

Factsheet

# Life Cycle Assessment:

Understanding the impacts  
of products and services



**ecoact**

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# Life Cycle Assessment (LCA)

When buying a car, a mobile phone, or food from a local store, customers are now asking - 'What is the environmental impact of this product?' 'Should I buy tomatoes grown in Spain or the UK?' 'Is there an alternative product that produces lower carbon emissions?'. Answering these questions accurately isn't easy, as many factors need to be considered, including which raw materials were used during the production process, how much water required to produce it, and how products are transported to the shop. Electronic items like mobile phones are particularly complex, as you also need to consider the electricity it uses over a number of years and whether it is then recycled, reused or sent to landfill.

All these reflections are part of life cycle thinking. Everything we create goes through a series of life cycle phases, from the extraction of raw materials through to end of life. The process of understanding what impacts occur as a result of the products and services we deliver is called Life Cycle Assessment (LCA). Applying this approach identifies what happens at each phase and enables businesses to design better products and customers to make better purchasing decisions.

Also, as momentum for net-zero accelerates and more and more companies set science-based targets, LCA is becoming an increasingly important tool for businesses to understand the sources of carbon emissions and ways of reducing them.



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Life Cycle Assessment is a key tool in enabling the transition to net-zero. It provides a robust and data-driven way to identify sources of emissions and how to reduce these. By skillfully deploying LCA companies can inspire action and innovation, effectively communicate on green credentials, and make the right strategic choices to meet emissions targets with confidence.

Niki Inglis  
Managing Consultant

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# What is a Life Cycle Assessment (LCA)?

A Life Cycle Assessment (LCA) is an internationally recognized, science-based methodology used to assess the environmental impacts of a product or service throughout its life – from raw material extraction (cradle) over processing, manufacture, distribution and use, to end-of-life disposal, recycling or reuse (grave).

Life Cycle Assessment allows for a robust inventory of the energy and materials that are required across the value chain and calculates the corresponding emissions to the environment. It also provides insights into upstream and downstream trade-offs associated with environmental pressures, human health, and the consumption of resources.

Understanding the environmental impacts of your products and services throughout their entire life cycle enables your company to make the right decisions on climate and sustainability. You may have a product or service that reduces costs, energy, or emissions in one area of its use, but overall, the impacts might be larger. The information and data you collect along the way are important for your company but also for consumers and policymakers.

The framework and principles for conducting an LCA are set out in the 14000 series of environmental management standards of the [International Organisation for Standardisation \(ISO\)](https://www.iso.org/), specifically ISO 14040 and ISO 14044.

If companies want to focus on the carbon emissions they can conduct a Product Carbon Footprint (PCF), for which ISO 14067, PAS 2050 and the GHG Product Standard provide further detail.

Delivering an LCA can be a complex process, as it requires in-depth research, experience, and data to ensure the accurateness of the assessment. EcoAct's expert team has conducted a wide range of LCA for clients across different sectors, measuring emissions across complex value chains and turning the analyses into effective strategies for minimising environmental impact and enhancing commercial value.

Each company and product are entirely unique and the EcoAct team will tailor the LCA to your specific needs. The scope of the LCA can also vary. For example, it could be a comprehensive study across the full value chain or simply an assessment of a specific feature of a product or service.

This factsheet looks at the purpose of an LCA and outlines EcoAct's five-step approach to guide you through the process and thus get the most out of the LCA.



## Environmental impacts



Within this factsheet examples will be built based on carbon emissions and the term LCA is used within this context. A comprehensive LCA considers a range of environmental impacts such as:

- Global warming
- Ozone depletion
- Acidification of soil and water
- Eutrophication
- Photochemical ozone creation
- Depletion of abiotic resources
- Human toxicity
- Ecotoxicity

# 1. Purpose of a Life Cycle Assessment

An LCA assesses the potential environmental impacts of a product or service throughout its life from raw material extraction, manufacture, distribution and use, to end-of-life disposal, recycling or reuse.

LCAs can be used comparatively to assess different product or service design options or in an attributional way to identify environmental hotspots in the lifecycle. This enables a company to make informed choices on how to reduce its impact on the climate and the environment most effectively. LCAs can also help mitigate immediate and future risks to businesses' value chains posed by climate change.





