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COMMERCIAL + RESIDENTIAL BUILDINGS

Lazy River Concept

Addressing Low Delta T in Hydronic Systems

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Agenda

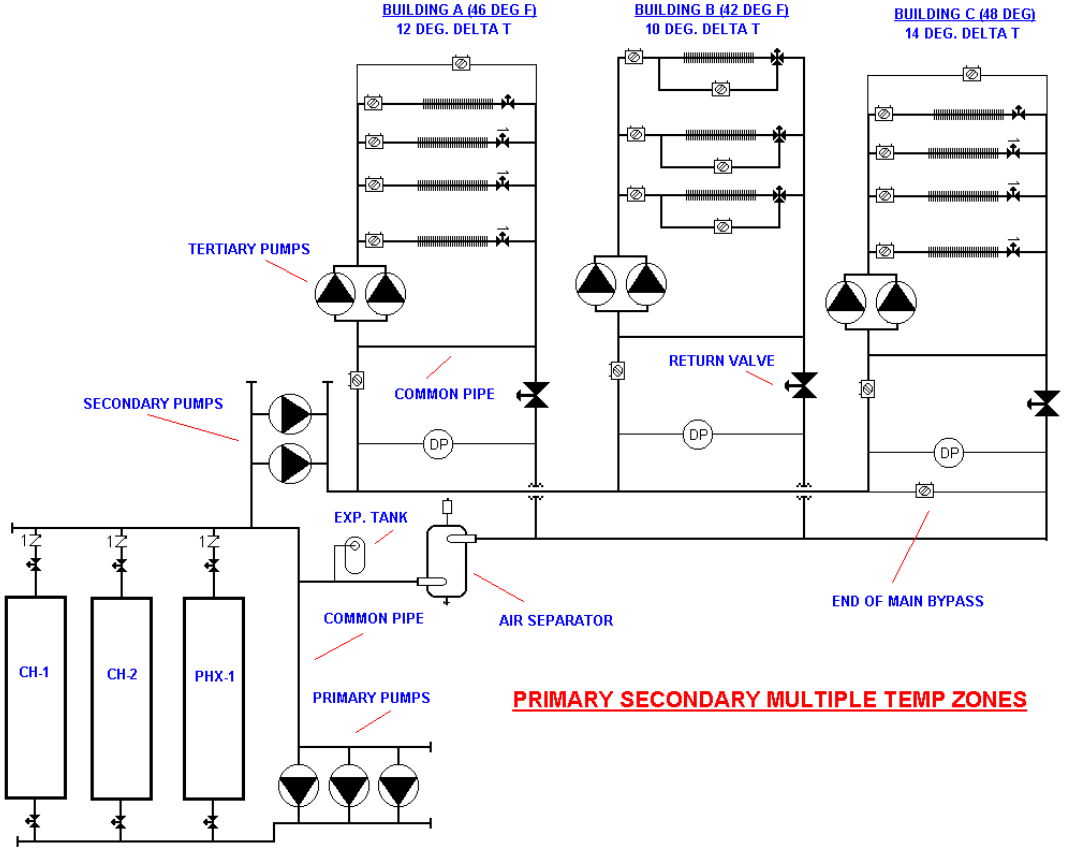
Description of the issues surrounding Condensing boiler systems and Chilled Water Systems.

- Why Two-Way valves and balance are the culprits in Low Delta T Systems.

Lazy River concept: Boiler Systems / Chiller Systems

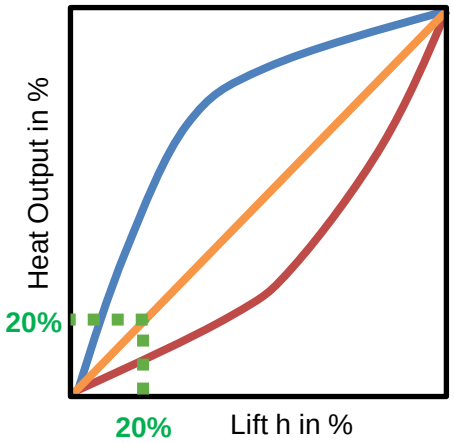
- Programming PID
- Benefits
- Energy Savings

