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Plastic Money:

Turning Off the Subsidies Tap

Phase 2 Summary Report

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About Eunomia

Eunomia Research & Consulting Ltd ('Eunomia') is a full-spectrum, independent environmental consultancy, established in 2001 and focused on improving environmental outcomes around climate, nature, energy, and materials in ways that also enhance social value. It is our mission to shape a more sustainable future, building a world that benefits both the environment and local communities. We combine practical experience with academic excellence, and a genuine passion for the subject matter, to offer creative solutions. Our clients include local, national, and suprainternational governments and agencies, NGOs, and businesses.

About QUNO

The Quaker United Nations Office (QUNO) works to promote peace and justice at the international level, focusing on areas such as human rights, peacebuilding, and sustainable development. Through its engagement with rights-holders, United Nations agencies, governments, and non-governmental organizations, QUNO seeks to build collaborative solutions to global challenges. Guided by Quaker principles, QUNO's Sustainable and Just Economic Systems programme addresses the systemic issues driving economic inequality and environmental degradation. QUNO's work on plastic subsidies is part of its broader commitment to fostering economic systems that are both sustainable and just.

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Any errors or omissions remain the sole responsibility of the report's authors.

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1.0 Introduction

Synthetic plastic polymers are widely used due to their versatility and low cost. However, their lifecycle — from extraction to disposal — contributes significantly to climate change, pollution, and biodiversity loss. In 2016, global production of primary plastics, mostly from fossil fuels, exceeded 400 million tonnes and is growing by about 3% annually.[1]

The Intergovernmental Negotiating Committee on Plastic Pollution (INC) is developing the UN-mandated Global Plastics Treaty to address plastic pollution, with a final agreed text of an international legally binding instrument expected by December 2024. The negotiators have been tasked with considering what measures could be pursued to contribute to that goal.

One possible measure is ending subsidies for primary polymer production (PPP), as current subsidies lower production costs and encourage investment, making plastics cheaper and more competitive against substitutes and alternatives. Eliminating these subsidies aligns with international efforts to reduce environmental harm. However, a major challenge is the lack of detailed data on these subsidies.

This research aims to help fill this data gap on PPP subsidies and model the impacts of removing these subsidies on primary polymer production and consumers of plastic products. This is a summary report presenting some of the key findings of the research. To access the full report please scan the QR code provided at the end of this report or use this link.

2.0 Research Scope

The study focuses on standard ('commodity') polymers that constitute the bulk of global polymer production: polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polyethylene terephthalate (PET), and polystyrene (PS).

The key economies investigated in this study include China, the United States of America, the Kingdom of Saudi Arabia, South Korea, India, Japan, Germany, Thailand, Brazil, Chinese Taipei, Iran, Russia, Belgium, France and Mexico. These are the top 15 polymer producing economies that account for around 85% of the global capacity to produce commodity plastics.[2]

2.1 Types of PPP Subsidies

The types of subsidies investigated in this study include:

Capital-related support

Capital-related support includes grants tied to investments in plants and concessional loans and loan guarantees from public finance institutions. Grants tied to investments in plants are the most transparent forms of capital-related support, and on occasion can be significant. Those identified by this study across a subset of economies appear to be worth upwards of several hundred million dollars a year on average.

[1] United Nations Environment Programme (2021). *From Pollution to Solution: A global assessment of marine litter and plastic pollution.* Nairobi.

[2] This ranking is based on several sources, some proprietary. The ranking below the top two producers often differs depending on the source and can change with the commissioning of a large facility in any given year.

Feedstocks subsidy supports

Government support to chemical feedstocks is typically provided via one of three mechanisms: (1) government intervention in the setting of prices for those feedstocks; (2) government policies, such as tax credits or rebates, that reduce the effective price paid by purchasers of those feedstocks; and (3) policies that reduce or exempt the feedstock chemicals from taxes normally applied to similar products.

