POWERFUEL

Portland energy recovery facility

Environmental statement
Technical appendix F:

Economic effects

(part 2 of 2)

F2

F2

Economic impact assessment

Economic Impact Assessment

Proposed Portland Energy Recovery Facility

26 August 2020

Project No.: 0552187

The business of sustainability

Signature Page

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Economic Impact Assessment

Proposed Portland Energy Recovery Facility

[redacted]

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Acronyms and Abbreviations

Name	Description

1. ECONOMICS

1.1 Introduction

This Appendix (F2) presents an assessment of the likely significant economic effects that are predicted to arise from the construction and operation of the proposed project. The underlying policy context informing the economy and economic development is sketched out in the accompanying Economic Baseline report (Appendix F1). As well as describing the policy context, the baseline report provides a summary of the current economy and some of its key characteristics, using comparisons of other geographies to help to identify relative strengths and weaknesses. In the context of the economy as it presently stands, this Appendix presents a summary of the work that has been completed to demonstrate what the likely impact of the proposed Energy Recovery Facility (ERF) would be – on jobs, on local and national expenditure, on local businesses, and through one of them, on a key element of tourism – that generated from passenger cruise liners calling at Portland Port.

The Appendix begins by setting out the method used to assess the economic impact of the project. Then, the potential economic effects of the project are identified, and quantified where possible, after which mitigation measures are considered. A summary of the project's anticipated impacts is presented at the end of the chapter.

1.2 Project Summary and Potential Effects

Powerfuel Portland Ltd proposes to build an ERF on the island of Portland, on brownfield land within the boundary of, and owned by, the Portland Port Authority. The site location is shown, on the North coast of Portland, Dorset, in Figure 1.1.

The potential economic impacts of the proposed project include:

- Supply of 15.2MW power to the National Grid;
- The potential to supply CHP to businesses and local households) in the vicinity of the site;
- Knock-on impacts on the operation of the port and potentially, other existing local businesses;
- Removal of a power bottleneck on the Island of Portland, facilitating inward investment by new and existing businesses;
- Direct, indirect and induced employment associated with the construction of the ERF;
- A permanent workforce based at the proposed ERF in Portland;
- Indirect employment associated with the operation of the ERF;
- Induced employment associated with the operation of the ERF;
- Reduction in waste management costs for Dorset Council;
- Brownfield land re-use (via regeneration and re-use).

1.3 Basis of Assessment

To facilitate a consistent approach to the assessment of significance across the environmental studies within the ES, Terence O'Rouke's approach to the determination of significance has been used (see Chapter 6 of the Environmental Statement). The degree of effect is determined from the interaction of impact magnitude and the sensitivity of identified receptors, and is then used to determine whether an effect is significant, using the four step process set out below.

1. Identify environmental resources or receptors and determine their value, importance or sensitivity to change. This is categorised as high, medium, low or negligible.
2. Identify impacts affecting environmental resources or receptors and determine their magnitude, scale or severity. This is categorised as large, medium, small or negligible.

3. Determine the degree of the effect caused by an impact on a receptor using a matrix and the categories established in steps 1 and 2 above.
4. Determine whether the effect is significant. If the degree of effect is moderate or above (including slight to moderate effects) then the effect is considered to be significant in EIA terms and mitigation must be considered for adverse effects. Slight or negligible effects are not considered to be significant.

Figure 1.1 Site Location, Shown by the Red Boundary, Portland

Source: Powerfuel

The sensitivity of the receptor will be judged according to its level of importance (eg the degree to which its features are of local, regional or national importance) and its ability to adapt to a changing environment. A high level of relative importance and/or lack of ability to respond to change will generally result in the receptor's being categorised as higher in sensitivity. Table 1.1 presents a summary of the criteria providing a general definition for determining the sensitivity of receptors.

Table 1.1 Economic Receptor Sensitivity

Sensitivity	Example
High	Receptor sensitivity is considered high in the case of more vulnerable receptors, which have limited capacity and means to adapt to change. The area is likely to be typified by higher levels of unemployment and/or underemployment than usual. There are relatively high levels of deprivation, compared to the national average. There may be some skills deficits within the labour force, but there are few factor market capacity problems. The receptor is likely to have little or no ability to absorb change or recover/adapt to adverse circumstances, without fundamentally altering its present character.
Medium	Receptor sensitivity is considered medium when there is limited capacity and means to adapt to a given change and maintain/improve quality of life. The area is typified by broadly comparable levels of unemployment and deprivation when compared to those typically found nationally. The receptor is likely to have medium ability to absorb change or recover/adapt.
Low	Receptor sensitivity is considered low when there is a moderate to high capacity and means to adapt to a given change and maintain/improve quality of life. The area is likely to have relatively low unemployment and deprivation levels, when compared to the national average. The receptor is tolerant of change without detriment to its character.
Negligible	An effect would not be discernible in the context of the number of jobs/spend created or lost within the wider study area and the capacity of that area to accommodate the change. The receptor is able to absorb change and/or recover or adapt to the change.

Having assessed receptor sensitivity, the magnitude of potential effects (both beneficial and adverse) on baseline conditions will be assessed through the detailed consideration of the proposed development, taking into account the following:

- Relevant legislation, policy or guidelines;
- The degree to which the environment/receptor is potentially affected (and whether conditions are enhanced or impaired);
- The scale or degree of change from baseline conditions as a result of the proposed development; and
- The duration of the effect (eg whether it is temporary or permanent), and whether it is likely to be reversible.

A combination of the magnitude of the sensitivity of the receptor and the magnitude of the likely effect will determine the overall significance of effects. The assessment criteria for impact magnitude is shown in Table 1.2 below.

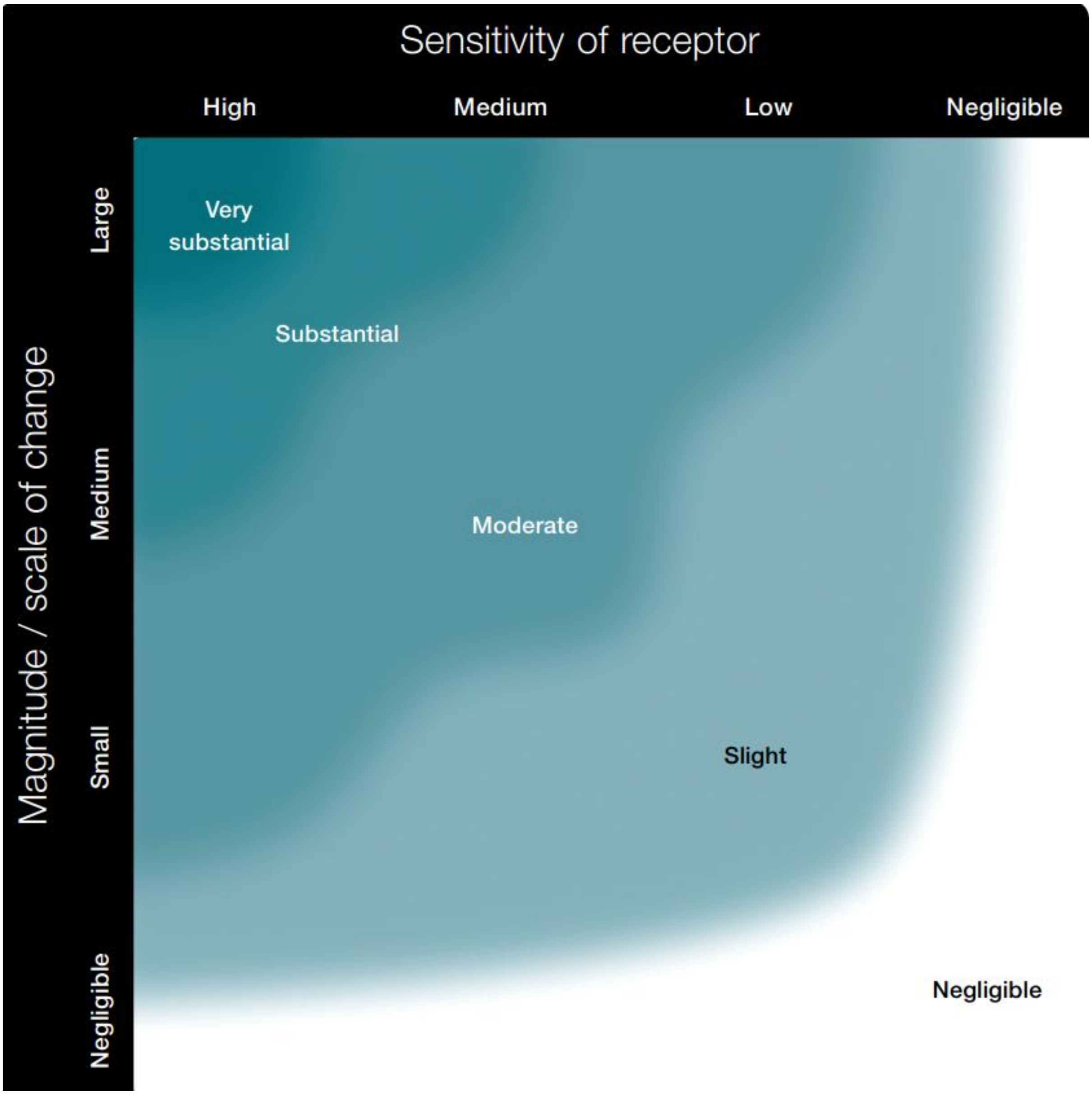
Table 1.2 Magnitude of Effects

Sensitivity	Example
Large	Total loss or major alterations to key elements or features of the baseline conditions. Impacts would be experienced at an international or national scale. Impacts would be of long term duration. Impacts will be experienced by large numbers of businesses and/or people (with number depending on local context).
Medium	Loss or alteration to one or more key elements of baseline conditions, so that baseline conditions are fundamentally changed. Noticeable impacts would arise judged to be important at a regional or sub-regional scale. Impacts would be medium term (eg 3-5 years)
Small	Minor shift away from baseline conditions, changes are detectable but not material. Impacts will be small scale, with a small number of affected businesses and/or people (with number depending on local context).
Negligible	Very little change from baseline conditions, impacts are unlikely to measurably affect the well-being of businesses or people with change being barely distinguishable.

1.3.1 Significance of Effect

A combination of the sensitivity of the receptor(s) and the magnitude of the receiving environment will determine the overall significance of the effects. To ensure consistency throughout the ES, the significance of the effects arising from the proposed development has been assessed as very substantial; substantial; moderate; slight or negligible. The matrix used to determine significance is shown in Figure 1.2 below. The chart is used in identifying a significance by reading the sensitivity and magnitude of the respective axes in order to identify the impact. For example in the event that an effect is judged to have a medium magnitude on a receptor judged to have a medium sensitivity, the net effect of the impact in this case is ‘moderate’.

Figure 1.2 Determination of the Significance of an Effect



In the impact assessment body of this report, each receptor/impact is discussed and at the end of each section, an impact assessment is given. A summary of the combined impact assessments across all receptors is provided in Table 1.14 at the end of this Appendix.

1.4 Method

The approach adopted for the assessment of economic impact is to:

- Identify the economic receptors likely to be affected by the development and/or operation of the proposed project;
- Gather data specific to the local economy and the receptors identified, including population, employment, unemployment and deprivation data, with the range of data presented comprising the baseline situation;
- Estimate the quantitative impact of the proposed facility, and where this is not possible, make an estimate of impact in qualitative terms; and
- Consider the impact of the facility on the economic receptors, specifically, relative to the baseline.