In General: What We Do Now

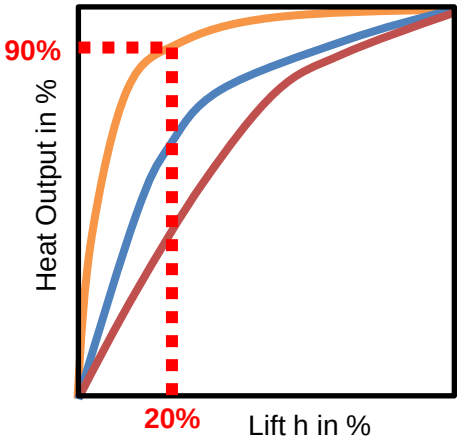


Effect of Control Valve Authority

Coil control with good valve authority (.4 or greater)



Coil control with poor valve authority (.2 or less)



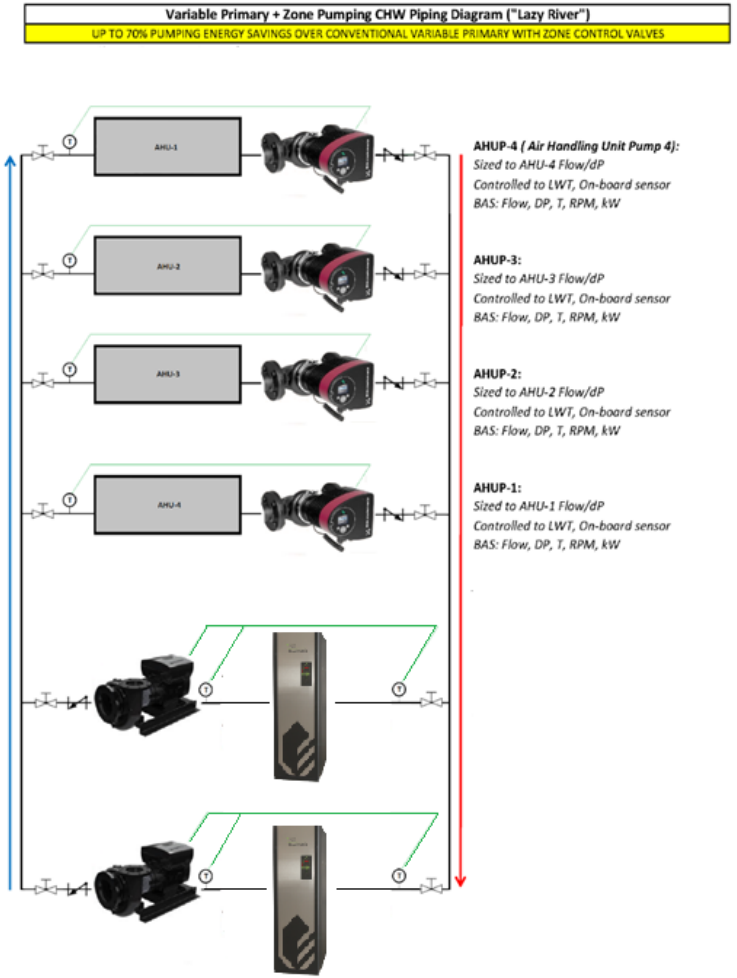
Likely to over pump !

Net Effect on Using either Manual BVs or PICV (auto flow devices)

- You add 8-15 feet of pressure drop to the system in perpetuity just for the two way valve and another 2.31-11.5 feet for auto flow device.
- To guarantee linear relationship you are adding expensive PICVs at over $1,200 / inch.
- PICV retrofit of these are very expensive and can clog if existing pipe is old and you use units that are not non-clog.
- PICV retrofit will also more-than-likely add pressure to distribution pumps.

Lazy River Concept --Boilers

- Replaces two way valves with smart pumps.
- Pumps control to delta T across coil or Leaving Water Temp.
- This gives you full delta T across the plant.
- Eliminates pressure drop from valve and using flow limit programming the balance valve.
- Minimum flow bypass is optional, on-off full port valves can be used if you want positive shutoff.
- Boiler pumps can be controlled to Delta T.

