
Photo by Malissa Murphy

Reducing Emissions Through Regenerative Farming

Case Study 4

2026

Context

Agriculture stands at the forefront of some of the world's most pressing challenges, including soil degradation, biodiversity loss, water scarcity, and extreme weather events. Recognising the critical role that the agricultural sector plays in both contributing to and addressing these issues, **Worldwide Fruit Limited** (WFL) has committed to a holistic and collaborative approach to sustainability. Their journey is not just about meeting industry expectations—it is about proactively shaping a more resilient, regenerative, and responsible supply chain.

Since 2019, WFL has worked closely with **Blue North Sustainability**, a consultancy specialising in agricultural sustainability, to support farmers in implementing practical, long-term solutions. This partnership has shifted WFL's approach from a prescriptive "top-down" model to a "bottom-up" strategy that genuinely empowers farmers. By prioritising farmer-led initiatives, WFL ensures that sustainability efforts are not only effective but also deeply rooted in the realities of agricultural operations.

Through this ongoing collaboration, WFL has driven key initiatives such as water stewardship projects, the large-scale roll-out of the **SHERPA** online sustainability management system, and **carbon footprint** reduction programs. These efforts have equipped farmers with the tools, knowledge, and support needed to navigate the complexities of modern agriculture while reducing environmental impact.

These case studies highlight WFL's commitment to sustainability by showcasing the progress, challenges, and opportunities within its supply chain. They capture how farmers and suppliers are adapting to climate change, reducing carbon footprints, and strengthening livelihoods. A key theme across these stories is the mindset shift required for sustainable and regenerative practices to take root. Farmers are moving beyond conventional approaches, embracing new ways of thinking, and finding innovative solutions to long-term resilience.

These case studies serve several purposes:

- **Demonstrating Progress**: Showcasing real-world examples of how sustainability efforts translate into action and impact.
- **Encouraging Knowledge Sharing**: Providing a platform for farmers and suppliers to exchange insights, challenges, and lessons learned.
- **Strengthening the Business Case for Sustainability:** Highlighting the tangible benefits of regenerative practices, from improved soil health to economic resilience.
- **Aligning with Global Sustainability Goals:** Supporting WFL's commitments under the Courtauld Commitment 2030 and other key sustainability frameworks.

By documenting and sharing these stories, WFL and Blue North aim to inspire meaningful change across the agricultural sector—one rooted in collaboration, innovation, and farmer empowerment.

This case study explores how regenerative farming practices can contribute to reducing agricultural carbon emissions. By examining input use and Product Carbon Footprints across two farms at different stages of their regenerative transition, it highlights where the greatest opportunities for emissions reductions lie and demonstrates how soil-focused management practices can contribute to more resilient and sustainable fruit production systems.

Case studies in the 2025/2026 series:

- Case Study 1: Regenerative Farming in the Koue Bokkeveld, South Africa.
- Case Study 2: Regenerative Farming in the United Kingdom, Chandler & Dunn.
- Case Study 3: Regenerative Farming in the Elgin Valley, South Africa.

BLUE NORTH
THINKING. FUTURE

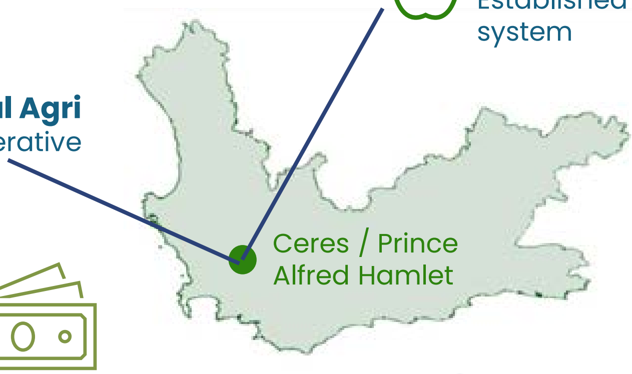
Compiled by Malissa Murphy and Wilmie Cronjé
Blue North Sustainability

Contents & Overview

Case Study 4: Reducing Emissions Through Regenerative Farming

p.5 1. THE IMPORTANCE AND RATIONALE FOR REDUCING AGRICULTURAL EMISIONS

Agriculture plays a critical role in both contributing to and addressing climate change. As the sector works toward net-zero goals, understanding and managing farm-level emissions is becoming increasingly important. This chapter explores **how regenerative farming practices that build soil health, improve nutrient efficiency and enhance water retention can help reduce reliance on external inputs while strengthening the resilience of orchard systems**. Drawing on insights from earlier case studies across the WFL supply chain, it also highlights the environmental, economic and regulatory drivers that are encouraging growers to transition toward regenerative approaches.