There are a range of factors associated with the construction and operation of the proposed facility that have the potential to influence people. The people affected will be specific individuals, but the ramifications of the proposed project are considered here through its effect on broader receptors which comprise the activity of combined groups of people. At a broad level, the economic receptors likely to be affected by the development are therefore defined as:

- Employment and labour markets (via improved employment opportunities or additional job security for existing employment);
- Existing businesses (through strengthening and expansion, and potentially also through negative effects via competition);
- New businesses/inward investment (via the supply chain servicing the proposed project and increased infrastructure capacity deriving from the proposed project);
- Local households through the provision of combined heat and power opportunities; and
- Geographically local authorities, via potentially reduced waste management costs.

In terms of assessing economic impacts, there are no statutory requirements setting out the format or approach to be employed in economic assessment for EIA purposes and therefore this analysis reflects as far as practicable the approach of HM Treasury's *Green Book - Central Government Guidance on Appraisal and Evaluation* (2018). The *Green Book* is the standard assessment methodology required by HM Government and underlines the preparation of transparent, objective, evidence-based appraisal and evaluation of proposals to help inform decision-making throughout the UK. In specific technical matters, other Government approved methods, including the Homes and Communities Agency's *Additionality Guidance* (Fourth Edition), and Supplementary Guidance to the Green Book are also adopted.

A key tenet of the Green Book is to ensure that net project impacts, rather than gross impacts, are measured. The development of an accurate counterfactual is challenging for a project of this nature and therefore the approach has been to adopt the convention of assuming that an alternative project will not come forward, and that instead, waste will continue to be dealt with using existing plants and processes. This includes the continued use of UK landfill and ongoing export of RDF to the Netherlands and other EU Member States.

Should the project receive permission, its construction will bring investment both to the local area and to the wider region, there will also be economic impacts in the supply chain across and beyond the UK. The impacts will be felt in one of three ways - direct impacts, which are generated by the construction and operation of the ERF itself, indirect impacts, which are associated with the activities taking place in the project's supply chain, and induced impacts, which derive from the spending of employees working directly on the ERF itself and also of employees further along the supply chain.

Of these three, the least significant will be induced impacts. Possibly because of this, and also because the assessment of induced impacts requires a deep understanding of household expenditure patterns, methods regarding the assessment of induced impacts are not as advanced as they are for direct and indirect impacts. In order to ensure quantitative assessments are as robust as possible, assessment of direct and indirect impacts has been prioritised, at the expense of induced impacts, reflecting the strength of available methods.

Other than obtaining an estimate of gross impacts to begin with, perhaps the biggest challenge in assessing the economic impact of a proposed scheme is to separate the gross impacts from what would have happened anyway, what takes place away from the 'target' area or local setting, and what indirect impacts might be created through supply chain interactions. The following three sub-sections, on leakage, displacement and multiplier, explain how this is done.

1.4.1 Leakage

While all of the project's impacts will be experienced somewhere, the location of the impact will depend on the distribution of spending and whereabouts of firms within the supply chain. In economic terms, the way in which revenue or jobs generated by a particular economic activity is lost to more distant areas is known as 'leakage', which is the number or proportion of the outputs that benefit those outside the target area.

In terms of the areas of interest, the analysis has been undertaken at up to three levels. Level 1, the smallest and most local area of interest, is defined by the old Local Authority area of Portland and Weymouth, which was abolished last year. This area includes the town of Weymouth and the Isle of Portland, specifically the areas of Wyke Regis, Preston, Melcombe Regis, Upwey, Broadwey, Southill, Nottington, Westham, Radipole, Chiswell, Castletown, Fortuneswell, Weston, Southwell and Easton; the latter six being on the Isle of Portland. It has not always been possible to conduct the analysis at this level of detail, due to lack of certainty regarding workers' locations prior to hiring and the fact that the supply chain has not yet been fully sourced.

The second area of geographic interest is larger. Known as Level 2, it is defined by the combined areas of Dorset, Bournemouth; Christchurch and Poole. The highest geographical area is Level 3 which comprises the remainder of the UK. The scope of the economic assessment excludes areas beyond the UK; any expenditure in these area or jobs created beyond the UK are not considered relevant to the assessment because they do not (in the first round of expenditure, at least) benefit the UK directly. A summary of these areas is given in the Table below.

Table 1.3 Geographical Areas for Leakage Estimates

Area	Equivalent to
Portland and Weymouth	Level 1
Dorset, Bournemouth; Christchurch and Poole	Level 2
Rest of UK	Level 3
Mainland Europe	Out of scope

Source: Consultant estimate

As noted above, the suppliers for some capital items have been identified, while for other items they remains unconfirmed. However Powerfuel Portland Ltd itself has its main working offices in Bridport, Dorset, with a registered office address in London. Its directors are Dorset based, and should the ERF be given permission, Powerfuel's intention is to prioritise procurement (of both staff and inputs) from the Isle of Portland, or if this is not feasible, then from the wider local area (defined as Level 2).

The development will be facilitated through the use of an engineering, procurement, construction and commissioning (EPC) contract, and the likely contractor has also expressed an interest in using local contractors. However final decisions will also require quality and cost issues to be addressed at bid stage and therefore as yet it is not possible to be certain of the exact location of suppliers. Nonetheless, judgements have been made to inform the assessment, following which it is expected that most suppliers will be located within the Level 2 defined area, or within mainland Europe. Further details are presented in Section 1.5.1.

1.4.2 Displacement

Displacement is the proportion of the proposed project's outputs/outcomes that are accounted for by reduced outputs/outcomes elsewhere. For example, if the operation of the proposed ERF merely causes customers to switch from other ERF plants to the Portland plant, the waste processing activity would be considered simply 'displaced' from elsewhere and therefore of little economic interest (notwithstanding some transport and emissions savings).

In terms of employment, displacement might take place if a person is employed, but to accept a newly created post at the ERF, that person quits an existing role, and nobody is recruited to replace them (the job essentially just shifts from one employer to another and no productivity benefits are achieved). Like leakage, displacement depends on geography; a job in Dorset might be 'additional' to Dorset in the sense that it does not displace an existing job in the area, but it might count as 'displaced' in the context of a UK-wide analysis in which someone joins the operation of the new ERF from an existing ERF in the North West, and no-one replaces them there.

1.4.3 Economic Multiplier Effects

Multiplier effects cause the further economic activity (jobs, expenditure or income) associated with additional income and supplier purchases. The multiplier effect causes gains in total income, output and employment to be greater than the change in economic activity that caused them in the first instance. This happens because when money is spent (for example), that money becomes an income to another person or business in the economy, and a proportion of that money is then re-spent, creating another round of expenditure (smaller than the last, but still positive). This is known as a second round effect. A proportion of the second round expenditure is also re-spent, causing a third round effect, and so on, so that the same money may be circulated again and again. The 'multiplier effect' seeks to quantify the initial effect of the expenditure and add in the effects from the associated subsequent rounds of expenditure.

There are two types of multiplier – an indirect multiplier (sometimes referred to as a supply linkage multiplier), which is associated with purchases made as a result of the investment, and the further purchases associated with linked firms along the supply chain.

The second type of multiplier is an induced multiplier (sometimes referred to as an income multiplier) which is concerned not with supply chains but with households. Each round of additional expenditure in the supply chain creates increased demand for products which in turn pushes up the level of household income through more overtime and increased employment. A proportion of this increased household income is spent by households, which increases the demand amongst companies supplying the households (car, clothes and household goods manufacturers, restaurants and leisure providers etc). This additional spending in turn creates new rounds of expenditure and demand, which service additional demands from households, and the cycle continues.

We have identified relatively robust evidence quantifying the size of the indirect multiplier. The source of this evidence is from the UK Office for National Statistics' Input Output Analytical Tables (ONS, 2020). The fundamental purpose of the Input-Output framework is to analyse the interdependence of industries in an economy, and the estimation of multipliers is a key output from the analysis. However, it should be noted that, while direct expenditure can be linked geographically, because of the different supply chain relationships between firms in different sectors of the UK economy, it is not possible to identify where in the UK the knock-on multiplier effects will be felt – only that it will be somewhere in the UK.

The UK Input-Output tables at present do not produce an estimate for induced multipliers. Rather than speculate as to the size of the associated induced multiplier, or use an induced multiplier obtained from another economy (Scottish Input-Output Tables produce estimates of induced multipliers, but these model specifically Scottish relationships and are not intended to reflect household behaviour in Dorset), we have not estimated an induced multiplier effect. This is a conservative position and will understate the total economic activity associated with the ERF.

Depending on the specific linkages, the underestimate is likely to be in the region of 10-20% of the total direct and indirect spend.

1.5 Impact Assessment

1.5.1 Effects of the Proposals During Construction

1.5.1.1 Spending and Supply Chain Impacts on Existing and New Businesses

The 24-month construction period will consist of site preparation (including set-up of contractor's compound, preparing lay-down areas and site security), civil works (including site levelling, foundations, drainage and underground utilities and services), delivery and installation of large plant items (including boiler, steam turbine and air cooled condensers), construction of building structure, installation of plant and equipment, building fabric construction, and external and soft hard finishes.

This will be followed by a six-month commissioning period to include testing and commissioning of systems (cold testing), setting to work and commissioning of complete process (hot testing) and a plant proving test.

Dust, odour, noise and litter will be carefully controlled and managed so that there are not anticipated to be any residual effects that will impact on economics. However, during the construction and commissioning process, economic activity will be generated through the physical construction and assembly of the ERF and through the associated demand for materials, capital equipment and services. Some of the investment associated with the ERF will take place locally, while other investment will be directed towards suppliers located further afield, in some cases in continental Europe.

The capital expenditure expected to be incurred in building and commissioning the ERF is estimated at £95m. While suppliers have not yet been confirmed, market reviews have taken place and in some instances the project promoters are engaged in negotiations with selected suppliers. Based on the most likely outcomes, it is possible to broadly estimate the proportion of expenditure which will be allocated to different project elements, and the approximate geographical area from which those elements are likely to be drawn. These estimates are shown in Table 1.4 below.

Local sectors likely to receive significant demand boosts include construction, civil engineering and site management, while sourcing of specialist equipment such as turbines and boiler-related technology is expected to largely come from Italy and/or Germany.

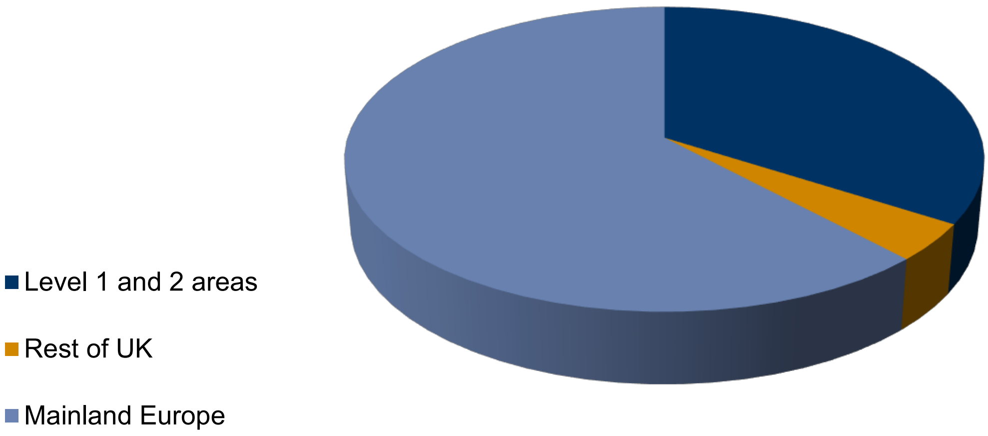
Table 1.4 Major Components of Project Expenditure

Project Element	Approximate Spend (£,000)	Likely Location of Spend
Project management	950	Dorset (Level 1 and 2)
Civil work technical engineering	3,800	Dorset (Level 1 and 2)
Site management	2,850	Dorset (Level 1 and 2)
Civil work construction	22,800	Dorset (Level 1 and 2)
Structural steel and burner	3,800	UK (Level 3)
Mechanical engineering	11,400	Mainland Europe
Boiler	32,300	Mainland Europe
Electrical Instrumentation (EI) and control engineering	5,700	Mainland Europe
Test and commissioning	1,900	Dorset (Level 1 and 2), UK, mainland Europe
Mechanical and electrical construction/installation	7,600	Mainland Europe
Procurement and logistics	1,900	Mainland Europe
Total	95,000	

Source: Powerfuel Portland Ltd estimates

Figure 1.3 below provides an indication of the likely geographical split of spend and shows that just over a third of capital spending is expected to be concentrated in Dorset, Bournemouth, Christchurch and Poole (ie Levels 1 and 2). Early evidence of this is provided by Powerfuel Portland Ltd's ongoing contractual discussions with Dorset based plant hire companies, steel stockholders, building contractors, design and build specialists and civil engineers.

