



CIBSE
Homes for the Future Group

Future heating seminar

At Hoare Lea, London, 14 Sept 2016

FUTURE HEATING STRATEGIES

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Solution Circles

CITY

**High heat density
& stressed utilities**

SUBURBS

Range of Solutions

**Low heat density
& limited utilities**

RURAL

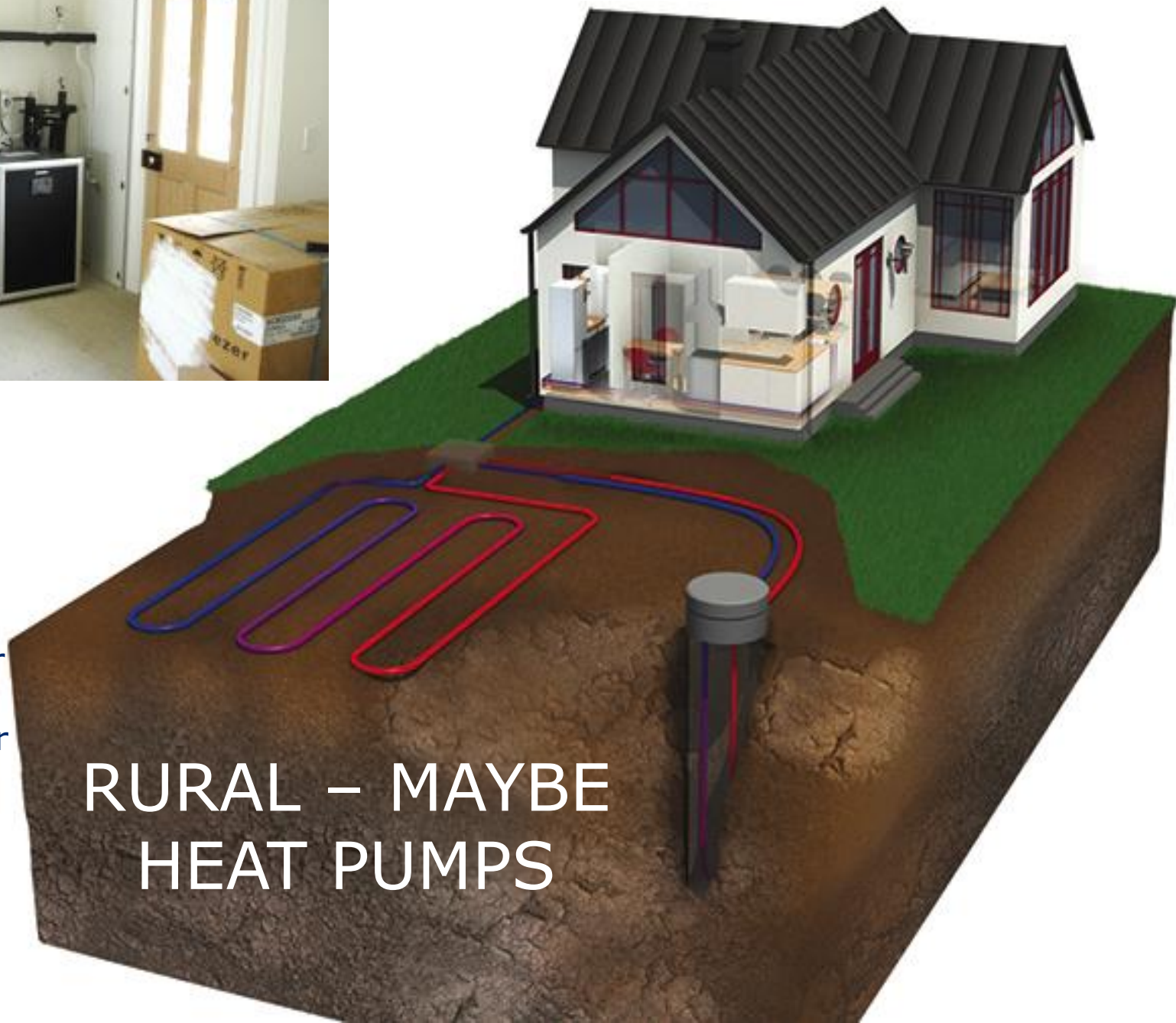
An aerial illustration of a city with a district heating network. The network is shown as a complex system of red and blue pipes connecting various buildings, including residential blocks, commercial buildings, and a large industrial or power plant structure. The city is depicted with green spaces, trees, and a road with yellow lane markings. The text 'HIGH HEAT DENSITY CITY' is overlaid at the top, and 'MAYBE DISTRICT HEATING?' is overlaid in the center. 'HEAT NETWORKS' is written at the bottom right.

