

Market Report: New Zealand

RECYCLING AND WASTE MANAGEMENT IN NEW ZEALAND



MARKET REPORT: NEW ZEALAND

TOPIC: RECYCLING AND WASTE MANAGEMENT

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1. Executive Summary

The way we create and manage waste in Aotearoa New Zealand is not sustainable. Most of the materials we use are disposed of in landfills, and the rate of disposal is increasing. These practices have contributed to making us one of the highest generators of waste per person in the Organisation for Economic Co-operation and Development (OECD).

The negative effects of historic and open landfills on the environment and on local populations are recorded in areas across the country. Many of the facilities still open will exhaust their capacity in the next few years. Landfill operators will then face either applying for new Resource Consents to expand existing facilities, negotiating for waste transfer to other existing landfills, or building new facilities in new locations.

New Zealand councils have a hands-off approach when it comes to landfills, choosing instead to contract out the responsibility to private enterprise. Most waste collection and landfill operations in the country are managed by two overseas-based private companies. They select and purchase properties for landfills, plan and build the infrastructure, and operate the facilities at significant profit. This duopoly makes the New Zealand waste sector very difficult to deal with.

In 2018, the New Zealand Government adopted the findings of the Eunomia Report, which had been commissioned by WasteMinz and other stakeholders. WasteMinz is a broad-scope representative body for the waste and resource recovery sector, and works closely with the Ministry for the Environment. The Eunomia Report advocated continued landfilling, but with measures introduced to support transition to a circular economy and product stewardship. Along with its endorsement by the government and WasteMinz, the policy is supported by Zero Waste and other private national and local environmental organisations, among the ranks of which are vocal and skilled lobbyists.

Recycling is a key component of the Eunomia Report findings. Much of New Zealand's recyclable material was shipped to China, but with China's National Sword ruling of 2018 the export market came to an abrupt stop. Recyclables are mounting, and buyers have placed additional pressure on the industry by demanding higher quality, less contaminated recyclable material. The infrastructure upgrade required to provide this, will demand an input of capital and, to be economically viable, a greater volume of clean recyclable material. If the government fails to provide the right incentives to consumers and the recycle industry, reliance to finance the upgrade will fall on private investors. They will then need to weigh up the risks and security of any investment. This is of particular importance where low-value or hard-to-recycle material is concerned, and where end products must compete on an at times volatile and uncertain international market.

While some recycling business initiatives are operating successfully, and both innovation and research into product development are fostered, the reality of achieving a circular economy remains a distant prospect. Matters as fundamental as establishing consistency of collection at kerbside level, ongoing changes to recycling collection methods, collection frequency, items eligible for collection, and how items should be presented, cause ongoing consumer confusion. Uncertainty surrounding drop off points for various items not collected at the kerbside, causes further confusion. Confused consumers are more inclined to 'wishcycle', and bins of contaminated material result in truckloads of recyclables going to landfill. Consequently, council budgets are being eroded by disposal levies that are rising incrementally.

Waste to Energy (WtE) technology would provide an integral link between New Zealand's still largely linear economic model and its proposed circular economy goal. WtE's contribution to the circular economy in recovering energy from waste otherwise buried; using it for thermal heating or electricity; and the recovery at source of valuable minerals otherwise lost to landfills; must also be acknowledged, as must opportunities for jobs in new technologies that emerge from product development and manufacture. Greenhouse Gas (GHG) emissions from waste in New Zealand should be noted. They account for 4 % of New Zealand's total GHG emissions, a figure that reduces further when biogenic sources and material recycled from bottom ash are taken into account.

People are now far more aware of the negative impacts of both old and new landfills and the threats they pose to environment. The environmental threat has particular resonance with iwi (Maori groups), who have strong cultural and spiritual links connecting the people to the land, water, sea and air. It is key that Maori and their representatives are included in any debate concerning the WtE idea. Maori often feel quite threatened, not understood, and left behind in decision-making, but their role in helping shape the future is vital.

A joint approach is needed, involving the government, councils, iwi and the two main companies handling waste, to re-evaluate the role of modern WtE plants in creating a sustainable waste sector. Future generations must be free of the huge burden we face today. The existing strong mind-set against WtE needs to be tempered with new understanding, and those concerned shown, using scientific facts, that WtE does not cause additional negative effects to the environment, health or climate change. It is not a competitor to the circular economy; it is a viable and clean alternative to landfills.

If we can initiate a constructive discussion on WtE with decision makers, we will have taken the first step on our journey.

2. Foreword

The planned forum on the 29 November 2021 is a first attempt to take many people (politicians, iwi, people from the industry, district and regional councils, as well as central government) on an educational journey. New Zealand has only 5 million people and due to their isolation, they have long been known as innovative people who make things out of nothing ('number 8' wire thinking). This fundamental thinking is still very much alive and therefore, our approach has to be in such a way that we engage New Zealand people in a discussion and make the solution their own.

The following report contains an outlay of the situation in New Zealand and issues New Zealand has to deal with in the future. It should give Switzerland Global Enterprise (S-GE) and their CleanTech branch, as well the experts, deeper insight into waste matters in this country.

3. Introduction

Waste disposal in New Zealand is very limited in scope and landfills are the disposal method of choice. There are some recycling plants operating, but to date most collected and recyclable waste has been exported abroad. The money from the sales of this material partly cover its collection.

New Zealand exported 1.02 million tonnes of recyclable material overseas annually until China introduced its 'National Sword Policy' in 2018. The export of recyclables from New Zealand to China came to an abrupt stop, and a halt in the export of recyclables to other countries followed.

