Submission
No 460

INQUIRY INTO PROPOSED ENERGY FROM WASTE FACILITIES

Name: Mr Ian Wiskin

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31st October 2025

The Hon Nicole Overall MLC
Chair,
Legislative Council Select Committee on Proposed Energy from Waste Facilities
Parliament House
Macquarie St
SYDNEY NSW 2000

Dear Madam Chair,

I am pleased to submit to the Select Committee's Inquiry. Submission follows.

Should you require my presence at any select committee hearing, I'll make myself available, subject to a mutually agreed timetable.

Yours faithfully,

Ian Wiskin

SUBMISSION TO THE LEGISLATIVE COUNCIL SELECT COMMITTEE ON PROPOSED ENERGY FROM WASTE FACILITIES

Declaration and Background

I act as a strategic adviser to the Parkes Energy Recovery (PER) Project; however, the comments in this submission are my observations and not necessarily those of PER.

My background includes initiating employment-generating development and assisting with the management of planning approvals for significant development, both locally and internationally. Some regional projects include, but are not limited to:

- North Parkes Copper/Gold mine (original approval)
- Cadia Copper/Gold mine (original approval)
- Cowal Copper/Gold mine (original approval)
- Visy Tumut Kraft Pulp and Paper Mill (original approval)
- Woodlawn (Tarago) MSW Bioreactor (original approval)

Given our many years of work with industrial companies, we are often called upon to advise on the commercial viability of recycling and energy recovery projects.

My interest in the waste sector began in the 1980s, establishing an industry initiative to recycle aluminium cans, decades before ‘return and earn’ schemes. Since then, some of my time has been directed to recycling for lead-acid batteries, to refuse-derived fuel (RDF), to utilising waste for industrial power generation, to recovering recycled paper as an input to paper manufacturing, and to examining the feasibility of various recycling and energy proposals.

Have we been here before?

In 1998, I was part of a team that initiated a search for additional landfill space for the Sydney region. At that time, the Sydney region faced a deficit in landfill space — a problem that persists today. Three sites were then identified – Woodlawn/Tarago, Cessnock and Ardlethan Tin mine. The latter two were unsuitable due to poor geological conditions. The Ardlethan's proposal was rejected following a Commission of Inquiry. Cessnock was promoted and evaluated by the then-government-owned Waste Service NSW (WSN), but the project was later abandoned.

During this time, our team developed a concept design for a landfill at Woodlawn, which was offered to the then NSW government but was declined.

Subsequently, Collex (now Veolia) was encouraged to adopt the Woodlawn initiative and proceeded with a bioreactor to accept Municipal Solid Waste (MSW), capture methane for electricity generation and other purposes. Planning approval was granted following a Commission of Inquiry, and the facility commenced operation in 2005 after planning approval was given for a Sydney-based rail waste transfer facility at Clyde.

My initiation to Energy from Waste (EfW) was in 2007 at a National Energy from Waste Conference at Manly, NSW,[1]. The conference addressed many of the issues raised in submissions to this select committee. As they say: ‘Everything old is new again’.

At the time, some of us predicted NSW would need to address a landfill deficit in 20 years. It is now 18 years later, and the prophecy is staring us in the face in 2030.

In 2007, there was neither merit nor a government imperative for EfW in NSW, as the landfill deficit was averted with the commencement of the Woodlawn/Tarago bioreactor.

However, we subsequently turned our attention to the adoption of industrial waste as a substitute energy source for several industries, including cement, steel, and paper production.

In recent years, I have had the opportunity to advise on the original ReGroup/Energy Australia Mt Piper EfW proposal (discontinued) to investigate EfW facilities in the UK, US, Europe and a combined paper recycling EfW facility in Melbourne.

This provided me with the necessary background to understand the EfW feasibility and drivers, environmental and health impacts, and management protocols of modern EfW facilities.

Waste Management – A Situation Report

The World Bank predicts global waste volumes will reach 3.4 billion tonnes annually by 2050. The latest estimates indicate that it will reach 3.9 billion tonnes, and global waste generation will increase by 55 per cent from 2025 to 2050.

Most of the world's waste is still landfilled without extracting value from the resource and minimising environmental impacts. Plastic waste remains an intractable problem, and over one-third of the world's waste ends up in waterways and oceans, where it is not controlled.

Facts are:

- Some 40 percent of the world's waste is disposed of in landfills. In 2022 / 23, NSW generated 22.4 million tonnes of waste – recycling 14.7 million tonnes and 7.7 million tonnes sent to landfill.
- Over 30 percent of the world’s waste is dumped, openly incinerated or entering waterways. NSW has seen an increase in open dumping of waste into the environment due to increasing landfill disposal costs.
- Recycling rates around the world have plateaued due to a lack of investment in recycled product plants and increasing costs of energy required to recover materials. In NSW, recycling has stalled at around 65 percent since 2015/16.

[1] National Energy from Waste Conference 18-19 July 2007, Manly NSW.

However, this doesn't account for contaminated recycled material (yellow bin) waste that is ultimately landfilled as being unsuitable for recovery and reuse[2].

- Sydney landfill space is expected to run out by 2030. In the absence of EfW, existing landfills will need to be extended, and the Woodlawn/Tarago landfill is likely to require an increase in the landfilling rate. This situation will have the perverse outcome of cannibalising existing landfill space in the future until EfW, or alternatives, take effect, raising concerns about the management and environmental impacts of increasing landfilling rates.
- In NSW, landfill disposal is experiencing a critical shortage and has fallen behind in delivering the 2019 National Waste Targets. NSW targets for 2030 are:
  - 80 percent diversion from landfill
  - 50 percent reduction in organics to landfill; and
  - A 10 percent reduction in per capita waste generation.

Notably, NSW's per capita waste generation has risen by 2 percent since 2019.

NSW targets will not be achieved by 2030. Alternative waste technologies, such as EfW and FOGO, will not be implemented unless timely planning approvals and accelerated construction are secured.

The looming waste/landfill crisis, if unresolved, will lead to significantly higher residential waste disposal charges and unacceptable short-term solutions for new landfills.

Comments on the Terms of Reference:

Term of Reference 1(a)

> ***The performance of the technologies proposed for the Tarago and Parkes Energy Recovery Facilities as compared to leading thermal technologies employed in "state of the art" facilities internationally, noting such technologies as proposed are not employed anywhere else on the Eastern seaboard***

In addressing the performance of technologies used in modern EfW facilities, the Select Committee should be guided by:

- The NSW government's cross-agency working group on EfW (2019)
- The independent report of the Chief NSW Scientist (May 2020), and additional advice of November 2020.
- NSW Government Energy from Waste Policy Statement (June 2021).
- Updated advice of the NSW Chief Scientist (April 2025) (released October 2025) as part of the NSW Government's Energy from Waste Framework (October 2025)

[2] Some estimates put contaminated recycled material from yellow bin waste between 20 and 30 percent.

Any EfW proposal will be required to have regard to the NSW Chief Scientist's findings, the NSW EfW Policy, and the EfW Waste Framework. Many of the requirements will be mandated in development consents and EPA licences for EfW proposals, which are legally enforceable.

Emission standards for modern EfW facilities apply the latest Best Available Technology (BAT) and are a benchmark for limits on emissions from operating EfW facilities in other jurisdictions.

The World Has Adopted Energy from Waste

Every world empire has used incineration of waste since the foundation of cities for at least the last 10,000 years.

The first industrial-scale waste incinerator was built in 1874, and rudimentary, uncontrolled waste-burning incinerators have been in use for the past 150 years, depositing essentially uncontrolled mass emissions into the environment. Sydney closed its last waste incinerator at Tempe in 1971 after failing air quality requirements.

There are over 2,000 EfW plants worldwide, comprising some 4000 boiler lines.

EfW is preferred to landfilling waste in the EU, United States, Canada, Japan, South Korea, Singapore, Taiwan, China, Saudi Arabia, Qatar, and the United Arab Emirates (home of the latest EfW facilities).

New modern facilities are being built to replace older plants in Europe and the US, whereas Asia, Africa and the sub-continent have an ambitious programme of new EfW construction.

Since the announcement of this Select Committee.

- Indonesia has announced plans to build EfW plants in 33 cities
- Greece has announced six new EfW facilities, and
- Vietnam has announced the opening of the world’s second-largest EfW.