HIGH HEAT DENSITY CITY

MAYBE DISTRICT
HEATING?

HEAT NETWORKS





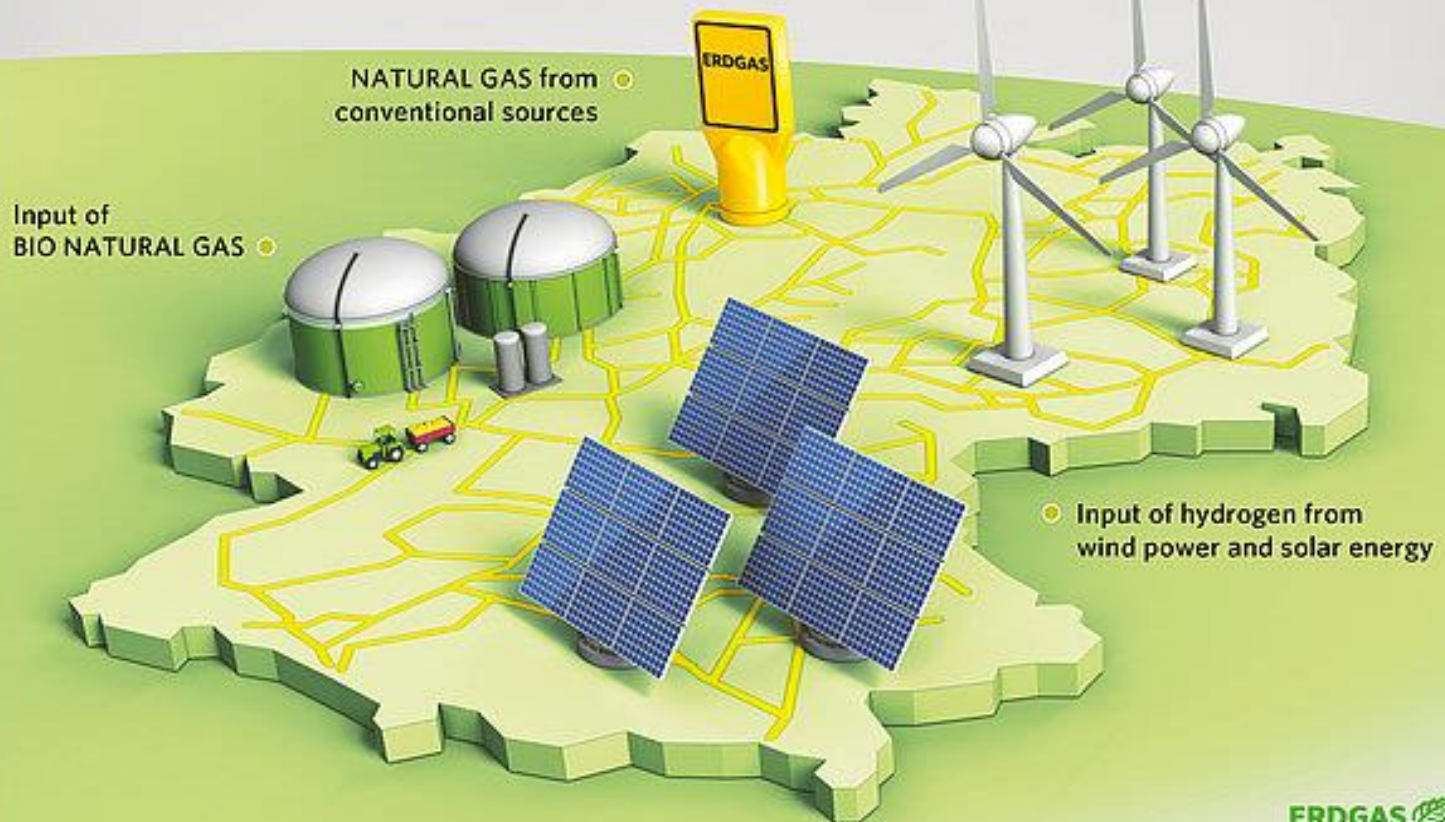
- Ground
- Ground water
- Surface water
- Air Source

