HEAT NETWORKS CODE OF PRACTICE
Raising standards for heat supply

Phil Jones
CEng MSc FCIBSE MEI MASHRAE
Chairman CIBSE CHP-DH Group

Building Energy Solutions
07714 203 045
philjones100@virginmedia.com

www.cibse.org/CP1
DISTRICT HEATING

HEAT NETWORKS
THERMAL STORAGE
The need for standards

» Not always delivering on promises

» ADE market research

» Anecdotal evidence

» Huw Blackwell’s CIBSE Journal article (August 2013)
  – Poor pipework specification
  – Lack of insulation continuity
  – High operating temperatures
  – Poor pipework layout
  – Poor pumping and flow control
  – Lack of accurate metering
  – Poor commissioning

» A threat to the sector
The Code of Practice

- Voluntary
- Minimum standards, not guidance
- New build & existing
- Small & large heat networks
- Technology neutral
- Not district cooling
- For the whole supply chain
- For client tendering

Steering Committee

Author
Heat networks: 
Code of Practice for the UK

Raising standards for heat supply

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CIBSE/ADE 
HEAT NETWORKS 
CODE OF PRACTICE

➤ To set minimum standards

➤ To set best practice standards where possible

➤ Avoids reproducing existing guidance

➤ Already being used in tendering & contracts

➤ To underpin training, accreditation & registration

➤ To take the sector to the next level

➤ Launched July 2015
HEAT NETWORKS: PLAN OF WORK

A. Avoid oversizing
B. Achieve low heat losses
C. Low return/flow temperatures
D. Variable flow control
E. Low carbon heat sources
F. Risks and environmental impacts

STAGES
1. Preparation and brief
2. Feasibility
3. Design
4. Construction
5. Commissioning
6. Operation + maintenance
7. Customer expectations/obligations

AIMS:
- Provide a cost-competitive heat supply
- Maintain a high level of reliability in heat supply
- Reduce CO₂ emissions and energy usage

A more integrated supply chain
1. Preparation and briefing

Objectives:

1.1 To commission the project in accordance with the Code of Practice
1.2 To agree contracts that are fair and equitable with customers
1.3 To define appropriate service levels for the heat supply
Standards not set before

Projects often go wrong at this early stage"
New CIBSE written style

‘Shall’ rather than should
7. Customer expectations and obligations

Objectives:

7.1 To provide reports on energy supply and use and bills that are clear and informative

7.2 To develop communications with customers that meet customer expectations

7.3 Obligations to be met by customers
Key goals that run across all stages of the plan of work

A. Correct sizing of plant and network
B. Low heat losses
C. Low return temperatures
D. Use of variable volume control
E. Use low carbon heat supply
F. Safe, high quality, low environmental impact systems

But these goals are linked!
Correct sizing of plant and network

1. Main concern was diversity factor for instantaneous domestic hot water heating
2. Typical peak seen in practice is <5kW per dwelling for new flats
3. CHP heat capacity typically one third of peak
4. For the majority of time systems operate at 10% to 25% of peak
5. Oversizing of network leads to higher heat losses
Achieving low heat losses from network

1. Code requires calculation of heat losses and economic evaluation – no fixed maximum loss
2. Avoid oversizing
3. Minimise length of network
4. Insulation type and thickness
5. Low mean network temperature
   • But is a 90/40 system worse than a 65/40 system? – use of variable network temperatures
6. How important is it?
   • A typical CHP-based system with 30% heat losses has 10% higher emissions than one with a 10% heat loss – as the low carbon CHP will supply the extra heat loss
Low return temperatures (and low flow temperatures)

1. Low return temperatures result in:
   - Less volume of water
   - Smaller pipes – lower cost
   - Lower heat losses
   - More efficient central plant
   - More cost-effective thermal storage

Requirement for new radiator circuit is a return temperature < 40°C – achieved with pre-settable TRV designed for low flow rates

2. Lower flow temperatures result in:
   - More efficient central plant
   - Lower heat losses
   - But larger pipes offset this benefit and add to cost – need to consider impact of smaller ΔT

3. Minimise bypasses, minimise No. of heat exchangers, and use variable volume control

The building services design governs return temperatures!
Variable volume control

1. Variable volume control using two-port control valves results in:
   
   • Falling return temperatures under part-load
   • Lower pumping energy*
   • Lower heat losses
   • Better use of low carbon plant