More and more recyclable material is no longer collected by councils because there is no market for it, and therefore no return on it. The cost of collecting recyclables now exceeds the cost of sending it to landfill. Additionally, New Zealand's growing population is leading to landfills becoming filled more rapidly. Limited years to run and increasing opposition to the continued use of landfills is putting more pressure on the government.

With the adoption of the Eunoia Report (2017), the government set New Zealand on the path of a circular economy and increased focus on product stewardship. This, and the zero-waste policy is now well-established in the minds of New Zealand's decision makers, in both government circles and in industry. A 2017 attempt to build a waste-to-energy plant in Hokitika, a West Coast town in the South Island, failed. However, within the last month a new corporation (British, Spanish, and Chinese) has announced plans to build a waste-to-energy plant costing NZD 350 million in Waimate, a South Canterbury town in the South Island.

Growing opposition to landfills, and the possibility of using heat or electricity from waste incineration, has resulted in the idea of waste to energy gaining some traction.

4. Waste Legislation in New Zealand

We have 3 waste legislation acts in New Zealand:

4.1 The Waste Minimisation Act 2008 ¹

Encourages reducing the amount of waste we produce and dispose of in New Zealand. Is responsible for waste levies, establishing stewardship schemes to encourage manufacturers to take responsibility, and minimise product impact on the environment. Regional Councils must write a waste assessment every six years.

- Step 1: Reduce
- Step 2: Re-use
- Step 3: Recycle & Compost
- Step 4: Recover (energy)
- Step 5: Dispose; Least favourable option

4.2 The Local Government Act 2002 ²

- To promote the social, economic, environmental, and cultural wellbeing of communities.
- Solid waste collection and disposal is a core service of local authorities.

4.2 The Resource Management Act 1991 (RMA) ³

- The RMA controls the environmental impacts of waste facilities such as disposal, recycling plants, and landfills.

17 October 2014 ⁴

Resource Management (National Environmental Standards for Air Quality) Regulations 2004

11 Incinerators at schools and healthcare institutions ⁵

The operation of an incinerator at a school or a healthcare institution is prohibited unless a resource consent has been granted for the discharge produced.

12 High-temperature hazardous waste incinerators ⁶

- (1) *The operation of a high-temperature hazardous waste incinerator is prohibited.*
- (2) *Subclause (1) does not apply if the incinerator—*
 - (a) *is a crematorium; or*
 - (b) *is operating at the following places:*
 - (i) *89 Paritutu Road, New Plymouth;*
 - (ii) *816 Wairakei Road, Christchurch;*
 - (iii) *Hape Drive (perimeter road), Auckland International Airport, Auckland.*

5. The Circular Economy – a highly ambitious goal

- The New Zealand Government adopted the circular economy and product stewardship outlined by the Eunomia Report of 2017. The circular economy is an alternative (4 Rs -reduce – reuse – recycle - recover) to the linear economy (make, use, dispose), and tries to keep goods in the economy until the end of their service life.
- The Ministry for the Environment (MfE)⁹ considers moving toward a circular economy will help protect natural resources and have long-term benefits for climate change and water quality. The issue in our modern world is that the life of most consumer goods is very short, and in most cases the cost of repairs (if they can even be made) is greater than the purchase price of a new item. This adds to waste and places further pressure on landfills in New Zealand.
- New Zealand is aiming to have 100 % reusable, recyclable or compostable packaging by 2025 or earlier, meaning no packaging used should end up in landfill. The government supports product stewardship schemes and encourages manufacturers to incorporate this into their practice.
- Waste that cannot be prevented or recycled will continue to go to landfills
- Circular economy proponents are convinced WtE plants cannot be integrated into the circular economy model, despite the fact that WtE can be complementary and neither approach needs to exclude the other.
- There is an opportunity to recover energy (heat or electricity) from waste. The benefits of WtE are twofold:
 - First, it reduces the need for landfills in NZ and therefore, it is not a burden for the environment, or for future generations.
 - Second, it utilises energy that lies wasted in landfills. It helps cover the increasing amount of electricity required and helps replace fossil fuels for large heat and energy users.
 -

6. New Zealand waste sector

6.1 General:

The New Zealand waste sector is very complicated with many entities (private and local government) involved. The responsibility for waste management and minimisation is in the hand of local authorities and how it is handled differs across these authorities. New Zealand has 66 local authorities, and 20 regional authorities.

6.2 The most important players in the waste industry:

- Waste Management: owned by the Chinese Beijing Capital Group
- Enviro NZ: owned by CK Infrastructure based in Hong Kong

These two companies dominate the collection and recycling markets and own some of the largest landfills in New Zealand.

6.3 Main smaller companies:

- Green Gorilla: New Zealand owned and is only in the recycling market - does not own any landfills.
- Smart Environment: New Zealand owned company and collects and recycles waste – does not own any landfills.
- VISY: recycling and packaging market (strong in Auckland) – Australian owned.

7. Landfills and waste

The current amount of waste generated in New Zealand, the use of landfills, and the rate of disposal have contributed to making us one of the highest generators of waste per person in the Organisation for Economic Co-operation and Development (OECD).

2018: New Zealand sent 3,701,807 tonnes of waste to class one landfills.

Description of the class landfills:

Class 1 (new: Municipal solid waste landfills):

Landfills that accept household waste as well as others wastes (industrial)

Class 2 (new: managed landfills):

Landfills composed mainly of cleanfill, but also construction and demolition waste with light contaminants.

Class 3 (new: Construction and demolition and landfills)

Landfills where construction and demolition materials such as wood products, asphalt, plasterboard, insulation and other are disposed land.

