

Evonik Green Bond Impact Report 2021

December 2022

Evonik Green Bond Impact Report

Evonik is one of the world leaders in specialty chemicals. According to our purpose “Leading beyond chemistry to improve life, today and tomorrow” we are interlinking disciplines, skills, and perspectives so that we can create value-generating and sustainable solutions for our customers. These solutions play a key role in our customers’ products and help them meet their sustainable goals and position themselves for the future. For that we rely, above all, on our innovative capability, which is based on our strong innovation culture.

In 2022, Evonik has embarked on the next phase of its strategic transformation. Sustainability is being integrated fully and systematically into all elements of the corporate strategy: portfolio management, innovation and HR processes. Accordingly, we set ourselves new ambitious sustainability targets. These relate, for example, to the transformation of our portfolio and the update of our climate strategy for the period 2021 to 2030 in line with the commitment to the Science Based Targets initiative (SBTi). Our commitment to become climate neutral in 2050 goes far beyond the issuance of Green Finance Instruments.

Evonik Industries AG issued its first Green Finance Instrument in the form of a green hybrid bond on August 26, 2021, with a nominal volume of €500 million. Evonik’s Green Finance

Instruments offer investors the opportunity to contribute to the financing of Eligible Green Projects as defined in Evonik’s Green Finance Framework, primarily capital expenditure related to the manufacturing of “Next Generation Solutions” with substantial sustainability contribution in the value chain.

The Green Finance Framework has been set up in line with the ICMA Green Bond Principles as well as the LMA Green Loan Principles and received a Second Party Opinion from ISS ESG.

The Green Finance Framework and the Second Party Opinion are available on our [website](#).

Next to the 2021 Allocation Report, published in August 2022, main focus of this Impact Report lies on the positive sustainability impacts of Next Generation Solutions, to which, among others, proceeds of the 2021 Green Bond issuance have been allocated.

The net proceeds received by the issuance of Green Finance Instruments as of December 31st, 2021 amount to €500 million.

Green Hybrid Bond Evonik Industries AG 2021/2081

Issuer	Evonik Industries AG
Amount	€500,000,000
Use of proceeds	Eligible Green Projects according to Evonik’s Green Finance Framework
Issue Rating	S&P: BBB-; Moody’s: Ba1
Tenor/Final Maturity	60 years/September 2, 2081
First Call Date	September 2, 2026
Coupon (fixed interest rate)	1.375 %
Re-offer Price	99.375 %
ISIN/WKN	DE000A3E5WW4/A3E5WW
Listing/Law	Luxemburg/Regulated Market/German Law
Prospectus	Download

Allocation of 2021 net proceeds to Eligible Green Projects

As of December 31st, 2021 Evonik has allocated €500 million to Eligible Green Projects related to Next Generation Solutions, of which €285 million (57%) were allocated to refinance existing capex projects with expenditures in 2018-2020 and €215 million (43%) were allocated to finance new projects with expenditures in 2021. Thereby Evonik has fully allocated an amount equivalent to the net proceeds of the €500 million green hybrid bond issued in 2021.

€50 million out of the €215 million were operating expenditures related to projects in research, development and innovation to specifically enhance and further develop the sustainability impact of Evonik's Next Generation Solutions.

The full Allocation Report 2021 is available on our [website](#).

Allocation Amount (in €m)				
GBP/GLP Category	Eligibility Criteria	Existing Projects (Refinancing): Expenditures 2018-2020	New Projects (Financing): Expenditures 2021	Total
Eco-efficient products acting as low carbon transition enablers and sustainability enablers in various industries	Next Generation Solutions Capex	285	165	450
	Next Generation Solutions RD&I Opex	-	50	50
Energy Efficiency		-	-	-
Renewable Energy		-	-	-
Total Eligible Green Projects		285	215	500

Portfolio Sustainability Assessment and Next Generation Solutions

In order to define Next Generation Solutions, Evonik uses a method called Portfolio Sustainability Assessment which has been assured by an external auditor. The methodology is based on the World Business Council for Sustainable Development (WBCSD)'s framework for portfolio sustainability assessments (PSA)¹, which Evonik was involved in developing from the outset. The objective is to proactively steer Evonik's product portfolio towards improved sustainability performance and to identify strengths and weaknesses of Evonik businesses. The Sustainability Analysis is a key component of the Evonik sustainability strategy used to assess our businesses and innovations.