Figure 1.3 Approximate Geographical Spend Breakdown



Source: Powerfuel estimates

As indicated by Table 1.4, it is too early as yet to identify a distinction between investment going to Level 1 and Level 2 areas. However, stripping out the activity expected to be bought in from beyond these areas (ie the rest of the UK and Europe) allows adjustments for expected leakage to be made. This produces a gross spend of £30.4m which is specifically expected to be spent with suppliers in Dorset, Bournemouth; Christchurch and Poole (note this excludes testing and commissioning, which will be split between Dorset, rest of UK and mainland Europe in proportions as yet unknown, and to remove doubt is treated here as part of European spend).

Adding the direct expenditure on structural steel and burner, which is the other main UK expense, increases the direct expenditure by £3.8m, although this will be spent outside of Area Levels 1 and 2.

Applying appropriate multipliers from ONS (2020) for the relevant Standard Industrial Classification (SICs are industrial sectors, such as manufacturing, agriculture or transport) produces an additional *indirect* expenditure associated with this direct investment of £32m. The total of direct and indirect expenditure across Dorset and the UK is expected to be approximately £66m in all (again, excluding testing and commissioning).

Thusfar, leakage and multiplier effects have been considered, but not displacement. Displacement is particularly challenging when dealing with construction, as it is especially difficult to know the extent to which one construction project might displace the activity of another. A displacement factor published in the Additionality Guide (HCA, 2014, Table 4.7, p30) suggests a 38% mean displacement figure at the sub-regional level for infrastructure works. However, at the UK level displacement should be assumed to be high, hence we have adopted a displacement figure at the national level (applicable to all indirect expenditure) of 75%.

Table 1.5 summarises findings for construction cost impacts. The sub-total row gives UK figures and should be the focus point; the overseas/total rows are out of scope but are presented to show gross spend.

The expenditure is also anticipated to support a large number of jobs, which are considered in the next section.

Table 1.5 Construction Cost Impact – Summary (£ millions)

Project Area	Direct Spend Total initial spend (£m)	Direct Spend Spend adjusted for local displacement (@ 38% level 1 and 2)	Indirect Spend Generated across UK after application of ONS output multiplier (£m) and 75% UK displacement	Total Spend Middle two columns combined
Level 1	Not available	Not available	Not available	Not available
Level 1 and 2	30.4	18.8	Within cell below (indirect spend cannot be locally apportioned)	18.8 (direct only)
Resto of UK	3.8	1.9	8.7	10.6 (direct and indirect)
Sub-total	**34.2**	**20.7**	**8.7**	**29.4**
Overseas	60.8	Not applicable	Not applicable	Not applicable
Total	95	Not applicable	Not applicable	Not applicable

Notes: (i) Column 1: Initial expenditure by Powerfuel Portland Limited. (ii) Column 2: as column 1, but with displacement applied at 38% for Level 1 and 2 activity and 50% for the structural steel and burner. (iii) Column 3: indirect spending is obtained by applying ONS' output multipliers to total indirect spend for each SIC, then reducing by 75% for displacement. For this purpose, displacement has been increased from 38% to 75% because it is much higher at national than local level (multiplier outputs from Input-Output tables are not available at local level and apply at national level, hence adopting national displacement levels).

Source: Powerfuel Portland Limited; ONS (2020), Consultant estimates.

The beneficial effect of the proposed ERF on existing and new businesses through expenditure effects is judged to be **slight and not significant** at **Level 1 and 2** areas (note that 'existing and new businesses' are defined here as the 'collective whole' of existing and new businesses across these areas rather than very specifically those businesses which have direct economic dealings with the plant; using that more specific definition would result in a significantly higher impact). The **'slight'** effect is based on the sensitivity of the receptor being medium and magnitude of effect being small.

At the **national level**, the sensitivity of the (all) existing and new businesses receptor is judged to be low and the magnitude negligible, resulting in an overall **negligible** impact that will not be significant.

1.5.1.2 Impact of Construction on Employment

The construction of the ERF is scheduled to take place over a 30 month period, including commissioning. The number of people employed on site at any one time will vary considerably during the construction phase, but it is estimated (based on projected construction costs and experience with similar projects elsewhere) that up to 300 staff will be employed on the site at peak times.

Again, relationships set out in the United Kingdom Input-Output Analytical Tables (ONS, 2020) allow us to estimate employment supported, both directly (in the geographic areas of interest) and indirectly (in the areas of interest and in the UK as a whole). Using the employment effect estimates for each of the relevant SICs contributing to overall construction gives a total of 276 direct FTE jobs across the

Level 1 and 2 areas, 19 more direct jobs across the remainder of the UK and a further 272 indirect job across the UK (some of these may also be within Level 1 and 2 areas). In all then, a total of 566 direct and indirect FTE jobs are expected to be either created or supported across the UK; an additional 38 (approximately) should also be supported via testing and commissioning, but the whereabouts of these is not yet known. Details are shown in Table 1.6 below.

As well as these jobs, an additional (larger) tranche of the proposed capital expenditure will be spent in mainland Europe, where jobs will be supported also. It is inevitable that via international supply chains some of this expenditure will come back to the UK where further indirect employment will be supported. However, reliable estimates of UK employment supported cannot be made without a much better understanding of UK and European supply chains.

Table 1.6 Estimated Contribution to UK Gross Construction Jobs

Project Element	Direct jobs supported	Likely area locations of direct jobs	Indirect jobs supported (these jobs are spread across the UK and locally)
Project management	12	Level 1 and 2	7
Civil work engineering	50	Level 1 and 2	26
Site management	37	Level 1 and 2	20
Civil work construction	177	Level 1 and 2	196
Structural steel and burner	19	Level 3	22
Sub total	295	Level 1, 2, 3	272
Test and commissioning	38	Not known	Not known

Source: Powerfuel (costs), consultant estimates based on United Kingdom Input Output Analytical Tables (Industry to Industry), 2016, accessed 6th August 2020, https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry

Indirect jobs will be supported nationally – including in areas Level 1 and 2. Examples of local indirect jobs created/supported will include many in hotels and catering - Powerfuel Portland Limited is liaising with several local hotels, including one with a 60 room capacity, with the expectation that local facilities could be used by visiting installation and commissioning engineers, project management staff and others.

Converting these estimates requires adjusting for leakage (already completed via the sifting of geographical areas), adjusting for displacement and increasing to take account of the multiplier effect. As noted above, displacement is especially challenging when dealing with construction. For construction job purposes, again we have applied the displacement factor published in the Additionality Guide (HCA, 2014, Table 4.7, p30) suggesting 38% displacement at sub-regional level. At a national level the impact would likely be much higher, perhaps 75% or above. The FTE multiplier effect is estimated by applying ONS' FTE Effects (again, from National Accounts, ONS 2020).

The associated estimates for net construction related employment are shown in Table 1.7 below. Applying the above factors gives an estimate of direct (net) construction related employment across Level 1 and 2 areas of 171, 9 direct jobs elsewhere in the UK and indirect (net) construction related jobs across the UK of 73. Net direct and net indirect construction jobs are therefore estimated at 254. None of the employment effects accruing to overseas markets are included.

Table 1.7 Estimated Contribution to UK Net Construction Jobs – Summary

Project Area	Direct employment	Direct employment less displacement	Indirect employment	Indirect employment less displacement	Total (net) employment, after multiplier and displacement
Level 1	Not available	Not available	Not available	Not available	Not available
Level 1 and 2	276	171	Within cell below - indirect employment cannot be locally apportioned	See left	171 (direct only, indirect included in national total)
Rest of UK	19	9	272	73	83
Sub-total	**295**	**180**	**272**	**73**	**254**

Notes: (i) Some totals do not add due to rounding. (ii) Column 1: employment figures based on evidence from ONS (2020) showing typical relationships for £1m spend within each SIC. (iii) Column 2: as column 1, but with displacement applied at 38% (50% for rest of UK which is the structural steel and burner item). (iv) Column 3: indirect employment estimates obtained by dividing ONS FTE multiplier by total number of jobs. (v) Column 4: column 3, net of 75% for displacement. For this purpose, displacement has been increased from 38% to 75% because it is much higher at national than local level (multiplier outputs from Input-Output tables are not available at local level and apply at national level). (vi) Final column: direct plus indirect construction related employment impacts, net of displacement

Source: Powerfuel; ONS (2020), consultant estimates.

As indicated above, it is difficult to be sure of the levels of displacement in construction employment, but the assumptions of sub-regional displacement at 38% and national displacement at 75% are considered to be reasonable. Regardless of the exact displacement taking place, using ONS methods therefore allows us to demonstrate the project *supports,* even if it does not create, the jobs in Table 1.6.

The beneficial construction effect of the proposed ERF on employment is judged to be **slight** at the areas of **Level 1 and 2** (note again that receptor is defined as all employment in these areas rather than specifically the people employed in the construction of the plant and in its supply chain. Using the latter more specific definition would result in a much higher impact). The **'slight'** effect is based on the sensitivity of the receptor being medium and the magnitude of the effect being small.

At the **national level**, the sensitivity of the receptor (all) employment is judged to be low and the magnitude of the effect negligible, resulting in an **overall negligible impact**.

1.5.2 Effects of the Proposals During Operation

1.5.2.1 Spending and Supply Chain Impacts on New and Existing Businesses

The EFW has a minimum design life of 25 years, during which an ongoing and fully scheduled maintenance plan will be put into place to promote the continuing safe, effective and continued operation of the plant. At times, the plant would shut down completely, although for the most part 24/7 operation would continue, with scheduled breaks for maintenance taking place on an as needed basis. To give an indication of operational periods, the plant is expected to be in use for some 92% of the time.

The annual maintenance spend is anticipated to be £4m, which will include £3m to be spent mostly in the Level 3 area (UK) and £1m to be spent on boiler/turbine and generator maintenance. This latter spend is expected to be lodged with the successful supplier of the plant, which at this stage is expected to be an overseas provider.

Beyond plant maintenance, transport costs are likely to be considerable and most likely road haulage contracts will be awarded to local hauliers. At this stage, the source of the RDF has not been determined and it is not known what proportion of the RDF will be transported by road and by sea. If all of the RDF were to be transported by road, up to 40 HGV deliveries would be required each day. Under this scenario, RDF road transport needs alone are likely to require some 40 man days of work per day, with knock-on impacts for the local economy.

If RDF is brought in by sea, employment would also be supported at the Port through loading and unloading activities. RDF brought in by ships will be unloaded and transported from the berth to the site by the existing stevedore at the Port, Quest Underwater Services. Using ships carrying 2,500 tonnes each (the likely size) implies an estimated 81 ship visits a year if all the RDF were to be transported by sea. This would have positive impacts on the Port, on employment and economic activity, with associated benefits to the local economy.

In reality, it is likely that RDF will be transported by a combination of road and sea, and so a smaller contribution to the local economy will be provided by each transport method. As an example, an illustrative split of 75% by road and 25% by sea is estimated to required 30 man days of work per day for the road haulage element and equate to an unspecified number of FTE jobs at the port. The workload associated with this would contribute hundreds of thousands of pounds into the local economy through business for local hauliers, the Port and Quest.

