



## Submission on the Queensland Draft Waste Management and Resource Recovery Strategy

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Thank you for the opportunity to comment on the Queensland Government's Draft Waste Management and Resource Recover Strategy.

### About the Centre for Air pollution, energy and health Research (CAR)

[CAR](#) is a Centre of Research Excellence funded by the National Health and Medical Research Council. The centre brings together more than 30 researchers at the forefront of their fields, based in seven of Australia's leading universities.

CAR is the only group of its kind nationally to bring together researchers focusing on health impacts of air pollution, and new versus traditional forms of energy. The centre supports teams of researchers in the fields of epidemiology, exposure assessment, toxicology, chemistry, biostatistics and clinical respiratory medicine to pursue collaborative projects and to develop their capacity. Our centre's vision for a healthier community is the driving force behind our research.

CAR is facilitating and translating research on moving to alternative, renewable forms of energy that have the most beneficial (or least detrimental) impacts on economy, environment and health, considering a technology's life cycle. For example, CAR is assessing how a transition in domestic energy use (from solid-fuel combustion to solar-generated electricity) may reduce household air pollution and therefore reduce childhood mortality rates in some Pacific Island Countries. Conversely, CAR plans to assess the potential for negative impacts from energy transitions, such as the environmental health impacts of disposal of photovoltaic solar panels at the end of their life cycle.

CAR has recently published a position paper on waste management and resource recovery, titled [Waste-to-Energy processes: what is the impact on air pollutants and health?](#)<sup>1</sup> Our critical review of the literature to produce this position paper is the basis of our submission to the Queensland Government 'Draft Waste Management and Resource Recover Strategy'.

### Focusing on the waste hierarchy is a priority

The Draft Waste Management and Resource Recover Strategy acknowledges the Clean Energy Financing Corporation waste hierarchy.<sup>2</sup> This approach tackles Australia's waste problem by reducing the amount of waste produced before considering methods for recovery (re-purposing, recycling).<sup>1,3</sup> Australia needs to adhere to this hierarchy to become a "zero-waste society", as the draft Strategy envisions.

Only half of the waste that Australia generates each year is recycled or recovered as a resource, although State governments have committed to better waste management. The Australian Federal Government Department of Environment and Energy's target is to increase waste recovery nationwide from 58 per cent to 80 per cent,<sup>4</sup> which will be helped by the Queensland Government collaborating closely with the Commonwealth Government and other states and territories to update the National Waste Policy. Reducing material that goes to waste before it is recovered will build resilience to international market fluctuations and drive improved recovery. A recent example of the uncertainty driving this policy is China's decision to restrict the importation of some (contaminated) waste produced by countries such as Australia.<sup>5</sup>

Queensland's current level of resource recovering/recycling is below the national average. As noted in the draft Strategy, this is in part due to its relatively low tip fees and the absence of a waste levy, which lead to a net import of interstate waste. Despite an increasing level of waste to process, the rate of recycling is not increasing so the volume of waste going to landfill is increasing. The effect on emissions of greenhouse gases and leaching of toxins into soil and water creates a substantial environmental and health hazard.<sup>1</sup> Reducing the amount of waste going to landfill is an effective way to address the draft's Strategic Priority 1 (*Reducing the impact of waste on the environment*).

### **Waste-to-Energy processes are an opportunity to better manage waste**

In terms of *transitioning to a circular economy for waste* (Strategic Priority 2), waste-to-energy (WtE) processes offer an opportunity to simultaneously address issues of waste recovery and energy production. However, it is important to note that WtE (i.e. converting sorted municipal and industrial solid waste into electricity and/or heat), is near the bottom of the waste management hierarchy. It should only be considered when the impact of solutions for waste management that are higher on the hierarchy have been exhausted.

As CAR's position paper shows, WtE involves more complete combustion and therefore lower emissions of pollutants and higher amounts of electricity per weight than incinerating unsorted municipal solid waste (MSW). A recent assessment that estimated the effects of inhaling combustion emissions showed WtE processes had a 64% lower public health risk than incinerating unsorted MSW.<sup>6</sup> Increased concentration of some items being incinerated may lead to greater emissions of carcinogens if appropriate management of emissions does not occur. However, the most recently published biomonitoring study of individuals living around a WtE facility suggests there is no heightened risk (e.g. above that from vehicular traffic and fish intake) due to heavy metal exposures.<sup>7</sup>

A full assessment of the environmental impacts of WtE processes should be considered on a case-by-case basis to evaluate the risks and benefits of pollutant emissions and less obvious potential impacts on the local and wider community, within the life cycle of WtE and alternative/traditional processes. Such an assessment would ensure that WtE supports the draft's Strategic Priority 1 (*Reducing the impact of waste on the environment*).

### **Refuse-derived fuel can create economic opportunities**

The sorting of MSW as feedstock ('refuse-derived fuel', RDF) for WtE will work towards *building economic opportunity* (Strategic Priority 3) for Queensland. As the draft Strategy states, recycling/recovering waste creates around three times more employment opportunities than sending waste to landfill. As Queensland already receives more interstate waste for processing than it has the capacity to recover/recycle, the state has a unique opportunity to become a hub for sorting of WtE feedstock to be used in local and interstate/overseas facilities. This sorting of WtE ensures appropriately classified waste from

one process can be used as a resource and feedstock for downstream, value-added processes. This systematic sorting will also support Strategic Priority 1 (*Reducing the impact of waste on the environment*) and Priority 2 (*transitioning to a circular economy for waste*).

