



Modelling South Africa's approach to near zero plastics leakage to our oceans

SAFRIPOL SUSTAINABILITY CONFERENCE

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Outline

- Background
- Breaking the plastics Wave
- Plastics to Ocean Model (P2O)
- Data collection and verification
- Preliminary results
- Conclusions



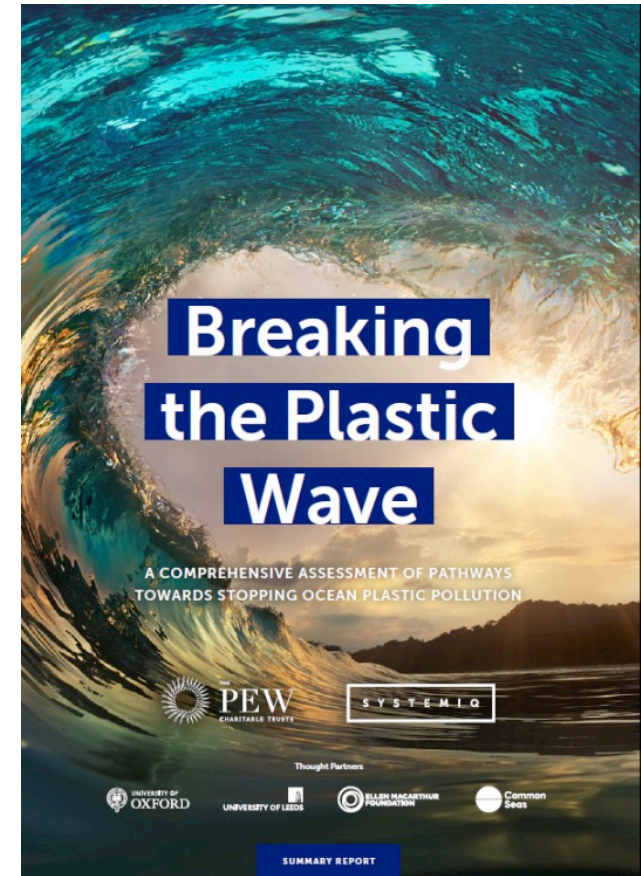
Background

- US\$ 3.7 trillion = lifetime cost to society, the environment and the economy of plastic produced in 2019 (WWF, 2021)
- US\$ 7.1 trillion = cost in 2040 if no action is taken
- South Africa is the 11th worst plastic polluter in absolute terms (Jambeck et al., 2015)
- South Africa adopted the Global Plastics Pollution Treaty in 2022
 - Address the entire life-cycle of plastic
 - Goal is to move to circular economies
 - Legally binding mechanisms for countries to work together toward a solution
 - Countries can be held accountable



Breaking the Plastic Wave (BPW)

- Ocean plastic pollution is of global concern
- Lack of evidence-based roadmap to describe the pathways to foster convergent action
- Pew Charitable Trust partnered with SYSTEMIQ to create a model of the plastics system
- Results suggest that there is an evidence-based, comprehensive, integrated and economically attractive pathway to reduce plastics leaking into the ocean
- The findings from the BPW study was published in the peer reviewed journal, Science on 23 July 2020.
- 4 levers to affect change are modeled
 - Reduction
 - Substitution
 - Recycling
 - Proper disposal

