

Enviroparks Hirwaun Position paper on waste sources

Enviroparks (Hirwaun) Limited ♦ April 2009

1. INTRODUCTION

1.1 Enviroparks (Hirwaun) Limited (EHL) has submitted a planning application to Rhondda Cynon Taf County Borough Council (RCT) and the Brecon Beacons National Park Authority (BBNPA) for an integrated energy and resource recovery facility on land at the Hirwaun Industrial estate. The planning application is accompanied by an environmental statement, a design and access statement and a planning policy statement.

1.2 South-east Wales is running out of landfill space. It is estimated that, without additional facilities to deal with the waste arising, the region will run out of landfill capacity in about seven years.

1.3 Enviroparks has been established to promote integrated waste processing, co-locating recycling and commercial operations on one site or 'park'. The concept is to treat diverse streams of waste materials as a resource feedstock and to recycle material and recover energy in the most efficient and controlled manner. On this basis, Enviroparks has developed a process approach that delivers a gradual reduction of volumes that are required to be treated at each stage, and has selected specific technologies for Hirwaun based on the types and volumes of waste arising in the locality of the plant. The plant is expected to deliver a 97.5% diversion from landfill for such material, making it a key strategic recycling operation in South Wales and an exemplar for future developments.

1.4 The inclusion of a high energy user on the Enviroparks site assists in overall site efficiency by providing the core operation with a customer for excess heat and for the purchase of renewable energy, and in turn delivers an additional economic benefit to the area.

1.5 RCT has asked EHL to provide further detail of the relationship between the proposed development and likely waste sources, having regard to the proximity principle for waste planning and the regional strategy for waste as set out in the South East Wales Regional Waste Plan first review (RWP). This paper is EHL's response.

2. TYPES AND VOLUMES OF WASTE THAT WOULD BE PROCESSED AT HIRWAUN

2.1 EHL has applied for planning permission to receive a maximum of 240,000 tonnes of waste per year on the site, broken down approximately as follows:

<i>Inputs</i>		<i>Outputs</i>	
Waste Type	Quantity (t/yr)	Product	Quantity (t/yr)
Food industry waste	30,000	Recyclates (equates to recycling 80% of incoming feedstocks)	80,000
Mixed industrial and commercial wastes, residual municipal waste and separately collected food wastes	210,000	Landfill(representing 80-90% landfill diversion in Phase 1, reducing further in Phase 2)	24,000
		Electricity	80,000 (MWh/yr)
<i>Total</i>	<i>240,000</i>	<i>Water – the large quantities of moisture held in waste accounts for the apparent imbalance of input and output data</i>	<i>balancing tonnages</i>

2.2 The Enviroparks resource recovery process would begin by sorting and removing recyclates such as glass, plastics, paper, wood, ferrous and non-ferrous metals, and aggregates, which would then be then sold. This sorting process would also separate organic waste which would be anaerobically digested to produce a methane fuel for electricity generation. The plant can also process food waste that has been separated at source. Finally the residues from the anaerobic digestion and fractions not suitable for anaerobic digestion are further treated to produce a gas for use as fuel in electricity generation using pyrolysis in Phase 1 and a combination of pyrolysis and a plasma gasifier in phase 2

2.3 Another process on the site, known as ‘Biomax’, will take oily food wastes and animal by-product wastes high in oil, and separate the oil in a centrifuge for use as a fuel for electricity generators or for conversion to biodiesel.

2.4 Of the total waste arriving at the Hirwaun site, it is anticipated that 30,000 t/yr will be directed to the Biomax, 210,000 t/yr to the fuel preparation area (FPA) for recycling, advanced anaerobic digestion, and pyrolysis and plasma gasification. However, it is necessary to take into account project phasing, the possibility of breakdown, or the likelihood of that the characteristics of the available waste might change. In response, the FPA has been designed to handle 210,000 t/yr through two separate but identical process streams. This could enable 140,000 t/yr of residual municipal solid wastes (rMSW) to be processed on one stream and 70,000 t/yr of source-separated kitchen waste (SSKW) on another – with completely auditable separation. As alternatives, the rMSW could be replaced completely or partly by industrial and commercial wastes, or the PFA could process 210,000 t/yr of food wastes. In other words, the FPA has been designed to operate flexibly in order to ‘future-proof’ the plant as far as possible.

