

# Latin America Greentech 2024 Trend Report



# Introduction

Latin America  
Greentech 2024  
Trend Report

Dear friends and colleagues,

It is our privilege to present Barn's Latam Greentech 2024 Trend Report. It represents the culmination of several years of active engagement and investment in the Latam greentech space, reflecting the collective expertise, experience and dedication of our team members, entrepreneurs, advisers and business partners.

From renewable energy to circular economy solutions, and sustainable agriculture to clean transportation, this report will delve into the transformative technologies and market dynamics driving both innovation and investments in the pursuit of a greener, more sustainable economy.

In the development of this report, we have analyzed Latin America's context and peculiarities, scrutinizing the dynamic landscape and how innovation and startups can become key transformational players of change.

Our enduring mission has been to finance the green economy transition in Latin America, pioneering a path toward a more sustainable and efficient economic model. The undeniable advantages present in this region position it as a key player in leading this transformative journey.

We trust this read will not only inspire you but also serve as a practical guide to what "comes next" in this exciting new industry! There are trends that we believe will create significant social positive impact, and could shape the future of Latam's economy.

This document is largely based on our team's academic and practical experience and remains a dynamic work in progress. Please feel free to reach out and share your comments, feedbacks and perspectives.

Barn Team



AGRI & LAND USE

# Precision Agriculture



AGRI & LAND USE

# Agricultural Biotech



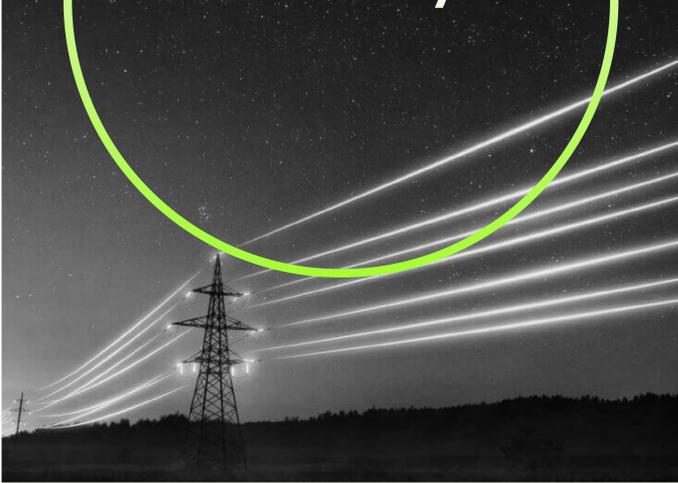
AGRI & LAND USE

# Traceability & Compliance



CLEAN ENERGY EFFICIENCY

# Power Grid Efficiency



CLEAN ENERGY EFFICIENCY

# Open Energy Market



LOGISTICS & TRANSPORT

# Fleet Electrification



LOGISTICS & TRANSPORT

# Road Efficiency



CIRCULAR ECONOMY

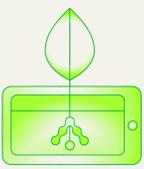
# Mandatory Recycling



CIRCULAR ECONOMY

# Waste to Product





# Precision Agriculture

Picture this: smart machines drawing on data to identify the specific seeding and planting needs in each patch of land. Drones scanning for pest and weeds, autonomous machines watering crops, equipment applying precise amounts of pesticides, and software accurately predicting harvest yields and mitigants. This is precision agriculture.

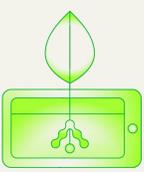
Think of precision agriculture as a high-tech toolbox for farmers. It includes such innovations as:

- Artificial intelligence addressing agricultural bottlenecks (logistics, pest detection, pesticide application, and best practices);
- Sensors and digital twins that create virtual copies of a farm providing a digital model of what is happening on the ground at any moment;
- Climate prediction (hyper-localized weather forecast models with climate intelligence, and recommendations on when and how to seed, nurture, irrigate, and harvest crops);
- Tailored application of fertilizers and pesticides for each plot;

All these technologies enable smarter, easier, more precise and cost-effective farming with sustainable management. The concept is not new in Latin America, especially in Brazil, where an estimated 20% to 30% of Brazilian crops are already getting a taste Precision Agriculture technology<sup>1</sup>.

