

Retrospective Voluntary Environmental Statement:  
Document 3 Waste Planning Assessment

Barry Dock Biomass Facility, Woodham Road

Biomass UK No.2 Ltd



**Sunrise Renewables**

67 Bewsey Street, Warrington, WA2 7JQ

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**2015/00031/OUT - David Davies Road, Woodham Road, Barry**

**Declaration in accordance with TAN21 (Annex B)**

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The attached statement sets out how the waste hierarchy has been considered in developing the proposals currently forming this planning application.

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**Signed: Howard J Davies**  
**Sunrise Renewables (Barry) Limited**  
**Date: 17th June 2015**

**Power Consulting Midlands Ltd**

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**Renewable Energy Plant at Barry Docks,  
Woodham Road, Barry**

**Waste Planning Assessment Prepared for  
Sunrise Renewables (Barry) Ltd**

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**June 2015**

## 1.0 INTRODUCTION

- 1.1 The Applicant, Sunrise Renewables (Barry) Limited, is developing a renewable energy plant based on an advanced conversion technology (ACT) at Woodham Road, Barry, CF63 4JE within the Port of Barry (the “**Project**”).
- 1.2 The principle of establishing a wood fuelled power plant at the Project site was established by planning permission reference 2008/01203/FUL, as approved by appeal reference APP/Z6950/A/09/2114605 on 2nd July 2010 (the “**2010 Permission**”).
- 1.3 Power Consulting Midlands Ltd (**PCML**) has been commissioned by the Applicant to provide a Waste Planning Assessment in accordance with the guidelines set out in TAN21 2014 (Annex B).
- 1.4 The Planning Application Waste Audit and Facilities Strategy from the original Sunrise Application in 2010 is provided for information purposes (Appendix A).

## 2.0 REQUIREMENTS FROM TAN21 2014 (ANNEX B) FOR A WASTE PLANNING ASSESSMENT

TAN21 (Wales) Requires the following to be included in a Waste Planning Assessment:

### Waste Policy Statement

- A description of how the proposals will contribute to the relevant provisions of ‘Towards Zero Waste’ and the Collections, Infrastructure and Markets Sector Plan.
- A statement of compliance with policy related to need & location requirements.
- A calculation of existing and projected future demand.
- Identify the markets that will be served by the proposed development.
- A calculation to identify the current shortfall in treatment capacity.
- A description of the consultation undertaken by the applicant.
- A signed declaration that in making the application the applicant has paid due regard to the waste hierarchy (see [Box] below)

### Development

Time-scale

- Lifespan of the operation, including any proposed measures for future proofing
- Days and hours of operation.

### Types and quantities of waste to be managed

- Estimated annual quantity of each waste type to be received, and estimated total capacity where relevant.
- The destination of any end product (residues and any hazardous materials) from the site should be submitted.
- The minimum and maximum quantities that the facility could process and remain operational.
- The amount of waste (in tonnes) the facility is designed to treat.

**Design, layout, buildings and plant – a full description of the proposed development including:**

- The processes involved, including transportation to and from the site.
- Layout and design of buildings, plant, operational areas, haul roads and external lighting.
- If relevant - Details on landfill gas and leachate control infrastructure should also be identified.
- Proposed restoration and aftercare

**Amenity and Nuisance**

- The compatibility of the proposed development with existing or neighbouring land uses.
- Measures to prevent and control land contamination, light pollution, noise, smell, dust, birds and vermin, litter,
- Any emissions associated with the proposed operations.

**Air pollution**

- The impact of emissions to atmosphere of any product gasses resulting from specialist treatment/recovery processes.

**Energy Efficiency (if relevant)**

- Explanation of how energy recovered from the incineration process will be maximised (e.g. through combined heat and power, district heating or the supply of steam / hot water to neighbouring industrial users).
- Evidence that the proposal would or would not meet the R1 energy efficiency calculation.

**Declaration**

This statement sets out how the waste hierarchy has been considered in developing the proposals currently forming this planning application.

### 3.0 WASTE PLANNING ASSESSMENT

**Applicant:** Sunrise Renewables (Barry) Limited  
**Site:** Barry Docks, Woodham Road, Barry  
**Application:** Erection of New Industrial Building and Installation of 10MW Wood Fuelled Renewable Energy Plant

#### 3.1 Waste Planning Assessment Introduction

The objective of a Waste Planning Assessment is to provide consistent information in the submission to demonstrate to the proposed development will contribute towards meeting Wales' overriding objectives. These objectives are set out in the overarching waste strategy document for Wales 'Towards Zero Waste' and is supplemented by a number of Sector Plans, including the Collections, Infrastructure and Markets Sector (CIMS) plan (adopted July 2012) and the Construction and Demolition (C&D) Sector plan (adopted November 2012).

