

Proposed Waste to Energy Facility at Pigeon House Road, Poolbeg Peninsula

Brief of Evidence: Public Health

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Contents

1	Community Health	4
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References

1 Witness

Andrew Buroni

- 1.1 I am a Senior Consultant at RPS, responsible for coordinating Health Impact Assessment services, based in Brighton. I hold a BSc with honours in Biological Sciences, an MSc in Environmental Impact Assessment and awaiting the finalisation of my PhD in international Health Impact Assessment methods and best practice.
- 1.2 I am a Fellow of the Royal Society for the Promotion of Health and an Associate Member of International Environmental Management and Assessment.
- 1.3 I have been formally trained in HIA through the International Health Impact Assessment Consortium (IMPACT) and Environmental Health Impact Assessment at the Caribbean Environmental Health Institute (CEHI) by the Pan American Health Organisation (PAHO) and Health Canada.
- 1.4 My background in health and environmental assessment has allowed me to design and coordinate a series of high profile HIA and integrated assessments, including:
- provision of HIA services for the Rufford Energy from Waste Facility;
 - provision of HIA services for the Runcorn Energy from Waste Facility;
 - HIA of a Waste to Energy Facility in Exeter;
 - provision of HIA services to London City Airport;
 - provision of HIA services to the UK Highways Agency;
 - HIA of expansion at Stansted Airport;
 - HIA of the 2012 London Olympic Games and their Legacy;
 - HIA of the Aire Valley Leeds Regeneration Programme;
 - HIA of the London Low Emission Zone;
 - HIA of the Tees Valley Metro;
 - HIA of the Durham Waste Strategy;
 - Integrated Appraisal of the London Sub Regional Development Frameworks; and
 - Integrated Environmental, Social and Health Impact Assessments (ESHIA) in Sakhalin, Salym, Kazakhstan, Angola, Ghana and the Arctic.

2 Community Health

General Response

- 2.1 A number of concerns have been raised during the consultation phase of the Environmental Impact Statement (EIS) for the proposed Facility. Key concerns reflect that health effects have not been adequately considered and that a Health Impact Assessment is required.
- 2.2 Firstly, it is important to emphasise that the founding principle and purpose of Environmental Impact Assessment (EIA) is to investigate potential environmental effects that may pose a risk to health. As per the requirements of the European Commission EIA and Waste Incineration Directives, each technical specialist area of the EIS assesses potential environmental effects against national and international guidance set to protect health.
- 2.3 To clarify:
- air quality (construction, operation and cumulative effects) has been modelled and assessed in terms of potential community exposure and the worst case risk has been assessed against guidance set to protect health^{1 2 3};
 - associated road traffic movements have been assessed in terms of community disruption (i.e. capacity) and air quality objectives set to protect health⁴;
 - noise and vibration have been assessed in terms of community exposure, subsequent annoyance and guidance set to protect health⁵;
 - soils, geology and groundwater have been assessed for potential contaminant mobilisation and community exposure that may pose a risk to community health⁶;

¹ WHO (2005). Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update. Summary of risk assessment.

² Waste Incineration Directive 2000/76/EC of the European Parliament and of the Council of the European Union.

³ EIS Chap 8, App 8, App 13.1

⁴ EIS Chap 7 & 8

⁵ EIS Chap 9 App 9

⁶ EIS Chap 11 App 11.

- terrestrial ecology has been assessed in terms of impacts to local fauna, flora and areas of conservational value for local communities ⁷;
 - marine and estuarine ecology have been assessed in terms of potential impacts on local ecology, risk of contamination of food stocks and subsequent risk to health⁸;
 - the assessment of material assets has been conducted to determine the potential effect on local community resources important to health ⁹; and
 - climate change has been assessed in terms of the release of green house gasses for comparison with the alternatives of Landfill and Anaerobic Digestion¹⁰.
- 2.4 The Human Being section addresses remaining issues unique to the site and areas of key concern such as potential community exposure to dioxins and furans, socio economic outcomes, relative community sensitivity and a review of appropriate literature.
- 2.5 In light of its scope, it is not appropriate to criticise the EIS for failing to address health issues that are inherently assessed within each of the specialist topic areas to national and international standards.
- 2.6 With regards to the requirement for Health Impact Assessment (HIA), it is important to note that HIA is an emerging field, and that the preparation of a HIA is not a statutory requirement.
- 2.7 Although guidance and a generic HIA process exists, the methods employed in HIA are often tailored to meet the particular assessment requirements of a project. In the case of the proposed Facility, the following approach would be appropriate:
- a) establish potential health pathways through a review of construction and operational activities,
 - b) establish a community profile, identifying existing burdens of health, inequality and community sensitivity;
 - c) engage with local communities to identify concerns, perceived risk and identify community needs;

⁷ EIS Chap 14 App 14.

