

Position Paper 2021/136

Towards a decarbonised circular plastics industry

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IndustriAll Europe's key demands:

- A transition pathway for the plastics industry with attention to infrastructure, description of the roles of all actors, and a thorough assessment of regional impacts and remedies
- Mapping of future skills needs and skills mismatches and plans for re-training and upskilling programmes derived therefrom
- Funds to support job-to-job transitions
- Clear and harmonised legislation on waste shipment, recycled content, chemical recycling, etc.
- Support for research, innovation and commercialisation of chemical recycling, biodegradable plastics, use of alternative feedstock
- The incentive to use recycled products that have a better carbon balance than raw materials
- Measures on a European scale, such as a ban on landfill and the export of plastic waste to third countries, as well as the establishment and continuous development of (uniform) deposit systems
- Strong social dialogue to accompany change: In 2013, the European Parliament proposed a European legal framework on the anticipation and the management of change – this should be created to ensure workers have the right to co-decide the transition in their workplaces and regions, strengthening social dialogue and collective bargaining.

Background

In 2019, the European Green Deal set the goal of “climate neutrality” by 2050. This means that greenhouse gas (GHG) emissions in the EU have to be cut as far as possible and the remaining emissions be compensated by an equivalent absorption (“net zero”). As carbon dioxide (CO₂) is the most prevalent GHG, public debate tends to focus on decarbonisation. To pave the way to neutrality in 2050, the European Commission has proposed to increase the 2030 target from minus 40% (compared to 1990 levels) to at least minus 55%.

For the plastics industries, achieving climate neutrality requires drastic changes. Decarbonisation of the first production stage, alternative feedstocks, increased circularity and Carbon Capture and Storage (CCS) or Use (CCU) all have a role to play.

Depending on the policy mix or pathway(s) to carbon neutrality, an additional 3-4 billion Euro will need to be invested per year until 2050.¹

The plastic industries

In 2018, global plastics production amounted to 360 million tonnes, of which 62 million is produced in Europe. Around 40% of plastics and plastic products goes into packaging, 20% into building and construction, and 10% into the automotive industry. Plastics can be found in diverse applications, such as insulation, lightweight vehicles, medical products, wind turbines and rotor blades. Global plastics production is forecast to double by 2050, and in Europe to grow by 18%.²

The plastics industry is divided into three sub-sectors: plastic production, plastic conversion and plastic recycling. They employ:

- Plastics Manufacturers: 140,000 in 2,000 companies (turnover €100 bn)
- Plastic Converters: 1,600,000 in 50,000 companies (turnover €260 bn)
- Plastic Recyclers: 30,000 in 1,000 companies (turnover €2 bn)³

Plastics have gained a rather negative reputation recently, especially in the context of plastic litter (macro- and microplastic pollution). However, many applications of plastics are beneficial: plastic packaging extends food durability and hence prevents food waste. Plastic products ensure hygiene and safety. They are lighter than other materials and therefore, for example, reduce transport energy requirements. While 5kg of CO₂ is emitted per kilo of plastics produced over the whole lifecycle, its use can generate a net reduction (e.g. insulation materials used in construction). Plastic products have lifespans of between a few weeks and 50 years.

Decarbonisation

The plastics industry has investment cycles of around 20 years. Due to the complexity of the value chain, significant investments into new or enhanced technologies and manufacturing facilities have to happen simultaneously at several points in the value chain.

The high temperatures needed to crack naphtha in steam crackers are mostly generated by burning natural gas. Crackers need temperatures of 850-1100°C and therefore large amounts of energy. Studies estimate that efficiency gains and process optimisation can lead to a reduction of 15-20% of CO₂ emissions by 2050.⁴

¹ <https://www.climate-kic.org/wp-content/uploads/2019/04/Material-Economics-Industrial-Transformation-2050.pdf>

² <https://www.climate-kic.org/wp-content/uploads/2019/04/Material-Economics-Industrial-Transformation-2050.pdf>

³ <https://www.plasticsconverters.eu/>

⁴ <https://www.climate-kic.org/wp-content/uploads/2019/04/Material-Economics-Industrial-Transformation-2050.pdf>

Electric crackers are at technology readiness level 7 (system prototype demonstration in an operational environment). The electrification or conversion to other feedstocks (see below) requires facilities to be converted entirely, or new facilities to be built. This will require considerable investment and timely reskilling of workers. If entirely new facilities are built, this is likely to take place at other sites than the current ones.ⁱ (steam crackers are often the size of several football pitches). It is essential that investment and construction go hand in hand with plans and collective agreements for the workforces, covering, for example, employment at the new sites, training or job-to-job transitions. Collective bargaining is key. In order to have a decarbonising character, the electrification of crackers depends on the availability and affordability of renewable energy.

