



ebtech

Heating System Energy Savings

The Basics

Ebtech Group of Companies

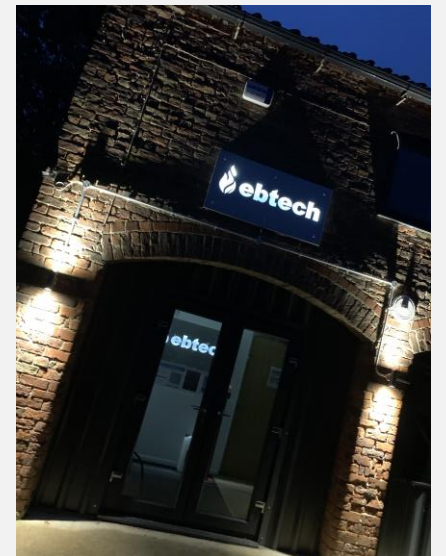
- Little bit about who Ebtech are:
- **Ebtech Energy Systems Ltd**
- **Ebtech Glasshouse Systems Ltd**
- **Ebtech Engineering Ltd**

Formed 2008 as Ebtech Solutions Ltd

Based in Hull, East Yorkshire

35 employees across the businesses

In excess of £10 million turnover



Energy Efficiency of your Business

- Why think outside the box ?
 1. Current energy prices
 2. Limited RHI payments left
 3. Aging glasshouses
- Start with the small wins before you plough into the investment.
- It may change your view on future investments.
- Lots of small wins could have a massive effect on your bottom line.



Maintenance Team

- Question.....

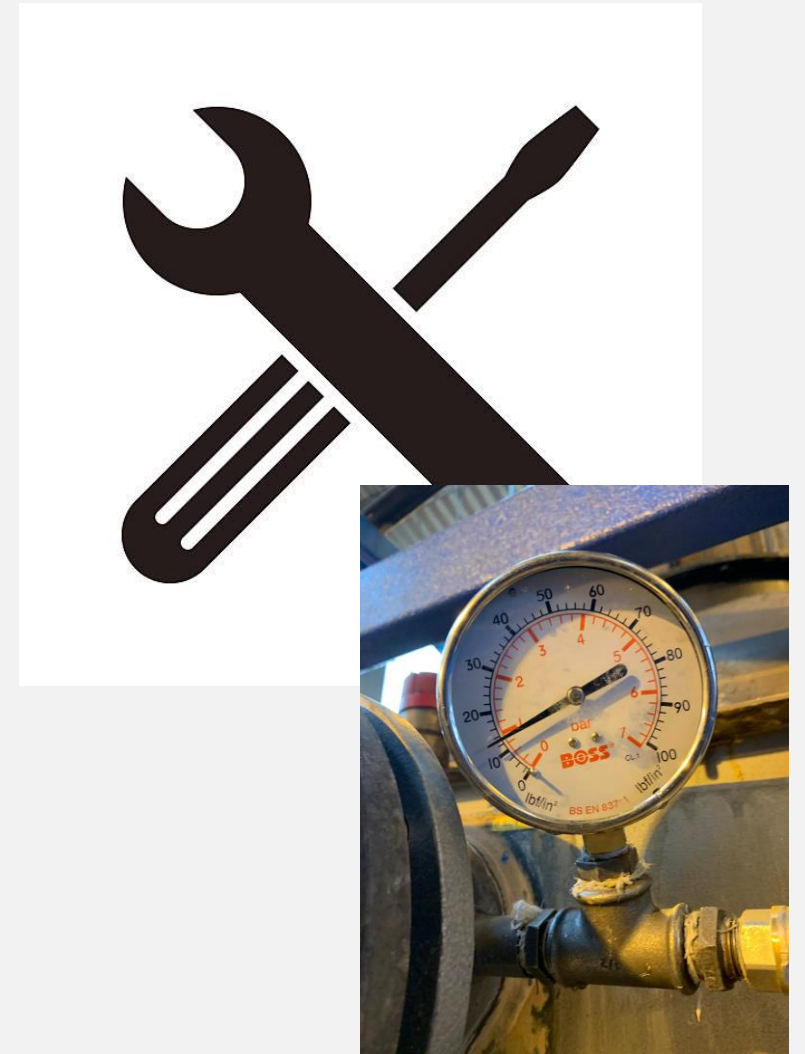
Every site **used** to have the maintenance person that knows the heating installations inside out.

