

## Climate Positive



# Accelerating towards a low-carbon future

Energy generated from non-fossil sources

24%

2020

25%

2021

31%

2022



## The global challenge

### Limiting global warming to 1.5°C above pre-industrial levels

Population growth and increasing consumption with associated CO<sub>2</sub> emissions, fuelled by the expansion of the middle class with increased disposable income in the developing world, have led to unprecedented levels of global warming of over 1°C above pre-industrial levels. Climate change is already causing more frequent and extreme weather events, and the rise in global temperatures must be limited to 1.5°C to avoid catastrophic impacts to the planet and health of society. Addressing this challenge requires transformational new approaches to energy and raw material consumption and sourcing.

## Delivering greater impact

### We are reducing our emissions in line with our verified SBT and working to deliver carbon saving in-use benefits throughout our supply chain

Growing consumer demand for sustainable ingredients means our customers require transparency and the ability to deliver products with proven, substantiated claims on their environmental footprint, including carbon. Delivery against our decarbonisation roadmaps, through the switch to alternative energy sources and technology transformation, alongside the transition away from fossil towards an increasingly bio-based portfolio of ingredients, allows us to demonstrate quantifiable carbon reductions at a product level, to support our customers in meeting these consumer expectations. Developing products which offer benefits in use, including avoiding emissions, also support customers and consumers in living more sustainably and reducing their carbon footprint.

### Climate Positive SDG targets:

7.2, 7.3, 9.4, 12.2, 13.2, 17



2022 CDP Climate Change Score

A-

## Climate Positive continued

### Reducing emissions

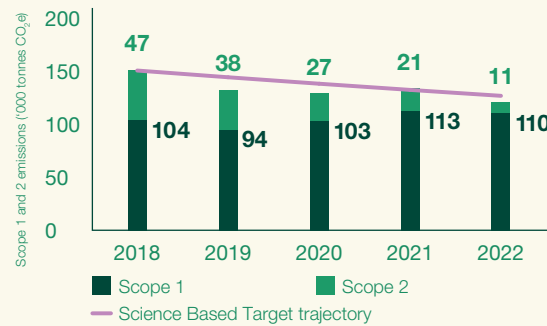
Tackling the climate emergency is a global challenge and a priority for Croda. By decarbonising our operations and supply chain, applying innovation, and delivering sustainable ingredients that provide benefits in use, we are also supporting our customers' decarbonisation ambitions. Our leadership position means we can be a vocal advocate for the transition to net zero across our industry and beyond. Our leadership surrounding climate-related risks and opportunities was recognised by CDP as we scored A- in our 2022 climate disclosure.

At the end of 2022, we are on track to achieve our 1.5°C SBT, with a reduction in scope 1 and 2 emissions of 19.8% since our baseline year of 2018. Progress in the last year has been driven by further reductions in scope 2 emissions, primarily due to purchasing Renewable Energy Certificates (RECs). Several capex projects have been approved and are under way that will significantly help us reduce our scope 1 emissions:

- Our manufacturing site in Brazil has installed a bioethanol boiler in place of consuming natural gas. Now operational, this will save more than 2,000 tonnes of CO<sub>2</sub> each year, equating to a 34% annual reduction in the site's scope 1 and 2 emissions
- This year, one of our largest manufacturing sites in North America progressed a boiler system upgrade modification, allowing a large proportion of natural gas to be substituted for landfill gas; significantly reducing CO<sub>2</sub> emissions
- Our manufacturing site in Spain is investing in recovering waste energy to produce hot water, helping reduce site emissions, showing how improving efficiency of existing assets, together with self-generation of power, can drive emissions down
- Chocques, a top performing Croda site for decarbonisation progress, is on course to achieve zero scope 1 and 2 emissions in 2023, thanks to steam generated from a local municipal waste incinerator. Supply of green energy has been secured for the site for decades to come, and has been externally verified as not contributing to the site's scope 2 emissions

### Emissions

#### GHG emissions<sup>1</sup>



Since 2018, our baseline year, our total scope 1 and 2 greenhouse gas (GHG) emissions have reduced by 19.8%. Within this, scope 1 emissions have increased by 6% and we have seen a greater than 77% reduction in scope 2 emissions. This has been driven by a switch to renewable electricity across our manufacturing sites.

Our scope 1, 2 and 3 GHG emissions are verified by Avieco, part of Accenture. Their formal independent verification statement is available at [www.croda.com/carbonverification](http://www.croda.com/carbonverification).

