

Decarbonizing Electricity in Global Value Chains

The following case study explores how Mars is tackling Scope 3 emissions within its commodity value chain. Mars partnered with Lock Two Three to develop an innovative solution adapted to the Scope 3 challenges in its rice supply in India, thereby creating an example for the company's complex value chain. Mars has undertaken a global initiative to address its value chain electricity usage with renewable electricity through Renewable Energy Certificates (RECs), procured alongside power purchase agreements (PPA). However, many of the ingredient commodities that the company sources lack complete traceability with regards to electricity consumption. In addition, there are hundreds of suppliers of individual commodities across multiple geographic regions, which creates challenges in allocating the acquired RECs to the supply chain. In this case study, with incomplete traceability of rice from farm to factory and limited electricity metering data available, Mars leveraged Life Cycle Assessment (LCA) data to model electricity usage and procured equivalent RECs to decarbonize their supply chain, a strategy described in Mars' whitepaper [Accelerating Change: A Case for Renewables Acceleration](#).¹ Mars then used Lock Two Three's LockStatement to create a clear, auditable link between the procured RECs and the electricity consumed in their rice supply in a given geography (India). This solution allowed Mars to take credible action on Scope 3 emissions, ensuring transparency and accountability in its sustainability reporting, while driving renewable energy adoption in its supply chain and nationally.

MARS



LOCK TWO THREE

¹ Mars, Incorporated, [Accelerating Change: The Case for Renewables Acceleration \(RACC\)](#), (2025).

1. Challenges in Decarbonizing Value Chains

For global companies that have set climate targets to achieve net-zero GHG emissions, reducing Scope 3 emissions is essential since the majority of total emissions lie in their value chain, rather than in their own operations. For companies in the food and beverage sector, Scope 3 emissions are even more critical, as they are often over 90% of the total carbon footprint, with commodities ingredients being a major component.

For this case study, Lock Two Three worked with Mars, a leading food and CPG company that has operations and supply chains spread around the world. Mars has an SBTi approved target to reduce overall emissions by 50% by 2030 and achieve net-zero by 2050 in line with a 1.5°C pathway. In 2023, over 95% of Mars' carbon footprint was from Scope 3 emissions.

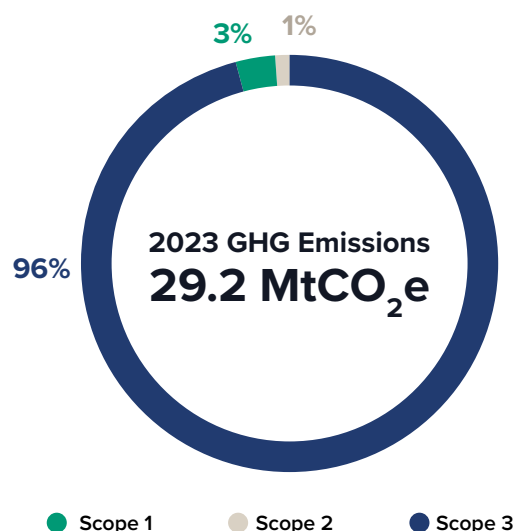


Figure 1: Mars' GHG emissions break-down for 2023²

One strategy that Mars has for reducing value chain emissions is to focus on converting electricity use in the value chain to renewable energy sources, as stated in Mars' Net Zero Roadmap.²

Renewable Electricity

While there are significant agriculture and land-based opportunities, a meaningful portion of agricultural value chain emissions are from energy and industrial source such as fertilizer production and on farm energy use. **Even focusing in the short term only on the electricity use and converting it to renewable sources represents a significant opportunity with little to no impact on the farming process.**

Figure 2: Mars Net Zero Roadmap³

While Mars has supplier engagement programs in place to collaborate with suppliers in transitioning to renewable energy, there are situations where direct supplier engagement is more challenging. The company has a 10,000+ supplier footprint across 80 countries, it is not administratively feasible to engage all their suppliers to obtain primary data on their electricity use and what share of it is associated with products and services it purchases.

Take for instance, the situation of rice supply in India.

