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LEGISALTIVE COUNCIL
PORTFOLIO COMMITTEE NO.6 – PLANNING AND ENVIRONMENT

Inquiry into 'energy from waste' technology

Submission made by:

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On behalf of the National Toxics Network Inc.

May 2017

Terms of Reference

That Portfolio Committee No. 6 inquire into and report on matters relating to the waste disposal industry in New South Wales, with particular reference to 'energy from waste' technology, and in particular:

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

b) the role of 'energy from waste' technology in addressing waste disposal needs and the resulting impact on the future of the recycling industry

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

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

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

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

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, and

h) and other related matter

Introduction

The National Toxics Network (NTN) welcomes the opportunity to make a submission to the Legislative Council Inquiry. NTN was formed in 1993 as a community based charity. NTN provides a central repository of technical expertise and educational materials to individuals and organisations across Australia in relation to toxic chemical pollutants, associated technologies and their impacts on environmental health.

NTN is the Australian NGO focal point for the International Persistent Organic Pollutants Elimination Network (IPEN) and works towards the full implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) and other global chemical conventions and agreements to which Australia is a signatory. These conventions have tangible outcomes in terms of reducing levels of identified toxic pollutants circulating in the environment such as dioxins, CFCs and mercury.

NTN committee members have been involved in a wide range of national government advisory bodies including the Hazardous Waste Act Policy Reference Group, the Stockholm (Convention) Reference Group, the National Industrial Chemicals Notification Assessment Scheme (NICNAS) Community Engagement Forum and Strategic Consultative Committee as well as the Australian Pesticides and Veterinary Medicines Authority advisory committees.

NTN has given evidence to previous Parliamentary inquiries, including the Senate Inquiry into the Threat of Marine Plastic Pollution in Australia; Inquiry into Unconventional Gas (Fracking) in South Australia; Inquiry into Unconventional Gas In Victoria; Inquiry into the Impacts of Air Quality in Australia.

Addressing the Terms of Reference

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.

Waste Less, Recycle More

The NSW Government has made a significant and ongoing commitment to waste reduction and recycling and recently announced the extension of the *Waste Less, Recycle More* initiative with a further $337 million over 4 years from 2017-21.

Waste Less, Recycle More provides funding for business recycling, organics collections, market development, managing problem wastes, new waste infrastructure, local councils and programs to tackle illegal dumping and litter. The initiative is funded through the waste levy and is the largest waste and recycling funding program in Australia.

According to the 2016 Scorecard for the *Waste Less, Recycle More* program[1], among many achievements, it has funded 822 projects, resulting in the creation of 845 jobs, $85 million has been invested in infrastructure and 2,230,167 tonnes of waste has been diverted and processed and 19,550 tonnes of used timber has been recycled and so on.

[1] http://www.epa.nsw.gov.au/resources/wastestrategy/waste-less-recycle-more-scorecard-2016.pdf

Despite these achievements, NSW does not have a Zero Waste policy framework in place and there is plenty of room for improvement to support the recycling, reuse and composting to energy sectors. In San Francisco, and other cities where composting is conducted on an industrial scale, the product is in high demand from the agricultural sector due to its clean, green reputation. Australia's reliance on imported petrochemical fertiliser could be substantially offset by a large-scale investment initiative into composting for agricultural application with associated soil carbon retention and associated GHG abatement.

b) the role of 'energy from waste' technology in addressing waste disposal needs and the resulting impact on the future of the recycling industry

Based on overseas experience and published evidence, NTN has formed the view that directing residual waste to combustion technologies is not in fact a valid pathway to safely treat this problematic waste stream or create clean renewable energy.[2]

Residual waste often represents poorly separated and collected waste across the full spectrum of waste sectors with increasing volumes coming from the commercial, industrial, construction and demolition sectors where waste generation is high and hazardous materials are contained, often hidden at the bottom of skip bins or embedded in building product scrap. A notable example being the recently Stockholm Convention listed persistent organic pollutant (POP), hexabromocyclododecane (HBCD), a chemical used extensively as insulation in extruded polystyrene in buildings in Australia.

There is a direct correlation between the amounts of residual waste generated in our society and the choice and effectiveness of source separation and collection services. This provides a perverse incentive for the waste industry to promote mixed waste collection as combustion technology operators lock in long contracts (30+ years) required to meet their fuel needs.

