



Subsidies and Plastic Production – An Exploration

by

Ronald Steenblik

Senior Fellow, International Institute for Sustainable Development (IIISD)¹

¹ The author would like to express his gratitude to Carolyn Deere-Birkbeck (Graduate Institute) for her guidance on this paper and to Doug Koplow (President, EarthTrack) for his help in framing the questions.

Table of Contents

1. Introduction	3
2. The structure of the plastics industry.....	4
3. Subsidy definitions and subsidy analysis	6
4. Subsidies along the value chain: sources and examples.....	10
4.1. The basic raw materials: hydrocarbons derived from petroleum and natural gas	10
4.2. Refining and production of monomers and polymers, and production of plastics in primary form	12
4.3. Subsidies for the manufacturing of finished plastic products	14
5. Subsidy disciplines and other tools of the multilateral trading system	14
5.1. The use and potential use of existing subsidy disciplines	14
5.2. The challenge of creating new binding subsidy disciplines targeted at plastics	17
6. Conclusions and suggestions for further work	21
References	23
Annex 1: EU definition of a “foreign subsidy”	26
Annex 2: List of international financial institutions (IFIs)	27
Annex 3: Plastics subsidies from international financial institutions	28

1. Introduction

Perhaps no manufactured substance has had such a profound influence on the material culture of humankind – at least not since the beginning of the Bronze Age – than plastics. Plastics can be found in almost all manufactured items, from automobile fenders to zippers, from artificial fishing worms to children’s yo-yos (Freinkel, 2011). Plastics are popular because they are light, malleable, and inexpensive. Because they are inexpensive to buy, however, they are particularly suited to objects such as plastic eating utensils and packaging that can be used once and disposed of.

Although some plastic production occurred during the first half of the 20th century, its volume was insignificant until after the Second World War. In 1967, at the time that Benjamin Braddock, the 21-year-old disaffected hero played by Dustin Hoffman in the film *The Graduate* is given one word of advice, and that word was “plastics”, annual worldwide production of these polymers was around 36 million tonnes (Mielke, 1997: 3). Today it is ten times that, and continuing to expand, driven by both population growth and increasing per-capita demand for plastic articles, particularly packaging (Geyer et al., 2017).

This expansion in demand and supply would be good news for the world were it not for the many problems created as a consequence of plastic’s longevity and persistence in the natural environment. Of the approximately 10 billion tonnes of plastic that have been produced in the world since 1950, it is estimated that only 9% has been recycled. In 2015, the recycling rate had increased to just 20%, with 25% being incinerated (25%), and 55% simply discarded – some of that to controlled landfills, but more of it in open dumps, from which much will eventually reach the world’s oceans, or released directly at sea (Ritchie, 2018). Because most plastics are resistant to microbial action, any that are not recycled or incinerated are expected to remain in the environment as long-chain polymers for millennia, perhaps even for millions of years.

The problems that plastics cause in the oceans are particularly worrisome. In their original form, they can entrap or clog the digestive systems of marine birds, mammals, turtles, and fish. As they degrade, through the action of sunlight and wave action, they simply reduce in size, ending up in the guts of ever-tinier marine fauna, but also in the bodies of the larger animals that prey on them, including humans. Not only do plastic particles displace nutritional food, but they carry chemical toxins that become entrained in the plastic matrix (Gallo et al., 2018).

The two main controlled disposal methods for plastics have their own environmental problems. Plastics placed in landfills, when subject to the heat given off by other items decomposing, can leach out chemicals such as phthalates and bisphenol A (BPA), contaminating groundwater (Wilk et al., 2019). Incinerating plastics gives off carbon dioxide, the world’s leading greenhouse gas by volume, but also potentially heavy metals (e.g., cadmium from PVC) and persistent organic pollutants, such as dioxin and furans, into the air and ash waste residues. Sophisticated technologies have been developed, and continue to be improved, that minimize such emissions, but they are expensive to operate and maintain in working order (Royte, 2019).

The preferred post-consumption handling of plastic waste therefore is recycling. Increasing the rate of recycling above its currently low rate is made more difficult by contamination of plastic waste by non-plastic waste and the heterogeneity of plastics, some of which are easier to recycle than others. Obtaining plastic resins from recycling that are as pure and uncontaminated as those made from virgin materials is thus costly compared with the cost of producing new resins from oil or natural gas. To the extent that those new resins benefit from the subsidies to the raw materials from which they are made, or to the manufacturing plants used to fabricate them, the relative competitive standing of recycled plastic is rendered that much more difficult.

This paper seeks to provide a first step towards answering the question of “To what extent does the production of virgin plastic benefit from subsidies?” To understand that question, it is necessary to

understand the different stages of the chain from basic raw materials to final plastic product manufacturing, as well as its industrial structure – where plastic is produced, and what companies produce it, which successive stages are vertically integrated, and which are not. Section 2 provides an introduction to these matters.

The question of what constitutes a subsidy is addressed in the section that follows. The starting point for any discussion of subsidies is the definition of a subsidy contained in Article 1 of the World Trade Organization’s (WTO’s) Agreement on Subsidies and Countervailing Duties (“SCM Agreement”). That definition is fairly concise, however, and comprises only subsidies that involve government expenditure, or potential government expenditure. Section 3 argues that, consistent with the OECD definition of “government support”, support conferred to producers through import tariffs should also be considered.

Section 4 then reviews sources of data that might shed some light on the scale and nature of subsidies to plastic production. This evidence provided is by no means complete, but is intended to point to avenues of research that could be pursued to provide a more complete picture.

Section 5 considers what options exist through the application of existing rules in international trade to address subsidies to articles of plastic, plastics in their primary form, and the raw materials from which they are produced, and briefly what new or more targeted subsidy disciplines could look like.

Section 6 concludes the paper with suggestions for further work.

2. The structure of the plastics industry

The term *plastics* covers a wide range of synthetic or semi-synthetic organic compounds that can be molded into solid objects. The two major divisions are between *thermoplastics* and *thermosets*. Thermoplastics can be melted and cooled many times, making them amenable to recycling. These are dominated by two polyolefins, polyethylene and polypropylene (Table 1). Thermosets create a three-dimensional network as they are formed and cool, and so cannot be re-melted and reformed. Examples are epoxy, silicone, polyurethane and phenolic. Some materials, such as polyester, can be made into either thermoplastic or thermoset versions.

Table 1. Global synthetic polymers and plastics production, 2015.

Polymer type	Production, 2015 (tonnes)	Share of total polymers
Polyethylene (PE) ¹	116	30.4%
Polypropylene (PP)	68	17.8%
Fibers of polyphthalamide (PPA)	59	15.4%
Polyvinyl chloride (PVC)	38	9.9%
Polyethylene terephthalate (PET)	33	8.6%
Polyurethane (PUR)	27	7.1%
Polystyrene (PS)	25	6.5%
Other	16	4.2%
Total polymers	382	100%
Additives	25	–
Total plastics	407	–

1. Of which LD and LDPE accounted for 64 million tonnes, and HDPE 52 tonnes.

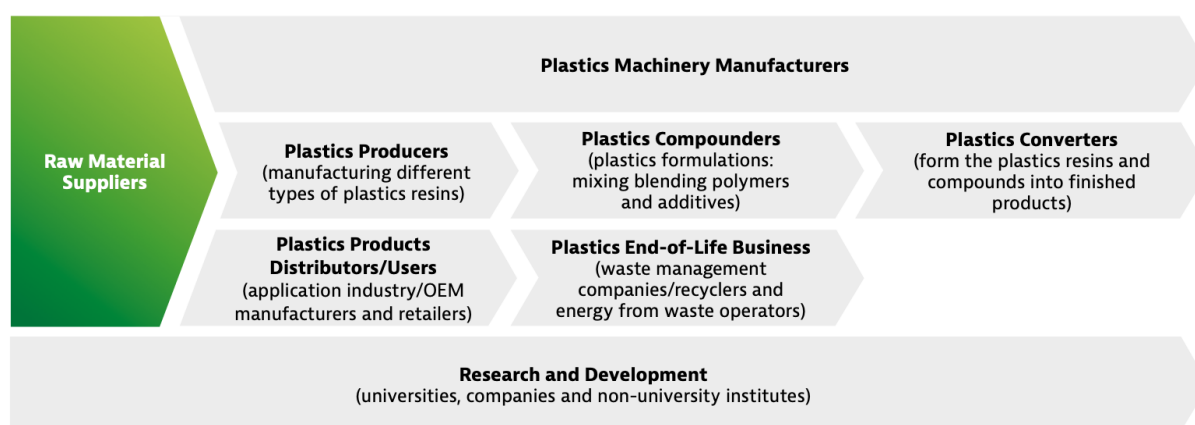
Source: Geyer et al. (2017).

All of these plastics and most others are made by transforming one of two, closely related chemicals called *olefins*. Propylene is the platform chemical from which polypropylene is made, and ethylene for four other plastics listed in Table 1. The majority of polystyrene is produced from styrene, via ethylbenzene, which in turn is produced via a Friedel–Crafts reaction between ethylene and benzene, another petrochemical.

Most propylene is produced as a minor co-product of ethylene production. Both chemicals can be produced from steam cracking liquid feedstocks such as naphtha (a product of refining crude petroleum), liquefied petroleum gas (LPG), or natural gas liquids (NGL), but the shares of propylene differ depending on the cracking temperature used.²

Generally, NGL cracking produces less propylene than naphtha, and some NGL crackers are now being designed that yield little to no propylene at all. In response, some producers have built facilities to produce propylene deliberately, instead of as a co-product, using propane (a gas extracted during the refining of crude petroleum) as the raw material.

Figure 1. Stages in the life cycle of plastics



Source: PlasticsEurope Deutschland e.V., GTAI 2018.

Structural changes in the markets for petroleum and natural gas are having profound changes on the market for plastics. With demand for gasoline and diesel stagnating in many countries (even before the Covid-19 pandemic), many multinational oil companies have been looking to shift more of their refinery output towards producing raw materials for plastics (Taylor, 2017). At the same time, Middle East hydrocarbon producers see investment in the plastic industry as a way to increase the value added from their petroleum and natural gas. Similarly, plastics manufacturing is increasingly being viewed within oil and natural-gas (which is expensive to export) company boardrooms as a way to move up the value chain.

