



Report and recommendations of the Environmental Protection Authority



Port Hedland Waste to Energy and Materials Recovery Facility, Boodarie Industrial Estate, Port Hedland

New Energy Corporation Pty Ltd

Report 1469

April 2013

Public Environmental Review Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
10/10/2011	Level of assessment set	
30/03/2012	Final ESD approved	25 weeks
13/08/2012	Environmental Review Document (ERD) released for public review	19 weeks
10/09/2012	Public review period for ERD closed	4 weeks
15/03/2013	Final information required for assessment received from Proponent	27 weeks
8/04/2013	Publication of EPA report	4 weeks
22/04/2013	Close of appeals period	2 weeks

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

In this case, the Environmental Protection Authority met its timeline objective in the completion of the assessment and provision of a report to the Minister.



Dr Paul Vogel
Chairman

3 April 2013

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by New Energy Corporation Pty Ltd (New Energy), to build and operate a Waste-to-Energy (WtE) and Materials Recovery Facility (MRF) at the Boodarie Strategic Industrial Area, Port Hedland.

The proposed facility would accept various wastes, recover materials that can be economically recycled via the MRF and convert suitable remaining waste to electrical power in a WtE plant.

The proposal is being formally assessed as no plants using the proposed technology currently exist in Western Australia.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides other advice by the EPA and Section 6 presents the EPA's recommendations.

Appendix 6 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

Strategic advice on WtE technologies

At the request of the Minister for Environment, the EPA and the Waste Authority have recently undertaken and released their strategic review on 'Environmental and Health Performance of Waste to Energy Technologies' (EPA, 2013) under section 16(e) of the *Environmental Protection Act 1986* (EP Act). This strategic review is available on the EPA's website.

In this review, the EPA concluded that it has been demonstrated internationally that modern WtE plants can operate within strict emission standards with acceptable environmental and health impacts to the community when a plant is well designed and operated using best practice technologies and processes.

The EPA supports the establishment of WtE plants in Western Australia subject to a number of principles which are outlined in the EPA's section 16(e) advice.

Waste management in the Pilbara

Waste management in the Pilbara has struggled to keep up with the pressure associated with the rapid expansion of mining and oil and gas developments, and the Pilbara landfills have seen significant increases in the amount waste being received.

Currently, the Pilbara is serviced by small unlined landfills. Little recycling is undertaken, with the majority of recyclables landfilled due to the distance to viable markets. Being unlined, there is also no recovery of landfill gas or energy, resulting in emissions of the greenhouse gas methane.

Some landfills are also subject to urban encroachment resulting in impacts to amenity through windblown litter, dust and odour.

The absence of best practice lined landfills has necessitated some companies transporting waste from the Pilbara to Perth for disposal.

2. The proposal

The proposal is situated in the Boodarie Strategic Industrial Area, Port Hedland (Figure 1 and Figure 2).

The proposal incorporates a MRF and WtE plant. The MRF would be used to separate recyclables and remove incompatible materials from the waste stream. The WtE plant would consist of gasifiers, gas storage, gas burner, heat exchanger and a steam generation unit, a steam turbine and air quality control system (AQCS). A continuous emissions monitoring system (CEMS) would monitor various air emissions. Other facilities include shredders, an evaporation pond, store rooms, a maintenance workshop, and administration buildings.

New Energy are proposing to use Entech gasification technology. Entech was established in 1990 and Entech gasification systems have been installed in a large number of plants around the world but generally at smaller capacity. These plants are located mainly in Asia, although the latest plant is in Poland and was commissioned in September 2012.

It should be noted that the Entech proprietary technology relates to the gasifier, burner and computer process control system. Other components such as the heat exchanger, boiler, generation plant and scrubber system are robust well proven technologies, and would be provided by other vendors.

There would be four gasifiers operating plus one spare to allow for maintenance. Each gasifier would be sized at 18 megawatts thermal capacity, giving a total of 72 megawatts. This would produce 18.5 megawatts of electricity, of which 15.5 megawatts would be available for export to the grid. The amount of waste required to feed the gasifiers depends on the calorific value of the waste, but would be a maximum of 205 000 tonnes per annum at lower calorific values. However, the total waste received at the facility could be up to 255 000 tonnes per annum, which after recovering recyclables would provide the 205 000 tonnes per annum for the gasifier feed.

Waste types that would be accepted at the facility include:

- construction and demolition (C&D) waste;
- commercial and industrial (C&I) waste;
- metropolitan solid waste (MSW);
- waste tyres and conveyor belts;
- green waste; and
- small quantities of liquid waste (mainly waste oils and oily waters).

Note: Only wastes with heavy metal concentrations up to Class III as defined in *Landfill Waste Classification and Waste Definition (As amended December 2009)* (DEC, 2009) would be accepted.

The facility would not accept hazardous waste such as:

- wastes with heavy metal concentrations greater than the requirements for a Class III landfill;
- ‘Scheduled’ wastes such as polychlorinated biphenyls (PCBs) and organochlorines;
- medical waste (bio-hazardous waste);
- asbestos;
- highly corrosive or toxic liquids or gases (such as strong acids or chlorine or fluorine);
- radioactive waste; and
- explosives.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 5 of the PER (New Energy, 2012).

