Climate Impact

We are working hard to reduce emissions across our value chain

Our investments and actions across Croda are driving emissions reductions, in line with our scope 1 and 2 Science Based Targets (SBTs)

Our 2023 scope 1 and 2 emissions are tracking well below our 1.5 ºC SBT, continuing the general trend of falling emissions since 2018. However, of note in 2023 is the reduction in output volumes as a result of the challenging business environment. As volumes improve we will need to continue to work hard to deliver decarbonisation projects to ensure this trend accelerates.

As we work towards becoming Climate Positive by 2030, our activities will increasingly focus on key areas such as sustainable sourcing, applying innovation to reduce operational emissions, and understanding and responding to the downstream impacts of our products.

A milestone year for climate change

2023 was the warmest calendar year since 1850, with record levels of emissions from burning fossil fuels and land use change and the first time every day has exceeded 1°C above the 1850-1900 pre-industrial level. More importantly it was marked by high frequency and severity extreme weather events across all geographies which severely affected human health, ecosystems and infrastructure. As these gave us and everyone a glimpse of what climate instability will look like, we have to accelerate our efforts and focus even more on the implementation of our programme to be Climate Positive.

Engagement and close collaboration with suppliers are critical to achieve our ambitious goals on sustainable sourcing and scope 3 decarbonisation. More responsible sourcing is about making the best use of available resources for our products, while minimising or eliminating negative impacts, and the use of renewable raw materials is part of our pathway.

Previously we have identified the challenges involved in quantifying our upstream scope 3 emissions, and in particular how we could move to a more granular level of data. We have continued engaging with suppliers to gather timely and relevant data. In 2023, for the first time, we have started to receive primary emissions data from suppliers, and we are targeting primary data from suppliers covering at least 20% of our purchased raw material volumes by the end of 2024.

Industry engagement: Together for Sustainability (TfS)

We continued to collaborate with the Together for Sustainability initiative, a member-driven global network of leading chemical companies committed to sustainability improvements. In 2023, TfS launched product carbon footprint (PCF) guidance and a new platform to help suppliers to the industry share primary data, which we are utilising to support our emissions reporting and decarbonisation efforts.

Whilst already aligned, we are working to fully assure that the TfS guidance is applied in our approach to generating PCF data for our products. This includes receiving comparable data from suppliers for efficient sustainability reporting and working with suppliers to quantify PCFs in a consistent way.

We rely on external ratings to help us to assess and partner with the most sustainable suppliers. We set high standards for our key suppliers to:

- Achieve an EcoVadis score above 45
- Have an approved Science Based Target (SBT) or equivalent public target
- Complete CDP assessments on Climate, Water and Forest

Protecting forests, high-carbon stock grasslands and biodiversity: ISCC certification

Our Seraya, Singapore site is the first to have been certified ISCC – International Sustainability & Carbon Certification – and we are in the process of certifying further sites. This will further help monitor our agri-based raw material carbon footprints, verifying traceability, and implement improved socioeconomic and ecological practices, keeping our supply chains deforestation-free and avoiding the conversion of biodiverse grassland.

Decarbonising through sustainable innovation

Reducing operational emissions

In 2023 our businesses developed scope 1,2 and 3 decarbonisation roadmaps for the first time, factoring in business growth and identifying gaps and opportunities to drive innovation and portfolio management beyond the site decarbonisation roadmaps, to ensure we can achieve our Science Based Targets through sustainable business growth.

Our scope 1 and scope 2 emission reductions are on target. 2023 saw Croda manufacturing sites around the world including Brazil, Denmark and France making excellent progress, achieving close to carbon neutrality. This has been achieved by methods including self-generation of renewable energy, the use of biogas, and waste-to-energy sources of fuel. Our new site at Dahej in India is being constructed using the latest low carbon technologies and approaches, and is set to be carbon neutral from the first day of manufacturing.

