

WITNESS STATEMENT

1. EXPERIENCE AND QUALIFICATIONS

My name is Ria Lyden. I am an Associate Director of Arup Consulting Engineers.

I have a Bachelor of Engineering Degree in Civil Engineering and a Master of Business Administration Degree. Both degrees are from University College Cork. I am a Chartered Engineer. I am a Fellow of the Institution of Engineers of Ireland and a member of the Institution of Structural Engineers. I have worked as a civil and environmental engineer for 26 years.

Since 1992 I have prepared, or supervised the preparation of numerous environmental impact statements for a wide range of industrial, infrastructure, institutional, commercial and residential projects.

2. INTRODUCTION

Arup Consulting Engineers were the main consultants to Elsam Dublin Waste to Energy Ltd, now DONG Energy, for the preparation of the EIS and waste licence application, on behalf of Dublin City Council, for the Dublin waste to energy project.

The EIS was prepared by a team of specialists with considerable experience in the preparation of EISs and reference was made to the EPA Documents, *Guidelines on the information to be contained in Environmental Impact Statements*, EPA 2002, and *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*, EPA 2003 (EPA guidelines).

The EU has also prepared guidelines, *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*, published by the Office for Official Publications of the European Communities in May 1999 (EU guidelines).

Arup prepared chapter 20 of the EIS, Cumulative Impacts and Interactions.

My evidence will cover the approach adopted in the EIS to assess cumulative impacts, indirect impacts and interaction of impacts and will demonstrate that these impacts have been assessed in the EIS by reference to both the EPA and EU guidelines.

3. REQUIREMENT FOR THE CONSIDERATION OF CUMULATIVE IMPACTS AND INTERACTIONS

Schedule 6 of the Planning and Development Regulations 2001, which mirrors Article 3 of the EIA Directive, specifies the information to be contained in an EIS, including:

A description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:

- “Human beings, fauna and flora
- Soil, water, air, climatic factors and the landscape
- Material assets, including the architectural and archaeological heritage, and the cultural heritage and
- The *inter-relationship* between the above factors.”

“A description is also required of the likely significant effects (including direct, *indirect*, secondary, *cumulative*, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from:

- The existence of the proposed development
- The use of natural resources.”

is addressed in individual chapters of the EIS, where the potential for significant cumulative impacts are considered to exist.

4. DEFINITIONS

There are no generally agreed and accepted definitions for indirect impacts, cumulative impacts or inter-relationship of impacts.

The EPA Guidelines define cumulative impact thus: *The addition of many smaller impacts to create one larger more significant impact.*

The EPA Guidelines do not define indirect impacts. The EPA Guidelines use the term synergistic impacts. Synergistic impact is defined as: *Where the resultant impact is of greater than the sum of its constituents.*

The EU Guidelines use slightly different definitions as follows:

Indirect Impacts: Impacts on the environment, which are not a direct result of the project, often produced away from or as a result of a complex pathway. Sometimes referred to as second or third level impacts, or secondary impacts.

Cumulative Impacts: Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project.

Impact Interactions: The reactions between impacts whether between the impacts of just one project or between the impacts of other projects in the areas.

The term ‘impact interactions’ is equivalent to the term ‘inter-relationship of effects’. The EU guidelines accept that their definitions overlap to a certain extent. The EU guidelines also refer to ‘Cross-Media Impacts’, in which the impact in one environmental medium may also have an indirect impact on another medium.

5. METHODOLOGY USED IN THE EIS TO ASSESS CUMULATIVE AND INDIRECT IMPACTS AND INTERACTIONS.

In the screening stage of preparation of the EIS for the Dublin WtE, the potential for significant cumulative and indirect impacts and interactions was examined and any such potential impacts were identified. Where the potential for significant cumulative and indirect impacts and interactions was identified, such impacts and interaction of impacts were included in the scope and addressed in the baseline and impact assessment studies for each of the relevant environmental media and aspects of the project. The cumulative and indirect impacts and interaction of impacts were presented in the chapters of the EIS which address the most relevant environmental media and aspect of the project.

The matrix and expert opinion approaches were used in the identification of the potential for significant cumulative and indirect impacts and interactions. Refer to Table 20.1 of the EIS for the matrix of potential interactions. Modelling and carrying capacity analyses were used to evaluate impacts.

