REPORT

NEW CLIMATE INSTITUTE

REGIONAL PRIORITIES FOR TACKLING PLASTIC LIFECYCLE IMPACTS

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REGIONAL PRIORITIES FOR TACKLING PLASTIC LIFECYCLE IMPACT

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ABBREVIATIONS

CCS	Carbon capture and storage
CCU	Carbon capture and utilisation
CCUS	Carbon capture utilisation and storage
CO_2eq	Carbon dioxide equivalent
EPA	Environmental protection agency
EU	European Union
FYP	Five-year plan
GDP	Gross domestic product
GHG	Greenhouse gas
HVC	High-value chemicals
ILBI	International legally binding instrument
IQ	Intelligence quotient
IRA	Inflation reduction act
LCA	Life cycle assessment
LT-LEDS	Long-term low-emissions development strategies
MTO	Methanol-to-olefins
Mt	Million tonnes
NDC	Nationally determined contribution
NGL	Natural gas liquid
OBBB	One big beautiful bill act
PLA	Polylactic acid
PPWR	Packaging and packaging waste regulation
RDD&D	Research, development, demonstration and deployment
SUP	Single-use plastic
TRL	Technology readiness level
UNFCCC	United Nations framework on climate change
US	United States
WtE	Waste to energy

/ Λ 01 INTRODUCTION

Plastics are deeply embedded in modern life – from packaging and textiles to construction and consumer goods – to the point where it is often difficult to recognise how much we depend on them or how many of our daily activities rely on their availability (UNEP, 2023).

Plastic demand has grown faster than any other material in recent decades (IPCC WG III, 2023). Global yearly production has increased from around two million tonnes (Mt) in 1950 to approximately 400 Mt in 2022 (Houssini et al., 2025), with more than half of all plastics ever produced having been made since 2004 (Geyer et al., 2017; UNEP, 2021; OECD, 2022b). However, both production and demand are not evenly distributed across the globe **(see → Figure 1 for detailed geographical analysis)**. In the coming decades, plastic demand is expected to soar, particularly in emerging economies in Sub-Saharan Africa and Asia, driven by economic and population growth (CIEL, 2019).

Plastics present major environmental challenges across their production, use and end-of-life management, emitting greenhouse gas (GHG) emissions and causing pollution – the most critical environmental impacts across the life cycle of plastics (OECD, 2022b).

GHG emissions are mainly released into the atmosphere during the production and end-of-life treatment of plastics, accounting for an **estimated 3.4% (1.8 $GtCO_2eq$) of global GHG emissions in 2019** (OECD, 2022b). Other studies that take a broader perspective on the plastics value chain and provide a more detailed breakdown of emissions by type of plastic estimate that the production of plastics **contributes 5.3% (2.24 $GtCO_2eq$) of global GHG emissions** (Karali et al., 2024).

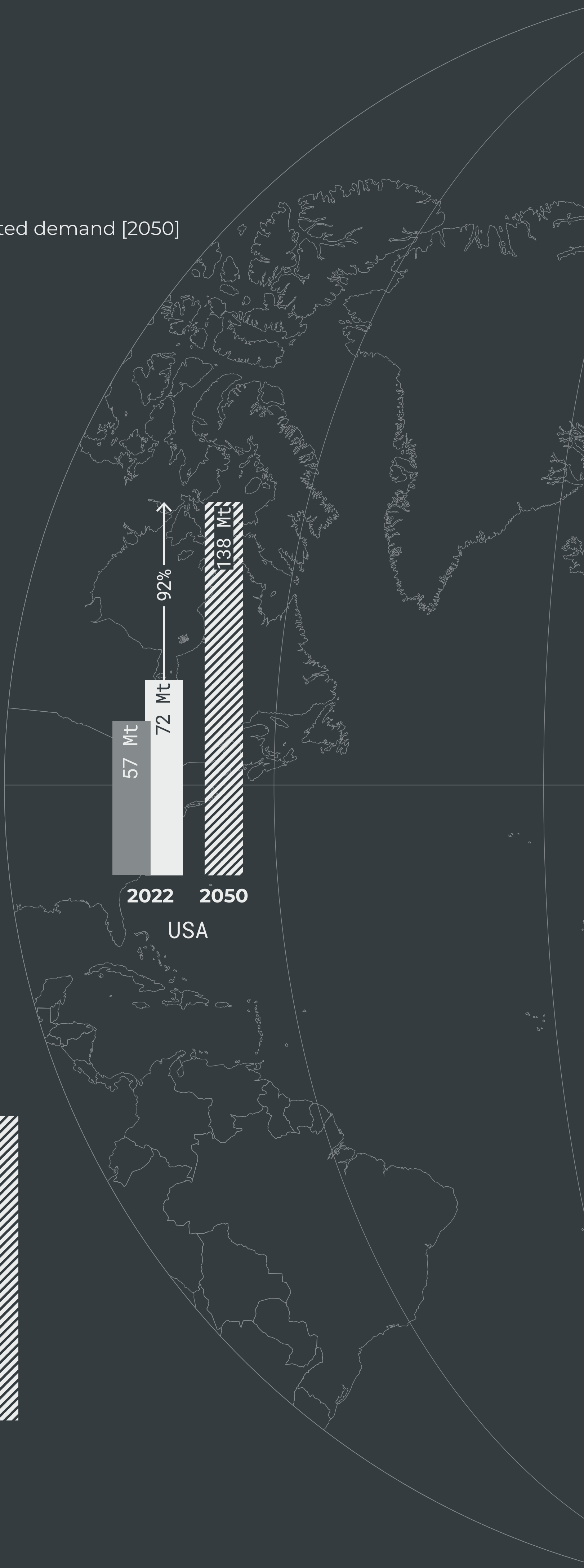
Plastic pollution entering the environment was estimated at approximately 22 Mt in 2019 with a total accumulated stock of 139 Mt in aquatic ecosystems (OECD, 2022b). Plastics and microplastics have been found in almost every part of the environment (Symeonides et al., 2021).

Without systematic change, the continued growth in plastic demand and production is likely to result in rising emissions and waste, adding to existing environmental pressures (IEA, 2018; OECD, 2022b).

Figure 1:
Plastics production and demand, global and regional overview

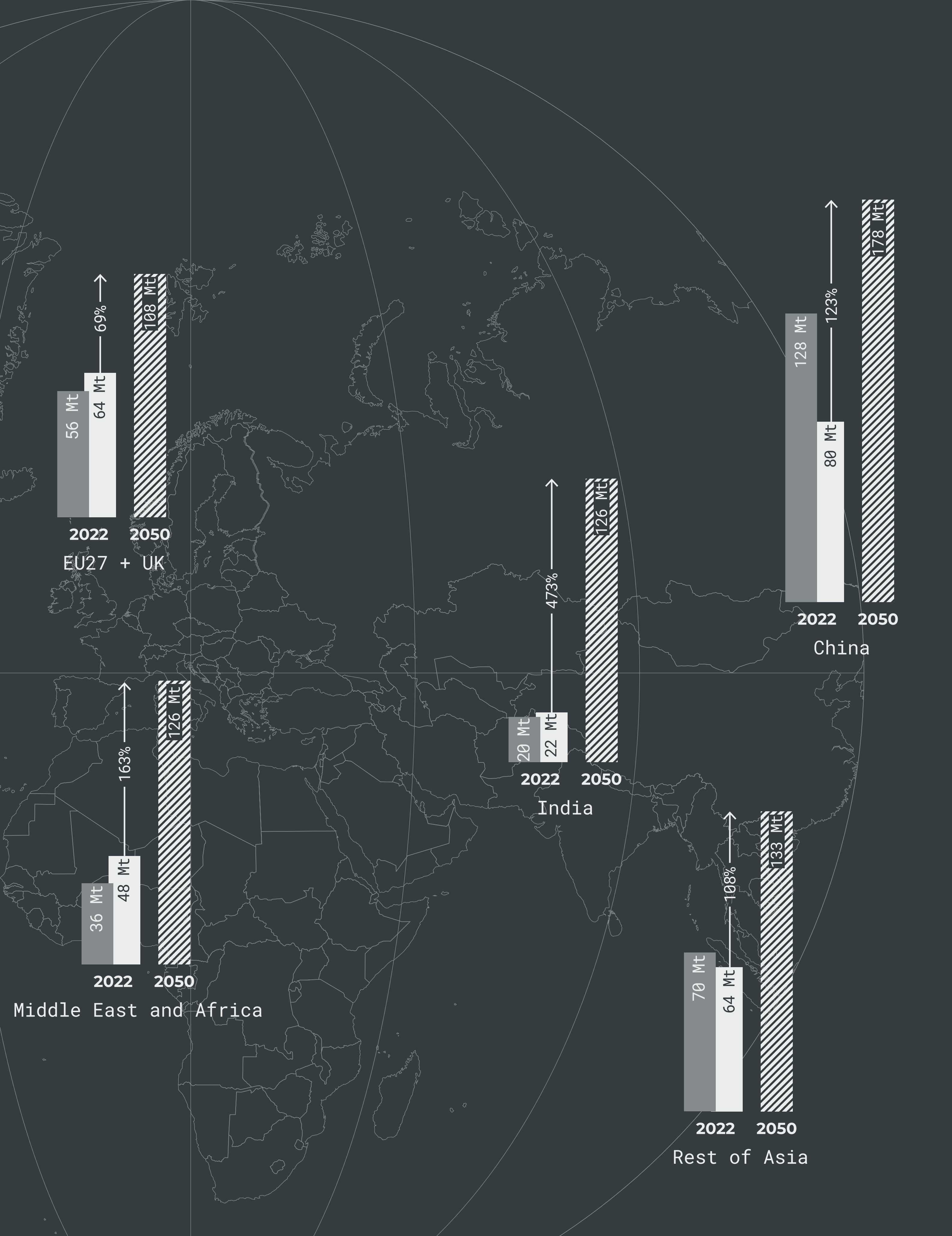
Production [2022] Demand [2022] Projected demand [2050]

Plastic demand has grown faster than any other material in recent decades (IPCC WG III, 2023). Global yearly production has increased from around two million tonnes (Mt) in 1950 to approximately 400 Mt in 2022 (Houssini et al., 2025), with more than half of all plastics ever produced having been made since 2004 (Geyer et al., 2017; UNEP, 2021; OECD, 2022a). However, both production and demand are not evenly distributed across the globe. In the coming decades, plastic demand is expected to soar, particularly in emerging economies in Sub-Saharan Africa and Asia, driven by economic and population growth (CIEL, 2019).



Global numbers [2022 and 2050]

Note: Projections are available only for demand based on economic and population growth. Regions representing less than 5% of global production or demand are not shown.



Source: Houssini et al. [2025]; OECD [2020a]; OECD [2020b].

This map is for illustration purposes only. The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by NewClimate Institute.

In this context, this report examines the full life cycle of plastics, with a primary focus on plastic production. It proposes the decarbonisation of the plastics sector through the prioritisation of different mitigation options, highlighting co-benefits for reducing plastic pollution and health risks. The report also analyses national and regional differences in plastic production systems, outlining how mitigation options could be tailored to diverse contexts. In doing so, it aims to guide policymakers and the global community towards a holistic approach and ambitious measures that tackle emissions while considering other environmental impacts and regional differences.

The report is organised as follows: → **Section 2** provides an overview of the chemical sector and a comprehensive analysis of plastics from production to end-of-life. → **Section 3** presents and analyses the magnitude of plastics' impacts on climate change and environmental pollution. → **Section 4** explores measures and technologies under three different strategies to decarbonise the plastics sector: minimise production, enhance circularity and decarbonise production. → **Section 5** examines four countries and regions: the United States (US), the European Union (EU), Saudi Arabia and China, highlighting differences in plastic production processes, feedstocks and each country's role in trade, together with the policies in place to tackle the climate impact of plastics. → **Section 6** proposes action points and recommendations on a national level, considering the analysis of → **Section 5**, and underscores the role of the international context to achieve decarbonising plastics and ending plastic pollution.