However, more than half of the CO₂ is embedded in the material (around 2.7 kg for every kg of plastic) and is released when incinerated at end of life. Cutting emissions at the early production stage would therefore be far from sufficient to fulfil the ambitious climate targets. The most promising pathway is to drastically increase the circularity of plastics.

Circularity

A move towards circularity requires thinking about longevity and recyclability as much as functionality already from the design stage of a product. Separability, component standardisation, reduction in the number of different materials used, a molecular composition that is as simple as possible and should break down easily, and be completely or fully recoverable.

On the EU level, regulation is required to define 'Eco-design' standards to ensure that products are fit for the industrialised circular economy. The revision of the Eco-design Directive and the future Sustainable Products Initiative play a role here. IndustriAll Europe calls for similar initiatives in all European countries beyond the European Union. We call for standardised information regarding the product's expected Circular Economy features, such as life duration, failure rate, repairability, maintainability, upgradability, and dismantle-ability. Digital Product Passports could prove a useful tool. Ideally, such product passports would include information on the working conditions at the production sites of a product.

IndustriAll Europe calls on all actors to step up investment in innovation, to review the relevant vocational training content and university curriculums. It is essential to make innovative approaches practically applicable as fast as possible. We appeal to scientific institutions and industry to cooperate from an early stage to prevent any delay in the marketing of solutions. Policy makers have a role to play: they can enable cooperation, fund research and use their power as influential customers.

Substantially increasing the circularity of plastics depends on the ability and willingness of many different actors, networking along value creation stages and life cycle phases: manufacturers, processors, wholesalers and retailers, recycling and waste management companies, government agencies and consumers. Without clearly defined pathways that describe the industry's transition and every player's role in it, the exercise will fail. A circular plastics economy needs a clear roadmap that integrates all actors and political support to make changes fast and simultaneously. Such a roadmap must not only cover

infrastructure and technology, but also transition plans for workers and regions. Social dialogue has a major role to play on all levels.

However, there are limits to circularity, as not all plastics can be recycled at a maintained quality or cannot be recycled indefinitely, let alone without a loss of material in the process.

The limits of recycling

Currently, over 40% of plastic produced in Europe is incinerated to produce energy; 2.7 tonnes of CO₂ are emitted per tonne of incinerated plastic.

Unfortunately, “plastics” and “packaging” are terms frequently used interchangeably in the public debate. Not all plastics are packaging, and not all packaging is plastics. Recycling rates of plastic packaging in Europe range between 26% and 52% due to different collection schemes, infrastructure, and consumer behaviour. The [EU Directive 2018/852](#) on Packaging and Packaging Waste aims for recycling rates of 50% of plastic packaging waste by 2025 and 55% by 2030. The Commission is working on its revision of the Packaging and Packaging Waste Directive.

Mechanical recycling is the only form of plastics recycling that is currently used on a commercial scale. In this process, sorted plastic waste is ground into plastic granulates that can be used by the plastic processing industry. Products from these granulates have a much smaller carbon footprint than plastics made from primary feedstocks. However, the trend towards complex specialised plastics renders mechanical recycling more difficult.

PET is the most recycled plastic, as it is used in its pure form, widely found on the market and generally has few impurities. A large proportion of other plastics is in effect downcycled rather than recycled, i.e. used to make products of lower quality. The complexity of products, the desired functionality and demanded quality is difficult to achieve with the use of secondary raw materials.

In total, a maximum of 10% of plastics is mechanically recycled. To increase this share, changes in design are needed and collection and sorting improved. The establishment and continuous development of deposit systems (as uniform as possible) can be a useful instrument in this context. Most waste infrastructure is public, its adaptation to a new system is a matter of political will and funding.

Chemical recycling is a process in which plastics are broken back down into their chemical constituents, which can then be used to make new plastics. This means that products can actually be of the same quality as products made from virgin material. A range of different techniques exist. They differ in terms of required purity and quality of the waste plastic, in the extent to which it can be broken down, and the quality and purity of the recycled plastic product. However, the process is energy intensive; sustainable chemical recycling would therefore depend on a large and stable supply of renewable electricity. To operate profitably, recycling plants would need huge amounts of waste. This would require a far more harmonised or centralised collection and sorting of plastic waste than what is in place today.