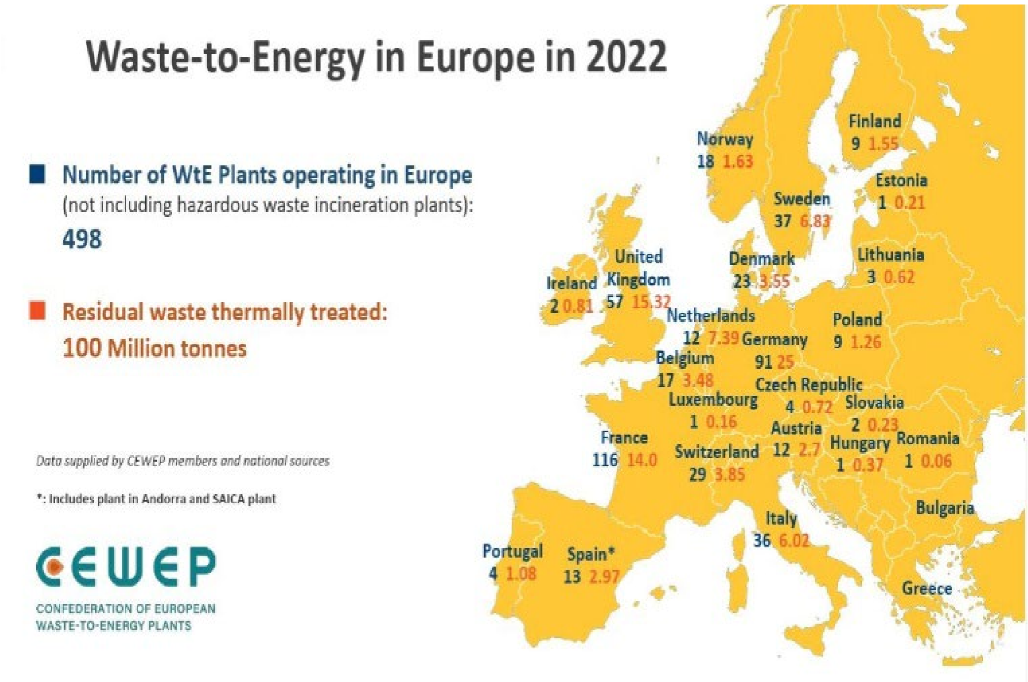
In Europe, EfW facilities processed over 100 million tonnes of waste (after reuse and recycling) in 27 countries with a combined population of 450 million.

All nations have difficulty achieving net recycling rate targets from the waste stream due to a lack of viable commercial pathways for recycled or recovered products, the cost of processing recovered waste, and a lack of energy essential for recycled processing.

European experience shows that achieving material recycling rates above 50 percent is exceptionally difficult. The best performance (up to 67 per cent) is from countries with the highest EfW take-up (Germany, Scandinavia, Switzerland).

The EU mandates a 10 per cent cap on landfill waste, to be met by 2035. Some Scandinavian countries are already at 1 per cent landfill through extensive adoption of EfW

Figure 1.



EfW provides an energy recovery pathway for making recycled products, offers reliable power for industry, and produces new products (road base and construction materials), recovers ferrous and non-ferrous metals from the remaining EfW bottom ash and pollution control residues left after combusting waste fuel at high temperatures.

EfW’s primary purpose is to manage the disposal of non-recyclable waste - municipal solid waste (commonly referred to as red bin waste) and commercial/industrial waste from businesses.

The secondary outputs from EfW are electricity and steam generation. Both elements can be used to supply reliable 24/7 power to the grid, businesses and residences. A properly configured EfW grid connection can be used to stabilise grid electricity supply against frequency and supply disruptions caused by intermittent renewable sources, preventing blackouts.

EfW also uses land more efficiently for energy production than renewables, which require considerably more land to generate the same amount of electricity.

For example, an optimised EfW for Parkes will generate between 24,000 and 27,000 MWh of electricity per hectare compared with a solar farm producing intermittent power of around 850-870 MWh per hectare.

Would You Live Near a Plant Using Waste for Fuel? – I Do

During my various trips to Parkes, I have had to deal with the constant refrain:

'Would you live near an EfW facility?'

The Berrima clinker and cement plant in the Southern Highlands was established in 1929 and currently produces 60 percent of NSW and ACT cement requirements.

Since 2018, the Berrima plant has approval to use 100,000 tonnes of solid waste-derived fuels (SWDF) sourced from the Sydney region as a coal/diesel substitute, including waste tyres, refuse-derived fuel (RDF) from wood and mixed solid waste (MSW) residues.

The Berrima cement stack is 600 m from the New Berrima residential area, which is 300 m from the cement works boundary. It is also 2 km from the Berrima township and 4km from Moss Vale.

My residence is 7 km away from the Berrima kiln stack. The population catchment within that radial distance is 12,000 people (23,000 if Bowral is included).

By comparison, the proposed PER facility is 5.5 km from the nearest Parkes residential area and 7.5 km from Cooke Parke (Parkes Central) and has a significantly smaller population catchment than that around the Berrima cement plant.

For most of its history since 1929, the Berrima cement plant has not been subject to strict pollution controls and would have emitted significant historical levels of pollution.

Berrima Cement is now a modern, well-regulated, emissions-controlled facility:

- Within proximity to a significant population.
- There are no historical or modern reports of health impacts.
- Cattle graze on pasture immediately adjacent to the plant boundary and the wider surrounding area and have done so for nearly 100 years.
- Land values of agricultural land adjacent to the cement plant are arguably the highest in NSW.

As it is an existing plant, the Berrima facility is not required to meet the emissions profile in the 2021 NSW EPA EfW Policy. However, it produces similar emissions to those of an EfW plant, as shown in Figure 2. Its emissions are well within EPA licence limits.

Figure 2

Parameter	Unit	Limits	30 April & 1 May 24 R016899-1
Mercury	mg/m3	0.05	<0.02
Type 1 and type 2 substances	mg/m3	0.5	<0.008
Solid particles	mg/m3	50	30
Nitrogen oxides	mg/m3	1250	750
Cadmium and Thallium	mg/m3	0.05	<0.005
Chlorine	mg/m3	50	0.49
Dioxine and Furans (I-TEQ middle bound)	ng/m3	0.1	0.0033
Hydrogen chloride (HCl)*	mg/m3	10	0.96
Hydrogen fluoride	mg/m3	1	<0.004
Sulfur dioxide	mg/m3	50	<0.031
Sulfuric acid mist and sulfur trioxide	mg/m3	50	0.064
Volatiles organic compounds	mg/m3	40	1.9

*Note that HCl is well below the limit of 10mg/m3.

Term of Reference 1(b)

The spread of the emissions predicted and the quality of emissions to be generated

Second-guessing the spread of emissions from any EfW proposal without the benefit of a site-specific air quality assessment is nothing more than speculation.

Advanced air-quality modelling that accounts for local topography, prevailing winds, seasons, stack height, and other factors is required. This will form the basis of an environmental assessment to be detailed in an Environmental Impact Study (EIS).

It is noted that opponents of the PER project have resorted to Plume Plotter to mimic conditions for plume spread from the Parkes EfW. The model is a very old 1970s model with many limitations. The first being the use of weather data from Dubbo as representative of conditions at Parkes. The outdated model also makes generic assumptions about physical and chemical processes, static weather conditions and fails to replicate terrain data. It cannot be relied upon for decision-making and appears to have the singular purpose of supporting a misleading scare campaign.

A key issue is a proper interpretation of the flu gas flow after it leaves the stack, which is mitigated by the ambient airstream. 99.9+ per cent of stack emissions are normal constituents of the atmosphere (Figure 3), including 20 percent from water vapour (steam) from moisture in the waste. The remaining pollutants of concern are challenging to detect in the airstream at the EfW boundary.

The primary pollutants of concern, such as heavy metals and dioxins, need to be assessed at ground level. Minuscule amounts of pollutants in the stack do not necessarily present at ground level and will be close to or beyond the limits of detection.

Emissions can emanate from many sources and cannot be attributed solely to EfW. Industrial processes, other industrial and agricultural activity, and diesel transport produce emissions. Most natural processes also emit emissions, including methane and CO_2. The latter is essential to plant growth and life.