1.1 Rice Supply Chain in India

The rice supply chain in India is composed of small-hold and large-hold farms supplying rice to middlemen collection agencies, who then sell the rice to processing plants. After processing, the rice is sold to distribution centres and on to wholesale or retail consumers. The numerous stakeholders and middlemen involved in India's rice supply chain makes it difficult and infeasible to ensure complete traceability from farm to factory gate.

² Mars, Incorporated, [2023 Sustainable in a Generation Report](#), (2023).

³ Mars, Incorporated, [Mars Net Zero Roadmap 2050](#), (2023).

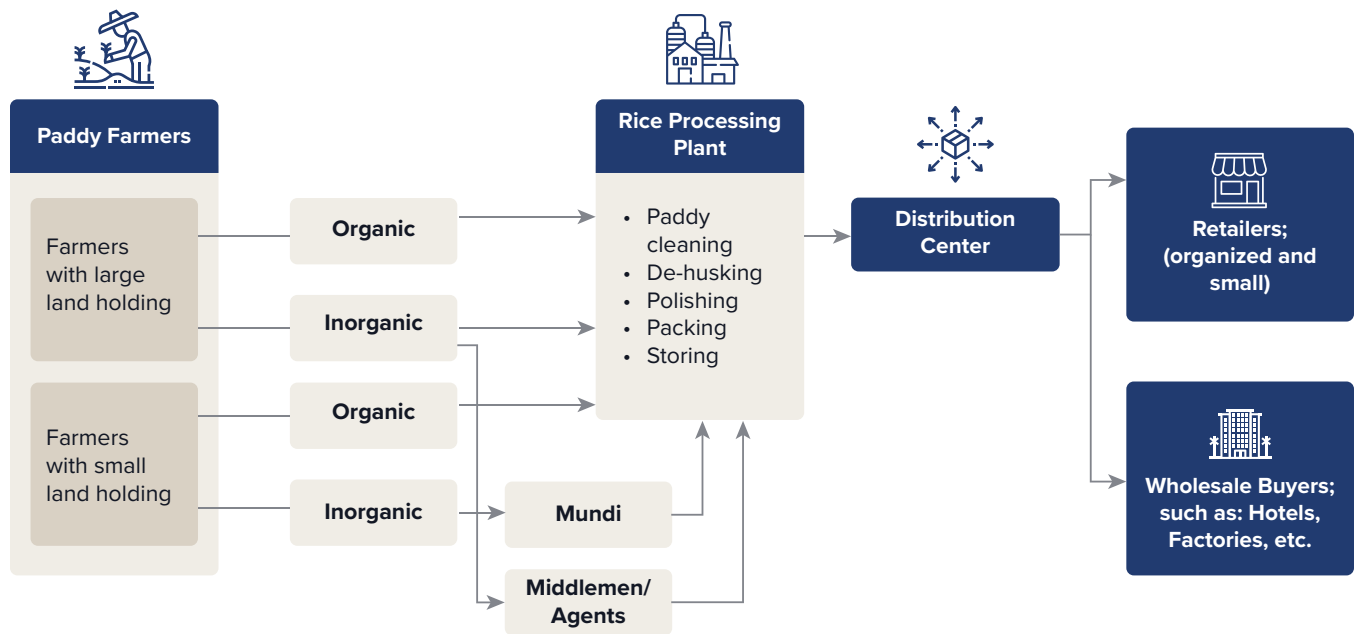


Figure 3: India Rice Supply Chain Flow Chart⁴

1.2 Lack of Primary Data and Reliance on Life Cycle Analysis

Let us first consider the main electricity inputs for rice production in India. We see that electricity for irrigation is the most significant consumer of electricity by far, at approximately 70%.⁵