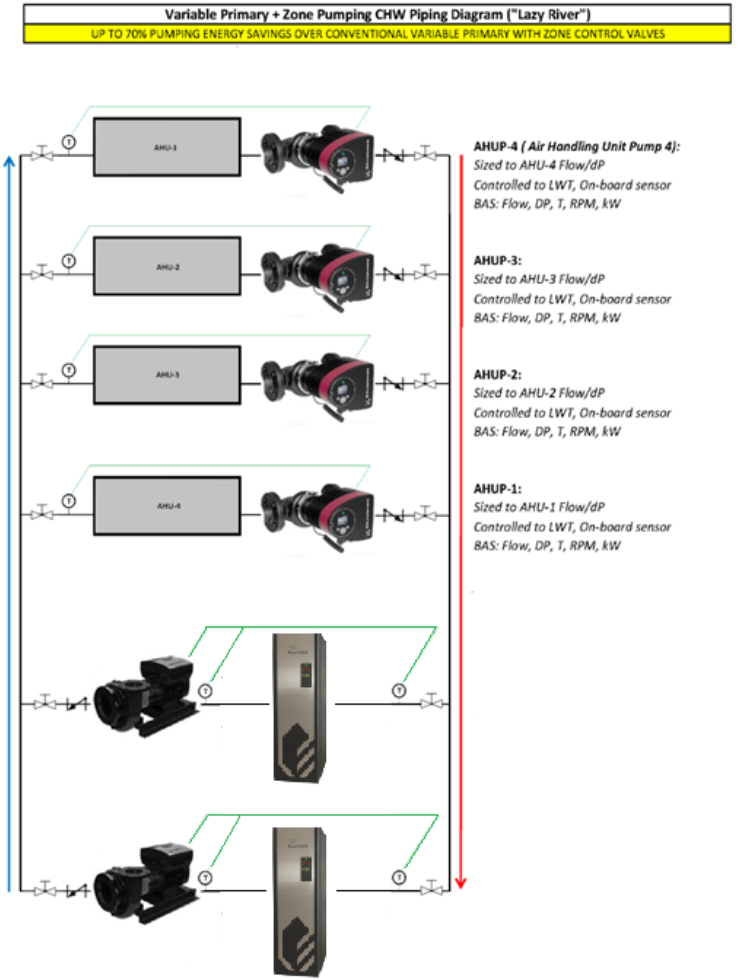


Lazy River Concept --Boilers Energy Savings

Example: 4MBTU/h load 150 Deg F Supply Temp / 120 Deg F Return Temperature yields an efficiency of 93.5% (condensing)

A drop of 15 deg F Delta T drops efficiency to 87% efficiency (non-condensing)

A year of operation like this figuring in for boiler reset and an unoccupied space time of 12 Hrs yield a 6,108 therm increase in gas use.



Lazy River Concept --Chillers

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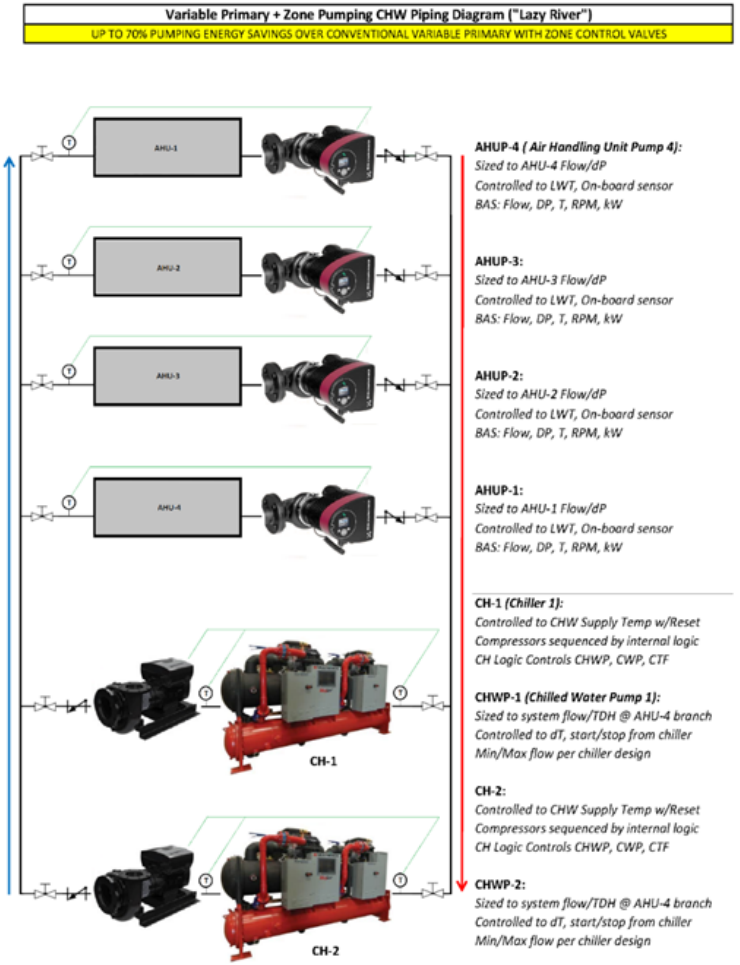
- Come visit our Brea HQ and see it in operation.