Downstream from the producers of ethylene and propylene are the manufacturers of hydrocarbon monomers and carbon monomers, which in turn are sold in the form of plastic resins (MJS Packaging, 2014). This stage is energy-intensive, requiring the superheating and pressurizing of the the unreacted monomer to isolate pure hydrocarbon chains that can be combined (polymerized) to form resin pellets of pure plastic. The amounts of heat and pressure applied are varied to create plastic resin pellets of different densities. For example, polyethylene products requiring high tensile strength, such as carrier

² Another minor source is off-gases produced in fluid catalytic cracking units in some refineries (Akah and Al-Ghrami, 2015).

bags and agricultural tarps, are often made from a high-density plastic (HDPE), while thin plastic films are made from low-density plastic (LDPE or LLDPE). (Greentumble, 2018)

The polymer resins are then processed by plastics compounders, who create more specialized plastics formulations by blending polymers with additives, such as plastic colorants (dyes and pigments). The final polymer resins are generally produced in the forms of beads or pellets.

Plastics converters, in turn, take the plastics resins and compounds and fashion them into finished products. Depending on the end product, there are several processes involved in this stage. Injection molding is used to form *solid articles* such as bottle caps, car parts, and PVC piping, whereas blow molding is used to make *pliable articles* such as PET water bottles.

To produce *plastic bags*, raw HDPE, LDPE, or LLDPE plastic pellets are reheated and pressurized to form a uniform molten liquid, into which air is pumped from below. This step produces a long, thin balloon of pliable plastic film that passes through a tall vertical corridor,

cooling as it expands upwards. The film is then passed through multiple rollers that stretch the plastic into thin sheets. Two sheets are then pressed at their edges to form the bags' sides (Greentumble, 2018).

The final participants in the value chain are the companies that sell and distribute plastic articles such as water bottlers to final users, and companies (both private and public) involved in collecting plastic waste and disposing or recycling it. In OECD countries, what is done with collected plastics varies considerably among recycling, combustion and energy recovery, or burying in landfills.

3. Subsidy definitions and subsidy analysis

The notion of what counts as a subsidy has evolved over time. The most common reference point, in no small part because of its acceptance by over 160 countries, is the WTO's definition, set out in Article 1 of the WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement). The WTO definition stresses the mechanism through which a subsidy is delivered, and lists three involving a financial contribution by a government or any public body in which a benefit is conferred:

- (i) a direct transfer of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds, or liabilities (e.g. loan guarantees);
- (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits); and
- (iii) a government provides goods or services other than general infrastructure, or purchases goods;

Article 1 then clarifies that a subsidy is also deemed to exist if "a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments."

Finally, Article 1(a)(2) deems a subsidy to exist if "there is any form of income or price support in the sense of Article XVI of GATT 1994." Article XVI(1) of GATT 1994, which also refers to "any form of income or price support", does not explicitly say so, but is assumed to not include price support conferred through import tariffs, as import tariffs do not involve "a financial contribution by a government".

For the purpose of the indicators used by the Organisation for Economic Co-operation (OECD), market price support (MPS) provided through any border measure, including import tariffs, *is* included in their sectoral indicators for government support. For the purposes of this study, it is proposed that this broader definition be used.

Table 2 shows examples of government support defined within a two-dimensional matrix, from a study of sectoral support to the aluminum industry (OECD, 2019). The rows, which represent transfer mechanisms, correspond to those included in Article 1 of the SCM Agreement, with the proviso that “induced transfers” also include transfers between consumers and producers, or vice-versa, created by government policies. The columns represent statutory or formal incidence – that is, the aspect of production or consumption to which the support is tied.

Common forms of government support to the different stages in the value chain include

- *Raw-material providers*: Tax breaks related to investments by, or the income of, primary producers of crude oil and natural gas; credit-related support or tax breaks for refineries.
- *Plastic resin producers and compounders*: Investment incentives for plastic-resin producing plants.
- *Plastics converters*: Investment incentives for plants producing final products.
- *Final users of plastics*: Government-procurement preferences for locally produced articles of plastic.
- *Plastics collectors and recyclers*: Bounties to companies for collecting or recycling plastic; investment incentives for recycling plants.

Various types of government entities provide support, both to firms operating within the sovereign territory of the government, and to companies that invest in or operate facilities abroad. Any types of subsidies can be provided by central or sub-national governments to firms operating within their borders.

In addition, some countries provide assistance – generally in the form of government loans or loan guarantees, but also through favorable tax treatment – to firms investing or acquiring existing companies abroad. The issue of “foreign subsidies” – especially those provided by central governments to firms operating outside their territory – has recently been highlighted by the EU (European Commission, 2020). According to the EU definition (Annex 1), such subsidies would include export financing, unless the export financing is provided in line with the OECD Arrangement on officially supported export credits.

Table 2. Illustrative matrix of support measures, by transfer mechanism and formal incidence.

Statutory or formal incidence (to whom and what a transfer is first given)										
Production										Consumption
Costs of value-adding factors										
		A: Output returns	B: Enterprise income	C: Cost of intermediate inputs	D: Labour	E: Land and natural resources	F: Capital	G: Knowledge	H: Direct support to consumers	
Transfer Mechanism (how a transfer is created)	1: Direct transfer of funds	Output bounty or deficiency payment	Operating grant	Input-price subsidy	Wage subsidy	Capital grant linked to acquisition of land	Grant tied to the acquisition of assets, including foreign ones	Government R&D	Unit subsidy	
	2: Tax revenue foregone	Production tax credit	Reduced rate of income tax	Reduction in excise tax on input	Reduction in social charges (payroll taxes)	Property-tax reduction or exemption	Investment tax credit	Tax credit for private R&D	VAT or excise-tax concession	
	3: Other government revenue foregone		Waiving of administrative fees or charges	Under-pricing of a government good or service		Under-pricing of access to government land or natural resources	Debt forgiveness or restructuring	Government transfer of intellectual property rights	Under-pricing of access to a natural resource harvested by final consumer	
	4: Transfer of risk to government	Government buffer stock	Third-party liability limit for producers		Assumption of occupational health and accident liabilities	Credit guarantee linked to acquisition of land	Loan guarantee; non-market-based debt-equity conversion		Price-triggered subsidy	
	5: Induced transfers	Import tariff or export subsidy; local-content requirements; discriminatory GP	Monopoly concession	Monopsony concession; export restriction dual pricing	Wage control	Land-use control	Credit control (sector-specific); non-market mergers and acquisitions	Deviations from standard IPR rules	Regulated price; cross subsidy	
– Including advantages conferred through state enterprises							Below-market loan, including by state-owned bank			

Note: This matrix is a work in progress and may be refined in the future. Some measures may fall under a number of categories (e.g. debt-equity conversions may involve elements of both risk transfers and revenue foregone). GP = Government procurement. Adapted from OECD (2018^[a]).

Source: OECD (2019), "Measuring distortions in international markets: the aluminium value chain", *OECD Trade Policy Papers*, No. 218, OECD Publishing, Paris, <https://doi.org/10.1787/c82911ab-en>.

Financial assistance is also provided to specific sectors or projects by multilateral financial institutions, such as the African Development Bank, Asian Development Bank, European Investment Bank, Inter-American Development Bank, and the World Bank (Annex 2). Besides offering short-term loans at market rates, or longer-term loans at better than market rates, some also take equity positions in certain facilities.

Because international trade disciplines on subsidies have been concerned mainly with the policies targeted at individual sectors in GATT or WTO members, and the effects of those policies on domestic producers, subsidy inventories have generally focused on countries as the main unit of account. Such an approach is appropriate for primary products of agriculture or fisheries, which are produced by hundreds or thousands of individual entities in each country. It is less useful for understanding the overall effects of subsidies provided by multiple countries on parts of a product's supply chain dominated by large, vertically integrated multinational corporations (Table 3).

Table 3. Leading multinational producers of polyolefins, polymers, resins or plastics in primary forms and production sites

Corporation	Main production sites	Main products
Dow	BRA, CAN, JAP, MEX, NIG, SAU, USA, VEN	Polyethelene resins; performance plastics; plastic additives
LyondellBasell	AUS, BRA, CHN, DEU, ESP, FRA, GBR, IND, ITA, MEX, NLD, THA, USA	Polypropylene resins and compounds; polyethelene
ExxonMobil	USA + many others	Raw fossil-fuel feedstocks; polyolefins and other polymers and resins.
SABIC	CHN, DEU, IND, MEX, NLD, SAU, USA	Raw materials, various polymer resins.
Ineos Group Ltd.	CHE + 24 countries	Plastics, resins and intermediates
BASF	DEU + 200 countries	Polymers, plastic additives
ENI	ITA + 72 other countries	Raw fossil-fuel feedstocks; plastics and synthetic rubbers
LG Chem	KOR	Polyolefins, PVC, polystyrene, synthetic rubbers and specialty polymers
Chevron Phillips Chemical	BEL, KOR, QAT, SAU, SGP, USA	Petrochemicals, polyolefins.
Lanxess	CHN, DEU, FRA, IND, JPN, KOR, UAE, USA	Plastics, synthetic rubbers, intermediates
DuPont	CHN, IND, USA	Specialty plastics; polystyrene
Formosa Plastics Corporation	CHN, IDN, PHL, TWN, USA, VNM	Refined oil products, olefins, polypropylene, polyethylene, suspension and dispersion PVC

Sources: Polymer Properties Database “[Crow’s top 10 plastics and resins producers](#)”, no date; Al Root, “[DowDuPont is splitting into 3 companies: Here’s everything you need to know](#)”, *Barron’s*, 30 April 2019; corporate web sites.

That is certainly the case for the crucial hydrocarbon inputs to plastic production. According to the Center for International Environmental Law (CIEL, 2017), just five companies – BP, Chevron, China National Petroleum Corporation, ExxonMobil, and Shell – account for over half of global sales of naphtha. Moreover, because of the necessity of locating plastic production with refineries, there is a high degree of vertical integration between the industries: major integrated oil and gas producers, such as BP, Chevron, ExxonMobil, Saudi Aramco, and Shell, own plastics companies; and some major plastics producers own oil or gas companies (DowDuPont, LyondellBasell), or refine petroleum products (Formosa Plastics).