When embarking on an LCA, it's important to consider that:

- An LCA is a means to an end, not the end itself
- It is essentially a tool enabling a variety of outputs
- Your business needs a clear goal and scope for the assessment, which allows for a system boundary to be established.

Typical boundaries are referred to as:

- Cradle-to-gate
- Cradle-to-grave

Examples of LCA application:

Product assessment 	Comparative analysis 
Case study of one or a few selected products or services	Evaluation of alternative options (e.g. materials)
Ecodesign tool 	Scope 3 Product screening 
Tool enabling user evaluation of new designs and products	Screening analysis of top products, e.g. part of SBT or Scope 3 analysis

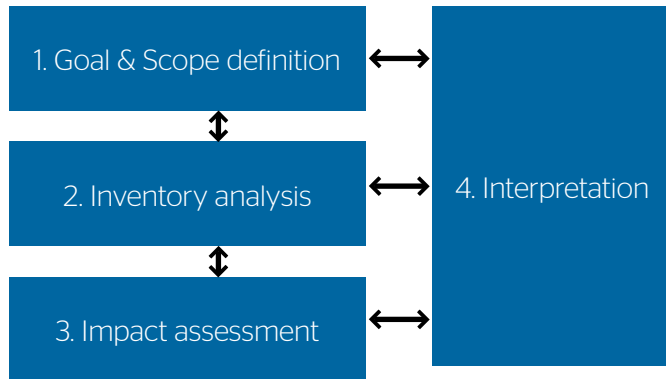
Generic product lifecycle



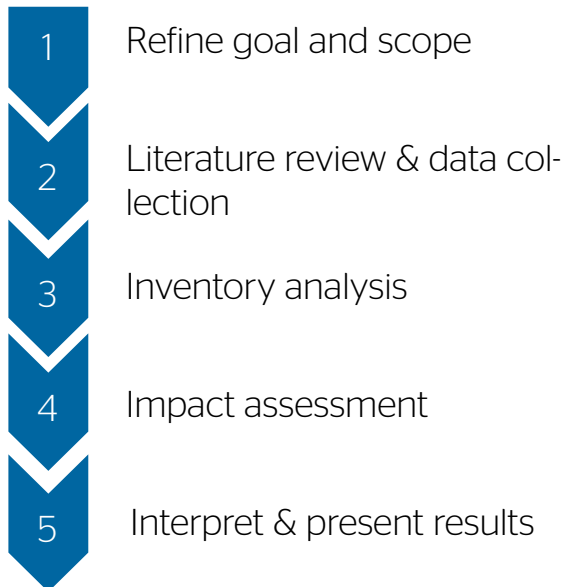


## 2. How do you complete an LCA?

According to ISO 14040 there are 4 stages within an LCA.



EcoAct's five-step approach is based on the stages above and is designed to facilitate your LCA journey.



### Step 1 - Refine goal and scope

This initial stage will establish the parameters for the work ahead and will include:

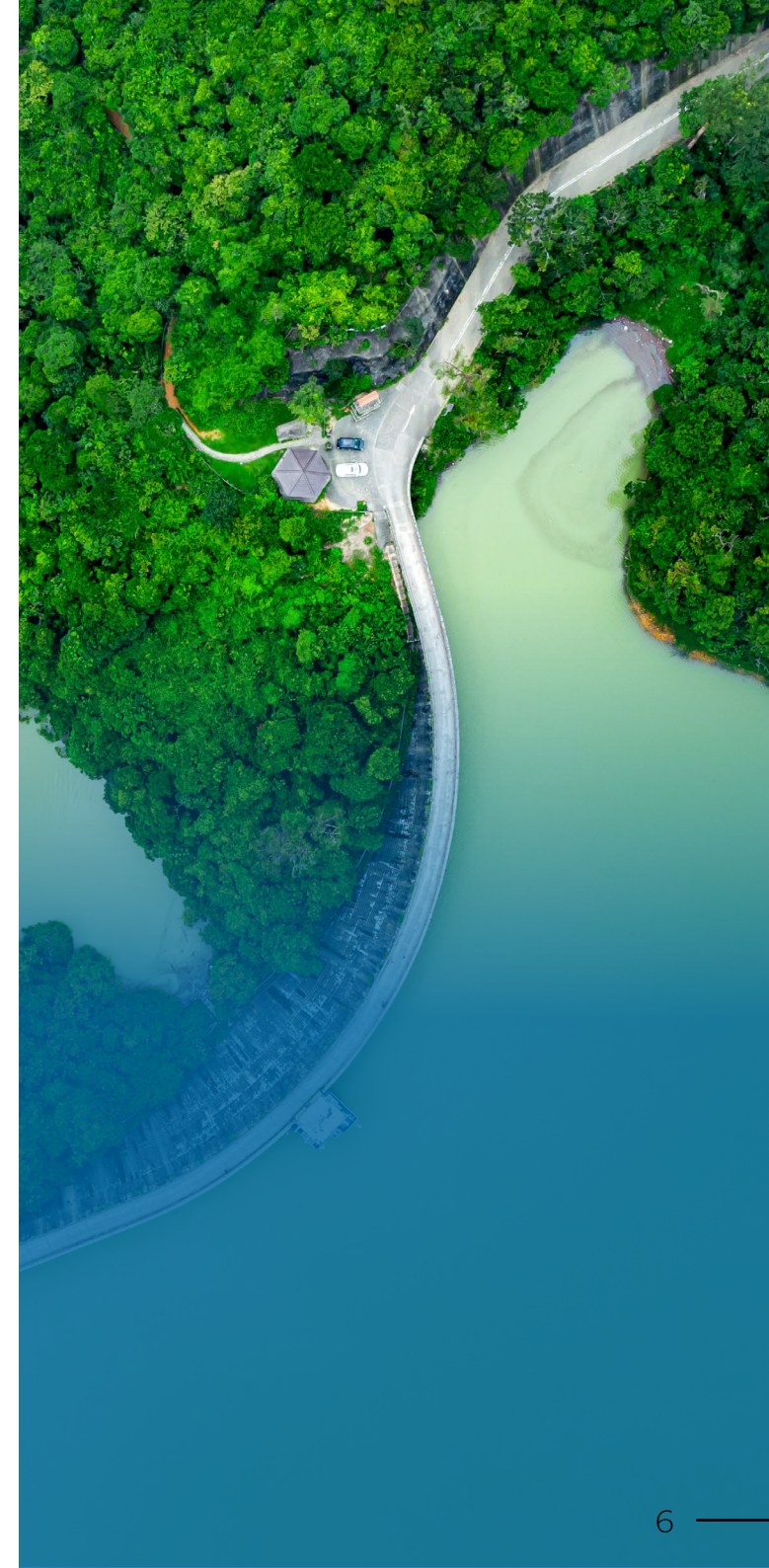
- Confirming the goals and objectives
- Refining functional unit, scope, and boundaries of the study
- Defining cut-off criteria and exclusions
- Confirmation of the project parameters (timelines, resource allocations, etc.)

### Step 2 - Literature review and data collection

We put particular emphasis on the data collection stage as this is typically the most time-consuming phase and requires significant input from a number of stakeholders.

EcoAct will agree on an engagement strategy with your company to collect information from relevant stakeholders, including internal experts and external contacts, suppliers and technical representatives to inform the assessment and for the provision of data.

EcoAct will utilise information as much as possible from existing internal systems (e.g. SAP, Teamcenter) and where relevant, provide data collection templates to enable consistent and easy provision of data for engaged contacts.







## 2. What does it take to do an LCA?

To bridge data gaps, information gathering and data collection will be informed also by a literature review (e.g. existing studies, secondary research).

### Step 3 - Inventory analysis

At this stage, the EcoAct team will analyse all the inputs and outputs associated with the product that is being analysed. It will entail breaking down all material and energy flows within the product systems based on data collected.

Modelling will be carried out, applying extensive verified databases of material and energy processes for background processes (e.g. ecoinvent).

The EcoAct team will also leverage other reputable LCA databases where necessary and review the current literature and research landscape to ensure the study is an accurate representation of the systems being explored.

### Step 4 - Impact assessment

Once all data has been collected in the inventory, the LCA model will be built, and the environmental impact of the product or service will then be calculated.

The EcoAct team will provide:

- Evaluation of environmental impacts using comprehensive and robust impact assessment methodologies
- Outputs of the impact assessment analysed and quality assured by EcoAct's internal experts
- Results of the LCA will be presented in Step 5 during the analysis and debrief session

### Step 5 - Interpretation and presentation of results

Following the completion of the LCA, the results and outcomes of the study will be presented in a debriefing workshop session.