Table 1: Summary of key proposal characteristics

Summary of the Proposal

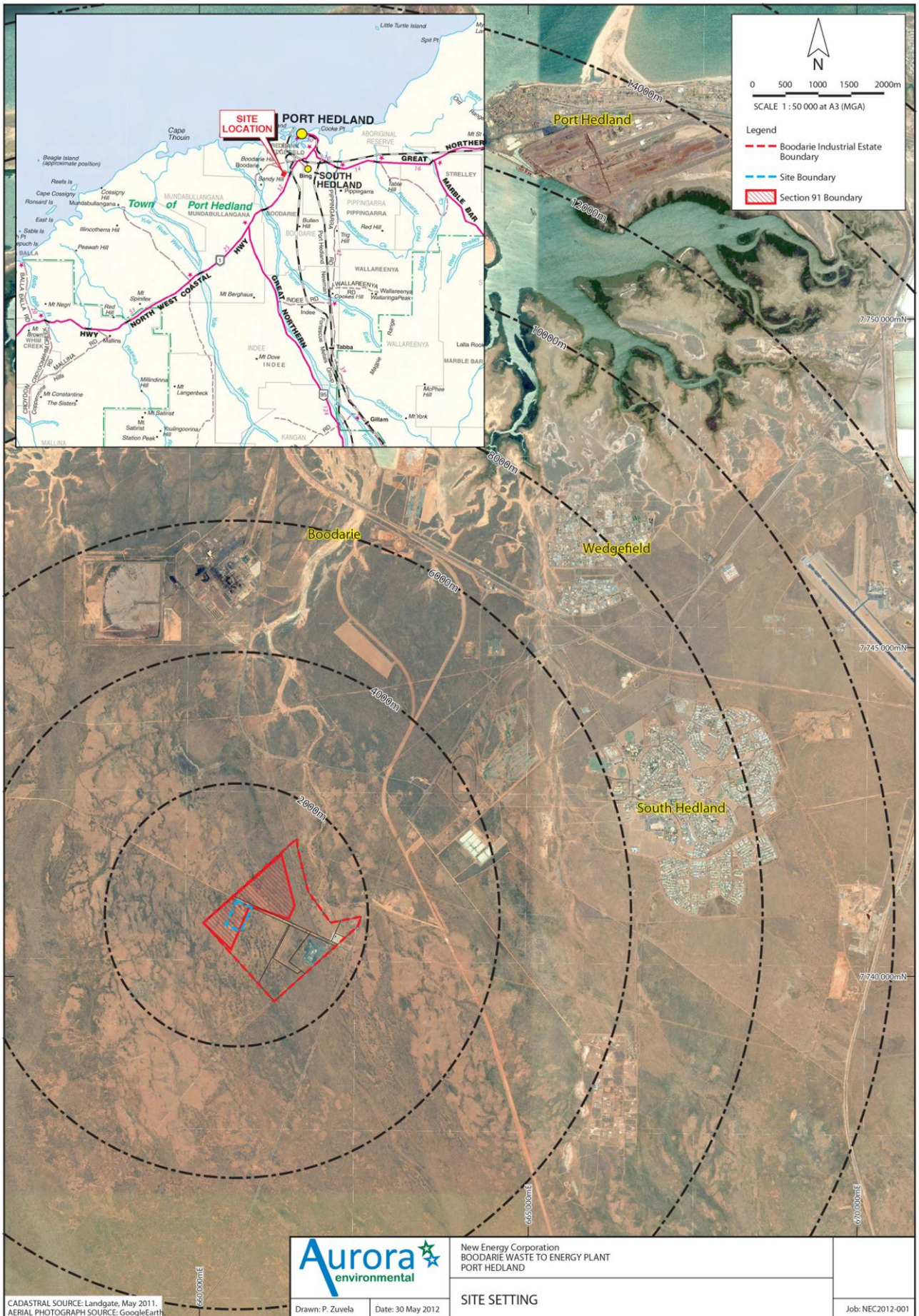
Proposal Title	Boodarie Waste-to-Energy and Materials Recovery Facility, Port Hedland
Short Description	A waste management facility comprising: <ul style="list-style-type: none"> • a material recovery facility; • shredders; • five gasification modules, each with a capacity of 18 MW (thermal); • heat exchanger, boiler, steam turbine and pollution control system; • an evaporation pond; and • associated infrastructure.

Physical Elements

Physical Element	Location	Description
Waste-to-Energy and Materials Recovery Facility and associated infrastructure	Boodarie (See Figure 1)	Clearing of up to 10 hectares of native vegetation within the development footprint.
Waste types accepted for processing: <ul style="list-style-type: none"> • Municipal Solid Waste • Construction and Demolition waste • Commercial and industrial waste • Green waste • Tyres and conveyor belts 		<p>Solid waste that meets the heavy metal criteria for Class III landfill in the <i>Landfill Waste Classification and Waste Definition 1996</i> (amended 2009).</p> <p>Liquid waste that is not contaminated with excluded waste (below).</p>

<ul style="list-style-type: none"> • Waste oils • Oily water • Solvents 		
<p>Excluded wastes:</p> <ul style="list-style-type: none"> • Wastes with heavy metal concentrations greater than the requirements for Class III landfill • ‘Scheduled’ wastes such as PCBs and organochlorines • Asbestos • Highly corrosive or toxic liquids or gases such as strong acids or chlorine or fluorine • Radioactive waste • Explosives 		Not accepted.
Waste receipt volume:		Up to 255 000 tonnes per annum.
On-site liquid storage:	Within development envelope (Figure 2)	Up to 24 hours only .

The potential impacts of the proposal initially predicted by the proponent in the PER document (New Energy, 2012) and their proposed management are summarised in Table 2 (Executive Summary) of the proponent’s document.