Process energy support

As with feedstocks, government support for energy used in the processes for producing monomers and polymers is typically provided via one of three mechanisms: (1) government intervention in the setting of prices charged for fuels or electricity; (2) government policies, such as tax credits or rebates, that reduce the effective price paid by purchasers of fuels or electricity; and (3) policies that reduce or exempt the fuels or electricity from taxes normally paid by other consumers of the same fuels or electricity.

2.2 Scenario Modelling

To assess the impacts of removing PPP subsidies, the following two scenarios were modelled in the study:

1) A **baseline scenario** in which it was assumed that feedstock subsidies and process energy subsidies for monomer production and polymerisation continue at the average rate from the period 2015-2020.
2) A **full subsidy removal scenario** in which it was assumed that all feedstock subsidies and process energy subsidies for monomer production and polymerisation are removed. The impact of full subsidy removal on monomer and polymer production volumes was assessed relative to the baseline scenario, for the years 2024 and 2050.

These scenarios were modelled for 71 economies and 7 primary polymers (HDPE, LDPE, LLDPE, PP, PET, PVC and PS).

3.0 Baseline Scenario

The baseline scenario projected forward the estimation of the current level of subsidies to the year 2050. Under this scenario, future economy and polymer specific production volumes were projected based on the projections of polymer demand in the OECD's Global Plastics Outlook: Policy Scenarios to 2060.[3]

A total subsidy rate (USD per tonne of polymer) by polymer and economy, for 2024 and 2050, was calculated by summing the annual value of feedstock subsidies and process energy subsidies to monomer production and polymerisation and dividing the total by the annual polymer production volume. Polymer prices (USD per tonne of polymer) — by polymer, and year — were estimated based on regional polymer price data from Wood Mackenzie.[4]

[3] OECD Global Plastics Outlook: Policy Scenarios to 2060, https://www.oecd-ilibrary.org/sites/aa1edf33-en/1/3/2/2/index.html?itemId=/content/publication/aa1edf33-en&_csp_=ca738cf5d4f327be3b6fec4af9ce5d12&itemIGO=oecd&itemContentType=book

[4] Data provided by Wood Mackenzie.

Note on Graph Numbering: The numbering of the graphs and tables in this summary report (e.g., Figures 5-11, 5-12, 5-13, etc.) reflects their numbering as assigned in the full Phase 2 Report, except for Table 1, which is original to this summary. This is to maintain consistency across all related documents. For additional context or to explore these figures further, please refer to the full report, accessible via the QR code provided at the end of this summary or the link provided in the introduction.

