



## **MGT POWER BRIEFING NOTE: Greenhouse Gas Savings Data**

**Date: 19<sup>th</sup> November 2009**

Electricity generated from plant matter such as woodchips can offer huge reductions in carbon dioxide emissions when used as an alternative fuel to fossil fuels. Biomass is recognised by the UK Government<sup>1</sup> as a near carbon neutral fuel source which allows non-intermittent generation of renewable electricity and allows fossil fuels such as coal and natural gas to be left underground.

Large resources of biomass exist to be utilised on a sustainable, ongoing basis, and all MGT Power's biomass will be sourced from forests certified as sustainable by an independent third party such as the Forest Stewardship Council or similar, to ensure good forest management practice.

Biomass is fundamentally carbon neutral since the ongoing cycle of harvest and re-growth under best-practice forestry management form a closed loop of carbon, with the same amount of carbon being released on combustion of biomass as was absorbed from the atmosphere originally when the plant grew.

However, as with all fuels, there are emissions arising from the supply chain of biomass, and the most significant component of this is long distance shipping. Large-scale biomass plants proposed in the UK will primarily source woodchip from overseas whilst looking to source from local sources in the medium to long-term.

Despite long distance sea freight of biomass, MGT Power's Tees Renewable Energy Plant (approved by DECC in July 2009) and the other biomass plants being proposed for the UK market will deliver extremely high 'greenhouse gas savings' versus the alternative of electricity from fossil fuels, since biomass supply chains typically entail extremely low carbon emissions<sup>1</sup>.

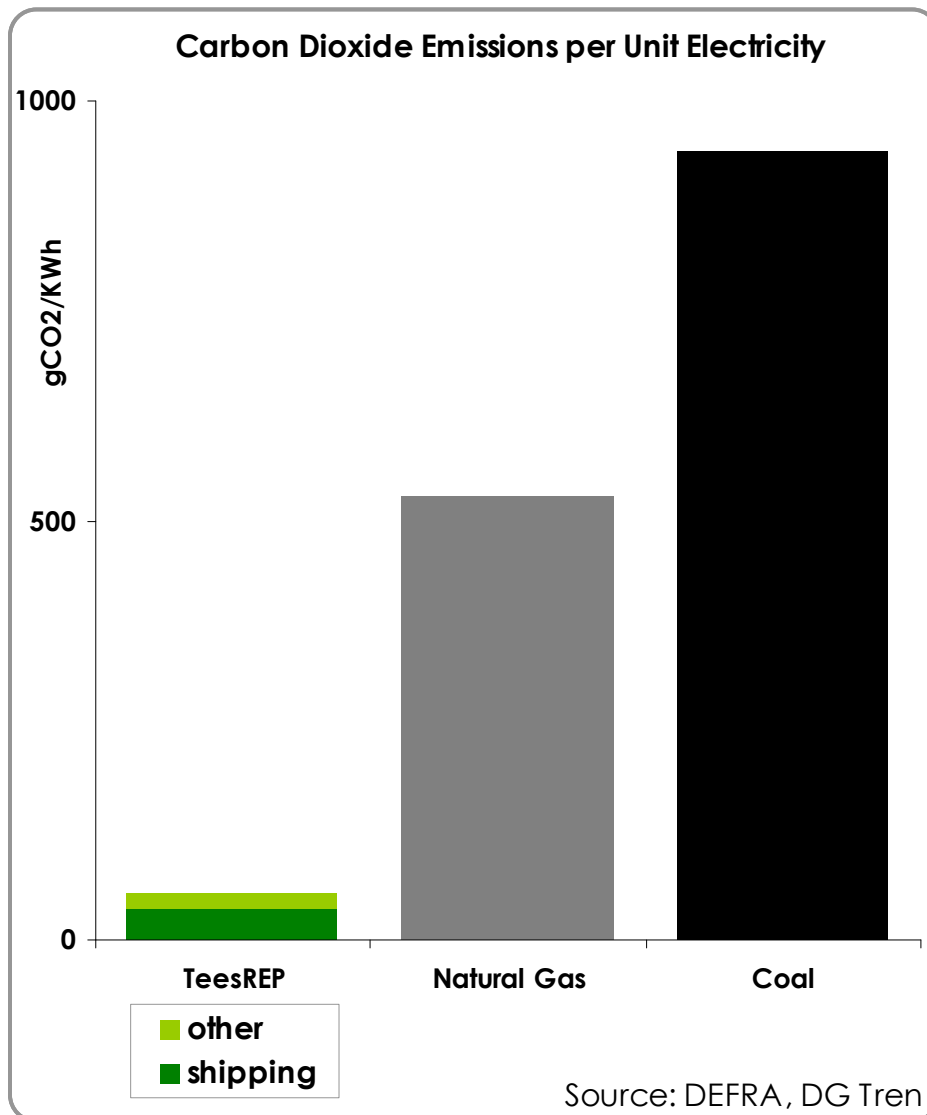
MGT Power will employ best-practice in the supply of the biomass for its Teesport plant, including the avoidance of excess processing into pellet

