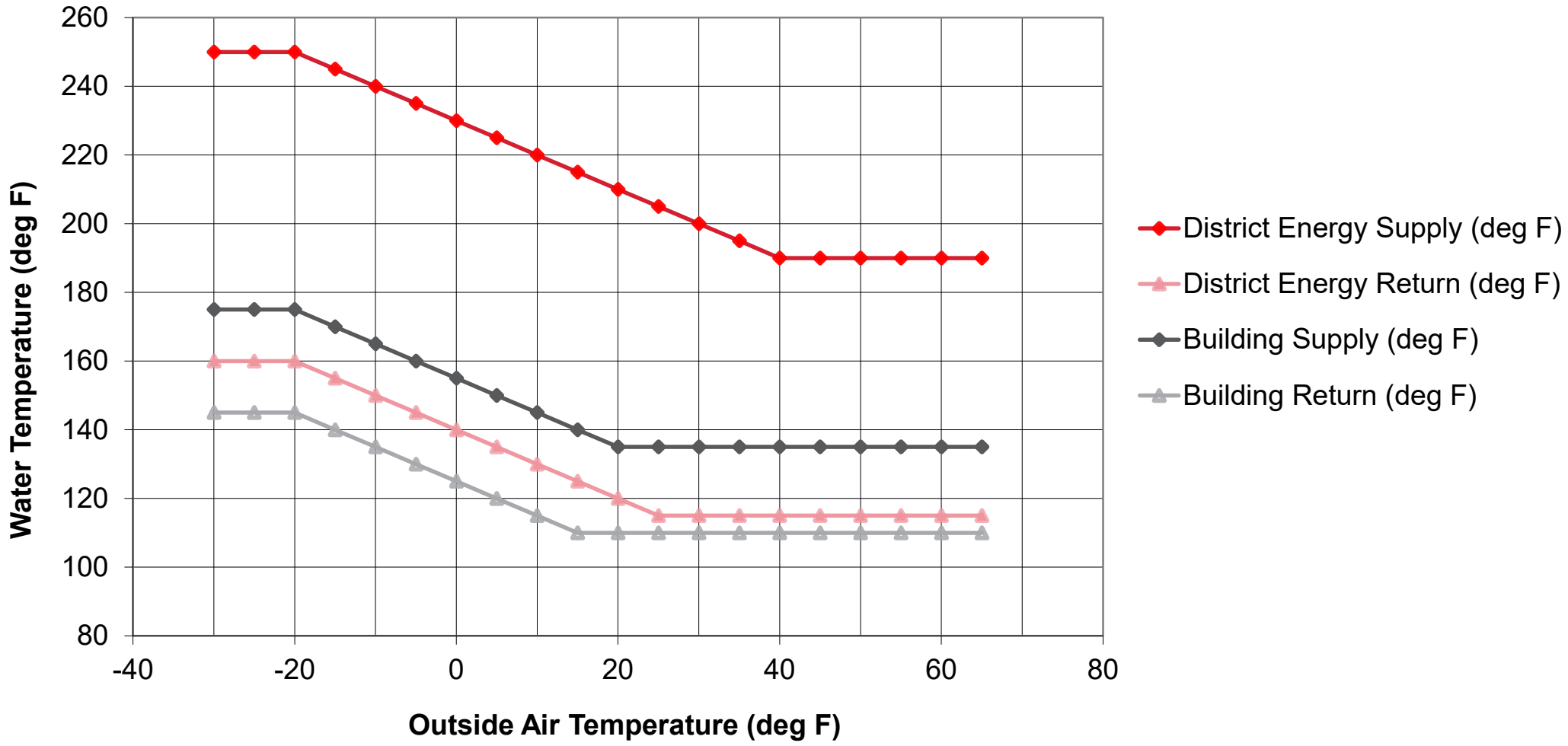
Reset schedule with desired return temp



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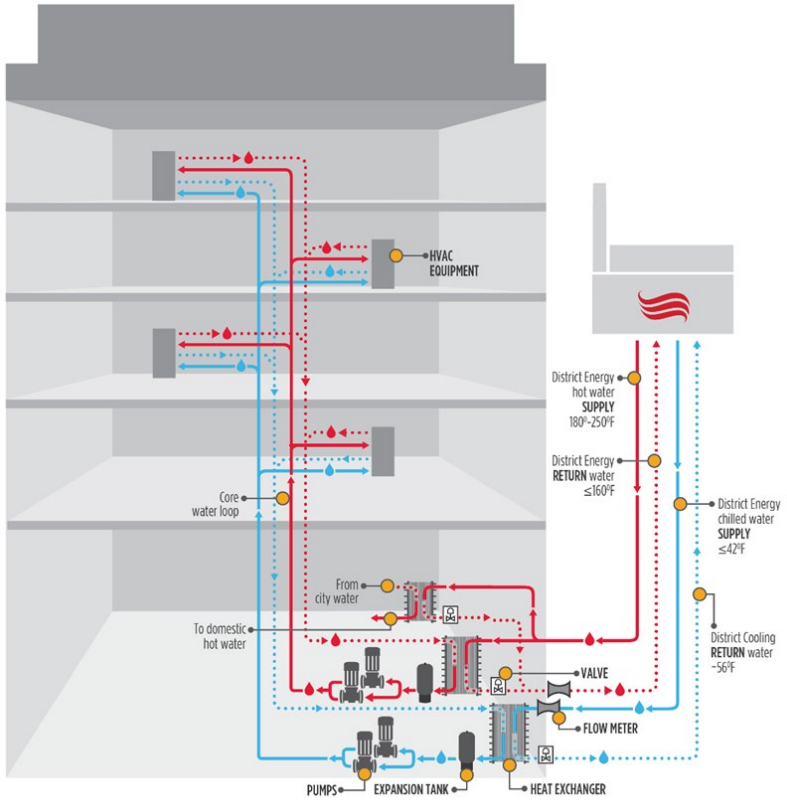
Building care during low-occupancy

- Outdoor temperature reset
  - Reduce thermal losses and the constant cycling of control valves
  - Adjust down to as low as 120 °F
- Lower zone setpoints, but keep HVAC systems running to avoid
  - Freezing issues
  - Excess humidity and mold growth
  - Condensation on windows that can damage casing and woodwork
- Prevent freezing equipment
  - Proper layup of fan coils after draining
  - When in use, ensure freeze stats are working and water is circulating
  - Check that glycol % are correct for -20 deg F
- Prevent Legionella in domestic water and continue system water treatment program
- Ensure controls and communication systems are working properly as designed and in stand alone mode