While modern agriculture faces significant and emerging challenges, precision solutions are emerging as the leaders in efficient and sustainable farming, helping address many of these new ag related challenges. The range of solutions these technologies bring is staggering and 2024 is gearing up to be a year with an influx of innovative startups that will push the boundaries of precision agriculture in the region.

<sup>1</sup>The Brazilian Farmer's Mind in the Digital Era by McKinsey, 2022 Edition.



# Agricultural Biotech

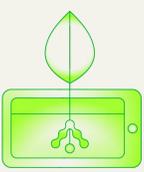
Our food comes at a hidden cost: years of battling pests and maintaining nutrient-rich soil, have led to an overuse of pesticides and fertilizers. This excessive use has resulted in an increased presence of these chemicals in the soil, leading to long-term effects such as crop resistance to chemicals and the draining away of important soil nutrients. The need to address this issue sustainably has given rise to biological solutions.

Biological agriculture is a paradigm shift away from a system historically dominated by chemical pesticides and fertilizers, to a more stable and natural one that harnesses bacteria and fungi present in the environment. The benefits of using biological products include mitigating the adverse effects associated with the intensive use of chemical products, continuously preserving and improving soil health and biodiversity.

Unlocking the full potential of biological solutions requires diving deeper into the secrets of soil life. In other words, the development of advanced biotechnologies is crucial in addressing pest issues in a more targeted manner, accelerating the research and development cycle, and creating and producing new biological solutions. The ultimate goal is to transition towards a more organic form of agriculture, which requires a new generation of bio products.

This transition will only be possible within the framework of utilizing data collected on the farm level, with technologies assisting in understanding soil usage for planting, and identifying deficiencies and richness in each type of soil. This enables agronomic recommendations with personalized offerings, taking into account the most suitable soil treatment for each crop, region, and variety.

Companies are investing in genetic improvement and biotechnology to develop more resilient cultivars for the diverse soils in Latin America and to navigate the increasingly unpredictable climate adversities due to events such as El Niño, amongst others. This innovation plays a pivotal role in agriculture, providing a variety of tools and techniques to enhance the efficiency, productivity, and sustainability of agricultural production.



# Traceability & Compliance

The entire agricultural market in Latin America is under pressure. As an example, the European Union has recently published EU Regulation 2023/1115, which regulates the trade relationship of certain commodities and products associated with deforestation and forest degradation. This regulation, commonly known as the EU Deforestation Regulation (EUDR), will be put into practice beginning December, 2024, leaving a short period for adaptation and preparation. This regulation requires traceability at each point in the supply chain, emphasizing the need for comprehensive records to facilitate quick and accurate tracing of food products. Producers and exporters will have to adjust and comply with the new regulation to be able to serve the EU market.

Additionally, the food and beverage industry currently faces unique challenges in the management and storage of production mainly related to transparency, compliance and traceability. Some of the issues currently include the lack of: (i) real-time visibility of actual inventory levels; (ii) lot traceability and tracking; (iii) proper management on product expiration dates and waste. The lack of transparency and traceability could lead to cross-contamination and product shortage, resulting in higher prices, fines and lawsuits. Given these challenges, it becomes evident how crucial it is for producers, manufacturers and distributors to efficiently track, trace and report food production from farm to fork.

Food companies and producers are increasingly turning to technology to digitize their traceability processes in order to minimize financial losses, increase efficiency and expand market share.

Traceability technologies offer benefits such as real-time monitoring of inventory levels, automated data collection for instant capture, amongst others, while replacing paper processes with digital solutions that enable companies to efficiently create and manage important data that will guarantee compliance and traceability best practices. We believe this will be a prerequisite to all market participants.



# Power Grid Efficiency

Latin America, which is rich in renewable energy resources, faces significant challenges with infrastructure, particularly with the saturation of transmission lines and inefficient distribution, hindering the expansion of renewable energy sources. With energy losses peaking at 15%, surpassing other developing regions, the region struggles with optimizing its electricity grid. Aging infrastructure, network size, and limited digital monitoring contribute to notable energy losses, emphasizing the urgent need to enhance improvements for more efficient, reliable, and affordable electricity distribution.

This is where the concept of smart grids can make a big difference. Improving the installed infrastructure through increased efficiency of an electrical grid can be achieved by better monitoring and control of the network, which can be done via sensors, automated computing mechanisms, and real-time data monitoring systems. All these technologies are part of the Power Grid Efficiency trend, involving the use of the smart grid with data collection for the application of A.I. (Artificial Intelligence) and other technologies.