In addition, the plant will produce a by-product from the furnace which is suitable for use as aggregate. This by-product, Incinerator Bottom Ash (IBA), is left at the end of the waste treatment process in variable amounts, depending on the composition of the RDF fed into the process. However, quantities can be reasonably large, generally between 20-30% by weight of the RDF input. The IBA has a disposal cost of £20.70 per tonne (i.e. approximately £1m pa), but it has a number of end uses, including as an aggregate for highways and construction, for which it has been accepted and widely used in the UK and on the continent for many years. The IBA could be stored on site and shipped out by sea at infrequent intervals or carried away via road haulage every two-three days. The final destination of the IBA has not been confirmed, but it is intended that it will either be taken by ship to Greenwich or by road to Avonmouth. Either route would create economic activity locally and further afield.

Permits and Public Sector Receipts

Business Rates payable to Dorset Council (which would not be payable without the plant) are expected to create around £600,000 of additional income for the Council.

The effect on existing and new business and on other organisations due to the ERF's operational expenditure effects at the **local (Level 1 and 2) area** is assessed at '**slight**'. This is based on the sensitivity of the receptor (all businesses and organisations) being medium and magnitude being small. At the **national level**, the effect is assessed at **'negligible'** (based on a low sensitivity to expenditure impacts across UK business/organisations and a negligible magnitude effect). If a very specific business were to be singled out, on the basis of it having won a new contract to assist with the plant's operation, then the relative magnitude and sensitivity of this specific operator would likely result in a much more significant effect.

1.5.2.2 Impact of Operation on Employment

The ERF is conservatively expected to create some 30 directly employed FTE permanent jobs. Among these, the following breakdown of occupation types is anticipated:

- Managers and directors, 3;
- Professional occupations, 3;
- Skilled trades, 8;
- Process, plant and machine operatives, 12; and
- Administrative and secretarial, 4.

Other occupation types (namely associate professional and technical; personal service; sales and customer service; elementary; and other) are not expected to be required directly in the operation of the plant.

Salaries will be competitive, with senior positions likely to be remunerated in the range of £70k and mid-level positions paid in the region of £40k per annum. Process, operative and administrative roles are likely to be pitched at around £25k pa.

We consider below the effect of leakage, displacement and multiplier impacts on the above direct employment estimates.

Leakage

We have already noted (see Section 1.4.1) that local recruitment will be prioritised where the skill mix allows this. We have also seen from the baseline research (see Table 1.1 in the Economic Baseline, Appendix F1) that of the list of professions to be recruited in the bullet points above, people in the first three groups are over-represented in Weymouth and Portland relative to regional and England averages, people in process, plant and machine operating roles are represented in accordance with national and regional levels, while administrative and secretarial skills tend to be underrepresented.

Following discussions with the Office of National Statistics and also NOMIS (a specific part of ONS charged with providing access to the most detailed and up-to-date UK labour market statistics from official sources), we have confirmed that no recent data are available showing in and out-commuting of either of the areas we are principally interested in – the Level 1 and Level 2 areas. Therefore, the most up to date source of data is the 2011 census, a data source already explored in respect of commuting in Appendix F1. The available data are far from perfect, firstly due to their age and secondly due to expectations that the post-Covid 19 epidemic period is likely to increase workers' likelihoods of working from home or more locally in future. Nonetheless, using the data as a proxy for commuting now can give us an indication of the likely patterns of travel in the labour market, allowing us to make some assumptions about employment leakage.

Table 1.8 gives information showing the pattern of residency amongst those who worked in the areas in Column 1 in 2011. So, of those who worked in the Level 1 Area (Weymouth and Portland) in 2011, 78% also lived there, whereas 17% in–commuted from one of the other local LAs in the Level 2 Area where they lived (Dorset, Bournemouth, Christchurch and Poole) and only around 1% lived further away than that, whilst still being located in the South West Region. About 6% worked in Weymouth and Portland and lived beyond the South West - in Wales or in another English region (note data showing those who worked in Scotland or elsewhere in the world is not available).

Table 1.8 Travel Patterns, 2011

Areas in which workers were employed	% of workers who lived in area Level 1	Living in Area Level 2	Living in SW, beyond Areas 1 and 2	Living in England and Wales, beyond SW
Level 1 area (Weymouth and Portland)	78.4	16.8	1.2	3.6
Level 2 area (Dorset, Bournemouth, Christchurch, and Poole)		90.2	3.8	6.0

Source: 2011 Census, ONS Dataset WU01EW - Location of usual residence and place of work by sex, downloaded from www.NOMISweb.co.uk, 31 July 2020

For the Level 1 area, job leakage (ie the degree to which people in-commute to the area to fill local posts) stood at around 22%. In fact therefore, over three quarters of people who work in Weymouth and Portland also live there. And of the 22% who do not, over three quarters of them commute inwards from the next area of interest – the Level 2 area. In fact, of all the jobs in Weymouth and Portland, only 4.2% were filled by someone who not only did not live there, but did not live in Dorset, Bournemouth, Christchurch and Poole.

Looking specifically at the Level 2 area, 90% of jobs in this area are filled by people who live there. The implication of this is that leakage is likely to be low – perhaps around 22% for the smaller Level 1 area (implying that of the original 30 jobs, an estimated 23.5 on average will be retained within that area) and 10% for the larger Level 2 area (implying that of the original 30 jobs, approximately 27 will be retained within that area).

Displacement

The displacement of existing jobs by the new jobs also needs to be considered. Detailed analysis was commissioned by Powerfuel from Tolvik Consulting (Tolvik, 2019), a leading provider of independent market analysis and commercial due diligence to the European waste and bioenergy sectors, to establish the likely market for the plant's services and the number of other suppliers and their plant capacities. Both existing plants were included and those in development. Tolvik's findings, under a number of different policy and capacity development scenarios, were that (bound by a 3 hour drive time) the proposed plant and all the other plants in the area would still offer insufficient capacity to deal with all the forecast waste, in all scenarios apart from the most pessimistic. In the most pessimistic scenario, which assumes a very favourable policy shift as well as other plant being built in addition to the proposed plant, there may be excess supply of 20k tonnes pa, implying displacement (effectively over supply) equivalent to 11% of the ERF's activity (based on the nominal capacity of 183,000 tonnes pa as the worst case).

Turning to where the staff will come from to operate the plant, the number of vacancies compared to the overall size of the local labour pool (specifically those within the labour market who are qualified for these roles) suggests that meeting this demand is well within the capacity of the local labour market. Moreover, the post-Covid 19 economy (assuming that Covid 19 does not become a semi-permanent feature) also suggests displacement is unlikely to be a serious problem in the short or medium term. The Organisation for Economic Cooperation and Development stated in its twice yearly forecast (in June) that "*The UK's economy is likely to face the deepest downturn amongst advanced nations as it has been hit hard by the Covid 19 crisis*" and suggested that the economy will contract by 11.5% in 2020 if the world avoids a second wave of coronavirus (FT, June 10 2020).

With a no-deal Brexit looking more likely than not at the end of 2020 compounding any recovery, unemployment levels are likely to rise very quickly and could stay at those levels for some time. There may be a partial recovery in unemployment rates before the recruitment phase, but it is reasonable to assume that recruiting in the short to medium term future is likely to be easier than recruiting now, with more movement in the labour market increasing the numbers of those looking for work and offering opportunities for recruitment with relatively little displacement. Overall therefore it is assumed that, due to the size and flexibility of the labour market, the fact that the new workers will represent only a small proportion of the total, and the negative economic outlook, displacement impacts will be low.

A displacement effect of 25% (for low) as set out in Table 4.8 of HCA (2014) has therefore been adopted at the local level, and 40% at the national level. Working the former through shows that after leakage and displacement (in the Level 1 area) of the 30 jobs some **17.6** (30 x 0.784 x 0.75) FTE jobs will count as fully 'net additional' jobs, while the rest will not benefit the local economy directly. In the larger Level 2 area, the figure is higher; of the 30 jobs about **20.25** (30 x 0.9 x 0.75) will be retained as 'net additional', while the others displace existing activity or leak to job-holders outside of the target zone. Nationally, the net impact will be 110, although this includes all of the indirect jobs, some of which will be in the local areas (it is not possible to say how many).

Multiplier

As for construction employment, relationships set out in the United Kingdom Input-Output Analytical Tables (ONS, 2020) allow us to estimate the additional employment which in turn is supported by these FTE operational jobs. The ERF is a waste treatment plant that also generates electricity. Both these sectors have extensive links with other UK economic sectors and in the case of generating electricity, the relationships are such that this sector has the highest multiplier of all. The FTE multiplier for the supply of Electricity, Gas, Steam and Air Conditioning (SIC 35) is 6.919, while the multiplier for Sewerage, Waste Collection and Treatment (SICs 37-38) is 1.933. Being as the plant is operating in both of these sectors with links to and beyond each, it is assumed that employment is split equally between them.

The multipliers inform the number of additional FTE jobs that each job in these sectors support, so that for every 1 job in the supply of electricity, gas, steam and air conditioning in Dorset, a further 6.919 indirect jobs are supported elsewhere in the UK. Where exactly the indirect jobs are located depends on the links within the supply chain, but some of these are likely to be in Dorset while others are elsewhere.

Operational Jobs - Results

After the actions of leakage, displacement and the multiplier, the results are that a minimum of 17.6 net additional jobs are created in Area Level 1, a minimum of 20.25 net additional jobs are created in Area Level 2 (note the Level 1 and Level 2 area jobs are not cumulative), and an estimated 80 net additional indirect jobs are created across the UK as a whole (the indirect jobs *are* cumulative and it is also likely that some of these would be located in Dorset).

The original 30 gross direct jobs which are created in Portland ultimately therefore lead to the generation of some 110 net additional jobs in all. As mentioned in Section 1.4, this excludes induced employment created through household spending, meaning that the actual total is likely to be higher, though will remain unknown.

In terms of impact assessment, at the **most local level (Level 1)** the impact of the operational employment is judged to be **'moderate'**. This is based on the sensitivity of the receptor (all employment across Weymouth and Portland) being high and the magnitude of the effect being small. At the **next area (Levels 1 and 2) the impact is judged to be slight**, based on medium sensitivity of the receptor and a small magnitude. At the **national level, the impact will be negligible**, which assumes the receptor (the national labour force) has a low sensitivity and the magnitude is negligible. A summary of the Net and Gross Operational Jobs created is shown in Table 1.9 below.

Table 1.9 Summary of Net and Gross Operational Jobs Created

	Sewerage, waste collection and treatment	Electricity, gas, steam and air conditioning	Total Jobs (note that level 1 and 2 jobs are not cumulative)
Level 1 direct jobs	15	15	30
after leakage @ 22%	11.7	11.7	23.4
& after displacement @ 25%	8.8	8.8	17.6
Level 2 direct jobs	15	15	30
after leakage @ 10%	13.5	13.5	27
& after displacement @ 25%	10.1	10.1	20.25
National level direct jobs	15	15	30
after leakage @ 0%	15	15	30
& after displacement @ 40%	9	9	18
indirect jobs generated across all areas (post displacement adjustment @ 40%)	8.4	53.3	61.7
Net overall jobs created, national	17	62	80

Source: Consultant estimates

Apprenticeships

Prior to opening, Powerfuel Portland Limited will be using its influence to encourage its construction contractors to operate an apprenticeship scheme, so that two apprentices can be trained in construction trades.

After opening, Powerfuel Portland Limited has ambitions to create a long-term apprenticeship scheme to train an ongoing group of apprentices. Powerfuel Portland Limited is working with Weymouth College to develop an apprenticeship programme associated with the project, specifically for local young people. In addition to the operational employment opportunities set out above, it is anticipated that the proposed ERF will offer two apprenticeship positions, ongoing during its operation.

