

Nouryon



Sustainability Report 2021





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Contents

The purpose of this report is to explain how we partner with our customers, suppliers, and employees to deliver solutions and drive sustainable progress. This report explains our strategy and provides information about our 2021 performance. It also includes case studies and data in accordance with the Sustainability Accounting Standards Board (SASB).



Click on the chapter title to go to the first page of the corresponding chapter

Cautionary Statement. The information in this publication is believed to be accurate at the date of its publication and is given in good faith but no representation or warranty as to its completeness or accuracy is made. Suggestions in this publication are merely opinions. Some statements and in particular forward-looking statements, by their nature, involve risks and uncertainties because they relate to events and depend on circumstances that will or may occur in the future and actual results may differ from those expressed in such statements as they depend on a variety of factors outside the control of Nouryon.

Message from our Chairman and CEO

Growing and Contributing to a Sustainable Future

I am pleased to present Nouryon's 2021 Sustainability Report and our progress as your partner in essential solutions for a sustainable future. At Nouryon, sustainability is about long-term thinking and achieving growth.

We do this by:

- continuously improving our safety and environmental performance,
- growing and innovating our essential solutions that help our customers be more sustainable, and
- engaging and partnering with our employees, customers, suppliers and society to drive sustainable progress.

As a leading global specialty chemicals company that is well-positioned for ongoing growth, Nouryon continues to make progress through our strong partnerships, and we believe that collaboration is key to our future success. Nouryon works closely with customers and other partners to innovate, make strategic investments, and deliver sustainable solutions that answer society's needs – today and in the future.

Sustainability is integral to everything we are and do – from our research and development to our operations – day in and day out. We understand that many of our customers also care deeply about our planet and its future. Therefore, we are continually innovating to develop more sustainable products. In fact, 71% of our R&D pipeline is focused on solutions with sustainability benefits. This ultimately helps our customers, our environment, our communities, and our Company. In 2021, amidst a challenging operating environment, we earned revenue of \$4.917 billion, an increase of 17% year-over-year, and 38% of this revenue came from our Eco-Premium Solutions¹.

We are pleased to report that Nouryon achieved record-breaking annual people and process safety performance. Our recordable injury rate declined by 25% and our process safety rate declined by 23% in 2021 as compared to the prior year. Furthermore, from 2018 through 2021, we reduced our OSHA incident rate by 49% and reduced our process safety incident rate by 74%. We also continued to build an inclusive and diverse workforce at many levels of our Company, including 36% gender and racial/ethnic diversity representation on our Board of Directors.

We are making good progress in the early stages of our decarbonization strategy. We set new 2030 targets to reduce absolute greenhouse gas (GHG) emissions (Scope 1 & 2) by 40%, total waste intensity by 10%, and water consumption intensity by 10%, versus a 2019 base year. By 2050, we aspire to be a net zero organization.

Our track record has earned us a Gold Rating by EcoVadis, placing Nouryon in the top 3% of companies then assessed by the global sustainability ratings provider. In addition, in 2021, we voluntarily provided responses to the Carbon Disclosure Project (CDP) climate questionnaire resulting in a first-time score of B for Climate Change.

I invite you to read more about all of the progress we are making in this report. And, as in previous years, we transparently report relevant data, including a clear overview of our Environmental, Social, and Governance (ESG) data on pages 76-78.

Thank you for your interest in Nouryon's contribution to a sustainable future.

Charlie Shaver, Chairman and CEO



¹ Our Eco-Premium Solutions are products that offer significant sustainability benefits over mainstream alternatives in the market while providing the same or better functionality.
² Based on annual Occupational Safety and Health Administration (OSHA) recordable injury rates versus chemical industry peers in the American Chemistry Council.

1 About Nouryon

Nouryon is a leading global specialty chemicals company. Our approximately 7,650 employees³ worldwide help to provide essential solutions that our customers use to manufacture everyday products such as personal care, cleaning, paints and coatings, agriculture and food, pharmaceuticals, and building products. We forge and foster long-term customer partnerships and operate in more than 80 countries around the world.

Our close attention to societal trends and customer needs, alongside our ability to translate these into business opportunities, have earned us a place among the leading companies in our industry in terms of safety and sustainability. This has consistently resulted in strong financial performance and business growth.

Our portfolio of industry-leading brands and commitment to customer service yielded strong results in 2021, including:



Operating in over 80 countries



11 Innovation and Application Centers worldwide



Approximately 7,650 employees worldwide



57 Manufacturing Sites worldwide



\$4.9 billion revenue



Adjusted EBITDA \$1,081 million



Free Cash Flow \$781 million

³ Headcount and similar metrics may differ slightly depending on exact collection date due to timing of reporting schedules, divestments, and acquisitions, as well as regular workforce fluctuations.

1. About Nouryon

Innovative chemistry is key to a sustainable future. That's why sustainability is an essential business driver for Nouryon and integral to our Company Purpose, Strategy, and Values.

Our Purpose



Your partner in essential solutions
for a sustainable future

1.1 Our Strategy for Growth

We aim to grow our leading position in specialty chemicals by exceeding customer expectations with innovative and sustainable solutions that address societal needs – today and in the future. We achieve this by focusing on attractive and growing end-markets.

End-Markets



Home & Personal Care



Natural Resources



Agriculture & Food



Polymer Specialties



Paints & Coatings



Renewable Fibers

Our business segments – Performance Formulations and Technology Solutions – continually innovate to contribute to a more sustainable future. Building on our customer offering for these end-markets, Performance Formulations and Technology Solutions are perpetually adding new, sustainable solutions to our existing portfolio.

As a result, Nouryon has continued to grow profitably, including in China and emerging markets such as South America, Southeast Asia, India, and the Middle East. Our plans include growth in new applications and geographies through: acquisitions and partnerships; further expansion of our sustainable product offering; and by maximizing the capacity, utilization, and flexibility of our production facilities to drive commercial and cost productivity.

Three-Pronged Strategy to Drive Growth



Deliver innovative and sustainable solutions that answer society's needs – today and in the future



Focus on attractive and growing end-markets as well as emerging markets



Drive commercial and cost productivity

1.2 Ethical Conduct and Our Values

Ethical business conduct is a core element of Nouryon's strategy for growth and success, and is incorporated in our Company Values: 'We aim high', 'We own It', and 'We do it right.'

We thrive on a culture of high performance, which includes always being highly accountable, acting with integrity, and embodying ethical business practices. We expect each employee to learn and comply with all company policies, applicable laws, and the guiding ethical principles outlined in our [Code of Business Conduct & Ethics](#). We also continuously scrutinize our internal practices through internal and external assessments and have procedures for taking immediate action when we identify conduct that falls below our high standards. Similarly, we have high expectations of business partners as evidenced in our [Business Partner Code of Conduct](#), which all partners must adopt.

Our Values:



We aim high

We drive growth by collaborating with customers and colleagues to become more focused, faster, more efficient, and better every day.



We own it

We are accountable and deliver on our commitments to customers, investors, and each other.



We do it right

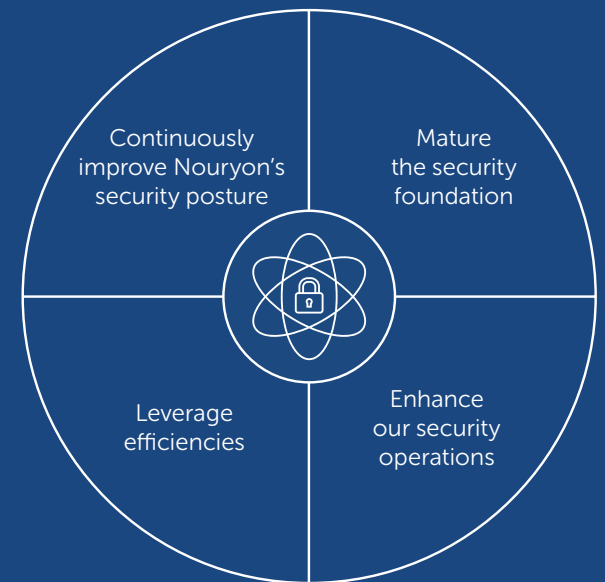
We support our people, customers and communities through strong ethics, and with safety, integrity, and sustainability in mind.



2 Strong Governance and Risk Management

A crucial component of securing a sustainable future is ensuring that Nouryon continues to always operate ethically and responsibly. This means maintaining a sound decision-making process while fulfilling regulatory requirements and commitments, mitigating risks, strengthening our cybersecurity, and establishing and enforcing ethical standards – for our customers, suppliers, and our Company. Our robust Governance and Risk Management capabilities form the core of Nouryon’s operations.

Continually strengthening our cybersecurity



Highlights



Task Force on
Climate-related
Financial Disclosures



Board-level
oversight of
all ESG areas



Corporate
Responsibility
Committee

2. Strong Governance and Risk Management

2.1 Governance

Nouryon's Board of Directors (Board) is charged with accountability and oversight of our Company's Environmental, Social and Governance (ESG) performance. Progress is reported to the Board on a quarterly basis. The Board is supported by the following committees:

- The Corporate Responsibility Committee provides Board-level oversight of sustainability, health, safety and environmental (HSE), product quality, social policies and programs, including inclusion and diversity, and other matters that may impact the Company's reputation.
- The Audit Committee is responsible for oversight of the integrity of our financial statements and effectiveness of our internal controls over financial reporting.
- The Compensation Committee oversees the compensation of key employees and other matters related to our human capital.
- The Nominating & Corporate Governance Committee recommends the nomination of individuals to serve on our Board and is responsible for setting our corporate governance practices.

You can find more information about our Board and its committees on our [website](#).

Our sustainability strategy is implemented by the Sustainability Director, working with the Chief Sustainability and Communications Officer and all Businesses and key functions. Sustainability focal points drive the implementation of our strategy across our organization.

We enlist auditors, both internal and external, as part of our ESG governance efforts. In addition, our policies are reviewed annually – both internally and with external parties.

Key ESG responsibilities:



[Charlie Shaver](#)

Chairman and Chief Executive Officer, overseeing all ESG responsibilities.



[Renier Vree](#)

Executive Vice President, Chief Financial Officer, also overseeing our Cybersecurity.



Governance matters, including with respect to our Board, our Delegation of Authority policy, and Executive Compensation, are the responsibility of our Executive Vice President, Business Affairs & General Counsel, [Michael Finn](#). Regulatory Compliance, including with respect to human rights, anti-bribery and anti-corruption, also lies with him and our Chief Compliance Officer and Vice President, Inclusion & Diversity, [Samantha Dreiling](#).



Product Stewardship is overseen by [Larry Ryan](#), Executive Vice President and President, Performance Formulations and the Americas.



Human Resources, including the development and empowerment of our people, is overseen by our Senior Vice President and Chief Human Resources Officer, [Tift Shepherd](#).



Operational health, safety, and environmental management is directed by the Integrated Supply Chain function, under the responsibility of the Senior Vice President and Chief Integrated Supply Chain Officer, [Paresh Bhakta](#)⁴. This includes overseeing our safety performance, greenhouse gas emissions, energy use, eco-efficiency program, and water management strategy, which ensures that our sustainability performance is supported at all our manufacturing sites.



Senior Vice President, South America & Global Carbon Business Leader Eduardo Nardinelli is leading Nouryon's globally coordinated strategic planning to meet our GHG emission reduction goals in 2030 and beyond.



Nouryon's global sustainability approach is overseen by the Chief Sustainability and Communications Officer, [Vivi Hollert](#).



Inclusion & Diversity is led by our Chief Compliance Officer and Vice President, Inclusion & Diversity, [Samantha Dreiling](#).



Sustainable Sourcing is managed by our Vice President and Chief Procurement Officer, Stephen Hester.

⁴ Paresh Bhakta appointed Senior Vice President and Chief Integrated Supply Chain Officer effective April 1, 2022.

2.2 Risk Management

Effective risk management is a key success factor for realizing our strategic objectives. Nouryon employs an enterprise risk management (ERM) approach to identify potential rewarded and unrewarded risks in order to take appropriate mitigating actions. Within Nouryon, ERM is used to augment the decision-making process. Nouryon's approach to risk management and internal control is based on the Committee of Sponsoring Organizations of the Treadway Commission (COSO⁵) reference model and includes strategic, financial, information technology (IT), legal, business continuity, HSE, and security components. Transparency and accountability are confirmed through various cycles of monitoring and audits to ensure all mitigating actions are performed.

Our ERM approach allows us to identify and manage strategic, operational, financial, and compliance risks to which Nouryon is exposed, including climate-related risks. This approach guides how we work and underpins our clear, strong, and consistent culture of ethical and sound decision-making. It also enables us to improve effectiveness and efficiency in our operations, accurately report financial results, and ensure compliance with applicable laws and regulations. Taken together, all these factors reinforce Nouryon's reputation and ability to be a consistently reliable business partner.



Nouryon's Board is ultimately responsible for oversight of our Risk Management and Compliance. Our ERM and internal control activities are organized in three lines:

- **First line:** all Businesses and Operations managers own and manage risk, which includes identifying and mitigating risks.
- **Second line:** oversight functions, such as Internal Controlling and Compliance, support Business and Operations management and help ensure that the risks are identified, properly mitigated, and that monitoring control procedures are operating as intended. In addition, the second line has oversight of the complete risk program.
- **Third line:** Internal Auditing provides an independent, objective means to evaluate and improve the effectiveness of governance, risk management, and internal controls, including the way Business and Operations are led, as well as how oversight functions manage and control risk.

Identifying and Mitigating Risk to Harness Growth Opportunities

Our risk management capability and resources were expanded in 2021 to align risk management more closely with Nouryon's strategic objectives.

Two internal cross-organizational risk assessment processes were defined – one for evaluating emerging market risk and one for strategic risk – to further support decision-making and solid governance. The emerging market risk assessment is aligned with Nouryon's focus on geographies with growth potential.

Sustainability-related risks and opportunities, including climate-related risks, are being reviewed at three layers of strategy: macro (generic), meso (industry), and micro (Nouryon). These assessments cover strategic, financial compliance, and operational considerations. The ERM process includes long-term sustainability risks. For example, the macro layer considers risks in the political and legal, sociocultural, ecological, demographic, technology and economic environments.

The new analyses underpin an updated and comprehensive ERM approach within Nouryon, for which we continually ask ourselves whether we are acting appropriately, and in which sustainability is a pervasive topic and integral to every aspect of risk management.

Cybersecurity

Cybersecurity is a component of the overall risk management program, reducing the risk to system and plant outages, or loss of sensitive information, which are essential to our business operations. In 2021, Nouryon strengthened its security profile with the appointment of a Chief Information Security Officer and team. These cyber specialists are strengthening Nouryon's digital defenses and cybersecurity foundation, enhancing our security operations, leveraging efficiencies, and continuously improving Nouryon's position to ensure sustained operations and business continuity. This is achieved by strategic prioritization, targeted technology improvements, employee awareness campaigns, protecting our brand, among other initiatives.

⁵ COSO is a joint initiative of organizations that provides comprehensive frameworks and guidance on enterprise risk management. For more information: <https://www.coso.org>



Task Force on Climate-related Financial Disclosures – Our Approach to Assessing Climate-related Risks and Opportunities

Climate change is one of the most pressing issues of our time, and the transition to a net-zero-carbon economy will create significant risks and opportunities. In 2021, we completed a comprehensive qualitative analysis using the Task Force on Climate-related Financial Disclosures (TCFD) framework. As our first TCFD analysis, we see this as the beginning of our journey towards incorporating climate scenario analysis in reporting and planning, and we expect the guidance and tools to advance over time. Our qualitative analysis included transition risks and opportunities as well as physical risks, and used leading climate models and scenarios. We drew upon publicly available data from the UN Intergovernmental Panel on Climate Change (IPCC) peer reviewed climate models, and we considered a range of scenarios to identify potential risks and opportunities to the company. We considered potential risks over short, medium, and long-term time horizons, across our value chain – upstream, downstream, and in our direct operations.

These results are described in our 2021 CDP response, and other sections of this report also cover TCFD elements. We provide a summary table of how our results align with the TCFD framework. For more information on our approach to climate change, see [Mitigating Climate Change: Objectives and Opportunities](#).

Our first
TCFD analysis
was completed
in 2021

Nouryon Task Force on Climate-related Financial Disclosures Index and Additional Information

Core element	Recommended disclosures	Reference to Nouryon 2021 Sustainability Report	Reference to Nouryon 2021 CPD Climate section
Governance Disclose the organization's governance around climate-related risks and opportunities.	a) Describe the Board's oversight of climate-related risks and opportunities.	2.1 Governance 2.2 Risk Management	Governance C1.1a
	b) Describe management's role in assessing and managing climate-related risks and opportunities.	2.1 Governance 2.2 Risk Management	Governance C1.2, C1.2a
Strategy Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	Included in our TCFD project as mentioned in 3.6 Transparently Reporting our ProgressPlanet - climate change.	Risk and Opportunities C2.1, C2.2, C2.2a.
	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.		Risk and Opportunities C2.3, C2.3a, C2.4, C2.4a Business Strategy C3.1, C3.3, C3.4
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	3.1 Our Targets 3.3 Alignment with United Nations Sustainable Development Goals Included in our TCFD project as mentioned in 3.6 Transparently Reporting our ProgressPlanet - climate change. 4.3 Mitigating Climate Change: Objectives and Opportunities	Business Strategy C3.2b
Risk Management Disclose how the organization identifies, assesses, and manages climate-related risks.	a) Describe the organization's processes for identifying and assessing climate-related risks.	2.1 Governance 2.2 Risk Management	Risk and Opportunities C2.2, C2.2a.
	b) Describe the organization's processes for managing climate-related risks.	2.1 Governance 2.2 Risk Management	Risk and Opportunities C2.2
	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	2.1 Governance 2.2 Risk Management	Risk and Opportunities C2.2 Business Strategy C3.1, C3.3, C3.4
Metrics and Targets Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	3.1 Our Targets 4.3 Mitigating Climate Change: Objectives and Opportunities 4.4 Eco-Efficiency and Circularity	Risk and Opportunities C2.1b, Targets and Performance C4.5, C4.5a, Carbon Pricing C11
	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	3.1 Our Targets 4.3 Mitigating Climate Change: Objectives and Opportunities 4.4 Eco-Efficiency and Circularity 4.5 Environmental Data Sheet	Emission Methodology C5.1 Emission Data C6.1, C6.2, C6.3, C6.5, C6.10 For additional information on historical emissions breakdown, see CDP C7 and sub questions.
	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	3.1 Our Targets 4.3 Mitigating Climate Change: Objectives and Opportunities 4.4 Eco-Efficiency and Circularity	Targets and Performance C4.1, C4.1a, C4.2, C4.2a

3 Compliance and Ethics

Our global footprint exposes us to increasingly stringent laws and regulations on a broad range of subjects, such as: safe use of hazardous substances; operational impacts; historical soil and groundwater contamination; product liability; human rights concerns; economic sanctions; antitrust laws; and anti-corruption laws.

Relevant Policies and Programs

- [Acceptable Use of Nouryon Systems and Devices Policy](#)
- [Anti-Corruption Policy](#)
- [Animal Testing Policy](#)
- [Business Partner Code of Conduct & Ethics](#)
- [Code of Business Conduct & Ethics](#)
- [Competition Law Compliance Policy](#)
- [Conflict of Interest Policy](#)
- [Employee Privacy Policy](#)
- [External Spend Policy](#)
- [Global Travel and Expense Policy](#)
- [Inclusion & Diversity Commitment](#)
- [Media Policy](#)
- [Meal, Gift & Business Entertainment Policy](#)
- [Policy Statement on HSE&S, Quality, Product Stewardship and Sustainability](#)
- [Record Retention Policy](#)
- [Sensitive Country Policy](#)
- [Social Media Policy](#)
- [SpeakUp! and Non-Retaliation Policy](#)
- [Sponsorship and Charity Policy](#)
- [Sourcing Sustainable Palm Oil](#)
- [Statement on Sustainable Procurement](#)
- [Tax Strategy](#)

Highlights



SpeakUp! and Non-Retaliation Policy



Code of Conduct and Business Partner Code of Conduct



100% of employees completed mandatory Compliance trainings



Conflict minerals risk assessment



Modern slavery and forced labor risk assessment

3. Compliance and Ethics

Legal and Regulatory Compliance

Our internal subject matter experts monitor compliance with laws and regulations and provide guidance and training as needed. We also emphasize ethics in our employee [Code of Conduct & Ethics](#), which employees receive training on annually, as well as our [Business Partner Code of Conduct](#).

Emphasizing Ethics

Our Compliance program is built upon: mandatory annual training, policies, and procedures; external party due diligence and monitoring; and investigating and remediating concerns of unethical, illegal, or inappropriate conduct. This approach helps our employees and other stakeholders understand and abide by Nouryon's high standards of ethical business conduct, comply with legal and regulatory requirements, and live our value 'We do it right.' We conduct ethics audits of all our operations on a regular basis. In addition, every Nouryon employee reviews and acknowledges our high expectations by signing an Annual Policy Certification in addition to completing mandatory online training. As part of our anti-corruption measures, employees are also required to abide by our Gifts & Entertainment policy.

Our commitment to compliance and ethics is also supported at the highest levels of our Company, starting with our Chairman and CEO. The Executive Vice President and Chief Financial Officer, Executive Vice President Business Affairs & General Counsel, and Senior Vice President and Chief Human Resources Officer provide

executive oversight of our compliance performance through the Compliance Committee, which is chaired by our Chief Compliance Officer and Vice President of Inclusion & Diversity. The Board of Directors and Audit Committee also receive regular updates on our Company's compliance program from our Chief Compliance Officer and Vice President of Inclusion & Diversity and Executive Vice President, Business Affairs & General Counsel.

Employee Awareness

Nouryon's Code of Business Conduct & Ethics requires employees to always act ethically and in compliance with all applicable legislation, including anti-bribery/anti-corruption, antitrust/competition, anti-harassment/discrimination, data protection, and economic sanctions. It applies to all employees, and every employee completes four compliance trainings on ethical business conduct each year. In 2021, 100% of employees completed assigned trainings that included anti-bribery/anti-corruption, data privacy/data protection, respectful workplace, and careful communications. This includes certain temporary workers, and part-time employees and contractors with Nouryon credentials (email addresses or badges).

100% of employees completed assigned trainings





Compliant Partners

Our commitment to ethical business conduct does not end with our employees. We require all our business partners to adhere to Nouryon's [Business Partner Code of Conduct](#), which outlines: compliance with laws and regulations; safety; standards for ethical and responsible business conduct and practices; treatment of people and fundamental human rights within supply chains; exclusion of conflict minerals; and fraud prevention. Certain third parties must also undergo a due-diligence process to provide information about their ownership, compliance programs, and any past relevant legal/regulatory issues, including economic sanctions. We only conduct business with suppliers, customers, and other business partners who share and support our standards. We continually monitor these third parties digitally for sanctions, regulatory fines, or adverse media. Any breach or violation can prompt Nouryon to reassess business relationships.

In 2021, we conducted a risk assessment regarding conflict minerals for all our suppliers and identified those that posed risks. Conflict minerals are tantalum, tin, tungsten, and gold (commonly referred to as 3TG), which are used in Central Africa to finance armed conflict, often fought with child soldiers. In our risk assessment, we asked our suppliers using any 3TG minerals in their supply chains to complete a questionnaire about their sourcing and controls to ensure that conflict zones and groups are avoided, so that in turn, we can be sure that Nouryon is not inadvertently contributing to such conflict and practices.