IndustriAll Europe supports the further development and commercialisation of chemical recycling as an essential tool to increase circularity.

In the light of such increased need for waste plastics, industriAll Europe demands a review of the current practices of exportation of waste outside Europe, and to facilitate cross-border shipment. Moreover, not all countries classify plastic feedstock produced from chemical recycling as “recycled material”. A common approach is necessary, especially in the context of the discussion around a potential required content of recycled material in a product. We welcome such a requirement as a strong incentive to step up recycling where feasible.

Alternative raw materials

Even if recycling is used to its potential, there is still the need for new plastics (losses during collection and recycling processes).

Switching from naphtha to ethane or ethylene can cut emissions substantially. It is possible to produce plastics from seaweed, sugar and corn starch, but also “leftovers”, such as straw, damaged timber, and more. But the conversion stages often need more energy. While all these routes merit exploration, industriAll Europe warns that the EU should not create competition for raw materials with food production.

Just as a required content of recycled material in a product, there could be a required share of non-fossil carbon in plastic products.

The use of new feedstocks will likely lead to new production routes, possibly to the relocation of crackers into the vicinity of bio-refineries – or the relocation of biorefineries into the vicinity of crackers. Again, it is essential that investment and construction go hand in hand with plans and collective agreements for the workforces covering, for example, employment at the new sites, training or job-to-job transitions. Collective bargaining is key.

Compostable and biodegradable plastics

Bio-degradable plastics can be broken down by microorganisms or fungi into water, carbon dioxide or methane, and biomass. The use of such plastics would be sensible if they are likely to be mixed with organic waste (e.g. food packaging), or are likely to remain in the environment and not enter waste disposal systems. However, the current classification as “biodegradable” requires that a material breaks down in an industrial composter under specific conditions within a certain timeframe. This does not say anything about its degradability in the environment. Both bio-based and fossil-based plastics can be biodegradable. Not all bio-based plastics are automatically biodegradable.

The European Commission has announced a policy framework on the classification of bio-based, compostable and biodegradable plastics for 2022.

Carbon Capture and Storage

Polymers themselves comprise compounds that contain carbon that can be released, e.g. when incinerated. Hence, at the end of their lifecycle, CO₂ has to be captured at the many small waste incineration plants across Europe. Plans to ban landfilling could lead to higher levels of incineration and therefore to more emissions. Non-recyclables can still be used as energy sources, e.g. in cement plants. This is clearly preferable to mere incineration and industriAll Europe calls on industrial sectors to make as much use as possible of such synergies. The European “Ecosystems” approach can facilitate such cooperation.

Single-Use Plastics

Plastics entered the European political limelight with the European Commission’s [Plastics Strategy](#) (“A European Strategy for Plastics in a Circular Economy”) published in January 2018. The first concrete outcome was the adoption of the Single Use Plastics Directive in June 2019 after a speed record process – so fast that it took almost two years afterwards to agree on implementation guidelines and hence left Member States and companies with only a few days until end of transposition period.

The Directive bans a certain range of plastic products (cotton bud sticks, cutlery, plates, straws, stirrers, balloon sticks, cups, food and beverage containers) and requires labelling for others. Agreement was difficult to reach, e.g. on the definition of “single use” and of “plastic”, or on the treatment of paper products with a plastic content. The [implementation guidelines](#) now define plastic for the scope of the Directive as “materials consisting of a polymer to which additives or other substances have been added, being the main structural component of a final product; single use plastic products as products wholly or partly made of plastic, typically intended to be used just once or for a short period of time.”⁵

First assessments from the plastics converting sector suggest no major employment impact of the Directive. Companies were able to adjust to new requirements through changes in design or materials. Some concentrated on reusability, while others reverted to compostable materials or paper products.

IndustriAll Europe hopes that the lesson learnt from this experience is that the European Commission, Council and Parliament allow for a more thorough process at earlier stages of the current and future legislative initiatives in this field.

ⁱ Agora Energiewende estimates that “between now and 2030, roughly half of the EU’s primary steel manufacturing and steam cracker facilities and an estimated 30 per cent of its cement production plants will reach the end of their lifetimes. Since the lifetimes of these industrial assets range from 20 to 70 years (see figure ES.4), the reinvestment and location choices that companies in the steel, chemical, and cement sectors make during the next decade will create long-lasting path dependencies.” (Breakthrough Strategies for Climate-Neutral Industry in Europe, p.15 f)

⁵ https://ec.europa.eu/commission/presscorner/detail/en/QANDA_21_2709