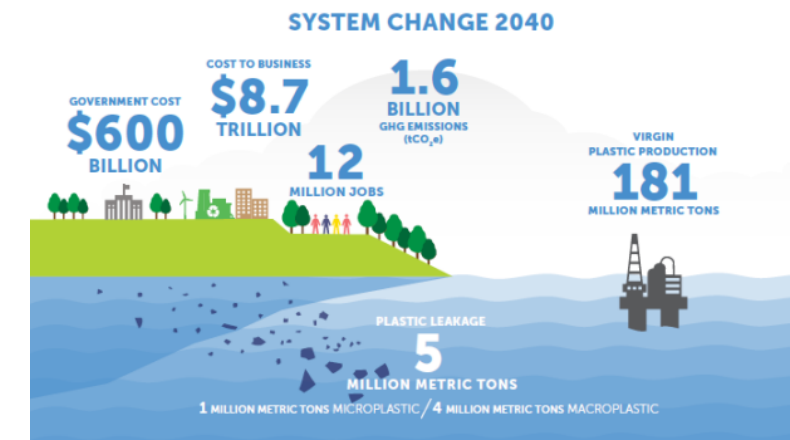
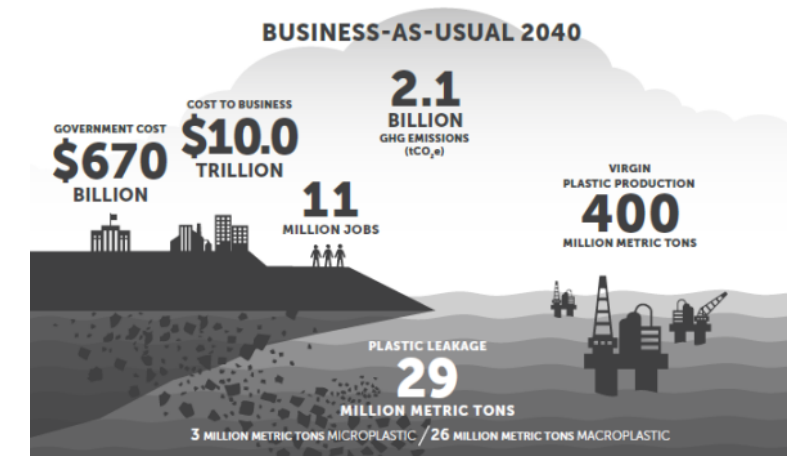