Lazy River Concept --Chillers Energy Savings

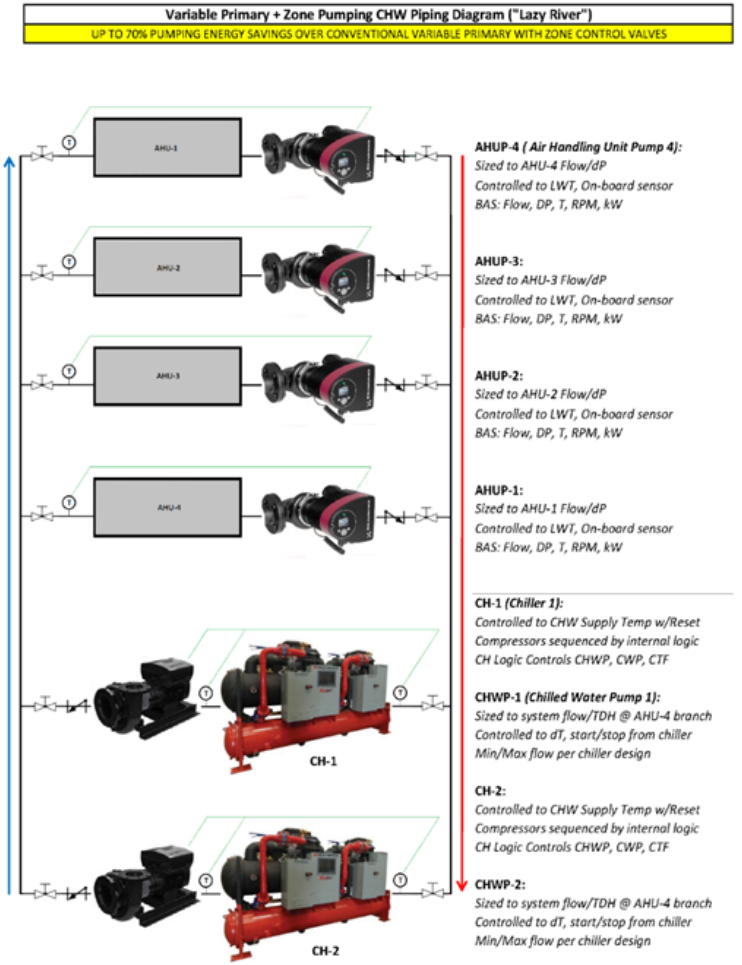
Example: 500 Ton Chiller 44/54 on evaporator with 85/95 on condenser yields-
0.584 kW/Ton Full load
0.327 kW/ton IPLV

Drop the Delta T by 3 degs on the evaporator yields
0.623 kW/Ton Full load
0.350 kW/Ton NPLV

Ironically anymore drop in Delta T yields flows over design capacity (in this example) which is one of the number one reasons why chiller plants are increased in size due to “not enough chiller.”

Lower Delta T increases flow rate and the Pressure drop goes from 8.3 psid to 17.8 psid which obviously increases the pump energy.

Eliminating the 8-15 feet in head (two way valve / balance device) results in a savings of 6-11% in pump energy. Plus the energy saved by using permanent magnet motors versus



Data Mining (Additional Benefits):

- We currently do not track flow temperatures at each coil. There are pressure gauges and thermometers but that information is not given to BAS. With this information you could determine fouled coils.
- We could be able to provide trouble shooting information (e.g. a larger than designed BTU would indicate an outside air damper stuck in an open position).
- Trouble shooting could be proactive than reactive.

A New Generation of Smart Pumps

- Pre-packaged control logics with choices of Delta-T, Delta-P, or others.
- BTU meter
- Requires low/no external sensors
- Dynamic balancing, no need for costly Rx commissioning
- Permanent Magnet Motor: long life and IE5 efficiencies.
- Data capability

Potential Market and Applications

- Applications: hospitals, campuses with central plant configurations and growing pains, such as deprived loads in the far corner, or difficulties in adding new loads, and costly continuous system balancing
- Estimate number of HW systems and CHW systems: hundreds of thousands.
- Cold domestic water system booster pumps can benefit, too.

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