Reference was also made to the EPA Guidelines and in particular to the guidance given for the preparation of an EIS for Project Type 32 – Waste disposal Installations for the incineration, chemical treatment or landfill of hazardous and non-hazardous waste, in the EPA's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements).

6. CUMULATIVE IMPACTS AND INTERACTIONS

The following text indicates where cumulative and indirect impacts and interactions of impacts have been addressed in the Dublin WtE EIS. These examples and references are not exhaustive and it is not intended to repeat information which has been provided by other witnesses.

6.1 Landscape and Visual Impact

The detailed landscape and visual impact study, including the generation of photomontages, is described in chapter 6 of the EIS. When considering the existing environment (6.4) the following aspects were considered:

- Traffic
- Air quality and climate
- Soils geology and groundwater (6.4.2)
- Water (6.4.5)
- Human beings (6.4.3, 6.4.4, 6.4.11),
- Terrestrial ecology (6.4.6, 6.4.8, 6.4.9, 6.4.13).
- Estuarine ecology (6.4.5)
- Material assets (6.4.11, 6.4.12)

The facility design included mitigation measures which take cognisance of the air quality and climate study and traffic studies. This resulted in the stack height being designed to ensure the adequate level of air dispersion required, and the facility is orientated to allow for the most appropriate traffic movement both on and off the site. Furthermore the site levels selected took cognisance of the ground conditions in order to strike the correct balance between material excavation and visual impact. The impact these mitigation measures on landscape and visual impact was addressed in the landscape and visual assessment.

The study addressed the incremental impact of the Dublin WTE in the context the surrounding present developments. The site context and existing developments are described in sections 6.4.1 to 6.4.9. The incremental impact of the Dublin WTE on foreseeable future developments are addressed in sections 6.6.2 to 6.6.4 and 6.6.21. The cumulative impact with and indirect impact on existing development is addressed in sections 6.6.5 to 6.6.8 and 6.6.23.

Specific mitigation measures were referenced for indirect impact and cumulative impact on future developments, ecology and traffic. Refer to sections 6.7.4 to 6.7.6.

The residual impact is expressed in terms of indirect and cumulative impact in section 6.8.1.

6.2 Traffic

A detailed traffic study was undertaken and was described in chapter 7 of the EIS. The traffic study calculated the traffic which will be generated by the development. The existing baseline traffic, which reflects the traffic generated by other developments in the area, was measured. Future road and public transport developments in the city, and future growth and change in traffic patterns in the area and City were included with the baseline traffic in the traffic prediction model. The increase in traffic

resulting from the Dublin WTE was presented as a percentage increment to the traffic on the road network in the future opening year and design year. Refer to tables 7.7, 7.8 and 7.9. Thus the cumulative impact of the facility in combination with current and future developments was assessed.

The emissions from the predicted traffic flows generated during the operational phase of the development were considered in the air quality and climate assessment (section 8.4, Annex 5 to Appendix 8.1 and Appendix 8.2 section 8.3.5) and noise assessment (9.2.8, 9.2.9, Fig 9.3, 9.2.26).

The movement of spoil from the site and the importation of clean fill material will cause additional traffic movements during construction phase. The construction trip generation is discussed in Section 7.7.11 and the Worst Case Construction Related Daily Trip Generation is given in Table 7.22.

Specific mitigation measures were identified in the traffic study for indirect and cumulative impacts, air quality impacts and material assets impacts. Refer to sections 7.8.1, 7.8.3 and 7.8.4.

The residual impact from the operational phase was expressed in terms of cumulative impact, in section 7.9.1.

6.3 Air Quality

A detailed air quality and climate study was presented in Chapter 8 of the EIS. In determining the impact of emission to air from the facility, the ground level concentrations of the different substances emitted were combined with the background levels, and the total level for each substance was compared with the reference standards. The background levels, obtained from monitoring in the vicinity of the site, take into account existing air emission sources and existing traffic in the vicinity of the site. Refer to sections 8.3.17 and 8.3.18.