2023 Internal Carbon Price:

£124/tonne CO_2e

(2021: £55/tonne CO_2e)

Designing new low-carbon ingredients

Our research teams work closely with supply chain experts to maximise the use of bio-based feedstocks in new product development. This helps to ensure our entire product portfolio moves towards our bio-based organic raw material target of 75% by 2030. We also focus on reducing the impact of our ingredients during the full product life cycle by, for example, increasing biodegradability, improving purity and lowering the environmental footprint of products.

As our understanding of the holistic environmental impacts of our ingredients increases through our LCA work, the nature impacts attached to the use of bio-based raw materials can be quantified and considered alongside climate effects. Our innovation will focus on maximising the climate benefits of bio-based whilst minimising potentially negative nature impacts.

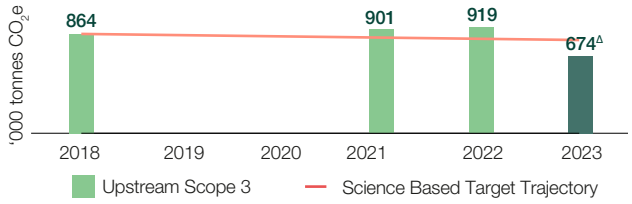
This includes identifying non-virgin feedstocks such as second generation waste or by-product based, working to ensure sustainable certifications are in place for all bio-based raw materials and engaging with suppliers to improve agricultural practices (see page 15).

Our sites are taking action to decarbonise our Operations globally:

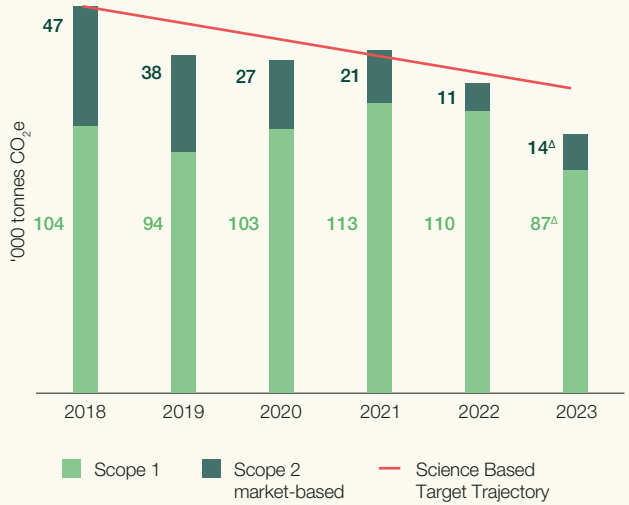
- Our Atlas Point site at Delaware, USA has reduced its CO_2 emissions by 18% since 2018 and increased its landfill gas burning capability in 2023 to replace part of its natural gas demand.
- Our site in Chocques, France uses steam generated from a waste incinerator for its heat.
- Incotec's new highly sustainable Aquarela site in Holambra, Brazil has 788 solar panels installed on the roof, aiming to generate 100% of its electricity consumption.
- Our Mevisa site in Spain has installed and commissioned a heat recovery system and solar panels that led to a reduction in annual CO_2 emissions of 15%.
- Our Ditton site in the UK upgraded its electricity supply to allow for more electrification onsite, reducing natural gas consumption.
- In 2023, our Latin American manufacturing site at Campinas, Brazil increased the amount of bioethanol consumed in its biomass boiler, resulting in less natural gas consumption.
- Renewable gas purchases have helped to reduce scope 1 emissions in our Asia operations, as well as increased purchases of renewable electricity to reduce scope 2 emissions.
- Our Singapore site has also switched from steam heat tracing to electrical, using less natural gas.
- In 2023, our Alabama, USA site purchased more Renewable Energy Certificates (RECs) to cover more of its electricity consumption.

Upstream Scope 3 Emissions

In 2023, we increased the transparency of our scope 3 emissions internally, creating a scope 3 dashboard, and moving from annual to quarterly scope 3 reporting. Calculations are now automated, providing more granular data to more people more regularly. This assists in sustainability-focused decision-making for procurement, supply chain and operations teams, as we can monitor and understand progress more closely, observing trends and developments on a quarterly basis, and identifying possible savings. The data we are gathering and sharing is used to create customer-facing PCFs (see page 8).