Unfortunately, many misconceptions exist about emissions, their sources, and their impact, leading to misinformation and undue community anxiety.

Emissions from various sources must be considered in perspective. No single source/industry should be singled out and demonised without understanding the overall background emissions profile.

EfW facilities employ a carefully controlled combustion process at very high temperatures, combined with sophisticated air pollution control equipment, to ensure emissions are well below strict environmental limits and fully protective of human health and the environment.

In a typical EfW facility, over ninety-nine per cent (99.9+%) of emissions from an EfW stack consist of standard atmospheric components, including nitrogen, oxygen, and water vapour in the form of steam, comprising twenty percent (20%) of atmospheric flue gas emissions from inherent water in MSW.

Figures 3 and 4 show the emission profile of a typical modern EfW facility[3].

Figure 3: Typical **Composition of EfW Stack Emission**

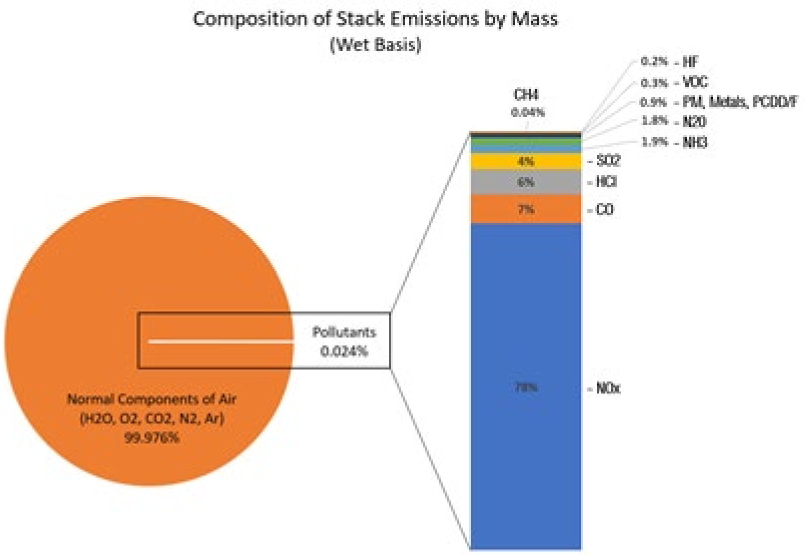
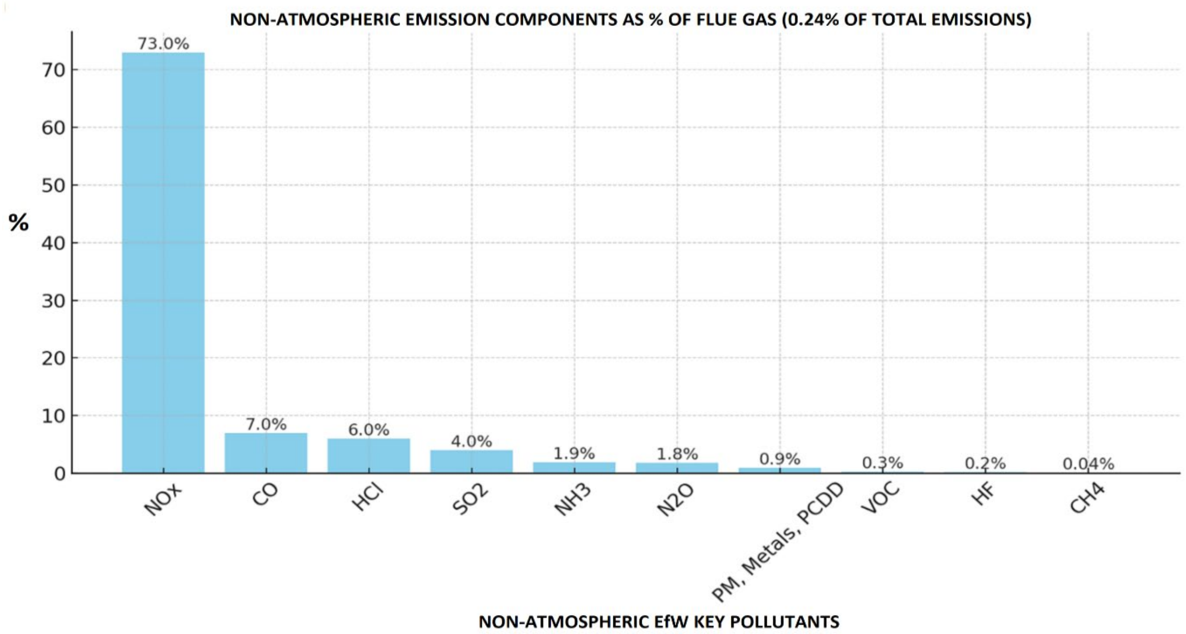


Figure 4: **Non-Atmospheric EfW Stack Emissions (excluding 99.9% of standard atmospheric components.**

[3] Source; Essex EfWplant New Jersey USA



The remaining 0.024 percent of emissions from the stack include nitrogen oxides (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), particulate matter (PM), and volatile organic compounds (VOCs), among several other substances considered pollutants.

Whilst not neglecting other pollutants in the air stream, I have focused on dioxins and their likely impact. Reducing Particulate Matter (PM) in the flue gas stream will also reduce the levels of other pollutants, particularly heavy metals.

Other sources of dioxin emissions in the vicinity of an EfW can influence the background level adjacent to the EfW locations.

Bushfires and volcanic eruptions naturally produce dioxins and furans. They are also chemical substances generated by human activities, produced unintentionally as byproducts of industrial processes, such as the production of pesticides and herbicides (remember Agent Orange, manufactured at Union Carbide in Sydney).

Other Dioxin Sources

To maintain some perspective, another source of dioxins is the use of diesel fuel in heavy vehicle diesels (HDV) in transportation, agriculture and mining.

Diesel fuel is the lifeblood of Australian industry. Transportation, agriculture and mining depend on the availability of diesel fuel to produce and export food, distribute goods across the nation, and mine products that underpin living standards. In 2024, Australia consumed some 34,000 ML of diesel.

The major diesel users are rigid and articulated trucks (HDVs), including the 1200+ heavy transports that pass Parkes daily. The proposed PER EfW is in an area surrounded on two sides by rail lines, intermodal terminals, and diesel-fuelled train operations.

When combusted, diesel fuel produces emissions similar to those made by modern EfW facilities. Nitrous oxides (NOx), carbon dioxide (CO_2), carbon monoxide (CO) and Particulate Matter (PM) and Volatile Organic Compounds (VOC). Other chemical emissions include Polycyclic Aromatic Hydrocarbons (PAH), Benzene, Formaldehyde, Acetaldehyde, Acrolein, 1,3-Butadiene, and Dioxins and Furans (PCDD/F).

In Australia, diesel-fuelled vehicles emit between 35 and 50 percent of total dioxin emissions from human-induced sources, mainly from diesel trucks[4].

Using the UNEP Toolkit (air emissions) Australian heavy diesel vehicles (HDV) produce 4.6 g I-TEQ/annum (best estimate)[5]. However, this is still a small proportion of 1,270g I-TEQ/annum of dioxins generated from uncontrolled burning (bushfires)[6]

A typical EfW would produce an estimated 0.29 g/m^3/annum[7] or 0.003ugI-TEQ/annum. A modern EfW plant's dioxin emission would be equivalent to 0.07 per cent of all HDV dioxin emissions in Australia annually.

Alternatively, the UNEP Toolkit I-TEQ in Australia states that HDV generate 0.04 μg I-TEQ/tonne. Assuming an average truck passing Parkes weighs 50 tonnes (Standard B Double 60-65 tonnes), each truck would generate annual dioxin emissions of 2ug I-TEQ/annum.

Each truck passing through Parkes generates 660 times more dioxin in a year than a typical EfW facility proposed for Parkes.

It is worth noting that EfW dioxin emissions are becoming less significant and are controlled by injecting activated carbon into the EfW flue gas. For example, a 2012 US analysis concluded that dioxin emissions from all U.S. EfW plants totalled 3.4 g TEQ and accounted for 0.09% of total dioxin emissions from controlled and open-burning sources.[8] This was a 66 per cent reduction in dioxin emissions from EfW from 2004 to 2012, and further improvements have since been implemented.