Class 4 (new: Cleanfill)

Landfills where cleanfill material is disposed to land.

New: Industrial landfills

Industrial waste landfill are monofills associated with specific industry or facility

- Landfills are mostly owned by the two large and dominant companies Waste Management or EnviroNZ, local authorities or joint venture with one or both of these big companies like TransWaste Canterbury which is a 50 : 50 shares between waste management and 5 different local authorities owning the Kate Valley landfill in Canterbury.

7.1 Waste Disposal

It is estimated that in Aotearoa New Zealand we generate 17.49 million tonnes of waste per year, of which an estimated 12.59 million tonnes are sent to landfill.

This estimate includes waste disposed of in Class 1, 2, 3 and 4 landfills, clean-fill, and farm dumps (see [Types of landfills](#) for descriptions of landfill types). It also includes materials recycled in

New Zealand and those sent offshore for recycling. (Source: Online Waste Levy System, and adapted from MfE, 2016 & MfE, 2014.)

Waste sent to Class 1 landfills (landfills that accept household waste) increased by 47 per cent from 2,499,571 tonnes in 2009/2010 to 3,682,419 tonnes in 2018/2019, with per capita waste increasing from 580kg to 740 kg per annum.

7.1.1 Class 1 landfill waste disposal

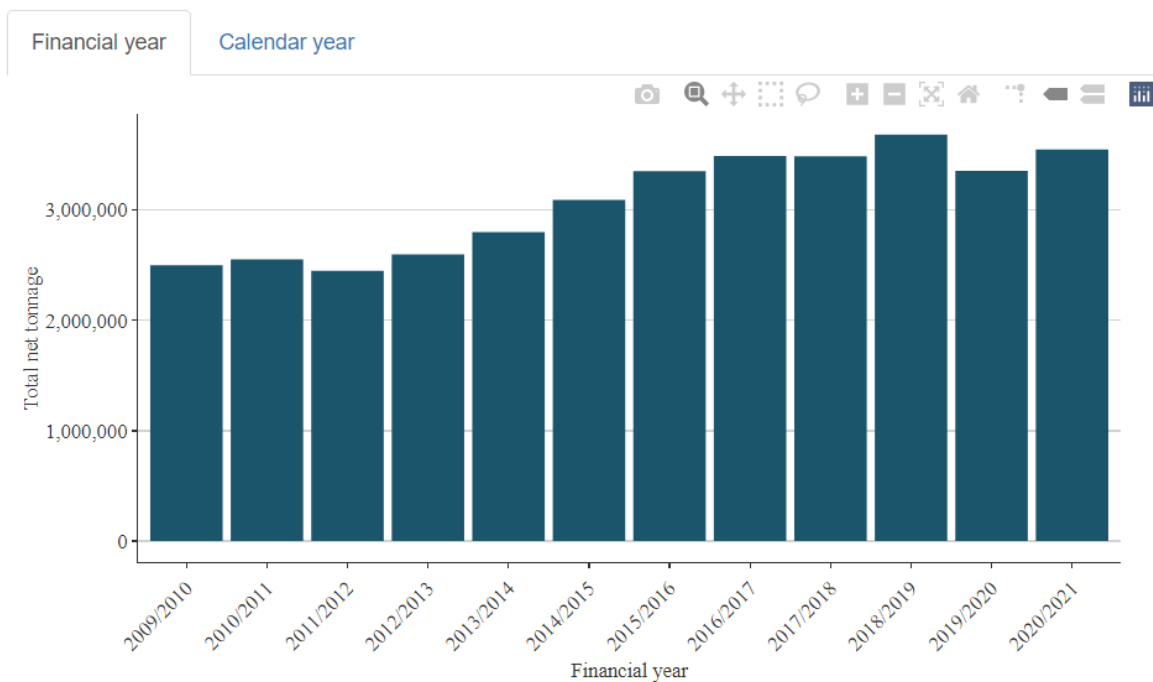
There was a slight decrease in waste to Class 1 landfills in 2019 and 2020, with the decrease in 2020 likely largely due to COVID-19. Longer term trends suggest the rate of waste disposal is only increasing for many sites around the country. Table 1 and Graph 1.

Table 1:

Year	Net Tonnage
2009 / 2010	2,499,571
2010 / 2011	2,553,071
2011 / 2012	2,447,181
2012 / 2013	2,596,963
2013 / 2014	2,798,577
2014 / 2015	3,090,878
2015 / 2016	3,351,738
2016 / 2017	3,488,251
2017 / 2018	3,485,557
2018 / 2019	3,682,419
2019 / 2020	3,352,322
2020 / 2021	3,546,880

Total tonnage of waste sent to Landfill class 1¹⁰

Graph 1:



Total tonnage of waste sent to Landfill class 1¹⁰

Other projections show that with current population trends and without any increased intervention the waste disposed of in landfills will almost double within 10 years in Auckland.¹¹

Note: Numbers of New Zealanders returning from overseas, as well as the dramatic increase of online shopping due to COVID will contribute to the increase of the total waste.

7.2 Waste disposal

Until 2018 landfills were categorised as Class 1–4. Since then each class name has become a descriptor of the type of waste the landfill contains. There is currently no data on tonnage to landfill available under the new descriptors.

I received the following note from MfE two months ago:

Waste disposed of to other classes of landfill is not information the Ministry yet holds; however, regulations have recently come into effect which require all classes of landfills to report tonnage data on waste received at and diverted from the site, implemented in a staggered manner. Class 2 landfills start reporting tonnage data to the Ministry on 1 January 2022, with class 3 and 4 landfills on 1 January 2023.