/ Λ 02

PLASTICS LIFECYCLE: A PRIMER

Plastics are part of the broader chemical sector, which is the largest industrial consumer of energy and the third-largest industrial CO_2 emitter (IEA, 2018). What sets the chemical industry apart from other energy-intensive industries like iron and steel or cement is its heavy reliance on fossil fuels, used not only to meet energy demand but also as feedstock (i.e. raw materials for intermediate or final products).

Within the chemical sector, plastics are its largest subsector (Gabrielli et al., 2023) **and the biggest contributor to CO_2 emissions** (Cabernard et al., 2022; Gabrielli et al., 2023; IEA, 2023a). Demand for plastics has grown faster than for any other bulk material, growing more than tenfold since 1970 and nearly 60% faster than global gross domestic product (GDP) growth (IEA, 2018; IPCC WG III, 2023). Plastics are made of polymers and additives, shaped into various end-use products. Polymers consist of large molecules built from repeated building blocks called monomers. Depending on the type of feedstock used to produce the monomers, plastics can be categorised into two groups: fossil-based plastics, derived from fossil fuels, and bio-based plastics, made from biological materials such as corn, sugarcane and wheat. Additionally, plastics can be categorised by feedstock circularity: primary plastics are manufactured with virgin feedstock that has not been previously processed, while secondary plastics are made from recycled plastic materials and waste (Environmental Investigation Agency, 2024).

The plastics life cycle can be divided into three phases: production, use and waste. The following sections describe each phase in detail to outline their main characteristics.

2.1 PHASE 1: PRODUCTION

Global plastic production predominantly relies on fossil fuel feedstock, representing 98% of global primary plastic production in 2022 (Houssini et al., 2025). However, recent trends indicate a growing share of secondary plastics, made from alternative options such as recycled plastics and alternative materials. These alternative routes collectively only represent about 10% of global plastic production, leaving fossil fuel-based plastic as the dominant production route of primary plastics **(see → Section 3 for further detail on these alternatives)** (OECD, 2022b; Plastics Europe, 2022).

Fossil fuels play an essential role in plastics production, though estimates of the global shares of oil, gas and coal vary (OECD, 2022b; IPCC WG III, 2023; Minderoo, 2023; Karali et al., 2024; Houssini et al., 2025). **Different production routes using each fossil fuel type are technically feasible** **(see → Figure 2 for a simplified overview of the plastic production system)**, but the selection of these routes varies by region based on factors such as production costs, feedstock availability, labour costs and environmental regulation **(see → Section 4 for further detail on geographical differences)** (IEA, 2018).

The fossil fuel production route to plastics can be divided into five steps **(see → Box 2)**. Differences in this process lie in the intermediate products and methods used to obtain the monomers **(see → Box 1 for extended definition of relevant concepts)**. The type of monomer used determines the properties and types of plastics produced.

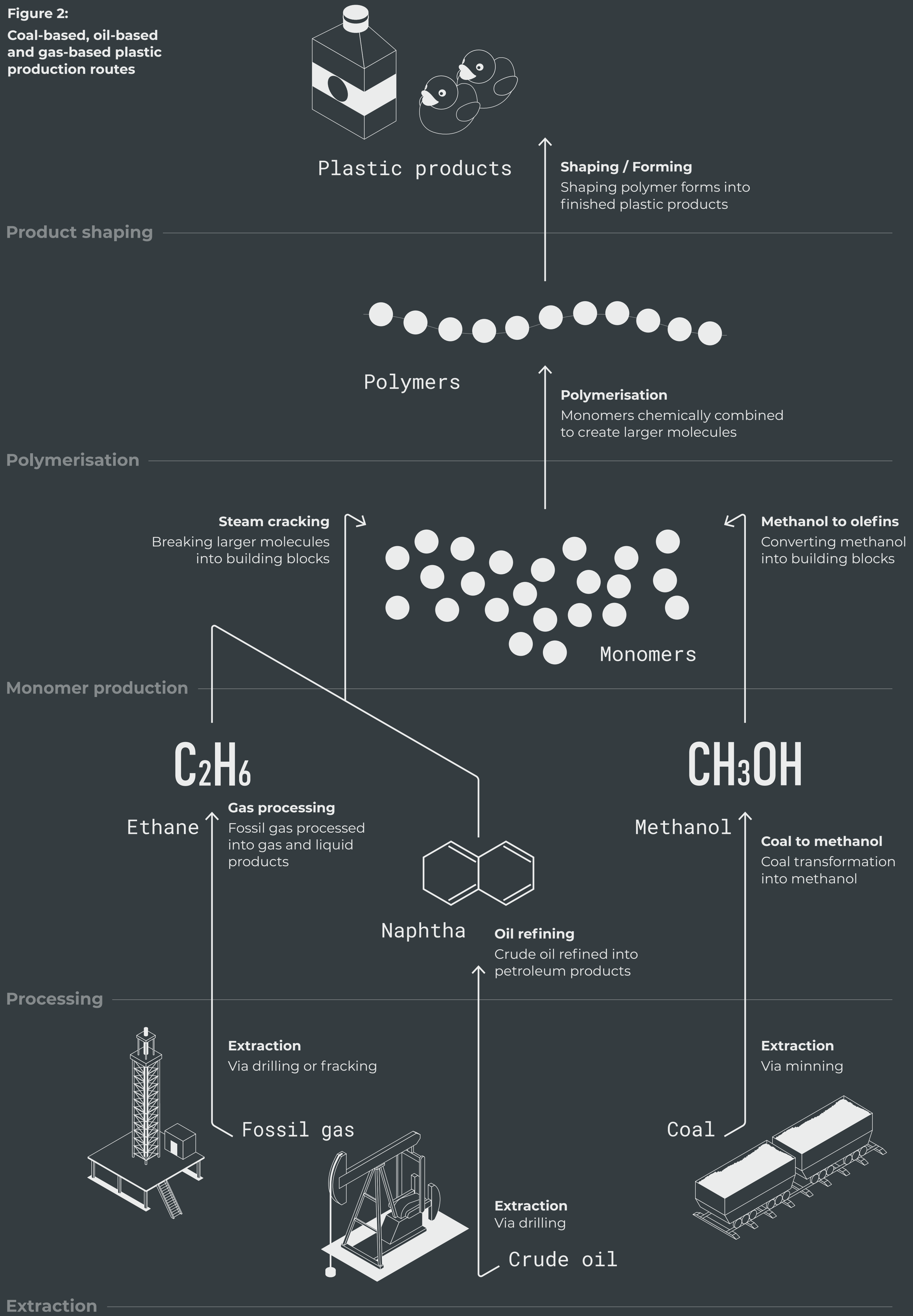
Box 1:

Basic plastic production concepts

Monomers: fundamental building blocks of plastics that are further processed and joined together to form polymers, which are further shaped into plastic products. Monomers can be derived from fossil fuels, biological elements or synthetic compounds.

High-Value Chemicals (HVCs): The most commonly used monomers are known as HVC. They are categorised into olefins (ethylene and propylene) and aromatics (xylene, toluene and benzene). Olefins are used directly as monomers to produce plastics, while aromatics need further processing.

Figure 2:
Coal-based, oil-based and gas-based plastic production routes



Box 2:
Fossil fuel plastic production process

Extraction: Fossil fuels are extracted through techniques such as drilling, fracking or mining.

Processing: Refinement and processing of the extracted fossil fuels produces intermediate products such as ethane, naphtha and methanol.

- **Ethane:** Obtained by converting fossil gas into natural gas liquids (NGLs) through several steps.
- **Naphtha:** A sub-product of crude oil refining, which transforms crude oil into petroleum products.
- **Methanol:** Obtained through coal-to-methanol process, which involves two processes: coal gasfication (feeding coal into a high-temperature pressurised container to obtain gas) and methanol synthesis (transforming the gas into methanol). Methanol can also be obtained from fossil gas through steam reforming, though this is less common, as ethane offers a cheaper production route for plastics (IEA, 2018).

Monomer production: Ethane, naphtha and methanol are further processed to obtain monomers. Ethane and naphtha are broken down into smaller molecules using steam cracking, a high-temperature process (around 850°C). Naphtha steam cracking produces both olefins and aromatics **(see → Box 1 for the definition of High-Value Chemicals)**, while ethane steam cracking produces predominantly ethylene. Methanol is converted into olefins through the Methanol-to-Olefins (MTO) process.

Polymerisation: Monomers are chemically combined into larger molecules to form polymers.

Final product: Polymers in the form of pellets, flakes, powders or liquids are shaped into finished plastic products.

2.2 PHASE 2: USE

Plastics are used in applications with widely varying lifespans – from under one year for packaging to nearly 20 years for industrial machinery components (Geyer et al., 2017). Short-lived plastics, such as single-use items, are key drivers of waste flows and pollution, with longer-lived plastics contributing to building plastic stocks in societies. Globally, single-use plastics account for approximately 37% of total production and almost two-thirds of waste generated comes from plastics with a lifespan of less than five years (OECD, 2022b; Environmental Investigation Agency, 2024). Short-lived plastics dominate and shape waste flows, making it critical to understand their production and use for analysing end-of-life and waste dynamics (Stegmann et al., 2022).

Plastic usage patterns vary significantly across regions. Consumption is much higher in richer countries, whose population have become accustomed to disposable and cheap products. For instance, the average inhabitant of the US consumes 216 kg of new plastics annually, while the average person in Sub-Saharan Africa uses less than one-tenth of that amount (OECD, 2022b; Houssini et al., 2025) **(see → Figure 3 for further regional per capita differences)**. Future projection of economic and population growth in emerging economies across Sub-Saharan Africa and Asia is expected to further increase plastic consumption in these regions (OECD, 2022a).