This document provides supporting information in respect to the specific requirements for a Waste Planning Assessment as set out in Annex B of Technical Advice Note 21: Waste (Welsh Government, 2014). It is noted that TAN21 requires the Waste Planning Assessment to be appropriate and proportionate to the nature, size and scale of the development proposed. The assessment does not repeat information already provided in the Planning Statement for the application and supporting documents but makes cross-references as applicable.

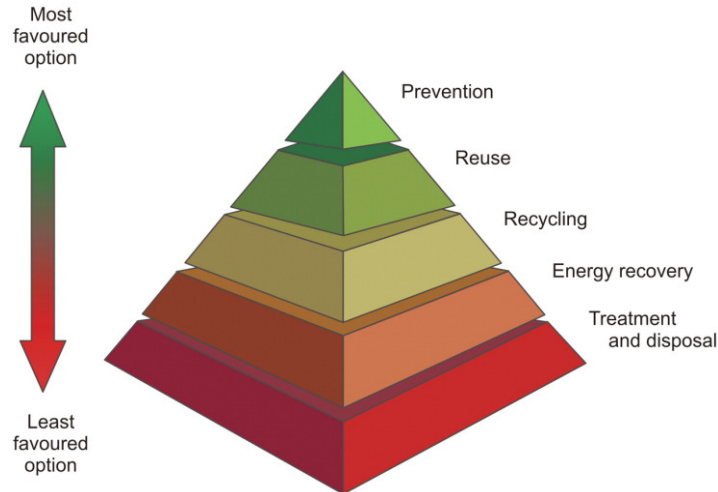
It is the opinion of the Applicant that the proposed development does not constitute a 'waste development'. However, it is fully recognised that the proposed development will require waste wood as a feedstock and will also produce some waste, mostly as ash, as a by-product. Accordingly, TAN21 has been considered as part of the Planning Statement and supporting documents as a key policy document applicable to the proposed development.

It is recognised that the requirements for a Waste Planning Assessment as set out in TAN21 has been written largely in regard to waste developments, where the need to justify the development relates to a wide set of associated impacts driven by the requirement to manage waste. The proposed development is an *energy development*, which includes the capacity to treat certain waste streams which have been processed 'off-site' as a fuel and as such the associated considerations are much simpler.

This Waste Planning Assessment has been prepared for the purposes of clarification and completion and provides detail appropriate to the scale and potential significant of a development of this size.

#### 3.2 Waste Policy Statement

Appendix 6 of the Planning Statement provides an account of the waste policy context for the proposed development and how the proposed development helps contribute to the relevant provisions of the strategy document. The main objectives of the strategy include landfill diversion, waste recovery and reducing waste generation in accordance with the Waste Hierarchy:



**Fig 1. The Waste Hierarchy**

In accordance with Towards Zero Waste and the Collections, Infrastructure and Markets Sector Plan high efficiency energy from waste facilities are encouraged. The R1 Formula, defined in Annex II of the Waste Framework Directive, allows a distinction to be made between disposal and recovery in respect of incineration based upon the energy efficiency of the facility. Under the R1 Formula, incineration facilities dedicated to the processing of municipal waste only must have energy efficiency above 0.65 to be categorised as recovery operation. While the proposed development is to utilise waste wood rather than municipal waste, the same principles of the Waste Framework Directive have been applied to this development. The proposed development will have an energy efficiency above 0.65 and therefore constitutes a Recovery operation.

By using waste wood that would otherwise be disposed of via landfill, the proposed development takes the waste higher up the waste hierarchy, and as such provides the following overall benefits:

- Recovery helps gain more value from limited resources
- Significantly reduce global greenhouse gas emissions by not using fossil fuels
- For certain separated wastes, optimised energy recovery options offer the best environmental option due to their mixed nature or the lack of reuse or recycling options
- Increase skills, employment and social justice
- Replaces the need for virgin materials or fossil fuels

The CIMS Plan requires the waste industry in Wales to turn itself into a resource management industry. The plan seeks to create a sustainable approach to resource management by developing markets for recycled material (within Wales as far as possible). The proposed development contributes to the market development for recovered wood. While the feedstock for the wood could come from England or Wales, it is the Welsh local grid and a Wales-based company which will benefit from the energy and steam production onsite.

The waste produced as a by-product of the operation of the plant will be regulated under an Environmental Permit and will be managed with due regard to the Waste Hierarchy. Additionally, the Environmental Permit requires that applicants demonstrate why their development represents the best overall environmental outcome in terms of the

technologies and techniques applied onsite. This is a “Best Available Techniques” (BAT) assessment and is a requirement of the permit application.

**3.2.1 Compliance with Policy in relation to Need and Location requirements**

Section 1 in the Planning Statement gives an account of the need for the proposed development, being to modify the technology for use at the Site previously approved for planning. The consideration of other locations is not relevant in this application in respect to feasibility.

**3.2.2 Assessment of existing and future demand for the project**

The Planning Statement provides an account of how the proposed development is anticipated to meet 100% of the site’s future energy requirement in due course.

