

# Compilation of information on our Handprint

Quantification of the handprint for selected Next Generation Solutions (avoided greenhouse gas emissions)



# Quantification of the handprint of selected Next Generation Solutions

We define handprint as the positive sustainability impacts that Evonik products enable along the value chain compared with other established products and applications on the market. Often, this positive contribution occurs downstream of Evonik's production processes (i.e., in customers' production processes or during consumer use). These products make a relevant contribution to a direct (measurable) improvement in one or more environmental and/or social indicators. This is reflected in a strong or weak positive rating in Signal Category (SC) 5 (environmental and social performance compared to alternative solutions) of our Portfolio Sustainability Assessment (PSA).

This handprint reflects the material sustainability ambitions addressed in SC 3 that the PARC (Product Application Region Combination) is delivering on. During the annually conducted PSA, special attention is paid to revising the market reference, as it may evolve quickly over time, or the Evonik solution may even become the market reference itself (and would consequently no longer have a handprint as defined for SC 5).

A handprint can be assessed qualitatively or (semi-) quantitatively, for example when it relates to a health benefit. Our goal is to increase the number of quantitative analyses in order to gain deeper insights into our product benefits and to enhance transparency.



## 1. Methodology and results of the handprint evaluation 2025

Evonik offers a variety of products that deliver a handprint over their life cycle compared to conventional alternatives.

We have been reporting avoided greenhouse gas emissions for selected product applications since 2008, following the chemical sector guidance "Avoiding Greenhouse Gas Emissions", published jointly by the World Business Council for Sustainable Development (WBCSD) and the International Council of Chemical Associations (ICCA)<sup>1</sup>. Our handprint calculations also incorporate the sector-agnostic "Guidance on Avoided Emissions" published by the WBCSD in 2025<sup>2</sup>. These calculations have been verified by an external auditor as part of the auditors' limited assurance engagement for the sustainability report<sup>3</sup>.

Our approach and rules for evaluating the handprint of our products are described in detail in a methodological paper published alongside this compilation of information on our handprint<sup>3</sup>. The internal Evonik Life Cycle Management team works in close cooperation with experts from the responsible business lines and conducts life cycle assessments (LCAs) in accordance with the requirements of DIN EN ISO 14040 ff. Greenhouse gas emission savings (also called avoided emissions "AE") are calculated based on the life cycle emissions of applications of selected Evonik products compared to conventional alternatives. Both the emission-saving product and the reference solution must deliver the same function to the user and be used for the same application.

Additionally, the reference solution must be available on the market, interchangeable for the typical customer in the selected market, and as similar as possible to the emission-saving product in terms of data quality, methodology, and assumptions. The simplified calculation methodology described in the "Avoiding Greenhouse Gas Emissions" guideline is applied, meaning that identical steps and corresponding emissions over the life cycle of both the reference and the Evonik solution are excluded from the assessment. This approach does not affect the final amount of calculated greenhouse gas emission reductions.

AE are first calculated for the specific Evonik product application and then for the market reference. The difference in emissions or impact between the Evonik solution and the market reference corresponds to the AE (per functional unit). Knowing the required amount of the Evonik product in the application (or per functional unit) to achieve the saving potential, the AE per kilogram of sold product can be calculated (specific AE per kg of product sold). Finally, the specific AE are multiplied by the overall sales volume of the respective product(s) in the reporting year to determine the total AE of the product application.

According to the sector-agnostic guidance published by the World Business Council for Sustainable Development (WBCSD), the selected solutions must be assessed against three eligibility criteria: climate action credibility, alignment with the latest climate science, and contribution legitimacy. The first of these criteria is evaluated at the corporate level and is outlined in our handprint methodology. The fulfillment of the remaining eligibility criteria has been checked for each handprint solution.

The avoided emissions results for the year 2025 are based on the following seven Evonik solutions.

### NGSs selected for handprint evaluation

Greentire technology
POLYVEST® in green tire tread compounds
Hydrogen peroxide to propylene oxide (HPPO) process
Fumed metal oxides in Lithium-ion batteries
Amino acids in animal feed
Improved hydraulic fluids for construction machinery and for stationary equipment
ROHACELL® for lightweight materials in airplane

<sup>1</sup> World Business Council for Sustainable Development (WBCSD) and International Council of Chemical Associations (ICCA), Avoiding Greenhouse Gas Emissions-Guidelines: Accounting for and Reporting Greenhouse Gas (GHG) Emissions Avoided along the Value Chain based on Comparative Studies, Version 2, December 2017

<sup>2</sup> World Business Council for Sustainable Development (WBCSD), Guidance on Avoided Emissions v2.0

<sup>3</sup> <https://www.evonik.com/content/dam/evonik/documents/Handprint%20methodology%20Avoided%20Emissions%202025.pdf.coredownload.pdf>



In Section 2, the selected Next Generation Solutions (NGSs) that enable greenhouse gas emission savings are presented.

A concise description is provided for each solution, along with detailed information on the scope, functional unit, system boundaries, assumptions, calculation methods, impacts, and results.

As part of the sustainability analysis, it was confirmed that the selected PARCs are rated as Next Generation Solutions, ensuring that these products do not exhibit any negative signals.

In 2025, the use of the seven selected Evonik Next Generation Solutions results in the avoidance of 44.3 million metric tons of CO<sub>2</sub>e.

These 44.3 million metric tons of CO<sub>2</sub>e reflect the total savings achieved by the selected applications, enabled by the amounts of the seven Evonik solutions sold in 2025.

Each NGS delivers a measurable improvement over the life cycle, and the associated Evonik products make a fundamental, extensive, or at least substantial contribution to reducing greenhouse gas emissions compared to conventional alternatives<sup>4</sup>.

## 2. Selected Next Generation Solutions for handprint evaluation

Every product application included in the calculation of our greenhouse gas savings is presented. The following updates are performed each year:

- Update of background data in LCA software
- Update of sales amount to 2025 quantities (the global amount sold of the corresponding Evonik solutions in 2025 was used to calculate the total savings).

<sup>4</sup>The significance contribution of chemical products to value chain avoided emissions is described in the WBCSD "Avoided Emissions" sector guidance.

## GREEN TIRE TECHNOLOGY

Evonik's silica/silane system for Green Tires is a Next Generation Solution. Compared to conventional car tires using carbon black as filler, the use of the silica/silane system and a certain polymer blend (solution styrene butadiene rubber (S-SBR) and butadiene rubber (BR)) – known as Green Tire technology – can achieve significant fuel savings and improved wet grip without impacting abrasion resistance (see Figure 1).

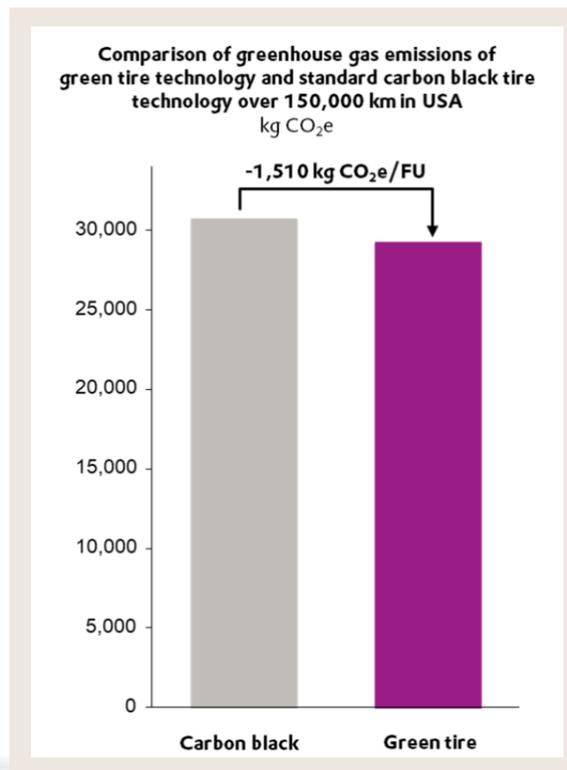
The rubber compounds in tires have a major impact on the characteristics of the tire performance. Organic and inorganic components determine the performance of the tread compound that is in contact with the road surface.

Such treads typically contain about 35% reinforcing filler, which is a key ingredient in the rubber compound to reach the desired properties. Instead of carbon black, silica can be used as filler. Bifunctional organic silicon compounds – called organosilanes – serve as coupling agents that connect silica and rubber.

In contrast to conventional carbon black as filler, the use of the silica/silane system allows an expansion of the "magic triangle" of tire performance (see figure 1).