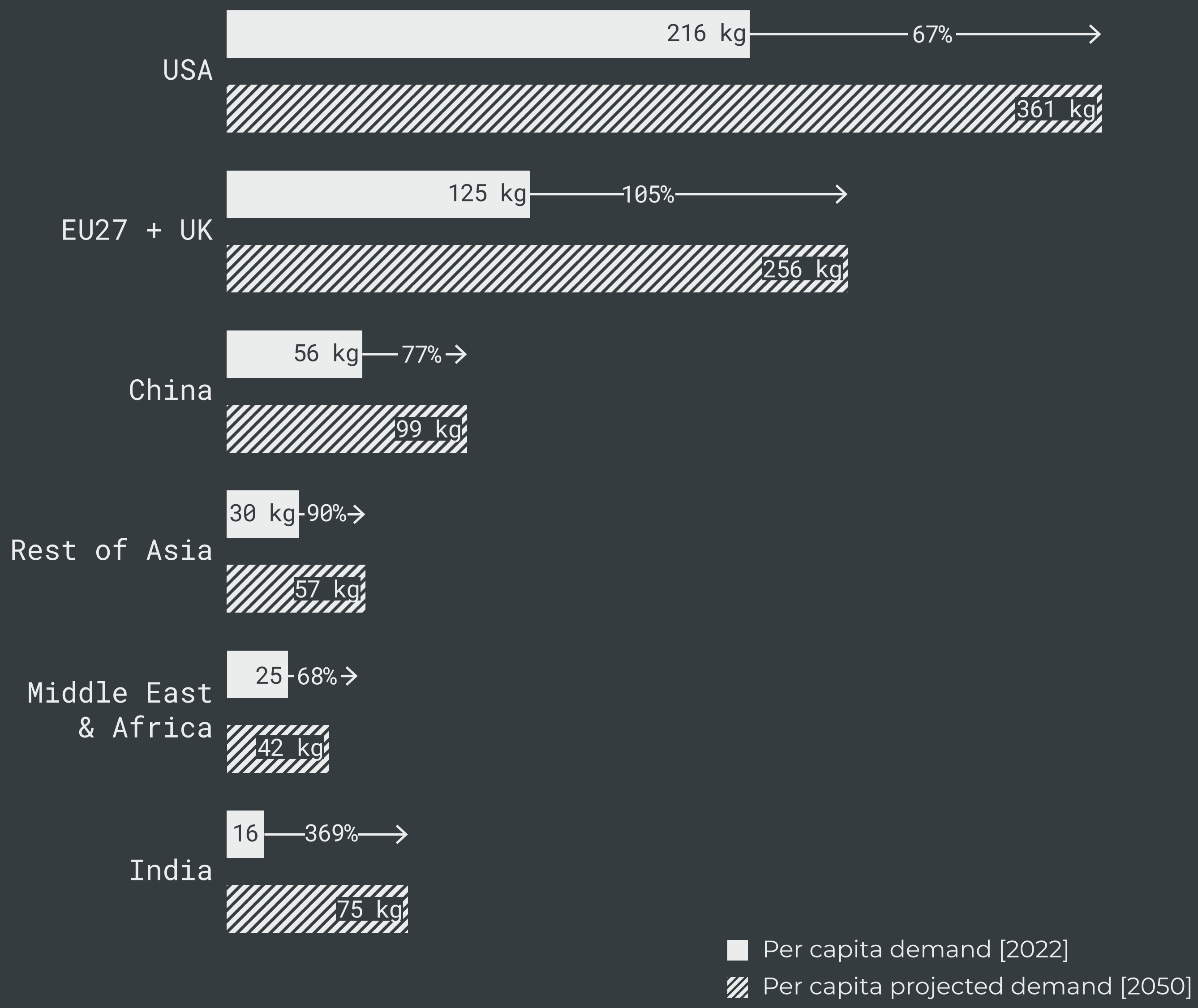
2.3 PHASE 3: END-OF-LIFE

After plastics are consumed or used, they can follow four pathways: recycling, landfilling, incineration or becoming mismanaged and littered.

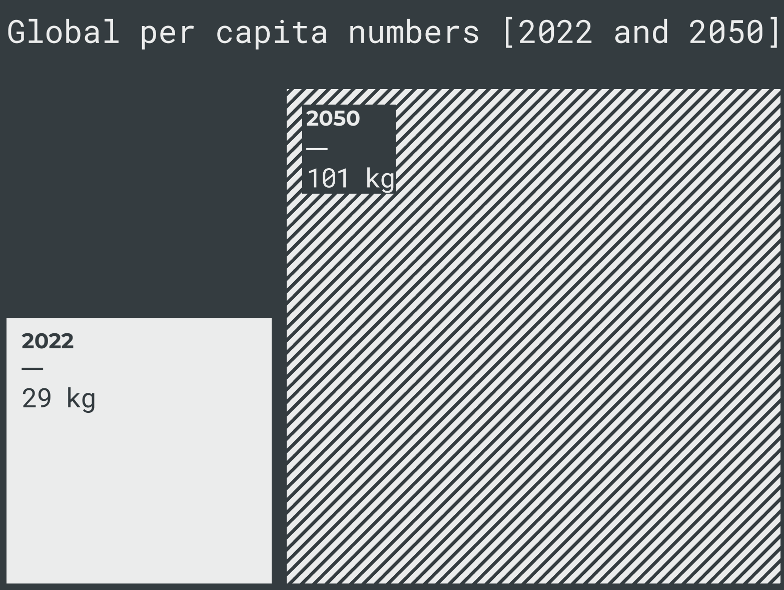
Recycling involves the collection, sorting and processing of plastic waste to repurpose it for producing new plastics. Two main plastic recycling routes are available: mechanical and chemical recycling. Mechanical recycling entails cleaning, re-melting and repurposing plastic products, with each polymer type retaining its polymer structure. However, mechanical recycling presents some technical constraints that limit its overall capacity to fully recycle all plastics (Zero Waste Europe, 2019a; SYSTEMIQ, 2022). Therefore, to improve overall recycling capacity, chemical recycling has gained traction as a potential complementary solution. However, chemical recycling also presents some challenges, such as the high energy inputs it requires due to the high temperatures needed **(see → Section 4.3 for further details)**.

Landfilling involves confining plastic waste in designated areas. While it is the most economical solution to manage plastic waste, it poses significant risks, such as soil and water contamination (OECD, 2022b).

Figure 3:
Global and regional per capita demand [2022 and 2050]



Plastic usage patterns vary significantly across regions. Plastic consumption is closely linked to affluence, with the highest use observed in wealthier countries. Future trends suggest that economic and population growth in emerging economies will drive substantial increases in plastic demand, although significant regional disparities are expected to persist.



Source: Houssini et al. [2025]; OECD [2020a]; OECD [2020b].

Incineration refers to burning plastic waste. This reduces the volume of waste and, when waste to energy (WtE) is used, recovers some energy released during the incineration. Environmental risks associated with incineration range from the impacts of ash, residual emissions and GHG emissions (Dubois, 2013).

Mismanaged and littered waste refers to plastics that are not properly collected, poorly landfilled or are directly discarded, and **that end up in the environment** (OECD, 2022b).

Reliable global data on plastic waste treatment is limited, with most information on plastic waste treatment unavailable or unpublished, and reporting practices varying across countries. Insufficient infrastructure for plastic waste treatment in some regions further complicates data collection. Consequently, most global estimates of plastic waste are based on a wide range of assumptions to fill these data gaps (OECD, 2022b).

Globally, landfilling is the most common method for treating plastic waste, accounting for almost half of total waste volumes, followed by incineration, recycling and mismanaged and littered plastics – each representing around 20% of global plastic waste treatment (OECD, 2022b; Houssini et al., 2025).

Regional differences also exist in waste treatment options. Many high-income countries, for example, have sophisticated systems in place, combining advanced sorting and recycling technologies with extensive waste collection systems and strict regulatory measures. In contrast, many developing countries face limited infrastructure and capacity to manage increasing waste from growing populations (OECD, 2022b; Houssini et al., 2025).

/ Λ 03

ENVIRONMENTAL IMPACTS OF PLASTICS

While this report focuses on mitigating GHG emissions from the plastics sector, it is important to recognise the broader environmental and health impacts linked to plastics across their life cycle. Plastics not only generate CO_2 emissions during production, use and waste management, but also contaminate ecosystems and pose substantial risks to human health. In the following section, both GHG emissions and broader environmental impacts of plastics are analysed in greater detail, highlighting their connections to different stages of the plastic lifecycle.

3.1 GHG EMISSIONS ACROSS THE PLASTICS LIFE CYCLE

GHG emissions released into the atmosphere accounted for 3.4%–5.3% of global emissions in 2019 (OECD, 2022b; Karali et al., 2024). The amount of emissions released depends on three key factors: the type of feedstock used, the specific plastics being produced and the regional energy mix (IPCC WG III, 2023). **The type of feedstock has significant impacts on emissions intensity.** Among the available production routes, coal-based MTO route has the highest emissions per tonne of plastic produced, followed by naphtha-based production and ethane-based production **(see → Box 2 for detailed production routes)**. **The type of plastic produced conditions the emissions released due to the different processes needed for their production,** with more complex plastics requiring more energy-intensive processes than simpler ones (Cabernard et al., 2022; Bauer et al., 2023; IPCC WG III, 2023; Karali et al., 2024). **The regional energy mix is another critical determinant of life cycle emissions.** Plastic production facilities heavily rely on fossil fuels to meet their energy needs, with coal having the highest emission intensity, followed by oil and fossil gas (Cabernard et al., 2022; Bauer et al., 2023; IPCC WG III, 2023; Karali et al., 2024).

Emissions are not produced equally throughout the plastics life cycle and are predominantly generated during the production and end-of-life stages **(see → Figure 4 for further detail)**. **Production is the most emission-intensive phase, accounting for an estimated 90% of total emissions** (EEA, 2021; OECD, 2022b; Karali et al., 2024). This phase includes energy-intensive processes like steam cracking, part of the monomer production phase, which requires high temperature and is a major consumer of energy in plastic production. While the MTO process generally requires lower temperatures than steam cracking, its reliance on coal as a feedstock results in higher overall emissions intensity compared to ethane- and naphtha-based steam cracking **(see → Box 2 for further detail on process explanation)** (Cabernard et al., 2022; Bauer et al., 2023; IPCC WG III, 2023; Minderoo, 2023; Karali et al., 2024). **The end-of-life stage also contributes to emissions,** with incineration being the most emission-intensive option. Regions that predominantly use waste-to-energy (WtE) facilities tend to have a higher share of life cycle emissions attributed to the end-of-life stage than the global average.

Figure 4:
Emissions share throughout plastics life cycle

Source: OECD [2022a]; Karali et al., [2024].

3.2 PLASTIC POLLUTION AND WASTE FLOWS

Environmental plastic pollution is among the biggest issues facing the plastic industry and society today (UNEP, 2021). Unmanaged and littered plastic waste are the main drivers of environmental plastic pollution, although plastics can end up in the environment throughout the entire life cycle (OECD, 2022b). At current production and consumption trends, plastics are projected to outweigh fish in the ocean by mass by 2050 (Ellen Macarthur Foundation, 2016). Furthermore, microplastics have been found in almost every part of the environment (Symeonides et al., 2021), including the deepest parts of the ocean (Chiba et al., 2018). Micro- and nanoplastics also enter human bodies and other organisms through ingestion and inhalation, posing significant risks to both wildlife and human health **(see → Box 3 for further detail on health risks from plastics)**.

Plastic pollution is heavily influenced by the type of plastic consumed and the geographical location (OECD, 2022a), which determines the characteristics of the available infrastructure to process plastic waste. Furthermore, understanding plastic waste flows is key to understanding how and where plastic pollution is caused.

Plastic waste flows are heavily influenced by the use of short-lived plastic products, such as packaging, consumer products and textiles. Consequently, there is a clear relationship between the amount of single-use plastic consumption and the volumes of waste produced, with countries with higher per capita plastic consumption generating more waste. For example, the US and EU countries generate 221 kg and 114 kg of waste per capita, respectively, compared to 14 kg in India (OECD, 2022b).

Regional per capita plastic consumption and waste generation vary significantly, and disparities in plastic waste treatment capacities further exacerbate the issue. In high-income countries, such as those in the OECD, only about 6% of plastic waste generated in 2019 was mismanaged or littered (OECD, 2022b). These countries benefit from advanced waste management systems, resulting in lower environmental leakage. However, they are also leading exporters of plastic waste, often shipping it to lower-income nations that lack the infrastructure, regulations and capacity to manage it effectively (UNCTAD, 2020).

Although recent studies indicate that plastic **waste trade flows** are undergoing significant changes, with high-income regions such as the EU becoming net importers of plastic waste and scrap (Houssini et al., 2025), the dominant dynamic **still poses challenges for low-income countries receiving waste**. Not only do they need to address the increasing volumes of domestic waste, but they also need to manage the imported volumes, which often lead to higher rates of mismanaged and littered plastics (OECD, 2022b).

