Modern Communal Heating Installations –
Key Considerations for an Effective System
What is communal heating?

- Centralised heating plant
- A satellite heating unit in each dwelling
- Independent control of heating and hot water for each residence
- An alternative to a conventional boiler or electric heating
- No requirement for a flue in each dwelling
- No need for expensive high rise gas installation
- Each residence is metered and charged just for the energy they consume
Communal Systems in the EU

Denmark 54%
Finland 50%
Netherlands 3%
Germany 12%
UK 2%
Common misconceptions about communal heating systems

- Lack of control
- Who will do the metering?
- Size of main plant
Common misconceptions about communal heating systems

• What about heat losses?
• Back up
• What about cycling of main plant?
• What about meters being tampered with?
• Communal heating is well suited to –

- Communal housing developments
- Blocks of apartments
- Sheltered accommodation
- Blocks of small flats
- Commercial premises
Evinox

Typical Apartment
Communal Heating System

Solar Collectors

Heating Interface Units

Central Plant Room – Thermal Store & Gas Fired Boiler
Typical System
Schematic 1

Communal heating system including CHP
Typical System Schematic 2

Communal system including Gas fired central plant, Solar, Biomass and Thermal Store
What are the benefits of communal heating systems?

- Independent heating and hot water for each residence same autonomy as having own boiler system.
- No requirement for a flue, gas supply or additional room ventilation in each dwelling.
- Eco-energy compatible - integrate easily with renewable energy sources; helps with SAP ratings.
What are the benefits of communal heating systems?

- More efficient - dramatically reduces kW loading compared to individual boilers
- Energy use for each dwelling is measured by a meter
- Remote billing and surveillance
- Easy access for servicing with minimal maintenance required
Integrating renewable energy sources

- Renewable technology can be effectively integrated and connected to a centralised plant room
  - Solar Thermal
  - CHP
  - Biomass
  - Air and Ground Source
  - Heat Pumps
Integrating renewable energy sources

Thermal Store
An introduction to Heating Interface Units for communal Heating Systems

Plate Heat Exchanger Units
Plate Heat Exchanger Units – Typical Circuit Diagram

Components

1. DH supply
2. DH return
3. DHW outlet
4. DCW inlet
5. HE supply
6. HE return
7. Circulation pump
8. Safety thermostat
9. Plate heat exchanger HE (Insulated)
10. HE control valve
11. Drain pipe
12. DHW control valve
13. Plate heat exchanger DHW (insulated)
14. Filling valve
15. Manometer
16. Air vent
17. Expansion vessel
18. Safety valve HE 3 Bar
19. Heat meter
20. Strainer
21. Lime scale reducer
22. Low pressure switch
23. MM control unit
24. Supply voltage
25. Ambient unit
26. Drain point
Plate Heat Exchanger Units

- Compact units save space – no requirement for stored water within the dwelling
- Instantaneous hot water
- Minimal Heat losses
An introduction to Heating Interface Units for communal Heating Systems

Heating Interface Unit with integrated Storage Tank
Storage Units –
Typical Circuit Diagram

Components

A Primary circuit return
B Primary circuit supply
C Domestic hot water
D Domestic cold water
E Apartment circuit return
F Apartment circuit supply
1 Domestic hot water storage
AISI 316L
2 Heat exchanger
3 Insulation 30/50 mm thick
4 Insulated Plate heat exchanger
5 Circulation pump

6 2-way valve
7 3-way valve
8 Thermostatic valve
9 Electric heater
10 Heat meter
11 Safety valve
12 8 l expansion vessel
13 Supply voltage
14 MM control unit
15 Ambient unit
Heating Interface Unit with integrated Storage Tank

- Diversity in sizing reduces central plant
- Primaries can be run at a lower temperature
- Flatter Load
- Easily integrated with renewables as storage can be used for buffer of renewable energy
Correct System Plant Sizing

• A coincidence factor has been defined statistically for centralised hot water production systems

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N = number of standard housing units T = peak period in hours S = Coincidence factor
For standard applications the weighting is obtained by using a forfeit value $F$ of 25 kW for each apartment. Where heat losses are greater than these values, it is the heating power of the apartment that is used as the basis of calculation.

$$P_1 = \text{losses} \times 1.05$$
$$P_2 = F \times N \times S \times 1.05$$

The upper value of $P_1$ or $P_2$ will be used.