The unit of assessment is defined as a so-called product-application-region-combination (PARC). PARCs group combinations of products, applications and regions for which sustainability performance – in terms of both favorable and unfavorable sustainability signals – is similar.

Sustainability signals relate to material ecological or social aspects along the value chain, from the supply chain through production and subsequent use to end of life.

The PSA methodology describes the signal categories (SCs) of specific relevance for the chemical industry:

1. Chemical hazard and exposure across the life cycle (SC 1)
2. Global regulatory trends (SC 2)
3. Sustainability ambitions in the value chain (SC 3)
4. Authoritative ecolabels (SC 4)
5. Sustainability performance compared to alternative solutions (SC 5)

Evonik follows this approach and evaluates the signal categories 1 to 5 to determine the sustainability performance of our portfolio.

The findings are used in a structured overall evaluation of the PARC's sustainability performance, resulting in allocation to the performance category A++ (Leader), A+ (Driver), B (Performer), C- (Transitioner) or C-- (Challenged). Equal weight is given to all material signals; negative signals are not offset by positive signals.

A++ (Leader):

A++ indicates PARCs that take the lead in meeting the standards for sustainable business defined by Evonik's stakeholders and our impact. PARCs in the A++ category fully meet the requirements. They do not show any material negative signals. Moreover, material strong positive signals have been identified in one or more signal categories.

A+ (Driver):

A+ indicates PARCs that are at an advanced stage of meeting the standards for sustainable business set by Evonik's stakeholders and our impact. PARCs in the A+ category meet almost all the requirements. They do not show any material negative signals. Unlike those in the A++ category, however, only material weak positive signals were identified for one or more signal categories.

Together, the categories "Leader" and "Driver" cover the Next Generation Solutions.

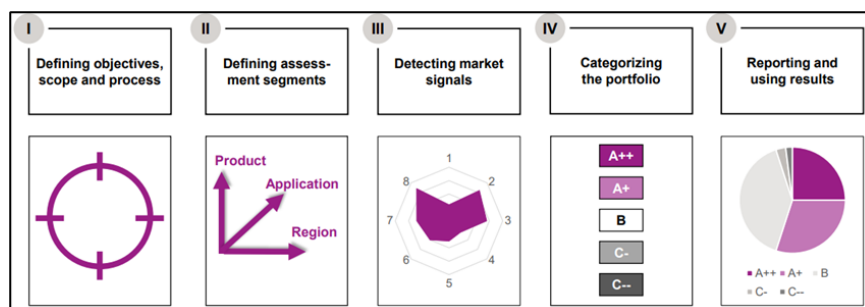



FIGURE 1: PORTFOLIO SUSTAINABILITY ASSESSMENT (PSA) FRAMEWORK

¹ World Business Council for Sustainable Development: Portfolio Sustainability Assessment (<https://www.wbcd.org/Projects/Chemicals/Resources/Framework-for-portfolio-sustainability-assessments>)

Sustainability impacts of Next Generation Solutions

GBP/GLP Category	UN Sustainable Development Goals	Sustainability impact metric	Impact result
<p>Eco-efficient products acting as low carbon transition enablers and sustainability enablers in various industries</p>		<p>Sales of all Next Generation Solutions in 2021:</p> <ul style="list-style-type: none"> • Amount • Percentage of total sales² <p>CO₂e avoided by using selected Next Generation Solutions sold in 2021:</p>	<p>~€ 5.8 billion</p> <p>41%</p> <p>38.5 million metric tons CO₂e</p>

For further details on the CO₂e avoided please refer to our brochure “Evonik Carbon Footprint 2021” on our [website](#).