Scope 1 and 2 GHG emissions



Scope 2 (location-based) emissions: 60,834 tonnes CO_2e^{Δ}

Net Zero Roadmaps to take us further, faster

2024 will see us develop Net Zero Roadmaps for key technology platforms, identifying opportunities to reduce scope 1, 2 and 3 emissions associated with these product families by 90% by 2050. We believe it is essential to start planning for beyond 2030, so we are ready to support our customers. Delivering Net Zero will require us to transform our product portfolio and this will take significant time to plan and execute. We will approach this work in a collaborative fashion with all relevant stakeholders, co-ordinated by cross-functional teams in Croda.

Since 2018, our baseline year, our total scope 1 and 2 greenhouse gas (GHG) emissions have reduced by 33%. Within this, scope 1 emissions have reduced by more than 16% and we have seen a greater than 69% reduction in scope 2 emissions. Our scope 1, 2 and upstream scope 3 emissions have received limited assurance by KPMG (see page 25). www.croda.com/sustainability.

Δ indicates where metrics have been assured (limited assurance) under ISAE (UK) 3000 and ISAE 3410 by KPMG, our independent assurance provider and reflects the position for the year ending 31st December 2023. See www.croda.com/sustainability for details.

Climate Impact continued

Understanding our downstream scope 3 impacts

We are committed to helping all our customers to achieve their Net Zero targets, which will include both upstream and downstream scope 3 emissions. We can help by delivering low carbon footprint ingredients and also by reducing a customer's downstream scope 3 emissions. We can do this by reducing the emissions associated with a customer's operations (e.g. enabling lower temperature processing) and by providing in-use benefits for a customer's customer: the end consumer.

Our new industry-leading **Downstream Scope 3 Inventory**, developed in partnership with Accenture will enable us to move in that direction, in partnership with customers and end consumers.

The inventory encompasses categories such as the transportation of products downstream through to end of life. It enables us to quantify and account for the benefits of using bio-based raw materials in our manufacturing, demonstrating the emission-reducing benefits of their use in Croda ingredients.

Gaining these insights is the start of an important process to better understand and so reduce these impacts. It highlights that the vast majority of our emissions downstream (59.9%) are generated through the indirect use of Croda products: that is, the emissions are generated by the use of products that contain a Croda ingredient, for example, the emissions associated with generating hot water for a shower, when a consumer is using a shampoo containing Croda ingredients. Whilst this category will be out of scope for our net zero target, it is important to be able to work with customers on solutions to reduce these indirect use phase emissions as we transition towards a net zero economy.

The most significant downstream category in scope for our net zero target is the end of life treatment of Croda's ingredients. A large part of this impact is the effect of methane being released at end of life, and further work is required to model the split of methane and CO_2 in more detail. However, our use of bio-based ingredients avoided 16,413 tonnes of fossil CO_2 being emitted to atmosphere at end of life in 2022.