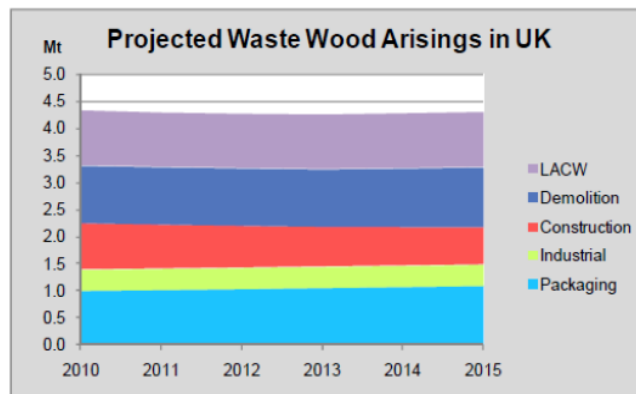
**3.2.3 Market that will be served by the proposed development**

The Planning Statement provides details on the wood that is to be used as a fuel feedstock in the proposed development. While this wood will be supplied under a contract and as a commercial arrangement to ensure that feedstock is consistently available, consideration has been given to the security of supply on a national level.

Wood waste can arise from a number of sources (municipal, commercial and industrial (C&I), construction and demolition (C&D)) and in many different forms. In 2012 DEFRA<sup>1</sup> published a review of recent research on the waste wood market. The report provided a summary of various research that has sought to quantify the overall UK wood waste tonnages, and to the extent possible, identify the quantities arising from each source.

The Tolvik report found that in 2010, UK wood waste arisings were 4.3 Million tonnes (Mt) (see Fig 2 below). According to the Tolvik report, wood waste arisings are not expected to increase in the near future.

*Fig 2. Projected wood waste arisings to 2015 (Tolvik, 2011)*



While the report finds that the waste wood arisings are expected to be stable or declining slightly up to 2015, it recognises that there are various factors that will influence these results. These include waste reduction but also the degree of growth in the wider economy. The report goes on to identify that large quantities of waste wood are still going to landfill and that further advances could be made in collection and sorting infrastructure thereby increasing the availability of waste wood for recovery.

<sup>1</sup> DEFRA (July, 2012): Waste Wood: A Short Review of Recent Research



In the wider legislative context it is anticipated that while arisings may not increase other than in relation to economic development, greater quantities of waste wood are expected to become available as landfill diversion targets, driven by the Landfill (England and Wales) Regulations 2002, cause waste wood to enter the feedstock market and greater investment in municipal waste collection and sorting, driven by the Waste (England and Wales) Regulations 2011, means that more wood will become available from material Recycling Facilities.

It is recognised that as the resource management industry grows waste wood is increasing part of a commodity market and therefore the relationship between supply and demand will be driven by economic forces.

#### **3.2.4 Identification of current shortfall in treatment capacity**

For the reasons set out above, the objective of the proposed development is not to achieve a waste *treatment* objective. Rather it is driven by combining a need for green energy and the increasing availability of waste wood in the commodity market. Therefore it is not applicable to consider treatment capacity in the context of waste *treatment*.

#### **3.2.5 Consultation undertaken by the applicant**

This includes the following activities:

1. Pre-application discussions with the Vale of Glamorgan Planning Officers
2. Pre-application discussions with the Vale of Glamorgan Ecology Specialist
3. Scoping meeting – Natural Resources Wales Officers
4. Consultation with the future operator throughout the process
5. Mailshot to local residents February 2014.
6. Feedback to consultees

### **3.3 Timescale**

The development has a design life of 25 years. The development will provide electricity in to the local electricity grid on a 24/7 basis. Boilers will be shut down once a year for annual maintenance but in planned sequence.

The details and impact of deliveries has been assessed and is included in the Planning Statement; however, in summary, wood fuel will normally be delivered to the site during a 12 hour day between 07:00 and 19:00 hours on weekdays (in contrast to the 2010 Permission which also allowed for deliveries on Saturdays and Sundays). Weekend deliveries would be restricted to emergency deliveries only (where required to avoid an interruption in the operation).

### **3.4 Type and Quantities of Waste to be Managed**

The waste that will be managed by this plant is pre-prepared waste wood chippings, which is delivered to the plant prior to being gasified. At the time of delivery, feedstock has a variable moisture content, the water having a function as a reformation agent in the gasification process. The waste wood fuel is fed into the gasifier system where it is converted into a raw natural gas ('syngas').

The Outotec gasifier will process up to 72,000 dry tonnes of wood waste per year to produce an average net output of up to 10 MW (compared to 9 MW with the Prestige system planned for the 2010 Permission) and is more flexible with respect to moisture content - the facility could handle between 60,000 tonnes and 86,000 tonnes of wood chip per annum depending on the amount of water accompanying the fuel in the form of moisture content.