Howbill Farming
Established regenerative system

Doornkraal Agri
Early regenerative transition

Potential N and Electricity savings as Regenerative Systems Mature

p.13 Can Orchards Produce Fruit Without Synthetic Fertilisers?

p.16 Considering the Role of Standards in Regenerative Farming

p.9 2. COMPARING REGENERATIVE AND CONVENTIONAL PRACTICES: CARBON EMISSIONS IMPACTS

This chapter presents a farm-level Product Carbon Footprint (PCF) comparison between two apple farms in the Ceres / Prince Alfred Hamlet region at different stages of their regenerative transition. **While the overall PCF results are relatively similar, the analysis highlights nitrogen fertiliser use as a key driver of agricultural emissions and an important opportunity for improvement.** The chapter explores how regenerative soil management can improve nutrient efficiency and water retention, potentially reducing reliance on fertiliser inputs and irrigation energy over time. **Estimated cost and emissions savings are therefore modelled for both nitrogen fertiliser and irrigation electricity, illustrating the potential benefits as regenerative systems mature over several years.**

p.17 3. CONCLUSION & FUTURE OUTLOOK

The final chapter reflects on the insights from the comparison and considers the role regenerative farming may play in reducing emissions across WFL's grower network. **Although carbon footprint results may not immediately decline during the transition phase, improvements in nitrogen efficiency and soil water retention demonstrate how soil-focused management can gradually lower fertiliser use and irrigation energy demand**. Continued measurement, collaboration and knowledge-sharing will be important for helping growers scale regenerative practices while strengthening long-term farm resilience.

Chapter 1: The Importance and Rationale for Reducing Agricultural Emissions

Agriculture operates at the frontline of climate change. Scientific evidence shows that greenhouse gases released through fossil fuel use and land-use change since the industrial revolution have altered the Earth's atmospheric energy balance, contributing to global warming and shifts in climate patterns (IPCC, 2018; United Nations, 2023). These changes are already affecting agricultural systems through altered rainfall patterns, rising temperatures and an increasing frequency of extreme weather events such as floods and droughts.

For the agricultural sector, this creates both a challenge and an opportunity. Understanding and measuring carbon emissions is becoming essential for developing effective strategies to reduce environmental impacts while maintaining productive farming systems.

International climate frameworks such as the **Paris Agreement** recognise that limiting global warming requires achieving net zero emissions — the point at which the amount of greenhouse gases released into the atmosphere is balanced by the amount removed (UNFCCC, 2015). Only once this balance is achieved will global temperatures stop rising.

Understanding and measuring carbon emissions is becoming essential for developing effective strategies to reduce environmental impacts while maintaining productive farming systems.

Photo by Sonja van Schalkwyk


Regenerative farming has gained increasing attention as a practical pathway toward more sustainable food production.

Photo by Malissa Murphy

Within agriculture, emissions originate from multiple sources. These include fuel used by tractors and machinery, electricity used for irrigation and cooling, fertiliser-related nitrous oxide emissions from soils, and emissions embedded in the production and transport of farm inputs.

At the same time, agriculture also holds unique potential to become part of the climate solution. Land management practices such as conservation agriculture, regenerative farming, permaculture and organic systems aim to reduce greenhouse gas emissions while enhancing soil carbon storage (FAO, 2022; Lal, 2020).

These approaches improve soil health by increasing soil organic matter, maintaining soil cover through mulch or cover crops and reducing soil disturbance. Healthier soils support stronger plant growth, improve water retention and increase resilience to climate variability. They also contribute to ecosystem stability by reducing erosion and improving water infiltration, which can lower flood risk and enhance drought resilience.

Responsible fertiliser management plays a key role in this process. When nutrients are applied carefully — replacing only what is removed through harvest — soils can maintain productivity without undermining soil carbon gains.

Regenerative farming has therefore gained increasing attention as a practical pathway toward more sustainable food production. By strengthening soil biology, reducing dependence on synthetic inputs and building resilient farming systems, regenerative approaches aim to support both environmental sustainability and long-term farm viability.