RURAL – MAYBE
HEAT PUMPS

The gas grid - reports of my death have been greatly exaggerated

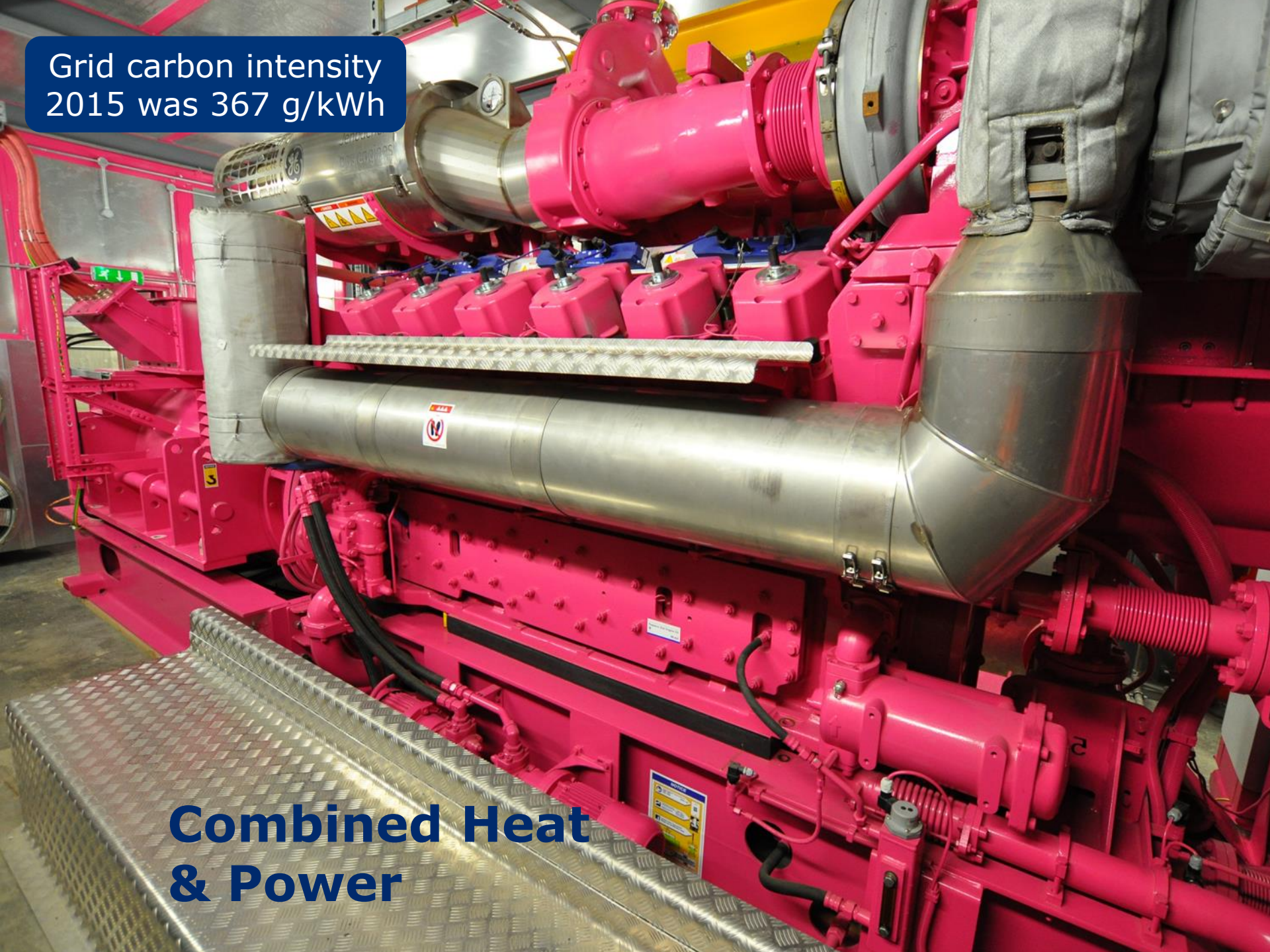


Natural Gas Grid of the Future Power from the Wind, Sun and Biomass



Grid carbon intensity
2015 was 367 g/kWh

**Combined Heat
& Power**



10 YEARS TO PREPARE

for a low carbon transition

Between 2025 and 2050 - 26 million homes will require new low carbon installations

20,000

homes per week



the equivalent of
10 Milton Keynes
each year

Few consumers are presently engaged to change their heating systems to combat emission reductions



Time



Effort



Money

our consumer research highlights people want better control of time, effort and money

There are two principal pathways for decarbonising domestic space and water heating



local area schemes using heat networks and individual home systems using electricity for heating

Eliminating emissions from buildings is more cost-effective than making deeper cuts in other sectors

£100 bn



likely cost of comprehensively retrofitting seven million homes

2,500

Consumers



involved in ETI research around heating use and needs

Carbon abatement costs increase around

30%

if electric heat systems are not used in any transition

Next decade is critical

10 Years



in preparing for transition as rapid implementation is required from 2025 to meet 2050 targets