The process results in residual ash (8% of the input fuel), which is collected automatically from the various stages of the process. Two types of ash are produced depending on the point of origin in the system and these are automatically segregated into two sealed storage tanks for weekly collection by sealed tankers. One of the ash types is taken off site by the collection organisation and then recycled into various building products and aggregates. The other type of ash will be disposed of via a registered hazardous waste facility.

### 3.5 Design, Layout, Buildings and Plant

#### 3.5.1 Technology

It is proposed to replace the system detailed in the 2010 Permission manufactured by Prestige Thermal Equipment (which produced a 9 MW average net output) with an alternative system made by the globally established manufacturer Outotec (www.outotec.com). The Outotec technology is more efficient and will result in the average net output increasing to 10MW for the same amount of fuel input.

Photo 1 - Example of operational Outotec gasification plant in USA



The Outotec equipment produces syngas through a fluidized-bed process while the Prestige Thermal Equipment produces syngas through a pyrolysis process. Both technologies are forms of 'gasification'. The general sequence of the proposed gasification process is as follows:

- Wood-waste feedstock is chipped off-site and delivered to the plant prior to being gasified. At the time of delivery, feedstock has a variable moisture content, the water having a function as a reformation agent in the gasification process.
- The wood fuel is fed into the gasifier system where it is converted into a raw natural gas ('syngas'), which is reformed and used as the primary fuel in the gasification boiler to generate steam to power the steam turbine. The Outotec gasifier will process up to 72,000 dry tonnes of wood waste per year to produce an average net output of up to 10 MW (compared to 9 MW with the Prestige system) and is more flexible with respect to moisture content.
- The steam turbine uses the steam to produce electricity and the plant transfers electricity to the grid via an alternator, transformer and on-site substation. The turbine is enclosed in an acoustically attenuated extension to the electricity switch room, to reduce noise to a minimum. The process is regulated from a computerised control room. The buildings will be lit internally using electricity generated from the process.
- The Outotec equipment utilises a single turbine-alternator which replaces the previously proposed system of multiple reciprocating piston engines.
- Burning of the refined syngas in the gasifier to produce energy combined with various plant and equipment used to reduce emissions results in cleaned exhaust emissions from the facility.

### 3.5.2 Design

There will be no change to the mobile plant deployed at the site. This will include a loading shovel and / or grab, a water bowser to control dust as necessary in vehicle circulation areas and a road sweeper to maintain the site access road and the highway in a clean condition, primarily for use during the construction phase.

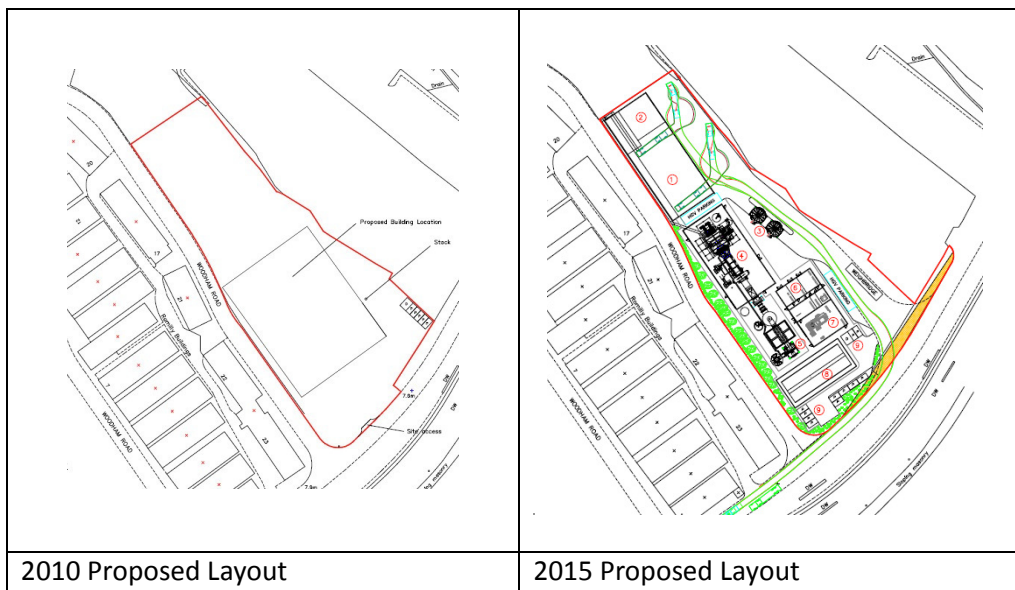
The proposed buildings will continue to be of steel portal frame construction. The colour and specification of external cladding will be agreed with the planning authority prior to construction. The floor slab of the building will be surfaced with reinforced concrete to a specification approved by Natural Resources Wales.

The amended plant design will continue to require an Environmental Permit from Natural Resources Wales. The Applicant consulted extensively with Natural Resources Wales' predecessor agency at the time of the original application and is consulting again in connection with the present application.

