Methane emission reduction targets - are they achievable?

2024 WasteMINZ Conference

May 2024

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Background

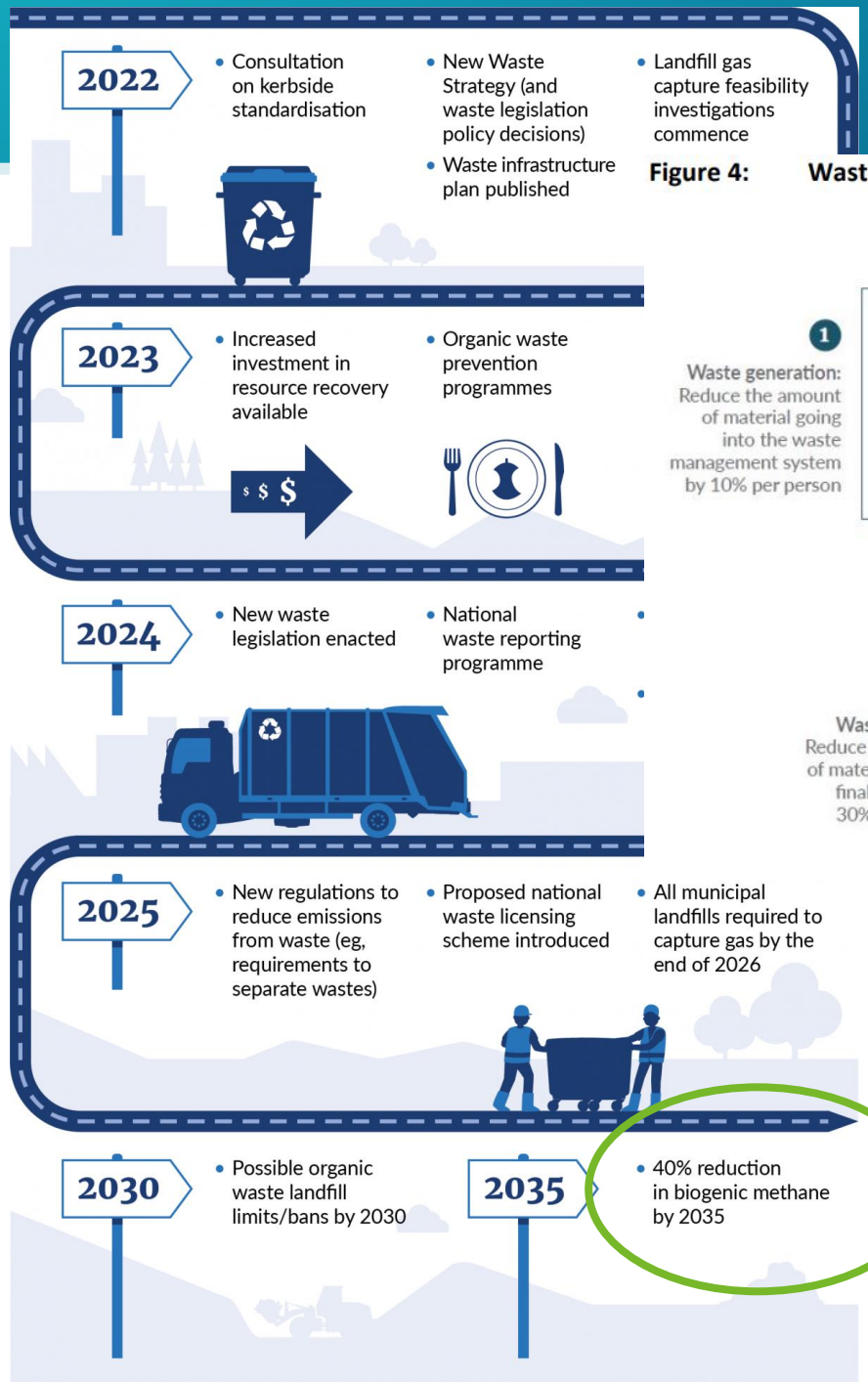
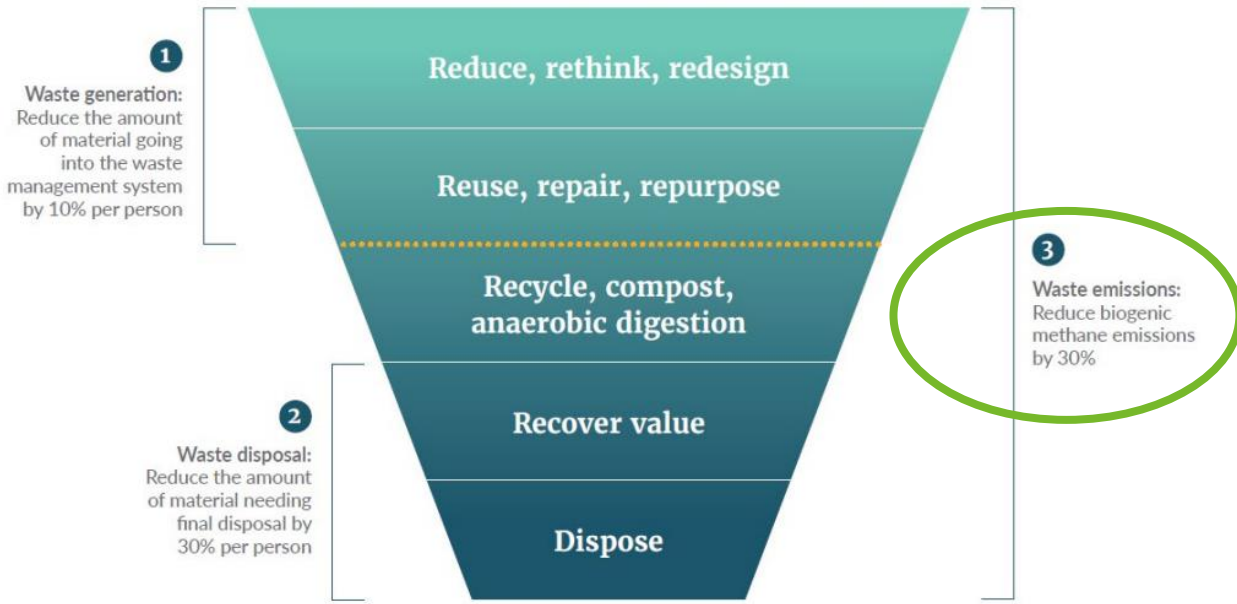