90%

of the UK's housing stock will still be in use in 2050



20%

contribution of household heating to national carbon emissions



Figure Two: Half-hourly GB electricity & low grade heat demand variation, 2010¹

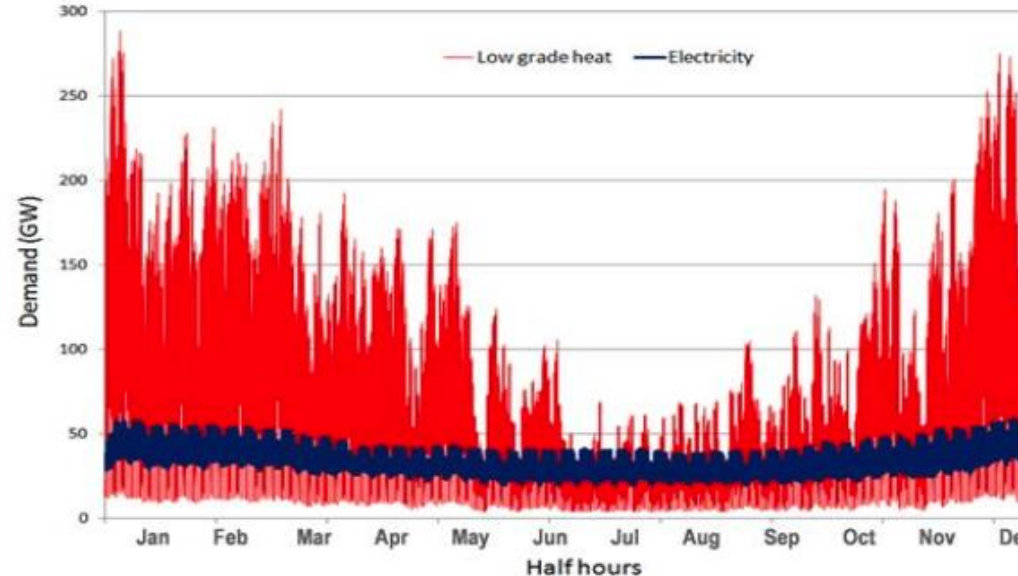
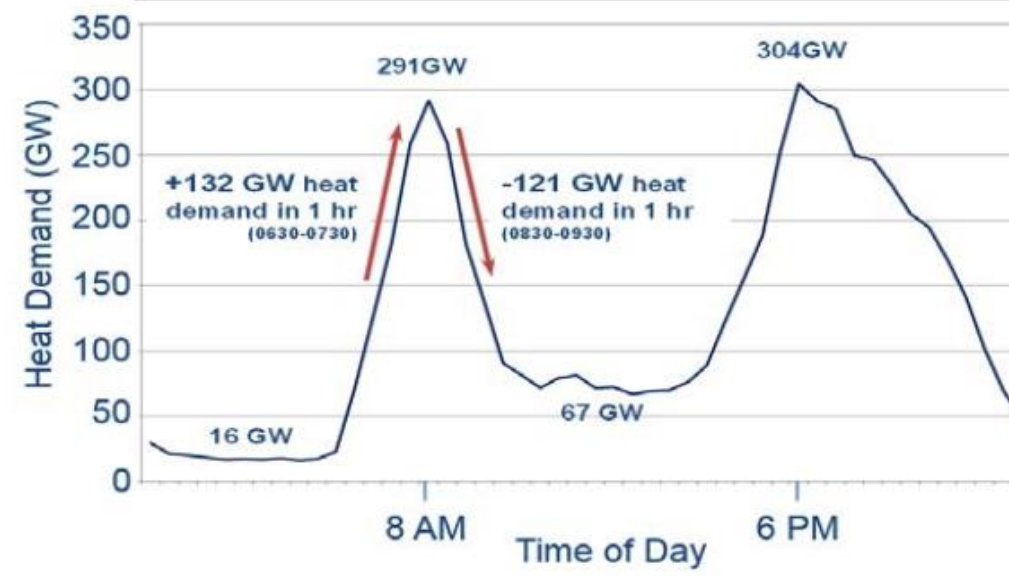


Figure Three: Winter Peak Heat Demand - 18th December 2010²



Old housing stock

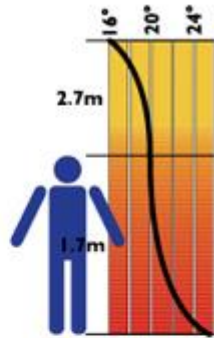


Peaky demand

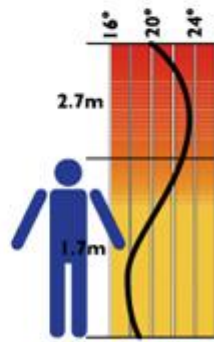
¹ Half Hourly Electricity and Low Grade Heat Demand Variation 2010 - Robert Sansom, Imperial College.