The solutions include eliminating network congestion, increasing supply stability and generating cheaper and more reliable energy. This should directly impact consumers' savings thanks to lower grid maintenance costs, optimized use of installed capacity, and the possibility of variable billing based on the effective amount of energy transmitted and consumed.

In addition to the use of artificial intelligence and sensors, another technology that is contributing to Grid Efficiency and gaining prominence is energy storage through batteries. These batteries store energy off the grid, thereby avoiding waste. Given that current energy grids are not designed for storage but rather to maintain a balance between supply and demand, battery solutions play a pivotal role in reducing losses, reducing intermittence, while guaranteeing energy delivery.



# Open Energy Market

Two significant trends are currently transforming the energy market in Latin America, particularly in Brazil: One is the expansion of distributed generation, marked by the proliferation of solar parks. The other is the opening of the free energy market to smaller consumers. These two trends are set to profoundly alter the dynamics of energy buying and selling in the region. They represent a shift from the current regulated model, also known as the captive market, where consumers are obliged to contract energy with the local distributor, to an open model.

This new model allows consumers to purchase directly from energy generators or other intermediary companies and the savings are substantial and range between 10% and 30% on electricity costs. The liberalization of the free energy market has been occurring gradually in Brazil, and as of January 1, 2024, consumers classified as 'Group A' may choose to purchase electricity from any concessionaire or authorized entity of the National Interconnected System. In practical terms, this means that around 106,000 new consumer units in the country will be eligible to migrate to this new free contracting service. Until this point, only large companies were authorized to negotiate in this manner.

Looking forward, the free energy market is likely to need a few more years before the option is available for the majority of Brazilian families in the low voltage market. This transition will foster a more competitive environment for energy supply and result in lower electricity bills for consumers. Another advantage will be the potential to use solely renewable energy sources, such as solar, and wind, which have significant lower environmental impact, offering more flexibility, with lower price volatility.

We are already witnessing the emergence of various interesting and innovative companies due to the market opening, and we anticipate that innovative companies will arise from the energy sector in Latin America, transforming the way energy is generated, transacted, distributed and consumed.



# Fleet Electrification

Nearly one-fifth of global emissions are attributed to the transportation sector, primarily from road transport. Almost all (95%) of the energy used for transportation worldwide derives from petroleum-based fuels, predominantly gasoline and diesel. Renewable, cleaner solutions such as ethanol and the electrification of transport are quickly gaining traction and significance.

A study spearheaded by Stellantis, a significant player in the global automotive industry, conducted a comparative analysis of CO<sub>2</sub> emissions from four different types of vehicles: 1. Gasoline-powered, 2. Electric with European energy, 3. Ethanol-powered, and 4. Electric with Brazilian energy (cleaner, renewable matrix). The model with the lowest emissions was the Electric vehicle powered by Brazilian energy, which emitted 21.45 kg of CO<sub>2</sub>E. This was followed by the Ethanol-powered vehicle, which emitted 25.79 kg of CO<sub>2</sub>E. In third place was the Electric vehicle powered by European energy, with emissions of 30.41 kg CO<sub>2</sub>E, and lastly, the fossil fuel based model which had the highest emissions, at 60.64 kg CO<sub>2</sub>E.

Therefore, the advantages of the models vary depending on the energy matrix that powers the vehicles. The Brazilian energy matrix for example, heavily weighted on sustainable sources enables fleet electrification with a comparatively lower environmental impact than counterparts in other nations.

Brazil and Latin America are a fertile ground for fleet electrification. Notably, the first half of 2022 saw an astounding 840% increase in sales of electric and natural gas trucks, buses, and vans, according to data from Anfavea (National Association of Automotive Vehicle Manufacturers), compared to the same period in 2021 in Brazil. Additionally, current electric vehicle manufacturers have gained prominence and expanded their operations in Latam, as evidenced by BYD's recent announcement of plans to vertically integrate its production chain of EV's in Brazil.



# Road Efficiency

In Latin America, trucking transportation is a crucial link connecting various locations within countries and regions, especially in areas where rail shipping is limited to bulky commodities and natural resources. The trucking industry, which plays an important and fundamental role in the logistics and supply chain sector, is undergoing a transformative phase driven by factors like the rise in e-commerce and nearshoring activities.

