



# Opportunities in the Biomass Heating Market



....Moving to Mainstream

*Chris Miles  
Econergy Limited*

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- What is the biomass heat market ?
- Where to find the opportunities ?
- Emerging markets – 2 important examples
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- What do I need to consider for biomass heating ?



**Betteshanger Colliery, Kent**  
**1 MW district heating**



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# What is the biomass heat market ?

- **Space & water heating** in buildings
- **Process heating** in greenhouses, fish farms etc
- Diverse solid fuel source
- Biomass boilers are mature technology
  - Large markets in Europe (10,000s of boilers pa)
- Fuel supply immature in UK
- Small unit size, large market
  - FES recommend 92TWh possible by 2020 (12% of UK heat demand)
  - Biomass Task Force: 7% by 2015



**Worcestershire County Hall 700KW (2002)  
10 year wood heat supply contract (ESCo)**

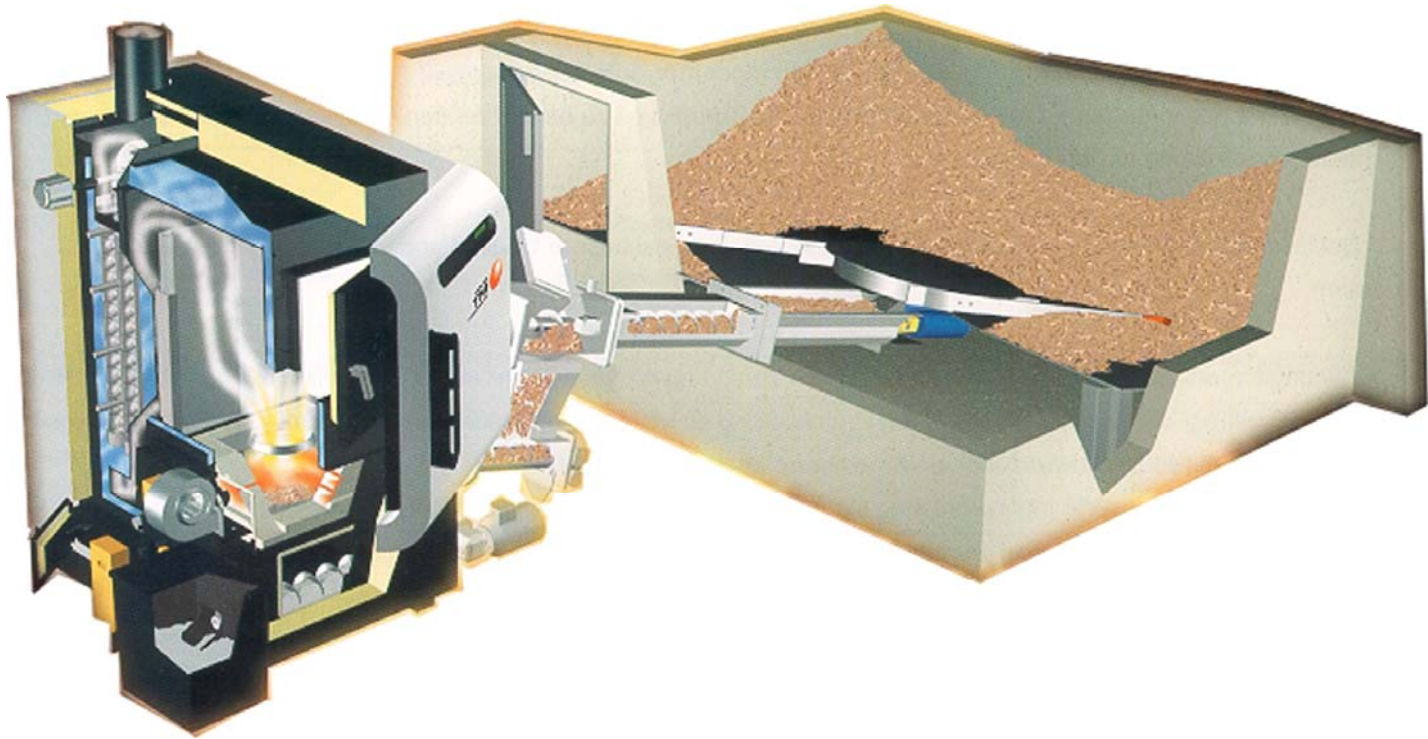


***Heat is nearly 40% of the UK energy demand***



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## How does the technology work ?