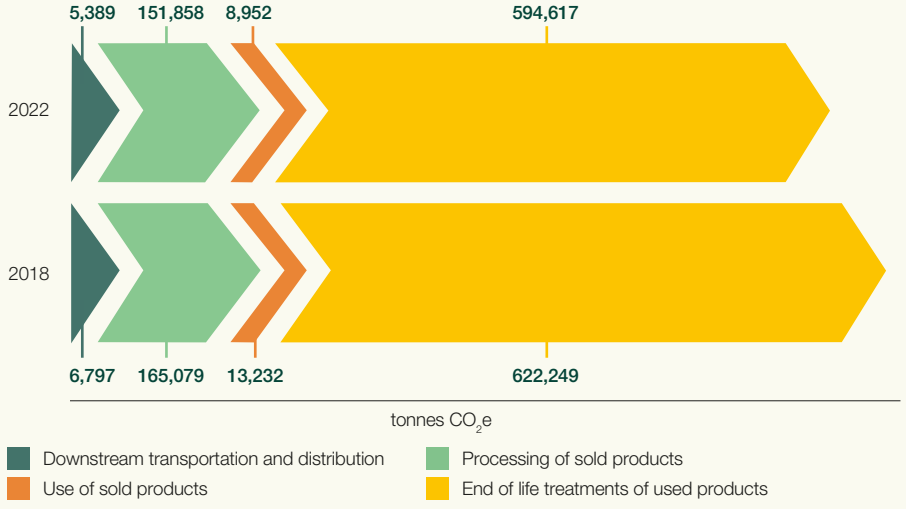
From Carbon Cover to carbon as a claim

As part of our 2030 Commitment we identified the importance of increasing the carbon 'benefit in use' of our ingredients through our Carbon Cover target (page 13), which includes downstream scope 3 emission reduction. Now, through our LCA work and collaborations, our innovation teams are prioritising 'carbon claims' when developing new ingredients, alongside performance and other claims. Examples of carbon claims include reducing the overall product carbon footprint of a customer's product by using Croda's ingredients compared to alternatives and reduced downstream scope 3 emissions during the use or disposal of the customer product.

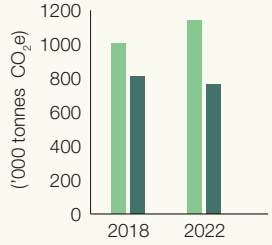
Avoiding emissions: Crobiotic 100

With malodours in clothes and fabrics often caused by bacterial build up, eliminating the bacteria can mean reduced odours and so less need to wash. Probiotic ingredients from our Home care business neutralise odours, giving consumers the potential to wash items less often and therefore save on water usage, energy consumption, and related emissions.

Downstream scope 3 categories for Croda that are in scope for our net zero target



The greatest emissions are associated with the indirect use of Croda ingredients



Climate Impact in action

Using LCA for innovation in bio-based crop protection ingredients

The polymeric dispersant Atlox™ 4913 is used widely in agrochemical products. An LCA study across multiple manufacturing sites examined the impacts of changing key raw materials from petrochemical to commercially available bio-based alternatives. The first raw material showed a clear climate change benefit, reducing GHG emissions by over 25% with minimal other environmental impacts so the decision was taken to make this transition in consultation with the market. However, for a second raw material the LCA demonstrated a significant burden shift on land and water use if switched, and highlighted the environmental burden from a third raw material. These have led to dialogues with suppliers to reduce them. The LCA also explored the climate change impact of a new processing technology designed to increase efficiency, and to include downstream customer-generated emissions. This demonstrates the potential of LCAs as a valuable tool for innovating and re-designing products aligned with Net Zero agriculture.

Transitioning our portfolio to bio-based ingredients

Moving to bio-based raw material sources as we work toward our target of 75% of our organic raw materials to be bio-based by 2030 can provide climate benefits due to the carbon that is sequestered from the atmosphere while they grow. 2023 was the first year we sourced 100% bio-based monopropylene glycol (MPG), an important raw material, for use at our manufacturing site in Spain. The move from petrochemical sourced MPG resulted in a 33% reduction in the carbon footprint of this raw material as it reaches our gate. In 2023, this led to a reduction in our scope 3 purchased good and services emissions of more than 750 tonnes of CO_2e associated with purchasing this material at this site. In 2024 we will expand our purchasing of this raw material for use at other Croda sites.

Process innovation for decarbonisation: reducing cycle times from 10 hours to two minutes

A multidisciplinary team has created a novel continuous process to produce Consumer Care ingredients reducing cycle times from 10 hours to two minutes. The continuous production plant has delivered annual savings of 360 tonnes of water and 86 tonnes of CO_2e relative to the batch process, equivalent to 4,500 bathtubs of water and 9,000 electric car charges. The plant itself has a 66% smaller footprint relative to a batch reactor, meaning less steel and concrete are used, lowering the construction carbon footprint. Smaller modular units can now produce commercially relevant quantities of products, with new modules only added when needed. In fact, a 'distributed manufacturing' model is now possible: building small yet competitive units across the world to meet local demand, so reducing shipping and environmental impacts. This project, part-funded initially by Innovate UK, saw Croda partner with CPI, NiTech and Cambridge University to develop the technology. We are very excited to be recognised for this achievement with two industry awards: the Innovation Award from the UK Chemical Industry Association; and the EFCE European Process Innovation Award.