Similarly, modern slavery and forced labor were also topics that were closely examined in 2021 by virtue of a risk assessment of suppliers that have low skill, labor intensive processes or products. Based on supplier responses, Nouryon is pinpointing where the related risks lie in order to review accordingly.

Encouraging Everyone to SpeakUp!

When it comes to reporting any kind of concern, Nouryon employees, suppliers, customers, and other business partners can report all suspected policy violations, inappropriate behavior, and illegal or unethical practices through SpeakUp!, our global reporting hotline. To ensure that our employees and external parties are aware of SpeakUp!, we promote contact information on our intranet, on the Nouryon website, on posters in every office and manufacturing site, and in our [Code of Business Conduct & Ethics](#) and [Business Partner Code of Conduct](#). We also train employees how to use SpeakUp!, inform them of protections provided by our Non-Retaliation Policy, and ensure they understand that in certain countries, applicable whistleblower protections ensure there is no retaliation against anyone who submits a good-faith report. We will not tolerate retaliation against any employee who makes such a report. SpeakUp! reports can be made anonymously, subject to certain legal limitations, in any of 30 languages. In 2021, all SpeakUp! concerns were registered and resolved within an average of 26 days.

26-day
average
resolution of
all Speak Up!
concerns

4 Our Commitment to a Sustainable Future

Sustainability is a key business driver for Nouryon and integral to our operations and product offering. We develop essential solutions for thousands of products people use every day, and we believe good chemistry is key to a sustainable future and that our actions as a company can contribute to this goal.

Fundamental to our Company Purpose is our Sustainability Commitment:



We partner with our customers, suppliers, and employees to deliver innovative solutions, drive progress, and create a safe and sustainable today and tomorrow for everyone.

Highlights



Aligned with and supporting UN Sustainability Development Goals



Set 2030 GHG emission reduction target along with our 2050 net zero ambition. Set 2030 targets on water and waste



Annual transparent disclosure⁶



Independent Limited Assurance by ERM Certification and Verification Services

Our 2021 Ratings



EcoVadis Gold Rating



CDP B Rating Climate Change



Sustainalytics⁷ 25.3 Rating

⁶ EcoVadis and CDP.

⁷ Copyright ©2022 Sustainalytics. All rights reserved.

4. Our Commitment to a Sustainable Future

Our efforts help contribute to the United Nations Sustainable Development Goals (UN SDGs), and we make a positive impact on these through our 'Commitment to a Sustainable Future', which is based on three clear commitments to:

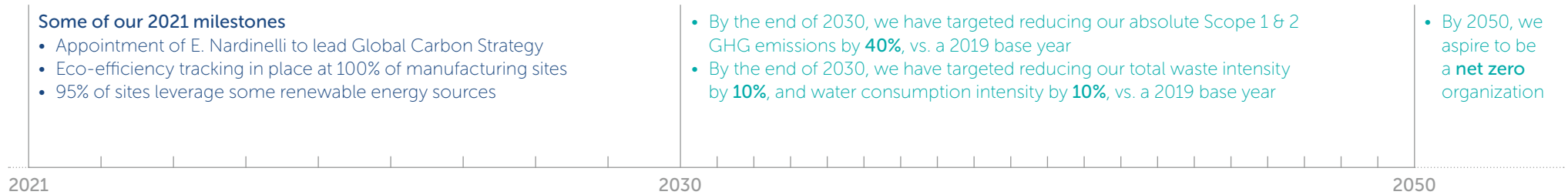
- **CONTINUOUSLY IMPROVE** our safety and environmental performance.
- **GROW AND INNOVATE** to create sustainable solutions, enabling customers to be more sustainable.
- **ENGAGE AND PARTNER** with employees, customers, suppliers, and society to drive sustainable progress.

These goals were developed following a [materiality assessment](#) and aim to support the objectives of the [UN Paris Agreement on Climate Change](#) and the [UN Sustainable Development Goals](#) (see page 19). Nouryon's strategy, sustainability goals and Code of Business Conduct & Ethics (see Chapter 2) are aligned with conducting business in a way that supports universal principles related to human rights, the environment, and anti-corruption, among others.

We track our progress and report metrics in accordance with the Sustainability Accounting Standards Board (SASB). For more information, including a full overview of ESG data as well as a SASB index, please see pages 75-79 or visit www.nouryon.com/company/sustainability.

		
<p>CONTINUOUSLY IMPROVE our safety and environmental performance</p>	<p>GROW AND INNOVATE to create Sustainable Solutions, enabling customers to be more sustainable</p>	<p>ENGAGE AND PARTNER with employees, customers, suppliers, and society to drive sustainable progress</p>
<p>Key Sustainable Development Goals:</p> 	<p>Key Sustainable Development Goals:</p> 	<p>Key Sustainable Development Goals:</p> 
 	 	  

4.1 Our Ambitions and Targets



As the transition to a net-zero-carbon economy accelerates, we continue to challenge ourselves to reduce impacts, mitigate risks, and harness growth opportunities related to climate change. To this end, we regularly review our operations and our products, which are also integral to the energy transition.

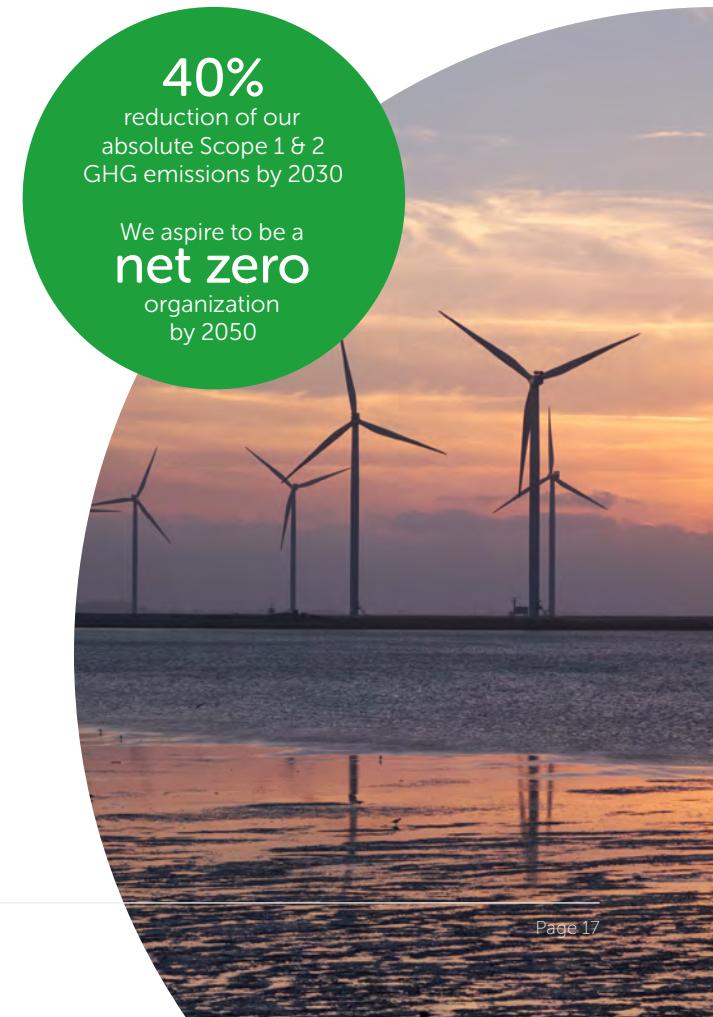
To achieve this, we set 2030 targets to reduce absolute GHG emissions ([Scope 1 and 2](#)) by 40%, total waste intensity by 10%, and water consumption intensity by 10%, versus a 2019 base year. By 2050, we aspire to be a net zero organization. Our 2030 targets are aligned with the [UN Paris Agreement](#).

Our Global Carbon Business Leader, Eduardo Nardinelli, is developing and executing a global business strategy for achieving our GHG reduction targets and is leading our carbon emission reduction initiatives.

Our plan to achieve our goals includes:

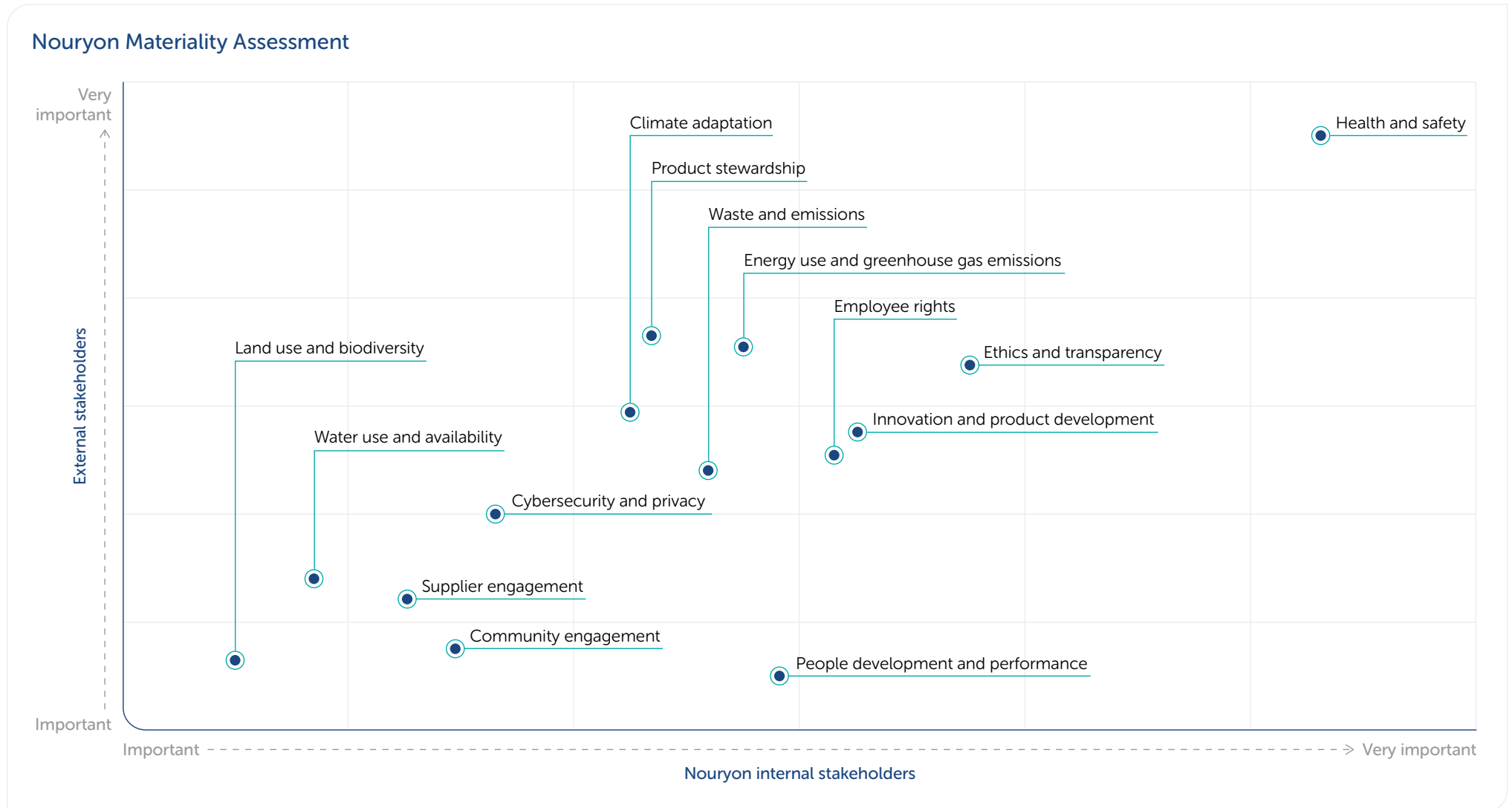
- Scope 1: Improving efficiency in our operations and optimizing our fuel mix.
- Scope 2: Increasing our use of renewable energy through power purchase agreements, on-site renewables, utility programs and certificates.
- Scope 3: We are currently analyzing indirect GHG emissions from activities across our value chains.
- In addition, across all scopes:
 - Exploring collaboration opportunities with our customers and suppliers.
 - Evaluating and deploying new innovation technologies such as those in the [ICOS Capital Fund III](#), where we are a strategic investor.
- Integrating net zero and climate change considerations into our strategy and planning.

The realization of our goals on the pathway towards net-zero relies on a number of considerations, including site evaluations, increased renewable energy, the rate of innovation, value-chain developments and regulatory requirements.



4.2 Stakeholder Materiality

We conducted a [materiality assessment](#) in 2019 with the support of an independent consulting firm. The assessment identified [health and safety](#) in all aspects of our operations, as well as climate change, including [energy use and greenhouse gas emissions](#), as issues of key importance to our business. Other high-priority focus areas include [ethics](#), transparency, and [employee rights](#). This materiality assessment helps us identify our sustainability priorities and set goals, which we track and report on a regular basis.





4.3 Alignment with United Nations Sustainable Development Goals

Several societal trends are driving demand and presenting opportunities for Nouryon’s sustainable solutions, which are aligned with the UN SDGs. These global trends include a growing population, an expanding and increasingly health-conscious middle class, climate change, and natural resource preservation. Our solutions can help to: increase crop yields and improve their quality; make products that are more biodegradable and easier to recycle; make buildings and vehicles more energy efficient; and improve the durability of bridges and wind turbines.

Nouryon supports all 17 UN SDGs. We believe our Company and sustainable solutions contribute most to the following 10 SDGs:

2 ZERO HUNGER
 End Hunger, Achieve Food Security and Improved Nutrition, and Promote Sustainable Agriculture

Agriculture is one of Nouryon’s priority end-markets. We bring essential functionalities to our customers via a strong portfolio that includes crop nutrients, adjuvants, and non-flammable solvents that are biodegradable and/or made from renewable resources. Our solutions help plants grow by providing nutrients to safely increase agricultural productivity and crop yields using fewer resources. These solutions also improve overall soil health, which requires less plowing and results in less erosion over time.

3 GOOD HEALTH AND WELL-BEING
 Ensure Healthy Lives and Promote Well-Being for All, Regardless of Age

Nouryon focuses on health and well-being in several ways. We prioritize health and safety in our operations and are an industry leader in people safety. We also offer a range of essential ingredients for cleaning, personal care, pharmaceuticals, and food. These include: safer, bio-based cleaning and personal care products; products that contribute to the controlled release of active ingredients in medication, including insulin purification and iron fortification in staple foods; and ingredients used in water treatment. We are also a founding partner of [Smarter Futures](#), an NGO addressing nutritional deficiency in Africa.

4 QUALITY EDUCATION
 Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities for Everyone

Nouryon’s learning and development approach offers employees both short-term and long-term capability building. We provide a broad range of opportunities for employees at all our locations worldwide, including on-the-job experience-based training, blended programs, online learning, specialist (virtual) classroom training, and mandatory compliance courses. Our employee-led Business Resource Groups (BRGs) include Nouryon Women’s Network, Nouryon Veterans, Nouryon Pride (LGBTQ) and BOOST (young professionals). A key focus area of Nouryon’s Corporate Social Responsibility (CSR) framework is STEM (science, technology, engineering and mathematics) education, which we support in our communities through volunteerism, engagement, and corporate giving.

5 GENDER EQUALITY
 Achieve Gender Equality and Empower All Women and Girls

Nouryon’s commitment to inclusion and diversity is codified in our Code of Business Conduct & Ethics, which clearly states that we respect and value all employees, irrespective of age, gender, race, religion, or sexual orientation. We provide training on how to maintain a respectful and inclusive workplace as well as how to identify and report potential harassment and discrimination. In addition to offering equal opportunities for ongoing learning and professional development, we support diversity within our Company through initiatives such as our BRGs, which provide career development advice, mentorship opportunities, and the ability to foster global connections. Our largest BRG is the Nouryon Women’s Network, which has approximately 400 members worldwide.



Affordable and Clean Energy

Nouryon leverages renewable⁸ energy and will continue to increase its use in the years ahead in line with the targets we have set to reduce our GHG emissions. Additionally, our solutions are essential to the efficient use of energy as well as the transition to renewable energy sources. For example, Nouryon's solutions are used to help make buildings and vehicles more energy efficient and to improve solar panels and the durability of wind turbines.



Promote Sustained, Inclusive and Sustainable Economic Growth, and Full, Decent, Productive Employment

Nouryon believes that business performance, safety, and sustainability are all related, and that growth leads to more employment opportunities. As part of our strategy, we aim to create sustainable growth in emerging markets. We also work to empower employees and create a safe, high-performing, inclusive, and diverse workplace that reflects the global nature of our Company and customers.



Build a Resilient Infrastructure, Promote Inclusive and Sustainable Industrialization, and Foster Innovation

A sustainable future will require new products and processes. Nouryon develops innovative solutions, such as bio-based and biodegradable ingredients for cleaning products. Additionally, we develop ingredients that enhance infrastructure durability and energy efficiency, thereby contributing to a more sustainable society. Our solutions are also integral to products related to the transition to renewable energy sources like wind turbines, high-voltage cables, and solar panels.

⁸ Energy from sources that are inexhaustible and sustainable, such as wind, solar, hydroelectric, biomass, and others.



Reduce Inequality Within and Among Countries

As part of our strategy, we aim to create sustainable growth in emerging markets. We invest in our facilities and provide safe working conditions and diverse workplaces that reflect the global nature of our Company and customers.



Ensure Sustainable Consumption and Production Patterns

The chemistry sector plays a key role in enabling more sustainable and circular production, for which Nouryon continually innovates. Improving the eco-efficiency of our production facilities is a key component of our approach to sustainability and circularity. For example, we use renewable feedstocks, such as cellulose instead of fossil-based. We also co-locate with customers to minimize transport-related emissions and create shared resource models.



Take Urgent Action to Combat Climate Change and Its Impacts

Nouryon recognizes that climate change has a fundamental impact on the global environment, society, and business economics, and we therefore aim to reduce greenhouse gas emissions throughout our value chain. Over the past decade, we reduced our absolute carbon footprint in support of the UN Paris Agreement. We are committed to reaching our 2030 and 2050 GHG emission reduction targets by adopting new technologies and more efficient processes and through sourcing more low-carbon energy. Aside from improving our own operational footprint, our products help our customers become more sustainable, for example, by decreasing weight and enhancing product durability and yield. This helps customers significantly reduce their energy, fuel, and resource consumption.

For more information on the 17 SDGs, visit <https://sdgs.un.org/>.





4.4 Memberships and Partnerships

Nouryon is a member and signatory of the [United Nations Global Compact](#), the world's largest corporate sustainability initiative. An international program, it brings companies, UN agencies, and labor and civil society organizations together to support universal principles on human rights, labor, environment, and anticorruption.

We are also a member of the [Roundtable on Sustainable Palm Oil](#) (RSPO) and [Responsible Care](#)[®], and partner with Swedish regional corporate cooperative [Hållbar Kemi](#) (Sustainable Chemistry). Furthermore, we are a strategic investor in the [Icos Capital Fund III](#), a fund that supports start-ups, including those focused on software and process technologies for manufacturing in agriculture, food, and chemical industries.



4.5 Ratings

A number of organizations provide independent ratings on our ESG performance. We are proud of the recognition we have received from them.

In 2021, Nouryon was awarded a Gold Rating by EcoVadis, placing us in the top 3% of companies then evaluated by them. EcoVadis is a global provider of business sustainability ratings and is used by Nouryon as well as by many of our customers to track performance in supply chains. The rating comprises four dimensions: Environment, Labor and Human Rights, Ethics, and Sustainable Procurement. We consider EcoVadis ratings in our own procurement process (see Chapter 6). In our role as a supplier, we also provide an annual submission to EcoVadis that includes an extensive questionnaire and evidence of our policies, procedures, actions, and results. More information on EcoVadis and its methodology can be found on its company [website](#).

We are also rated by Sustainalytics⁹ on an annual basis. Our 2021 Sustainalytics score was 25.3, placing us in the top 14% of specialty chemicals companies, and is available on the [Sustainalytics ESG website](#).

4.6 Transparently Reporting Our Progress

Nouryon reports transparently and we are proud to share the latest steps in our sustainability journey in this annual Sustainability Report, which includes our [ESG fact sheet](#). We report metrics aligned with the SASB disclosure standards (see Index on page 75).

In 2021, we voluntarily responded to the Carbon Disclosure Project (CDP) climate questionnaire for the first time. This resulted in a B score, the details of which are available on the [CDP website](#).

In addition, we reported to the Task Force on Climate-related Financial Disclosures (TCFD) for the first time (see page 11). Selected 2021 information and data in this report has been assured by ERM CVS. Please see their Independent Assurance Statement on page 79 for an explanation of the information covered, and their assurance conclusion. As such, the specified 2021 data has been included in the Independent Assurance Statement as an appendix to this report (page 79).

Our 2021 Ratings:



EcoVadis
Gold Rating



CDP B Rating
Climate Change



Sustainalytics⁹
25.3 Rating

⁹ Copyright ©2022 Sustainalytics. [All rights reserved.](#)

5 Continuously Improving Our Safety and Environmental Performance

Sustainability is at the core of Nouryon's operations. We are focused on continually improving our safety performance and further reducing our environmental footprint for the benefit of our employees, contractors, customers, communities, and the environment.

Key UN SDGs



Key Achievements



Top-quartile performer in people safety



78% reduction in Process Safety Events¹⁰



Eco-efficiency tracking in place at 100% of manufacturing sites

Relevant Policies & Programs

- Life-Saving Rules and Golden Principle (applicable to all employees and contractors)
- Safety training for employees and contractors
- Behavior-Based Safety (BBS) program
- Process Safety Management (PSM)
- Annual Safety Day
- Health, Safety, Environment and Security (HSE&S), including product stewardship

Current Performance



~22% of organic raw materials are bio-based



~59% of total energy is low-carbon based



~83% of electricity is low-carbon based

Our Ambitions and Targets



Safety ambition: zero injuries, waste, and harm

- By the end of 2030, we have targeted reducing our absolute Scope 1 & 2 GHG emissions by 40%¹¹
- By the end of 2030, we have targeted reducing our total waste intensity by 10%, and water consumption intensity by 10%¹¹

- By 2050, we aspire to be a net zero organization

2030

2050

¹⁰ PSE1+PSE2, compared to 2018.
¹¹ Versus a 2019 base year.

5. Continuously Improving Our Safety and Environmental Performance



CONTINUOUSLY IMPROVE
our safety and environmental performance

Key Sustainable Development Goals:

- 3** GOOD HEALTH AND WELL-BEING
- 9** INDUSTRY, INNOVATION AND INFRASTRUCTURE
- 12** RESPONSIBLE CONSUMPTION AND PRODUCTION
- 13** CLIMATE ACTION

Our global supply network enables fast customer response and reduces complex logistical dependency, with supply reliability and high product quality. Nouryon's Integrated Supply Chain (ISC) function supports this by driving operational excellence via safety, productivity, and cost measures for profitable growth. Despite extraordinary challenges presented by the COVID-19 pandemic, Nouryon has maintained its focus on customers and operated safely.

Operational health, safety, and environmental management, directed by the ISC function, are the responsibility of Senior Vice President and Chief ISC Officer, Paresh Bhakta¹². This includes overseeing our safety performance, greenhouse gas emissions and energy use, eco-efficiency program, and water management strategy, ensuring that our sustainability performance is supported at all our 57 manufacturing sites worldwide.

As a responsible operator and reliable supplier, we put safety first and are a top quartile industry performer in people safety¹³. Our goal is to sustain responsible operations by continuously improving our performance, with the ambition to reach zero injuries, waste, and harm by focusing on people safety, process safety, and product safety. In 2021, Nouryon achieved record-breaking safety performance in terms of people and process safety. Our recordable injury rate declined by 25% and our process safety rate declined by 23% in 2021 as compared to the prior year.

