Response to the

Consultation Draft EPA Position Statement: Thermal Energy from Waste Activities

21 June 2019

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Attachment

Submission to the South Australian EPA "*Enhancing resource recovery and discussing the place of energy recovery from waste*" Discussion Paper January 2018

What is the AIEN?

The Australian Industrial Ecology Network (AIEN) is a vibrant network of like-minded individuals, companies and institutions with a common interest in sustainable development through the study and practice of industrial ecology. We advocate the principles and concepts of industrial ecology in policy formation and business practice. The AIEN actively engages with organisations to facilitate improved performance and environmental benefits.

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The AIEN was established as a proprietary limited company in October 2014 to promote and facilitate industrial sustainability through the application of industrial ecology. The company aims to provide a 'window on the world' of industrial ecology by relaying news, canvasing new ideas, producing 'position papers' on topics, such as energy from waste, organising events and alerting people to developments in academia and in practice. In effect, AIEN aspires to become the 'go-to' organisation for all things to do with industrial ecology, including collaboration on the design, planning and implementation of IE projects.

Industrial Ecology (IE) and Sustainability

The overarching aim of IE is the sustainability of economically developed and developing societies. Theoretical IE is concerned with the principles, concepts and techniques for analysis that help us understand the myriad interactions between humans and the natural environment. It is axiomatic that for human existence to be sustainable, human activities must be compatible with environmental sustainability. If we wipe out the species on which we depend for survival or destroy their habitat or render unviable the natural resources that support our way of life, then our species will not be sustainable.

Sustainable development is the route to achieving sustainability, essentially by bringing about intended changes in human behaviour. That is the focus of IE in practice and arguably its ultimate objective. If IE is not applied in practice, and particularly with stakeholder 'license to operate', sustainable development has no chance of happening either.

Introduction

Thank you for the opportunity to provide feedback regarding the *Consultation Draft EPA Position Statement: Thermal Energy from Waste Activities.* The AIEN congratulates the South Australian Government on its thermal energy from waste (EfW) activities position document for the State.

The AIEN responded to the South Australian EPA *"Enhancing resource recovery and discussing the place of energy recovery from waste"* Discussion Paper in January 2018 and this additional submission largely follows up the themes developed in our previous submission.

The AIEN is aware that most Australian states are additionally preparing position statements and guidelines for EfW in their respective states and AIEN have prepared a consistent response to each paper. We recognise that if Australia is to embrace EfW it would be beneficial if all states had very similar if not the same priorities in their position statements.

The AIEN requests this specific feedback offered regarding the Thermal energy from waste (EfW) activities position statement be read in conjunction with the other document aforementioned (attached) in order to ensure maximum clarity surrounding the communication of the positions being articulated.

The AIEN would be pleased to provide additional information or clarification of any points raised if/as required.

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Purpose

The EPA will use this position statement to assess development assessment referrals and activities of prescribed environmental significance requiring a licence as per Schedule 1 of the Environment Protection Act 1993 relating to thermal energy from waste (EfW) activities.

The aim of this position statement is to ensure that the recovery of EfW in South Australia supports the Objects of the EP Act and the Waste Management Objective of the Environment Protection (Waste to Resources) Policy 2010. This position statement meets those objectives by promoting the waste management hierarchy (Figure 1) to drive circulation of materials through the material resource recovery process and back into the productive economy prior to undertaking EfW activities.

As discussed in the South Australia's Waste Strategy 2015–2020, the state government believes that EfW should support any viable options for higher order beneficial uses and have regard to impacts to resource recovery businesses and supply chains that compete for the same feedstock materials. As such, enhanced material resource recovery and the circulation of materials through the economy are preferred policy outcomes ahead of energy recovery and disposal in accordance with the waste management hierarchy. The volumes of waste required by EfW activities must be sustainable, given the need to not compete with, nor undermine, higher order beneficial uses of waste, and to avoid an underutilised or stranded EfW asset.

In keeping with the waste management hierarchy and circular economy objectives, the combustion of waste without sufficient resource recovery is not supported. The production and use of refuse derived fuel from waste that would otherwise be disposed to landfill will be supported where it includes appropriate material resource recovery, as set out by this position statement.

The AIEN support the principles that SA EPA are adopting in relation to the evaluation of Energy from Waste (EfW) projects

The AIEN recognise that this document is primarily taking a position on thermal treatment of wastes materials and anaerobic digestion will be or is addressed in a separate position statement.

Scope

EfW or Waste to Energy are terms often used to describe a range of mechanical, thermal, and biological waste processing activities undertaken for the primary purpose of generating and maximising the production of a usable form of energy including heat, electricity or fuel.

This position statement addresses thermal EfW technologies including direct combustion of waste, gasification, pyrolysis, the production and use of refuse derived fuel (RDF), and the mechanical biological treatment of waste where this activity results in the production of RDF.

This position statement must be read in conjunction with the Standard for the production and use of refuse derived fuel

AIEN believe that in order for any EfW project to succeed in this context, it requires five (5) distinct pillars to be addressed and ensure compliance from an environmental point of view as well as a financial point of view.

This AIEN response will accommodate our consideration and response to the SA EPA Position statement will accommodate our thinking in line with these five pillars.

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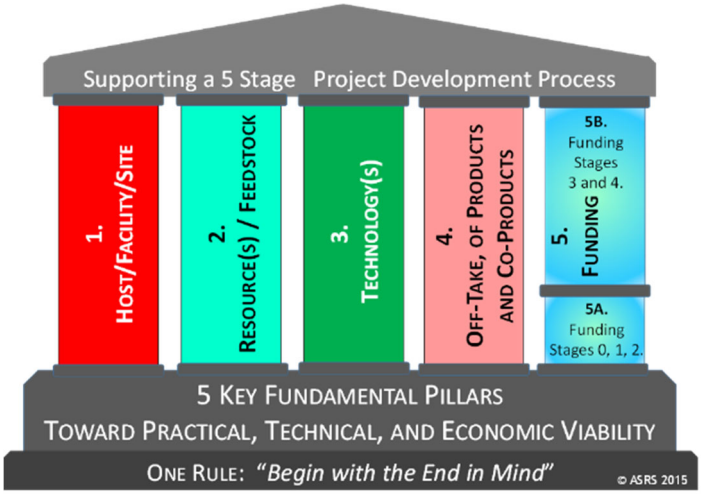
The Five Pillars

- Host/Facility/Site
- Resources/Feedstock
- Technology(s)
- Off-Take Agreements
- Funding

These 5 pillars, which are not in any particular order, are integral to any project development process, whether an EfW, a distributed generation (DG), a microgrid of DG projects, or a fully integrated resource recovery and EfW project.



Host/Facility/Site

Development assessment and environmental authorisations

The AIEN recognise that the conduct of a thermal EfW activity triggers one or more prescribed activities of environmental significance as per Schedule 1 of the EP Act will be referred to the EPA for environmental assessment following formal lodgement of a development application with the relevant planning authority, and make the following comments in relation to gaining the required approvals.

Community consultation and ongoing engagement

The AIEN recognise that there are some zones and areas within any jurisdiction whether in the Metropolitan area or within Regional zones that may not in any situation be an acceptable host for an EfW site.

Such an example is the recently declined Blacktown EfW MSW incinerator proposal at Eastern Creek NSW where the pure size of the development in that area was a determining factor in the rejection of that facility.