Ideally, a thorough analysis of subsidies to the plastics industry would identify subsidies all along the value chain at both the national level and at the company level for the most concentrated parts of the industry. Attempting to identify subsidies to companies downstream from raw-material providers

would be a much more daunting task, by comparison. For example, in Germany – Europe’s leading producer of plastic resins and plastic products – the number of companies that process plastics and fabricate products made of plastic numbered around 2,900 as of 2016 (GTAI, 2018).

4. Subsidies along the value chain: sources and examples

Considerable information exists on subsidies to plastics production, in government budget and tax-expenditure reports, in databases assembled by non-governmental organizations (NGOs), and in the annual reports of the plastics companies themselves. But it is scattered and has not yet been assembled in a systematic way. By contrast, over the last decade organizations such as the Organisation for Economic Co-operation and Development (OECD), International Energy Agency (IEA), and the International Monetary Fund (IMF), have constructed large databases on government support to the production and consumption of petroleum and natural gas, which are the raw-material feedstocks from which most plastics are derived. Additional insights on such support can be gleaned from the peer review reports of members of the Asia-Pacific Economic Co-operation (APEC) economies and the Group of Twenty (G20) economies.

The recent history of trade disputes and unilateral trade-defense actions involving plastic products also provides some indication, albeit imperfectly, of which producing countries have been most frequently accused of subsidizing primary plastics or plastic products, and which products are the ones most frequently implicated. As explained in Section 5, such disputes and actions have concerned mainly producers in the Middle East, South Asia, and eastern Asia, and most often polyethylene terephthalate (PET) in its primary form, or products made from it, such as PET films.

Finally, even the companies themselves complain about other companies’ subsidies. One of the largest, LyondellBasell, wrote in its most recent *Annual Report* (2020: 22):

[W]e face increased competition from companies that may have greater financial resources and different cost structures or strategic goals than us. These include large integrated oil companies (some of which also have chemical businesses), government-owned businesses, and companies that receive **subsidies or other government incentives** to produce certain products in a specified geographic region. [Highlighting added by author.]

4.1. The basic raw materials: hydrocarbons derived from petroleum and natural gas

Fossil fuels are a logical starting point for considering the impact of subsidies on the relative competitiveness of virgin plastics. For modern-day plastics, the main fossil fuels of interest are crude petroleum and natural gas.

The OECD reports on government support to fossil-fuel production that are provided through grants or tax breaks for 45 countries: the whole OECD membership, most G20 countries that are not OECD members (Argentina, Brazil, China, India, Indonesia, Russia, and South Africa), and six Eastern European countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine).³ Of these, the main countries that are both significant producers of oil or natural gas, and of primary plastics, are Brazil, Canada, China, India, Indonesia, Mexico, Netherlands, Russia, and the United States, plus Iran, Saudi Arabia, and the United Arab Republics (U.A.E.).

Various non-governmental organizations, such as Oil Change International, report the face value of government mediated loans and loan guarantees to many of these countries. The subsidy equivalent

³ <https://www.oecd.org/fossil-fuels/data/>.

values of these supports add up to several tens of billions of dollars annually, perhaps as much as USD 100 billion, but the degree to which they affect final prices for petroleum and natural gas sold within each of the countries has not been systematically studied.

In the OECD countries, market prices for crude petroleum are set competitively with world (import or export) reference prices. Nonetheless, the effect of their budgetary support and tax breaks on world prices themselves is likely to be downward overall. Also, it is possible that there may be some instances in which refineries, particularly those situated far from coastal ports, are being supplied with oil or natural gas at prices significantly lower than world market prices. In several of the non-OECD countries, their petroleum and natural gas industries are controlled by state-owned enterprises that may be cross-subsidizing chemical inputs to plastic manufacturing by charging higher prices for other products.

Likely the largest subsidies benefitting the plastics industry are the result of policies that depress domestic prices for crude petroleum and natural gas expressly. Data published by the International Energy Agency (IEA) and the International Monetary Fund (IMF) do not separately identify the subsidy value of cheap crude-oil inputs to petroleum refineries, nor subsidies benefitting natural gas liquids, but rather estimates of subsidies to final petroleum products (particularly transport fuels, and kerosene and LPG for cooking) and natural gas broadly. These numbers therefore are mainly useful in suggesting the degree to which (pre-tax) domestic prices for petroleum and natural gas fall short of international reference prices.

Neither the IEA nor the IMF make public their price gaps estimates, only the total value of the consumption price support (= price gap x volume consumed). Table 4 lists the world's top 20 primary plastic producing countries and whether the IEA measures any petroleum or natural gas subsidies benefitting consumers. What it suggests, but does not prove, is that oil refineries or natural gas processing plants may be benefitting from low-priced hydrocarbon inputs in China, the largest producing country, and Middle East petroleum and gas producing countries, plus India and Indonesia.

Table 4. Top 20 producing countries of primary plastic in 2019, and consumer price subsidies for petroleum and natural gas in 2019

Country	Primary plastic production, 2015, MT	Petroleum consumption subsidies, 2019 (USD billion)	Natural gas consumption subsidies, 2019 (USD billion)
China	63.7	12.4	--
United States	36.0	--	--
Korea	14.4	--	--
Saudi Arabia	14.3	18.2	4.7
India	9.9	21.0	0.9
Japan	8.8	--	--
Germany	8.7	--	--
Chinese Taipei	7.8	--	--
Thailand	7.7	--	--
Brazil	6.1	--	--
Iran	6.0	18.0	16.3
Belgium	4.0	--	--
Russia	5.3	--	10.4
France	4.9	--	--
Canada	4.2	--	--
Netherlands	4.1	--	--
Mexico	3.3	--	--
Spain	3.3	--	--
U.A.E.	2.9	0.2	5.0
Indonesia	2.5	19.2	--

Source: Data for plastic production from Euromap (2016, October), *Plastics Resin Production and Consumption in 63 Countries Worldwide: 2009 – 2020*, Frankfurt am Main: EUROMAP General Secretariat. <https://www.pagder.org/images/files/euromappreview.pdf>; data for consumer price subsidies from International Energy Agency; IEA - <https://www.iea.org/data-and-statistics/charts/value-of-fossil-fuel-subsidies-by-fuel-in-the-top-25-countries-2019>.

4.2. Refining and production of monomers and polymers, and production of plastics in primary form

Central-government subsidies to the primary plastic producers have not yet been assembled. There is ample evidence that such subsidies exist, nonetheless. The BASF Group in its Annual Report (2020), for example, mentions having received “government grants and government assistance” from several countries, amounting to €27 million (USD 30 million) in 2019, and €43 million (USD 50 million) in 2018. This assistance included regional business development subsidies in *China*, and grants for research projects and electricity price compensation in the 2019 fiscal year provided by unnamed countries (BASF, 2020: 230).

In the *United States*, with natural gas supply increasing due to hydraulic fracturing and horizontal drilling (“fracking”), several U.S. states are providing subsidies to commodity plastics production. These subsidies often take the form of state or local abatements to property or other *ad valorem* taxes, or subsidies for new job creation. Louisiana, for instance, gives a state-level board the power to exempt industrial facilities from local property taxes, which has caused problems for local communities.⁴ Other state or federal levers to subsidize this type of infrastructure have often taken the form of subsidized credit, either through direct loans or sovereign guarantees. There could also be in-kind contributions (e.g., road or rail links) being made by from the state to support these facilities.⁵

Among OECD countries, such local investment incentives – to use the generic term – are likely most prevalent in the United States. The EU has strict rules on state aid that restrict its individual Member States from providing investment incentives. Most aid of this kind is provided through grants distributed in the context of regional development assistance. Most other OECD countries are too small to be able to afford investment incentives, or have pacts among their subnational units that limit their use.

One very helpful source on sub-national investment incentives in the United States is the Subsidy Tracker (<https://www.goodjobsfirst.org/subsidy-tracker>), maintained by the NGO, Good Jobs First. It contains information on state and local investment incentives since 2000 in a database that is searchable by industry or company. A quick perusal of this database shows substantial assistance provided to the parent companies of several leading plastics primary plastics producers (Table 5), mainly in the form of credits or rebates on state corporate income tax, or local property tax abatements. Some of these subsidies were complemented by federal grants. And in many cases the Subsidy Tracker analysts were unable to quantify the value of the subsidies. On the other hand, by no means have all of these subsidies benefitted plastic producers. In the case of LG Chemicals, for example, all of the subsidies have been targeted at plants involved with the manufacturing (or research on) fuel cells.

Nevertheless, the table does provide a broad impression of the degree to which the parent companies of plastic manufacturers have been able to tap into state and local investment incentives over the last two decades. Overall, the subsidies appear to be relatively modest. However, they have been provided in discrete amounts associated with particular plants, so may nevertheless have contributed a

⁴ See, for example, “Why Louisiana stays poor, PT 1: the Louisiana paradox” (<https://www.youtube.com/watch?v=RWTic9btP38>). [This link](#) shows details for ExxonMobil.

⁵ The U.S. energy-subsidy expert, Doug Koplow (President of Earth Track), has looked into the petrochemical industry’s capture of supposedly more general subsidized bonds some years back, and has told the authors that he is looking for newer data in connection with work he’s currently undertaking on natural gas subsidies.

significant share of these plants' overall up-front capital costs, as well as signaling to investors that the plants enjoyed local political support. A good example of that is the estimated USD 1.5 billion incentive package offered recently to Formosa Plastics Corp. USA to locate a USD 9.4 billion plastics facility in Baton Rouge, Louisiana (McConnaughey, 2018). Further scrutiny of the individual measures in the database and press reports would yield more precise information.

