The potential use of the mains water loop for cooling, heat and energy networks

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The heating and cooling challenges

District networks – challenges and opportunities

The potential use of mains / ring main water

A case study at McLaren House

Further work
The heat challenge from a Government perspective...
The heat challenge from a Government perspective...

More energy is used for heating than for electricity generation and this causes around a third of UK greenhouse gas emissions DECC 2012

RAC Industry consumes 16% of all UK electricity - 10% of all greenhouse gas emissions
What is the plan?

- Industrial Heat
- Heat Networks
- Heat in Buildings
- Grids & Infrastructure
The Future of Heating: Meeting the Challenge

Heat Networks

~ 2000 networks serve ~ 210,000 dwellings and 1700 commercial and public buildings

Could allow us to benefit from many sources of heat such as:
- CHP
- Deep geothermal
- Large heat pumps
- Waste industrial and commercial heat

Could be cheaper than electrically driven options
District heating’s share of the total market

Barriers to application

- Capital cost of the infrastructure - Disruption to a built up urban environment
- Institutional issues
- Cost of energy and carbon
Our study – 1

- McLaren House
- LSBU Halls of residence
- 600 bedrooms
- ~ 98 $m^3$/day CWS demand
- Heating provided by gas boiler
- Small cooling load
Our study – 2

- 4 options
- Existing heating and cooling
- Using CWS as cold source
- Pre heating HWS and cooling using a heat pump
- Rejecting heat from a heat pump to CWS
Direct cooling using fan coil units
Heat pump for HWS with cold rejection to the building’s cooling system
Use of a heat pump for HWS with cold rejection to the building’s CWS
Results – savings per hour

![Graph showing energy input, carbon emissions, and revenue costs for conventional system and three options.]

- **Energy input kWh**
- **Carbon emissions kg CO₂**
- **Revenue cost £**

Options compared:
- Conventional system
- Option 1
- Option 2
- Option 3
Further scope
Critical to success

- Integrity of the water main
- Heat transfer with the water main
- Implementation complexity
- Costs of implementation
Conclusions

- Enhancing heating and cooling networks for buildings
- Reducing dependence on conventional cooling and heating methods
- Reducing carbon footprint associated with cooling and heating
Thank you