Key findings from BPW study applying the P2O model globally

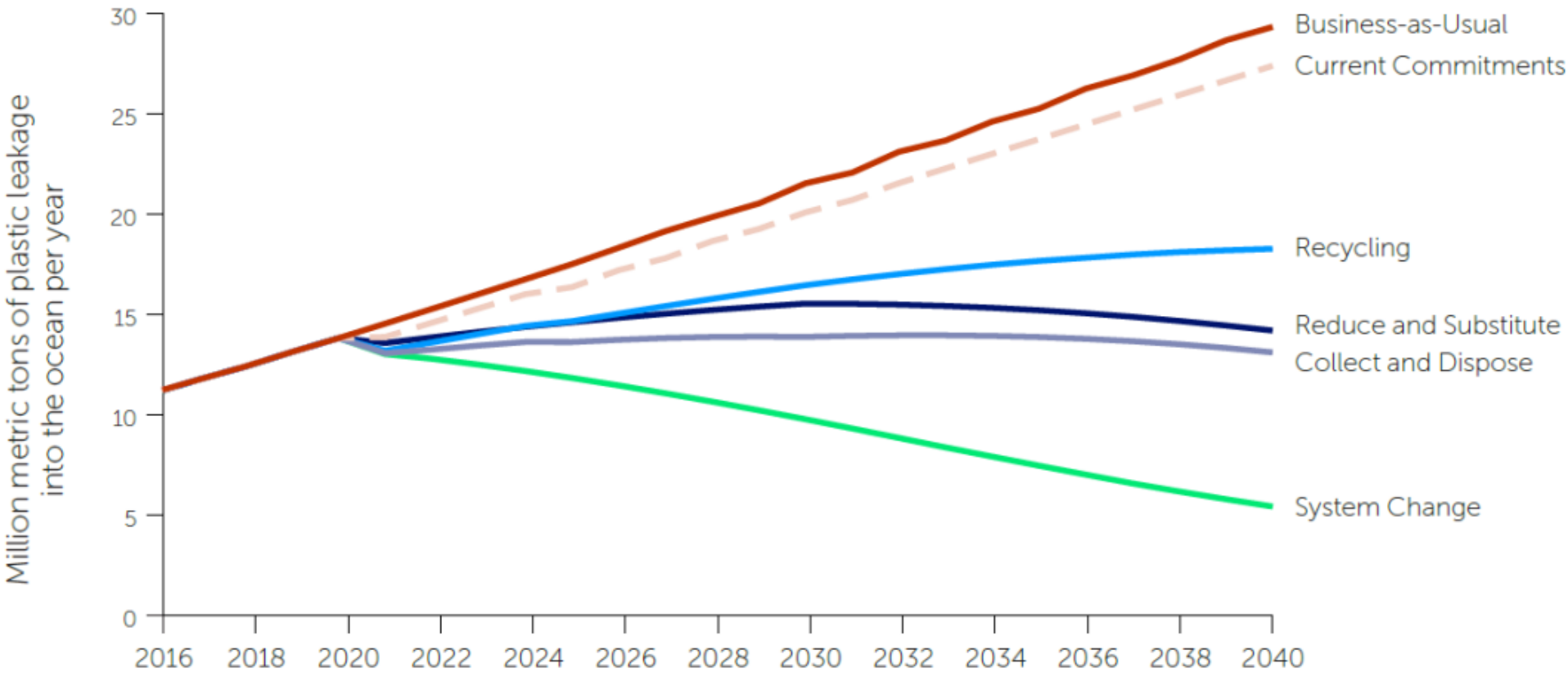
3 Scenarios

- Business as usual (BAU)
 - annual flows into the ocean could nearly triple by 2040
- Current industry and government commitments are met
 - annual flows reduce by 7% from BAU
 - 147% increase in plastics leakage into oceans
- System Change
 - Apply and robust invest in all technologies, management practices and policy approaches
 - In 20 years, there would be about 80% reduction from the current trajectory of plastics flows into the oceans
 - New solutions would provide consumer with the same services that plastics delivers today – at lower cost to society





Land-based plastic leakage under different scenarios





Key message from the BPW

“With the right level of action, tackling the problem of plastic pollution may be remembered as a success story on the human ability to rethink and rebuild systems that can sustainably support lives and livelihoods while environment thrives”