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<sup>1</sup> UK Biomass Strategy 2007

[http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/explained/bioenergy/bioenergy.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/explained/bioenergy/bioenergy.aspx)

form, and utilisation of efficient, large scale shipping vessels, to maximise greenhouse gas savings. Full life-cycle analysis of the entire supply chain of MGT Power's biomass fuel indicates that even after taking into account emissions from long distance shipping, TeesREP will offer 95% greenhouse gas savings versus coal powered electricity and 90% greenhouse gas savings versus natural gas powered electricity (see chart below).



#### **Appendix: Shipping Emissions Calculation**

- With a speed of 14 knots, and a one way transatlantic journey distance of 6000km, a vessel will be at sea for 19 days for a round trip.

- A 110,000 cubic metre (45,000 tonne) woodchip carrier vessel will use 27.2 tonnes of fuel oil (bunkers) per day (Source: Howe Robinson shipbrokers)
- Therefore a round journey will use  $19 \times 27.2 = 516.8$  tonnes fuel oil
- Fuel oil is approximately 87% carbon by mass (Source: US Department of Energy)
- 1 unit mass of carbon creates  $(12+16+16)/12 = 3.66$  units of mass of CO<sub>2</sub>
- Therefore one round journey creates  $516.8 \times 0.87 \times 3.66 = 1648.6$  tonnes CO<sub>2</sub>
- Therefore  $1648.6/45000 = 0.036$  tonnes or **36kg of CO<sub>2</sub> are emitted per tonne of biomass transported**

Comparison with official DEFRA numbers:

- DEFRA's *2008 Guidelines to GHG Conversion Factors*, states large bulk carrier (14,201 tonnes) emissions as 7gCO<sub>2</sub>/t-km and very large bulk carrier (70,000 tonnes) emissions as 6gCO<sub>2</sub>/t-km. ([http://www.defra.gov.uk/environment/business/reporting/pdf/ghg\\_cf-guidelines-annexes2008.pdf](http://www.defra.gov.uk/environment/business/reporting/pdf/ghg_cf-guidelines-annexes2008.pdf))
- Taking the average of these (to approximate a 45,000 tonne vessel) gives 6.5gCO<sub>2</sub>/t-km
- Taking average transatlantic freight distance of 6000km
- Gives  $6000 \times 6.5 = 39,000$ gCO<sub>2</sub> or **39kg of CO<sub>2</sub> emitted per tonne of biomass transported**

1 tonne of biomass generates 1.1 MWh of electricity therefore long distance shipping creates  $39/1.1 = 35$  gCO<sub>2</sub> per KWh electricity generated (as displayed on chart above).

For further information, please see the Tees Renewable Energy Plant Sustainability Q&A and MGT Power's Sustainability Guiding Principles at [www.mgtpower.com/sustainability.php](http://www.mgtpower.com/sustainability.php)

Contact information:

**Taylor Keogh (Media enquiries)**

020 3170 8467

[james@taylorkeogh.com](mailto:james@taylorkeogh.com)

**MGT Power**

[enquiries@mgtpower.com](mailto:enquiries@mgtpower.com)