#### Energy consumption and efficiency improvements

In 2022, we consumed 875,545,559 kWh of energy across our global operations (864,679,531 kWh in 2021). As part of our strategy to improve the efficiency of energy consumption, 26 projects were implemented globally, realising 17,180,619 kWh of annualised efficiency improvements, equivalent to 2,767 TeCO<sub>2</sub>e avoided emissions.

1. Our GHG inventory has been completed in accordance with the Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (Revised Edition) using the operational controls approach. Scope 1 emissions are calculated using UK Government emission conversion factors for greenhouse gas company reporting. Scope 2 emissions are market-based.

### Climate Positive award: Croda China

273 employees at Croda China took more than 800 individual actions over a five-week programme to reduce their personal carbon footprint. The awareness initiative, promoting the actions we can all take in our everyday lives to reduce carbon emissions, means that approximately 17,500 kg of carbon emissions a year will be collectively saved by the team. The judges were impressed by the scale of engagement and how the team's attitude and culture were changing.



For more information on our Purpose In Action (PIA) Awards

**See page 5**



## Climate Positive continued

### Validation of our decarbonisation roadmaps

We reached a significant milestone in 2022 with every Croda location, including non-manufacturing sites, completing decarbonisation roadmaps demonstrating how they can achieve a 50% reduction in scope 1 and 2 emissions by the end of 2029.

A quality assessment framework was designed to ensure a robust process was followed: for example, engaging with site employees and ensuring sites had considered a range of initiatives beyond the use of alternative fuel sources, including reducing energy consumption and increasing energy efficiency. Each site roadmap was assessed using the framework and all sites reached the required standards. This quality assessment process was validated externally by Avieco.

### Internal carbon price

Since 2020, we have applied an internal shadow carbon price to capex projects to help prioritise projects that will reduce scope 1 and 2 emissions, reducing their pay back periods. In 2022 we increased this price from £55 per tonne to £124 per tonne, in line with the UK Government’s Green Book, highlighting the increasing importance of climate action to avoid exposure to the cost of carbon and the importance we place on ensuring business growth without increasing GHG emissions, through zero scope 1 and 2 emission capacity and capability investments wherever possible.

### Employee engagement

Engaging all employees in our decarbonisation programme is critically important to achieve our targets. In December, we invited all Croda employees to regional Carbon Summit webinars, presenting an update on our decarbonisation progress and initiatives, and answering questions. The presenters’ children were featured talking about what climate change meant to them, challenging our leaders on the actions they were taking to address climate change.

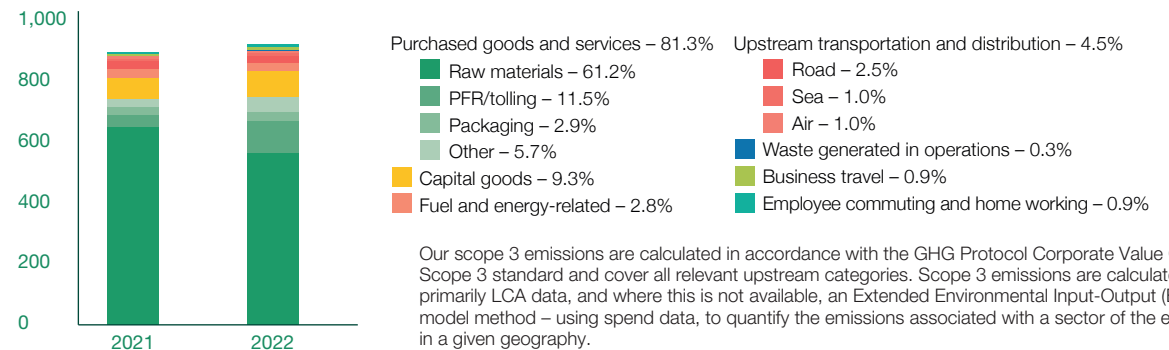
72 low carbon sites make up 4% of Croda’s scope 1 and 2 emissions but employ 2,652 people, so taking visible actions at these sites is important to engage all employees in our decarbonisation journey. The main actions required, common across all non-manufacturing locations, are electrification of the company car fleet, and the move to renewable electricity. Global guidance has been issued to the regions to support company car policies. In working to develop these roadmaps and by taking action, several sites will achieve carbon neutrality (zero scope 1 and 2 emissions) in 2023.