Many have now retired, and a lot of experience has been lost.

How many of you still have this person?

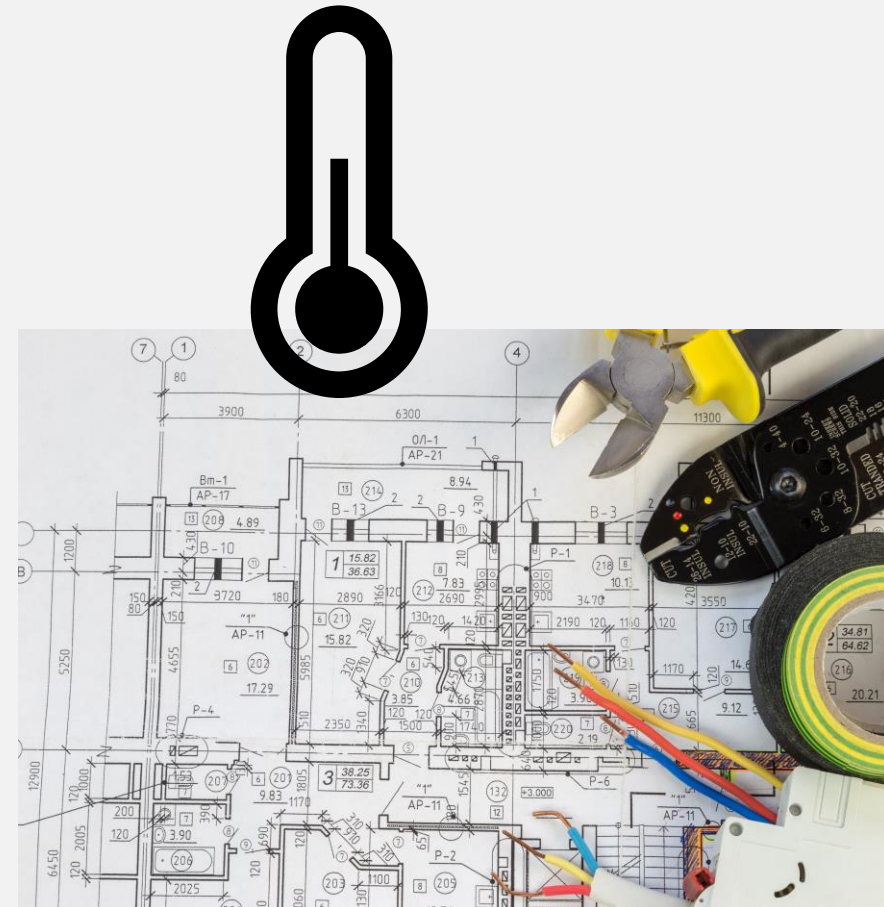
Does there need to be more training opportunities for maintenance teams?

- The starting point is "Good Maintenance".
- Without this, a majority of what we give you here is irrelevant. Any improvements will be lost.



Heating System Energy Savings – The Basics

- Heating System Efficiency – Where Do I Start?
- Systems have historically been designed to give maximum temperature lift in high demand scenarios
- That maximum demand is only for a small number of days in a year.so 90% of the year, we can make improvements.
- Energy used to be cheap, and in many scenario's the brief was to destroy heat!
- We need to look at ways of heating methodically and reducing operating expenditure.



