Submission No 215

INQUIRY INTO 'ENERGY FROM WASTE' TECHNOLOGY

Organisation: Waste Management Association Australia

Date received: 28 May 2017

WASTE MANAGEMENT ASSOCIATION OF AUSTRALIA

SUBMISSION TO THE
NSW PARLIAMENTARY INQUIRY INTO EfW TECHNOLOGY

WMAA NSW RESOURCE AND ENERGY RECOVERY WORKING GROUP

24 MAY 2017

SUBMISSION TO THE NSW PARLIAMENTARY INQUIRY INTO EfW TECHNOLOGY

The Waste Management Association of Australia (WMAA) is the peak national body for the waste and resource recovery sector. Our purpose is to lead the success of the waste and resource management sector across Australia. The NSW Resource and Energy Recovery Working Group brings considerable technical and industry experience across the various areas of the waste management industry including consultants, large and small waste companies, commercial waste facility operators and local government. We are grateful for the opportunity to make a submission to the NSW Parliamentary Inquiry into Energy from Waste technology and would be happy to provide further information to the inquiry upon request.

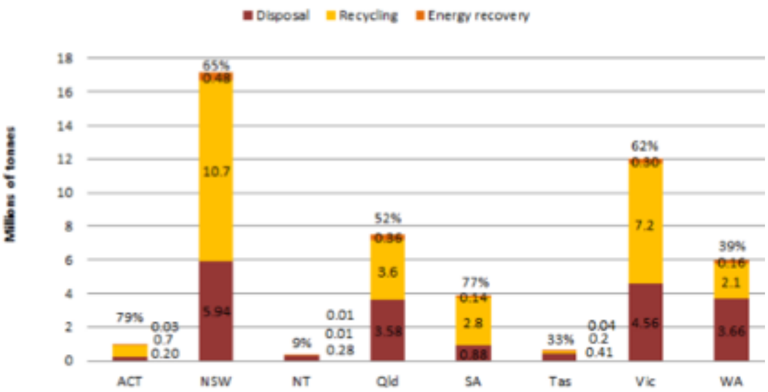
This submission has largely focused on the Sydney Metropolitan area. Although many of the comments would be applicable to the extended NSW area, it is noted that current legislation, logistics and population density present different challenges and may require different outcomes.

a. *The current provision of waste disposal and recycling, the impact of waste levies and the capacity (considering issues of location, scale, technology and environmental health) to address the ongoing disposal needs for commercial, industrial, household and hazardous waste.*

The Australian Government's *Waste Generation and Resource Recovery in Australia* (WGRRiA) report[1] applies a consistent methodology for assessing and reporting data from each Australian jurisdiction. This is the most comprehensive report on waste and recycling activity in Australia, and it provides the most robust basis for comparing each jurisdiction's performance. The most recent publication contains 2010-11 data.

The latest WGRRiA report demonstrates the scale of the waste sector in NSW, and the success of waste levies being used as a market based tool in driving diversion and a high level of recycling. The graph shows:

- NSW has far and away the biggest recycling sector of all Australian jurisdictions, recovering 10.7 million tonnes of material from the waste stream
- Recycling rates are much higher in NSW, SA, Victoria, ACT (which each apply levies on landfill disposal or in the case of ACT set the price for landfill disposal), compared with states with no or very low levies (QLD, WA, Tasmania and NT). Although it needs to be noted that the levy in WA has been increasing in recent years.



The resource recovery rate for each jurisdiction is given as a percentage above each column

Figure 1 – Resource Recovery Rates by State

The importance of the NSW landfill levy in driving resource recovery is further demonstrated by looking at the impact this levy has on different parts of the NSW waste stream. Specifically, compared to other Australian jurisdictions, NSW has a relatively high recovery rate for construction and demolition (C&D) waste streams, and household waste streams. As further explained in the table below, these waste streams are more sensitive to the application of landfill levies, compared with commercial and industrial (C&I) waste. In relation to C&I waste, NSW performance is on-par with the national average.

The NSW landfill levy has been a critical factor underpinning the development of resource recovery

1. www.environment.gov.au/protection/national-waste-policy/publications/waste-generation-and-resource-recovery-australia-report-and-data-workbooks

WASTE STREAM	NSW PERFORMANCE	COMMENT
Municipal Solid Waste (MSW)	MSW generation was about 4.8 Million tonnes (Mt) in 2010-11, with a resource recovery rate of 57%, which is 6% above the Australian average.	Councils aggregate MSW and have the capacity to enter long-term arrangements for its management and disposal. Levies have a strong impact on MSW, because councils are exposed to (and feel) the direct impact of increasing disposal costs. Councils, therefore, have an incentive to seek alternatives to disposal in NSW.
Commercial and Industrial (C&I)	NSW C&I waste generation was about 5.5Mt in 2010-11, with a resource recovery rate of 60%, which is 1% above the Australian average.	Waste is generally a small proportion of the total operating costs of C&I customers (typically <2%), and therefore not a major focus in cost control. Additionally, many C&I customers pay for waste services by volume, rather than weight, and are therefore less sensitive to changes in disposal costs due to the application of landfill levies.
Construction and Demolition (C&D)	NSW C&D waste generation was about 6.9Mt in 2010-11, with a resource recovery rate of 75%, which is 9% above the Australian average.	C&D waste streams are typically heavy, and are often generated on a project basis. This means the application of landfill levies can be very noticeable for C&D waste generators. At the same time, this material is relatively homogenous (compared to MSW or C&I). It is, therefore, easier to process the material for resource recovery.

infrastructure across this state. It incentivises diversion, increasing demands for alternative technology and markets as well as through the reinvestment of these funds (see commentary below). In the MSW space, there are currently five (5) mixed waste processing facilities in operation or commissioning, with combined capacity of more than 680,000t/a:

- Global Renewables Eastern Creek (220,000t/a)
- Veolia Woodlawn (150,000t/a)
- SUEZ Kemps Creek (134,000t/a)
- SUEZ Raymond Terrace (50,000t/a)
- Biomass Solutions Coffs Harbour (50,000t/a)

By comparison, there are no mixed waste processing facilities in Victoria (noting Melbourne has a much lower levy than Sydney and much less reinvestment back to industry), and only one (1) facility of this type in QLD at Cairns (where there is no levy). While cheap disposal is not the only barrier to developing this sort of long-term infrastructure, it is clear that landfill levies can underpin a level of private investment that is not viable in jurisdictions where landfill is cheap.

