# 4 Need and Alternatives

## Introduction

4.1 This chapter sets out the need for the project within the broad context of renewable energy targets as well as in relation to security and diversification of energy supplies as set out in European and National legislation and policy. Concurrently, and more specifically it considers Brunner Mond's ongoing operational energy requirements and how these would be met in part by the project.

4.2 The second part of this chapter provides information on the alternatives considered as part of the project. This includes the consideration of alternative sites identified as potential locations for the development and the alternatives in design that were considered during the evolution of the project.

## Need for the Project: Brunner Mond's Requirements

### Energy Requirements

4.3 Brunner Mond is one of Europe's largest manufacturers of Sodium Carbonate, Sodium Bicarbonate and Calcium Chloride. They are the sole UK producer of these basic chemicals which have a wide range of important applications particularly the glass, detergents, chemical, pharmaceutical, food and flue gas treatment industries. Brunner Mond operates two sites located near Northwich Cheshire (Lostock and Winnington).

4.4 The process of Soda Ash manufacture uses naturally occurring raw materials including brine, limestone and coke produced from UK coal. The process is energy intensive consuming approximately 2.5 TWh (terawatt hours) of heat energy per year.

### Combined Heat and Power

4.5 Following the implementation of the European Large Combustion Plant Directive, Brunner Mond made the decision that its power station at Lostock would not be able to meet future environmental obligations and, with approval of both the local authorities and the Environment Agency, pursued a project to install a state of the art gas fired Combined Heat and Power (CHP) plant at Winnington for the supply of steam and electricity to the two sites.

4.6 The CHP plant is now operational and is operated by E.ON UK CHP Limited, who provide a supply of steam and electricity to both of Brunner Mond's sites.

4.7 Although the CHP plant is state of the art and one of the most efficient plants of its kind, Brunner Mond has taken the decision that it is not sustainable to rely solely on fossil fuel to provide all the heat for their energy intensive process for both commercial and environmental reasons.

4.8 The large heat demand of the production process operated in Winnington and Lostock means that a large scale energy recovery plant would provide a vital opportunity to sustain the business into the future. The existing CHP plant is designed to generate up to 140 MW of electricity and up to 600 tonnes of steam per hour (approximately 480 MW thermal). The proposed Sustainable Energy Plant (SEP) would have a total gross maximum electrical capacity of approximately 60 MWe and would be capable of producing up to 100 tonnes of steam per hour consuming approximately 600,000 tonnes of pre-treated waste derived fuel per annum (tpa). The proposed plant would improve the overall sustainability of energy use at the Brunner Mond sites providing approximately one third of the required heat energy and therefore resulting in a significant reduction in the use of fossil fuels.

## Policy and Legislative Context: Energy Policy

### Draft National Policy Statements

4.9 Although the proposed SEP is not an IPC scheme, the draft National Policy Statements published by the Department for Energy and Climate Change (DECC) for consultation in November 2009 provide recent and relevant guidance in relation to energy projects.

4.10 The Draft Overarching National Policy Statement for Energy (EN-1) sets out in Part 3 the need for new energy infrastructure. Section 3.1 states that:

*'Government has therefore concluded that there is a significant need for new major energy infrastructure …'*

4.11 The Statement (Section 3.4) notes that the UK has committed to sourcing 15% of its total energy from renewable sources by 2010 and acknowledges that the Government's lead scenario in the Renewable Energy Strategy suggests that approximately 30% of energy may come from renewable sources by this date. The Statement lists energy from waste plants as a contributor to meeting these targets.

4.12 The Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) states in Section 2.5 that:

*'The recovery of energy from the combustion of waste, where in accordance with the waste hierarchy, will play an increasingly important role in meeting the UK's energy needs.'*

4.13 In Section 2.1.1, with regard to need, the Statement indicates that:

*'…EN-1 sets out the Government's conclusion that there is a significant need for new major energy infrastructure (see summary and conclusion in Part 3 of EN-1). EN-1 Section 3.4 includes assessment of the need for new major renewable energy infrastructure. In the light of this, the IPC should start its review of applications for infrastructure covered by this NPS on the basis that need has been demonstrated.'*

4.14 In addition to this demonstrated need for renewable energy projects such as energy from waste facilities, the proposed SEP would provide an alternative to the landfill of waste as discussed below.