Burning residual waste is known to generate toxic and hazardous air pollutants and ash requiring secure landfill. Turning one quarter of our residual waste stream (which is predominantly non-recyclable plastic) into toxic ash requiring secure, monitored landfills ultimately undermines the objectives and intention of the *NSW Energy from Waste Policy*. Leaching of dioxin and other POPs from incinerator ash not held in secure landfill has been demonstrated to have food chain contamination impacts that result in food products exceeding tolerable daily intake levels for some foods such as eggs[3].

Research in the EU and US has demonstrated that a zero waste approach to residual waste management provides greater ecological and economic outcomes.[4],[5],[6] Investing in dedicated and refined source separation creates far more jobs than the incinerator sector, and also

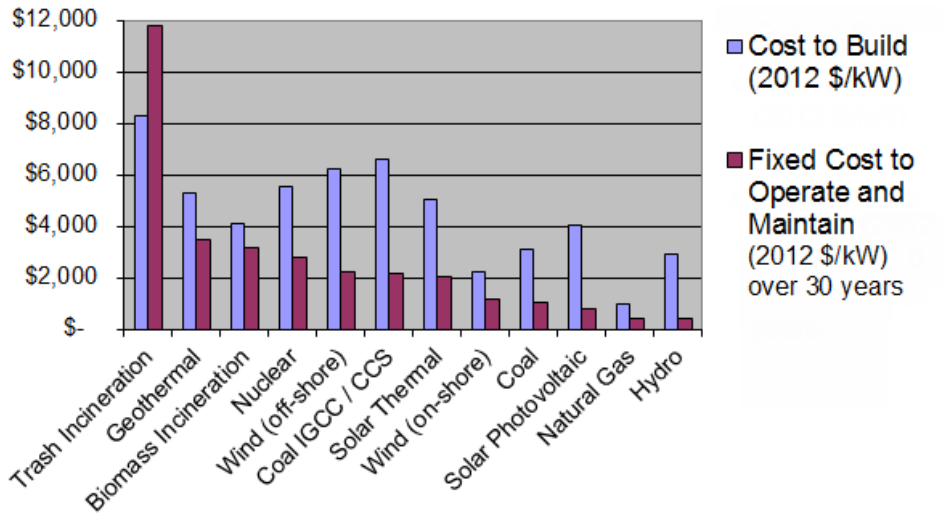
[2] National Toxics Network (2013), Burning Waste for Energy. It doesn't stack up. Exposing the push towards unsustainable waste to energy technology in Australia, August.
[3] Petrlik, J. and Bell, L. (2017) Toxic Ash Poisons Our Food Chain. International POPs Elimination Network, April 2017.
[4] http://www.ecocycle.org/specialreports/leftovers
[5] Zero Waste Europe, Zero Waste to Landfill and/or Landfill Bans: false paths to a Circular Economy, Policy Paper, November 2015.
[6] Muller, N., et al. 2011."Environmental Accounting for Pollution in the United States Economy." American Economic Review, 101(5): 1649-75.

provides the best opportunity to further remove recyclables and organics from this waste stream, while lowering the volume of residual waste significantly. Anaerobic and/or aerobic treatment of residual waste can then be undertaken to safely secure this waste stream in a relatively smaller landfill or containership cell without creating hazardous air emissions, toxic ash and with the ability to access this waste resource in the future as new technologies and treatments become available. 'Mining' of resources from older landfills has now been undertaken in a number of countries around the world.

Conversely, burning residual waste is a one-off process converting finite resources into hazardous, persistent air emissions and toxic ash requiring a comparatively higher level of regulation and management due to risks which include fire, explosion, air pollution control (APC) failure, food chain impacts and groundwater contamination from ash landfills, especially for the host communities[7]. The amount of energy generated from burning residual waste is minimal when a full accounting of the impacts is taken into consideration.

