Biomass to Megawatts
Presentation to USEFE
4th June 2015
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Bord na Mona
3 Peat-fired Stations

- Edenderry Power (2000)
  128 MWe - BNM
  100 MWe - ESB
- West Offaly Power (2005)
  150 MWe - ESB

- 3 Mt milled peat – 23.7 PJ/a
- 30% co-firing – 7.1 PJ/a
- Need ≡ 1 Mt green biomass
Irish Government Policy

White Paper, March 2007
• Set a target of 30% co-firing in the 3 peat stations by 2015.

NREAP, July 2010
• Generation of 1,006 GWh from bioenergy in 2020, of which 687 GWh from solid biomass
Why Co-fire with Biomass (EPL)

1. Co-firing is Governmental policy
2. Leads to reduced carbon intensity
3. Planning consent only to 2015 – ABP Mayo Power refusal
4. Priority dispatch as a Hybrid Plant, with >40% biomass
5. IED – lower SO$_2$, NO$_x$ and dust emission limits from 2016
# Edenderry Volumes & Specification

<table>
<thead>
<tr>
<th>Biomass Required</th>
<th>(kt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>20</td>
</tr>
<tr>
<td>2009</td>
<td>72</td>
</tr>
<tr>
<td>2010</td>
<td>110</td>
</tr>
<tr>
<td>2011</td>
<td>156</td>
</tr>
<tr>
<td>2012</td>
<td>220</td>
</tr>
<tr>
<td>2013</td>
<td>240</td>
</tr>
<tr>
<td>2014</td>
<td>280</td>
</tr>
<tr>
<td>2015</td>
<td>300</td>
</tr>
<tr>
<td>2020</td>
<td>400</td>
</tr>
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<table>
<thead>
<tr>
<th>Quality Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
</tr>
<tr>
<td>Wt. Av. m.c.</td>
</tr>
<tr>
<td>Ash</td>
</tr>
<tr>
<td>Size</td>
</tr>
<tr>
<td>Gross CV</td>
</tr>
<tr>
<td>Chlorine</td>
</tr>
<tr>
<td>Ash Deform.</td>
</tr>
</tbody>
</table>
Carbon Emissions per MWh

Carbon Intensity of Electricity Produced

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Emissions (tCO2/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat</td>
<td>1.1</td>
</tr>
<tr>
<td>Coal</td>
<td>1.0</td>
</tr>
<tr>
<td>OCGT Distillate</td>
<td>0.8</td>
</tr>
<tr>
<td>HFO</td>
<td>0.7</td>
</tr>
<tr>
<td>OCGT Gas</td>
<td>0.6</td>
</tr>
<tr>
<td>1 Biomass: 1 Peat</td>
<td>0.5</td>
</tr>
<tr>
<td>2 Biomass: 1 Peat</td>
<td>0.4</td>
</tr>
<tr>
<td>CCGT Gas</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Suitable Biomass Types

Forest Materials
- Wood Chips
- Sawdust
- Pulpwood/Residues

Energy Crops
- Willow
- Miscanthus

Dry Materials
- Wood Pellets
- Palm Kernel Shells
- Almond Shells
- Sunflower pellets

Combustion and Corrosion Tests

Laboratory Tests
Handling Trials
Irish Timber Growers

- Logs
- Wood Chip
- Brasl
Energy Crops

- Launched “Farming Energy from the Land” Initiative in 2010

- Limited successes 650ac of willow planted

- Limited use for Miscanthus due to high Chlorine
Dry Materials (<10% mc)

• Tested many products
• Suitable to date:
  – Wood Pellets
  – PKS
  – Almonds
  – Sunflower pellets
  – Shea nut pellets
• To be tested:
  – Lignin
  – Crushed Grape Seed
  – Cycloned Olive Stone
Current Situation with ESB Peat Stations

- ESB will continue post 2019 with co-firing if sufficient biomass and business case

- Peat usage
  - WOP – 1.245m tonnes
  - LRP – 835kt
Why Co-fire at WOP/LRP

- Plants only 50% through design life
- Sufficient peat to co-fire to 2035
- Supply chains for biomass in place
- After use potential if bogs are cut away
- 1200 jobs in peat production; 100 in power plants
Opportunities for Leitrim, Roscommon, Cavan & Longford

- At 40% co-firing LRP requires 300Kte of biomass
- Objective is to maximise indigenous biomass - forestry and energy crops
- Coford report - forestry reserves
- New willow scheme proposed to Dept of Agriculture
Barriers to Development of Indigenous Willow

• Previous scheme unsuccessful due to
  – Wait & see approach by Farmers
  – Land rental prices of €150 - €180/acre
  – Aversion to “locking in” good land
  – No income for 3 years
  – Income from forestry on “bad land” much better
  – Bureaucracy in the Government grant system
  – Demise of the Miscanthus Crop
Solution

- New proposal under review with Dept of Agriculture
- Greater gross margin for farmers
- 15,000 Ha of willow will yield 300Kt of chips/annum and create 1,000 jobs
- Garner support from all stakeholders, those being:
  - Department of Agriculture, Food and the Marine
  - Department of Communication, Energy and Natural Resources
  - Department of Environment, Heritage and Local Government
  - Teagasc
  - Irish Farmers Association
  - Marketing program from ‘Top Down’
Barriers to Accessing Private Forestry Reserves

• Small owned tracts of land
• Harvesting costs high if individually approached
• Grant support for infrastructure
• Lack of understanding of the biomass market
Solution

- Set up co-ops/groups
- Education re the biomass market
- Build trust
- Lobby Government for appropriate grant scheme
- Create support for home grown solution