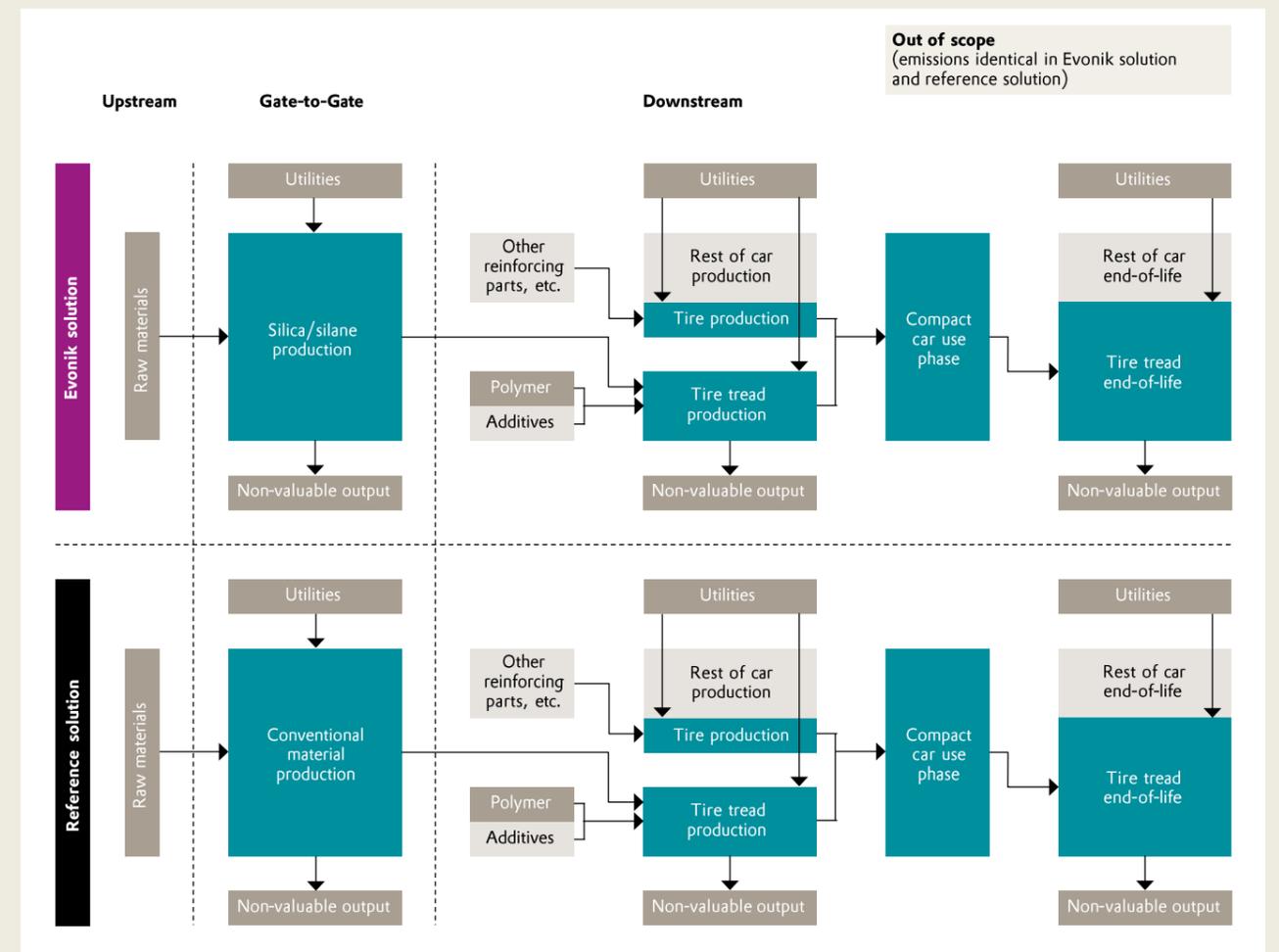


Rolling resistance and wet traction are improved without significantly affecting abrasion and therefore the service life of the tire. These improvements result in significantly lower fuel consumption for end users and therefore in reduced greenhouse gas emissions. Carbon black filled tires still dominate the global market. As the Green Tire technology has penetrated the European and parts of the Asian (Japan and South Korea) market, the advantage is only claimed for the rest of the world where carbon black tires still prevail.

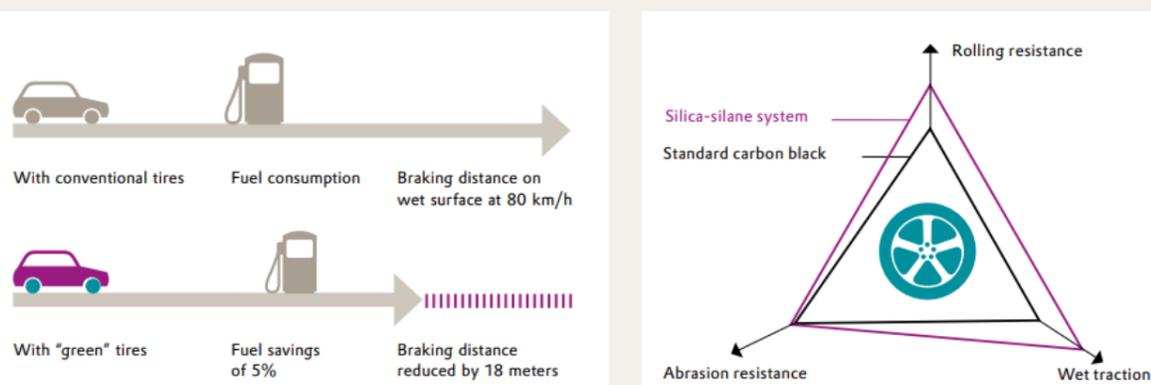


<b>Next Generation Solution</b>	Silica-silane systems in a specific rubber blend (S-SBR, BR) as a tread component in region Americas/East Europe & Turkey/Asia without Japan & South Korea for the green tire technology.
<b>Reference solution(s)</b>	Carbon black tire: Carbon black as filler material and emulsion styrene butadiene rubber (E-SBR) as tread component.
<b>Functional unit</b>	The use of silica-silane and rubber compound (S-SBR, BR) or carbon black and E-SBR as components in a compact car tire over 150,000 km.
<b>Boundaries</b>	Cradle-to-grave. Life cycle steps considered in calculations are shown in figure 2.
<b>Main parameters and assumptions</b>	The respectively required volumes of tread components for the distance of 150,000 km have been determined. A passenger car EURO 6 with its corresponding fuel consumption was assumed. Same type of vehicle and tires in each region. Field test data and statistics on fuel consumption and savings were considered.
<b>Background information on the assessment</b>	The life cycle assessment was completed in 2025, and the method is certified annually. In 2025 the LCA for the Silica production was updated using 2024 production data. With the recent update, the differentiation and regionalization between different Silica grades was increased. Each Silica grade which is used for the green tire technology is now covered by a site/region specific LCA. This means that we now use several different Silica LCAs depending on the region where the green tires compete against the carbon black tires and the grades which are typically used in the region. The regional share of electric vehicles to which this handprint does not apply is not included in the sales figures.

**Figure 2**  
Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through the use of the Green Tire technology



**Figure 1**  
The expanded "Magic Triangle" and impact on fuel consumption reveal the Green Tire technology's benefit



## POLYVEST® IN GREEN TIRE TREAD COMPOUNDS

POLYVEST® ST-E 60 is a new generation of silane functional rubber additives. It is used in green tire tread compounds to improve the homogenous dispersion of silica particles in the rubber matrix as well as to act as a reactive plasticizer decreasing the viscosity of the compound. It combines the advantages of liquid rubbers and functional silanes. Due to its rubber-based nature it exhibits a natural fit and excellent compatibility with the rubber matrix of tire tread compounds.

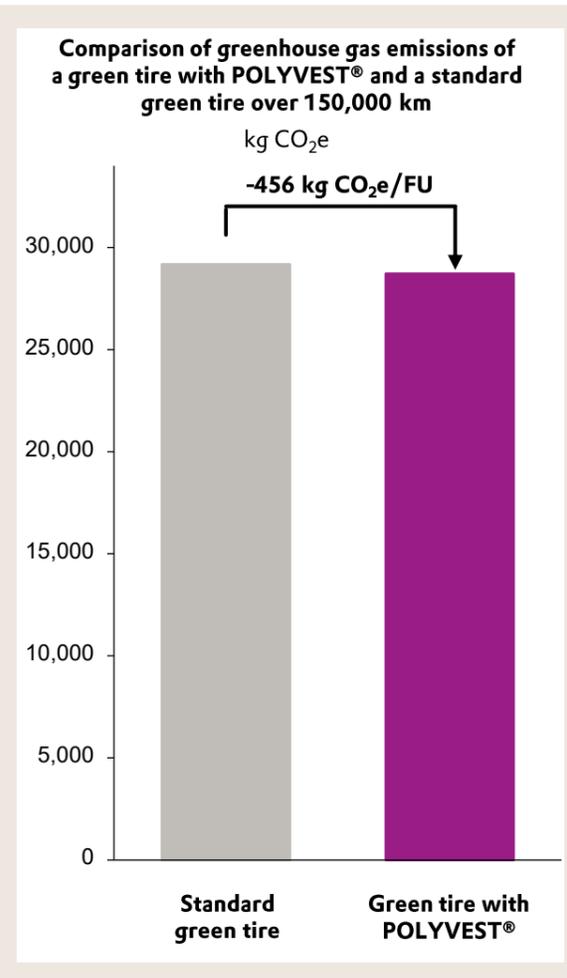
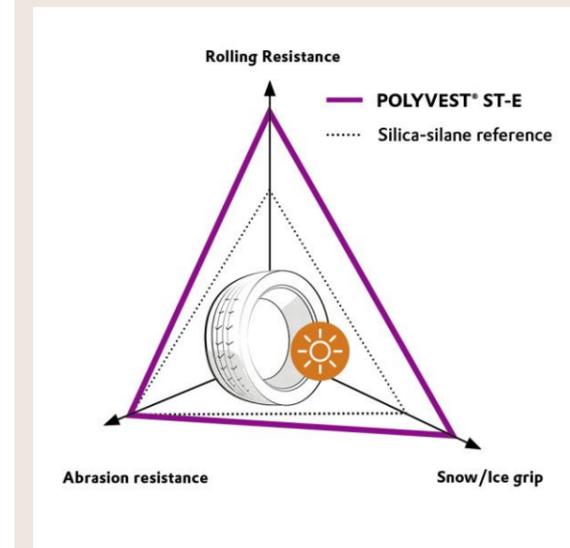
As a dual functional material POLYVEST® ST-E 60 forms strong chemical bonds with filler and matrix to create a stable and long-lasting network. If not using POLYVEST® ST-E 60, the standard plasticizer in tire treads is TDAE oil. This process oil does not chemically react with the system, leading to migration onto the surface and consequently a decrease in tire performance over time.