2.5 The introduction of phase 2 processing would see the fine-tuning of the FPA processing operation, with plasma gasification introduced to process the drier biomass wastes and to further increase landfill diversion through the treatment of any process residues. However, given that the plant would be expected to operate for approximately 25 years, each element has been designed to be flexible in its process approach and volumetric throughput to accommodate potential changes to the market.

2.6 The combined process is thus designed to separate an extremely broad range of feedstocks so as to respond to as many local and national requirements as possible. In practice, whether a feedstock is a waste or non-waste is immaterial to the operation of the plant: in all cases the process will be appropriately regulated and controlled so as to comply with the legal obligations of waste processing.

2.7 On the basis of the above information, it can be concluded that the EHL can adopt a reasonably flexible approach to waste procurement.

3. ENVISAGED WASTE SOURCES

3.1 EHL has not been shortlisted by RCT in the council's current procurement process for a municipal waste contract. However, the viability of the Enviroparks project at Hirwaun has never relied on RCT's municipal waste contract being awarded to EHL by RCT. EHL's business model has always envisaged that alternative waste sources would need to be found. The development would operate as a 'merchant' scheme.

3.2 The commercially sound route has been to assess the volumes and types of wastes arising within 30 km of the Hirwaun site and then to ensure that the processes within EHL are flexible and competitive compared to the landfill operations. Landfill is the current preferred disposal route – primarily due to a lack of viable alternatives. The 30 km radius complies with the proximity principle for waste collection and recycling¹.

3.3 In order to identify the quantities of target waste streams arising within this target radius, three major regional landfill sites were identified that take:

- municipal solid wastes (MSW);
- industrial & commercial wastes (I&C);
- construction and demolition wastes (C&D).

3.4 These existing landfill operations are at Bryn Pica, Trecatti and Silent Valley. According to Environment Agency Wales waste data reports, in 2008 these three landfill sites accepted 739,000 tonnes of waste. EHL's business model is based around the diversion of up to 240,000 t/yr of waste from these sites – a third of the total volume of waste landfilled.

3.5 For the proposed Enviroparks at Hirwaun, the MSW and I&C waste streams are of particular interest as the content and physical make up of these waste streams is very similar, and Enviroparks process is designed primarily to handle these waste streams efficiently.

3.6 The total I&C waste disposed of at the three identified landfill sites during 2005 was 220,000 tonnes. Under growth predictions of 3% a year, this figure would be expected to be approximately 245,585 tonnes in 2008.

3.7 With respect to MSW availability, the 2008 landfill data from the Environment Agency Wales indicate that Bryn Pica accepted approximately 134,000 tonnes of MSW (c. 75% of the total volume); Silent Valley landfilled 133,860 tonnes of MSW (c.97% of the total), and Trecatti accepted 54,860 tonnes of MSW (13% of total), giving an estimated total of 322,540 tonnes of MSW waste at the target landfill sites for 2008.

¹ In any event, Article 5 of the European Waste Framework Directive requires the proximity principle to be applied to waste disposal installations, as opposed to waste recovery installations such as that proposed by EHL.

3.8 As the Hirwaun proposal is market-led, the gate price of these existing target sites is of key significance. A telephone poll of the target sites indicated that the current gate price for mixed waste per tonne was approximately £65, which included landfill tax at £32. The government will increase tax to at least £48 per tonne by 2010, and predicted that gate fees will thus be in the region of £81 per tonne by 2010. An EHL gate fee of less than £80 would therefore be competitive and excludes any other commercial advantage to using Enviroparks in preference to landfill sites, such as the Landfill Allowance Scheme and the Landfill Regulations that limit the tonnage to landfill.