Air emissions measured within the EfW stack are a helpful indicator of the very low levels of dioxins emitted from EfW. Measurement of air emissions immediately outside the stack, or metres from an HDV, would not be detectable or at the limits of detection once emissions are dispersed in the air mass.

What is essential is whether dioxins can be measured at ground level immediately adjacent to an EfW or a diesel HDV source. The fallout zone is likely to be within the footprint of the EfW facility. Confirmation requires a specific site assessment.

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[4] *National Dioxins Program Technical Report No. 2 Dioxins Emissions from Motor Vehicles in Australia Australian Government Department of the Environment and Heritage*

[5] *Table 4.82 Revised Estimate of Emissions – Diesel Engines National Dioxins Program Technical Report No. 3 2004 Inventory of Dioxin Emissions in Australia. The UNEP Toolkit yields lower emissions than Australian-derived factors.*
US EPA estimates HDV transport emit 0.5ng I-TEQ/veh/km. A Norwegian study mentions HDV emitting 5.1ng/I-TEQ/km.

[6] Summary: National Dioxins Program Technical Report Inventory of Dioxin Emissions in Australia 2004.

[7] Dioxin emission from six UK EfW plants is averaged @0.2ug/m^3/annum. The I-TEQ mass of MSW emissions is less than total PCDD/F mass by a factor of 0.01 Source: Dioxins and waste to energy plants – a reality check, B.R. Stanmore, National Waste to Energy Conference 2007.

[8] Inventory of U.S. 2012 dioxin emissions to atmosphere Henri Dwyer, Nickolas J Themelis

Assessing dioxin levels in individual HDVs depends on the operating environment, engine tuning, and efficiency. The evidence shows that whilst dioxin emissions exist, the levels are extremely low, close to or below the detection level and well within the regulated limits.

The same applies to EfW dioxin emissions. The common factor for EfW and diesel is negligible emissions.

Evidence also shows that pollutants such as CO, NOx, NO2, and PM are also generated from diesel vehicles/equipment. HDV outputs are estimated to be -9.5 ng/km uphill and 0.72 ng/km downhill.[9]

Just as EfW minimises emissions of diesel combustion, diesel emissions are controlled by oxidation catalysts, particulate filters and selective catalytic reduction. Diesel engines also produce dioxins are from incomplete combustion. Dioxins attach to fine carbon particles (PM <2.5) and are emitted to the atmosphere. The management of dioxin emissions from EfW is far more rigorous than that of diesel engines.

EfW flue gases contain minute quantities of dioxins and furans. These are adsorbed onto the activated carbon's surface and added to the semi-dry reactor, where the flue gas is filtered and captured.

EfW plants are designed to achieve a minimum temperature of 850°C for at least 2 seconds in the combustion chamber to minimise dioxin and furan formation. The reaction products are a dry solid material called Air Pollution Control Residue (APCr) or fly ash, separated from the gas stream using a fabric filter, and disposed of off-site at an approved treatment facility or processed into useful products where permitted.

In summary:

- All dioxins emitted from all EfW facilities (75+) in the United States are less than all HDV on Australian roads.
- A typical Parkes EfW would produce less dioxins annually than emitted to air than half the trucks passing through Parkes each day.
- Since the 1990’s dioxin emissions from EfW dioxin and particle capture have reduced dioxin emissions by 1000 times and in many cases are at or below the level of detection.
- EfW emissions and heavy diesel vehicles/equipment produce common emissions, but the levels of the primary pollutants of concern are negligible. In addition, the surrounding environment dilutes contaminant concentrations to very low levels within regulatory limits designed to protect environmental and human health.

[9] *‘ug’ is a nanogram, or one billionth of a gram, or 0.000000001 of a gram. Dioxin measurements are converted to I-TEQ to provide a realistic measure of relative toxicity. Dioxin Land deposition is measured in picograms (pg), which is 10,000th of a billionth of a gram (ng).*

Term of reference 1(c)

Health impacts from currently operating older technology waste incinerators as compared to the proposed newer technology

There is scientific consensus that EfW systems do not adversely impact human health in modern EfW facilities.

Primary pollutants of concern—particulate matter (PM), lead, mercury, dioxins, and furans —are not considered to contribute to ambient air concentrations and do not pose a health risk. In summary:

- Modern EfW is not associated with adverse health and environmental effects.
- Atmospheric emissions for all criteria pollutants were significantly below the stringent pollution limits, and modern EfW emissions are well within environmental limits.
- All risks to human health are negligible, with no chronic risk of concern for people, animals, water sources or agriculture.
- There is no relationship between the level of dioxin emissions from EfW plants and their concentrations in the surrounding environment.
- EfW employees have shown no increase in heavy metal or dioxin blood levels compared to the general non-smoking population. Cigarette smokers using at least 20g of tobacco/day all show increased concentrations of blood cadmium.

To repeat, numerous reviews show a broad scientific consensus that EfW systems do not adversely impact human health. The primary pollutants of concern in EfW facilities— particulate matter (PM), lead, mercury, dioxins, and furans —are not considered to contribute to ambient air concentrations and do not pose a health risk.

More specifically:

Studies indicate that modern technology waste incineration plants that comply with emissions legislation are not a cancer risk or have adverse effects on reproduction or development. There are several reasons:

- Emission levels of EfW facilities built in developed countries are several orders of magnitude lower than those of older incineration facilities (without pollution control), where some epidemiological studies have led to perceived health concerns.

- Risk assessment studies indicate that most exposure is produced through the diet, not by a direct route. In other words, contamination pathways are through the food chain and could have originated from numerous historical pollution sources. For example, the primary pollutants of concern (dioxins and PFAS) are present in environments where EfW facilities do not exist, and there is no evidence that modern EfW facilities contribute to existing levels of these pollutants.

- Dioxins or PCDD/F are distributed widely in nature, both in soils and vegetation, because of bushfires. Dioxin levels in previously industrialised areas, subject to limited historical controls, are decreasing. Concern about dioxin emissions should not be a reason to oppose EfW construction. In fact, EfW can be a net destroyer of dioxins found in the MSW waste stream that would otherwise go to landfill and potentially leach into the environment.

- Monitoring the dioxin level of populations near EfW plants does not reveal increases in dioxin levels when compared with populations not influenced by EfW facilities[10]. Total dioxins from EU EfW facilities (some 500) amount to less than 0.2% of total industrial emissions.[11]

- Assessment of the blood of EfW workers shows no increase in dioxin or heavy metal levels over the general population, not influenced by the proximity of EfW facilities.

- An analysis of long-term experience of EfW operators has shown similar emission patterns between periodic measurements[12] and continuous sampling[13]. Modern EfW plants emit extremely low concentrations of dioxins and furans (sometimes below the limit of detection) due to sophisticated combustion control and pollution abatement. This happens regardless of the specific measuring equipment used.

Misleading Reports Used to Anchor Activist Claims About EfW

One could spend chapters outlining and reviewing studies on emissions from EfW plants.

Many studies referred to by activists concern historical emissions from numerous industrial sources, including less-controlled incineration plants before 2000. Many older facilities have been replaced by modern EfW facilities, resulting in significant improvements in pollution control.

However, let me address one example of defects in the reports used by Zero Waste and its allies to attack EfW and which serve as the intellectual basis of their EfW campaign.

In January 2023, Zero Waste Europe issued a report on waste emissions and claimed reported high levels of persistent organic pollutants (POPs) in the vicinity of EfW plants in Spain, the Czech Republic and Lithuania

For example, at the Lithuanian EfW, eggs were sampled at six locations within a 3-kilometre radius. Five were below the EU standard of 3 ug I-TEQ dioxins/gram of fat.

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[10] Dioxins and WtE Plants; State of the Art European-wide overview of long-term analysis of dioxins in WtE plant surroundings (March 2022). Published by Confederation of European Waste to Energy Plants.
[11] The European Pollutant Release and Transfer Register https://industry.eea.europa.eu/#/home

[12] Periodic measurement of dioxins – sampling for short periods (6-8 hours).
[13] Continuous sampling of dioxins – sampling for long periods of time (2-4 weeks)

One sample upwind of the EFW and 300 metres from other sampling locations had a reading higher than the others. The report merely suggested it should be further investigated. Critically, no assessment was made of background levels in eggs from areas not influenced by the EfW.