With POLYVEST® ST-E 60 the migration effect can be overcome, increasing the durability of a tire. In combination with the silica/silane system, POLYVEST® ST-E 60 enables further improvement of key performance indicators of green tire tread compounds such as rolling resistance, abrasion resistance, and wet grip (see figure 3).

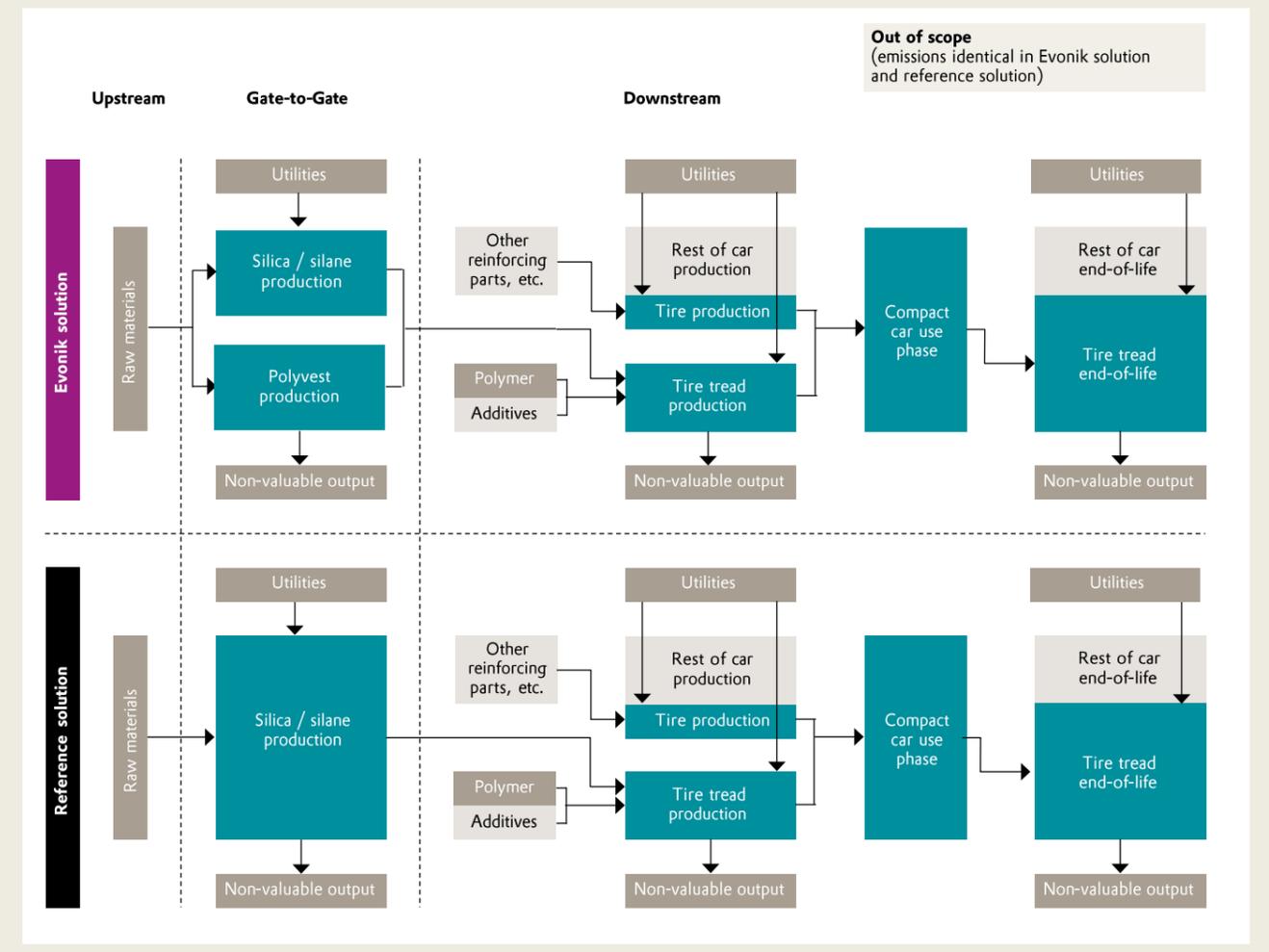
This effectively leads not only to improved fuel efficiency, resulting in less greenhouse gas emissions, but also to enhanced driving safety.

**Figure 3**  
The expanded "Magic Triangle" for POLYVEST in green tire tread compounds



<b>Next Generation Solution</b>	POLYVEST® ST-E 60 as additive for green tire treads
<b>Reference solution(s)</b>	Standard green tire (silica/silane system in rubber blend).
<b>Functional unit</b>	150,000 km driven by compact car
<b>Boundaries</b>	Cradle-to-grave. Life cycle steps considered in calculations are shown in the figure 4.
<b>Main parameters and assumptions</b>	Euro 6 car compact class consuming E10 fuel. Lifetime of 50,000 km for all tire types. Compound formulations for tire treads (expert interview). 1.5% fuel savings by POLYVEST® green tire technology (field test data).
<b>Background information on the assessment</b>	The product LCAs for POLYVEST® HT and POLYVEST® ST-E 60 have been performed in 2024 with 2023 production data. Based on compound formulations from our experts, the required amount of product for the tire treads has been determined. For tire production and end-of-life, the existing green tire model has been used. The use phase has been modeled according to the existing model with additional data on fuel savings by POLYVEST®. The share of electric vehicles to which this handprint does not apply is not included in the sales figures.

**Figure 4**  
Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through the use of POLYVEST® in green tire tread compounds.



## HYDROGEN PEROXIDE TO PROPYLENE OXIDE (HPPO) PROCESS

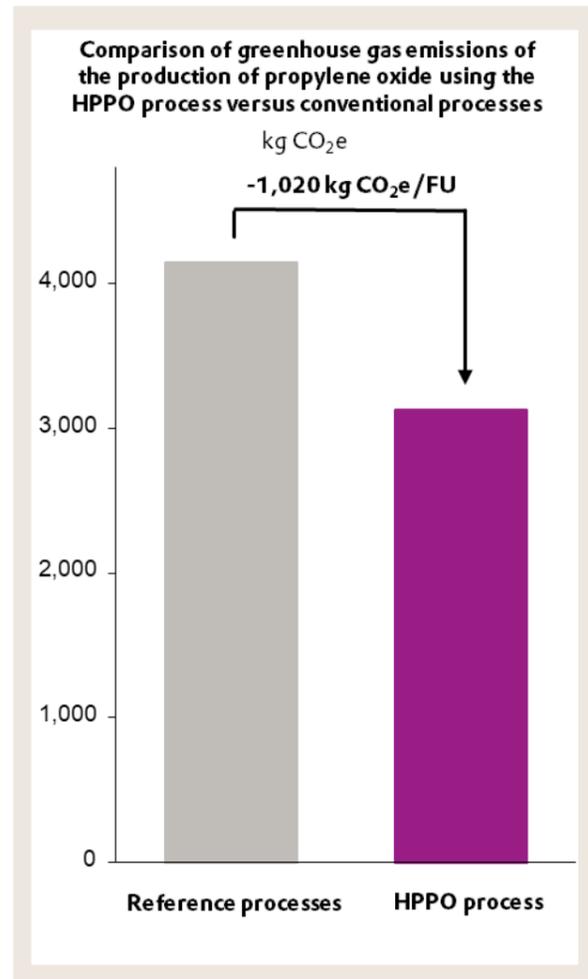
Propylene oxide (PO) is an important intermediate in the production of polyurethane — a highly in-demand chemical necessary for the foam used in everyday items like seat cushions, sport shoes, insulating materials, and more. The problem is that conventional production processes for PO tend to generate large quantities of co-products and consume a great deal of resources. Evonik and thyssenkrupp Industrial Solutions (tkIS) have therefore developed an alternative process that is more efficient and more environmentally friendly. Known as HPPO, from "hydrogen peroxide to propylene oxide," this technology involves the direct synthesis of PO from hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). The process uses far fewer resources than conventional methods, while generating only water as a co-product.

