

SYSTEMIC IMPACT ASSESSMENT

ENHANCING FOOD SUSTAINABILITY FOR THE PLANET



As the first European venture capital fund, Planet A relies on its own scientific team to assess the environmental and climate impact of an innovation. Prior to an investment, a systemic impact assessment, like this one, is conducted and integral part of the investment decision. All assessments as well as the methodology are published for maximum transparency.

About Mondra

Mondra is a UK-based company providing an enterprise SaaS solution to improve transparency and traceability of product emissions in the FMCG sector, focusing on the food industry. Their platform enables supermarkets, suppliers, and producers to accurately measure and share product carbon footprints. By utilising digital product passports, Mondra facilitates emissions tracking across the supply chain, meeting the rising demand for transparency while helping uncover emission reduction opportunities. Mondra is a leader in the UK market and supports almost all large FMCG brands in meeting regulatory standards, building consumer trust, and advancing sustainability goals.

About this Study

This study examines the environmental emissions and resource intensity of the food sector and presents Mondra's science-based solution for delivering measurable environmental improvements across the supply chain. The report highlights Mondra's unique potential to drive substantial positive impact, supported by key factors that enable the effective scaling of its solution.

Table of content

1. The Challenge: Transforming our unsustainable food system	4
2. The Solution: LCA	5
3. Impact Potential: How Mondra is Transforming the Food Sector	7
2.1. Sector-Specific LCA Automation: Enabling Better Decision-Making	7
2.2. Strategic Partnerships: Unlocking High-Quality Data and Industry Influence	7
2.3. Key Features Driving Impact Beyond Scope 1, 2 & 3 Tracking	8
2.4. Why Mondra's Approach Has Significant Impact Potential	8
4. Conclusion	9

1. The Challenge: Transforming our unsustainable food system

Research indicates that even if fossil fuel emissions were eliminated today, the global food system alone would still generate enough greenhouse gas (GHG) emissions to make limiting warming to **1.5°C impossible** and achieving the **2°C target extremely challenging** (Clark et al., 2020).

Agri-food systems account for about one-third of total anthropogenic GHG emissions (Crippa et al., 2021). Global agri-food systems emissions reached 16.2 billion tonnes of carbon dioxide equivalent (Gt CO₂e) in 2022, virtually unchanged from 2021, and representing an increase of 10% since 2000 (FAO, 2024)