Landfill levies also raise revenue that can be used to improve the development of new infrastructure. WMAA advocates that a significant portion of the monies raised through waste levies should be reinvested back into the waste and resource recovery sector, especially to build resource recovery capacity and thereby reduce reliance on waste disposal.

The NSW Waste Less Recycle More (WLRM) grant program is a nine (9) year $802 million initiative that is fully funded from the waste levy. This represents a small portion of the money raised via the waste levy, which is a significant source of revenue to the NSW Government. The NSW EPA reports that the WLRM program has already awarded $292 million to 822 projects, which will create 845 jobs.

A number of NSW landfills have closed in recent years, with a consolidation of disposal around a small number of high capacity sites. With the recent closure of the Belrose Landfill and the imminent closure of the Eastern Creek Landfill, Sydney's disposal options for putrescible waste will soon be limited to SUEZ's Lucas Heights landfill and Veolia's Woodlawn Landfill that is 250km south of Sydney and accessed by rail from Clyde and Banksmeadow.

Waste generation rates in NSW continue to increase and, unless additional resource recovery capacity is developed, we will eventually need to develop a new landfill (or landfills) to service the Sydney population. The application of the landfill levy to assist in funding further infrastructure is critical to ensure that preference is given to the development of new resource recovery infrastructure, rather than new disposal sites. WMAA is supportive of the current WLRM program, however, would also encourage that the current caps on amount and requirement to match funds be reviewed to enable larger capital grants to be obtained to assist in delivering this essential infrastructure in NSW.

Given the importance of waste and resource recovery facilities for both public health and amenity, as well as the need for these facilities to support the urban growth predicted by Governments, WMAA also questions whether it is really appropriate for Government to simply "leave it to the market" to continue to provide these facilities, which has been the approach in NSW since the dismantling of WSN.

A number of states in Australia have just had their Waste Infrastructure Plans on exhibition (Victoria and SA), with varying degrees (read minor) of financial and planning support proposed for industry. In some regards, SA is leading the way from other states in that the Wingfield Resource Recovery precinct is well planned with its accessibility, ability to grow, clear buffer zone and good transport links and several modern well sited landfills. However, given the size of Adelaide, the density and growth of the SA population and the cost of land, one may argue that SA is uniquely placed.

Other states are not so lucky. The cost of land and urban growth pressures are particularly evident in NSW and Victoria. Existing sites, such as Hallam Road in Victoria and Jack's Gully in NSW are under pressure from adjacent urban spread. Given the cost of land, the challenge of finding land within appropriately zoned precincts, air shed issues (particularly for EfW facilities), as well as in some cases the legislative framework which exists, developing new sites in brownfield locations are challenging for all operators in the eastern states.

Development of new infrastructure at existing landfill sites can also be problematic, as community and planning authorities' expectations of a change of land use (and release of buffer zones for subdivision) have been developed in some cases over many years. However, this is an option that should be explored further in NSW. That is, putting these existing sites to further use for resource recovery sites, as opposed to potentially landfill given their current zoning and licensing. Even if newer facilities are enclosed and environmental considerations addressed, the perceptions remain a challenge.

Greenfield sites have their own challenges, particularly in relation to transportation. Often there are poor road networks and long travel times. This is not sustainable for commercial and domestic collection vehicles, particularly when coupled with noise restrictions associated with collection times. There is a need for convenient waste aggregation points (that is, transfer stations within metropolitan areas), if there is a desire to pursue greenfield sites for such infrastructure, that will not be encroached by urban growth. However, these transfer stations also require legislative and planning support by Government in order to be delivered.

Many pieces of work have been done by many levels of Government over recent years in relation to waste infrastructure planning. For example, a number of NSW Regions of Council (RoCs) were funded in 2014-15 to identify their needs. This was provided to the NSW EPA, yet there has been no comprehensive plan prepared in NSW and to date it does not appear as if the Greater Sydney Commission will fill this void.

It is submitted that waste and resource recovery infrastructure is too important to be left to the market alone by Government. Absolutely, the market is best placed to design, develop, invest and build such infrastructure in a competitive environment. However, it requires the clear support of Government at all levels, which must have a clear vision for what it wants, where and what is required and then provide the appropriate legislative, environmental and planning support to ensure its delivery. WMAA believes that there must be NSW Infrastructure Plan for Waste and Resource Recovery Facilities, identifying appropriate precincts and locations that support the growth of Sydney. This must then be supported by a State Environment Planning Policy (SEPP) to provide clear development pathways. In the absence of this support, NSW will continue to see facilities closing, with no real planning or discussion with industry as to what is required into the future to meet population projections.

Investment in NSW is further hampered by the issue of interstate waste transport, which highlights the importance that price signals in influencing behaviour. Specifically, a large volume (currently estimated at 600,000t/a) of waste is transported out of Sydney due to cheap disposal options in south-east QLD where there is no landfill levy. This activity undermines the NSW waste sector, and especially the ability for NSW operators to invest in new resource recovery capacity. WMAA strongly advocates for a common approach to levies nationally. Recognising that a reduction in levies would undermine existing (and future) infrastructure investment, WMAA advocates that other states should follow the lead of NSW and provide strong market based instruments to encourage investment in resource recovery. In the absence of this occurring, NSW should look to workable alternatives to the current proximity principle, such as the levy liability following the waste, irrespective of where it is disposed.

By global standards, NSW has relatively high recycling rates. However, a comparison against other comparable countries demonstrates that the amount of material disposed to landfill is also relatively high in NSW. A key reason is that, on top of having well-established recycling systems, many other countries also have access to energy from waste (EfW) facilities.