### Scope 3 emissions

Having developed an industry leading granular scope 3 inventory in 2021, our focus during 2022 was on increasing the visibility of this data across the organisation to help inform decision-making, including for the development of sector decarbonisation roadmaps (see p25 Climate leadership: product carbon footprint data). We have developed a corporate scope 3 dashboard for quarterly reporting across the business, showing our upstream scope 3 categories. Our sustainable procurement team have developed a roadmap to achieve our scope 3 SBT. We have taken a layered approach, starting with supplier engagement and a supply chain review, with long-term greater impacts to be achieved through innovation and portfolio management led by the sectors, understanding that gathering primary data on carbon emissions attached to sourcing our raw materials is critical for quantifying the benefit of decarbonisation activities within our supply chain (see page 25).

In 2022, our upstream scope 3 emissions were 920,578 tonnes CO<sub>2</sub>e. This is a 3% increase since 2021. The emissions attached to our capex projects increased due to project mix. Business travel and employee commuting resumed post Covid and emissions increased in both of these categories. We saw reductions associated with Fuel and Energy Related Activities, aligned with progress towards our operational emissions reduction target.

#### 2022 scope 3 emissions<sup>3</sup> by category ('000 tonnes of CO<sub>2</sub>e)



Our scope 3 emissions are calculated in accordance with the GHG Protocol Corporate Value Chain Scope 3 standard and cover all relevant upstream categories. Scope 3 emissions are calculated using primarily LCA data, and where this is not available, an Extended Environmental Input-Output (EEIO) model method – using spend data, to quantify the emissions associated with a sector of the economy in a given geography.

### Sustainability-linked revolving credit facility

In 2019, we became one of the UK’s first large public companies to include a sustainability metric in a revolving credit facility (RCF), with targets in the seven-year agreement aligned with our 2030 Commitment to become Climate Positive.

Based on Croda’s scope 1 and 2 GHG emissions, these metrics are audited and included in our RCF covenants. We have successfully met the targets each year since launch and have received a deduction on the margin payable, with the savings reinvested into our decarbonisation capital expenditure programme.

For example, in 2022 we invested the savings in the scale up of a new carbon neutral filtration technology at our Ditton manufacturing site in the UK, as well as a proof of concept project for low emission steam generation at our Rawcliffe Bridge manufacturing site in the UK.

## Climate Positive continued

### Customer award for carbon reduction

We've been working in partnership with Syngenta to deliver innovative and sustainable ingredients in a way that meets their commercial and sustainability goals, providing greater transparency on the origin, composition and environmental impact of ingredients, together with sustainable benefits in use.

In June 2022, this collaborative approach to sustainability was recognised in the Syngenta supplier awards, where we were presented with the Sustainability Award – Carbon Reduction.

“We are delighted to have won,” said Daniele Piergentili, President Life Sciences, Croda. “The strength of our partnership together with our shared sustainability ambitions, including the commitment to reduce carbon emissions, have meant both Croda and Syngenta have made great progress against our sustainability programmes. We look forward to working on more projects.”

### Climate leadership: PCF data

2022 has seen Croda working to automate the calculation of PCF data for all products from our top 13 manufacturing sites. This requires using activity-based costing data from our sites and includes the emissions associated with raw materials to calculate a cradle-to-gate footprint per product. The data has two main purposes:

- Internally, it will enable the sectors to make portfolio management decisions with carbon footprint as a datapoint, and will inform the next generation of low carbon products. The sector teams will be finalising 2030 decarbonisation roadmaps during 2023, going beyond the actions already being implemented at our manufacturing sites to include scope 3, and this information will be an invaluable part of that process.
- Externally, this data will be important for customers as they calculate and aim to reduce the scope 3 emissions associated with their raw material purchases. We will be able to provide a number that can demonstrate reductions since 2018, our baseline year, and show future reductions to support our customers' supply chain SBTs.

The release of an industry standard PCF methodology by TfS in 2022 was welcomed, to help provide consistency in PCF calculations. We became the Industry Champion for the Personal Care and Home Care sectors for the new Product Carbon Footprint (PCF) Guidelines for calculation of chemical materials. This guide will enable suppliers and corporations to produce and share high-quality carbon footprint data. The standardisation of the PCF Guidelines will enable us to further collaborate with suppliers and customers and measure the impacts of our shared carbon reduction projects. As members of TfS we will promote the use of this methodology by our suppliers and will ensure our own PCF data aligns with this methodology, seeking external verification in 2023.

### Net zero transition

In 2022 we began our planning for beyond 2030 and considering how we will achieve our ambition to be a net zero organisation by 2050. Our UK manufacturing site at Rawcliffe Bridge became our first site to develop a net zero roadmap (see case study). In 2023 we will begin developing net zero roadmaps based on technology platforms rather than individual site level to support the transformation and future preparedness of our business.