The P2O model

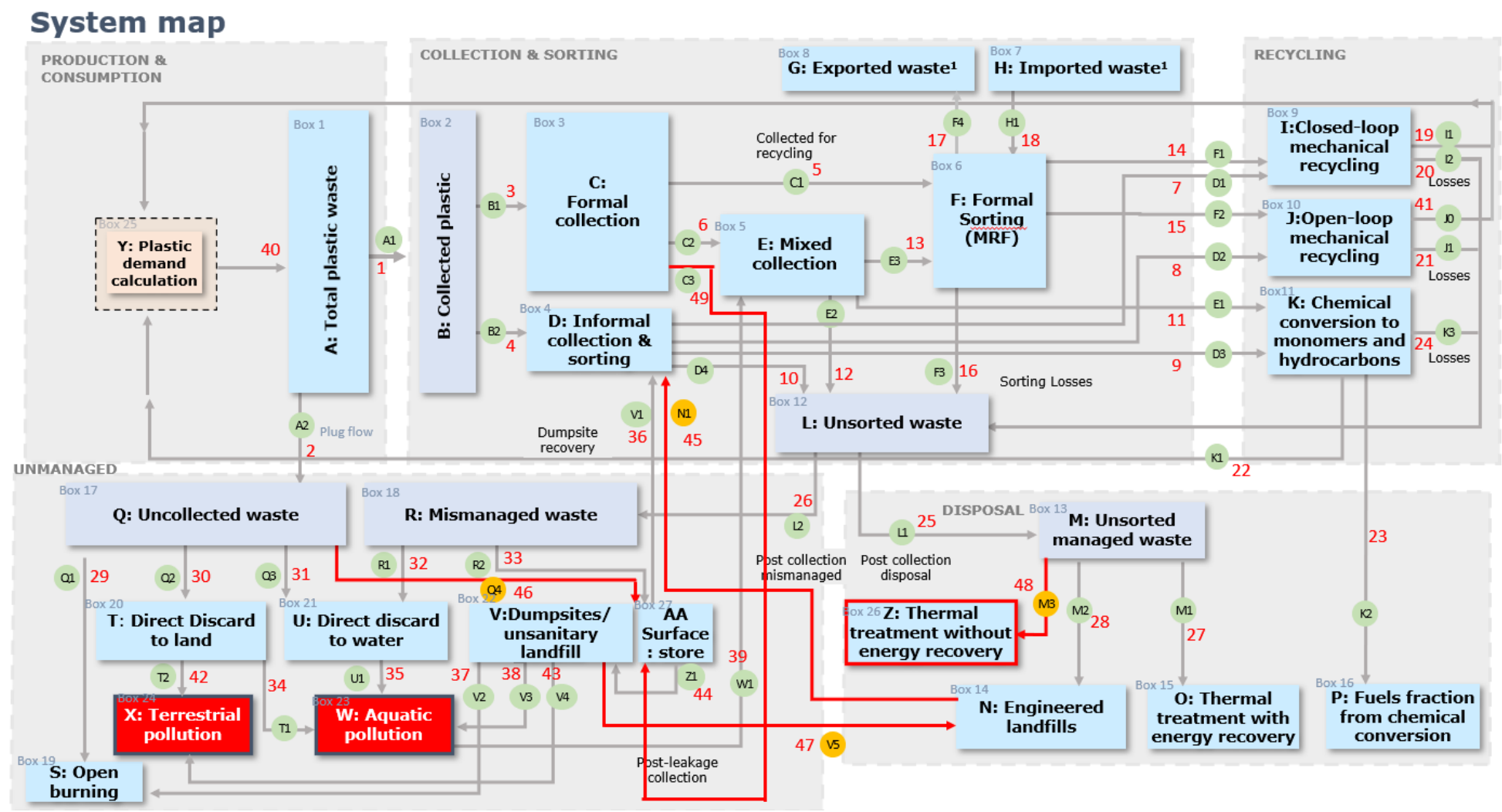
- Data–driven coupled ordinary differential equation model
- Calculates the flow of plastics through representative systems
- Key stocks and flows for land-based sources of plastic pollution across:
 - the entire value chain for MSW macro plastics
- Projected growth in demand is calculated using:
 - country level population size
 - per capita macro plastics in MSW
- Global population was split into 8 geographic archetypes based on income category in the global study. Relevant archetype data were used to fill gaps in SA data
- Populations were differentiated by distance to water (<1km or >1km) and rural vs urban
- 3 different material categories were used
 - Rigid monomaterials
 - Flexible monomaterials
 - Multimaterials or multi layers



Applying the P2O model in South Africa

- To test the P2O model at country level
- Using South African data as input into the model
- Model different scenarios
 - Business as usual
 - EPR
 - Best feasible scenario – maximizing jobs, reasonable costs, reducing GHG emissions
- Provide evidence to inform policy direction towards addressing plastics pollution using the four levers
 - Reduction
 - Substitution
 - Recycling
 - Proper disposal

Systems map for South Africa



Data collection - Plastics

- Industry data is collected annually by Plastics SA
- Annabe Pretorius and Plastics SA kindly shared available data with the project team
- Challenges in the South African context
 - Industry specific data on plastics are collected by Plastics SA, but not in the format required by the model
 - Recycling rates are reported as a % of collected, not % of MSW
 - Imports of products packaged in plastics are not included in the Plastics SA data
 - Data on rigid and flexibles can be calculated, multilayer is more difficult
 - Lack of data on split between formally collected and informally collected materials for recycling
 - Lack of data on open-loop recycling