Given that any facility in Metropolitan South Australia might reasonably require significant volumes of waste to accommodate profitability, the AIEN recommend a review of the potential area zones that may be suitable host sites for such a facility. The AIEN additionally recommend some distinction between Incineration, Pyrolysis and gasification of certain waste streams.

Businesses that wish to invest would require certainty to assist them in site selection. For example, Regency Park is an industrial zone as is Gilman. One zone may be suitable for an EfW utilising thermal treatment to generate heat and electricity, the other may not. In fact, neither may be suitable.

Siting, Noise and Air Quality

The AIEN notes that "*Evaluation distances for effective air quality and noise management*" document 2019, requires a minimum evaluation distance of 500 metres for the incineration of municipal solid waste, however it makes no recommendation for gasification and pyrolysis.

The AIEN recommend that a review of this document needs to be undertaken to add these technologies and ensure that the evaluation distances are correct.

The AIEN notes that there are many different treatment technologies currently on the market and consideration must be given to each one. The overarching term "incineration" does not effectively reflect the technologies available.

Table 1 Excerpt from *Evaluation distances for effective air quality and noise management*
Appendix 1: Recommended evaluation distances

Activity	Additional Activity Notes	Evaluation distance (meters)	Description of typical activities and potential air or noise impacts
Incineration • Development Regulations Schedule 22 3(1) • Environment Protection act Schedule 1 3(1)	Destruction of Chemical Wastes	1,000	Impacts most likely relate to smoke and odour, BATEA includes afterburners, scrubbers, emissions stacks and particulate detection probes
	Destruction of medical Waste	500	
	Cremation	150	
	Solid municipal waste	500	
Gasifiers	???	???	???
Pyrolysis	???	???	???
Liquid Fuels	???	???	???

The AIEN believe that there are substantial omissions in this table that is referred to as one of the "go to" sources for siting a plant.

This table should be updated by the EPA to reflect future technology options that industry may choose to commission to recover the energy from within the SA waste stream. We additionally note that there is mention of MSW however no mention of C&D and C&I wastes.

The AIEN additionally draw your attention to the Technology section later in this document.

Resources and Feedstock

Feedstock Eligibility Criteria

The AIEN support the EPA "*Municipal solid waste criteria rationale*".

The AIEN make the following comments regarding the kerbside collected residual waste bin.

Environment Protection (Waste to Resources) Policy 2010 specifies the kerbside collection of waste as suitable for disposal direct to landfill and requires no additional treatment.

The logic at the time was that the material had already undertaken appropriate waste treatment by the resident in sorting the waste into a comingled recyclable waste stream and green organics waste stream and a residual waste stream.

The AIEN therefore do not understand the requirement for a minimum 40% of waste in a council district being in the residual bin as long as the council has a 3-bin system. The cost of disposal to an EfW plant is significantly greater than organics and kerbside recycling so it will always be in councils interest to ensure and continue to maintain, promote and educate their rate payers how to utilise the 3-bin system for waste disposal.

Additionally, the EPA have a requirement for the Councils to maintain a 3-bin service to ratepayers to allow for the disposal of the residual bin to EfW.

Schedule 3	**Waste and other matter excluded from application of clause 11**
Part 1	Waste or other matter of the following kinds is excluded from the application of clause 11 (Waste or other matter to be treated prior to disposal to landfill):
(e)	waste collected by a council by a kerbside waste collection service where the council also provides separate kerbside waste collection services for recyclable waste and vegetative matter;

The AIEN make the following comments re the residuals from the C&D and C&I waste stream.

With the implementation of the waste to resources EPP in 2010, it was the intention of the EPA to consult with industry and define what the term "pre-treated" of waste prior to disposal/RDF/EfW actually meant.

To the AIEN's knowledge that was never actually completed and there is still some conjecture as to what that actually means from a diversion point of view.

With this in mind, the AIEN recognise that recovering saleable commodities will always be more economically viable than disposal to any energy from waste process.

The AIEN believe that EPA have the appearance of preferring RDF for existing technologies, over RDF for a technology that is commissioned purely for the purpose of energy production.

Levy Liabilities for EfW/RDF production.

We note that the use of materials into an existing facility such as the SUEZ ResourceCo - Adelaide Brighton Cement process is levy free, however the use of the same materials into an Incinerator energy generation plant incurs a levy.

Both processes are combusting the waste and as long as both processes meet all technical/emissions and feedstock specification requirements the AIEN does not understand why the EPA choose to treat them differently.

Technology(s)

The AIEN make the following observations regarding the technology options.

As discussed earlier in the AIEN response, the EPA have included the below Table 2 in the Consultant Draft that defines the technologies along with the glossary and we additionally note that this supports our belief that EPA is showing the appearance of picking winners.

Table 2 Waste levy liability

EfW Activity	Waste levy applies
Incineration, thermal destruction, or thermo-chemical decomposition of waste including by thermal oxidation (combustion), gasification or pyrolysis whether-or-not energy recovery is undertaken	✓
Incineration, thermal destruction, or thermo-chemical decomposition or any other 'use' of RDF where the RDF is produced in accordance with the RDF standard and feedstock eligibility criteria	✗
Dedicated thermo-chemical decomposition/conversion of source-separated or homogeneous waste materials including by gasification or pyrolysis where energy or waste derived products are generated including syngas, oil, char and any other recovered resources ready and intended for imminent use	✗

We note that the levy applies when collected waste are not processed prior to a thermal treatment technology application.

Whilst the AIEN recognise and encourage the pre-treatment of waste prior to either landfill disposal or thermal treatment to "recover the energy" we believe that the EPA have set an established protocol in the waste to resources EPP that kerbside collected residual waste had sufficient treatment prior to collection for direct disposal to landfill.

The AIEN do not see the correlation between RDF to thermal oxidation and RDF to energy as a correct delineation as to the application of the levy and believe that this correlation can only be as of the result of a bias against these types of technologies that could potentially expose the EPA to legal challenges and should be either all technologies are leviable or no levy applicable regardless of the technology.

The AIEN support the use of residual material in an EfW or RDF/PEF application only when all viable recyclable material has been recovered, not just metals and stone.

As discussed above The AIEN believe that the EPA may need to provide greater clarity in relation to what it considers to be pre-treatment prior to disposal/EfW application.

Off-Take Agreements

The AIEN make the following observations in regard to the offtake options for the by-product materials produced in the EfW facility.

We note that the air emissions criteria for an EfW plant has been well defined in the document.

The AIEN note that an EfW plant can and will produce more waste heat than electricity. The AIEN wish to understand if the EPA will have any criteria regarding the use, if any, of that waste heat.

We note that the only mention of the disposal of the solid materials, that is bottom ash and bag ash, is in relation to levy liability.

If the EPA are going to apply any levy at all to these materials, the industry will look toward a beneficial reuse and develop alternatives to landfill for these materials.

We note, "*A reduction may be available for subsequent landfill disposal of bottom ash and fly ash from a direct combustion activity, ensuring that the same material is not effectively levied twice. The net levy liability will be calculated by the EPA upon reconciliation of all related waste receipt and disposal data* (note 9)."

However, if the EPA are to treat all technologies equally, the levy should not apply at the front end and therefore the levy will be applicable to the disposal of the solid materials. The AIEN believe that the EPA should qualify the acceptable beneficial reuse of these materials and at a minimum, should draw the proponent to the standard for the production and use of waste derived fill document October 2013.

Funding

The AIEN make the following observations regarding the funding of EfW plants.