² Winter Peak Heat Demand - Data provided by Robert Sansom, Imperial College.

UNDERFLOOR HEATING

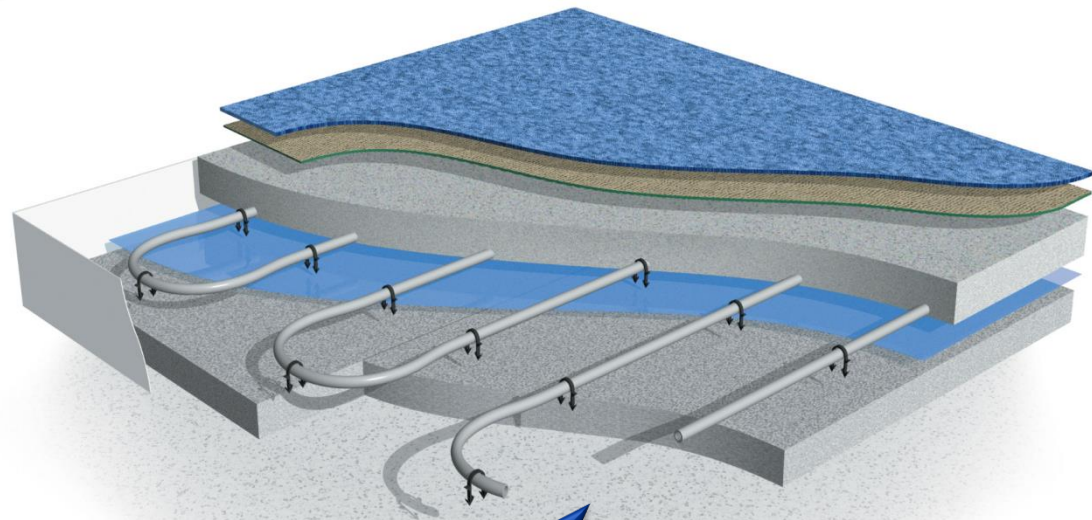


underfloor heating is the closest to an ideal heating system.



radiators

Operate at low temperature and with good comfort



Ideal for condensing boilers and Heat Pumps

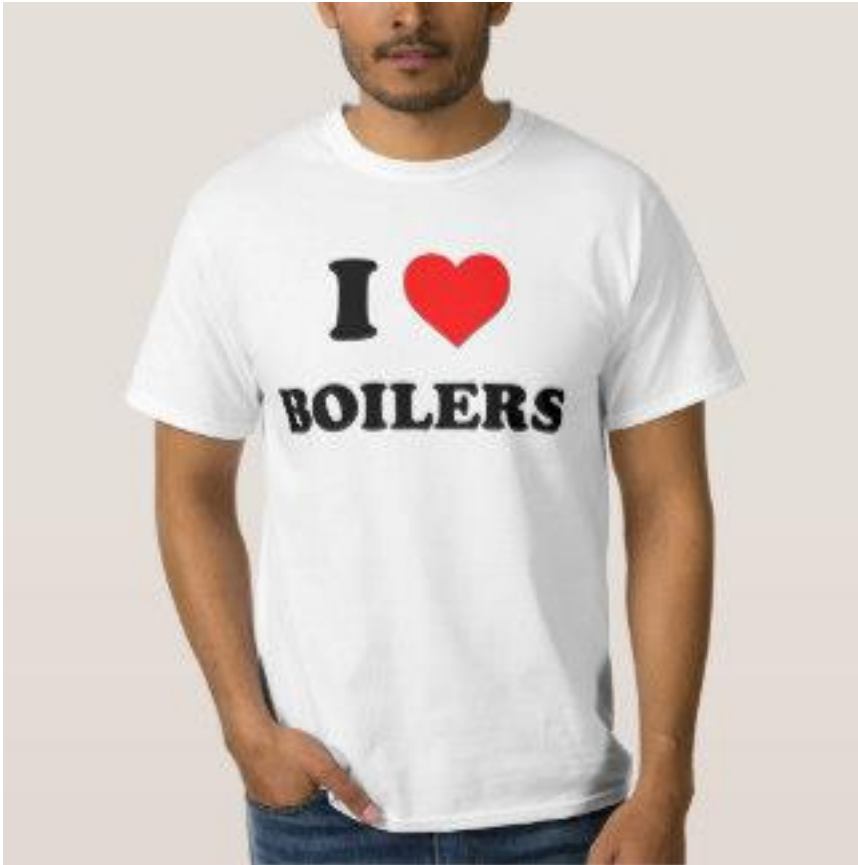
Lower temperatures for longer

THERMAL STORAGE - to smooth demand



Olympic Park

Consumers!