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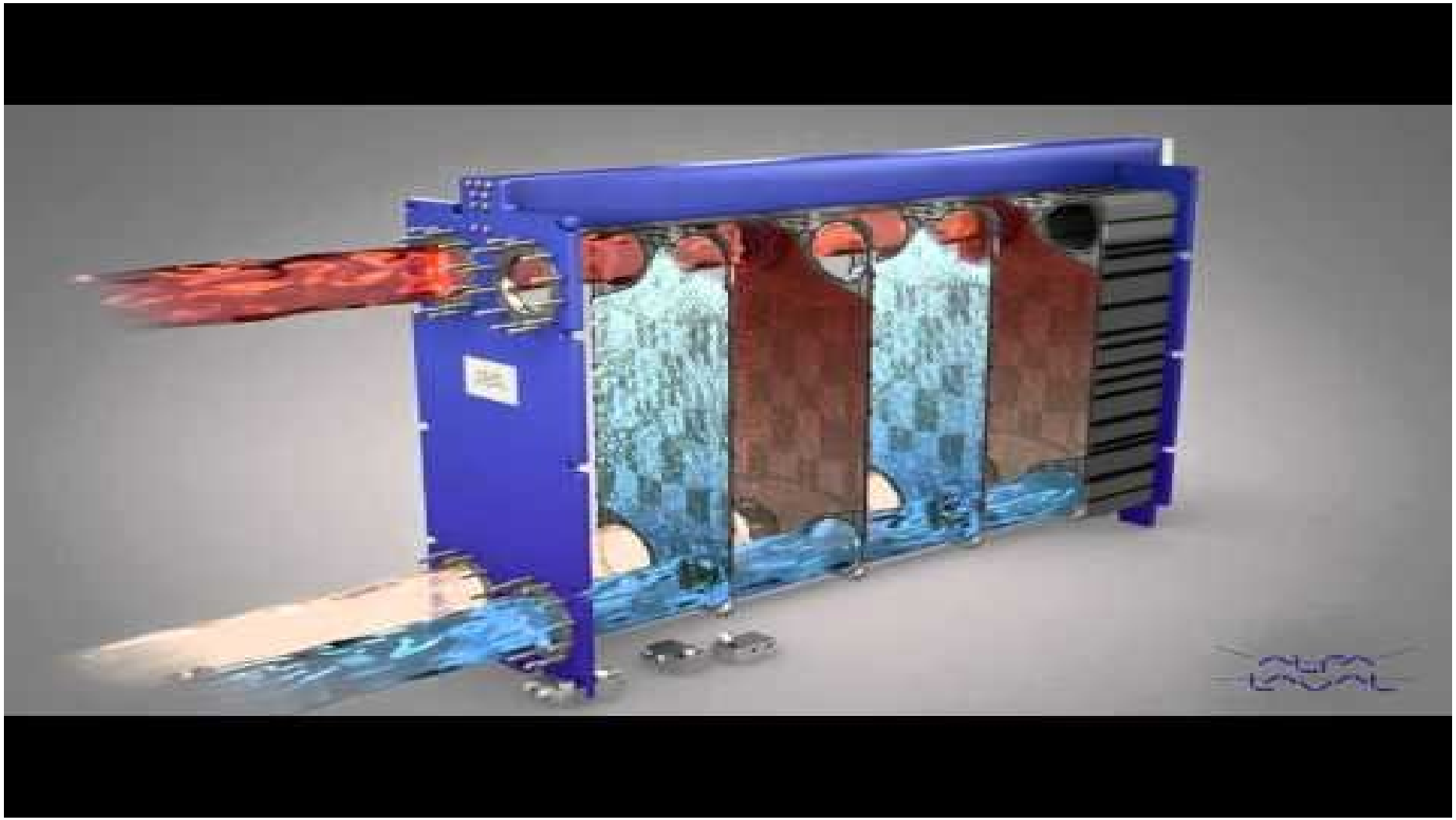
Efficient heat transfer – Understanding your Heat Exchanger



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Common Heat Exchangers in HVAC

Brazed Plate

CONS | PROS

- Easily fouled
- Non-serviceable (except for chemical cleaning)
- Unavailable at large sizes

- Very low LMTD
- Small and light (relative)
- Economical at low sizes