Figure 4: Waste hierarchy with targets



Outline

- Developed a landfill gas generation model for a typical Class 1 landfill
- Developed scenarios for the reduction of organic material based on potential capture rates for kerbside and commercial organics
- Additional scenarios including overall volume reduction
- Modelled landfill gas generation for the different scenarios
- Considered different destruction efficiencies and the impact on GHG emissions

Organic diversion scenarios

- Assuming kerbside waste = 34% of the waste stream
- Considering low and high capture rates for kerbside and commercial waste streams

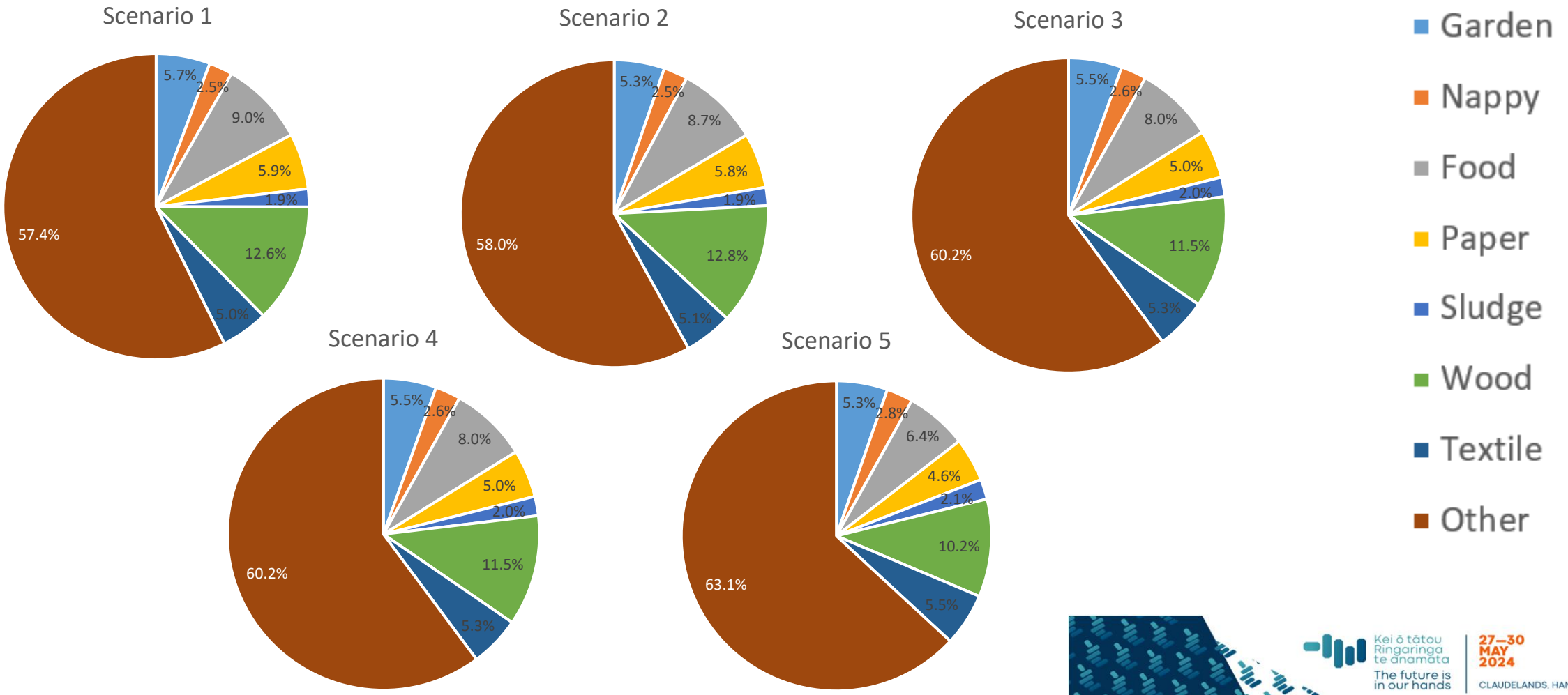
Organic component	Kerbside diversion rates		Commercial diversion rates	
	Low capture rate	High capture rate	Low capture rate	High capture rate
Garden	25.0% reduction	45.0% reduction	-	-
Food	15.0% reduction	35.0% reduction	15.0% reduction	35.0% reduction
Paper	10.0% reduction	25.0% reduction	25.0% reduction	35.0% reduction
Timber	-	-	20.0% reduction	40.0% reduction