The WGRRiA Report considers Australia's performance compared with other nations that are members of the OECD, and notes that:

> *Australia's levels of MSW resource recovery were similar to those in the UK, Finland, Italy and the US, but were significantly below many northern and western EU nations and Korea. These nations make greater use of EfW facilities and often also divert a greater proportion of MSW to composting. Nations such as Switzerland, Austria, Sweden, Denmark, Norway and Belgium dispose of less than 2% by weight of MSW directly to landfill.*

WMAA strongly supports the concept of a 'waste hierarchy' that ranks ways of dealing with waste in order of preference, with avoiding the creation of waste the most desired outcome, and disposal the least desired outcome. This hierarchy concept, which sets priorities for the efficient use of resources, has been widely adopted by various government bodies in Australia and internationally. In NSW, the waste hierarchy depicted below underpins the objectives of the *Waste Avoidance and Resource Recovery Act 2001*.

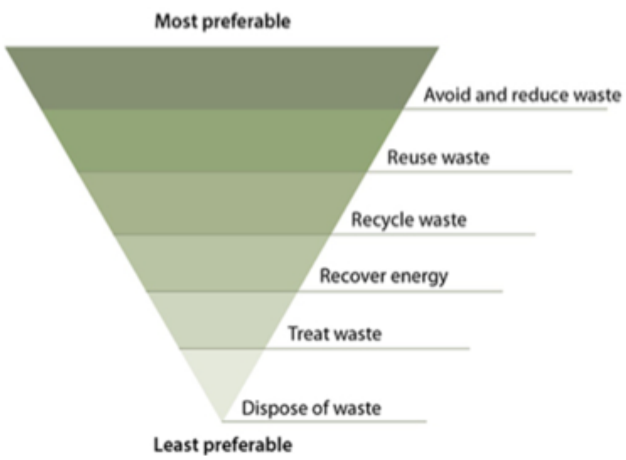


Figure 2 – The Waste Management Hierarchy

In accordance with the waste hierarchy, WMAA supports the view that where further recycling is not feasible, it is preferable to recover the energy from the material and feed it back into the economy, rather than dispose of this material. WMAA appreciates that this must be undertaken in a manner which is acceptable to the community, including managing the risks of harm to human health and the environment.

WMAA notes and supports that, in considering the case for developing EfW facilities, it is critical to consider the alternative pathways. If we do not create new opportunities to recover resources, then we will need to create new opportunities for disposal. The unfortunate reality is that modern society generates waste which must be dealt with.

The role of EfW is further explored in relation to Question 'b' below.

In summary, WMMA recommends the following points:

- Considering the large capital investment required for waste infrastructure projects and the lack of current data, it is recommended that the most up to date waste data is made publically available.
- That there is need for a common approach to levies nationally with other states following the NSW lead with strong market based instruments to encourage investment in resource recovery. Managing the application of levies in NSW is required to support this investment with a greater portion hypothecated to waste and resource recovery infrastructure.
- The development of a new Waste and Resource Recovery Infrastructure State Environment Planning Policy (SEPP) for waste including EfW to identify priorities and pathways providing investment certainty and addressing local community concerns.
- That the EPA publish the most recent Infrastructure Needs Assessment (by KMH Environmental) and use this as the basis of a Waste and Resource Recovery Infrastructure Plan (the only current policies are the WaRR Act and the funding priorities under WLRM, which are not specific or proactive).

b. The role of 'energy from waste' to address the ongoing needs and the resulting impact on the future of the recycling industry

THE ROLE OF ENERGY FROM WASTE

Management of solid wastes is internationally recognised as being guided by the Waste Management Hierarchy, which stipulates the preferred order of approaches to be undertaken in managing these resources. The hierarchy (depicted in Figure 2)[2] demonstrates that waste avoidance is the most preferred approach. If waste avoidance or reduction is not possible, then subsequent approaches – in order of decreasing preference – are reuse of waste items, recycling of the materials in the waste items, recovery of the energy embodied in the wastes, treatment, and finally disposal to landfill.

NSW has achieved significant success in diverting waste from landfill. Diversion in the Municipal and Commercial/ Industrial waste sectors has risen in 2002-03 from 31% and 34% respectively, to 55% and 61% respectively in 2012-13[3], despite the increase in waste generation over the same period. To a certain extent, this has been achieved by addressing the "low hanging fruit". Further diversion represents an increasing challenge. Many councils (generally outside of Metropolitan Sydney), are considering implementing co-collection of food and garden organics (FOGO collections). While this will increase landfill diversion in these regions, it is to be expected that diversion will plateau, because further recovery from the residual materials is unlikely to be economically viable. In order to achieve higher diversion rates, recovery of energy from these residuals will be required.

Management of wastes in accordance with this hierarchy is one of the objects of the *NSW Waste Avoidance and Resource Recovery Act 2001* (refer Figure 2).

The role of 'energy from waste' is to recover embodied energy from materials which cannot be reused or recycled, and would otherwise go to landfill for disposal. Ignoring this step in the hierarchy would in itself represent a 'waste' of the energy resource. It is important to stress that 'energy from waste' is not a means of waste disposal. Rather, it is a means of recovering resources (energy) from wastes which would otherwise go to disposal. Following energy recovery, further resources such as metals can be recovered from the process residues, with the bottom ash processed into an inert material widely used in construction materials, with the remaining flue gas residual sent for appropriate disposal in a landfill.

2. www.epa.nsw.gov.au/wastestrategy/waste-hierarchy.htm
3. NSW EPA State of the Environment, 2015

Typically, less than 5% of the mass of waste processed in this manner is sent for landfill disposal, thereby significantly conserving landfill void space as well as avoiding the odour issues normally associated with landfilling.

ENERGY FROM WASTE TECHNOLOGY

There are four (4) broad approaches to the recovery of energy from waste via a thermal process route. Within each there are a variety of technical options on the market, each representing a proprietary process offered by their respective designers and suppliers. An evaluation and comparison of these options is beyond the scope of this paper. Each system will have its own benefits that may or may not be applicable to the specific circumstances of each project. The important consideration is to ensure that the process operation and emissions conform to best practice, as outlined in the response to Question 'c' further in the document.