Table 2:

Waste disposal by destination							
	2014			2018		predicted 2021 Eunomia	predicted 2021 BERL
Waste	Tonnes	Total %	Landfill %	Tonnes	Total %	Tonnes	Tonnes
Class 1 Landfill	3,220,888	21.0	33.0	3,701,807	21	3,870,889	4,192,290
Class 2 landfill	2,575,771	16.8	27.0	2,965,362	17	3,048,973	3,302,130
Class 3 landfill	64,394	0.4	1.0	74,134	0	76,224	82,553
Class 4 landfill	3,799,262	24.8	39.0	4,373,908	25	4,497,235	4,870,642
Farm dumps	1,362,66	8.9	N/A	1,565,772	9	1,613,005	1,746,933
Recovery	4,288,743	28.0	N/A	4,937,424	28	5,076,640	5,498,155
Total	15,311,724			17,627,654		18,124,683	19,629,581
	Source Eunomia report 2017					Eunomia 2017	Berl report

Absolute tonnage of waste; percentage of total waste going into different landfills for 2014, 2018; and predicted tonnage of waste; by Eunomia ¹² and Berl ¹³.

The two references ^{15 16} from the Eunomia report are not available on the MfE website any longer.

7.2.1 Landfills on borrowed time

With existing facilities on borrowed time and filling up, planning is underway for expanding or creating new landfills. The planning processes are always lengthy, complicated, and frequently involve hearings in the Environment Court. The most recent and well-known case is the proposed Dome Valley landfill near Warkworth, north of Auckland. Auckland Council gave consent for the site to provide a new landfill for Auckland, but the proposal is now in front of the Environment Court with a hearing due to take place in June 2022.

The below table is an indication of some of the landfills in which are running out of time.

Dumps on borrowed time

Council	Remaining time	Extra capacity coming?
Central Hawke's Bay	5-5.5 years	Consented proposed landfill footprint will last 67 years
Clutha	5 years (consent expires in 2023)	Proposed site layout developed would allow 348,000m ³ , which would last 32 years
Dunedin	5 years	In Aug 2020, submitted consent for new landfill at Smooth Hill. Capacity of about 6 million m ³ , which would last 50 years
Gisborne	4 years	Landfill serving rural East Coast townships will close in 2025. Alternatives will be considered over two years
Hastings and Napier	5.5 years	Another 3 million tonnes consented or in pipeline. Enough to last 28-30 years
Kaikoura	4-6 years	No (once filled, waste will be transported outside district)
Nelson and Tasman	York - 7-8 years; Eves Valley - 9 months.	Working on consent for new landfill
Porirua	5 years	Two extra landfill cells planned, with capacity of 1,290,000 tonnes. Expected to last till 2046
Taupo	6 years	Extra 20 years of filling (about 500,000 tonnes) if able to get new consent
Waikato (Tirohia)	3.2 years	Tirohia landfill expansion consent (in progress) for another 3,000,000 cubic metres, to extend landfill life by extra 17 years
Wairoa	6-7 years	Proposed development of new cell on existing landfill
Waitaki	6 years	None
Waitomo	2 years	Consented for another 35 years, extra 188,000 tonnes
Wellington	5 years	Consultation on options planned for Oct 2021
Westland	5 years	Due to Fox Glacier dump extraction project of 14,000 tonnes, a new waste cell is being developed. Expected future capacity of 55,000 tonnes, with life of 15 years, depending on tourism impact.

7.2.2 Landfills with and without methane gas captures facilities

The data for methane gas recovery, also called Landfill Gas Recovery (LFGR) is provided by the Ministry for Environment (MfE), last updated in 2013. (Table C1)

Out of the 28 landfills registered, 10 have a methane gas recovery system, 17 have not, and one landfill is unknown. There is no data available of tonnage recovered a year.

Table C1: Landfills with and without landfill gas recovery

Name	Operator	LFGR
AB Lime Ltd (Winton)	AB Lime Ltd	Yes
Ahipara Landfill	Far North District Council (Pukepoto Quarries)	No
Bonny Glenn (Rangitikei District)	Midwest Disposal Ltd	Yes
Broadlands Road Landfill	Taupo District Council	No
Burma Road Landfill	Whakatane District Council	No
Butlers Landfill	Westland District Council	No
Central Hawke's Bay District Landfill	Central Hawke's Bay District Council	No
Claris Landfill (Great Barrier Island)	Auckland City Council	No
Colson Road Regional Landfill	New Plymouth District Council	No
Eketahuna Landfill	Tararua District Council	No
Eves Valley Landfill	Tasman District Council	No
Fairfield Landfill (Dunedin)	Transpacific Industries Group (NZ) Ltd	Unknown
Franz Josef Refuse Station	Westland District Council	Closed

Green Island Landfill	Dunedin City Council	Yes
Haast Refuse Station	Westland District Council	No
Hampton Downs Landfill	EnviroWaste Services Ltd	Yes
Innovative waste Kaikoura	Innovative Waste Kaikoura Ltd	No
Karamea Refuse Tip	Buller District Council	No
Kate Valley (Amberley)	Canterbury Waste Services Ltd	Yes
Levin Landfill	Horowhenua District Council	Yes
Marlborough Regional Council (Bluegums)	Marlborough District Council	Yes
McLean's Pit Landfill	Grey District Council	No
Mount Cooee Landfill	Clutha District Council	No
Oamaru Landfill	Waitaki District Council	Closed
Omarunui Landfill	Hastings District Council	Yes
Palmerston Landfill	Waitaki District Council	No
Patearoa Landfill	Central Otago District Council	Closed
Pongaroa Landfill	Tararua District Council	No
Redruth Landfill	Timaru District Council	Yes
Redvale Landfill	Transpacific waste management	Yes
Rotorua District Sanitary Landfill	Rotorua District Council	No

7.3 Old landfills

There is a huge issue with old landfills. According to MfE, New Zealand has an estimated 1800 landfills: some open, many closed, and some unknown. Many more unknown landfills beyond the MfE estimates are spread throughout New Zealand. Often councils cannot provide any figures because the landfills are historic. The images below show a landfill washout that occurred during an extreme flood on the West Coast of the South Island, in March 2019. Thousands of kilograms of waste was washed away. While visible waste is apparent on the coast, the liquid waste that has also been washed into the sea cannot be overlooked.