As industries around the world develop increasing sustainability ambitions, face stricter environmental regulations, and are keener than ever on lowering their investment costs, HPPO is becoming a highly attractive technology for PO production.

Evonik and tkIS supply PO producers with the license and know-how for the construction and operation of HPPO plants. In addition, Evonik provides the necessary license and know-how for the construction and operation of on-site hydrogen peroxide megaplants, which can be invested by Evonik and/ or the PO producers.

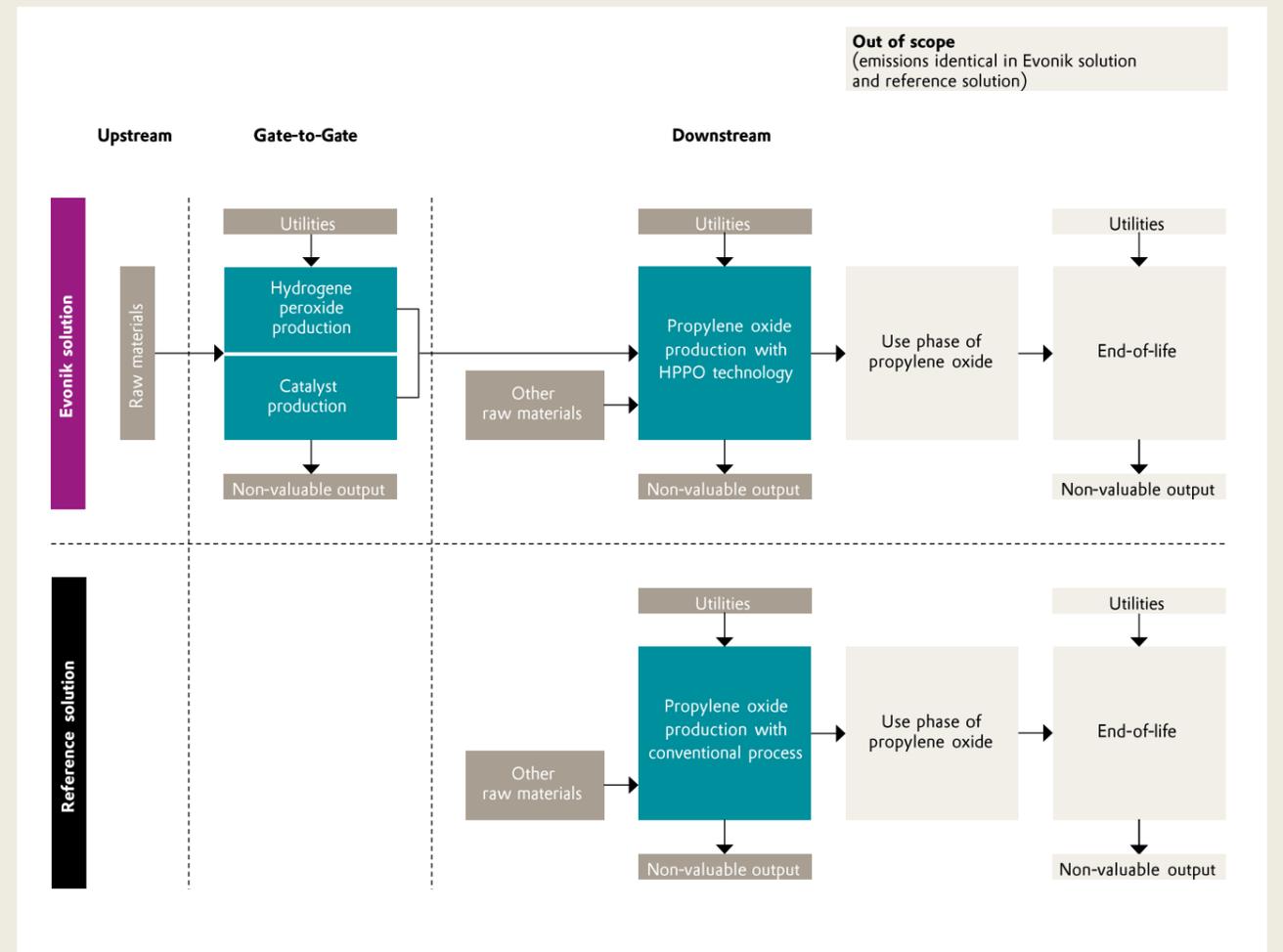
The titanium silicalite-1 (TS-1) catalyst used for the HPPO process was specifically developed by Evonik. In addition, Evonik and tkIS work together with producers on-site on the planning, construction, and commissioning of the plants.

Propylene oxide from the HPPO process shows a by average 25% reduced carbon footprint compared to the average of reference solutions. Depending on the boundary conditions the reduction potential range varies from 15% to 37%.



<b>Next Generation Solution</b>	HPPO process for environmentally friendly propylene oxide (PO) production as raw material for different polyurethane (PU) applications.
<b>Reference solution(s)</b>	Conventional processes for PO production as raw material for different PU applications.
<b>Functional unit</b>	Production of one ton of propylene oxide (which can e.g. be processed to polyether polyols and used as PU foam in insulation materials).
<b>Boundaries</b>	Cradle-to-grave. Life cycle steps considered in calculations are shown in the figure 5.
<b>Main parameters and assumptions</b>	The cases of South Korea and China have been analyzed separately. The propylene oxide/styrene monomer (PO/SM) and cumene (CuPO) process are considered as competitive routes in South Korea according to their production shares while for China, the chlorohydrin process and the propylene oxide/styrene monomer (PO/SM) according to their production shares are considered as reference to be substituted.
<b>Background information on the assessment</b>	Comparative life cycle assessments have been performed with license agreement data and market report data in 2020. The 2025 sales volume of H <sub>2</sub> O <sub>2</sub> to the HPPO production sites and corresponding production amounts of PO have been considered for calculating total savings.

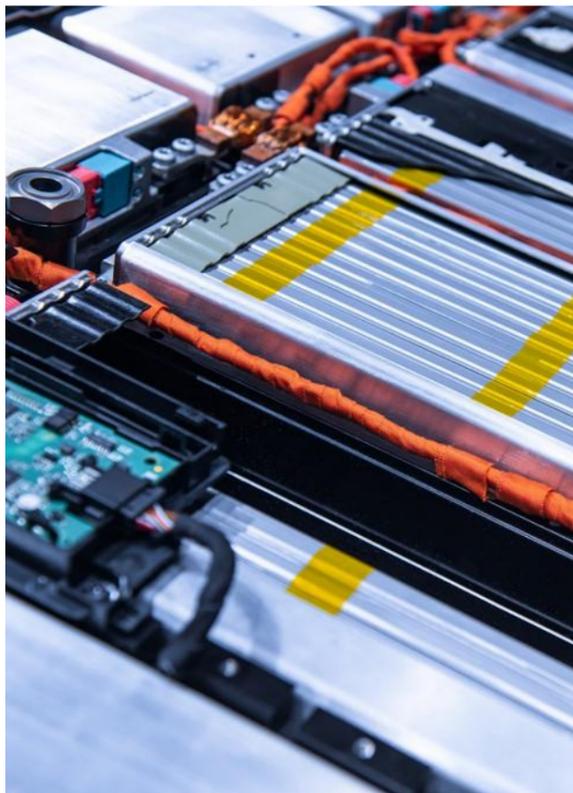
**Figure 5**  
Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through the use of the HPPO process



## FUMED METAL OXIDES IN LITHIUM-ION BATTERIES

The global shift to electric mobility is key to reducing greenhouse gas emissions and air pollution from road traffic. Batteries that are powerful yet safe, with quicker charging times and extended driving ranges, are essential for the acceptance of electric vehicles. However, their high energy density puts increased strain on the battery materials and demands better technology development.

High-quality metal oxides from Evonik are used as additives in Li-ion batteries (LIB) to increase their performance, service life, and safety. AEROXIDE® fumed alumina and fumed titania are produced by flame hydrolysis and consist of nanostructured aggregates with mean aggregate sizes of approx. 100 nm. The white powder provides a very narrow particle size distribution and exhibits high chemical purity. As dry coating on the surface of cathode materials AEROXIDE® acts as a defined cathode electrolyte interface (CEI). It prevents undesired reactions and makes batteries last longer. This increases the service life of a Li-ion battery significantly by about 50%.