Internal surfaces will continue to drain to a sealed sump or foul sewer. External surfaces including roof water will drain to a sustainable surface water system.

### 3.5.3 Layout and Elevations

For convenience, the revised plant layout (see Appendix 3 of Planning Statement) is shown below in comparison to the layout for the 2010 Permission:



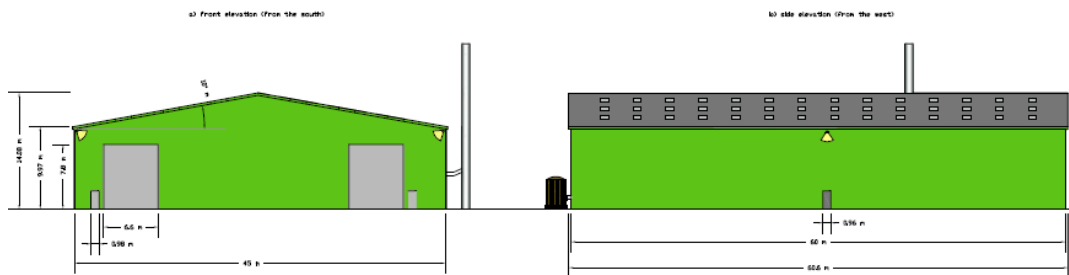
Originally all plant operations were located within a single structure with a total footprint of 2700 sqm. Under the revised arrangements it is proposed to separate the power plant functions into separate structures to accommodate the revised plant (total building footprint 2,497 sqm). The result will therefore be a net 7.5% reduction in building footprint at the site. Details of the structures are as follows:

- Wood Storage and Feed Building: The wood storage and feed building (at 52.4 x 21.6 x 13.7m high) remains similar in height to that of the previously approved building

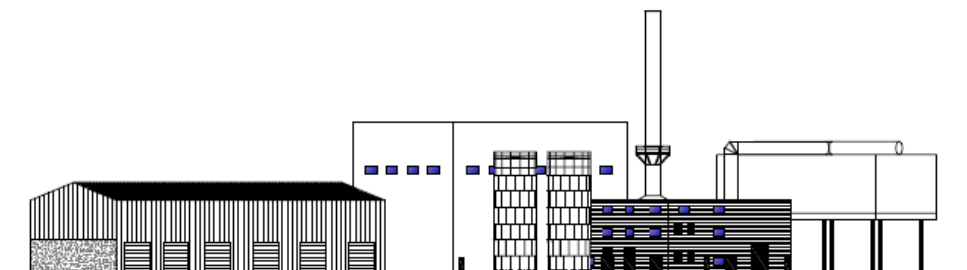
(14m). The submitted Traffic Movement plan (in Appendix 5) prepared by the project contractor confirms there is adequate space for articulated vehicles to access the building.

- Turbine, Welfare & Ancillaries Building: This building (29.1 x 17.9 x 11m high) has a reduced height compared to that of the previously approved building and incorporates switchgear, the main control room and a turbine room (to replace the formerly proposed piston engines).
- Main Process Building: The gasification equipment will be entirely enclosed within a bespoke structure (41.4 x 20.4 x 23m high). This will significantly improve containment of the process as a whole. The maximum height of the previous plant was 14m so there will be a net increase in height of 9m for this element.
- ACC Unit: An external air-cooled condenser (ACC) unit (32m x 14.5m x 20m high) mounted on steel stilts is now proposed adjacent to the Turbine, Welfare & Ancillaries Building.
- External Equipment: ash residue from the combustion process will be stored in two externally located silos (18.4m high x 6.7m diameter) allowing ease of access (see Traffic Movement Plan included in Appendix 5). Flue Gas treatment (FGT), exhausting to the chimney stack will also be external to the buildings.
- Chimney Stack: the chimney stack being re-sited some 20m to the south-east relative to the original location and in order to meet emissions requirements, the stack height will be increased to 43m (which is less than the stack height approved for the waste-energy plant approved for construction at Atlantic Way on the opposite side of the dock).

Appendix 4 of the Planning Statement contains the elevations for the revised layout; however, for convenience Elevations A and B, below illustrate the differences between the elevations for the 2010 Permission and the current application.



Elevation A: Elevations for the 2010 Permission



Elevation B: Elevations for the revised layout

The revised layout comprises two buildings that are lower and one that is higher than the building height in the 2010 Permission, as more particularly detailed in Section 3.5.3 above and Appendix 4 to the Planning Statement. Main points to note are:

- The average building height of the 2010 Permission is 14m while the average building height in the revised layout is 16.3m.
- The change in chimney stack height has been determined in order to comply with the requirements of the Waste Incineration Directive (WID)/Industrial Emissions Directive (IED). This will result in the chimney stack increasing in height from 20m to 43m with adjustments to the diameter to allow for the increase in height – the diameter will increase from 1.0m to 2.75m.

