

Waste Management Investment

This intervention decreases the mismanaged waste rate by increasing capacity for landfill. It is used by the “X Billion USD for Waste Management” scenario.

1 Introduction

This intervention relies on information about capital and operating expense to landfill a certain mass of waste.

1.1 Assumptions

- This intervention is assumed to have landfill rate go up gradually and linearly from a selectable start date to the configurable end date.
- Capital expenditure is amortized over 50 years.
- The expanded waste management capacity will be used for all waste types of which only a fraction is plastic ($\%_{plastic}$).
- The addition of new waste management infrastructure will not redirect other end of life plastic fates to landfill except mismanaged.
- There are known region specific observed values for mass of waste landfilled ($m_{landfill}$) and both the operating cost (r_{opex}) and capital expenditure (r_{capex}).

1.2 External knowledge

This uses materials describing capital and operating expenditures for landfill (Lau et al. 2020).

2 Primary impact

Investment is a mix of capital and operating expense:

$$r_{annual} = r_{annual-opex} + \frac{r_{capex}}{50}$$

This intervention assumes a potential change in the incineration ($m_{increase}$) over time based on an investment I :

$$m_{increase} = I * \frac{m_{landfill}}{r_{annual}}$$

With this potential change defined:

$$\Delta_{landfill} = \min(m_{increase} * \%_{plastic}, W_{mismanaged})$$

This is then applied to the overall landfill rate:

$$W_{landfill} = W_{landfill} + \Delta_{landfill}$$

See secondary effects for change to mismanaged.

3 Secondary impact

This intervention assumes that the new landfill would have otherwise been mismanaged.

$$W_{mismanaged} = W_{mismanaged} - \Delta_{landfill}$$

There are no further assumed effects.

4 Discussion

Future work includes additional investigation into if increased landfill capacity impacts fates other than mismanaged.

Works Cited

Lau, Winnie W., Yonathan Shiran, Richard M. Bailey, Ed Cook, Martin R. Stuchtey, Julia Koskella, Costas A. Velis, et al. 2020. "Evaluating Scenarios Toward Zero Plastic Pollution." *Science* 369 (6510): 1455–61. <https://doi.org/10.1126/science.aba9475>.