We are also committed to reducing our carbon footprint and energy consumption. We do this by increasing operational

efficiency performance and by expanding the sourcing of renewable energy. Of our 57 manufacturing sites worldwide, 84% have certified Environmental Management Systems (EMS), e.g., ISO 14001 or RC 14001 equivalent.

In 2021, our ISC approach saw improved asset uptime of 3.2% (excluding lost time to weather events and global supply shortages), which delivered ~\$90M of combined reductions in operational and raw material costs, and realigned resources for a more agile organization. This was achieved by simplifying our overall operational structure and plant operations, as well as through centralized spend tracking and controls.

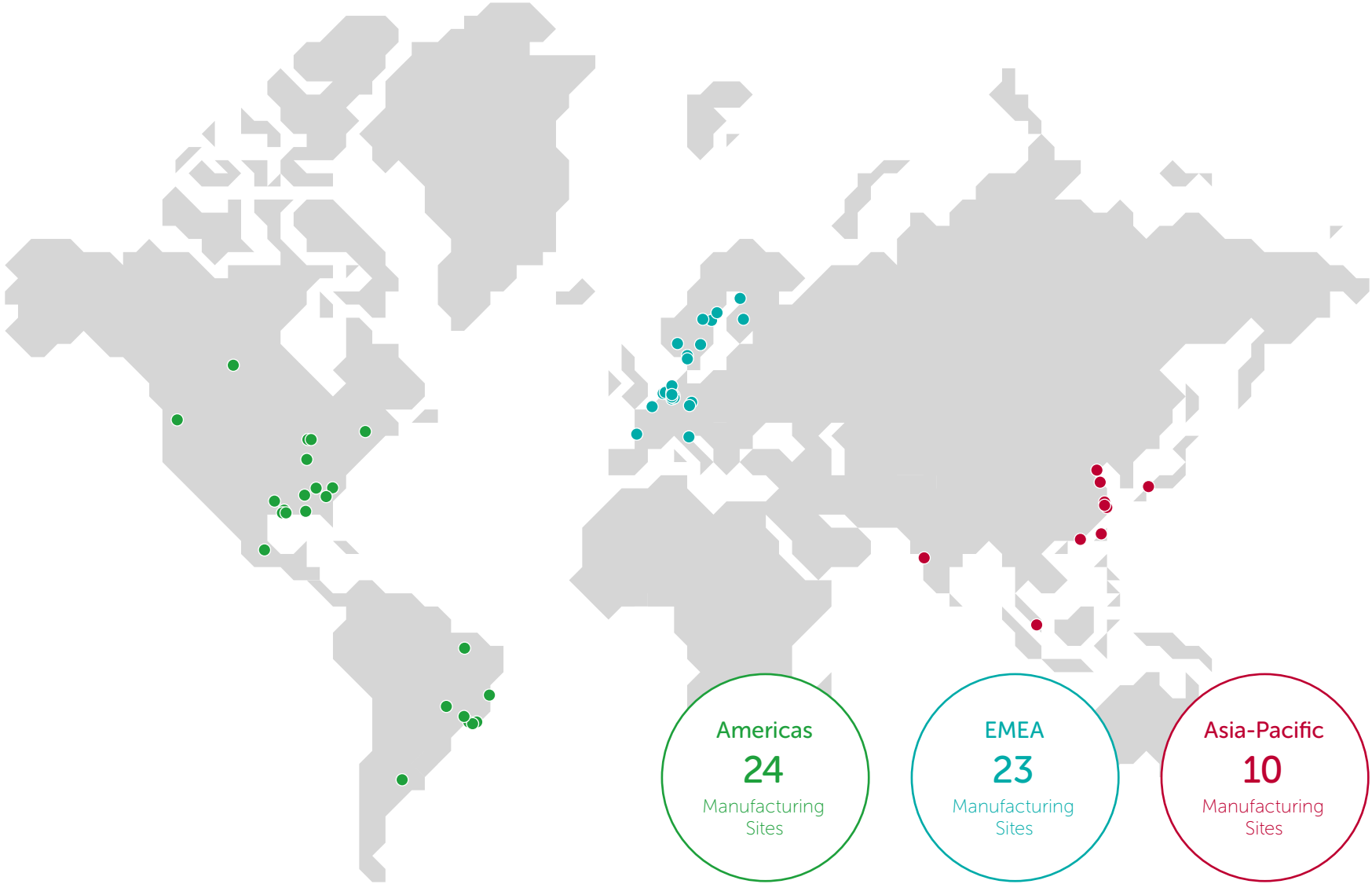
—
We are proud to be a leader in people safety. Safety sits at the heart of Nouryon's success and it is essential for every one of us to take ownership of our own and others' safety.
—

Charlie Shaver
Chairman and CEO

¹² Paresh Bhakta was appointed Senior Vice President and Chief Integrated Supply Chain Officer effective April 1, 2022.

¹³ Based on annual Occupational Safety and Health Administration (OSHA) recordable injury rates versus chemical industry peers in the American Chemistry Council.

57 Manufacturing Sites Worldwide



5.1 Continually Improving Our People and Process Safety

One of Nouryon's Values is 'We do it right' and this includes a culture of safety awareness to protect our people, contractors, customers, communities, and the environment. The safety of our employees is one of our key priorities and we have achieved top-quartile performance in people safety¹⁴. Our goal is to continually improve our performance, with the ambition of reaching zero injuries, waste, and harm in our workplace. We have set internal goals to eliminate workplace injuries and have several strategies in place to keep improving our safety performance, including our Behavior-Based Safety and Process-Safety Management. As a result of these strategies, from 2018 through 2021, we reduced our OSHA incident rate by 49% and reduced our process safety incident rate by 74%. We continue to pursue improvements in our safety performance, for example, by developing relevant skills and behavior, based on the Frontline Leader Safety training program (see inset).

¹⁴ Based on annual Occupational Safety and Health Administration (OSHA) recordable injury rates versus chemical industry peers in the American Chemistry Council.

Frontline Leader Safety training

In 2021, we piloted a new training for site supervisors and leadership teams to improve employee engagement around safety, better identify safety priorities, and evolve our safety culture. While each site already employs a safety dashboard, the training emphasized the importance of making safety a daily topic of conversation and consideration. To achieve this, the training approach focused on leadership alignment, process safety fundamentals, safety briefings, exposure contacts and coaching plans. All Nouryon sites in North America and South America have successfully completed the training and global rollout to the rest of our regions is in progress.



People Safety

Nouryon has leading management systems in place to drive continuous improvement in safety, and we also believe that safety must be embedded in our culture at every level. To increase awareness and strengthen our safety culture, we proactively report on leading parameters such as:

- **Near misses:** events that had no impact but did have the potential to result in injury, ill health, or damage to assets or the environment.
- **Hazards:** any condition or situation that could potentially harm people, products, or the environment.

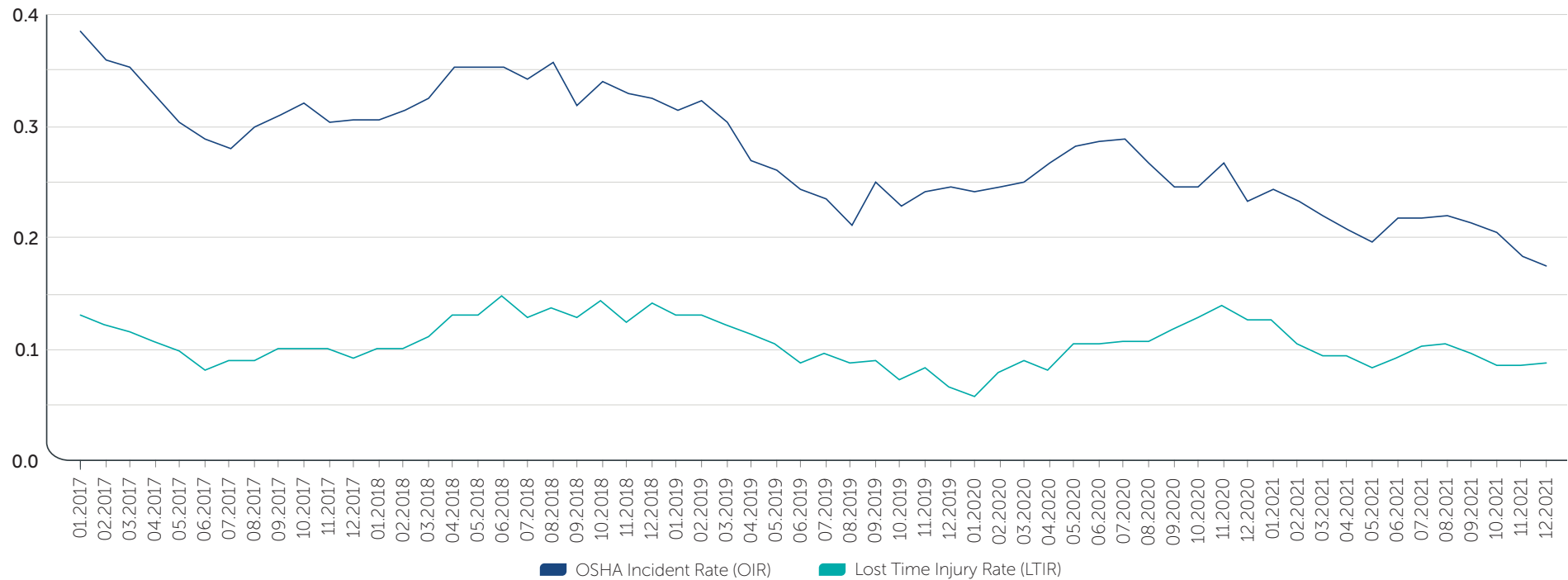
We operate factories around the world and value our relationships with our local communities. Our approach to community engagement starts with building and maintaining relationships with neighboring stakeholders as required in our HSE Rule on Emergency Response and Community Awareness. Each site is audited to ensure that it has informed and involved the communities in which it operates. Sites conduct training and emergency drills on a regular basis – at least once per year – and document outcomes and lessons learned.

In addition, we use a Behavior-Based Safety (BBS) program at all locations to identify unsafe behaviors, train front-line

leaders, and inspire behavioral change among employees and contractors to reduce potential hazards in the workplace. These observations are performed regularly and in a structured way. BBS was identified as a contributing factor to our São Paulo, Brazil, Paulínia facility's 30-year record without injury (see related case study in this chapter).

We also host an annual company-wide Safety Day, last held in September 2021, to promote awareness of the topic and strengthen our global safety culture. We conduct corporate internal audits for health, safety, environment, and security (HSE&S) including process safety in a three-year cycle at our production sites.

Safety Statistics: Employees, Temporary Workers, and Contractors





Safety Training

We conduct regular health and safety training beyond initial new-joiner training. For example:

- Instructions and skills training are provided to line management and employees on specific health hazards at work (e.g., training tools for dust, noise, ergonomics, chemical safety, and health risk assessments).
- All site managers must also complete HSE Leadership and Process Safety Fundamentals training.
- To manage key hazards and to reinforce our LSRs, each site must have mandatory Life-Critical Procedures (LCPs) among its local ones. Additional operational procedures, such as those covering maintenance and inspection plans, machine guarding, and electrical safety and lifting also enhance our Life-Saving Rules. All employees and contractors exposed to potential risks associated with LCPs must be trained on site-specific procedures. Employees must demonstrate the required level of competence through testing and validation, and refresher training is provided.
- When changing assets, a formal Management Of Change (MOC) process must be employed and documented, which also results in specific training requirements.
- We offer many online courses on safety through our learning platform, which are available to all employees.
- We also provide tools to improve our hazard recognition capabilities, such as our HSE&S Good Practices tool and a Risk of the Month tool to increase awareness and improve learning.

Our Life-Saving Rules

The purpose of our Life-Saving Rules (LSRs) is to ensure a safe work environment and safe behavior among our employees, contractors, and visitors.



Golden Principle: Stop work if conditions or behaviors are unsafe



Work with a valid work permit when required



Make sure moving machinery is guarded



Wear a seatbelt in motor vehicles when provided



Use fall protection when working at height



Check equipment is isolated before work begins



Do not use alcohol or drugs at work



Obtain a permit for entry into a confined space



Obtain authorization before disabling safety equipment

Contractor Safety

- Our Business Partner Code of Conduct requires compliance with our safety rules and regulations.
- We evaluate contractor safety during the tendering process, using the ISNetwork database. All contractors must successfully complete training on our Life-Saving Rules, the Golden Principle to stop work if conditions or behaviors are unsafe, and applicable Life-Critical Procedures. They must also be familiar with the Permit to Work system of their location or project site.
- In addition to Life-Saving Rules and training during the tendering process, we require refresher training to be conducted regularly and training records be maintained. Training includes HSE&S procedures, safe work systems, procurement practices, and local regulations. Specific requirements must also be completed prior to starting any work (as defined in our contractor safety management procedure).

Spills or Incidents

Each safety incident is investigated through a formal process, so that root causes are identified and appropriate corrective actions are implemented. In addition, Nouryon has an internal platform for learning from our incidents, the purpose of which is to improve hazard awareness and reduce risk tolerance at all sites. These shared learnings help Nouryon to improve people and process safety by allowing each site to assess the selected incidents and implement action items that reflect scenarios similar to those at the incident sites.

Safety Performance Awards and Recognition

As in recent years, Nouryon's safety performance was acknowledged in 2021 by external organizations around the world. The awards included:

- **Canada National (CN) Railway Company Safe Handling Gold Award:** Nouryon's safe rail loadings of hazardous goods and regulated products in the US throughout the year were lauded with CN's top prize. Launched in 1992, the Safe Handling Award is an integral part of ongoing performance improvement initiative of the Responsible Care® Program.
- **13 Responsible Care® Facility Safety Awards** from the American Chemistry Council (ACC), in recognition of our exceptional employee health and safety performance, as well as our commitment to sustainability. Eleven of the awards were given for Excellence and two were Honor Responsible Care® Facility Safety Awards for the following Nouryon facilities in the US:
 - **Excellence:** Augusta, GA; Columbus, MS; Bridgewater, NJ; Brewster, NY; Lima, OH; Battleground, Fort Worth and Pasadena, TX; Moses Lake, WA; and Green Bay and Howard, WI.
 - **Honor:** Chattanooga, TN, and Salisbury, NC.
- **2021 Texas Chemistry Council Caring for Texas Award:** for the first time, all of Nouryon's Texas (US) sites were acknowledged in the same year – Battleground (sixth consecutive award), Pasadena (five prior awards), Houston (two prior awards) and Fort Worth (two prior awards).
- **Environmental Excellence Award, City of Forth Worth/ Pretreatment Services:** Pretreatment Associate awarded to Nouryon, Fort Worth, TX (US) for two years of 100% compliance with pretreatment regulations.
- **Chilean Safety Association Certification of COVID-19 Contagion Risk Management:** Nouryon Talcahuano, Chile.
- **Responsible Care® Merit Award** from the Association of International Chemical Manufacturers (AICM) in recognition of Nouryon's distinguished performance in the fields of sustainability and responsible care in China. Four Nouryon employees also received 2020 Key Contributor Awards honoring their efforts in industrial policy advocacy and hazardous-chemical safety management (see related case study in this chapter).



Process Safety

We strive to deliver leading performance in HSE&S. Our operational-efficiency program is focused on improving the overall equipment effectiveness (OEE) of all our assets. We constantly measure and analyze OEE, reduce losses, and implement sustainable improvements in order to improve uptime, reliability and capacity. This also enables us to increase our energy efficiency.

Nouryon established a Process Safety Management (PSM) approach for all operations in 2015, in alignment with industry standards and best practices. Our process PSM framework is designed to prevent incidents, and keep our facilities and people safe. PSM applies a management system and controls at all manufacturing sites, so that hazards are assessed, understood and managed. In 2021, we continued to raise awareness and improve reporting of process safety indicators. As our performance in process safety has improved, we have shifted our focus to leading indicators, i.e., low impact events and systems that could lead to more serious events. We review all incidents and near misses on a weekly basis. The total number of incidents involving a (Levels 1 and 2) process safety event (PSE) decreased by 78% between 2018 and 2021.



Continuously Improving Our Transportation Safety

As part of our commitment to continue improving, we looked more closely at Nouryon logistics in 2021, regarding both environmental impact and safety. Transportation, including handling and storage, were priority focus areas in this exercise. Despite our strong track record, we engaged logistics experts and created a central function to conduct gap analysis in our warehouses, terminals and depots as well as our processes and associated technology. As a result, additional investment in resourcing and IT are being allocated in order to evolve our transportation strategy, while accelerating safety performance in this area.

Our Global Central Engineering Center of Excellence – an essential element of process safety and overall safety – supports our equipment and application integrity across Nouryon's global operations. In 2021, we created a core group of engineering and environmental expertise for global oversight of:

- Rotating equipment, such as pumps and compressors
- Fixed equipment, including pressurized and relief vessels
- Instruments and electrical components
- Turnarounds

Our team of maintenance, reliability and environmental technology experts are tasked with establishing and maintaining global engineering standards and ensuring their alignment across our Company. The resulting enhanced equipment integrity is anticipated to bring greater efficiency, reliability and consistency, and ultimately, improved safety – as well as profitability.

	Unit	2018	2019	2020	2021	Absolute Change 2020-2021
People Safety						
Total OSHA incident rate (OIR) for employees, temporary workers, and contractors	Per 200,000 hours worked	0.34	0.26	0.23	0.17	-0.06
Lost time injury rate (LTIR) for employees, temporary workers, and contractors	Per 200,000 hours worked	0.15	0.07	0.13	0.09	-0.04
Total OSHA incident rate (OIR) for employees and temporary workers	Per 200,000 hours worked	0.28	0.23	0.27	0.21	-0.06
Total OSHA incident rate (OIR) for contractors	Per 200,000 hours worked	0.51	0.33	0.13	0.05	-0.08
Lost time injury rate (LTIR) for employees and temporary workers	Per 200,000 hours worked	0.15	0.04	0.17	0.11	-0.06
Lost time injury rate (LTIR) for contractors	Per 200,000 hours worked	0.14	0.16	-	-	0.00
Number (#) of transport incidents ¹⁵	# incidents				6	
Process Safety						
Process Safety Incident Count (PSIC)	# incidents PSE1	11	20	4	5	1.00
	# incidents PSE2	70	40	20	13	-7.00
	# incidents combined (PSE1+PSE2)	81	60	24	18	-6.00
Process Safety Total Incident Rate (PSTIR) PSE1 + PSE2	Per 200,000 hours worked	0.75	0.59	0.25	0.20	-0.06
Process Safety Total Incident Rate (PSTIR) PSE1	Per 200,000 hours worked	0.10	0.20	0.04	0.05	0.01
Process Safety Incident Severity Rate (PSISR)	Per 200,000 hours worked	0.10	0.20	0.04	0.09	0.05

¹⁵ Reporting started in Q3 of 2021 and only reflects partial year results.



5.2 Product Stewardship Throughout the Value Chain

We recognize that we have a role to play in the drive toward a more sustainable society, beyond ensuring regulatory compliance in every region in which we operate. Nouryon therefore creates business value by providing safer and more sustainable solutions for our customers through our product stewardship programs at company and site levels. At a global level, and across our businesses, Larry Ryan, Executive Vice President and President, Performance Formulations and the Americas, oversees Nouryon's product stewardship.

This proactive global approach is designed to consider product safety and sustainability and manage potentially harmful substances throughout the value chain, often acting ahead of legislation. It also enhances our ambition to develop and deliver our Eco-Premium Solutions¹⁶ to our customers and the market.

In addition, Nouryon supports the aims of the European Green Deal, the [European Union \(EU\) Chemical Strategy for Sustainability](#)¹⁷, the US Toxic Substances Control Act¹⁸ legislation, among others. We also advocate the further development of chemicals management legislation around the world.

Risk Assessment and Hazard Communication

We handle more than 4,000 unique substances¹⁹, including raw materials used in our production and R&D samples. Of these, 2,200 are sold and used throughout the world and have been subjected to a hazard assessment. In 2021, 87% of Nouryon's net revenue came from products containing substances that are classified as Globally Harmonized System (GHS) categories 1 and 2 Health and Environmental Hazards²⁰.

Our core competencies are in complex and hazardous chemistries and the [handling of highly reactive chemicals](#). All substances are carefully managed to ensure they are used safely at our production sites and by our customers. Our product stewardship and regulatory affairs teams address the requirements for hazard information and communication, and our processes are aligned with GHS chemical classification and labeling requirements as well as other applicable national and regional regulations.

Nouryon conducts hazard and risk assessments to ensure new raw materials in our products can be used safely. This process includes assessment of potential exposure to workers, consumers, or the environment. Hazard classification and recommendations for safe use are subsequently communicated to customers via Safety Data Sheets (SDSs)²¹, in alignment with local and regional

requirements, and alternatives are sought when needed. A hazard and risk assessment must be performed for 100% of new substances manufactured by, or toll manufactured for, Nouryon.

EU REACH

In connection with the aforementioned risk assessment of new products in the EU member states, Norway, Iceland, and Liechtenstein, Nouryon uses REACH chemical hazard assessment and communicates safe uses through an extended safety data sheet, e-SDS, in accordance with REACH regulations REACH stands for Registration, Evaluation, Authorization and Restriction of Chemicals and includes established procedures for collecting and assessing information on the properties and hazards of substances. One of the main steps in REACH is the registration of all substances imported/manufactured above one ton in the EU.

Nouryon continuously works to ensure that our products can be safely used in alignment with REACH (Regulation (EC) No 1907/2006), which aims to improve the protection of human health and the environment from the possible risks posed by chemicals. To this end, we actively maintain 518 REACH registrations and continuously implement other REACH developments to ensure continued compliance.



¹⁶ Our Eco-Premium Solutions are products that offer significant sustainability benefits over mainstream alternatives in the market while providing the same or better functionality.

¹⁷ For more information: https://ec.europa.eu/environment/strategy/chemicals-strategy_en

¹⁸ For more information: <https://www.epa.gov/tsc-a-inventory>

¹⁹ This includes raw materials for our manufactured products, intermediates and R&D samples from innovation projects. This does not include products and materials purchased that are not directly employed in our manufacturing processes, e.g. lubricants or laboratory reagents.

²⁰ GHS category 1.1 Health hazards include the following criteria: Acute Toxicity, Skin Corrosion/Irritation, Serious Eye Damage/Eye Irritation, Respiratory or Skin Sensitization, Germ Cell Mutagenicity, Carcinogenicity, Reproductive Toxicology, Target Organ Systemic Toxicity – Single Exposure, Target Organ Systemic Toxicity, or Repeated Exposure Aspiration Toxicity. GHS category 1.2 environmental.

²¹ <https://echa.europa.eu/safety-data-sheets>

Managing Substances of Concern

Substances of concern (SoC) are formulations that can be harmful to humans and the environment when they are not used appropriately. We proactively monitor new and future SoCs to ensure that no new SoCs are introduced in Nouryon products. This systematic global program uses the aforementioned REACH methodology for risk assessment and promotes substitution of harmful substances in our production processes and products with more sustainable alternatives. The basic process for all Nouryon innovation projects is a stage gate project methodology whereby we determine whether the new product or process contains any prohibited, restricted or possible SoCs.

In 2021, 3% of Nouryon's net revenue came from products containing SoCs (>0.1% by weight). Of our net revenue, 0.1% is on the REACH Annex XIV (Authorization) list, and 0.3% is on the REACH Annex XVII (Restriction) list. These substances are carefully managed to ensure they can be manufactured and used safely. All have undergone a risk assessment according to the REACH methodology.