CADASTRAL SOURCE: Landgate, May 2011.
 AERIAL PHOTOGRAPH SOURCE: GoogleEarth

Aurora
 environmental

Drawn: P. Zuvela Date: 30 May 2012

New Energy Corporation
 BOODARIE WASTE TO ENERGY PLANT
 PORT HEDLAND

SITE SETTING

Job: NEC2012-001

Figure 1. Location of the proposal indicating regional context

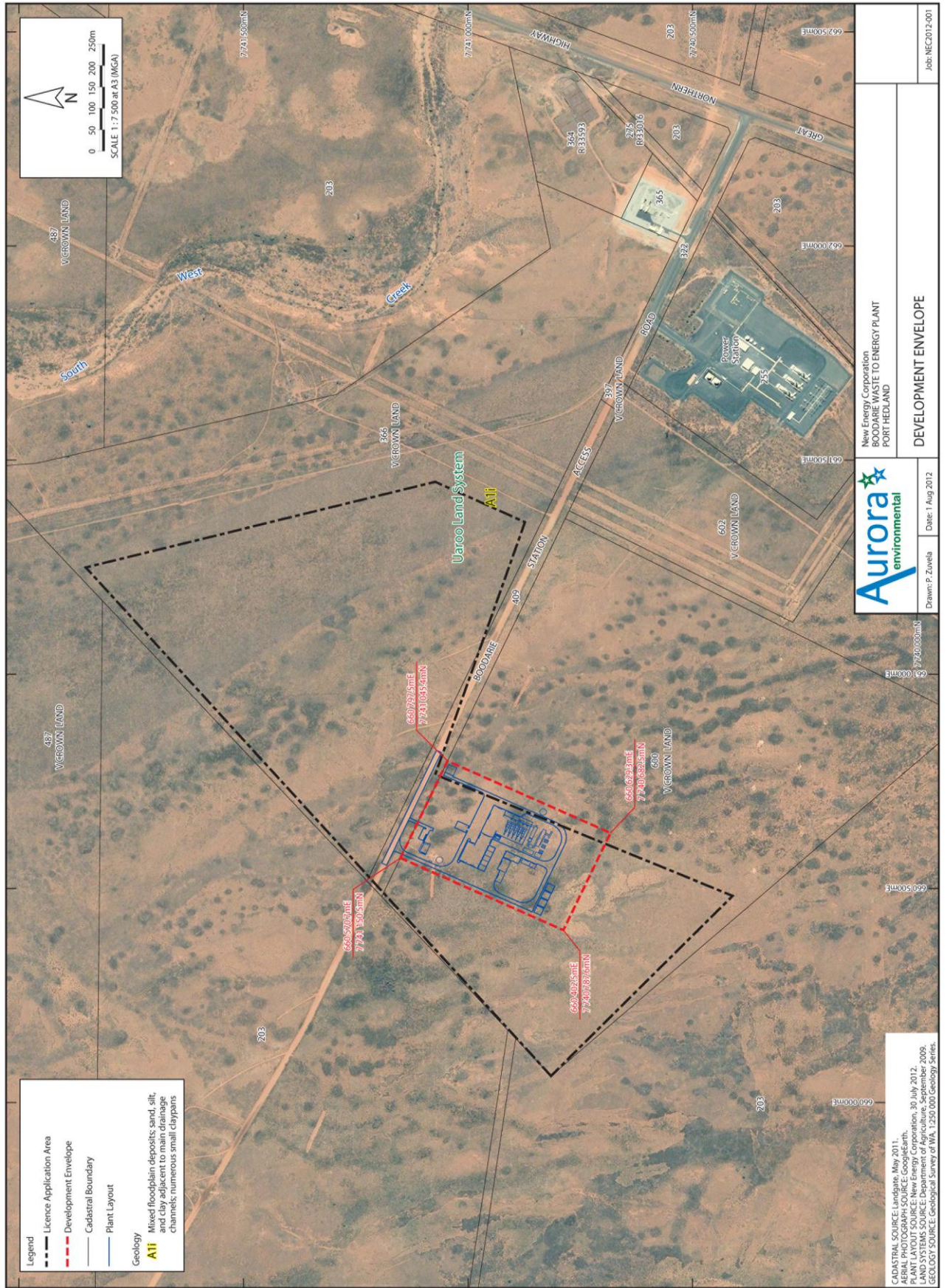


Figure 2: Development envelope

3. Key environmental factors and principles

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factor requires detailed evaluation in this report:

- (a) Air quality.

The above key factor was identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics set out in Table 1.

Details on the key environmental factor and its assessment are contained in Sections 3.1. The description of the factor shows why it is relevant to the proposal and how it will be affected by the proposal, taking into consideration environmental impact management by the proponent. The assessment of the factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) Environmental Principle 1 – the precautionary principle;
- (b) Environmental Principle 2 – the principal of intergenerational equity;
- (c) Environmental Principle 3 – the principal of the conservation of biological diversity and ecological integrity;
- (d) Environmental Principle 4 – principles related to improved valuation, pricing and incentive mechanisms, and
- (e) Environmental Principle 5 – the principle of waste minimisation.

3.1 Air quality

Description

The proposal site is in the Boodarie Strategic Industrial Area, and the nearest residence is approximately 5.5 kilometres (km) to the north west.

Air emissions

During the gasification process, and the burning of the resultant syngas, a number of air pollutants would be produced. These include oxides of nitrogen and sulphur (NO_x and SO_x), carbon monoxide, acid gases (hydrochloric and hydrofluoric acid), metals and air toxicants (for example polyaromatic hydrocarbons and chlorinated hydrocarbons). These pollutants originate from the waste feed and/or are formed during the combustion process.

Entech states that its gasification process is unique in that it provides high agitation and surface area exposure of the waste, very long retention times, and low gas velocities. Entech claims that this results in the ability to process a wide variety of waste streams, and a cleaner offgas than is generated by other WtE technologies.

In order to minimise the discharge of pollutants, the exhaust gas would pass through an AQCS prior to discharge to atmosphere. The AQCS would inject reagents to remove acid gases, metals and dioxins and a fabric bag house filter to remove particles. The gas cleaning systems, including the bag filter would be designed with 25% excess capacity so that routine maintenance can be performed without a loss in efficiency or the need to shut down the gasifiers.