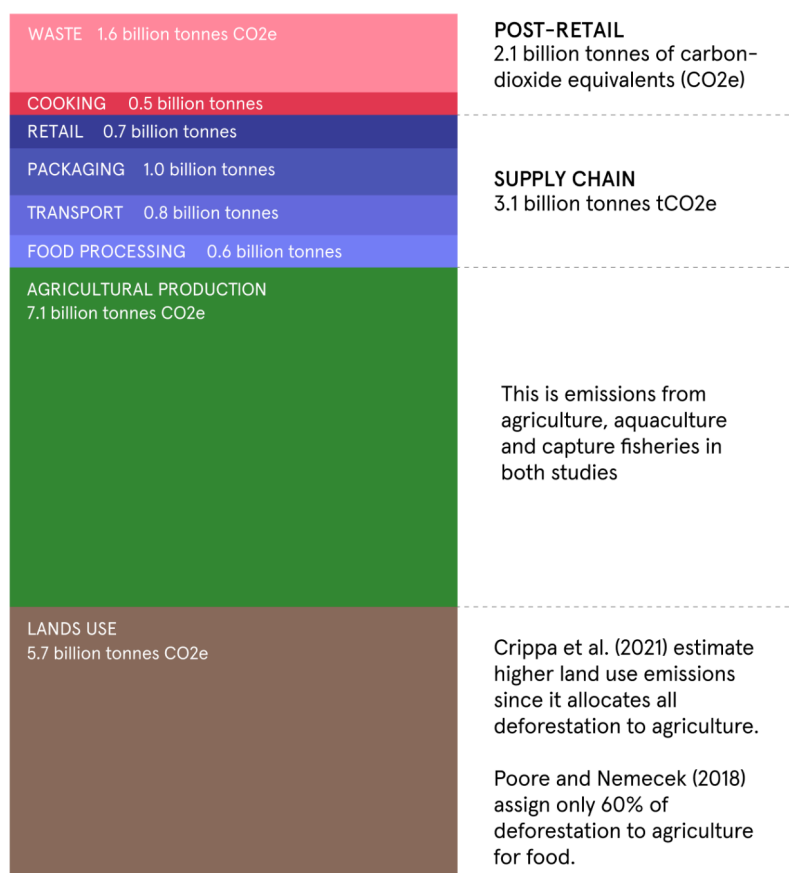


Fig. 1: Roughly 1/3 of Global GHG emissions come from food. Source: Crippa et al. (2021), quoted in Our World in Data (Ritchie, 2021)

Spotlight on the UK, Mondra's market: The food system accounts for 19% of domestic greenhouse gas emissions, rising to nearly 30% when imports are factored in (National Food Strategy, 2021a). While the UK Government has pledged to achieve net-zero carbon emissions by 2050, emissions from food production have decreased at only half the rate of those from the broader economy (National Food Strategy, 2021b). At the current trajectory UK food system emissions will be four times higher than the required level by 2050, jeopardizing the country's ability to meet its Net Zero target (The Food Foundation, 2023).

Beyond emissions, agriculture drives **60–80% of global biodiversity loss** due to deforestation and habitat destruction, while it also consumes **70% of the world's freshwater resources** (European Business & Biodiversity Campaign, 2020; Khatri, 2024; WRAP, 2024). Additionally, plastic packaging in food and FMCG products remains a **major contributor to global environmental pollution**.

Despite the scale of the challenge, the industry **lacks large-scale tools** to facilitate a transition to sustainable products. Progress has been limited for Scope 3 emissions (indirect emissions from a company's value chain), which account for over 90% of a food retailer's greenhouse gas footprint (WWF-UK, 2022). Sharing carbon emissions-related data through the food supply chain is inherently difficult due to

- (1) food supply chains being complex;
- (2) a lack of willingness and ability from stakeholders to share product carbon data;
- (3) different standards and interoperability of data.

The issue is even more pronounced in private label products, where limited supply chain transparency and compositional insight—combined with massive production volumes—make it particularly difficult to implement effective sustainability strategies. The food industry therefore struggles to operationalise CO₂ data, impacting business decisions and hindering progress towards Net Zero commitments.

2. The Solution: LCA

The integration of Life Cycle Assessment (LCA) into product and supply chain management offers a systematic approach to quantifying environmental impacts across a product's entire life cycle. LCA enables the evaluation of all life cycle stages, from raw material extraction and processing to production, distribution, usage, and end-of-life disposal. This methodology facilitates the identification of critical impact areas, enabling FMCG organisations to implement targeted sustainability strategies to reduce environmental emissions of their products and services (Hellweg et al., 2023). LCA can be instrumental in enhancing product sustainability through:

1. **Identifying Environmental Hotspots:** LCA results can uncover environmental hotspots within their FMCG product's life cycle by assessing contributions to key impact categories such as energy or resource consumption and emission output. By identifying the most relevant life cycle stages and processes, FMCG organisations can prioritise mitigation strategies and resource optimisation efforts (ISO, 2006).
2. **Optimising Material and Energy Flows & Supporting Eco-Design:** By enabling the comparison of alternative materials (e.g., ingredient composition or packaging materials of different FMCG products), energy sources and other resources, LCA can support decision-making toward low-impact choices. Empirical studies demonstrate its effectiveness; e.g., a dairy farm achieved a 20% reduction in methane emissions through feed optimisation, while a packaging company reduced its carbon footprint by shifting to lighter, recyclable materials.
3. **Evaluating Circular Economy Strategies:** LCA plays a crucial role in assessing the sustainability of circular economy strategies by determining whether the environmental benefits of material circularity (e.g., reducing primary resource demand) outweigh the impacts associated with recycling or repurposing processes. It facilitates the evaluation of

circularity principles, including narrowing (reducing material consumption), slowing (extending product lifespan), and closing (enhancing post-use recycling). Case studies demonstrate that closed-loop systems, such as reusable beverage packaging, significantly reduce waste generation and greenhouse gas emissions, ensuring alignment with global climate goals (Ellen MacArthur Foundation, 2019).

