Biomass Opportunities in UK Electricity Market
Introduction

- Issues very complex
- Very political
- Issues very inter-related
- Climate Change
- Renewable Power does not work without subsidy
- Biomass is now “High Risk”? 
Contents

- Review of impact of previous UK policies
- EU Political Dimension
  - EU ETS
- UK Political Position
  - 2000 Energy Paper 68
  - 2003 Energy White Paper
  - 2007 Energy White Paper
  - 2009 Renewable Energy Strategy
  - 2010 ROO 2011 Consultation
- ROC Scheme
- Biomass Market from 2010
- Concluding Comments
Review of Previous UK Policies

- 1976 Department Trade & Industry Plan – 200 mt/annum of coal
- 1990’s Privatisation Programme
  - Dash for Gas – Politics √: Envment ×
  - British Coal
  - Bacton Gas Link
- Electricity Market
EU Political Dimension

- EU’s Kyoto Commitment – Legally binding from 06
- Kyoto – What’s next post 2012?
  - EU GHG Emission 2010 target
EU Political Dimension

- EU National Allocation Plans – 1st stage 04 - 07
  - EU States submitted plans in 03
  - Very complex, many opt outs used
  - Most states issued too many allowances, apart from UK! (Explanation later)
  - Overall shortage of carbon, until Mar 06
    - Emissions published in 06 – price collapse
  - Prior Mar 06 Carbon Price Euro 33/mt – then Euro 0.50 cents to 08
EU Political Dimension

- EU National Allocation Plans – 2nd stage 08 – 12
  - EU States submitted plans in 06/07 most rejected
  - EU response - very stringent approach
  - A number states plans rejected & made legal challenge – broadly failed (5!)
  - Buoyant market from 08 – but nervous!
  - Future 08 carbon price Euro 23/mt
  - Current price ~ €15 (recession!)
  - 09 Emission year: UK 60% of shortfall
    - Impact €300m (Explanation later)
## EU ETS phase2 caps (mt/CO₂)

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**Total:**
- **2,298.5**
- **2,122.16**
- **2,325.34**
- **2,080.93**

*Source: EU Commission Announcement 26 October 2007*
EU Political Dimension

- EU Performance
  - 2010 Projected Performance

![Figure 16: Relative gap (over-delivery or shortfall) between “with existing domestic measures” projections and targets for 2010 for EU-15 and Member States](image)
EU – ETS Impact on UK Market

- Impact on marginal cost

![Chart showing the impact of ETS on marginal cost for coal, gas, and oil. The x-axis represents Allocation Price (€/tCO2e) and the y-axis represents Change in Marginal Cost (€/MWh). The lines for coal, gas, and oil are depicted with respective colors.]
EU – ETS Impact on UK Market

- **Generation Cost Comparison**
  - Marginal cost of electricity from Gas at 50% efficiency and 20p/therm is £13.50/Mwhr
  - Marginal cost of electricity from coal at 37% efficiency and £1.20/Gjoule is £11.00/Mwhr
UK Political Position

Government Planning

- Renewable Energy Strategy Consultation 2008
- UK Renewable Energy Strategy 2009
- 2010 Consultation on Grandfathering of Dedicated Biomass; AD & EfW 2010
- 2010 Consultation on Grandfathering of Liquid Bio-Fuels – still current
- 2011 ROO Consultation – still current
- 2012 Banding Review
UK Political Position - 2000

  - Projection energy demand and CO2 emissions
  - ESI and 12 economic sectors
  - Model of UK economy to 2020
  - Least cost solution to achieve Kyoto
UK Political Position - 2000


Crude Oil Price Assumptions

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<th>Year</th>
<th>Low $US/bbl</th>
<th>High $US/bbl</th>
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<td>2020</td>
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UK Political Position - 2000


Delivered Gas Price Assumptions

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<td>2020</td>
<td>12.3</td>
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UK Political Position - 2000


UK CO$_2$ Emission Predictions (MtC)

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<td>2020</td>
<td>160.0</td>
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UK Political Position - 2000