A CEMS would be installed. The CEMS would predict any imminent breach of emission setpoints and would be interlocked with the control system to override normal temperature and pressure control and to adjust various process feed rates to avoid such breaches occurring. Alarm interlocks would be provided to terminate feed in the event of an emission setpoint breach. The CEMS would be provided with software to allow remote on-line posting of all emission parameters. Periodic emission monitoring of heavy metals and dioxins and furans would also be undertaken by the proponent.

New Energy state that stack emissions would comply with the emission limits in the European Union Waste Incineration Directive 2000/76 (WID), (EU 2000), and Entech guarantees that air emission concentrations would meet the WID criteria.

As part of the assessment, Entech has supplied stack emission monitoring results carried out by independent parties for a number of Entech plants. The results provided (not all substances were measured in all results) showed that the reference facilities are capable of complying with the WID emission concentration limits.

Air emissions have also been calculated for the Boodarie WtE Facility on a mass balance basis using the predicted composition of the waste. The calculations are based on factors influencing the emissions such as the partitioning of metals between gas and ash, acid gas levels generated in combustion, destruction of dioxins in the burner (and de novo formation on cooling) and removal efficiency of the scrubbing system. The resulting predictions of discharge concentration are substantially lower than the WID criteria.

The proponent has undertaken modelling of ground level concentrations which predicts cumulative ground level concentrations would not exceed any adopted criteria for human health (approved by the Department of Health), with NO_x and particulate matter being the highest compared to criteria, due mainly to existing background levels.

In order to account for variations in the feedstock, emission concentrations for a 500% spike in sulphur and halogen input were calculated. Only the hydrogen fluoride discharge approached the WID emission limit, and all other emissions remained well below. Similarly emissions for a 500% spike in heavy metals were calculated. The heavy metal discharge approached the WID limit but all other emissions remained well below.

Submissions

The Department of Environment and Conservation (DEC) raised a number of matters regarding performance of the technology, which are addressed below and in the proponent's response to submissions.

Assessment

The EPA's environmental objective for this factor is to maintain air quality for the protection of the environment and human health and amenity.

New Energy's proposed Boodarie WtE facility is at the preliminary design phase. Apart from the proprietary gasification equipment, the equipment vendors for other key components have not been selected at this time. This will occur during the detailed design stage and Engineering Procurement and Construction (EPC) process.

The EPA has therefore assessed the proposed Boodarie Waste-to-Energy and Materials Recycling Facility under Part IV of the EP Act on the basis of the preliminary design.

Technology

The EPA's strategic review of the *Environmental and Health Performance of Waste to Energy Technologies* lists matters that proponents will be expected to demonstrate in relation to the chosen technology.

The EPA notes that the Boodarie WtE facility would utilise four gasification modules, plus a fifth module to provide redundancy. These multiple modules would feed into a single heat exchanger, boiler and pollution control system.

The EPA notes that components such as heat exchangers, boilers, generation plants and air pollution control systems are robust well proven technologies For WtE facilities.

The largest Entech gasification module currently in operation is in Malaysia, sized at 14 megawatts. The proposed gasification module for the Boodarie facility is 18 megawatts, which represents a technology scale-up of 28%. Entech has advised that it has previously managed much larger scale-ups successfully, and this scale up is unlikely to present any insurmountable engineering challenges. Entech also has a facility in Singapore which incorporates two Entech gasification modules feeding into a single steam generation and air quality control system, but the Boodarie WtE facility would be the first with five modules into one steam generation and air quality control system.

Therefore, the EPA notes that while the key components of New Energy's plant (i.e. MRF, gasifier, heat exchanger, boiler, process control, steam generation plant and air quality control system) are all proven technologies with examples operating elsewhere, the size, and configuration proposed will be particular to the Boodarie plant.

As such, the EPA considers that the detailed design, Engineering Procurement and Construction (EPC) phase and, importantly, commissioning phase are most appropriately considered through the Works Approval process under Part V of the EP Act.

The DEC has provided information on the process that it will undertake during the Works Approval and Licensing of WtE facilities and this is included as Appendix 5. In particular, the EPA notes the DEC's ability to require a comprehensive commissioning plan.

The EPA considers that a staged commissioning approach should be adopted in the Works Approval whereby each gasifier is commissioned individually, then two in parallel, then three, then four. Emission performance should be demonstrated at each stage prior to proceeding to the next stage. The operating Licence should not be issued until it has been demonstrated that the plant can operate as claimed.

Emission standards

The EPA's strategic review of the *Environmental and Health Performance of Waste to Energy Technologies* identifies the European Union Waste Incineration Directive 2000/76 (WID), (EU 2000) as the appropriate standard for WtE facilities in Western Australia.

The EPA notes that gasification technology (as opposed to combustion) offers the potential for emissions at much lower concentrations than the limits in the WID, and considers that for these emissions it is appropriate to set targets lower than those in the WID.

While noting that the main stack emissions would be monitored continuously, the EPA considers that during the initial operation of the plant (minimum of two years following receipt of Certificate of Practical Completion), more frequent testing should be required for those emissions that are not continuously monitored (e.g. heavy metals, dioxins and furans).

The EPA notes that under Part V of the EP Act, the DEC can specify in the Works Approval that the plant be constructed to meet the requirements of the WID. The DEC can also specify stack emission limits as it deems appropriate in the operating Licence.

The EPA considers that the Works Approval and Licensing process under Part V of the EP Act are the appropriate regulatory mechanisms to specify the emission limits and monitoring criteria for the Boodarie WtE facility.

Energy efficiency

The Boodarie WtE facility would have an overall energy efficiency of approximately 24% (i.e. the percentage of electrical power exported to calorific energy input). This is reasonable for a gasification plant. The EPA notes that the plant would satisfy the European Union Best Available Technology - Energy Efficiency Regulation (EU, 2005).