Waste composition scenarios

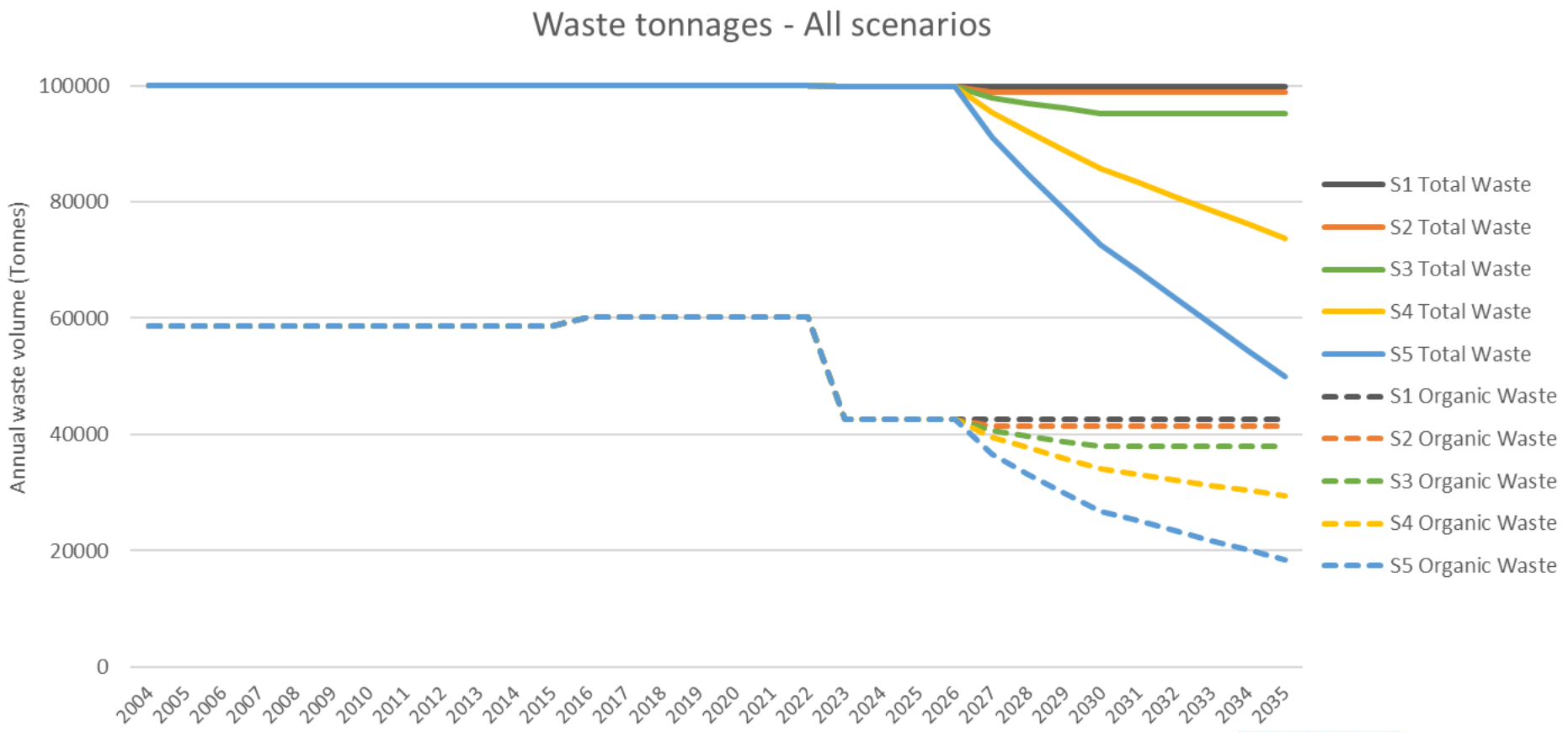
- Class 1 landfill opened in 2004
- 100,000 tonnes pa
- Default organic composition based on UEF regulations from 2004 to 2027

Organic component	Scenario 1: Base case	Scenario 2: Kerbside changes only	Scenario 3: Kerbside and commercial changes	Scenario 4: Organic reduction and volume reduction	Scenario 5: Ambitious organic reduction and volume reduction
General description	Default organic composition with no changes over time	Reduction in organics received from kerbside in 2027	Reduction in kerbside organics + reduction in commercial sources of organics between 2027 and 2030	Scenario 3 + 2.5% reduction in overall volume annually from 2027	Ambitious kerbside and commercial organic reduction + 5% overall volume reduction annually from 2027
Garden	5.7%	5.3%	5.5%	5.5%	5.3%
Food	9.0%	8.7%	8.0%	8.0%	6.4%
Paper	5.9%	5.8%	5.0%	5.0%	4.6%
Timber	12.6%	12.8%	11.5%	11.5%	10.2%