⁸ EIS Chap 15 App 15.

⁹ EIS Chap 17.

¹⁰ EIS Chap 8, App 8.

- d) assess and appraise potential health outcomes applying an appropriate evidence base and the use of technical outputs to ensure accurate and robust conclusions and recommendations;
- e) develop recommendations geared to minimise harm and maximise health improvement opportunities; and
- f) to feed back outputs to inform and alleviate community concerns.

2.8 All of these stages have been performed as part of the EIS:

- a) the EIS provides a detailed breakdown of construction and operational activities¹¹ with the potential to influence environment and health;
- b) a community profile indicates existing health burden, inequality and local sensitivity to specific health pathways¹²;
- c) community concerns have been recorded and applied to guide the assessment and develop more effective environmental and health mitigation and health improvement measures during construction, operation and through the Community Gain Fund¹³;
- d) an independent Community Interest Group was established to support community consultation and further discuss potential community and health issues¹⁴;
- e) a detailed literature review has been prepared by an internationally recognised toxicologist¹⁵;
- f) the EIS provides detailed modelling of a wide range of potential environmental risks to health and is consistently conservative in its assessment to guidance levels set to protect health¹⁶;
- g) the EIS provides a series of mitigation intended to reduce environmental impacts with the potential to impact and disrupt local communities during both construction and operation¹⁷;

¹¹ EIS Chap 18 and Chap 5.

¹² EIS Chap 13 & App 13.4.

¹³ EIS App 2.

¹⁴ EIS App 2.

¹⁵ EIS App13.3.

¹⁶ Waste Incineration Directive 2000/76/EC of the European Parliament and of the Council of the European Union.

¹⁷ EIS Chap 21.

- h) the EIS, non technical summary and all of the technical appendices have been made publicly available to aid in reducing and removing community concerns and anxiety; and
 - i) additional open days, presentations, community engagement programmes and publications (Waste Wise) have been provided throughout the process to provide communities with the latest developments and answer specific concerns.
- 2.9 Although a Health Impact Assessment may be desirable in further interpreting the EIS, applying the current evidence base and modelled technical outputs the conclusion is not anticipated to change, that the proposed facility does not constitute a significant risk to health, although it would provide an alternative approach for reaching this conclusion.
- 2.10 Such a conclusion is in keeping with the current evidence base of potential health effects from modern waste to energy facilities provided within the EIS and further supported by the UK Health Protection Agency in their Position Statement for Municipal Waste Incineration¹⁸.
- 2.11 The following section has been prepared to further clarify this section, to address remaining perceived risks and to address commonly raised community concerns.

Response to Specific Comments

Air quality

- 2.12 A number of concerns have been raised regarding the perceived adverse health effect as a result of emissions from the proposed facility emissions.
- 2.13 The air quality section of the EIS provides detailed air dispersion modelling and applies a consistently conservative approach to assess potential exposure and risk to health.
- 2.14 The modelling results indicate that ambient ground level concentrations for all modelled emissions will be below the relevant air quality standards set for the protection of health.
- 2.15 Risk from potential exposure to Dioxins and Furans are a frequently raised health concern. However, detailed air quality modelling coupled with a proven health risk assessment method applied within the EIS, indicates that potential community exposure and worst case risk is not considered significant.
- 2.16 To clarify, the worst-case exposure assumes that individuals spend 16 hours a day, 7 days a week, 50 weeks a year outdoors in an area of maximum possible emission concentration

¹⁸ Health protection Agency. (2005). Municipal Solid Waste Incineration Position Statement. Available at http://www.hpa.org.uk/chemicals/ippc/incineration_posn_statement.pdf last accessed April 2007.

(which happens to be out to sea) and eat vegetables also grown in the highest possible emission concentration for an average lifetime of approximately 70 years. The model therefore calculates the worst possible case of Dioxins and Furan inhalation, ingestion and absorption through skin contact.