The content of this session will be agreed in advance, and can include aspects such as:

- Conclusions around absolute climate change impacts of products and services assessed
- Assessment of the significant carbon impacts (hot-spot analysis, contribution analysis & sensitivity analysis)
- Review of potential opportunities to reduce impacts
- Scenario analysis across options for comparative assessments

# 3. Outcomes and business benefits of an LCA

An LCA is intended to facilitate informed business decision-making and stakeholder communication. Through interpretation, identification of environmental hotspots in supply chains and scenario analysis, companies can then improve the way products and services are delivered, and meeting the growing demand from customers for sustainable products.

An LCA can provide the following benefits:

Product and service innovation and net zero strategy

An LCA is a valuable decision-support tool for product designers to demonstrate sustainability leadership. An LCA can determine potential environmental impacts of existing or future products and help to reduce these. It can highlight which stages of the life cycle are the most relevant areas of focus and identify measures for addressing them.

As more and more organisations set net zero targets, new ideas, designs, products and processes will be required to facilitate the transition to a low carbon economy, and an LCA can be a vital first step in this process.

With the growing demand for low carbon solutions, an LCA supports the opportunity for innovation and product development, which in turn can help your company anticipate the future and develop methods of minimising the effect of shocks and stresses of future events while delivering commercial returns.

Back up products environmental claims and avoid the risk of greenwashing

Product sustainability claims are becoming increasingly important for consumers, but without robust evidence, companies face significant risks of being accused of greenwashing. LCAs provide a robust and transparent way for businesses to make claims on their products and to demonstrate a commitment to environmental sustainability and to society, helping consumers to make informed purchases.

Stay ahead of regulation

Government regulation is now moving toward 'life-cycle accountability', where the manufacturer is responsible not only for direct production impacts but also for the impacts of product inputs, usage, transport and final disposal. An LCA provides companies with a detailed look into all aspects of their products and can help identify areas that may need to be adapted to stay in line with new regulation.

## LCA as a business tool



### Strategic management

- Understand supply chain risks and impacts
- Explore alternative business models, e.g. store vs. online subscription
- Meeting GHG targets confidently



### Marketing & sales

- Meet consumer expectations
- Substantiate claims
- Product differentiation
- Enhance climate change communication



### Research & development

- Drive emissions reductions
- Enhance innovation
- Support sustainable product design



### Supply chain & procurement

- Understand supply chain
- Evaluate suppliers
- Improve traceability
- Enable supplier engagement



## 4. What happens next?

Life Cycle Assessment can easily be viewed as a single-standing project, which once complete provides the information it set out to obtain and is then finished. We suggest not stopping at that point, but going further than this. EcoAct's approach to LCA is not to do these extensive calculations in isolation but connect them up with your company's path to net-zero.

### Product Improvements

A Life Cycle Assessment will provide a high level of detail on sources of emissions and the most material of those – the [emissions hotspots](#). With this information, companies should dig deeper to [understand how these can be reduced or avoided entirely](#). Eco-Design and Scenarios Analysis can help identify opportunities to proactively reduce product emissions.

### Streamlined LCA

Streamlined LCA means assessing not just one product in your portfolio with LCA but expanding this to cover multiple, if not all, products. This can for example be done with [Organisational Life Cycle Assessment \(OLCA\)](#) or other Streamlined LCA approaches which make scaling LCA to the product portfolio much easier. These approaches develop a comprehensive overview of the portfolio of products, enabling you to understand understand hotspots across the entire company and make strategic decisions that can shift entire ranges or portfolios. At the same time the