*Well specified boiler plant will operate automatically at very high levels of efficiency (>90%) and with clean emissions suitable for smoke control zones*



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# What is driving biomass heating ?



## **Biomass Heat Drivers**

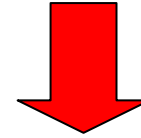
- Low cost of heat
  - 1/3 cost of oil; 2/3 cost of gas
- CO2 reductions
  - Carbon neutral fuel
- High heat load
  - eg nursing home
- Procurement policy
- Grants
- Planning mandates
- Part L building regulations
- Support farming/forestry



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# What are the barriers ?

- Capital Cost
- Space and access for fuel delivery & storage
- Wood fuel supply
  - Availability, quality, price
- Ignorance (high cost of sale & installation)
- Local service/installers
- “Consents” issues
  - Planning, Emissions, Lorries, Noise, PG1/12, Smoke control zones, Listed buildings.....



**Biomass Heat  
Barriers**



# e.g. Wood Chips Fuel supply - space & access for fuel storage



# Major Market No. 1

## District Heating for Rural Developments

- Groups of rural buildings
  - Farm yard re-development
  - Estate office & residences
- Fuel supply
  - Own forestry, energy crops
  - Fuel storage (barns)
  - Fuel transport (tractors)
- High oil bills
- “Heat Entrepreneurs”
  - 50 to 500 KW
- Market for forestry/energy crops



**Strawsons, Lincolnshire (2003): Underfloor heating of office development fuelled by willow coppice**





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# Rural developments: Key Needs

- Referral sales
- Local partners
- Standard designs for district heating
- Training for installers/fuel suppliers
- Infrastructure grants for fuel suppliers
  - Midland Wood Fuel, Anglia Wood Fuel, SE Wood Fuels etc.



**Lowes Farm, Norfolk (2005): District heating of 11 luxury houses & pool from estate forestry**





# Major Markets No 2 Public Sector Clusters

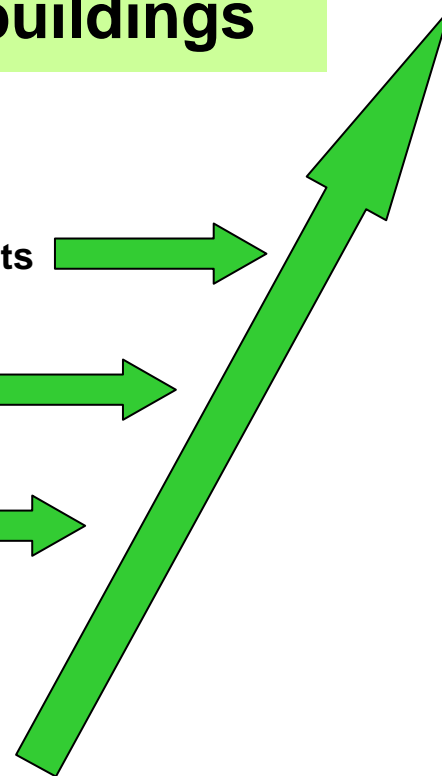
**Public estate: 50,000 buildings**

4) Planning “encourages” private developments →

3) Repeat business reduces delivery cost →

2) RDA investment in fuel supply →

1) Hedge against oil/gas prices →



**Biomass  
Champion(s)**



**Sustainable  
Procurement Policy**



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# South Yorkshire Cluster (2.5MW)