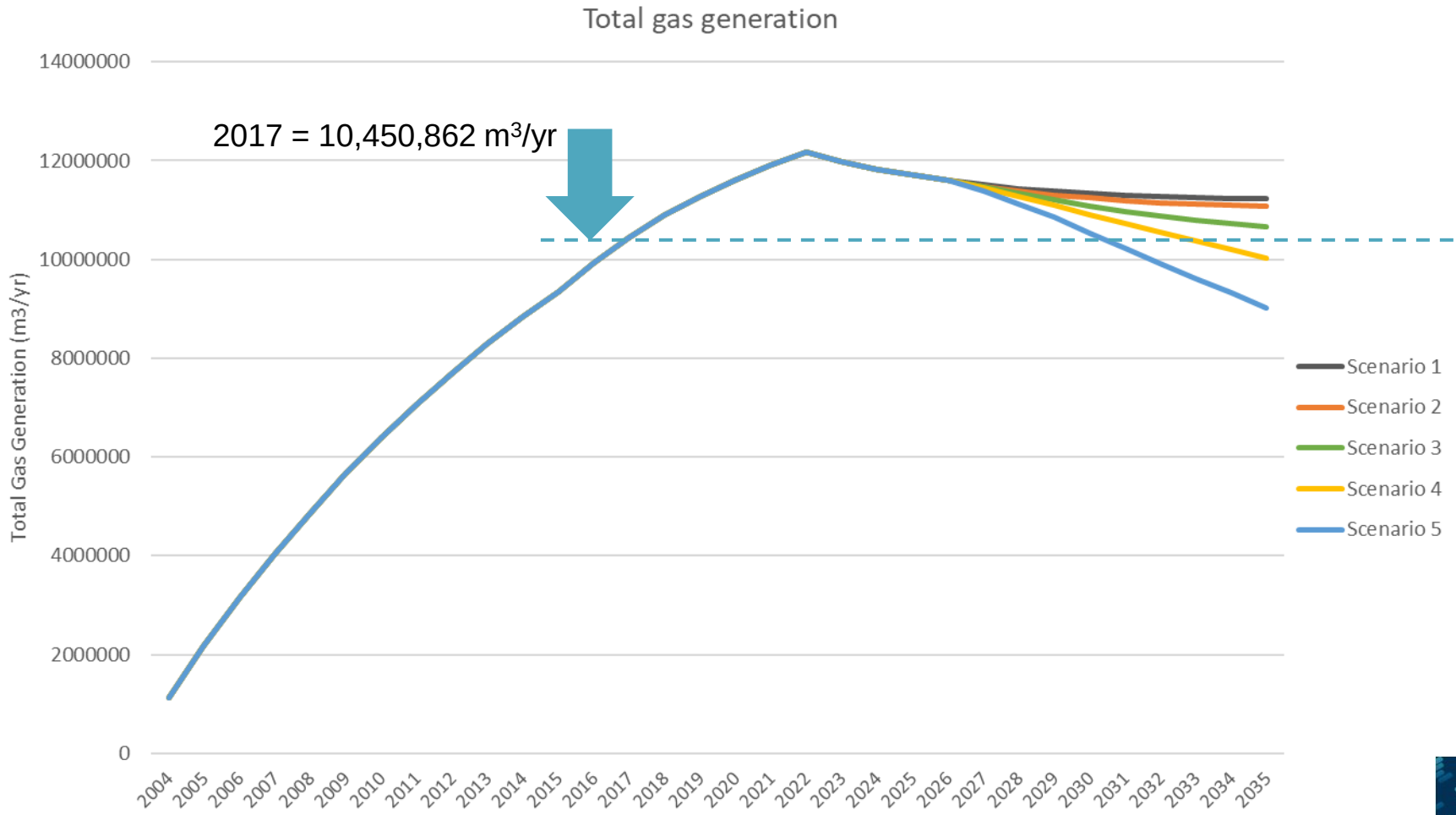
Modelled waste composition (2035)