The AIEN recognise that the commercial viability and funding of these plants is not within the scope of the EPA delegation, however we do note that in recent times the introduction of various alternative waste treatment technologies have caused consternation for regulators across many states and has been used as an argument toward gaining or securing EPA approvals for processes and offtakes.

Any Licencing arrangements need to be well defined with a path towards an ongoing licence to operate, it should be noted that the risk of not meeting the appropriate environmental criteria's is that of the developer and that EPA will at all times regulate in accordance with the principle laid out in this document and any related documents mentioned with in.

AUSTRALIAN INDUSTRIAL ECOLOGY NETWORK

AIEN

Submission to the South Australian EPA Enhancing resource recovery and discussing the place of energy recovery from waste

January 2018

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In February 2016, AIEN held its inaugural conference on energy from waste (EfW) in Ballarat Victoria. It was followed by a similar event in February 2017 and a third conference will be held in Ballarat in February 2018. In July 2017, the AIEN also hosted a one-day event on EfW in Adelaide (SA - Unpacking EfW Conference), which focused specifically on related issues in South Australia. These events and submissions made to other inquiries on EfW have established the AIEN as a major contributor to the national discussion on EfW.

The primary motivation for this and all other submissions made by the AIEN is to promote future world best practice in sustainable development based on the principles of industrial ecology. Its contributing members have no particular commercial or political positions that influence their collective views and so from this unique perspective, the AIEN offers observations and comments on the options and opportunities for EfW presented in this submission.

Structure of this Submission

This submission has been structured around:

a) Some initial discussion around the generic topics of:
   - Justifiable demand;
   - The actual demand for any subsidised "black" energy that might be generated; and
   - The conditions necessary to achieve a freely granted "Community Licence to Operate" (CLO) since ultimately such projects are developed for and on behalf of the serviced community, and at their ultimate expense and in their name.

b) Two essential and existing documents: -
   i. The "Sustainability Guide for EfW Projects and Proposals" (SG/EfW2004) Attachment A; and
   ii. Western Sydney Sub-Regional Resource Recovery – Options Analysis (WSRR2014), attachment B

Attachment A

In our opinion, this continues to be the most authoritative document published, on the subject. It was sponsored by Australian Greenhouse Office, to address the following fundamental issues and questions: -

a) Recovering energy from residual wastes, including the very significant question of what constitutes a residual waste? What is the sustainable market for the energy? Under what circumstances is such a binary approach (either/or - nothing in between) justifiable economically, environmentally and socially?

   How can all legitimate concerns of the community who are the ultimate customer for such facilities and in whose name such projects are promoted, be sufficiently addressed so that a 'Community Licence to Operate' is granted, even conditionally? NB: Attachment A was drafted specifically to address all such issues, concerns and outcomes with the ultimate granting of a fully informed "Community Licensee to Operate presenting as the primary criterial for success".

Background to the SG/EfW – Summarised

The SG/EfW is an entirely self-explanatory document, in that:

- The circumstances of its initiation (very similar to the current situation in SA and Western Sydney);

- The methodology applied in the production of the SG/EfW including the comprehensive national community consultations undertaken to record and collate issues and concerns (including in Adelaide 29 Oct'2003);

- The synthesis of the relevant issues into the final Six Project Scoping Principles adopted;
- The broad representation on the project editorial committee is recorded;
- The broad representation of the project reference group is recorded; and
- The full list and cross section of the project sponsors are recorded.

This document is now in the public domain and the AIEN seeks only to draw attention to the systematic approach and subsequent outcomes

Attachment B

If the SG/EfW2004 document seeks to systematically define when an EfW approach for residual urban waste streams are likely to achieve a CLO, from a fully informed community, freely given, the later document (WWRR 2014 Attachment B) provides a fully worked options analysis for how a similarly sized community (880 population) could achieve the higher order, optimised resource recovery outcomes without needing to resort to traditional EfW, and at a lower net cost to the community.

Since these two supporting documents had the advantage of being developed in the entire context of the briefs for both projects, this submission will refer to them, as relevant, in response to the 28 specific questions that follow.

Other Adopted Generic Topics or Concepts in this AIEN Submission

And finally, we seek to differentiate between EfW approaches to Urban Waste streams, as the main focus of this submission, rather than EfW approaches to agricultural and forestry wastes and residues, in regional and rural situations.

Where agricultural and forestry (sustainably sourced biomass) is concerned, the principles and justifications in rural and regional areas can produce entirely different outcomes. If this topic is of interest to SA EPA, AIEN would be pleased to make a quite separate submission on the subject.

Discussion of certain generic topics for reference as required in subsequent responses to specific questions.

<u>GT1 – Justifiable Demand</u>

This criteria is often adopted by planning and approval agencies, requiring that a project is actually needed or strategically beneficial in pursuit of the common good, as a precondition to subsequently evaluating the proposed impacts and consequences of a proposal. This submission looks to provide a fully integrated decision-making framework to such Justification of Demand assessments to be made for a truly objective outcome.

GT2 – What is a "Residual?"

EfW proponents will preface the justification for facilities, such as currently being promoted in Western Sydney, by asserting that they only intend to combust 'RESIDUAL' waste. Wastes, that have previously had recyclables removed and that therefore present as having ''no higher resource value''. Such waste is to be terminally converted to at least realise inherent Calorific Value (CV). This 'justification' requires a description, if not a definition of what is meant by 'RESIDUAL' waste.

Before the advent of Comingled Kerbside Recycling (CKR), residual waste was considered to be everything the community needed to discard, save only for those materials of interest to the 'rag and bone' sector.

Today 'recycling options' have expanded to include not only the CKR standard packaging items but also those materials that are the subject of an ever-expanding list of Producer Responsibility items. This trend represents a concerted attempt to reclaim as much of the biomass i.e. organic content of waste streams (usually >60% wet waste) as possible.

In this scenario alone, ''residual waste'' is not a static, universally understood term and, in fact, the evidence is that with every passing year, more and more of these materials are being transferred from the ''residual'' list to the recyclable/recoverable list. With the right policy settings, developed to truly reflect the community's desire for optimised and systematic resource recovery, the ''residual'' waste category is destined to represent an ever-decreasing volume of a region's urban waste stream. See Attachment B for a truly integrated plan to actually achieve such an outcome).

This trend stands in stark contrast to the outcomes that will arise if very complex and expensive EfW plants are established to process what today is considered 'residual', as less and less material will logically fall into this category over time. The AIEN contends that the commercial drivers for and demands of such plants will directly impede, if not entirely prevent the development of future programs to maximise resource recovery, which are at the core of a successful circular economy.

In summary, the AIEN view is that in striving to achieve accurate criteria for assessing the best use of materials (SG/EfW PSP1 Section 3.3 pp33) 'residual waste' does not have a fixed definition. It is a rapidly diminishing category of a general waste stream, which yields a corresponding decline in calorific and hence economic value when used to generate thermal energy. The future status of EfW must be questionable in a market characterised by a rapidly falling demand for any resultant 'black' energy.

GT3 – The actual demand for heavily subsidized "black" energy from such urban waste processing EfW plants.

The issue of the market for the 'black' energy that will be produced by an EfW plant is a crucial criteria for justifying the demand for any particular EfW proposal. It would be operating in a national energy market where the overwhelming focus is on closing coal fired, black energy plants in favour of clean or renewable power sources. It is noted, for example, that five coal fired power stations in Australia have been closed in the last 3 years.