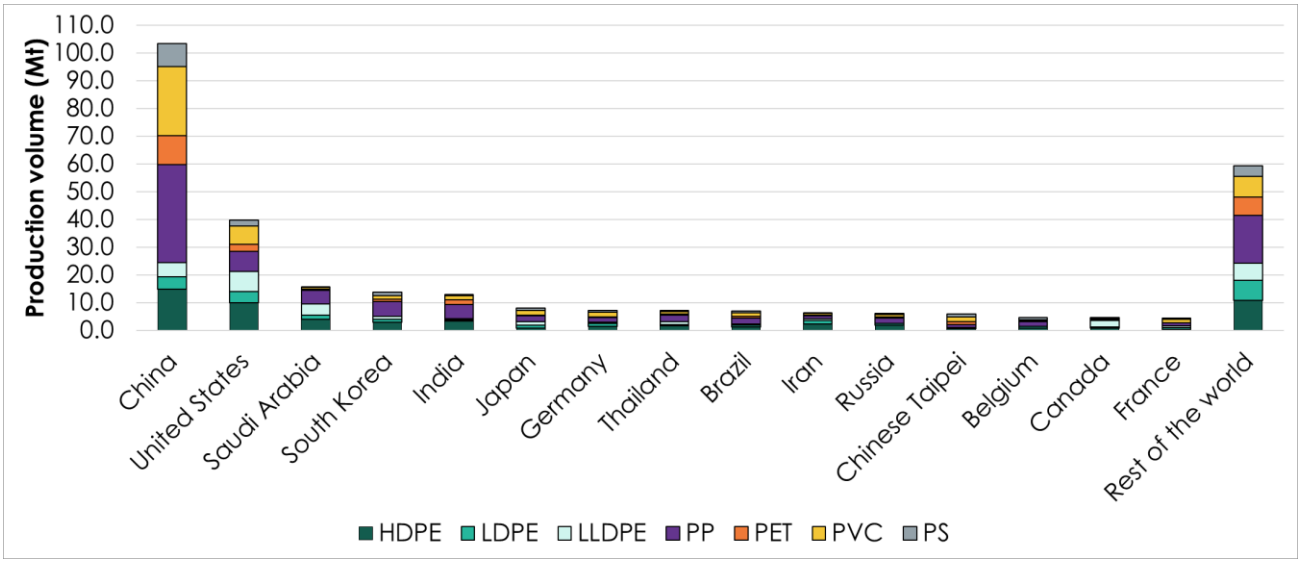
3.1 Polymer Production Volumes

In the baseline scenario, total production of commodity polymers is estimated at 305 million tonnes in 2024, rising to 590 million tonnes in 2050.

In 2024 and 2050, China is the largest polymer producer with estimated total polymer production of 103 million tonnes in 2024 (Figure 5-11),- rising to 206 million tonnes in 2050 (Figure 5-12)-. China produces all seven of the main primary polymers (HDPE, LDPE, LLDPE, PP, PET, PVC and PS).

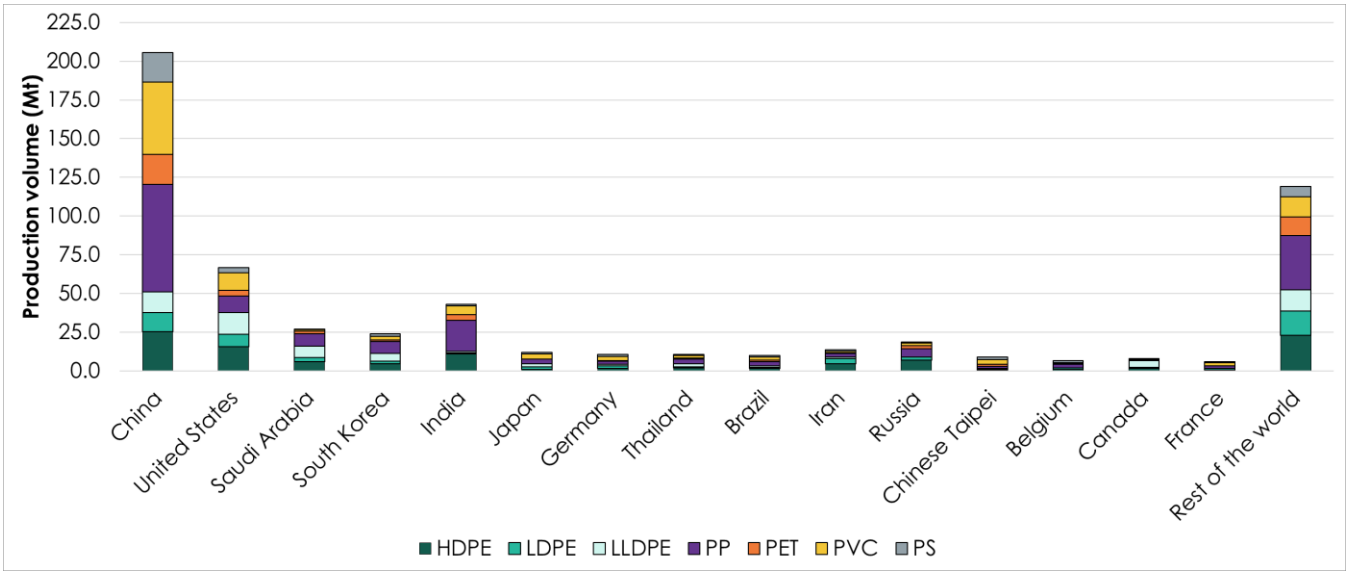
The United States is the second largest polymer producer in 2024 and 2050, accounting for 40 million tonnes of production in 2024 and 67 million tonnes of production in 2050. The majority of US production is various forms of PE; 21 million tonnes in 2024 and 38 million tonnes in 2050, respectively (Figure 5-11 & 5-12--).