Developing Alternatives Through Innovation: Product Substitution Examples

Nouryon has a proven track record when it comes to substitutions for SoCs for our all-important end-markets. In recent years, Elfan® AT84, Redicote® E-47 NPF, and a safer alternative to Di-cyclo hexylphthalate (DCHP) were just some of the substitutions we have offered to address evolving customer and regulatory needs, such as eliminating nonylphenol ethoxylate. For the cleaning market, we introduced innovations such as Dissolvine® GL, wetting agent AG 6206, and Berol® 260 – part of Nouryon's [low dioxane portfolio](#), including degreasers and cleaners from the Berol® and Ethylan® surfactant product lines.

These are produced using a proprietary process that reduces the amount of 1,4-dioxane created as a by-product. Our innovative process also makes formulating more cost effective for our customers and offers the possibility of optimizing raw material purchases, reducing inventories, and simplifying production. All products within our low-dioxane portfolio are also listed in database CleanGredients, meeting the US EPA's Safer Choice standard. They include:

- [Berol® 226 SA](#): synergistic surfactant blend for optimized cleaning and easy handling
- Berol® 260 and [266](#): primary surfactant performance degreasers
- Berol® 609: nonyl phenol ethoxylate free
- Berol® DR-B1: performance cleaner for outside usage, qualified for direct release into the environment
- Ethylan® 1005: low foam, low aquatic toxicity primary surfactant degreasers

In 2021, Nouryon introduced a new addition to our Berol® portfolio to comply with new regulations in New York and California that require cleaning products to contain low 1,4-dioxane levels. Consequently, we developed a new low-dioxane product to help customers transition existing formulations or create new ones that comply with these regulations – some of the strictest in North America – without compromising performance:



Berol® 611 surfactant

Nouryon introduced a new dispersing agent and emulsifier for industrial cleaning, hard-surface cleaning and adhesives. This ethoxylated fatty acid alcohol is a low foaming nonylphenol ethoxylate-free surfactant that has excellent wetting and dissolving properties at room temperature. It demonstrates outstanding detergency and solubility properties when formulated into multipurpose hard surface cleaners, heavy-duty degreasers, and textile treatment cleaning. The versatility of its application extends to all other cleaning applications that require alternatives to replace NP9/NP10 surfactants.

5.3 Mitigating Climate Change: Objectives and Opportunities

Nouryon recognizes that climate change could have a significant impact on the global environment, society, and economic systems, and we aim to reduce greenhouse gas emissions along our value chain. As the transition to a net-zero-carbon economy accelerates, we continue to raise the bar on how we can reduce climate-related impacts, mitigate risks and harness growth opportunities.

In support of the objectives of the UN Paris Agreement, we have already significantly reduced our emissions over the last decade. We have also identified ambitious operational goals to continue minimizing the environmental impact that we have on our planet, by setting targets to reduce absolute GHG emissions (Scope 1 & 2) by 40%, total waste intensity by 10%, and water consumption intensity by 10%, versus a 2019 base year. By 2050, we aspire to be a net zero organization.

In order to support and accelerate Nouryon's path toward achieving these goals, we appointed a Global Carbon Business Leader, Eduardo Nardinelli, who is also responsible for Nouryon's business in South America. He leads the global business strategy for carbon, not as a challenge, but as a commercial opportunity, and ensures company-wide alignment on GHG reductions initiatives and targets. This includes exploring innovative solutions and partnerships to reduce GHGs across our value chain.

More on our Ambitions and Targets and how we will achieve them is included in [chapter 4.1](#).



Leadership Highlight

— Eduardo Nardinelli

Senior Vice President, South America & Global Carbon Business Leader.

Appointed in 2021, Eduardo is leading Nouryon's globally coordinated strategic planning to meet our GHG emission reduction goals in 2030 and beyond.

Current Performance



~59%

of our total energy consumption²² is low carbon and renewable



~83%

of our electricity consumption is low carbon and renewable

²² includes electricity, hot water, and steam.





Measuring and Reporting Our Greenhouse Gas Emissions

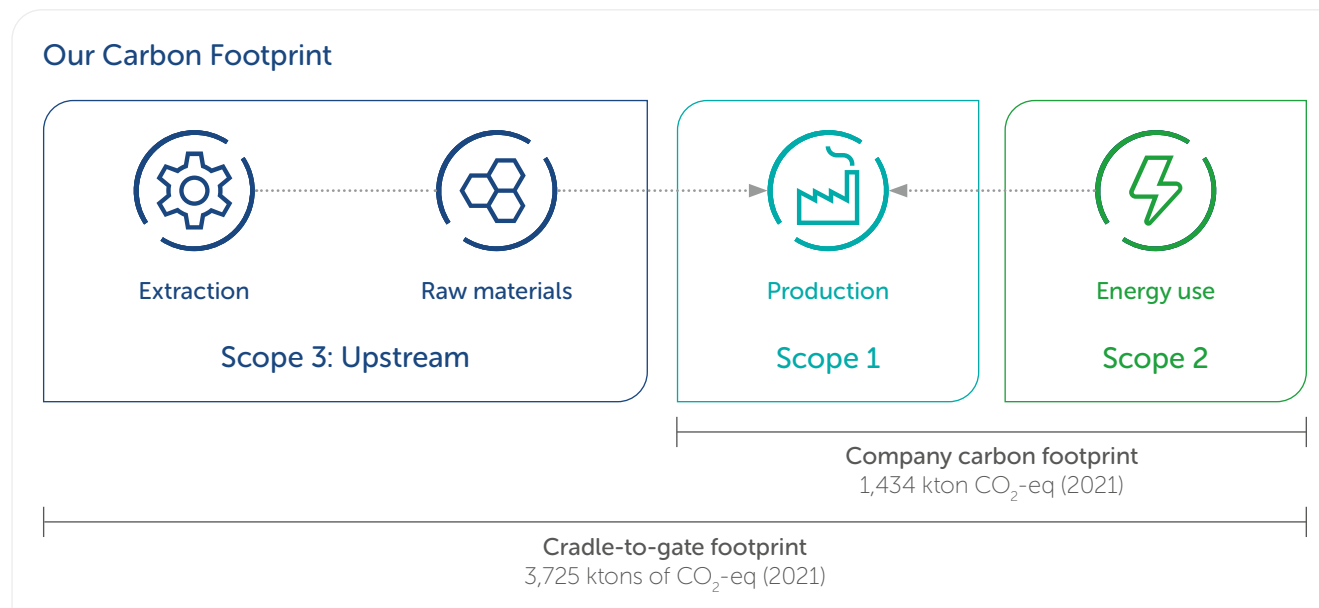
Greenhouse gas emissions in CO₂ equivalents are reported at three levels: emissions from our own operations (Scope 1)²³, emissions from purchased energy (Scope 2)²⁴, and emissions associated with the raw materials we purchase (Scope 3, upstream).

Each year, we calculate our greenhouse gas emissions inventory, estimating CO₂ equivalent emissions. This allows us to measure progress against our targets. We developed dashboards with GHG and eco-efficiency data so that each of our sites worldwide can track their performance, using

a site-at-a-glance tool. Furthermore, we have developed internal reports and guidance procedures that describe our calculation methodology so we can ensure year-to-year consistency.

Our focus is on further reducing GHG emissions while growing revenues. Between 2009 and 2021, we reduced emissions per ton of product by 9%.

To support our customers, we also conduct life cycle assessments and provide product carbon footprints (PCFs) and environmental product declarations (EPDs) when needed.



²³ 'Scope 1' absolute GHG emissions refers to the total direct emissions CO₂ equivalent (for example, CO₂ emissions due to combustion of fuel at our production facilities to generate steam) and is calculated as the sum of direct CO₂ emissions and CO₂ related to non-biomass fuels.

²⁴ 'Scope 2' absolute GHG emissions refers to the total indirect emissions CO₂ equivalent (for example, CO₂ emissions at a power plant delivering electricity to our production facilities) and is calculated as the sum of indirect CO₂ related to purchased electricity steam and hot water.

Scope 3 Emissions

In support of our Carbon Business Strategy, we recently expanded our Scope 3 emissions calculations beyond upstream raw materials and developed a full Scope 3 emissions inventory covering emissions across the value chain. We focused on a detailed analysis of emissions in the following categories seen to be significant for Nouryon:

- Purchased goods and services specifically, purchased raw materials (Category 1)
- Fuel and energy related activities (Category 3)
- Waste generated in operations (Category 5)
- End-of-life treatment of sold products (Category 12)

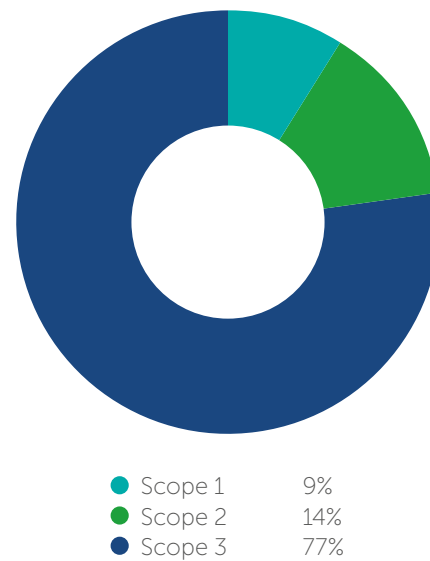
For the other categories, we used the GHG Protocol's Quantis Scope 3 Evaluator Tool. This project started in 2021, using prior year data, and the basis of the Scope 3 calculations is 2020.

Scope 3 emissions account for 77% of Nouryon's total emissions, with purchased goods and services comprising the largest category.

Considering emissions across the full value chain helps us build a robust climate strategy, provides further insight into potential reduction opportunities and how these compare with Scope 1 and 2 reductions, and informs our Scope 3 plans including potential partnerships. A Scope 3 analysis is inherently complex, and the approaches and tools will advance over time. For example, Category 12 has a range of uncertainty due to the effect of different assumptions of product end-of-life treatment. Despite these uncertainties, the analysis provides helpful insight on the relative footprint of different parts of our value chain.

We will continue to refine our Scope 3 calculations and use the results to inform our pathways to achieve our targets and our long-term carbon strategy.

Scope 1, 2, and 3 estimated emissions (2020)



Estimated Size of Scope 3 Categories

Category 1 Purchased Goods and Services	
Category 2 Capital Goods	
Category 3 Fuel, Energy-Related Activities*	
Category 4 Upstream Transport	
Category 5 Waste Generated in Operations	
Category 6 Business Travel	
Category 7 Employee Commuting	
Category 8 Upstream Leased Assets	
Category 9 Downstream Transport	
Category 10 Processing of Solid Products	
Category 11 Use of Solid Products	
Category 12 EoL of Solid Products**	
Category 13 Downstream Leased Assets	
Category 14 Franchises	
Category 15 Investments	

* Not included in Scope 1 or 2.

** Includes intermediate products.



Emission Reduction Initiatives

We aim to achieve our GHG reduction target through a wide range of actions that include focusing on energy efficiency measures and increasing our renewable energy usage. Our solutions can also contribute to GHG reductions for our customers. For example, making packaging lighter with our Expancel® thermoplastic microspheres, which drives transportation fuel efficiency and reduces transportation-related emissions. Similarly, our solutions are essential to renewable energy related products such as lightweight composite parts in wind turbines and insulation for high-quality, high-voltage cables, and for helping to make solar panels durable and highly efficient.

Improving Energy Consumption and Operational Eco-Efficiency

We have a strong drive to embed continuous improvement in manufacturing, energy efficiency and consumption across our supply chain. This includes tracking and reporting our energy and environmental data on a quarterly and annual basis. Between 2009 and 2021, we increased our energy intensity by 6% in line with increased production and revenues.

Sourcing Low Carbon Energy

Low carbon energy refers to energy generated using processes such as renewable, biomass and nuclear energy, which result in substantially lower greenhouse gas emissions than conventional processes. In 2021, 59% of our energy came from low carbon and renewable sources such as hydro, wind, solar, biomass for power, and steam from bio-waste. This was equal to the previous year.

Our Greenhouse Gas Emissions

See our [environmental data sheet](#) for more details.

5.4 Eco-Efficiency and Circularity

The chemical sector plays a key role in enabling more sustainable and circular production. Improving the eco-efficiency of our facilities is a key component of our approach to sustainability.

Our global HSE procedures establish requirements to help promote environmental protection at all sites. For example: Site management continuously looks for ways to reduce environmental impact, waste generation, and energy consumption through objective plans and targets in the site's Improvement Plan. The Site Management team is responsible for assuring that an Environmental Management System is in place, and that identified significant environmental aspects are properly managed.

In cooperation with Company goals, each location establishes annual targets for energy reduction, and should consider use of the best available technologies. Each site completes a water balance and is aware of the sustainability issues associated with the water supply at the facility. In addition, sustainability reviews, including carbon efficiency, are conducted for CapEx projects above a certain monetary threshold.

In 2021, Nouryon introduced a dashboard to track eco-efficiency parameters, including GHGs. Our sites can now subsequently track these in order to gauge performance and identify gaps.

We are also constantly innovating to create more sustainable and circular products. This includes using renewable feedstocks such as cellulose instead of fossil-based feedstocks, and circular production methods, such as co-locating with customers to minimize transport and create shared resource models.

From 2009 through 2021, we reduced sulfur oxide (SOx) and nitrogen oxide (NOx) intensity by 55% and 58% respectively, and the intensity of our water intake and waste by 24% and 15% respectively. From 2009 through 2021, our Company greenhouse gas emission intensity has decreased by 9%.

Products from Recycled and Bio-Based Feedstock

To help meet the growing demands of our customers for more sustainable products, we develop products using bio-based raw materials partly or fully derived from natural sources. Sustainably produced bio-based sources enable a more circular economy and can also have a lower carbon footprint versus alternatives across their life cycle, reducing greenhouse gas emissions.

We also use waste materials as inputs for higher value products, including tallow, used cooking oil, cotton linters, and others. For example, we make rheology modifiers for the paint industry, based on cellulose made from cotton linters. We use bio-based steam where possible. In Örnsköldsvik, we use steam delivered by our neighboring pulp mill that incinerates bio-mass to generate steam.

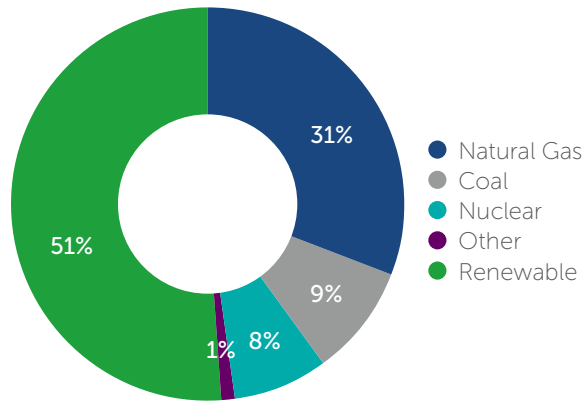


9%
greenhouse gas
emission intensity
decrease

between 2009
and 2021

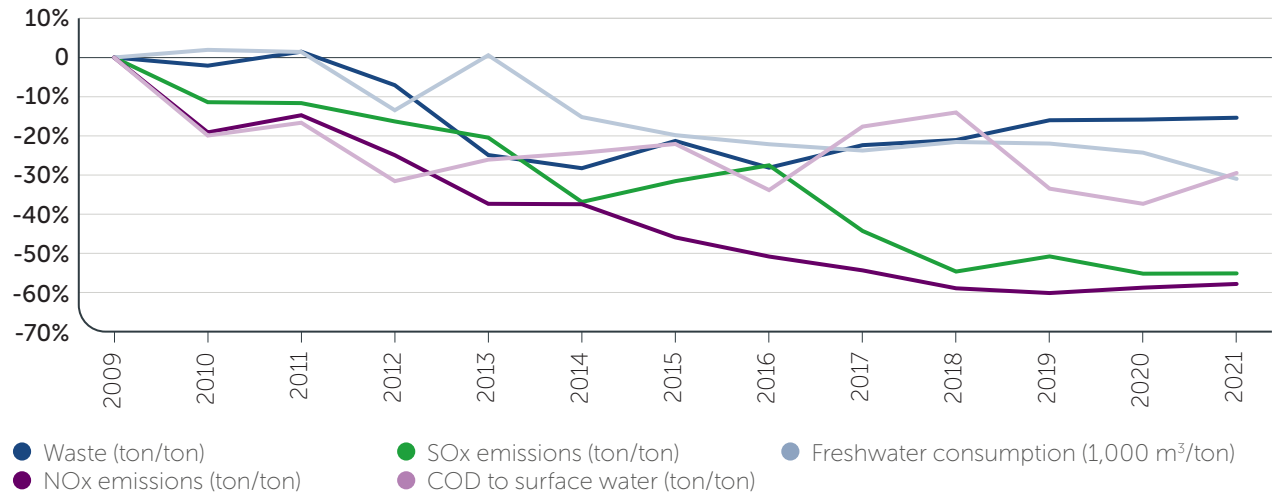
Energy Use in Our Operations

Percentage per source



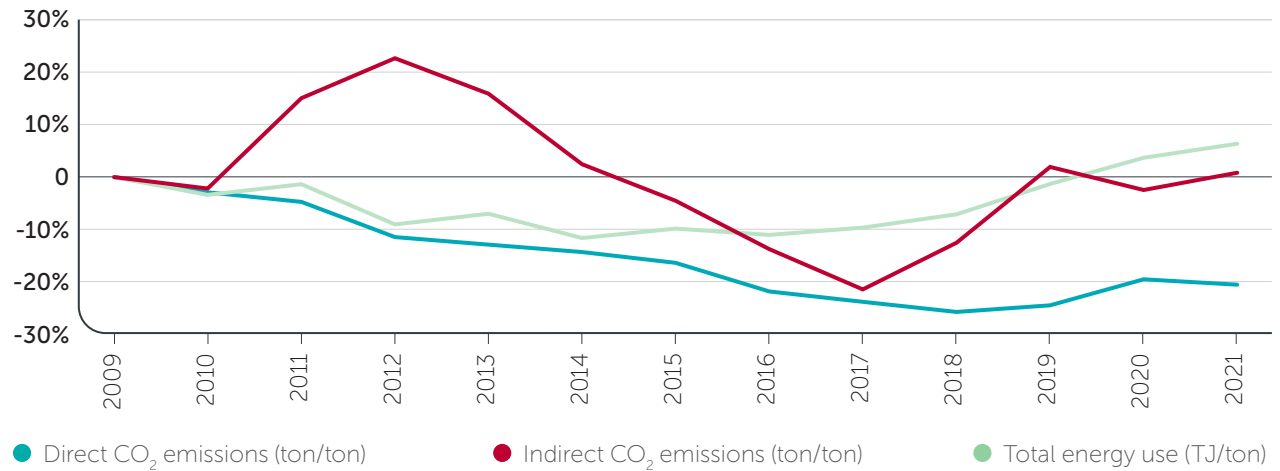
Development of Eco-Efficiency Parameters

Reduction vs. 2009 in use/emissions per ton



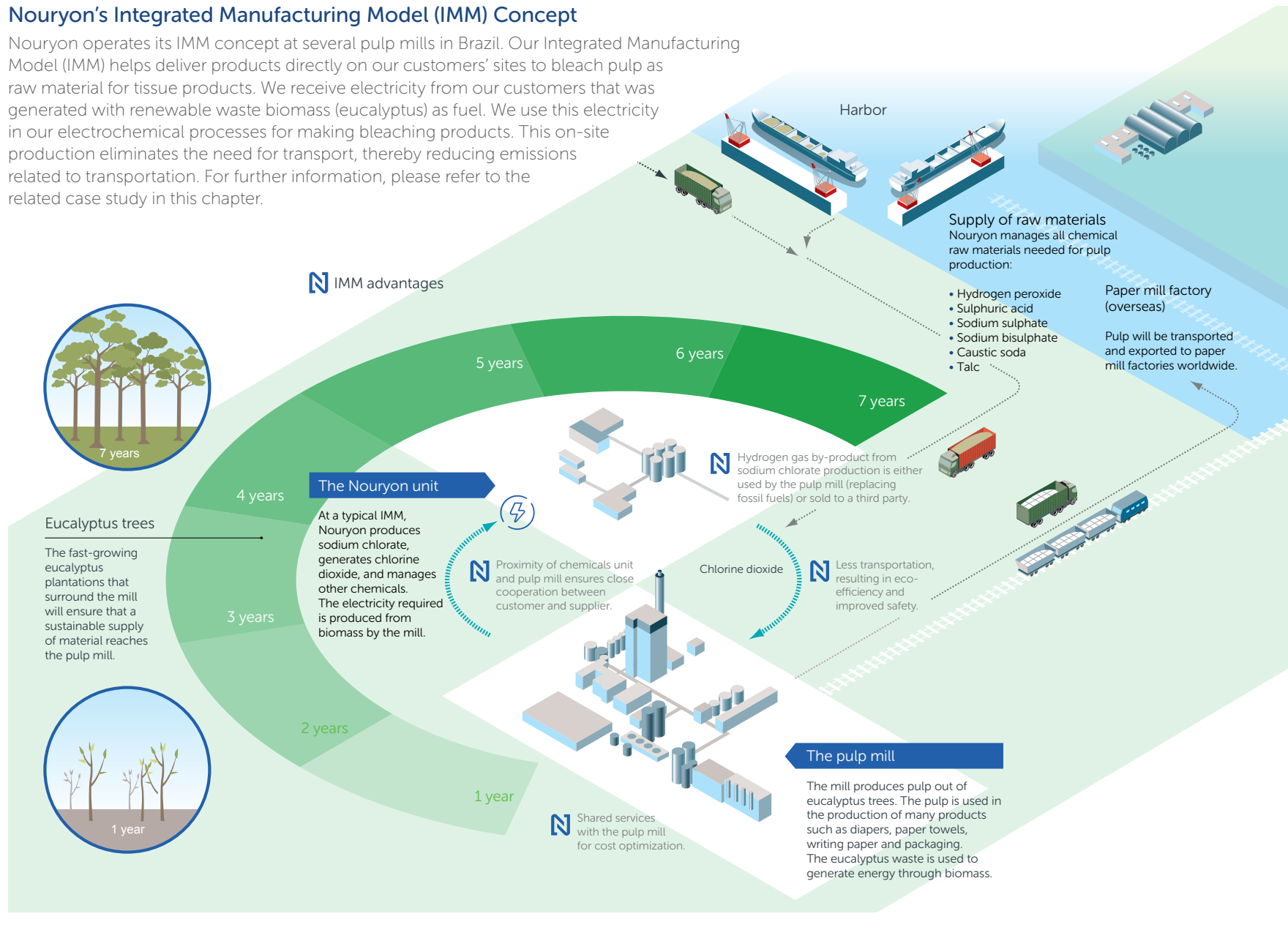
Development of Eco-Efficiency Parameters

Reduction vs. 2009 in use/emissions per ton, GHG related



Nouryon's Integrated Manufacturing Model (IMM) Concept

Nouryon operates its IMM concept at several pulp mills in Brazil. Our Integrated Manufacturing Model (IMM) helps deliver products directly on our customers' sites to bleach pulp as raw material for tissue products. We receive electricity from our customers that was generated with renewable waste biomass (eucalyptus) as fuel. We use this electricity in our electrochemical processes for making bleaching products. This on-site production eliminates the need for transport, thereby reducing emissions related to transportation. For further information, please refer to the related case study in this chapter.