### WtE trends in other countries

Europe is a widespread adopter of WtE, with up to 8% of all electricity generated in this way.<sup>8</sup> It accounts for nearly half of the global market for WtE technologies.<sup>9</sup> As of 2008, 475 WtE plants processed an average of 59 million tonnes of MSW per annum creating revenue of \$USD 4.5 billion.<sup>8</sup> Denmark processes 54% of its MSW by WtE – more than any other country.<sup>8</sup> Sweden alone has 34 WtE plants. Its goal is to repurpose 99% of MSW (including for WtE). In fact, Sweden now imports waste to feed its WtE demand.<sup>10</sup>

Europe is followed by the Asia-Pacific region and North America respectively. While Japan dominates the Asia-Pacific WtE market share, with 60% of its MSW assigned for incineration, China is the fastest growing adopter, with 125 new plants recently planned to double its capacity.<sup>8,9</sup> In 2016, the USA had 71 WtE plants generating around 14 billion KWh of electricity from about 30 million tonnes of RDF (64% of that being biomass, generating 51% of WtE-derived electricity).<sup>11</sup>

### Exploring innovation in WtE processes

In addition to that outlined above, innovations to address Strategic Priority 3 (*building economic opportunity*) should include research into the viability of WtE as an innovative commercial process. Viability should be considered not only in terms of the sustainability of supplied feedstock appropriate for WtE (which could include overseas as well as interstate sources), but also the risks and benefits in the life cycle of WtE process compared to other streams of waste management and energy production. A portion of the waste levy proceeds proposed in this draft Strategy may fund impactful pilot studies to assess the above and potentially attract larger, national or international funding sources. The importance of WtE feedstock supply and technological innovation is clearly growing worldwide, and particularly in our neighbouring Asia-Pacific region.

New and emerging WtE technologies that use non-combustive heating (gasification) or microorganisms to biologically digest matter (bio-digestion) and recover energy may bring the most potential to the economy and sustainable development, while safeguarding the health of Queenslanders.<sup>9</sup>

### Conclusion

Waste cannot be avoided, but it does not have to be a problem if opportunistic and innovative approaches to its management are employed. While WtE has potential benefits for the environment, health and economy as an alternative to incineration or landfill, waste needs to be dramatically reduced in the first instance. Waste should only be considered for WtE processes when it cannot be avoided, reduced, recycled or re-purposed. Even then, it must be properly sorted to manage emissions and any potential health risks. Such sorting brings opportunities for state, national and international enterprise while minimising contaminated materials ending-up in our environment.

### References

1. Cole-Hunter T, Cowie C, Johnston F, et al. *Waste-to-Energy Processes: What Is the Impact on Air Pollutants and Health? A Position Paper from the Centre for Air Pollution, Energy and Health Research (CAR)*. Sydney, Australia. Located online: <https://www.car-cre.org.au/position-papers> <https://doi.org/10.5204/rep.eprints.127966>

2. Clean Energy Finance Corporation. *The Australian Bioenergy and Energy from Waste Market*; 2015.
3. Porta Cubas A. *Submission to "Updating the 2009 National Waste Policy: Less Waste, More Resources."* Sydney, Australia; 2018.
4. Australian Government. *Updating the 2009 National Waste Policy: Less Waste, More Resources*.; 2018.
5. Preiss B. Kerbside recycling to be sent to landfill as waste crisis unfolds. *The Age*. February 17, 2019.
6. Karunathilake H, Hewage K, Sadiq R. A life cycle perspective of municipal solid waste: Human health risk-energy nexus. In: *7th International Conference on Sustainable Built Environment 2016*. ; 2016.
7. Ruggieri F, Alimonti A, Bena A, et al. Human biomonitoring health surveillance for metals near a waste-to-energy incinerator: The 1-year post-operam study. *Chemosphere*. 2019;225:839-848. doi:10.1016/j.chemosphere.2019.03.041
8. Zafar S. Trends in Waste-to-Energy Industry. BioEnergy Consult. <https://www.bioenergyconsult.com/trends-in-waste-to-energy-industry/>. Published 2018. Accessed November 1, 2018.
9. World Energy Council. *World Energy Resources 2016*. London, United Kingdom doi:[http://www.worldenergy.org/wp-content/uploads/2013/09/Complete\\_WER\\_2013\\_Survey.pdf](http://www.worldenergy.org/wp-content/uploads/2013/09/Complete_WER_2013_Survey.pdf)
10. Fredén J. Towards zero waste. Swedish Institute. <https://sweden.se/nature/the-swedish-recycling-revolution/>. Published 2018. Accessed November 1, 2018.
11. U.S. Energy Information Administration. Waste-to-Energy (Municipal Solid Waste). [https://www.eia.gov/energyexplained/index.php?page=biomass\\_waste\\_to\\_energy](https://www.eia.gov/energyexplained/index.php?page=biomass_waste_to_energy). Published 2018. Accessed November 1, 2018.

### For more information

This submission has been produced by the Centre for Air pollution, energy and health Research (CAR).

For more information about CAR and our work in energy transitions as well as the health impacts of air pollution, contact us at [car@sydney.edu.au](mailto:car@sydney.edu.au) or visit our website: [car-cre.org.au](http://car-cre.org.au)