7.3.1 Westland dump rubbish washed away in Fox River floods reaches Fiordland



Rubbish from a dump, which was operating for 40 years near the Fox River, has been strewn all over South Westland

7.3.2 Landfills at risk

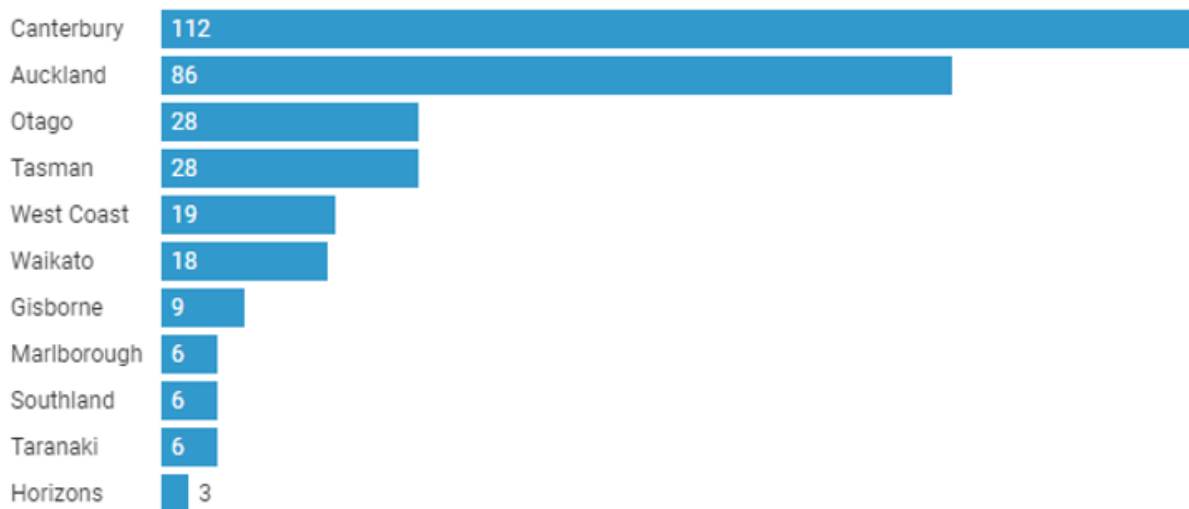
Headline in the press:

More than 300 old dumps at risk of coastal erosion and flooding ¹⁸

Nikki Macdonald 05:00, Mar 29 2021

321 known landfills are near the coast line and have a high risk of coastal erosion and flooding especially with rising sea levels in the future due to climate change.

7.3.2.1 Total Landfills at risk, by Regional Council



Several Regional Councils could not provide any data.

7.3.2.2 Map of coastal landfills at risk

Most Regional Councils reported landfills at risk, but are not aware of, or neglected, the much bigger risk of erosion as a result of climate change.



7.3.2.3 Auckland's at risk old landfills

Auckland has 89 of the 112 landfills nationwide at risk from just half a metre of sea level rise, and dealing with them may come down to excavating and completely moving them.

86 of the 89 old landfills in Auckland are less than 0.25 m above sea level (Table 31)

Table 31 Landfills exposed to sea level rise scenarios: count (#) and proportion (%) of total

	Total	SLR_0.25m		SLR_0.50m		SLR_1m		SLR_2m		SLR_3m	
	#	#	%	#	%	#	%	#	%	#	%
Active landfills	2	0		0		0		1	50.0%	1	50.0%
Closed landfills	198	86	43.4%	89	44.9%	90	45.5%	97	49.0%	99	49.3%
Transfer station	1	0		0		0		0		0	

8. Recycling

Recycling revenues have declined as a result of the Chinese National Sword and therefore, some authorities do not recycle material anymore due to the lack of revenues and therefore, are getting detoured to landfills. The lack of revenue, private collector and recyclers are struggling and consequently, the costs will be passed on to residents and rate payers.

Due to the Chinese National Sword the recycling market move to other countries like Indonesia, Thailand, Vietnam and Malaysia but they were quickly overwhelmed with the volume and consequently, the market price dropped. India followed suit and prohibited the import of solid plastic.

Local councils had no other alternative than stock pile pressed in bales. New Zealand needs to investigate in alternative methods reducing waste for recycling and disposal because it can't rely on other countries.

Table 3 shows the waste material exported in 2018 by countries and the most important commodities.