Improving Recyclability

Our products can help our customers improve the recyclability of their products. For example, we offer polymer catalysts that can adjust the properties of mechanically recycled polymers, allowing them to be upscaled and used in applications currently reserved for new virgin polymer streams. Our products also help retain high quality in finished products made from recycled plastics.

Reducing Waste Through Green Shipping

In addition to product design, we look for opportunities to reduce waste in our value chain. For example, in our Asa site in Japan, our customers return empty containers for products, so that these can be reused or recycled. In 2021, the Asa site received more than 190,000 containers from our customers for reuse or recycle.

We also use onsite expansion of our Expancel® product and point-of-use mobile expanders to reduce shipping volumes and cost. This has the potential for significant savings. For each truck of material we expand onsite, we save 30-40 trucks.

We continually look for ways in which we can ship more efficiently to save cost and reduce our impact. This includes utilizing warehouses closer to customers and re-usable dunnage, which provides a dual benefit by reducing packaging waste and eliminating the need for special cleaning at customer sites.

Waste

We are working to reduce our total waste intensity (i.e., waste per ton of production) by 10% by 2030 over the 2019 base year. To date, we have reduced our total waste intensity by 15% from 2009.

²⁵ <https://www.wri.org/aqueduct>

²⁶ Between 2009 and 2021.

Water

Nouryon conducts an annual water risk assessment. We utilize the WRI Aqueduct tool²⁵, and validate the results by surveying all sites globally. This forms the basis of our assessment of sites with high water stress, as reported in our environmental data. We identified two sites – Ningbo and Boxing, in China – as water stressed, and other sites to be monitored. This process also informs potential improvement opportunities. We have 10 optimization projects underway to reduce wastewater. Such projects include reuse or recovery of waste water or wash water, reduction of freshwater consumption, improved washing efficiency using less water, and the use of alternative types of water to freshwater.

We have reduced our water consumption intensity²⁶ (i.e., water consumption per ton of production) by 31% – and strive for further improvement. We aim to reduce this by 10% by 2030 over the 2019 base year.

15%
reduction of
our total waste
intensity

between 2009
and 2021

31%
reduction of our
water consumption
intensity

between 2009
and 2021



5.5 Environmental Data Sheet²⁷

	Unit	2009	2018	2019	2020	2021	% Change 2009-2021
Company Carbon Footprint: Cradle-to-Gate							
Direct emissions (Scope 1)	kton CO ₂ -eq	526	533	523	537	550	4%
Direct emissions (Scope 1) intensity	kg CO ₂ -eq/ton of production	200	149	151	161	159	-21%
Indirect emissions (Scope 2) ²⁸	kton CO ₂ -eq	668	796	894	825	885	32%
Indirect emissions (Scope 2) intensity	kg CO ₂ -eq/ton of production	254	222	259	248	256	1%
Combined direct and indirect emissions (Scope 1 and 2)	kton CO ₂ -eq	1,194	1,329	1,417	1,362	1,434	20%
Scope 3 upstream emissions for raw materials ²⁹	kton CO ₂ -eq	n/a	n/a	2,163	2,246	2,291	
Estimated Scope 3 total	kton CO ₂ -eq				4,541		
Total emissions (Scopes 1, 2, and 3 estimated)	kton CO ₂ -eq				5,903		
Direct emissions, covered by emissions-limiting regulations	% of direct emissions		26%	25%	28%	29%	
Product Related Carbon Footprint							
Direct emissions	kton CO ₂ -eq	526	531	516	530	544	3.3%
Indirect emissions	kton CO ₂ -eq	668	796	894	825	885	32%
Average carbon footprint per ton of product	kg CO ₂ -eq/ton	454	370	408	407	413	-9%
Energy Management³⁰							
Total energy consumption	mIn GJ	23.0	29.1	29.8	30.2	32.1	40%
Energy intensity	GJ/ton of production	8.74	8.12	8.62	9.06	9.29	6%
Percentage renewable energy ³¹	%		51%	46%	52%	51%	
Percentage low carbon and renewable energy ³²	%		63%	59%	59%	59%	
Percentage energy from grid electricity	%		70%	62%	61%	60%	
Total self-generated electricity	mIn GJ	-	-	-	-	-	
Air Quality							
NOx absolute emissions	Ton	889	497	465	463	492	-45%
NOx emission intensity	Kg/ton of production	0.34	0.14	0.13	0.14	0.14	-58%
SOx absolute emissions	Ton	5,286	3,264	3,413	2,995	3,111	-41%
SOx emission intensity	Kg/ton of production	2.01	0.91	0.99	0.90	0.90	-55%
VOC absolute emissions ³³	Ton	717	789	669	1,172	1,938	170%
VOC emission intensity	Kg/ton of production	0.27	0.22	0.19	0.35	0.56	106%
Hazardous air pollutants	Ton					374	
Hazardous air pollutants intensity	Kg/ton of production					0.11	

²⁷ For all figures, minor corrections to historical data may be made to improve accuracy or based on methodology updates.

²⁸ All Scope 2 emissions are calculated using the market-based method.

²⁹ In 2019, we updated our methodology for calculating Scope 3 upstream emissions. In prior years, we estimated emissions from raw materials based on the bill of materials for products. In 2019, 2020, and 2021 we use actual raw material data. Raw materials exclude intra-company transfers, trading, tolling, and utilities.

³⁰ Energy consumption is expressed in mIn GJ, which is the sum of the actual consumed by the sites. For 2018, 2019, 2020, and 2021, the consumption was extracted from our reporting system, Enablon. The energy consumption for 2009 was derived from the consumption expressed in Fuel Equivalents that year by applying a factor expressing the relation between direct consumption in GJ and Fuel Equivalents for 2018, 2019, 2020, and 2021.

³¹ Renewable energy data includes renewable fuel consumed, produced and purchased and is based on utility or supplier data, or other green power products. This does not consider certifications for biomass and hydro power, which are not tracked currently.

³² Including low carbon and renewable grid electricity.

³³ The increase in the 2020 volatile organic components (VOC) emissions compared to 2019 is due to the acquisition of the CMC Äänekoski site.

5.5 Environmental Data Sheet Continued

	Unit	2009	2018	2019	2020	2021	% Change 2009-2021
Emission to Water – Chemical Oxygen Demand (COD)³⁴							
COD absolute emissions to surface water	Ton	968	1,134	845	768	896	-7%
COD emission intensity to surface water	Kg/ton of production	0.37	0.32	0.24	0.23	0.26	-30%
COD absolute emissions to external waste water treatment	Ton			15,245	16,503	17,905	
COD emission intensity to external waste water treatment	Kg/ton of production			4.41	4.96	5.18	
Water Management							
Total freshwater intake	1,000 m ³	162,148	142,953	134,721	147,123	161,436	-0.4%
Per ton of production	m ³ /ton	61.7	39.9	39.0	44.2	46.7	-24%
Percentage in regions with high water stress	%	0.3%	1.8%	2.3%	2.0%	1.6%	
Fresh Water Consumption³⁵							
Total	1,000 m ³	11,078	11,839	11,350	10,621	10,037	-9.4%
Per ton of production	m ³ /ton	4.2	3.3	3.3	3.2	2.9	-31%
Percentage in regions with high water stress	%	3%	17%	17%	18%	16%	
Waste Management							
Total waste	Ton	47,746	51,365	52,659	50,872	53,068	11.1%
Per ton of production	Kg/ton of production	18.2	14.3	15.2	15.3	15.4	-15%
Hazardous waste	Ton	14,440	16,802	16,546	17,543	20,874	45%
Hazardous waste to landfill	Ton	1,615	312	417	465	268	-83%
Hazardous waste reused	%	39%	20%	25%	39%	36%	
Production							
Performance Formulations	kton		1,844	1,792	1,708	1,725	
Technology Solutions	kton		1,740	1,662	1,622	1,729	
Sustainable Sourcing							
Suppliers screened using Risk IQ ³⁶	%					96%	-
Suppliers measured on Ecovadis performance ³⁷	%					49%	
Suppliers acknowledging our Business Partner Code of Conduct ³⁸	% by spend					98%	
% of bio-based raw materials (portion of organic materials)	%			20%	21%	22%	
Management Systems							
% of manufacturing sites with ISO-14001/RC-14001 certifications	%				Per April 2021	Per February 28, 2022	
					77%	84%	
% of manufacturing sites with ISO-9001 certifications	%					88%	

³⁴ Until 2018, only COD discharge to surface water was measured.

³⁵ Total freshwater consumption (excluding once through cooling water intake) [1,000m³]

³⁶ In terms of all external spend (product, non-product, energy, logistics, etc.) The Risk IQ tool considers industry segment risk, country risk and Ecovadis scores from the complete Ecovadis database. Based on 2020 spend.

³⁷ Based on policies, actions, results. For more information: <https://ecovadis.com/>

³⁸ Tracked by acceptance of a Nouryon Purchase Order or a signed Nouryon contract

Case Study

Nouryon Emission Efforts Awarded in Japan

Our Asa site in Japan was recently commended as a '2021 Excellent Company for Global Warming Countermeasures' in Yamaguchi Prefecture in recognition of our Company's proactive approach to reducing carbon dioxide. The site installed refrigerators in its product storage unit that were updated to be more energy efficient, achieving a 15% reduction in CO₂ last year.

Araki Shigeo, Nouryon Asa Site Manager, who received the certificate from the local governor at a ceremony on November 12, 2021, said: "Nouryon is committed to achieving sustainability objectives, improving safety performance, and engaging with our communities in Japan."

Earlier in 2021, the Asa site was also certified as a 'Volunteer Fire Corps Office' by the Fire and Disaster Management Agency and Ministry of Internal Affairs and Communications in acknowledgement of the site's significant contributions to and support of firefighting activities in the community.

In Yamaguchi Prefecture, approximately 12 to 14 individuals, organizations, and companies with outstanding contributions to global-warming countermeasures and environmental, resource, and energy conservation are selected annually for the award, which Nouryon received for the first time.



Award ceremony with Araki (right) and Yoshimoto (left)



Case Study

São Paulo's Paulínia plant: 30 record years without injury

August 2021 marked an impressive anniversary for 30 years without work-related incidents at our site in Paulínia, São Paulo, Brazil. The achievement, which broke national records in Brazil, reflects Nouryon's commitment to safety in the workplace.

Paulínia opened in 1986 and produces metal alkyls, which are essential for producing plastic, including polypropylene and polyethylene. Safety is a top priority for Nouryon and its employees around the world, and the achievement at the Paulínia site was widely celebrated by employees and company leaders.

"I am so proud of our entire staff for this important achievement", said Ezequiel Moraes, Operations Manager at Nouryon in Itupeva and Paulínia. "Everyone follows our safety procedures to ensure we deliver our products to our customers with safety requested, keeping our people safe, so we can come back home to our families every night. We all consider ourselves safety leaders at the Paulínia site."

Paulínia employees follow the same standard safety processes that apply in all 80 countries where we operate. Our Behavior-Based Safety program encourages employees to observe their colleagues' behavior with a constructive approach, in order to avoid injuries or risks in the workplace. We also observe the Golden Principle that allows an observer to stop work if conditions or behavior are unsafe. Finally, Visible Leadership encourages leaders to be in the field daily and in contact with operations to develop a sustainable culture of safety, in which all employees respect, understand and recognize present dangers, and react consistently to prevent accidents.





Case Study

– Reducing Emissions Through Renewable Energy

Our Mons, Belgium site purchases 100% renewable electricity. In 2021, we shifted 15% of the site's electricity needs to solar cells. By the end of 2022, we plan to source an additional 15% of its electricity needs from additional panels.

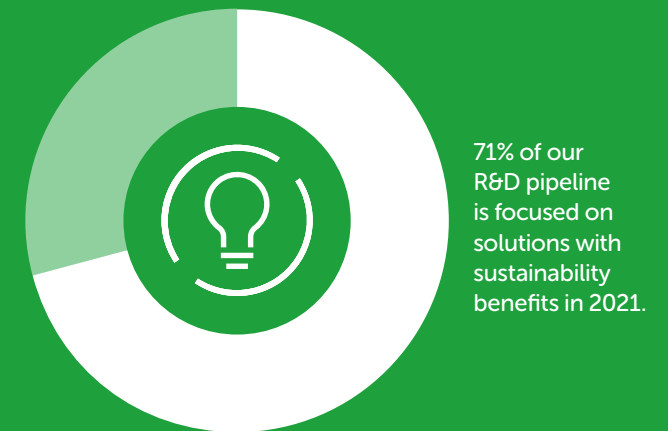
We also invested in a reversible thermal oxidizer (RTO), which connects all 70 volatile organic compounds (VOC) emission points through pipes for on-site treatment. This also allows us to recycle sulfuric acid by reconcentrating it and reusing the 95% that is extracted, which reduces the primary waste stream.



6 Growing Our Sustainable Solutions Through Innovation

Our commitment to a sustainable future is deeply embedded in our Business. As a leading global provider of sustainable solutions, we are dedicated to helping our customers achieve their sustainability goals and to growing our attractive end-markets. These are areas in which we have a privileged position, and we pursue them by investing resources, via our Innovation and Application Centers and through our talent and capacity.

Our Research and Development (R&D) Pipeline



Highlights



38% of revenues from Eco-Premium Solutions³⁹



11 strategically located Innovation and Application Centers



Retention rate of more than 98% over the past five years of our top 250 customers



Megatrends drive growth for our Sustainable Solutions



First Chinese Continuous Initiator Dosing License for Leading PVC producer

³⁹ Our Eco-Premium Solutions are products that offer significant sustainability benefits over mainstream alternatives in the market while providing the same or better functionality.

Relevant Policies & Programs

- Policy statement on Health, Safety, Environment and Security (HSE&S)
- HSE&S Rules and Procedures

Key UN SDGs



6. Growing Our Sustainable Solutions Through Innovation

6.1 Megatrends Driving Opportunities in Our End-Markets

Our end-markets are driven by societal megatrends and the associated trends influencing our customers, among them, increasing demand for: eco-friendly and more-natural, bio-based products; renewable energy and raw materials; biodegradable solutions; reduced carbon emissions, and recycling improvements.



GROW AND INNOVATE

to create Sustainable Solutions, enabling customers to be more sustainable

Key Sustainable Development Goals:



Megatrends drive growth opportunities with higher performing and more complex solutions



6.2 Our Essential and Sustainable Solutions

In partnership with our customers, we develop innovative, tailored solutions designed to meet end-use application performance specifications, sustainability requirements, regulatory requirements, and environmental laws and regulations.

Our goal is to deliver desired functionality and improved sustainability performance for our customers, while minimizing waste and emissions to air and water, increasing yields, and reducing energy consumption in our manufacturing processes (see Chapter 4). We use our expertise and collaboration with customers, suppliers, universities, and other partners to develop innovative, high-performing and sustainable solutions that meet the needs of our customers and society. To meet the growing demand from our customers for life cycle product data, we conduct many life cycle assessments needed to estimate, for example, product carbon footprints and environmental product declarations.

Central to our innovation philosophy are Eco-Premium Solutions that offer significant sustainability benefits over mainstream alternatives in the market, while still providing the same or better functionalities. 38% of our 2021 revenues were from our Eco-Premium Solutions. More information about our Eco-Premium Solutions can be found in chapter 6.3.

Increasingly, our product innovations are focused on bio-based, biodegradable, circular solutions, including natural polymers in Home & Personal Care and cellulose based raw materials in Paints & Coatings. Examples include our range of biodegradable and bio-based products, such as chelating agents, surfactants, and polymers based on natural materials. The acquisition of JM Huber's CMC business in 2020 enhanced our portfolio and technical capabilities in the field of cellulosic derivatives. Many of the products we offer lead the industry in product safety and sustainability programs including EU Ecolabel, Nordic Swan, COSMOS approved, US EPA Safer Choice.

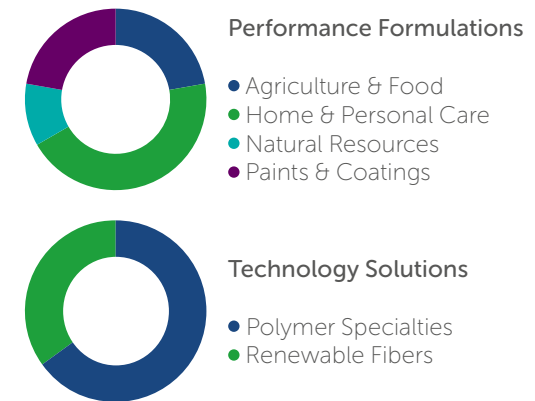
A Selection of Our Industry-Leading Brands



Two Business Segments Focused on Sustainable Solutions

The Performance Formulations and Technology Solutions business segments are enabling innovation through significant research and development, with distinct strategies to capture market share. Together, they deliver market-focused, innovative, and sustainable solutions to answer our customers' needs, contributing to a retention rate of more than 98% over the past five years for our top 250 customers.

Revenue split by Business Lines per Business Segment



Performance Formulations

Performance Formulations provides solutions for many everyday products that help our customers be more sustainable and supports among others, large multinational corporations as well as regional market leaders and distributors that are aligned to our growing end-markets in Home & Personal Care, Agriculture & Food, Paints & Coatings, and Natural Resources. Performance Formulations revenue grew 21% in 2021 versus 2020.

Performance Formulations is a globally balanced business with a proven track-record in renewable/biodegradable offerings, which represent almost half of our revenues across the Personal Care and Pharma sub-markets. Within the Paints & Coatings end-market, we target the faster growing applications, including cool roof coatings, that are driven by the push to more efficient and sustainable solutions.

Our Performance Formulations innovations include water-soluble polymers, biodegradable laundry polymers, and green⁴⁰ demulsifiers that can be found in biodegradable washing pods, biodegradable binders, silicon-free products, among others used in personal care, mining, food, and pharmaceutical products. Performance Formulations is a leading sustainability enabler that makes an impact by providing solutions to end-markets, including the following:

Agriculture & Food:

- Diet fortification
- Food and beverage preservation
- Crop nutrients
- Improved crop yield
- Water conservation
- Green solvents for fungicides

Home & Personal Care:

- Naturally-based and biodegradable products used in cleaning and personal care solutions
- Cleaning products for homes, hospitals, and more
- Natural ingredients for hair and skin care

Natural Resources

- Natural materials over fossil-based
- Lightweighting
- Recyclability/secondary use

Paints & Coatings

- An environmentally-friendly antimicrobial agent that enables the formulation of a robust and tintable anti-viral paint
- Low volatile organic compounds (halogenated and non-halogenated).
- Expandable microspheres that increase insulating properties for roof coatings

In 2021, Nouryon introduced LumaTreat[®], a global patent-pending smart-tagged polymer line of products that is revolutionary in the water management industry. LumaTreat[®] products are fluorescent monomers that attach to a deposit control agent. The combination of the fluorescent monomer and deposit control polymer provide a 'smart tag' that accurately measures the 'free' or unused polymer in the water treatment system. This tags most polymers used in water treatment to prevent calcium phosphate, calcium carbonate and other deposits that, over time, produce scale deposits. See the related case study in this chapter for further information.

Nouryon also continued to adapt to increasing consumer preferences for greener cleaning products in North America throughout last year. To meet demand in the cleaning market for products that are sustainable and comply with new US regulations, we launched several degreasers and cleaners with low-dioxane levels. More details related to many of the sustainability benefits provided by Performance Formulations are provided in the related case study in this chapter.

⁴⁰ Green Products: products that are bio-based, bio-degradable, or both, or which offer other benefits to the environment (e.g., low ecological toxicity or lower energy).



Nouryon's Agriculture & Food solutions contribute to mitigating food shortages, sustaining nutrition, and increasing crop yield:

- Our micronutrients allow targeted nutrition for plants that increases natural resource efficiency by improving overall soil health. This results in a reduced need for plowing and less soil erosion over time.
- They are also used in diet fortification, with specialty iron compounds, as well as in food and beverage preservation.



Leadership Highlight

—
Larry Ryan

Executive Vice President and President, Performance Formulations and Americas

Larry also serves as a board member of the American Chemistry Council (ACC).

Technology Solutions

Technology Solutions is an innovator of essential components that allow customers to build and advance their products. Our Technology Solutions business segment contributes positively to sustainability through both product and process innovations. Revenue in the Technology Solutions segment increased 8% in 2021 compared to the year before.

Our new product innovations promote benefits for our customers and the environment. Our process innovations reduce waste, wastewater, and emissions to air, and we continually strive to increase yields and reduce energy consumption.



Our Technology Solutions business segment manufactures unique molecules and systems that initiate or enable targeted chemical reactions critical to our customers' end-use applications. Technology Solutions also has proven expertise in innovating sustainable solutions that help our customers be more sustainable. Focusing on Polymer Specialties and Renewable Fibers, Technology Solutions is a leading sustainability enabler that makes an impact through integral ingredients in the following applications:

Polymer Specialties:

- PVC (polyvinyl chloride) window profiles
- High-voltage cables
- Paint resins
- Insulation panels
- Solar panels
- Recycling enabler to plastics
- Composites for end-products such as wind turbines

Home & Personal Care:

- Recyclable packaging
- Tissue products
- Textiles and apparel

Some of the sustainability benefits enabled by our Technology Solutions include:

- Renewable Energy: solutions for solar panels with long durability and high efficiency; lightweight composite parts in windmills for renewable electricity; insulation for high-quality, high-voltage cables.
- Circularity and Recycling: renewable fibers transforming the textile industry; improved plastics recycling through upgraded polymer properties; bio-based hygiene products and packaging materials.

In 2021, Nouryon signed an agreement with Renewcell, a company with a unique textile recycling technology, for their new plant in Sundsvall, Sweden. We will provide specialty chemicals and engineering solutions to help develop their recycling chemistry. The facility will recycle textile waste, including items such as worn jeans and production scraps. Operations are scheduled to begin in the first half of 2022.

We also issued our first [Continuous Initiator Dosing](#) (CID) license in China in 2021 to Shaanxi Beiyuan Chemical Group Co., Ltd. (Beiyuan), one of the country's leading producers of PVC. Under the five-year license agreement, we will also supply our [Trigonox® 187](#) proprietary CID initiator (see [page 56](#)), which will be produced at our new, world-class site in Tianjin, China. The partnership with Beiyuan builds on our successful track record of supplying CID technology to customers throughout Europe, the Middle East and Africa (EMEA) and the Americas. For more information, see the case study in this chapter.



Leadership Highlight

Johan Landfors

Executive Vice President and President, Technology Solutions and Europe

Johan also serves as a board member of the European Chemical Industry Council (CEFIC) and the Association for Innovation and Chemical Industries in Sweden (IKEM).

Our Solutions are Essential to Many Everyday Products

Chelated micronutrients for improved plant nutrition replacing inorganic nutrients



Adjuvants and green solvents for improved crop protection



Light-weight components for cost-efficient windmills



Bio-based additives to optimize paint flow and dry time



Sensory materials for skin care



Separation products used in pharmaceutical production



Bio-based hair care polymers and naturally derived ingredients



Crosslinking agents to increase durability of solar panels



Bio-based polymers for sun care applications



Additives used in food preservation, texture modification and fortification



Reduced moisture absorption as well as shrinkage in food packaging



Formulations for biodegradable cleaning goods



Sustainable solutions for laundry detergents and softeners



Optimization of lithium ion **battery performance**



Fabric softeners used on bedding and furniture



Lightweighting of shoe soles and other consumer goods

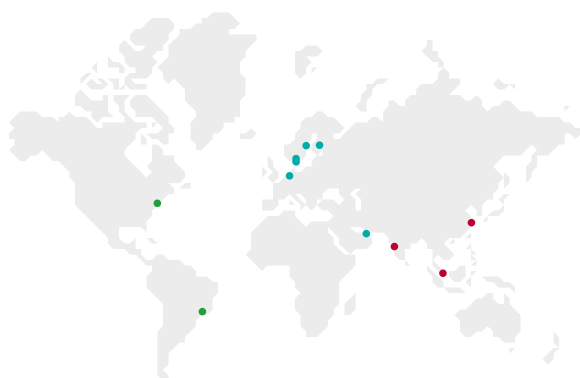


Metal surface treatment and cleaning

Research & Development Focused on Innovating Sustainable Solutions

Nouryon continually invests in innovation for more sustainable solutions. In 2021, 71% of our research and development (R&D) pipeline⁴¹ focused on solutions with sustainability benefits.