3.9 The FPA process has been designed to have a maximum throughput of 210,000 t/yr, and accordingly Enviroparks would need a market share of approximately one third of the identified target waste for the site to be at full capacity. This is considered to be feasible and achievable, as the types and quantities of waste arising in the target area far exceed the processing capacity of EHL, thus providing a commercially sound approach to procurement.

4. SOUTH EAST WALES REGIONAL WASTE STRATEGY (2004)

4.1 The South East Wales Regional Waste Plan (RWP) is endorsed by all local authorities in the region and intends to provide a comprehensive strategy with regard to waste, in response to environmental and economic challenges. The current draft first review follows the preparatory technical background provided in the South East Wales Regional Waste Assessment (January 2003).

Waste management principles

4.2 The RWP provides the land-use framework for waste and highlights five fundamental principles. These are:

Sustainability – ensuring ‘development which meets the needs of the present without compromising the ability of future generations to meet their own needs’ and seeking to ‘de-couple’ waste production from economic growth to ensure that the increase in production of waste is slower than the increase in the economy;

The waste hierarchy – establishing that waste should be managed by, in descending order of desirability, reduction, re-use, recovery of materials, recovery of energy and, least desirable, disposal;

Proximity - the principle that waste should be managed as near as possible to where it is produced;

Regional self-sufficiency – the principle that as far as practicable waste should be managed within the region where it is produced;

Flexibility – the principle of leaving options open for as long as possible to monitor change and allow new opportunities to emerge.

For the various reasons given earlier in this report, the EHL proposals at Hirwaun embrace all five of these principles.

4.3 WAG’s *Technical Advice Note 21: Waste* advises that RWPs should be reviewed every three years, and accordingly a consultation draft of the South East Wales RWP first

review was published in October 2007. The RWP first review is a non-statutory plan prepared through a voluntary joint arrangement of the eleven waste planning authorities in S.E. Wales with the assistance of other key stakeholders. Once endorsed by each of the waste planning authorities and agreed by the Welsh Assembly Government, the RWP first review will become the strategic framework for the preparation of local development plans and a material consideration in the development control process.

4.4 Due to the pace at which waste technologies and aspirations have moved on in South East Wales since the publication of the 2004 Regional Waste Plan, this paper relies upon the RWP first review, 2007.

4.5 Paragraph 12 of The RWP first review states that South East Wales has in the past approached waste as problem that is most conveniently and cost effectively disposed of in landfill, although it is now recognised that this disposal approach is unsustainable in the long term because of growing volumes of waste, because of the risk of environmental pollution and because of the unacceptability of burying of valuable resources. It states also that waste must now be approached as a resource from which value can and should be recovered, with the value in waste being realised through the reuse, recycling or composting of products and materials and the production of energy. Importantly, the RWP first review states that new facilities will need to be developed in South East Wales to recover value from the waste produced in the region. The document notes that there is an urgent need for new waste management /resource recovery facilities to enable South East Wales to meet the EU Landfill Directive requirements for the diversion of biodegradable municipal waste from landfill.

Waste volumes: comparison between RWP totals and the Hirwaun proposal

4.6 According to the RWP first review it is estimated that, in 2002/03, controlled waste arisings in South East Wales totalled 4.7 million tonnes. These were broken down as follows:

<i>Waste Stream 2002/03</i>	<i>(t/yr)</i>
• <i>MSW</i>	762,215
• <i>Industrial</i>	860,213
• <i>Commercial</i>	455,977
• <i>C&D Est</i>	2,535,699
• <i>Agricultural Est</i>	18,355
• <i>Special / Hazardous</i>	106,674
• <i>All controlled waste</i>	4,739,133

4.7 The Enviroparks proposal would have a throughput of around 240,000 tonnes p.a, representing 5% of the total volume of controlled waste arising in South East Wales in 2002/03. With a diversion rate of around 97.5% from landfill after the introduction of the phase 2 processing technologies, EHL believes that it will achieve the highest landfill diversion rate yet achieved in the UK.