Figure -5-11: Polymer production volumes, baseline scenario, 2024



Source: Eunomia Analysis

Figure 5-12-: Polymer production volumes, baseline scenario, 2050

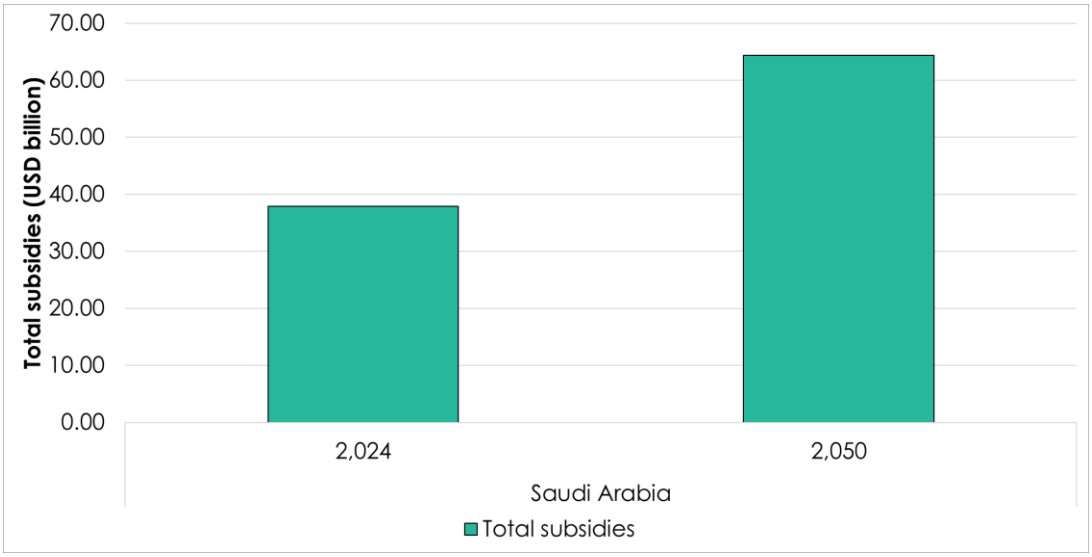


Source: Eunomia Analysis

3.2 Total PPP Subsidies

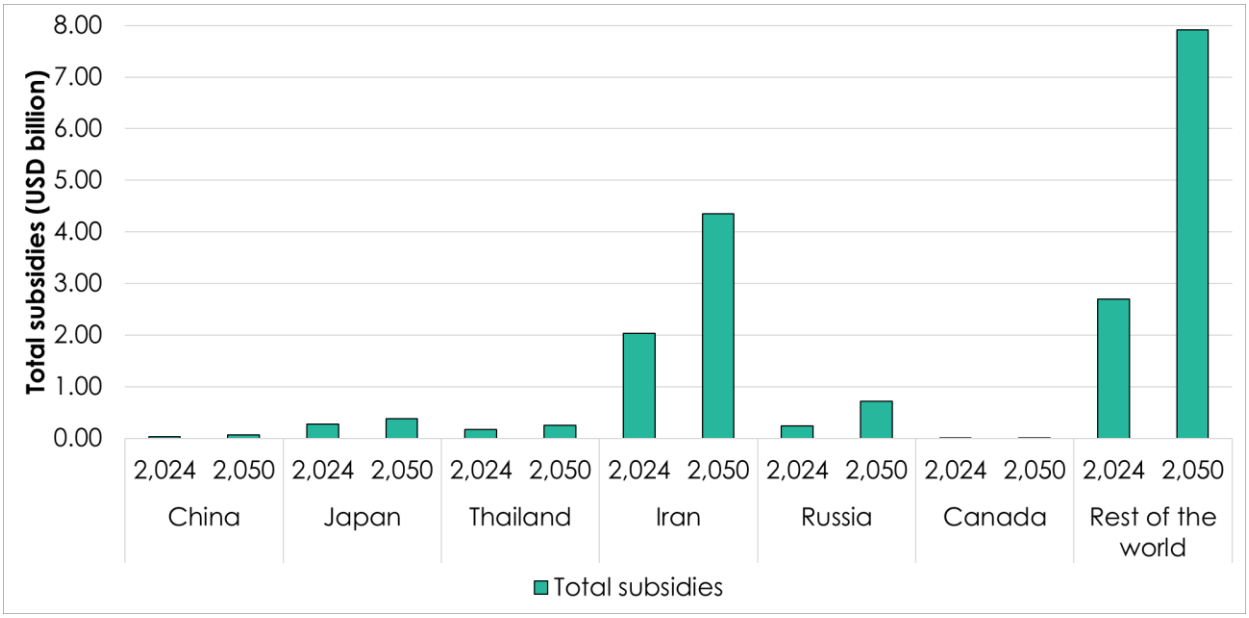
Total price-related subsidies to polymer production are calculated as the sum of process energy subsidies to monomer production, process energy subsidies to polymer production and feedstock subsidies. These are estimated to have been USD 43 billion in 2024 and to rise to USD 78 billion in 2050 (Figure 5-9- & Figure 5-10)-. Saudi Arabia accounts for the majority of these subsidies; USD 38 billion in 2024 and USD 64 billion in 2050 (Figure 5-9)-.