Similar findings apply to other locations identified by the report.

In 2024 a broad group of organisations produced a report on EfW[14] (Jelinek). T claimed:

- 'Waste incineration is not a solution to the triple planetary crisis - it contributes to it'.
  EfW has never claimed it is the sole solution to the waste conundrum. It is one tool in a basket to reduce increasing high levels of waste generation.

- 'Waste incineration destroys valuable phosphorus resources in biowaste and disrupts global biogeochemical cycles'.
  FOGO schemes to reduce organic waste in the MSW stream will become mandatory by 2030 in NSW. A reduction in organics will not affect the combustion efficiency of EfW.

- 'Communities living near incinerators may be at higher risk of health issues due to their harmful effects'.
  Not supported by medical and epidemiological evidence.

- 'Air emissions are not the only pollution pathway from waste incinerators: Both fly ash and bottom ash from incinerators are highly contaminated with dioxins and other chemicals such as PFAS'.
  Extraction of dioxins and heavy metals from MSW through EfW removes potential pollutants that would otherwise be landfilled with ready pathways into the environment. Bottom As (IBAA) has been demonstrated to be inert and used extensively as a virgin material construction substitute. Fly ash does contain captured pollutants that are stabilised and deposited into a licenced landfill. In the UK carbonisation is used to stabilize fly ash for use as manufactured 'limestone'.

- 'Emissions in air from waste incinerators are not fully controlled, as some very toxic substances are monitored for only a few hours twice a year or not measured at all'.
  Most gaseous emissions are monitored continuously and others measured periodically, due to the requirement for laboratory testing and the very small quantities detected in the flue gas stream, usually measured quarterly, or in accordance with the regulator requirements.

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[14] Waste incineration and the environment Nikola Jelínek, Jindřich Petrlík, Jane Bremmer, Gilbert Kuepouo, Griffins Ochieng, Sarah Ožanová, Lee Bell 2024.

The NSW Energy from Waste policy and licence conditions will mandate the continuous and periodical testing regime to be applied.

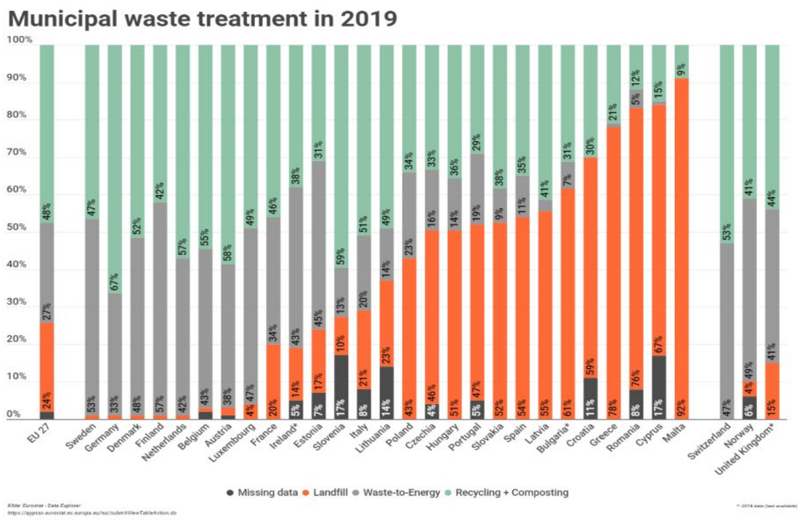
- 'Waste incinerators cannot operate without state subsidies and other forms of economic support from public budgets'.
  In Australia, EfW is not supported by state subsidies or budget assistance. Feasibility of EfW is dictated by policy directives and levies applied to landfill disposal designed to divert waste from landfill.

- 'Alternatives to waste incineration exist for most waste streams, with examples included in the report'.
  EfW operators support initiatives for management of waste to recover resources from the waste stream. MSW treatment by EfW recovers valuable metals for reuse, produces electricity and steam to support resource recovery, conversion and economic well-being.

- 'Despite strict emissions limits, waste incinerators are responsible for almost one fifth of all dioxins released into the air in the European Union'.
  Wrong – EfW only contributes 0.2 percent of all dioxin emissions from all industrial sources in the EU.

- This report adds to the growing body of evidence that waste incineration undermines more sustainable Zero Waste policies and the goal of a Circular Economy.

EfW is not a deterrent to recycling or diversion from landfilling



Countries with the highest recycling rates have the highest EfW rates.

The countries with the highest **recycling** rates (50-70%)... also have the highest **waste-to-energy** rates (30-50%)...

Country	Recycling +Composting	Waste-to-energy
Germany	67%	31%
Austria	58%	39%
Belgium	54%	43%
Netherlands	54%	44%
Switzerland	53%	47%

Source: https://danskaffaldsforening.dk/affald-tal

EU Eurostat - 2018 figures

In summary, the environmental and health reality is:

- For the past 25 years, numerous studies of dioxins from EfW in the US, France, South Korea and China have found no health effects from modern EfW facilities.
- Since the 1990's dioxin emissions from EfW dioxin and particle capture have reduced dioxin emissions by 1000 times. In the US in 2012, total dioxin emissions were 3.4g I-TEQ/annum, down from 10g I-TEQ/annum in 2004. This compares to total dioxin emissions from US landfill fires of 1,500g I-TEQ/annum.
- Up to two-thirds of the capital cost of an EfW plant is directed to capture and treat emissions and materials produced by waste combustion.
- Numerous peer-reviewed studies have collated available data on the efficacy and safety of EfW:

  - UK Health Security Agency (2010)

    "UKHSA's opinion on incinerators is that modern, well run and regulated Municipal Waste Incinerators are not a significant risk to public health, as these incinerators only make a small contribution to local concentrations of air pollutants."

    "Adverse health impacts including cancers, and adverse birth outcomes have been evaluated for associations with exposures to emissions from MWI. The evidence review shows that currently there is no clear evidence of any associations".

  - UK Health Security Agency (2025)

    "A study by Douglas and others in 2017 on exposure to incinerator emissions in Great Britain, between 2002 and 2010, showed a very small contribution (1000 times lower) of particulate matter (PM10) from MWI to ambient background pollution levels"

- UK Department for Environment, Food & Rural Affairs, Incineration of Municipal Solid Waste (February 2013)

  https://assets.publishing.service.gov.uk/media/5a7c909ced915d48c24109e5/pb13889-incineration-municipal-waste.pdf

  "Incinerator emissions have reduced substantially over the past 25 years – most emissions are less than 10% of the level 25 years ago.

  Because waste incineration has a long operating record, there is a good database of information on emissions and potential health effects compared to other options for managing waste.

  Emissions from an Incinerator typical of those currently operating in the UK (230,000 tonnes per year) are approximately equivalent to: •

  - *Oxides of nitrogen – Emissions from a 7 km stretch of typical motorway*
  - *Particulate matter – Emissions from a 5 km stretch of typical motorway.*
  - *Dioxins and furans – Emissions from accidental fires in a town the size of Milton Keynes.*
  - *Cadmium – A twentieth of the emissions from a medium-sized UK coal-fired power station.*

    These emissions are approximately equivalent over the same time period. So, emissions of oxides of nitrogen from a typical incineration over a period of an hour are approximately the same as emissions of oxides of nitrogen from a typical motorway 7 km in length over a one-hour period."

- UK House of Commons Research Briefing 'Incineration of Waste in England' April 2025. Note 6.2 Air Quality and Health

  https://researchbriefings.files.parliament.uk/documents/CBP-10229/CBP-10229.pdf

- White Paper on Municipal Waste Incineration, Utilitalia, September 2020. (Utilitalia is the national federation of Italian utilities providing public services in the sectors of environment, water and energy).

  https://www.cewep.eu/wp-content/uploads/2021/03/WHITE-PAPER-DEFINITIVO-2-24-febbraio-2021.pdf

  See Chapter 3.3 Extensive analysis of EfW, including analysis of contribution to air emissions.

- Scientific Truth About Waste to Energy, Castaldi M.J. City University of New York 2021 https://static.spokanecity.org/documents/solidwaste/wastetoenergy/wte-report-2021.pdf

Detailed analysis of EfW and impacts in the United States.