Table 5. Indicative sample of cumulative state and local subsidies provided to parent companies of leading plastics manufacturers in the United States

Parent corporation	Cumulative state and local subsidies (USD millions)	Time period within which subsidies were provided
Sasol	1,851	2008-2017
Royal Dutch Shell	1,815	2003-2021
Exxon Mobil	1 021	1983-2020
Dow	464	2000-2021
LG Chemicals	438	1996-2019
BASF	278	2003-2019
DuPont	189	2000-2018
Formosa Plastics	50	2008-2015
Lanxess	39	2000-2017
LyondellBasell Industries	17	2000-2016
Chevron Phillips Chemical	9	2001-2009
Ineos	3	2005-2016

Source: Steenblik (2021), based on Subsidy Tracker database: <https://www.goodjobsfirst.org/subsidy-tracker>, accessed on 21 April 2021.ⁱ

Note: Figures reflect subsidies to parent companies of leading plastic manufacturers; the subsidies indicated may also be directed to non-plastics activities within portfolio of business activities. This table does not include federal grants and allocated tax credits that a number of companies also received.

India is another country with sub-national investment incentives. Under its “Stand-up India” program, the Government of Gujarat administers a special “Scheme for Financial Assistance to [the] Plastics Industry”, which has two components: 1) an interest subsidy of up to 7% of loans for five years for fixed capital investment in building new plants and machinery, and related assets; and 2) a 80% reimbursement of the net VAT paid for the first five years of commercial operation.⁶

The situation in the Gulf States is compounded not only by their very low fossil-fuel input prices, but also state ownership of key production capacity and related infrastructure. Saudi Arabia, the leading plastics producer in the region, includes plastics production and conversion as one of its strategic industries (Elaraby et al., 2016).⁷ As the Kingdom’s National Industrial Cluster Development Program website states in respect of the chemicals cluster generally, “Through a number of financial incentives and a supportive national policy, the Saudi Government encourages industrial joint ventures or technology licensing to substitute imports and make this industry competitive for export.”⁸ (Emphasis not in original.) Similarly, in China, Japan, Korea, and Chinese Taipei, the close links between governments, state-owned enterprises and private companies, and the active use of industrial policies to promote national industry, means that strong government subsidies could be playing a significant role, but it will take focused case study research to confirm whether or not this is the case.

Multilateral development banks have also become involved in financing refineries. In 2018, for example, the Arab Petroleum Investments Corporation (APICORP) contributed USD 100 million to the financing of Duqm, a USD 5.75 billion new refinery that is jointly owned by Oman Oil and the

⁶ <https://www.standupmitra.in/Home/SubsidySchemesForAll#State>.

⁷ <https://www.ic.gov.sa/en/clusters/chemicals/opportunities/plastics-and-conversion/>

⁸ <https://www.ic.gov.sa/en/clusters/chemicals/overview/>

Kuwait Petroleum Corporation. The refinery's output is intended to "meet the forecast deficit in diesel and naphtha in high consumption regions, particularly Asia" (APICORP, 2019: 35).

4.3. Subsidies for the manufacturing of finished plastic products

No database currently exists that identifies subsidies to the thousands of plants across the world that transform plastic resins into finished products, like plastic bags, bottles, household items, or automobile parts. Some of the ones cited earlier (e.g., Subsidy Tracker for the United States) could be interrogated through searches on company names. A quick search of the EU's database on approved regional aid packages shows that plastic product manufacturers in the EU received at least € 130 million during 2006 and approximately 2014 period.⁹ Obtaining similar data on subsidies in emerging economies would be much more of a challenge, however, given the state of publicly available information. However, a search of reports in the news media could provide insights into at least the nature of support provided in G20 countries like China, India, Indonesia, Japan, Korea, Mexico, and Russia, as well as non-G20 countries such as Viet Nam.

One policy that appears worthy of investigating is India's "Scheme for Setting Up of Plastic Parks", established in 2013.¹⁰ This plan had the objective of "increase the competitiveness, polymer absorption capacity and value addition in the domestic downstream plastic processing industry" of the country. It provided grant funding up to 50% of the cost of each project, up to a ceiling of Rs 400 million (USD 6 million) per project. Other contributions were expected to be provided by state governments or state industrial development corporations or similar agencies of state governments, and loan from financial institutions.

5. Subsidy disciplines and other tools of the multilateral trading system

5.1. The use and potential use of existing subsidy disciplines

At the multilateral level, subsidies to goods are disciplined (i.e., sanctioned) according to the rules set out in the WTO's Agreement on Subsidies and Countervailing Duties. Subsidies that are challenged at the WTO by one or more of the organization's members and are found to be contingent on export performance or "on the use of domestic over imported goods" (i.e., upon meeting a minimum level of domestic content) are prohibited. All others are "actionable" and must be both "specific" in the context of Article 2 of the SCM Agreement and be found to be creating adverse trade effects in the member's domestic market or an export market.

Unilateral remedies in the form of countervailing duties (specific additional duties levied on imports from specified companies) are also available to members who allege adverse effects caused by subsidized imports. Such countervailing duties can be imposed only "pursuant to investigations initiated and conducted in accordance with the provisions of" the SCM Agreement, however. The advantage to importers seeking to protect their domestic industry from subsidized imports is that the period between initiating an investigation and imposing a CVD is usually much quicker and cheaper than to pursue a case at the WTO. The dispute between the United States and the EU over each

⁹ See the EU's table of "Summary information regarding State aid granted by Member States and communicated in accordance with Article 9(4) of the General Block exemption regulation (OJ L 214, 9.8.2008, p. 3) [or previously: Article 8(2) of the Block exemption regulation for regional aid (OJ L 302, 1.11.2006, p. 29)]".

https://ec.europa.eu/competition/state_aid/register/msf_2017.pdf
¹⁰ See <https://chemicals.nic.in/sites/default/files/FPP260613.pdf>

others' subsidies to their respective manufacturers of civilian aircraft took 14 years to resolve, and cost each side millions of dollars in legal fees.

To date, no countries have made recourse to WTO rules in an attempt to end another country's subsidization of plastics or to the raw materials from which they are made. Some use has been made of unilateral countervailing measures to protect domestic manufacturers from subsidized imports, but to a lesser extent than for steel and steel products. Of all the products targeted, polyethylene terephthalate (PET) and PET films seem to have received the most attention.

There have also been no subsidy challenges relating to crude oil or refined petroleum or natural gas products mounted at the WTO (Steenblik et al., 2018). Neither have there been any CVDs applied to imported petroleum or natural gas products. The reason for this is likely because of the different perspectives of small and medium-sized hydrocarbon producers and refiners on the one hand, and the large multinationals on the other. The latter in particular are unlikely to support action taken against subsidized imports because one of their subsidiaries may be a beneficiary of those subsidies, or they may be reluctant to be seen as opposing the governments in which they operate even if they do not. This matters since a countervailing measure is required to enjoy the support of the majority of the producers of the product in question¹¹, and multinational oil or gas companies usually account for more than 50% of that product.

Regarding synthetic polymers, on a few occasions between 1980 and 2015 countries have imposed CVDs on them (Table 6). At least as many countervailing investigations were initiated but ended up concluding that the effect of the subsidy was insignificant, or the targeted country reached an agreement with the complainant. Among the countries targeted by countervailing measures, India stands out, followed by China, other south Asian countries, and Middle Eastern countries. In all but one instance the target product was polyethylene terephthalate (PET). There has been at least one subsidy-related case adjudicated by the WTO. In 2014, Pakistan initiated a challenge to imposition of provisional and definitive countervailing measures by the European Union on imports of certain polyethylene terephthalate from Pakistan; the case was finally concluded in May 2018.¹² In general, though, anti-dumping duties and safeguard measures have been used comparatively more often against such products.¹³

Table 6. Countervailing duties imposed on primary plastic polymers or resins between 1980 and 2015¹

Country applying the CVD	Targeted exporting country(ies)	Targeted product	Year CVD first imposed
Brazil	India, South Africa	Polypropylene resin	2014
European Union	Iran, Pakistan, UAE	Certain polyethylene terephthalate (PET)	2010
European Union	Oman, Saudi Arabia	Certain polyethylene terephthalate (PET)	2011
United States	China, India	Certain polyethylene terephthalate (PET) resin	2015

¹¹ Article 11.4 of the SCM Agreement states that an application to determine whether the evidence is sufficient to justify the initiation of an CVD investigation "shall be considered to have been made 'by or on behalf of the domestic industry' if it is supported by those domestic producers whose collective output constitutes more than 50 per cent of the total production of the like product produced by that portion of the domestic industry expressing either support for or opposition to the application. However, no investigation shall be initiated when domestic producers expressly supporting the application account for less than 25 per cent of total production of the like product produced by the domestic industry."

¹² DS486: European Union — Countervailing Measures on Certain Polyethylene Terephthalate from Pakistan.

¹³ For example, in 2007 the European Union imposed a definitive anti-dumping duty on imports of polyethylene terephthalate (PET) originating in India; see Council Regulation (EC) No. 192/2007 of 22 February 2007. In the same year, Argentina consultations with Brazil over anti-dumping measures on imports of certain PET resins from Argentina (DS355); in January 2008 the measures were suspended so the case was dropped.

1. Countries covered: Argentina, Australia, Brazil, Canada, Chile, China, Costa Rica, Egypt, European Union, India, Japan, Mexico, Pakistan, Peru, South Africa, Turkey, United States, and Venezuela.

Source: Bown, Chad P. (2012) "Temporary Trade Barriers Database", available at <https://www.chadpbown.com/temporary-trade-barriers-database/>

Countervailing duties have been imposed on plastic products much more often than on primary plastics (Table 7). Articles made from PET, particularly films or bags, have often been targeted. Also often targeted have been polyester fibers. Firms exporting from south, south-east and eastern Asia have been most frequently subject to CVDs. As has been the case for primary plastic products, there have been many more CVD investigations that have been initiated but later dropped.