Heating System Energy Savings – The Basics

Heating systems are similar

- Simple check, methodically walk the site when its quiet and listen.
 -back to the comment of “**Question Everything**”
 -What's running that shouldn't be running
 -What's not running, that should be running
 -What's broken?
 -What's leaking?
-
- It all sounds simple.....but it's surprising how many times we see the same things



Heating System Energy Savings – Pumps

1. Pump Noise – whining motors
2. Signs of leaking – possible limescale marks

Pump seals and bearing may be leaking, especially the weeks leading upto Christmas.

Expansion and contraction of seals and bearing can cause them to leak quicker.

- Preventative maintenance is key!
- Pumps are essential to all heating systems, and without them you can't get heat to your crop.



Heating System Energy Savings – Pumps

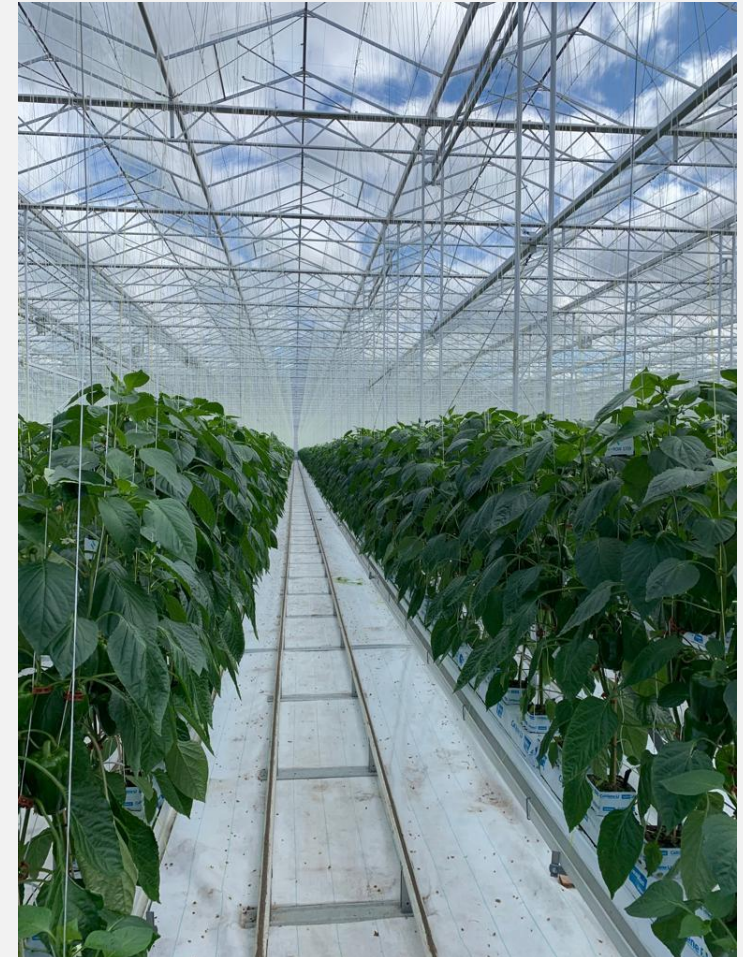
- A pump is designed to give you a design flowrate.
- If the pump is worn, then it will not be giving you the flow your crop needs.
- The runtime on circulation pumps can easily exceed 15 - 20 years, so any inefficiency is massively amplified.
- Given the number of pumps you will likely have, a small saving here will save you a lot of money.



Heating System Energy Savings – Heat

- While you're doing your walk around.....
- Are there cold and hot spots of uneven heat distribution
- Two things come to light here...
 1. Heat drift - caused by prevailing winds, lack of air movement or rising heat
 2. Worn, broken, or mis-controlled valves or circulation pumps

.....Again, simple, but all too common



Heating System Energy Savings – 3 Port Valves

- 3 port valves / mixing valves – a key part of any system, but all too commonly at fault.
- The key parts:
 - The valve itself, in which you have a rotary shoe that needs to close one of the 3 ports at the correct time.
 - The motor mounted onto the valve, that needs to turn that shoe to the right position at the right time.
 - Then there is the actual linkage mechanism that connects the motor to the valve.
- If any one of these has an issue, then we're not running efficiently.....despite how good your environmental controls are!