It should be noted that three (3) large scale EfW plants, 225,000t/a-400,000t/a processing residual MSW, C&I and C&D, have already been approved by the WA EPA over the last four (4) years. All of these approvals have followed extensive Public Environmental Review and public consultation. The technology approved included two (2) gasification technology plants and one (1) combustion technology plant.

In SA, the SUEZ ResourceCo Alternative Fuels facility was approved by the SA EPA in 2006 and has been operating for over ten (10) years, diverting 150,000t/a and producing Refuse Derived Fuel (RDF) for the cement kiln at Adelaide Brighton Cement, meeting all its regulatory requirements. Recently, Boral has received approval to use RDF at their Berrima facility. This is the first approval made under the NSW EPA EfW Policy. Subsequently, approval to manufacture the RDF has been granted to several companies.

The four (4) broad approaches are outlined below:

A. Refuse Derived Fuel

The pre-treatment of residual waste prior to combustion to produce a specific fuel fraction is increasing globally. Fuel produced from combustible waste is referred to as Refuse Derived Fuel (RDF). Often the production process will aim to produce a fuel product which meets a stringent specification, in which case the product is referred to as Solid Recovered Fuel (SRF) or Process Engineered Fuel (PEF). These latter terms are used interchangeably, and these materials generally have greater market acceptance because of the greater reliability they offer for a downstream thermal process as a result of their relative homogeneity. RDF is a by-product from the processing of waste, while PEF/SRF has specifications for its quality and composition.

PEF/SRF is defined in Europe as a solid fuel prepared from non-hazardous waste to be utilised for energy recovery, and meeting the classification and specification requirements set out in EN15359. In general, PEF/SRF has a higher calorific value and lower moisture content than RDF, making it a more attractive fuel.

This approach enables the recovery of energy to occur at a different site to that where the waste is processed, thereby reducing the dis-amenity associated with transporting large quantities of waste materials, and enabling this type of fuel to be traded as a commodity. The fuel can take various forms depending on the type of energy recovery system to be used. This includes a loose or flock material, which has been size-reduced, or extrusions into a fuel pellet.

COMBUSTION

In combustion processes, the waste feedstock undergoes complete oxidation in a furnace, releasing heat into the gaseous and solid combustion products. Energy recovery is achieved by using the hot combustion gases to heat water to produce steam, which is then expanded through a steam turbine to generate electricity.

A process flow diagram for a typical combustion plant is shown in Figure 3[4].

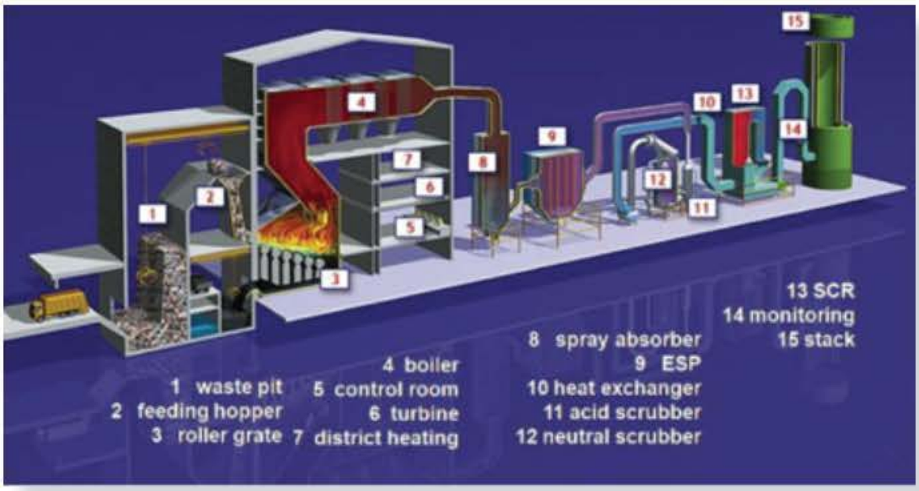


Figure 3 - Flow diagram of a MSW grate incinerator equipped with a roller grate

Combustion technology is widely used overseas. There are a number of technology providers offering a variety of proprietary furnace configurations, including moving grate, fluidised bed, and rotary kiln. In Europe, combustion technology is a central characteristic of the waste management system established for a number of cities. These plants serve to manage residual wastes and recover energy through power generation as well

4. IEA Task 36 – Overview of Technologies Used for Energy Recovery

as district heating. As a result, they are located close to residential areas. Examples include:

- Riverside Resource Recovery Facility, UK (approximately 20km East of the City of London);
- Issy-les-Moulineaux, France (approximately 7km from Paris CBD and 3.6km SW of Eifel Tower);
- Lausanne, Switzerland (approximately 2km from the CBD and 100m from residential housing);
- Thun, Switzerland (approximately 500m from residential housing);
- Vienna, Austria (approximately 3km from the CBD); and
- SE London Combined Heat and Power plant, UK (approximately 5km from central London).

The locations of these facilities in relation to residential housing and the commercial centre of these cities are shown in Figure 4 to Figure 9.