The experience in the EU and US demonstrates that waste to energy incinerators also undermine the recycling industry.[8],[9],[10]

In addition US based Energy Justice Network report that waste to energy incinerators are comparatively the most expensive form of waste disposal and 'renewable energy' production.[11]



Source: "Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants," Energy Information Administration, April 2013, p.6, Table 1. Full report here: www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf

[7] http://english.arnika.org/ipen-cee/waste-incinerators-accidents

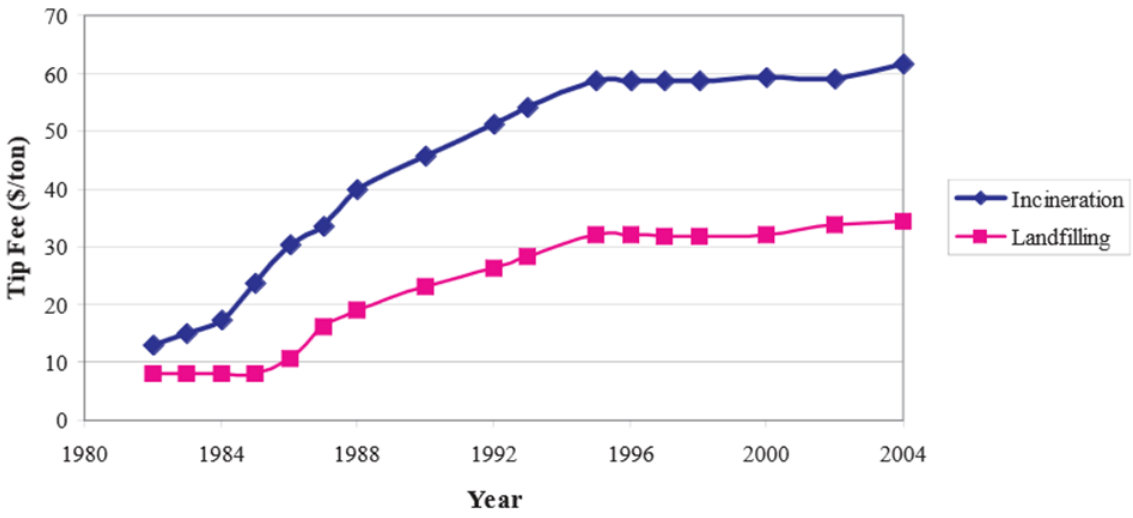
[8] Morris, J. (2008) Recycling and Composting Saves Money, Energy and Pollution Compared to Disposal Via Waste-to-Energy (WTE) Conversion. Montreal Video Conference – October 21, 2008.

[9] The Danish Government (Nov 2013) *Denmark without waste, Recycle more – incinerate less.*

[10] Global Alliance for Incinerator Alternatives, Waste Incinerators: Bad News for Recycling and Waste Reduction, October 2013.

[11] "Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants," Energy Information Administration, April 2013, p.6, Table 1. Full report here: www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf

Figure 3. Landfill and Incinerator Tip Fees



Source: National Solid Waste Management Association 2005 Tip Fee Survey, p.4.

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

In NTN's view, Waste to Energy incinerators are a dinosaur industry not compatible with zero waste strategies, our carbon constrained reality, and our desperate need to invest in jobs creation, a circular economy and the profound need to return carbon back our biosphere, not our atmosphere.

NSW Energy from Waste Policy Statement
The *NSW Energy from Waste Policy Statement*[12] ['The Policy'] was developed in 2015. The Policy sets out the considerations and criteria that apply to recovering energy from waste in NSW. It ensures that energy recovery:

- poses minimal risk of harm to human health and the environment
- will not undermine higher order waste management options such as avoidance, re-use or recycling.

The Policy states that energy from waste can be a valid pathway for residual waste where:

[12] [12] http://www.epa.nsw.gov.au/wastestrategy/energy-from-waste.htm

- further material recovery through reuse, reprocessing or recycling is not financially sustainable or technically achievable
- community acceptance to operate such a process has been obtained

The Policy refers to key objectives enshrined in the state's legislation. *The Protection of the Environment and Operations Act 1997* (POEO Act) sets the framework to ensure that human health and the environment are protected from inappropriate use of waste, and the *Waste Avoidance and Resource Recovery Act 2011* (WaRR Act) aims to ensure that the consideration of resource management options occurs according to the waste hierarchy.

Where waste cannot be avoided or products reused, the EPA applies overarching principles to waste avoidance and recovery technologies:

- higher value resource recovery outcomes are maximized
- air quality and human health are protected
- 'mass burn' disposal outcomes are avoided
- scope is provided for industry innovation

Eligible Waste Fuels Guidelines
The Policy points to *Eligible Waste Fuels Guidelines* that define which low-risk 'eligible waste fuels' could be considered and which must be assessed by the NSW Environment Protection Authority and approved subject to a resource recovery exemption and order.

