Incineration Investment

This intervention increases incineration through capacity for collection and processing. 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 incinerate a certain mass of waste.

1.1 Assumptions

- This intervention is assumed to have incineration 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 capacity will be used for all waste types of which only a fraction is plastic ($%_{\text{plastic}}$).
- The addition of new infrastructure will redirect landfill and mismanaged to incineration.
- There are known region specific observed values for mass of waste incinerated ($m_{\text{incinerated}}$) and both the operating cost ($c_{\text{opex}}$) and capital expenditure ($c_{\text{capex}}$).

1.2 External knowledge

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

2 Primary impact

Investment is a mix of capital and operating expense:

$$c_{\text{annual}} = c_{\text{annual-ope}}x + \frac{c_{\text{capex}}}{50}$$
This intervention assumes a potential change in the incineration ($m_{\text{increase}}$) over time based on an investment $I$:

$$m_{\text{increase}} = I \cdot \frac{m_{\text{incinerated}}}{\text{annual}}$$

With this potential change defined:

$$\Delta_{\text{incineration}} = \min(m_{\text{increase}} \cdot \%_{\text{plastic}}, W_{\text{mismanaged}} + W_{\text{landfill}})$$

This is then applied to the overall incineration rate:

$$W_{\text{incineration}} = W_{\text{incineration}} + \Delta_{\text{incineration}}$$

See secondary effects for change to mismanaged and landfill.

3 Secondary impact

This intervention assumes that the newly incinerated material would have otherwise been mismanaged or sent to landfill. Starting with mismanaged:

$$W_{\text{mismanaged}} = W_{\text{mismanaged}} - \Delta_{\text{incineration}} \cdot \frac{W_{\text{mismanaged}}}{W_{\text{mismanaged}} + W_{\text{landfill}}}$$

Next, for landfill:

$$W_{\text{landfill}} = W_{\text{landfill}} - \Delta_{\text{incineration}} \cdot \frac{W_{\text{landfill}}}{W_{\text{mismanaged}} + W_{\text{landfill}}}$$

There are no further assumed effects.

4 Discussion

Future work includes additional investigation into how additional incineration capacity impacts other end of life plastic fates. Note that this intervention reflects an implicit belief that incineration is a preferred outcome to landfill. To that end, users may choose to direct investment only to landfill through the second tab if they disagree with this perspective.

Works Cited