Box 3:

Health risks associated with plastics

Health risks arise for different reasons. Plastic production contributes to both global carbon emissions and particulate matter. Climate change effects on human health can already be felt worldwide (WHO, 2023) while fine particulate matter produced from petrochemical activities is the fifth leading risk factor for death worldwide (Cohen et al., 2017). However, one of the most important concerns comes from micro- and nanoplastics. Both can be generated through the use of plastics and the degradation of plastic waste ending up into the environment. Microplastics have been detected in almost every part of the environment and can enter human bodies through ingestion and inhalation (Symeonides et al., 2021).

Not only can the presence of micro and nanoplastics in the human body pose risks to human health, but additives or other chemicals contained in these products can have impacts on human health. The associated risk depends on the type of plastic and other chemicals used in production. In general, the presence of plastics and other components in the human body can contribute to impaired cognitive development and lower IQ in childhood, as well as obesity and lung cancer (Symeonides et al., 2021). Furthermore, most plastic chemicals, polymers and microplastics, have been insufficiently or never studied for human health effects (Symeonides et al., 2024). Therefore, further research is needed to fully understand the impacts of plastics on human health.

/Λ 04

PLASTICS INDUSTRY UNDER A PARIS-ALIGNED PATHWAY

Plastics contribute to two interrelated challenges: GHG emissions that accelerate climate change and environmental pollution that impacts ecosystems, wildlife and human health. With global plastic demand expected to grow substantially in the coming decades at annual rates of 2.5% to 4% (OECD, 2022a), these negative impacts are likely to intensify. If current production patterns, recycling rates and the global energy mix do not change, GHG emissions from plastics could more than double or even triple by 2050 compared to 2019 levels, consuming up to 31% of the remaining carbon budget from 2019 to limit warming to 1.5°C with a 67% chance (Karali et al., 2024). Mitigating emissions from the plastics sector is therefore critical for achieving the 1.5°C climate limit while also addressing broader environmental and human health concerns.

To meet the 1.5°C limit, global CO_2 emissions must reach net zero around 2050, followed by net zero for all GHG emissions in the second half of the century (IPCC WG III, 2023). Accordingly, the plastics sector should adopt these milestones as key targets and strive for even more ambitious reductions. **Studies exploring decarbonisation of the plastics sector** toward achieving net-zero emissions by mid-century emphasise that the most effective solution to meet this target would **combine three strategies: minimise production, enhance circularity and decarbonise production** (ETC, 2019; Zheng and Suh, 2019; Meys et al., 2021; EUNOMIA, 2022; Stegmann et al., 2022; SYSTEMIQ, 2022).

4.1 CONSIDERATIONS TOWARDS A NET-ZERO PLASTICS SECTOR

The three strategies presented – minimise production, enhance circularity and decarbonise production – comprise different mitigation options **(see Sections → 4.2, → 4.3 and → 4.4 for a detailed analysis of the mitigation options under each strategy or → Table 1 for a summary overview)**. **Sequencing of these available mitigation options is key to decarbonise plastics,** starting with mature, short-term actions that can deliver immediate emissions cuts, while preparing for longer-term solutions. This approach helps reduce cumulative emissions and avoids getting locked into unsustainable pathways. The sequencing is designed to first reduce the demand for virgin plastics, then enable the production of essential plastics without fossil feedstocks and power all processes with clean energy **(see → Figure 5 for a schematic overview)**.

Plastic pollution and associated health risks are also considered, assessing the co-benefits of the mitigation options and prioritising those that also tackle plastic pollution. Furthermore, the approach also considers avoiding the risk to shift the burden of environmental impacts to new domains **(see → Table 1 for further details on co-benefits and risks of mitigation options)**.

The sequencing starts prioritising mitigation options under minimising production and enhancing circularity strategies, key to reduce the projected growth in plastics demand, which otherwise expands the volume of plastics requiring decarbonisation. Cutting the volume of plastics that need to be produced directly limits future emissions and lowers the share of fossil-based plastics that must be decarbonised. Importantly, many of the mitigation options under these two strategies are already available and can be implemented immediately, enabling immediate emissions reductions and minimising cumulative emissions through sequencing mature short-term measures with less mature long-term solutions.

Once production has been minimised through the first two strategies, the **focus shifts to decarbonising plastics** that are still required, **using mitigation options under the decarbonising production strategy**. Alternatives to fossil feedstock should be prioritised first to reduce the sector's reliance on fossil resources. In cases where no viable alternative feedstock exist, carbon capture, utilisation and storage (CCUS) will need to be deployed. Most importantly across all stages, plastics production must transition to run on clean energy sources.

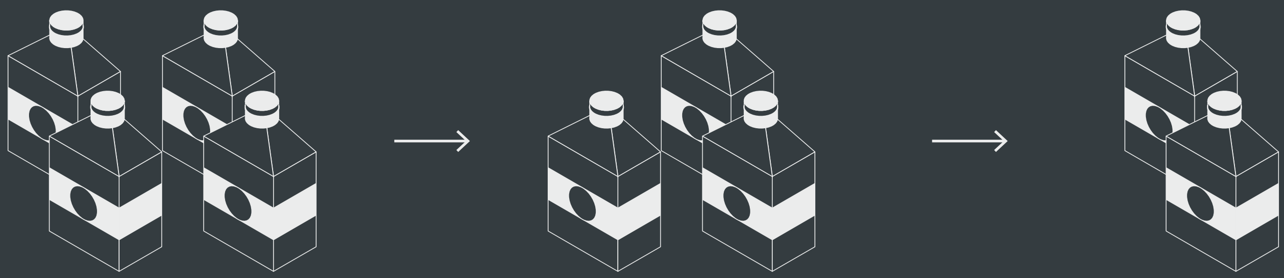
Box 4:

Technology readiness level description

The Technology Readiness Levels (TRL) are a measurement system used to assess the maturity level of a particular technology. Each is evaluated against the parameters for each technology level and is then assigned a TRL rating based on its progress. There are nine levels: TRL1 (Basic principles observed) is the lowest and TRL 9 (system proven in operational environment) is the highest (European Commission, 2014).

Figure 5:
Sequencing process of mitigation options for plastics decarbonisation

✳ How can we reduce the need for virgin plastic?



Reduction of plastic production and consumption
Eliminate unnecessary plastics and reduce material intensity

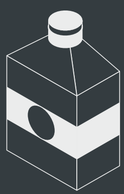
→

Substitution by alternatives to plastics
Substitute plastic products with environmentally sound options

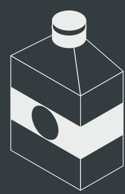
→

Enhance recycling
Keep plastic materials in a closed cycle

✳ How can we produce necessary plastics without fossil feedstock?



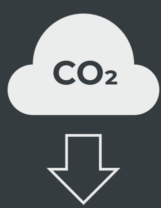
Bio-based and synthetic feedstocks
Use bio or synthetic feedstock to replace fossil-based plastic



Fossil feedstocks with CCUS
For unavoidable fossil use, apply CCUS to mitigate emissions during production

✳ How can we power production cleanly?

Electrification of production
Electrification of steam cracking and other low-temperature production processes



Clean energy sources
Green H_2 to power high-temperature processes

Mitigation Strategies: Minimise production | Enhance circularity | Decarbonise production

Table 1:

Contains a detailed summary of each one of the mitigation measures that are described in Section 4

Mitigation strategies: Minimise production | Enhance circularity | Decarbonise production

Mitigation Measure	Impact Area	Potential Challenge	Action required	Co - Benefit
Reduction of plastic production and consumption	- Reduction of fossil fuel feedstock - Overall reduction of energy needs	Lifestyles built on the availability of cheap plastic products	Behavioural and consumption trends changes	- Low cost / low-emissions strategy - Reduction of plastic pollution
Substitution by alternatives to plastics (e.g. glass)	Reduction of fossil fuel feedstock	Environmental impacts of the alternatives used	- Case-by-case assessment - Improve environmental performance of alternatives	Reduction of plastic pollution
Recycling	- Increasing plastics circularity - Reduction of fossil fuel feedstock	Recycling capacities are unable to match the projected increase in plastic demand	Recycling combined with the net reduction of plastic production and consumption	Reduction of plastic pollution
		Mechanical recycling: Technical limitations lead to open-loop recycling and lower recycling capacity	- Better design of products, incentives for recycling and enhanced sorting and processing - Combined with chemical recycling to improve the recycling cycles	
		Chemical recycling: energy intensive process and process emissions associated	Only used as a complementary solution to mechanical recycling	
Alternative feedstocks (e.g. biomass)	Reduction of fossil fuel feedstock	Feedstock shifts often require major operational redesigns, locking petrochemical facilities into fossil technologies	Planning to redesign or revamp end-of-life production sites to accept greater range of feedstock	
		Biomass: Competition for this resource by different sectors with different goals	- Set prioritisation rules based on the limited availability of decarbonisation alternatives in these sectors - Resource usage based on regional and country conditions and sustainable availability of this source	Potential combination with recycling to convert plastics into a carbon sink sector
		Synthetic feedstock: Hydrogen and CCU at early stage of development could cause potential fossil lock-in	Synthetic feedstock to be used as an alternative when technically feasible available and under certain conditions	

Mitigation strategies: Minimise production | Enhance circularity | Decarbonise production

Mitigation Measure	Impact Area	Potential Challenge	Action required	Co - Benefit
Carbon capture and storage (CCS)	Emissions reductions	- Technical limitations to fully capture all CO_2 - Lack of available transport and storage infrastructure - Low technology maturity	- Technology to be used as a complementary solution when no other alternatives exist - Prioritisation of RDD&D	
Clean energy sources	Reduction of fossil fuel as an energy source	**Hydrogen:** Low technology readiness to produce green hydrogen and potential lock-in of fossil hydrogen or fossil fuel	Only Green hydrogen considered as an appropriate alternative	
		Electrification: Electricity production from fossil fuel resources	Deployment of renewables to cover electricity demands	
		Electric Steam Cracking: Low technology readiness and process emissions generated	- Prioritisation of RDD&D - Combination with other solutions such as CCS	

Many solutions remain at low technology readiness levels (TRLs) **(see → Box 4 for further detail)** or only available at limited commercial scale, creating uncertainty and the risk of long-term fossil fuel lock-in through over-reliance on unproven technologies **(see → Box 5 for further detail)**. Solutions such as CCUS should not be treated as "silver bullets", as this could lock-in fossil fuel use and delay urgent near-term action. Similarly, other emerging technologies – such as bio-feedstock or chemical recycling – may shift environmental pressures to new domains **(see Section → 4.2, → 4.3 and → 4.4 for further detail on challenges that each solution faces)**. However, full decarbonisation of plastics will ultimately require a strategic combination of these technologies (ETC, 2019; OECD, 2022a; IPCC WG III, 2023). To accelerate progress, it is essential to invest in in research, development, demonstration, and deployment (RDD&D) while applying a precautionary approach that acknowledges the uncertainties and trade-offs involved.

Box 5:
Lock-ins

Lock-in refers to the way technologies, institutions, and behaviours— on their own and in combination— create inertia that slows down systemic transformation through a path-dependent process. While lock-ins can arise unintentionally from the accumulated effects of past choices and events, they are also often deliberately reinforced by actors who benefit from maintaining the status quo (Tilsted et al., 2023).

4.2 STRATEGY 1: MINIMISING PRODUCTION

4.2.1 REDUCTION OF PLASTIC PRODUCTION AND CONSUMPTION

This mitigation option refers to measures that achieve a net reduction in the volume of plastic production and consumption, focusing on eliminating plastics that do not require replacement. This can be achieved by eliminating unnecessary items or by reducing the material intensity. These strategies offer a low-cost, low-emission pathway to reduce plastic production and demand, decreasing the use of fossil feedstock and the energy required for manufacturing.