Energy Recovery Facility Guidelines
Where there is a proposal to incinerate waste or waste-derived material that is not a listed eligible waste fuel, the facility must meet the requirements of an Energy Recovery Facility and use current international best practice techniques.

Proponents are referred to Section 4 of the NSW Energy from Waste Policy Statement and the *Energy Recovery Facility Guidelines**. [*At the time of making this submission, the Energy Recovery Facility Guidelines had not been published on the EPA website but were expected to be published in early 2017].

Energy Recovery Facility
Any facility proposing to thermally treat a waste or waste-derived material that is not a listed eligible waste fuel mist meet the requirements to be an energy recovery facility. These facilities must demonstrate that they will be using current international best practice techniques, particularly with respect to:

- process design and control
- emission control equipment design and control
- emission monitoring with real-time feedback to the controls of the process
- arrangements for the receipt of the waste
- management of residues from the energy recovery process

According to The Policy, the listed considerations will ensure that air toxics and particulate emissions are below levels that may pose a risk of harm to the community or environment. Energy recovery facilities must use technologies that are proven, well understood and capable of handling the expected variability and type of waste feedstock. This must be

demonstrated through reference to fully operational plants using the same technologies and treating like waste streams in similar jurisdictions.

The Policy establishes *Technical Criteria* and minimal requirements for the process and air emissions as required Under Group 6 emission standards within the *Protection of the Environment Operations (Clean Air) Regulation 2010*.

The Policy establishes *Thermal Efficiency Criteria* for the net energy produced from thermally treating the waste, including the energy used in applying best practice techniques, must therefore be positive. To meet the criteria, facilities must demonstrate that at least 25% of the energy generated will be captured as electricity.

The Policy establishes *Resource Recovery Criteria* for different waste streams in order to:

- promote the source separation of waste where technically and economically achievable
- drive the use of best practice material recovery processes
- ensure only the residual from bona-fide resource recovery operations are eligible for use as a feedstock for an energy recovery facility.

i. the European Union

The EU's Waste to Energy incinerator sector is often held up as the world's best standard for incinerator operation. However, the EU has recently declared a major policy redirection on waste management and the waste to energy incinerator sector in line with the major commitments to a *circular economy*.

The European Commission has now legislated that all members states must remove their organic waste stream for separate collection and recommends to member states that rely on incinerators to decommission their old facilities and not build new ones and, for those members states without an existing industry, to invest in greater source separation and choose non incineration waste to energy technologies for waste disposal such as anaerobic digestion.[13]

In addition member states are asked to review any public subsidies to waste to energy incineration facilities and redirect them to less harmful technologies as they current incineration subsidies do not send the right market signals in terms of investment in a circular economy. Discussion on incinerator taxes are also underway recognising their impact on the environment and resource depletion.

ii. United States of America

In the USA, growing concerns over identifiable health risks, high costs and environmental justice issues, such as the siting of high risk and polluting facilities in low-income communities with high populations of Afro-Americans and Latinos, has stymied the incinerator market for decades. These elements combined with a direction in the USA

[13] European Commission, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, The role of waste-to-energy in the circular economy, Brussels, 26.1.2017.

toward recycling and composting has meant that no new incinerators have been added to the 113 existing incinerators in the last decade.[14]

According to the USEPA[15] waste incineration has stagnated as more cities embrace composting and recycling,

> *"The waste-to-energy industry has been outpaced by the growth of recycling and composting. In 1990, recycling and composting accounted for 33.2 million tons of waste; that rose to 81.8 million tons in 2006, an increase of 146 percent. The amount of waste burned for energy recovery in 2006 (31.4 million tons) is only slightly larger than that in 1990, 29.7 million tons – a 0.3 percent average growth."*

The U.S. Department of Energy[16] detailed some of the reasons for the decline of the incinerator market and pointed out the key role that tax subsidies, energy credits and regulations play in the financial viability of incinerators:

> *"The WTE market has been steadily shrinking in the USA, due to the following reasons:*
> *1. The Federal Tax Policy no longer favours investment in the capital-intensive (because of expensive pollution control and monitoring equipment) WTE technologies. (WTE companies previously had tax-credit benefits.)*
> *2. Energy regulations, which once required utilities to buy WTE energy at favourable rates, have been revamped.*
> *3. There have been increasing challenges to interstate waste movement.*
> *4. With increasing awareness and protest by communities, the governments have been forced to involve them in the decision-making process. This sometimes means having to leave the waste management option to the communities themselves. People are increasingly opting for recycling and composting of waste, and out of WTE."*

iii. International best practice

Australia is signatory to the Stockholm Convention on Persistent Organic Pollutants whose objective is the protection of human health through the reduction and elimination of intentional and unintentional Persistent Organic Pollutants (POPs/UPOPs). Waste to Energy incinerators are recognised as a primary source of POPs and UPOPs generation. As the UNEP BAT/BEP guidelines state,

> "*Waste incinerators are identified in the Stockholm Convention as having the potential for comparatively high formation and release of chemicals listed in Annex C to the environment. The potential purposes of waste incineration include volume reduction, energy recovery, destruction or at least minimization of hazardous constituents, disinfection and the recovery of some residues. When considering proposals to construct new waste incinerators, priority consideration should be given to alternatives such as activities to minimize the generation of waste, including resource recovery, reuse, recycling, waste separation and promoting products that*

[14] Texas Comptroller of Public Accounts (2013) *Energy* Chapter 18
[15] U.S. Environmental Protection Agency, Office of Solid Waste, *Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 2006*, (Washington, D.C., November 2007), pp. 1-2.
[16] U.S. Department of Energy, 1997. cited in GAIA (2003) *Waste Incineration: A Dying Technology*

generate less waste. Priority consideration should also be given to approaches that prevent the formation and release of persistent organic pollutants."[17]

There is therefore a compelling obligation on all Australian states to pursue the safest waste disposal options available to avoid the generation of POPs, which, once released, remain in the environment for very long periods contaminating the food chain and building to dangerous levels in humans and other biota.

Australia is not immune from the long-term impacts of POPs with recent biomonitoring of Swan River dolphins in Western Australia revealing they had the highest body burden of POPs such as PCBs, HCB and dieldrin of any cetaceans worldwide[18]. Australia should not be investing in new sources of POPs contamination such as incinerators as it undermines our obligations under the Stockholm Convention. Australia therefore needs to set its policy drivers towards increased recycling and composting prior to establishing a policy framework to introduce the waste to energy incineration industry.

Currently NSW does not have these Zero Waste policy frameworks in place and there is great room for improvement to support the recycling, reuse and composting to energy sectors. In San Francisco and other cities where composting is conducted on an industrial scale the product is in high demand from the agricultural sector due to its clean, green reputation. Australia's reliance on imported petrochemical fertiliser could be substantially offset by a large scale investment initiative into composting for agricultural application with associated soil carbon retention and associated GHG abatement.

Similarly, under the International Basel Convention[19] and the Strategic Approach to International Chemical Management[20] (SAICM) to both of which Australia is a signatory country, support for Zero Waste strategies such as waste reduction, source separation, composting and other strategies are recommended to avoid the need for establishing incinerators.

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

New research[21],[22] is pointing to the failure of the Stockholm BAT/BEP guidelines and EU IPCC directives to control the release of POPs and other hazardous pollutants from incinerators - particularly those operating under these guidelines in the EU. Reliance on the EU's Waste Incinerator Directive's BREF (currently under review) is not providing the level of air pollution control needed to protect our global environment or host communities. A significant flaw in these regulatory documents pertains to the monitoring regime which is

[17] UNEP, guidelines on best available techniques and provisional guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants, May 2007, Geneva, Switzerland.
[18] http://www.perthnow.com.au/news/swan-river-dolphins/news-story/878433f82d0e59ddbbaf924c6500a9f6
[19] http://www.basel.int/theconvention/overview/tabid/1271/default.aspx
[20] http://www.saicm.org/Resources/SAICMStories/GlobalWasteManagementOutlook/tabid/5517/language/en-US/Default.aspx

[21] Zero Waste Europe, Air Pollution from Waste Disposal: Not for Public Breath, November 2015.
[22] Petrlik, J. and Bell, L. (2017) Toxic Ash Poisons Our Food Chain. International POPs Elimination Network, April 2017.

intended to prevent the release of highly toxic PCDD/F (dioxins and furans)[23] and other UPOPs at levels exceeding 0.1 ng I-TEQ m^3.