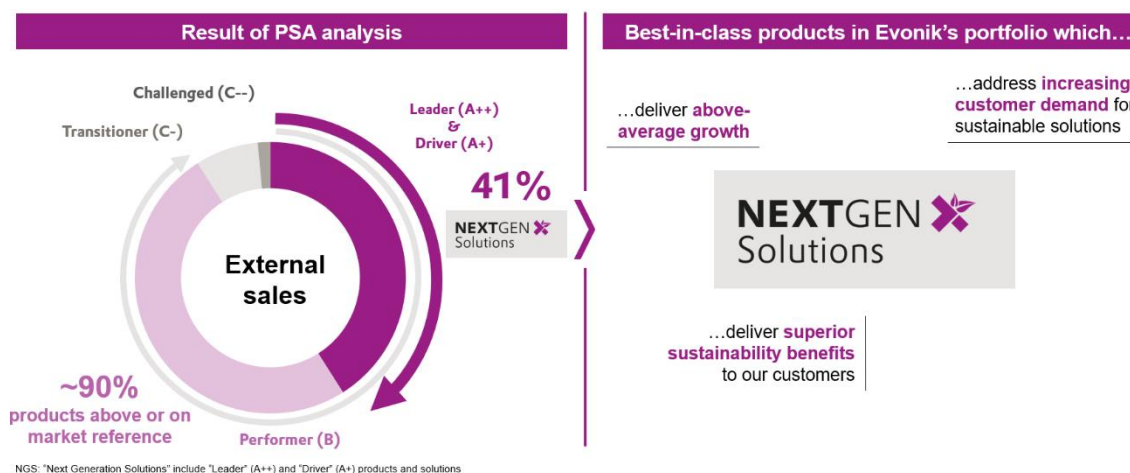
² The sustainability analysis covers all external sales of our chemicals manufacturing divisions. Consequently, the Technology & Infrastructure division is not part of the scope.

Handprint of selected Evonik's Next Generation Solutions

We define handprint as positive sustainability impacts that Evonik products enable along the value chain compared with other established products and applications on the market, especially in customer application. These products make a relevant contribution to a direct (measurable) improvement regarding one or more environmental and/or social indicators.

In 2021 we generated 41% of our sales by products and solutions that come with superior sustainability benefits above or well above market reference, our "Next Generation Solutions" (NGS). Our goal is to grow the NGS sales share beyond 50% by 2030. On the one hand, this is to be achieved through the further development of existing Next Generation Solutions. On the other hand, we are focusing research and development on generating additional sales with new Next Generation Solutions. At the same time, we intend to reduce the sales share of products classified as "transitioner" or "challenged" through targeted reformulation or withdrawal from the relevant businesses.

Handprint: "Next Generation Solutions" 41% of Evonik's portfolio with superior sustainability benefits



Handprint of selected Evonik's Next Generation Solutions

Evonik offers a variety of products enabling greenhouse gas emission reductions over the life cycle of their applications compared to using conventional alternatives.

Four NGS have been selected to calculate avoided greenhouse gas emissions – following the “Avoiding Greenhouse Gas Emissions” guidelines published jointly by the World Business Council for Sustainable Development (WBCSD) and the International Council of Chemical Associations (ICCA)³ – and these avoided emissions have been verified within the scope of our auditors’ limited assurance engagement of the 2021 sustainability report.

The avoided emissions reported here result from the application of the following four Evonik solutions, to which, among others, proceeds of the 2021 Green Bond issuance have been allocated as Capex and/or Opex (RD&I):

- green tire technology
- amino acids and animal feed
- foam stabilizers for insulating materials
- additives for hydraulic fluids

In 2021, the use of the four Evonik products resulted in the avoidance of 38.5 million metric tons CO₂e. These 38.5 million metric tons CO₂e reflect the total savings of the selected applications over their life cycle that were enabled by the amounts of the four Evonik solutions sold in 2021.⁴

Each NGS provides a measurable improvement over the life cycle and the associated Evonik products have either a fundamental, extensive, or at least a substantial contribution to reducing greenhouse gas emissions compared to conventional alternatives.⁵

For 2022 we have already extended our avoided emissions’ calculation from four to six Next Generation Solutions. Our ambition is to further increase the number of NGSs’ handprint quantification in the future. Next to the greenhouse gas avoided emissions we are currently working on further quantification of handprints of our Next Generation Solutions. Indeed, our intention is to report in the future absolute avoided water (or waste) from products’ application alongside avoided greenhouse gas emissions.

