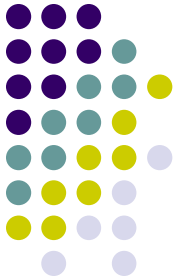
Welcome To



System Benefits With ECM PUMPS

Hydronic System Efficiency

Should we be focusing on more than just the heat source?

The hydronic heating industry has put there main focus on the heat source with a series of innovations.

Boiler Advancements

Stack heat recovery units

Automatic vent dampers

Electronic ignition

Increased jacket insulation

Condensate heat recovery (condensing boilers)

Variable speed fans (modulating boilers)

Increased turn down rates

As of 9/1/12 DOE mandated boilers to have automatic temperature control (outdoor reset control)

Changes in piping design targeted at the Heat source

Injection piping with outdoor reset control

Buffer tanks to keep boiler from short cycling

Hydraulic separators for proper flow through boiler

Alternative Heat Sources

Geothermal

Solar

Wood

Corn/pellet Boilers

What about the method and cost or efficiency of delivering that heat?

Can we make circulating the heat more efficient?

Do we need to?

Pumping systems account for 22% of the world's electrical power demand

Air Compressors 18%, Fans 16%, Cooling Compressors 7%, Other equipment 37%

Centrifugal and axial pumps account for 73% of all pumps

Over 95% of all pumps are oversized due to multiple butt covering!

Heating Basics – Pump Sizing

You need to know… FLOW

BTU ***output*** of the boiler(s) for the primary pump(s) and loop loads for secondary pump(s)

Design temperature differential (delta T) – dependant on application, local climate

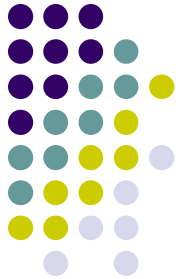
Calculate flow based on laws of thermodynamics (definition of a BTU)

GPM = BTU/Hr. Divided by delta T x 500

Calculate: Flow for 300,000 BTU/Hr.@ 20 degree F design differential(delta T)?

30 Usgpm

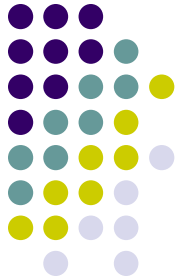
Heating hours per season



Barrow, Alaska 20,370 hrs.	Outdoor temp 36
Bismarck, N.D. 8,932 hrs.	Outdoor temp -16
Hilo, Hawaii 0 hrs.	Outdoor temp 63
Kansas City, Mo. 5,326 hrs.	Outdoor temp 4
Key West, Fl. 68 hrs.	Outdoor temp 58
Yuma, Arizona 983 hrs.	Outdoor temp 44
St Paul/Mpls MN 5751 hrs.	Outdoor temp -11