Figure 5-9: Total price subsidies to polymer production, baseline scenario, 2024 & 2050



Source: Eunomia Analysis

Figure 5-10-: Total price subsidies to polymer production (excluding Saudi Arabia), baseline scenario, 2024 & 2050



Source: Eunomia Analysis

Adding in other forms of government support that are not captured by the price-gap calculations, such as grants for investing in steam crackers and polymerization plants, tax expenditures, and rebates on fossil fuel inputs (see Phase 1 report) would raise the total to at least USD 45 billion a year in 2024. That value puts it in the range of subsidies to several other economic activities with major environmental significance identified recently by Koplow and Steenblik (2024), such as non-energy mining (USD 40 billion a year) and marine capture fisheries (USD 55 billion), though they are of a lower order of magnitude than government support to agriculture (over USD 600) and fossil fuels (over USD 1000) (Table 1).[5] When total subsidies to polymer production are combined with other environmentally harmful subsidies (EHS), the total EHS reaches an estimated USD 2.6 trillion.

Table 1: Estimated scale of environmentally harmful subsidies

Sector	Scale of subsidy (billions of 2023 USD per year, rounded)
Fossil fuels	1,050
Non-energy mining	40
Agriculture	610
Fisheries	55

[5] Doug Koplow and Ronald Steenblik (2024), *Protecting Nature by Reforming Environmentally Harmful Subsidies: An Update*, Earth Track. https://www.earthtrack.net/sites/default/files/documents/ehs_report_september-2024-update_final.pdf

Forestry	175
Transport	180
Water	390
Construction	150

Source: Koplow & Steenblik, 2024.[6]

4.0 Impacts of Removing PPP Subsidies

The full subsidy removal scenario assessed the impacts of removing all estimated subsidies on monomer and polymer production volumes, relative to the baseline scenario, for the years 2024 and 2050.

It was assumed that when subsidies are removed the polymer price increases by the total subsidy amount. The impacts on the demand for primary polymers from the price increase were then modelled using the price elasticity of demand for primary plastic. The price elasticity of demand was estimated as -0.15 using a panel data regression model with time-series data for six polymers in seven different regions, across the years 2015-2022.[7] Finally, the impacts of removing subsidies on final consumers were modelled based on price data for different types of plastic-containing consumer goods.

4.1 Impacts on Polymer Production

The results presented here are for any of the top 15 ranked economies according to total polymer production volume in 2024 with changes in production volumes, plus selected economies with the largest modelled changes in polymer production volumes.