EfW plants that combust plastics or all other 'fossil' based materials are considered only marginally less 'black' than pure coal fired facilities. It is only the biomass fraction in 'residual' waste that is assumed to improve the sustainability status of any energy derived from such plants. However, this is exactly the very fraction of waste streams that is receiving the most impetus to transfer them from a 'residual' to a 'recyclable' status. As Fig. 1 clearly demonstrates, in a sustainable resource paradigm, biomass will be 'too valuable to just burn'.

And Biomass is so much more than firewood!

Biomass – the Sustainable Competitive Advantage

Table 1: Comparison of benefits and properties of non fossil sources

Low carbon energy sources	Features/Properties								
	A	B	C	D	E	F	G	H	I
	Renewable	On demand supply	Heat	Power	Gas	Oil	Char	PetroChem industry manufacturing precursors	Potential to be Carbon negative
Fossil fuels with sequestration		✓	✓	✓					
Hydro	✓	✓		✓					
Wind	✓			✓					
Solar – thermal	✓		✓	✓					
Solar – PV	✓			✓					
Geothermal	✓	✓	✓	✓					
Wave/Tidal	✓			✓					
Nuclear		✓	✓	✓					
Biomass	✓	✓	✓	✓	✓	✓	✓	✓	✓

Whilst <100yrs biomass can be converted to fulfil all the roles currently provided by fossil resources – there is nowhere near enough – so should be applied to highest and best uses – bioenergy as a by-product.

Figure 1: – Biomass is so much more than just firewood

To extend this logic further, in a fast approaching paradigm, where the vast majority of biomass has been removed from residual waste, to support the manufacture of direct replacements/ supplements for all products and services currently sourced from 'fossil' raw materials, only the oil based plastics will feature in 'residual' wastes and in that situation, such materials will also be much too valuable to burn since they can so readily be processed back into petro/chemical sector platform or precursor materials, such as methanol, naphtha and the like. Materials that average a commercial value currently of approx. $1,000/t as compared to only $30-$50/t if converted for CV alone in an EfW plant.GT4 – Demonstrating a freely obtained "Community Licence to Operate (CLO)

<u>GT4 – Demonstrating a freely obtained "Community Licence to Operate (CLO).</u>

Attachment A is focused specifically on adopting a project development process that:

a) Can fully consult and inform the host community to eventually obtain,

b) A fully informed and freely granted CLO.

Assumptions in the Terms of Reference

The Terms of Reference seems to assume the EfW is an accepted term referring to the combustion or Biological treatment of residual wastes such that:

a) The volume of waste for subsequent disposal to landfill is significantly reduced (perhaps by 80-90%);

b) The physio/chemical reactivity of such residuals (ash) is reduced;

c) The energy recovered is a product with a fair and recognisable market or demand; and

d) The recoverable materials in the wastes to be so processed have been removed prior to the final binary process of recovering a varying proportion of the inherent Calorific Value (CV)

Often, the international facilities, designed and operated to achieve these outcomes are cited as the benchmarks of such EfW strategies.

With reference to the SG/EfW, in this submission we challenge the ideas of: What a residual waste is.

- What the actual market and/or demand is for energy produced from such wastes.
- What alternative waste processing options are available to a community facing this choice.
- What the Justifiable Demand is for a 'traditional' EfW proposal.
- The conditions necessary to achieve a 'Community Licence to Operate' a facility, which is being proposed to service the community's clearly articulated needs and which is to be built and operated in their name, at their expense.

    - We address the various issues on the premise that EFW is not derived solely from a thermal process. Energy certainly can be derived from thermal means, typically:
      Incineration
    - Gasification &
    - Pyrolysis

But it can also be derived from biological processes, such as:

- Dry anaerobic digestion
- Liquid or wet anaerobic digestion
- Aerobic fermentation
- Landfill Gas (LFG)

Response to the white paper - Enhancing resource recovery and discussing the place of energy recovery

1. *Is there an opportunity to expand EfW in SA? If so, with what source material (waste feedstock) and technologies?*

The opportunity to expand

The primary purpose of SA Waste levies is to increase the cost of simple (landfill) disposal to the point where systematic resource recovery is a more cost-effective outcome. This submission proposes that such a 'tipping point' by 2019-2020 will be reached, and that systematic resource recovery will be the most cost-effective process option for the urban waste streams of the Metropolitan Adelaide Area.

The implementation of the W2R EPP in 2010 introduced a general waste management obligation in South Australia that with some limited exceptions that it would be illegal to dispose of waste unless it had been through a pre-treatment process; Division 2 – Waste to be treated prior to landfill.

In our submission, the AIEN recommends that this same approach be applied to any materials that are delivered to a facility for the purpose of creating energy from the waste, particularly in the event of a thermal treatment facility. See Attachment A

Wherever possible, the AIEN will always encourage optimal source separation of materials prior to waste or commodity collection. The AIEN has identified a weakness in regulatory guidelines that require significant and potentially redundant recovery from waste streams that have already undertaken source separation prior to the subsequent processing of residual materials for EfW.

Waste Feedstocks - LGA

Most council's in Metropolitan Adelaide have a mandatory two bin system; comingled recycling and residual general waste and further either a mandatory or optional green waste bin.

In the opinion of the AIEN the green waste bin should become mandatory and councils would be encouraged to implement the diversion of food waste into the green waste bins for the purpose of the optimised recovery of the inherent nutrients carbon and energy.

With the implementation of co-mingled recycling bins and the implementation of a green waste (FOGO) collection the residual waste can potentially be considered (subject to Attachment A) in a thermal treatment process.

Waste – Feedstocks - C&I

In SA there is a very mature and sophisticated collection option for commercial food waste. This option if further implemented would allow for the residual commercial dry mixed waste to be processed through one of the already available resource recovery facilities with the residual from these sites being made available for processing into PEF or use in an EfW application.

Waste Feedstocks - Mixed C&D

South Australia already has very mature markets for processing what is often referred to as the combustible fraction of construction and demolition industry. They will also separate the inert fraction at source so when the material is transferred to a disposal facility it has already been reduced by 80% or more. Further the AIEN believes that as the levy approaches $103 in 2019-2020 that the success of this industry in SA can be readily built upon.

Technologies

The AIEN is agnostic about the technology selected for a particular application. However, as discussed earlier, our position is that the chosen EfW solution is determined to ensure the highest and best practical, technical, economic and environmental viability, and that will complement existing resource recovery systems within the context of the highest best use hierarchy. Generally, the AIEN approach to technologies is as "servants" rather than "masters", is that the project should determine the most appropriate technology to achieve the required results, rather than vice versa.

