



# NARRATIVE

2022 ANNUAL REPORT



**SISTEMA.bio**<sup>®</sup>  
CREATING VALUE FROM WASTE





## OUR MISSION

We create **Value**  
from **waste**





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units installed every single day. The 11 units we were so proud of in 2010 were rounding errors in 2022. In fact, we installed 11 units every six hours all year long; installing 1,000 units every 18 days.

Celebrating these milestones, it was easy to get caught up in the big numbers of 2022. But central to the Sistema.bio model is that every farmer still gets personalized service, financing, and technology specially catered to their needs. We still measure the impact on every farm where we work and ensure we are changing people's lives. We are focused on the significant milestones to come but also celebrate every farmer that chooses clean energy and regenerative agriculture.

Looking forward, we have an ambitious goal for 2023: it took 12 years to install 50,000 units, and we aim to install the same amount in 12 months. We know our work can collectively create a significant influence on climate change and global food systems, but we will never forget that these large achievements are made up of the impacts of every individual farm and the family that lives there.

**Let's go! ¡Adelante!  
Tufanye Kazi! CChal dar!**

**Alexander B. Eaton**  
CEO, and Co-founder

Want to read more about our CEO's vision?

[CLICK HERE](#)

## MESSAGE FROM THE CEO

### 2022 & 2023: Celebrating the big impacts but keeping our focus on the farmer

I remember our first "big" biodigester sale: it was 11 units in early 2010, and we were so excited by the size of our impact. By 2013 we passed 1,000 biodigesters installed, converting waste into clean energy and fertilizer, measurably improving the lives of more than 5,000 people with our technology, innovation, and hard work. We were incredibly proud, and we celebrated the milestone.

With those first 1,000 farms, we knew that the impacts we were tracking could be multiplied. Even with the challenges that smallholder farmers face every

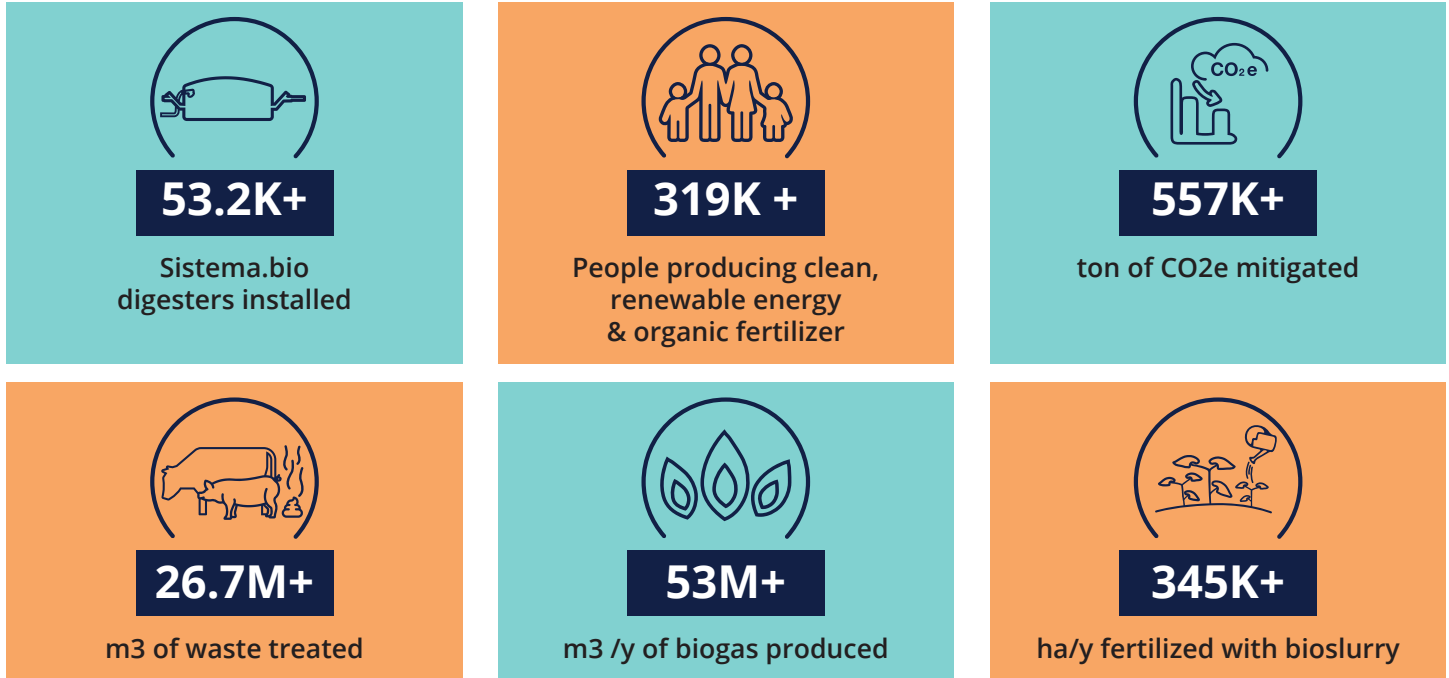
day, we began to focus on scale. Indeed our impact and scale have grown every year since, but starting in 2020 we had to face new challenges. The pandemic, war, and direct impacts of climate change became drivers of energy and fertilizer price increases, undermining global food security, supply chains, and regional sustainability initiatives. But the new climate, social, and economic global trends are just **an acceleration of the problems that Sistema.bio was founded to address.** Being part of the solution to these challenges means that the last couple of years have been a period of incredible growth of Sistema.bio's impact.

