

## 26060: Commentary on GHD Observations on the REA Works Approval Application-001

In response to the REA Works Approval Application (WAA) for a Waste to Energy (WtE) plant in Laverton North GHD provided some observations in a letter dated 22 August 2019 and provided as part of a submission to EPA Victoria BY Ashurst Australia.

The Ashurst submission includes a section on best practice for gasification of Municipal Solid Waste (MSW), and concludes that the gasifiers in existing operating plants in Europe are sized at around 35,000 tpa. We agree with this conclusion. The proposed design for the Laverton plant is to have six gasifiers (each of around 33,000 tpa capacity) operating in parallel.

tkIS-AU commentary on the GHD observations is provided in the table below. The GHD Reference number refers to the list of observations in the letter of 22 August 2019. This list, with numbers added, is attached to this commentary for convenience.

GHD Reference	Response
1	<p>As noted in the opening paragraph of the Executive Summary of the thyssenkrupp report, the scope was a Technical Due Diligence study.</p> <p>The report was prepared for a confidential client and the brief for the study was a desktop review based on data provided, and discussions with the technology provider (Eco-Waste). thyssenkrupp was not engaged to assess commercial topics such as capital and operating costs.</p>
2	<p>The Hatlar report referenced in the thyssenkrupp report is the “Due-Diligence Environment and Technology Review Feb 2019” prepared by the Hatlar Group Pty Ltd”. The contents of this report formed the basis of the various sections of the WAA.</p> <p>The Operating Manual for the MSW gasification power plant Tehran was reviewed as part of the study to ascertain the operability of a typical facility that was in service outside China.</p>
3	<p>We refer to paragraphs 4 and 5 of the introduction of thyssenkrupp report.</p> <p>“thyssenkrupp has a long-standing history in gasification providing end-to-end solutions. As a licensor we have supplied gasification and ancillary technology since the early twentieth century. Our gasification expertise ranges from feedstocks such as biomass and municipal waste through to coal and oil. thyssenkrupp provides expertise in gas treating and combustion as part of gasification processes and independently. Additionally, thyssenkrupp expertise extends to combustion and boiler services in the sugar industry. In Australia, thyssenkrupp has significant experience with third party gasification and boiler technologies.</p> <p>Recent projects executed by thyssenkrupp in Australia include MSW gasification (for a number of international clients), syngas processing, in-situ gasification, and steam boiler systems. thyssenkrupp has also provided due diligence</p>



thyssenkrupp

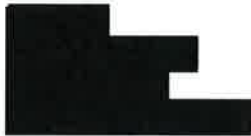
GHD Reference	Response
	<p>services to clients reviewing gasification technology acquisitions. The largest gasification project engineered by thyssenkrupp globally was done in Australia based on a third-party technology, for a coal to polypropylene facility in China.”</p> <p>The thyssenkrupp report was compiled by a team of engineering professionals experienced in design and operation of; gasification, combustion, power generation and gas treating facilities. The report was produced by thyssenkrupp as an entity and the names of contributing individuals need not be provided to validate the assessment.</p>
4	<p>Emissions data from existing operating plants is discussed in other sections of the WAA</p>
5	<p>The scope of the study was specifically a desktop review of the Eco-Waste technology using the documentation provided and telephone discussions with the Eco-Waste personnel.</p> <p>Site visits were conducted by the confidential client.</p> <p>The report was prepared by qualified and experienced engineers and the conclusions are based on assessment of the Eco-Waste data and the reported operating record of Eco-Waste gasifiers</p>
6	<p>The basis of comments from thyssenkrupp regarding risks to MSW gasification projects is outlined in the Project Technical Risks assessment in Section 4 of the report. This section includes a list of risks identified from past gasification projects and provides commentary on mitigation measures and specific design elements incorporated in the proposed technology that address these risks.</p> <p>Risks exist for all projects, but issues from past projects based on alternative designs do not necessarily apply to the proposed technology. Learnings can be incorporated, and mitigation measures can be provided. There are many operating MSW gasification facilities worldwide which have demonstrated that risks can be overcome. A history of successful operation of Eco-Waste gasifiers on similar waste and at similar scale as that proposed for Laverton further supports the operational suitability and capability of this technology</p>
7	<p>The brief for the thyssenkrupp study was to review the technical suitability of the Eco -Waste technology for the specified purpose, not to undertake a comparison of alternative technologies.</p> <p>A BREF assessment was conducted by others and is discussed in the WAA.</p>
8	<p>A BREF assessment was not part of the scope of the thyssenkrupp study</p>
9	<p>The thyssenkrupp report is not a Technology Audit and is not titled as such.</p> <p>The report was commissioned by a confidential third party and any assessment and conclusions were determined by thyssenkrupp independently of the project team.</p>
10	<p>The report is part of an extensive WAA document and was included by REA to provide an independent review of the selected gasification technology.</p> <p>Documentation provided by REA in the WAA addresses the other issues raised by GHD.</p> <p>As required by the study brief, thyssenkrupp independently assessed the Eco-waste technology from the information provided</p>