Human Health Risk Assessment

In NSW, a Human Health Risk Assessment (HHRA) is mandatory as part of the Environmental Impact Assessment and must be publicly displayed before any decision to approve the project. The HHRA looks at all pathways for potential risks, is rigorous, and is conducted by scientifically qualified experts. The HHRA is then assessed by suitably qualified medical and environmental health scientists.

To ensure itself on human health and safety, the Select Committee should adopt a methodology like that used by the NSW government for PFAS in the environment to assess misleading claims about EfW primary pollutants.

The NSW Health Experts Advisory Panel on PFAS (August 2025) findings are summarised here.

https://www.health.nsw.gov.au/environment/Documents/pfas-recommendations.pdf

The expert findings included advice from respected clinical pharmacologists and experts in measuring PFAS in the environment. It addressed evidence of health effects and the role of epidemiological studies for health outcomes. It should guide the Select Committee, as many of the principles that apply to PFAS are relevant to other low-level pollutants from human activity.

Unfortunately, activists opposed to EfW have launched a campaign of misinformation and have made wildly exaggerated claims before air quality and HHRA studies are completed for a specific EfW proposal. This has resulted in community anxiety and concern.

The Select Committee should seek advice from relevant health authorities, clinical pharmacologists, and experts in POP detection.

Term of Reference 1(d)

Impacts on human health including on regional town drinking water, rainwater harvesting and soil contamination

See I (c) above.

Term of Reference 1(e)

The impact on agriculture locally and across the wider region

Given the long history of EfW worldwide, it is reasonable to expect literature on any significant impact on agriculture. However, there is little or none from non-activist sources.

Many EfW plants in other jurisdictions are located in major population centres, while others are in rural areas with agricultural pursuits immediately adjacent.

Landfills have been identified as a threat to agriculture. As recently as February 2025, the European Environment Agency endorsed EfW as critical for reducing methane emissions from landfills to limit ground-level ozone, which *"impacts ecosystems and agricultural production. Ozone reduces growth rates and crop yields*".

In Parkes, the proposed EfW facility is located within an NSW government-owned Special Activation Precinct (SAP) comprising 4,500 Ha, aimed at attracting commercial and industrial partners to establish long-term investments. There is a significant buffer zone around the EfW location, and the site selected by RGDC meets the distance requirements to the local population and the SAP Masterplan (subject of previous community consultation).

The EfW will generate electricity and steam that may be attractive to the agricultural-derived products, food processing, mineral processing and general industrial industry as energy off-take customers for reliable 24/7 electricity. Value-adding to existing agricultural produce should interest the farming community.

Unfortunately, a local scare campaign has elicited opposition from some sectors of the farming community. I'm advised that, despite requests to meet with farm organisations and local farmers, farmers have elected to oppose the EfW project without consultation with the proponent, and before the EIS and technical studies have been made available for scrutiny.

As a long-time supporter of the agricultural community, it is unfortunate that it is taking a 'holier than thou' attitude to EfW.

Understandably, farmers are concerned about trace contamination of their produce. The EfW protocols for protecting populations and the surrounding environment are far more stringent than those applying to farmers.

What would happen if EfW monitoring standards were applied to farms? You won't want to know.

There is a wise saying: 'If you look, you will find.'

Periodic measurement and monitoring of the primary EfW pollutants of concern, such as dioxins and heavy metals, require high-resolution spectrometry and gas chromatography. A gas chromatography-high-resolution mass spectrometer combines gas chromatography's separation power with a high-resolution mass spectrometer's accurate mass measurements for chemical identification of trace substances. It is said these tools can *'identify a grain of sand in a sand pit the size of the planet'.*

Should the same tools be used to identify herbicide/pesticide and fertiliser compounds in uncontrolled farm discharges, it would, without doubt, reveal downstream trace contamination of water and land, with implications for Livestock Protection Assurance, claims of trace-free produce, and organic certification.

Equally, the same would apply to the testing of farms in the Parkes region that use land-applied sewerage sludge (biosolids) from Sydney Water treatment plants as a fertiliser substitute. The irony is Sydney waste has been transported and used in the Central West for years.

In Europe, there is a long history of land application of sewage sludge (biosolids) as an alternative fertiliser. Evidence shows that biosolids contain per- and polyfluoroalkyl substances (PFAS) and microplastics.

PFAS has been detected in most people's blood from over 4500 PFAS and 10,000 derivative compounds used in numerous applications – cookware, stain-resistant fabrics and carpets, toiletries, cosmetics, etc.

Applying EfW type testing to every sewerage treatment plant (STP) in NSW would yield PFAS traces in treated effluent released to the environment.

The key issue is not whether they exist, but whether the very low levels of trace contamination from herbicides, pesticides, PFAS, and fertiliser compounds pose a threat to the integrity of agricultural produce or to human and animal health. All the evidence suggests they don't.

Equally, the very low levels (some at the limit of detection) of EfW dioxins, heavy metals, and PFAS pose no threat to agricultural traceability or human and animal health. These matters need to be confirmed in a site-specific assessment.

As part of controlling the pollutants of most concern, EfW is required to maintain a zero-discharge policy for rainwater falling within its boundaries. Water captured on the EfW site will be utilised as process water, recovered and reused.

Let's Examine EfW Air Emissions

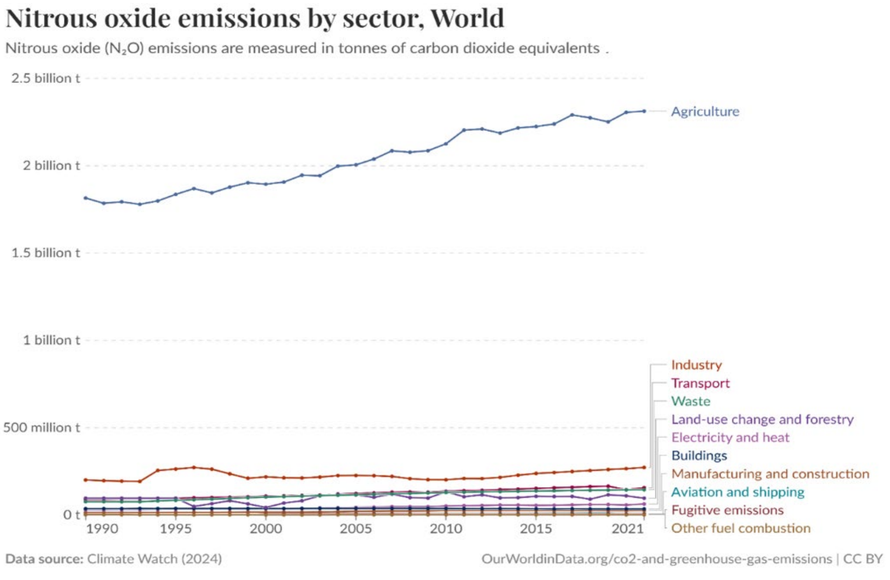
EfW air emissions (as previously discussed) comprise 99.9+ percent of normal atmospheric constituents – including nitrogen, oxygen, carbon dioxide and water vapour in the form of steam. The latter constitutes twenty percent (20%) of flue gas emissions from moisture in the waste stream.

The remaining 0.2+ per cent of potential pollutants of concern, except Nitrous Oxide, are <10 percent of emission limits. EfW Nitrous oxide is around 70+ percent of the remaining air stream.

Contrast this with nitrous oxides from agriculture, primarily from fertilisers, which are 368 times more significant as a greenhouse gas than CO2 over 100 years. Not to mention methane emissions from livestock.