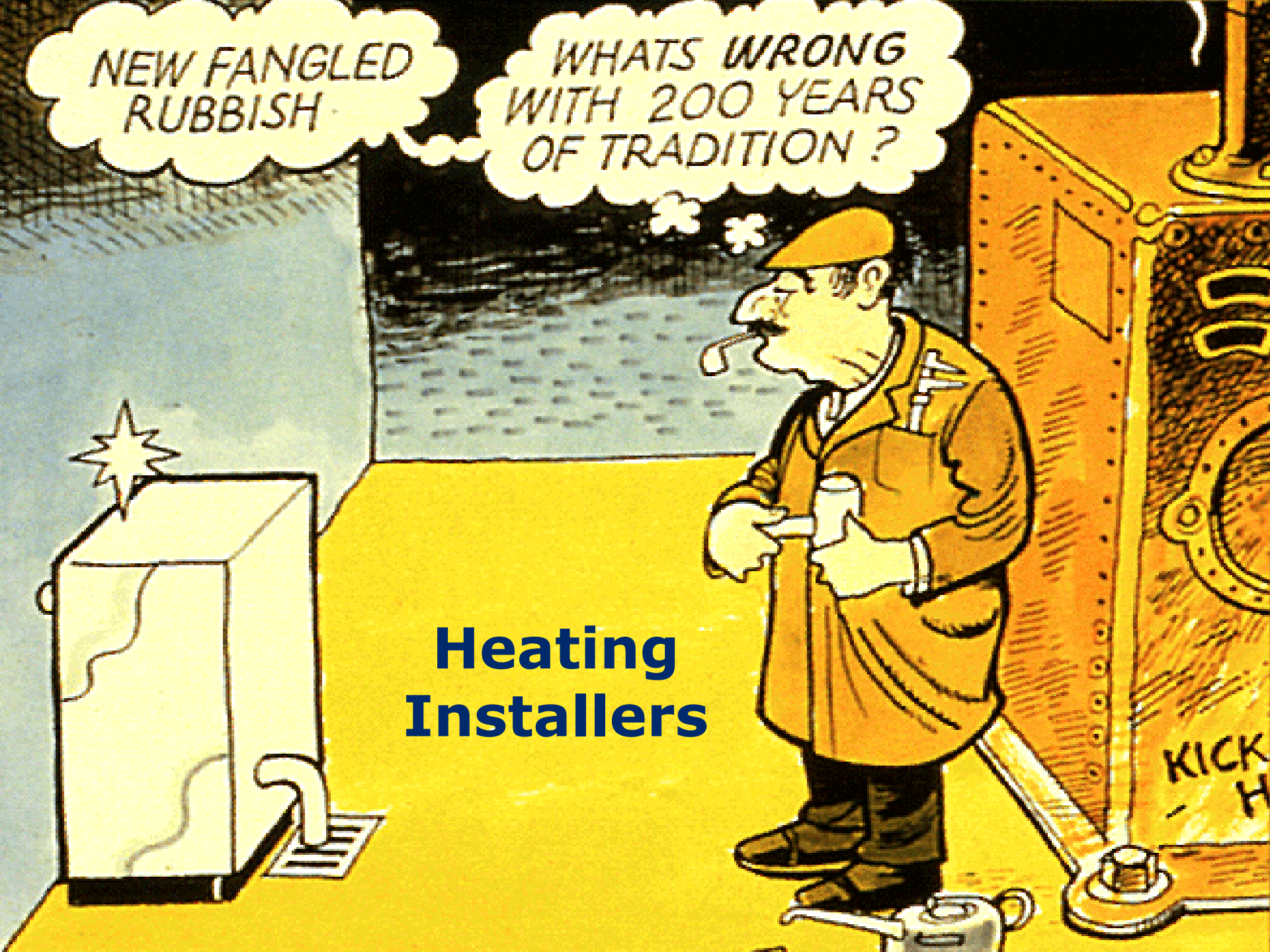


Reports of my boiler's death have been greatly exaggerated

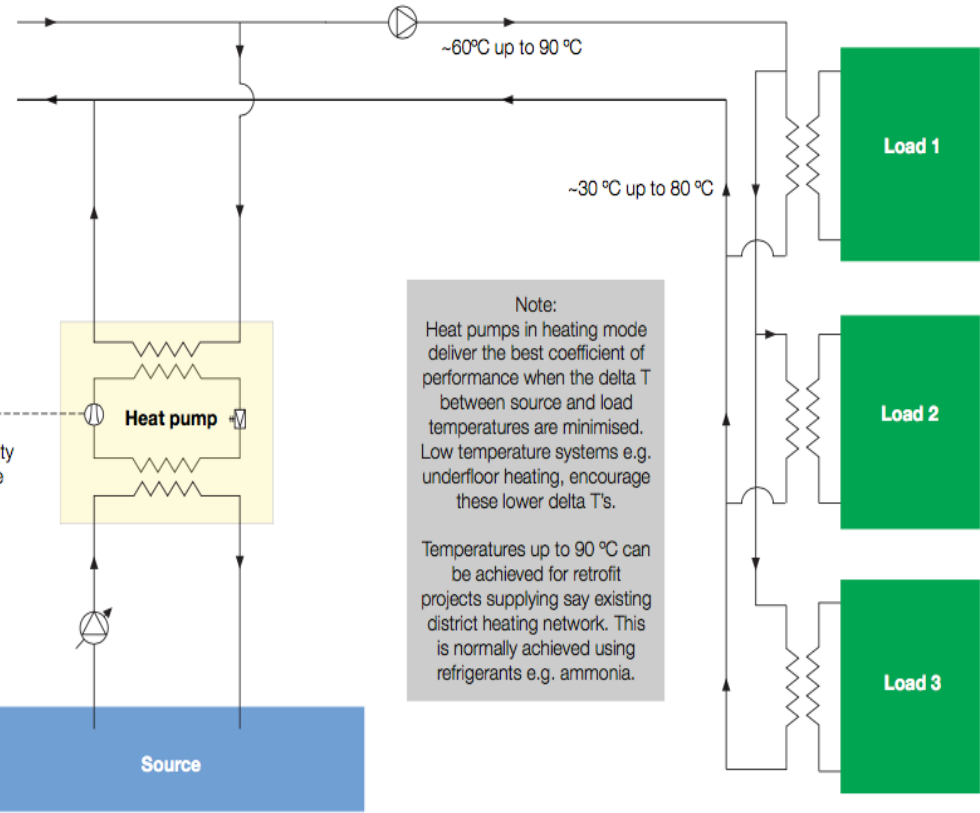
