VOLVO

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Volvo Cars position on sustainable plastics

Purpose of this document

This position paper presents Volvo Cars position on and the sustainability challenges of thermoplastic[1] materials, a material category used by Volvo Cars in large volumes.

Background and challenges

- Plastics[2] are commodity materials used by many different industry sectors today. The automotive sector accounts for 8 per cent of their use[3]. In 2021, about 390 million tonnes of plastics were produced. Around 90 per cent of the produced plastics were based on fossil resources.
- Today it is possible to find plastics based on other resources than primary fossil resources, such as recycled plastics, renewable resources (bio-based waste or vegetable oils) and captured greenhouse gases.
- Plastics are associated with many different sustainability issues, such as use of fossil resources and hazardous chemicals, littering of cities, pollution of waterways, generation of microplastics, and negative impact on wildlife. Another large societal issue is the low global recovery and recycling rates for plastics.
- Plastics play an important role in passenger vehicles, their versatility in performance and formability provides unique features. They are also key for multiple safety functions, such as safety belts, airbags and lights.
- Sustainable plastics play an important role in our sustainability ambitions. A fully electric XC40 has around 250 kg of thermoplastic materials with a CO_2 impact of 7 per cent of the vehicle (materials production and refining phase). Plastics used in packaging for manufacturing and distribution of spare parts are here excluded.

Future challenges

- One of the future challenges for plastics is being able to collect more plastic waste and utilize the collected waste in high performance plastic materials. When circulating plastics, we also need to be able to remove harmful and prohibited chemicals from the plastics. This is important to ensure that these chemicals don't continue to affect our

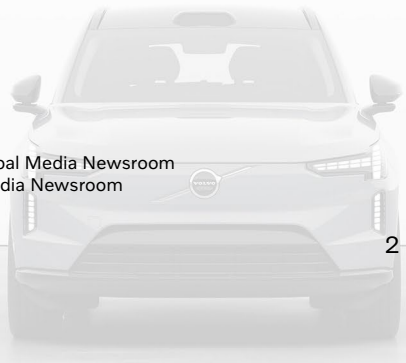
1 Thermoplastic materials are plastics that melts when exposed to high temperatures.
2 A plastic material is made up of a polymer together with additives.
3 Plastics - the Facts 2022, Plastics Europe

society. Chemical legislations are continuously evolving, and substances can therefore be banned during the use of plastic materials.

- To increase the inclusion of recycled plastics in high performance applications, chemical recycling will need to be used. Chemical recycling results in plastics with primary properties even though they are based on recycled feedstock. As a result, this technology needs to be scaled up. McKinsey & Company[4] estimates that more than $40 billion in capital needs to be invested into chemical recycling over this decade in order to scale up and satisfy 4-8 percent of the plastics demands by 2030.
- Decarbonization of the plastic industry also needs to ramp up. Near-zero emission materials are needed for all types of plastics used in society.

Volvo Cars position

- Plastics can be truly sustainable materials with low CO_2, high inclusion of post-consumer waste, recyclable, and safe (without harmful chemicals).
- We are currently allowing the use of mass-balance to help our suppliers start their sustainability journey. However, we will prioritize having sustainable materials in our vehicles.
- Volvo Cars actively advocates for policies and tries to support the plastic industry in their transformation:
    - In June of 2018 we released a special version of our XC60 SUV that looked identical to the existing model but had 170 of its plastic components replaced with equivalents containing recycled plastics. In total 60 kg of recycled plastics was put into the car in collaboration with 20 of our component suppliers. The work with the demo car kick started our recycled plastics ambition[5]. The close collaboration with our suppliers both during and after the demo car project has resulted in that a majority of the components in the demo vehicle has been implemented in the EX90.
    - In Sweden we have initiated a closed loop recycling of bumpers from workshops. Our goal is to recycle 150 tons of plastics from bumpers each year and we aim to set up more of these closed recycling loops in the future.
    - In the beginning of 2023, we had more than 700 000 returnable packaging units made of at least 25% recycled content in circulation within our network.
    - We are engaged in multiple research projects and industry networks with focus on increasing the use of pre- and post-consumer plastics in our vehicles. One example of such an arena is the Polymer Technical Institute, a neutral test facility for sustainable plastics, where we collaborate with other Swedish OEMs.
    - In our new vehicles one can also find both mechanically and chemically recycled plastic materials as well as bio-based materials[6].



4 Advanced recycling: Opportunities for growth | McKinsey
5 Volvo Cars aims for 25 per cent recycled plastics in every new car from 2025 - Volvo Cars Global Media Newsroom
6 The new, fully electric Volvo EX90: the start of a new era for Volvo Cars - Volvo Cars Global Media Newsroom

Volvo Cars actions

- Volvo Cars aims to reach net zero greenhouse gas emissions by 2040 and making low-CO_2 plastics part of our purchasing policy.
- By increasing the amount of recycled content, we reduce the climate impact from the plastics in our vehicles. Volvo Cars ambition is to have 25 per cent recycled and bio-based content in our new car models by 2025 and 35 per cent by 2030. We aim to start using more ELV scrap and reduce our use of feedstock from other product streams, like packaging.
- To reduce our dependence on fossil resources we are actively trying to diversify the feedstock needed to produce both plastics and their reinforcements.
- We are also actively working to improve the plastic packaging design we use in manufacturing and distribution for easy sorting, high recyclability and enable a high share of recycled content in them.
- We will focus on increasing our supply chain transparency and traceability to understand which sustainability risks that are associated with the materials we use.
- An important part of the work towards reaching our ambition is to collaborate with other plastic users to jointly advocate for reduced CO2 emissions from the plastic industry and at the same time raise the importance of safeguarding both people and the planet.

