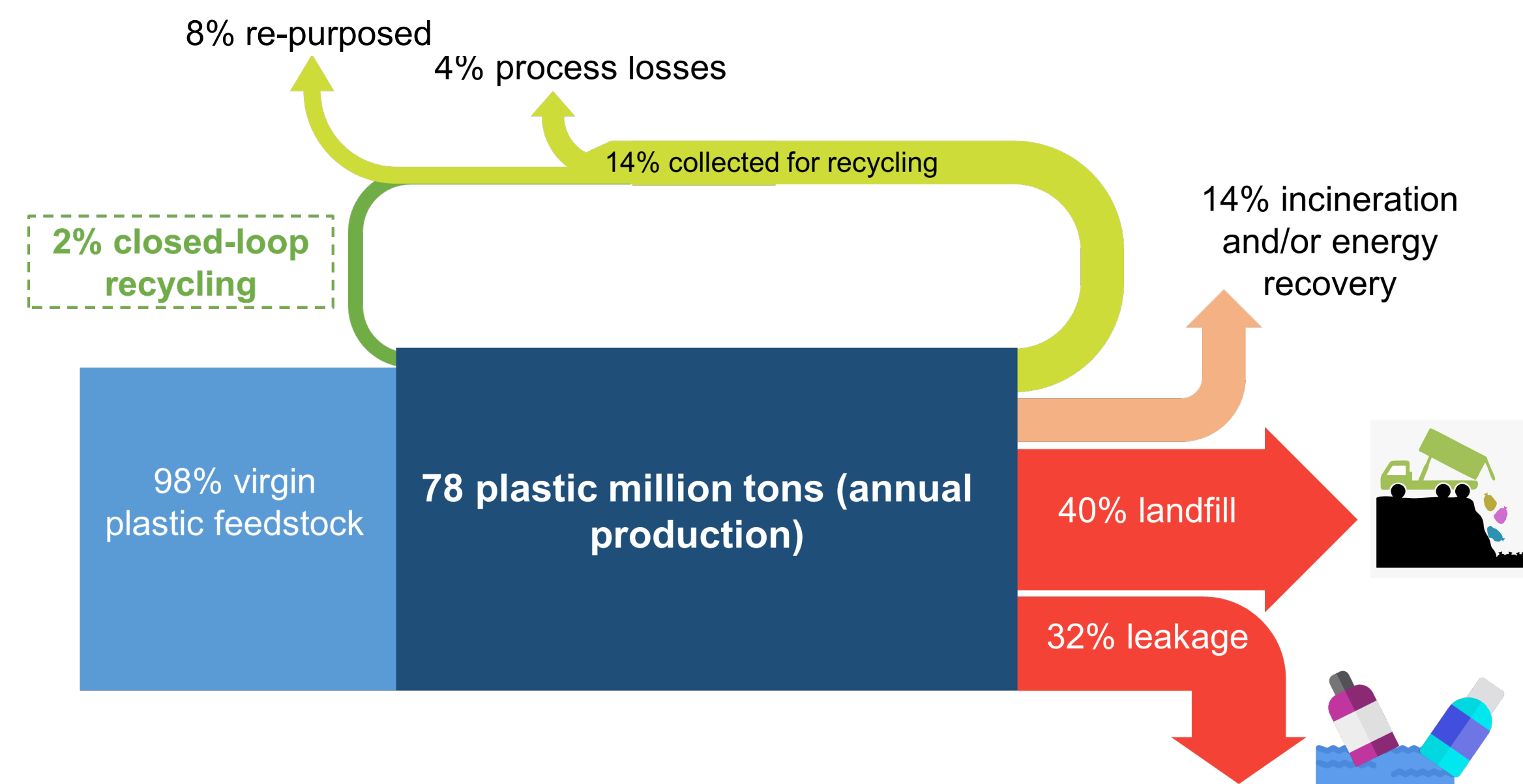


Advancing Circular Economy of Plastics through eCommerce



Motivation / Background

- Plastics growth has increased 200-fold between 1950 to 2015
- 8 million metric tons** of plastics enter the ocean each year and **150 million tons** are currently circulating in the ocean
- Out of the total plastics in the system, only 2% is truly recycled in a closed-loop supply chain