No subsidies to finished plastic products have been challenged at the WTO, though there have been several cases relating to anti-dumping measures. Recently, for example, Peru requested consultations with Brazil regarding certain measures that concern the importation to and commercialization in Brazil of biaxially-oriented PET film from Peru.¹⁴

Table 7. Countervailing duties imposed on semi-finished or finished plastic products, 1980- 2013¹

Country applying the CVD	Targeted exporting country(ies)	Targeted product	Year CVD first imposed
Brazil	India	Polyethylene terephthalate (PET) films	2008
European Union	Turkey	Polyester fibers and yarns	1991
European Union	Chinese Taipei	Certain woven glass fiber fabric(s)	1998 & 2000
European Union	India	Polyethylene terephthalate (PET) film	1999
European Union	Australia, Indonesia, Chinese Taipei	Synthetic polyester fibers	2000
European Union	India	Polyester textured filament yarn (PTY)	2002
European Union	India	Compact disks — recordable (CD-Rs)	2003
European Union	Malaysia, Thailand	Certain plastic sacks and bags	2006
European Union	China, India, Viet Nam	Polyester staple fibers	2013
Turkey	India	Polyethylene terephthalate (PET) films	2009
United States	Mexico	Yarns of polypropylene fibers	1983
United States	India	Polyethylene terephthalate (PET) film sheet and strip	2002
United States	Viet Nam	Polyethylene retail carrier bags	2010

1. Countries covered: Argentina, Australia, Brazil, Canada, Chile, China, Costa Rica, Egypt, European Union, India, Japan, Mexico, Pakistan, Peru, South Africa, Turkey, United States, and Venezuela.

Source: Bown, Chad P. (2012) "Temporary Trade Barriers Database", available at <https://www.chadpbown.com/temporary-trade-barriers-database/>

Could countries make more use of the WTO and unilateral measures to discipline subsidies to plastic? In theory, yes. But history does not instill confidence that it will happen, even with more attention focused on subsidies to plastics. The environmental, and to a lesser extent, adverse trade effects of subsidies to marine capture fisheries have not resulted in any uptick in either unilateral action against subsidized fish imports, nor cases brought to the WTO. Similarly, the commitments made by G20 and APEC members to phase out “inefficient fossil-fuel subsidies” have spawned no new trade measures against any country’s fossil fuels.

When the major cross-border harm caused by subsidies is as much environmental as trade-related – as is the case with subsidies to plastic production – existing disciplines are generally only partially effective. For one, environmental damage, even if one country’s products or pollution from producing those products, imposes tangible costs in another country or countries, those suffering the costs have

¹⁴ See https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds596_e.htm.

no standing. The concept of “adverse effects” applies only to effects on competition in the markets in which the subsidized product is sold. The environment may nonetheless benefit to the extent that trade-related disciplines deter the provision of subsidies, thus over-production of the good in question, or inputs to that product’s inputs.

The other side to this coin are production-related subsidies to environmentally preferable substitutes to plastics. A plastic derived from, say, biological feedstocks (e.g., vegetable oils), could be found to be benefitting from subsidies and challenged by producers of a chemically similar plastic derived from fossil-fuel feedstocks. If the bio-plastic had properties that differed substantially from those of the closest fossil-derived plastic (e.g., it was biodegradable), however, it could be immunized from disciplines brought by producers of those fossil-derived plastics if it was sufficiently unlike those conventional plastics. Nonetheless, those production-related subsidies could still be challenged by other producers of the bio-plastic.

Subsidies to research and development fall into more of a gray area. Article 8 of the SCM Agreement deemed certain kinds of subsidies as non-actionable, if they met objective criteria and were pre-notified. One category of non-actionable subsidy was assistance for research activities conducted by firms (or by higher education or research establishments on a contract basis with firms) if: the assistance covered not more than 75% of the costs of industrial research or 50% of the costs of pre-competitive development activity. Article 8 was never invoked by a WTO member in order to shield any subsidy from a possible challenge, and the Article was allowed to lapse at the end of 1999. Practically speaking, this expiration has had little impact, as government support for research or development that has benefitted particular industries has in practice rarely been challenged at the WTO. It was an issue in the long-running aircraft subsidy disputes, but only because the amount of support was large and contributed to a significant part of the total cost of bringing new civilian aircraft to market.

5.2. The challenge of creating new binding subsidy disciplines targeted at plastics

What, then, of the possibility of negotiating some kind of new Agreement on Plastics Subsidies, at the WTO or elsewhere? There are several subsidy negotiations that have taken place at the WTO or OECD over the last 35 years – some of which ended in formal agreements, many of which have not (yet) led to such an outcome – from which lessons can be drawn. The motivations for launching the earlier negotiations – related to farming (1986-94), shipbuilding (1990-94 and 2002-2005), and iron and steel production (early 1990s and early 2000s) – were essentially to reduce trade distortions and to end costly subsidy competition among countries. Avoiding trade conflicts and ensuring fair competition were also the main goals behind the world’s first sector-specific international agreement limiting subsidies, the 1951 Paris Treaty, which created the European Coal and Steel Community (CVCE, 2015).

The attempt to develop more targeted and effective disciplines on subsidies to marine capture fishing, which began at the WTO in 2002 and is still on-going, is the notable exception: it is the first one that was inspired also by the environmental damage exacerbated by the subsidies, both to the fish stocks themselves but also to the broader marine environment.

More recently, attempts have been made to begin exploring how subsidies to fossil fuels could be addressed using trade policy. Subsidies to fossil fuels certainly contribute to trade frictions, but they are condemned most forcefully for their contribution to greenhouse-gas emissions. Formal subsidy disciplines would strengthen the non-binding commitments that have already been made by G20 and APEC leaders (in 2009) “to rationalize and phase out over the medium term fossil fuel subsidies that encourage wasteful consumption”, by G7 leaders specifically by the end of 2025, and by UN members in the context of agreeing to the Sustainable Development Goals (SDGs), specifically SDG 12.c, which are supposed to be met by 2030. Given the close relationship between plastics and fossil

fuels, any action to discipline subsidies benefitting fossil fuels could have direct relevance to the geographic pattern and level of plastics production.

The history of the international community successfully concluding binding sector-specific agreements to discipline subsidies has been mixed. In this area, the tension between the value of applying consistent rules to all economic activities in a non-discriminatory way, and the need to accommodate or address the particularities of individual industries, has been well described by Pagani (2008: 26) in reference to the OECD negotiations on shipbuilding and steel subsidies:

WTO rules not only present shortcomings in providing strict subsidy control, but they are also general, in the sense that they apply indiscriminately to all industrial goods and they do not take into account the specificities of the various industrial sectors. This leads to a particularly ineffective discipline for certain types of industries, such as those which operate on a world-wide market, are labour-intensive and cyclical and are therefore traditional recipients of government aid.

Below are short summaries of the main subsidy initiatives negotiated to date.

- *Agricultural products*: The Uruguay Round of multilateral trade negotiations (1986-1994) created the first sector-specific subsidy agreement at the WTO, the Agreement on Agriculture. It is still in force.
- *Large ships*: A plurilateral Shipbuilding Subsidy Agreement was negotiated at the OECD, concluded and signed by seven OECD and WTO members¹⁵, also in 1994; but it was never ratified by the U.S. Senate, so never went into force.
- *Steel*: In February 2002, the High Level Group of the OECD's Steel Committee created a Disciplines Study Group to develop "options for strengthening of disciplines on government interventions and other market distortions in steel", which would have also included disciplines on subsidies. In addition to the OECD member countries, other participants included Argentina, Brazil, China, India, and Russia. However, in September 2005 the talks reached an impasse and were suspended (Pagani, 2008: 20).
- *Fish*: The WTO's Doha Round of multilateral trade negotiations (also launched in 2002) included language calling on its members to clarify or create new negotiations relating to fish subsidies. That agreement is still being negotiated, with hopes it will be concluded by the end of 2020.
- *Fossil fuels*: At the WTO's Eleventh Ministerial Conference (MC11) in Buenos Aires (December 2017), twelve WTO members¹⁶ called on the organization to begin work on fossil fuel subsidies with the ultimate aim of starting negotiations on an agreement to strengthen disciplines on fossil fuels (WTO, 2017). To date, that proposal has not resulted in any new negotiations.

Separately, on 25 September 2019, four of the WTO signatories to the aforementioned 2017 Ministerial Declaration – Costa Rica, Iceland, New Zealand, and Norway – plus Fiji, announced the commencement of negotiations to forge an Agreement on Climate Change, Trade and Sustainability (ACCTS). Switzerland joined the negotiations early in 2020. The ACCTS aims to address climate change through several trade-related measures, one of which is to phase out fossil fuel subsidies. This part of the negotiation, which started in 2020, once concluded will only apply to its six original parties. The Agreement would then be opened up to other countries to join.

¹⁵ European Community, Finland, Japan, Republic of Korea, Norway, Sweden, and the United States of America. At the time, Finland and Sweden were not yet members of the European Community.

¹⁶ Chile; Costa Rica; Iceland; Liechtenstein; Mexico; the Republic of Moldova; New Zealand; Norway; Samoa; Switzerland; the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu; and Uruguay.

One distinguishing feature of the ACCTS negotiations, for which it is too early to know whether they will conclude successfully, is that – in contrast with all the other multilateral and plurilateral subsidy negotiations – it is starting with countries with economies far smaller than those that have typically dominated the negotiations over other types of subsidies. This approach mirrors to some extent the way that the Trans-Pacific Partnership (TPP) regional trade agreement developed. From an agreement initially between two small economies, New Zealand and Singapore, it expanded first to eight and then eventually twelve, including much larger economies, such as Canada, Japan, Korea and the United States.

Ignoring for the purpose of this paper political-economy challenges to developing new disciplines to constrain the use of subsidies to plastics (including special and differential treatment for developing countries), the range in the architecture that such disciplines can be structured varies widely between outright prohibition and phased elimination, and between no tolerance for any subsidies and the allowance for some.

The model provided by the WTO Agreement on Agriculture is the most data-driven one. WTO members subject to the agreement had to phase out export subsidies for agricultural products, and reduce their most trade-distorting subsidies by agreed percentages over a 10-year period. Yet other forms of government support, deemed non-trade-distorting, were allowed to be provided without limit. However, for that approach to work, extensive data had to be available to establish the base subsidy level for each member's industry, and the members had to be willing, and have the capacity, to report progress to reducing their subsidies.

At the other extreme was the 1951 Paris Treaty, which created the European Coal and Steel Community (CVCE, 2015). Article 4(c) of that treaty simply prohibits all “subsidies or state assistance, or special charges imposed by the state, in any form whatsoever”. That prohibition did not last for long, however, for as soon as the industry faced a crisis, eight years later, derogations to the agreement were made, and subsidies to the EU's coal industry persisted until those tied to current production ended at the close of 2018 (Steenblik and Mateo, 2020).