Waste tyres and conveyor belts

The EPA notes that there are potential issues that could arise if large quantities of tyres or conveyor belts are processed. This is because tyres contain up to 2% zinc oxide (from the vulcanisation process). Zinc oxide particles are very small (nanoparticles), and the EPA considers that it would be prudent to check the efficiency of the air pollution control system in removing these zinc oxide particles prior to allowing large quantities of tyres or conveyor belts to be processed.

Advice to the DEC

Since the Part IV assessment has been based on the preliminary design, the EPA considers that the DEC's Works Approval and Licensing process under Part V of the EP Act will be critical to ensuring acceptable performance of the plant. To assist in this process, the EPA provides the following advice and recommendations to the DEC:

- The WID (and future updates) is the appropriate standard for the Boodarie WtE facility.
- The stack emission limits should be set consistent with the WID, or lower for those emissions where gasification can achieve significantly better performance.
- A staged commissioning approach should be adopted in the Works Approval whereby each gasifier is commissioned individually, then two in parallel etc. Emission performance should be demonstrated at each stage prior to proceeding to the next stage.
- The operating Licence should specify those parameters which should be continuously monitored.
- During the initial operation of the plant (minimum of two years following receipt of Certificate of Practical Completion), more frequent testing

should be required for those emissions that are not continuously monitored (e.g. heavy metals, dioxins and furans).

- The proponent should be required to demonstrate through trials and monitoring that the air pollution control system can effectively deal with zinc oxide particles prior to large numbers of tyres and/or conveyor belts being processed.

Summary

New Energy's proposed Boodarie WtE and MRF plant is at the preliminary design phase.

While the key components of New Energy's facility (i.e. MRF, gasifier, heat exchanger, boiler, process control, steam generation plant and air quality control system) are all proven technologies with examples operating elsewhere, the size, and configuration proposed will be particular to the Boodarie WtE plant.

The EPA has therefore assessed the proposed Boodarie Waste-to-Energy and Materials Recycling Facility under Part IV of the EP Act on the basis of the preliminary design. Having particular regard to the:

- front end MRF to remove incompatibles and sort waste streams;
- ability to inspect and blend waste streams;
- redundancy in the design (four gasifiers plus one backup);
- claimed plant performance meeting the emission limits in the WID;
- numerical modelling undertaken which predicts that ground level concentrations of emissions will meet the appropriate criteria at sensitive receptors;
- continuous emission monitoring system;
- large separation distance to sensitive receptors (5.5 km);
- ability of the Works Approval under Part V of the EP Act to ensure a rigorous and staged commissioning process;
- enforcement provisions available under Part V of the EP Act; and
- the EPA's advice to the DEC,

it is the EPA's opinion that its objective for air quality can be met provided that the facility meets, or performs better than the WID or its updates at commissioning and throughout its operational life. A Licence should only be issued under Part V of the EP Act once the facility has demonstrated to the satisfaction of the DEC that it has met or performed better than the WID at commissioning and under all operational conditions.

3.2 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act. Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

4.1 Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by New Energy to build and operate the Boodarie WtE and MRF is approved for implementation.

These conditions are presented in Appendix 4. Since the facility would be regulated under Part V of the EP Act, the condition-set does not include any project specific conditions.

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent and the DEC in respect of matters of fact and matters of technical or implementation significance.

5. Conclusions

The New Energy Corporation's proposed Boodarie WtE plant is at the preliminary design phase. The EPA has therefore assessed the proposed Boodarie WtE and MRF under Part IV of the EP Act on the basis of the preliminary design.

In this circumstance the approval and regulation process will need to proceed cautiously through the preliminary design, detailed design, EPC phase, and importantly, commissioning phase.

The EPA considers that the Works Approval and Licensing process undertaken by the DEC under Part V of the EP Act is the most appropriate process for setting and regulating air emissions.

In regard to waste management in the Pilbara, the EPA notes that the introduction of the Boodarie WtE and MRF should significantly improve waste management by diverting waste from unlined landfills, increasing recycling rates, recovering energy, and reducing greenhouse gas emissions.

The EPA has therefore concluded that the proposal can be managed to meet the EPA's environmental objective for air quality provided there is satisfactory implementation of the EPA's recommended advice.

6. Recommendations

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is for a WtE and MRF located at the Boodarie Strategic Industrial Area, Port Hedland;
2. That the Minister considers the report on the key environmental factor and principles as set out in Section 3;
3. That the Minister notes that the EPA considers that air emissions are most appropriately managed via the Works Approval and Licence under Part V of the EP Act;
4. That the Minister notes that the EPA has concluded that it is likely that the EPA's objective for air quality can be met; and
5. That the Minister notes the EPA's advice to the DEC;
6. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

LandCorp

Department of Water

Department of Indigenous Affairs

Department of Health

Department of Environment and Conservation

Individuals:

No individual submissions

Appendix 2

References

- DEC (2009) *Landfill Waste Classification and Waste Definition (As amended December 2009)*. Department of Environment and Conservation, Government of Western Australia, December 2009.
- EPA (2013) *Environmental and Health Performance of Waste to Energy Technologies*. Report No. 1468. Environmental Protection Authority, Government of Western Australia, April 2013.
- EU (2000) European Parliament and Council of the European Union (2000) Waste Incineration Directive (WID). *Directive 2000/76/EC of the European Parliament and of the Council on the Incineration of Waste*. Official Journal of the European Communities. L332/91.
- EU (2005) European Union *Best Available Technology, Energy Efficiency Regulation* required under EUD-COM (2005), 667 final.
- New Energy (2012) Public Environmental Review: *Boodarie Waste to Energy and Materials Recovery Facility*, prepared by Aurora Environmental for New Energy Corporation Pty Ltd, August 2012.

Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Flora & fauna habitat	Clearing of 10 ha of native vegetation.	DEC: more information on the distribution of <i>Tephrosia rosea</i> is required.	Further information supplied: no <i>Tephrosia rosea</i> found on proposal site. Not considered to be a key environmental factor.
Water	The proposal would require 100 000 kl/a of water.	DOW: the proponent should secure the requirement from Water Corporation early.	Water sourced from scheme water. Not considered to be a key environmental factor.
POLLUTION			
Air quality, including odour and dust	The proposal would emit low concentrations of acid gases, metals, and air toxics as well as NO _x , SO _x and particles. Odour would be generated by the MSW.	DEC: questions relating to emission performance, best practice, monitoring, waste feed, residues, modelling, etc. DOH: questions regarding background data, modelling and air quality criteria.	Air quality is considered to be a key environmental factor.
Greenhouse gases	Emission of greenhouse gases due to combustion of waste.	DEC: notes that the greenhouse gas benefits have been overstated.	Proposal would provide a net greenhouse benefit. Not considered to be a key environmental factor.
Water quality	Evaporation pond for disposal of wash water.	DOW: the proponent should ensure that flood protection against a 100 year flood event is adequate.	Evaporation ponds / drainage from the site can be managed via the

		DOW will review site drainage and groundwater management plans.	DEC Works Approval. Not considered to be a key environmental factor.
Noise	The plant would generate noise 24 hours a day, however it is 5.5km to the nearest noise sensitive premises.	Boundary noise needs to comply with Noise regulations.	Boundary noise can be managed via DEC Works Approval. Not considered to be a key environmental factor.
Waste	The proposal would produce bottom ash from the gasifiers and fly ash from the AQCS.	DEC: waste residues need characterisation and appropriate disposal.	The proponent has undertaken to test, manage and dispose of the waste appropriately. Can be managed under DEC licence. Not considered to be a key environmental factor.
SOCIAL SURROUNDINGS			
Aboriginal heritage		DIA: notes the proponent has demonstrated an awareness of his obligations under the AHA.	Managed under AHA. Not considered to be a key environmental factor.
Public health		DOH: proposed infrastructure and site works should not create additional mosquito breeding habitat. Also see preliminary factor - Air Quality	Proponent has indicated in the proposal that mosquito control measures would be undertaken. Not considered to be a key environmental factor.

Abbreviations:

DEC – Department of Environment and Conservation

DOH – Department of Health

DOW – Department of Water

PM_{2.5} –particle matter with a mean aerodynamic diameter of 2.5 micrometres or less

CO – carbon monoxide

Cu – copper

AQCS – Air Quality Control System

AHA – *Aboriginal Heritage Act 1972*

PRINCIPLES		
Principle	Relevant Yes/No	If yes, Consideration
<p>1. The precautionary principle <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i> <i>In application of this precautionary principle, decisions should be guided by –</i> <i>(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> <i>(b) an assessment of the risk-weighted consequences of various options.</i></p>	Yes	Specialist studies and site investigations have been sourced or undertaken and modelling carried out to inform the risk assessment process.
<p>2. The principle of intergenerational equity <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	Yes	The project would contribute positively to current and future waste management outcomes and provide benefits for future generations without having a negative impact on health, diversity or productivity.
<p>3. The principle of the conservation of biological diversity and ecological integrity <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	Yes	Site specific studies have been sourced or undertaken to determine the presence of Threatened and Priority flora, fauna and ecological communities.

<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p>	<p>Yes</p>	<p>New Energy recognises and accepts the costs of managing and monitoring the outcomes of the project, which have been factored into the feasibility of the facility.</p>
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p>	<p>Yes</p>	<p>Best practice emission controls would be used to minimise air emissions. The proposal would reduce the amount of waste going to landfill.</p>

Appendix 4

Identified Decision-making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of the *Environmental Protection Act 1986* (EP Act) specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

Decision-making Authority	Approval
1. Department of Environment and Conservation	<ul style="list-style-type: none">• Works Approval and Licence
2. Town of Port Hedland	<ul style="list-style-type: none">• Planning approval

RECOMMENDED ENVIRONMENTAL CONDITIONS

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)**

BOODARIE WASTE-TO-ENERGY AND MATERIALS RECOVERY FACILITY, PORT
HEDLAND

Proposal: The proposal is to develop a waste management facility located in the Boodarie Strategic Industrial Area approximately 13 kilometres south-west of Port Hedland.

Proponent: NEW ENERGY CORPORATION PTY LTD
Australian Company Number 16 139 310 053

Proponent Address: Suite 1, 12 Parliament Place
WEST PERTH WA 6005

Assessment Number: 1911

Report of the Environmental Protection Authority Number: 1469

This Statement authorises the implementation of the Proposal described and documented in Columns 1 and 2 of Table 2 of Schedule 1. The implementation of the Proposal is subject to the following implementation conditions and procedures and Schedule 1 details definitions of terms and phrases used in the implementation conditions and procedures.

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Column 3 of Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the Proposal has been approved under the EP Act.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within 28 days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after the expiration of 5 years from the date of this statement, and any commencement, within this 5 year period, must be substantial.

3-2 Any commencement of implementation of the proposal, within 5 years from the date of this statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of 5 years from the date of this statement.