Manual J Outdoor Design Temp

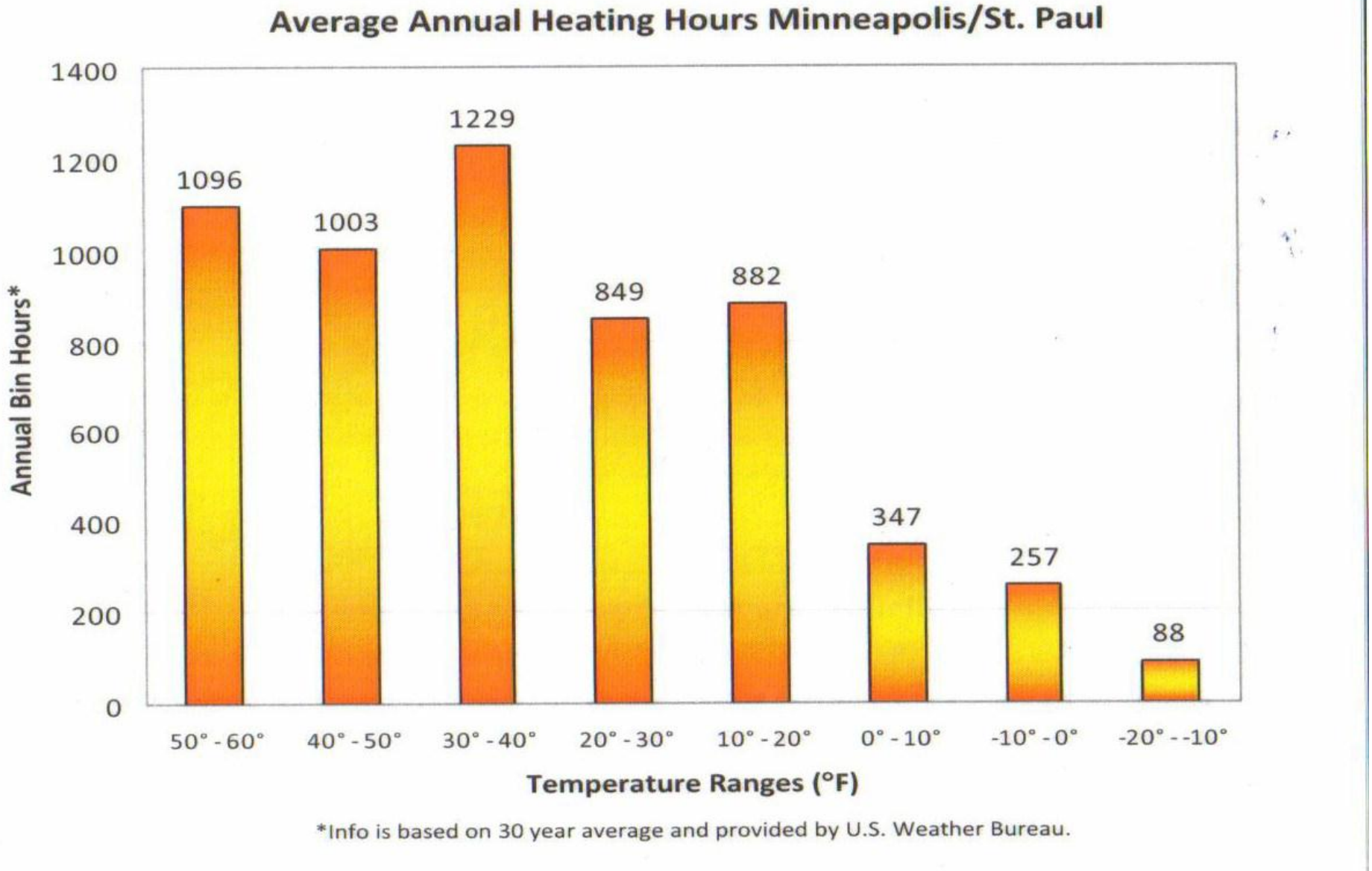
Do we need the same amount of BTU's/Hr?



Would we design for the same outdoor temperature?

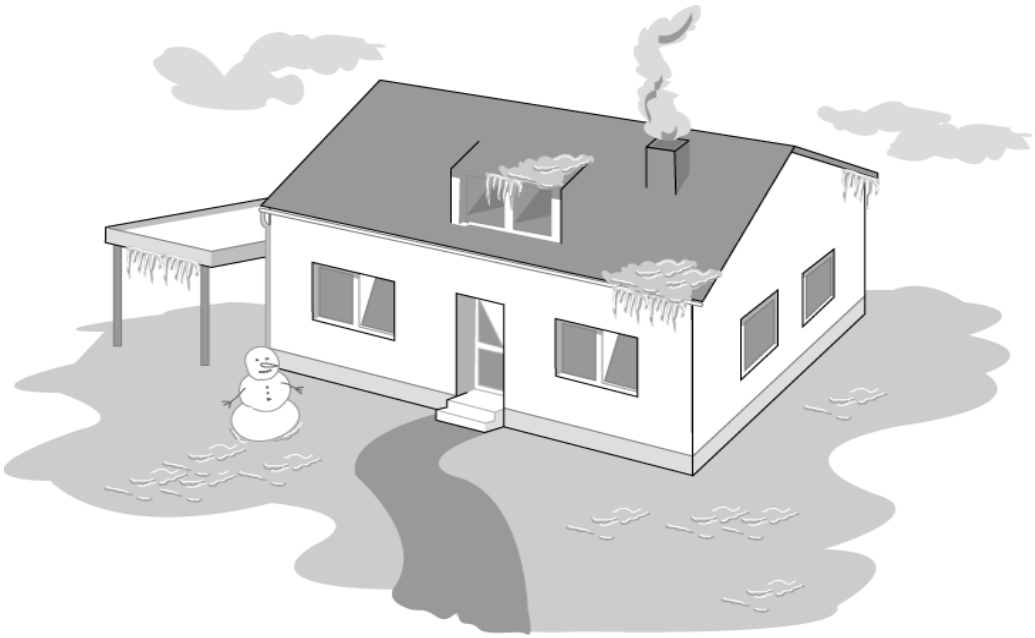
How many hours of each season would be at design temperature?