### Energy White Paper

4.15 The White Paper 'Meeting the Energy Challenge' was published in 2007. This outlines a strategy to maintain energy supply and manage the transition to a low carbon economy. The main aspects of the strategy include:

- '*Drive investment to accelerate the deployment of low carbon technologies*
- *Promote policies to improve energy efficiency, to cut emissions and to reduce our dependency on fossil fuels.'*

4.16 Section 5.3.44 of the document states that:

*'Generating energy from that portion of waste that cannot be prevented, re-used or recycled has both energy and waste policy benefits. Energy generated either directly from waste or through the use of refuse derived fuel has benefits for security of supply. In addition, the biodegradable fraction of waste is a renewable resource.'*

## Policy and Legislative Context: Waste Policy

### The Waste Framework Directive

4.17 Directive 200/98/EC (the Waste Framework Directive) sets out the broad policy hierarchy with regard to waste management. Article 4 of the Directive states that Member States sets out the waste hierarchy, indicating that energy recovery should be undertaken in preference to landfill of waste.

### The Requirements of the EU Landfill Directive

4.18 The Landfill Directive puts a requirement on Member States to significantly reduce the amount of biodegradable domestic waste sent to landfill.

4.19 The Directive places progressive limits upon the amount of Biodegradable Municipal Waste (BMW) that can be landfilled. The overarching aim of this is to reduce the emission of gases and the leachate of pollutants into groundwater.

4.20 The three principal targets of the Directive are as follows:

- By 2010: reduce the amount of BMW landfilled to 75 percent of that produced in 1995;
- By 2013; reduce the amount of BMW landfilled to 50 percent of that produced in 1995; and
- By 2020; reduce the amount of BMW landfilled to 35 percent of that produced in 1995.

4.21 The project would be capable of accepting the fuel in the form of pre-treated Municipal Solid Waste (MSW), Industrial and Commerical Waste (C&I) and Solid Recovered Fuel (SRF). It would therefore make a significant contribution to the UK's ability to meet the requirements set by the Directive.

**Planning Policy Statement 10: Planning for Sustainable Waste Management**

4.22 PPS10 was issued in July 2005. Paragraph 1 sets out the overall objectives of Government policy on waste, which states that:

*'Through more sustainable waste management, moving the management of waste up the 'waste hierarchy' of reduction, re-use, recycling and composting, using waste as a source of energy, and only disposing as a last resort the Government aims to break the link between economic growth and the environmental impact of waste.'*

4.23 The document subsequently outlines the waste hierarchy, which confirms recovery of energy from waste as a preferred option compared to disposal of waste to landfill.

**Requirements of the Waste Strategy 2007**

4.24 The Waste Strategy, issued by DEFRA in May 2007, replaces the Waste Strategy 2000. Paragraph ix sets out the Government's key objectives, including:

*'[to] get the most environmental benefit from…investment [in infrastructure] through increased recycling of resources and recovery of energy from waste using a mix of technologies.'*

4.25 Paragraph xv states the main elements of the new strategy including first to:

*'incentivise efforts to reduce, re-use, recycle waste and recover energy from waste.'*

4.26 In Chapter 5, Stimulating Investment, paragraphs 17 to 31 are devoted to recovering energy from waste. Paragraph 17 begins:

*'recovering energy from waste which cannot sensibly be reused or recycled is an essential component of a well balanced energy policy…'*

**Renewables Targets**

4.27 Directive 2009/28/EC on the promotion of the use of energy from renewable sources requires EU member states to take appropriate steps to encourage greater consumption of energy from renewable energy sources. The Directive includes a UK target of 15% of energy from renewable sources by 2020.

4.28 The Renewable Energy Strategy 2009 sets out ambitious lead scenarios, including more than 30% of electricity generated from renewables.

**Regional Spatial Strategy**

4.29 The Regional Spatial Strategy (RSS) for the North West region, or the North West of England Plan, was issued in September 2008 and runs to 2021. It largely replaces the Cheshire Structure Plan (and other structure plans in the region) as the strategic planning framework.