Apprenticeships are likely to be offered in skilled trades such as electrician/engineer and will follow the BTEC qualification route.

An existing Portland company, Manor Marine, already runs a successful scheme. Powerfuel Portland Limited is collaborating with Manor Marine in order to develop opportunities for both companies' apprentices to benefit from the provision of a broader range of skills and experience, the scope of which would not be possible without joint collaboration.

1.5.2.3 Power Capacity and Supply

The island's power supply at present is provided by SSE, via a Primary Substation on the island fed from a Bulk Supply Point 7km away at Chickerell, on the mainland. Chickerell primary substation is one of nine primary sub-stations supplied by Chickerell Bulk Supply Point (BSP). SSE's forecast data indicates that Chickerell Bulk Supply Point will have just 15.97MW of spare capacity by 2023/24. It is understood that the Chickerell primary substation (currently offering 18MW for the island's needs) has a maximum demand of 10.72MW, so has a very reasonable 7.28MW (40%) spare capacity. The constraint is at Chickerell BSP. To overcome this constraint, SSE can either increase capacity at Chickerell BSP (by providing an additional transformer and switchgear) or an alternative approach might be to perhaps reconnect one of the other primary substations to a different bulk supply point.

This means that while reasonable domestic growth needs (driven by the construction of additional dwellings for instance) could be accommodated in the medium term, significant increases in the demand for power from existing or newly located industrial customers could not be met through the use of current infrastructure capacity. SSE is obliged through regulation to provide for the needs of existing consumers within the capacity limits of the connection agreement, so there is no concern for existing consumers (at least, for those operating within their current demand limits). However, any new or upgraded demand from non-domestic consumers (certainly for bulk supply) would have to be paid for by the applicant, which could act as a disincentive to investment.

Potentially, there is therefore a constraint on new investment on the island, and certainly on the kind of economic activity associated with heavy energy demand. Examples of such industries include manufacturing, quarrying (already taking place on Portland now), or Portland Port. Where private suppliers (such as the ERF) provide power to the Grid for local use, SSE would be obliged to be the provider of last resort, essentially 'backing up' such private supplies with its own capacity provision. This means that if the ERF provided power generally for the use of islanders and businesses, the costly infrastructure link to Chickerell would need to be provided anyway. The only exception is where power is supplied via a private wire agreement[1].

The budget cost of supplying 15.2MW (the amount expected to be made available by the ERF) has been discussed with SSE. Necessary improvements would be required to facilitate connection and reinforcement works, which due to the distance between the point of demand (Portland) and supply (Chickerell), would most likely need to be at 132kv standard. Cable excavation to the substation at Chickerell would be needed, and also the provision of a 132/33 kV transformer and 33/11 kV transformer and switchboard equipment. The estimated cost of the provision of capacity through means other than the plant is therefore at least £20m and potentially as high as £26m (a greater degree of confidence in cost would be obtainable from a bespoke assessment).

However, the ERF developers are discussing an agreement to provide a 'private wire' facility. A 'private wire' facility does not require SSE back up and is provided at risk to the buyer. In the event of a power supply failure in these circumstances, alternative agreed arrangements would kick-in. For example, power would be drawn from other temporary generation sources or need would be reduced through demand management. The potential user for much of the proposed ERF plant's excess

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[1] Private wire systems are privately owned local electricity networks which are not part of the public network and are sometimes linked to privately-owned electricity producing plant. Private wire supply is off-grid and therefore usually avoids network charges.

power could be the Port – which is expecting to need more power on an ad hoc basis in future (see page 21). The ERF is able to generate some 15.2MW of power for export itself and this power supply can be made available to the Grid, to Portland-based companies or organisations via a 'private wire', to Portland households via a district heating scheme, or to a combination of all three. Therefore, there is a considerable and positive economic benefit of the plant, in that it avoids the need for power infrastructure investment which can otherwise be provided through a 'private wire' arrangement. While there remains spare power capacity on the island, the cost of not building the plant is merely higher electricity prices for new customers who might otherwise be supplied by the plant (such as private wire customers and District Heating beneficiaries). However, if power demand on Portland gets to a point where it exceeds available supply, the cost would be much greater. As a minimum, a large lump sum would have to be found, probably funded by a combination of SSE and the new investor(s) who would wish to purchase the bulk electricity. In the meantime, excess utility costs could act as a disincentive to new investors or at least ensure Portland employment sites are less competitive due to higher (utility driven) abnormal costs. This would have implications for competitiveness, lost investment and/or jobs.

In this case, the opportunity cost of not building the plant turns into a real cost, incurred by the people and businesses of Portland (through lost income, investment, jobs and convenience), and also by SSE and the next applicant for large scale power on the island (through having to fund an investment which would cost a minimum of £20m to install).

In short, the proposed ERF provides power capacity (via a private wire arrangement) that simply will not be there otherwise, without a very large investment. It is still possible that even with the plant, future changes in the use of electricity mean that Portland arrives at a position where it has insufficient power supplied relative to demand. However, without the plant, such an event is both more likely to happen and more likely to happen sooner.

In completing the impact assessment, the receptor for this element is defined as the next applicant for significant industrial power on Portland, combined with SSE. These are the stakeholders on whom the burden of funding improved grid connections would fall. The impact is assessed as the at least £20m opportunity cost of *not* going ahead with the scheme in the short-medium term. **At the geography of area Level 1 and 2** (Chickerell is outside of the Level 1 Area), the sensitivity of the receptor is assessed at medium, with the magnitude similarly medium. The effect of this element is therefore **moderate, beneficial and significant**.

Shore Power

Cruise Business

Portland Port had (up until the recent Covid 19 pandemic outbreak) a solid and growing cruise business, with some 41 cruise ship calls in 2019, 43 booked for 2020 and 45 booked for 2021. According to the Port, just over half of visiting cruise ships are already equipped for shore power. While Covid 19 has resulted in the loss of most of this year's programme, optimism is high for the future of cruising generally and bookings are being made for 2021. After the September 11th attacks in 2001 and the 2008 financial crisis there was a rapid drop in cruise activity – and an almost equally rapid recovery. With travel agents advising that enthusiasm amongst cruise customers is high, and many returning customers already booking cruise holidays in 2021, the cruise ship sector – and the port – are expecting a swift recovery.

Yet the extent of any recovery, and indeed the continued success of the cruise business at Portland, could be threatened if the Port were unable to provide shore power, certainly towards the middle of the 2020s and beyond. On-board auxiliary diesel generators that power ship's services while in port are the primary source of air emissions from ships in ports today, because the auxiliaries run on heavy fuel oil or bunker fuel (which has a high particulate content). Shore power allows ships with suitable on-board infrastructure to turn off their engines whilst in port and use power from the shore. If the power from the shore is clean energy, then the reduction in CO_2, NOx particulates and SO_2

achieved from running the ship on shore power (rather than via shipboard diesel generators) is considerable.

Powerfuel has undertaken research assessments (Bridge Economics, May 2020, Arup, August 2020) and held meetings with various shore power stakeholders (amongst them Portland Port, the Cruise Lines International Association, University College London Energy Institute, UK Chamber of Shipping and the Ministry of Defence), to gain an understanding of shore power – how it could (or could not) be provided by the Port and the way in which the Port's business might change without it.

There is a strong policy push towards shore power internationally - from the International Maritime Organisation (IMO) and the EU - and domestically from the UK Government. In 2018, the IMO's Marine Environment Protection Committee (MEPC) adopted an initial strategy on the reduction of greenhouse gas emissions from ships, setting out a vision to reduce greenhouse gas (GHG) emissions from international shipping by at least 50% (compared to 2008 levels) by 2050, accompanied by efforts being made to phase them out completely, as soon as possible. For its part, the EU has confirmed that shore power supply represents an attractive solution to reduce local pollution generated by vessels at berth in EU ports, which has been recognised by Article 4(5) of Directive 2014/94/UE on Alternative Fuel Infrastructure.

In the UK, the Government's Clean Maritime Plan (Department for Transport, July 2019) contains a number of zero-emission shipping ambitions, outlining the government's vision for the future of zero-emission shipping and the milestones that will need to be achieved to reach it. The plan emphasises the benefits of electrification within the shipping industry and notes that electrification in the maritime sector may be delivered through several mechanisms, the first of which is listed as 'shore-side power (powering vessels' auxiliary systems for vessels at berth, also referred to as cold-ironing)' (p36)

Figure 1.4 Holland America Ship MS Eurodam Using Shore Power

Source: ABB

Research commissioned by the Department for Transport (Frontier Economics and UCL/UMAS, 2019) estimates that UK ports are likely to see total electricity demand increase significantly by 2050.

Even without further policy intervention, this research estimates that the total annual electricity demand at UK ports could rise from 20 GWh in 2016 to around 250 GWh by around 2050, largely driven by the demand for shore power. In contrast, under a scenario in which there are very ambitious assumptions about maritime electrification, the research estimates that annual electrical demand at UK major ports could rise to over 4000 GWh by around 2050, predominantly driven by demand for electric propulsion, but with demand for shore-side power also expected to increase significantly.

Cruise is perhaps the shipping sector under most pressure to make environmental improvements quickly. The sector's activities are 'open' to the public in the sense that other shipping sectors are not and travellers and cruising passengers alike are becoming more demanding in respect of environmental standards. Pressure from consumers and residents has been coupled with increased media scrutiny, the result of which is driving both ports and cruise lines to faster take-up.

Both the UK Government and IMO have identified 2050 as a target date for radical improvements in emissions free shipping and in the run up to this, different marine shipping sectors will be jostling for position, guided by commercial pressures and policy pushes. In parts of the world, such as California and China, at berth emissions are already strongly regulated and shore power use is largely or partly compulsory.

According to CLIA (2019), some 30% of cruise ships (by tonnage) were already fitted with shore power by 2019, 17% are planned for retrofitting with shore power (ie together, nearly half the fleet), and an additional 39% are configured so that they could be fitted with shore power capacity in the future. This leaves less than 15% of the fleet that are not already using shore power or configured for its future use, and have no plans to be fitted with it or configured for it in future.

Triangulated data from CLIA, from the Department of Transport (2019b), the Port of Bergen (2018), Portland Port, and from knowledgeable stakeholders and an understanding of the policy environment has enabled a forecast to be prepared showing the future number of cruise ship calls at Portland under 'with shore-power' and 'without shore-power' scenarios. There is little prospect of the Port being able to provide shore power in the absence of the proposed plant (Arup, August 2020), and if it wished to, the costs are expected to be prohibitive (see Section 1.5.2.3). Therefore, in the absence of the plant, the Port is unlikely to install shore power without government or other financial assistance. Even if the infrastructure were in place, it is unlikely that power could be provided through the Grid more cheaply than via the ERF plant private wire.

Predictions regarding the number of cruise ships that would no longer call at the Port without the installation of shore power (essentially, without the proposed ERF private wire) are conservative, in order that the positive effects of shore power (and the plant) are not exaggerated. Similarly, the number of yearly cruise ship calls is forecast to reach the Port's target (65pa) but only in 2027, which allows for a relatively slow recovery post – Covid 19. The forecast assumes:

- IMO's target to reduce maritime emissions by 50% by 2050 will be meaningfully (and increasingly) pursued as environmental and carbon needs climb the agenda;
- Cruise will continue to adapt faster to environmental pressures than cargo and containerised marine sectors;
- Over the 20 years after shore power capacity is installed in late 2023, an average of 57% of cruise calls will use shore power;
- The market penetration rate of shore power use (over non-use) reaches 70% in 2035;
- Under the 'without shore power' scenario, the first ship 'lost' to the Port is in 2026 and a small number of cruise ship calls continue to be lost annually until the last year of the forecast (2050).