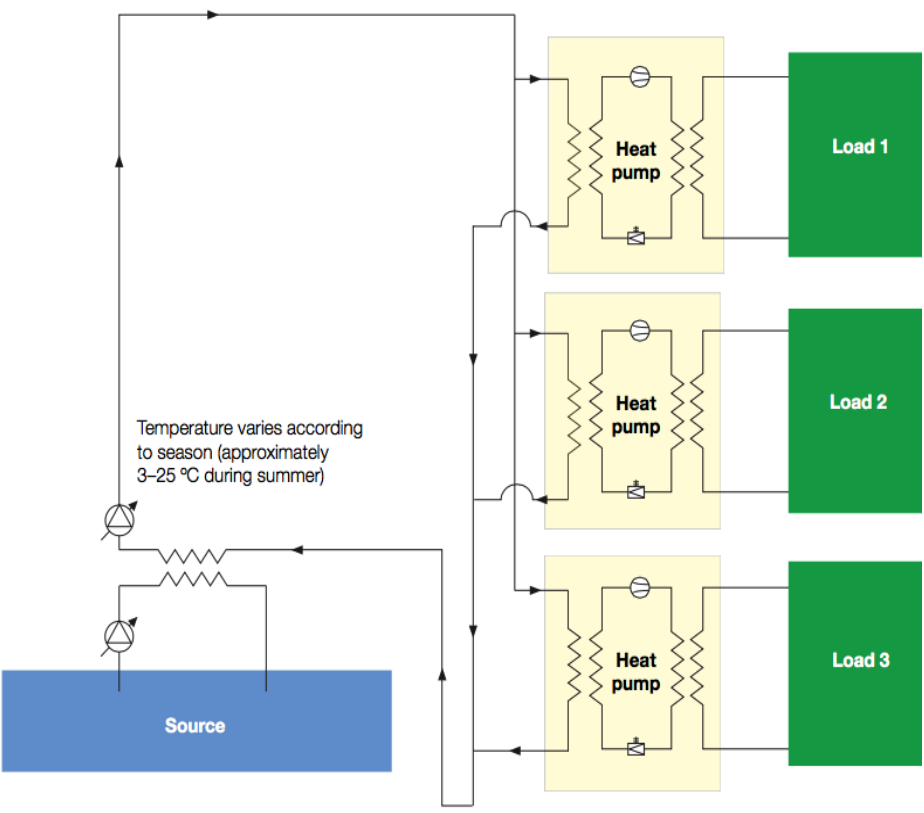
NEW FANGLED
RUBBISH

WHATS WRONG
WITH 200 YEARS
OF TRADITION?