4. **Facilitating Informed Decision-Making and Product Stewardship:** LCA provides a structured framework for comparing different products, processes, and systems based on their environmental performance throughout their entire value chain including production, distribution, usage, and disposal. By incorporating a wide range of impact categories, such as carbon footprint, water usage, and resource depletion, LCA enables decision-makers to select environmentally optimized alternatives while maintaining economic and functional viability (Guinée et al., 2011) ultimately fostering the development of more sustainable products (Benoît Norris et al., 2020). Additionally, this comprehensive approach also aligns with the principles of extended producer responsibility (EPR), wherein manufacturers are encouraged to design products that are more sustainable throughout their life cycle.
5. **Promoting Transparency and Stakeholder Communication:** The application of LCA enhances transparency in corporate sustainability reporting by providing standardized and scientifically validated data on environmental performance. This fosters trust among stakeholders, strengthens regulatory compliance, and enhances a company's reputation in the market. Many corporations leverage LCA to communicate environmental claims through eco-labeling and environmental product declarations (EPDs) (European Commission, 2021).
6. **Strengthening Supplier Collaboration:** LCA promotes supply chain transparency by identifying key environmental impact sources within upstream and downstream operations. Collaborative sustainability initiatives, such as optimizing fertilizer use and improving irrigation efficiency in food production, have demonstrated measurable reductions in resource consumption and emissions. By fostering supplier engagement, LCA facilitates the implementation of industry-wide best practices in sustainable sourcing and production (FAO, 2023).

Furthermore, LCA automation tools like Mondra enhance the efficiency and accessibility of LCA studies by automating data collection, integrating real environmental impact assessments to the farm/ grassroot level, and facilitating scenario analysis. Applying the LCA automation tool in the FMCG sector can provide a data-driven foundation for sustainability improvements, enabling organisations to systematically quantify, compare, and mitigate environmental impacts. By leveraging LCA software's analytical capabilities, businesses can optimise resource use, enhance supply chain transparency, align with circular economy principles and comply with existing and future regulations around sustainability.

3. Impact Potential: How Mondra is Transforming the Food Sector

Mondra offers a **cloud-based platform** for companies to assess and improve the sustainability of their food production and supply chains with **more granular insights into carbon emissions** for each **Stock Keeping Unit** they sell, as well as water usage, water pollution, and biodiversity. The **footprinting platform enables collaborative decarbonisation, from source (farm level) to shelf.**

2.1. Sector-Specific LCA Automation: Enabling Better Decision-Making

By specialising in **food and FMCG (Fast-Moving Consumer Goods)**, Mondra is well-positioned to develop **superior industry knowledge** and **higher-quality background models**. These are critical for building a **highly effective LCA automation tool** that empowers **non-LCA experts** to generate **product-specific environmental insights**.

Mondra's **LCA automation** delivers three key **value propositions**:

- **Monitor:** Enables rapid environmental assessments of FMCG and food products.
- **Improve:** Identifies sustainability hotspots and optimises product lifecycles, especially for **private-label products**, where supply chain and composition data are often opaque.
- **Declare:** Supports **regulatory compliance** and enhances consumer communication, facilitating **environmentally conscious purchasing decisions** that drive positive impact.

2.2. Strategic Partnerships: Unlocking High-Quality Data and Industry Influence

Mondra's partnership-driven approach is essential to **improving data granularity** and ensuring **real impact across the supply chain**. The complexity of food supply chains—from farm to retail—requires **high-quality, standardised data** to drive effective sustainability decisions. Partnerships also create **lock-in effects** through **strong relationships and mission alignment**, enhancing Mondra's long-term impact potential.