Notes

The following notes are provided for information and do not form a part of the implementation conditions of the Statement:

- The proponent for the time being nominated by the Minister for Environment under section 38(6) of the EP Act is responsible for the implementation of the proposal unless and until that nomination has been revoked and another person is nominated.
- If the person nominated by the Minister, ceases to have responsibility for the proposal, that person is required to provide written notice to the Environmental Protection Authority of its intention to relinquish responsibility for the proposal and the name of the person to whom responsibility for the proposal will pass or has passed. The Minister for Environment may revoke a nomination made under section 38(6) of the EP Act and nominate another person.
- To initiate a change of proponent, the nominated proponent and proposed proponent are required to complete and submit *Post Assessment Form 1 – Application to Change Nominated Proponent*.
- The General Manager of the Office of the Environmental Protection Authority was the Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the EP Act at the time the Statement was signed by the Minister for Environment.

Schedule 1

Table 1: Summary of the Proposal

Proposal Title	Boodarie Waste-to-Energy and Materials Recovery Facility, Port Hedland
Short Description	<p>A waste management facility comprising:</p> <ul style="list-style-type: none"> • a material recovery facility; • shredders; • five gasification modules, each with a capacity of 18 MW (thermal input); • heat exchanger, boiler, steam turbine and air pollution control system; • an evaporation pond; and • associated infrastructure.

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Physical Element	Location	Authorised Extent
Waste-to-Energy and Materials Recovery Facility and associated infrastructure	Boodarie (See Figure 1)	Clearing of up to 10 hectares of native vegetation within the development footprint.
<p>Waste types accepted for processing:</p> <ul style="list-style-type: none"> • Municipal Solid Waste • Construction and Demolition waste • Commercial and industrial waste • Green waste • Tyres and conveyor belts • Waste oils • Oily water • Solvents 		<p>Solid waste that meets the heavy metal criteria for Class III landfill in the <i>Landfill Waste Classification and Waste Definition 1996</i> (amended 2009).</p> <p>Liquid waste that has less than 1% halogen content, and/or is not contaminated with excluded waste (below).</p>
<p>Excluded wastes:</p> <ul style="list-style-type: none"> • Wastes with heavy metal concentrations greater than the requirements for Class III landfill • 'Scheduled' wastes such as polychlorinated biphenyls and 		Not to be processed.

organochlorines • Asbestos • Highly corrosive or toxic liquids or gases such as strong acids or chlorine or fluorine • Radioactive waste • Explosives		
Waste receipt volume:		Up to 255 000 tonnes per annum.
On-site liquid storage:	Development envelope (Figure 2)	Up to 24 hours only.

Appendix 5

**The Department of Environment and Conservations process for Works
Approval and Licensing of Waste-to-Energy proposals**



Department of Environment and Conservation (DEC)- General overview of the likely works approval and licensing process under Part V of the *Environmental Protection Act 1986* for waste to energy plants in Western Australia (WA).

Given the socio political aspects associated with the Waste to Energy (WtE) sector and its infancy in WA, DEC considers new WtE facilities should comply with Best Practice criteria in relation to the environmental performance and management of the facility.

As there is only a limited amount of State and Australian technical guidance for some industrial processes, including waste to energy, it is reasonable to expect proponents and regulators to refer to alternative technical guidance where necessary to assess Best Practice.

The Best Practice criteria is similar to that in European Union Pollution Prevention and Control legislation which requires permitted installations to use Best Available Techniques (BAT) to prevent and minimise pollution.

The EU Commission issues a “BAT reference document” (BREF) for each prescribed industrial sector, including waste incineration. The BREFs are the result of an exchange of information between regulators, industry and other interested parties in Member States. The BREF’s are used by member states to compile their own guidance¹.

The [Waste Incineration BREF note](#) sets out the accepted/proven methodologies for pollution control in accordance with the principals of Best Available Techniques (BAT), as defined by:

“best” – means the most effective techniques for achieving a high level of protection of the environment as a whole;

“available” – means techniques developed on a scale which allows them to be used in the relevant industrial sector, under economically and technically viable conditions, taking into account the costs and advantages; and

“techniques” – includes both the technology and the way the installation is designed, built, maintained, operated and decommissioned.

The EU Waste Incineration Directive (Directive 2000/76/EC) (WID) also sets legislative criteria for the design, operation, emissions and monitoring of waste incineration processes. The WID has recently been incorporated into the EU Industrial Emissions Directive.

DEC’s position is that works approval and licence applications for WtE schemes should address the key requirements of the WID, having regard to the Waste Incineration BREF note.

¹ The UK sector guidance on the incineration of waste ([EPR 5.01](#))



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The key requirements in DEC's view include, but are not limited to:

- Waste acceptance and feedstock control
- Combustion process controls
- Controlling emissions to air to meet emission limit values (ELV's)
- Monitoring of air emissions and combustion process controls
- Abnormal operations
- Process waste disposal or recovery

Any proposed deviations from the Best Practice standards for these key criteria will require a reliable and an appropriate level of justification.

The Works Approval Stage

The Part V works approval process allows DEC to assess the environmental acceptability of a proposal.

For works approval applications for WtE facilities DEC will compare the technical information and data for the proposed facility with the strict process design, operational controls and emission limits set out in the WID. This includes key pollutants such as nitrogen dioxide, sulphur dioxide, dioxins and total particulates (including PM₁₀), the limits for which have been set to protect both the environment and human health.

From the start of the application process, through the commissioning phase and throughout operation the operator will need to consider the most appropriate Best Practice process controls for their facility.

For point source emissions to air, proponents are required to submit evidence of impacts from the emissions, in the form of air quality assessments and models to demonstrate that the proposed operation will not have a negative impact on sensitive locations surrounding the site.

Additionally, the Air Quality Assessment will be required to demonstrate that the proposed facility can meet the required ELV's as defined by WID for emissions to air from stacks. These ELV's are likely to be included within the works approval as conditions of operation.

DEC will also require a commissioning plan to be submitted in the works approval application, detailing the key stages and anticipated completion timescales. If the commissioning plan is not available at this stage a condition can be set in the works approval to require the commissioning plan to be submitted and approved before commissioning can commence.

