ENERGY EFFICIENCY IN THE FOOD AND OTHER INDUSTRY SECTORS - TIPS AND EXAMPLES

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FOCUS ON - THERMAL ENERGY

- Hot water management- minimising use
- Heat recovery- maximising use
- Insulating – mimimising heat requirements
- Boiler management- optimising use

MANAGING HOT WATER

- Typical purchase cold water cost: €2.50 per m^3
- Heating water to say: 65 ^oC, costs an additional €3.40 per m^3, where fuel costs 5 cent per kWh and boiler efficiency is 85%

  { [m . Cp . ΔT]
  [1000 kg water * 4.18 kJ/kg K * (65 - 15^{o}C)] / boiler eff. 85% / 3600 kJ/ kWh }

- In this example, total cost for 65 ^oC hot water is €5.90 per m^3
- So the bigger the temperature rise the greater the cost.

HOT WATER

- Quantify how much you are using and where:

Triggered hoses for cleaning

Cleaning is a significant cost – e.g.43% of fuel use in one pig processing site

Measure:
• litres/minute (bucket & stopwatch)
• Total litres over e.g. one cleaning shift (take meter readings before & after)

Hand wash stations

Measure:
• litres/minute (flow-cup or container & stopwatch)
• Estimate total litres per day

HOT WATER

Triggered hoses for cleaning

Typical values seen:
20 - 60 litres/min

Best practice:
15 - 20 litres/min

Hand wash stations

Typical values seen:
2 - >25 litres/min

Best practice:
2 - 4 litres/min

EXAMPLE OF POTENTIAL SAVINGS IN A MEAT PLANT – HOT WATER USED FOR CLEANING

- Meat plant using 175 m^3 water in cleaning shift , at 65°C cleaning shift
- Measurement of a typical individual hose: 26 litres/min
- By reducing flow to 20 litres/min:
  - Potential water savings: 7,000 m^3 per year
  - Potential fuel savings: 425,000 kWh per year
- At typical values of €2.50 for water and €0.05/kWh for fuel, potential savings of €42,000 per year

OPTIONS FOR STERILISERS IN MEAT INDUSTRY

- Cost of operation can be reasonably significant in– e.g. one site spending approx €23,000/ annum in fuel to heat steriliser water

Suggestions

- Motorised valve to reduce flow to sterilisers
- Chemical option – ambient instead of 82 ^{o}C

HAND-WASH STATIONS

- In all business -potential to reduce
- Low flow aerators for 2 – 4 litres/min only €7-15 to install per tap
- E.g. one site potential to save €1,700 per year (320 m^3 p.a. and 10,000 kWh)
- Potential to reduce flows in showers too, down to 8 litres/ min (check out your flow rate at home)

HEAT RECOVERY

- Potential areas for heat recovery use heat exchangers to pre heat water, space heating, etc.

  - Economisers on boilers (heat recovery from flue gas)
    - About 3 - 5% improvement in efficiency

  - Refrigeration
    - Heat recovery being implemented

    now in many plants

  - Compressors & other mechanical equipment

  - Waste heat from air handling units (Leisure Centres, kitchens etc,)

Heat recovery from air compressors

- 90% of energy consumed by compressors is wasted as heat
- 60 to 90% of this heat can be recovered to pre heat water, space heating, etc.
- Leak detection and repair can reduce energy consumption by as much as 30%
- Keep in cool areas, don't enclose

LAGGED PIPES AND TANKS

The bigger the surface area or the longer the pipe, the bigger the losses

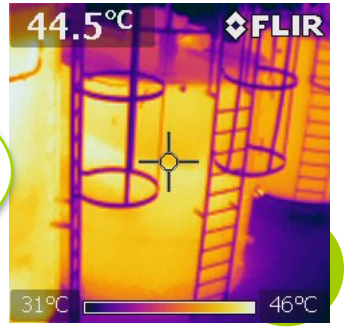
The bigger the temperature difference, the bigger the losses