11 Innovation and Application Centers Worldwide



Americas: 2
EMEA: 6
Asia-Pacific: 3

- Innovation Centers provide for larger, global platform development while Application Centers are regional in order to allow us to tailor solutions to local market and customer needs.
- This dispersion improves our resiliency and allows us to continually innovate our solutions to meet customer needs today and in the future.
- As customers favor local supply chains and are moving away from single-source suppliers, this approach also improves our ability to serve our customers and develop localized solutions.

In 2021, we opened our eleventh Innovation Center, along with a new, eco-friendly office in Dubai, United Arab Emirates, to better serve our local customers and support growth plans for the Middle East and Africa, covering key our end-markets. The combined facility is located within the Laboratory Complex at [Dubai Science Park](#), which is LEED⁴² certified. LEED is the most widely used green building rating system in the world. The office accommodates Nouryon's regional commercial teams, as well as the Innovation Center, which has been designed for the testing and development of locally focused products. This will allow us to expand our technical capabilities as well as engage our local customers.

We announced plans in 2021 to expand production capacity at our Levasil[®] colloidal silica production facility in Green Bay, Wisconsin, US, to meet increasing demand from North American end-markets. Construction is expected to be completed in the second half of 2022. [Levasil[®] colloidal silica](#) products are very versatile and support several end-markets. A product of two natural ingredients – sand and water – Levasil[®] colloidal silica enhances and improves key functionalities and sustainability profiles of other products and manufacturing processes.

Nouryon also announced the intention to build a new production facility to meet increasing global demand for innovative and sustainable additives for the rapidly growing Paints & Coatings end-market and other high growth end-markets. The new facility will be situated in Southeast Asia. With a capacity of 15-20 kilotons, it will expand our Bermocoll[®] cellulose ether business, which supplies ethyl hydroxyethyl cellulose (EHEC) and other essential ingredients to multinational and regional customers. Demand for Bermocoll[®] cellulose ether continues to increase as consumption of water-based and odorless paints rises and the Paints & Coatings end-market grows. Construction on the new plant, which will be our most advanced EHEC facility, is planned for late 2022 and it is expected to be operational by mid-2024.

⁴¹ This includes process optimizations and is measured based on projects over 40 hours.

⁴² Leadership in Energy and Environmental Design-certified (LEED).

We were also able to make further inroads into end-markets in China and the US in 2021 by laying the foundation for extended Expancel[®] thermoplastic microspheres production in those countries. Plans were announced to increase Chinese capacity of our expandable microspheres by relocating our production site from Suzhou to Ningbo, China (see [page 55](#)). We also began the engineering phase of our Expancel[®] thermoplastic microspheres facility expansion in Green Bay, Wisconsin, US, moving us closer to better serving our Specialty Additives customers in North America. Expandable microspheres are used to make customer end products lighter, and reduce cost and environmental impact by requiring less raw material. Nouryon has seen a significant increase in demand for these formulations, which is being driven by sustainability trends in both geographies.

We also invested in process improvements in 2021, particularly in the areas of wastewater and waste acid. We began full-scale production at our innovative, world-class organic peroxide greenfield site in Tianjin, China (see [page 54](#)). Aside from treating our wastewater, this site also employs active carbon filters, capturing volatiles and reducing carbon emissions.

In Itupeva, Brazil, we opened our new Agricultural Application Development Center to accommodate the needs of customers in one location. The team in Brazil works closely with customers to develop essential solutions in formulation aids, solvents, and surfactants for the agrochemical markets, as well as for fertilizers, biopesticides, seed treatment, and micronutrients. At the center, Nouryon will also test the compatibility of active ingredients and formulation designs in South America.

6.3 Eco-Premium Solutions

Our Eco-Premium Solutions⁴³ are products that offer significant sustainability benefits over mainstream alternatives in the market while providing the same or better functionality. The sustainability benefits of our Eco-Premium Solutions can include one or more of the following:

- Lower toxicity
- Lower energy use or improved energy efficiency
- Lower emissions and waste
- Less land use
- Improved health effects
- More efficient use of natural resources or raw materials
- Improved safety (during production, transport, handling)

We classify a sustainability benefit underlying an Eco-Premium Solution as 'significant' when a particular benefit demonstrates at least a 10% lower impact on the specific criteria. For example, products that help customers to lower their energy consumption by more than 10% would represent Eco-Premium Solutions based on reduced energy use. For example, we will deem a solution's functionality to be superior if it allows customers to lower the use of our product in their applications by at least 10% while obtaining the same functionality as an alternative. We also ensure that a given solution does not have adverse effects on any of the other criteria.

In 2021, 38% of our revenue came from the sale of Eco-Premium Solutions. 21% of our revenue came from Eco-Premium Solutions with a direct customer benefit.

Nouryon's product development processes are designed to drive continuous sustainability improvement in the overall portfolio as products are updated or replaced. Eco-Premium Solutions are a fundamental driver of our sustainability agenda for creating more value from fewer resources, of the products we sell, and of the processes we use to manufacture them.

Nouryon's Eco-Premium Solutions include, among others:

- Solutions for the [cleaning market](#)
- Bio-based polymers
- Dissolvine® M and GL – readily biodegradable chelating agents for more sustainable detergents
- High-performance chelated micronutrients that deliver essential metals to plants, increasing agricultural productivity and crop quality
- Proven high-quality products for asphalt applications, which lower energy consumption for our customers.
- Expancel® thermoplastic microspheres, which reduce paper loss during paper board manufacturing
- Levasil® colloidal silica, which works exceptionally well as a stabilizer, durability enhancer, and strength developer in construction applications
- Polysulfides, as used in double glazing sealants

In 2021, Nouryon introduced Thioplast® EPS 35 polysulfide, an innovative solution that enables high-performance coatings and adhesives to withstand harsh environments in the construction, automotive, aerospace, marine, and energy industries. It combines the capabilities of various epoxy modifiers in one product, enabling customers to achieve durable coatings and adhesives while reducing the complexity of their formulations.

Nouryon's Adsee® C80W belongs to adjuvant family based on cocamidopropylamines and is readily biodegradable. After years of field trials, it has proven to be the best adjuvant for controlling powdery mildew and early/late blight on fruits and vegetables, providing up to 20% increase in harvestable yield.



Leadership Highlight

—
Suzanne Carroll

Senior Vice President, Home & Personal Care

Suzanne leads our Home & Personal Care Business that helps bring sustainable solutions to our customers providing everyday products, such as skin care applications, shampoo and sunscreen.



Leadership Highlight

—
Alain Rynwalt

Senior Vice President, Polymer Specialties

Alain is leading our Polymer Specialties Business, bringing solutions to our customers that help retain high quality in finished products made from recycled plastics.

⁴³ Our Eco-Premium Solutions are products that offer significant sustainability benefits over mainstream alternatives in the market while providing the same or better functionality.



Case Study

– Circular Economy Business Practices in Brazil

Nouryon's state-of-the-art Integrated Manufacturing Models (IMMs) in Brazil are adjacent to customer pulp mills, often even on the premises. Typically, we manufacture [sodium chlorate](#) and [generate chlorine dioxide](#) that is then pumped directly to a pulp mill which produces tissue products. Depending on individual customer needs, we can also manage all the [logistics](#) for the other chemicals their operations require.

Our model contributes to the circular economy within each partner's value chain. Modern pulp mills normally generate excess energy (e.g., electricity and steam from the pulping process) that can be used in other manufacturing processes. Powered by renewable biomass (such as eucalyptus) generated by our pulp partners, Nouryon's IMMs effectively reduce the carbon footprint for operations while simultaneously producing chemicals more efficiently. On-site sodium chlorate production also reduces transportation requirements. The combined result is efficient, safe, and sustainable production and delivery of bleaching chemicals, while reducing environmental impact and providing job opportunities.





Case Study

New, Advanced Organic-Peroxide Site in Tianjin, China

In December 2021, Nouryon began full-scale production at our world-class, innovative, greenfield organic-peroxide site in Tianjin, China, to support the increasing demand from Packaging, Paints & Coatings, and Construction customers in the region. The site consists of three manufacturing facilities and is equipped with the latest technology for safety, energy efficiency, and environmental protection. Nouryon product brands produced at the site include Trigonox® and Perkadox® organic peroxides as well as Butanox® methyl ethyl ketone peroxide.

The manufacturing facilities are equipped with the latest wastewater and environmental-treatment systems and utilize the world's leading safety processes to minimize emissions to air. This equipment design further improves the efficiency of manufacturing processes and helps reduce water and energy consumption.

"Asia is an important growth market for Nouryon and the opening of our new organic peroxide facilities in Tianjin is a significant milestone for us," said Nouryon Chairman and CEO Charlie Shaver. "We have a long history in Asia and this strategic investment demonstrates our commitment to growth and to delivering innovative and sustainable solutions that answer society's needs, today and in the future."

"We are excited to launch our modern and innovative organic peroxide manufacturing facilities in Tianjin, where we have introduced some of our ground-breaking innovations," said Johan Landfors, Nouryon Executive Vice President and President of Technology Solutions and Europe. "This investment underscores the technology leadership in our products and manufacturing processes, our dedication to growing with the polymer industry in the region, and our continued commitment to our customers in Asia. Nouryon is dedicated to further improving our [environmental footprint](#) and [safety performance](#), and we are proud that our new facilities not only meet but exceed China's stringent safety and environmental standards."





Case Study

New Ningbo Facility Addresses Asia Polymer Demand in Our End-Markets

In 2021, Nouryon started production at a new manufacturing facility located at its site in Ningbo, China, to meet increasing demand in the Asia region for polymers used in Packaging, Paint & Coatings, and Building and Construction. The Ningbo site is comprised of six manufacturing facilities that produce chelating agents, organic peroxides, ethylene amines, cellulose ethers, and surfactants. The new facility, which began development in 2020, has an annual capacity of 35,000 tons, and will

produce two key intermediates – tert-Butyl hydroperoxide (TBHP) and tert-Butyl alcohol (TBA) – which are essential ingredients in the production of polymers and composites.

“This investment supports Nouryon’s commitment to meet the growing needs of our customers in the region for products such as safe and hygienic food packaging, paint resins and PVC window profiles.” said Alain Rynwalt, Nouryon’s Senior Vice President of Polymer Specialties.

Nouryon has a 100-year history in the development of [organic peroxide solutions](#), going as far back as the early 1920s. “Nouryon is the market leader in Polymer Specialties because of our technology leadership, innovation focus, and our global manufacturing footprint,” said Johan Landfors, Executive Vice President and President of Technology Solutions and Europe at Nouryon. “This facility allows Nouryon to further strengthen the reliability of our regional supply of organic peroxides in Asia.”





Case Study

First Chinese CID License for Leading PVC Producer

Under our five-year license agreement with Shaanxi Beiyuan Chemical Group Co., Ltd. (Beiyuan), we will license our innovative [Continuous Initiator Dosing \(CID\) technology](#) to Beiyuan as well as supply our [Trigonox®-187](#) proprietary CID initiator, which will be produced at our new world-class site in Tianjin, China.

PVC has become one of the most widely used materials in the world for many essential products, including window profiles, electronic cables, medical containers, and tubing. Due to its fire and weather resistance as well as its electrical insulation and blending versatility, it is used predominately in the construction, automotive and healthcare markets. According to GlobalData, the global PVC capacity will potentially increase from 56 million tons in 2019 to 65 million tons in 2024, and China accounts for half of this increase. Beiyuan is one of China's leading PVC producers.

"As the largest global producer of polymerization initiators for PVC, Nouryon is excited to partner with Beiyuan and extend our technology to China," said Alain Rynwalt, Nouryon's Senior Vice President Polymer Specialties. "Our patented CID technology will allow Beiyuan to increase reactor output, while improving productivity and energy consumption, product quality, and operational safety."

"With this agreement, we look forward to advancing the PVC market and creating more value in China," said Yancai Liu, General Manager at Beiyuan. "By automating the handling of polymerization initiators, PVC production will be a safer and more efficient process with less energy usage. We believe our partnership with Nouryon will keep us at the forefront of the industry and will help us to address increasingly stringent environmental and safety regulations."

"Our customers around the world are demanding more sustainable solutions and are therefore making the shift to CID technology for PVC production," said Sobers Sethi, Nouryon Senior Vice President of Emerging Markets and China. "We are committed to helping our customers grow in China by sharing our expertise. For Nouryon, helping our customers become more successful is the key to our long-term partnerships for mutual growth."





Case Study

LumaTreat®: Revolutionary Smart-Tagged Polymers for Water Treatment

LumaTreat® polymer products are fluorescent monomers that attach to a deposit control agent. The combination of the fluorescent monomer and deposit control polymer provide a Smart Tag that accurately measures the 'free' or unused polymer in the water treatment system. The products are considered a breakthrough because LumaTreat® can tag most polymers used in water treatment to prevent calcium phosphate, calcium carbonate and other deposits that, over time, produce scale deposits.

To date, the industry has widely used pyrenetetrasulfonic acid tetrasodium salt (PTSA) in water treatment formulations. However, PTSA is an inert fluorescent tracer that only provides an estimate of how much formulation is in the water. LumaTreat® polymers enable customers to accurately measure 'free polymer' in the system, reducing the amount of polymer and water usage during the treatment process. This is a sustainable solution that both minimizes polymer consumption and conserves water.

"LumaTreat® polymers contain high-purity (or active level) tagged monomers that provide accurate measurement of the free polymer and the amount of stress on the water treatment system," said John Anderson, Sales & Marketing Leader, Nouryon. "LumaTreat® optimizes polymer and

water usage under everyday conditions while preventing scaling during system disruptions, such as hot spots of deposits, pH pump failure, or changing water conditions."

Another advantage for customers is that the LumaTreat® polymers use the same fluorimeters found in PTSA technology, so that water treaters can use their existing equipment. This eliminates capital expenditure and ensures formulation costs won't change significantly.

"We're really proud of the Nouryon team that worked on this scientific breakthrough, which led to a pending patent," said Larry Ryan, Nouryon's Executive Vice President and President, Performance Formulations and the Americas. "This innovation not only benefits the environment but also helps reduce costs for our customers. That's a great win for everyone."

This version of LumaTreat® polymer is the first of three patent-pending compositions introduced by Nouryon, and targets water treaters who use PTSA. We are working in partnership with customers on additional versions to be introduced at a later point in time. Nouryon's patent applications are published as International Publication Number WO2020/243176 and WO2020/243180.





Case Study

Landmark Collaboration to Remove Micropollutants from Wastewater and Return Clean Water to the Environment

As the world population grows, demand for new pharmaceutical solutions increases, along with pollution from discarded pharmaceuticals. These micropollutants mainly reach the environment through the discharge of effluent from municipal wastewater treatment facilities.

In a unique collaboration with UV system supplier [Van Remmen UV Technology](#) and [Wasser 3.0](#), a non-profit company that operates at the crossroads between materials science, water management, and water technology, Nouryon will participate in a pilot study of innovative processes for the removal of micropollutants and microplastics at the Landau-Mörlheim wastewater treatment plant in Germany.

Micropollutants, including residues from pharmaceuticals, pesticides, and microplastics are threats to water quality and pose a challenge to wastewater treatment facilities. Traditional water technologies are limited in their ability to address complex persistent organic pollutants, which is a strong driver for the development of more advanced options.

Nouryon and Van Remmen UV Technology will support the Wasser 3.0 PE-X® technology for microplastic removal with the unique and customizable combination of Nouryon's MicrOx™ hydrogen peroxide solution and the Advanox™ ultraviolet (UV) treatment from Van Remmen UV Technology, which removes persistent micropollutants, such as pharmaceuticals, from wastewater via an Advanced Oxidation Process. The MicrOx™ - Advanox™ process combines UV-C light with hydrogen peroxide and is efficient, easy, and safe to operate. It returns clean water to the environment.

[Hydrogen peroxide](#) is widely used in a variety of applications. It is well known as an environmentally-compatible product that decomposes into only oxygen and water, in addition to being an essential ingredient in environmental applications such as water and waste gas treatment. Our [MicrOx™](#) hydrogen peroxide solution is produced in a sustainable and resource efficient way, using renewable electricity.

The combination of our innovative technologies for the removal of micropollutants and microplastics promises greater efficiency in process and treatment performance. This unprecedented comparative study aims to investigate how our respective technologies can be used in tandem for efficient use of resources and removal of micropollutants, employing only environmentally safe products and processes.





Case Study

ArmoSoft® DEVQ: New Vegetable- Based Active for Fabric Softeners

Our new sustainable fabric care solution for commercial laundry, ArmoSoft® DEVQ is a readily biodegradable, vegetable-based alternative to alkyl quats. It allows commercial laundry formulators to create eco-friendly, halal-certified fabric softeners with outstanding storage stability and softening performance. Unlike competitive esterquats, ArmoSoft DEVQ is uniquely composed of nearly 100% di-esters, the key contributor to fabric softening performance. It delivers similar cationic adsorption properties as DHTDMAC to maintain the fabric resiliency and soft, fluffy feel that commercial laundry hospitality and health and wellness segments demand, with the greener, premium profile many consumers prefer.





Case Study

Amaze™ SP: A 100% Natural Polymer for a Natural, Styled Look

Demand for natural hairstyling products accelerated during the COVID-19 pandemic. Consumers are more conscious of the environment and integrity of ingredients in the products they use. Telecommuting calls for lighter-texture hair products that appear more casual though well-groomed, but natural solutions often fall short on performance criteria typically met by synthetic styling polymers. The exceptional sensory and fixative properties of Nouryon's Amaze® SP bio-based polymer (INCI Name: Sodium Polyitaconate) make it an ideal choice for today's hairstyle trends. Amaze® SP is a 100% natural polymer that provides a unique weightless hold with humidity resistant style retention, volume and anti-frizz performance comparable to synthetic polymers, while imparting a smoother, glossier appearance.



7 Engaging and Partnering with Employees, Customers, Suppliers and Society to Drive Progress

Nouryon actively engages and partners with our employees, customers, suppliers, and society to drive progress. We empower our people to successfully deliver on our Company purpose and strategy through our Values: 'We aim high', 'We own it', and 'We do it right'. These form the backbone of our performance-driven culture.

Key Achievements



36% gender and ethnic diversity represented on our Board of Directors⁴⁴



Established Global I&D Network⁴⁶



Four Business Resource Groups⁴⁷



24% of mid-level managers and above are female in 2021⁴⁵



Established Global Mentoring Program



96% of suppliers were assessed for CSR risk using the EcoVadis Risk IQ tool⁴⁸

Key UN SDGs

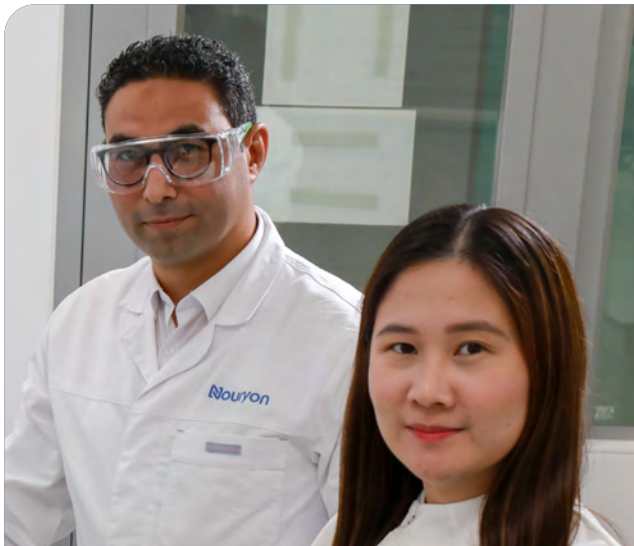


Relevant Policies & Programs

- [Code of Conduct, including anti-discrimination and anti-harassment](#)
- [Anti-corruption, anti-bribery](#)
- [Business Partner Code of Conduct, including suppliers](#)
- [Health, Safety, Environment and Security \(HSE&S\), including product stewardship](#)
- [Palm Oil Statement](#)
- [Sensitive Country Policy](#)

⁴⁴ Board Members who are female and/or of a US racial/ethnic minority.
⁴⁵ Mid-level managers are defined as the management paygrade below the first senior executive level. Source data, December 2021.
⁴⁶ With 50 representatives from 35 Nouryon locations, to localize and activate I&D initiatives.
⁴⁷ Nouryon Women's Network, Pride, Veterans, and Boost.
⁴⁸ In terms of all external spend (product, non-product, energy, logistics, etc.) The Risk IQ tool considers industry segment risk, country risk and EcoVadis scores from the complete EcoVadis database. Based on 2020 spend.

7. Engaging and Partnering with Employees, Customers, Suppliers and Society to Drive Progress



ENGAGE AND PARTNER

with employees, customers, suppliers, and society to drive sustainable progress

Key Sustainable Development Goals:



We invest in training and development for our approximately 7,650 employees and are committed to creating a diverse, inclusive, and safe work environment. Our commitment to our employees complements our comprehensive approach to corporate responsibility, and we aim to achieve a respectful and inclusive work environment that reflects all employees' unique needs, perspectives, and potential.

In 2021, Nouryon established a new Inclusion and Diversity (I&D) function to support its commitment to building an inclusive culture that allows diverse perspectives and ideas to be shared, heard, and translated into better business results. The I&D Program was introduced to help us achieve strategic priorities, such as attracting and retaining top talent, as well as fostering innovation. We are building a pipeline of diverse talent, with fair and inclusive recruitment, and performance-management processes. We monitor progress through transparent reporting on key metrics related to our diversity.

Nouryon also aspires to be a good corporate citizen and global business partner in alignment with the [UN SDGs](#), supporting the communities in which our employees live and work, and identifying where we can make the most impact. Our Corporate Social Responsibility (CSR) framework is another fundamental element of our sustainability approach. Practical in nature and based on the substantive practices of volunteerism, engagement, and corporate giving, it allows us to support community-engagement initiatives.

We have also identified key learning institutions and universities around the world with which we collaborate and connect for internships, talent acquisition (including diverse talent), and research, in addition to learning and development opportunities for our current employees. We firmly believe in providing our employees with the necessary resources to develop leadership capabilities and advance their careers. In addition to providing opportunities for specialized learning, we also train our employees on our Values.

7.1 Inclusion & Diversity

A diverse, respectful, and inclusive work environment is critical to unlocking the full potential of our global workforce, driving collaboration and innovation, and understanding the unique needs of our customers. Nouryon supports its inclusive culture through its Code of Business Conduct & Ethics, which employees review and acknowledge every year. We also require all employees to complete Respectful Workplace training. Furthermore, as I&D is based on the needs of our employees, many of our initiatives are employee led.

Nouryon's I&D strategy is built on the following four pillars:



At the executive level, I&D is led by Samantha Dreilinger, Nouryon Chief Compliance Officer and Vice President of Inclusion & Diversity. She works with our senior executives to advance Nouryon's I&D priorities and initiatives.

