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Volvo Cars position on Circular Economy

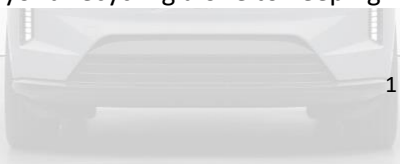
Purpose of this document

The overall intention of Volvo Cars' position papers is to provide clarity to stakeholders in areas of high relevance to the company in light of its ambitions and long-term strategies. This paper addresses how Volvo Cars can help tackle the triple planetary crisis (of climate change, biodiversity loss, and pollution) and waste by more efficient use of resources and its products through circular economy.

Background and challenge

General

- The term *circular economy*, as used in this paper, refers to an economic system and operating model which can maximize efficiency during the lifetime of resources. By doing so, this reduces demands on finite primary resources, as well as the related impacts from processing primary or secondary resources. Overall, the circular economy aims to create a more sustainable and restorative approach to production and consumption.
- The UN Global Foresight Report on Planetary Health and Human Wellbeing highlights that our planet faces a triple crisis of climate change, biodiversity loss, and pollution.[1]
- Material resource extraction and processing of fossil fuels, minerals, non-metallic minerals together with biomass cultivation cause over 55% of greenhouse gas emissions (GHG) and account for 40% of particulate matter health related impacts. Without actions to alter the way resources are used, material resource extraction could increase by almost 60% from 100 billion tonnes in 2020 to 160 billion tonnes by 2060.[2, 3]
- Additionally, global circularity remains at less than 10%, while six out of the nine planetary boundaries have already been crossed. Furthermore, roughly 9 million premature deaths annually are linked to air and water pollution with many more affected by land degradation, rising temperatures and extreme weather.[4, 5, 6,7]
- Effectively applying the circular economy has the potential to save up to 120 billion tonnes of material, reduce GHG emissions by 6-7%, unlock $4.5 trillion in economic growth and create 6 million jobs towards 2050.[8] According to The Nature Imperative report from Ellen MacArthur Foundation, September 2021, "*the extraction and processing of natural resources accounts for more than 90% of biodiversity loss and water stress*".[9] In this context, circulating products and materials can help meet a large part of consumer demand for goods and services with less primary resources. This in return can reduce negative impacts on biodiversity and water stress caused by the extraction and processing of virgin resources.[10]
- It has been shown that it is possible and profitable to decouple economic growth from resource use and environmental impact through the circular economy beyond recycling alone to keeping



materials in use for as long as possible, rethinking how we design and deliver goods as well as services to create new business models.[3]

Volvo Cars impact

- As a company that manufactures vehicles, we recognise that we require resources to deliver our products and mobility to the market. The vast majority of these resources are used in our value chain but outside Volvo Cars' own operations (manufacturing and non-manufacturing). For example, we estimate that water usage is greatest in the upstream activities, followed by the use phase and our own operations.[11] Annual total resource use (baseline year 2021) is also estimated to occur mainly upstream. Copper, aluminium, and steel are the most resource intensive materials within our products.[12]

Volvo Cars position

- At Volvo Cars, we recognize that we have an impact on the environmental and economic performance of our products across the entire value chain, including our supply chain, our production operations, the usage of our cars, as well as end-of-life processing. We are investigating how applying circular principles can support our profitability, through cost mitigation and creating new revenue streams. However, our journey to become a circular business is only possible through extensive collaboration with current and new business partners, both within and outside of our company, value chain stakeholders and other industrial actors.
- Our transitioning into a circular business will require us to:
    - Minimize primary resource use by avoiding primary material and freshwater use and increasing overall efficiency of material, energy and water.
    - Eliminate waste and pollution by preventing it, redirecting outputs to high-value circular loops, and tackling biodiversity impact.
    - Grow circular business by generating more circular revenue to support the decoupling of revenue and primary resource use.
- Volvo Cars recognises that the scope of the circular economy is broad and deep across the value chain and vehicles live long lives with multiple users in a variety of locations. We aim to assess the whole scope across resources such as water, energy, materials, and the related environmental impact of those resources from mining to recycling or end of life of our vehicles.
- The primary function of our products is to enable mobility and freedom to move. However, some of our products can also offer utility through energy storage, energy services, and by providing pivotal data through sensors to continue making mobility safer.
- We know that our customers, employees, and investors as well as policymakers and regulators are putting increased pressure on business to be more sustainable and produce more sustainable products. In this transition, we are committed to:
    - being transparent about our journey towards becoming a circular business,
    - collaborating with suppliers, engaging our customers, and interacting with policymakers during this journey.
- Volvo Cars corporate circular ambition is:
    - to move towards becoming a circular business by 2040,

- and to annually generate 1 billion SEK as additional business (i.e., combination of cost saving and revenue) through adoption of circular economy initiatives by 2025 from the 2018 baseline.