The impact of the loss of business will be felt firstly by the Port and its stevedoring suppliers, and also by coach trip and transport operators, in the form of lost income, potentially leading to lost employment. This is a business economic impact which is not quantified due to the commercial sensitivities involved, although it is likely to be significant and in the terminology of the present assessment, potentially **substantial** for the businesses involved but judged **moderate** overall in the context of the assessment. Perhaps of more interest here is the visible public cost which would be a knock on impact of the loss of cruise based tourist trips.

Portland Port has witnessed strong growth within the UK cruise industry, having become the leading cruise destination in the South West of the UK in 2014. The Port received a Dorset Echo Industry Award for Best Contribution to Local Tourism in June 2018 and in November of that year was awarded Gold at the Dorset Tourism Awards in the International Visitor Experience of the Year category.

In 2019, based on the approximately 54,000 passengers coming through the Port, spending an average of £71 per head on day trips[2] (source: CLIA), an estimated spend of £3.8m would have been generated over the 'cruise season'.

Figure 1.5 Cruise Ships at Portland Port

Source: Portland Port

Using these assumptions of per head spend and estimating future passenger throughput based on an assumed 1,500 passengers per ship, enables us to model the impact (on tourism passenger spend alone) from cruise calls under each of the with/without shore power scenarios. The net difference is essentially the impact of offering shore power. It should be noted that, in principal, shore power options would otherwise only be available to the Port following the investment of a sum in the region of £20-£26m. Should funds for this investment be found, merely the cost of such an investment (relative to the power supplied) would likely be some 16p kw/h, with generating costs on top. Sixteen pence per kw/h is about the same price ship owners face to run their diesel engines, so while the environmental case for the use of shore power would remain, the financial case would act as a disincentive.

Table 1.10 shows the effect of not providing shore power on local cruise related tourism spend over three different time periods – 20 years, 25 years and 30 years (the design life of the plant is intended to be 25 years). The third row gives the impact (in Net Present Value terms, discounted at the Treasury rate of 3.5%) on tourism spend of losing the cruise calls which would not take place without shore power provision. The figures vary around a central point of £50m in today's money. The next two rows show average losses per year. In the 25 year case, average annual losses in tourism spend

[2] €80 per head spend, based on evidence published by CLIA showing day trip expenditure of visiting passengers in the UK. This is a 2017 figure excluding crew expenditure and is therefore viewed as conservative.

are around £1.9m (discounted) and £3.4m (undiscounted). It is worth noting that losses are less in earlier years and, as cruise ships go elsewhere, they mount in later years.

Table 1.10 Impact of Shore Power Provision on Local Tourism Spend, £m

All figures in £m, and discounted to 2020 equivalents unless where stated otherwise	20 year period	25 year period	30 year period
Tourism spend without shore power (£m)	55.7	57.9	58.5
Tourism spend with shore power	89.1	104.7	117.8
Estimated tourism spend difference (NPV, £m)	33.3	46.7	59.3
Indicative average loss per annum (£m, undiscounted)	2.7	3.4	3.9
Indicative average loss per annum (NPV, £m)	1.7	1.9	2.0

Source: Consultant estimate

All of the figures above are gross and do not address additionality. In order to turn these figures into net additional figures, we need to consider leakage, displacement and multiplier effects.

For leakage, figures from the past three years consistently suggest that of all passengers landing at Portland, some 20-21% travel from the Port to destinations outside the Level 1 and 2 areas (most are heading to Stonehenge), and the remainder stay within the area, visiting local areas such as Weymouth, Portland, Bournemouth and the Jurassic Coast. No data are available to distinguish between Level 1 and Level 2 visits.

For displacement, Portland's main competitor cruise ports are Guernsey/Channel Islands, plus Cherbourg, Le Havre, Dover, Portsmouth, Southampton and Falmouth. Therefore, it is unlikely that, in the event of the loss of cruise ship calls to these ports, many passengers would continue to visit and spend their money in the Level 1 and 2 areas that are of interest to this study. It is possible that the absence of the cruise ship passengers might encourage previously reluctant tourists to undertake some additional day trips they might not otherwise have done. However, this would have to be 'new' to Dorset itself, otherwise it would not be additional, merely displaced itself. In these circumstances, it seems reasonable to assume a low level of displacement within the Level 1 and 2 areas, probably less than 15%. At the national level, displacement would be higher, in order to account for those tourists whose cruise ships switch from Portland to other UK Ports. Nonetheless, there is also a substantial risk that calls will be lost to France, Guernsey and Jersey. Therefore, we assume displacement is not higher than 50% at the national level.

In terms of the multiplier, there is no SIC representing the tourism sector, which comprises numerous other component SICs. However, arguably the main sectors benefiting from cruise based on-shore day trippers would be retail; land transport; accommodation and food services; travel agents and tour services; and arts, entertainment and recreation (which also includes museums, historical sites and buildings, visitor attractions and so on). Other than the destinations of tour trip parties and average spend, there is no break-down of their spend available. So, as an illustrative scenario, it is assumed that each tourist spends their money equally across all of these sectors. Without shore power, the number of lost cruise calls at Portland Port is predicted to result in the loss of on-shore passenger spending of between £3 and £4.3m per annum (gross, before displacement is removed) of spending in the Level 1 and 2 areas combined. This is equivalent to the loss of approximately £2-£3m of annual local tourism spend. Note that this does not include impact on coach hire companies, the Port itself, stevedoring services, bunkering or any other cost – this solely relates to expenditure made by passengers whilst on day trips.

Table 1.11 Impact of Shore Power Provision on Local Tourism Spend and Jobs

All figures in £m, and are undiscounted	20 year period	25 year period	30 year period
Spending			
Net spend difference (between with and without shore power), £m (undiscounted)	60.3	92.8	129
Average spend per year (£m)	3.015	3.712	4.3
Net impacts after having taken account of displacement for local impacts (Area Levels 1 and 2)	64%	64%	64%
Net average spend per annum lost (Area Levels 1 and 2), £m	1.92	2.38	2.75
Which would on average support the following jobs			
Retail sector	8	10	11
Land transport	8	9	11
Accommodation and food service	9	12	14
Travel agents and tour services	4	5	6
Creative, arts, museums, entertainment and culture	7	9	10
Total estimated jobs lost	36	45	52

Note the spending figures in the top half of the table are essentially the same figures as those in Table 1.10, except they are undiscounted (using discounted figures here would lead to job numbers being discounted, which makes no sense).

Source: Consultant estimates

The above figures are inclusive of leakage (they all relate to the Level 1 and 2 areas), displacement and the effects of a multiplier. Although the expenditure patterns are assumed, the assessment indicates that without the provision of shore power, Areas Level 1 and 2 would lose an average of between 36 and 52 FTE permanent jobs. The number of jobs lost increases with the length of the assessment period, because as time advances more cruise ship calls (and tourist visits) are lost.

As the above analysis demonstrates, the tourism spend figures (facilitated through the plant's provision of shore power to the port, which supports existing and future cruise ship calls) are quite considerable, amounting to tens of millions of pounds over the operating period of the plant. However, as the tourism sector in Areas **Level 1 and 2** is also large (in Dorset alone total day trip spend in 2018 was estimated at £912m, see Dorset Tourism Partnership, 2018), placing these figures in context as an important part of the impact assessment. In this context, the sensitivity of the receptor (in broad terms, local tourism expenditure, or in more discrete terms, tourism day trip spend and the jobs sustained by it) is assessed as medium, while the magnitude of the impact is small. This results in a **slight (beneficial) impact** at the local level, as the plant is able to ensure the continued economic impact of short to medium term growth in cruise ship calls and then continue to support them at the Port's intended level of 65 per year.

1.5.2.4 Plant Visits

Powerfuel Portland Limited is committed to inclusivity, involving the local community in what it does and playing a constructive role as a business and economic operator on the island of Portland. Once open, the operator of the plant will be legally restricted in the extent to which tours or site visits can be offered in order that the safety and security of visitors and staff can be guaranteed. That said, two separate audiences have been identified – educational trips and industrial tourists - and plans for the ERF's construction have been developed such that once in operation, plant access can be provided to both groups.

Both types of visits will require booking and will be facilitated through the provision of an educational guide, an education room, structured displays, virtual or computer based exhibits and live videos. Educational visits will take place on an ad-hoc basis, by arrangement, while industrial tourism opportunities will be scheduled for bookings depending on demand, but possibly on a quarterly basis.

The facilitation of plant visits for educational visits and as part of an industrial tourism offer will help Powerfuel Portland Limited ensure long-term involvement and engagement with the community throughout the plant's operation.

1.5.3 Impact on Local Energy Supply

As discussed above, once operational, the proposed ERF would provide increased 'energy security' for Portland, in particular through increasing the amount of headroom available in supply for provision to large or industrial users via private wire (such as the Port). Additionally, the design and construction of the ERF is such that on opening, the ERF is intended to be 'District Heating (DH) Ready'.

District heating is a technology which generates fewer carbon emissions than a standard gas boiler system and over the lifespan of the system is a much more cost and energy efficient solution for both the system owner and the consumer. In simple terms, rather than having an individual boiler and pipe network inside one home or building, district energy schemes have a large centralised energy centre. In this instance, the centralised energy source would be the ERF plant which will be built with technology already in situ to provide heat, hot water and power to multiple buildings via a district heating and cooling pipe network. District heating has many benefits and is quickly becoming a favoured energy solutions in major UK cities such as London, Nottingham, Sheffield and Manchester. The UK Government is supporting the technology as part of its drive to reduce the UK's carbon emissions by 80% by 2050.

Powerfuel Portland Limited does not intend to be the installer or operator of the district heating network. Instead, the team is working with a community energy charity to try to ensure that the district heating element is delivered if demand is sufficient. The project model is to forgo revenue from heat sales for a period in order to support the community energy group deliver the project with partners. Powerfuel Portland Limited are exploring an opportunity to work with Vital Energi, a leading district heating provider, subject to project planning permission.

Because Powerfuel Portland Limited will not be the direct administrator or provider of the district heating system, it will not own the system's infrastructure, and therefore the route of the network and the decision as to which buildings/households are served by it is not in its control. However, in order to advance the analysis, Powerfuel Portland Limited has commissioned an options appraisal from Ove Arup and Partners (Arup, July 2020) to set out the options for the development of the district heating system and to give an indication of costs and benefits.

Annual energy use for heating is available publically for public buildings and an analysis of open source Display Energy Certificates (DECs) and fossil fuel benchmarks from the Chartered Institute of Building Services (CIBSE) carried out by Arup (*ibid*) indicates the following possible beneficiaries of such a system:

- Osprey Leisure Centre (annual consumption, 2,486 MWh/pa);
- Portland Hospital (254 MWh/pa);
- HMP The Verne (6,966 MW/h pa);
- Comer Homes, a 554 flat development (3,445 MW/h pa); and
- HM Young Offenders' Institute (HMP YOI), Portland (7,149 MW/h pa).

If district heating is provided, the effect of the plant on local organisations and households (the impact being judged here as being the provision of a district heating arrangement) the assessment of **'slight'** (beneficial) is obtained. This is based on the sensitivity of the receptor (nearby households and organisations) being low and the magnitude of the effect being small. This assessment necessarily applies only in the plant's environs in Portland.

1.5.4 Impact on Local Waste Provisioning

This section focuses on the economic impacts associated with the management of waste – the effects on local waste management capacity are assessed in ES chapter 12 and the need for increased waste management capacity is examined in the Waste Need Statement submitted in support of the planning application.

Prior to last year's reorganisation of local government in Dorset, waste in the Level 1 and 2 areas was managed by the Dorset Waste Partnership (DWP). The partnership was a waste disposal authority – the county council - and six waste collection authorities - Dorset's borough and district councils. The majority of DWP staff and assets have transferred to Dorset Council and continue to deliver the same services as before. For a transitionary period of one year, staff supporting Christchurch were transferred to Dorset Council, and then onto Bournemouth, Christchurch and Poole Council from 1 April 2020.