Anaerobic Digestion (utilising biomass material)

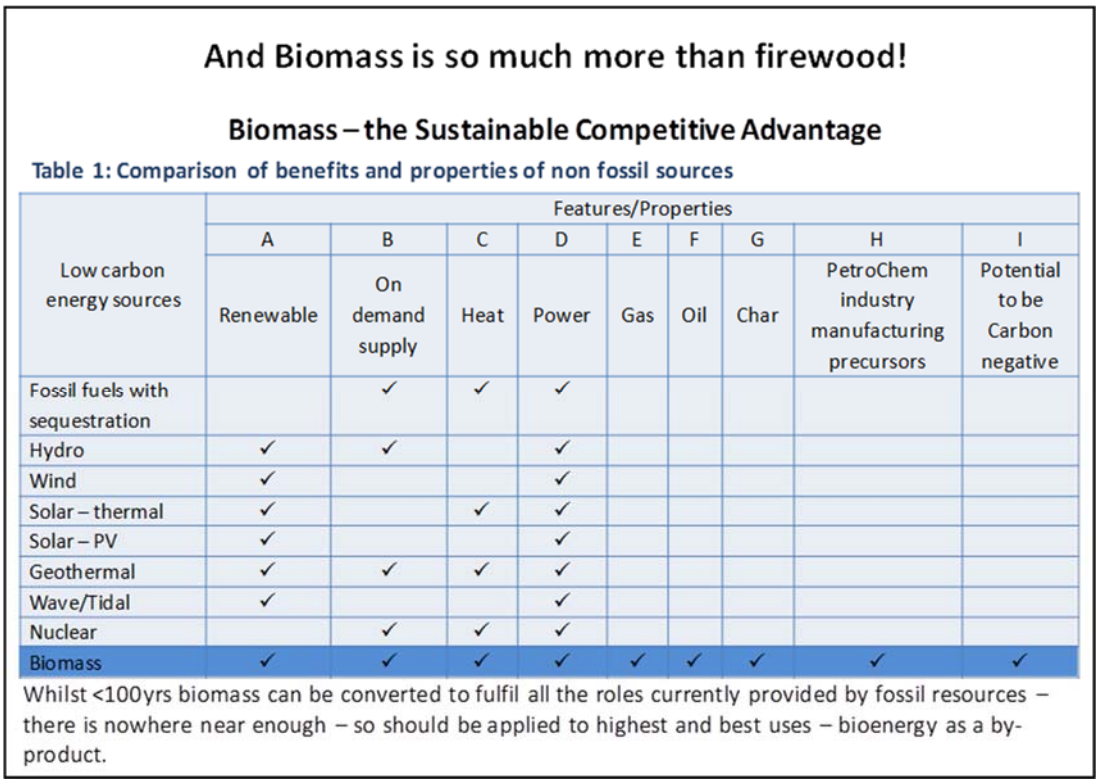
The AIEN believe that in the first instance in the South Australian environment an anaerobic digester process would be a sound addition to the existing waste treatment processes, due to the potential end-user market for the Digestate. We recommend that a thorough process be undertaken to ensure that any technology implemented realises an end product that has a re-purpose or marketable commodity rather than a landfill rehabilitation material. (See comments related to Urban Waste processing vs regional/rural opportunities above)

Thermal Treatment

If a fully recovered waste stream process is implemented, and the resulting residual waste stream, or portions thereof, has suitable characteristics as feedstock (including woody biomass material) for use in a thermal treatment process for energy recovery, then the AIEN would encourage the installation, however we would strongly recommend that South Australia guard against over-sizing so as to potentially cannibalise existing higher end uses and stifle innovation toward the implementation of higher end uses for the materials.

Landfill Gas

It is important to recognise that the two largest landfills in the northern metropolitan area do not generate energy from their LFG and are only flaring this gas as a minimum to meet their environmental requirements. The AIEN view is that, as things stand in 2018 and beyond, squandering this energy is totally unacceptable and recommends that the EPA implement a policy to rectify this as a matter of urgency. The recovery of FOGO (a biomass material) prior to disposal will significantly reduce the LFG produced and wasted at these facilities and will in turn, through AD, be able to produce renewable energy reducing the reliance on fossil fuels and producing a high-quality soil enhancer.



And Biomass is so much more than firewood!

Biomass – the Sustainable Competitive Advantage

Table 1: Comparison of benefits and properties of non fossil sources

Low carbon energy sources	Features/Properties								
	A	B	C	D	E	F	G	H	I
	Renewable	On demand supply	Heat	Power	Gas	Oil	Char	PetroChem industry manufacturing precursors	Potential to be Carbon negative
Fossil fuels with sequestration		✓	✓	✓					
Hydro	✓	✓		✓					
Wind	✓			✓					
Solar – thermal	✓		✓	✓					
Solar – PV	✓			✓					
Geothermal	✓	✓	✓	✓					
Wave/Tidal	✓			✓					
Nuclear		✓	✓	✓					
Biomass	✓	✓	✓	✓	✓	✓	✓	✓	✓

Whilst <100yrs biomass can be converted to fulfil all the roles currently provided by fossil resources – there is nowhere near enough – so should be applied to highest and best uses – bioenergy as a by-product.

Figure 1: – Biomass is so much more than just firewood

2. *Could the EfW sector be further developed through public or private investment and ownership or as a partnership?*

The AIEN does not have a position in regard to this issue. Suffice to say that given the population of Adelaide there may not be sufficient feedstock for more than one type of technology, so a public private partnership may be one way of ensuring fair and reasonable pricing. Although, where recovery of homes from Urban Waste Streams could be beneficially value added in conjunction with agriculture/forestry residues in the hinterland, then collaboration with such projects could be very cost effective and sustainable.

3. *Is EfW Technology best applied at a site specific or district level, or at a larger scale?*

The AIEN considers that, depending upon the feedstock type, volume and frequency of availability, there may be opportunities for onsite and microgrid as well as district and large-scale applications.

To address the heterogeneity of urban waste sources in relation to the tight quality control of end products – including energy, integrated facilities are often the most viable.

Site Specific & District Level

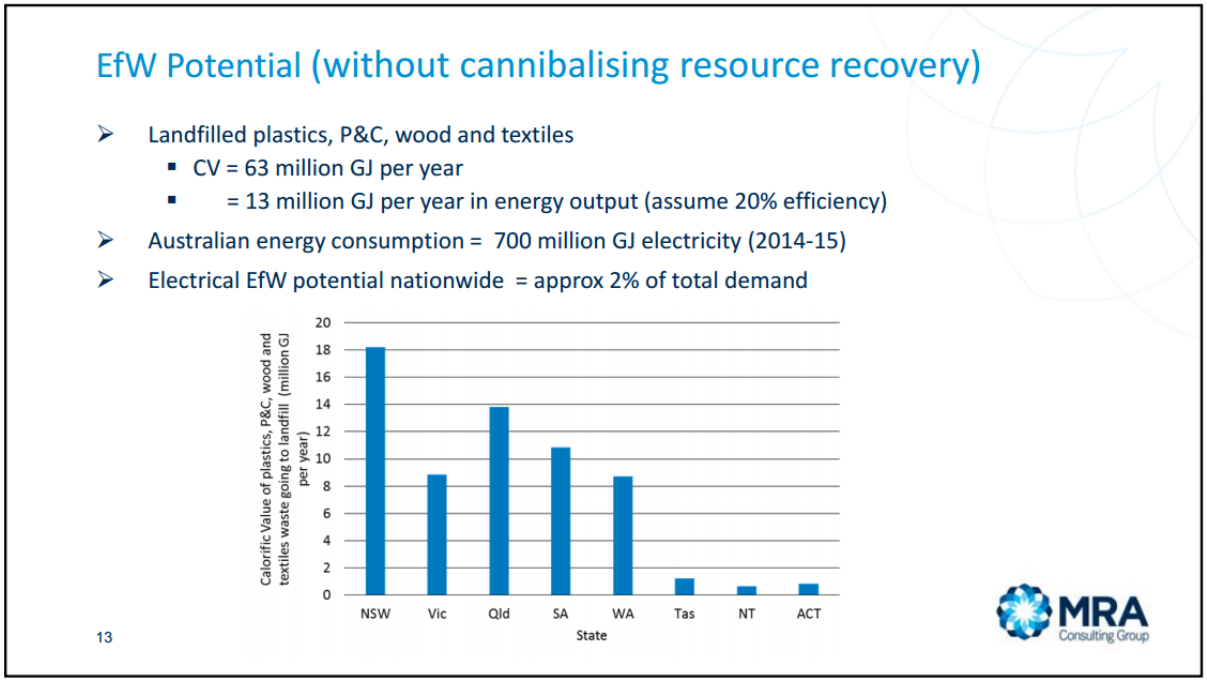
The feedback we received from the delegates from the regional communities at the SA unpacking EfW conference was that regional communities wanted to explore the opportunities available to

them however most of the discussion is towards large scale operations. The AIEN believe that there is an opportunity for small scale projects for regional areas especially with Anaerobic Digestion technologies and projects such as the ones proposed by the City of Salisbury and the Adelaide Airports Corporation once implemented and commercialised will assist with the case studies for Regional Areas.