17

Table

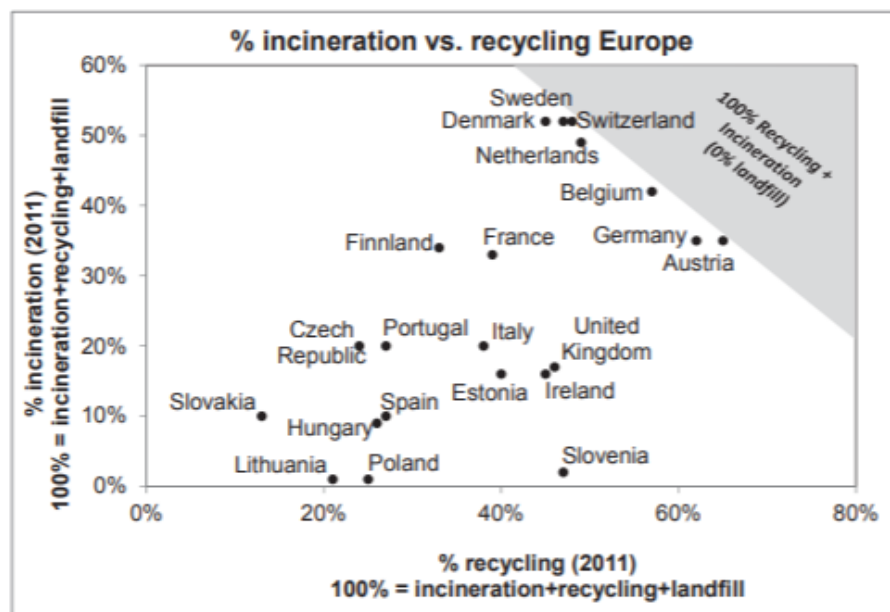
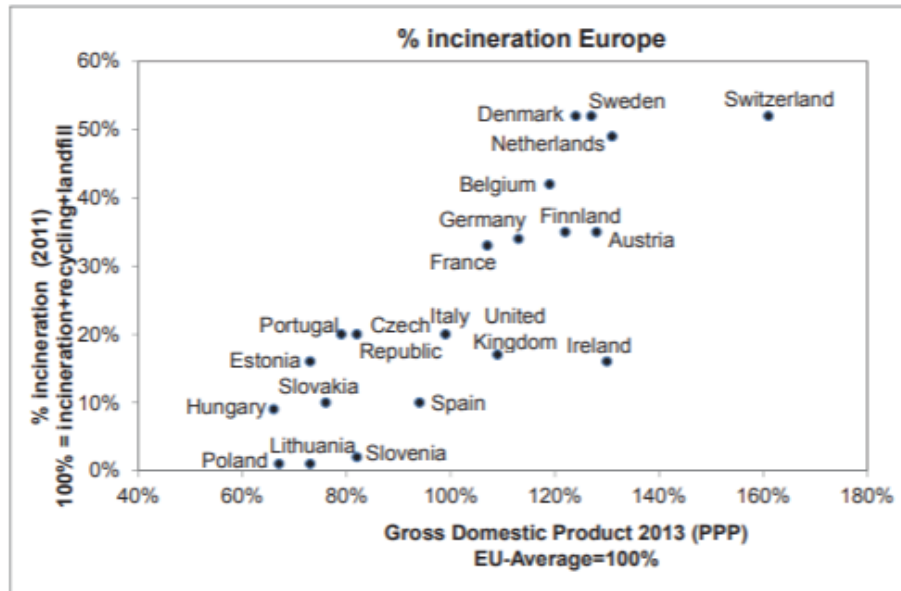
by Country	Tonnes	\$ million
Australia	361,178	209
Republic of Korea	196,665	70
India	77,292	60
Indonesia	75,687	41
United Kingdom	61,002	30
Total	1,017,478	573
by commodities		
Ferrous waste and scrap	480,938	237
Paper or paperboard	305,147	23
Aluminium waste and scrap	43,970	91
Copper waste and scrap		50
Stainless steel waste and scrap		23
Total	1,017,478	573
Source: Statistic NZ		

Export waste by tonnage and \$ revenue

8.1. Cannibalism of recycling

The common misconception is that recycling and WtE are competing with each other and therefore, WtE plants should not be introduced.

Prof Dr Rainer Bunge, ETH Zurich, Switzerland showed the relation between GDP and percentage of incineration in different European countries and the relation between recycling and incineration respectively.



Incineration quota increases with Gross Domestic Product (top). In contrast to a common misconception, incineration does not compete with recycling, but with landfilling (bottom). Rich countries recycle and incinerate their wastes, while poor countries landfill (data EUROSTAT, IMF).

9. Waste Incineration (WtE)

- Sweden: 34 plants with the largest one consuming 700,000 tonnes

- Switzerland: 30 plants: work through the plants and make an Excel list
- Switzerland, Sweden and Denmark have stopped landfilling. Switzerland started more than 40 years ago. First incineration plant built in Austria 1971 (Hundertwasser design outside)

All the above countries not only have no landfills any longer, but have also adopted a Waste Prevention Programme to minimise waste and increase recycling.

9.1 Why New Zealand did not embrace WtE, as argued against by the Waste Management Institute (WasteMINZ):

- Abundance of land in NZ
- Landfills are relatively low cost
- Community perception: WtE is causing harm to health and the environment, but acknowledged that with modern technologies these perceptual issues could be overcome
- Destroy the effort of recycling (Cannibalism of recycling) because WtE needs waste (feedstock) and works against recycling efforts.
- NZ covers a large area compared to its population, and because of transport costs, only in a large city like Auckland would WtE be feasible
- WtE plants only could be economically viable if the waste disposal fee was increased by regulatory intervention
- New Zealand has a large percentage (80 -85 %) of renewable energy. Comment: 2021 massive imports of coal (over 2,000,000 tonnes by the end of the year 2021) to generate electricity to compensate for the shortfall and assure national supply can be maintained.
- Must be change in the RMA (Resource Management Act): Comment: the RMA is undergoing a review and will be replaced. With what?? We don't know yet.