Electricity Consumption in Rice Production in India

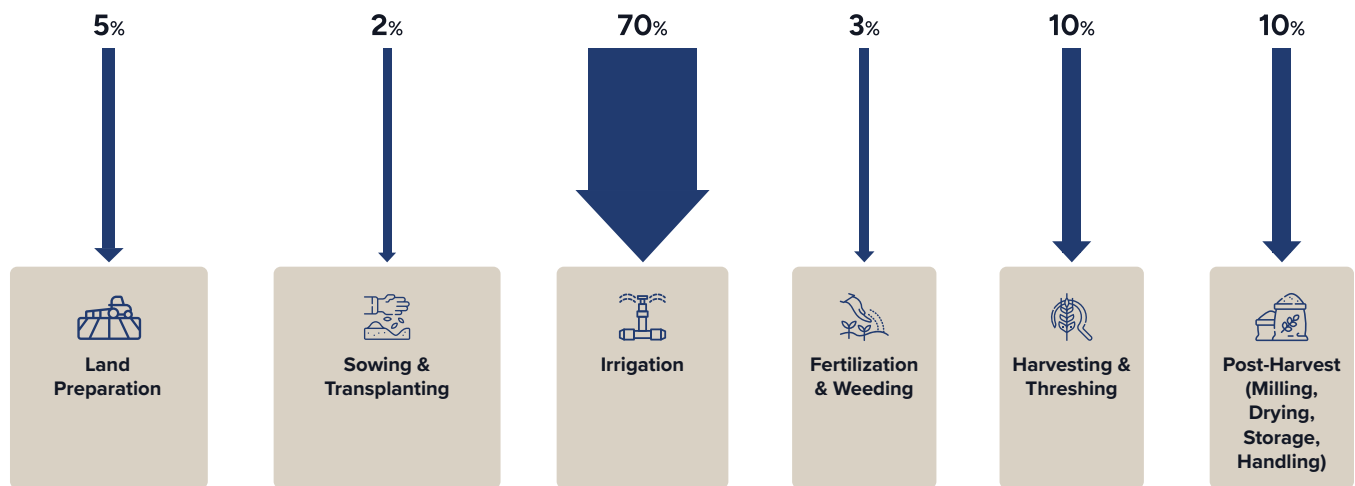


Figure 4: Electricity Consumption in Rice Production in India. [created based on data from *Energy Footprints of Rice Production*]⁵

The high electricity use for irrigation of rice paddies in India is compounded by the government policy to provide free or heavily subsidized electricity to farmers. Not only does this encourage farmers to use more electricity, but it also creates a situation where electricity provided to farms is not individually metered⁶ and farmers are not required to pay electricity bills for irrigation. Consequently, there is a lack of electricity consumption data for individual farmers.

⁴ Vikas Sharma et al., "Supply Chain Management of Rice in India: A Rice Processing Company's Perspective", International Journal of Managing Value and Supply Chains, vol 4, no. 1 (2013).

⁵ Suresh Patel et al., *Energy Footprints of Rice Production*, Cuttack, India: ICAR – National Rice Research Institute, (2018).

⁶ Nate Ryan, "Replacing an Inefficient Policy of Free Agricultural Electricity in India," J-PAL South Asia Policy Insight, (2018).

The above situation leads to a scenario where obtaining primary data on electricity consumption in the rice supply is nearly infeasible. However, Mars still wishes to take action, as part of its global initiative to include renewable electricity in the supply chain. Hence, Mars used a secondary source Life Cycle Analysis (LCA) database prepared by World Food LCA Database (WFLDB) and created impact factor-based calculations to estimate both the intensity and carbon footprint of electricity in the rice supply.

Within the LCA database of the purchased materials, such as rice, Mars can see the impact of electricity generation and the impact of building the electricity generation and distribution systems. Therefore, it was relatively simple to select whether the electricity being used to supply the products was from renewable sources or from the grid and generated in accordance with the average grid mix in each country, such as India. The portion of electricity supplied by the grid was multiplied with the grid emission factor and the portion that was generated by renewable energy was multiplied with the technology specific (such as solar PV or wind) emission factor. Using this approach, Mars estimated the GHG impact of the electricity being used in its supply chain.

After deducing the electricity consumption this way, Mars wished to mitigate the electricity emissions by developing renewable electricity projects and acquiring the RECs associated with their power generation. But how can they link their supply chain electricity decarbonization efforts to Scope 3 emission reductions? Enter the Lock Two Three solution.