1. Primary Data Integration

To enhance **data quality and accuracy**, Mondra collaborates with partner organisations to get different types of data: Primary farm data; Primary data for branded goods; Scope 1 & 2 emissions data. These partnerships and robust data sourcing enable **more precise emissions calculations**, ensuring **product-specific impact assessments** are based on **real-world, granular data**.

2. Supplier & Retailer Integration

Mondra's integration across the supply chain is strengthened through partnerships with:

- **Oracle** – System integration
- **BRC** – Solution alignment
- **WRAP** – Vision and tool development alignment
- **IGD** – Standardization and food labeling

These collaborations further enhance **supply chain implementation, streamline data-sharing, and improve the adoption of sustainable practices.**

3. Market Expansion

To scale its impact globally, Mondra partners with:

- Prominent multinational food producers and distributors in different geographical regions
- Renowned provider of **PLM (Product Lifecycle Management)** and compliance solutions for **process manufacturers and CPG retailers**

These partnerships **accelerate Mondra's international expansion, helping to extend its sustainability solutions to larger global markets.**

2.3. Key Features Driving Impact Beyond Scope 1, 2 & 3 Tracking

Mondra's approach extends beyond traditional **carbon footprint tracking and digital twin development,** offering additional tools to enhance **supply chain sustainability:**

- **DQS Improver / Label DQS** – Helps manufacturers select more sustainable ingredients and supports informed consumer choices.
- **Net Zero Sourcing** – Provides **supplier-specific insights,** enabling **data-driven sustainability improvements** in product sourcing.
- **Feed Modeller** – Calculates **embedded emissions in animal feed,** helping **brand owners and suppliers** reduce the carbon footprint of **animal-based products.**
- **Supply Chain Resilience** – **Mitigates risks** of supply chain disruptions by generating insights on **year-over-year climate trends.**

2.4. Why Mondra's Approach Has Significant Impact Potential

1. Strong Industry Partnerships

By establishing **strategic collaborations across the entire value chain,** Mondra creates multiple **defensive advantages (MOATs),** including **exclusive data access, industry lock-in, and domain expertise,** which drive **better sustainability outcomes.**

2. Deep Supplier Integration

While Mondra is currently focused on **Tier 1 and selected Tier 2 suppliers,** its vision to integrate **all suppliers** will be **crucial for achieving system-wide impact.**

3. Product-Specific Supply Chain Focus

Mondra's **granular insights** into **individual product supply chains** empower **data-driven sustainability decisions,** fostering **real, measurable environmental improvements.**

4. Conclusion

Addressing the emissions in the FMCG sector is paramount to reaching our environmental goals of 1.5°C, due to the massive share of resource consumption and emissions for which the FMCG sector is directly or indirectly responsible. LCA is a scientific framework that can uncover the emission hotspots in the FMCG sector value chain and LCA automation tools can not only enhance the accessibility but also the accuracy of LCA studies. Mondra has the potential for a **significant positive environmental impact** by revolutionising **environmental product footprinting** for the FMCG sector including the food industry. By providing **impact visibility across the entire supply chain**, enabling engagement, and equipping stakeholders with the tools needed to take action, Mondra addresses a key barrier to **decarbonising the FMCG and food supply chain**.

Mondra qualifies as an enabling technology under the EU Taxonomy, directly supporting the transition to a climate-neutral economy by reducing greenhouse gas emissions (aligned with the Technical Screening Criteria 8.2 “Data-driven solutions for GHG emissions reductions” of Annex I C (2021) 2800 final).