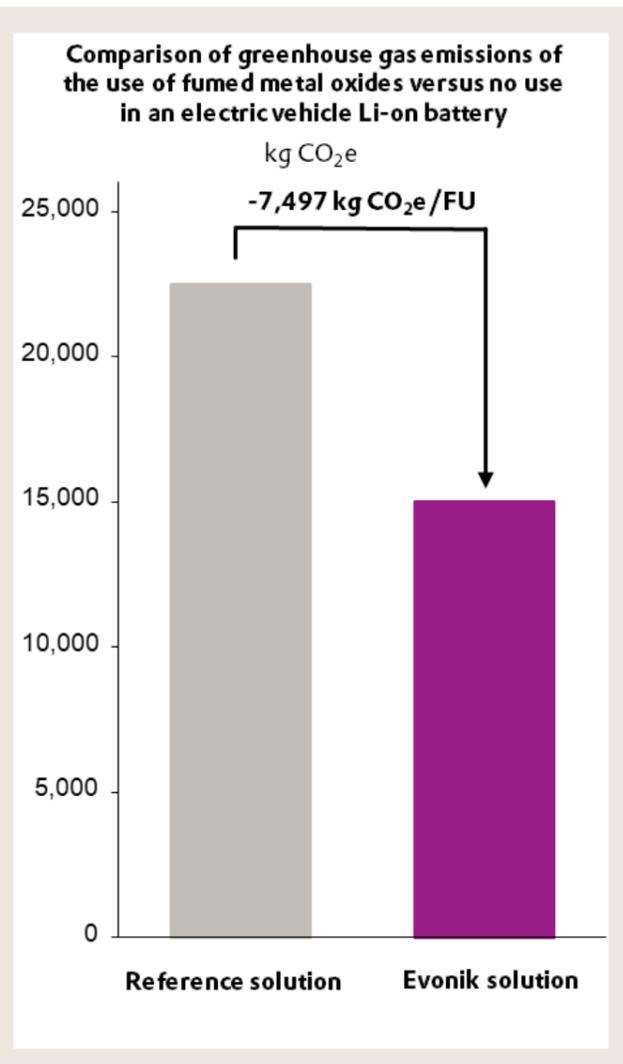
With longer lasting Li-ion batteries, fewer newly produced batteries are required to meet market demand.

The production of Li-ion batteries itself is very energy intensive and causes a lot of greenhouse gas emissions as well as the raw material production and supply.

By increasing the battery lifetime and consequently reducing battery production, the Evonik solution avoids the emission of greenhouse gas.

Applications of AEROXIDE® in Li-ion batteries:

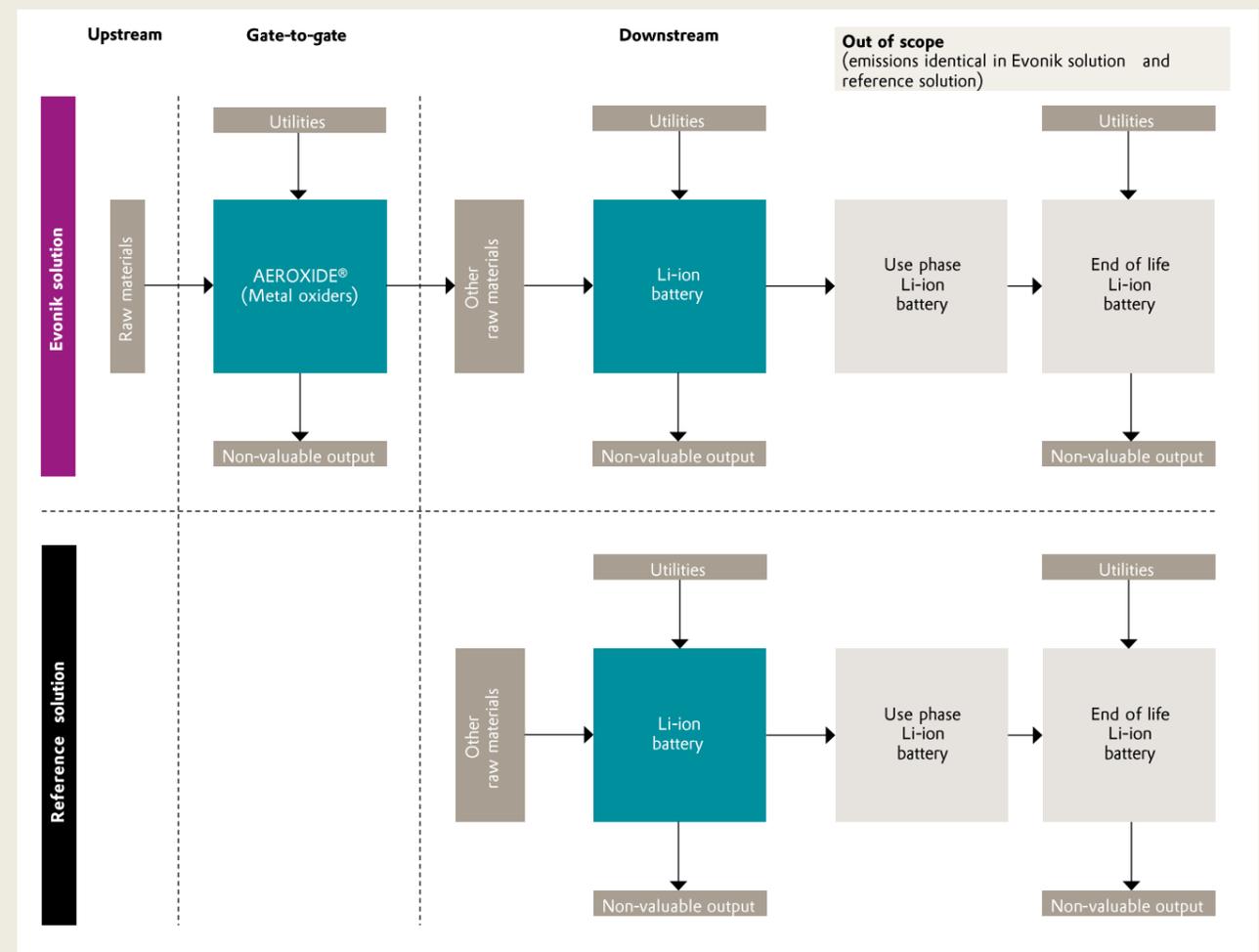
- Protective dry coating for cathode materials
- High performance LIB separator coating
- Nanostructured ceramic fillers inside separators
- Additive for electrolyte immobilization (gel polymer type)



<b>Next Generation Solution</b>	AEROXIDE® fumed metal oxides increase the performance, service life and safety of batteries.
<b>Reference solution(s)</b>	Standard electric vehicle Li-ion battery without the use of fumed metal oxides as protective cathode coating.
<b>Functional unit</b>	Electric vehicle Li-ion battery with a capacity of 100 kWh
<b>Boundaries</b>	Cradle-to-grave. Life cycle steps considered in calculations are shown in the figure 6.
<b>Main parameters and assumptions</b>	Literature value for greenhouse gas emissions of battery production has been used. A battery capacity of 100 kWh has been assumed. The Evonik solution increases the battery lifetime by 50%.
<b>Background information on the assessment</b>	The underlying life cycle assessments of the Evonik products have been conducted in 2025 and are based on production data from 2024. The LCA covers the global production of fumed metal oxides with separate LCAs for each production site.

Figure 6

Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through the use of AEROXIDE® fumed metal in batteries



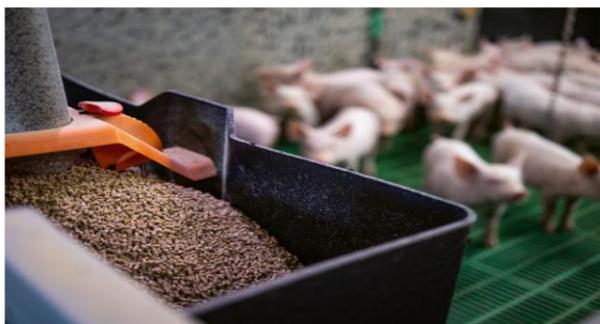
## AMINO ACIDS IN ANIMAL FEED

Animal feed is specifically formulated to meet the physiological and nutritional needs of animals, and in particular the necessary requirements of essential amino acids. A lack of certain amino acids in animal feed can be compensated either by adding a higher percentage of protein-rich feed components such as oil seed, or by fortifying the feed with essential amino acids. Supplementing animal feed with essential amino acids allows for the substitution of high protein ingredients which are associated with high emissions and requirements on land and water resources.

Furthermore, feed supplementation with these essential amino acids reduces the crude protein content of the diet. Hence nitrogen emissions such as ammonia and nitrous oxide resulting from the manure management are diminished.

In the Animal Nutrition business line, several PARCs have been created in relation to feed additives (MetAMINO®, Biolys®, ThreAMINO®, Tryptophan and Valin) and the sales region. The PARCs relating to the amino acid usage in the regions South America, North Asia, and South Asia, and Middle East and Africa have been rated as NGSs.

