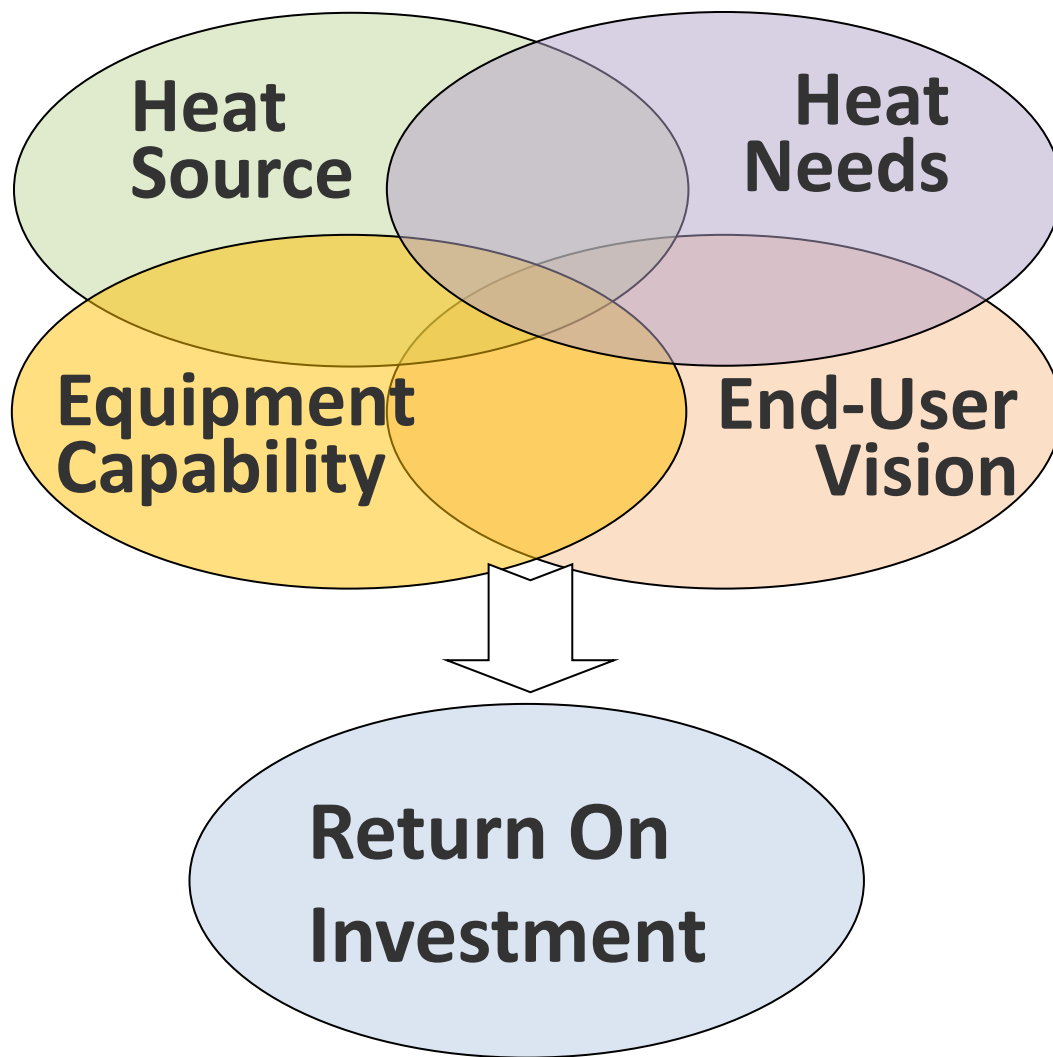
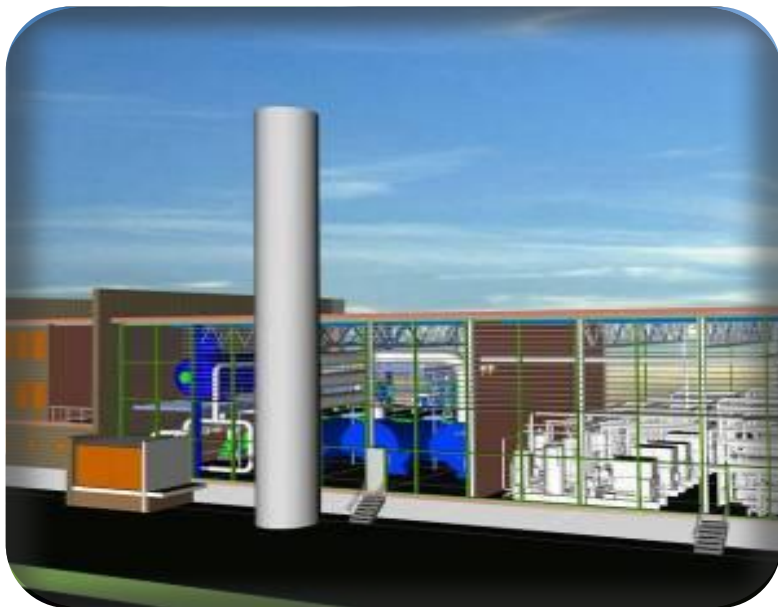