- 2.17 Considering this highly conservative hypothetical exposure, background levels remain significantly below the European Community Tolerable Weekly Intake (EC TWI) level for Dioxins and Furans¹⁹.
- 2.18 It is also important to consider that the EC TWI is also conservative in nature and provides an inherent safety factor²⁰. As such, and as detailed in the EIS, the worst case and cumulative exposure will be significantly below guidance levels and is not considered to be significant.
- 2.19 Such a conclusion is in keeping with the current evidence base of potential health effects from modern waste to energy facilities provided within the EIS.
- 2.20 The potential health effects of particulate matter of 10 and 2.5 microns in diameter, has been raised as a common area of community concern. As previously discussed, particulate matter is not anticipated to exceed guidance levels set to protect health and potential worst case exposure to changes in concentration are not of a level to quantify any meaningful health effect²¹.
- 2.21 The number of ultra fine particles in air has been subject to research in recent years, following suggestions that such particles may in particular be involved in the cardiovascular effects often seen to be associated with general particulate matter. However, there is insufficient research to draw an exposure response mechanism to this particular fraction of particulate matter²². It is also important to note that ultra fine particles are inherently unstable in the atmosphere because they coagulate quickly.

¹⁹ European Commission Health & Consumer Protection Directorate-General Scientific Committee on Food (2001). Opinion of the Scientific Committee on Food on the risk assessment of dioxins and dioxin-like PCBs in food. Adopted 30 May. Available at http://ec.europa.eu/food/fs/sc/scf/out90_en.pdf Last Accessed April 2007.

²⁰ David Byrne (2001) European Commissioner for Health and Consumer Protection Address at the Fisheries Committee of the European Parliament Committee on Fisheries Brussels, 10 July 2001. Available from <http://www.foodlaw.rdg.ac.uk/eu/doc-31.htm> last accessed April 2007.

²¹ Department of Health. Committee on the Medical Effects of Air Pollutants available at <http://www.advisorybodies.doh.gov.uk/comeap/index.htm> last accessed April 2007.

²² World Health Organisation. (2003). Health Aspects of Air Pollution with Particulate Matter, Ozone and Nitrogen Dioxide. Report on a WHO Working Group. Bonn, Germany.

- 2.22 With the current inability to distinguish health effects of this particular fraction from other particulate matter, the assessment of risk from ultra fine particulates currently falls within the assessment of coarse (PM10) and fine (PM2.5) particulate matter.
- 2.23 Considering that the detailed air quality dispersion modelling conducted within the EIS indicates that annual contributions of both coarse and fine particulate matter are not significant, disperse predominantly away from residential areas and total predicted ambient air quality will fall significantly below guidance levels set to protect health, potential risk to health is not perceived to be significant.
- 2.24 Furthermore, when considering potential risk from the proposed facility, it is important to note that motor vehicles are viewed as the main contributor to particulate matter pollution levels in Dublin city (85%) with industry being equal to residential heating systems (7%)²³. The proposed Facility is not expected to materially alter this situation.
- 2.25 In addition to general emissions to air, the Community Interest Group and local residents have raised specific concerns of odour due to current issues with the sewage treatment plant. The proposed Facility will store and handle all waste deliveries within the facility working in a negative pressure environment. The negative pressure is maintained through an air system that draws Facility air into the waste treatment process. As a consequence, odour emissions are contained within the proposed Facility and unlikely to present a risk of community annoyance.

Community Sensitivity

- 2.26 The community profile within the EIS indicates that local communities are exhibiting socio economic health improvements following local regeneration efforts. However, pockets of economic deprivation and subsequent health inequality exist within relatively small geographic areas.
- 2.27 It is important to note that the existing burdens of poor health within such small geographic areas are not necessarily a symptom of a poor quality environment, but more a symptom of relative socio economic status and lifestyle²⁴. This is a generally accepted phenomenon²⁵.

²³ Local City Report. Health Impact Assessment of Air Pollution. ENHIS-1 Project:WP5 Health Impact Assessment. Dublin.

²⁴ EIS APP 13.4 page 14 para 3.

²⁵ Wardle, J. and Jarvis, M.J. and Steggles, N. and Sutton, S. and Williamson, S. and Farrimond, H. and Cartwright, M. and Simon, A.E. (2003) Socioeconomic disparities in cancer-risk behaviours in adolescence:

2.28 Local communities therefore exhibit sensitivity to environmental and economic effects, but it is important to note that such communities are equally sensitive to health gains brought about through socio economic improvements from the proposed Facility (direct and indirect employment opportunities) and significant improvements in Social Capital and other initiatives through the Community Gain Fund.

Cumulative Effects

2.29 Cumulative effects have been considered throughout the EIS:

- air quality has been assessed by factoring in existing ambient air quality, neighbouring industrial facilities, existing and future road vehicle emissions;
- the dioxin and furan exposure risk assessment factors in the existing background level from wider sources; and
- traffic modelling factors in existing and predicted traffic movements, for the with and without the facility scenarios.

Health Risk from Road Transport Emissions

2.30 A number of community concerns have been raised regarding emissions from vehicles delivering waste to the proposed Facility. Firstly, it is important to consider that the proposed Facility will not generate additional vehicle movements, as such waste will continue to require collection and transportation to waste management facilities.