1.1 Why Farmers Are Making the Transition

Across the WFL supply chain, growers are increasingly exploring regenerative farming. While reducing carbon emissions is an important outcome, the shift is rarely driven by emissions reduction alone. Instead, growers are motivated by a broader goal: restoring the long-term health, resilience and economic viability of their farming systems.

Across different regions and farming contexts, several common drivers are emerging. These include increasing climate variability, rising input costs, tightening regulations on crop protection products, and growing expectations from retailers and consumers to demonstrate measurable sustainability progress.

Experiences from earlier case studies illustrate how these pressures are influencing growers to rethink their production systems.

For **Howbill Farming** in South Africa's Koue Bokkeveld, the devastating drought of 2007–2008 served as a catalyst for change. Facing severe water shortages, the farm began experimenting with mulching and soil-building practices that later evolved into a regenerative system covering approximately 500 hectares (ha) today (*Case Study 1*).

While reducing carbon emissions is an important outcome, the shift is rarely driven by emissions reduction alone.

Photo of Doornkraal farm managers in a 1-year regenerative orchards. By Malissa Murphy

Photo of Ernst van Dyk (Howbill Farming) and David Farrell (Blue North). By Malissa Murphy

At **De Keur**, the transition was inspired by observing another grower achieve stronger yields and fruit quality through regenerative practices. Today the farm has around 149 ha under regenerative management and continues expanding the approach as soil health improves *(Case Study 1)*.

Meanwhile **Doornkraal Agri** represents an earlier-stage adopter, gradually expanding regenerative practices across approximately 600 ha, motivated largely by a commitment to responsible farming and long-term sustainability *(Case Study 1)*.

In the Elgin Valley, similar pressures are driving change. Rising fertiliser prices and tightening regulations on crop-protection products prompted **Dennegeur** to begin rethinking its farming system nearly two decades ago. What began as a response to profitability challenges gradually evolved into a broader ecological approach centred on soil health and system balance *(Case Study 3)*.

Monteith Trust has followed a more incremental pathway, focusing on precision management and data-driven improvements that enhance efficiency while maintaining production reliability *(Case Study 3)*.

In the United Kingdom, growers face additional pressures including rising input and labour costs, shifting climate conditions and increasing retailer sustainability expectations. At **Chandler & Dunn**, these pressures prompted a shift toward orchard management practices that support biodiversity, soil health and long-term system resilience *(Case Study 2)*.

Across these diverse contexts, the motivations for change converge around a common goal: building farming systems that remain productive while becoming more resilient to economic, environmental and regulatory pressures.

Understanding how these farming decisions influence carbon emissions provides an important opportunity to identify where regenerative practices can contribute to more climate-resilient fruit production systems.

Chapter 2: Comparing Regenerative and Conventional Practices - Carbon Emissions Impacts

As agricultural systems transition toward more sustainable practices, an important question emerges:

Do regenerative farming systems result in lower carbon footprints than conventional approaches?

Understanding this relationship is increasingly important as food businesses and agricultural producers work toward reducing greenhouse gas emissions across their supply chains.

To explore this question within WFL's supply chain, a comparison was conducted between two supplier farms located in the Ceres / Prince Alfred Hamlet production region of the Western Cape, South Africa. Their proximity allows for a comparison of emissions profiles under broadly similar environmental conditions.

Rather than comparing a regenerative farm with a purely conventional system, the analysis examines farms at different stages of their regenerative transition.

- **Howbill Farming** represents a farm where regenerative practices have been implemented and refined over many years, with approximately 500 ha currently managed under regenerative principles.
- **Doornkraal Agri** represents a farm earlier in the regenerative transition, where regenerative practices are being gradually introduced across approximately 600 ha.

It is important to note that this comparison is based on a single year of carbon footprint data, which was the most recent dataset available for both farms. Carbon footprint results can vary between seasons depending on yield, climate conditions and management decisions. For this reason, carbon footprint assessments are typically more robust when evaluated over multiple years, allowing trends to emerge as farming systems stabilise and regenerative practices mature. Results should therefore not be interpreted as indicative of long-term performance.

To interpret the results of this comparison, it is first necessary to understand how carbon footprints are measured within fruit production systems.


Photo by Malissa Murphy

2.1 Understanding Product Carbon Footprint

A Product Carbon Footprint (PCF) measures the greenhouse gas emissions associated with producing a specific product—in this case fruit—expressed as kilograms of carbon dioxide equivalent (kg CO_2e) per kilogram of fruit produced.