2. Lock Two Three's Solution

Lock Two Three facilitates REC acquisition to decarbonize electricity consumption in an organization's value chain. When a company's supplier has electricity consumption data available, the LockUser is able to follow the Facility or Supplier Data Routes to enable companies to acquire RECs on behalf of their suppliers and use LockStatements to attribute redemptions exclusively to their "Fair Share" of the supplier's total electricity consumption. In this case study, however, the rice supply in India presented a unique challenge due to the limited availability of granular supplier electricity consumption data. The complexity of the rice supply chain makes full traceability impractical at this stage, and electricity metering data for rice paddy irrigation—where the highest electricity consumption occurs—is largely unavailable.

2.1 Creating the Supply Shed Commodity Route

Faced with this challenge, Lock Two Three worked closely with Mars to adapt the tool to suit their needs, creating the Supply Shed Commodity Route - a solution based on LCA evidence and the Supply Shed concept from the Value Change Initiative (VCI). The VCI is a multi-stakeholder forum that has launched a Food and Agriculture working group, bringing together the world's largest food companies and frameworks, including GHG Protocol and SBTi, to create solutions for Scope 3 emission reductions in the food and agriculture sector.

The Supply Shed concept is suitable for situations where a company is not able to directly trace purchased products to a specific upstream supplier, but it is known that the products are coming from a group of suppliers within a geographic market where the company sources.

Supply Shed

The Value Change Initiative defines Supply Shed as, "a group of suppliers in a specifically defined geography and/or market providing similar goods and services (commodities) that can be demonstrated to be associated with the company's supply chain."⁷

⁷ Value Change Initiative, [Achieving net zero through value chain mitigation interventions](#), (2024).