Currently some construction waste and shredded tyres are being used in the Cement Kilne, and one anaerobic digestion plant is being built in Auckland.

Important!!

Further to the above the following points are the most important things to be prepared for the question to the expert panel.

9.1.2 Stifling innovation and waste reduction – by Dr Jeff Seadon, Senior Lecturer AUT ¹⁷

1. *Waste-to-energy plants require a high-volume, guaranteed waste stream for about 25 years to make them economically viable. If waste-to-energy companies divert large amounts of waste away from landfills, they need to somehow get more waste to maintain their expensive plants. For example, Sweden imports its waste from the UK to feed its “beasts”.*
2. *The waste materials that are easiest to source and have buyers for recycling - like paper and plastic - also produce most energy when burned.*
3. *Waste-to-energy destroys innovation in the waste sector. As a result of China not accepting our mixed plastics, people are now combining plastics with asphalt to make roads last longer and are making fence posts that could be replacing treated pine posts (which emit copper, chrome and arsenic into the ground). If a convenient waste-to-energy plant had been available, none of this would have happened.*
4. *Waste-to-energy reduces jobs. Every job created in the incineration industry removes six jobs in landfill, 36 jobs in recycling and 296 jobs in the reuse industry.*

5. *Waste-to-energy works against a circular economy, which tries to keep goods in circulation. Instead, it perpetuates our current make-use-dispose mentality.*
6. *Waste-to-energy only makes marginal sense in economies that produce coal-fired electricity – and then only as a stop-gap measure until cleaner energy is available. New Zealand has a green electricity generation system, with about 86% already coming from renewable sources and a target of 100% renewable by 2035, so waste-to-energy would make it a less renewable energy economy.*
7. *Lastly, burning waste and contaminated plastics creates a greater environmental impact than burning the equivalent oil they are made from. These impacts include the release of harmful substances like dioxins and vinyl chloride as well as mixtures of many other harmful substances used in making plastics, which are not present in oil.*
8. *Many landfills have higher concentrations of precious metals, particularly gold, than mines and some are being mined for those metals. As resources become scarcer and prices increase, our landfills may become the mines of the future.*

9.2 WtE plants based on the planned and canned plant in Hokitika (West Coast)

- Plant with a yearly throughput of 330,000 tonnes of waste
- 28 MW max output generator and with general heat for housing and industrial use as well with 18 MW going back into the electricity grid
- would create about 200 jobs

9.2.1 Concerns:

- Produces greenhouse gases and toxic emissions
- Its location would cause a massive increase of truck traffic because much of the feedstock would have to be imported
- Bottom ash (estimated between 3 – 28 percent) of the waste through put would be trucked to a Nelson landfill (estimated: 9,900 – 92,400 tonnes)
- Waste had to be properly baled so no waste could be blown away by wind.

9.2.2 Emission concerns:

- WtE has a large CO₂ output
- Accordingly, to the Berl Report, 71 % of landfill gas is captured (mostly methane), and used. This ignores that CH₄ has to be combusted to produce energy, which will produce CO₂ emissions. Comment: landfills release CH₄ which is, depending on the literature, about 28 - 80 times more potent than CO₂.
- Gas emissions into the air (dioxin, furan, chlorides and fine particles) can cause harm to health in the nearby community.
- Bottom ash disposal, despite the fact that heavy metal can be extracted and recycled.

9.2.2.1 Source of CO₂ emission in New Zealand

Carbon emission is now the big issue regarding the climate change and the release of carbon emission out of WtE stack. It is the biggest topic for the opponents of WtE.

The total annual carbon emission in New Zealand is 78.9 Mt CO₂-e.

We have to put the total annual carbon emission in perspective. 48 % of carbon emission are caused by the agriculture sector, 42 % by the energy, 6 % by the industrial processes and product use and only 4 % by waste. (Graph 2)

Graph 3 shows the breakdown of Greenhouse Gas emissions (GHG) net, gross, CO₂ and Methane.

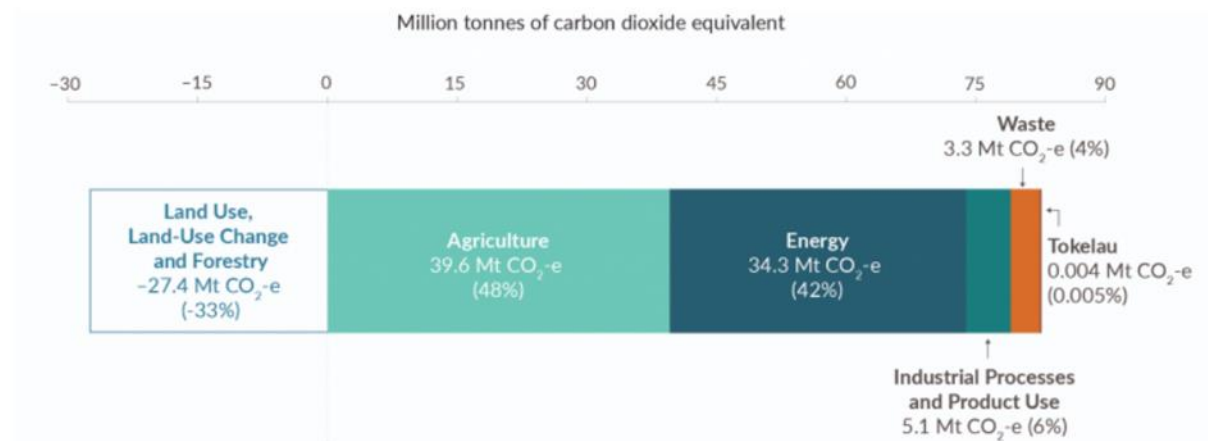
If you would assume that the total 4 % is produced by WtE plants then you have to take out 60 % from biogenic sources and about 15 – 20 % for the recycled material from the bottom ash. That would leave the remaining carbon emission between 20 – 25 %.