Examples of unnecessary plastics include products used for branding in packaging, those designed to incentivise multipack purchases and secondary packaging (e.g. packaging of packaging) (SYSTEMIQ, 2020, 2022). Lowering material intensity can be achieved through design, increased product lifespan and promoting sharing-based consumption models such as car sharing practices, in-store refill solutions and reusable food service items (SYSTEMIQ, 2022).

Some studies indicate that eliminating unnecessary packaging items and over-packaging could reduce plastic packaging production volumes by 8% (SYSTEMIQ, 2022). Furthermore, applying material efficiency measures could reduce plastics use in different sectors: by 20% in packaging, 5% in electronics, 35% in automotive and buildings and 10% in other value chains (ETC, 2019).

This mitigation option faces one main challenge. Plastics permeate daily life in the industrialised world, particularly in high-income countries where people have become accustomed to **lifestyles built on the cheap availability and fast disposability of these materials** **(see → Figure 3 for regional per capita plastic consumption)** (Tilsted et al., 2023). This behaviour is further reinforced by a perception of plastics as cheap, convenient and recyclable products (Symeonides et al., 2021). Together, these factors create a behavioural lock-in, limiting systemic transformations.

Addressing this challenge requires a fundamental rethinking of the role of plastics in society, shifting perceptions to recognise that plastics cannot be viewed as a cheap, inert and sustainable option, especially given the current rates of production and consumption. A shift in perception is needed, one that accounts for the full spectrum of environmental, social and health impacts associated with plastics. In parallel, it is essential to examine the influence of external actors that shape narratives around the continued necessity and inevitability of plastic use (Tilsted et al., 2023).

This mitigation option offers several co-benefits. Reducing overall plastic production and consumption directly **cuts the amount of plastic waste and pollution,** along with the associated health and ecological risks. Furthermore, minimising production of new plastics is **essential to achieve a truly circular plastics sector,** as available waste feedstock cannot keep up with assumed growing demand (Stegmann et al., 2022; EUNOMIA, 2024).

4.2.2 SUBSTITUTION BY ALTERNATIVES TO PLASTICS

This mitigation option refers to the substitution of plastic products with alternative materials such as glass, aluminium, steel, paper, cardboard, wood and fabric. These alternatives can help reduce GHG emissions by lowering reliance on fossil feedstock, but only when they have a lower overall emissions intensity.

This mitigation option faces one main challenge. Life cycle Assessment (LCA) studies show that **alternative materials often perform worse than plastics** across several environmental categories, and they can result even in higher GHG emissions (Dolci et al., 2024; Meng et al., 2024). The feasibility and effectiveness of the substitution depend on several factors, including material weight, reusability, end-of-life treatment, production process and regional context (Dolci et al., 2024; Meng et al., 2024)

Addressing this challenge requires a case-by-case evaluation of alternatives, considering the key factors mentioned above and ensuring that material choices are grounded in scientific facts. However, it is also important to acknowledge the limitations of LCA. These include difficulties in accurately modelling end-of-life scenarios, such as recycling or other impacts, such as plastic pollution, and the decontextualisation of the results when applied to different contexts than those studied (EUNOMIA, 2020). Furthermore, as energy systems decarbonise, transport electrifies and reuse infrastructure improves, alternative materials may become more environmentally favourable in certain regional contexts (Meng et al., 2024).

This mitigation option offers one main co-benefit: a direct reduction in plastic use and plastic pollution by replacing plastic items with alternative materials. While the implementation of this solution heavily depends on several factors, it can still play an important role in reducing the environmental impacts generated by plastics.

4.3 STRATEGY 2: ENHANCING CIRCULARITY

Current production of secondary plastics (i.e. plastics produced from recycled materials) remains relatively small compared with primary plastic production from fossil fuel feedstock (IPCC WG III, 2023). In 2023, secondary plastics accounted for just 9% of global plastics production (Plastics Europe, 2024). However, recycling plays a crucial role in both reducing plastic pollution and decarbonising plastic production, helping keep embedded carbon in a closed cycle (EEA, 2021). The following two sections describe mechanical and chemical recycling, analysing their benefits, mitigation potential and challenges.

4.3.1 MECHANICAL RECYCLING

This mitigation option refers to cleaning, re-melting and repurposing plastic products, with each polymer type retaining its structure through the recycling process. Currently, it is the most efficient and cost-effective circular technology, with the lowest investment needed compared with other recycling methods (OECD, 2022b; SYSTEMIQ, 2022). Overall, mechanical recycling is estimated to produce 75–90% fewer emissions than primary production of plastics, depending on the emissions intensity of the electricity used (IEA, 2023b).

This mitigation option faces two challenges. First, the **quality of the waste stream significantly influences the effectiveness of the process** and the capacity to produce high-quality recycled plastics (ETC, 2019). Several factors affect waste quality, including the heterogeneity of waste stream, contamination from other materials (e.g. residue from packaged substances) and the presence of chemical additives. Second, **plastics can only be mechanically recycled a limited number**

of times before they lose their mechanical properties (SYSTEMIQ, 2022). As a result, mechanical recycling often leads to open-loop downcycling, where plastics are repurposed into lower-value products rather than reused for their original function (ETC, 2019).

Addressing these challenges requires better product design, enhanced sorting and processing infrastructure and incentives for recycling (OECD, 2022b). Designing products with recycling in mind and implementing more advanced separation and pre-treatment processes are key to improving the quality of waste. Furthermore, demand-side measures such as policies and market incentives are needed to make secondary plastics more competitive than virgin plastics (SYSTEMIQ, 2022). Finally, to overcome the technical and physical limitations of mechanical recycling, it should be complemented by chemical recycling to improve the quality of recycled material and increase the number of recycling cycles (SYSTEMIQ, 2022).

This mitigation option offers one main co-benefit. It plays a crucial role in reducing plastic pollution while keeping embedded carbon in a closed cycle (EEA, 2021).

4.3.2 CHEMICAL RECYCLING

This mitigation option refers to processes that break down end-of-life plastics into smaller molecular components, such as monomers or precursor substances, which can then be used to produce new plastics (ETC, 2019; SYSTEMIQ, 2022; IPCC WG III, 2023). These processes can be divided into two main categories: thermolysis and solvolysis.

Thermolysis involves high-temperature processes that convert plastic waste into feedstock suitable for plastic production. The two main thermolysis processes are pyrolysis and gasification. Solvolysis uses solvents to decompose waste into compounds that can be reused to make recycled plastic (IEA, 2023b).

From the above-mentioned technologies, early industry investment has focused on thermolysis – especially pyrolysis – due to its economic feasibility, broad compatibility with mixed waste streams and potential to integrate with existing infrastructure (SYSTEMIQ, 2022). Some studies indicate that emissions per tonne of plastic produced from this recycling route are around 3 tCO_2eq (Möck et al., 2022). Although its emission intensity is lower than that of virgin fossil fuel-based plastics, the process still releases emissions into the atmosphere.

This mitigation option faces three challenges.

First, **pyrolysis is an energy-intensive process** that emits GHG emissions, particularly from the combustion of pyrolysis gas and the heating requirement of the system.

Second, a major concern is the **use of pyrolysis to produce fuels** rather than recycled plastic feedstocks. While this increases overall material efficiency, the end-use combustion of these fuels still releases GHG emissions, undermining climate goals

(IPCC WG III, 2023). The risk is heightened by the fact that many planned chemical recycling projects are led by oil and gas companies, which may prioritise fuel production over a circular route (IEA, 2023b).

Third, **chemical recycling facilities are still at the pilot or demonstration stage**. Plastic-to-plastic technologies are only emerging and are less mature than plastic-to-fuels, with some of the associated environmental impacts that are not yet fully understood (OECD, 2022b). Therefore, the scalability and climate benefits of chemical recycling are still unclear, with significant investment and technological advancements required (EUNOMIA, 2024).

Addressing these challenges requires clearly defining the role of chemical recycling as a complement to mechanical recycling, targeted specifically at hard-to-recycle plastic waste streams (SYSTEMIQ, 2022). Furthermore, only plastic-to-plastic recycling routes should be prioritised, as they represent the only real circular option (SYSTEMIQ, 2022).

This mitigation option offers one main co-benefit. It plays a crucial role in reducing plastic pollution while keeping embedded carbon in a closed cycle (EEA, 2021).

4.4 STRATEGY 3: DECARBONISE PRODUCTION

4.4.1 ALTERNATIVE FEEDSTOCK

In the following sections bio-based and synthetic feedstock are described. Moving away from fossil feedstock to alternatives with lower associated GHG emissions would reduce associated process emissions.

Biobased plastics

This mitigation option refers to two distinct types of biobased plastics: biodegradable and non-biodegradable plastics. Both are derived from biomass but differ in their synthesis processes, applications and chemical structure (ETC, 2019). The key characteristic that defines biodegradability is the plastic's chemical structure, which determines whether microorganisms can break it down into natural compounds. Regardless of the type, bio-based plastics reduce emissions by avoiding the addition of fossil carbon into the system. Even if incinerated at end-of-life, their emissions are partially offset by the CO_2 absorbed during biomass growth (EEA, 2021).

The most prominent biodegradable plastic today is polylactic acid (PLA), which accounted for 40.2% of global biodegradable plastic production in 2022 (Dolci et al., 2024). PLA is typically produced by fermenting starch-derived materials into monomers that are subsequently polymerised into plastics (Yu et al., 2023).

Non-biodegradable bioplastics are synthesised through processes that transform biomass into the same chemical building blocks used in conventional fossil-based plastic production **(see → Figure 2 for further detail on the fossil fuel-based route)**. Examples include biomass gasification to generate syngas, which is further processed to obtain methanol or the transformation of biodiesel into bio-naphtha (ETC, 2019; Meys et al., 2021; SYSTEMIQ, 2022).

This mitigation option faces three challenges.

First, the **use of bio-based feedstock continues to be a niche industry** because of high costs and competition for biomass from other sectors (IEA, 2023b).

Second, **increased biomass demand for bioplastics could lead to both direct land-use changes**, such as converting forests into plantations, and **indirect land-use changes**, such as replacing food crops with biomass for plastics, resulting in further forest land conversion (EEA, 2021).

Third, **estimates of global sustainable biomass supply vary widely**. Optimistic projections often rely on assumptions like higher crop yields, reduced food waste, increased afforestation and better pastureland management (ETC, 2019; Meys et al., 2021).

Addressing these challenges requires that bio-based plastics are deployed in tandem with strategies to reduce overall plastic demand and improve circularity, thereby lowering biomass requirements and associated risks. Given the competing demands for biomass across sectors, prioritisation is essential. Some studies have identified plastics production as the second-highest priority for biomass utilisation, following alternative aviation fuels, based on the limited availability of decarbonisation alternatives in these sectors (ETC, 2019). Furthermore, it is essential to assure that expanding biomass for plastics does not come at the expense of food security or biodiversity. To this end, biomass sourcing should prioritise unavoidable biomass and agricultural waste and food supply chain residues and must adhere to the highest sustainability standards (EEA, 2021; Stegmann et al., 2022; IPCC WG III, 2023).

This mitigation option offers one main co-benefit. When combined with effective recycling systems, the use of biomass-based feedstock could transform the plastics sector into a net CO_2 sink by embedding biogenic carbon in durable plastic products and keeping it within the material cycle (Stegmann et al., 2022).

Synthetic feedstock

This mitigation option refers to the combination of two technologies: carbon capture and utilisation (CCU) and green hydrogen to produce methanol, which can then be converted into plastics via the MTO process **(see → Box 2 for further details on the MTO process)** (SYSTEMIQ, 2022). The process starts with the capture of CO_2, which is then combined with green hydrogen – produced by electrolysis of water using renewable electricity – to synthesise methanol.