In the following chapter you find detailed information about the selected four Next Generation Solutions for the year 2021.

³ 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

⁴ For further details on the CO₂e avoided please refer to our brochure “Evonik Carbon Footprint 2021” on our [website](#).

⁵ The significance contribution of chemical products to value chain avoided emissions is described in the WBCSD “Avoided Emissions” Guideline.

Case Studies of the four Next Generation Solutions

Green Tire Technology

Compared to conventional car tires, 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 2). The lower fuel consumption results in end-users generating fewer CO_{2e} emissions.

The rubber compounds in tires have a major impact on the characteristics of 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 percent reinforcing filler, without which rubber compounds could not attain the desired properties such as traction, abrasion resistance, tear resistance, and tear propagation resistance. For decades, these properties could only be achieved with customized carbon blacks.

Today, the replacement of carbon black with silica offers even further improvements in car tires. Due to the different chemical properties of rubber and silica, however, these components are not capable of bonding. This is where bifunctional organic silicon compounds – or organosilanes – come in: They serve as coupling agents that bond the silica and rubber in the manner of a bridge.

Key characteristics such as rolling resistance, wet traction, and abrasion resistance can generally be optimized only to a limited extent, and with negative impact on other properties. In contrast to conventional carbon black filler systems, the use of the silica-silane system allowed for the first time an expansion of the “magic triangle” of tire performance (see Figure 3).

Rolling resistance and wet traction were improved without significantly affecting abrasion, and therefore the service life, of the tire. These improvements have resulted in significantly lower fuel consumption for end-users, and therefore in reduced greenhouse gas emissions.

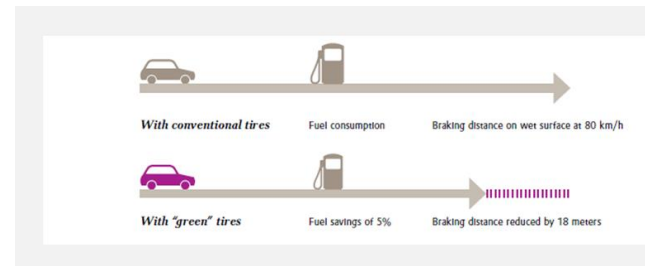


FIGURE 2: BRAKING CHARACTERISTICS AND FUEL CONSUMPTION

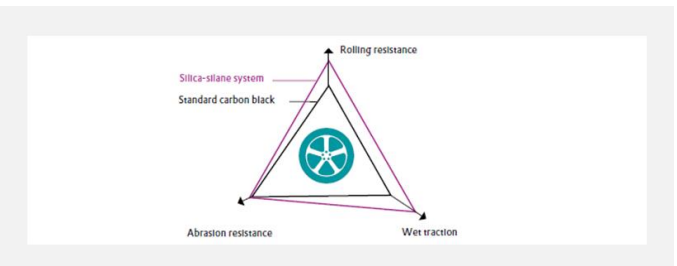


FIGURE 3: EXPANSION OF THE “MAGIC TRIANGLE” BY THE SILICA-SILANE SYSTEM

Case Studies of the four Next Generation Solutions

Amino Acids in Animal feed

Animal feed is specifically formulated to meet the physiological and nutritional needs of the animals, and in particular the necessary requirements of essential amino acids. 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 can save significant amounts of feed raw materials, resulting in the freeing up of required land and water resources, and a corresponding reduction in CO₂e emissions. Furthermore, feed supplementation with these essential amino acids reduces emissions of both nitrogen and greenhouse gases resulting from feeding and excretion, and offers credits for the use of natural manure.