### Net zero roadmap for UK manufacturing site



We became one of the first UK manufacturing sites to develop a 2050 net zero roadmap as part of the UK Government's Department for Business, Energy and Industrial Strategy 'Industry of the Future' programme, the findings of which fully align to our existing site roadmap developed internally to reduce carbon emissions by 50% by 2030.

In 2021 we were selected to take part in the study and partnered with engineering firm Atkins to develop a net zero roadmap to 2050 for our Rawcliffe Bridge site. The roadmap compares a baseline scenario, where carbon emissions continue rising in line with increases in production volumes, to alternative scenarios for meeting decarbonisation targets of a 90% reduction by 2050. The roadmaps considered electrification of various high temperature processes and the best technology choices to achieve this. They also considered substitution options to replace natural gas for the site's heating requirements. The opex and capex costs of switching to blue or green hydrogen were compared to full electrification using UK Treasury 'Green Book' cost data projections. This is the first time the costs for reaching net zero have been calculated for these scenarios.

## Climate Positive continued

### Carbon cover

At the end of 2022, our carbon cover ratio was 0.66:1 – the ratio of avoided emissions through the use of our ingredients to our scope 1, 2 and upstream scope 3 emissions. This target has been affected by the divestment of our PTIC businesses, as several of our initiatives sat within that part of the business. However, our level of ambition remains unchanged. In the last year, we received validation for three new case studies, including a new product in Home Care, CroBiotic™ 100 (see p27).

#### Downstream GHG emissions

Our carbon cover target aims to support customers in avoiding downstream emissions. The concept of avoided emissions is defined by the GHG Protocol as “emission reductions which occur outside of a product’s lifecycle or value chain, but as a result of the use of the product” and often referred to as scope 4. Avoided emissions will be an important part of the net zero transition.

We have started thinking beyond our existing avoided emissions case studies to consider remaining downstream scope 3 emissions associated with the use of our ingredients and how further savings can be made. In better understanding and quantifying emissions in the three downstream scope 3 categories identified in the diagram, we will collaborate with customers to identify innovative ways to reduce our shared downstream scope 3 emissions from today’s baseline. For example, through:

- Consumer education and engagement to reduce energy consumption in use
- Supplying our ingredient in an alternative form, reducing customer processing emissions
- New product development to satisfy an unmet need, reducing use-phase emissions

Measuring the emissions associated with the end-of-life of used products will allow us to quantify, and our customers to realise, the benefits of our move to bio-based ingredients, avoiding the release of additional fossil carbon into the atmosphere.

Our thinking in this area continues to develop, and we will look to align with guidance from the WBCSD on avoided emissions, due for release in early 2023.

### Upstream and downstream emissions



## Climate Positive continued

### CroBiotic™ 100

Surveys indicate that malodour of garments is one of the biggest reasons that consumers choose to wash them. Reducing or eliminating the malodour means consumers can wash clothes less frequently, therefore reducing energy usage/carbon emissions and water consumption. Our next generation cleaning ingredient CroBiotic™ 100 is an optimised powder blend of bacterial strains in spore form. It offers an innovative and effective long-term approach to odour control and hard surface cleaning: a more sustainable solution to cleaning both in transportation and product application.

The product is used in spray formulations, diluted with water and sprayed onto clothes to reduce malodour. It has been shown to reduce the odour from sources including pets, sweat and food and studies have demonstrated savings of 86 kgCO<sub>2</sub>e and 18,600 L water per kg of product used.

### Sustainable innovation

We have set an ambitious target for 75% of our organic raw materials to be bio-based by 2030. This transition away from petrochemical feedstocks through sustainable innovation has a positive climate impact, avoiding the release of additional fossil carbon into the atmosphere at the end of life of our ingredients. Our sustainable innovation strategy spans the transformational development of existing technologies and the discovery of alternative new solutions.

In the design phase of new product development, our research teams are working with supply chain experts, internally aiming to maximise the bio-based content of new developments well ahead of our portfolio target.

At the end of 2022, 59.4% of our organic raw materials were bio-based. The divestment of our PTIC businesses did have an impact on progress but our target remains unchanged, and we are increasing our level of ambition as 'new' Croda.

In 2022 we committed to transitioning all ethylene oxide purchases to bio-based globally. Our transition to bio-based ethylene oxide (bio EO) is well developed in North America through the ECO range of 100% bio-surfactants. We are progressing well in Europe and Asia towards first bio EO usage in the coming year, with availability of bio EO increasing rapidly in several locations, catalysed by our public leadership position. In addition, where sources are less readily available, teams are investigating the use of ethylene oxide from recycled feedstocks, where upstream scope 3 carbon savings are possible.