  - CHP Targets
    - 10Gwe by 2010 – *Bacton interconnector*
  - Renewable Targets
    - 10% of Electricity Generation by 2010
    - Introduction of ROC Scheme
  - Road Fuel duty escalator – *Fuel strikes*
  - Effect of Climate Change Levy - £4.30
UK Political Position – 2003

- Energy White Paper 2003
  - Path to 60% reduction by 2050
  - Renewable sources 30-40% by 2050
  - To 2010 based on EP68 energy projections
  - Updated set of Energy Predictions from 2010
  - But significantly did not address low gas price assumption in 2000 plan
### UK Political Position – 2003

#### 2003 Energy Bill Generation Prediction to 2010/20

**Generation (Gross supplied) by fuel type (Major Power Producers) (TWhe)**

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<tr>
<th></th>
<th>DTI (2003)</th>
<th>EP68</th>
<th>EWP</th>
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<td>Gas</td>
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<td>173</td>
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<td>Imports</td>
<td>10</td>
<td>8</td>
<td>6</td>
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<td>Total</td>
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<td>371</td>
<td>387</td>
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<td>NGC 7 year</td>
<td>364</td>
<td>387</td>
<td>290/335</td>
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<td>Difference</td>
<td>16</td>
<td>16</td>
<td>16</td>
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</table>
UK Political Position - 2003

Additional Measures (2003 Energy Bill)

- Transport – RTFL scheme
- Emissions Trading target of 4Mt C/y - if €40/ton
- Building Regs – Tighter & aim CO2 neutral
- Afforestation – “The National Forrest”
- Public Sector Targets – NHS reduce 2000 Carbon Footprint by 15% by 2010
- Domestic Energy Efficiency – Energy Trust
- Business Energy Efficiency – Carbon Trust
UK Political Position - 2003

- EU ETS Phase 1
- UK National Allocation Plan - 2003
  - UK declared its position with
    - Updated energy projections with significant underestimate of “business as usual” emissions
    - Electricity demand under-estimated
    - Power sector bigger burden than expected
    - UK legal challenge in 05 - *Failed*
    - 15m tonne CO2 shortfall in 2005-7 period
  - Carbon bought 04 - 07 from other EU states
UK Political Position – 2007

- **Energy White Paper 2007**
  - Renewables Obligation Review
    - Banding
    - Headroom
  - Biomass Strategy
    - Major expansion of supply and use in UK
  - Commitment to RTFO
    - 2.5% by 2008
    - 5% by 2010
    - 10% by 2020
  - Carbon Capture Storage CCS
    - Installations to be brought into EUETS in Phase II
    - Competition for funding
UK Political Position – 2007

- **Energy White Paper 2007**
  - **EU ETS**
    - To achieve ambitious Directive to generate confidence in long term carbon price
    - Aviation?
    - Surface Transport?
  - **Distributed Generation**
    - Simplification of Licence Conditions to remove barriers
    - Price transparency – simple tariff
    - DTI – Distributed Energy Unit (to assist developers)
UK Political Position – 2007

- **Energy White Paper 2007**
  - Carbon Reduction Commitment (CRC)
    - Cap and Trade Scheme for large non-intensive, commercial and public sector organisations not caught by either EU ETS or “Climate Change Sector Agreements” – **DEFRA aim in force by 2009**
    - Organisations > 6,000MWh i.e. Elec - £500k/annum
    - Planning
      - Infrastructure Planning Commission by April 09 (now scrapped!)
      - Remit electricity projects
        - onshore >50MW
        - offshore >100MW
        - Network Infrastructure
UK Political Position – 2010

- Renewable Energy Strategy 2009
  - No Grandfathering for Biomass
- Consultation on continued Banding for Biomass
  - Result, acceptance of banding with caveats, for biomass & EfW
- Consultation on continued Banding for Liquid Bio-fuels
  - Ongoing
- Consultation on 2011 ROO
  - Ongoing
UK Political Position – ROC Scheme

- Introduced in 2002
- 1 MWhr = 1 ROC = ~£45
- Sectors – See OFGEM Analysis
- Co-firing of biomass – originally to end in 2006
  - 2004 changes
    - Extended to 2009
    - Initially with 25% market cap
    - From April 06 with 10% cap to 09
    - Proportion of Energy Crops after April 09
    - Banding – Biomass now at higher rate
    - Headroom confidence
## Renewable Electricity Market