Both farms calculated their carbon footprints using the Confronting Climate Change (CCC) carbon calculator, widely used across the South African fruit sector and recognised internationally.

The CCC Pome Fruit Benchmark Report (2025) indicates that the average farm product carbon footprint for pome fruit is approximately **0.16 kg CO_2e per kg fruit**, with electricity, fuel and nitrogen (N) fertiliser representing the largest contributors to emissions.

Regional averages for the Ceres / Prince Alfred Hamlet region are approximately **0.14 kg CO_2e per kg fruit**, based on 84 CCC datasets.


The internationally recognised Confronting Climate Change (CCC) carbon calculator is widely used by South African fruit growers to measure Product Carbon Footprints (PCFs).

Scan to explore Doornkraal Agri's PCF Report on Carbon Heroes

Photo by Doornkraal Agri

> Regenerative systems do not always show immediate reductions in carbon footprints — but they often begin by reducing the inputs that drive agricultural emissions.

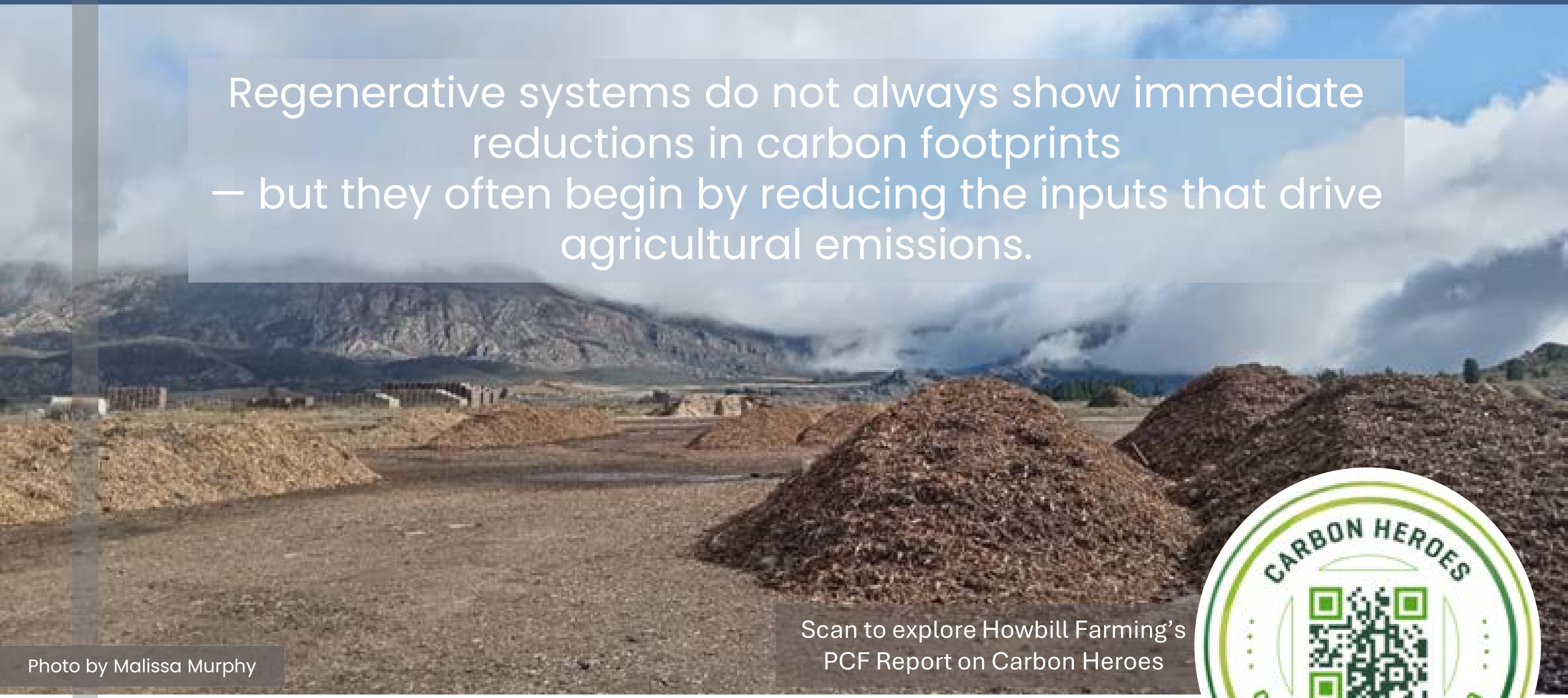


Photo by Malissa Murphy

Scan to explore Howbill Farming's PCF Report on Carbon Heroes

CARBON HEROES carbonheroes.co.za

2.2 Product Carbon Footprint Results

When emissions from all inputs were combined, the PCFs of the two farms were calculated as follows:

- **Howbill**: 0.158 kg CO_2e per kg fruit
- **Doornkraal**: 0.137 kg CO_2e per kg fruit

At first glance, the farm further along in its regenerative transition recorded a slightly higher carbon footprint. This may appear counterintuitive, as regenerative systems are often expected to reduce emissions. However, this reflects transitional system dynamics rather than long-term outcomes, as regenerative systems typically require a period of adjustment before efficiency gains are realised.

During this transition phase, soil biological processes and management practices are still stabilising. Activities such as establishing cover crops, applying compost and adapting irrigation management can temporarily increase energy use, even as they contribute to improved soil function over time.

Overall, the carbon footprints of the two farms remain relatively similar. This highlights the complexity of evaluating emissions during a regenerative transition and illustrates how management changes can influence emissions in different ways as farming systems evolve.

Despite the similar overall carbon footprints, the comparison highlights an important result: the farm further along in its regenerative transition has already begun reducing nitrogen fertiliser use, one of the most significant drivers of agricultural emissions.

Because nitrogen fertiliser is one of the largest contributors to agricultural emissions, differences in fertiliser use between the two farms offer an important opportunity to understand how regenerative practices may influence carbon footprints over time.

2.3 Nitrogen Fertiliser Use: A Key Opportunity for Emissions Reduction

Howbill applied approximately **91 kg N per ha**, compared with **116 kg per ha** at Doornkraal, representing a **21.5% lower usage comparing the two farms**.

Using an estimated fertiliser price of R30 per kg N (Agbiz, 2024), this difference represents:

- **R750 per ha** in fertiliser savings
- **~ 350 kg CO_2e per ha** avoided emissions

The emission reduction estimate is based on an emission factor of approximately 14 kg CO_2e per kg of N fertiliser, which accounts for both emissions associated with fertiliser manufacturing and nitrous oxide emissions following field application (IPCC, 2019; CCC, 2025).

Decoupling production from dependence on inorganic N inputs – through improved nutrient cycling and N-fixation associated with regenerative farming - therefore represents one of the most significant opportunities for reducing emissions (and costs) in fruit production systems.

Potential Nitrogen Savings as Regenerative Systems Mature

Using the CCC benchmark N application rate of 95 kg N/ha, potential savings could develop as regenerative systems mature:

Estimated Nitrogen Fertiliser Savings as Regenerative Systems Mature

Transition Stage	N Reduction	Cost Saving*	Emission Reduction*
Early transition (3 years)	20%	~ R570/ha	~ 266 kg CO_2e/ha
Established system (5 years)	40%	~ R1,140/ha	~ 532 kg CO_2e/ha
Mature system (10 years)	60%	~ R1,710/ha	~ 798 kg CO_2e/ha

*Estimated cost savings assume a nitrogen fertiliser price of R30/kg N, while emissions reductions are calculated using an emission factor of 14 kg CO_2e per kg N (IPCC, 2019; CCC, 2025). Cost estimates are based on current indicative fertiliser prices and do not account for potential changes in input costs over time.

By the time regenerative practices are fully established (around 10 years), a 500-ha orchard could potentially achieve approximately:

- **R855 000 per year** in fertiliser savings
- **~ 400 tonnes of CO_2e** emissions avoided annually

Can Orchards Produce Fruit without Synthetic Fertiliser?

Experiences from earlier case studies within the WFL supply chain suggest that substantial reductions in synthetic fertiliser use are possible as soil health improves.

At De Keur, the farm initially took a bold approach when transitioning to regenerative farming, eliminating inorganic fertiliser entirely in several orchard blocks. Reflecting on this decision, the team later noted that the transition could have been introduced more gradually. As Anton de Jager (Head of Regenerative Agriculture) explains, the decision to go “cold turkey” required confidence and careful management, but it ultimately proved successful. Today, 149 ha of orchards have produced fruit for five seasons without inorganic fertiliser inputs.

Similarly, Howbill Farming reports that several Pink Lady orchards have produced premium-quality fruit for five years without inorganic fertiliser, demonstrating that strong yields and fruit quality can be maintained when soil systems are functioning well.