#### **3.5.4 Proposed restoration and aftercare**

At the end of the plant's useful life (25 years unless extended at the time), the plant will be decommissioned. In line with standard industry practice, the cost of site remediation will be funded from the proceeds decommissioning.

### **3.6 Amenity and Nuisance**

#### **3.6.1 Compatibility of Proposed Development with existing / neighbouring land uses**

The site is partially vacant and occupied by a container storage and refurbishment operation; there are no compatibility concerns with the neighboring land uses.

As under the 2010 Permission, the Applicant intends to maintain flexibility as to where best to source wood products for energy conversion by the plant and how best to transport them to site, be it by road, rail or sea. In so far as the Applicant arranges such transportation by road, the maximum number of annual deliveries will remain unchanged from the 2010 Permission, being 4015 per year (or 77 per week).

The comments of the Director of Environmental and Economic Regeneration to the Planning Committee relating to the 2010 Permission, dated 21 May 2009, are recalled: "Since the trip generation in the scale of things for Barry Docks is minimal, and the highway network is already designed to take such large HGVs, the Highways Authority has no objection to the proposals."

#### **3.6.2 Noise**

Best practicable means will be used during site operations to ensure that noise does not exceed agreed levels. The Applicant has selected a leading national contractor to carry out such work and it is well versed in compliance procedures in this regard. The enclosure of the operating process within structures and/or buildings will ensure that noise levels are not significant.

The plant has been designed to meet the BAT (Best Available Technology) requirements of the Environmental Permitting regime, which include noise emissions controls. The steam turbine produces the most noise, but is enclosed within an acoustically attenuated compound within the Turbine, Welfare & Ancillaries building.

The plant as a whole is designed to be fully compliant with applicable dBA requirements. The roller shutter doors will generally be closed except to receive deliveries in order to provide additional acoustic attenuation.

The Applicant has consulted extensively with the main contractor selected for the project to ensure that the plant is fully compliant and obligations have been imposed on them to ensure that the design, procurement, construction and operation comply with all applicable

law and guidelines. These include the following:

- Welsh Statutory Instrument 2006 No. 2629 (W.225)
- The Environmental Noise (Wales) Regulations 2006 (as amended by the Environmental Noise (Wales) (Amendment) Regulations 2009 (SI2009/47)).
- Welsh Statutory Instrument 2007 No. 3519 (W.311) The Environmental Noise (identification of Noise Sources) (Wales) Regulations 2007
- Technical Advice Note (Wales) 11, 'Noise'
- Welsh Statutory Instrument 2006 No. 2629 (W.225)
- The Environmental Noise (Wales) Regulations 2006. See also Welsh Statutory Instrument 2007 No. 3519 (W.311)
- The Environmental Noise (identification of Noise Sources) (Wales) Regulations 2007
- <http://wales.gov.uk/docs/desh/publications/140731planning-policy-wales-edition-7-en.pdf>
- <http://wales.gov.uk/docs/desh/publications/131217noise-action-plan-for-wales-en.pdf>

The contractors are carrying out their work taking these points into account and also the findings from the Noise Study for the Project, which has been updated for the purposes of the present application (refer to Appendix 9 of the Planning Statement).

Verification that noise levels continue to comply with such legislation and guidelines will take place during commissioning of the plant in accordance with a background noise measurement scheme to be agreed with the Local Authority prior to commencement of construction.

### **3.6.3 Dust**

There is no material change to the proposed environmental control measures.

Site operations will be carried out to minimise the creation of dust. A mains water supply will be available and all external water pipes are to be lagged to prevent frost damage. Water sprays and/or bowsers will be used as necessary to reduce dust levels in external circulation areas. Staff will monitor dust emissions continuously whilst the plant is in operation and will take appropriate action when required. Regular visual inspection will take place with recording of results in a diary.

### **3.6.4 Mud / detritus**

Measures will be put in place to prevent any deposit of debris on the highway. There will be regular visual inspection and a road sweeper will be deployed as necessary, including during the construction phase.

### **3.6.5 Odour**

No material will be accepted which is likely to cause an odour nuisance. The biomass plant itself does not produce odorous emissions.

### **3.6.6 Pests / vermin**

The proposed fuel type will ensure that the site will not suffer from a vermin infestation. However, the site will be inspected daily given the presence of nearby water bodies and a

pest control contractor will be hired if necessary.

### **3.7 Air emissions & pollution**

In order to operate, the Project will require an Environmental Permit and this will only be given provided the plant continues to be WID/IED compliant, as was the case for the 2010 Permission. This includes a need to agree the proposed abatement technology to minimise air emissions before the site can operate and confirmation that the Best Available Technology (BAT) has been employed. Therefore, local air quality will not be adversely affected by the proposals. In this respect there is therefore no material change from the 2010 Permission.

The Applicant has commissioned an Air Emissions Assessment for the present application (see attached at Appendix 2 of the Planning Statement). This exercise was pre-scoped in conjunction with the local officers of Natural Resources Wales with the agreed objective of determining the increase in stack height necessary to achieve a negligible change of environmental impact relative to the previously improved scheme.