The activation and localization of Nouryon's I&D program is implemented by our global I&D Network, which was created in 2021 and consists of 50 representatives from businesses and functions from 35 Nouryon locations around the world. Our I&D Network representatives also act as local liaisons for employee ideas, suggestions, and concerns. In addition, they take an active role in promoting the Business Resource Groups (BRGs) operating at Nouryon.

Business Resource Groups

Nouryon has four company-wide, employee-led BRGs, with over 800 members, that provide career development advice, mentorship, community service and global networking and knowledge sharing opportunities: Nouryon Women's Network, Nouryon Veterans Network (US), Nouryon Pride Network (for LGBTQ+ employees and allies) and BOOST (young professionals and those new to Nouryon). BRGs are open to all employees, whether they identify with the specific group or consider themselves allies.

BRGs support our commitment to an inclusive and diverse workforce by organizing events including virtual quarterly coffee meetings and special programs for occasions such as Pride Month and International Women's Day. Nouryon Women's Network and Nouryon Veterans Network also offer mentorship programs, in which more than 200 employees currently participate as either mentors or mentees. With the establishment of a dedicated I&D function, we expect additional BRGs to be created in the coming year.





I&D Progress

We believe that a workforce that includes diverse backgrounds, experiences, and perspectives is critical to Nouryon’s success and helps us to anticipate and meet the needs of our global customers. In 2021, we continued to make progress.

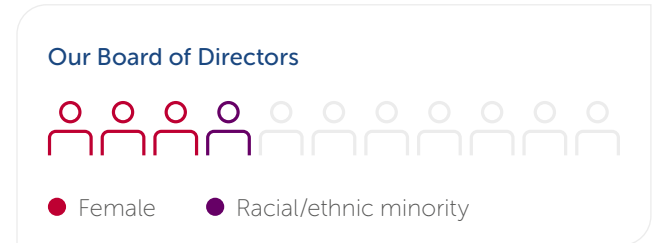
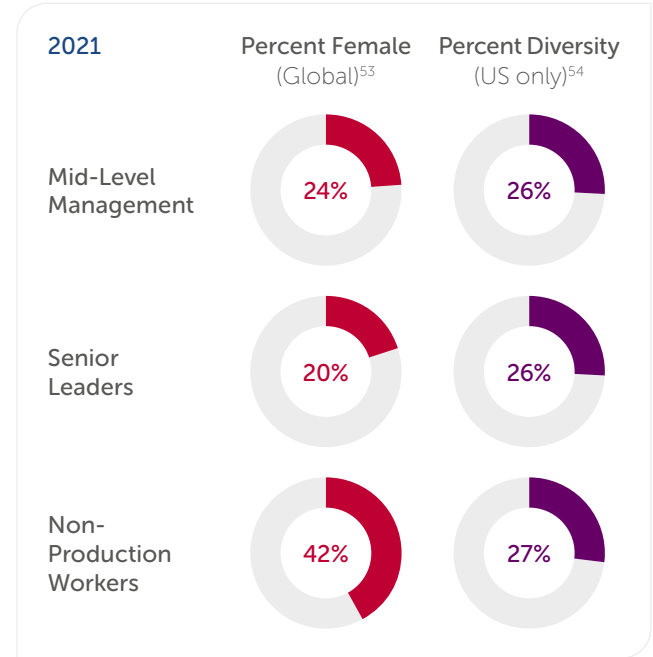
Key achievements:

- 36% gender or racial/ethnic diversity represented on our Board of Directors⁴⁹
- 24% of mid-level managers and above are female⁵⁰
- Four Business Resource Groups⁵¹
- Established Global Mentoring Program
- Established Global I&D Network⁵²

In 2021, we established an extensive assessment process to ensure that we have accurate workforce demographic data. This will allow us to track our progress, recognize areas of improvement, identify areas of opportunity at all levels of our organization, and develop action plans. As a result, we are focusing on the following areas:

- Greater representation of women and racially/ethnically diverse employees in middle management and senior leadership
- Inclusive hiring and interviewing practices
- Continuing to build a high-performing culture through inclusive leadership and I&D initiatives

We will also use this data to help review all aspects of our employee life cycle to ensure that our hiring, engagement, rewards, and promotion processes reflect the profile and needs of our diverse workforce. To hold ourselves accountable and assess diversity of all levels of our organization, we measure and track our progress through data collection and analysis.



⁴⁹ Board Members who are female and/or of a US racial/ethnic minority.

⁵⁰ Mid-level managers are defined as the management paygrade below the first senior executive level. Source data December 2021.

⁵¹ Nouryon Women’s Network, Pride, Veterans, and Boost (for junior employees and those new to Nouryon).

⁵² With 50 representatives from 35 Nouryon locations, to localize and activate I&D initiatives.

⁵³ We respect that gender is not binary; however, this data aligns with the US reporting requirements and uses the traditional categories of male and female.

⁵⁴ Reflects the minority population in our US workforce, as defined by the US Equal Employment Opportunity Commission.

7.2 Human Resources: Attracting, Developing, and Retaining Talent

In 2021, a new global Human Resources (HR) team was appointed under the leadership of Tift Shepherd, Nouryon Chief Human Resources Officer. The team has already made process improvements and set priorities, which include: advancing our high-performance culture, improving our employee value proposition, updating our talent acquisition approach, and evolving our development and performance framework for a more fulfilling employee experience.

Attracting New Talent

A strong onboarding process supports new hires in their integration into our Company. In Nouryon France, for instance, internal mentors from various departments oversee initial employee training and competency validation.

In 2021, Nouryon welcomed 850 new hires worldwide, representing an increase of 270 over the previous year. This is a testament to our appeal in the market as a young and growing company with a high-performance culture characterized by purpose, shared values, strong leadership, and a sense of community and accountability.

We also aim to enhance our talent and expertise further and incorporate diversity data in company-wide recruitment, actively monitor our progress and continually challenge ourselves to make improvements. In 2021, we identified several universities and organizations as diversity partners. We are working with these partners to identify, recruit and retain diverse employees who reflect the communities and markets in which we operate. We also established US partnerships with Society of Hispanic Professional Engineers, Society of Women Engineers, and National Society of Black Engineers.



Retaining and Developing Our Existing Talent

Nouryon's growth strategy and goal for a sustainable future drives all aspects of our HR approach. One of the key elements of our talent acquisition and retention strategy is the continuous development of our employees and leaders.

Over the last three years, we have hired more than 30 new senior-level executives to complement and upgrade the existing team and help drive performance. Key areas of additional focus relate to executing our commercial strategy, reporting, and our internal culture, including sustainability, accounting, risk management, inclusion and diversity, cybersecurity, safety, and continuous improvement. Our continued success depends on our ongoing ability to recruit and retain talented leaders that engage their teams to serve our customers.

We support both short-term and long-term capability building and help our employees to live our values, learn continuously, and learn from one another. We offer favorable employment terms that are aligned with market practices. This includes arrangements that encourage a healthy work-life balance.

Learning, Leadership, and Development

To sustain Nouryon's performance and growth, we encourage our employees and leaders to regularly gain new knowledge and skills so that they can continually contribute to our success. We offer a broad range of learning activities, such as on-the-job experiences, blended programs, online learning, (virtual) classroom training, and mandatory compliance courses. Our global digital learning environment helps employees find relevant training more quickly, enroll in scheduled offerings, and provides 24/7 access to online training, enabling at-home learning and offering flexibility.

In 2021, we launched a two-part program for all new commercial 'growth' employees to help them focus on strengths and build relationships. During the initial phase of this new sales curriculum, the program explored self-

awareness, how to recognize pitfalls that can impede success, and how to develop strategic approaches. The second phase focused on stakeholder management and value-based selling.

Our 18-week digital, global leadership experience, LEAP, was offered in 2021. The program focuses on leadership skills, awareness of personal biases, and cultivating a culture of inclusion. All topics are linked to the Nouryon values, strategy, and Organizational Health Index focus areas to help our leaders apply learnings in their daily work.

In 2021, a new leadership-development training – JUMP – was launched for aspiring leaders who are not currently managers. Twenty-four participants were instructed on how to increase self-awareness and improve coaching and networking abilities. The pilot took place in addition to existing online programs:

- **STEPS:** all leaders with direct reports covering required knowledge on people processes and systems (52 participants in 2021).
- **LEAP 1:** first-time leaders with less than three years of management experience (135 participants in 2021).
- **LEAP 2 (Lead the Way):** experienced leaders with more than three years' experience (64 participants in 2021).

In 2021, a training taxonomy of 21 core information management competencies was also designed around the broader topics of: security and compliance; connecting people; ensuring delivery; driving productivity; using data and reporting; and catalyzing growth. Nouryon also encourages informal opportunities for knowledge sharing, particularly at the local level. An example of this is our site in Ambès, France, which began communicating regular topical employee updates about site or company-wide developments.



7.3 Engaging Our Communities and Employees

Our Corporate Social Responsibility (CSR) framework was expanded in 2021 and now focuses on volunteerism, engagement, and corporate giving to positively impact the communities in which Nouryon operates. As a global organization, it is important for us to work with diverse populations and develop partnerships with companies that share our philosophy of inclusion, collaboration, sustainability, and giving back to our communities. We look for partners that are aligned with our Code of Business Conduct & Ethics and value the importance of the events and activities we host, in which our employees and the community can participate.

To make a positive difference around the world, the following CSR priorities were identified in 2021:

Focus areas		
<ul style="list-style-type: none"> STEM Education (science, technology, engineering and mathematics) Sustainability and Environmental Stewardship Safety and Health Accelerating a High-Performance and Innovative Culture 		
Approach		
Philanthropy	Partnerships	Volunteerism
Engagement		
Public and Government Relations	Employee and Community Engagement	Global, Regional and Local Programming

Global Mentoring Program

In addition to development programs and on-the-job development opportunities, Nouryon established a Global Mentoring Program through our BRGs in 2021. The program has over 200 participants and encourages knowledge sharing and coaching from more experienced colleagues for employees aiming to develop themselves and their networks. This program allows employees to access a diverse and experienced pool of willing mentors located in all our regions and working at all levels of our organization.

Performance Management

To sustain the performance and growth of our employees and our Company, we use a Continuous Performance Management process to set dynamic objectives, hold regular check-ins, and give employees feedback throughout the year. This allows us to help our employees and leaders stay engaged and deliver high performance. In 2021, 94% of our staff participated in the full annual performance management cycle.

We also apply a pay-for-performance approach, in which outstanding results are rewarded.

Compensation and Benefits

Nouryon strives to offer competitive compensation, in alignment with local market and industry standards, offering additional benefits when and where possible. For example, benefits in Italy include paid parental leave, paid leave for medical consultations (20 hours per year), paid leave for blood or bone-marrow donation. In Belgium, employees in the twilight of their careers receive additional salary support for reduced hours. In 2021, a number of attractive additions were made to the collective labor agreement for our operations in the Netherlands:

- Extended maternity/paternity leave of up to five weeks, in addition to the five days guaranteed by law. This is compensated through a combination of government benefits, Nouryon contribution and employee vacation days.
- Reduced hours for staff who are care takers, to be compensated at 90% for 80% employment
- Special arrangements for older employees, including 80% work/90% compensation with 100% pension accrual (upon medical evaluation), and early retirement scheme.

Some examples of 2021 CSR engagement activities at our locations around the world included:



Kids in Need Foundation (KINF): This newly established US collaboration is one of our Partnerships for a Sustainable Future. Nouryon hosted ‘backpack builds’, during which 150 employees from our US offices in Radnor, PA, Houston, TX, and Chicago, IL volunteered to pack 1,000 school bags with supplies for distribution to schools near those locations. In addition to aligning with our priority of STEM Education, the partnership with KINF promotes a high-performance culture by helping to supply students with the tools needed to succeed in school.

Volunteer Fire Corps Office: In Japan, our employees partner annually with a local volunteer fire corps office to support ongoing community protection and safety programming. In addition to supporting the efforts of first responders to keep local residents safe, our support for this agency aligns with our key focus area of Health & Safety. We believe that a healthy and safe community is necessary for a sustainable future and in 2021, we were acknowledged for our involvement (see [page 42](#)).

American Corporate Partners (ACP): This US partnership pairs Nouryon mentors with American veterans (and their spouses) who are transitioning to civilian life. Our mentors coach their protégés on channeling military acumen into professional and business skills on their new career paths. Nineteen Nouryon mentors from all levels of our organization – including our Chairman and CEO Charlie Shaver – are helping veterans to, among other things, refine their resumes and improve their interview skills.

Mother’s Day Event (Brazil and Mexico): Nouryon hosted a networking and knowledge-sharing event for working mothers in our Company. The event was attended by 74 employees in Brazil and 75 employees in Mexico, and provided a platform for sharing the experiences, challenges, and rewards of combining career and children and finding the right work-life balance.



Community Open Days (China): From July to September 2021, Nouryon’s Taixing, Jiaxing, Ningbo and Guangzhou sites successively held community open days to showcase chemical innovations, improve information transparency, and advocate open and harmonious communication with the public and stakeholders in surrounding communities. Themed ‘Joining Hands for Sustainability and Building Carbon Neutrality,’ this annual event was a first for the Jiaxing site since joining in 2019. Nouryon has hosted the event for over a decade in collaboration with the International Association of Chemical Manufacturers. More than 300 Nouryon employees, their families, and industrial-zone stakeholders participated in a variety of awareness activities.



Supporting COVID-19 Community Healthcare (India): In 2021, Nouryon partnered with the Mahad Manufacturers Association and other peers to support the construction of a new, community COVID-19 health care center. Located near Nouryon’s Mahad manufacturing site, the recently opened facility is equipped with: COVID-19 testing; 84 beds supplied with oxygen; consulting rooms; isolation wards; storage; and new medical equipment, including ventilators. To date, the facility has treated more than 1,100 patients in the community free of charge.

Partnering on Personal Protective Equipment (PPE): Throughout the global COVID-19 pandemic, we delivered critical life-saving products, including face coverings, personal protective equipment (PPE), cleaning and disinfecting products, sanitizers, as well as paper and fabric supplies. Our essential solutions are in these products and our employees were able to make valued donations of health and safety equipment.

French third-party training partnership: Some partnerships not only have a positive impact on our local economic ecosystems, but on our bottom line. Members of Nouryon’s HR function in France work in close collaboration with local external partners on annual training and accreditation plans, which in turn qualifies our Company for government subsidies and provides local training opportunities. In 2021, 60% of our French accreditation plan was financed through this partnership.

7.4 Sustainable Sourcing

We ask our suppliers to partner with us for a sustainable future, so that as Nouryon and our customers become more sustainable, they do, too. Our business partners, including our suppliers and customers, must adhere to our Business Partner Code of Conduct, which sets expectations regarding compliance, safety, ethics, human rights, fraud prevention, and support for sustainability.

Driving Sustainability with Our Suppliers

We use EcoVadis to measure and track the sustainability performance of suppliers across multiple categories – environment, labor and human rights, ethics and sustainable procurement – based on policies, actions, and results. In 2021, we expanded our sustainable

sourcing approach to include a new process to screen suppliers using the EcoVadis Risk IQ tool⁵⁵, and set specific performance criteria with a corrective action process to drive improvement. Non-compliant suppliers that do not improve above our defined threshold are identified to be phased out. For more information, see our [global sustainable procurement statement](#).

This approach gives us an opportunity to engage our suppliers on sustainability and drive improvement. At the same time, we are reinforcing internal understanding of and alignment on the issues. In 2021, we trained 100% of Nouryon category managers on sustainable sourcing and supplier requirements, including our sustainability strategy goals, and we are committed to continuing this training for all category managers going forward. Specific goals and metrics supporting our EcoVadis sustainability assessment and rating were also added to our Procurement team's

individual employee performance objectives.

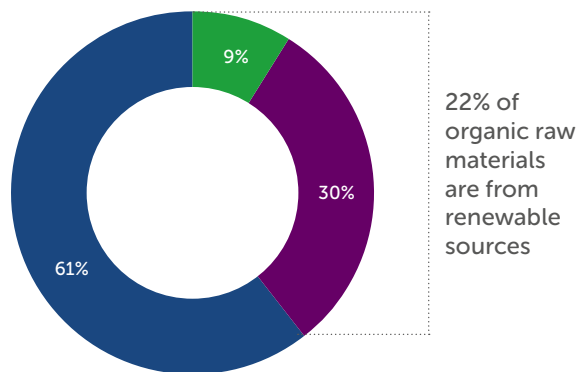
By the end of 2021, 96% of suppliers were assessed for CSR risk using the EcoVadis Risk IQ tool (% of external spend), and 49% of suppliers were measured on their CSR performance by EcoVadis score⁵⁶ (% of external spend) – a significant increase over the year prior.

Compliant suppliers were eligible for our first-ever Supplier of the Year Awards for sustainability, which was based on their EcoVadis raw materials score in addition to exceptional partnership in sustainability, reliability and special event support.

⁵⁵ In terms of all external spend (product, non-product, energy, logistics, etc.) The Risk IQ tool considers industry segment risk, country risk and EcoVadis scores from the complete EcoVadis database. Based on 2020 spend.

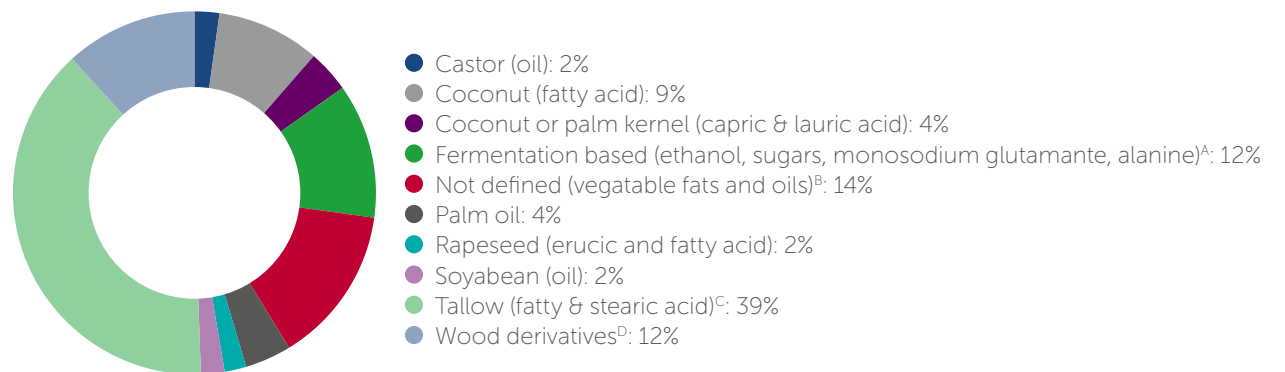
⁵⁶ Based on policies, actions, results. For more information: <https://ecovadis.com/>

Share of Total Raw Materials



- Organic: Renewable, bio-based
- Organic: Fossil-fuel derived (petrochemicals)
- Inorganic (e.g. salt, minerals, clay)

Bio-Based Raw Materials Purchased by Nouryon



^A Ethanol (crop depends on region, but ~70% of world production is derived from sugar cane, sugar beets, and molasses); monosodium glutamate; alanine (from sugar beets, sugar cane, tapioca, molasses, and corn); sugars (glucose and others, from corn, rice, wheat, cassava, corn husk, and sago); acids (dimer, gluconic, citric, sebacic, tartaric, etc., from various sources)

^B Other fatty acids (e.g. in surfactants, from coconut, cotton seed, soybean, sunflower, dehydrated castor, linseed, tung, palm, tall oil (TOFA), and other sources); glycerin (mainly a by-product from bio-diesel; biodiesel can be made from a variety of vegetable oils and animal fats, including soybean, rapeseed, palm, jatropha, sunflower, algae, used cooking oil, tallow, etc.); fatty alcohols (from plant sources such as palm and coconut trees)

^C Stearic acid is predominately produced from tallow; however, it can originate from other fats and oils.

^D Cellulose, tall oil, gum rosin, etc.

Genetically Modified Organisms (GMOs)

Nouryon does not manufacture GMOs. We do not sell products that use GMOs to provide any specific functionality, nor do we use GMOs in manufacturing processes to impart any specific variability. Certain raw materials we use are derived from crops that have been produced from GMOs prior to our use, for example, soybean oil and cotton linter cellulose. These materials are used in products that make up roughly 5% of our products by revenue. Nouryon continually monitors the ongoing debate around GMO usage and will act upon any new findings, as appropriate.



Recognizing Our Suppliers

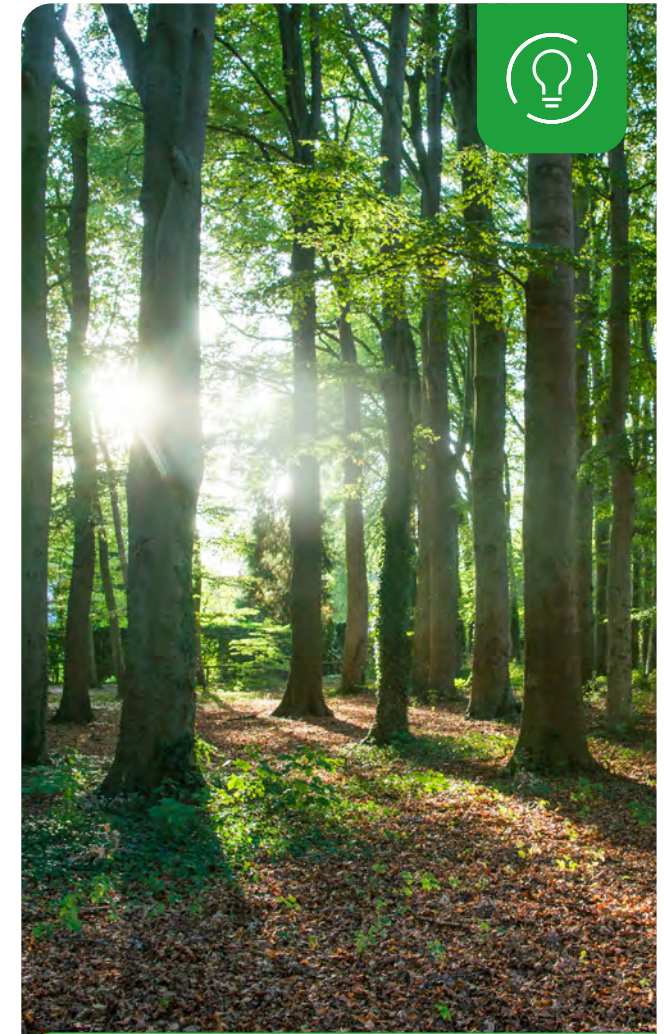
Nouryon's 2021 Supplier of the Year Awards

Nouryon's Supplier of the Year Awards acknowledge suppliers who share and support our high sustainability standards as measured in the EcoVadis Corporate Social Responsibility (CSR) platform. The platform assesses and tracks the sustainability performance of suppliers based on their policies, actions, and results. Our 2021 winners in the Sustainability category were [BASF](#), [Eurotainer](#) and [SAP](#).



Supporting Responsible Palm Oil

Palm oil is a key bio-based feedstock in our operations. We endorse the industry standard for palm oil sustainability, the [Roundtable on Sustainable Palm Oil \(RSPO\)](#), and four of our sites hold [RSPO Mass Balance \(MB\) certification](#). We use processed palm oil products, which means that we do not have direct contact with palm mills or plantations. However, through ongoing interaction with our supply base, we aim to use sources that do not contribute to further deforestation or infringe on the rights of workers and local communities. We believe that palm oil can be cultivated in a responsible way and will continue to focus on using options not linked to environmental or social issues in the supply chain.