This growth has prompted efforts towards modernization and revenue generation, reshaping the entire transportation landscape. However, despite these advancements, high operational costs, poor infrastructure, and supply chain challenges have directly affected prices, resulting in increased logistic costs of freight between ports, consumer hubs, distribution centers, and production facilities.

For instance, trucks require regular maintenance on items such as engine, lubricants, tires, amongst others. Tires are a great example: they are costly and require constant maintenance, given that an average truck requires 22 tires, at a unitary cost of USD 400. The maintenance of these items become a key factor in determining an operator's financial success. Also, the dynamics of tire management remain largely manual and analogic, generating inefficiencies, avoidable risks, and financial losses to the sector.

As we look forward to 2024, we foresee significant investment opportunities emerging from new integrated and digitized solutions specializing in logistic efficiency niches such as tire management.

We also believe that technologies that offer cost reduction (ROI) for fleet operators will experience substantial growth due to the operational and maintenance challenges faced by fleets of all sizes, and how they impact overall profitability in the sector.

We are keeping a close eye on this niche given its considerable market size, its significant impact on the region's economy, and the fact that many clients continue to rely on rudimentary, outdated processes.



# Mandatory Recycling

The National Solid Waste Policy (PNRS) in Brazil, established by Federal Law No. 12,305/2010, set a significant milestone for the creation of instruments, frameworks, and programs focusing on preventing and reducing waste generation in the country. It determines how the country deals with "waste" and requires transparency in waste management from both public and private sectors.

The creation of a national policy allows for specific actions tailored to each type of waste generated in the country. Although the law was enacted in 2010, it was only with Federal Decree No. 10,936 in 2022, clarifying key points and determining more effective forms of oversight, that we began to see real sizeable action in the reverse logistics market gaining traction.

One significant aspect of the National Solid Waste Policy (PNRS) was the establishment of 2024 as the target year to eliminate any remaining illegal dumping across all Brazilian cities. To accomplish this, we are seeing the expansion of tools and novel solutions designed to facilitate and accelerate the implementation of the law.

The robustness of the law, together with the considerable complexity involved in implementing reverse logistics across various chains, has given rise to numerous challenges within the segment. These challenges have, in turn, paved the way for impactful innovations.

We've seen the emergence of new business models, including associations, marketplaces, and companies offering waste management and traceability software, as well as companies applying technology to address chain-specific problems. We believe this new market will drive the creation of new and relevant companies.



# Waste to Product

Latin America's recycling rates significantly trails the rest of the world, averaging at 4.5% annually in comparison to the global average of 13.5%<sup>2</sup>. As a result, the region contributes to 12% of the total global waste. For example, Brazil is expected to generate approximately 100 million tons of waste annually until 2040. This projection underscores the necessity for a multitude of solutions to tackle this issue.

The advancement of technologies such as "Waste to Product" is not only valuable but also crucial. It facilitates waste recovery through recycling or energy generation, while generating a new source of income. A prime example of the "Waste to Product" concept gaining traction in the market is "Waste to Energy". This concept revolves around the production of biogas, biomethane, and electrical energy from the utilization of byproducts.

Examples of such waste include food scraps and sugarcane bagasse. This biomass is attracting the attention of researchers, investors, and governments worldwide due to its potential in the field of renewable energy. It offers a solution to two significant environmental challenges: reusing the large volume of waste produced by society while reducing dependence on fossil fuels. The generated electrical and thermal energy, along with the stored biogas or biomethane, can be used to power thermal power plants, motor vehicles, and boiler heating in industrial processes.

We anticipate the rise and expansion of new business strategies that place the circular economy as a key factor in driving profitability and sustainability. Emerging technologies capable of efficiently extracting energy from waste hold the potential to convert what have traditionally been cost centers into profitable, revenue generating businesses for organizations.

<sup>2</sup>International Panel on Climate Change (IPCC) Report, 2021.

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# Reach out

We thank you for taking the time to explore this document and help disseminate knowledge. If something caught your eye or if you're interested in delving deeper into discussions, please reach out to us. We'd be delighted to connect you with our team.

Barn has a proven track record of financing innovation in Latin America to help the world transition to a greener and more efficient economy. We are active venture capital investors helping finance and build companies with the ability to address and solve challenges that directly affect our society.

We look forward to hearing from you.

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