4.8 As already noted, a further concern is that South East Wales is running out of landfill space. Without additional facilities to deal with the waste the region produces, then South East Wales will run out of landfill void space in about seven years time.

Process technologies

4.9 The RWP's strategic waste management options include alternative combinations of waste management technologies that would enable the region to meet or exceed legislative targets. The RWP first review advises that individual technologies for managing waste cannot be considered in isolation – they need to be utilised in combination in an integrated recovery and disposal strategy for all waste streams. The strategic waste management options identified in the RWP first review are:

- reduction and reuse;
- recovery of materials: recycling, composting, anaerobic digestion, mechanical biological treatment (MBT) / biological mechanical treatment (BMT), mechanical heat treatment;
- recovery of energy: incineration, pyrolysis, gasification, anaerobic digestion, the combustion of refuse derived fuel;
- disposal to landfill;
- disposal facilities for specific wastes: battery recycling, chemical treatment, construction and demolition waste recycling, end of life vehicle (ELV) treatment, packaging recycling, tyre recycling / recovery, WEEE treatment.

4.10 In order to review the RWP's technology strategy, four main alternative strategic waste management options covering the main treatment technologies for residual waste were generated. These were:

- Option 1: a landfill-led strategy for residual waste;
- Option 2: an energy from waste-led strategy for residual waste;
- Option 3: a mechanical biological treatment-led strategy for residual waste.
- Option 4: an autoclave-led strategy for residual waste.

4.11 These options were broken down into 19 sub-options and were then assessed using life cycle assessment, sustainability appraisal, strategic environmental assessment and strategic health impact assessment techniques. No single best option emerged from these assessments, although the seven best performing sub-options were as follows:

- Sub-option 2a: involving pyrolysis
- Sub-option 2c: involving incineration with energy recovery
- Sub-option 3a: involving mechanical biological treatment followed by pyrolysis
- Sub-option 3b: involving mechanical biological treatment followed by gasification
- Sub-option 3c: involving mechanical biological treatment followed by incineration
- Sub-option 3d: involving mechanical biological treatment followed by refuse derived fuel to off-site energy use

- Sub option 4d: involving autoclave followed by refuse derived fuel to offsite energy use.

4.12 A review of these seven sub-options found that in the Rhondda Cynon Taf Borough Council administrative area, new facilities were calculated to be required for all waste management options.

The Enviroparks response

4.13 The Enviroparks development proposed for Hirwaun would have six distinctly separate technologies that are linked together using well-established process integration engineering. It is this combination of technologies that produces the energy production efficiencies that enable an Enviroparks to be classified as an energy producer. These technologies are summarised again as follows:

Fuel preparation area

4.14 The key technology employed is the fuel preparation area (FPA). The primary purpose of the FPA is to separate incoming feedstocks into three primary categories. The first category is recyclates. It is estimated that, even after doorstep recycling, the FPA can extract a further 38% of recyclates out of a residual municipal waste stream, and these metals, plastics, wood, textiles, etc, have a further residual value when sold off-site. The second category is soluble organic waste and the third category is insoluble organic waste – derived from any feedstock that is of a 'biological' nature which can come from food processors, from restaurants and importantly from household black bag waste (up to half this type of waste can be organic in nature, and is typically food waste) and also from kitchen food waste that has been collected separately. The soluble organic 'fraction' is pumped to the anaerobic digester, whilst the insoluble organic matter is dried and used as a controlled biomass fuel for the pyrolysis plant. In phase 1 anything left will go to landfill – typically about 12% by volume and including items that have no recycling or low energy value. The introduction of a plasma gasifier in phase 2 reduces the quantity sent to landfill further.

