

# Biomass Co-Firing Ferrybridge “C” Power Station

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Combustion, Coal Characterisation And Coal  
Conversion Divisions.

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# Scottish and Southern Energy



- UK's largest non-nuclear generator
- Over 10,000MW of generation capacity including share of joint ventures
- 46.6TWh generated
- 1,518MW of renewable energy generation
- 568MW hydro and wind generation capacity qualifying for ROCs



# Renewable Obligation



- Designed to increase amount of renewable generation
- Firing Renewable fuels to satisfy the Government's Renewable Obligation
- Identify fuels that will burn well and are economically and environmentally sustainable



# Co Firing of Biomass



- First Commercial co firing of biomass in a UK Coal Station, Started Sep 2002
- 920 Kt Biomass burnt (Mar 08)
- Principal Fuels: Olive Pellets, Palm Kernels

# Biomass Characteristics

Fuel	Cv GJ/Tonne	Volatile Matter	Ash	Moisture
Olive Pellets	16 - 17	66%	7%	9%
Palm Kernels	16.5-17.5	67%	4%	9%
Wood	16.5 – 17.5	74%	0.5%	7%
Coal	24-25	28-32%	10%	10 – 12%



# Olive Cake



- Olive Cake
- Dried filter cake from Olive Oil Production
- Relatively cheap, Freely available.
- Difficult to mill due to fibrous nature of stones
- High  $\text{Cl}^-$  from Brine Washing



# Fuels – Olive Pellets



- Consists of the pulp from Olive Oil Production
- No Stones
- No Cl<sup>-</sup> problems
- More expensive than cake but easier to mill

# Palm Kernel Expellers



- By Product of Palm Oil manufacture
- Best quality fuel for co firing
- Dust more of an issue
- Environmental Issues with destruction of rain forests



# Wood



- Require dried wood – Green wood too wet
- Wood Pellets widely available in Scandinavian domestic market
- Relatively expensive
- Fibrous – Unsuitable for high dosing Co-milling

# Co Milling



- Biomass delivered to plant by road
- Stored in purpose built facility- Rain, Odour & Dust
- Loaded onto coal conveyor from dedicated feeder
- Dust controlled by cyclovent facility
- Rotting Biomass and vermin control



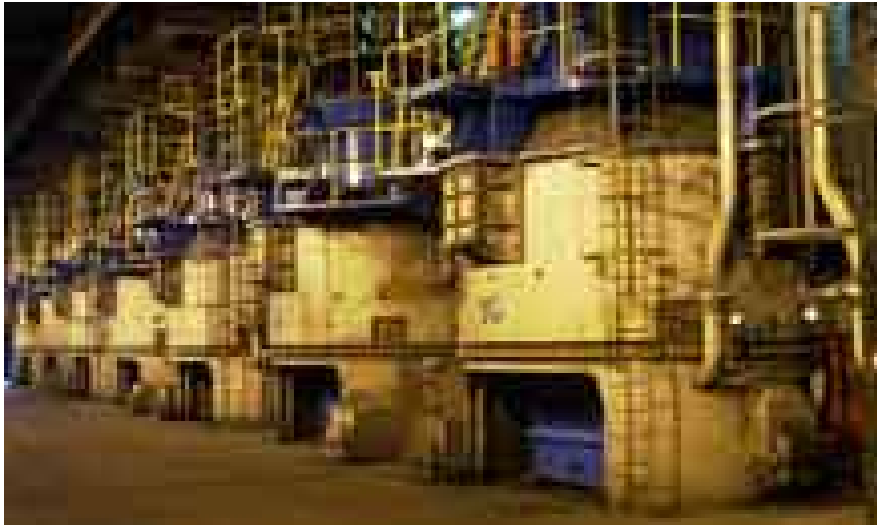
# Co Milling Issues



- Load degradation –  
Particularly at high dosing  
levels  $> 5\%$  w/w
- Measurement of dosing  
rate achieved through  
control scheme
- Extra cleaning
- No effects seen on pressure  
parts – low dosing rates  
dilute K levels



# Milling Equipment



- Babcock 10E Ball Mills
- Mills fill up, and have to be backed off
- Mill Motors have failed due to high running currents with higher biomass %