Heating System Energy Savings – 3 Port Valves

- Common issues.....
-Leaking shaft seal. Is the valve wet, or does it have signs of limescale build up on the outside?
- Like pumps, they can leak when cold, and seal when warm.....but either way, its heading to that week before Christmas failure!
- Operate the valve manually, does it move smoothly?
- Each actuators has a rated torque – if the motor has to work harder due to corrosion, then it will likely fail
- A whining sound can often be heard



Heating System Energy Savings – 3 Port Valves

- Do the valves open and close correctly when demanded by the computer?
- Is heat getting to where it need to be?
- It's very easy to set these up incorrectly, even on new installations
So always question it...
- This can be critical and highly disruptive
- If the control system wants to opening the valve, then it could be closing and have the opposite impact.



Heating System Energy Savings – 2 port valves

- Butterfly valves have seals that can de-grade in time
- A sign of this is a valve that will not fully close

A valve that will not fully close will cause issues when:

1. Isolating for maintenance and it won't fully seal. You might need to isolate at the next valve which is much further away.
2. When fitted with an actuator, it could strain and cause damage.

A valve that is passing water is costing you heat...and money!



Heating System Energy Savings – Water Quality

- How often are you having to top the heating system up with water?
- A lot of the issues we've described so far are preventable if the water within the system is "good quality".
- If you have frequent leaks and need to top up, you are adding uncontrolled water volumes. Find the leak, don't just re-fill and forget.
- A good water treatment company can improve and maintain good water quality.
- A simple part stream filter or water strainer can remove large amounts of suspended solids.
- Your boiler/heat pump manufacturer often sets a required water quality.
- Hoval have turned towards VDI 2035 Regulations – a chemical free approach to water treatment instead of used inhibitors.



Heating System Energy Savings – Water Quality

- **What's the issue if we adding fresh water to the system?**
- Fresh water introduces oxygen into the system.
- Oxygen promotes corrosion within the system.
- Limescale and build-up of deposits can cause problems in heating systems:
 1. Heat exchanger blockages – reduction heat exchange both at the boiler and in the glasshouse
 2. Block / Foul heating pipes – increasing system pressure and putting additional strain on circulation pumps
- This will ultimately reduce the heat output of the system and cost you more money to do so.
- This is a hidden danger and can cause serious problems.



Heating System Energy Savings – Oil and Gas Boilers

- Boilers – those big lumps that you feed with expensive fuel!
- How efficient are they?



Heating System Energy Savings – Oil and Gas Boilers

- How well have the boilers been maintained?
- When where they serviced last?
- Do you know they are burning efficiently?
- Tell-tale signs of reduced heat transfer include:
 1. Narrowing of the temperature difference over the boiler
 2. Increase in fuel consumption



Heating System Energy Savings – Biomass Boilers

- Biomass Boilers.....
- All the same scenarios are the same, are they burning efficiently, but also are you getting the best out of them in respect of RHI?
- Do you have a buffer storage tanks, and is it sized correctly?
- Does the buffer tank capacity need increasing to reduce demand on other oil / gas boilers?
- Surprising how many people we talk to that aren't utilising their Tier 1 RHI!



Heating System Energy Savings – MCPD (Medium Combustion Plant Directive)

-I'm sure this will be covered today, if not covered already.
- Boilers over 5MW input to comply and have MCPD permit to operate before January 2024.
- Boilers over 1MW input to comply and have MCPD permit to operate before January 2030.
- Consider that ageing boiler plant is maybe better replaced rather than made to comply.
- If you are able to reduce flow temperatures, is another boiler the right option?
- It's becoming increasingly unlikely new gas boiler installs will be allowed after 2030, so why not future proof yourself...
- Are heat pumps a viable option for you!