Volvo Cars actions

To achieve our circularity ambitions, Volvo Cars is continuously developing and executing initiatives and actions within our own operation, upstream and downstream value chain. These actions are mainly related to enabling circularity within design, engineering, sourcing, manufacturing, logistics, retail, and aftermarket activities. They are based on key circular guiding principles such as reduce, reuse, repair, refurbish, remanufacture, and recycle. A few examples of Volvo Cars actions are:

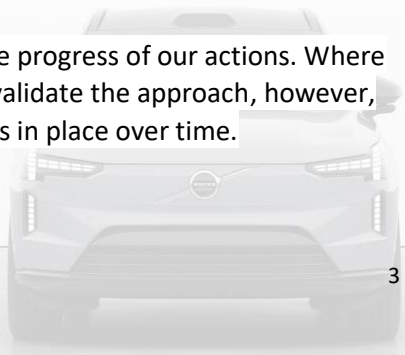
Within our own operations – Product design and engineering

- offering attractive products, usage models, and services to consumers in ways that enable them to support the transition to a circular economy. We've developed and are aiming to apply *design-for-circularity* and *engineering-for-sustainability* principles in the development of our products. This involves various measures such as
  - during the design stage, design for: disassembly, recycled and renewable material selection, reducing parts & tools, maximum utilization of products etc.
  - in product and component engineering: consideration of the entire lifecycle, weight optimization, material efficiency, minimizing emissions and waste, consideration of health aspects, consideration of the social impact etc.
- reducing primary resource use by increasing the amount of recycled content in our products, which is now part of the steering process of our car programmes.
- using a battery passport to create transparency in resource use and, in the future, also visibility of the battery condition through the lifetime of our vehicles.

Within our own operations - Processes

- ongoing investigations and initiatives for in-house development and production of batteries and remanufacturing of batteries at the regional battery centers.
- striving for solutions to recycle our vehicles after their end-of-life with for example reuse and recycling of batteries, stretch of our global footprint of reuse and recycling centers, trading used tools and machineries, and adhering to the European's recycling standards which means we achieve 85% recyclable and 95% recoverable through our vehicle lifecycle. However, access to the vehicles at their end of life is a known challenge for the entire industry.
- producing our products with energy, resources, and material efficient technologies that leads to reduced waste in the system. For example, using improved processes around waste management such as improved Material Utilization Degree (MUD)[13] during manufacturing, and adapting closed loop systems in aluminium and steel production.[14]
- set ambitions for own operations regarding waste reduction, water withdrawal, and energy efficiency towards 2030.
- developing methodologies to consolidate data and measure the progress of our actions. Where estimates are used, we work with experts and third parties to validate the approach, however, we strive for complete visibility with the right systems and tools in place over time.

Within our upstream and downstream value chain



- working closely with business partners in up and downstream to create new circular processes, initiatives, and solutions, and where we discuss our policies and ambitions.
- working to improve visibility of recycled content in our upstream supply chain by requesting verification from Tier 1 suppliers in a legal amendment released in June 2024. We're as well working with our upstream supply chain towards material certification schemes to secure responsible sourcing and traceability of the scraps.
- for the use phase of our products, ensuring seamless reuse of our vehicles through warranty and workshop services as well as supplying spare parts through the vehicles' lifetime and 15 years after the end of their production.
- In our retail operations, we analyzed waste composition and identified major water use areas across the retailer network to form a targeted strategy for them.

General

- contributing to and benefiting from engagement with third-party initiatives, e.g. being a member of the Responsible Business Alliance [15] in their Responsible Mineral Initiative (RMI)[16] and the World Economic Forum (WEF)[17] in their initiative on "Circular Transformation of Industries"[18].
- aiming to build and leverage value networks as part of our journey towards becoming a fully circular business by 2040. Through collaborative partnerships, we aim to retain material value, reduce waste, and enhance sustainability across our entire value chain.
- being part of the public debates on circular economy development, engaging with stakeholders and legislators, and being proactive to promote circular economy while ensuring that our policy advocacy efforts are in line with the above ambitions.

References

1 UN Environment Programme - Circulytics
2 Nature Magazine - Global human-made mass exceeds all living biomass
3 UN Environment Programme - Global Resources Outlook 2024
4 The Lancet Planetary Health – A just world on a safe planet
5 Potsdam Institute for Climate Impact research – Earth Exceed safe limits
6 Science – Earth beyond six of nine planetary boundaries
7 Circular Economy Foundation – Circularity Gap Report 2024
8 Global Circularity Protocol for Business - Impact Analysis on Climate, Nature, Equity and Business Performance
9 Ellen MacArthur Foundation – page 14- How the circular economy tackles biodiversity loss
10 Ellen MacArthur Foundation – page 23- How the circular economy tackles biodiversity loss
11 Volvo Cars Position on Water Management - volvo_cars_position_on_water_management.pdf (volvocars.com)
12 Volvo Cars Position on Nature and Biodiversity - volvo_cars_position_on_nature_and_biodiversity.pdf (volvocars.com)
13 Material Utilization Degree, MUD is the share of utilized material of the total amount of semifinished product needed for producing a part. For example, if 10kg of steel coil is needed to produce a steel stamped part of 7kg due to that scrap is generated in the manufacturing, the MUD is 0.7.
14 Volvo Cars position on sustainable steel - volvo_cars_position_on_sustainable_steel.pdf
15 Responsible Business Alliance – Responsible Business Alliance
16 Responsible Mineral Initiative - Responsible Minerals Initiative
17 World Economic Forum - The World Economic Forum
18 World Economic Forum - Circular Transformation of Industries