MetAMINO® is an example of an amino acid containing sulfur. Unlike several other amino acids, it cannot be generated in the animal's own body. Methionine is particularly important in poultry nutrition because of a higher demand for this protein-forming amino acid for feather growth.

Evonik manufactures MetAMINO® in a chemical process called the carbonate process. The company produces many of the important intermediates, such as acrolein, methyl mercaptan, and hydrocyanic acid, in an integrated production process at the same site. The reaction steps are integrated in various circuits and byproducts and intermediates as well as energy streams can be used by other plants at the same site.

Biolys® is the Evonik-specific brand of L-lysine (L- α , ϵ -diamino-n-caproic acid). It is an essential amino acid contained in almost all proteins, and because of its basic side chain is classified as a basic amino acid. L-lysine is the first limiting essential amino acid in hog farming. In contrast to MetAMINO®, Biolys® – like all the other amino acids described here – is produced by biotechnological fermentation processes using microorganisms. As a consequence, these amino acids are automatically obtained as the L enantiomer, which is the only biologically effective form. Evonik's commercial L-lysine trade product is Biolys®, which contains L-lysine sulfate and biomass resulting from fermentation as an additional component. The active ingredient content is at least 54.6% L-lysine.

ThreAMINO® (L-threonine or L- α -amino- β -hydroxybutyric acid) is a neutral essential amino acid.

Alongside methionine and lysine in poultry farming and lysine and methionine in hog farming, threonine is the next limiting essential amino acid.

TRYPAMINO® (L-tryptophan or L-2-amino-3-(3'-indolyl) propionic acid) is among the structurally more complex aromatic amino acids.

Tryptophan is the next limiting amino acid after threonine in hog farming.

ValAMINO® (L-valine or L-2-amino-3-methylbutanoic acid) is an amino acid with a structure relatively similar to that of ThreAMINO®. In both poultry and hog farming valine is the next limiting amino acid after tryptophan.

ThreAMINO®, TrypAMINO® and ValAMINO® are produced by a biotechnological method.

Case Studies of the four Next Generation Solutions

Improved insulation materials

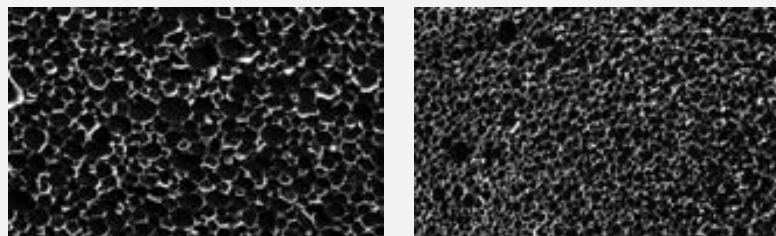
Evonik develops additives, specifically foam stabilizers (TEGOSTAB®), which are very important in foam production and for optimizing foam properties. These polyurethane (PU)-based foams are used, for example, in building insulation or for insulating electrical appliances such as refrigerators. The improvement of insulation properties reduces energy consumption and thus helps reduce greenhouse gas emissions.

The stabilizers used for the production of polyurethane foam consist of polyether-modified polysiloxanes. In these surface-active substances, the siloxane chain represents the hydrophobic part of the molecule that is located at the surface of the foam cells; this lowers the surface tension and thereby stabilizes the foam. The polyether groups, as the hydrophilic part of the molecule, are responsible for compatibilization with the PU matrix, which makes the surface activity possible.

To achieve maximum foam stabilization and the particularly fine-cell foam structure resulting from this, the molecular structure has to be adapted to the individual foam formulation. Custom-tailored foam stabilizers therefore give rise to particularly good insulating properties in the finished foam product (Figure 4).