In 2022 we crossed 50,000 total units installed, with 20,011 biodigesters installed in one single year. We averaged over 50

# 0. 2023 AT A GLANCE

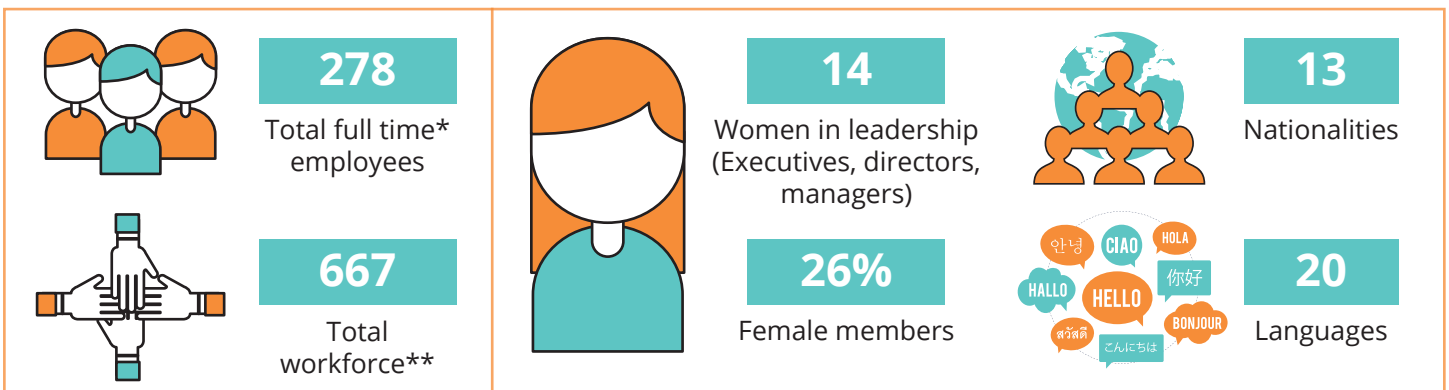
## Sistema.bio impact data

A biodigester installed every three hours in North, Central and South America, Africa and India & Asia Pacific.



