“Self-managed district heating”

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Full energy saving is achieved by using the most efficient component of the system and providing only the right energy required by each user.
Self-managed district heating
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The master controller knows in real time the instantaneous energy consumption for DHW or heating and it transfers this information to the boiler plant.

Using Radiax with DHW, the pumps’s speed can be set depending on the demand and the day time frame.

Using Radiax equipped with calorifier the primary circuit temperature can be reduced when DHW demand is absent.

Ratio between renewable sources energy and boiler provided energy is controlled by the Radiax.
System main components

Condensing boiler: high efficiency, especially at partial loads and low temperatures

Variable speed circulation pumps: manage the flow depending on the instantaneous water consumption, therefore saving electric and thermal energy reducing dispersion

Solar systems or biomass boilers are fuelled by cheaper or free energy sources; they provide from 50% to 100% the energy required by the system
Several Radiax models are available to maximize the efficiency of each eating system (floor heating, district heating, with calorifier, fan coil, with chiller, ...)

- Local DHW production through plate heat exchange up to 45kW

- Weather compensated flow temperature based on external temperature and room temperature in order to provide the minimal required efficiency with no energy waste

- The heat meter measures the energy consumption every two seconds to guarantee more precise accounting
Radiax data monitoring

- The unit manages BUS connections up to 255 Radiax and it includes GSM or analogic modem for remote control.
- Consumption data are transferred in real time to the boilerplant.
- RadiaxTel, the software for system remote management, checks faults, meters consumption and calculates fees.
- Each apartment can be configurated depending on its comfort and temperature features.
Simultaneous-consumption factor, a real case

- Goal: verify the DHW consumption trend in residential buildings
- Radiax: for 120 appartment residential building (split into groups of 60, 30 and 15 for a more precise statistic analysis), located in Bologna, Via Delle Armi
- Sistem: energy source: condensing boiler; energy meter: Radiax-Clima model; management software: centralized data mining
- Measurement conditions: 4 month of “phone calls” every 15 minutes between 4.30 am and 11.00 pm
- Reported samples in this presentation: full week in may with focus on may 24
Data analysis

**Active Radiax at the time of the call** (how many apartments were using DHW at the time of the call)

**DHW usages** (how many apartments used DHW at least once between two calls)
Data analysis

Delta kWh increase on all apartments (total consumption increase between one call and the previous)

Instantaneous energy consumption (power usage at the call)
Data analysis

Average DHW duration time when requested

Average primary flow for each apartment
Simultaneous-consumption analysis

Users simultaneously requiring DHW are:
- max 6 users out of 120 apartments (5%)
- max 4 users out of 60 apartments (6.7%)
- max 3 users out of 30 apartments (10%)
- max 2 users out of 15 apartments (13.3%)

The largest the number of apartments, the smallest simultaneous consumption
In a 15 minutes period, the active Radiax for DHW demand are:
max 60 out of 120 apartments (50%)
max 28 out of 60 apartments (47%)
max 16 out of 30 apartments (53%)
max 12 out of 15 apartments (80%)

The ratio number of apartments/energy request increases with decreasing of number of apartments
Instantaneous energy demand peaks transmitted by Radiax are:

- 71.60 kW on 120 apartments (0.6 kW per unit)
- 65.91 kW on 60 apartments (1 kW per unit)
- 28.18 kW on 30 apartments (0.9 kW per unit)
- 24.32 kW on 15 apartments (1.6 kW per unit)
Sizing of the system

- A Radiax Multiautonomo system can provide heating and DHW in a 120 apartments residential complex with only 750-800 kW.

- The same complex designed for wall hang boilers would need 120 of them at an average of 27kW, for a total of 3240.

- Radiax system requires ¼ the installed total power in a conventional system.
Self-managed district heating: advantages of individual and district heating together

Individual heating
- Individual temperature regulation
- Possibility to switch off any time
- Consumption is clearly defined
- House achieve higher value

District heating
- Higher flexibility in fuel choice
- Lower installed power
- Longer life of the more robust system
- Higher efficiency in production
- Lower maintenance costs
- Higher safety
- Lower emissions
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Thank you for your attention