This option faces one main challenge: the early-stage development and uncertainty of the technologies needed for its deployment. Both CCU and green hydrogen production are not yet commercially deployed at scale (SYSTEMIQ, 2022).

CCU technologies remain nascent, with limited global deployment. Their potential to reduce emissions depends on the source and process used for capturing CO_2 and the energy requirements of the process (IPCC WG III, 2023). Hydrogen production at industrial scale is already available, mainly through steam reforming of fossil gas. However, production through water electrolysis using renewable electricity is still not ready at the required scale, with significant uncertainty around production costs (RMI, 2022). Furthermore, green hydrogen faces several technical barriers around transportation and storage, which need to be addressed before large-scale industrial application becomes feasible (SYSTEMIQ, 2022). Additionally, direct methanol synthesis from captured CO_2 and hydrogen is still an active area of research (Gabrielli et al., 2023).

Addressing these challenges means that the overall potential of this route to deliver decarbonisation is restricted by its limited technological readiness. However, it presents significant potential when combined with plastics produced from bio-feedstock, helping reduce the demand for biomass (SYSTEMIQ, 2022; IPCC WG III, 2023).

4.4.2 CARBON CAPTURE AND STORAGE (CCS)

This mitigation option refers to plastics produced using fossil fuels or other alternative sources, where the emissions generated are captured and permanently stored through CCS technologies (Gabrielli et al., 2023). CCS implementation requires the development of specific infrastructure to capture CO_2 at emission sources, followed by transport either to inland storage sites or to ports for transfer to offshore storage facilities (IEA, 2019; SYSTEMIQ, 2022). CCS also has the potential to transform the plastic value chain into a net carbon sink by integrating biomass as both feedstock and an energy source alongside CCS deployment. However, further research is needed to avoid undesired impacts and to better understand the challenges associated with this technology (Meys et al., 2021).

This mitigation option faces three main challenges.

First, **CCS remains a relatively immature technology,** and its CO_2 avoidance potential and deployment costs are uncertain. CCS technologies have technical limitations and cannot fully capture all CO_2 emissions from industrial plants, resulting in only partial decarbonisation (IPCC WG III, 2023).

Second, even when CCS becomes a commercially mature technology, its **cost competitiveness against other mitigation options would largely remain case-dependent**. CCS supply chain costs vary widely depending on the industrial process and the availability and proximity of transport and storage options, with long-distance CO_2 transport generally considered economically unfeasible (Leeson et al., 2017; RMI, 2022; SYSTEMIQ, 2022). The availability of transport and storage infrastructure remains limited, and social resistance – especially around siting large-scale inland and offshore storage facilities – poses an additional barrier.

Third, there is a **general concern that CCS could delay or displace actions elsewhere**, in case it becomes commercially available and economically attractive. An overreliance on the technology could lead to production and infrastructure lock-ins, extending the plastics sector's dependence on fossil fuels and delaying the transition to more sustainable alternatives (Paltsev et al., 2021).

Addressing these challenges requires a cautious approach to the role of CCS in decarbonisation plans. The effort toward commercialisation of full-scale CCS in the chemical industry needs to be accelerated, but at the same time, CCS should not displace efforts on other mitigation actions reviewed in this section.

4.4.3 CLEAN ENERGY SOURCES

This mitigation option refers to the substitution of fossil fuels used as an energy source with alternative fuels. Decarbonisation is then achieved through the elimination of carbon emissions per unit of energy provided (RMI, 2022). Current alternatives are the use of biomass and green hydrogen, neither of which requires major retrofitting of existing installations (ETC, 2019). Biomass-derived natural gas and biomass liquid fuels are potentially the alternative substitution. In the case of hydrogen, green hydrogen is produced through electrolysis using renewable electricity (ETC, 2019).

This mitigation option faces different challenges for each alternative.

In the case of **biomass use**, the technology is relatively mature, but its **economics and resource availability are limited** (RMI, 2022). Furthermore, when considering the use of biomass as an alternative fuel, several concerns arise regarding broader environmental impacts and the competition with other sectors for biomass resources.

On the other hand, **green hydrogen depends on the deployment of some technologies that are not yet available at a commercial scale**, such as large-scale electrolysers (SYSTEMIQ, 2022). Moreover, the use of hydrogen as heat, especially in conventional gas-based infrastructure, diminishes its value as a high-value energy carrier and chemical feedstock, with electricity or fossil fuel with CCS emerging as economically more competitive alternatives (Johnson et al., 2025).

Addressing these challenges requires, in the case of the use of biomass, assessing its suitability as an energy source. Some studies indicate the use of biomass for high-heat generation in plastics would not be considered as a high-priority use of this resource, compared to other harder-to-abate sectors where alternative options are more limited (ETC, 2019). As a consequence, biomass as an alternative energy source is not proposed in this case.

In the case of hydrogen, it would likely be advantaged over biomass as it does not face the same constraints on sustainable supply. However, **this route can only be considered as an alternative if hydrogen is produced through electrolysis using renewable electricity**. Alternative forms of hydrogen, such as blue hydrogen – produced from fossil gas with CCS – should not be prioritised, given the concerns raised about CCS technologies **(see → Section 4.4.2)**.

4.4.4 ELECTRIFICATION OF PRODUCTION PROCESSES

This mitigation option refers to direct electrification of the production process for plastics, with the key focus on electrifying the heat supply in steam cracking **(see → Section 2.1 for further detail on this stage)** (IPCC WG III, 2023). In this decarbonisation route, net emission reductions are only achieved if electricity is derived from renewable sources. Electric steam crackers have an estimated TRL of 7 (RMI, 2022), which means that they are still at the prototype-demonstration stage (European Commission, 2014). The deployment of this technology will require the construction of new facilities or the modification of existing plants.

This mitigation option faces two challenges.

In the case of **steam cracking, the electrification of the process would not eliminate the process-related emissions** resulting from the cracking reaction and the combustion of by-products (IPCC WG III, 2023). Secondly, due to the **current TRL of this solution, investing in electric steam crackers could maintain fossil fuel dependency for decades,** given the long timescales required for large-scale deployment.

Addressing these challenges requires the deployment of renewable electricity production at scale, to provide clean electricity. Furthermore, electrified **steam cracking could potentially be combined with other solutions,** such as CCS, to capture process emissions, although several challenges are also faced by this technology **(see → Section 4.4.2 for more details on CCS)**.

/ Λ 05 COUNTRY FACTSHEETS

There are several key dimensions that are particularly relevant for understanding global plastic production. Analysing them allows for a clearer understanding of cross-country differences in plastic production and trade. **The role that a country or a region plays in plastic production is defined by factors such as feedstock availability, industrial expertise, infrastructure and manufacturing capacity** (IEA, 2018; UNCTAD, 2020). Plastic trade occurs at various stages of the production process – refining, feedstock production and plastic products – with countries focusing on areas where they hold a competitive advantage (IEA, 2018).

Understanding these regional attributes is critical for designing targeted plans that both reduce GHG emissions and curb plastic pollution. In the following section, four selected countries and regions – China, the EU, the US and Saudi Arabia – are analysed. These countries correspond to the most relevant actors in terms of fossil extraction, feedstock production, trade and production of plastic products (OECD, 2022b; Houssini et al., 2025). Each represents a unique production route for plastics and plays distinct roles in the global plastic production. For each, production and trade trends are analysed **(see → Table 2 for a summary these dimensions)**.

Although plastic waste accounted only 6% of the global volume of traded final plastic products in 2022 (Houssini et al., 2025), it remains a critical concern since it is often exported to countries lacking adequate management infrastructure, exacerbating global plastic pollution challenges (UNCTAD, 2020). Consequently, this is also analysed for each country, alongside traded plastic products derived from production.

Furthermore, for each country the main national and regional policies are described. The analysed policies are classified under the mitigation categories presented in **→ Section 4**: strategy 1: minimise production, strategy 2: enhance circularity and strategy 3: decarbonise production. Furthermore, the long-term low-emissions development strategies (LT-LEDS) – national plans that outline how countries aim to achieve sustainable, low-emissions growth pathways providing a long-term vision – that each country has shared under the United Nations framework convention on climate change (UNFCCC) are also assessed.

Table 2:

Key plastics industry characteristics and policies in place for China, the EU, US, and Saudi Arabia

	China	EU	US	Saudi Arabia
Global ranking extraction of fossil fuels[1]				
Coal	1st	8th	4th	❋
Oil	7th	❋	1st	3rd
Gas	4th	❋	1st	9th
Main feedstock used	Coal-based	Oil-based	Gas-based	Gas-based
Global ranking of plastic production [by volume]	1st	3rd	2nd	❋
Role in global trade				
Refining products[2]	Largest importer	5th largest exporter & importer+	3rd largest exporter & 4th largest importer	6th largest exporter
Primary forms[3]	6th largest exporter & largest importer	4th largest exporter & 2nd largest importer+	Largest exporter & 3rd largest importer	2nd largest exporter
Plastic products	Largest exporter	2nd largest exporter & importer+	5th largest exporter & largest importer	❋
Plastic Waste	❋	Largest exporter & 4th largest importer+	2nd largest exporter & 7th largest importer	❋

Source: UNCTAD [2020]; Energy Institute [2025]; Houssini et al. [2025].

1 Ranking is based on the position of the country in the global ranking for extraction of each fossil fuel.

2 Fossil fuel outputs of the refining process of oil and gas.

3 Primary forms of plastics: polymers produced from the plastic feedstock in form of resin pellets or fibres.

+ Data for Germany.

❋ These countries are outside top 10 ranking.

5.1 CHINA

5.1.1 PRODUCTION SYSTEM

China is the world's largest plastic producer, driven by its large-scale manufacturing capacity, having quadrupled its output since the early 2000s (Karali et al., 2024). **Plastic production infrastructure and chemical production assets are relatively young,** meaning that current assets are expected to remain operational for many years (RMI, 2022; Tilsted et al., 2023).

China's plastic production system is characterised by its abundant coal resources and limited oil and gas availability. Coal abundance – despite the higher associated costs for chemical production compared to other feedstocks – has driven the development of coal-to-olefin production routes **(see → Box 2 for further details)**

(IEA, 2018). These routes have enabled coal companies to enter petrochemical operations, reducing reliance on crude oil imports and boosting domestic capacity (Stegmann et al., 2022). Currently, over half of China's methanol production is used for MTO processes, a share that is expected to grow (RMI, 2022).

5.1.2 GLOBAL TRADE

China plays a leading role in global trade as an importer of precursors for plastic production – fossil fuel outputs of the refining process of oil and gas – as domestic production falls short of meeting the demand from its massive manufacturing market. China's large production capacity not only serves the internal market but also supplies global markets as the **global leader in exporting finished products** (UNCTAD, 2020; OECD, 2022b). In 2015, around half of all plastics produced in China were exported to the US and EU, showing the sector's strong link to foreign demand (Cabernard et al., 2022).

5.1.3 POLICIES IN PLACE

In 2021, as part of the 14th Five-Year Plan (FYP) China presented the **Pollution Control Action Plan** (Government of China, 2021b). This plan **promotes minimisation of production** through the reduction at source of certain plastic categories, such as single-use plastics, plastics bags and excessive packaging. Furthermore, it **promotes the use of plastic substitutes** while requiring environmental and lifecycle assessments for each option. The **plan also seeks to promote circularity** through improved product design, enhanced waste collection systems and construction of recycling facilities. However, in the **same document, the expansion of incineration capacity is also included**, which could increase overall lifecycle emissions (OECD, 2022a).