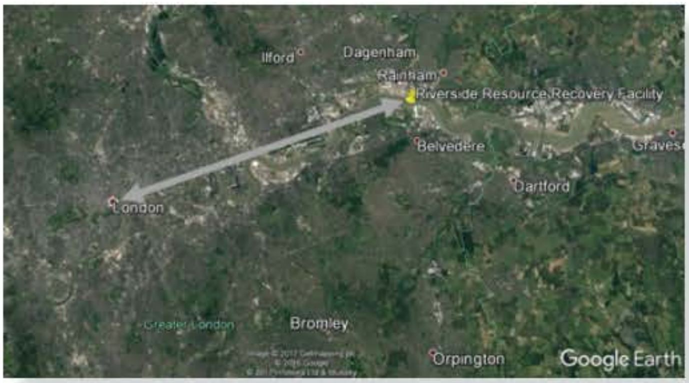


Figure 4 - Riverside Resource Recovery Facility, UK

Figure 5 - Issy-les-Moulineaux, France

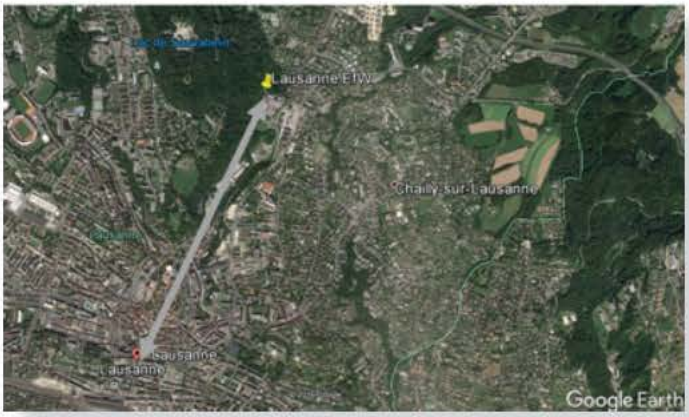


Figure 6 - Lausanne, Switzerland

Figure 7 - Thun, Switzerland

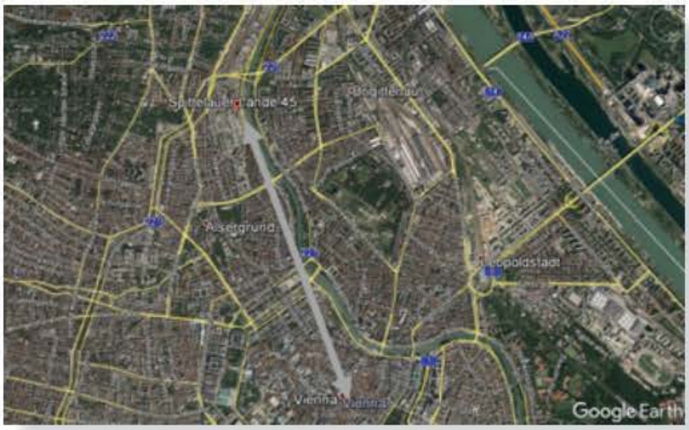


Figure 8 - Vienna, Austria

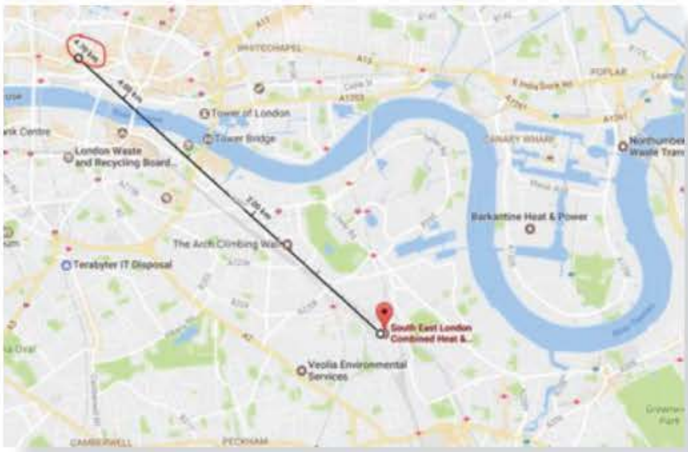


Figure 9 – South East London CHP, UK

B. Pyrolysis

Pyrolysis is not a new process as evidenced by the fact that charcoal has been manufactured by the pyrolysis of wood for centuries. In the early 19th Century, the process was used to supply coal gas for urban lighting.

In the pyrolysis process, the biomass (such as wood, agricultural residues or coal) is heated in a very low oxygen environment at temperatures above 430°C. The biomass decomposes and produces the following products:

- Char (carbon such as charcoal or coke);
- A gas with a high calorific value. Its composition varies, but in general it is made up largely of hydrogen and methane with small amounts of other hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen; and
- Oils and tars.

The char and the gas can be used as fuels in other processes. The oils and tars can be a problem, but they are also a source of a wide range of organic compounds.

Pyrolysis gas can be burned in a boiler or in an engine for the direct production of electricity. In this case, care must be taken to clean the gas and remove all tars and particulates.

The process is endothermic – meaning, it requires heat to be supplied, generally through burning some of the combustible gases produced. Pyrolysis will remove and destroy the volatile components of the biomass. The residual carbon is unaffected because there is insufficient oxygen to oxidise it.

Pyrolysis has not been successfully used to treat mixed municipal wastes and would, in all likelihood, be unsuitable for this application, because the heterogeneous nature of the waste would result in high contamination of the product char, rendering it unsuitable for most applications.

C. Gasification

Gasification is often confused with pyrolysis but it is in fact a process carried out under completely different conditions. With gasification, the material is heated at elevated temperatures in the presence of controlled quantities of air (or oxygen) and steam. Under these conditions, tars are cracked and the carbon residue is oxidised. The process is exothermic – meaning, it gives off heat, and the products are a combustible gas, and ash.

Gasification with air generates producer gas, while gasification with oxygen generates synthesis gas. Both are combustible, but have different concentrations of carbon monoxide, hydrogen, methane, carbon dioxide and nitrogen. Both producer and synthesis gas can be burnt in another process for the production of energy, and synthesis gas can also be used for the production of chemicals such as methanol – an important industrial chemical or a liquid fuel.

As with pyrolysis, gasification is not a new process. Fuel shortages during World War II resulted in many transport vehicles being fitted with rudimentary small gasifiers, being powered effectively by wood.

Gasification has been applied for the management of mixed urban waste and is widely used in Japan. Due to a very high temperature burn, it produces an inert vitrified residue which can be easily reused. However, it is not yet as commercially developed and deployed as combustion processes outside of Japan, and tends to be of a smaller scale.

THE IMPACT ON RECYCLING

If energy recovery were the only technology to be employed in managing wastes to achieve landfill diversion, recycling and recovery of material resources would be limited. Paper, cardboard and plastics currently recovered would be lost to energy recovery. This is not possible, however, under current NSW Government policy guidelines. The policy restricts the waste materials which can be processed through an energy recovery system, effectively mandating that recovery of recyclable resources be undertaken prior to recovery of energy from the residual materials.