Waste is now an executive function of the two new unitary authorities in Dorset, namely Dorset Council and Bournemouth, Christchurch and Poole Council. According to Defra's ENV18 dataset (see ERM 2020), in 2018 the total waste managed by the Dorset Waste Partnership, Bournemouth Borough Council and Poole Borough Council (which covers the same area) was 380,414 tonnes; of which:

- 203,972 tonnes was recycling/composted (54%);
- 109,984 tonnes was incinerated with energy recovery (29%);
- 51,344 tonnes was landfilled (13%); and
- 15,116 tonnes was unclassified (4%).

As the proposed ERF is a merchant plant, the source of the RDF is not currently known. However, the facility would be in a good position to manage Dorset's residual waste, as there are currently no similar energy recovery facilities in the county. All of the waste that is currently sent to landfill or for energy recovery is exported from the county (and therefore managed outside the level 2 area).

Therefore, there will be economic benefits available, firstly through an expected reduction in transport costs (and associated carbon emissions), and secondly through reduced gate fees.

The quantity of waste currently being landfilled by Level 1 and 2 area Local Authorities can be conservatively estimated at 51,000 tonnes per annum based on the above, and additional landfill space is also being demanded by private sector operators.

Research suggests that Dorset Council has been paying some £130/tonne to landfill residual waste. If this figure also applies to BCP, this would imply a landfill bill in the region of £6.6m for 2018 for the combined authorities. Some £94/tonne of the landfill gate fee is presently landfill tax. At a national level, the element of landfill tax (over £4.75m) should be considered a transfer payment and therefore of little relevance to an economic assessment. However, at the local level this is not so much the case, as landfill tax payments are payable to HMRC. Financially, similarly, the tax represents a drain on Local Authority's funds as much as the gate fee element. Without more detail about the Level 1 and 2 area Local Authorities' payment of gate fees for residual waste management, it is not possible to undertake a detailed analysis of savings,. However, should the ERF's gate fee be pitched (for example) in the region of £80/tonne, there is a potential to save Dorset Council and BCP Council considerable sums, for this landfill element, perhaps in excess of £2.5m per annum. Over the 25 year life of the plant, such a saving would add up to a net present value in the region of £43m.

The impact of the plant on local authorities' waste costs has been assessed as **'moderate'**, based on the sensitivity of the receptor (cost effective local waste services) being medium and the magnitude of the effect also being medium.

1.5.5 Impact on Carbon Emissions

This section considers the monetised impact that the operation of the proposed ERF will have on the tonnes of carbon dioxide (equivalent) emitted into the atmosphere. A 'carbon dioxide equivalent' (or CO_2 equivalent) is a shorthand measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential, by converting quantities of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

- The carbon impact of the proposed ERF is considered from three perspectives:
- The impact from combusting waste and generating power for the Grid;
- The impact from providing shore power to the Port;
- The impact from providing heating to nearby organisations and residents via a District Heating Scheme.

Estimates of the net effect that the ERF will have on carbon emissions (CO_2 equivalents) have been prepared by Fichtner Consulting Engineers and published in their Carbon Assessment (ES technical appendix E). The impacts are considered in turn below, including their monetisation.

1.5.5.1 Carbon Impact of Combusting Waste and Generating Power

The combustion of waste directly generates direct emission of carbon dioxide (CO_2). It also produces emissions of nitrous oxide and methane, both of which are potent greenhouse gases. While the combustion of waste produces CO_2 emissions, export of the energy created to the grid offsets emissions from the generation of power elsewhere, and in the case of the ERF, the power produced is most likely to be displaced from gas-fired power stations. Use of the ERF to process waste also diverts emissions from alternative waste treatment processes which themselves may be far from carbon neutral.

Fichtner's analysis takes into account:

- CO2 released from the combustion of fossil fuel derived carbon in the ERF;

- Releases of other greenhouse gases from the combustion of waste;
- Combustion of gas oil in auxiliary burners;
- CO2 emissions from the transport of waste, reagents and reissues.

Their analysis gives the ERF credit for exporting electricity, displacing carbon emissions from other (mainly gas-fired) power stations. Net emissions included in the bullets above have been compared with the carbon emissions from sending the same waste to landfill, taking account of the release of methane in the landfill gas not captured, and emissions offset from the generation of electricity from landfill gas.

In the base case, the result of the ERF combusting waste and generating power for the Grid is predicted to lead to a net reduction in greenhouse gas emissions of approximately 21,900 tonnes of CO_2 equivalent per annum compared to the landfill counterfactual if operating at the plant's nominal design capacity (183,000 tonnes of waste processed per annum). At the maximum design capacity (202,000 tonnes per annum) this increases to 34,100 tonnes of CO_2 equivalent per annum.

1.5.5.2 Carbon Impact of Providing Shore Power

As well as generating power which will displace power generated from higher carbon intensity gas fuelled power stations, it is intended that the plant will export power to the Port, where it will be used as shore power by cruise ships and by military vessels from the Royal Fleet Auxiliary. Without shore power provision, ships are generally reliant upon on-board diesel generators for their power, and these diesel generators are carbon intensive. The supply of shore power from a clean source is therefore advantageous in terms of reducing the amount of carbon emissions emitted overall.

Fichtner's analysis (see section 3.1.3.2, Fichtner, 2020) draws on Arup estimates of the likely demand for shore power at the port. These are estimated at some 20,000 MWh in 2024, rising to around 24,400 MWh by 2045, with demand coming from cruise ships and Royal Fleet Auxiliary vessels. Fichtner's estimate of the carbon impact of meeting this demand from ERF generated power rather than from ships' own auxiliary engines is that there will be a CO_2 equivalent saving. Per annum this is likely to lie in the range between 4,500 to 5,500 tonnes. The central figure (5,000 tonnes per annum) has been taken as representative for the economic analysis.

1.5.5.3 Carbon Impact of Providing District Heating

The assessment assumes that any heat output from the ERF will offset emissions from natural gas boilers. The average heat output from the ERF is assumed to be 2.29 MW, which is based on a heat network being constructed to supply the Osprey Leisure Centre; Portland Hospital; HMP The Verne; the 554 Comer Homes development; and the HM Young Offenders' Institute, Portland. The assessment adjusts for boiler efficiency and carbon dioxide offset in the counterfactual, and also allows for a reduction in electrical output from the plant, which would be consequential on exporting some heat. The estimated impact on CO_2 equivalent emissions from providing the district heating via the plant (rather than through separate natural gas boilers) is a reduction of 3,000 tonnes per annum.

1.5.5.4 Monetising Carbon Impacts

For each of the above three cases (waste combustion, shore power and district heating), annual net carbon impacts (in CO_2 equivalents) have been monetised and subsequently discounted using a 3.5% discount rate in accordance with supplementary guidance to the Treasury Green Book (see Department for Business, Energy and Industrial Strategy, April 2019). Advice has also been taken from BEIS economists in respect of applicable values for carbon. These have been provided to us in three formats, a central prices scenario, plus two other scenarios, low and high, around the central case. The main analysis has been carried out using the central price scenario, with the two other scenario results presented to demonstrate sensitivity around the central case. Throughout the economic analysis, the more conservative nominal design capacity of 183,000 tonnes of waste processed per annum figure has been used, rather than the notional maximum capacity of 202,000 tonnes.

The EU Climate and Energy Package (December 2008) introduced separate emissions reduction targets for the traded sector (that is those emissions covered by the EU Emission Trading System, also known as the EU ETS), and for the non-traded sector (those emissions not covered by the EU ETS). The presence of separate targets in the Traded and Non-Traded sectors implies that emissions in the two sectors are essentially different commodities valued at different rates.

Changes in emissions which occur in the traded sector are valued at the Traded Price of Carbon, whereas changes in emissions in the non-traded sector are valued at the Non-Traded Price of Carbon. The traded and non-traded carbon prices are different in the short-term, but are projected to converge, becoming equal in 2030 and remaining so in further years. This is based on the assumption that there will be a functioning global carbon market by 2030.

The incineration of municipal waste is excluded from the EU ETS and therefore non-traded carbon prices have been used. Presently, carbon prices published are in 2018 values, so these have been updated using the Treasury's GDP Deflator at Market Prices, which updates prices to 2020 values, matching the rest of the assessment.

The results of the analysis, which show the estimated carbon impacts of the ERF for the three main elements of its operation are shown in Table 1.12 below.

Table 1.12 Estimates of Monetised Carbon Impacts of Proposed ERF – £000s

Element	Low Scenario	Central Scenario	High Scenario
NPV of CO_2e from combusting waste and generating power	20,305	40,610	60,915
NPV of CO_2e from shore power	4,636	9,272	13,908
Sub-total	24,941	49,882	74,823
NPV of CO_2e from district heating	2,782	5,563	8,345
Total, combined 3 sources	27,722	55,445	83,167

Notes: All figures are shown in £000s and are net present values, discounted at 3.5% for 25 years. Estimates use BEIS' non-traded carbon prices, and show the central case as well as a low case and high case. Some figures may not add due to rounding.

Source: Consultant estimate.

The analysis indicates that there is potential to realise significant savings in greenhouse gas emissions from the plant's operation. In the central case the monetised saving from reducing greenhouse gases is expected to be in excess of £55m in today's money, comprising over £40m in respect of combusting waste and generating power (relative to landfill), £9m through providing shore power more efficiently and some £5.5m from supplying district heating. The latter is not guaranteed (depending, as it does, on the involvement of a third party to build and establish the district heating network), so the figures are presented separately for ease of breakdown.

The assessment using CO_2e values from the central case was also undertaken over 20 and 30 years in addition to the standard 25 years (25 years is the expected operating lifetime of the plant), to show how the CO_2e values change should the operational time scale of the plant change. The results are shown below.

Table 1.13 Estimates of Monetised Carbon Impacts, Central Scenario modelled over 20 and 30 years, £000s

Element	20 Years	25 Years	30 Years
NPV of CO_2e from combusting waste and generating power	31,272	40,610	49,969
NPV of CO_2e from shore power	7,140	9,272	11,408
Sub-total	38,412	49,882	61,377
NPV of CO_2e from district heating	4,284	5,563	6,845
Total, combined 3 sources	42,696	55,445	68,222

Source: Consultant estimate

As expected, the carbon benefits of the proposed ERF increase when the assessment period is lengthened, and reduce when it is shortened.

According to the Department for Business, Energy and Industrial Strategy, which publishes an annual breakdown of emissions of carbon dioxide by local authority areas (BEIS, June 2020) the total amount of CO_2 equivalent produced in Dorset for the most recent year (2018) was 1.62 million tonnes. Comparing this to the population (given in the same data source as 376,500) yields an average of 4.3 tonnes per capita. The corresponding figures for Bournemouth, Christchurch and Poole are 1.44 million tonnes and 395,800 people (the latter also from the same data source and quoted in the economic baseline), or 3.6 tonnes per head. The BEIS figure for 'Total Dorset' is the combined figure for the two authorities. This coincides with our Level 1 and 2 area and totals 3.06m tonnes of carbon and 772k people, yielding a per capital estimate of 4.0 tonnes.