Enabling best practice: buyer training and supplier engagement

In 2023, we launched a training programme for Croda buyers on sustainability and engaging with our supply chain, delivered in partnership with EcoVadis and using our Together for Sustainability membership platform. This has enabled our procurement teams worldwide to educate and challenge suppliers in our efforts to achieve our 2024 sustainability milestones. We also held supplier events in 2023 with a strong focus on sustainability. Our Thane site in India hosted an in-person event for more than 50 suppliers, with a major focus on training towards the EcoVadis platform, carbon reduction and ingredient traceability. This programme has enabled Croda to build its inventory of primary upstream scope 3 data from suppliers, and identify the steps to deliver more transparent and traceable agri-based raw material supply chains beyond palm derivatives (see page 15).

Climate Positive

Key

- Target achieved
- Target on track
- Target requires additional focus
- Target challenging to achieve
- Fundamentals (F)

Objective and targets	Status	Milestones and metrics	Status	2023 progress
Reducing emissions • 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% • Thereafter, by 2050 we will be a Net Zero organisation		• A reduction of 25% in 2018 absolute scope 1 and 2 emissions by the end of 2024 • All Croda locations to have a decarbonisation roadmap by the end of 2022		• Absolute scope 1 and 2 emissions have reduced by 33% since 2018, and we are on track to achieve our 1.5 ºC scope 1 and 2 SBT • Our upstream scope 3 emissions were 674,234 tonnes[Δ] in 2023, 22% lower than 2018 • Our business teams developed decarbonisation roadmaps to 2030, covering scopes 1,2 and 3.
Carbon Cover • 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		• Two million tonnes of CO_2e emissions savings delivered through use of our products by the end of 2024, which will be externally verified • 100% of our product portfolio evaluated for downstream scope 3 impact by the end of 2024		• 812,620 tonnes CO_2e[Δ] were avoided through the use of ingredients attached to verified case studies giving a Carbon Cover ratio of 1.05:1[Δ] (2022: 0.66:1). • We have developed an industry-leading downstream scope 3 inventory to understand our hotspots and impacts, enabling us to support our customers as they work towards becoming Net Zero
Sustainable innovation • By 2030, over 75% of our organic raw materials by weight will be bio-based, absorbing carbon from the atmosphere as they grow		• 71% (rolling three-year average) of our organic raw materials to be bio-based by the end of 2024		• Our use of bio-based raw materials remained steady at 59%[Δ] (2022: 59%) • We are reviewing our 2024 milestone in recognition of our raw material portfolio following the divestment of PTIC in 2022, while maintaining our ambitious 75% target for 2030
F				
Sustainable sourcing and partnerships • Ensure all key suppliers are responding to EcoVadis and engaging with us to improve practices		• By the end of 2024, all key suppliers will be required to achieve a minimum of the average score from EcoVadis (or equivalent) or will have an action plan with timelines to close gaps • By the end of 2024, key suppliers representing at least 50% of our raw material volumes will be required to sign up publicly to SBTi or equivalent carbon reduction targets • By the end of 2024, suppliers of crop-based raw materials will be required to provide supply chain transparency in a fully traceable and certified sustainable manner		• Key suppliers representing 83% of targeted spend have been evaluated using EcoVadis and corrective actions have been assigned and prioritised • Key suppliers representing 19% of our raw materials volumes have made public commitments to carbon reduction with more than half of these suppliers, 14.6% of raw materials volume, signed up publicly to the SBTi • Supplier requirements are clearly outlined within the 2022 Croda Supplier Code of Conduct and approximately 36% of crop-based raw materials volume is certified sustainable with mapped supply chains

[Δ] indicates where metrics have been assured (limited assurance) under ISAE (UK) 3000 and ISAE 3410 by KPMG, our independent assurance provider and reflects the position for the year ending 31st December 2023. See www.croda.com/sustainability for details.