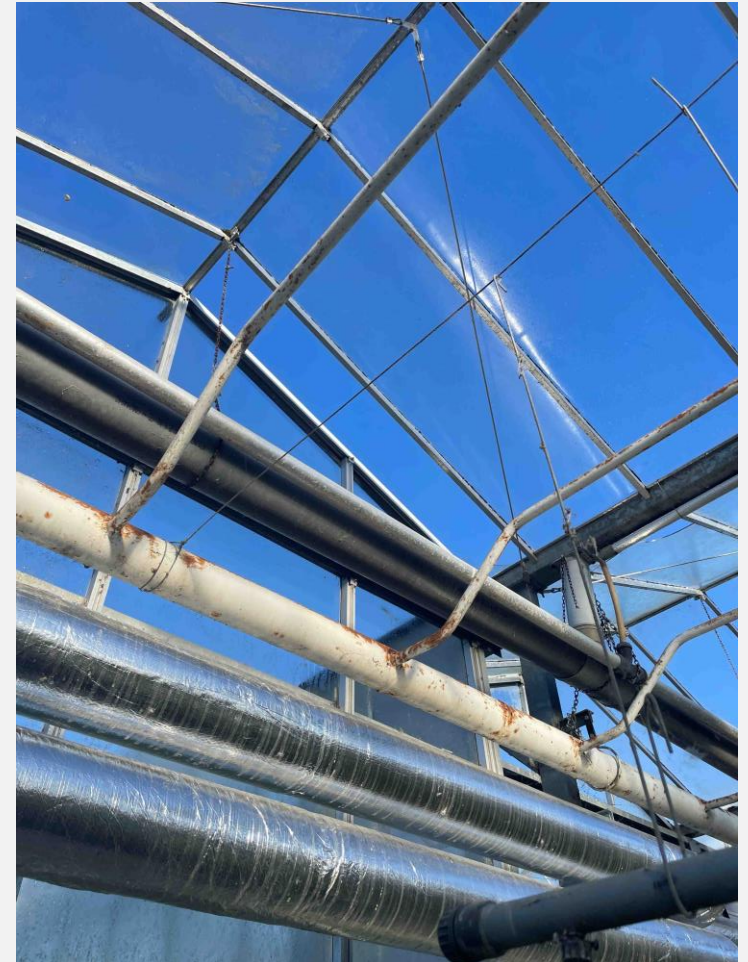
Heating System Energy Savings – Air in the System

- Trapped air in heating systems – another unseeable issue.
- Restricts water flow in pipes and stops heat getting to where you need it.
- Are all your air vents working correctly?
- Are the ball valves on the air vent open?
- Do you have air vents in the high points of your system?
- Do you have a cold heating loop in a glasshouse, or a colder glasshouse zone compared to others?