EU BAT/BEP compliant incinerators must operate below the 0.1 ng I-TEQ m^3 PCDD/F emission level or face breach of permit repercussions. Levels of PCDD/F release above this level can lead to localised contamination of soil and food web effects. However, the common sampling method for nearly all EU incinerators has been the EN 1948 method, which consists of one or two annual stack grab samples of flue gas emissions. This 6-12 hour 'snapshot' is nearly always conducted under optimal operating conditions and avoids sampling under circumstances where high levels of PCDD/F are formed such as start up and shut down conditions, process upsets and electrical trips (failures).

To accurately measure the full range of 'real life' scenarios under which incineration takes place a continuous monitoring system for PCDD/F must be employed. The best known of these systems is the AMESA technology[24] and can sample continuously for hundreds of hours capturing the full range of operational variability in terms of PCDD/F emissions. Where this form of monitoring has been conducted it has been demonstrated that incinerators are NOT compliant with the Australian and European limit of 0.1 ng I-TEQ m^3.

In some cases the true emissions levels are up to 50 fold higher than the reading provided by the commonly used EN 1948 method (which Australia uses). Claims by WTE incinerator proponents that they the meet strict EU regulations are based on this monitoring anomaly and no incinerator in Australia has employed the AMESA system, which leaves regulators with a false sense of compliance.

In addition, a new report investigating incinerator monitoring methodologies in the Netherlands has highlighted the failure of 'grab sample' regulations to record the true concentrations of POPs emitted and urges regulators to instead provide for long term monitoring including biomonitoring in surrounding environments.[25] The monitoring for this study was conducted on a recently constructed, state of the art waste, new generation incinerator in Harlingen, Netherlands. The study noted:

> *Currently only short-term flue gas sampling is mandated by the authorities; based hereupon, under normal operating conditions, the incinerator appears to be compliant with emission standards. This short-term sampling scheme is seriously flawed, however, in that it only demands one continuous 12-hour sampling period per annum – an extreme grab sampling transgression in the time domain. In starkest possible contrast, significantly elevated dioxins emissions were measured in flue gas during events of unstable combustion conditions by continuous long-term measurements. The dioxin congener patterns from long-term flue gas sampling show similar patterns as the congeners found in backyard chicken eggs and grass, evidence that elevated dioxins in eggs is due to emissions from the incinerator.* (Arkenbout 2017 p.1)

Incinerator licences in Australia for the few existing medical waste incinerators include 'bypass' provisions that allow the incinerator to bypass all of its flue gas filters in 'critical'

[23] For information on dioxins see http://toxicowatch.wixsite.com/toxicowatch/dioxins

[24] http://www.environnement-sa.com/products-page/en/emission-monitoring-en/amesa-2/

[25] Arkenbout, A. and Esbensen K.H., (2017) Sampling, monitoring and source tracking of dioxins in the environment of an incinerator in the Netherlands, , presented at the EIGHTH WORLD CONFERENCE ON SAMPLING AND BLENDING / PERTH, WA, 9–11 MAY 2017.

situations allowing the unfiltered release of carcinogenic POPs, heavy metals and products of incomplete combustion (PICs) in high concentrations and with no regulatory repercussions. These bypass operations may occur many times in a single year leading to significant contamination events.

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

The waste to energy incineration industry is not established in Australia and subsequently state and local government regulators have little experience in monitoring the industry. Experience overseas shows that most incinerator pollution events occur during start up, shut down and bypass periods, when compliance testing is not undertaken. Prior notification of compliance testing allows industry to adjust technology parameters to reduce levels of pollution, suggesting strongly that Continuous Emissions Monitoring (CEMs) for all air pollutants is necessary.

In addition, as previously mentioned, stack testing does not provide a sufficient level of compliance data to demonstrate the impacts of incinerator pollution on surrounding host communities with biomonitoring around facilities revealing much higher levels of pollution impacts than recorded regulatory stack testing. Testing of eggs, meat and vegetation[26] in the surrounding environment is essential to fully quantify the true environmental impacts of incinerator emissions. Baseline monitoring prior to building any incinerator would be required to measure regulatory compliance data against.

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

Incinerators are extremely capital intensive to establish and operate and far more so that alternative waste management techniques. One of the biggest capital sinks for operational aspects of incinerators in retrofitting filtration devices and scrubbers of the APC units to meet new and stricter air quality and emissions standards that are inevitably developed over the 25-30 year life span of the incinerator.