The commissioning plan should include, but not be limited to:

- details of the commissioning stages and expected timescales
- expected emissions to the environment during each stage
- an environmental emissions management plan detailing the *air / water / land / noise / odour* sampling and monitoring protocol to be *used* during commissioning
- actions to be taken to protect the environment and report to the DEC in the event that the actual emissions exceed those expected



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- actions to be taken during start up to minimise and manage emissions
- contingency plans in the event of any incident.

More specifically, the commissioning period will need to measure air emissions for the specified air pollutants with continuous and extractive monitoring. This information should be used to check and/or adjust the amount of abatement material required to meet the emission limit values specified in WID during the operational phase.

The works approval will require commissioning to be carried out in accordance with the approved commissioning plan.

If the information in the works approval application does not meet the key WID criteria, having regard to the Waste Incineration BREF note specified criteria, DEC may not issue a works approval. The proponent would be given opportunity to provide additional information or a revised proposal in order to address the areas of concern where the key criteria are not met.

DEC will only issue a works approval once the proponent has satisfactorily demonstrated that the proposal meets the specified criteria (or has justified deviations from that criteria) and has demonstrated that the potential environmental impact is acceptable.

The works approval will contain conditions to ensure the premises can operate in an environmentally acceptable manner and that the works themselves do not cause an unacceptable environmental impact. In particular conditions are set to cover the commissioning phase. This allows the works approval holder to test, trial or operate the plant for a limited time and discharge or emit waste into the environment without a licence.

Commissioning under a works approval requires the works approval holder to control, manage, monitor and report emissions and discharges of waste during the period of the works approval. It does not remove the requirement to apply for a licence or registration prior to the operation of the works.

The commissioning stage brings the plant up to operating condition for the first time so as to measure the various parameters which are monitored during operation. During initial commissioning the works approval holder will need to operate the facility in order to test and verify the process controls and provide updates/reports to DEC on the progress of the commissioning.

The works approval holder must submit a compliance report to DEC upon completion of the works construction and each stage of commissioning to verify that the works have been completed in accordance with the works approval.

The compliance report upon completion of commissioning shall include:

- a summary of the environmental performance of the plant as installed against the design parameters set out in the works approval application
- a review of performance against the works approval conditions with details of procedures developed during commissioning for achieving and demonstrating compliance with the works approval conditions.



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Where there have been changes or alterations to the works from those approved under the works approval, this needs to be clearly stated in the compliance document and justification provided for the deviations.

The compliance documents need to be submitted as soon as the works are complete. DEC will review the compliance reports and may undertake a site visit to conduct a compliance audit. Under section 57(3)(b) of the EP Act, DEC must not issue a licence or amend a licence where works have not been completed as per the conditions of a works approval.

The Licence Stage

Once it is agreed that all conditions of the works approval have been met and DEC is satisfied all works have been completed appropriately, DEC will issue or amend the licence as required to allow the facility to operate.

The licence is likely to specify conditions requiring the facility to be operated in accordance with the requirements of the Best Practice criteria as per the WID, including various validation, monitoring, measurement and recording criteria.

The licence is likely to set controls on the operation of the facility with regards to the throughput, storage and types of wastes that can be accepted.

Varying levels of control apply to WtE plants with regards to the nature of the waste proposed to be utilised as the plant fuel. The major controlling factor on the acceptability of fuel types at a WtE facility is the ability of the fuel to meet the design criteria for the facility and therefore provide the appropriate technical, economic and environmental fuel mix for the plant.

The licence is likely to specify minimum requirements for combustion conditions to ensure complete combustion of all potentially polluting substances. Such technical standards are likely to require verification through on site testing and analysis with reporting to DEC.

It is likely that limits on emissions from the plant will be specified in the licence and these ELV's are likely to be consistent with the continuous/periodic ELV's specified in the WID.

ELV's set are likely to include, but are not limited to the following parameters emitted to air:

- total dust/particulates;
- total organic carbon;
- hydrogen chloride;
- hydrogen fluoride;
- heavy metals;
- dioxins;
- sulphur dioxide; and
- nitrogen dioxide.

The licence is likely to require monitoring to be carried out, including taking and analysing samples, instrument measurement (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the



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basis of such data. Records of all monitoring and associated measurements will need to be retained and incorporated into reports as per the licence conditions. In particular the licence will require the licensee to submit an annual compliance report to cover all the licence conditions to demonstrate that they have been complied with.

The licence may set conditions relating to waste products from the facility (e.g. incinerator bottom ash and air pollution control residues). These would need to be monitored and records provided on the type, quantities and composition of such wastes and their destination, to ensure that appropriate facilities are used for the type of waste produced.

All DEC licences for prescribed premises contain conditions requiring licensees to report any abnormal operating conditions, deviations, failures of monitoring equipment and exceedances of limits as soon as possible and such incidents need to be investigated and measures taken to mitigate them and prevent reoccurrence.

For WtE plants the licence is likely to require waste to be ceased being charged to the combustion zone if certain defined circumstances occur, such as process control and emission parameters falling outside of the licence limits. These requirements are usually automated via the plant's process control system and such periods have to be recorded.

Ongoing Compliance Assessment

DEC assesses the reports and monitoring information submitted under works approvals and licences and undertakes site inspections and audits to assess compliance with set conditions.

The EP Act gives powers to DEC to take enforcement action in the event of licence conditions being breached and DEC's enforcement and prosecution policy covers the action that may be taken in such circumstances. This ranges from instigating improvement actions via licence amendments or notices, to issuing prevention notices whereby measures are required to prevent the discharge of waste, pollution and environmental harm.

Appendix 6

Summary of Submissions and Proponent's Response to Submissions