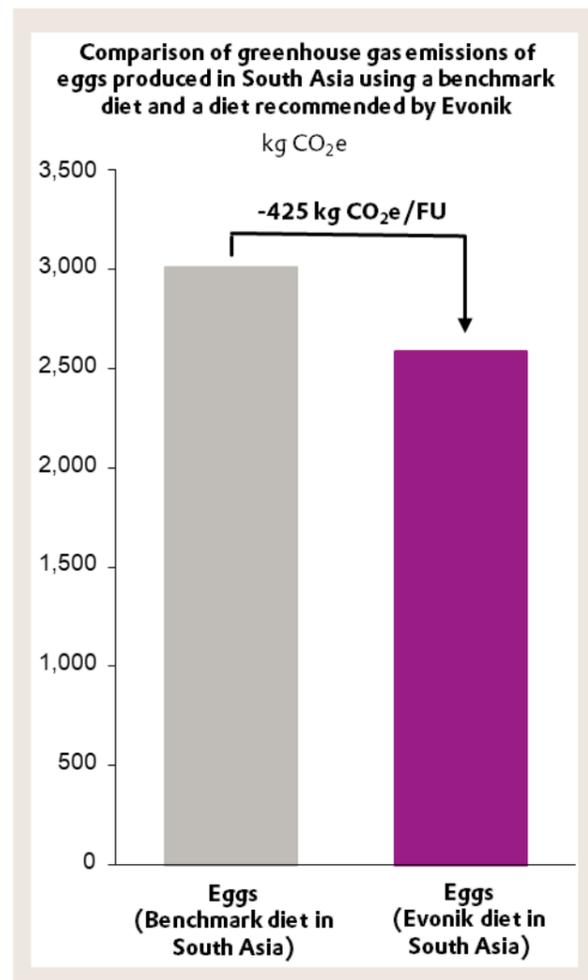
A material topic for the agriculture value chain is the protection of the ecosystems. Feed supplements enable a reduction of the amount of feed needed to supply the essential nutrients that animals require and consequently a reduction in land, fertilizer and freshwater use to produce animals. By satisfying the protein requirements of the animals via amino acids, the nitrogen content of the feed diet is decreased, this also reduces the amount of nitrogen excreted by the animals in manure, which helps to reduce harmful nutrient pollution. These two effects contribute to a positive rating in SC 3 and 5 making the amino acids an NGS.



The handprint has been validated by a life cycle assessment and certified by TÜV Rheinland. The functional unit is one ton animal live weight, respective eggs. For example, compared to the industry standard diet, the use of Evonik recommended amino acid supplementation in layer hen feed can reduce the eutrophication potential of egg production in North Asia by 16% and Land Use in Middle East and Africa by 7%.

The visual below shows the carbon footprint of eggs produced via two different diets. Whereas the benchmark diet represents a reference diet in Asia North with a reduced amino acid content, the Evonik diet contains the amino acid profile recommended by Evonik experts.

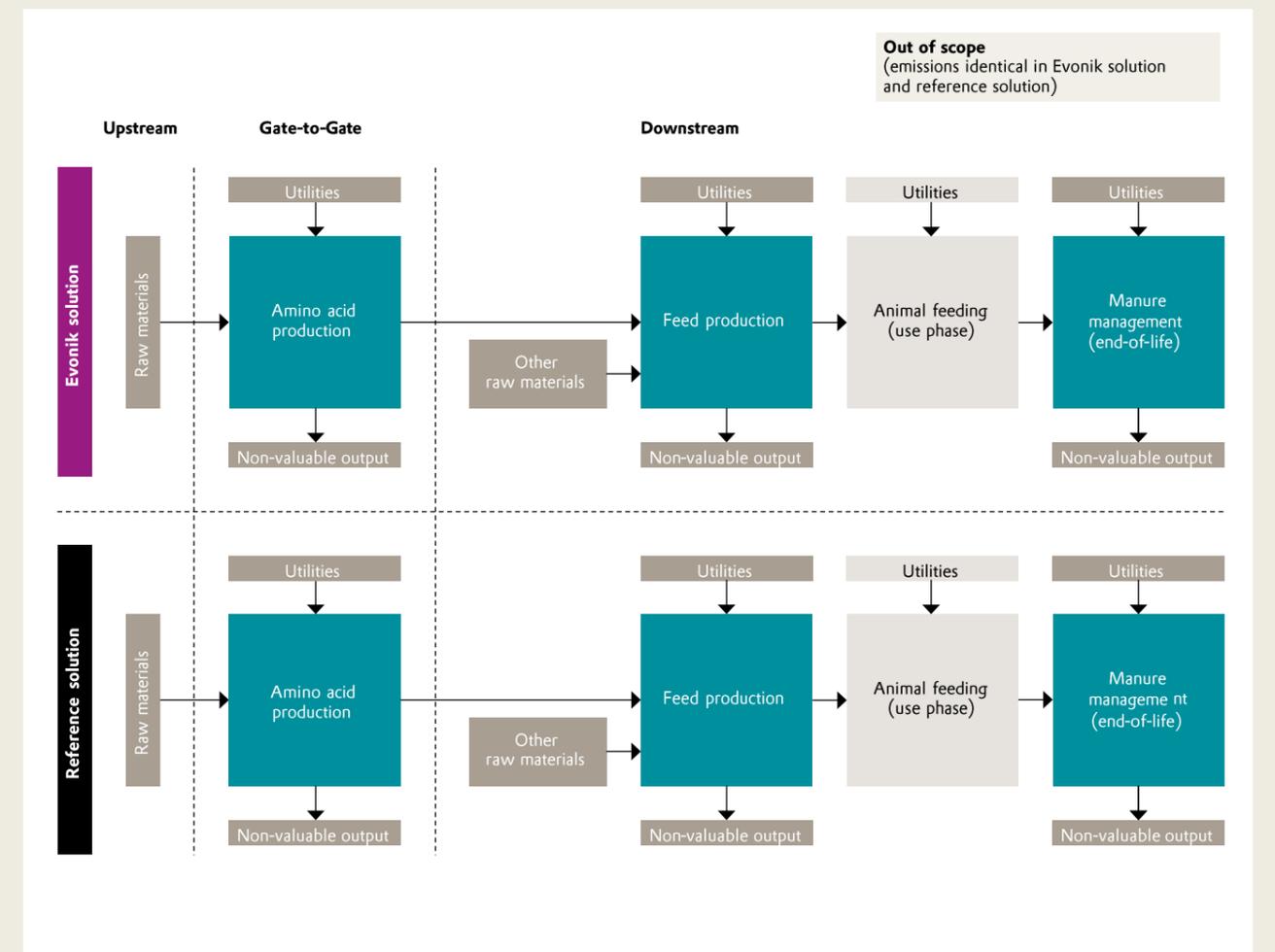
The amino acid addition in the Evonik diet enables a low crude protein diet and the reduction of ingredients with a high carbon footprint.



<b>Next Generation Solution</b>	Feed mix with a balanced amino acid profile based on Evonik recommendations (including MetAMINO®, Biolys®, and ThreAMINO®), representing "best practice" for diets with low protein levels, for regions South America, North Asia, South Asia, and Middle East and Africa.
<b>Reference solution(s)</b>	Feed mix with an amino acid supplementation customary in the respective regional market. Such a feed mix usually contains less, and different, amino acid supplementation.
<b>Functional unit</b>	One ton of live weight or, in the case of feeding laying hens, one ton of eggs.
<b>Boundaries</b>	Cradle-to-grave. Life cycle steps considered in calculations are shown in the figure 7.
<b>Main parameters and assumptions</b>	The composition of the feed mixes and the animals' nutritional demands per functional unit related to 2024. Feeding of pigs, broilers and laying hens has been covered in the study. The composition of the feed mixes, the animals' nutritional demand and (as far as possible concerning data availability) the regional origin of feed materials has been adapted to the regions South America, North Asia, South Asia and Middle East and Africa, respectively. As a conservative assumption, an identical feed conversion rate between the Evonik solution and reference solution (per region) has been considered.
<b>Background information on the assessment</b>	Sales volumes for amino acids supplied by Evonik to the feed industry in 2025 have been used to calculate total savings. Regional sales volumes have been aligned with the respective regional emission avoidance. The considered amino acids are: MetAMINO®, Biolys®, ThreAMINO®, Tryptophan and Valin.