Enhanced anaerobic digestion

4.15 The soluble organic feedstock recovered by the FPA resembles a thin soup, and would be pumped into the anaerobic digesters where it degrades under controlled conditions producing a methane gas. After the gas has been recovered the remaining solution is passed through an effluent treatment plant and discharged. The insoluble organic fraction, which has a high cellulose content and therefore cannot be digested, is passed through a filter press to remove water and then further dried in a flash drier. This produces a very consistent solid biomass fuel which can be fed into the pyrolyser which in turn produces a valuable fuel gas.

Plasma converter

4.16 The residual feedstocks (i.e. between 10-20% of incoming feedstocks), whilst having no residual value, might still have a calorific value. Calorific value is a measure of the energy content of a material. EHL proposes to capture this energy in the form of a synthetic gas by exposing this feedstock to the very high temperatures within a sealed plasma converter. What remains after this process is a vitrified rock that is totally inert and which can be used as hardcore in construction.

Biomax

4.17 Some waste feedstocks will have a very high oil content. If that oil can be removed before further treatment occurs in the three previous processes, the oil can be converted to a fuel to produce electricity or biofuel. An example of feedstocks would be puff pastry (the best, with up to 40% fat) or animal by-product wastes. This could include food waste or abattoir wastes. It is important to point out, however, that the Biomax process is not an animal rendering plant and can only process feedstocks that have themselves already been partially processed off-site. The typical operating temperature is significantly less than 100 degrees centigrade, but also includes a sterilisation and pasteurisation at high temperatures for a short period during the process.

4.18 The primary product after processing is oil. The solid and water can be recombined and anaerobically digested after which the water remaining is passed through an effluent treatment plant. The solid produced would be dried and used as a biomass fuel on site.

Electricity and heat production

4.19 The above processes produce two types of gas and an oil that would all be pumped to the power or engine house. In this building EHL would operate a number of engines designed to combust these gases. This in turn produces electricity which keeps the processes running continuously with the power they have generated, with the excess being supplied to the local electricity distribution network as renewable energy.

High energy user

4.20 To complete the concept of the Enviroparks a company will be invited by EHL to co-locate to improve the electrical and thermal efficiency of the site. A number of well known companies have approached Enviroparks to consider co-location. Enviroparks is currently working with WAG and International Business Wales to identify an appropriate high energy user and to encourage this company to relocate into Wales.

Summary

4.21 It will be evident that EHL proposes to employ a range of technologies that are favoured by the RWP first review, with a view to advancing the key principles on which the RWP first review is based.

4.22 By using these technologies in combination under closely controlled environmental conditions, with a high energy end user located on site, the Enviroparks development would also promote the 'ecopark' integrated waste processing concept that represents the ultimate development objective for TAN21 and the RWP first review.

The 'Ecopark' concept

4.23 The RWP first review highlights the opportunities linked with co-locating waste management, resource recovery, reprocessing, re-manufacturing facilities and other synergistic activities within the environmental goods and services sector, to form environmental technology clusters as endorsed by TAN 21.

4.24 The proposed Enviroparks at Hirwaun captures the essence of this idea as it is an in-building integrated facility that recycles waste, primarily of a municipal and light industrial

nature, and converts the non-recyclable portions into electricity. The co-location of a high energy user also takes advantage of the renewable energy produced on a local basis.

4.25 The Wales Environment Trust's initiative titled '*Resource Aggregation Plan and Infrastructure Development*' (RAP-ID) is tasked with laying the foundation for, and aiding the delivery of, the waste management / resource recovery infrastructure necessary to serve the requirements of existing and future business development in Wales.

4.26 Over the last decade, the Wales Environment Trust has undertaken considerable work promoting the concept of resources within wastes, and the capture and realisation of that resource value within 'ecoparks' or resource recovery parks. It has been suggested that an ecopark would typically take the form of an industrial estate and business park situated in the vicinity of a resource recovery facility, enabling the tenants of the park either to produce reprocessed resources, including energy and water, or use them in their manufacturing process.