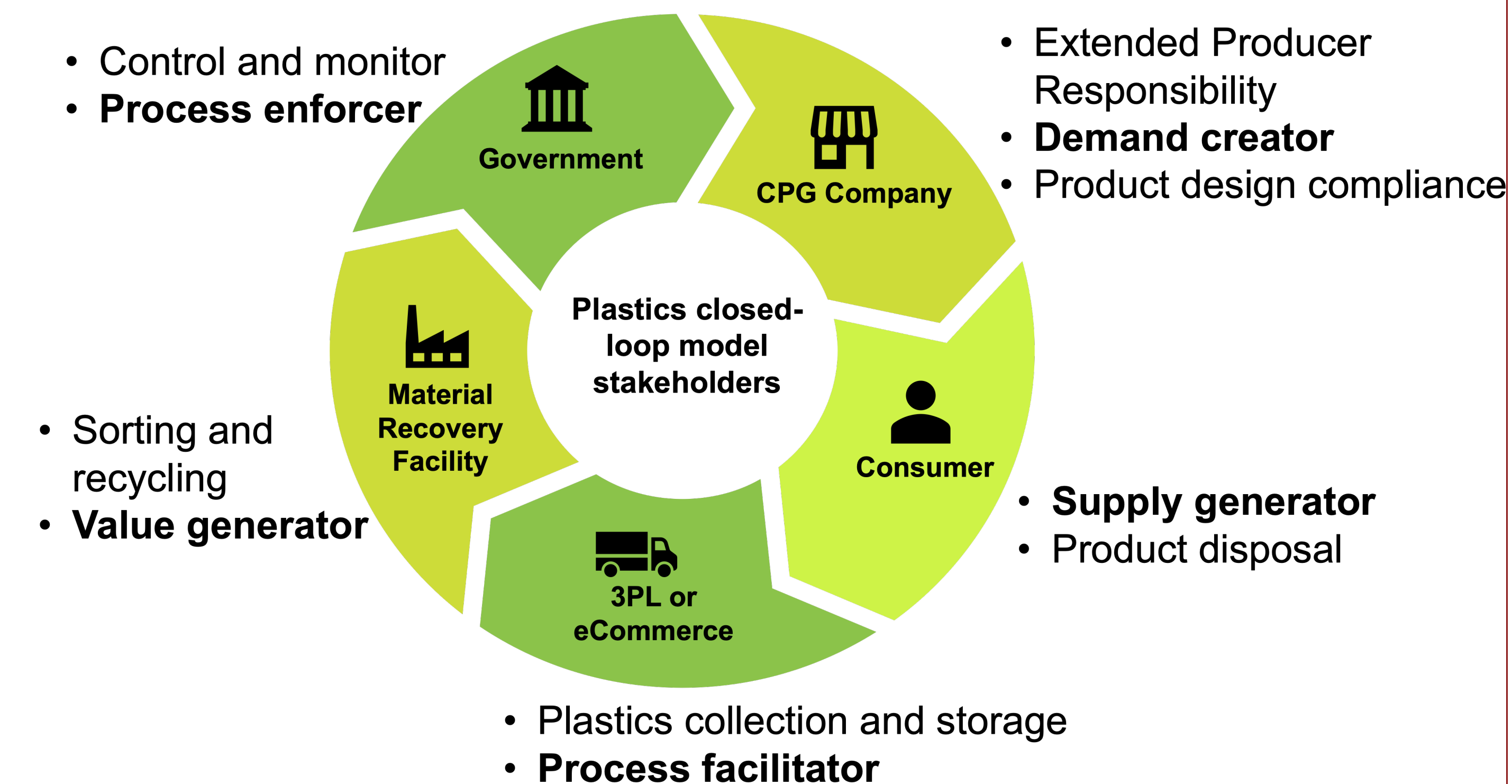
Key Question / Hypothesis

How to leverage the **existing eCommerce logistics** network to create an **economic and efficient recovery of plastics** from consumers to form a plastics closed-loop supply chain?