4.30 Policy EM10 of the RSS states that:

*'Plans, strategies, proposals and schemes should promote and require the provision of sustainable new waste management infrastructure, facilities and systems that contribute to the development of the North West by reducing harm to the environment (including reducing impacts on climate change), improving the efficiency of resources, stimulating investment and maximising economic opportunities.'*

**Regional Waste Strategy**

4.31 The Regional Waste Strategy was published in September 2004, with the objective of guiding the North West region:

*'away from unsustainable waste management practices by reducing our current dependency on landfill, moderating the growth in waste arisings, minimising resource use, maximising resource efficiency and reducing the hazardous content of waste'.*

4.32 The Regional Waste Strategy for the North West recognises that:

*'One of the most important changes that will take place in the region will be some growth in the amount of waste that is burnt as a fuel, following the removal of recyclable material in order to recover value (in the form of energy) from it. Energy or value recovery has an important part to play in this Strategy because it bridges the gap between success in recycling and the remaining residual waste, which cannot be deposited in landfill because of the Landfill Directive targets.'*

4.33 The Strategy supports the development of 'thermal treatment facilities' as part of an integrated approach to waste management. To this end there is considered to be a recognised need at regional level for the proposed plant.

**Relationship to PFI Waste Contracts**

4.34 The project is not intended to address the needs of Cheshire's, nor any other specific PFI waste contract. There are other projects that are planned or permitted which have been designed to address Cheshire's municipal residual waste disposal needs. This project is able to take pre-treated waste derived fuel from Cheshire but such fuel may also be imported from beyond Cheshire's boundaries. Where this happens, it is likely that it would be imported by rail rather than road for economic and sustainability reasons. However, if a suitable source of fuel were available locally (for example at the adjacent proposed Viridor site), the Brunner Mond scheme could easily accept such feedstock, subject to agreeing terms.

4.35 Throughout the UK there is still a considerable amount of municipal waste going to landfill. According to figures from DEFRA (2008/9), 50% (13,784,000 tonnes) of municipal waste is still going to landfill. In the north west region, 59% (2,258,000 tonnes) is going to landfill. Management of waste via energy from waste schemes nationwide is only 12%, and only 3% in the north west, the second lowest in the country. Despite letting PFI waste contracts for municipal waste, there are still quantities of 'unallocated' municipal waste that could be diverted away from landfill and used to generate energy. Further information regarding availability of pre-treated waste derived fuel is provided in Appendix 4.1.

4.36 In addition to the availability of pre-treated municipal waste derived fuel for the project, there are still quantities of C&I waste generated, a proportion of which is suitable as fuel for the plant. Although the category C&I waste excludes construction, demolition, excavation and mining wastes, there is still more than twice as much C&I waste as household waste – about 68 million tonnes a year, compared to about 25 million tonnes of household waste.

4.37 As explained in DEFRA's Commercial and Industrial Waste in England; Statement of Aims and Actions, October 2009, the Government's objectives for all types of waste includes securing the investment in infrastructure needed to divert waste from landfill and to get:

*' …the most environmental benefit from that investment, through increased recycling of resources and recovery of energy from residual waste ...'*

**Need: Summary**

4.38 Brunner Mond has a significant, locationally specific, energy requirement as part of its role as the sole UK producer of sodium carbonate and associated products. The large heat demand of the production process operated in Winnington and Lostock means that a large scale energy recovery plant would provide a vital opportunity to sustain the business into the future.

4.39 The proposed SEP would have a total gross maximum electrical capacity of approximately 60 MWe and would be capable of producing up to 100 tonnes of steam per hour, consuming approximately 600,000 tonnes of fuel per annum (tpa). The proposed plant would improve the overall sustainability of energy use at the Brunner Mond sites providing approximately one third of the required heat energy and therefore resulting in a significant reduction in the use of fossil fuels and production of renewable energy from a good quality facility.

4.40 Energy policy highlights the need for energy from waste projects. The most recent, draft National Policy Statements for Energy set out the Governments position on energy infrastructure. The Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) states that there is a significant need for new major energy infrastructure.

4.41 In addition to providing a substantial part of the required energy for Brunner Mond's operations, the proposed SEP would contribute towards the aims of waste policy by reducing the UK's reliance upon landfill as a final destination for waste. This aim is set out in policy at

European, national and regional levels. At each level, measurable objectives for that reduction are provided with incremental targets set over time.