Restricting the feed to EfW in this manner will ensure recycling is unaffected by this technology so that the integrity of the waste hierarchy is maintained.

However, a recommendation on applying a similar "Resource Recovery Threshold" principle to landfill is contained in Question 'c' below. This would have a much greater impact on improving recycling rates. It is also worth noting that, the countries with the highest penetration of EfW facilities have the highest recycling rates.

Other jurisdictions (like the WA EPA) have approached this issue without stipulating a Resource Recovery Threshold, but by requiring that any EfW facility must only process residual waste.

Provided environmental, health and higher resource recovery options are considered, EfW can play a role in achieving higher diversion of waste from landfill.

c. current regulatory standards, guidelines and policy statements oversighting 'energy from waste' technology, including reference to regulations covering:

i. The European Union
ii. United States of America
iii. International best practice

WMAA considers the NSW EPA to be the organisation most qualified to set regulatory standards, guidelines and policy statements relating to EfW in NSW.

WMAA members were part of the NSW EPA's Energy from Waste Consultative Committee, which was formed to provide expert advice on the development of the current NSW Energy from Waste Policy Statement. The Policy in its current form does provide adequate protection of environmental and human health.

However, there are areas in the Policy that can be improved. Several recommendations have been included below to better align with the European Union and International Best Practice.

THE EUROPEAN UNION (EU)

The aim of the **Waste Incineration Directive** (WID; 2000/76/EC) is to prevent or limit, as far as practicable, any negative effects on the environment. In particular, it relates to the pollution of air, soil, surface and groundwater and the resulting risk to human health by emissions from the thermal treatment of waste. It looks to achieve significant levels of environmental and human health protection by setting strict operational and technical requirements, which will enable the implementation of emission limit values for facilities throughout Europe. WID was first implemented in the EU in 2000 and imposed stringent requirements on incineration and co-incineration plants within its scope. These requirements covered a range of technical and operational aspects including types of waste permitted at plants, their delivery mechanisms, design of combustion furnaces, abatement plant, residue handling, monitoring equipment and emission limit values. Such technical standards and emission values are also required to be verified through on site testing/analysis and reported back to the Environment Agency.

The WID as described above has been recast within the **Industrial Emissions Directive** (IED; 2010/75/EU) as of December 2010. The purpose of this was to transpose several pre-existing directives on the control of emissions from industrial processes into one (1) directive on industrial emissions. The IED was introduced into European law, and was to be adopted into each member country's law by 6 January 2013.

The implementation of the IED caused minimal changes to the requirements of the WID in the IED. However, Article 42(1) of the IED removes the waste incineration provisions from gasification and pyrolysis plants "if the gases resulting from this thermal treatment of waste are purified to such an extent that they are no longer a waste prior to their incineration and they can cause emissions no higher than those resulting from the burning of natural gas".

The recovery of energy from mixed wood waste collections ,such as construction and demolition waste or civic amenity site waste or wood waste that is contaminated (e.g. painted or chemically treated) or mixed with contaminated wood, will be regulated as the incineration of waste.

All new plants must fulfil the so-called R1-Regulation which sets a minimum thermal efficiency for classification as an energy recovery process.

Management and re-use of bottom ash is typically dealt with on a national level. In England and Wales, for example, the agencies use Standard Rules SR2012 No13 of the *Environmental Permitting (England & Wales) Regulations 2010* to licence treatment of Incinerator Bottom Ash (IBA). Similar regulations exist in most other European countries.

UNITED STATES OF AMERICA (USA)

The citing and operation of EfW facilities in the USA is regulated under the federal *Clean Air Act* (CAA; originally passed 1970), and also similar state laws with respect to emissions limits and required pollution control technologies. It should be noted that, there is no single body of law that regulates citing, construction and operation. Most EfW capacity which is still operating was installed in the late-1980s to early 1990s.

INTERNATIONAL BEST PRACTICE

It should be noted that, Japan has a significant installed capacity of EfW plants that are regulated under the Japan Environmental Governing Standards (JEGS) 2010. There are a number of important definitions in the JEGS, and in many cases the definitions differ from the equivalent term in the EU and other regions. It is noteworthy that the national emissions limits are more stringent for metropolitan than for rural areas and can be less stringent than for the European WID.

International best practice standards are set and continuously further developed in Europe. International best practice includes regulatory frameworks promoting the circular economy, source separation, and recovery of organics and recyclables. It also clearly establishes rules to ban non-treated waste or waste with biological potential and any plastics going to landfill.

WMAA recognises and supports the fact that the NSW EfW policy has incorporated many international best practice standards. However, the following recommendations are provided to improve the policy:

- A more consistent approach with the waste hierarchy regarding the resource recovery threshold. The current NSW EfW Policy has established resource recovery hurdles for the use of waste in EfW, but without limits for landfills in its regulatory framework. This means that the recognised higher order use of waste faces more hurdles than landfilling.
- The specific limit in the NSW EfW Policy for chlorine is removed. The IED (Europe standard) applies the 1% rule only for hazardous wastes containing chlorine as these wastes can be more difficult to combust fully, and therefore the required temperature will be 1100°C. The EfW Policy clearly states that the thermal treatment of hazardous wastes is excluded from the Policy statement. However, the NSW EfW Policy applies this rule to all waste containing chlorine. It has been industrially proven that waste

can be combusted safely with elevated chlorine content and the flue gas treated as required below the required emission limits.

- The Standard rules SR2012 No13 of the *Environmental Permitting (England & Wales) Regulations 2010* to license treatment of Incinerator Bottom Ash (IBA) are adopted in NSW. Today, the re-use of bottom ash is not possible in NSW due to the lack of a Resource Recovery Exemption.

- The NSW EPA closely follows European best practice and incorporates future developments as they arise into the NSW EfW Policy.

- The proposed Waste and Resource Recovery SEPP require new land release areas to incorporate waste and resource encourage and facilities on site, including potentially EfW (similar to Barrangarroo).

d. "additional factors which need to be taken into account within regulatory and other processes for approval and operation of 'energy from waste' plants"

The current NSW regulations and processes for approval and operation are comprehensive, covering all aspects relating to the EfW facility. This includes emission control and residual emissions, health impact, social license, transport, recycling and greenhouse benefits.