Modelled waste volume - total tonnage



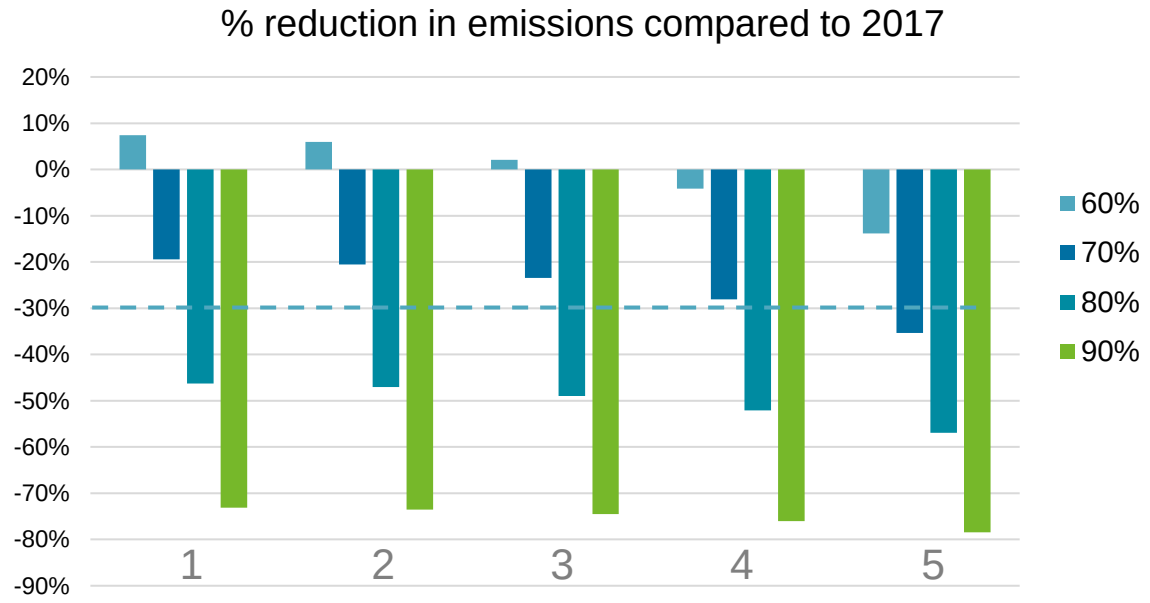
Landfill gas modelling results



Scenario 1 = 7% increase
Scenario 2 = 6% increase
Scenario 3 = 2% increase
Scenario 4 = 4% decrease
Scenario 5 = 14% decrease

Impact on greenhouse gas emissions

- Collection and destruction efficiencies will need to improve in order to achieve a significant reduction in emissions compared to 2017
- Need to achieve 80% destruction efficiency OR optimistic diversion AND volume reduction to achieve a 30% reduction in emissions



*Assuming destruction efficiency of 60% in 2017

Conclusions

- Kerbside recycling is only likely to achieve effective diversion of garden, food and paper using current systems
- Diversion of commercially derived waste is also unlikely to target all organic waste streams
- Based on realistic diversion scenarios, the overall composition of waste at a Class 1 landfill is unlikely to change significantly ⇨ landfill gas generation is also unlikely to reduce significantly
- Improvements in destruction efficiency is the best way to reduce emissions
- Significant disruption is going to be needed in order to achieve meaning reductions in emissions from Class 1 landfills