Most other subsidy agreements have followed an approach analogous to the SCM Agreement itself, mainly identifying more precisely which subsidies that under the SCM Agreement would be actionable but would be prohibited under the sectoral agreement.

The OECD's “New Shipbuilding Agreement – Consolidated Text” (September 2005), which was supposed to have replaced the earlier ill-fated “Agreement Respecting Normal Competitive Conditions in the Commercial Shipbuilding and Repair Industry (21 December 1994)” but was abandoned in 2010, would have divided subsidies into prohibited, actionable, and non-actionable subsidies. The prohibited category was extensive and incidence-dependent, and would have included subsidies for the production of ships, subsidies for the continued operation of shipbuilding (including those to cover operating losses, as well as for debt repayment or restructuring), and subsidies for investment, “including those for the creation of new shipyards, those for investment in existing shipyards, and those for the establishment, expansion or addition of production facilities or capacity” (Pagani, 2008: 366-367).¹⁷ It would have also prohibited subsidies for the “modernization, ... conversion or technological upgrading of facilities, equipment or machinery, including those with the objective of reducing costs, improving productivity or product quality or meeting environmental standards.” The category of actionable subsidies, by contrast, depended on an effects-test, specifically whether the subsidy caused adverse effects to the interests of another party or parties, or caused them “serious prejudice”, such as through significant price undercutting.

Regarding steel subsidies, the last draft text of “Elements of an Agreement to Reduce or Eliminate Trade-Distorting Subsidies in Steel”, of 12 May 2004, would have prohibited “any subsidy, within the

¹⁷ Note: Much of this language was left between square brackets, indicating that it was merely proposed and was disputed or at least not fully endorsed by one or more of the negotiating parties.

meaning of paragraph 1 of the ASCM, which is specific within the meaning of Article 2 of that Agreement” to the extent that it benefitted, directly or indirectly, steel products, the manufacture of steel products, or a manufacturer of steel products (Pagani, 2008: 185). “As a working hypothesis”, exceptions to these prohibitions would have been allowed for subsidies assisting the permanent closure of facilities (in whole or in part), to indemnify damage caused by a natural disaster, and a portion of the costs of research and development. The text also spelled out special provisions for subsidies provided for environmental purposes, training, the recruitment of disadvantaged or disabled workers, small and medium-sized enterprises, disadvantaged regions, and possible preferential treatment for developing economies and economies in transition.

What distinguishes the approach likely to emerge from the current WTO negotiations on subsidies to marine capture fishing is the degree to which prohibited subsidies would be contingent on the state of the fisheries resource, and the areas in which the fishing takes place. Such determinations, moreover, would not be made by the WTO but by other institutions. The final text of the WTO agreement on fisheries subsidies was still being hammered out at the time of this writing, but as of July 2020 its basic approach was known enough to be described as follows (Tipping and Irschlinger, 2020: 8, 11, and 16):

- Subsidies would be prohibited when a fish stock is overfished and that stock is either not recovering or there has been a continuous reduction in the stock, unless measures are in place to ensure the stock’s recovery, implicitly limiting the prohibition to overfished stocks that are getting worse.
- Subsidies that contribute to overcapacity and overfishing would be prohibited under several circumstances: (1) subsidies for operational and capital costs if the rate of fishing or the capacity of the fleet exceeds sustainable levels as determined by the coastal state or regional fisheries management organization (RFMO), using maximum sustainable yield (MSY) or alternative reference points; (2) subsidies “contingent or tied to” fishing in all ABNJ; all subsidies supporting fishing on the high seas in areas outside the competence of an RFMO; subsidies to reflagged vessels.
- Any subsidies determined to be benefitting vessels or their operators engaged in illegal, unreported (IUU) fishing would be prohibited.

It is still too early to speculate about the shape of any future agreement that addresses fossil-fuel subsidies. Whatever its approach, it would presumably address one important, perhaps the *most* important, subsidy benefitting virgin plastic production: artificially cheap raw materials. Any attempt to phase out subsidies to plastic manufacturing could then focus on the downstream segments of the value chain.

All of the aforementioned sectoral agreements, whether in force, suspended, or still in negotiation, include, would have included requirements, or anticipate the notification of relevant subsidies and supporting data to the WTO or, in the case of the abandoned shipbuilding and steel subsidy agreements, to the OECD. However, only the Agreement on Agriculture, and the ongoing fishery subsidy and fossil-fuel subsidy negotiations had detailed and internationally comparable inventories of subsidy information already available (thanks to ongoing work by staff of the OECD) on government support at the start of the negotiations. Some information on subsidies to shipbuilding and steel manufacturing existed prior to the start of those agreements’ negotiations, but that information was neither as systematic nor complete, and had depended – and still depends – on voluntary reporting by governments. Tellingly, one outcome of the abandonment of the second attempt to craft a new shipbuilding subsidies agreement was to strengthen and increase the frequency of the OECD’s “Inventory of Government Subsidies and Other Support Measures” to shipbuilding (OECD, 2016a), which is essentially a survey. By contrast, the OECD staff servicing the Working Party on Shipbuilding (WP6), which oversees the work, has on at least one occasion compiled support measures taken by economies not participating in the WP6 Inventory – namely, Brazil, China, India,

Indonesia, Malaysia, Singapore, Spain, the United States of America, and Viet Nam – on the basis of “public and specialized sources” rather than country responses to surveys (OECD, 2016b).

There are many reasons for the differences in outcomes across these various attempts to limit sector-specific subsidies. Some of these relate to the number and subsidizing practice of the main countries that would be limited by the agreements, and by the force of broader economic and geo-political currents. The Agreement on Agriculture was regarded by much of the GATT membership at the time as a *sine qua non* to making any further progress on other trade issues. Most of the other agreements have not enjoyed that status.

But another necessary condition has been the existence of detailed data on the nature and size of the subsidies to producers in the sector. As explained by Steenblik (2020), such data were already available when negotiations commenced in all the subsidy negotiations that eventually proceeded to an agreement. Moreover, none of those negotiations depended on data gleaned from formal member-country subsidy negotiations to the WTO. Rather, for a large part, those data had been collected by the OECD.

In short, while the prior existence of a detailed inventory of support measures produced by an independent but trusted source has not always ensured the commencement of serious international discussions to control subsidies to a particular sector, it certainly seems to have increased the likelihood of a successful outcome.

6. Conclusions and suggestions for further work

The foregoing survey provides a first impression of the role that subsidies play, or may play, in lowering the cost of producing primary plastics and finished plastic products. What it suggests is that there is a strong probability that at least some plastics production is benefitting from subsidized inputs, particularly olefins derived from petroleum or natural gas. It seems likely also that some, if not many, plants for producing primary plastics have benefitted from various investment-related subsidies.

At this point, however, it is not possible to cite an estimate of the value of subsidies flowing to particular products. Based on an initial review of countervailing-duty investigations that have been initiated over the last 20 years in response to alleged subsidization of primary plastics or products made of plastics, likely beneficiaries of subsidies include polyethylene terephthalate (PET) resins and films, and perhaps polypropylene resin and polyester fibers.

Certainly, more research would yield a clearer picture. But before advocating that kind of effort, one must answer the question, “To what purpose?”. There would be, of course, a value to industrial economists, trade economists and researchers seeking to better understand the environmental consequences of subsidies to having detailed and internationally comparable information on subsidies to plastics. For the purpose of developing better policies, however, the amount and type of information needed would depend on the most likely approach taken towards subsidy reform.

An approach that seeks to restrict subsidies on the basis of their design can benefit from quantifying the scale of the subsidies, but rough estimates would be acceptable. What would be needed more than anything else is information on design characteristics: how, to whom and to what are the subsidies given. An internationally co-ordinated approach in which each country reduced subsidies by an agreed percentage over a designated period, by contrast, would have to meet higher standards of accuracy, replicability, and comparability for the data.

A research agenda that sought to provide data that met the lower standard but could be built on later to achieve the more stringent one is probably the most pragmatic approach. That would mean, as a first step, focusing on the main (e.g., top 20) producing countries and producing companies (e.g., the top 15) of primary plastics and perusing all publicly available sources of information on measures that

support plastic production, identifying the segment(s) of the value chain that is (are) benefitting from the measure(s), and documenting whatever information is provided on the value of the subsidy. Such value information is unlikely to be comparable across countries in its raw form, for many reasons: it may refer to the gross value of loan guarantees, rather than their subsidy-equivalent value; or cover more beneficiaries than just the plastics industry; or cover several years. Processing these data to yield comparable estimates can be left to a second phase of the work.

Building an inventory of support measures benefitting primary plastics production would be no small task. Although international databases on subsidies to fossil fuels are available in English, as well as the annual financial reports of countries, the budgetary and tax-expenditure documents¹⁸ of most countries for which English is not an official language are not. To review these documents accurately thus would require a team of researchers who are able to read documents in Arabic, Bahasa Indonesia, Japanese, Korean, Mandarin Chinese, Portuguese, and Russian, at a minimum. Fortunately, many of the same investigators who have undertaken this type of work in support of the fossil-fuel-subsidy databases of the OECD and for the Energy Policy Tracker¹⁹, for example, could be engaged to undertake similar work on measures supporting plastics.

Reducing government support to the plastics industry will likely require a co-ordinated, multi-institutional effort, one that starts with ending support provided by international financial institutions for new investments in new or expanded production facilities. Countries could also pledge, perhaps at first in a non-binding way, to cease providing financing and subsidies to such facilities. Negotiations towards developing more formal, sectoral agreement that is binding could then be pursued at the WTO or, failing that, an inter-governmental organization such as the OECD (which has had some experience – not always successful – at crafting plurilateral sectoral subsidy agreements itself). Whatever approach is taken, the most difficult to address forms of support will be any that are provided on a continuous basis (e.g., via subsidized prices for feedstocks), support provided by sub-national entities, and support provided by state-owned enterprises.

¹⁸ One database that could be drawn upon soon is the Global Tax Expenditure Database (GTED) – a joint project of the German Development Institute and the Council on Economic Policies – which is expected to become publicly available in March 2021.