References

- Benoît Norris, C., Traverso, M., Neugebauer, S., Ekener, E., Schaubroeck, T., Russo Garrido, S., Berger, M., Valdivia, S., Lehmann, A., Finkbeiner, M., Arcese, G., & United Nations Environment Programme (UNEP). (2020). *Guidelines for Social Life Cycle Assessment of Products and Organizations 2020*. UNEP.
<https://www.lifecycleinitiative.org/wp-content/uploads/2020/09/Guidelines-for-Social-Life-Cycle-Assessment-of-Products-2020-20.08.20.pdf>
- Clark et al. (2020, November 6). *Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets* | *Science*. <https://www.science.org/doi/10.1126/science.aba7357>
- Crippa et al. (2021, March 8). *Food systems are responsible for a third of global anthropogenic GHG emissions* | *Nature Food*. <https://www.nature.com/articles/s43016-021-00225-9>
- Ellen MacArthur Foundation. (2017). *The New Plastics Economy: Catalysing Action*. Ellen MacArthur Foundation.
<https://content.ellenmacarthurfoundation.org/m/78d6bbcaadec796/original/The-New-Plastics-Economy-Catalysing-action.pdf>
- Ellen MacArthur Foundation. (2019). *Reuse – Rethinking Packaging*. Ellen MacArthur Foundation.
<https://www.ellenmacarthurfoundation.org/reuse-rethinking-packaging>
- European Business & Biodiversity Campaign. (2020). *Fact Sheet: Biodiversity in the Food Industry*. European Business & Biodiversity Campaign.
https://www.business-biodiversity.eu/bausteine.net/f/8405/FactSheetLebensmitteleinzelhandel_en.pdf?fd=3
- European Commission. (2021). *Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations*.
<https://eur-lex.europa.eu/eli/reco/2021/2279/oj/eng>
- Food and Agriculture Organization of the United Nations (FAO) (2024). *Greenhouse gas emissions from agrifood systems. Global, regional and country trends, 2000–2022*.
<https://www.fao.org/statistics/highlights-archive/highlights-detail/greenhouse-gas-emissions-from-agrifood-systems.-global--regional-and-country-trends--2000-2022/en>
- Food and Agriculture Organization of the United Nations (FAO). (2023). *The State of Food and Agriculture 2023: Revealing the true cost of food to transform agrifood systems*. FAO.
<https://openknowledge.fao.org/server/api/core/bitstreams/b881d890-f90b-435e-8af2-24b19e342a11/content>
- Guinée, J., Heijungs, R., Huppes, G., Zamagni, A., Masoni, P., Buonamici, R., Ekvall, T., & Rydberg, T. (2011). Life Cycle Assessment: Past, Present, and Future †. *Environmental Science & Technology*, 45, 90–96. <https://doi.org/10.1021/es101316v>
- Hellweg, S., Benetto, E., Huijbregts, M. A. J., & et al. (2023). Life-cycle assessment to guide solutions for the triple planetary crisis. *Nature Reviews Earth & Environment*, 4, 471–486. <https://doi.org/10.1038/s43017-023-00449-2>
- International Organization for Standardization (ISO). (2006). *ISO 14040:2006—Environmental management—Life cycle assessment—Principles and framework*.
<https://www.iso.org/standard/37456.html>
- Khatri, A. (2024, August 20). *How household and personal care manufacturers can work towards a*

- nature-positive world*. World Economic Forum.
<https://www.weforum.org/stories/2024/08/household-personal-care-products-sector-nature-positive/>
- Ritchie, H. (2021, March 18). *How much of global greenhouse gas emissions come from food?* Our World in Data. <https://ourworldindata.org/greenhouse-gas-emissions-food>
- The Food Foundation. (2023). *The Climate Impact of the Food System*. The Food Foundation.
https://foodfoundation.org.uk/sites/default/files/2023-07/TFF_CLIMATE%20BRIEFING.pdf
- Waste and Resources Action Programme (WRAP). (2024, December 12). *Future-proof food*. WRAP.
<https://www.wrap.ngo/what-we-do/future-proof-food>
- WWF-UK. (2022). *What's in Store for Our Planet? The Impact of UK Shopping Baskets on Climate and Nature*. WWF-UK.
<https://www.wwf.org.uk/sites/default/files/2022-11/WWF-Whats-in-Store-for-our-Planet-the-Impact-of-UK%20Shopping-Baskets-on-Climate-and-Nature-2022-v1.pdf>