Building on the priorities of the 14th FYP, the Chinese government issued the **strengthening clean and efficient use of coal communication** (Government of China, 2024), which directly affects decarbonising production. However, the message is mixed. On one hand, it **promotes shifting coal use from energy generation to feedstock in the chemical sector** – a move that would increase emissions from plastic production. On the other hand, it **calls for integrating this shift with green electricity, green hydrogen and carbon capture technologies**, which would reduce sectoral emissions (Government of China, 2024). The **LT-LEDS** document from China announces that efforts will be made to accelerate the **industrial peaking of carbon emissions** from sectors such as chemicals, accelerating green and low-carbon transformation (Government of China, 2021a).

For over two decades, China was the largest importer of plastic waste accounting for 56% of global imports (Wen et al., 2021). However, the **country began regulating imports of plastic waste in 2014 and ultimately banned them in 2018**. This led to a 46% drop in global plastic trade flows that year (Wen et al., 2021), with the ban particularly impacting Japan, US and the EU. As a result, these countries increased domestic recycling, disposal and domestic stockpiling, or unreported trade (OECD, 2022b).

5.1.4 DECARBONISATION CHALLENGES

High carbon intensity: Due to its heavy reliance on coal, China's plastics sector has a carbon intensity up to twice the global average (Cabernard et al., 2022; Liang et al., 2023). Given China's dominant role as the world's top plastic producer, its coal-based production system significantly contributes to the global plastic carbon footprint (Cabernard et al., 2022).

Strategic use of coal: Coal use in China's plastic and chemical industries appears to be a strategic policy choice. In 2024, the chemical sector represented the primary contributor to rising energy use and emissions, with coal consumption increasing by 18% year-on-year during the first eight months (CREA, 2024). As demand for coal in the power sector declines, coal producers are increasingly moving towards chemicals with several planned initiatives expanding the country's coal-to-chemicals capacity (CREA, 2024).

Young infrastructure lock-in: China's reliance on a young, coal-based infrastructure suggests that future demand will likely be met using existing infrastructure and production assets, making rapid transformation more difficult and increasing the risks of stranded assets (RMI, 2022; Tilsted et al., 2023).

Table 3:

Coverage of current Chinese policies across mitigation strategies for the plastics sector

Instrument	Mitigation strategy	Assessment
Pollution Control Action Plan	**Minimise Production**	**Target:** Yes – ban
		Scope: Specific plastic products
		Instrument: Policy guidance
	Enhance circularity	**Target:** No
		Scope: All plastics
		Instrument: Policy guidance
Strengthening the clean and efficient use of coal	**Decarbonise production**	**Target:** No
		Scope: Chemical sector
		Instrument: Policy guidance
LT-LEDS	**Decarbonise production**	**Target:** No
		Scope: Chemical sector
		Instrument: Voluntary agreement

5.2 EUROPE

5.2.1 PRODUCTION SYSTEM

The EU's plastic production system holds a large segment of global capacity for chemicals and plastic production as the third biggest producer of plastics in the world, representing 12.3% of global production (Plastics Europe, 2024). However, this capacity has been declining in recent years (Plastics Europe, 2024). The **primary feedstock used in the region is naphtha, derived from crude oil** (EEA, 2021; Karali et al., 2024). Due to the limited resources available in the region, oil is imported from different countries, with the US, Norway, Kazakhstan, Iraq and Saudi Arabia being the top five countries from which the EU imports crude oil (EUROSTAT, 2025).

The EU's petrochemical production facilities, particularly steam crackers, will require upgrades or replacements in the coming decades (Tilsted et al., 2023). Investment decisions made during this decade will shape the future EU plastics production system. Aligning new investments with decarbonisation strategies is critical for ensuring a sustainable plastic production sector in the years ahead (SYSTEMIQ, 2022).

5.2.2 GLOBAL TRADE

EU's role in global trade is characterised by its powerful chemical industry. The EU maintains a strong position in high-value market segments (IEA, 2018), with polymers produced in the EU used both in the region and for export, establishing the EU as a net exporter of polymers (EEA, 2021). Germany alone accounts for 10% of global exports in polymers and ranks second in terms of exported final plastic products. At the same time, as the second-highest region in per capita plastic consumption(OECD, 2022b), EU countries are among the top importers of finished plastic products (UNCTAD, 2020), generating two-thirds of the EU's plastic-related carbon footprint outside the region in 2015 (Cabernard et al., 2022).

In terms of plastic waste, EU countries rank among the top exporters, with Germany leading in volume globally (UNCTAD, 2020). However, EU waste exports have decreased in recent years, due to external bans from importer countries, such as China. Recent studies indicate that the EU is emerging as a net importer of plastic scrap to supplement its growing recycling industry (Houssini et al., 2025).

5.2.3 POLICIES IN PLACE

The EU has implemented a range of directives and regulations concerning plastics. In the case of those targeting minimisation of production and circularity, the most important ones are the EU Plastic Strategy (European Commission, 2018)and the Packaging Directive (European Commission, 1995).

Under the EU Plastic Strategy, which aims to protect the environment and reduce marine litter, GHG emissions and dependence on imported fossil fuels, the **Single-Use Plastic (SUP) Directive** was developed (European Commission, 2019) . The Directive **applies different measures – from banning to reducing** – based on the availability of alternatives to the **targeted products**. Furthermore, the **directive mandates collection targets and minimum recycled content** for certain products (Zero Waste Europe, 2019b; Break free from Plastics, 2024). The SUP Directive is a positive first step towards reducing plastic use; however, it falls short by only covering a limited range of products and therefore does not substantially reduce overall plastic use in the EU (Zero Waste Europe, 2019b).

The Packaging Directive (1994) is the origin of two relevant legislative measures – the Directive on Plastic bags and the Packaging and Packaging Waste Regulation (PPWR). The **Directive on Plastic bags introduced national reduction targets for plastic bag consumption** from 2015. The **PPWR covers different materials used in packaging** – such as paper and cardboard, plastic, glass and wood. Specific measures targeting plastics include **requirements for a minimum recycled content** in plastic packaging and **restrictions on single-use plastics packaging** not covered by the SUP Directive, such as pre-packed fruit and vegetables (Zero Waste Europe, 2019b).

The EU has also developed additional legislation packages that could **accelerate the decarbonisation of plastic production**. Under the **revised Renewable Energy Directive** (European Commission, 2023), indicative targets are introduced for the **share of renewables in industry**, noting the relevance that they could play in substituting demand for low-temperature heating and cooling options in industries such as chemicals. The directive also introduces targets for the use of renewable fuels of non-biological origin in the industry sector. The **Clean Industrial Deal** plans to release a Circular Economy Act in 2026, aiming to **set requirements for the use of bio-based and recycled materials** to substitute virgin fossil materials in sectors like plastics (European Commission, 2025). Furthermore, it also mentions that in 2025 a chemical industry package will be released to recognise the strategic role of **chemicals and accelerate the transition towards a cleaner sector**. The **LT-LEDS** submitted by the EU clearly states that plastics will experience emissions **reductions through reduced energy needs, process emissions and increased recycling rates** (European Commission, 2020).

5.2.4 DECARBONISATION CHALLENGES

High per capita consumption: The EU, as one of the world's wealthiest regions, has the second-highest per capita consumption of plastic products (Houssini et al., 2025), creating a risk of behavioural lock-in **(see → Box 5 for further detail)**. High-consuming regions where populations have become accustomed to lifestyles built around cheap, disposable plastic goods make it difficult to reduce plastic use and more sustainable consumption patterns (Tilsted et al., 2023).

Table 4: Coverage of current EU policies across mitigation strategies for the plastics sector

Instrument	Mitigation strategy	Assessment
Single-Use Plastic Directive	Minimise Production	**Target:** Yes – ban
		Scope: Specific plastic products
		Instrument: Legislation
	Enhance circularity	**Target:** No
		Scope: Specific plastic products
		Instrument: Legislation
Packaging and Packaging Waste Regulation	Minimise Production	**Target:** Yes – ban
		Scope: Specific plastic products
		Instrument: Legislation
	Enhance circularity	**Target:** Yes – reduction target
		Scope: Specific plastic products
		Instrument: Legislation
Clean Industrial Deal	Decarbonise production	**Target:** No
		Scope: Plastic and chemicals
		Instrument: Recommendation
Renewable Energy Directive	Decarbonise production	**Target:** Yes – percentage goal
		Scope: Industry
		Instrument: Legislation
LT-LEDS	Decarbonise production	**Target:** No
		Scope: Plastic
		Instrument: Voluntary agreement

5.3 UNITED STATES

5.3.1 PRODUCTION SYSTEM

The US plastic production system is shaped by its abundant gas resources (IEA, 2018; Heller et al., 2020; Karali et al., 2024). Combined with the shale gas boom of recent decades, this has made gas-based production of plastics the preferred option over other fossil feedstocks (IEA, 2018). Although this route is the least carbon-intensive among fossil-based options **(see → Section 3.1 for detailed analysis of the production routes)**, emissions could be higher than average gas-based routes due to the methane emissions release during shale gas extraction (Cabernard et al., 2022). The US ranks second in terms of total plastic production volume and has the highest per capita consumption in the world (Houssini et al., 2025).

5.3.2 GLOBAL TRADE

The US' role in global trade is defined by its status both as a major importer and exporter of plastic products at all stages of the lifecycle. The US is among the top exporters of feedstock and plastic precursors – fossil fuel outputs of the refining process of oil and gas – aligning with other leading fossil fuels producing countries. Simultaneously, it ranks first in the world for imports of final plastics, driven by its high per capita consumption (UNCTAD, 2020). Due to its high import volume, more than 80% of US' plastic-related carbon footprint was emitted abroad in 2015 (Cabernard et al., 2022). In terms of plastic waste, the US is the second-largest exporter of plastic waste worldwide (UNCTAD, 2020).

5.3.3 POLICIES IN PLACE

The Environmental Protection Agency (EPA) released the **National Strategy to Prevent Plastic Pollution** in 2024 (U.S. Environmental Protection Agency, 2025), a non-binding instrument that **promotes minimising production** through the use of alternative materials to replace plastic products and reducing the production of single-use plastics. In terms of **circularity**, the strategy proposes to develop and expand capacity for reusing plastic materials. However, it lacks specific targets and implementation plans.

Key initiatives for **decarbonising production in the sector include the Inflation Reduction Act** (IRA) (U.S. Government, 2023), which contains major provisions to help strengthen the economic case for new decarbonisation technologies in hard-to-abate and emissions-intensive industries (King et al., 2024). This includes financing concrete projects or providing tax credits for technologies, such as CCUS or production of clean hydrogen. The **One Big Beautiful Bill Act** (OBBB) passed by the Trump administration **undermines progress in deploying renewable energy and clean energy technologies accelerated by the IRA** (Climate action tracker, 2025). The LT-LEDS for the US mentions the **potential of non-carbon fuels, energy efficiency and electrification** to reduce emissions from the industrial sector. Furthermore, it **highlights the role of solutions like CCS** in sectors such as chemicals.

5.3.4 DECARBONISATION CHALLENGES

High per capita consumption: The US has the highest per capita consumption of plastic products (Houssini et al., 2025), creating a risk of behavioural lock-in **(see → Box 5 for further detail)**. High-consuming regions where populations have become accustomed to lifestyles built around cheap, disposable plastic goods make it difficult to reduce plastic use and more sustainable consumption patterns (Tilsted et al., 2023).

Low recycling rates: The US has not implemented significant regulatory actions to incentivise plastic recycling, and its recycling rates remain low compared to other OECD countries (Heller et al., 2020). Without measures to incentivise circularity, the US lacks an essential component for decarbonising the plastics sector.

Current administration: Trump Administration's decision to withdraw the US from the Paris Agreement undermines the credibility of these goals and targets. Together with current administration's reversal of emissions-reduction policies risks delaying progress in decarbonising the plastics sector and undermining global efforts to keep warming within 1.5°C (Climate action tracker, 2025). However, continued efforts of subnational and non-state actors remain relevant and important for driving decarbonisation across key sectors (Climate action tracker, 2025).