¹⁹ The core group supporting the Energy Policy Tracker includes staff of the Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development, plus numerous others. See <https://www.energypolicytracker.org/about/>.

References

- Akah, Aaron and Musaed Al-Ghrami (2015), “Maximizing propylene production via FCC technology”, *Applied Petrochemical Research* 5, pp. 377–392. <https://doi.org/10.1007/s13203-015-0104-3>
- APEC (2017), *Peer Review on Fossil Fuel Subsidy Reforms in Chinese Taipei*, Final Report, APEC Energy Working Group, March 2017.
- APICORP (2019), Annual Report 2018: Transitioning for a New Energy Landscape, Dammam, Saudi Arabia: Arab Petroleum Investments Corporation.
- BASF (2020), *BASF Report 2019: Economic, environmental and social performance*, Ludwigshafen, Germany: Badische Anilin und Soda Fabrik.
- Beckman, Eric (2018, August 13), “The world’s plastic problem in numbers”, World Economic Forum, <https://www.weforum.org/agenda/2018/08/the-world-of-plastics-in-numbers>.
- Cross, R.J., Linus Lu and Andre Delattre (2019, December), *Following the Money 2019: How states rate in providing online access to government economic development subsidy spending*, Washington, D.C.: U.S. PIRG Education Fund.
- CVCE (2015), “Treaty establishing the European Coal and Steel Community (Paris, 18 April 1951)”, Luxembourg: Centre virtuel de la connaissance sur l'Europe, available at http://www.cvce.eu/obj/treaty_establishing_the_european_coal_and_steel_community_paris_18_april_1951-en-11a21305-941e-49d7-a171-ed5be548cd58.html
- Elaraby, Marwan, Sultan Almasoud, Sanjarbek Abdukhalilov, Iain Elder, Brendan Hundt and Matthew Powell (2016, December 2), “Saudi Arabia: an overview of the industrial sector in the Kingdom of Saudi Arabia and the National Industrial Cluster Development Program”, available at <https://www.mondaq.com/saudiarabia/industry-updates-analysis/549678/an-overview-of-the-industrial-sector-in-the-kingdom-of-saudi-arabia-and-the-national-industrial-cluster-development-program>.
- Euromap (2016, October), *Plastics Resin Production and Consumption in 63 Countries Worldwide: 2009 – 2020*, Frankfurt am Main: EUROMAP General Secretariat. <https://www.pagder.org/images/files/euromappreview.pdf>
- European Commission (2020, June 17), “White Paper on levelling the playing field as regards foreign subsidies”, COM(2020) 253 final, Brussels: European Commission, available at https://ec.europa.eu/competition/international/overview/foreign_subsidies_white_paper.pdf.
- Farhaanjam, Mahsa and Abdolhossein Shiravi (2018, December), “Energy dual pricing in Iran and its impact on accession to the World Trade Organization”, *Petroleum Business Review* 2(4), pp. 13-25.
- Freinkel, Susan (2011), *Plastic: A Toxic Love Story*, Boston: Houghton Mifflin.
- Gallo, Frederic, Cristina Fossi, Roland Weber, David Santillo, Joao Sousa, Imogen Ingram, Angel Nadal and Dolores Romano (2018), “Marine litter plastics and microplastics and their toxic chemicals components: the need for urgent preventive measures”, *Environmental Sciences Europe* 30(13). <https://doi.org/10.1186/s12302-018-0139-z>
- Geyer, Roland, Jenna R. Jambeck and Kara Lavender Law (2017, July 19), “Production, use, and fate of all plastics ever made”, *Science Advances*, 3(7), DOI: 10.1126/sciadv.1700782.

- Greentumble (2018, May 1), “How are plastic bags made? Step-by-step plastic bag production process”, <https://greentumble.com/how-are-plastic-bags-made/>
- GTAI (2018, March), *Industry Overview – The Plastics Industry in Germany*, Issue 2018/2019, Germany Trade and Invest.
- Lucas, Deborah (2012), “Valuation of government policies and projects”, *Annual Review of Financial Economics* 4, pp. 39–58.
- LyondellBasell (2020), *Annual Report 2019*, North Canton, Ohio: LyondellBasell.
- McConnaughey, Janet (2018, April 25), “State, local governments offer \$1.5 billion in tax breaks for \$9.4 billion Formosa chemical plant”, *The Advocate*, https://www.theadvocate.com/baton_rouge/news/business/article_83304bcc-4889-11e8-82bb-eff0173a01a7.html
- Marinelli, David (2018, November 4), “The lies about plastic”, <https://www.davidmarinelli.net/blog/the-lies-about-plastic/>
- Meikle, Jeffrey (1997), *American Plastic: A Cultural History*, New Brunswick, NJ: Rutgers University Press.
- Mirasol, Feliza (2010, August 15), “US chemical profile: Propylene”, Houston: Independent Commodity Intelligence Services (I.C.I.S.), <https://www.icis.com/explore/resources/news/2010/08/16/9384812/us-chemical-profile-propylene/>
- MJS Packaging (2014, May 11), *The Complete Guide To Plastic Resins*, <https://www.mjspackaging.com/blog/the-complete-guide-to-plastic-resins/>
- OECD (2016a, May 6), “Inventory of Government Subsidies and Other Support Measures: May 2016”, Document No. C/WP6(2016)3, Paris: Organisation for Economic Co-operation and Development, [https://one.oecd.org/document/C/WP6\(2016\)3/en/pdf](https://one.oecd.org/document/C/WP6(2016)3/en/pdf)
- OECD (2016b, May 6), “Support measures of selected countries not participating in the WP6 Inventory”, Document No. C/WP6(2016)4, Paris: Organisation for Economic Co-operation and Development, [https://one.oecd.org/document/C/WP6\(2016\)4/en/pdf](https://one.oecd.org/document/C/WP6(2016)4/en/pdf).
- OECD (2019), “Measuring distortions in international markets: the aluminium value chain”, *OECD Trade Policy Papers*, No. 218, OECD Publishing, Paris, <https://doi.org/10.1787/c82911ab-en>.
- Pagani, Fabrizio (2008), *The OECD Steel and Shipbuilding Subsidy Negotiations: Text and Legal Analysis*, London: Cameron May.
- Ritchie, Hannah (2018), “FAQs on plastics”, published online at OurWorldInData.org. Retrieved from <https://ourworldindata.org/faq-on-plastics> on 1 November 2020.
- Ritchie, Hannah and Max Roser (2018), “Plastic Pollution”, published online at OurWorldInData.org. Retrieved from <https://ourworldindata.org/plastic-pollution> on 1 November 2020.
- Royte, Elizabeth (2019), “Is burning plastic waste a good idea?”, *National Geographic*, <https://www.nationalgeographic.com/environment/article/should-we-burn-plastic-waste>

- Alarabiya News (2015, January 12), “Saudi Arabia aims to be among top 10 global plastics exporters”, Jeddah <https://english.alarabiya.net/en/business/economy/2015/01/12/Saudi-Arabia-aims-to-be-among-top-10-global-plastics-exporters>
- Steenblik, Ronald (2020, forthcoming), “Negotiations to discipline fossil-fuel subsidies and the neglected role of data”, *IISD Trade and Sustainability Review*1(1), Winnipeg: International Institute for Sustainable Development, pp. 34-41.
- Steenblik, Ronald and Mark Mateo (2020), “Western Europe’s long retreat from coal and implications for energy trade”, *World Trade Review* 19, s98–s119, doi:10.1017/S1474745620000269.
- Steenblik, Ronald, Jehan Sauvage and Christina Timiliotis (2018), “Fossil fuel subsidies and the global trade regime”, in J. Skovgaard & H. Van Asselt (eds.), *The Politics of Fossil Fuel Subsidies and their Reform* (pp. 121-139), Cambridge: Cambridge University Press. doi:10.1017/9781108241946.009
- Taylor, Matthew (2017, December 26), “\$180bn investment in plastic factories feeds global packaging binge”, *The Guardian*, <https://www.theguardian.com/environment/2017/dec/26/180bn-investment-in-plastic-factories-feeds-global-packaging-binge>
- Tipping, Alice and Tristan Irschlinger (2020, July), *WTO Negotiations on Fisheries Subsidies: What’s the state of play?*, Winnipeg, Manitoba: The International Institute for Sustainable Development.
- Wilk, Barbara K., Sylwia Fudala-Ksiazek, Małgorzata Szopińska and Aneta Luczkiewicz (2019), “Landfill leachates and wastewater of maritime origin as possible sources of endocrine disruptors in municipal wastewater”, *Environmental Science and Pollution Research*, 26, pp. 25690–25701.
- WTO (2017, December), “Fossil Fuel Subsidies Reform Ministerial Statement”, Doc. No. WT/MIN(17)/54 of 12 December 2017, Geneva: World Trade Organization. <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/MIN17/54.pdf&Open=True>

Annex 1: EU definition of a “foreign subsidy”

The following is a quote from Annex 1 of European Commission (2020, June 17), “White Paper on levelling the playing field as regards foreign subsidies”, COM(2020) 253 final:

“For the purposes of this White Paper, a “foreign subsidy” refers to a financial contribution by a government or any public body of a non-EU State,²⁰ which confers a benefit to a recipient,²¹ and which is limited, in law or in fact, to an individual undertaking or industry or to a group of undertakings or industries.

“Foreign subsidies would fall under any new legal instrument only insofar as they directly or indirectly cause distortions within the internal market. Thus, the current definition covers (i) foreign subsidies granted directly to undertakings established in the EU; (ii) foreign subsidies granted to an undertaking established in a third country where such subsidy is used by a related party established in the EU; and (iii) foreign subsidies granted to an undertaking established in a third country where such a subsidy is used to facilitate an acquisition of an EU undertaking or participate in public procurement procedures.

“The financial contribution can take various forms. For example, it can consist in

- the transfer of funds or liabilities (capital injections, grants, loans, loan guarantees, fiscal incentives, setting off of operating losses, compensation for financial burdens imposed by public authorities, debt forgiveness or rescheduling);
- foregone or not collected public revenue, such as preferential tax treatment or fiscal incentives such as tax credits;
- the provision of goods or services or the purchase of goods and services.”