However, there are three (3) more factors that could also be be considered in processes for approval:

- The 'do nothing' situation. In this respect, if an EfW facility is not built, the impact of growing waste volumes (in excess of current levels), and their impact on community (traffic, landfill and transport emissions, greenhouse, recycling) should be compared side by side with the proposed development in a quantitative way.

- The energy requirements (heating, cooling and electricity) for the surrounding area and the National Electricity Market should also be taken into account. EfW provides a significant but partial renewable energy source that is baseline and supports grid stability of electricity networks.

- The NSW EfW Policy is currently restrictive with regards to emerging or innovative EfW technologies, as they may not be able to demonstrate fully operational reference plants on like waste types. It is recommended that a pathway for approval for these kinds of technologies, which does not present risk of harm to the environment or health, be developed by the NSW EPA and included into the EfW Policy at the earliest opportunity.

e. "the responsibility given to state and local government authorities in the environmental monitoring of 'energy from waste' facilities"

WMAA supports the current provisions for the NSW State Government (through the EPA) to monitor the environmental performance of EfW facilities. The NSW EPA is better suited than local government for monitoring of EfW facilities. The NSW EPA is required by law to consider the potential environmental impact across a wider geographic area than just one local government area, and it has greater resources to monitor these kinds of facilities including technical, policy and legal expertise.

f. opportunities to incorporate future advances in technology into any operating 'energy from waste' facility

Modern EfW facilities and technology providers are faced with competitive and regulatory pressures to continually improve performance of key components and the overall efficiency of the plant. It is worth noting that in the EU, modern EfW facilities being licensed under the IED need to adhere to Best Available Technology (BAT) Requirements. The BAT are continually under review and advancements in technologies are recognised and adopted in revisions of the BREF Guidance[5] notes as appropriate.

Most modern EfW facilities are constructed in a modular facility, which readily enables the upgrade of the process and equipment items with newer technology (for example, grate, turbine, air pollution control, ash recycling and treatment).

Modern EfW facilities can also be flexible in terms of feedstock properties such that, in the event of upstream changes to waste recycling practices, either through further source segregation or though waste pre-treatment, the composition changes, the plant can still process the waste, thus not discouraging advances in recycling through the current choice of technology.

g. the risks of future monopolisation in markets for waste disposal and the potential to enable a 'circular economy' model for the waste disposal industry

A major barrier to a competitive waste market in NSW is the challenge of gaining approval and investing in long-term infrastructure. If it was 'easy' to develop new putrescible waste landfills, then Sydney would not be reliant on two (2) facilities, as it is currently. Whilst landfill development is hard, in many circumstances, advanced resource recovery technology is even harder. High barriers to developing new resource recovery infrastructure have a similar effect of reducing market competition. There

5. http://eippcb.jrc ec.europa.eu/reference/wi.html

are a limited number of organisations with the scale and resources required to develop any waste or recycling infrastructure in NSW.

If the objective is to develop a more competitive market, then serious thought must be given to streamlining current planning and approvals processes in order to provide the market with a higher degree of confidence in the ability to develop new facilities. WMAA supports the concept of planning reforms that reduce the time, cost and uncertainty associated with gaining approval, and is of the view that this reform can be undertaken in a manner which does not increase the risk of poor outcomes for the community or the environment.

We note that development of new EfW facilities would increase market competition, compared with the current situation, given it would provide a new opportunity for managing materials which are currently disposed to landfill.

In relation to enabling a circular economy model for the waste industry, we note that the European Commission recently (26 January 2017) released a communiqué on 'the role of waste-to-energy in the circular economy'[6]. This paper concludes that:

> *Waste-to-energy processes can play a role in the transition to a circular economy, provided that the EU waste hierarchy is used as a guiding principle and that choices made do not prevent higher levels of prevention, reuse and recycling. This is essential in order to ensure the full potential of a circular economy, both environmentally and economically … it is only by respecting the waste hierarchy that waste-to-energy can maximise the circular economy's contribution to decarbonisation.*

This conclusion by the European Commission is aligned with the view of WMAA, as presented in this paper, that the management of waste in NSW should be undertaken in accordance with the waste hierarchy. This hierarchy sets out that energy recovery is a better option than disposal, where it is safe to do so.

A SEPP should also ensure the industry adopts a portfolio approach to the introduction of EfW facilities and ensure the individual plants are sized according to need and local catchment to receive waste to:

- reduce the overall impact from a planning perspective in terms of physical scale;
- reduce the local traffic impact;
- adopt a principle of managing waste within the region it arises;
- not sacrifice future recycling; and
- maintain commercial competition within the industry.

The Development Approval for any future EfW facility needs to first establish need. The majority of EfW facilities developed across the world are built to service local councils or groups of local councils' waste needs supplemented with residual C&I waste arising within the locality.

Typically, in other OECD countries, the majority of EfW plants are sized between 200,000-300,000t/a, being a size which manages the waste arising in the region the facility serves. Larger facilities are in existence or development. These, however, tend to serve very high density metropolitan areas where the volumes of waste arise locally, and tend to also be well served by alternative transport infrastructure, such as waste by rail or by river, to minimise traffic impacts.

Local government in NSW could potentially play this role in providing future feedstock for these facilities. Following the waste hierarchy, it should be possible for councils to direct the residual MSW to EfW rather than landfill. One of the current barriers to this – that is being successfully pursued in NSW – is individual councils, on their own, not having sufficient size and scale to approach the market to deliver such a facility. Guidance is required from state government to encourage joint procurement of EfW facilities, including potentially amending the *Local Government Act 1993* to enable this procurement to occur between councils, including potentially longer term contracts.