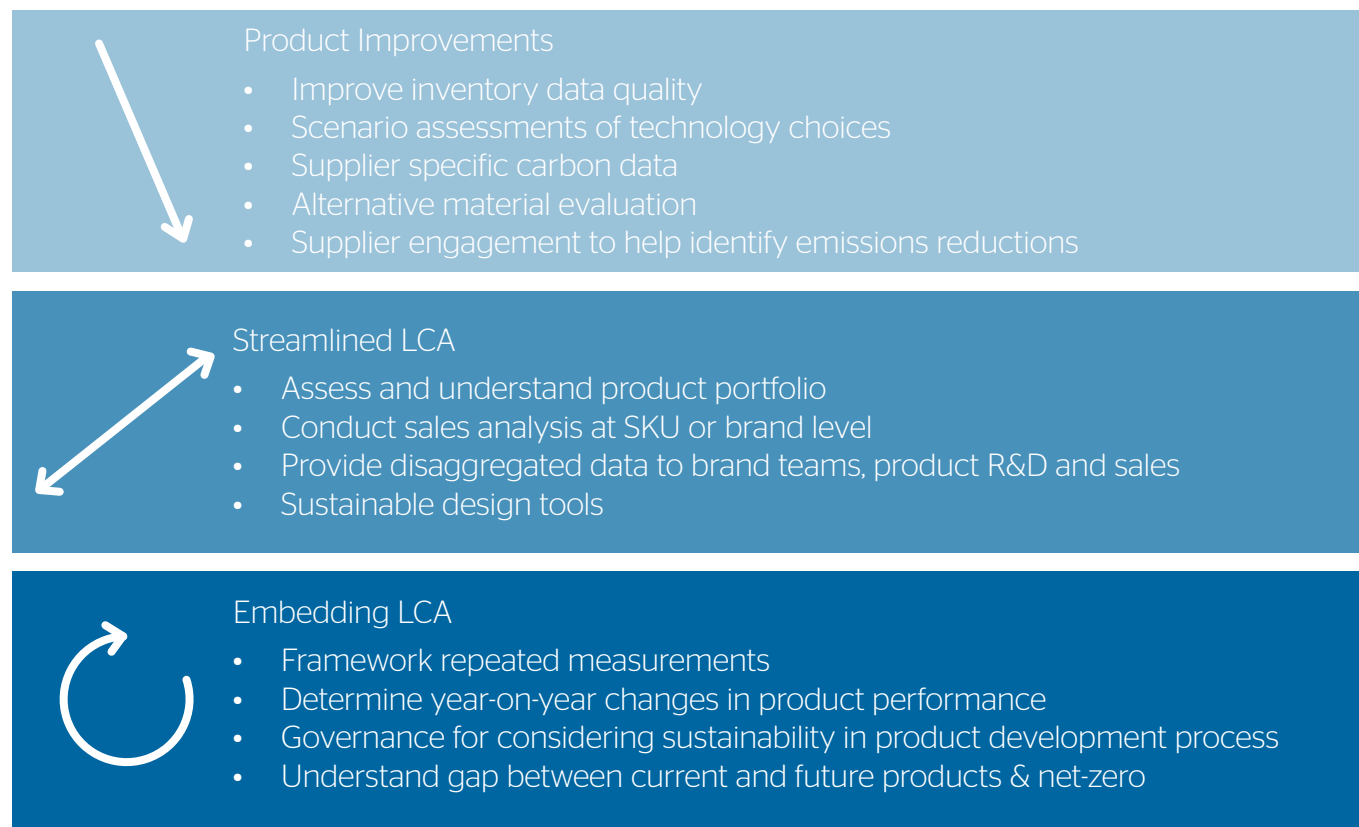
product level detail remains enabling R&D and product designers to identify ways of improving the environmental impacts of the individual products.

### Embedding LCA

Once you have assessed your products, we recommend adopting a methodology and framework for updating the LCA. This will enable tracking of emissions over time and understand how dynamic effects such as changing electricity

grid mix may influence the emissions over time.

In order to meet the ambition set in the Paris Agreement, [we must halve our emissions every decade](#) and be net-zero by 2050. For many companies, there is an opportunity to do this even faster. [As the demand for LCA grows in many sectors driven by increased regulation](#), advances in software and data analytics, such as Artificial Intelligence (AI) and Machine Learning (ML), are easing the transition to LCA Automation.



## — Case study - Anya Hindmarch



Anya Hindmarch is a British fashion accessories designer who founded her eponymous global brand, Anya Hindmarch, in London in 1987. In 2007 she stirred up the fashion world with the “I’m Not A Plastic Bag” tote which was an immediate sell out worldwide. These bags are made from an innovative new fabric which is created from recycled plastic bottles and coated with plastic from recycled windshields. Every effort and careful consideration was given to the processes and the recycled materials used to ensure the bag’s sustainability and its quality. This process demonstrates the possibility of engaging with a supply chain to drive forward the innovation we need for positive change.