### **3.8 Energy Efficiency**

The purpose of the project is to generate electricity for the local grid. There are no feasible heat off takers in the vicinity therefore the plant is designed to convert as much of the fuel energy to electricity as is possible.

The selection of the technology discussed above also results in an increase in the average annual generating capacity to 10 MWe compared to 9.0 MWe for the 2010 Permission as a result of improved efficiency. Such increased efficiency means there will be no surplus heat generated (i.e. it is not a Combined Heat and Power (CHP) plant). Such increased output has no visual or technical impact and will be limited by the capacity of the transmission network to transmit the power (which is separately regulated). From a technical standpoint the change is neutral.

Utilising established biomass energy technology contributes to national targets for renewable energy provision. The facility will supply electricity via the electricity grid, which is equivalent to the annual energy usage of approximately 23,600 households (increased from the previous level of 22,000) based on an average UK household consumption of 3,300kWh.

The following table shows the R1 calculation for this plant showing that it comfortably exceeds the 0.65 threshold required under the “Guidance on applying the Waste Hierarchy”, issued by Defra June 2011.



**R1 Calculation for the Sunrise Renewables Limited Application:**

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
<b>E<sub>w</sub>: energy input to the system by waste</b>	<b>321,840</b>
E <sub>f1</sub> : amount of light fuel oil for start up (after connection with the steam grid)	0
E <sub>f2</sub> : amount of light fuel oil for keeping the incineration temperature	0
E <sub>f3</sub> : amount of natural gas for start up and keeping incineration temperature	0
<b>S E<sub>f</sub>: energy input by imported energy with steam production</b>	<b>0</b>
E <sub>i1</sub> : amount of light fuel oil for start up/shut down (no connection with the steam grid)	350
E <sub>i2</sub> : e.g. natural gas for heating up of flue gas temperature for SCR and start up/shut down	0
E <sub>i3</sub> : imported electricity (multiplied with the equivalence factor 2.6)	0
E <sub>i4</sub> : imported heat (multiplied with the equivalence factor 1.1)	0
<b>S E<sub>i</sub>: energy input by imported energy without steam production</b>	<b>350</b>
E <sub>p<sub>el</sub> internal used</sub> : electricity produced and internally used for the incineration process	10,400
E <sub>p<sub>el</sub> exported</sub> : electricity delivered to a third party	74,080
<b>S E<sub>p<sub>el</sub> produced</sub> = E<sub>p<sub>el</sub> internal used</sub> + E<sub>p<sub>el</sub> exported</sub></b>	<b>84,480</b>
E <sub>p<sub>heat</sub> exp.1</sub> : steam delivered to a third party without backflow as condensate	0
E <sub>p<sub>heat</sub> exp.2</sub> : district heat delivered to a third party with backflow as condensate (hot water)	0
<b>S E<sub>p<sub>heat</sub> exported</sub> = E<sub>p<sub>heat</sub> exp.1</sub> + E<sub>p<sub>heat</sub> exp.2</sub></b>	<b>0</b>
E <sub>p<sub>heat</sub> int.used1</sub> : for steam driven turbo pumps for boiler water, backflow as steam	0
E <sub>p<sub>heat</sub> int.used2</sub> : for heating up of flue gas with steam, backflow as condensate	0
E <sub>p<sub>heat</sub> int.used4</sub> : for concentration of liquid APC residues with steam, backflow as condensate	0
E <sub>p<sub>heat</sub> int.used5</sub> : for soot blowing without backflow as steam or condensate	6,484
E <sub>p<sub>heat</sub> int.used7</sub> : for heating purposes of buildings/instruments/silos, backflow as condensate	0
E <sub>p<sub>heat</sub> int.used8</sub> : for deaeration - demineralization with condensate as water input	0
E <sub>p<sub>heat</sub> int.used9</sub> : for NH4OH (water) injection without backflow as steam or condensate	0
<b>S E<sub>p<sub>heat</sub> int.used</sub> = S E<sub>p<sub>heat</sub> int.used1-9</sub></b>	<b>6,484</b>
<b>R1 = (E<sub>p</sub> - (E<sub>f</sub> + E<sub>i</sub>)) / (0.97 * (E<sub>w</sub> + E<sub>f</sub>))</b>	<b>0.73</b>
<b>E<sub>p</sub> = 2.6*(S E<sub>p<sub>el</sub> int.used</sub>+S E<sub>p<sub>el</sub> exported</sub>) + 1.1*(S E<sub>p<sub>heat</sub> int.used</sub>+S E<sub>p<sub>heat</sub> exported</sub>)</b>	<b>226,780</b>



## **APPENDIX A**

### **PLANNING APPLICATION WASTE AUDIT AND FACILITIES STRATEGY (from 2010)**

Applicant: Sunrise Renewables Limited

Site: Barry Docks, Woodham Road, Barry

Application: Erection of New Industrial Building and Installation of 10MW Wood Fuelled Renewable Energy Plant