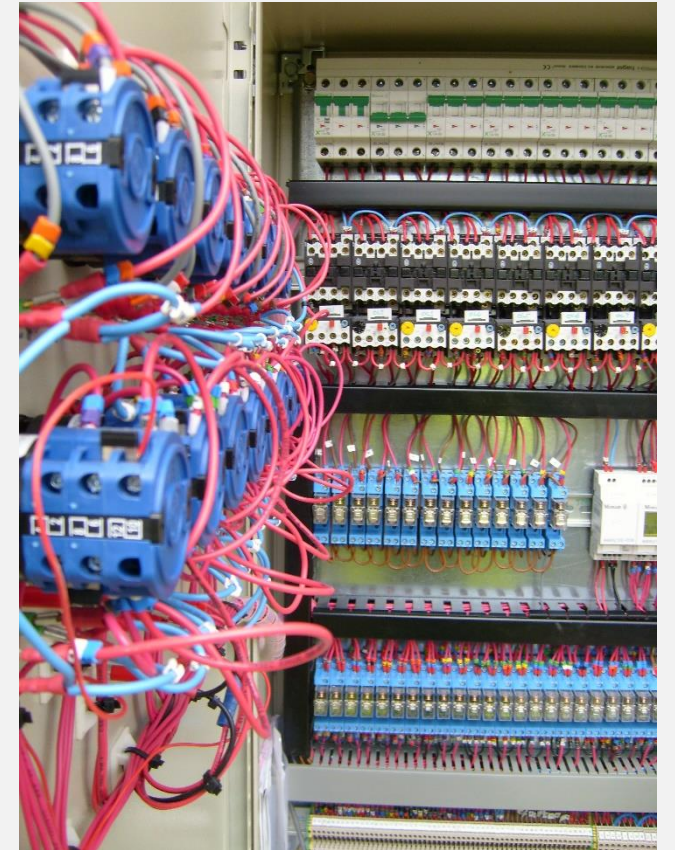
Heating System Energy Savings – Air in the System

- Air vents need to be good quality, not domestic / light commercial units.
- Need to be checked annually to make sure they are working.
- Manual air vents “need to be manually vented”.....sounds obvious. They can easily stick due to corrosion.
- Identify where all the vents are on each system and make sure they are all accessible and free.
- It only takes one air lock on a system to cause an issue.
-again, basic, but surprisingly common issue we see!



Heating System Energy Savings – Variable Speed Motors

- Variable speed drives on motors...or inverters.
- Can apply to circulation pumps and CO2 fans.
- **RULE OF THUMB.....Run a motor at 80%, it reduces the electrical consumption by 50%.**
- Heating system pumps are design for peak flowrate, and often run at like this providing there is a small demand.
- Inverters can reduce the pump speed based on demand
-even where a pump is fitted with an inverter without control, we can set it at fixed speed at optimised flow rate....and still save money.
- Considering how many pumps you have on your site, this may be a hug win!



Heating System Energy Savings – Solar / Power Generation

- Looking at solar?
- Looking at on site power generation?
- If you reduce your site electrical consumption, you are actively reducing the amount of solar you need!



Heating System Energy Savings – Insulation

- Insulation of the heating pipework.
- All pipework needs to be insulated, apart from the ones used for heat emission (glasshouse heating loops).
- Historically the industry has only insulated the pipework and not ancillary equipment
- Energy costs now dictate that we need to catch up with the rest of the commercial heating world and insulate everything.
- As a rule of thumb, we can consider that each valve is the equivalent heat loss to 1m of pipe.....how many valve do you have in your heating system (plus pumps, plus flanges.....)
- Also consider damaged insulation, or insulation that has been removed for maintenance purposes and not replaced.



Heating System Energy Savings – Pipe Temperatures

- **Pipe Temperatures.**
- Historically, pipe temperature we designed as high as 95°C
- What flow temperature are you working at?
- 95°C was generally based on a time when thermal screens weren't a common thing and energy was cheap.
- With the additional of thermal screens, flow temperature can be reduced.
- Can you reduce the air temperature / uplift in the glasshouse?
- If so, pumps are most likely running to hard and would benefit from being inverter driven.



Heating System Energy Savings – Summary

- **Check and question everything:**
- Circulation pumps – do they sound ok and are they running too quickly
- Seals and Bearings – check pumps and 3 port to prevent leaks and actuator strain
- Water Quality – is it up to standard?
- Boiler – are they running efficiently / controlled correctly
- Air Vents – are they blocked / installed in the correct locations
- Inverters – would you heating system benefit from variable speed pumps
- Pipe Temperature – can these be reduced
- Future proof your site – save energy, save money!



We are Ebtech – Thank you for listening !

- Talk to us about options for your site as there is no “one solution fits all”
- We can help.....
- with the small wins that we discuss here
-and help with the big decisions that follow!