Our sustainable innovation strategy also focuses on reducing the footprint of our ingredients during the full product life cycle by: increasing biodegradability; improving purity; and lowering the environmental footprint of products. This holistic approach ensures all aspects of a product's life cycle are considered during the design phase.

In the earlier discovery phase, new disruptive technology platforms and processes are being investigated to offer alternatives to some existing products, within a framework of safe and sustainable design.

### Transition to bio-based MPG

Transitioning our raw materials to bio-based sources will enable us to make a significant positive impact through sequestered carbon as well as reducing the GHG emissions associated with these raw materials, in the case of Monopropylene Glycol (MPG), by up to 61%. MPG is used to dilute multiple products manufactured across our sites. As 2022 has seen more commercially available streams of MPG become available, we have engaged with several suppliers in Europe and North America, working with them to understand pricing, availability and environmental implications of transitioning to bio-based sources. Plans are being put in place to begin a phased transition to bio-MPG starting in 2023.

### Flue2Chem

In another example of industry-wide collaboration to help tackle the climate emergency, the Flue2Chem Innovate UK project aims to demonstrate that a UK supply chain to produce alkoxyated surfactants from CO<sub>2</sub> is economically and technically feasible. Funding for the project was approved as part of the UK Research and Innovation (UKRI) Transforming Foundation Industries Challenge, which includes the chemical industry. Project and supply chain partners working alongside Croda include: Unilever, SCI, BASF, Tata Steel, Johnson Matthey, UPM-Kymmene, Holmen, the University of Sheffield, the University of Surrey, Carbon Clean, Proctor & Gamble, the Centre for Process Innovation, the Confederation of Paper Industries, and Reckitt. Our role in the chemical industry supply chain makes Croda's participation in this project important, to advocate for sustainable transformation and better support our customers.

# Commitment performance

## Climate Positive



### Key

Target achieved	
Target on track	
Target requires additional focus	
Target challenging to achieve	

Objectives and targets	Status	Milestones and metrics	Status	2022 progress
<p><b>Reducing emissions</b></p> <ul style="list-style-type: none"> <li>By 2030, we will have achieved our SBTs, reducing scope 1 and 2 emissions by 46.2% from a 2018 baseline, in line with limiting global warming to 1.5°C, and reducing upstream scope 3 emissions by 13.5%</li> <li>Thereafter, by 2050 we will be a net zero organisation</li> </ul>	  	<ul style="list-style-type: none"> <li>A reduction of 25% in 2018 absolute scope 1 and 2 emissions by the end of 2024</li> <li>All Croda locations to have a decarbonisation roadmap by the end of 2022</li> </ul>	  	<ul style="list-style-type: none"> <li>Absolute scope 1 and 2 emissions have reduced by 19.8% since 2018</li> <li>Every Croda location, including non-manufacturing sites, has completed decarbonisation roadmaps demonstrating how they can achieve a 50% reduction in scope 1 and 2 emissions by the end of 2029</li> </ul>
<p><b>Carbon cover</b></p> <ul style="list-style-type: none"> <li>By 2030, use of our products will avoid four times the carbon emissions (scope 1, 2 and 3) associated with our business – our 4:1 carbon cover</li> </ul>	  	<ul style="list-style-type: none"> <li>Two million tonnes of CO<sub>2</sub>e emissions savings delivered through use of our products by the end of 2024, which will be externally verified</li> <li>100% of our product portfolio evaluated for downstream scope 3 impact by the end of 2024</li> </ul>	  	<ul style="list-style-type: none"> <li>687,926 tonnes CO<sub>2</sub>e were avoided through the use of ingredients attached to verified case studies giving a carbon cover ratio of 0.66 (2021: 0.4)</li> <li>In 2022 we developed a framework which enabled further engagement with customers and identification of scope 3 savings, enhancing the quality of our product portfolio evaluation</li> </ul>
<p><b>Sustainable innovation</b></p> <ul style="list-style-type: none"> <li>By 2030, over 75% of our organic raw materials by weight will be bio-based, absorbing carbon from the atmosphere as they grow</li> </ul>		<ul style="list-style-type: none"> <li>71% (rolling three-year average) of our organic raw materials to be bio-based by the end of 2024</li> </ul>		<ul style="list-style-type: none"> <li>Our use of bio-based organic raw materials increased by two percentage points from 57% to 59.4%</li> </ul>