Shell-In-Tube/Coil

CONS | PROS

- High LMTD
- Expensive
- Increasing rare

- Rugged and forgiving
- Proven and reliable
- High pressure tolerance

Plate & Frame

CONS | PROS

- Gaskets are problematic
- Easily fouled
- Heavy

- Low LMTD
- Expandable
- Economical at large sizes

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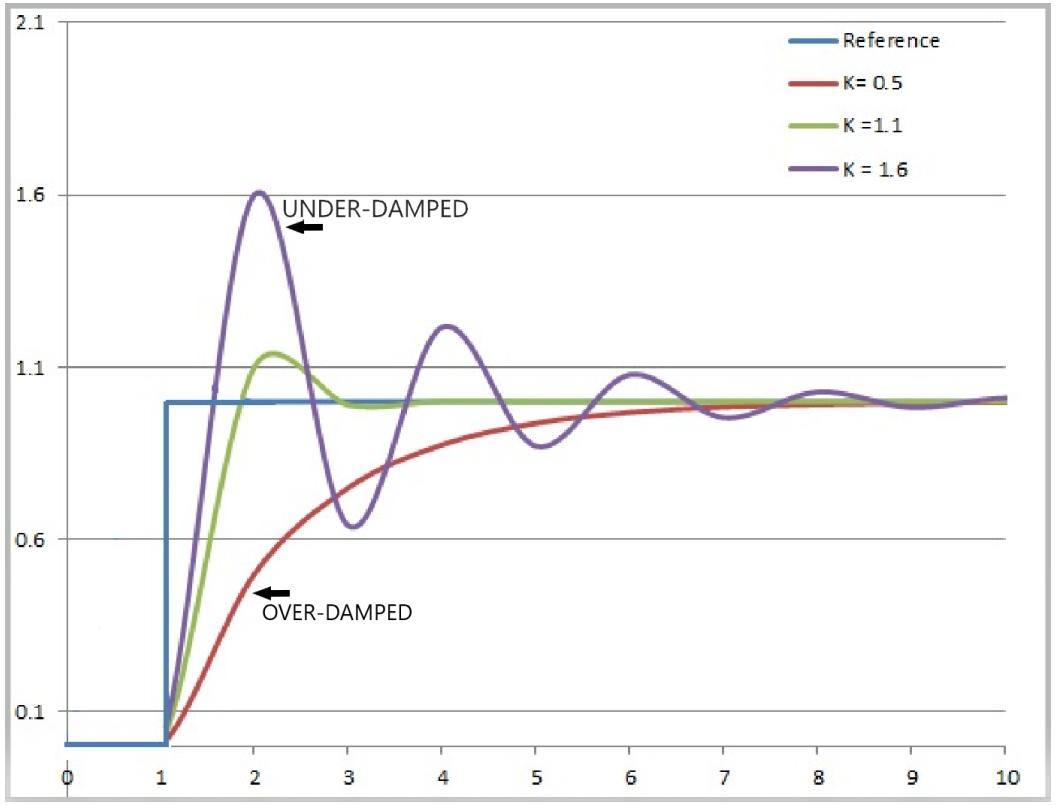
Common issues when selecting a new HX