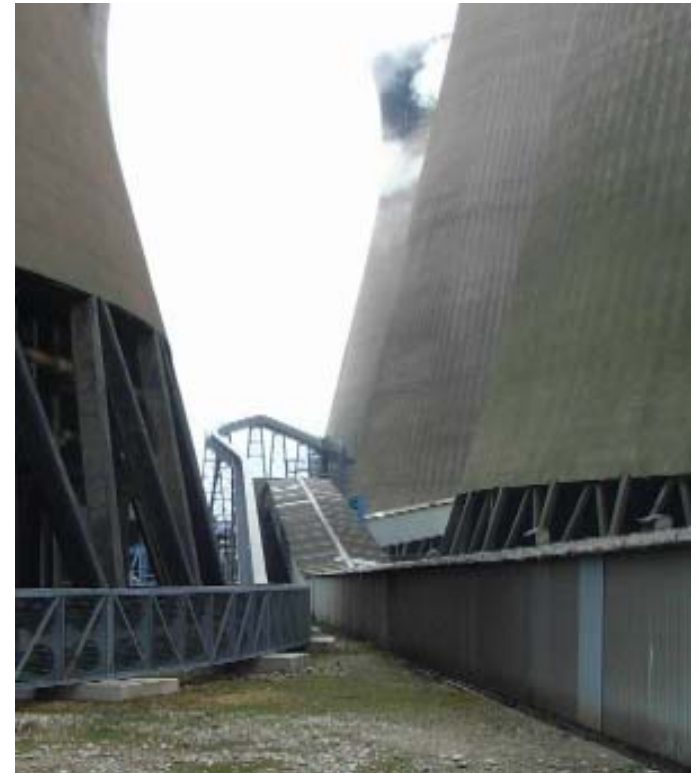
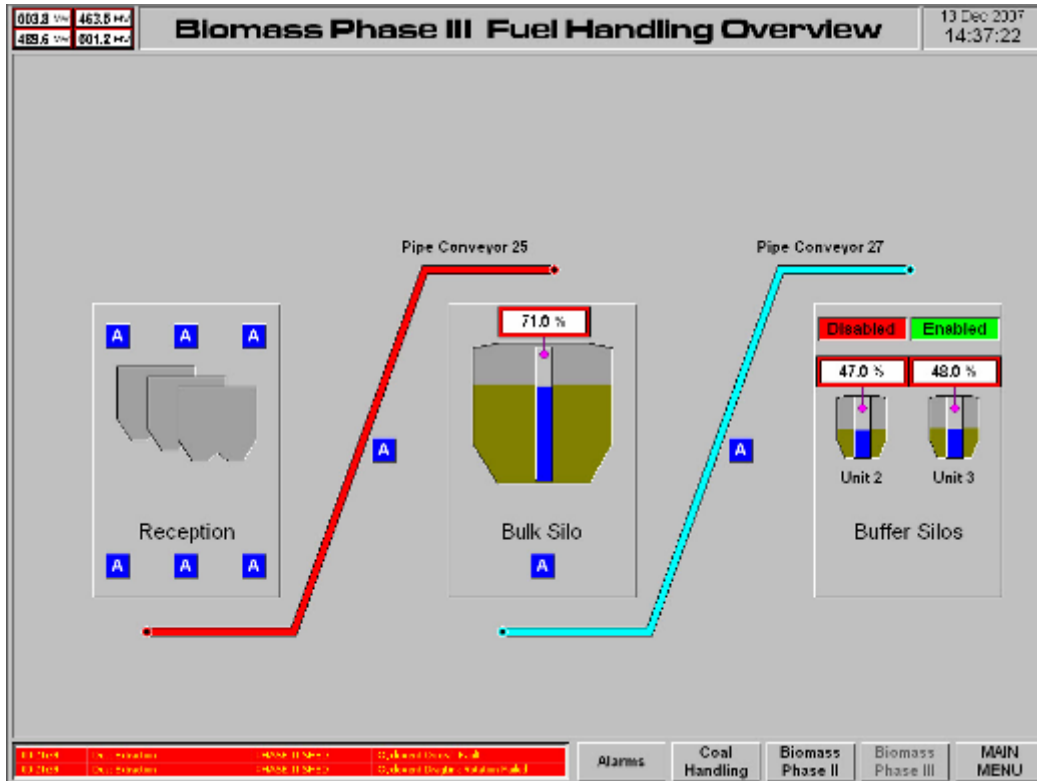
# New Biomass Facility



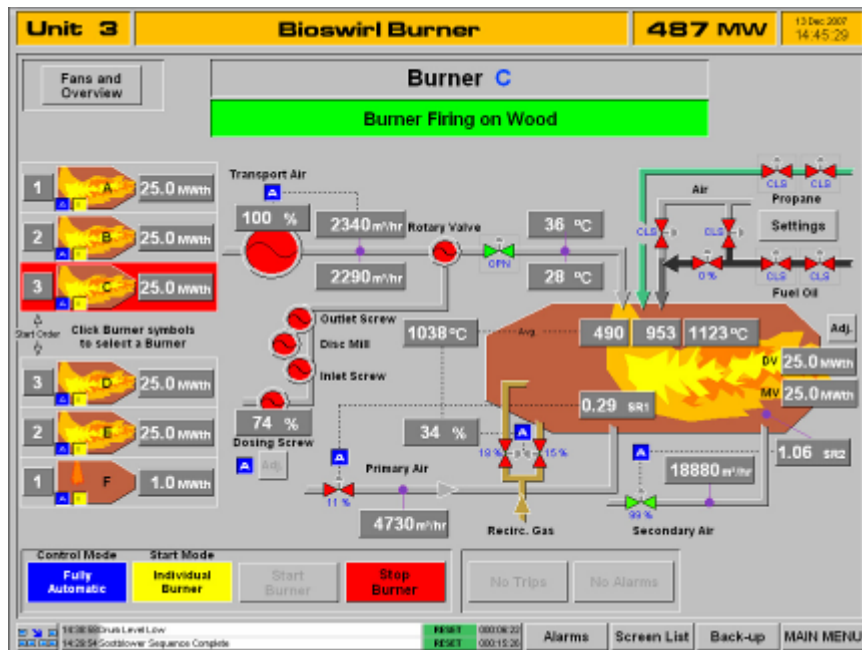
- New dedicated facility for firing neat biomass
- New reception and material handling facilities



# Material Handling



# Dedicated Burners



- Sub Stoichiometric combustion in first stage of burner
- Gasses burn in furnace chamber
- Burning White Wood
- Requires clean fuel – not resilient to contamination



# Burners