GHD Reference	Response
11	The HRL Report is included in the WAA documentation
12	The use of slag was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
13	A demonstration that the constructed plant complies with the provisions of the WAA will be required by the EPA before the issue of a Licence to Operate. This was fully explained by the EPA at the Information Session
14	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
15	As part of the study, actual temperature measurements at the gasifier outlet and secondary oxidisation chamber outlet were provided by Eco-Waste for one of their operating plants. These readings showed that required temperature profiles were being achieved. The boiler reviewed is designed for fast quench.
16	<p>This aspect of detailed design has not been completed at this stage. We agree good engineering practise be applied, however such work would be in subsequent project phases after obtaining WAA. As stated in the executive study of the report:</p> <p>“This assessment is subject to the detailed design of the plant complying with Australian Standards and the project being implemented by suitably experienced engineering and construction contractors.”</p> <p>Emission modelling is outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.</p>
17	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
18	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
19	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
20	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
21	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.
22	This aspect was outside the brief for the thyssenkrupp report and is covered in other sections of the WAA.



# ATTACHMENT A : GHD OBSERVATIONS

22 August 2019



Our ref: 12513061-59359  
Your ref:



## Laverton North REA WAA Review Summary of GHD reviews

### 1 Introduction

GHD Pty Ltd (GHD) has been engaged by Ashurst Australia (Ashurst), on behalf of Charter Hall Group (Charter Hall), to provide input to a submission by Charter Hall regarding the Works Approval Application (WAA) recently lodged with EPA Victoria (EPA) by Recovered Energy Australia (REA) to establish a Waste to Energy (WtE) facility in Laverton North.

### 2 Key issues identified in GHD review of REA WAA

The table below outlines observations and recommendations for key issues or deficiencies identified in the GHD review of the REA WAA. GHD's review of the WAA was limited to those sections and appendices relating to the Best Practice Assessment, the Air Quality Assessment (AQA) and the Health Risk Assessment. Only issues where recommendations are felt to be necessary to enable a full assessment of the project to be made, are included in the table below.

Key Issue	Observations	Recommendations
<b>Best Practice Assessment</b>		
1 thyssenkrupp Industrial Solutions (tkIS) Due Diligence report scope and content	Due Diligence report scope was limited to performance of the technology, and excluded capital and operating costs, and operational criteria. Scope and limitations of the tkIS report were not clearly defined.	Scope and limitations be provided.
2 tkIS report references	Report refers to references that are not provided for review – Hatlar report, and MSW gasification power	Hatlar report be provided. This is the key source of information for the tkIS report.