## Diversity at Sistema.bio

At Sistema.bio we celebrate diversity in our teams and country offices! We work between three very diverse regions inside and outside in terms of cultures, languages, religions, age groups, and educational levels.



\*Full time Employees (FTE): All employees that work for us full time, as their only job, on any type of contract (it can be fixed contracts or consulting contracts to give some examples). They are assimilated to employees They are registered on our internal HR software as legally required.

\*\*Workforce: All people that work for us on external or flexible contracts.





# 1. INTRODUCTION: 2022 GLOBAL TRENDS

For nearly two years, due to the COVID-19 pandemic, the entire world went through unprecedented turmoil. We have learned about resilience, as we continue to navigate the fallout from a pandemic, while also continuing to face other challenges such as the global economy, massive layoffs, the Russia- Ukraine war, and the environmental disruptions due to climate change.

In 2022, the world saw a number of global trends. Here are four that will shape Sistema.bio's pathway throughout 2023:

1. **Rising tensions in the global economy:** Already high inflation has been exacerbated by the Russian invasion of Ukraine, making food, energy, and other necessities more expensive, with much of the burden falling on the poorest and most vulnerable people. Many countries also face daunting debt vulnerabilities, straining their resources to combat economic and social challenges.
2. **Evolving Carbon Market:** Voluntary Carbon Markets (VCM) set a historical record in 2021<sup>1</sup> and in 2022 VCM reached the \$2 billion mark. This much-anticipated briefing provides final market values for 2021. In addition, after COP27 in Egypt, there has been an increase in work on the Compliance Carbon Market to establish regulatory country frameworks.
3. **Climate change is already having a significant impact on farming and food production:** The gradual increase in temperatures and unreliable and low rainfalls have already started to damage crops and strain livestock and poultry farmers. In the next decade, climate change is likely to make these problems worse. Farmers are already struggling with

the effects of climate change, and the future looks bleak for them. Unless emissions are reduced, farming will become increasingly difficult and costly, and food shortages will continue to hit developing countries the hardest. Local and global food security is at stake.

4. **The continuing digital transformation:** In 2022, the digital world rapidly evolved and changed. This is due in large part to the continuous rise of technology like augmented reality and artificial intelligence, which are allowing businesses to create more immersive and interactive experiences for their customers. This rapid change is beginning to cause some older businesses to face challenges, but it is also opening up new opportunities for entrepreneurs and companies who are able to embrace the technology.

<sup>1</sup>Forest Trends' Ecosystem Marketplace. 2022. The Art of Integrity: State of Voluntary Carbon Markets, Q3 Insights Briefing. Washington DC: Forest Trends Association.





## 2. COMPANY OVERVIEW: WHO WE ARE

Sistema.bio is a social enterprise that provides access to innovative biodigester technology, training, and financing to address the challenges of poverty, food security, and climate change. We manufacture, distribute, sell, and install high-quality and affordable biodigesters that enable farmers to convert waste into renewable energy and organic fertilizer. Working together with farmers worldwide, Sistema.bio delivers high-quality carbon mitigation, sequestration, and climate change adaptation programs through our biodigesters. Sistema.bio works with small-holder farmers all over the world and makes them more productive and efficient while creating a healthier environment on their farms and reducing their carbon footprint.

Sistema.bio was founded in 2010 in Central Mexico. After 12 years of operations, Sistema.bio is now working with over 53,200 farms in 31 countries around the world, with the potential to provide clean energy and sustainable agricultural practices to 100M farmers in over 15% of the world's farmland. In line with the Global Climate Agenda, Sistema.bio has committed to impacting over 1.5M people (290,000 farms) with our technology by 2025, leading to 5M tons of reduced GHG emissions and the creation of over USD\$100M in net positive economic benefits in rural economies; and by 2030 our goal is to reduce 1% of annual global GHG emissions.