Volvo Cars proposed suggestions to make plastics more sustainable

1. **Plastic industry**

- Scaling up chemical recycling
    - Chemical recycling is a necessity to ensure utilization of large amounts of recycled plastics in high performance applications. It will help to reduce our dependence on primary fossil resources. Chemically recycled plastics have higher carbon footprint than their mechanically recycled counterparts, as a result we would like to see a CO2 emission reduction road map for this industry.
- Accelerate investments and plans for low CO_2 plastic production
    - We find it critical for the plastic industry to speed up investments in low CO_2 emission plastics on all continents. Reducing the CO_2 footprint can be done in different ways like changing the feedstock, using climate neutral energy and electrifying crackers. All plastic producing companies need to have CO_2 reduction roadmaps that cover scope 1, 2 and 3 emissions[7].
- Safeguarding human rights, preserving biodiversity, providing traceability, and transparency
    - The plastic industry's dependence on crude oil will likely remain for decades. It is therefore important to reduce the negative impacts of crude oil extraction on biodiversity and local communities. It is important for us that our supply chain safeguards both people and the planet. The plastic industry must conduct risk based due diligence of their supply chains.
    - The bio-based resources used as feedstock in the plastic industry should preferably be by-products from other industries or regeneratively farmed feedstock. Regenerative farming ensures increased ecosystem services from the farmland in the future.

7 What are Scope 3 emissions and how it differs from Scope 1 and 2 | World Economic Forum

2. Policymakers

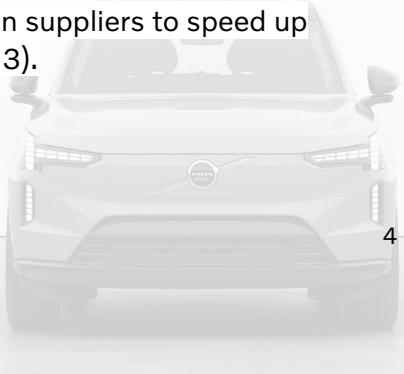
- The new draft of the end-of-life vehicle (ELV) directive sets mandatory targets for recycled plastics. The automotive industry needs clear definitions and methodologies for calculating recycled content. At Volvo Cars we would like to see 25% of the weight of all thermoplastics in the vehicle as the mandatory recycled content target. The aim should be that the recycled content should be made up of only post-consumer plastics, but in a transition period we would like to see pre-consumer plastics being allowed. We would also like to allow chemical recycling and mass balance to achieve the target
- Today there is a possible conflict between the ELV directive & the EU taxonomy. The automotive industry is highly dependent on chemical recycling to reach the targets proposed in the new ELV directive. However, the EU taxonomy says that chemical recycled plastics need to have a lower CO_2 footprint than their primary fossil-based counterparts in order to be classified as a sustainable investment. At the start-up phase one cannot assume that the carbon footprint of chemical recycled material will be lower than a fully optimized production of fossil-based polymers.
- Bio-based materials are today used in the automotive sector to reduce carbon footprint and to lightweight vehicles. These materials need to be promoted in government policies due to their added cost. There is a large risk that these materials will decrease in use, since companies will focus on reaching the mandatory recycled content targets outlined in the new ELV directive.
- Policymakers and others need to secure the expansion of renewable electricity, green hydrogen[8] and green methanol. There is a risk that plastic producers will continue to rely on natural gas, coal, crude oil, and if so, we cannot secure truly fossil free plastics.

3. Recycling Industry

- Recycling of plastics from end-of-life vehicles does not work effectively today. This is due to a combination of current vehicle design and recycling processes. Today, plastics are shredded and post sorted, giving low quality grades, leading to that the material often is burned for energy recovery. We need to move away from this practice.
- At Volvo Cars we want to close the loop for plastics. To make this possible the dismantling industry must start to take out plastic components from vehicles ahead of ELV shredding, so that the plastics can be separated and sorted. This is in line with the new ELV directive. For maximum recyclability of ELV plastics it is important to create multiple plastics streams, based on the polymer and reinforcements used. We, the automotive industry, must also increase our efforts in designing our vehicles for recycling and dismantling, in order to increase the amount of plastics that can be recycled at end-of-life.

4. Plastic Users

- Volvo Cars urges other plastic users to put requirements on suppliers to speed up deliveries of near-zero emission materials (scope 1, 2 and 3).



8 Green hydrogen refers to hydrogen produced with renewable energy.