### Creating a carbon neutral product

EcoAct looked at all the elements of the production of the bag from cradle to gate. This included sourcing and processing the materials all the way through to transportation to the warehouse. With all the data collected, EcoAct were able to calculate the total amount of emissions produced in the creation of the bags.

With a complete footprint it was then possible to offset the total emissions associated with the bags through the purchase of carbon credits. It is very important that credits are purchased from projects that are certified according to international standards. The credits purchased



## Case study - Anya Hindmarch

to offset the bags come from a Verified Carbon Standard (VCS) certified [wind power generation project in India](#).

This project aims to close the supply-demand energy gap that currently exists in India by generating electricity from a renewable source of energy. In addition, this renewable energy project also provides opportunities for employment in the local communities, working in maintaining, operating and general running of the sites. It highlights the impacts of climate change and plays an active role in its mitigation by shifting electricity generation away from non-renewable sources. It is really important to EcoAct and to Anya Hindmarch that offsetting delivers this additional value and contributes to long-term sustainable development initiatives.

At this point in time, eliminating all emissions from our supply chains is extremely difficult. Carbon neutrality is enabling organisations to take urgent action today on their full emissions whilst they continue their efforts to reduce them.

EcoAct are delighted to be supporting Anya Hindmarch with her project to raise awareness of plastic consumption and recycling. Plastic use and the negative climate impact of production are two huge global issues that we face today.

By tackling these issues head on, Anya Hindmarch is demonstrating how companies can take responsibility for their impacts and inspiring us all that through innovation we can transition to a more sustainable future. Anya Hindmarch is demonstrating how companies can take responsibility for their impacts and inspiring us all that through innovation we can transition to a more sustainable future.



# — Case study - Biocarbon Laminates



The [built environment contributes around 40% of the UK's total carbon footprint](#) and therefore has a vital role to play in our urgent transition to a net-zero economy.

In 2019, the Royal Institute of Architects (RIBA) launched the 2030 Climate Challenge to encourage architects and the wider construction industry to achieve whole-life carbon for new and retrofitted buildings by 2030. Consequently, demand is rising for more sustainable materials and building products.

See Ltd recognised the importance of this challenge and is passionate about creating a more sustainable business. In 2019, the group partnered with EcoAct, an Atos company, to accelerate their own ambition for net-zero by 2030.

One of the key projects of this partnership was to measure the environmental impacts of the group's key product, BioCarbon Laminates, reduce these impacts and be transparent about their credentials through an Environmental Product Declaration (EPD). Ultimately, this would not only support their own climate targets but meet the needs of architects and builders looking to make more sustainable choices.