These experiences highlight both the challenge and the potential of regenerative transitions. Moving away from synthetic fertilisers often requires experimentation, close observation of soil conditions and adjustments to management practices.

However, as soil health improves, many growers find they are able to reduce fertiliser inputs step by step while maintaining productivity. For some farms, this gradual transition can eventually lead to systems that rely far less — or in certain cases not at all — on inorganic fertilisers.

Photo by Riaan Schoeman


Photo by Malissa Murphy

2.4 Water and Electricity Use

Electricity used for irrigation on many farms is the largest contributor to farm-level emissions in pome fruit production (CCC, 2025). Pumps used to extract and distribute irrigation water require substantial electricity, particularly in regions where water must be lifted in large volumes to higher elevations from dams, rivers or boreholes and distributed across large orchard areas.

Healthy soils with higher organic matter content can store significantly more water and improve rainfall infiltration, reducing irrigation demand over time (Lal, 2020). As soil structure improves and biological activity increases, both water holding capacity and plant available water improves, allowing growers to reduce irrigation volumes while maintaining orchard productivity and fruit quality.

Real-world example: Howbill Farming

At Howbill Farming, regenerative soil management has contributed to an estimated 25% reduction in irrigation-related water use over time, reflecting improvements in soil structure and water-holding capacity observed during the farm's regenerative transition (Case Study 1).

Based on the farm's electricity consumption of approximately 8 067 kWh per ha, as recorded in its PCF report, this reduction in irrigation demand is estimated to correspond to a saving of approximately **2 690 kWh** of irrigation electricity per ha.

Using an indicative electricity cost of approximately R2.50 per kWh, reflecting typical agricultural electricity tariffs in South Africa (Eskom, 2024), this reduction corresponds to:

- ~ **R6 720 per ha** in electricity cost savings, and
- ~ **2.4 tonnes of CO_2e emissions** avoided per ha, based on South Africa's grid emission factor of roughly 0.9 kg CO_2e per kWh (IEA, 2023).

This example demonstrates how regenerative soil management have already delivered measurable reductions in both energy use and emissions on farms where these practices are well established.

Potential Electricity Savings as Regenerative Systems Mature

While the example above reflects real-world experience from Howbill Farming, the potential impact of improved soil health on irrigation demand can also be illustrated using industry benchmark data.

The CCC Pome Fruit Benchmark Report indicates average electricity consumption of approximately **3 567 kWh per bearing ha** across the South African pome fruit sector.

Using this benchmark as a baseline, the potential reductions in irrigation electricity use as regenerative systems mature may be estimated as follows:

Estimated Irrigation Electricity Savings as Regenerative Systems Mature

Transition Stage	Electricity Reduction	Cost Saving*	Emission Reduction*
Early transition (3 years)	15%	~ R1 340/ha	~ 0.48 t CO_2e/ha
Established system (5 years)	25%	~ R2 230/ha	~ 0.80 t CO_2e/ha
Mature system (10 years)	35%	~ R3 120/ha	~ 1.12 t CO_2e/ha

*Estimated electricity cost savings assume an indicative electricity price of R2.50 per kWh based on typical South African agricultural electricity tariffs (Eskom, 2024). Emissions reductions are calculated using an electricity emission factor of approximately 0.9 kg CO_2e per kWh, reflecting the carbon intensity of South Africa's electricity grid (IEA, 2023). Cost estimates are based on current indicative electricity prices and do not account for potential changes in electricity tariffs over time.

These estimates illustrate how improvements in soil organic matter and soil structure - leading to better rainfall penetration, water holding capacity and plant available water - can directly reduce irrigation and associated energy demand as regenerative practices become more established (FAO, 2022; Lal, 2020).

For a 500-ha orchard, a mature regenerative system could potentially deliver:

- **~ R1.56 million** in electricity cost savings per year, and
- **~ 560 tonnes of CO_2e** emissions avoided annually.

While actual outcomes will vary depending on irrigation systems, water sources and local environmental conditions, these estimates provide an indication of the potential scale of savings that the adoption of regenerative farming could deliver over time to pome fruit producers in South Africa.

Considering the Role of Standards in Regenerative Farming

The experience of the two Ceres apple farms highlights an important question within the regenerative agriculture movement: what role should formal standards play in recognising regenerative farming?

