Sunrise Renewables (Barry) Ltd - Renewable Power Plant at David Davies Road, Barry ("Project")

Responses to questions raised by Friends of the Earth ("FoE")

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1. Is the Project a waste disposal facility? Is it a Schedule 1 Development under the EIA Regulations?

Answer: No it is not. Attached below is the 'R1 Calculation' for the Project showing that it comfortably exceeds the 0.65 threshold required under the "Guidance on applying the Waste Hierarchy", issued by Defra June 2011. As such it is to be considered a 'power generation facility' as opposed to a 'waste disposal facility' and it is not therefore a Waste Disposal Facility for the Incineration of hazardous or non-hazardous waste under Schedule 1 Development of the EIA Regulations.

2. Is the Project Advanced Conversion Technology? Is the technology gasification?

Answer: Yes it is. In the United Kingdom the person who determines whether technology is or is not Advanced Conversion Technology is the Office of Gas and Electricity Markets – Ofgem. According to Ofgem's Renewables Obligation: Guidance for Generators (April 2015):

> "2.105. Gasification and pyrolysis are examples of advanced conversion technologies (ACTs). These technologies use waste and biomass feedstocks to produce either a synthesis gas (syngas) and / or liquid fuels (bio-oils) which can be used to generate electricity."

The technology selected by the Applicant for the Project is based on gasification:

> "For gaseous fuels produced by gasification or pyrolysis, eligibility for the standard gasification and pyrolysis bands in any month is dependent on the fuel having a minimum GCV of 2 MJ/m3."

Under its supply contract the manufacturer is warranting to the Applicant that it will meet Ofgem's requirements for gasification:

> "Syngas CV value: the System shall meet at design capacity a minimum gross calorific value of the produced syngas (as shown within the Firing Diagram conditions as attached hereto) of 2 MJ/m^3 measured at 25 degrees Celsius and 0.1 megapascals measured at a point to be jointly determined over the bed and under the overfire and which has been approved by Ofgem. The syngas calorific value will be determined from a minimum of 3 separate gas samples during the Performance Test."

The Project therefore plans to use technology which meets Ofgem's requirements for an Advanced Conversion Technology using gasification.

3. Is the plant a Renewable Energy Plant? How will the syngas be used?

Answer: Yes it is – it generates electricity from a renewable fuel. In the United Kingdom the organisation regulating power generation is the Office of Gas and Electricity Markets – Ofgem. According to Ofgem's Renewables Obligation: Guidance for Generators (April 2015):

> "The Renewables Obligation (RO), the Renewables Obligation (Scotland) (ROS) and the Northern Ireland Renewables Obligation (NIRO) are designed to incentivise large-scale renewable electricity generation in the UK and help the UK meet its requirements for 15 per cent of energy to be sourced from renewable sources by 2020."

As an Advanced Conversion Technology (see Answer 3 below) the plant is eligible for Renewable Obligation Certificates under the RO scheme. As such, Ofgem considers it to be "large-scale renewable electricity generation", as stated above.

This is in part because the chosen technology takes the biomass – here waste wood – and instead of simply burning it like an incinerator, it 'boils off' synthetic gas (called "syngas" which is not dissimilar to natural gas) and uses that as the fuel. The result is that the emissions from the process are much cleaner than an incineration where the products of combustion go straight out with the exhaust: for a gasifier, the vast majority of the combustion products drop out with the ash, making it a much simpler job to clean the emissions before they meet the regulated standards required for release into the atmosphere.

Under its supply contract the manufacturer is warranting to the Applicant that it will meet the applicable requirements for combustion and emissions laid down in the Industrial Emissions Directive:

> "Combustion: the System shall meet at design capacity a minimum flue gas temperature of 1562°F (850°C) for at least 2 seconds residence time after introduction of last combustion air in accordance with the Industrial Emissions Directive (Directive 2010/75/EU of The European Parliament and of The Council on industrial emissions (integrated pollution prevention and control)."