#### **SCOPE OF DOCUMENT: ESTIMATION OF THE TYPE AND QUANTITY OF WASTE LIKELY**

#### **TO BE PRODUCED DURING THE LIFE OF THE DEVELOPMENT**

#### **AND IDENTIFICATION OF WASTE MANAGEMENT TARGETS**

1. The application proposals represent the redevelopment of part of an existing industrial site with the erection of a new industrial building.
2. Since the project planning started there have been several changes in secondary legislation, which affect the development. Of these The Site Waste Management Plan Regulations 2008 (SI 314/2008) and The Environmental Permitting (England and Wales) Regulations 2007 are the most relevant to waste generation from the development construction, operation and decommissioning stages.
3. As the project cost is greater than £300,000 the development would appear to be regulated by The Site Waste Management Plan Regulations 2008. However, Regulation 3 exempts the project from the requirement to have a Site Waste Management Plan (SWMP) if it is a Part A installation as defined in the Environmental Permitting (England and Wales) Regulations 2007. However, the details required by a SWMP will be submitted as part of the permit application i.e. waste generation and minimisation.
4. As the biomass plant is defined as a Part A installation it will require an Environmental Permit, issued by the Environment Agency. The application for the permit is a comprehensive process which requires the submission of detailed information on all emissions to air, water or land which will be regulated by the imposition of conditions in the permit.
5. The planning statement (version 1.3, 03/09/08, ref: 816\_891\_SRB/PS) details waste arising from the operation of the plant in Section 8.10.
6. Waste arising from the construction phase will be closely controlled. Any material arising from the excavation of existing concrete floor slabs will be taken off site to a materials recycling facility for recycling if it cannot be reused on site. Any waste produced by the development will be dealt with as follows:
  - i. Redundant fencing - reused or recycled on site
  - ii. Soil - removed from site and deposited at a suitably licensed or exempt infill operation.
  - iii. Bricks and concrete - taken off site for crushing and screening to produce secondary aggregates, which will be used in the development.
7. The development is a recovery activity, which will utilise approximately 72,000 tonnes of wood per annum to generate electricity. The wood fuel arises from natural sources and recycling sites so the development sits well in the waste hierarchy as markets for recycling construction and demolition timber are volatile, with large quantities still being deposited to

landfill. The other main recycling activities for wood are board (MDF etc) and animal bedding manufacture, which have limited capacity. The biomass plant uses 'new carbon' which is stored in natural wood and timber rather than 'old carbon' which is locked up in fossil fuel reserves, peat bogs etc. The degradation of wood deposited in landfill produces methane, which is 25 times more potent than carbon dioxide as a greenhouse gas, which can be avoided by the use of sustainable development such as the application plant.

8. 95% of waste generated by the development will be reused or recycled at a transfer station. Where possible vehicles will use the return trip to bring recycled aggregates to the site for use in the development.

9. All raw materials will be sourced from local suppliers to the detailed design specification of the building to reduce waste generation from the building works.

10. All waste carriers used in the project will have a carrier registration certificate issued by the Environment Agency.

11. All off site waste management operations will have an environmental permit or exemption issued by or registered with the Environment Agency.

12. All waste removal from the site will be documented to comply with the Duty of Care (S.34 of the Environmental Protection Act 1990).

13. Contractors have not yet been selected to carry out the construction works as the project size necessitates the issue of a tender document inviting companies to bid for the works. Tenders will be evaluated on an equivalent basis to 'best value' to ensure that the selected companies meet the requirements of this waste audit and SWMP requirements submitted with the environmental permit application.

14. Waste hierarchy - the biomass plant will process wood fuel (derived from waste wood), most of which cannot be recycled, reused or composted. The plant has been designed to prevent and minimise the generation of waste and will be able to provide waste heat to users up to 1 km from the development site, if required.

15. Proximity principle - the wood fuel will be primarily sourced from local suppliers.

16. High quality innovative design - the plant meets the BAT (Best Available Technology) requirements of the environmental permitting regime. Pyrolysis is an advanced conversion technology, which turns the inputs into gas fuel, which feeds an engine and also generates heat for re-use, rather than relying on heat alone (like traditional mass burn plants).

17. Provision of complementary facilities – Complementary facilities will be provided for within the site boundary.

18. Environmental protection and enhancement - the site's emissions will be regulated by the Environment Agency and the plant will not be able to operate before the environmental permit is issued. The permitting process also requires consideration of site history and completion and closure of the plant before a permit can be surrendered.

19. Adequate space and access – The site was chosen as it is an existing site with good access and sufficient space to accommodate the development.

20. Environmental education - the design and access statement in the planning statement refers to the use of the site for educational purposes.

21. Public safety - the plant will operate as a 24 hour process and be manned at all times, with remote telemetry for technical assistance and monitoring.