The AIEN recognises that within the Adelaide metropolitan area there are several opportunities for developing EfW projects including thermal treatment depending on the chosen technology. Once again, the AIEN warns against over sizing the thermal technology option. Reviewing the white paper there is only 890,000 tph of material landfilled in the whole of South Australia, the AIEN estimates that by recovering the green waste and organics, glass, metals and bringing the moisture content to 15% the total material with a calorific value could be less than 200,000 tonnes per annum, it may be that small scale close to market options may be the most economical in a South Australian context.

4. *Could EfW make a significant contribution to the baseload energy grid and the national energy market going forward.*

The following slide presented at a recent Keep NSW Beautiful event provides context for this issue



This 2% of total demand figure would be further reduced in a metropolitan Adelaide context by: -

i. Allowing for the continual redefinition of Residual MSW (GT2 above) and (SG/EfW2004);

ii. That no typical EfW process plant would consider attracting more than, say, 60% of the available material for simple supply risk issues; and

iii. Basing the project on an "unsubsidised" cost basis (as a precondition for the achievement of GT4).

Under these circumstances it seems that net power produced may well be <1% of total demand, and that when benchmarked against the full range of emerging clean energy sources, the Justification for Demand may not be achievable.

5. *Could the uptake of EfW assist in the reduction of the use of high greenhouse gas emissions intensity fuel contributing to a low carbon future? What are the factors that could assist with displacing high intensity fuels? What are the factors that could lead to EfW displacing renewables? What regulatory mechanisms or policy could be applied to EfW to reduce the extent of any displacement of renewables?*

The issue for the EfW industry is the market for the 'black' energy that will be produced by an EfW plant. It would be operating in a national energy market where the overwhelming focus is on closing coal fired, black energy plants in favour of clean or renewable power sources. It is noted, for example, that five coal fired power stations in Australia have been closed in the last 3 years.

EfW plants that combust plastics or all other 'fossil' based materials are considered only marginally less 'black' than pure coal fired facilities. It is only the biomass fraction in 'residual' waste that is assumed to improve the sustainability status of any energy derived from such plants. However, this is exactly the very fraction of waste streams that is receiving the most impetus to transfer them from a 'residual' to a 'recyclable' status. As Fig. 1 clearly demonstrates, in a sustainable resource paradigm, biomass will be 'too valuable to just burn'.

To extend this logic further, in a fast approaching paradigm, where the vast majority of biomass has been removed from residual waste, to support the manufacture of direct replacements/supplements for all products and services currently sourced from 'fossil' raw materials, only the oil based plastics will feature in 'residual' wastes and in that situation, such materials will also be much too valuable to burn since they can so readily be processed back into petro/chemical sector platform or precursor materials, such as methanol, naphtha and the like. Materials that average a commercial value currently of approx. $300-$1,000/t as compared to only $30-$50/t if converted for CV alone in an EfW plant.

The AIEN do not recommend a regulatory frame work that will ban the use of thermal treatment for residual waste only that in the assessment of the project an evaluation of the net energy recovery value is assessed against the higher end commodity use and the risk of stifling the introduction of innovative higher end recovery technologies, for which much current evidence is emerging for the realisation of these higher net resource value outcomes.

6. *What is the EPA's role in safeguarding the waste hierarchy with regard to EfW e.g. ensuring that wastes with high calorific value such as plastics are not diverted to thermal EfW potentially undermining higher order recycling, reuse and reduction activities?*

Before the advent of kerbside recycling, residual waste was considered to be everything the community needed to discard, save only for those materials of interest to the 'rag and bone' sector

Today 'recycling options' have expanded to include not only the kerbside recycling bins standard packaging items but also those materials that are the subject of an ever-expanding list of Producer Responsibility items (CDL and potential for expanded packaging).

This trend away from landfill represents a concerted attempt to reclaim as much of the biomass i.e. organic content of waste streams (usually >60% wet waste) as possible.

In this scenario alone, ''residual waste'' is not a static, universally understood term and, in fact, the evidence is that with every passing year, more and more of these materials are being transferred from the ''residual'' list to the recyclable/recoverable list. With the right policy settings, developed to truly reflect the community's desire for optimised and systematic resource recovery, the ''residual'' waste category is destined to represent an ever-decreasing volume of a region's urban waste stream. See *Attachment B* for a truly integrated plan to actually achieve such an outcome).

This trend stands in stark contrast to the outcomes that will arise if very complex and expensive EfW plants are established to process what today is considered 'urban waste residuals', as less and less material will logically fall into this category over time. The AIEN contends that the commercial drivers for and demands of such plants will directly impede, if not entirely prevent the development of future programs to maximise resource recovery, which are at the core of a successful circular economy.

In summary, the responses to Q5 & 6 above, the AIEN view is that in striving to achieve accurate criteria for assessing the best use of materials (SG/EfW PSP1 Section 3.3 pp33) 'residual waste' does not have a fixed definition. It is a rapidly diminishing category of a general waste stream, which yields a corresponding decline in calorific and hence economic value when used to generate thermal energy. The future status of EfW must be questionable in a market characterised by a rapidly falling demand for any resultant 'black' energy.

7. *Could EfW as an alternative to landfill deliver net environmental benefits to SA in the form of greenhouse gas emission reductions, management of fugitive air emissions, and ensuring the environmental quality of waters? What regulations and policy could reduce the extent of any net cost in one or more of these factors?*

Attachment B provides the most comprehensive and integrated answer to the question. At question 4 we demonstrate that the actual energy product from such EfW facilities will be minimal, therefore such facilities serve only one strategic function, to reduce volume and reactivity of the material under management. Certainly, all putrescible landfills should be required to install and operate B.AT landfill gas extraction and reuse, but ultimately Attachment B is a relevant example of a full integrated system that will ensure maximum resource recovery at highest net resource value and with the minimum emissions or detrimental environmental effects. AIEN would be pleased to work with the SA Government to accurately adapt Attachment B concepts to include the precise SA circumstance if requested.

8. *If an EfW proposal is to be grid-connected what opportunities and challenges might lie ahead with regard to EfW energy end-user agreements, i.e. with regard to securing agreements and feedstock material, accessing infrastructure and the cost of bringing this energy to the market?*

This AIEN submission supports the view that this circumstance would not be economically viable in SA and therefore would not be applicable. Due to the factors available to energy producers that export through the grid network EfW in SA would be confined to uses of the energy at the back of the meter applications.

9. *Is it feasible and necessary for proponents of EfW to demonstrate the greenhouse gas emissions intensity and lifecycle emissions of their proposal? What range of data and what level of evidence should be required? How would it be validated?*

The Australian Government regulates Greenhouse emissions visa vie the National Greenhouse Inventory – Kyoto Protocol, SA EPA should adapt their reporting criteria to accommodate the Accounting practises of this office.