		plant Teheran Operating Manual: Gasifier and Boiler.	
3	Supporting information	Some of the comments in the tkIS report are unsupported by other information contained in the report. References stated in the reference section of the report do not seem to be sufficient to provide much of the content of the report. It is not clear who wrote the report, and their level of experience in this area.	Details of the contributing authors be provided.
4	Operational data	Little operational data was provided in the tkIS report that demonstrates the operability/reliability of the technology. No data was independently sourced by tkIS from environmental agencies or authorities that monitor the performance of the existing gasification plants.	More extensive data from reference facilities be provided.
5	Report reliance	The tkIS report relies heavily on information and data provided by Eco-Waste, and was based on a desktop assessment of this information only, with no plant visits undertaken by tkIS. The report contains unsubstantiated opinions of the report author or authors about plant capabilities.	Sources of information in the report be stated, and where author experience is relied upon, this be stated.
6	Technical challenges with gasification	The tkIS report acknowledges that gasification of variable inputs such as MSW is technically challenging, and that there are examples of unsuccessful projects. It states that the reasons for failure have not always been technical, and that such information is not in the public domain.	This admission of uncertainty about MSW gasification seems to be inconsistent with the positive opinions expressed elsewhere in the report about the likely performance of this particular plant. It would be helpful if the tkIS report stated why this plant will not suffer the same fate as many others.
7	Best practice assessment	The report does not assess the proposed facility in terms of the	A BREF assessment should have been provided as part of this report, especially

	BREF (a European best practice manual normally used to assess incineration plant capabilities), and does not define or mention Best Practice. A table of project technical risks and mitigation measures is provided, but there is no Best Practice assessment.	as it presents itself as a Due Diligence report. The same type of BREF assessment provided in Section 3 of the WAA document should have been undertaken by tkIS.
8	WAA BREF assessment	Section 3 of the WAA document is titled Environmental Best Practice, and this refers to the BREF and undertakes an assessment of the proposed facility in accordance with some of the BREF criteria.
		The qualifications and experience of the author of the BREF assessment in the WAA document are not known or stated in the document. This is an especially important part of the WAA document. It is not even possible to cross check whether the BREF conclusions are similar to those reached by tkIS, the specialist incineration technology company employed to provide an independent due diligence report on the technology, because they didn't undertake a BREF assessment.
9	Completeness of tkIS report	EPA should require the tkIS report to be amended to address the points outlined above. The independence of tkIS from the project team also needs to be stated. The qualifications and experience of the tkIS report authors should be stated. The title of the tkIS report, Independent Technology Audit is not accurate, as the report relies only on information provided by Eco-Waste. Additional independent investigation of information about the reference plants would assist in this regard.
10	Completeness of the WAA	The sources of information upon which Section 1, about the project and Section 6, the process description, and Section 7, the environmental best practice section, should be stated in the WAA document. This may be the Hatler report referred to in the tkIS report, but this

		<p>report is not mentioned in these sections, or in the Section 19, the References Section. The tkIS report is mentioned in Section 7, but not included in Section 19 References. Ideally, the Hatlar report, plus other sources of information used to create these sections should be provided, and these sections of the WAA document should be rewritten and properly referenced, with the sources of information identified. Section 3 of the report, which outlines the project team experience and track record should be rewritten to identify the authors of these technical sections and their specific and relevant experience stated. This would provide a greater level of confidence in the WAA than is currently the case.</p>
<p>Waste</p>	<p>Section 6.2 Source of Residual Waste Supply and Compositional Analysis contains information about the sources of waste feedstock, the expected characteristics and composition of the waste. This references work undertaken by MRA on residual waste audits of Melbourne councils, and work undertaken by HRL Technology Group on converting the physical compositional data from MRA into chemical constituents (carbon, hydrogen, nitrogen, oxygen, chlorine and sulphur). This included estimates of the likely ash composition of Melbourne Metropolitan region waste for three scenarios. This approach seems valid. However, no copy of the HRL report is provided, and the methodology used to derive these cannot be assessed.</p>	<p>A copy of the HRL report needs to be provided.</p>



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Waste	Diversion of more than 97% of input waste from landfill, as stated in section 1 of the WAA, is very high and relies on slag being used for road base or other products. If the slag is not suitable for this purpose, or not in demand by the market, it will need to be landfilled. This would reduce landfill diversion from 97% and require significantly increased landfill airspace for potentially contaminated slag material. This would increase the cost of managing slag, especially if it needs to be stabilised prior to landfill.	A copy of certified chemical analysis reports needs to be provided demonstrating that the slag does not contain elevated total and/or leachable contaminants preventing its proposed use.
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Plant construction	Demonstration that the proposed development has been built in accordance with the WA and the BAT requirements of the EU BREF (2016 and 2018 draft)	EPA specify as a condition of the Works Approval the preparation of a construction verification report prepared by an EPA-appointed auditor demonstrating that the facility has been built in accordance with the WA and the EU BREF (2016 and 2018 draft) before a licence is granted to REA.
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#### Air Quality Assessment (AQ)

