POWERFUEL

Portland energy recovery facility

Environmental statement
Addendum
Appendices

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Human health risk assessment addendum

Human Health Risk Assessment - Addendum

Portland Energy Recovery Facility

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The business of sustainability

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Human Health Risk Assessment - Addendum

Portland Energy Recovery Facility

Chris HazellMarshall
Technical Director

Simon Aumônier
Principal Partner

Environmental Resources Management Limited

2nd Floor Exchequer Court

33 St Mary Axe

London

EC3A 8AA

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1. INTRODUCTION

As part of the Planning Application for the Portland Energy from Waste plant, ERM undertook a Human Health Risk Assessment (HHRA) on behalf of Powerfuel. The HHRA considered emissions from the ERF and traffic generated by project on roads in Portland, along Chesil beach and in Weymouth. This HHRA focused on the potential for negative impacts associated with the proposed project.

However, a key element of the ERF project is that the plant will provide shore power for shipping in Portland Harbour. Currently, ships in Portland Harbour run their diesel engines to provide electrical power whilst in dock. Under the shore power scheme, ships will take power supply provided by the ERF and will shut down their engines, with a consequent reduction in emissions.

The Air Quality Impact Assessment has been updated to take into account the net change in emissions due to the use in shore power. The AQIA considered the net change in emissions and impacts of oxides of nitrogen (NO_x), particulate matter (as PM_{10} and $PM_{2.5}$) and sulphur dioxide (SO_2).

The AQIA identified that, for NO_x, NO_2, PM_{10} and $PM_{2.5}$, air quality is, on average, improved when the plant provides shore power. This is because the increase in pollutant concentration due to the plant and plant traffic is smaller than the existing impacts of ship emissions. The results for SO_2 are slightly different, with some locations showing an improvement, and other areas a worsening of impact. The results of the updated AQIA taking into account this improvement in air quality have been taken forward into the HHRA, and are presented here.

The HHRA considers two aspects: impacts associated with changes in NO_2, PM_{10}, $PM_{2.5}$ and SO_2; and impacts associated with other emissions such as metals and dioxins. As the offset of shipping emissions impacts only NO_2, PM_{10}, $PM_{2.5}$ and SO_2, this element of the HHRA has been updated.

The method for the HHRA is unchanged, and therefore the method and underlying population data have not been replicated in this report. The first HHRA report should be considered for points of methodology and population data. The only changes are to the assumed number of days that the ships are in port (260 berth days). This report sets out only the updated results, arising from the updated results presented in the AQIA.

2. UPDATED ASSESSMENT OF HUMAN HEALTH EFFECTS OF SO_2, NO_2, PM_{10} AND $PM_{2.5}$

2.1 Years of Life Change Through Exposure to $PM_{2.5}$

As noted in Section 1, the exposure of the population to $PM_{2.5}$ will decrease as a consequence of the plant providing shore power and off-setting existing emissions from ships in port. Using the same method used to calculate years of life lost in the original HHRA, this results in a gain of 2.0 years of life distributed across the exposed population.

The measure of life years gained would not be equally distributed throughout the exposed population. Statistically, those in the highest exposure group would gain the most. However, leaving this qualification aside, the result averaged over the exposed population gives a gain of approximately 32 minutes per person per year, or 16.5 hours gained throughout the 30 year lifetime of the plant.

2.2 Particulate Matter (PM_{10})

Table 2.1 shows the change in health outcomes due to the changes in PM_{10} concentrations, resulting from the plant emissions, traffic emissions and offset shipping emissions.

Table 2.1 Estimate of Health Effects from Change in Exposure to PM_{10}

Outcome	Per annum	Per 30 years of operation
All mortality	-0.007	-0.22
Cardiovascular mortality	-0.00020	-0.0060
Cardiovascular admissions	-0.007	-0.22
Ischeamic heart disease admissions	-0.0060	-0.171
Heart failure admissions	-0.0017	-0.052
Cerebrovascular admissions	-0.0013	-0.039

The decreased exposure to PM_{10} will lead to a negligible (albeit positive) improvement in the health of the local population. Whilst this is not significant, and the changes in health would not be discernible in the population, there is a net improvement due to the reduction in shipping emissions.

To put these figures into context, for example, there are 18 cases of cardiovascular mortality in the Study Area each year, compared to a reduction of 0.0060 cases due to the operation of the ERF.

2.2.1 Nitrogen Dioxide (NO_2)

Table 2.2 shows the change in health outcomes due to the changes in NO_2 concentrations resulting from the plant emissions, traffic emissions and offset shipping emissions. The overall net change in NO_2 concentrations is a decrease, albeit the change is negligible.

Table 2.2 Estimate of Health Effects from Change in Exposure to NO_2

Outcome	Per annum	Per 30 years of operation
All mortality	-0.024	-0.71
Cardiovascular mortality	-0.0011	-0.034
Ischeamic heart disease admissions	-0.022	-0.65
Heart failure admissions	-0.0082	-0.25
Cerebrovascular admissions	-0.0066	-0.20

As with PM_{10}, the decreased exposure to NO_2 will lead to a negligible (albeit positive) improvement in the health of the local population. Again, whilst this is not significant, and the changes in health would not be discernible in the population, there is a net improvement due to the reduction in shipping emissions.

To put these figures into context, they can be compared to the total number of Ischaemic Heart Disease (Coronary Heart Disease) primary diagnoses. In the Study Area, there are 581 cases of Ischaemic Heart Disease each year, compared to a reduction of 0.066 due to the operation of the ERF.

2.2.2 Sulphur Dioxide (SO_2)

Table 2.3 shows the change in health outcomes due to the changes in SO_2 concentrations resulting from the plant emissions, traffic emissions and offset shipping emissions.

Table 2.3 Estimate of Health Effects from an Increased Exposure to SO_2

Outcome	Per annum	Per 30 years of operation	Number of years operation for 1 additional case
Cardiovascular mortality	0.00011	0.003	9486
Cardiovascular admissions	0.0087	0.26	114
Ischeamic heard disease admissions	0.005	0.15	195
Heart failure admissions	0.00067	0.020	1499
Cerebrovascular admissions	0.00058	0.017	1710

Unlike PM_{10} and NO_2, there is a neglibile (albeit negative) impact. During the estimated 30 year operating period, there will not be an additional case for any of the health outcomes considered. Again, to put these figures into context, there are 581 cases of Ischaemic Heart Disease in the Study Area each year, compared to an additional 0.005 cases due to the operation of the ERF.

2.3 Conclusions

In the case of PM_{10} and NO_2, the offsetting of shipping emissions will lead to a negligible but positive improvement in health in the exposed population. Whilst this is not significant, it is nevertheless an improvement. In the case of SO_2, the shipping emissions offset is smaller and there are some locations where there is a very slight worsening in health outcomes. Again, these are not significant.

When those health outcomes that are common for PM_{10}, NO_2 and SO_2 are considered together, the overall effect on health is beneficial.

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ERM's [Swansea]
Ethos
Kings Road
SA1 Swansea Waterfront
Swansea SA1 8AS

T: +44 (0) 1792 306930
F: +44 (0) 1792 306056

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