- Focus on upfront cost at the expense of thermal efficiency
  - Higher utility charges for energy over equipment lifetime
  - ***Pumps*** and air-side equipment need to be larger
  - Flow charges (DESP)

- Engineer or DB Contractor is unaware of DESP requirements
  - Pressure requirements (unsafe)
  - Flow charges (DESP)

- HX metallurgy and gaskets: Failure to consider water quality
  - Corrosion and leaking
  - Scale accumulation and plugging

Control Valves



- Positioner speed
  - Too slow = overheat/cool
  - Too fast = hammer and wear
  - More equipment cycling
  - Instability in the comfort space
- Modulating positioner
  - Is the signal binary (i.e. on/off) or variable?

Maintenance

- Replace faulty thermometers and pressure gauges
- Review District Energy's suggested maintenance checklist
- Always follow manufacturer suggested maintenance recommendations

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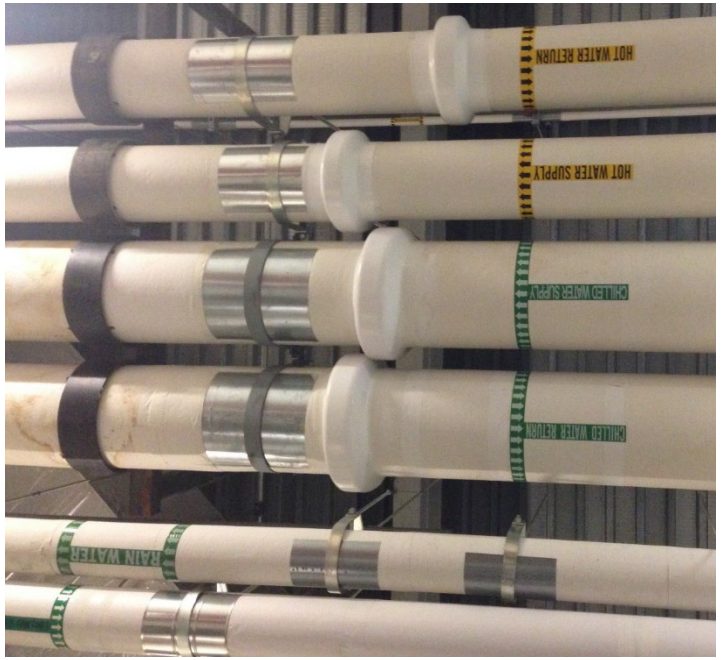
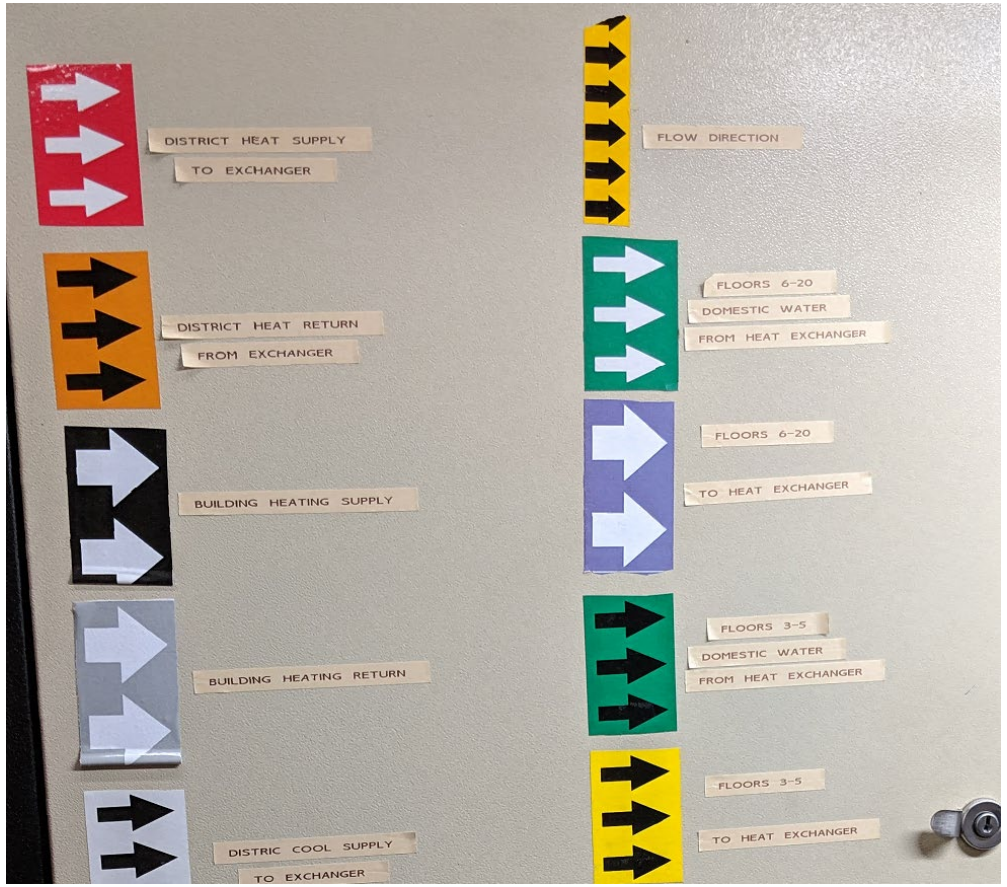
Label equipment/piping to understand system





- Helps your team and service providers understand process
- Essential during programming and troubleshooting
- Use ANSI/ASME/ASHRAE standards

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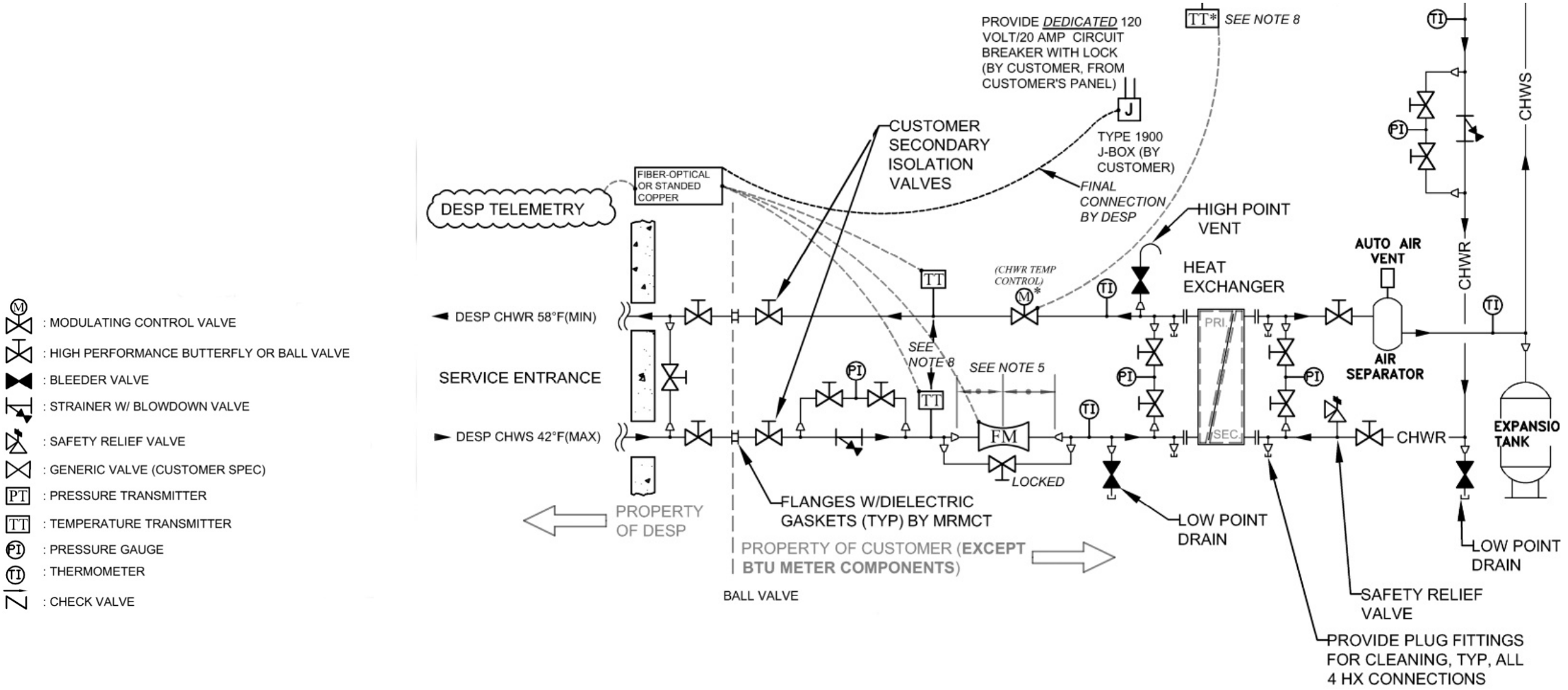
Piping Schematic/P&ID and Mechanical Equipment Schedule