Data collection – Municipal solid waste

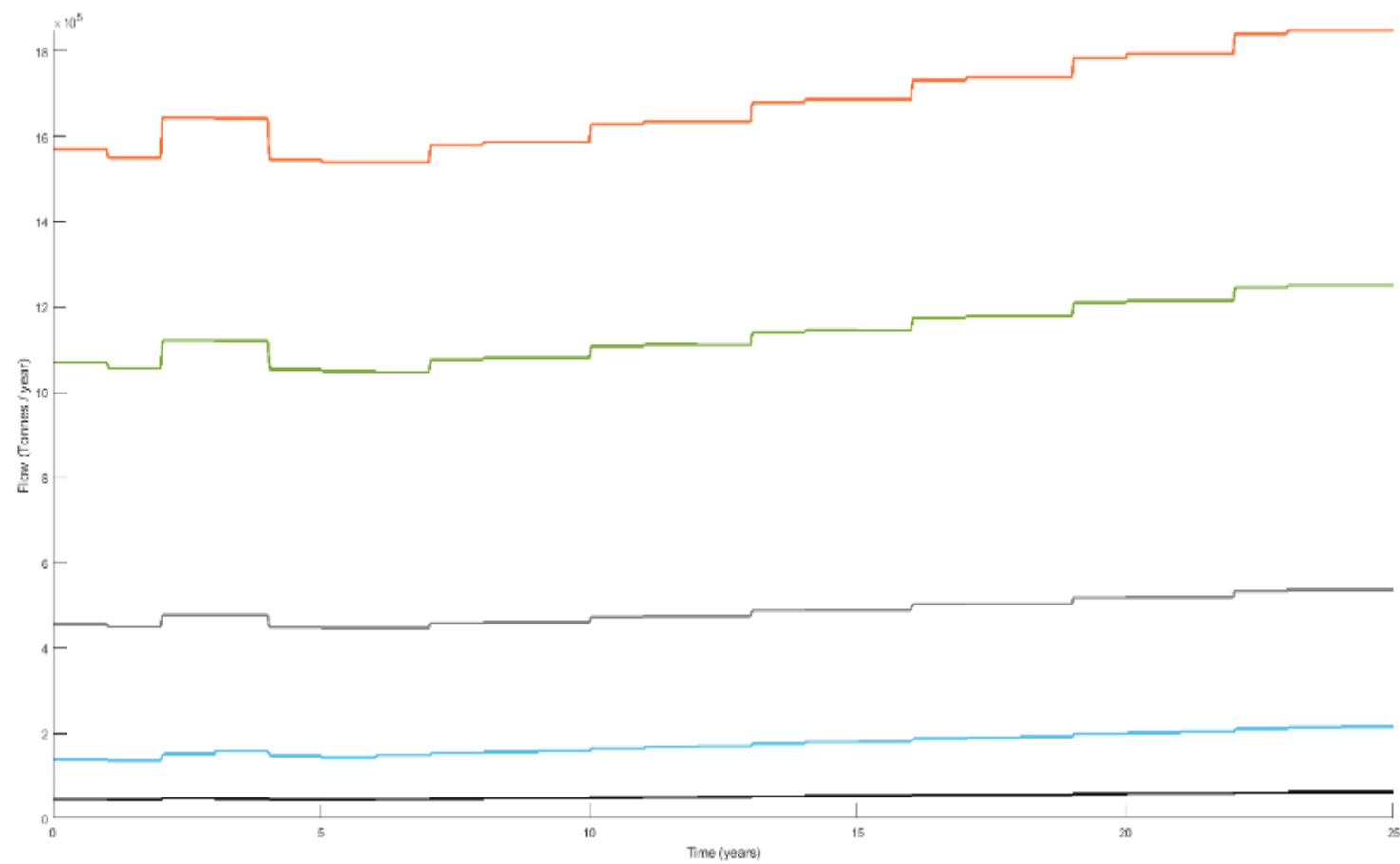
- State of Waste report, 2018
- South African Waste Information System (SAWIS), 2013 regulation making this compulsory
- Challenges in the South African context
 - Poor reporting by municipalities into SAWIS
 - Waste Characterization studies are not available for all municipalities
 - Characterisation studies does not follow standard methodologies and results are not directly comparable
 - Plastics are often reported as a single category
 - Lack of data on the split between formal and informal collected waste
 - Lack of data on plastics recovery from landfills
 - Lack of data on uncollected waste and their management
 - Lack of data on the split between managed and mismanaged waste
 - Lack of data on available landfill airspace in SA
 - Lack of data on disposal rates at landfills