# Case study - Biocarbon Laminates

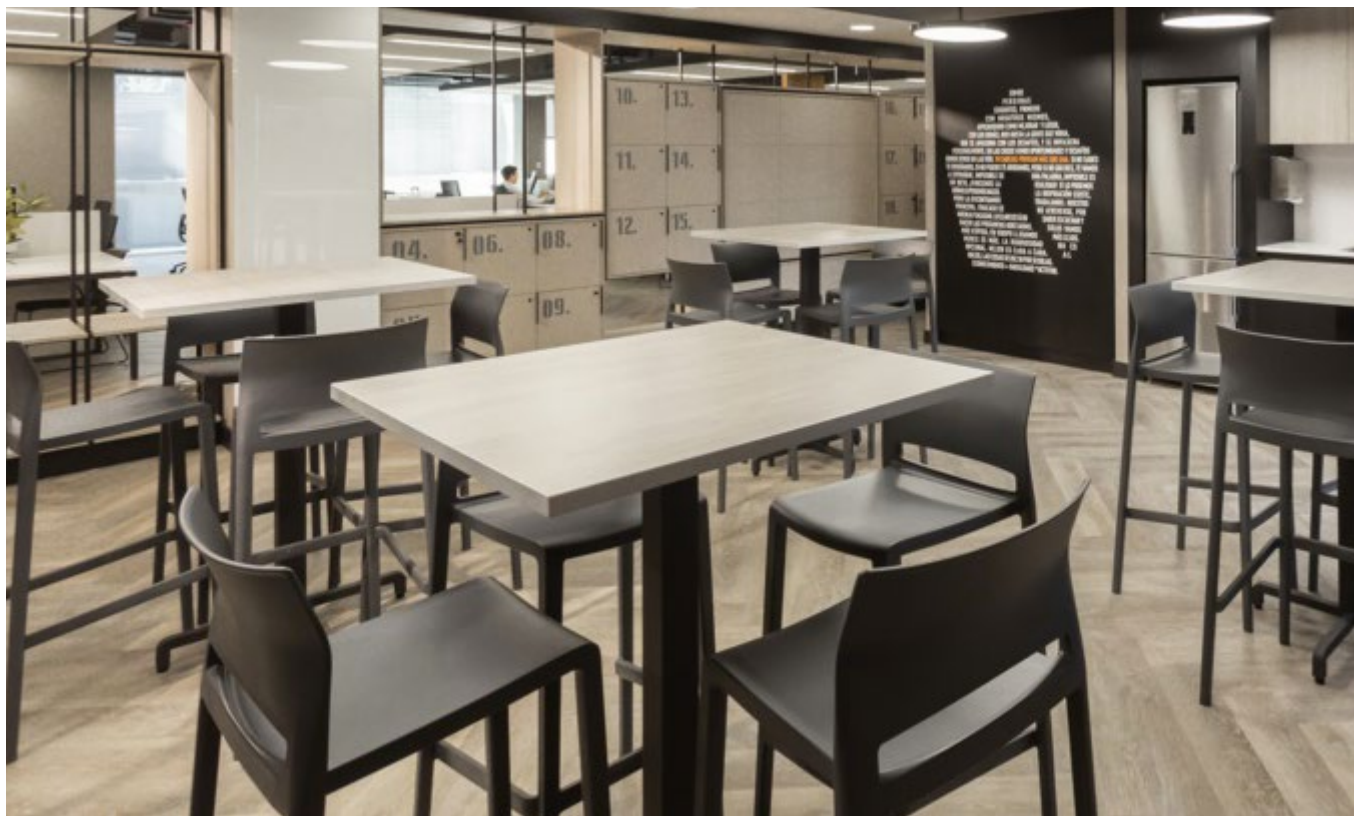
Creating a carbon neutral project: from cradle to grave

An EPD requires a Life Cycle Assessment (LCA) which must adhere to strict criteria for how to assess and measure the environmental impacts and benefits of a particular product. It follows the ISO 14025 and 14040 series of standards and therefore ensures a robust environmental assessment that enables an organisation to make credible and verifiable statements about their product's environmental credentials.

Using this process, the full life cycle of BioCarbon Laminates was assessed from source materials to transportation and end of life of the product ("Cradle-to-grave"). The assessment included environmental impacts such as carbon emissions, non-renewable energy use and water consumption.

The assessment considered the group's existing sustainability strategy and Sustainable Forestry Management. For example, their partnership with the Forest Stewardship Council (FSC) and use of recycled materials.

The process helped to identify the emissions hotspots throughout the lifecycle of the product and identify new initiatives to improve their carbon footprint. In particular, initiatives are focused on raw material sourcing and the improvement of manufacturing processes.



“ We are very proud to launch BioCarbon Laminates as the UK's first carbon neutral laminate. Working with EcoAct, we conducted a full Life Cycle Assessment (LCA) that analysed its carbon emissions, non-renewable energy use and water consumption. By measuring and reducing the environmental impacts, we believe this product provides architects and builders with a sustainable option that is fully verified to the highest environmental standards.

Robert Thompson  
CEO, See Ltd

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## Case study - innocent



“EcoAct have been instrumental in helping us work out what our climate change target should be as well as the best way to go about achieving the target. They offer a great balance between providing the cold-hard technical insight required alongside a fun, friendly and engaging way of doing things.

Simon Reid  
Sustainability Manager, innocent

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innocent drinks have always had strong environmental values and big ambitions when it comes to sustainability. In 2017 they wanted to tackle the challenge of taking more carbon out of their supply chain.

As a growing international business, innocent has a supply chain that sources fruits and vegetables for their smoothies globally, which are then blended and put into bottles at a number of factories in Europe.

They wanted to gain a clearer view of the climate change impact across their supply chain and specifically:

- Calculate their Scope 3 emissions
- Devise a better and simplified methodology for estimating emissions from fruit
- Set a science-based target
- Improve data quality and update emissions calculation methodologies.
- Improve engagement with their suppliers

As a rapidly growing business, they wanted help to ensure they could deliver on their ambitions both commercially and sustainably.