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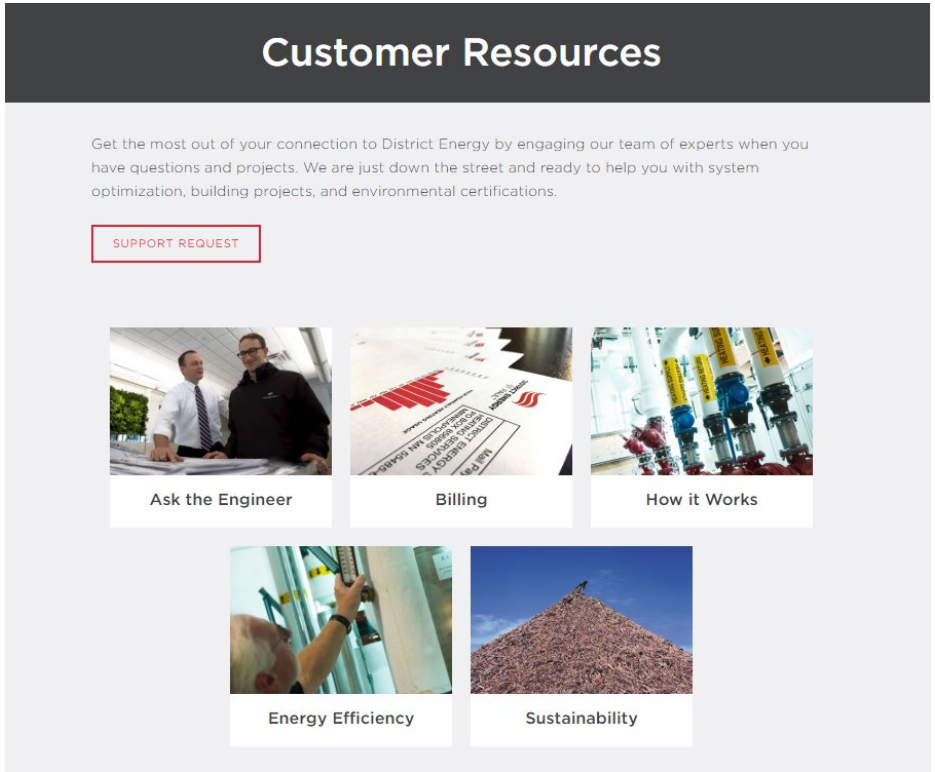
Resources at DistrictEnergy.com

- Ask the Engineer
- Past operating engineers presentations
- Maintenance checklist
- Request service or submit a question
- Newsletter



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Questions

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