²⁰ According to this definition, a private body entrusted with functions normally vested in the government or directed by the non-EU government can also grant a “foreign subsidy”.

²¹ The recipient may be an undertaking established in the EU or in a third country.

Annex 2: List of international financial institutions (IFIs)²²

The most influential IFIs are multilateral development banks (MDBs). These are institutions created by a group of countries that provide financing and professional advice. MDBs typically have large memberships and include both developed donor and developing borrower countries. MDBs finance projects via long-term loans at market rates, very-long-term loans (also known as credits) at below market rates, and grants. Some, like the Arab Petroleum Investments Corporation, also provide equity investment. The leading MDBs are generally considered to be (in alphabetical order):

- African Development Bank (AfDB)
- Arab Petroleum Investments Corporation (APICORP)
- Asian Development Bank (ADB)
- Asian Infrastructure Investment Bank (AIIB)
- CAF - Development Bank of Latin America
- Eastern and Southern African Trade and Development Bank (TDB)
- European Investment Bank (EIB)
- European Bank for Reconstruction and Development (EBRD)
- Inter-American Development Bank Group (IDB, IADB)
- Islamic Development Bank (IsDB)
- New Development Bank (NDB)
- World Bank

There are also several “sub-regional” MDBs whose membership typically includes only borrowing nations. The banks lend to their members, borrowing from the international capital markets. Because there is effectively shared responsibility for repayment, the banks can often borrow more cheaply than could any one member nation. These banks include:

- Black Sea Trade and Development Bank (BSTDB)
- Caribbean Development Bank (CDB)
- Central American Bank for Economic Integration (CABEI)
- Economic Cooperation Organization Trade and Development Bank (ETDB)
- Eurasian Development Bank (EDB)
- East African Development Bank (EADB)
- West African Development Bank (BOAD)

Multilateral financial institutions (MFIs) are similar to MDBs but they are typically treated as distinct entities because of their more limited memberships, and because they often focus on financing certain types of projects.

- Arab Bank for Economic Development in Africa (BADEA)
- European Commission (EC)
- International Bank for Economic Co-operation (IBEC)
- International Investment Bank (IIB)
- International Finance Facility for Immunisation (IFFIm)
- International Fund for Agricultural Development (IFAD)
- Nederlandse Financieringsmaatschappij voor Ontwikkelingslanden NV (FMO)
- Nordic Investment Bank (NIB)
- OPEC Fund for International Development (OFID)

²² Source: https://en.wikipedia.org/wiki/International_financial_institutions

Annex 3: Plastics subsidies from international financial institutions

Table. Illustrative examples of the face value of loans and loan guarantees provided by a selection of international financial institutions to petrochemical projects in 2018-2020

Face value (USD millions)	Fiscal Year	Mechanism[1]	Financial institution	Institution Type	Beneficiary	Purpose of financing	Facility location
35	2020	Loan	International Finance Corporation	Multilateral	Indorama Eleme Fertilizer & Chemicals Ltd.	Construct a feed conditioning unit ("FCU"), an add-on gas processing facility, which will help increase polymer production.	Nigeria
88.1	2019	Loan	National Westminster Bank	ECA	Currenta	Acquire a 100% stake interest in Currenta, which manages and operates three chemical sites in Germany.	Germany
188	2019	Loan	Export Development Canada	ECA	Canada Kuwait Petrochemical Limited Partnership	Procurement of various Canadian goods or services	Kuwait
185.4	2019	Loan	Export Development Canada	ECA	Alpek, S.A.B. de C.V.	Procurement of various Canadian goods or services. Alpek SAB de CV is one of the largest PET and PTA producers in the Americas and the sole producer of polypropylene and caprolactam in Mexico.	Mexico
9.8	2019	LG	UK Export Finance	ECA	Oman Methanol Company LLC	Production of methanol. Note: The financing is in the form of "Buyer Credit" (BC): BC is a finance facility in which, normally, a guarantee is given by UKEF to lenders supplying finance to an overseas borrower buying UK goods or services.	Oman
35	2019	Loan	International Finance Corp.	ML	Polymer & Chemicals Limited ("EPCL")	Phase 3 of the Engro Polymer plant, the only fully integrated chlor-vinyl chemical complex in Pakistan. It is involved in manufacturing, marketing and distribution of poly-vinyl chloride (PVC) and chlor-vinyl allied products, including vinyl chloride monomer. NOTE: Vinyl chloride monomer is among the top twenty largest petrochemicals produced in the world.	Pakistan
432	2019	Loan	Japan Bank for International Co-operation	ECA	Japan Saudi Arabia Methanol Company, Inc. (JSMC)	Joint venture project producing methanol.	Saudi Arabia
76.1	2019	Loan	Export Development Canada	ECA	Methanex Corporation	Construction of a third production line connected to the existing Geismar 1 and Geismar 2 plants on mixed greenfield and brownfield land, owned by Methanex. Methanex Corporation is a Canadian company that supplies, distributes and markets methanol worldwide	USA (Louisiana)

Face value (USD millions)	Fiscal Year	Mech- anism[1]	Financial institution	Institution Type	Beneficiary	Purpose of financing	Facility location
103	2018	Loan	Japan Bank for International Co-operation	ECA	PT. Chandra Asri Petrochemical (CAP) Tbk	Establish a manufacturing plant for high-density polyethylene (HDPE), linear low-density polyethylene (LLDPE), and metallocene linear low-density polyethylene (mLLDPE) inside its petrochemical complex in Cilegon, located in the western part of the island of Java.	Indonesia
68.8	2018	LG	Nippon Export and Investment Insurance	ECA	PT. Chandra Asri Petrochemical (CAP) Tbk	To build a new polyethylene plant with capacity of 400 KTA in Cilegon, West Java, bringing CAP's total polyethylene production capacity to 736 KTA.	Indonesia
350	2018	Loan	Bank of China	Bilateral	Refinery and Petro- chemical Integrated Development (RAPID) Bridge Financing	Development of a plant to produce specialized chemicals such as synthetic rubbers and high-grade polymers for export to the rest of Asia.	Malaysia
350	2018	Loan	Industrial and Commercial Bank of China	Bilateral	Refinery and Petro- chemical Integrated Development (RAPID) Bridge Financing	Development of a plant to produce specialized chemicals such as synthetic rubbers and high-grade polymers for export to the rest of Asia.	Malaysia
75.1	2018	Loan	Export Develop-ment Canada	ECA	SKI Carbon Black (Mauritius) Limited	Procurement of various Canadian goods or services. Carbon black is an important additive used in plastics.	Mauritius
76.6	2018	Loan	Export Develop-ment Canada	ECA	Alpek, S.A.B. de C.V.	Support for working capital and general corporate purposes. Alpek SAB de CV is one of the largest PET and PTA producers in the Americas and the sole producer of polypropylene and caprolactam in Mexico.	Mexico
76.6	2018	Loan	Export Develop-ment Canada	ECA	Alpek, S.A.B. de C.V.	Procurement of various Canadian goods or services. Alpek SAB de CV is one of the largest PET and PTA producers in the Americas and the sole producer of polypropylene and caprolactam in Mexico.	Mexico
35	2018	Loan	German Investment & Development Corp.	Bilateral	Eleme Petrochemicals Plant Expansion	Development and construction of a urea complex at Port Harcourt, Nigeria. Once completed, the complex (which adjoined the existing 1.4million TPA urea complex) will be the largest integrated urea production facility in the world. Urea is used as a fertilizer, but also as a feedstock for plastic.	Nigeria
35	2018	Loan	Proparco	ECA	Eleme Petrochemicals Plant Expansion	Development and construction of a urea complex at Port Harcourt, Nigeria.	Nigeria
100	2018	Loan	CDC Group Plc	ECA	Indorama Eleme Petrochemicals Plant Expansion	Development and construction of a urea complex at Port Harcourt, Nigeria.	Nigeria
125	2018	Loan	European Investment Bank	Multilateral	Nigeria Fertilizers; Eleme Petrochemicals	Development and construction of a urea complex at Port Harcourt, Nigeria.	Nigeria

Face value (USD millions)	Fiscal Year	Mech- anism[1]	Financial institution	Institution Type	Beneficiary	Purpose of financing	Facility location
70.7	2018	Loan	African Development Bank	Multilateral	Indorama Eleme Fertilizer Project II	Development and construction of a urea complex at Port Harcourt, Nigeria.	Nigeria
120	2018	Loan	International Finance Corporation	Multilateral	Eleme Fertilizer II (Petrochemicals Plant Expansion)	Development and construction of a urea complex at Port Harcourt, Nigeria.	Nigeria
120	2018	Loan	International Finance Corporation	Multilateral	Eleme Fertilizer II (Petrochemicals Plant Expansion)	Development and construction of a urea complex at Port Harcourt, Nigeria.	Nigeria
300	2018	Loan	New Development Bank	Multilateral	Sustainable Infra- structure in Relation to “ZapSibNefteKhim” Project (SIBUR)	General infrastructure and environmental-protection measures. Once fully operational the complex would cover Russia’s demand for most polyolefins and increase export capacity of Russia’s petrochemicals sector.	Russian Federation
63.3	2018	Loan	National Commercial Bank	Bilateral	FPC Yanbu Petrochemical Complex	FPC Yanbu Petrochemical Complex in Saudi Arabia.	Saudi Arabia
319.9	2018	Loan	Saudi Industrial Development Fund	Bilateral	FPC Yanbu Petrochemical Complex	FPC Yanbu Petrochemical Complex in Saudi Arabia.	Saudi Arabia

1. LG = loan guarantee. 2. ECA = export-credit agency. *Note:* The table makes no claim of being exhaustive.

Source: Steenblik, R. (2020), Annex 1. Data extracted from Oil Change International’s “Shift the Subsidies Database”, <http://priceofoil.org/shift-the-subsidies/> (version as of 13 November 2020), included over 146 petrochemical projects since 2013, a selection of which are noted here for illustrative purposes.

¹ Goods Jobs First Subsidy Tracker: Discover Where Corporations are Getting Taxpayer Assistance Across the United States.
<https://www.goodjobsfirst.org/subsidy-tracker>