Filling the data gaps

- The project team consulted peer reviewed literature on South Africa
- Local data and expert knowledge informed South African assumptions
- Archetype data from the global study was used to fill remaining data gaps

Preliminary results BAU – Management



Plastics waste generated

Plastic waste formal collected

Plastic waste un-collected

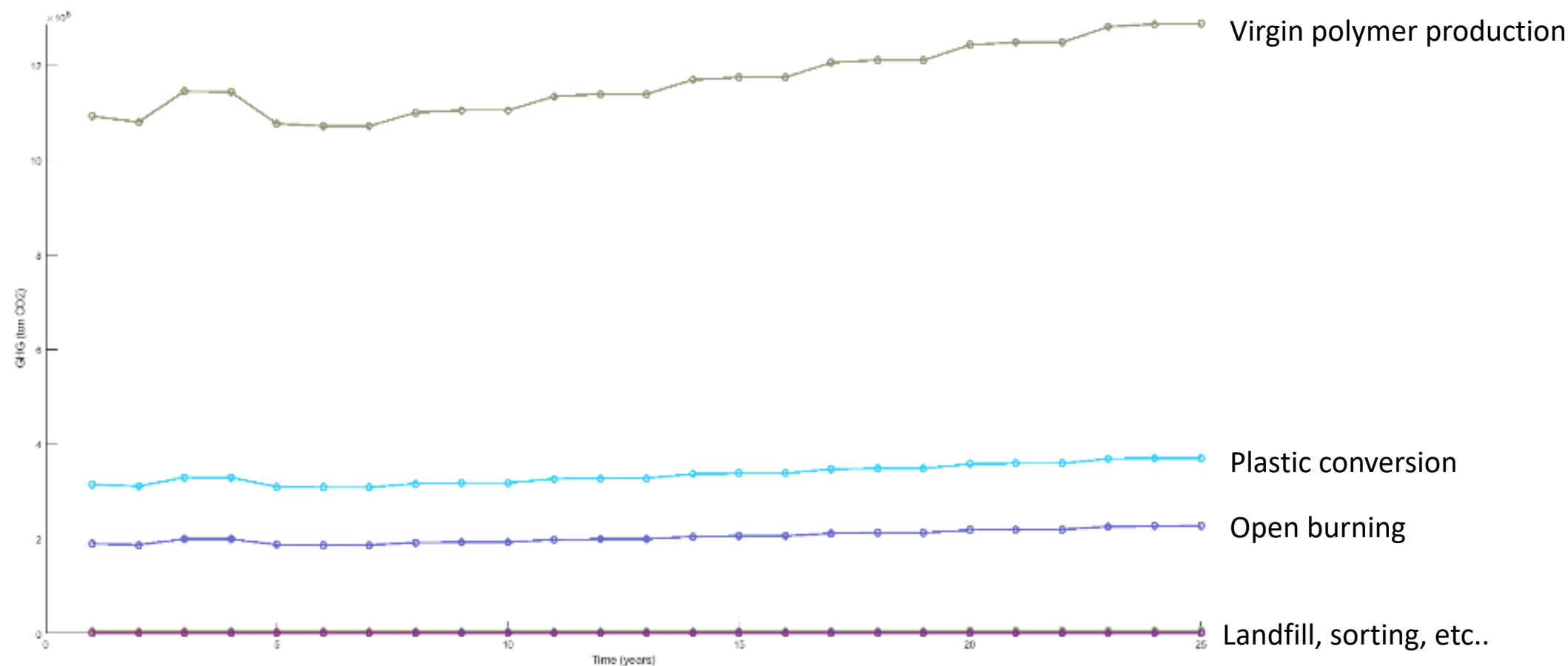
Plastic waste recycled

Plastic waste informal collected



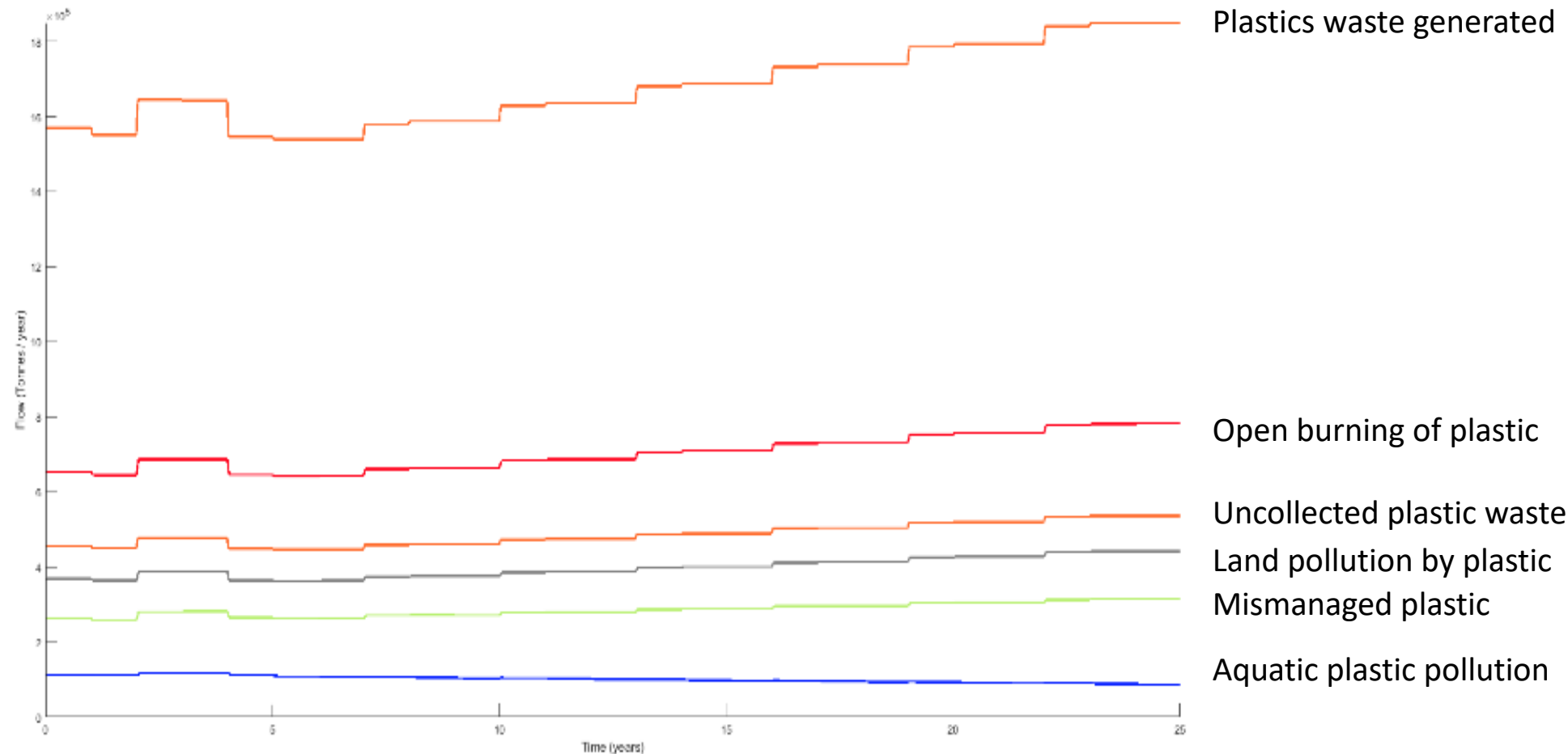
Preliminary results BAU – GHG emissions