### Current Climate
- ROC Banding from April 09

<table>
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<tr>
<th>Band</th>
<th>Technologies</th>
<th>Level of support ROCs/MWh</th>
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<td>Established 1</td>
<td>Landfill gas</td>
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<td>Established 2</td>
<td>Sewage gas, co-firing on non-energy crop (regular) biomass</td>
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<td>Reference</td>
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<td>Post-Demonstration</td>
<td>Offshore wind; dedicated regular biomass</td>
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<td>Emerging</td>
<td>Wave; tidal stream; fuels created using an advanced conversion technologies (anaerobic digestion; gasification and pyrolysis); dedicated biomass burning energy crops (with or without CHP); dedicated regular biomass with CHP; solar photovoltaic; geothermal, tidal Impoundment (e.g. tidal lagoons and tidal barrages (&lt;1GW)); Microgeneration</td>
<td>2.0</td>
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</table>
Renewable Electricity Market

- UK Renewable Energy Strategy Consultation BERR - June 08
  - The Size of the Challenge – Potential Scenario to reach 15% Renewable Energy Target by 2020
Renewable Electricity Market

- UK Renewable Energy Strategy Consultation BERR (DECC)- June 08
  - Renewable Electricity Generation Capacity Comparison Between 2006 & Projected 2020
# Renewable Electricity Market

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<th>Year</th>
<th>Est UK Sales TWh</th>
<th>Suppliers obligation %</th>
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<th>Actual TWhr</th>
<th>Co-firing cap %</th>
<th>Max Co-Fired ROCs TWh</th>
<th>Proportion Co-Firing Energy Crop</th>
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Renewable Electricity Market

- Current Climate
  - Assessment of Market Size
  - Technology Type

Table B3: 2006-07 ROCs, SROCs and NIROCs issued by generation technology type and month

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<th>Month</th>
<th>Biomass and waste using ACT</th>
<th>Biomass</th>
<th>Co-firing of biomass with fossil fuel</th>
<th>Hydro &lt;20 MW DNC</th>
<th>Landfill gas</th>
<th>Micro Hydro</th>
<th>Off-shore wind</th>
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<th>Wave</th>
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<td>192,426</td>
<td>347,376</td>
<td>5,589</td>
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Developments in the UK Waste Market

- **Landfill Legislation**
  - Disposal Sites Changing from Waste Management Licensing to PPC/IPPC Permits
    - Engineering, hydrological & geographical specifications significantly higher.
    - Many existing sites can’t achieve new standard and are now operating on a closure plan. Expectation is landfill sites will reduce by 40%.
  - Landfill Tax
    - Escalating at £8/yr in April 2010 - £46/mt
    - Current gate fees to Landfill are approx £20/mt + Landfill Tax
  - Councils – Statutory Duty to Divert BMW from Landfill
  - LATS structure – Introduced to allow Credits Trading between Disposal Authorities
Bio-Mass Market: From 2010

- **Market Segments**
  - Co-Firing Bio-mass
  - Dedicated Bio-mass
  - Combined Heat & Power

- **Fuels**
  - Imported biomass (mainly wood)
  - Biomass fraction of Waste

- **Dedicated Biomass Plants**
  - Fuel Contract
  - EPC Contract
  - Project Finance
  - Regulatory Risk
    - Developer
    - Bank
Bio-Mass Market: From 2010

- Dedicated Biomass Plants Influencing Factors
  - Potential is 5GW of capacity
    - Base load
    - Fully dispatchable
  - Fuel Contract
    - Fuel Type
    - Availability & Longevity at competitive price
    - Suitable Counterparty
  - EPC Contract
  - Project Finance
    - Hot to cold!
    - Regulatory Risk
  - Developer
    - Regulatory risk
    - More risk averse
    - Competition from co-fired sector
  - Government
    - Jekyll & Hyde?
Concluding Comments

- Market & drivers complex
- In 09 Banding “kick started various sectors” including Biomass
- Existing generators
  - 0.5ROC doesn’t work
  - Conversion option
  - Nervous about banding
- Dedicated Biomass
  - Grandfathering granted
  - Development now appears stalled!
- What’s next?