Most projects will be attempting to gain some form of carbon credits that are sealable the Clean Energy Regulator there are protocols in place that SA EPA can easily adopt.

10. *Should proponents of EfW be required to demonstrate that the greenhouse gas emissions intensity is less than that of currently utilised baseload and peaking energy fuels while the state transitions to its target of zero net greenhouse gas emissions by 2050?*

This AIEN submission supports the view that these circumstances will not and should not every apply refer Q8

11. *Is there a role for the further development of some EfW technologies or processes vs others? Why, and under what circumstances?*

We refer to the initial comments in this submission that seeks to differentiate between urban waste processing approaches and technologies, and those adopted in a regional/rural contest, processing agricultural and forestry residues and by-products.

Whilst continual and iterative improvements in technologies will occur, access to tailored MSW processing technologies is readily available today; but AIEN would always recommend approaching technologies as the "servants" not the "masters" in such discussions. The process technologies should be tailored to the required process and strategic outcomes, and not vice versa. The AIEN recognise that with innovation comes additional risk however that should not necessarily be the catalyst to stifle that innovation.

The fact is that the AIEN recognises that in a well-defined circumstance the development of technologies in Australian States and Territories would bring with it the potential for increased wealth.

The risks from this can easily be managed with the use of a flexible licence system that will allow for the design and commissioning of a technology where an actual operational licence would not be issued until the equipment was fully operational, commissioned and was meeting all of the emissions standards as required by the SA EPA emissions protocols.

12. *Considering the waste management hierarchy and the role of the waste levy, should a levy apply to an EfW activity? Would any such levy be higher, lower or equal to that associated with landfill disposal?*

The AIEN do not believe that a gate fee levy on genuine EfW projects would be in any way beneficial and would have the potential to destroy projects. In order to clarify if the levy is applicable the following process should be considered.

In assuming a self-sustaining environmentally sustainable project, rather than a material destruction project, is intended, the gate fee should only be required to the extent that sufficient revenue, is gained to cover cost of the operation plus profit of the enterprise for example:

- The cost of the technology, interest & depreciation
- Processing of feedstock to specification
- Operating Expenses including Management, administration and labour
- Profit/ROI

Simple energy cost balance equation should be similar.

(CE + EC) – PE must be ≤ SE

Key to Equation

CE = Cost of Energy in (fuel and/ or electricity)

EC = Cost of Feedstock Energy Content

PE = Value of Parasitic Energy

SE = Value of Saleable Energy

For example	EfW[1]	Material Destruction[2]
Total gate fee revenue-	$100	$100
Energy production gross margin-	$10	($10)[3]
Operations cost -	($60)	($60)
Profit -	$50	$30

Notes - 1 Levy is not applicable at gate

2 Levy is payable at the gate

3 Gross margin is negative when cost of goods sold (cost of energy input & or cost of feedstock & value of parasitic energy) exceeds energy sales revenue.

Furthermore, as with any project an energy cost balance equation specific to each project to support the claim to EfW should be developed and implemented so as to ensure that the project is an EfW project and not a material destruction project.

The residuals from an EfW project that do not meet any suitable end use criteria and therefore require landfilling would be required to pay the applicable metropolitan landfill levy.

13. What other fiscal considerations could be applied to EfW in SA?

The AIEN believe as with any project of these types that the market itself should determine if a project is fiscally viable. The AIEN recognise that as with landfills and other projects of this nature that a bond or bank guarantees would be considered, based on the size and nature of the project, this bond or bank guarantee could be reduced as the project is commercialised and is shown to meet all of the EPA operational requirements.

14. Given the complexity of EfW proposals and the nature of regulatory assessment that would be required, what methods of cost recovery could be used by government when responding to EfW development and ongoing operations?

Attachment A established some basic proposal assessment criteria, which if adopted could bench mark these proposals which comply, or not. SAEPA could then introduce a fee-for-service project assessment framework for non-complying proposals.

AIEN would be pleased to work with SA EPA to update and streamline Attachment A to achieve this outcome.

The AIEN recognises the significant cost to the EPA and the State for the assessment and implementation of an EfW project and therefore during the assessment stage we recommend a percentage of the cost of the proposal i.e. 0.2%-0.5% management fee depending on the size and nature of the project and once commissioned a licence fee similar to any landfill operations.

15. Is a three-bin kerbside collection system a sufficient method of resource recovery prior to undertaking EfW on the residual component?

As discussed earlier if the green waste bin becomes mandatory on kerbside collection systems including food organics, along with a community education program The AIEN believe that this should be sufficient. The AIEN believe that in some Council jurisdictions in metropolitan Adelaide green waste bins are an opt in system. In order to further encourage a take up the organics and Kerbside could become weekly with the residual predominantly none put material collected fortnightly.

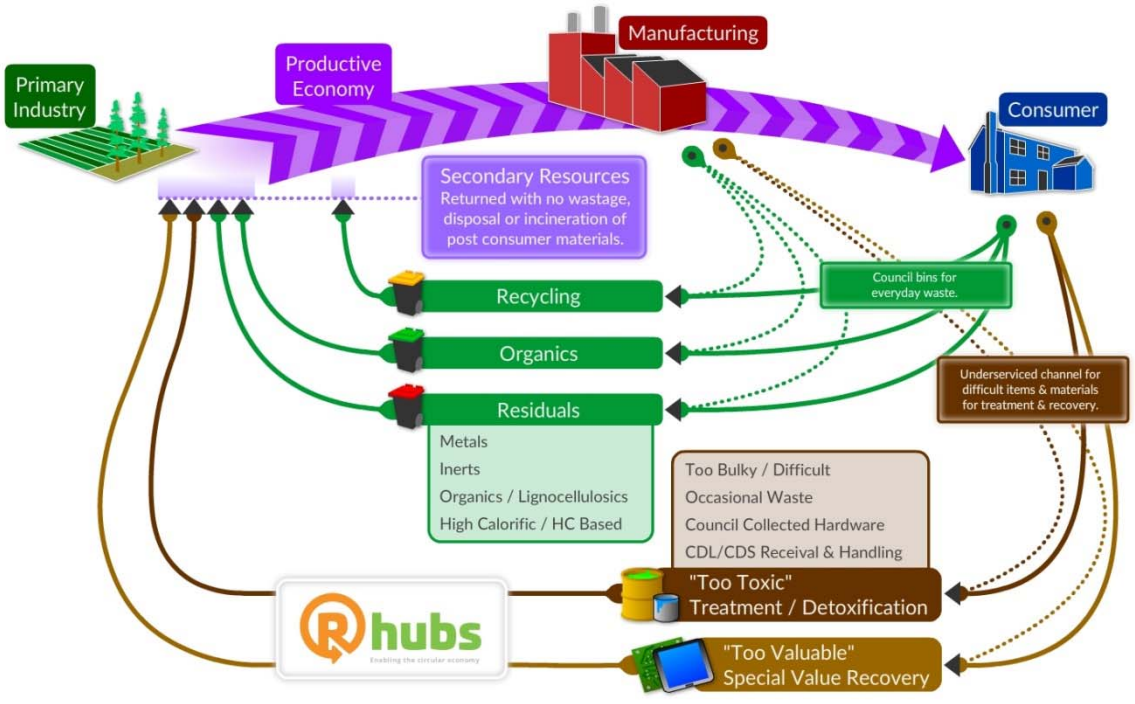


Figure 2: Optimised Post-Consumer Resource Recovery Framework

Fig 2 is the provided as conceptual response to this question, were the discard options for the community is limited to just Reb, Yellow and Green lidded bins, for all mainstream discarding of household wastes and spent materials/items.