**Figure 7**

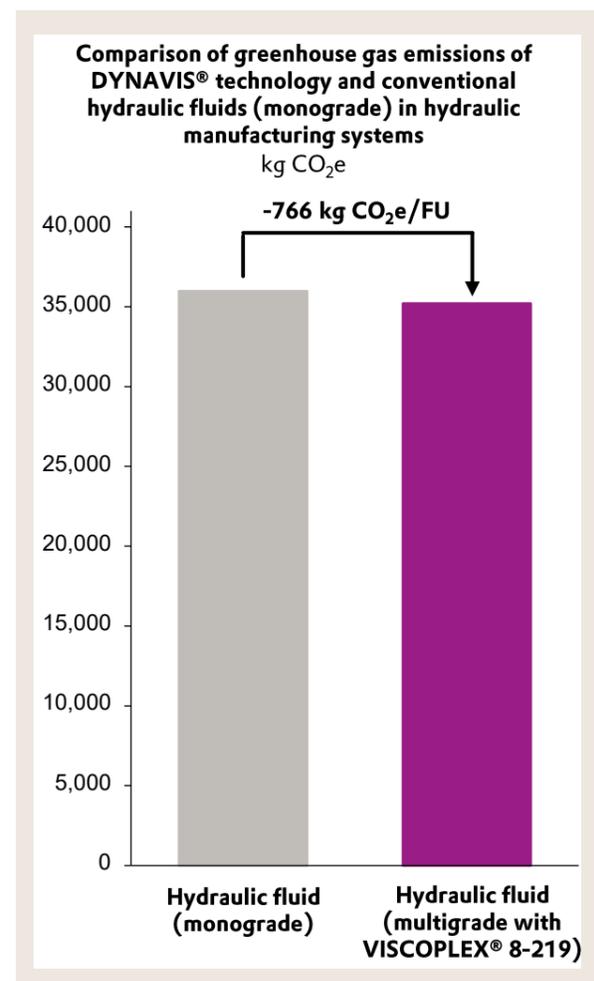
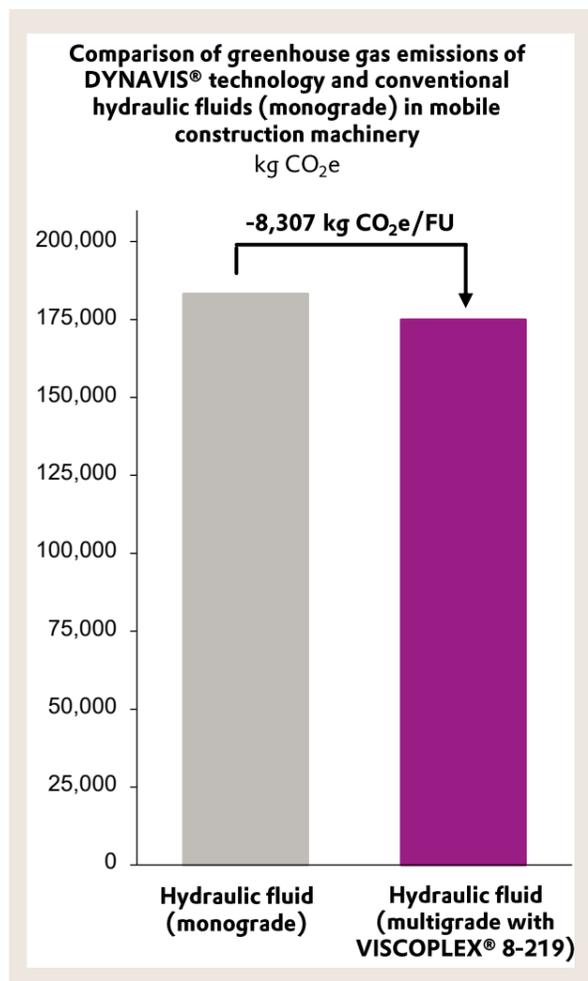
Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through the use of amino acids in animal feed



## IMPROVED HYDRAULIC FLUIDS FOR CONSTRUCTION MACHINERY AND STATIONARY EQUIPMENT

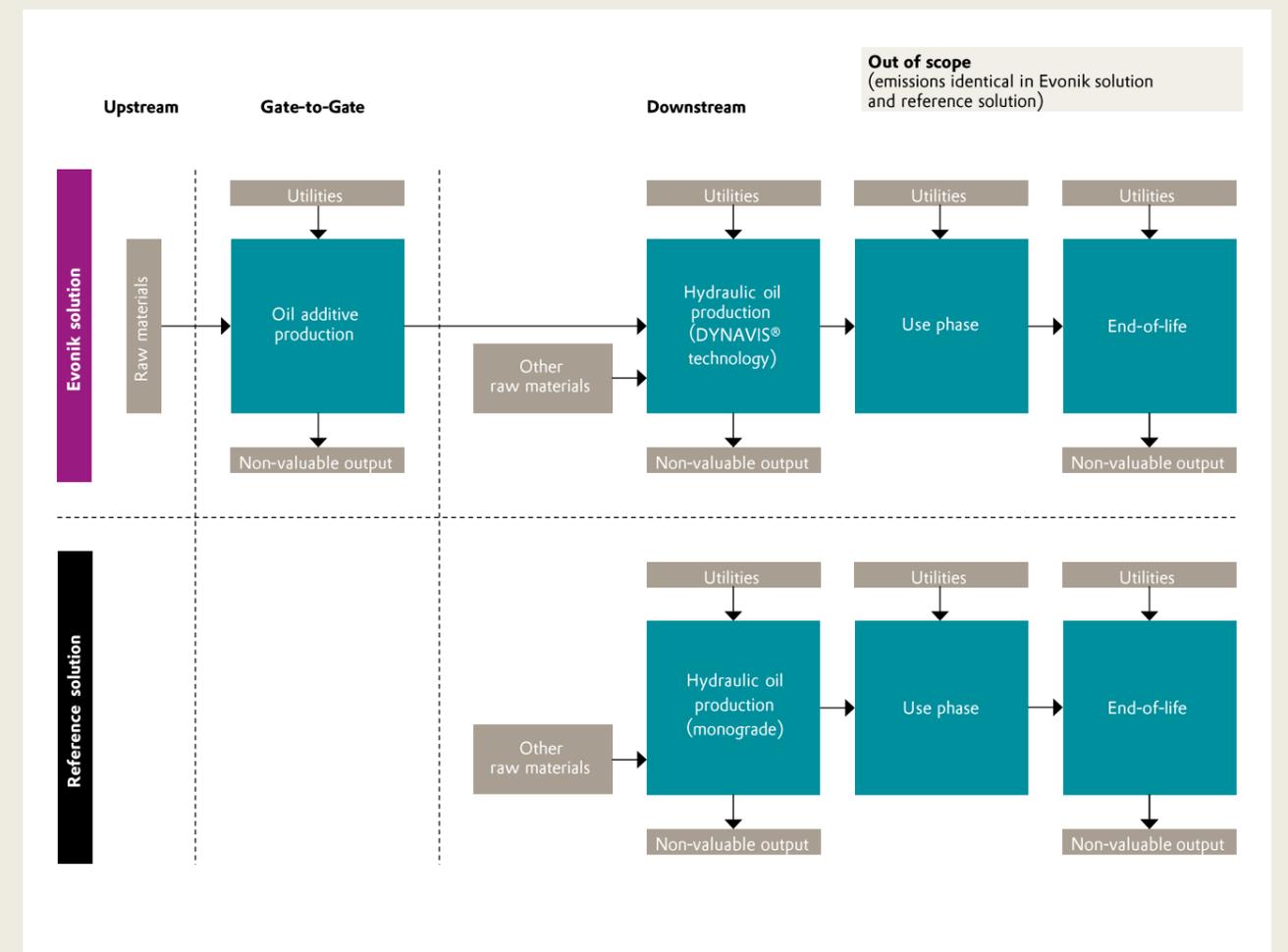
The right oil viscosity under operating conditions in hydraulic pumps, motors, and actuators is crucial for high equipment efficiency. Hydraulic fluids formulated with DYNAVIS® technology are based on highly shear stable viscosity index improvers, VISCOPLEX® from Evonik, that allow fluids to maintain the desired viscosity under shear and over an extended temperature operating window. This technology results in more powerful machinery with reduced internal leakage, less hydrodynamic friction and reduced cooling demand. Lower oil peak temperatures potentially enable longer oil drain intervals. DYNAVIS® is also fit for operating conditions varying from highly dynamic to less dynamic flow patterns of the hydraulic fluid (e.g. in hydraulic manufacturing systems). In all cases, the fluid not only needs to protect the equipment from wear and corrosion, but needs to transmit power efficiently, as well.

In the PSA, this product application has been considered within the PARC "Viscosity modifiers for hydraulic fluids in manufacturing" and rated as an NGS because it positively addresses stakeholders' ambitions (SC 3) regarding productivity and energy efficiency. It also has a positive environmental impact (SC 5) compared to conventional hydraulic oils without DYNAVIS® technology (i.e., monograde fluids). Intensive R&D and numerous field trials have proven that DYNAVIS® technology allows manufacturing systems to work up to 10% more efficiently. For example, plastic injection molding equipment benefits with 2 – 6% reduced energy consumption in the hydraulic system and overall lower GHG emissions. The handprint has been quantified through an LCA conducted by our in-house experts from the LCM group. Using a better oil, based on DYNAVIS® technology at the next scheduled maintenance, is an easy option for reducing energy demand in any hydraulic manufacturing plant.



Next Generation Solution	First case: DYNAVIS® technology in hydraulic fluids of hydraulic construction machinery globally. Second case: DYNAVIS® technology in hydraulic fluids of hydraulic manufacturing systems.
Reference solution(s)	For both cases: Conventional hydraulic oils without DYNAVIS® technology (monograde)
Functional unit	First case: Operation of a hydraulic construction machine moving 1 million metric tons of mass over a defined distance. Second case: 8000 h production hours of an injection molding machine
Boundaries	Both cases: Cradle-to-grave. Life cycle steps considered in calculations are shown in Figure 8.
Main parameters and assumptions	First case: All hydraulic fluids have been used in field tests in a mid-sized excavator. While the oil drain interval of the monograde fluid is 2,000 hours, the DYNAVIS® fluids need to be changed after extended oil drain intervals, i.e., 4,500 hours. Furthermore, fuel consumption per functional unit decreases by 5 – 15%. Second case: Based on the latest field tests, 3.3% electricity saving was found. Total amount of reduction mainly depends on the length of the cycle. Oil Drain Interval (ODI) of 8000 h. For the carbon footprint of the monograde fluid, composition is assumed to consist of 100% base oil group I.
Background information on the assessment	For both cases: The model is mainly based on data from Europe. The reference year is 2023. Savings refer to the global use of DYNAVIS® technology. The global amount sold of the corresponding Evonik VISCOPLEX® products to the hydraulic oil industry in 2025 has been used to calculate total savings.