Figures for Weymouth and Portland are not available but assuming the overall total figure is representative of Weymouth and Portland, applying a 4 tonnes per head carbon figure to the population of 65,865 (ONS, 2018, as quoted in the Economic Baseline) gives an estimated carbon output of 263,460 tonnes per annum. Multiplying this by the central carbon price for 2020 of £69.28 produces an estimated approximate cost for a year's worth of carbon produced by Weymouth and Portland of £18.25m. Using the lowest level of carbon savings associated with the plant (just that associated with combusting the waste and generating power for the Grid) gives a reduction in carbon of 21,900 tonnes and a cost reduction of £1.52m (each figure over 8% of the total). This is the equivalent to the carbon emissions of nearly 5,500 people produce (about a twelfth of the population). Given these comparisons, for the Level 1 area, sensitivity is judged as 'high' and magnitude is judged as 'medium', producing an overall impact effect that is **substantial, beneficial and significant.**

Looking at the Level 1 and 2 area (wider Dorset and BCP) the 3.06m annual tonnes of carbon produced in 2018, if released in 2020 would have an associated cost of some £212m. This compares with a reduction of nearly 21,900 tonnes (valued at £1.52m). While sensitivity is still judged as 'high', magnitude is clearly less than it was at the Level 1 area. For the Level 1 and 2 area together, magnitude is judged as small. This produces an impact effect of **moderate, beneficial and significant**.

Nationally, the UK produced some 344 million tonnes of CO_2 equivalent in 2018, which if produced in 2020 would be associated with a cost of some £24 billion. The sensitivity of the receptor (UK economy) remains 'high', but the magnitude of the associated effect (in the context of the very high national UK-wide carbon costs) is now much lower, and in fact is judged to be negligible. This results in an impact effect judged to be **negligible** and therefore not significant.

1.5.6 Impact on Image/Business Confidence Through Brownfield Land Use

The site comprises 6.29ha of previously developed land (PDL, also known as brownfield land) located on the north eastern coast of the Isle of Portland, within Portland Port.

The main part of the site (which will accommodate the ERF building) comprises an area of 2.14ha, roughly triangular in shape and largely covered with hardstanding. It has been vacant for several years, and as it lies within port land, it is not currently publicly accessible. The remaining area of 4.15ha will be used for cable routes.

During the post-war period, the main site area was dominated by a weapons research establishment building in the south east, with other buildings dedicated to mechanical repair facilities for military vehicles. The naval base and two major weapons research establishments were closed in 1995/96, after which the buildings on site were progressively demolished to create open storage space. The last vacated buildings, used by UMC, Portland Shellfish and Permavent, were demolished in 2014 and 2017.

One of the impacts of the project will therefore be the re-use of 2.14ha of brownfield land. There is no realistic suggestion of any alternative use for this site in the short to medium term.

The re-use of this land, and the effect that this has on business confidence and the image of the area, is assessed as a **'slight'** beneficial effect, based on low sensitivity and small magnitude. Existing businesses (and those looking at the potential of inward investment) within the immediate area might be pleased to see PDL being brought back into use and the considerable investment involved could contribute to an improved air of business confidence. Pushing against this is the negative image sometimes associated with waste management facilities. However, the immediate area is an existing industrial area within the confines of a working port, and therefore any negative image issues are not expected to outweigh the advantages of such a tangible business investment on local confidence.

1.6 Mitigation and Monitoring

Mitigation that has been designed into the scheme and forms part of the proposals (primary mitigation) has been taken into account at the impact assessment stage (above).

Beyond the primary mitigation built into the design of the scheme, no secondary mitigation has been identified as being needed to address the effects of the scheme. In the absence of secondary mitigation measures, no description of them or scheme re-assessment is required here. As no adverse effects are predicted, no monitoring is required.

1.7 Residual Effects

This chapter has assessed the economic effects of the construction and operation of a proposed ERF, the development of which is planned for land within the Portland Port complex in Portland, Dorset. No mitigation measures have been identified and Table 1.14 summarises the main economic impacts of the proposed development. The 'impact assessment' findings, presented in the fourth column, are all positive. One receptor is expected to experience a substantial, significant positive effect (at the area Level 1). Five receptors are expected to experience a moderate, significant positive effect (of which one is at area Level 1 and the remainder at Level 1 and 2), and the remaining receptors are likely to experience either negligible or slight effects that will not be significant.

The receptor that may expect a substantial beneficial effect is the local economy (at the level of Weymouth and Portland), via reductions in the cost of carbon produced. The five receptors that may expect a moderately beneficial effect are as follows.

- Employment across Weymouth and Portland (ie a Level 1 area impact). The impact of operational employment will be felt directly, indirectly and through induced expenditure.

- The developers are planning to provide power to a local business which will help ensure power demand from the Grid does not accelerate too quickly, causing new infrastructure to be required. The impact on those who would have to pay for any new infrastructure (likely a combination of the next applicant for a large power supply increase and SSE) is judged to be moderately beneficial.
- Portland Port, and associated companies and individuals working in the supply chain facilitating cruise liner calls at the Port (the impact is a positive one based on the plant's provision of shore power, which is necessary for continued success in attracting cruise liners).
- Local Authorities and the people living within Dorset, Bournemouth, Christchurch and Poole, the cost-effectiveness of whose waste treatment service will be improved.
- The local economy across the Level 1 and 2 areas, measured via monetisation of carbon impacts. Carbon produced locally will be partly offset by the ERF's operation, resulting in a lower carbon cost.

Table 1.14 Impact Assessment: Summary

Receptor	Sensitivity of receptor	Magnitude of effect	Impact assessment outcome	Rationale
Construction Phase				
Level 1 and 2 Impact on new and existing businesses through expenditure impacts	Medium	Small	Slight, positive	Direct and indirect expenditure will be beneficial to firms at a local level.
National Level Impact on new and existing businesses through expenditure impacts	Low	Negligible	Negligible	Direct and indirect expenditure will be beneficial to firms at a national level, but in a national context this will be hard to discern.
Level 1 and 2 Impact on jobs through expenditure impacts	Medium	Small	Slight	Direct and indirect jobs will be beneficial at a local level, so too will induced jobs (the latter are unquantified in the analysis).
National Level Impact on jobs through expenditure impacts	Low	Negligible	Negligible	Direct and indirect jobs will be beneficial nationally, so too will (unquantified) induced jobs.
Operational Phase				
Level 1 and 2 Impact on new and existing business through expenditure effects	Low	Small	Slight	Some local businesses and organisations in the ERF's supply chain will benefit from its operation.
National Level	Negligible	Small	Negligible	More indirect expenditure will be felt at the national level, but

Receptor	Sensitivity of receptor	Magnitude of effect	Impact assessment outcome	Rationale
Impact on business through expenditure effects				given the size of the economy, the impact will be negligible
Level 1 Impact of operation on employment opportunities	High	Small	Moderate	Direct and indirect jobs will be beneficial at a local level, so too will induced jobs (the latter are unquantified in the analysis).
Level 1 and 2 Impact of operation on employment opportunities	Medium	Small	Slight	Direct and indirect jobs will be beneficial locally, so too will (unquantified) induced jobs.
National Level Impact of operation on employment opportunities	Low	Negligible	Negligible	Direct and (especially indirect and induced) jobs will be beneficial at the national level, but because of the size of the economy this will be hard to discern.
Level 1 and 2 Impact on funder of medium term infrastructure investment	Medium	Medium	Moderate	The plant reduces the need for SSE/power applicant investment by allowing the provision of a 'private wire' facility to specific users, at least in the medium term.
Level 1 and 2 Portland Port, and supply chain businesses, in terms of the provision of shore power	Medium	Medium	Moderate	The provision of shore power will enable the Port to retain and grow its cruise business. There will be impacts for several businesses in the cruise supply chain (receptors impacted by tourist spend excluded from this impact)
Level 1 and 2 Tourism spend and supported jobs, deriving from cruise calls at Portland Port	Medium	Small	Slight	Shore power promotes cruise ship calls enabling growth in tourism spend in Level 1 and 2 areas.
Level 1 Impact on existing households/organisations through facilitation of District Heating	Low	Small	Slight	The potential impact on local households/organisations of a DH arrangement offering discounts on market prices will be beneficial to those concerned, but it will not be available beyond Portland.

Receptor	Sensitivity of receptor	Magnitude of effect	Impact assessment outcome	Rationale
Level 1 and 2 Local people/LAs through more cost effective disposal routes	Medium	Medium	Moderate	The improvement in efficiency in treating local waste will reduce costs to Local Authorities.
Level 1 Impact on economy assessed via monetisation of carbon	High	Medium	Substantial	The carbon produced locally is partially offset by the ERF's operation.
Level 1 and 2 Impact on economy, assessed via monetisation of carbon	High	Small	Moderate	The carbon produced locally is partly offset by the ERF's operation, but the effect is diminished due to scale.
National Impact on economy, assessed via monetisation of carbon	High	Negligible	Negligible	The carbon produced nationally is offset by the ERF's operation, but the effect is negligible due to scale.
Level 1 Impact on image/business confidence through brownfield land use	Low	Small	Slight	Slight positive effect locally derived from the positive signals sent through large scale investment and re-use of PDL.

1.8 Cumulative Effects

This section addresses the cumulative impact of the proposed ERF along with other relevant schemes in the vicinity. More detail about these schemes, especially those which have permission under the 1997 and 2010 Portland Harbour Revision Orders, is provided in ES chapter 3. Of these schemes, there are a number currently in the planning process or under construction, which could lead to cumulative economic effects (ie regarding jobs, expenditure and the labour market) when linked to this scheme.

There are three schemes of particular interest, plus the significant development and associated planning permissions relating to improvement works at Portland Port. The three (non Port) schemes which have been identified as being of particular interest are:

- Ocean Views, Ocean Views, Hardy Complex, Castle Road, Portland (phase 2): redevelopment of former naval accommodation block into 157 apartments, together with the development of 191 new build homes, with associated car parking;
- Plot X1 and X2, Mulberry Avenue, Portland: erection of two blocks of two storey business units comprising three B1 units and six B8 units (total floorspace 766 sqm) with associated parking and landscaping; and
- Plot M1B, Hamm Beach Road, Portland: erection of three industrial and commercial buildings (B1, B2 and B8, total floorspace 2,879 sqm) and associated external works.

Depending on the timing of the development taking place (if the development takes place at all) temporary disruption to the local community as a result of increased traffic, air quality, dust and noise could potentially take place derived from the cumulative impact of the ERF and the sites listed above. If there were cumulative impacts (in particular from transport during construction) this could have economic implications via a loss of office productivity caused by workers being distracted by noise or inconvenience. However, the Transport Assessment (technical appendix L1) has determined that cumulative impacts from these schemes will not be significant which therefore rules out the potential for knock-on economic impacts.

There are a number of opportunities for development and use in respect of land surrounding Portland Port (and by implication, land in close proximity to the proposed ERF). These potential developments and uses are permitted under the 1997 Portland Harbour Revision Order and the 2010 Portland Harbour Revision Order. They include the construction of two animal feed storage and distribution warehouses (to service the Port's animal feeds business, facilitated by monthly freighter visits); the open storage of waste products including wood and metal; the construction of a warehouse building for landside aquaculture use (size 135m x 37m) and various mooring dolphins/berthing/pontoon provisions to provide improved shipping access and coastal protection.

No substantive cumulative impacts are expected to derive from the simultaneous operation of these Port and non-Port developments with that of the proposed ERF.

During the operational period of the plant, there are not expected to be any cumulative negative effects with these other proposals. In fact, the development of the proposed plant, the Ocean View residential scheme (and other nearby residential schemes) the Port developments and the employment/commercial/leisure sites detailed above will provide employment opportunities for new and existing residents, business opportunities for existing or incoming businesses while the ERF will contribute to the supporting infrastructure necessary for commercial and residential development.

If the above mentioned cumulative schemes gain approval and are developed alongside the proposed ERF, they are collectively expected to have a **slight to moderate, significant** beneficial cumulative effect. This is based on the receptor (being the people and economy of Portland) having a medium sensitivity and the magnitude of the combined effects having been assessed as small to medium. There is expected to be an adequate supply of labour to cover the construction and operation of all the cumulative schemes within the Level 1 and 2 areas, even should they all occur simultaneously.

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