Most conventional agricultural standards are practice-based, assessing compliance with prescribed actions rather than ecological outcomes. This approach fits poorly with regenerative agriculture, which is inherently principle-based and context-specific. Regenerative farmers apply core principles - such as maintaining living roots, minimising disturbance, increasing diversity, and integrating livestock - in ways that reflect the unique ecological and economic context of their farms. Prescriptive standards can therefore struggle to accommodate the adaptive, systems-based nature of regenerative management.

The new Regenified 6-3-4 standard - developed by leading farmers in the regenerative movement - integrates the six principles of soil health, three rules of adaptive stewardship, and four ecosystem processes, measuring both management and ecological outcomes through structured verification.

While this represents an important advance, certification still requires intensive third-party engagement. For many farmers already facing significant compliance demands, additional verification risks adding cost and complexity - and may detract from the freedom and joy many associate with regenerative farming.

Importantly, regenerative progress can also be demonstrated through approaches beyond formal certification. Many farmers already track ecological indicators - such as soil carbon, infiltration, and biodiversity - and can share these transparently through platforms like the Worldwide Fruit Resilience Hub or Blue North’s Carbon Heroes. Such indicator-based transparency offers a credible, lower-cost way to demonstrate progress, while remaining closely aligned with the collaborative ethos that inspired many to transition to regenerative farming in the first place.

For the farms featured in this case study, the regenerative journey is ultimately defined not by a label, but by their own convictions and the observable improvement in the ecological health and resilience of their orchards.

Photo by Malissa Murphy

Chapter 3: Conclusion and Future Outlook

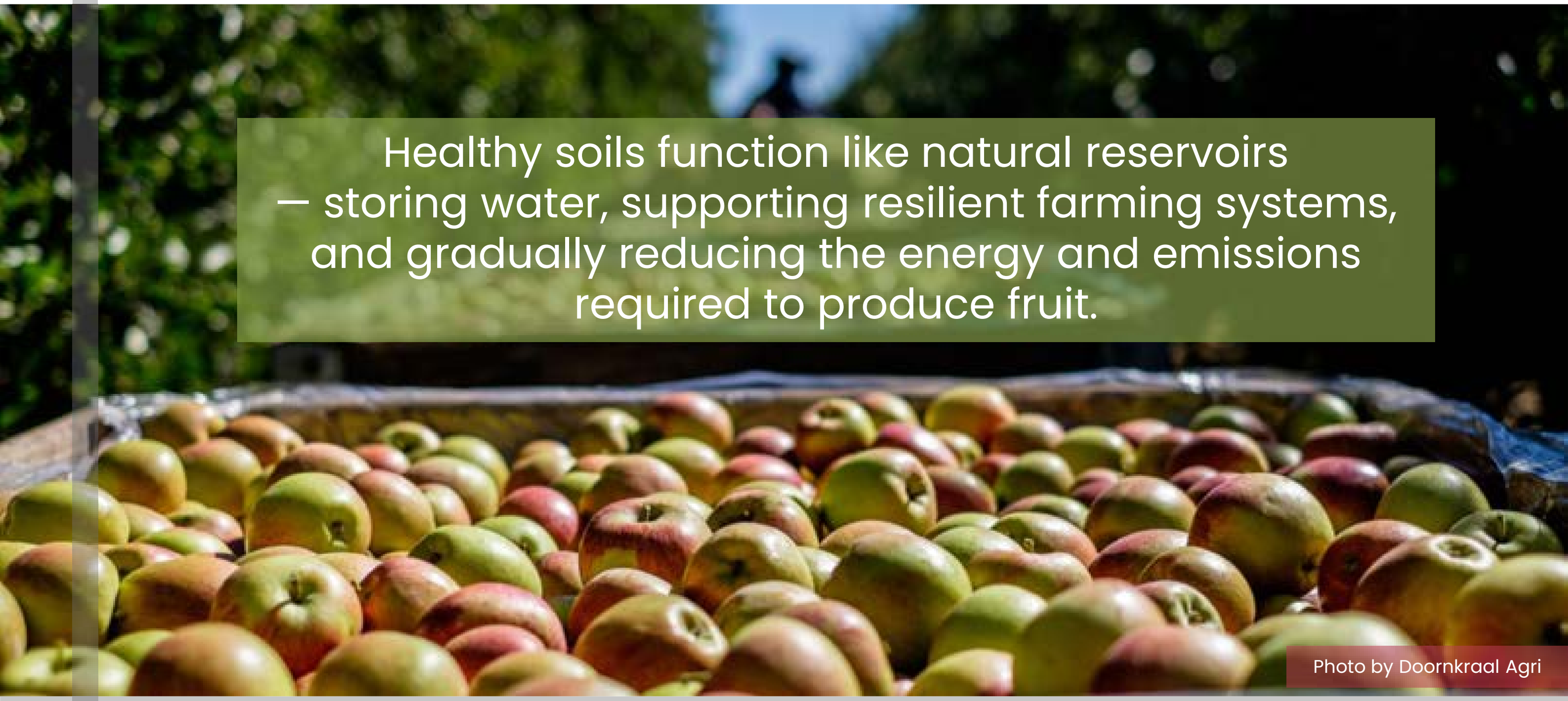
Evaluating carbon emissions within agricultural systems is complex, particularly when comparing farms at different stages of transitioning toward regenerative practices. The comparison presented in this case study illustrates that carbon footprint outcomes do not always immediately reflect the longer-term benefits of regenerative management. During the transition phase, farming systems are still adjusting as soil biological processes strengthen and management practices evolve.