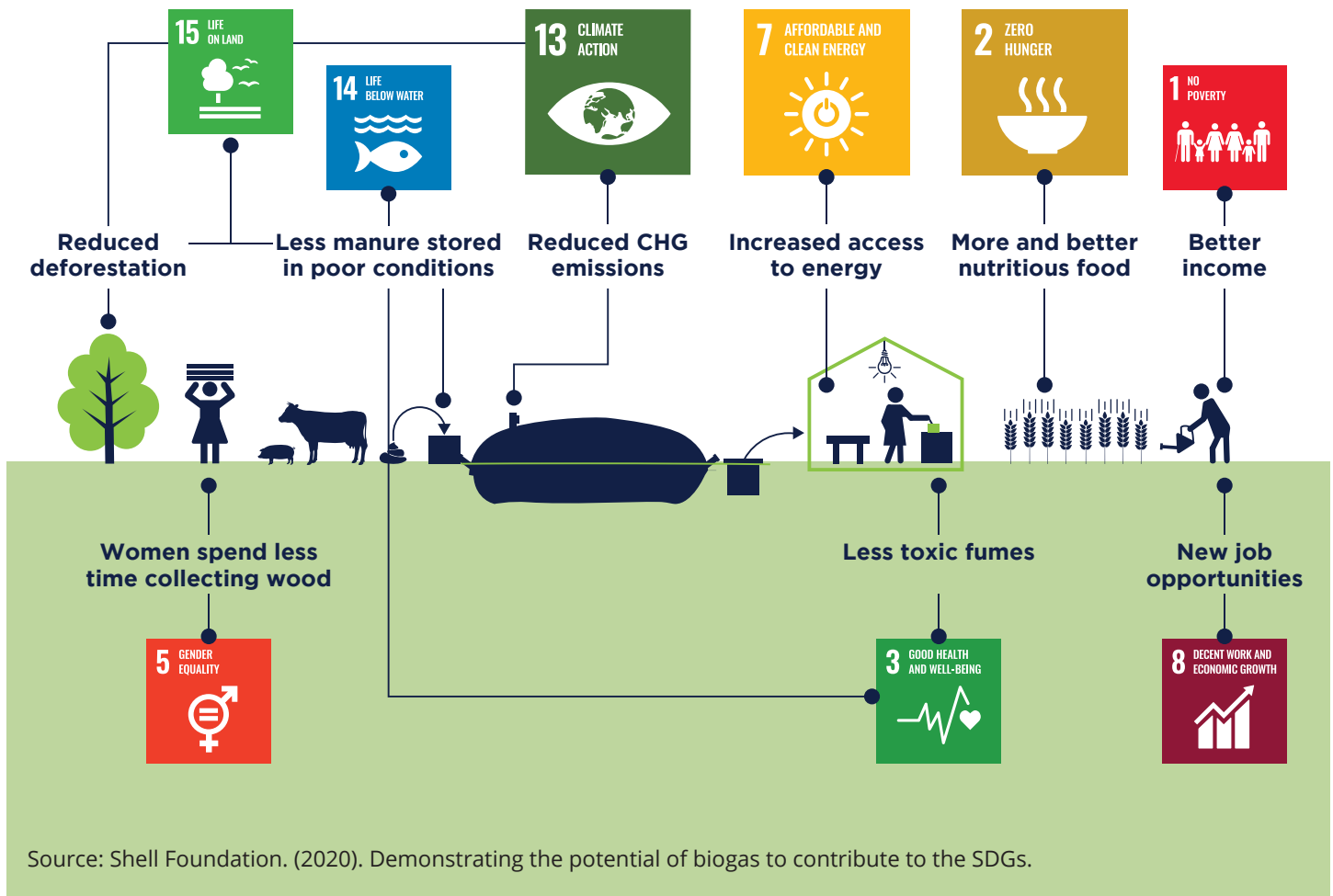
## Our contribution to the Sustainable Development Goals and the Global Climate Agenda

Since the foundation of Sistema.bio, our technology has been envisioned as an effective mechanism to reduce carbon emitted at small and medium farms around the world. We address several Top Solutions in the Drawdown framework -- biogas for cooking, conservation agriculture, and improved clean cookstoves. With the climate crisis, Sistema.bio is aligned, more than ever, with the 2030 Climate Agenda and the Sustainable Development Goals (SDGs).