4.42 It is recognised that the continuing practice of large scale landfilling of waste represents a missed opportunity and the potential to reuse a large proportion of that waste is being overlooked. In the case of waste that cannot be recycled, its use as a fuel material is the next most appropriate in terms of the waste hierarchy.

## Alternatives Considered

4.43 This section outlines the main alternatives studied by Brunner Mond and E.ON Energy from Waste UK Limited in the development of the project and an indication of the main reasons for the choice, taking into account the environmental effects.

4.44 As discussed above the alternatives are considered in the following terms:

- Alternative locations,
- Alternative on-site arrangements.

### Alternative Locations

4.45 A review of possible alternative sites for the project has been carried out. A key consideration is that a primary purpose of the proposed energy from waste facility would be to supply steam to the Lostock site, in addition to electricity. Given that it is not practical to transport steam over long distances, sites on or close to the Lostock or Winnington sites were considered to be preferable.

4.46 Sites at both Lostock and Winnington owned by Brunner Mond were considered for the proposed SEP. Criteria taken into account in considering site options included:

- Land area available in brown field locations;
- Availability of road and rail transportation links;
- Environmental aspects, including likely environmental effects;
- Local planning policy;
- Health and safety;
- Operational issues, effect on existing site operations and compatibility of adjoining land uses, existing and proposed e.g. the Viridor scheme;
- Practical issues such as the scope of any enabling work and constructability.

4.47 The land available has been a key consideration in identifying possible sites. As set out above, the land is required to be close to either the Lostock or Winnington sites, given the difficulties in transporting steam over longer distances.

4.48 In terms of transport links, the Lostock site has an existing rail link from the Manchester-Chester railway line. In addition, the site benefits from existing rail sidings that could be modified to suit the logistics of receiving and off-loading large quantities of fuel. The site can also be accessed from the A530 Griffiths Road, which connects with the A559 to the north, the A556(T) to the south and further afield to the A54 and the M6.

4.49 The Winnington site also has a rail connection, but suitable off loading facilities would be more difficult to achieve. In addition, the site's location in relation to the Northwich urban area is less favourable and traffic impacts are likely to be greater.

4.50 In terms of the likely environmental effects, the land at Lostock is previously developed land currently occupied by the former Lostock Power Station (now decommissioned). The site has therefore recently been used for energy generation purposes and is currently occupied by buildings formerly used for that purpose. The former power station also had emissions stacks associated with its use. Therefore a new energy from waste plant would continue the earlier land use, and involve the same features, rather than introduce an entirely new land use and new features into the landscape.

4.51 Sufficient land would be available at both sites. Following demolition of the existing power station, the plot at Lostock would be of sufficient size to accommodate the project with a suitable layout for efficient plant operation. There is an adjoining area of land that is suitable for temporary use as a construction laydown area.

4.52 In terms of local planning policy, much of the land required at the Lostock site is also allocated in the Waste Local Plan 2007 as site WM12B, and some of the remainder forms part of site WM12A. The former is identified as suitable for mechanical/biological treatment, anaerobic digestion, thermal treatment, household waste and recycling centre or material recycling facility. All sites identified in the Waste Local Plan were selected following an assessment of the likely need for facilities, and suitability of the sites. The site assessment has been subject to Strategic Environmental Assessment. The land at Winnington is not allocated in the Waste Local Plan.

4.53 Operational feasibility, deliverability and risk were also considered in comparing the merits of the two sites.

4.54 On balance, the Lostock site was chosen as the preferred site for a number of reasons. The site benefits from better road access with appropriate rail facilities more easily provided. Use of the Lostock site would continue the former land use and involve similar features to the former power generating station. These reasons are considered to be sufficient, but are strongly reinforced by the fact that land at Lostock is allocated in the Waste Local Plan for waste management purposes including thermal treatment.

**Alternative Site Layouts**

4.55 Within the preferred site a number of alternative layouts were considered. In this respect, access has been a key consideration. This is influenced by the existing topography and the location of the existing rail sidings, giving the preferred point of entry.

4.56 Other considerations were:

- Proximity to adjacent residents and potential environmental effects such as visual impact and noise.
- Rail delivery logistics, including container off-loading and handling;
- Practical considerations, such as constructability, logistics of goods vehicles within the site.