The costs of retrofitting plants can be prohibitively high leading to significant financial implications for investors which may include municipalities and state entities. In the US cities of Detroit[27] and Harrisburg[28] such operational costs have had such a drain on the financial reserves of the city as to draw them to the point of bankruptcy. The technology that should be fitted to any operational incinerator in Australia is an AMESA continuous monitoring system for dioxins and furans.

It is well overdue time for developed nations to consider non thermal combustion technologies to treat residual waste. Waste to energy incinerators are the most expensive and polluting technologies to treat residual waste and yet a number of technologies exist

[26] www.ipen.org/news/high-levels-dioxins-found-chicken-eggs-sampled-near-waste-incinerators-and-metallurgical-plant

[27] http://www.detroitnews.com/story/news/local/detroit-city/2016/10/18/detroit-incinerator-faces-suit-safety-violations/92351000/

[28] http://www.pennlive.com/news/2017/04/pennsylvania_ag_on_harrisburg.html

that do not produce toxic air and ash pollution. This short paper details some of the technologies available. NTN believes that there could be a valuable role for the Gas Phase Chemical Reduction technologies to treat residual waste given that this technology has been proven to successfully treat other hazardous waste stockpiles and has an Australian based company already operating[29],[30]. Adoption of this type of technology could also address the policy void and dangers hazardous waste poses within the entire waste management framework and go some way to dealing with Australia's increasing hazardous waste stockpiles, bringing the issue of hazardous waste into the full consideration of waste management.

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, and

Zero Waste Europe have many years and experience implementing zero waste strategies and work closely with the European Environment Bureau to achieve the best waste management outcomes possible. We highly recommend the Inquiry consider their recent report – *The Potential Contribution of Waste to the Low Carbon Economy*[31].

In addition, Zero Waste Europe has been working to establish a solid framework to support a circular economy. It would also be prudent of the Inquiry to consider the advice contained in their policy documents.[32],[33]

Finally, the following reports highlight the global recognition that waste to energy incinerators undermine the recycling, reuse and composting sectors, undermine jobs creation in the zero waste sector and, stifle innovation in cleaner emerging technologies to address our waste management needs. Essentially Waste to Energy incinerators are a dinosaur industry not compatible with sustainable waste management, our carbon constrained reality and our desperate need to invest in jobs creation, a circular economy and the profound need to return carbon back our biosphere, not our atmosphere.

[29] Hallett, D., Trentacoste, N., and McEwen, C. (2013). Use of Gas Phase Reduction (GPR) Presented to: US EPA (Cincinnati, Ohio) June 25, 2013. (vendor presentation).

[30] Hallett, D. J. (2016). Data on successful use of GPCR on various chemicals. Presentation by Hallett Environmental and Technology Group Inc. 13th HCH Forum.

[31] https://www.zerowasteeurope.eu/downloads/the-potential-contribution-of-waste-management-to-a-low-carbon-economy/

[32] https://www.zerowasteeurope.eu/wp-content/uploads/2017/01/EPRpolicypaper.pdf

[33] https://www.zerowasteeurope.eu/downloads/creating-a-toxic-free-world-avoiding-a-collision-between-the-eu-and-the-circular-economy/

Further information

Further information to support this submission can be found in the following reports.

http://www.no-burn.org/wp-content/uploads/Burning-Recycling-0513.pdf

http://www.no-burn.org/wp-content/uploads/Stop-Trashing-the-Climate-Report-Executive-Summary-low-res.pdf

http://www.no-burn.org/wp-content/uploads/Resources-up-in-Flames.pdf

Friends of the Earth (2010*) More jobs, less waste. Potential for job creation through higher rates of recycling in the UK and EU*. September 2010

Global Anti Incineration Alliance (2011) *Not Renewable, Barely Energy The False Promise of "Waste-to- Energy" Incineration and the Threat it Poses to Real Climate and Energy Solutions.* April 2011

Morris, J. (2008) *Recycling and Composting Saves Money, Energy & Pollution Compared to Disposal Via Waste-to-Energy (WTE) Conversion.* Montreal Video Conference – October 21, 2008.

Sora, J. (2013) *Incineration overcapacity and waste shipping in Europe: the end of the proximity principle?* Fundacio Ent January 7th, 2013

Tellus Institute with Sound Resource Management (2011) *More Jobs, Less Pollution: Growing the Recycling Economy in the U.S.*