2.31 The proposed Facility therefore presents a redistribution of vehicle movements to the proposed site and a potential reduction in overall road vehicle kilometres due to the reduction of waste required to be transported to landfill.

2.32 As documented within the EIS ²⁶, the redistribution of road vehicle movements is not anticipated to significantly influence local air quality and will remain within guidance levels set to protect health.

Residual Waste Management and Health Risk

baseline results from the Health and Behaviour in Teenagers Study (HABITS). Preventive Medicine, 36 (6). pp. 721-730. ISSN 00917435

²⁶ EIS Chap 8 Table 8.10.

- 2.33 A number of concerns have been raised regarding residual waste reflecting that the more efficient the filtering process the more hazardous the residual waste.
- 2.34 In essence this is true, and the reason why such stringent measures and a duty of care is required for all aspects of the waste management process including the transportation and reuse of residual waste materials. As such, the proposed facility will ensure that all residual wastes leaving the site follow strict measures to prevent environmental and health risk and reuse of residual waste does not constitute an environmental or health risk.

Perceived Risk

- 2.35 From a review of the catalogue of local community and Community Interest Group comments, it is clear that local communities express a great deal of concern as to perceived environmental risks to health. However, in reality the actual risks to health are minimal and where they do exist, they are not necessarily in line with community priorities or perceptions.
- 2.36 Construction of the proposed Facility presents a number of potential health pathways. However, when considering the level of emissions generated on site, their intermittent nature / duration and minimal opportunity for community exposure, the risk to community health is not significant and will be further mitigated through a Construction Environmental Management Plan.
- 2.37 Once operational, the core community concern is risk from a number of compounds emitted to air. Defining the potential risk to health is ultimately dependent upon the concentration of compounds emitted and the level, mode and extent of community exposure.
- 2.38 As detailed within the EIS, the air dispersion modelling indicates that:
- the proposed Facility will meet or improve upon all environmental emission concentration standards set to protect health ²⁷;
 - worst case cumulative effects are not significant ²⁸;
 - emission dispersion and deposition falls predominantly away from local communities; and
 - health risk from a lifetime of combined inhalation, ingestion and skin contact of possible worst case scenarios for residual emissions of the flue gas treatment does not pose a significant risk.

²⁷ EIS Chap 8 Table 8.7.

²⁸ EIS Chap 8.4.

- 2.39 Potentially the most significant health risk associated with the proposed Facility is the increase in local road vehicle movements to deliver waste and transport staff during both the operation and construction stages. However, the significance of potential health effects again reflects the increased level of community exposure to emission concentrations. As demonstrated in the EIS ²⁹, facility road traffic contributions are not considered to be significant, being similar to or lower than existing levels of PM, NO₂ and benzene and are too small to result in any meaningful change in health effect.
- 2.40 In contrast health benefits of the facility include moderate yet important improvements through potential employment opportunities, the provision of future district heating (reduction of dioxins and particulate matter produced in coal / wood fired heating), complementing local regeneration efforts and more importantly, the provision of a Community Gain Fund.
- 2.41 Although potentially controversial, the Community Gain Fund presents the most significant health effect from the proposed Facility. This is the case as the fund represents targeted action to support the City Council in addressing existing social and health issues, further develop social capital and improving the health and wellbeing of residents in some of the city's most deprived areas.
- 2.42 Further, in light of the fact that modelling of the worst-case environmental risk from construction and operation of the proposed Facility is not significant and that actual exposure to operational emissions will be well below that applied within the risk assessments (residual emissions will disperse predominantly east away from local communities), it is unlikely that the proposed Facility will have any measurable negative health effect on local communities.
- 2.43 Addressing perceptions of health risk are complex with numerous variables at the community and individual level. The key method of addressing community perceptions is through the factual investigation and dissemination of environmental and health effects.
- 2.44 The EIS constitutes a formal planning requirement to ensure that the proposed development will not constitute a significant risk to environment and health. However, it is also important to note that the EIS, Non-Technical Summary and all technical appendices are public documents intended to inform communities and aid in alleviating perceived risks.

Hazard and Risk

- 2.45 The majority of community concerns raised, reflect a level of misunderstanding of the concepts of hazard and risk, and an inappropriate application of the existing evidence base.

²⁹ EIS Chap 8 Table 8.10.

2.46 To clarify, hazard is the potential to cause harm while risk is the likelihood of harm. It is important to distinguish the two when assessing health effects, as agents of relatively low hazard can present substantial risk, while conversely an agent with a high hazard might present no measurable risk in certain circumstances.