**Heating
Installers**



Surface Water Source Heat Pumps



- Source side loop (Kingston)
- Load side loop [Heat Network] (Drammen)

Note:
Heat pumps in heating mode deliver the best coefficient of performance when the delta T between source and load temperatures are minimised. Low temperature systems e.g. underfloor heating, encourage these lower delta T's.

Temperatures up to 90 °C can be achieved for retrofit projects supplying say existing district heating network. This is normally achieved using refrigerants e.g. ammonia.



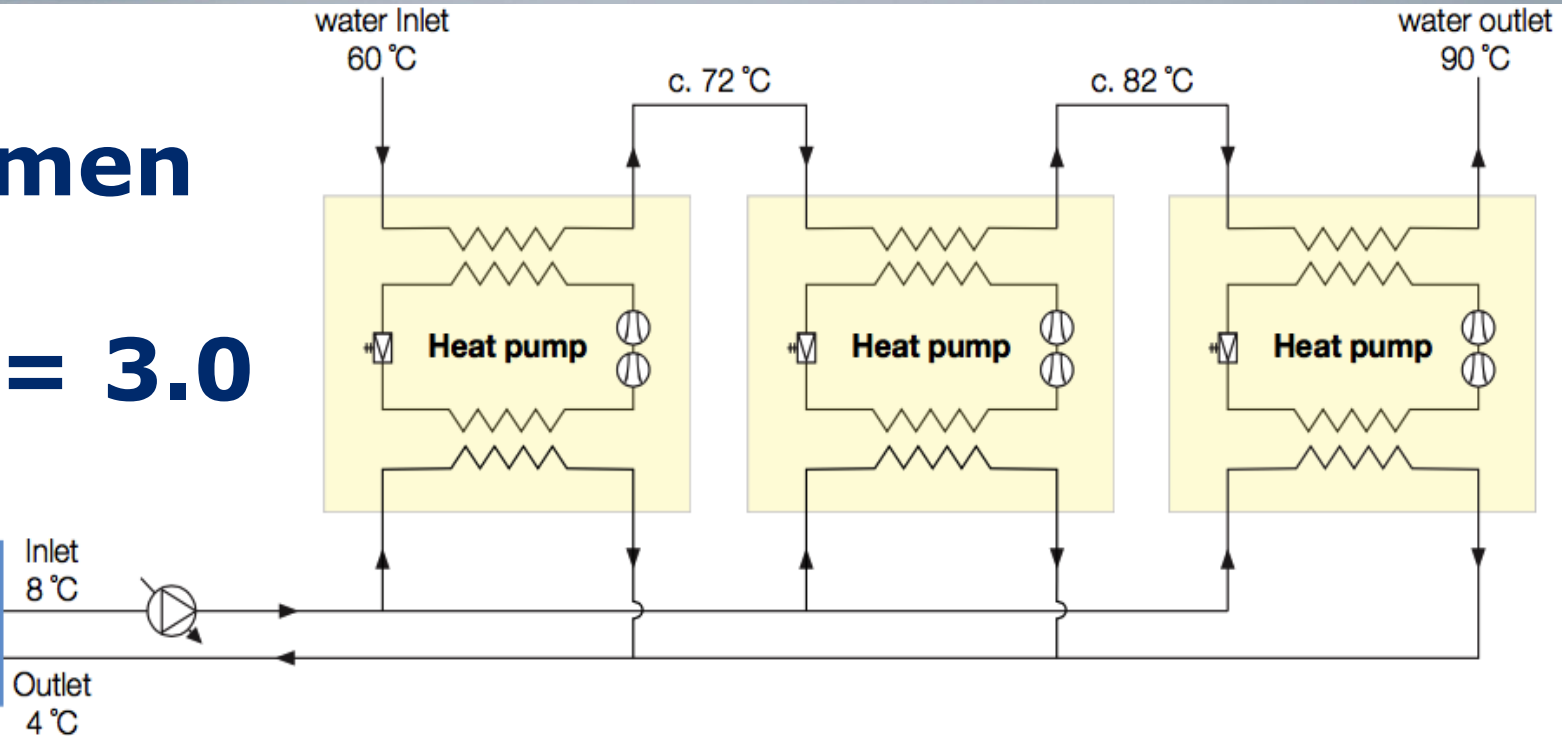
Drammen



Drammen

SCoP = 3.0

Source
(sea water)



Kingston Heights



A river runs through it!



**Kingston
Heights**



An ambient loop!

Kingston Heights

FUTURE HEATING

Will be a mix of technologies across the solution circles

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