STRATEGO BRUSSELS 2016

**STAR RENEWABLE ENERGY
(big heat pumps)
David Pearson**





14 MW, 90°C, District heating
3 x 2 stage 4.6 MW Systems

 **DRAMMEN
FJERNVARME**

$$\text{COP}_{\text{heating}} = 3.0$$

Evaporating temp. 2°C
Sea water 8 to 4°C

Condensing temp. 89°C
District heating water 60 – 90°C

www.tinyurl.com/recycleheat



How significant is Drammen?



85% of heat is zero carbon (2035 Ready)

85% lower emissions

Right price for electricity means:

80% cheaper than gas

67% cheaper than biomass

No shortage of fuel – ever

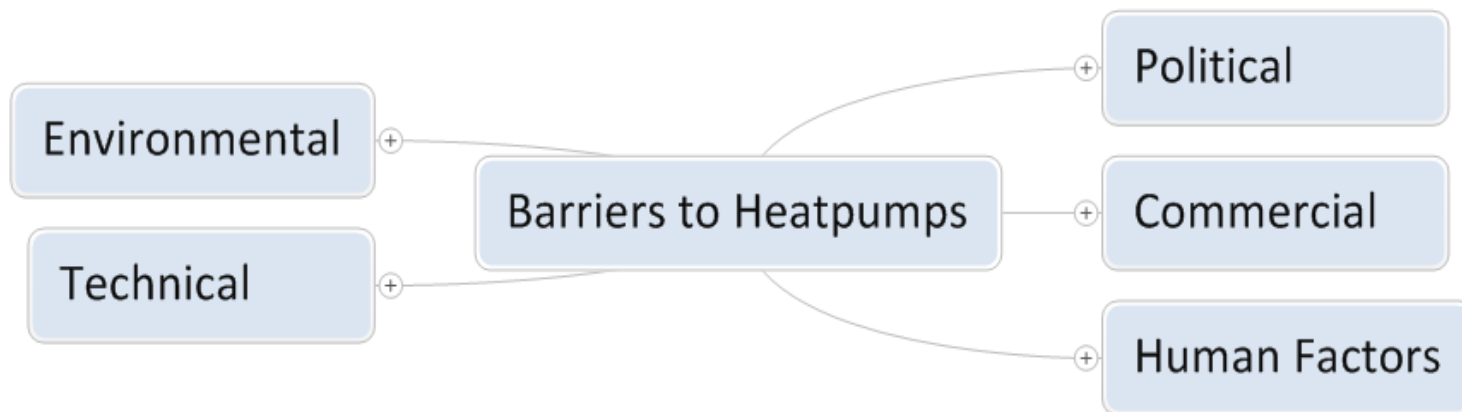
90C means any building

Repeatable in every European City

(rivers/sea/groundwater/sewers/industrial heat)

WHAT ARE THE BARRIERS?

ARE ANY OF THEM ACTUALLY VERY SMALL?



Barriers to Heatpumps

Political

- Squeeze down on gas
- Squeeze up on renewable - not enough
- Recovered heat as well as renewable
- Mandatory offer from gas providers
- don't allow NOT-DH ready developments

Commercial

- Simpler installs
- More market volume = lower costs (mainly installs)
- Don't tax electricity for heatpumps -Doh!
- Do tax emitters of carbon eg gas
- Beware Deadends - Condensing boilers & local gas CHP