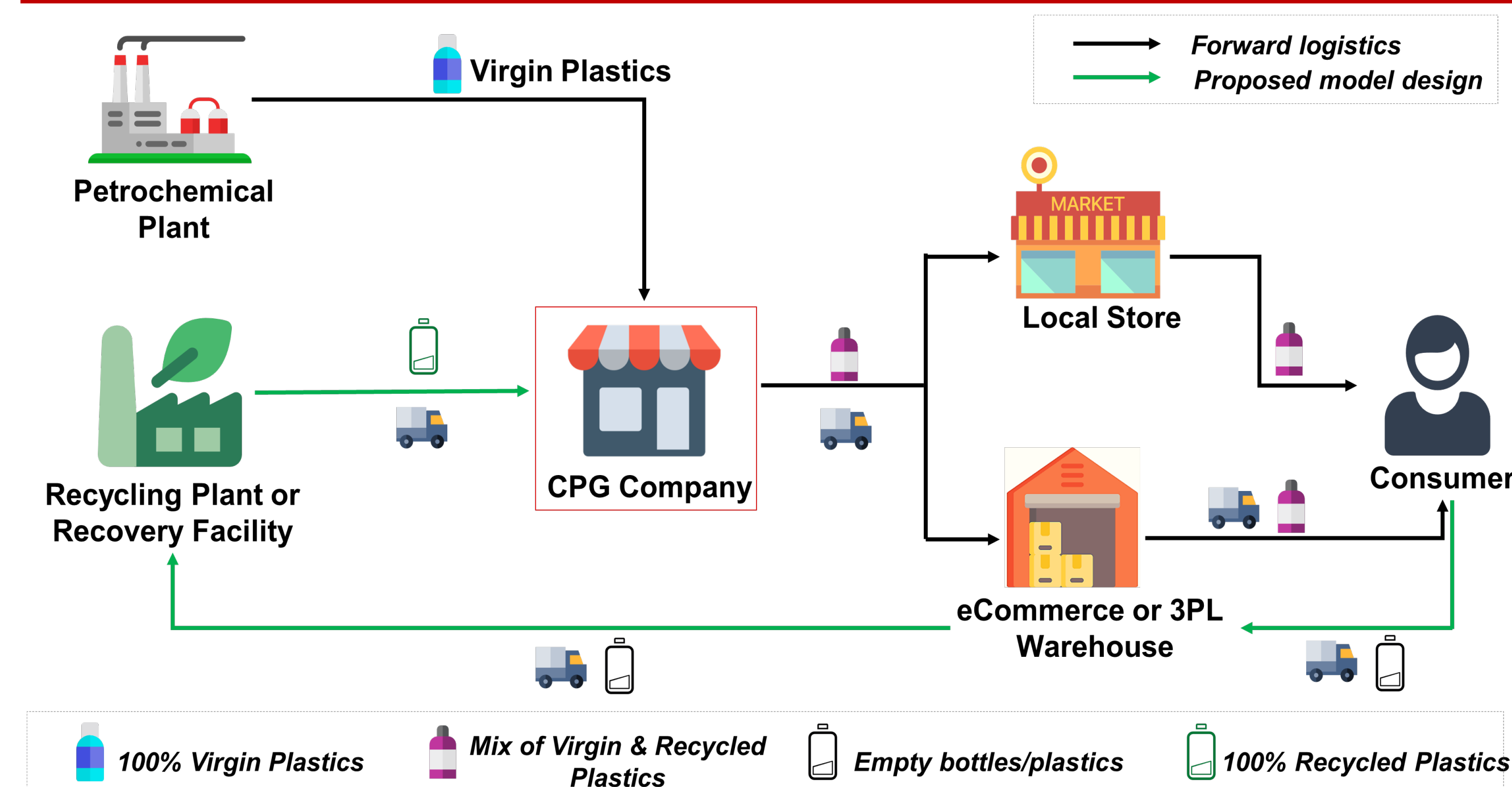
Relevant Literature

- Banerjee, S. (2020). E-Commerce Based Closed-Loop Supply Chain for Plastic Recycling. Massachusetts Institute of Technology.
- Ellen MacArthur Foundation (2016). The New Plastics Economy: Rethinking the future of plastics.
- Information Resources Management Association (Ed.). (2020). Waste management: Concepts, methodologies, tools, and applications. Engineering Science Reference, an imprint of IGI Global.

Extended Producer Responsibility Framework



Proposed Closed-Loop Supply Chain Model



Model Results

Scenario Analysis	Base Case	Break-Even
Plastics Collected / month	11 million lbs.	45 million lbs.
Proposed System Cost / month	\$14 M	\$6 M
Proposed System Revenue / month	\$ 1 M	\$6 M
Proposed System Impact / month	\$13 M	0
Carbon emission reduction / month (CO ₂ eq.)	7 million kgs	29 million kgs

Base Case

- Only 10% of addressable plastics picked up due to limited # of participating warehouses
- Disruption of an existing high efficiency, cost-intensive last mile delivery
- Lack of co-ordination and collaboration among stakeholders

Recommendations & Contributions

- Model Feasibility:** Practically and implementable plastics closed-loop model using eCommerce network
- Economic Feasibility:** Practical break-even point parameters
- Multi-stakeholder collaboration:** 25% cost reduction by coalition members to support plastics closed-loop
- Increased eCommerce efficiency:** Reduction in pickup time and unload time or introduction of drop-off points
- Increased plastics collection:** Target collection rate of 47 lbs per household per year
- Pilot Test Recommendation:** Design parameters and evaluation metrics to validate the model

Jacob Backstrom



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