2.47 Ultimately, it is concentration exposure that defines the level of risk; this is true of all elements, molecules and biological agents. Although health hazards from facility and associated transport emissions have been raised, the potential exposure concentrations are not of a level to constitute a significant risk to health. The same point was made by the UK Health Protection Agency in their response to the British Society for Ecological Medicine. Here, they stated that:

*'the HPA maintains its position that contemporary and effectively managed and regulated waste incineration processes contribute little to the concentrations of monitored pollutants in ambient air and that the emissions from such plants have little effect on health'*³⁰.

Comparative Risk

2.48 When considering potential risk it is often useful to set such risk in context to gain a better understanding as to the likelihood and significance of health effects.

2.49 In the case of dioxins and furans, it is important to note that we are exposed to a wide range of dioxin sources. However, with respect to thermal treatment of waste, it is notable that in the last ten years, new waste to energy facilities have exhibited a quantum leap in reducing such emissions^{31 32}. This is illustrated by the fact that in 1990, a third of all dioxin emissions in Germany came from waste incineration plants whereas for the year 2000, the figure was less than 1%. Nowadays, chimneys and tiled stoves in private households alone discharge

³⁰ Health Protection Agency. (November 2005). HPA Response to the British Society for Ecological Medicine Report. Chemical Hazards and Position Division. Available from <http://www.ecomed.org.uk/content/IncineratorHPA.pdf> last accessed April 2007.

³¹ Zurcher M, Prof Brunner & Prof Burtcher (2001). Ultra Fine Particulate Emissions from Municipal Solid Waste Incineration. Institute for applied environmental technologies, University of Rapperswil Switzerland & the Institute for Signals and Sensors, University of Aargau. Bamberg. Germany

³² DEFRA, ENVIROS, University of Birmingham. (2004). Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes.

approximately twenty times more dioxins into the environment than waste emission plants³³
³⁴.

- 2.50 Such a trend has also been exhibited in the US, where US EPA data clearly show that industry and regulatory controls on waste incineration have resulted in a significantly lower contribution of dioxins and furans from these sources since 1987³⁵, and that unregulated sources such as backyard barrel burning of garbage and residential wood burning are rising in significance as key contributors to these emissions³⁶. Importantly, because of proximity, individual exposure to these sources is likely to prove a far greater risk than exposure to controlled emissions from a Waste to Energy Facility.
- 2.51 To set in context the associated risk of the proposed Facility, a study by the French environmental campaigning group Robin des Bois found that a typical two-hour barbecue can release 12-22 nanogram of dioxins into the atmosphere³⁷.
- 2.52 The researchers also found that the average air concentrations of dioxins in the vicinity of the barbecue ranged from 0.6 to 0.7 nanogram per cubic metre. Such concentrations are up to seven times higher than the EU maximum concentration level authorised for release from a waste to energy facility over a 6-8 hour period³⁸.

Conclusion

³³ Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Waste incineration – a potential danger? Bidding farewell to dioxin spouting. September 2005, translated from the original German version, published in July 2005. Page 3. Available from www.bmu.de/english/waste_management/downloads/doc/35950.php last accessed April 2007.

³⁴ Ella Stengler. (November/December 2005). Waste Management World The European position. Where is waste-to-energy, and where is it going? Available from http://www.wte.org/docs/CEWEP_WTE_Europe_2005.pdf last accessed April 2007.

³⁵ A Comparison of Dioxin Risk Characterizations. (May 2002). The Chlorine Chemistry Council®. Page 16. Available at http://www.dioxinfacts.org/dioxin_health/public_policy/dr.pdf Last Accessed April 2007

³⁶ A Comparison of Dioxin Risk Characterizations. (May 2002). The Chlorine Chemistry Council®. Page 17- 18 Fig 8-9. Available at http://www.dioxinfacts.org/dioxin_health/public_policy/dr.pdf Last Accessed April 2007

³⁷ BBC. (2003). Barbecue Cancer Warning. Available from <http://news.bbc.co.uk/1/hi/health/3106039.stm> Last Accessed

³⁸ Western Daily Press. (2003). Having a BBQ could increase cancer risk. Available from http://www.accessmylibrary.com/comsite5/bin/pdinventory.pl?pdlanding=1&referid=2930&purchase_type=ITM&item_id=0286-23990556 last accessed April 2007.

2.53 Overall, having reviewed the EIS, together with the extensive community engagement programme, it is my opinion that the EIS constitutes a thorough investigation as to the potential health effects of the proposed Facility. Furthermore, although a formal HIA may be desirable from a practitioner perspective, it would add little to the evidence base or community understanding of the issues associated with the proposed Facility.