4.57 The site layout is fundamental to the practical and safe working of the facility and following approval of a base layout by the client and process engineer, a number of variations were considered.

4.58 There are two distinct approaches to the overall appearance of this type of development. One is to express function in the form of a straightforward building of industrial appearance and the other is to present a different shape so that it appears less angular, more homogenous and thus less industrial in appearance. It was noted that any attempt to superimpose a different appearance other than to express its form would result in an increase in its overall height and extent.

4.59 Three initial concept proposals were produced, each adopting a different approach to the overall aesthetic of the building. Discussions took place within the client design team with a decision made to express the functional forms of the facility rather than conceal them, and to avoid introducing additional forms in order to rationalise the building footprint and in turn reduce the amount of irregularity.

4.60 The main constraints considered while designing this scheme concerned the actual shape and size of the site and vehicle movements both internally for the new SEP and beyond to the existing Brunner Mond facility. The internal process has driven the building mass to be as efficient as possible.

4.61 The main access/exit to the whole Brunner Mond site is to the south of the proposed SEP, with all incoming traffic being met with a view of the stacks and the flue gas treatment area. With this in mind each of the schemes were designed to provide an interesting architectural feature to this main view, to focus viewer attention away from the more industrial architecture of rest of the building.

4.62 The canal which runs to the east of the SEP has a public footpath with follows the site boundary. Immediately within the site, adjacent to the footpath, are the Air Cooled

Condensers. These would adopt a similar architectural treatment to that of the main building to provide architectural merit to this public facing aspect.

4.63 A consistent colour scheme of greens and greys has been adopted to all three options and reflects the natural colours of the surrounding landscape and further help the building sit successfully within its context.

4.64 The three initial design options were as follows:

*Option 1*

4.65 In an attempt to lessen the overall visual mass of the building, a band of horizontally laid cladding was introduced around the full perimeter in a mixture of green and grey colours. This band would not only help in reducing the visual mass of the building, but also help to rationalise the irregular footprints of the various building elements on site, into one combined structure to produce a less complicated and simple aesthetic from all views. To ground the building a base band of dark anthracite cladding would be incorporated and in a further attempt to lessen its overall impact the extents of building above the central horizontal band would be coloured in a neutral colour to best blend in with the skyline when viewed from the distance.

*Option 2*

4.66 In this option, the original simple `box` massing of the building has been retained with the junctions of these box intersections emphasised towards the stack elevation with a series of recessed semi transparent feature panels providing an insight into the internal processes of the building, and an architectural focal point. The building would be grounded with a dark anthracite base to help it to sit within its context, with the main building colour scheme more industrial to relate to Brunner Mond buildings on the adjacent site.

*Option 3*

4.67 In this option, the building form was further simplified by producing a defined line between the focal end of the building and the more industrial aspect to the rear. This division is shown with a subtle change in building form and more noticeably colour, with the building vertically clad full height in a fading green colour scheme. This not only reflects the natural landscape colours which surround the site, but also helps focus the viewer attention toward the more visually appealing stack end of the building while adding to the architectural merit of the scheme. The horizontal infill panels would be a mix of colours to further enhance the architectural quality, with those adjacent to the stacks semi transparent allowing views into the internal process of the plant.

4.68 Option 2 was selected as the most appropriate design for the site.

**Alternative Technologies**

4.69 Brunner Mond has considered the potential to apply alternative technologies to meet some or all of its energy needs. These are listed below with key reasons they were not considered appropriate:

- Wind power - Studies have shown that there is neither sufficient wind of the right consistent quality to power wind turbines nor available land within the site to provide the energy required to sustain the site production. The low availability factors for inland wind generation also make this inappropriate for a continuous chemical manufacturing operation as it would require 100% back up from another technology.
- Solar – At the site latitude there is insufficient sunlight during the year and insufficient land available on the site to produce solar heat energy for the applicant to contemplate this as an alternative solution.
- Photo voltaic – Insufficient sunlight is available.
- Nuclear power – This is considered to be inappropriate and un-economic for the size and location of the energy need.
- Advanced technologies – The applicants will only consider tried, tested and proven technologies, as the risks associated with emerging advanced technologies for a site of this size are too great.
- Geothermal – Not available at the current time.