Partnering to Offset CO₂ with Reforestation

7,400 trees planted in partnership with [Tree-Nation](#), a non-profit organization that allows citizens and companies to plant trees all around the world and offset CO₂ emissions. This has resulted in 5.99 hectares reforested and a total of 2261.5 tonnes CO₂ captured.

7.5 Policy Engagement and Memberships

We engage with legislative and regulatory bodies, industry and trade associations, and non-government organizations in our key markets, as well as participate in policy discussions on sustainability within our industry via trade associations. We share our expertise and solutions on topics such as energy, carbon reduction, water, waste, product and process safety, and circular chemistry.

Our engagements involve a diverse set of stakeholders focused on chemicals-related issues, including climate mitigation and adaptation issues. These topics include product design for energy efficiency, material safety, energy management in business and manufacturing operations, and industry collaboration to influence climate policy.

Managing Engagement on Policy

We maintain a formal process to manage all direct and indirect engagements with policy makers and related organizations. This process covers the scope and business impact of specific policy issues and is integrated into annual business review meetings and the risk management assessment process. This ensures that any activities that influence public policy are consistent with our business strategy. If activities are inconsistent, they are promptly flagged for action by the Government Affairs team to the relevant businesses and functions within Nouryon.

In line with the Nouryon Code of Conduct and our Company policies, Nouryon does not provide any financial contributions or endorsements to political parties or politicians. Nouryon does not have a political action committee (PAC) in the US, nor do we contribute to the PACs of industry and trade associations of which we are a member.

Advocacy Actions Related to Sustainability

We seek to engage constructively with governments, regulators, and legislators on the development of proposed policy that is relevant to our business. These policies can be relevant to us in a wide range of areas, from tax and employment issues to safety and chemicals management policy. We seek to support policy that is sufficient, clear, stable, predictable, comprehensive, economically efficient, and well designed to deliver society's goals at the lowest cost. We also seek to support policy that aligns with and supports our position, such as on our sustainability ambitions.

In the US, we are a member of the American Chemistry Council (ACC). Consequently, we have contributed to the development of ACC's sustainability metrics.

In Europe, as a member of European Federation of the Chemical Industry (CEFIC), we have actively engaged within industry and trade associations to take a constructive and proactive approach to the EU Green Deal and the EU Chemicals Strategy for Sustainability. We not only focus on the risks and challenges these new proposals have for our industry; we also focus on opportunities via new business models and innovation, and have been a driver of a value chain approach.

In China, we are actively engaged in the advocacy efforts of industry and trade associations related to the ongoing development of Chinese legislation on chemicals management and a cap-and-trade system for carbon emissions.



Leadership Highlight

— Stephen Hester

Vice President, Chief Procurement Officer

Stephen leads our Procurement team, which engages with our suppliers ensuring our standards are met, while helping drive continuous improvements throughout our supply chain.

Our memberships

Americas

American Chemistry Council (ACC); American Cleaning Institute (ACI); Council of Producers & Distributors of Agrotechnology (CPDA); American Coatings Association (ACA); Texas Chemistry Council (TCC); Association of Water Treaters (AWT); American Composites Manufacturing Organization (ACMA); Chemistry Industry Association of Canada (CIAC); Brazilian Association of the Chemical Industry (ABIQUM).

Asia

China Petroleum & Chemical Industry Federation (CPCIF); Association for International Chemical Manufacturers in China (AICM); EU Chamber of Commerce in China (EUCCC); American Chamber of Commerce in Shanghai (AmCham Shanghai); China Cleaning Industry Association; Ningbo Petrochemical and Chemical Industry Association; Taizhou Energy Saving Technology Development Association; Suzhou Society of Environmental Science; Suzhou Chemical Industry Association; Singapore International Chamber of Commerce (SICC).

Europe

European Federation of the Chemical Industry (CEFIC); European Committee of Organic Surfactants and their Intermediates (CESIO); European Biocidal Products Forum (EBPF); Association for the German Chemical Industry (VCI); Association of the Dutch Chemical Industry (VNCI); Confederation of Netherlands Industry and Employers (VNO-NCW); Dutch Association for Energy, Environment and Water (VEMW); Samenwerkende Bedrijven Eemsmond (SBE); Association for Innovation and Chemical Industries in Sweden (IKEM), Chemical Industry Federation of Finland.

Nouryon executives holding board-level positions with trade associations include:

- **Larry Ryan**, our Executive Vice President and President, Performance Formulations and Americas, serves as a board member of the American Chemistry Council (ACC).
- **Johan Landfors**, our Executive Vice President and President, Technology Solutions and Europe, serves as a board member of the executive committee of the European Chemical Industry Council (CEFIC), and a board member of the Association for Innovation and Chemical Industries in Sweden (IKEM).
- **Egbert Henstra**, our Senior Vice President, Transformation and Strategy Performance Formulations, serves as a board member of the Association of the Dutch Chemical Industry (VNCI).



VNCI



cefic





Case Study

Partnering on Smarter Futures in Africa

Smarter Futures is a partnership that provides technical support and training for flour millers, government food control staff, and other stakeholders in Africa with regard to cost effective and economically viable fortification of flour with vitamins and minerals. This improves dietary nutritional value, which in turn improves people's health and well-being – particularly for women of childbearing age, adolescents (especially girls), and young children.

Adding nutrients, especially iron and folic acid, can help improve strength and health by preventing problems caused by vitamin and mineral deficiencies, such as neural tube birth defects, impaired learning capacity, and decreased productivity. Flour fortification addresses such deficiencies because it delivers essential nutrients through staple foods and does not require consumers to change their eating or buying habits.

As a world leader in the production of food grade sodium iron EDTA, the iron compound recommended as the most-bioavailable option for whole wheat flours and produced under our trademark Ferrazone, Nouryon is a founding partner of Smarter Futures. We proudly support Smarter Futures through cash and in-kind contributions, which include a new rapid test for iron EDTA in flour.





Case Study

– 2021 Responsible Care® Merit Award for China

The Association of International Chemical Manufacturers (AICM) recognized Nouryon's distinguished performance in the fields of sustainability and responsible care in China. Four Nouryon employees also received 2020 Key Contributor Awards honoring their efforts in industrial policy advocacy and hazardous chemical safety management.

To meet the Responsible Care Merit Award requirements, Nouryon's eight manufacturing facilities in China conducted annual self-assessments supported by improvement plans and internal audits.



Responsible Care is a global chemical industry initiative to enhance and improve the industry's HSE&S performance. Nouryon is a signatory to the [Responsible Care Global Charter](#), and is therefore committed to nurturing a work culture that proactively supports safe chemicals management, protects people and the environment, engages business partners and stakeholders, and [contributes to sustainability](#) through the development of innovative solutions.



Gary Gao, Asia Health, Safety, Nouryon Environment and Security Manager, was one of four Nouryon employees to receive the 2020 AICM Key Contributor Award.

Closing Word from Our Chief Sustainability & Communications Officer

Thank you for taking the time to read about Nouryon's sustainability commitment and progress. We are proud to share the data behind the stories from 2021. I invite you to explore and familiarize yourself with the fact sheets and tables on the following pages, which quantify our sustainability progress and provides data points supporting this progress.

Should you wish to learn more about Nouryon, please visit nouryon.com, where you will find extensive information about our initiatives around the world as well as our product offerings and specifications.

Once again, thank you for your interest in Nouryon's sustainability progress and initiatives. Whether you have read our 2021 Sustainability Report as a candidate, customer, business partner, or community stakeholder, we are proud to be your partner in essential solutions for a sustainable future.

Best regards,

Vivi Hollertt
Chief Sustainability & Communications Officer



Sustainable Accounting Standards Board Index

Sustainable Industry Classification System® (SICS®) RT-CH | Sector: Resource Transformation| Industry: [Chemicals](#)

Topic	Metric ⁵⁷	Code	Page
Greenhouse gas emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	RT-CH-110a.1	40
	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	RT-CH-110a.2	34
Air quality	Air emissions of the following pollutants: (1) NOx (excluding N2O), (2) SOx, (3) volatile organic compounds (VOCs), and (4) hazardous air pollutants (HAPs)	RT-CH-120a.1	40
Energy management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable, and (4) total self-generated energy	RT-CH-130a.1	40
Water management	(1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	RT-CH-140a.1	41
	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	RT-CH-140a.2	zero
	Description of water management risks and discussion of strategies and practices to mitigate those risks	RT-CH-140a.3	39
Hazardous waste management	Amount of hazardous waste generated; percentage recycled	RT-CH-150a.1	41
Community relations	Discussion of engagement processes to manage risks and opportunities associated with community interests	RT-CH-210a.1	66
Workforce health and safety	(1) Total recordable incident rate (TRIR) and (2) fatality rate for (a) direct employees and (b) contract employees	RT-CH-320a.1	30
	Description of efforts to assess, monitor, and reduce exposure of employees and contract workers to long-term (chronic) health risks	RT-CH-320a.2	26
Product design for use-phase efficiency	Revenue from products designed for use-phase resource efficiency	RT-CH-410a.1	47
Safety and environmental stewardship of chemicals	(1) Percentage of products that contain Globally Harmonized System of Classification and Labeling of Chemicals (GHS) Category 1 and 2 Health and Environmental Hazardous Substances, (2) percentage of such products that have undergone a hazard assessment	RT-CH-410b.1	31
	Discussion of strategy to (1) manage chemicals of concern and (2) develop alternatives with reduced human and/or environmental impact	RT-CH-410b.2	32
Genetically modified organisms	Percentage of products by revenue that contain genetically modified organisms (GMOs)	RT-CH-410c.1	69
Management of the legal and regulatory environment	Discussion of corporate positions related to government regulations and/or policy proposals that address environmental and social factors affecting the industry	RT-CH-530a.1	70
Operational safety, emergency preparedness, and response	Process Safety Incidents Count (PSIC), Process Safety Total Incident Rate (PSTIR), and Process Safety Incident Severity Rate (PSISR)	RT-CH-540a.1	30
	Number of transport incidents	RT-CH-540a.2	30
Production by reportable segment		RT-CH-000.A	41

⁵⁷ Metrics are based on available data.

ESG Fact Sheet⁵⁸

Environment

	Unit	2009	2018	2019	2020	2021	% Change 2009-2021
Company Carbon Footprint: Cradle-to-Gate							
Direct emissions (Scope 1)	kton CO ₂ -eq	526	533	523	537	550	4%
Direct emissions (Scope 1) intensity	kg CO ₂ -eq/ton of production	200	149	151	161	159	-21%
Indirect emissions (Scope 2) ⁵⁹	kton CO ₂ -eq	668	796	894	825	885	32%
Indirect emissions (Scope 2) intensity	kg CO ₂ -eq/ton of production	254	222	259	248	256	1%
Combined Direct and Indirect emissions (Scope 1 and 2)	kton CO ₂ -eq	1,194	1,329	1,417	1,362	1,434	20%
Scope 3 upstream emissions for Raw Materials ⁶⁰	kton CO ₂ -eq	n/a	n/a	2,163	2,246	2,291	
Estimated Scope 3 Total	kton CO ₂ -eq				4,541		
Total emissions (Scopes 1, 2, and 3 estimated)	kton CO ₂ -eq				5,903		
Direct emissions, covered by emissions-limiting regulations	% of direct emissions		26%	25%	28%	29%	
Product Related Carbon Footprint							
Direct emissions	kton CO ₂ -eq	526	531	516	530	544	3.3%
Indirect emissions	kton CO ₂ -eq	668	796	894	825	885	32%
Average carbon footprint per ton of product	kg CO ₂ -eq/ton	454	370	408	407	413	-9%
Energy Management⁶¹							
Total energy consumption	mIn GJ	23.0	29.1	29.8	30.2	32.1	40%
Energy intensity	GJ/ton of production	8.74	8.12	8.62	9.06	9.29	6%
Percentage renewable energy ⁶²	%		51%	46%	52%	51%	
Percentage low carbon and renewable energy ⁶³	%		63%	59%	59%	59%	
Percentage energy from grid electricity	%		70%	62%	61%	60%	
Total self-generated electricity	mIn GJ	-	-	-	-	-	
Air Quality							
NOx absolute emissions	Ton	889	497	465	463	492	-45%
NOx emission intensity	Kg/ton of production	0.34	0.14	0.13	0.14	0.14	-58%
SOx absolute emissions	Ton	5,286	3,264	3,413	2,995	3,111	-41%
SOx emission intensity	Kg/ton of production	2.01	0.91	0.99	0.90	0.90	-55%
VOC absolute emissions ⁶⁴	Ton	717	789	669	1,172	1,938	170%
VOC emission intensity	Kg/ton of production	0.27	0.22	0.19	0.35	0.56	106%
Hazardous Air Pollutants	Ton					374	
Hazardous Air Pollutants intensity	Kg/ton of production					0.11	

Environment Continued

	Unit	2009	2018	2019	2020	2021	% Change 2009-2021
Emission to Water – Chemical Oxygen Demand (COD)⁶⁵							
COD absolute emissions to surface water	Ton	968	1,134	845	768	896	-7%
COD emission intensity to surface water	Kg/ton of production	0.37	0.32	0.24	0.23	0.26	-30%
COD absolute emissions to external waste water treatment	Ton			15,245	16,503	17,905	
COD emission intensity to external waste water treatment	Kg/ton of production			4.41	4.96	5.18	
Water Management							
Total fresh water intake	1,000 m ³	162,148	142,953	134,721	147,123	161,436	-0.4%
Per ton of production	m ³ /ton	61.7	39.9	39.0	44.2	46.7	-24%
Percentage in regions with high water stress	%	0.3%	1.8%	2.3%	2.0%	1.6%	
Fresh Water Consumption⁶⁶							
Total	1,000 m ³	11,078	11,839	11,350	10,621	10,037	-9.4%
Per ton of production	m ³ /ton	4.2	3.3	3.3	3.2	2.9	-31%
Percentage in regions with high water stress	%	3%	17%	17%	18%	16%	
Waste Management							
Total waste	Ton	47,746	51,365	52,659	50,872	53,068	11.1%
Per ton of production	Kg/ton of production	18.2	14.3	15.2	15.3	15.4	-15%
Hazardous waste	Ton	14,440	16,802	16,546	17,543	20,874	45%
Hazardous waste to landfill	Ton	1,615	312	417	465	268	-83%
Hazardous waste reused	%	39%	20%	25%	39%	36%	
Production							
Performance Formulations	kton		1,844	1,792	1,708	1,725	
Technology Solutions	kton		1,740	1,662	1,622	1,729	
Sustainable Sourcing							
Suppliers screened using Risk IQ ⁶⁷	%					96%	-
Suppliers measured on Ecovadis performance ⁶⁸	%					49%	
Suppliers acknowledging our Business Partner Code of Conduct ⁶⁹	% by spend					98%	
% of bio-based raw materials (portion of organic materials)	%			20%	21%	22%	
Management Systems							
% of manufacturing sites with ISO-14001/RC-14001 certifications	%				Per April 2021 77%	Per Febr 28, 2022 84%	
% of manufacturing sites with ISO-9001 certifications	%					88%	

⁵⁸ For all figures, minor corrections to historical data may be made to improve accuracy or based on methodology updates.

⁵⁹ All Scope 2 emissions are calculated using the market-based method.

⁶⁰ In 2019, we updated our methodology for calculating Scope 3 upstream emissions. In prior years, we estimated emissions from raw materials based on the bill of materials for products. In 2019, 2020, and 2021 we use actual raw material data. Raw materials exclude intra-company transfers, trading, tolling, and utilities.

⁶¹ Energy consumption is expressed in mJ which is the sum of the actual consumed by the sites. For 2018, 2019, 2020, and 2021 the consumption was extracted from our reporting system Enablon. The energy consumption for 2009 was derived from the consumption expressed in Fuel Equivalents that year by applying a factor expressing the relation between direct consumption in GJ and Fuel Equivalents for 2018, 2019, 2020, and 2021.

⁶² Including renewable grid electricity.

⁶³ Renewable energy data includes renewable fuel consumed, produced and purchased and is based on utility or supplier data, or other green power products. This does not consider certifications for biomass and hydro power, which are not tracked currently.

⁶⁴ The increase in the 2020 volatile organic components (VOC) emissions compared to 2019 is due to the acquisition of the CMC Åänekoski site.

⁶⁵ Until 2018, only COD discharge to surface water was measured.

⁶⁶ Total freshwater consumption (excluding once through cooling water intake) [1,000m³]

⁶⁷ In terms of all external spend (product, non-product, energy, logistics, etc.) The Risk IQ tool considers industry segment risk, country risk and EcoVadis scores from the complete EcoVadis database. Based on 2020 spend.

⁶⁸ Based on policies, actions, results. For more information: <https://ecovadis.com/>

⁶⁹ Tracked by acceptance of a Nouryon Purchase Order or a signed Nouryon contract.

Social

	Unit	2018	2019	2020	2021
Workforce Data⁷⁰					
Global headcount Nouryon employees	#	10,395	10,389	9,730	7,650 ⁷¹
% female in workforce	%	23%	24%	23%	25%
% female in senior positions ⁷²	%	26%	25%	24%	24%
Employee turnover rate (voluntary and involuntary)	%	12%	17%	14%	14%
Safety					
Total Recordable Incident Rate (TRIR)– Nouryon Employees, temporary workers and contractors	Per 200,000 hours worked	0,34	0,26	0,23	0,17
Lost Time Incident Rate (LTIR) – Nouryon Employees, temporary workers and contractors	Per 200,000 hours worked	0,15	0,07	0,13	0,09
Management Systems					
% of manufacturing sites with OHSAS-18001/RC-18001 and ISO45001 certifications	%			36%	16%

Governance

	Unit	2018	2019	2020	2021
Board					
Directors	#	9	9	10	11
Average director tenure (years)	#	0	1	2	2
Independent directors	#	8	8	9	10
Independent directors (%)	%	89%	89%	90%	91%
Board Diversity					
Women on the Board	#	1	0	1	3
Women on the Board (%)	%	11%	-	10%	27%
Board members of racial/ethnic minority	#	1	0	0	1
Board members of racial/ethnic minority (%)	%	11%	-	-	9%
Board diversity	%	11%	-	10%	36%
Board Coverage of ESG Issues					
Frequency of Board updates on ESG issues		Quarterly	Quarterly	Quarterly	Quarterly
Board oversight of climate strategy? (Y/N)		Y	Y	Y	Y
Policies and Statements					
Code of Conduct, anti-discrimination, anti-harassment		N	Y	Y	Y
Anti-corruption, anti-bribery		N	Y	Y	Y
Business Partner Code of Conduct, including suppliers		N	Y	Y	Y
Health, Safety, Environment and Security (HSE&S), including product stewardship		N	N	Y	Y
Palm oil statement		N	N	Y	Y
Sensitive Country Policy		N	N	Y	Y

⁷⁰ Workforce data prior to 2021 includes Nobian employees (Nobian's separation from Nouryon occurred in 2021). 2021 workforce data excludes Nobian employees.

⁷² Headcount and similar metrics may differ slightly, depending on exact collection date, due to timing of reporting schedules, divestments, and acquisitions, as well as regular workforce fluctuations.

⁷³ Senior positions are defined as mid-level managers and above. Source data December 2021.

Independent Assurance Statement

ERM Certification and Verification Services Limited ('ERM CVS') was engaged by Nouryon Speciality Chemicals BV ('Nouryon') to provide limited assurance in relation to the specified data as presented in Nouryon's 2021 Sustainability Report (the 'Report').

Engagement summary	
Scope of our assurance engagement	Whether the data for the following performance metrics for the reporting year ended 31 December 2021 are fairly presented in the Report, in all material respects, with the reporting criteria:
	Environment <ul style="list-style-type: none"> Total Scope 1 GHG emissions [kton CO₂e] Total Scope 2 GHG emissions (market-based method) [kton CO₂e] Scope 3 upstream GHG emissions (from purchased raw materials only) [kton CO₂e] Total energy consumption [mln GJ] Energy intensity [GJ/ton of production] Renewable energy (as % of total energy use) NOx absolute emissions [ton] NOx emissions intensity [kg/ton of production] SOx absolute emissions [ton] SOx emissions intensity [kg/ton of production] Total freshwater consumption (excl. once through cooling water intake) [1,000m³] Total freshwater consumption intensity (excl. cooling water) [1,000m³/ton production] Total waste [ton] Total waste intensity [kg/ton of production] Hazardous waste [ton]
	Safety <ul style="list-style-type: none"> Total OSHA incident rate (OIR) for employees and temporary workers [per 200,000 hours worked] Total OSHA incident rate (OIR) for contractors [per 200,000 hours worked] Lost time injury rate (LTIR) employees and temporary workers [per 200,000 hours worked] Lost time injury rate (LTIR) contractors [per 200,000 hours worked]
	Other <ul style="list-style-type: none"> Sites certified to ISO 14001 [%] Suppliers acknowledging Nouryon's Business Partner Code of Conduct [% by spend] Female workers (proportion of global employees) [%]
	Reporting criteria
Assurance standard	ERM CVS' assurance methodology, based on the International Standard on Assurance Engagements ISAE 3000 (Revised).
Assurance level	Limited assurance.
Respective responsibilities	Nouryon is responsible for preparing the data and information included in the Report. ERM CVS' responsibility is to provide a conclusion on the agreed scope based on the assurance activities performed and exercising our professional judgement.

Our conclusions

Based on our activities, as described below, nothing has come to our attention to indicate that the data listed under 'Scope of our assurance engagement' are not fairly presented in the Report and, in all material respects, with the reporting criteria.

Our assurance activities

A multi-disciplinary team of sustainability and assurance specialists performed the following assurance procedures:

- Interviews with relevant staff at Nouryon corporate offices to understand and evaluate the data management systems and processes (including IT systems and internal review processes) used for collecting and reporting the selected data;
- A review of the internal reporting criteria, definitions and conversion factors used;
- Virtual site visits to Columbus (USA), Ningbo (China) and Stockvik (Sweden), to review local reporting processes and consistency of reported annual data with selected underlying source data for each indicator. We interviewed relevant staff, reviewed site data reporting methods, checked calculations and assessed the local internal quality and assurance processes;
- An analytical review of the data from all sites and an assessment of the completeness and accuracy of the corporate data consolidation;
- Year-end assurance activities at corporate level including the results of internal review procedures and the accuracy of the consolidation of the data for the selected metrics; and
- A review of assured metrics in Nouryon's Sustainability report.

The limitations of our engagement

The reliability of the assured information is subject to inherent uncertainties, given the available methods for determining, calculating, or estimating the underlying information. It is important to understand our assurance conclusions in this context.

Our observations

We have provided Nouryon with a separate Management Report with our detailed findings and recommendations.



Gareth Manning

Partner, Corporate Assurance
20 May, 2022

ERM Certification and Verification Services Limited, London

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ERM CVS is a member of the ERM Group. The work that ERM CVS conducts for clients is solely related to independent assurance activities and auditor training. Our processes are designed and implemented to ensure that the work we undertake with clients is free from bias and conflict of interest. ERM CVS and the staff that have undertaken work on this assurance exercise provide no consultancy related services to Nouryon in any respect.

About Nouryon

Nouryon is a global, [specialty chemicals leader](#). Markets and consumers worldwide rely on our essential solutions to manufacture everyday products, such as personal care, cleaning goods, paints and coatings, agriculture and food, pharmaceuticals, and building products. Furthermore, the dedication of approximately 7,650 employees with a shared commitment to our customers, [business growth](#), safety, [sustainability](#) and innovation has resulted in a consistently strong financial performance. We operate in over 80 countries around the world with a portfolio of industry-leading brands. Visit our [website](#) and follow us [@Nouryon](#) and on [LinkedIn](#).

Nouryon