4.27 While the RAP-ID initiative will focus initially on solutions for waste from commercial and industrial businesses, the early development of commercial and industrial waste facilities will have the potential to deliver financial savings and the reduction of the risk / cost of fines to WDAs through combined facilities for commercial, industrial and municipal wastes.

4.28 The proposed Enviroparks development at Hirwaun would be located on an existing industrial site and would incorporate a high energy manufacturing user. It would include facilities for recycling commercial, industrial and municipal wastes. Enviroparks would thus represent a comprehensive response to the RAP-ID initiative and the aspiration set out in TAN21 and RWP first review for ecopark developments.

Locational guidance

4.29 As a part of the review process for the waste local plan, consultant RPS was commissioned by the three regions in Wales to carry out a study to generate and assess areas of search for regional waste facilities across the principality. The aims of this process were primarily to identify areas of search for regional in-building, and to identify areas of search for regional open-air facilities across each of the three regions in Wales.

4.30 The areas of search were categorised as follows;

- *first areas of search* – identified as areas appropriate for waste management development due to the presence of appropriate site characteristics and few significant environmental constraints;
- *second, third and fourth areas of search* – identified as those areas that cannot be excluded from consideration as appropriate areas, but where a greater level of constraint or constraints exist;
- *Exclusion areas* – identified as those areas that, on the basis of clear planning policy, have been excluded from consideration as appropriate for waste management development.

4.31 Paragraph 12.3.5 of the RWP first review states that:

The Areas of Search map for in-building facilities does not prejudice the development of new in-building waste management facilities on any existing land use class B2 'general industrial' employment sites, existing major industrial areas, or new B2 sites allocated in development plans whether or not they fall within an Area of Search for in-building facilities – because the principle of B2 or major industry use is already established on these sites.

4.32 The RWP first review thus regards sites of this nature as appropriate locations for in-building waste management facilities, and further states:

Advances in technology and the introduction of new legislation, policies and practices mean that many modern waste management / resource recovery facilities on the outside look no different to any other industrial building and on the inside contain industrial demanufacturing processes or energy generation activities that are no different to many other modern industrial processes in terms of their operation or impact. For this reason, many existing land use class B2 'general industrial' employment sites, existing major industrial areas, and new B2 sites allocated in development plans will be suitable locations for the new generation of in-building waste management facilities this will be required in accordance with the RWP Technology Strategy.

4.33 The proposed Enviroparks site at Hirwaun Industrial Estate is allocated for industrial use by RCT and BBNPA, and is thus considered to be an appropriate location for the range of uses proposed. EHL is proposing a high quality architectural and landscape treatment to further ensure that the development contributes positively to the visual amenity of the Hirwaun Industrial estate.

5. CONCLUSIONS

The principal conclusions of this position paper are as follows.

- i). EHL's proposed development does not rely on securing local waste management contracts. Instead, the development would operate as a merchant scheme.
- ii). Waste destined for three established landfill sites in the locality would be diverted to the Enviroparks development for recovery. The rising cost and tax penalties associated with landfill operations will ensure that this diversion of the waste stream is commercially attractive.
- iii). When operating at full capacity, the Enviroparks scheme would be able to process the equivalent of a third of the waste volume currently disposed of in the three local landfills. For further comparison, the Enviroparks proposal would process a maximum 5% of total controlled waste arisings in south-east Wales. There are thus grounds for confidence that the requisite waste throughput can be achieved.
- iv). At the regional level, south-east Wales is running out of landfill space. There is a pressing need to bring forward sustainable alternatives.
- v). The Enviroparks proposal is aligned very closely to the technological preferences and locational guidance set out in the South East Wales Regional Waste Plan first review. Significantly, the development is the closest manifestation yet seen of the 'ecopark' concept, with a high energy user proposed to make use of the renewable heat produced on the site.

- vi). The Enviroparks development would also respond to the Regional Waste Plan first review's aspiration for development in well-designed buildings with comprehensive measures to maintain environmental amenity.

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