# Climate action. Commercial sense.

Together with our clients, we act to put climate and nature centre stage to drive sustainable corporate transformation within planetary boundaries.

EcoAct is an international sustainability consultancy and project developer with 18+ years of industry experience and 360+ climate experts globally. Founded in France in 2006, the company now spans three continents with offices in Paris, London, Barcelona, New York, Montreal, Munich, Milan and Kenya.

EcoAct's core purpose is to lead the way in developing sustainable business solutions that deliver true value for both climate and client. Data is the cornerstone of our consulting practice, supported by our dedicated Climate Data Analytics and Research& Innovation teams.

At EcoAct we are driven by a shared purpose to make a difference. To help businesses implement positive change in response to climate and environmental sustainability challenges, whilst also driving commercial performance

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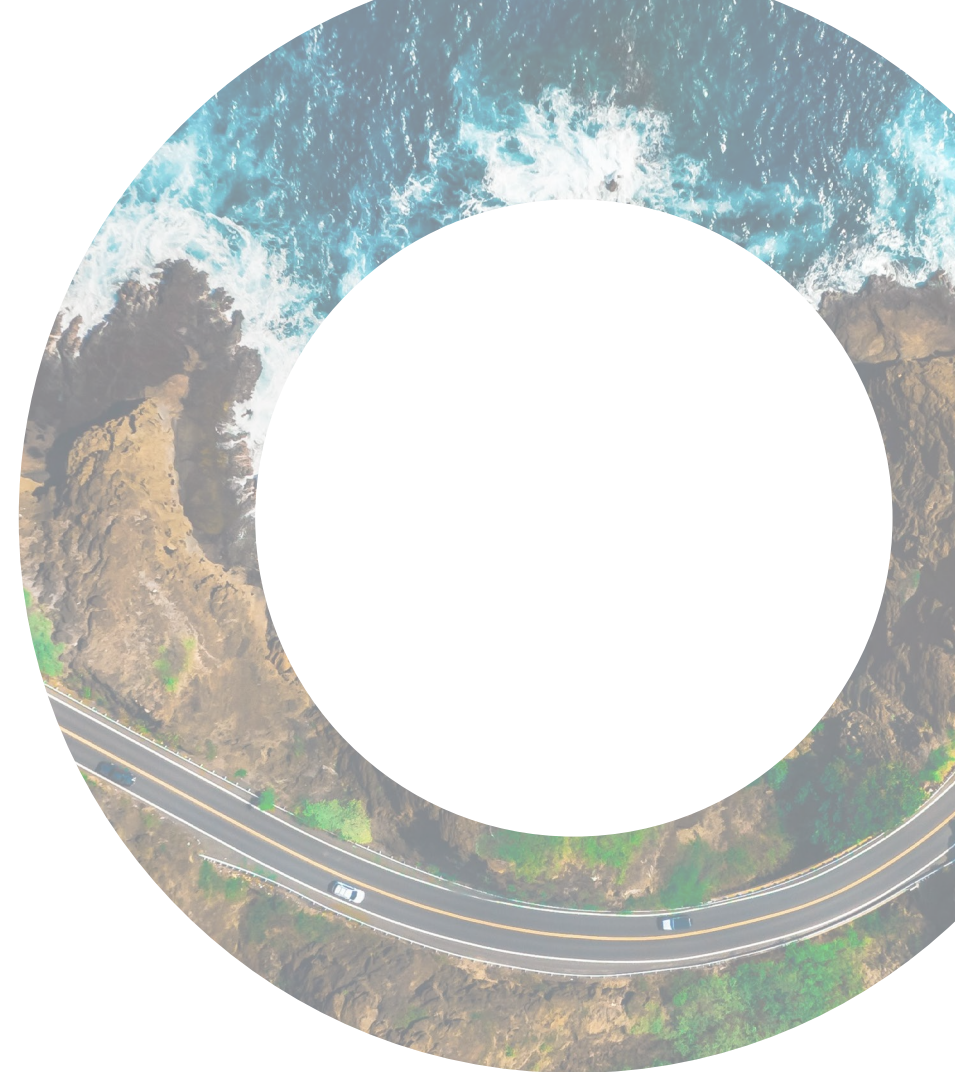
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