Rice Value Chain

Traceability to collection center

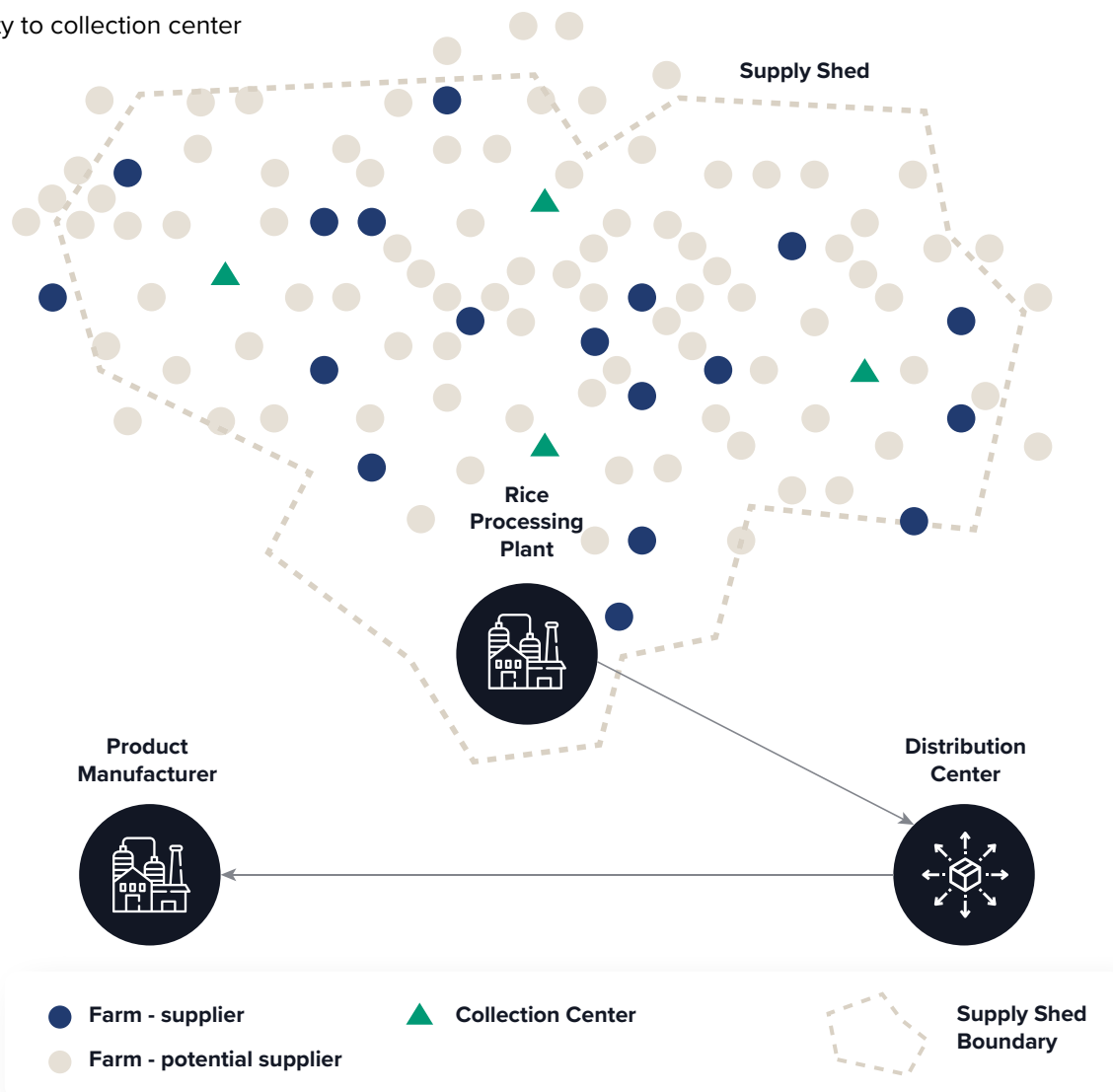


Figure 5: Rice Supply Shed. [Adapted from Value Chain Initiative, *Achieving net zero through value chain mitigation interventions*, (2024)].

Since Mars sources rice from known geographic regions in India where perfect traceability to individual rice farmers is not currently possible, the Supply Shed concept is applicable. This situation, however, is not unique to rice or India. The company's value chain is spread across 80 countries globally among thousands of suppliers of commodities where finding individual commodity or supplier specific data are extremely resource-intensive tasks.

2.2 LCA Data and REC Beneficiary Allocation

Food companies often utilize industry standard databases, such as the World Food LCA database, to help them assess the emissions released during the production of agricultural ingredients. Companies can further adapt the LCA models with primary data to suit the unique characteristics of their own supply chains. LCAs can provide emission factors based on modelling, academic studies and industry averages to calculate the upstream embedded electricity per mass of purchased commodity. While they may not be as specific as facility-level electricity meter readings, they do offer a solution for situations where electricity meter readings are simply not available - allowing companies to take immediate action, rather than wait for the perfect solution.

Mars wishes to develop renewable electricity projects and acquire RECs in India as a pilot of their Renewables Acceleration strategy of addressing Scope 3 GHG emissions by establishing renewable electricity purchases to match energy consumption. The company appreciates that unbundled RECs are not a recognized device for Scope 3 mitigation, at least in current GHG Protocol or SBTi guidelines. However, several global peers, including technology companies, have explored the route of REC procurement to reduce Scope 3 emissions. Mars, through its internal policy, maintains that it would cover Scope 3 MWh with direct purchase of renewable energy in power purchase agreements (PPAs) and then use the RECs generated in the process to validate the use of lower emission factors for that electricity.

In this case study, the beneficiaries of the RECs should be the Indian suppliers that had used electricity to produce and supply rice to Mars. Since the individual rice farmers or suppliers could not be traced for electricity consumption, the beneficiary of the REC redemption was structured as a group of suppliers in India. Hence, the beneficiary name in this case can be stated as India Rice Supply Shed and Mars linked those acquired RECs to their India Rice Supply Shed via a LockStatement.

2.3 LockStatement Procedure

Mars used Lock Two Three to create the LockStatement as follows:

1. Mars determined the data route (Commodity Supply Shed), defining and selecting the commodity type (rice) and geographic location (India) to include within their Procurement Invitation.
2. Mars input the total megawatt hours (MWh) they have attributed to electricity embedded in their commodity (rice), and uploaded an LCA into the Lock Two Three platform to evidence their calculations.
3. Lock Two Three issued a Procurement Invitation for Mars and provided guidance on the specific RECs to procure to cover the MWhs of electricity consumed, based on the data contained in the LCA.
4. Mars uploaded the RECs to the Lock Two Three platform.
5. Lock Two Three issued a LockStatement, providing a clear audit trail linking the procured RECs to the Mars' India Rice Supply Shed.