> "Emissions: Emissions from the System when firing feedstock that meets the Fuel Specification will comply with the requirements of Annex VI, Parts 3 and 4 of the Industrial Emissions Directive (Directive 2010/75/EU of The European Parliament and of The Council on industrial emissions (integrated pollution prevention and control))"

Just to emphasise: gasification is not the same as incineration which is often misunderstood.

4. Will the ash produced be hazardous?

Answer: each year the plant will produce approximately 2208 tonnes of non-hazardous bottom ash and 1464 tonnes of hazardous fly ash. The two types of ash are produced in different sections of the plant boiler and are collected separately for storage in separate silos pending disposal. Specialist disposal contractors using sealed powder trucks will handle disposal of the hazardous fly-ash. This will be disposed of at a regulated landfill location specialising in the disposal of fly ash in accordance with applicable law and regulation. Bottom ash will be disposed of separately for use in the construction industry.

5. Is the plant a low-energy efficiency facility? Can the heat output be used?

Answer: The plant is not a combined heat and power plant since there is no viable adjacent heat offtaker. The plant is therefore a dedicated renewable power plant and as such the input energy is converted as efficiently as possible to electricity for use in the locality. The previous selected technology pyrolised 72,000 tonnes of dried wood to produce 9MWe export capacity. In comparison the proposed technology will convert the same amount of dry wood into 10MW export capacity. Therefore it is more efficient

Schedule
Barry Renewable Energy Project – R1 Calculation

Type of energy	energy Ex [MWh]
amount of incinerated waste (without 1.2 and 1.3)	321,840
e.g amount of incinerated sewage sludge	0
e.g. amount used activated carbon incinerated	0
Ew: energy input to the system by waste	**321,840**
$E_{f\,1}$: amount of light fuel oil for start up (after connection with the steam grid)	0
$E_{f\,2}$: amount of light fuel oil for keeping the incineration temperature	0
$E_{f\,3}$: amount of natural gas for start up and keeping incineration temperature	0
S E_f: energy input by imported energy with steam production	**0**
$E_{i\,1}$: amount of light fuel oil for start up/shut down (no connection with the steam grid)	350
$E_{i\,2}$: e.g. natural gas for heating up of flue gas temperature for SCR and start up/shut down	0
$E_{i\,3}$: imported electricity (multiplied with the equivalence factor 2.6)	0
$E_{i\,4}$: imported heat (multiplied with the equivalence factor 1.1)	0
S E_i: energy input by imported energy without steam production	**350**
$Ep_{el\ internal\ used}$: electricity produced and internally used for the incineration process	10,400
$Ep_{el\ exported}$: electricity delivered to a third party	74,080
S $Ep_{el\ produced}$ = $Ep_{el\ internal\ used}$ + $Ep_{el\ exported}$	**84,480**
$Ep_{heat\ exp.1}$: steam delivered to a third party without backflow as condensate	0
$Ep_{heat\ exp.2}$: district heat delivered to a third party with backflow as condensate (hot water)	0
S $Ep_{heat\ exported}$ = $Ep_{heat\ exp.1}$ + $Ep_{heat\ exp.2}$	**0**
$Ep_{heat\ int.used1}$: for steam driven turbo pumps for boiler water, backflow as steam	0
$Ep_{heat\ int.used2}$: for heating up of flue gas with steam, backflow as condensate	0
$Ep_{heat\ int.used4}$: for concentration of liquid APC residues with steam, backflow as condensate	0
$Ep_{heat\ int.used5}$: for soot blowing without backflow as steam or condensate	6,484
$Ep_{heat\ int.used7}$: for heating purposes of buildings/instruments/silos, backflow as condensate	0
$Ep_{heat\ int.used8}$: for deaeration - demineralization with condensate as water input	0
$Ep_{heat\ int.used9}$: for NH4OH (water) injection without backflow as steam or condensate	0
S $Ep_{heat\ int.used}$ = S $Ep_{heat\ int.used1-9}$	**6,484**

R1 = (Ep - (Ef + Ei)) / (0.97 * (Ew + Ef))	**0.73**

Ep = 2.6*(S $Ep_{el\ int.used}$+S $Ep_{el\ exported}$) + 1.1*(S $Ep_{heat\ int.used}$+S $Ep_{heat\ exported}$)	**226,780**