



## Community Heat and Power

Autumn 2007

## What is community (or district) heating

The distribution of heat, rather than fuel, to individual homes or users from a local, yet centralised, boiler (heat generator)

If the heat is obtained as a by-product of electricity generation we reduce the need for thermal power stations and improve overall efficiency of use of fuel from 35% (fossil-fueled power station) to 80% (combined heat and power = CHP)



## Sources of information

A useful source with case examples and references to other sources of information

<http://www.chpa.co.uk/>



Waltham Forest

# Benefits of community heating

Benefits from economies of scale

Large boilers are more efficient than small

Fuel can be gas, oil or biomass

Simplicity of central maintenance

Potential for CHP is a more realistic possibility than at domestic level

Energy costs are lower than those of conventional supplies



St Pancras

## Relative fuel costs

Fuel	Pence / kWh	Kg CO <sub>2</sub> /kWh
Air-dried wood 20% moisture	2.0 to 3.0	0.3* (=0)
Heating oil	3.5	0.25
Electricity (domestic)	10	0.42
Gas (domestic)	3.0	0.19

**\* Life-cycle contribution is close to zero**

## Potential problems with community heating

How should costs be assessed and allocated equitably to users?

Users may feel “out of control” or unhappy about sharing an essential service

Who owns the service and takes responsibility for its day-to-day reliability and security of supply?

How are the depreciation and replacement costs managed and spread equitably?

The need for ducts and pipework favours new-build or replacement projects



Bristol

## Energy balance for CHP unit

Fuel	100%
Heat deg C	
High grade	45-55%
Medium grade	4-5%
Low	4-5%
Electricity	25-35%



BASF CHP unit 90%  
fuel efficiency

## Example: Ashfield District Council The Poplars - a sheltered housing complex



50 buildings with 150 residents and a community centre

Replacement of 25 year-old community-based heating system of one boiler by CHP unit and new boiler

A management company has a ten-year contract but Council negotiates gas price

Costs are allocated as an average across all similar homes across District to spread cost benefit of > £30,000 per year

CO<sub>2</sub> emissions saving, 680 tonnes per year

***Annual primary energy  
saving of  
1,260,000 kWh***

***Annual carbon dioxide  
saving of  
680 tonnes***

## The Poplars: Project economics

The total cost of the project	112,000
CHP plant	75,000
Electrical services, including new metering	8,000
New gas supply	5,500
New boiler	9,500
Local electricity company software charge	1,500
Other costs, incl. controls and consultancy fees	12,500
<b>Total:</b>	<b>£112,000</b>



*Running costs for the original boiler house were about **£53,800** a year.*

*With the more efficient, CHP-based, system these are expected to be reduced to around **£29,100** a year, giving benefits to both tenants and the Council.*

*Additionally, electricity costs at the Council's leisure centre and swimming pool are expected to be reduced by **£6,800** a year, giving total energy cost savings of **£31,500** a year.*

## Example: Rugby Cattle Market A potential opportunity

Mixed development on brown-field site

Master plan still in preparation but likely development is (approx):

- 120 Open-market houses
- 80 Social/affordable houses
- 1 Nursing home
- ? Offices

Is there scope for a community-based heating and/or CHP system?



Rugby Cattle Market – close  
to railway station and college

## Rugby Cattle Market - Energy required



Building	Area m <sup>2</sup>	Electricity kWh/yr	Heating* kWh/yr
200 houses	30,000	4,100,000	12,000,000
Nursing Home	1,000	67,000	440,000
Offices	5,000	210,000	575,000
<b>TOTAL</b>	<b>36,000</b>	<b>4,377,000</b>	<b>13,015,000</b>

## Rugby Cattle Market – CHP capacity ?



CHP capacity is determined by the minimum requirement for heating and in this case is taken to be sufficient for the CHP to supply 10% of annual heat load = 1,301,500 kWh.

Given the CHP provides 50% heat and 30% electricity from gas input then:

Total cost of running site from gas at 3.5p/kWh

and electricity at 10p/kWh would be: £893,225

Total cost of running site using CHP from gas £847,583

**Annual revenue saving is: £ 45,642**

*NB: The values assumed are illustrative only. More detailed assessment of actual patterns of demand are required for detailed design and sizing of boilers and CHP unit.*