**Figure 8**  
Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through the use of improved hydraulic oils



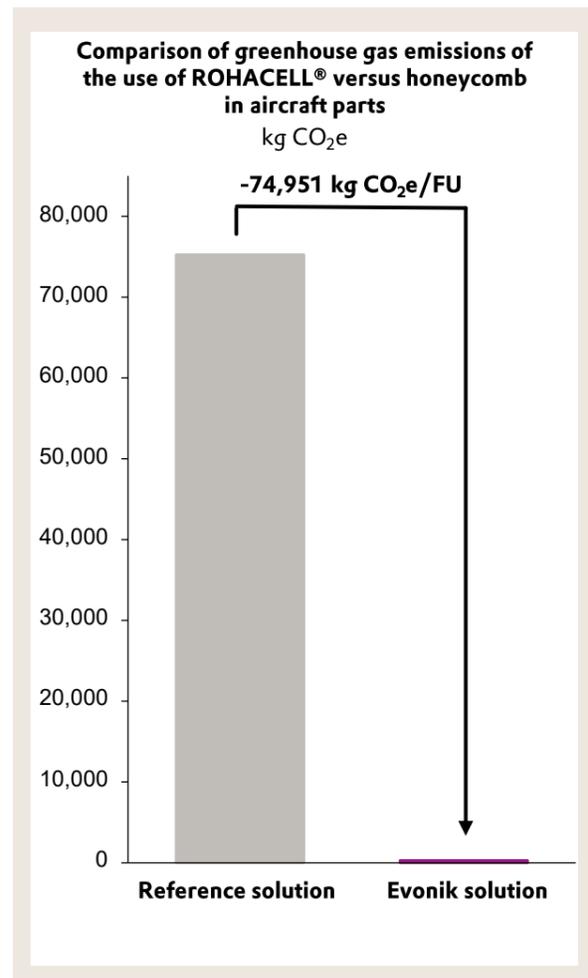
## ROHACELL® FOR LIGHTWEIGHT MATERIALS IN AIRPLANE

The aviation industry faces increasing pressure to reduce its environmental impact, with fuel consumption being major contributor to its carbon footprint. One of the most effective ways to achieve lower emissions is through lightweight construction, as reducing aircraft weight directly translates into lower fuel consumption and, consequently, reduced CO<sub>2</sub> emissions.

Evonik's ROHACELL® structural foams provide an efficient lightweight solution for aircraft composite parts, offering significant weight reductions compared to conventional honeycomb materials or monolithic concepts made of metal. By replacing honeycomb structures with ROHACELL®, aircraft manufacturers can achieve a decrease in structural weight, leading to improved fuel efficiency over the aircraft's entire operational lifetime. Given that even small weight reductions can result in considerable fuel savings across thousands of flight hours, the impact of ROHACELL® on avoided emissions is significant.

Beyond weight savings, ROHACELL® also enhances the efficiency of the production process. Unlike honeycomb materials, which require complex processing and additional filling materials, ROHACELL® is easier to integrate into composite structures, reducing material waste and energy consumption during manufacturing. Additionally, its high mechanical strength and durability contribute to longer-lasting components, further supporting sustainability by minimizing the need for replacements and repairs.

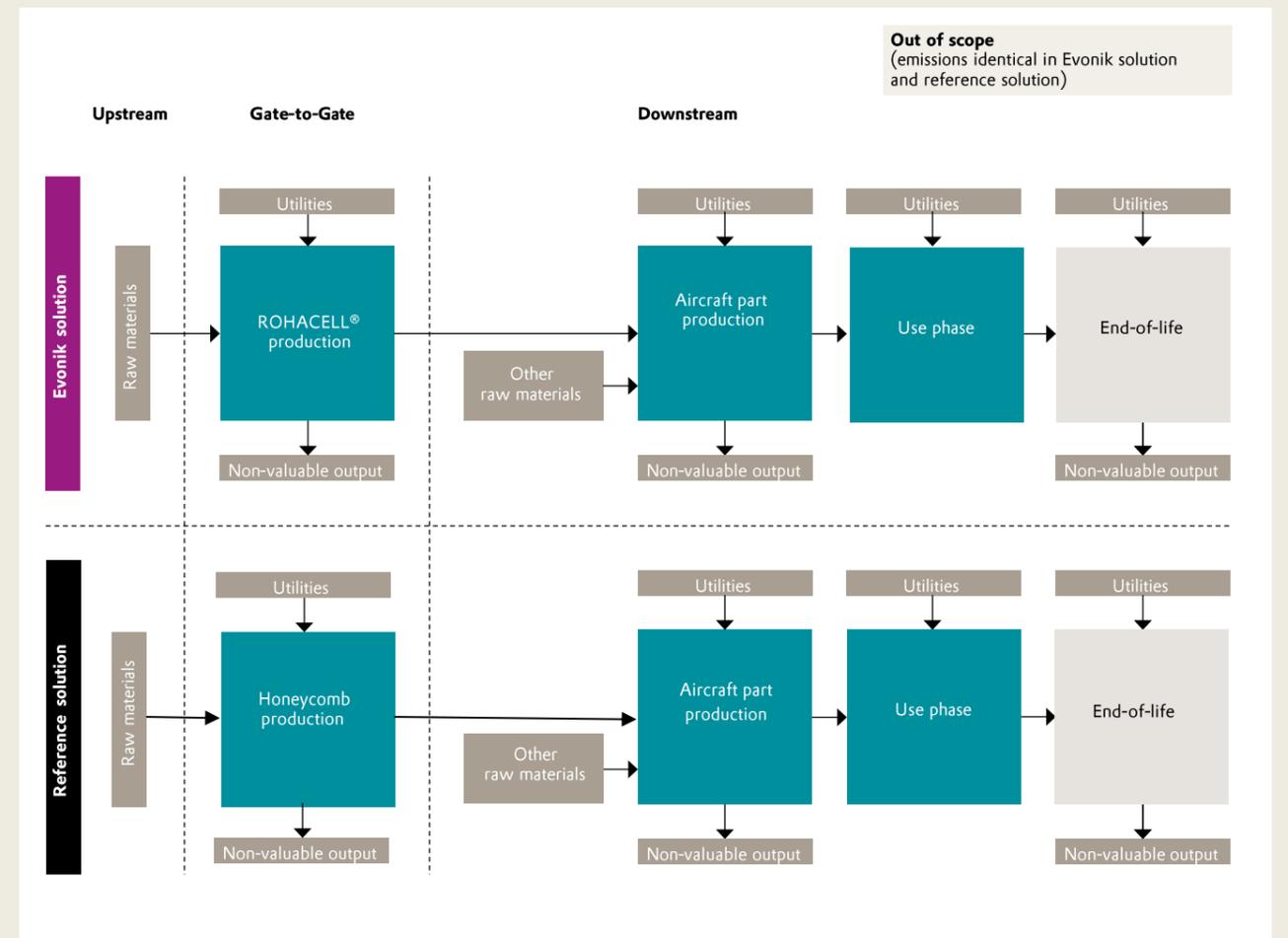
Using ROHACELL® in a single aircraft part avoids 74,951 kg CO<sub>2</sub>e/FU. This is due to the material's lightweight properties, which reduce fuel consumption and greenhouse gas emissions throughout the aircraft's lifecycle.



<b>Next Generation Solution</b>	Next Generation Solution from ROHACELL® structural foam serves as an effective core material for sandwich composite components in aircraft, facilitating significant weight reduction and cost savings. By incorporating lightweight solutions in aircraft design, fuel efficiency and minimize emissions through decreased fuel consumption is enhanced.
<b>Reference solution(s)</b>	Honeycomb structures are recognized as the benchmark core material in sandwich composite aerostructures.
<b>Functional unit</b>	Total lifetime of a commercial airplane.
<b>Boundaries</b>	Cradle-to-grave. Life cycle steps considered in calculations are shown in the figure 9. Identical emissions for Evonik and reference solution are not considered, e.g., total aircraft production and end-of-life of the aircraft.
<b>Main parameters and assumptions</b>	The literature value for avoided greenhouse gas emissions per kilogram of weight reduction in a passenger airplane has been utilized to assess the environmental impact over the aircraft's total lifetime. Weight reductions are calculated based on comprehensive industry reports that detail the production processes of aircraft parts.
<b>Background information on the assessment</b>	Underlying life cycle assessments of the Evonik products have been conducted in 2025 and are based on production data from 2024.

**Figure 9**

Overview of life cycle steps considered in the comparative analysis of greenhouse gas emission reductions through use of ROHACELL® in aircraft parts



**EVONIK INDUSTRIES AG**  
Rellinghauser Straße 1-11  
45128 Essen Germany  
[www.evonik.com](http://www.evonik.com)

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