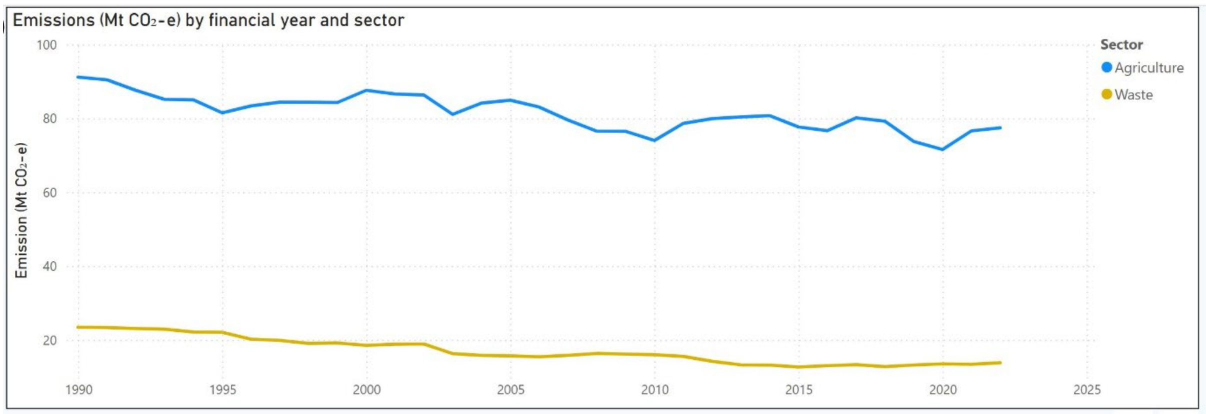
Agriculture is the sector that emits the most nitrous oxide, through its extensive use of nitrogen-based fertilisers (see Table 2). Nitrogen-based fertilisers that are not taken up by crops and plants are processed by soil microbes, which emit nitrous oxides; hence, agriculture significantly contributes to elevated atmospheric nitrous oxide levels. (Figures 5&6)

Figure 5



This finding is supported by the Australian government's National Inventory Report 2022, which shows all CO2e emissions from the Australian agricultural and waste sectors (Figure 6).

Figure 6: Australian Emissions (Mt CO2e) from Agricultural and Waste



Both the agriculture and waste sectors are committed to reducing emissions, and it is critical that they play their respective roles.

EfW has been shown to reduce overall net greenhouse gas emissions relative to landfilling. Every tonne of waste diverted from landfilling and processed in an EfW facility avoids between 1 and 1.4 tonnes of CO_{2e}, as landfills are a significant source of methane. Methane is 80 times more important than CO_2 over 20 years and 23 times over 100 years, as landfills emit methane at declining levels after the initial 20 years.

As recently as February 2025, the European Environment Agency endorsed EfW as critical to reducing methane emissions from landfills to limit ground-level ozone that "*impacts ecosystems and agricultural production. Ozone reduces growth rates and crop yields".*

Unlike regulations requiring EfW and other industrial facilities to maintain a zero-discharge policy on their sites, farms discharge water to adjoining watercourses and land. PFAS and other contaminants, such as pesticide and herbicide residues, lack downstream controls.

The extent of PFAS or other trace element contamination from land application of sewerage sludge is not fully understood, but limiting the application of known contaminants is always an effective way to reduce emissions.

Overseas evidence also demonstrates the importance of the dilution effect of small quantities of contaminants, with low or near the limit of detection, being diluted by water and air in the ambient environment.

Dilution is not a substitute for limiting the production of contaminants, but it does provide a degree of safety and maintain environmental and human health.

It is essential to take a measured view of the actual impacts of emissions from all sources and reduce them where practicable.

Term of Reference 1 (f)

> **Alterations to the Parkes Special Activation Precinct specifically in relation to the proposed Energy Recovery Facility in that region**

The Parkes SAP was established to attract investors through a streamlined planning scheme, with RGDC undertaking environmental and cultural studies relied upon by investors. The SAP planning regime provided for streamlined planning approval.

Investors have bid on an NSW government tender underpinned by certain assumptions. Changing the SAP regime without the express approval of the EfW proponent would constitute a breach of the existing agreements and the original EfW tender process.

However, there is a case to be considered for the EfW project to be considered as State Significant Infrastructure (SSI) for the following reasons:

- Parkes Energy Recovery (PER) responded to an NSW government tender.
- Land allocated by the NSW government-owned RGDC is owned by the State, for which a rental will be paid to RGDC.
- Development of the EfW is for an essential public purpose – providing infrastructure necessary to solve the looming public crisis of landfill deficit in

2030 and to resolve the disposal of Municipal Solid Waste (MSW) for Sydney and the regions.
- MSW to be sourced for the EfW, once collected from households, becomes the property of a public authority (local councils).

Had the NSW contributed to the capital cost of a EfW project, it would have been undoubtedly declared and assessed as State Significant Infrastructure.

Term of Reference 1(g)

Impacts of waste-dumping over a number of decades in the Tarago region

During the operational life of the Woodlawn mine, I was the Executive Director of the NSW Chamber of Mines, Metals and Extractive Industries (now NSW Minerals Council). I was familiar with the site's geology and its suitability for use as a bioreactor. In 1998, we assembled a team to initiate development approval for the Woodlawn Bioreactor, which began operation in 2004. The project approval was assessed and recommended for approval by a Commission of Inquiry.

Although I have not been involved in the management of the now Veolia Bioreactor since its commencement, I believe it has achieved the objective of solving the then landfill crisis in Sydney. Its methane capture programme surpasses other landfills. However, landfills, by their very nature, have issues with odour and water management. This has not been helped by recent years of above-average wet weather, which have caused water management issues.

Notwithstanding, delays in approving EfW at both Woodlawn and Parkes will result in:

- An increased rate of landfilling and extensions to existing landfills, causing additional management issues.
- Cannibalising increasingly valuable landfill space for future requirements. Despite increased recycling, reuse, and waste reduction, there will still be a need for landfill space. In Europe, there is a target of 10 per cent landfill (in some Scandinavian countries, 1 per cent has been achieved). EfW does most of the heavy lifting on managing waste.
- Regional areas will increasingly come under pressure to identify further landfill space unless EfW facilities can serve them.

Term of Reference 1(h)

The methodology of emission monitoring employed by leading large scale waste-to-energy facilities in Australia and across the world

The EfW methodology for emission monitoring has been raised from time to time by project opponents, who argue for continuous monitoring of all emissions, including dioxins and heavy metals. Given the very low levels of dioxins, in particular, the use of continuous monitoring would still need to be verified by laboratory testing using high-resolution mass spectrometry and gas chromatography.

Although there are several continuous monitoring sensors on the market, maintaining them is problematic, as sensor contamination can lead to false readings and biased results. However, EfW operators have undertaken detailed country-by-country assessments to understand if there is utility in full-time continuous monitoring of law-detectable emissions.

The findings are detailed in the following report:

https://www.cewep.eu/wp-content/uploads/2022/03/CEWEP-Report-Dioxins-and-WtE-plants-State-of-the-Art.pdf

In summary, it found:

- Assessments and comparisons between emissions at the stack of EfW plants and concentrations measured in the surroundings have shown that when dioxins are found in the surroundings of an EfW plant, there is no correlation with the plant's emissions.
- EU EfW plants are subjected to and comply with one of the most stringent regulations in terms of pollution prevention and control. Since 2019 an even more ambitious set of limits for dioxins and furans has been put in place with the publication of Waste Incineration *BAT (Best Available Techniques) Conclusions*. Today, dioxin emissions from EfW account for less than 0.2% of the total European industrial dioxin emissions.
- Monitoring of dioxins is associated with both stringent limits and extended periods, meaning that measurements must be carried out during operating stages, including start-up and shutdown.
- Data assessments, comparisons and long-term experience of operators have shown similar emission patterns between periodic measurements and continuous sampling.
- A well-managed EU EfW plant emits extremely low concentrations of dioxins and furans (sometimes below the limit of detection of the instruments) thanks to its sophisticated combustion control and pollution abatement system. This happens regardless of the specific measuring equipment.

Notwithstanding, the method of emission monitoring ultimately falls within the regulator's jurisdiction.

Term of Reference 1(i)

Alternative solutions to reduce and manage residual waste produced by Greater Sydney, and

Given the urgency of the task, projected waste generation, and the likely inability to meet recycling and reuse targets, there are no other commercially viable alternatives to EfW or developing additional landfills.

Despite China restricting the flow of contaminated waste, the Australian government has, accelerated the export of clean recycled paper and clean shredded plastic. This has a direct impact on the viability of recycled processing in Australia, which is further complicated by excessive energy and labour costs.

Ironically, overseas recycled manufacturers receive the benefit of obtaining clean recyclables at a low cost, leaving the treatment of contaminated material to for local disposal.

Term of Reference 1(j)

Any other related matters

Greenhouse Gas (GHG) Emissions

My comments on greenhouse gas emissions reductions are based on a very conservative theoretical analysis. Each EfW proposal will require a site-specific GHG assessment and may yield greater GHG reductions than those from a theoretical model.