All other discards (especially PS type materials and items) would be received at specialist “Bring”, “Drop off”, prelim sort, aggregate and forward facilities referred to in Fig 2 as RHubs, but in the SA context these facilities would be extensions/adaptions of the existing CDC facilities in the state, brought under a common performance specification.

16. *Would it be necessary to require mandatory resource recovery criteria to be met for residual kerbside waste prior to EfW?*

The AIEN recommend a benchmark approach based on best practise minimum recovery protocols.

17. *In a similar manner to the existing requirement of the Environment Protection (Waste to Resources) Policy 2010 to treat waste in order to recover resources prior to the disposal of waste to landfill, should the EPA consider mandating that resource recovery is undertaken prior to an EfW process?*

Attachments A & B provide a detailed and fully integrated response to this question.

The AIEN would fully support the same or similar mechanism to the W2R EPP 2010 with the addition of the implementation of a weekly FOGO collection.

18. *Should a mechanism be considered requiring minimum resource recovery criteria to be met by local government before they can be eligible to put residual waste to EfW (i.e. criteria that are consistent with the future SA Waste Strategy landfill diversion targets)?*

The implementation of the W2R EPP in 2010 introduced a general waste management obligation in South Australia that with some limited exceptions that it would be illegal to dispose of waste unless it had been through a pre-treatment process; Division 2 – Waste to be treated prior to landfill.

In our submission The AIEN recommends that this same approach be applied to any materials that are delivered to a facility for the purpose of creating energy from the waste, particularly in the event of a thermal treatment facility.

Wherever possible, The AIEN will always encourage optimal source separation of materials prior to waste or commodity collection. The AIEN members have identified a weakness in regulatory guidelines that require significant and potentially redundant recovery from waste streams that have already undertaken source separation prior to the subsequent processing of residual materials for EfW.

See Attachment A which provides an integrated framework to address this issue

19. *What level of resource recovery should be required e.g., a blanket minimum standard vs waste-stream-specific targets and would this change depending upon the source and/or type of any particular waste stream?*

Attachments B and GT-2 provide a fully integrated response to this question

Wherever possible, The AIEN will always encourage optimal source separation of materials prior to waste or commodity collection. The AIEN members have identified a weakness in regulatory guidelines that require significant and potentially redundant recovery from waste streams that have already undertaken source separation prior to the subsequent processing of residual materials for EfW.

The AIEN do not support the blanket minimum standards as they tend not to account for the already source separated materials, some demolition companies are better than others at source separation however most already due to the significant cost savings separate the inert fractions from the combustible fraction. Within the C&I collections industry there is already well-advanced source separation of cardboard, paper, metals, timber and hard & soft plastics (usually single polymer) added to this in SA we have the extremely successful CDL system.

The kerbside system has a two-bin system with some form of a third green waste bin so The AIEN believe that the continual increase in levies will be sufficient to continually improve the existing diversion targets.

20. *How prescriptive should the EPA be in pursuing resource recovery criteria applying to EfW, how could market forces assist or not assist in determining resource recovery outcomes for EfW?*

Refer GT- 1,2,3 and 4 and the clearly demonstrated achievement of a CLO via the adaption of Attachment A.

If performance outcomes and orderly articulated “Criteria for Success” are readily available and adopted, market forces will self-regulate for the preferred outcome.

As discussed above The AIEN do not support a prescriptive resource recovery criteria, however we recommend that the EPA are reasonably prescriptive in relation to the outcomes of the EfW processes chosen. The recent introduction of mass balance reporting if properly implemented and managed will encourage suitable and environmental outcomes for these materials that will move towards EfW projects.

21. *Should SA look to adopt an energy efficiency criteria (such as the EU R1 indicator) as a means of assessing energy recovery vs disposal for thermal EfW proposals?*

The AIEN supports the EU R1 indicator as one of the assessment tools, it is important to recognise that EfW is an energy recovery process and not a materials destruction process, see comments in Q12.

22. How far into the future should we consider new recycling and reuse technologies improving to the extent that EfW is no longer economically viable and the likelihood of stranded assets becomes a significant risk?

The AIEN believe that the effective life of an EfW plant is 30 years, the question is what technological advances may be developed and commercialised within those 30 years. The real question to be thought through as part of this discussion is would an LGA be prepared to sign a 30-year supply agreement for their residual waste streams?

23. Do EfW facilities have the potential to hamper ongoing innovation in resource recovery?

The AIEN will point to Europe where several facilities are struggling to find volume and in some cases the residual form the waste stream is transported for country to country as a product that they are referring to as PEF, The AIEN do not see this as a good outcome in an Australian context as we deal with the tyranny of distance therefore the hampering of innovation would become more paramount to a large scale EfW facilities survival.

24. How might a 'social licence' be applied to a proposal for an EfW facility? What would the process be for proponents in securing a 'social license'?

See Attachment A

Apart from addressing the direct economic, social and environmental impacts of such proposed facilities, the Community Licence to Operate must be given primacy, since such facilities are developed to service these same communities and doing so in their name and at their expense.

It has been shown that while many proponents of EfW and even communities that would like to see EfW developed will often not want to see it in their own community, again looking towards Europe they are "hiding or disguising" direct burn facilities in extremely modern buildings and in some cases in "play parks" the reality is that they are still direct burn incinerators.

The AIEN recommend that in order to attempt to gain the social licence to build and operate a facility the proponent would need to engage all stakeholders very early and bring them along with the process, trying to ensure that they have had some ownership of the process to implementation and just as important transparency will preclude the vacuum of knowledge that allows for the propagation of false information.

25. What role will air quality modelling data play in securing a social license?

The AIEN believe that real time emissions monitoring should be mandatory and built into the emissions management of any thermal treatment project, particularly when there is a stack emission and the production of ash.

26. *Should the EPA develop and publish minimum evaluation distances specific to different groups or types of EfW facilities which would be used to decide how to proceed with scientific investigations into potential environmental impacts during the planning process?*

The AIEN believe that separation distances should be relative to the proposed technology for example a well-run AD plan can be with in close proximity to sensitive receptors whereas a large thermal treatment plant should be situated sufficiently distant from sensitive receptors.

27. *WA, VIC, and NSW all require proposals for EfW to demonstrate proof-of-concept through direct comparison of the proposal to a suitable reference facility already in operation within Australia or overseas. Should this requirement also be considered in SA?*

The AIEN suggest that this has the potential to stifle local innovation and often only allows for technologies to be implemented that are several years old in fact some of the biggest selling points is that they have been around for years and are proven.

While on the surface this may seem attractive to a regulator The AIEN are not totally convinced that you get the best outcome. The AIEN believe that as long as any technological innovation will meet the base line emissions of proven technologies and the SA EPA guidelines for emissions control from EfW facilities.

28. *With a view to achieving a net environmental benefit, are there opportunities for coordinating the cross-jurisdictional movement of waste feedstock for EfW facilities?*

At this time given the response to the attempt by the NSW EPA to introduce the proximity principle into their jurisdiction The AIEN do not believe that SA EPA would be able within the current climate to affect the cross-jurisdictional movement of materials, that would be a function of the market. A way that we might be able to resolve this issue may be a variation in the Waste to Resources EPP to allow for the levy to be collected if materials that are transported across-jurisdictions meet a required PEF specification.

The AIEN would be pleased to make a personal presentation to the committee to expand on this written submission.