30 year Average For Twin Cities

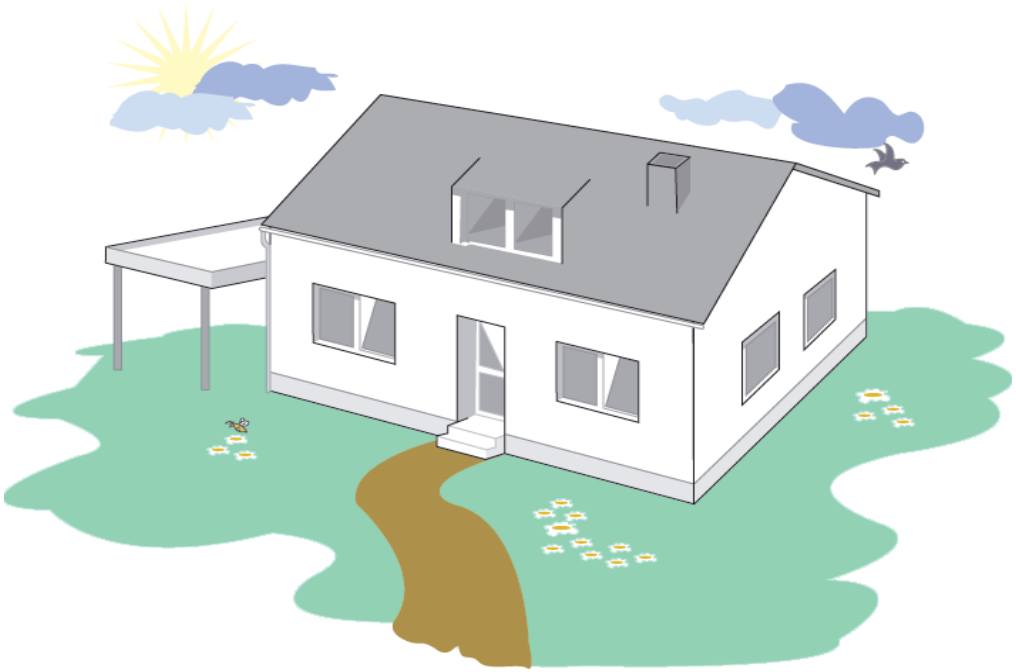


Coldest design day Temperature

The coldest day of the year is 2 % of the total operating period



But how is the system working during the remaining 98% of the operating period?



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Pump Affinity Law

Note! If the speed of a pump is increased by *10%*

the volume flow increases by *10%*

the head increases by *21%*

the power increases by *33 %*

Example:

Slowing a pump from 1800 rpm to 1200 rpm results in a 33% decreased flow, 66% decrease in head and 70% decrease in power.

Heat Distribution Efficiency

How many Btu's/hr. are being delivered per watt being used

Btu’s/hr. divided by total watts being used by circulators

Example: 100,000 Btu/hr. boiler & (1) .5 amp 115v pump system

.5 amp x 115v = 60 watts divided by100,000=1,666Btu’s/hr. per watt used

If we use a 30 watt pump divided by 100,000=3,333Btu’s/hr. per watt used

Now imagine multiple pump systems!

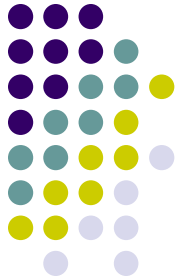
VFD’s are one solution to the energy consumption of pumps

Up to 80% energy savings can be achieved using proper VFD
techniques

The pump can run closer to it’s best efficiency point

But Is It worth the expense to modulate the speed of the pump?

Benefits of a variable speed pump with an ECM motor



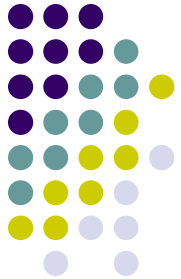
Electrical usage savings

System performance

Heat source efficiency

Comfort

ECM (Electronically Communicated) technology



(ECM) Electronically Commutated Motor

High efficient brushless DC programmable motor

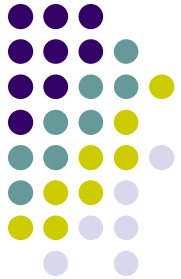
Pump uses a permanent magnet rotor.

DC motors are significantly more efficient across a range of speeds than AC motors

Soft starts save wear and tear on system components

Reduced noise and longer life

ECM (Electronically Communicated) Pump Technology



Smart pump, flow controlled by pressure changes at the impeller

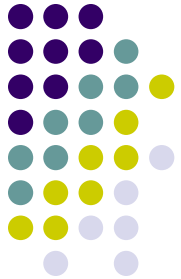
Can be dead headed

No external sensors needed.

Pump can be programed to run at a constant head pressure.

Pump can be programed to run at a variable head pressure.

Pump can be checked to fine tune so its running as efficient as possible



Presentation without Demonstration is only Conversation