As with all energy technologies, including the manufacture, transport and construction of solar and wind farms, EfW (Energy from Waste) produces emissions. Industries such as coal and gas electricity generation, agriculture, and transport also produce significant emissions and greenhouse gas sources.

What are the facts about greenhouse gas emissions from EfW?

EfW's total CO_2 emissions are about 1,100 kg per tonne of MSW (Municipal Solid Waste)[15].

If one tonne of MSW is disposed of in a landfill, then about 70 kg of methane (50-100 kg range) is released. Given that the greenhouse gas potential of methane is 28 times more damaging than CO_2, over 100 years and 80 times more significant over 20 years from landfill, it is estimated to be equivalent to 1610 kg CO_{2e} per tonne of MSW[16].

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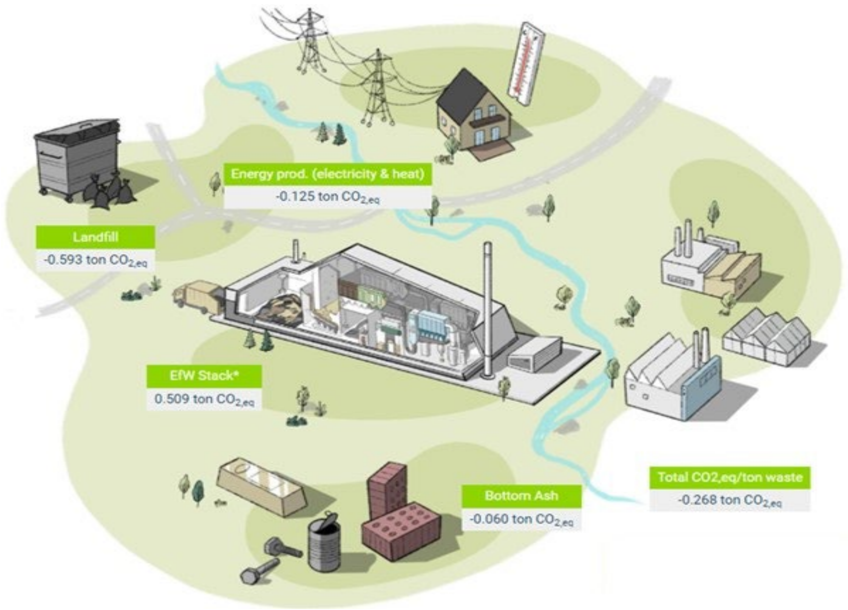
[15] Position Paper: Executive Committee of IEA Bioenergy. The Implementing Agreement on Bioenergy forms part of a programme of international energy technology collaboration undertaken under the auspices of the International Energy Agency.

[16] Adjusted for gas capture.

In Australia, about 42 percent of methane is extracted from landfill, with some used for energy production. Many landfills in regional areas lack methane capture, resulting in uncontrolled GHG emissions.

Using a very conservative estimate that one tonne of MSW represents one tonne of CO_{2e}, Figure 1 shows a net reduction in greenhouse gas emissions from EfW compared with business-as-usual (landfilling).

Figure 7 Theoretical GHG Analysis (1 tonne MSW)[17]



- CO_{2e} emissions at the EfW stack (0.509 tonnes$CO_{2e/t}$[18]
  minus
- Landfill methane avoidance (0.593 tonnes $CO_{2e/t}$)
  minus
- Electricity/heat alternative fuels avoidance (0.125 tonnes $CO_{2e/t}$)
  minus
- CO_{2e} emissions captured in bottom ash and new materials production (0.060 tonnes $CO_{2e/t}$)
  Equals
- Net total CO_{2e} emission reduction (0.268 tonnes $CO_{2e/t}$)

Using EfW results in a net reduction in greenhouse gas emissions from MSW (see Figure 8).

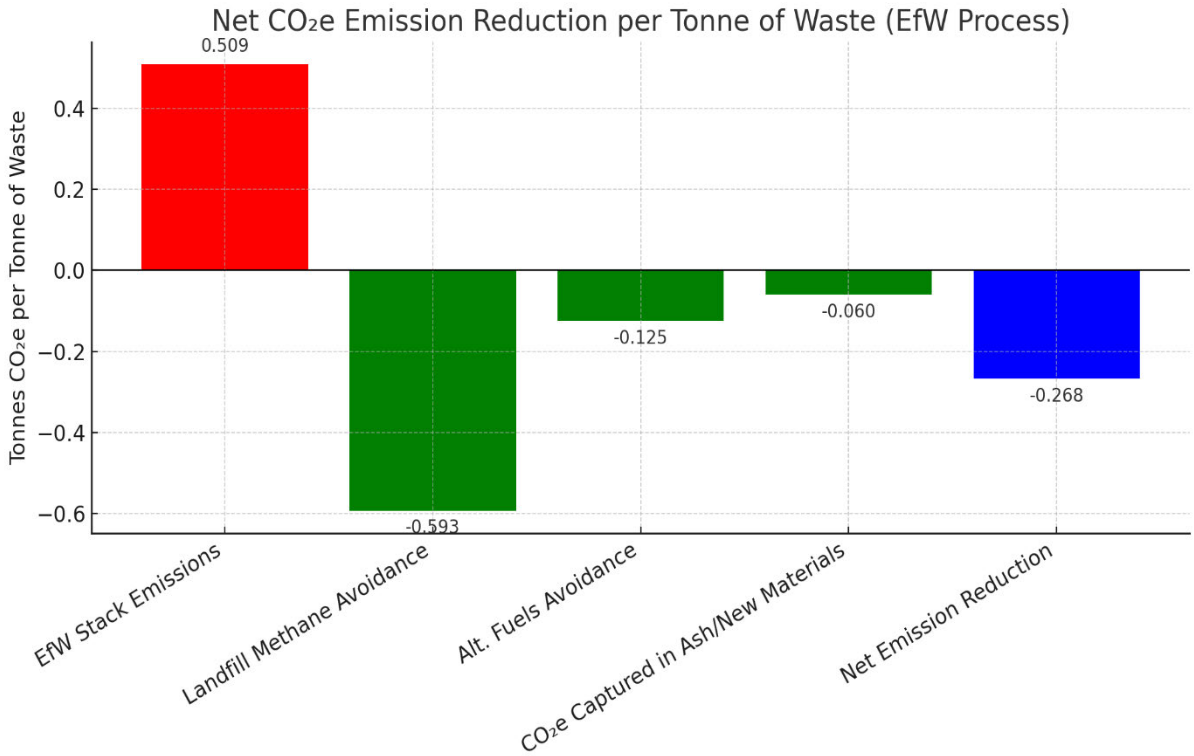
[17] Source: Kanadevia Inova Zurich Note: 'ton' is a metric 'tonne'

[18] Accounting for biogenic (natural carbon) component

Life-cycle assessments of EfW have shown that energy recovery provides benefits over landfilling.

- Reduced greenhouse gas emissions
- Reduced depletion of natural resources (fossil fuels and materials)
- Reduced impact on water (leaching)
- Reduced land contamination

Figure 8:



Note: Figures 7 and 8 are exclusive of transport GHG and are not a substitute for a project-specific GHG assessment

EfW has the potential to supply long-term, reliable base-load power for businesses co-locating in the proposed Parkes SAP and is critical for backing up the intermittent gaps in supply from solar and wind renewables.

Even ignoring the benefits of landfill avoidance, EfW significantly reduces greenhouse gas emissions compared to conventional fossil-fuel energy generation.

Over the last 12 months, 70 per cent of electricity generation in NSW came from coal, a figure that has been consistent for some time despite more renewables coming online. Decarbonising the energy grid will alter the future fuel mix over time. Still, the essential arithmetic of avoided landfill emissions from EfW will continue to show a net reduction in greenhouse gas emissions.

For comparison, the electricity generation of 1 MWh from standard fossil fuel and EfW sources is:

Coal	1000kg CO_{2e}
Oil	800kg CO_{2e}
Gas	500kg CO_{2e}
EfW	300- 400kg CO_{2e}[19]

[19] Up to 50 percent of the CO_2 EfW output is considered biogenic (part of the natural carbon cycle and classified as renewable.