The specific impacts of the emissions to air from the three power stations in the vicinity of the Dublin WtE site (Poolbeg, North Wall and Synergen Power Stations) were assessed in combination with the emissions to air from the Dublin WtE facility. Refer to section 8.4.16 and Annex 3 to Appendix 8.1 of the EIS and table A8.6.

The air emissions from the traffic generated by the project were also included in the assessment, the details of which are given in Annex 5 to Appendix 8.1, and an allowance was made for future changes in air quality which would be expected to occur by 2012. (Note 3 to table 8.8.)

The cumulative background levels to which the increment from the Dublin WTE was added were summarised in Table 8.8.

The emissions from the facility, combined with the cumulative background levels were compared with the relevant air quality standards. The air quality standards have been defined in order to protect human health and the environment. Refer to Table 8.9.

The assessment of impact for each individual parameter was expressed in terms of the cumulative impact on other media such as human beings and the environment. Refer to sections 8.4.5 to 8.4.8.

The cumulative assessment also addressed the incremental emissions relevant international protocols in addition to other significant pollution sources in sections 8.4.17 and 8.4.18.

Specific mitigation measures for the operational phase were included in the design of the facility.

Emissions during construction phase were also considered and mitigation measures were provided to minimise the impact on air during construction (8.5.3).

6.4 Climate

In addressing climate impacts, the impact of the Dublin WtE facility was assessed in the context of all emissions of greenhouse gases from Ireland and Ireland's obligations under the Kyoto Protocol. Refer to section 8.4.22 to 8.4.39. The assessment is summarised in sections 8.4.37 to 8.4.39.

6.5 Noise

A detailed noise assessment of construction and operational stage predicted noise levels was conducted and was presented in chapter 9 of the EIS. Baseline noise levels were measured. These took account of existing noises in neighbourhood including noise emanating from the scrap handling, primarily from the scrap yard placed on the north side of Pigeon House Road, a fan at a silo to the north of the measuring position, a fan at the sewage treatment plant, and to some extent vehicles on Pigeon House Road. Refer to section 9.2.19.

The predicted noise emissions from the plant associated with the incineration process and worst case traffic movements were considered in sections 9.3.6 and 9.3.7.

During construction phase noise emissions from construction activities were predicted which include soil stripping, piling and steam blowing during commissioning (9.3.11, 9.3.12)

The noise emissions from the operation and construction phases were modelled to give resulting levels at the sensitive receptors and these levels were combined with the measured background levels, thus addressing the cumulative impact of the project with other developments in the vicinity for comparison with the relevant standards. Refer to section 9.3.24 and tables 9.10 and 9.11. The study included an assessment of the likelihood of complaints due to noise from the development in both the construction and operational phases, thus assessing the impact of the development on human beings. Refer to sections 9.4.11 to 9.4.17.

Off site noise impacts from traffic associated with the development was also assessed in section 9.4 and appendix 9.3. 1

6.6 Vibrations

Vibration impacts were assessed. Background levels and impacts from the development were found not to be significant. Refer to sections 9.4.18 to 9.4.22.

6.7 Residues and Consumables

Cross media effects relevant to air emissions were addressed in the EIS. Sections 5.6.47 to 5.6.57 explained how the plant has been designed to ensure that the potential pollutants to air in the flue gases emissions will be removed from the flue gases and collected as residues in the flue gas treatment equipment, for removal off site as solid waste. Sections 5.5.34 explained that process effluents will be reused in the process. Any pollutants in the process effluent will be collected as solid residues, as explained in section 5.6.58. These solid residues were addressed in chapter 10. The residues will be reused or disposed of to appropriately licensed facilities.

6.8 Soils, Geology and Groundwater

A detailed soil, geology and groundwater study was undertaken which consisted of a desk study and geotechnical and environmental site investigations. The study was presented in chapter 11 of the EIS.

1 The report referenced in Appendix 9.3 of the EIS was submitted to An Bord Pleanala 8th of March 2007

Potential indirect and cumulative impacts were addressed as part of the overall predicted impact of the facility during construction phase in Section 11.5 and operational phase in Section 11.6. Specifically the potential impact on water quality was addressed in Sections 11.5.3, 11.5.4, 11.5.8, 11.5.11, 11.5.12, 11.6.2, 11.6.5. The potential impact on air quality was addressed in 11.5.3.