- Q = U A ΔT
- = at loss in kW

- Multiply kW erating hou for the year = kWh heat loss pe

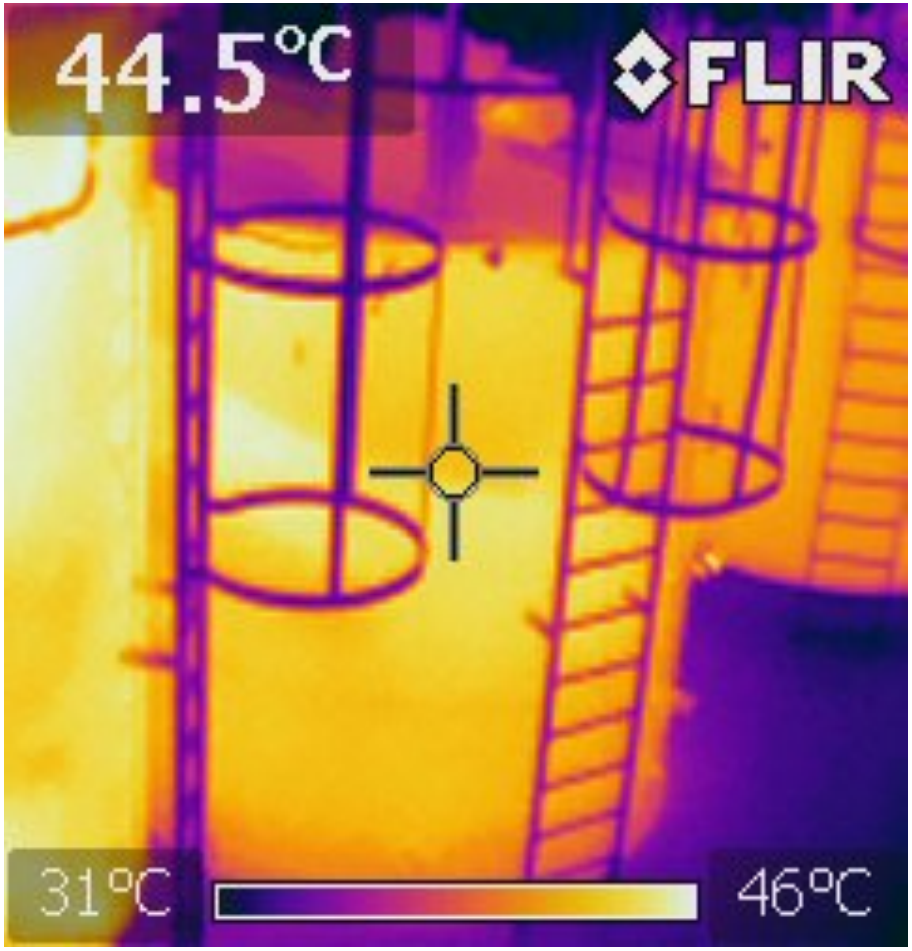
The longer the operating hours per year, the bigger the losses

Here is where you can influence!
U-values for unlagged pipes and tanks: 8 – 15 W/m^2 ^{o}C
For lagged: typically reduced by 90% for 50 mm, so multiply by 0.1