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Best practice assessment	The uncertainties raised regarding the Best Practice Assessment have a flow on effect of reducing confidence in the modelled air emission rates and subsequently, predicted impacts, and AQA conclusions.	Assessment of the potential risk to the local air quality environment surrounding the proposed REA facility should not be accepted until uncertainties regarding the proposed technology are addressed.
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Generation of air emissions	A series of observations are made regarding the proposed process design, specifically relating to achieving required temperatures for destruction of pollutants and rapid temperature quenching to reduce the formation of dioxins/furans.	Additional information and assessment is required to demonstrate that combustion temperatures are achieved and that the design will achieve rapid temperature quench.
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Discharge of	Sensitivity analysis for stack dimensions was arrived at using a	Additional information is required to demonstrate that GEP for design of
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	emissions	'combined stack' approach with an effective stack diameter determined for three separate flues. No details are available on the building characteristics used (Width, Length and Height) to independently verify that Good Engineering Practice (GEP) has been adopted.	stacks has been achieved to limit entrainment of pollutants in building wakes, and subsequent avoidable impacts at ground level receptors near to the source.
17	AQ assessment methodology	The methodology for application of background air quality data to the model predictions is not standard and does not follow the full technical requirements of SEPP(AQM). Annual average measured concentrations from a nearby EPA station were applied with little analysis or justification.	The AQ study needs to be supplemented by undertaking further assessment of background levels. The prescribed method, which is to apply background concentrations of pollutants measured (NO <sub>2</sub> , CO and SO <sub>2</sub> in this instance) on an hour-by-hour basis to the model, should be applied.
18	Air emission discharge standards	Demonstration that air emissions from the proposed development actually comply with Schedule E of SEPP(AQM) and IED 2010/75/EU in all operating scenarios, including steady state, unsteady state, all transient, part load and start up and shut down operating conditions as defined in IED 2010/75/EU.	EPA specify Proof of Performance as a condition of the Works Approval and that this be independently verified by an EPA-appointed auditor before a licence is granted to REA.
<b>Health Risk Assessment</b>			
19	Best practice assessment	The uncertainties raised regarding the Best Practice Assessment have a flow on effect of reducing confidence in the modelled air emission rates and subsequently, predicted impacts, and therefore the HRA.	Assessment of the potential risk to human health due to the proposed REA facility should not be accepted until uncertainties regarding the proposed technology and the air modelling are addressed.
20	Risk calculations	There are inconsistencies in stated concentrations of contaminants used as inputs to the health risk calculations. Some inconsistencies could lead to significant (78x) underestimations in the predicted	Inconsistencies should be addressed prior to further assessment of potential risk to human health from the proposed REA facility.

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	risk levels.	
Exposure pathways	Questions are raised with regards to some potential exposure pathways that were absent from the risk calculations, including market gardens or stock grazing near to the facility, as well as dermal risk from deposited materials for nearby workers.	Comments should be made on the absence of these exposure pathways from the HRA prior to further assessment of potential risk to human health from the proposed REA facility. Cattle grazing should be assessed.
Ecological risks	In Appendix B, the toxicology is focused on human health risk. Potential ecological impact associated with emissions has not been considered in this report, specifically Hydrogen Fluoride, where the toxicity value is 0.60 ug/m <sup>3</sup> (phytotoxicity) is more stringent than the human health criterion.	Potential ecological impact associated with emissions should be considered in this report, specifically Hydrogen Fluoride.

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In summary, based on a review of specified sections of the WAA, GHD is of the opinion that the WAA is lacking critical information required to allow EPA or affected parties such as Charter Hall to properly assess the proposed development or to conclude that it represents best practice for thermal destruction of MSW. This limitation has flow on effects for the air quality and health risk assessments and has lead GHD to conclude that the WAA is not of sufficient quality to allow EPA or affected parties such as Charter Hall to assess the level of risk of the proposed development on the air quality environment and human health or to conclude that it complies with all relevant environmental regulations, policies and guidelines.

Kind regards



Principal Environmental Engineer