2. Need controlled bypass flow to maintain temperatures in the network and meet minimum pump flow requirements

*For a 50% drop in demand pump energy drops to 12.5%
Use of low carbon heat sources

1. Optimal sizing
   • 60% to 80% from low carbon plant
   • Delivered CO$_2$ content <150g/kWh

2. Use of thermal store

3. Maintain low return temperatures

4. Location of peak boilers

5. EfW?

6. WSHP’s?
Safety, quality and environment

1. Safety
   • Trenching work remains a high risk area

2. Quality
   • Inspections of heat network installations
   • Commissioning of buildings

3. Environment
   • Visual impact
   • Air quality
   • Noise
   • Construction impact
Training, certification & registration

- To ensure implementation of standards
- DECC pump priming funding
- 3 day training course
- 1st day: introductory client overview
- Days: 2 & 3 technical plus short exam, leading to certification
- www.cibse.org/CP1training
- Similar to DEC/EPC training & registration
- Piloted in June 2015
Conclusions

» Successful CIBSE/ADE partnership
» Gained industry consensus
» Regular review
  – Best practice becomes minimum standard?
» Already being used in tendering
  – Indicates the need for standards
» Trained assessors in place
» Checking and policing
  – Maybe in future?
CP1 - Feedback

Heat networks:
Code of Practice for the UK
Passing standards for heat supply

www.cibse.org/CP1feedback

CP2 - publication soon

Surface water source heat pumps:
Code of Practice for the UK
Harnessing energy from the sea, rivers, canals and lakes

Other codes of Practice
www.cibse.org/Codes-of-Practice
SURFACE WSHPs

- Supply temperature?
- Heating or cooling?
- Sizing? (monovalent)
- Water source?
- Open or closed loop?
- Abstraction-discharge $\Delta T = 3^\circ C$
- Civil’s
- Environmental & regulatory issues
<table>
<thead>
<tr>
<th>Source</th>
<th>Specific characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea</td>
<td>Relatively constant source temperatures</td>
<td>RNLI (multiple projects)</td>
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<tr>
<td></td>
<td>Saline</td>
<td></td>
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<td></td>
<td>Stratification</td>
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<td></td>
<td>Riparian activities can be an issue e.g. affecting submerged pipework</td>
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<tr>
<td></td>
<td>Fish and other marine life including, molluscs, shellfish and crustaceans</td>
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<td></td>
<td>Storms and tidal</td>
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<td></td>
<td>Detritus, such as plastic bags</td>
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<tr>
<td>Estuary</td>
<td>Temperature modified by river temperatures</td>
<td>Plas Newydd, Anglesey</td>
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<tr>
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<td>Brackish with possibility of saline</td>
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<td>Fish and other aquatic and marine life including, molluscs, shellfish and crustaceans</td>
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<td>Tidal</td>
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<td></td>
<td>Detritus, such as plastic bags</td>
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<tr>
<td>River</td>
<td>Temperature dependent on flow, solar radiation, water source, such as melt water, groundwater etc.</td>
<td>Kingston Heights, London</td>
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<td>Temperature swing across the year</td>
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<td>Fish and other aquatic life including, molluscs, shellfish and crustaceans</td>
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<td></td>
<td>Potential for flooding</td>
<td></td>
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<td>Detritus, such as plastic bags, shopping trolleys etc.</td>
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<td>In urban areas, greater potential for vandalism</td>
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<tr>
<td>Canal</td>
<td>Very slow water movement with temperatures range from 2 °C to 25 °C across the year</td>
<td>GlaxoSmithKline, London</td>
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<td></td>
<td>Boats and canoeing</td>
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<td></td>
<td>Sludge and accretions</td>
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<td></td>
<td>Regular dredging and other riparian activities can be an issue affecting submerged pipework</td>
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Source side loop (Kingston)

Load side loop [Heat Network] (Drammen)
NEXT STEPS

➤ Look for high heat density opportunities

➤ Look for existing heat networks

➤ If you are thinking of developing/connecting to a district heating scheme then......
  - DOWNLOAD A COPY OF THE CODE OF PRACTICE
  - FIND A TRAINED HEAT NETWORKS ASSESSOR
  - CARRY OUT A THOROUGH FEASIBILITY STUDY

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