In addition to improving the fine-cell structure of foam, customized foam stabilizers also serve to optimize the processing properties of a foam system. They minimize irregularities such as cavities (undesirable hollow spaces) in the foam and help achieve a more homogeneous density distribution, which also contributes to a further improvement of insulating properties.

FIGURE 4: MICROGRAPHS OF THE CELL STRUCTURE OF FOAM SYSTEMS WITH STANDARD ADDITIVES AND WITH ADDITIVES FROM EVONIK



Micrographs illustrate the positive effect of optimized Evonik foam stabilizers on the fine-cell structure of rigid polyurethane foams. The left-hand image is a micrograph of the cell structure of a modern foam system for refrigerator insulation; the right image shows (at the same magnification) foam containing the same polyurethane system, in which the standard additives have been replaced by the Evonik additives. The finer the cell structure of the foam, the lower the thermal radiation it can transmit, which results in a lower overall thermal conductivity.

Case Studies of the four Next Generation Solutions

Improved hydraulic oils

Mobile construction machines consume the bulk of their required energy in their hydraulic units. Using DYNAVIS® technology enables significant fuel savings and productivity gains compared to conventional hydraulic oils that are mostly monograde fluids or oils with low additives content (Figure 5). Lower fuel consumption means that end users generate fewer greenhouse gases (CO_{2e}), especially carbon dioxide.

The hydraulic fluid plays a major role in the use of hydraulic construction machinery such as excavators and wheel loaders. Its viscosity and viscosity-temperature behavior has a considerable impact on the operation of such hydraulic machinery (Figure 6). Evonik's oil additive specialists have performed studies with hydraulic excavators of different sizes in day-to-day operations in various applications as well as field tests following a defined protocol that reflects the typical work modes of such machinery.

The viscosity of a hydraulic fluid decreases with increasing temperature. This dependency can be minimized with DYNAVIS® technology, based on fluid formulations with viscosity index improvers of high shear stability, which allows for energy savings.

At low temperatures, such thinner oils reduce internal friction and enable an easier cold start and warm-up phase.

At high temperatures, a more viscous oil prevents an increase in internal return flow losses in the hydraulic pumps, thereby increasing volumetric efficiency. This ensures that the viscosity does not fall below a prescribed minimum, thus ruling out overheating, increased wear, and premature failure. For end users these improvements result in significantly higher productivity and lower fuel consumption, and therefore in reduced CO_{2e} emissions.

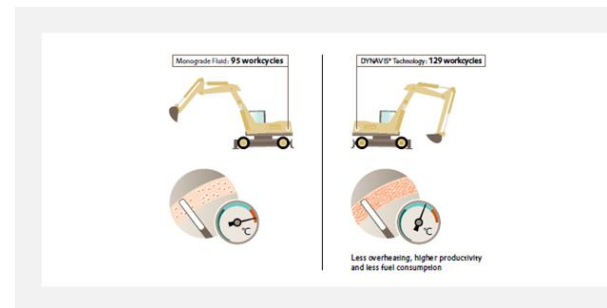


FIGURE 5: COMPARISON OF MONOGRADE AND DYNAVIS® HYDRAULIC FLUIDS AND EFFECTS ON THE APPLICATION

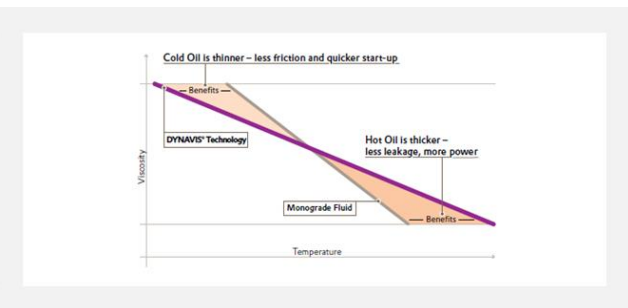


FIGURE 6: DEPENDENCE OF VISCOSITY ON TEMPERATURE, AND POSITIVE EFFECTS ON THE APPLICATION

For further details please refer to our brochure "Evonik Carbon Footprint 2021" on our [website](#).

Disclaimer

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