WMAA makes the following recommendations:

- The introduction of a SEPP that streamlines current planning and approval processes to provide market confidence for investment for waste and resource recovery facilities in NSW.
- State government leadership in the emerging EfW sector is necessary to create the environment for investment and to provide clear direction. In particular, councils and RoCs should be given greater guidance on how to procure regional infrastructure, as is normal in overseas infrastructure procurement. Policy settings that align with waste hierarchy, local needs, pricing and limitations on cheap landfill disposal are required to provide an attractive investment environment.

h. Any other related matter

EfW FACILITIES REFERENCES ACHIEVING BEST PRACTICE ENVIRONMENTAL OUTCOMES

The following is just a small sample of operational EfW facilities in the UK & mainland Europe that are meeting best practice environmental outcomes with emissions and energy efficiency.

6. http://ec.europa.eu/environment/waste/waste-to-energy.pdf

Buckinghamshire UK (2016)
Thermal power per line: 1 x 101.8MW
Electric power output: 29.4 MW
District heating output: 6.6 MWth
www.greatmoor.co.uk/emissions-reports/

Riverside UK (2013)
Thermal power per line: 3 x 81 MW
Electric power output 73 MW (gross)
R1= 0.81

Ferrybridge UK (2015)
Net Electricity Production – 67.8MWe
Net Electrical Efficiency > 31%
R1 – 0.85
Savings in CO_2 – 670 kg/t waste

Cleveland UK (2013)
Thermal power per line: 2 x 46 MW
Electric power output 26 MW (gross)
R1= 0.70

Lucerne Switzerland (2015)
Net Electricity Production –18MWe
Process steam to paper mill – 22MWth
R1- 0.75
Savings in CO_2 – 450kg/t

REFERENCE REPORTS FOR BEST PRACTICE EfW

The following references are provided as examples of independent reports into EfW facilities:

1. Western Australian EPA and Waste Authority support for EfW

www.wasteauthority.wa.gov.au/publications/waste-to-energy
WtE Summary Report 2013 by WSP
WtE Technical Report 2013 (Stage 1, 2 & 3) by WSP

2. Green Peace (Europe) support for EfW

www.greenpeace-magazin.de/der-muell-und-die-mythen
Wie sauber sind müllverbrennungsanlagen?
or translated:
How clean are MSW energy incineration plants?

They were the hate object of the 1980s. In almost every major city, citizens protested against the construction of waste incineration plants (MVA). People were afraid of dioxin pollution and noise created by delivery traffic. Thanks to the civil protests, most of the horror scenarios did not occur, although in the last 20 years, the number of waste incineration plants has almost doubled. In 2007, there were 72 MVA. At the same time, however – due to the strict pollution control regulation – compared to 1990, the dioxin pollution fell to one thousandth.

"Fireplaces and tiled stoves are much bigger dioxin slugs than all waste incineration plants," says IFEU expert Giegrich. An IFEU study concludes that the plants "remove" air toxins: if the equivalent amount of electricity and heat were generated in conventional coal-fired power plants, an additional three tons of arsenic, cadmium and other heavy metals burdened the atmosphere. MVA is also better off in its carbon dioxide balance than its reputation: when one tonne of residual waste is burnt, about one tonne of carbon dioxide is produced. However, about half of this is classified as climate-neutral, because the greenhouse gas originates from organic residues in the residual waste toner. As with every incineration, however, residues remain in the refuse bins – per ton of residual waste 250 kilograms of slag and 30 kilograms of filter dust from flue gas cleaning. The dusts must be placed in the special dumping site, while the slags, when they meet certain pollutant limits, are used in road construction.

3. German Green Party support for EfW

www.cewep.eu/information/whatiswastetoenergy/subdir/m_542
Refer see slides 25 and 26

Lessons learned in Germany:

- Avoiding waste and recycling quotas cannot be sufficient to solve all problems related to municipal waste – they are an integral part of the solution
- Recycling has limits, e.g. plastic, hygienic products like diapers, and others
- Even recycling products become waste after use, problem of "down-cycling"
- Using the best available technology for the incineration of residual waste leads to less impact on the environment and Environmental commitment is an important requirement for developing cleaner incineration technologies.

There are still challenges to face.

A sustainable waste management is a central element of environmental and climate protection. This includes:

1. establishing re-use and take back systems;
2. closing the cycle for raw materials, including integrated product-design and increased recycling;
3. no more landfilling at the earliest possible point; and
4. residues should generate heat and electricity using the best available and reliable technology.

EXTENDED PRODUCER RESPONSIBILITY

Extended Producer Responsibility (EPR) commonly forms part of an integrated waste management strategy, and is defined in the 2001 OECD Guidance as "an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle".

It adopts the Polluter Pays Principle (PPP), an environmental policy principle which requires that the costs of pollution be borne by those who cause it.

And the circular economy concept, aiming to close materials loops and extend the lifespan of materials through longer use and the increased use of secondary raw materials, improving resource security.

The following is an extract from a paper published on EPR, "The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges - Global Forum on Environment: Promoting Sustainable Materials Management" 17-19 June 2014, Tokyo, Japan:

> *(EPR) is increasingly recognised worldwide as an efficient waste management policy to help improve recycling and reduce landfilling of products and materials. The basic feature of EPR is that producers assume responsibility for managing the waste generated by their products put on the market. Since its first developments in the early 1990s, such*

schemes have contributed to significant increases in recycling rates and reductions of public spending on waste management in many countries. In addition, producers under an EPR scheme are incentivised to maximise the material benefits from their products throughout the value chain.

Today, most OECD countries and many emerging economies have EPR programmes and policies in place. Such programmes are also in the scoping stage in some developing countries in Asia, Africa and South America. Australia has fallen behind other comparable countries in this respect, which is a lost opportunity.

CONCLUSION

The Waste Management Association of Australia (WMAA) is the peak national body for the waste and resource recovery sector.

The NSW Resource and Energy Recovery Working group has considerable expertise in EfW on account of having amongst its members technically qualified and experienced consultants, industry and local government representatives in the fields of waste management, energy and environmental sustainability. Personnel from companies that have developed, banked and operated EfW plants in Australia, the EU and other jurisdictions, are active in the group.

If requested, WMMA would be pleased to call upon its wide ranging expertise to provide further evidence or information to the inquiry.

Gayle Sloan
WMAA Chief Executive Officer

WMAA

WASTE MANAGEMENT ASSOCIATION OF AUSTRALIA