- **Social Housing (2005/06)**
  - Callow Place, Sheffield Council (500KW)  
6 blocks, 300 dwellings
  - Union St Flats, Barnsley Council (500KW)  
3 blocks, 140 dwellings
  - Carwood Close, Sheffield Council (320KW)  
97 houses – district heating
- **Council buildings (2006)**
  - Westgate, Barnsley (500KW)  
town centre district heating
  - Smithies lane, Barnsley (500KW)  
distribution centre
  - Digital media centre, Barnsley (150KW)
- **Barnsley Metropolitan Borough Council wins Ashden Award for sustainable energy (June 2006)**



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# South Yorkshire Fuel Supply

- Yorkshire Forward investment in fuel supply infrastructure
- Fuel supplier, Silvapower, uses a farmer to process, store & deliver fuel
- Barnsley Council fuel depot for their tree arisings
- >2,000 tpa by 2006/07
- Critical success factors
  - Fuel supply planning
  - Quality
  - Working capital





# Biomass heating system - design considerations

- Peak load heat loss & profile – to size boiler
  - Wood only: one or more boilers & buffer tanks (turn-down/back-up)
  - Hybrid: Wood boiler with gas/oil boilers for peaks & back-up
- Fuel type & source
  - Availability & price
  - Chip (moisture, particle size), pellet, log
  - Free from contaminants
- Space & access
  - Fuel delivery, receipt, storage options & delivery vehicle
- Planning issues (visual, emissions, noise, traffic....)
- District heating design
- Hydraulic & control issues determine system design



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# Which fuel should we consider ?

| Fuel type           | Wood chip  | Wood pellet   | Logs  |
|---------------------|--|---|---|
| Key characteristics | <p><b>Heat cost: 1- 2.5p/KWh</b><br/>           10KW to 5MW<br/>           Low energy density<br/>           (600KWh/m3)<br/>           Automatic feed for 24<br/>           hour operation<br/>           Large scale operation is<br/>           most economic</p> | <p><b>Heat cost: 3 – 4.5p/KWh</b><br/>           10KW to 500KW<br/>           High energy density<br/>           (3450KWh/m3)<br/>           Can transport long distances<br/>           Fuel delivered by blower</p> | <p><b>Heat cost: 1 - 2.5p/KWh</b><br/>           15 to 70KW<br/>           Easy to handle<br/>           Known &amp; existing supply chain<br/>           Can produce from small scale<br/>           wood land</p> |
| Issues              | <p>Low need local supplier<br/>           Quality is critical<br/>           Fuel reception design is<br/>           key</p>   | <p>Pellet quality is critical<br/>           Cost<br/>           Need large scale production<br/>           to keep costs down<br/>           Unlikely to be local</p>  | <p>Need to load manually at least<br/>           once per day<br/>           Only suitable for small scale</p>  |



# Wood Pellets – emerging fuel supply Jesus College, Cambridge

- 100KW KWB wood pellet boiler
- Installed to meet part L building regulations at lowest cost
- Pellets supply by Energy Crops Company, who are setting up a national pellet supply business





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# Automated log boiler

- up to 70KW
- Full control of heating system, back-up boiler & DHW
- Modulating output control - up to 92% efficiency
- Logs up to 50cm
- Up to 20 hours running time (more with buffer)
- Combustion optimisation
- Manual load (daily)
- Lower cost than wood chip installation





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# Energy Service Contracts (ESCos)

## 1. Energy Service (excl. capital finance)

- Customer finances boiler plant & awards 1 to n year biomass heat supply contract
- Supplier designs, purchases, build, operates, maintains plant and manages fuels supply

## 2. Energy Service (incl. capital finance)

- 10 to 20 year biomass heat supply contract
- Supplier finances, designs, purchases, build, operates, maintains plant and manages fuel supply



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# Next Steps

## Feasibility Study

- What are your real objectives ?
  - CO2 reduction, using local forestry, economic, PR ?
- Do you have space & access ?
- Assess options v. economic, environmental and other criteria ?
- Validate fuel supply

## Managing risk

- A hybrid wood fuel / fossil fuel solution
- Use proven technology & service companies
- Energy services contract using quality fuel

chris@econergy.ltd.uk      Tel: 07730 437221