The technology for Carbon Capture and Storage (CCS) are well on its way either direct from the air (Switzerland, Iceland) or directly from chimneys like the ‘Longship’ project in Norway funded with the help from the government. The technology is still at the beginning. Until New Zealand would go ahead with the build of a WtE, this technology would be really advanced. Of course, not all WtE plants can be equipped with such technology because the storage must be secured and close by, so the logistic can be managed and make economic viable.

Even without CCS, the carbon emission from WtE is relatively small in relation to the total amount of carbon emission produced in New Zealand.

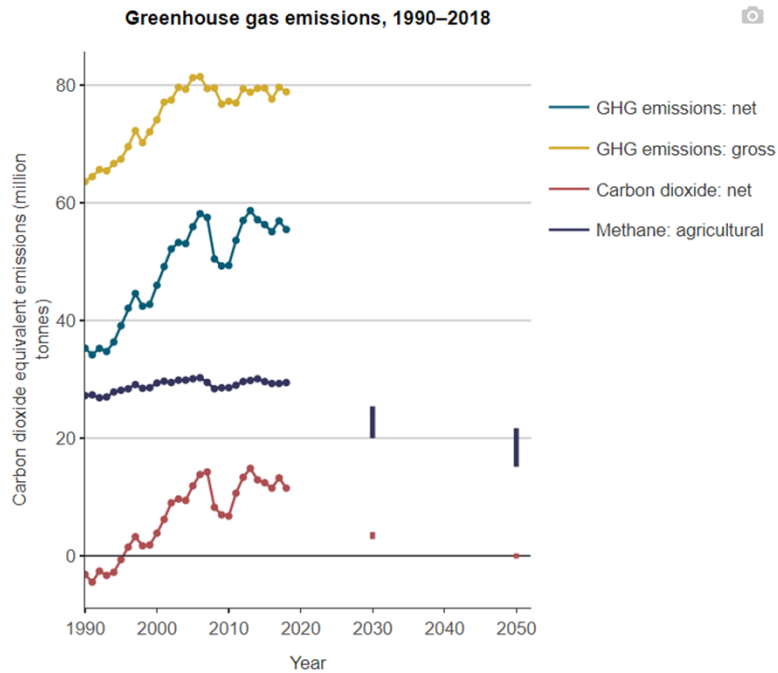
Graph 2:

Breakdown of New Zealand’s emissions (in million tonnes of carbon dioxide equivalent, Mt CO₂-e) by sector in 2019.



Net emissions from the LULUCF sector are expressed as a negative number because the sector removes more greenhouse gases (GHGs) from the atmosphere than it emits.

Graph 3: Breakdown of Greenhouse gas emissions (GHG)



9.2.3 Effects on the market:

- It is very difficult to extract costs from most privately operated landfills due commercial sensitivity and confidentiality restrictions.
- Recycling operators and landfill owners are concerned that their operations could be jeopardised by WtE and substitutes for landfills.

Answer to the above request from the Ministry of Environment (MfE):

The information the Ministry holds on the specific types of waste accepted and processed at recycling facilities, as well as where it comes from is commercially sensitive and is withheld under the following section of the Act:

- *s9(2)(b)(ii) – would be likely unreasonable to prejudice the commercial position of the person who supplied or who is the subject of the information.*

9.2.4 Costs:

- The Eunomia Report found that the principal reason not pursuing WtE is the relatively high cost compared to large scale landfills.
- MacPhearson Study (2012) ³, the cost per tonne of waste for a 200,000 WtE plant including capital and operating costs range between \$ 140 – 210. Taking the sales of energy or heat into account the gate fees per tonne would be between \$ 100 – 170.
- Other sources say it would be around \$ 400
- UK: average gate fee is \$ 169 with range between \$ 63 - \$ 233

10. Landfill gate fees in New Zealand and recycling

Gate fees are very hard to come by due to confidentiality and commercial sensitivity of contracts between authorities and landfill owners:

Some prices (per tonne):

- Average New Zealand \$ 140
- Renew Energy \$ 80 (proposed WtE in Hokitika)
- Palmerston North \$ 170 dropped off at EnviroNZ MFR and then transported to Bonny Glenn landfill
- Feilding: \$ 100 - \$ 126, plus another \$ 32 to Bonny Glenn
- Wellington City Council: \$ 120 and is 50/50 cost split between disposal fees the returns from recycling.
- Christchurch EcoDrop: \$ 253.40
- Marlborough: Bluegums landfill: 132.20
- Hastings: Oamaru landfill \$ 110.40
- Queenstown: \$ 80 - \$ 85

a. Cost of recycling

- Recycling collection and sorting is a significant cost
- Recycling is often more costly than sending all waste to landfill
- Declining prices of recycling material (ban) led to certain recyclable material no longer being collected.
- Return on low or nil waste commodities, lower financial risk for authorities.

But

- Significant investment has been made in recycling facilities.
- Risk of jeopardising the recycling effort (zero waste)
- Concern regarding long term contracts with WtE facilities due to lack of feedstock and closing procedure of these plants.

b. Required waste volume:

- Minimum 200,000 – 300,000 tonnes of waste required per year
- Bailage of minimum \$ 60,000 tonnes of waste required in collection facilities

Remark: WtE Thun, Switzerland has an annual through put of 100,000 tonnes of waste.

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