In order to construct the underwater cooling channels there will be the necessity for some underwater excavation. This will result in the temporary impact on the estuarine ecology in the vicinity of the excavation. Refer to section 11.5.12 and 15.5.11.

It is envisaged the fill material onsite will be reused in soft landscaping areas in accordance with the landscape plan proposed for the site. This is proposed as a mitigation measure for various impacts including visual, soils and materials assets.

A potential indirect impacts on soils was addressed in section 4.4.1 (a) relating to potential to divert sewage sludge for thermal treatment.

Mitigation measures for impacts on soils proposed in Section 11.7 addressed all the relevant direct, indirect and cumulative impacts and it is predicted there will be no significant residual negative impacts on the soils or geological environment.

6.9 Water

Cross-media effects with respect to cooling options were addressed in section 5.11.30. Three cooling methods were considered, air cooled condensers, cooling towers and once-through sea water cooling. Once-through sea water cooling could have potential impacts on water and the estuary but will reduce noise, visual impact and will improve energy efficiency.

A detailed assessment was conducted of the existing hydrography of Dublin Bay and Liffey Estuary and the predicted impact of the facility, specifically the emissions from the cooling water systems of the Dublin WTE. The study was presented in chapter 12 of the EIS. The dispersion of the emission plumes from the facility was analysed using a 3D computer dispersion model of the Liffey and Estuary. The relevant emissions from the Synergen and Poolbeg Power plants and the Ringsend Waste Water Treatment plant were inputted into the model. Refer to sections 12.3.5 and 12.3.8.

The cumulative impact and interaction of the emissions from the Dublin WTE with the relevant emissions from the Synergen and Poolbeg Power plants and the Ringsend Waste Water Treatment plant was predicted by this model and assessed.

The existing estuarine flora and fauna was addressed in 12.1.21 to 12.25 and the predicted impact is addressed in 12.4.25 as well as in sections 15.5 and 15.7.

A potential indirect impact on water was addressed in section 5.5.36. This was the reuse in the WTE plant of treated 'grey' water from the Ringsend Wastewater treatment plant rather than discharging the effluent to the River, as is done currently.

6.10 Human Beings

The impact on human beings was addressed in a number of chapters of the EIS. The main one was chapter 13. A detailed description of the existing environment in the vicinity of the proposed facility is provided and the predicted impact on human beings from the proposed facility was detailed.

Impacts and interactions of impacts on Human Beings with respect to Landscape and Visual aspects, Traffic, Noise, Air Quality have been dealt with separately by specialists in those fields and are detailed in the respective Chapters.

The potential for complex indirect, cumulative and interactive impacts between soils, the emission to air of dioxins and dibenzofurans and human health is addressed in the dioxin uptake study in sections 13.4.9 to 13.4.16 and Appendix 13.1. The study modelled the dioxin ingestion of a theoretical MARI and TARI, as defined in section 13.4.9. The conclusion of this study was as given in section 13.4.16.

The potential for complex indirect, cumulative and interactive impacts from all the emissions from municipal waste incineration on human health was assessed in published studies such as those by the World Health Organisation 1996, The Health Research Board 2003, and the UK Department of Environment Food and Rural Affairs in 2005. These were referenced in sections 13.3.27 to 13.3.41. The general conclusion of these studies was that properly equipped and operated modern municipal waste incineration does not pose a threat to human health.

The facility during construction and operation will generate employment which will have a direct and indirect socio-economic benefit. This has been considered in section 13.6.1. The proposed Community Gain Fund could have a positive indirect impact on community facilities, as addressed in section 13.6.2. The landscaping proposal will have an indirect positive impact on residential amenities, which are described in sections 13.6.1 to 13.6.3.

During construction there may be a temporary impact on human beings from soil stripping and excavation but mitigation measures to reduce the impact of these activities have been provided in the Chapter 11, Soils, Geology and Groundwater.

6.11 Terrestrial Ecology

A baseline study of the existing flora and fauna species within and around the site for the proposed Dublin WtE Facility was conducted. The study was presented in chapter 14 of the EIS.

