CO2 Emissions from Proposed EfW facility

1. Green house Gas Assessment

To assess the net greenhouse emissions of the proposed EfW at Rookery South we have to consider the following:

- The emissions that result from the treatment of the waste.
- The offset from displaced power produced with Fossil fuels
- The savings from metal recycling
- The savings in emissions made by diverting waste from Landfill

2. CO2 Emissions from the proposed EfW at Rookery

The proposed EfW will produce CO2 emissions due to the combustion of carbon in Waste.

The CO2 released from the thermal treatment of organic waste was initially extracted from the atmosphere via photosynthesis. Therefore, this biogenic release is classed as carbon neutral.

It is therefore only the CO2 released from the waste produced using fossil fuels (such as plastics) that will be considered in this assessment.

- The EfW facility is proposed to process a nominal 585,000 tonnes per annum of a mixture of MSW and suitable C&I waste
- The resulting mix of MSW and C&I waste contains approx 27% Carbon.
- 64% of the Waste is classed as Biodegradable by Defra and defined in the Landfill Allowance Trading Scheme (Government Legislation).
- The proposed EfW facility exports approximately 55 MW of electricity, assuming a net cycle efficiency of approximately 26%
- The plant will export approximately 720 kwh of electricity per tonne of waste
- This would release carbon emissions derived from fossil fuels of 356 kg

3. Displaced Fossil Fuel Power

The export of electricity from the EfW will offset the power generated at other sources. Most of the power generated in the UK is derived from nuclear, gas-fired and coal-fired power stations with a small proportion from renewable sources.

Energy from Waste facilities seek to replace part of the energy produced by fossil fuel power stations. From a recent report by BERR (March 2008) stated that in 2007, carbon dioxide emissions per unit of electricity supplied by major power producers from fossil fuels was estimated to be 614 tonnes per GWh.

Therefore, treating one tonne of waste in the Rookery EfW will produce enough electricity to save 85 kg of CO_2 (than if the power was sourced from a fossil powered power station).

In one year, the plant will treat a nominal 585,000 tonnes of waste which would produce enough electricity to offset just under 50,000 tonnes of CO_2 (than if the power was sourced from a fossil powered power station).

4. CO_2 savings from recycling metals.

The proposed RRF will also recover metals which can be sent to be recycled. Manufacturing metals from its ore is a very energy intensive process. Defra has stated that for every tonne of ferrous metal recycled the CO_2 savings are equivalent to 1.3 tonnes. Non-ferrous metals can save 9 tonnes of CO_2 for every tonne of non-ferrous metals recycled.

For every tonne of waste processed, we will recycle just more than 21 kg of ferrous metals and 4.7 kg of non-ferrous metals. This gives a saving of 70 kg of CO2 saved from recycling metals processed by the RRF.

5. Displacing Waste deposited at Landfill

The provision of the proposed EfW will divert waste from Landfill.

When waste is landfilled, then the organic waste content will begin to biodegrade.

The gas produced during this process contains a mixture of methane and carbon dioxide (in an average split of 55:45).

Methane has a global warming potential of 21. This means that 1 kg of methane in the atmosphere has the same global warming effects as 21 kg of carbon dioxide.

Therefore, landfill gas is collected where possible and used in gas engines to produce electricity. However, not all of the gas can be collected (due to practicalities) and also not all the captured gas can be utilised to produce electricity.

In this assessment, the assumptions used by a 2004 report for Defra has been used, these assumptions consist of:

- 200m^3 of landfill gas produced per tonne of waste
- A collection rate of 75% over life of the landfill, with energy production of 203 kWh per tonne of waste landfilled being produced.
- Carbon dioxide releases are unaccounted for as these again will be biogenic and so carbon neutral.

This means that one tonne of MSW landfilled would result in emissions of methane equivalent to 410 kg of CO_2.

However, the electricity produced from firing landfill gas would result in an offset of 125 kg of CO_2 (based against fossil powered power stations).

This will result in a net increase of carbon dioxide of 285 kg of CO_2 per tonne of waste landfilled.

6. Net Carbon Dioxide Savings:

Taking into account both offsets from fossil fuel powered power stations and also from diversion of landfill, one tonne of waste treated in the Rookery South Resource Recovery Facility would achieve carbon dioxide savings of approximately 440 kg of CO_2.

For a nominal 585,000 tonnes of waste, this equates to total CO_2 savings of over 250,000 tonnes per year.

The provision of heat as well as power would also increase the savings of carbon dioxide as this would offset additional power requirements for heating of local homes and industries.