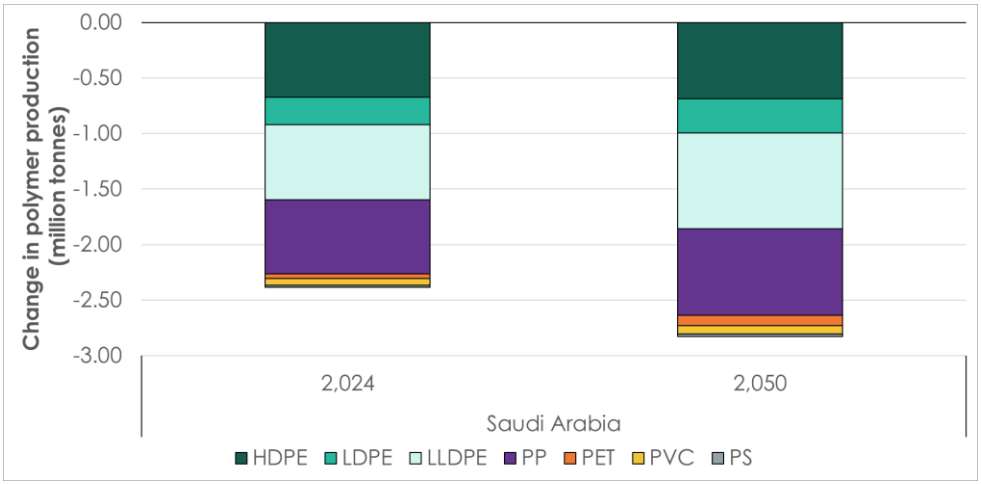
Under the full subsidy removal scenario, polymer production decreases by the largest amount, relative to the baseline scenario, in Saudi Arabia (Figure 5-13)-. It is estimated that removal of subsidies to plastic production reduces Saudi Arabia's polymer production by 2.4 million tonnes in 2024 and 2.8 million tonnes in 2050.

Changes in polymer production volumes are much smaller for other economies (Figure 5-14-). The second largest decrease in production is for Iran, where polymer production decreases from the baseline scenario by 0.22 million tonnes in 2024 and 0.27 million tonnes in 2050.

[6] *ibid*

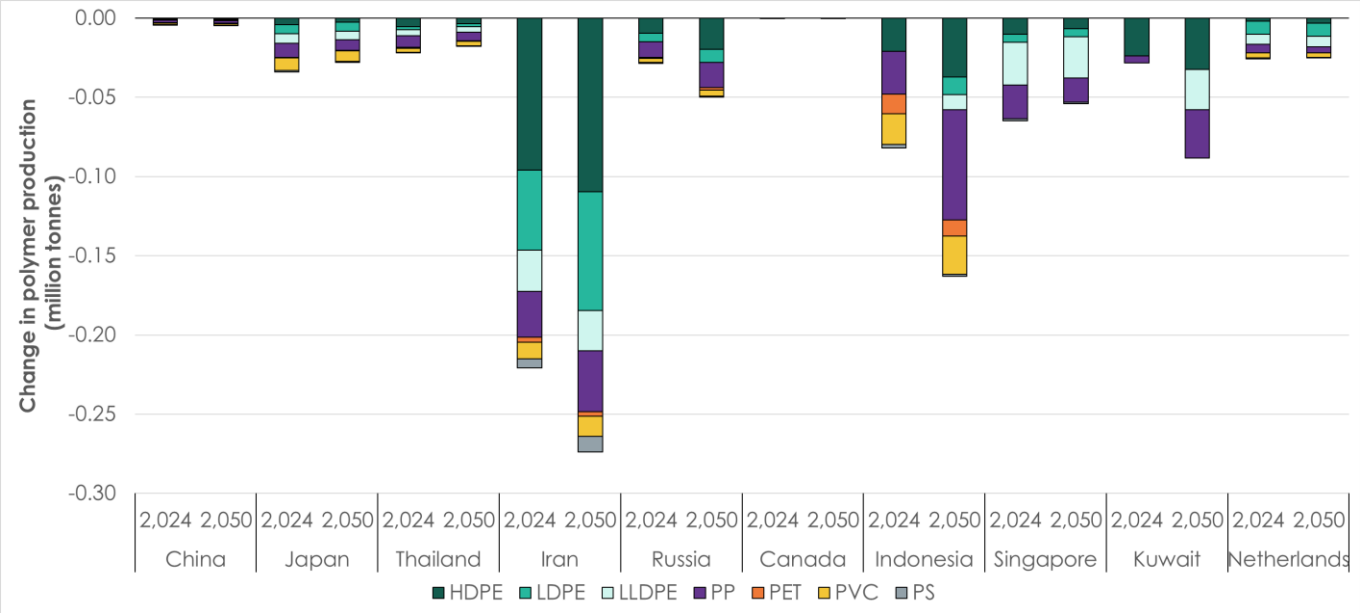
[7] Data provided by Wood Mackenzie.