Table 5:

Coverage of current US policies across mitigation strategies for the plastics sector

Instrument	Mitigation strategy	Assessment
National Strategy to Prevent Plastic Pollution	**Minimise Production**	**Target:** No
		Scope: Plastics
		Instrument: Recommendation
	Enhance circularity	**Target:** No
		Scope: Plastics
		Instrument: Recommendation
Inflation Reduction Act	**Decarbonise production**	**Target:** No
		Scope: Chemical industry
		Instrument: Legislation
LT-LEDS	**Decarbonise production**	**Target:** No
		Scope: Chemicals
		Instrument: Voluntary agreement

5.4 SAUDI ARABIA

5.4.1 PRODUCTION SYSTEM

Saudi Arabia's plastic production system – along with other countries located on the Arabian Peninsula – **is characterised by abundant fossil fuel resources**. Ethane derived from fossil gas serves as its primary feedstock (Karali et al., 2024). Key infrastructure to produce plastics, such as steam crackers, **(see → Section 2.1 for further details on plastic production process)**, has an average age of less than 10 years in the region (Tilsted et al., 2023). Therefore, production over the coming decades is expected to rely on current technologies.

5.4.2 GLOBAL TRADE

Saudi Arabia's role in global trade is characterised by its abundant fossil resources. This access to fossil feedstock, combined with a well-established petrochemical industry, underpins the country's role in the global plastics value chain, **ranking as one of the world's top exporters of plastic precursors** – which are the fossil fuel outputs of the refining process of oil and gas (UNCTAD, 2020). Over 90% of naphtha output derived from crude oil produced in the Middle East is exported rather than consumed domestically, due to the availability of cheaper alternatives for producing plastics locally with other fossil resources, such as fossil gas (IEA, 2018).

5.4.3 POLICIES IN PLACE

Currently, **there is no legislation** in Saudi Arabia that specifically targets measures aimed at **minimising production** and promoting **circularity**.

The current strategy outlined in the **2030 National Industrial Development Program** (Kingdom of Saudi Arabia, 2022), which is part of Saudi Arabia's Vision 2030 programme, **hinders the country's capacity to fully decarbonise production of plastics**. In this strategy, the current and future importance of the plastics sector is highlighted, encouraging growth in gas-based sectors like plastics (Kingdom of Saudi Arabia, 2022). Furthermore, the main decarbonisation strategy heavily relies on the deployment of CCUS technologies as the only solution (Climate action tracker, 2024). **Saudi Arabia has not made its LT-LEDS available.**

5.4.4 DECARBONISATION CHALLENGES

Reliance on oil and fossil gas: Fossil fuels have been the backbone of the Saudi economy for decades. Current government plans, described in the Saudi Vision 2030, expand the use of oil and gas in promising sectors such as chemicals and plastics (Kingdom of Saudi Arabia, 2022). Furthermore, Saudi Aramco, the state-owned oil and gas company, is focusing on diversifying its operations due to the forecasted decline in fossil fuel use for transport or energy (IEA, 2024). The company is turning into petrochemicals, with expectations of high demand from global markets (Carbon Tracker, 2024).

Lack of reduction and circularity plans: Without plans to reduce plastic production or implement circularity measures, Saudi Arabia lacks an essential component for decarbonising the plastics sector. This gap could reinforce the country's heavy reliance on CCUS as the only measure to reduce its emissions **(see → Section 4.4.2 for further details)**.

Young infrastructure lock-in: Saudi Arabia's reliance on young petrochemical infrastructure suggests that future demand growth will likely be met using existing infrastructure and production assets, making rapid transformation more difficult and increasing the risks of stranded assets (RMI, 2022).

Table 6:
Coverage of current Saudi Arabia policies across mitigation strategies for the plastics sector

Instrument	Mitigation strategy	Assessment
2030 National Industrial Development Program	**Decarbonise production**	**Target:** No
		Scope: Plastics
		Instrument: Recommendation

5.5 POLICIES TO TACKLE PLASTIC DECARBONISATION

Globally, many countries have introduced regulations targeting plastic pollution (PRI, 2019), **primarily aimed at reducing environmental leakage.** Minimise production and enhance circularity are covered by nearly all the four countries and regions analysed, although they predominantly apply these strategies to tackle plastic pollution. The most advanced frameworks include production reduction targets and bans on specific plastic categories, and circularity is promoted through a range of different measures. **Yet, progress remains uneven across regions and limited in reducing littering rather than restraining overall consumption of plastics** (OECD, 2022b).

Across nations, there are very few climate-related policies that explicitly address plastics (IEA, 2025), and policies on reducing emissions from industrial energy use have historically also been sparse (Nascimento et al., 2022). The four countries analysed in this report are not an exception. Specific policies covering decarbonising production are scarce, and measures for decarbonising plastics depend on broader frameworks designed for industry or industrial sectors – such as chemicals. Even some of the analysed policies and strategies could potentially increase emissions. **Specificity is essential, and decarbonisation policies targeting plastics are needed.**

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DECARBONISING PLASTICS: STEPS TOWARDS NET-ZERO

GHG emissions from plastics are a major driver exacerbating climate change. The production phase accounts for 90% of total lifecycle emissions, and without intervention, emissions from plastics could more than double or nearly triple by 2050. **Plastics also are a major environmental pollution issue,** with approximately 30Mt leaked into the environment in 2022 and ocean plastics projected to outweigh fish by 2050. This twin crisis – climate change and pollution – demands integrated solutions.

Based on the available strategies to decarbonise the plastics sector – minimising production, enhancing circularity and decarbonising production – the report sequences mitigation options under each strategy to transform the sector towards net zero. Sequencing these mitigation options is essential to effectively decarbonise plastics, starting with mature, short-term actions that deliver immediate emissions reductions while preparing for longer-term solutions. Priority is given to measures that also reduce environmental pollution and related health risks. This approach helps reduce cumulative emissions and avoids getting locked into unsustainable pathways. The sequencing is structured around three overarching goals: reducing the need for virgin plastics, producing necessary plastics without fossil feedstocks and powering the entire system with clean energy.

Global production of plastics is driven by regional and country-specific characteristics. Decarbonising the plastics sector needs to consider the national characteristics and challenges described, adapting global frameworks to country-specific conditions. At the same time, global plastics are part of a complex and interconnected system, as seen in trade patterns. Therefore, global frameworks are also necessary to achieve full decarbonisation of the sector.

6.1 REGIONAL ROLE

Plastic-related policies mainly target and set goals for reducing plastic pollution. These policies can evolve beyond pollution delivering greater benefits if their measures are aligned with decarbonisation objectives.

Strategy 1: Minimise production

To implement an ambitious phase-out of unnecessary plastics and reduce overall plastic use, **countries with high per capita consumption must take the lead, driving systemic changes in how plastics are consumed and perceived in their countries.** At the same time, **regions with lower per capita consumption need to avoid building unnecessary dependencies on plastics** as their economies and populations grow. **Alternative materials to plastics need to be addressed through**

regionally appropriate strategies to ensure sustainable use and avoid resource overexploitation. Ensuring consumption and production systems are addressed globally is key to reducing both climate and pollution impacts related to plastics.

Strategy 2: Enhance circularity

Circularity must be enhanced globally, with **countries that have already advanced recycling infrastructure supporting the processing of waste streams from regions with limited access** to these technologies and transferring the required technology. **Waste export to third countries with lack of processing capacity needs to stop,** since top exporters are among the richest countries in the world and have capacities to process their own waste. **Mechanical recycling capacity should increase** through investment in new infrastructure, product design prioritising recycling, as well as enhanced sorting and processing. **Chemical recycling needs to be developed** to close the circular gap for those hard-to-recycle waste streams and increase the recycling cycles, but it needs to play a complementary role to mechanical recycling.

Strategy 3: Decarbonise production

To reach net-zero emissions for the **sector-specific and detailed decarbonisation plans for the plastics industry need to be developed**, building on country-level mitigation goals and clearly stating how these goals will be translated into different sectors of the economy. **Countries dominating global plastic production and consumption** are also among the world's major economies. These regions possess the economic and technological capacity to **lead decarbonisation of the plastics sector through domestic policy, global cooperation and investment in RDD&D** for emerging technologies. Moreover, financial support must primarily come from these regions to support global decarbonisation of the sector.

Decarbonisation of production systems needs to be led by major producing countries. Those with **upcoming infrastructure renovation needs have a unique opportunity** to align new investments with clean technologies. Countries with **newer assets must adapt their systems to enable retrofitting** with cleaner feedstocks and cleaner energy. **Fossil-fuel-producing countries must explore new strategic roles** in a decarbonised plastics future, leveraging their specific advantages to support the transition of the sector. Countries' decarbonisation plans must avoid over-reliance on single-technology solutions – especially on technologies that are currently under development or not ready at scale – given the risks they pose to achieving emissions reduction targets.

6.2 ROLE OF THE ILBI AND ALIGNMENT OF OTHER MULTILATERAL PROCESSES

Given the global scale of plastics and their interconnected value chains, coordination among actors is essential to mitigate both plastic pollution and climate change impacts. The international legally binding instrument (ILBI) on plastic pollution has the potential to facilitate such coordination at a global level. While its primary focus is on preventing plastic pollution, a comprehensive treaty must also address the sector's climate impacts, recognising that pollution and emissions are inherently linked.

The ILBI can play a pivotal role by establishing globally agreed targets to reduce plastic production and consumption, substitute plastics with environmentally sound alternatives, and enhance circularity. These three components under strategies 1 and 2 **(see → Section 4.1 for further details)** are essential to achieve the decarbonisation of the sector.

Full decarbonisation of the plastics sector also requires industrial transformation of the current production system. Alignment between the ILBI and the UNFCCC process could provide incentives for countries to take stronger action, avoiding siloed measures and decisions. Nationally determined contributions (NDCs) should be aligned with a 1.5°C goal, setting absolute, economy-wide emission reduction targets, and should be underpinned by robust national planning processes covering all sectors. Therefore, the plastics sector needs to be considered when preparing post-2030-NDCs, clearly stating the role of plastics in achieving the national target. Furthermore, LT-LEDS also need to detail how each country intends to align its plastic production and consumption with its long-term decarbonisation goals. The majority of LT-LEDS from the analysed countries do not mention plastics in achieving their proposed targets and focus on broader frameworks designed for industry or industrial sectors such as chemicals.

In August 2025, delegates had a second chance to agree on an ILBI on plastic pollution, after failing to reach agreement at the fifth session in Busan in December 2024. However, after two weeks of negotiations, no agreement was reached, and the meeting was adjourned. The most important issues that prevented consensus were related to the scope of the mandate around sustainable plastics production, the raw materials used to make plastic products and responsibility for financing the implementation of the future treaty. Unable to reach consensus by the end of the negotiation rounds, delegates were unable to agree on a final text. Notably, fossil fuel and petrochemical lobbyists were actively present in the negotiation sessions, influencing the outcome and pursuing their interest in lowering the ambition of the treaty.

ILBI negotiations will potentially reconvene in 2026. **An ambitious ILBI is essential for reducing plastic production and mitigating the climate impacts of plastics.** Most countries advocate for a strong plastics treaty, while some are united in blocking negotiations to prevent an ambitious text. As seen from China's legislation to ban plastic waste imports, national government action can have global impacts. Therefore, **coordinated action by a group of ambitious countries could be a powerful tool** to drive agreement on an issue that continues to flood the environment with plastic waste and hinder the chances of keeping global temperature rise below 1.5°C.

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