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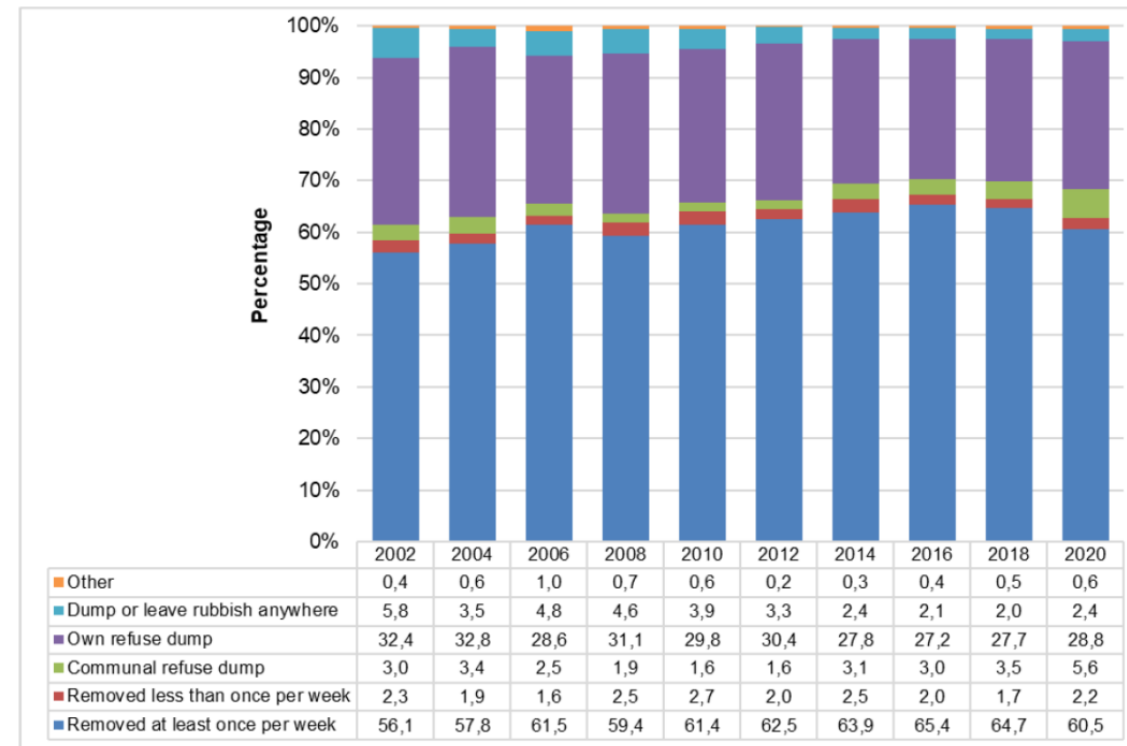
Preliminary results *BAU* – Pollution flows





Preliminary Results for South Africa

- Plastics leakage into the oceans is much lower than initially anticipated
 - South Africa is the 30th driest country in the world
 - Rainfall is comparatively low when compared to rest of Africa
 - South African rivers are mostly non-perennial, therefore not major conduits of plastic pollution to oceans
- A significant part of mismanaged plastics gets burnt and goes up in smoke
 - This is a significant finding especially due to the potential impacts on human health
- Significant portion of the plastics pollution is coming from uncollected/mismanaged sources



Household waste disposal practices



Conclusions

- Applying the P2O model in the South African context have resulted in improvements of the model
- Model results will be workshopped with the Technical Advisory Group and refined if necessary
- Outputs
 - Technical report
 - Briefing note
 - Virtual Regional Science, Technology and Innovation hub

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Thank You