While the overall product carbon footprints of the two farms were relatively similar, the analysis highlights how regenerative practices can begin influencing the underlying drivers of agricultural emissions. In particular, improvements in nitrogen efficiency and soil water management demonstrate how soil-focused management practices may gradually reduce reliance on external inputs while maintaining productive orchard systems.

Together with the experiences shared in the earlier case studies in this series, these findings highlight how regenerative farming is being implemented across different contexts within the WFL supply chain. While approaches vary between farms and regions, a common theme emerges: growers are increasingly focusing on soil health as the foundation for building more resilient production systems.

These findings reinforce an important principle of regenerative agriculture: meaningful system changes often develop gradually as soil health improves and ecological processes stabilise.

Looking ahead, continued measurement and monitoring will play an essential role in understanding how regenerative practices influence emissions as farming systems mature. Tracking carbon footprints across multiple seasons can provide valuable insights into how management decisions affect both environmental outcomes and farm efficiency over time.



Healthy soils function like natural reservoirs — storing water, supporting resilient farming systems, and gradually reducing the energy and emissions required to produce fruit.

Photo by Doornkraal Agri

As part of this ongoing effort, WFL will begin piloting the Regenified framework with its four Conservation Champion growers in April 2026. This pilot will support the development of an approach to better understand and validate where farms are positioned along their regenerative farming journey. Insights from this work will help inform how regenerative progress is assessed across the supply base, with further updates to be shared in future planned case studies.

Initiatives such as WFL's model farms and the Worldwide Fruit Resilience Hub will further help support this learning process across the grower network. The Resilience Hub is a digital platform that combines transparent reporting, supplier scoring and the sharing of best practices, enabling growers track sustainability progress while facilitating knowledge exchange across the supply base.

Ultimately, regenerative farming offers more than a pathway to reducing emissions. It represents an opportunity to build more resilient, efficient and sustainable production systems capable of delivering high-quality fruit while responding to the environmental and economic challenges facing modern agriculture. As regenerative systems mature, improvements in soil health, water management and nutrient cycling have the potential to reduce emissions and strengthen the long-term resilience of fruit production systems.

Healthy soils, resilient farms, and nutritious food are all part of the same system.

Photo by Zonnehaven

Sources:

- Agbiz. (2024). Agricultural input price trends in South Africa. Agricultural Business Chamber of South Africa.
- CCC. (2025). South African Pome Fruit Carbon Benchmark Report 2025. Hortgro.
- Eskom. (2024). Eskom tariff schedule and grid emission factors. Eskom Holdings SOC Ltd.
- FAO. (2022). Regenerative agriculture and sustainable soil management. Food and Agriculture Organization of the United Nations.
- IEA. (2023). Electricity grid emission factors. International Energy Agency.
- IPCC. (2018). Global Warming of 1.5°C: Special Report. Intergovernmental Panel on Climate Change.
- IPCC. (2019). Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management and Food Security. Intergovernmental Panel on Climate Change.
- Lal, R. (2020). Soil organic matter and water retention in agroecosystems. Agronomy Journal, 112(5), 3265–3277.UNFCCC. (2015). The Paris Agreement. United Nations Framework Convention on Climate Change.
- United Nations. (2023). Climate Action: Agriculture and Climate Change. United Nations Climate Action.