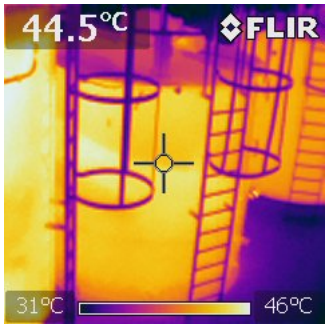


INSULATION – UNLAGGED PIPES AND TANKS – EXAMPLE FROM A FOOD FACTORY

Tanks and pipes in a food factory, held at 45 °C, at all times



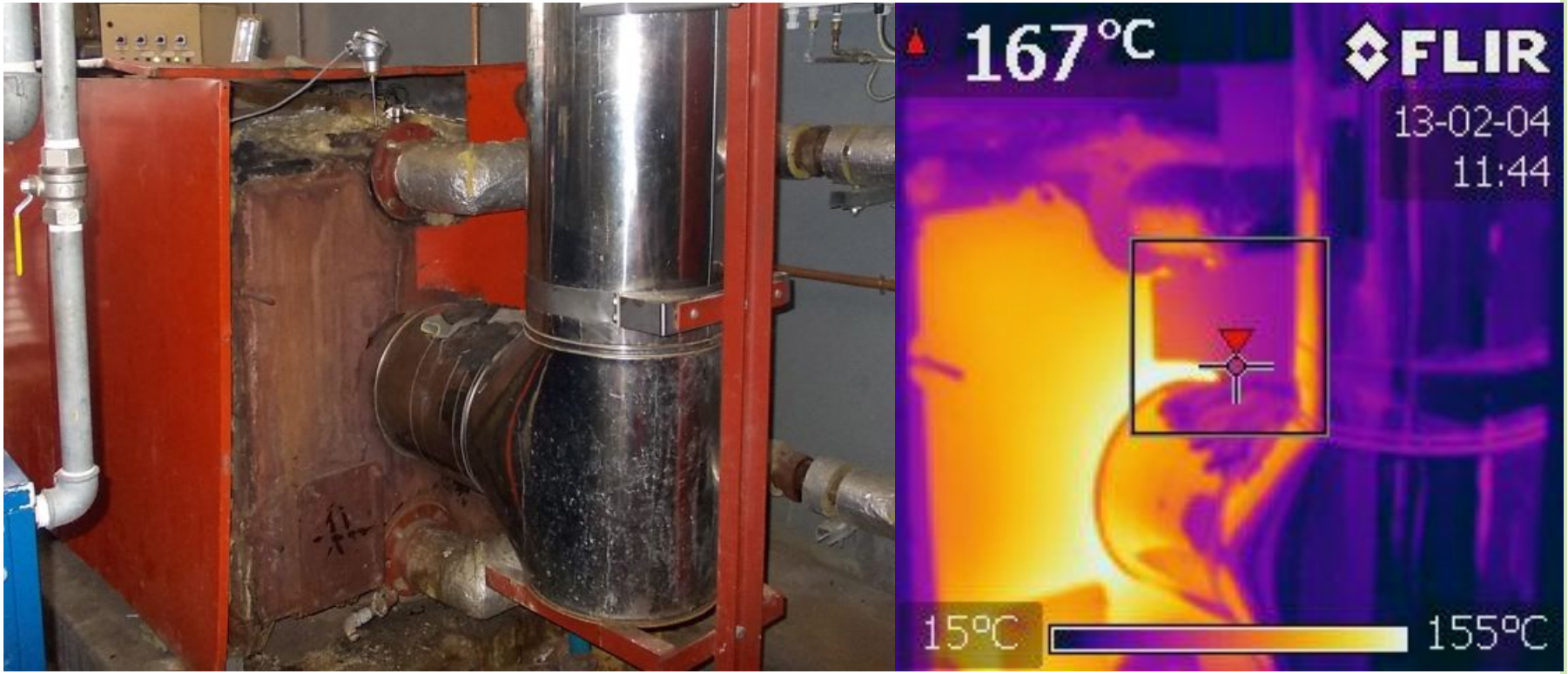
Insulation – unlagged pipes and tanks – example from a food factory



Unlagged tank: 20,000 litres at 45 °C, 24/7

- Losing 4 kW
- If lagged, would save €1,600 p.a. in natural gas

- Unlagged pipe: 250 metres at 45 °C, 24/7
  - Losing 14 kW
  - If lagged, would save €6,000 p.a. in natural gas



Small area, but big ΔT: 165 °C – 30 °C = 135 °C
Could be losing ~ 1 kW heat through this unlagged part of boiler

BOILER EXCESS A

- Flue gas analysis
- Watch out for excess air levels- 53% in this case
- This example – LPG boiler 1% saving %, saving €530 p.a.

Office block

- Installed new gas boiler 92% efficient compared to old oil boiler at 70%
- Natural gas 50% price of oil
- Estimated fuel cost reduced by 68%
- ROI= 1 year

2012 Estimated fuel Cost	Cost
Oil	€38,000
Potential Annual fuel savings	€25,800
Project Cost	€23,300
Payback	< 1 Year

THANK YOU

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