Figure 5-13-: Change in polymer production volumes, subsidy removal scenario, 2024 & 2050



Source: Eunomia Analysis

Figure 5-14-: Change in polymer production volumes, subsidy removal scenario, 2024 & 2050



Source: Eunomia Analysis

4.2 Impacts on Consumers

-Table 4-1 presents the impact of full subsidy removal on the prices of selected consumer products. The impact is minimal across a range of plastic-containing products.

In the case of fast-moving consumer goods such as a bottle of water, a bottle of soft drink, or a juice box, the plastic content of the product is contained in the packaging, and accounts for a small share of the overall product weight. For these products, the average price increase resulting from the removal of subsidies to polymer production is less than 1%. Whereas, for products such as plastic mulch film used in agriculture, the entire product is plastic and the share of the plastic price in the overall product price can be larger. Therefore, an increase in polymer prices resulting from the removal of subsidies to plastic production has a relatively larger impact on the retail price of the final product. Nevertheless, the price impact for consumers is still small, estimated at 3.16%.

Table 4-1-: Impact on consumer product prices from removing subsidies to plastic production

Product sector	Product label	No. of economiescovered	Average product price - original (US$)	Average product price - new (US$)	Average price increase (US$)	Average price increase (%)
Packaging	Bottle of water	17	0.662	0.664	0.0024	0.75%
Packaging	Bottle of soft drink	15	0.915	0.916	0.0015	0.17%
Packaging	Juice box	17	2.411	2.413	0.0017	0.09%
Clothing	Dress	17	38.56	38.60	0.0371	0.08%
Flooring	Vinyl flooring (per kg)	17	5.12	5.19	0.07	1.53%
Agriculture	Agricultural mulch film (per kg)	17	52.05	52.29	0.24	3.16%

Source: Eunomia analysis.

5.0 Concluding Remarks

The findings of the study reveal that the PPP industry potentially receives substantial subsidy support in a number of economies across the world. The level of PPP subsidies could be potentially in magnitude similar to non-energy mining and marine capture fisheries subsidies, and if the demand for plastic products that contain these primary polymers continues to increase over time, the level of PPP subsidies will continue to rise as well.

The results of the modelling exercise show that the complete removal of the PPP subsidies would lead to a significant reduction in primary polymer production, with a larger reduction observed in economies with higher levels of subsidies. In terms of the impact on prices of plastic products, the overall impacts across the majority of the plastic product groups seem to be very low, implying a negligible impact on the consumers of final products.

Further research and analysis will be undertaken in the next stages of this study to enrich the findings of the modelling exercise presented in this report. More specifically, the study will, in the next stage, aim to:

- Model additional scenarios of partial removal of subsidies as well as the potential for some exemptions for specific processes or energy sources (e.g. renewable energy sources).
- Model a few key environmental impacts of these scenarios, such as reduction in GHG emissions and reduction in plastic pollution.
- Examine possible relationships between the level of PPP subsidies and polymer prices at global and/or regional levels.
- Update and expand the economy profiles included in the Phase 1 Report of this research and produce some additional economies' profiles.

Please scan the QR Code below to access the full report

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