**Example**

100 housing units fitted with ModuSat TP. Average losses of 3.5 kW per housing unit.

$P_1 = [(100 \times 3.5 \text{ kW}) \times 1.05 = 370 \text{ kW}$

$P_2 = 100 \times 25 \times 0.27 \times 1.05 = 709 \text{ kW}$

**The minimum power required is 709 kW.**
Unit with Integrated Storage - Calculation

For units with integrated storage, the coincidence factor will be used notably to ensure that the power of the boiler room can meet the total power required for the hot water. The power of the boiler room will therefore be:

\[ P_1 = (\text{losses} + 1 \text{ kW} \times N) \times 1.05 \]
\[ P_2 = N \times P_i \times s \times 1.05 \]

\( P_i \) being the instantaneous power absorbed, times by the sum of the units installed.

\( s = \) coincidence factor

The minimum power retained will be the highest value of \( P_1 \) or \( P_2 \).

**Example**

100 housing units fitted with ModuSat 75. Average losses of 3.5 kW per housing unit.

\[ P_1 = [(100 \times 3.5 \text{ kW}) + (100 \times 1 \text{ kW})] \times 1.05 = 472.5 \text{ kW} \]
\[ P_2 = 100 \times 11 \times 0.27 \times 1.05 = 312 \text{ kW} \]

The minimum power required is 472.5 kW.
Unit with Integrated Storage - Calculation

- Comparison for examples shown for 100 housing units

Plate Heat Exchanger Unit - 709 kW
Unit with integrated storage - 472.5 kW
Metering, Monitoring, Surveillance and Billing

Typical Solutions
Read Only Meters

- A requirement to physically attend the building to record the data

- Ideally located outside of the dwelling preferably in a communal area

- Good solution for small developments or where the meters can be installed in a convenient secure location within the communal areas
• Read meters remotely via a GSM modem or via telephone communication system

• Meter is wired to BUS data cabling system and data is fed to a master unit

• Master unit collates meter information and sends data to remote monitoring office
• Heat energy consumption

• Flow and return temperatures to and from the apartment from communal heating

• Actual flow rate of communal heating water into the apartment is be monitored.
BUS metering

- Temperature and flow readings provide an overview of system operation

- Provides engineer with the ability to check remotely if:
  - The system is balanced
  - Any areas of poor flow
  - An individual meter problem
BUS Metering and Full Remote Surveillance

• In addition to the features provided with BUS metering, full remote surveillance can include –

  ➢ Remote management software controls every satellite unit
  ➢ Data can be uploaded to the HIU to provide control remotely
  ➢ Control of heating by SMS text message
Pay as you go metering

- ‘Smart card reader’ system enables occupier to control energy bills by paying in advance
- Removes burden of bills or debt for end user
- No requirement for the Managing Agent or Housing Association to collect money from tenants
- Point of sale unit provided in local store or management office for purchase of card. Can also be topped up over the phone or internet
Complete billing service including revenue management

- Record daily consumptions of each apartment
- Monitor system performance
- Can issue billing data only or a full billing service
- Bills issued in a format agreed with client, ranging from spreadsheets to templates on clients own headed paper
- Perform a daily update of record for transactions made at the point of sale unit
- Revenue collection
- Utility bill management
- Provide reports of individual dwelling purchases for pay as you go meters
Key Considerations

Even with modern technology common problems still arise as a result of poor design or poor installation practices –

• Poor flow rates
• Poor hot water performance
• Lack of insulation
• Integrity of the communication bus
• Poor water quality through lack of correct water treatment
How do we prevent problems?

- Use qualified consultant for design and quality control
- Correct plant sizing
- Project Management
- Ownership of quality
- Strict quality control of the installation process
- Controlled commissioning and ample time for this important task
Key Considerations

Lease and tenancy agreements, things to consider in advance -

- Know in advance how you will look after the scheme before you start
- Future replacement costs
- Service charges where will they be charged to?
- Tariff costs
- Debt control
The benefits of a complete solution for communal heating projects

- Surveying and assessment
- System design
- Project Support
- Training
- After-sales service and maintenance
- Billing and revenue collection
• Any questions?
Visit our website for further information about our full range of H&V solutions for residential and commercial applications.