In addition, baseline studies were undertaken in 2003 which drew on existing bird data for Dublin Bay, principally wintering waterfowl data from the Dublin Bay Project database. The bird study is reproduced in Appendix D, Volume 2, of the Technical Appendices to the Dublin Waste to Energy Baseline Monitoring Report, which was prepared by COWI and RPS-MCOS in 2005 and has been available on the project website. Material from the bird study was also incorporated into Chapter 3, Volume 1 of the Baseline Monitoring Report, entitled Estuarine Ecology.

The cumulative and interactive effects of construction activities and the operational phase on the ecology of the vicinity were in sections 14.4.1 to 14.4.4, and on the designated sites in 14.5.1 and 14.5.2. Indirect impacts on Brent Geese were addressed in section 14.4.2. The indirect impacts on the designated Special Areas of Conservation and Special Protection Areas in Dublin Bay are addressed in sections 14.5.1 and 14.5.2 and 15.5.31.

6.12 Estuarine Ecology

A baseline study of the marine and estuarine ecology was carried out including an extensive literature review. The study was presented in chapter 15 of the EIS.

During construction phase there could be an increase in suspended solids in the water due to soil stripping. The possible effect of this on estuarine ecology is addressed in 15.5.11 and 15.5.12.

Marine fauna may be affected by noise pollution, however, impacts are likely to be minimal and short term and mainly restricted to the construction phase. (15.5.13).

During operation it is proposed to release cooling water to the River Liffey which will result in a temperature increase resulting in a thermal plume. The impact of the predicted increase in temperature on estuarine ecology was addressed from 15.5.20 to 15.5.27 and 15.5.41. Mitigation measures were provided in 15.6.9.

It is also proposed to use biocides within the cooling water system to prevent biofouling of the cooling water pipes. The impact of the discharge of biocides on estuarine ecology was addressed in 15.5.28-15.5.33, 15.5.42. Mitigation measures were provided in 15.6.10. It is also proposed to intake water from the River Liffey for cooling water and provide a screen at the intake point. This could result in the potential entrainment and impingement of fish and other aquatic life. However, invertebrate and flora species diversity in the area of the intake was low and thus impingement impacts were not expected to be significant, sections 15.5.36 to 15.5.38 and 15.5.43). Mitigation measures are provided in 15.6.13, 15.6.14.

There is the potential for the reduction in estuarine and marine ecology which would have the potential to effect on commercial fish, section 15.5.38. However, as the impact of the proposed development is not expected to be significant, the effect on this aspect of human beings is not considered significant.

6.13 Architectural Heritage, archaeology and cultural heritage

A baseline desk top architectural heritage, archaeology and cultural heritage was undertaken.

There is the potential during construction, specifically during soil stripping and excavation, for possible archaeological features to be disturbed. However, it is proposed for a qualified archaeologist to be present during soil stripping and excavations and all possible identified archaeological features will be logged.

6.14 Material Assets

The impacts on material assets were assessed in chapter 17. The indirect impact on human beings in relation to property values was assessed in 17.4.8 and 17.4.9. Other indirect impacts include the significant impact in reducing the demand for landfill capacity, section 17.4.19.

6.15 Overall Cumulative Impact of the development

The overall cumulative impact of the development is summarised in the non technical summary section 1.21.11, which relates to negative impacts and in section 17.6 in relation to positive impacts.

1.21.11 It is concluded that the proposed Dublin WtE facility if designed, constructed and operated in accordance with this EIS will not have a significant impact on the environment.

17.6.1 The two principal residual impacts from the Dublin WtE facility are the reduction in the volume of municipal, industrial and commercial waste to be landfilled in the greater Dublin area, and the supply of 60MW of electricity to the national grid. Where the above mitigation measures are put in place, no residual impacts are anticipated to result from either the construction or operational phases of the proposed development.

17.6.2 When district heating is developed, heating will be supplied to selected residential and commercial properties in the area.

7. CONCLUSION

In conclusion, the significant cumulative impacts, indirect impacts and interactions of effects are fully addressed in the EIS. The approach adopted in the EIS, where the cumulative and indirect impacts

and interaction of impacts were presented in the chapters which address the most relevant environmental media and aspect of the project, is in compliance with the recommendations of both the EPA and EU Guidelines.