This LockStatement provides evidence that allowed Mars to switch the electricity emission factor from the fossil fuel heavy Indian electricity grid emission factor to the renewable electricity factor, thus reducing their Scope 3 emissions for rice in India.



Figure 5: LockStatement

3. Results

When Mars collaborated with Lock Two Three, one of the key objectives was to create an auditable trail of its REC purchases and registry entries such that the management and accounting of RECs can be assured.

Following the completion of this pilot test project, Mars said,

“Lock Two Three demonstrates a key step in creating transparency in the assurance of EACs generated or procured for our value chain electricity usage. It is one of the enablers for our Renewables Acceleration strategy in service of our commitment to cut emissions in half by 2030 and achieve Net Zero by 2050.”

Mars plans to use the LockStatement as evidence of their Scope 3 inventory calculations. The company added,

“The benefit of using the Lock Two Three statement is that it helps us produce an auditable trail on the purchased EACs. So that is a good step towards improving traceability for reporting.”

4. Lessons Learned

1. Leveraging LCA Data in the Absence of Direct Metering

LCA-based models allowed Mars to take proactive steps in decarbonizing electricity use in their commodities supply without waiting for comprehensive supplier-level data. While facility-level metering is ideal, an LCA approach can serve as a credible measure, enabling companies to act now rather than delay Scope 3 decarbonization efforts.

2. Applying the Supply Shed Concept for Complex Value Chains

The rice supply chain in India illustrates how a Supply Shed approach can be effective when direct traceability to individual farms or suppliers is infeasible. By defining a geographic boundary and linking RECs to that region, companies can demonstrate meaningful climate action and provide a clear audit trail, even in fragmented supplier networks.

3. Remaining Adaptable as Renewable Energy Markets Evolve

As reporting requirements and market conditions continue to shift, it is crucial to maintain flexibility in how renewable electricity is tracked and validated. Industry peers are applying RECs acquired through renewable electricity purchase agreements to claim GHG impact in the supply chain. However, the process of acquisition (with registry data), redemption and allocation of RECs to the supply chain are important considerations for global companies, like Mars, that still needs to be fine-tuned and improved.

Lock Two Three's capacity to incorporate various REC types and adjust to emerging guidelines makes it well-positioned to serve diverse stakeholders, supporting broader adoption and long-term scalability of Scope 3 decarbonization solutions.

Mars Inc. has set a high bar for integrating sustainability across its global value chain. Their collaboration on this study, sharing data, operational insight, and critical review, demonstrates a shared commitment to credible, scalable decarbonisation.

Lock Two Three thanks the Mars Inc. Corporate Sustainability team for their openness throughout the process; the lessons learned benefit not only both organisations but the wider renewable energy community. We look forward to exploring further approaches together and with other leaders in the field.

About Mars

Mars, Incorporated is driven by the belief that the world we want tomorrow starts with how we do business today. As a global, family-owned business, Mars is transforming, innovating, and evolving to make a positive impact on the world. Across our diverse and expanding portfolio of quality snacking, food, and pet care products and services, we employ 140,000+ dedicated Associates. With more than \$47 billion in annual sales, we produce some of the world's best-loved brands including Ben's Original™, CESAR®, Cocoavia®, DOVE®, EXTRA®, KIND®, M&M's®, SNICKERS®, PEDIGREE®, ROYAL CANIN®, and WHISKAS®. We are creating A Better World for Pets through our global network of pet hospitals and diagnostic services – including AniCura, BANFIELD™, BLUEPEARL™, Linnaeus and VCA™ – using cutting edge technology to develop breakthrough programs in genetic health screening and DNA testing.

About Lock Two Three

Lock Two Three works with organizations to increase traceability in their value chain decarbonization efforts. The company's product, the LockStatement, is a tool that creates an auditable trail to link REC redemptions with Scope 3 emission reductions. Get in touch by emailing us at info@Lock23.com to learn how Lock Two Three can help with your organizations' value chain decarbonization journey.