The benefits generated by our biodigesters contribute to 9 out of the 17 SDGs. These are SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG3 (Good Health and Well-Being), SDG5 (Gender Equality), SDG7 (Affordable and Clean Energy), SDG8 (Decent Work and Economic

Growth), SDG13 (Climate Action), SDG14 (Life Below Water) and SDG15 (Life On Land).

In the last couple of years, Sistema.bio has invested in consolidating our Carbon and Impact team, ensuring we maximize our impact measurement and project development.







## 3. 2022 ACHIEVEMENTS

### 3.1 Global overview

Our team has a lot to celebrate, but one of the most exciting achievements is that Systema.bio closed 2022 with our biggest numbers ever, crossing 20,000 units installed in one year and over 50,000 farms benefited since 2010. We crossed USD 11.3M in revenue. We also delivered emission reductions through carbon credits contracts that generated revenue in 2022.

We started 2022 by announcing the closure of a series B investment led by an equity investment from KawiSafi Ventures and matched by AXA IM Alts, a global leader in alternative investments, through the AXA IM Impact Investing strategy. Existing investors Engie RDE, EU ElectriFI fund, Chroma Impact, Blink CV, and Co Capital also participated in the round, and Triodos Bank provided additional working capital financing.

[CLICK HERE](#) to read more about the investment.

Last year was a growth year for Systema.bio. India reached more than 36,600 biodigesters driven by partnerships with the National Dairy Development Board (NDDB) and Infosys. In Africa, there was an expansion and professionalization on our commercial team to serve our farmers directly, and with the support of the global team and

key international (Native) and local partners, Systema.bio initiated operations in Uganda.

Finally, Mexico and the rest of the LATAM region was restructured after the pandemic. Such changes were made thanks to the arrival of Almendra Ortiz-Tirado, the new LATAM director.







This new year 2023 comes with ambitious goals, and to prepare for them in 2022 we started the construction of our new factory in India, which will be inaugurated in Q2-2023. Under Camilo Pages, Co-Founder and CPO, the production team has stepped up to next-level efficiency, production capacity, quality control, partnerships, and logistics. Sistema.bio will now be able to produce over 60,000 units per year, with automation designs that will allow us to cross 100,000 units. With the idea of regionalization, we will still maintain production in Mexico and assembly in Kenya and other markets.



## Team updates

The strength of the company comes from the strength and passion of **our team**, and 2022 was an intensive year for our People and Culture team. Recruitment and talent are two words that broadly defined us last year. Now our team is in a really great place and a lot of hires from 2022 are flourishing.

Some of our most outstanding and strategic new team members are:

- **New members:** Almendra Ortiz-Tirado as LATAM Director, Menno Krijger in the role of Global Sales and Marketing Director, and Headley Jacobus as the Global R&D Lead. Last but not least, we were pleased to announce in July 2022 the appointment of Dr. Joyce Cacho as our Chairwomen of the Board of Directors.

Learn more about Joyce [HERE](#)

- **New roles:** Esther Altorfer, who previously held the roles of CFO, COO, and Kenya Managing Director, initiated a new role as Chief Strategy Officer in November 2022. Madrin Maina was promoted internally to take the Direction of the East Africa Region.



**JOYCE CACHO**  
Board Chair



[CLICK HERE](#)



**ALMENDRA  
ORTIZ-TIRADO**  
LATAM Director



**MENNO KRIJGER**  
Global Sales and  
Marketing Director



**HEADLEY JACOBUS**  
Global R&D Lead



**MADRIN MAINA**  
East Africa Director



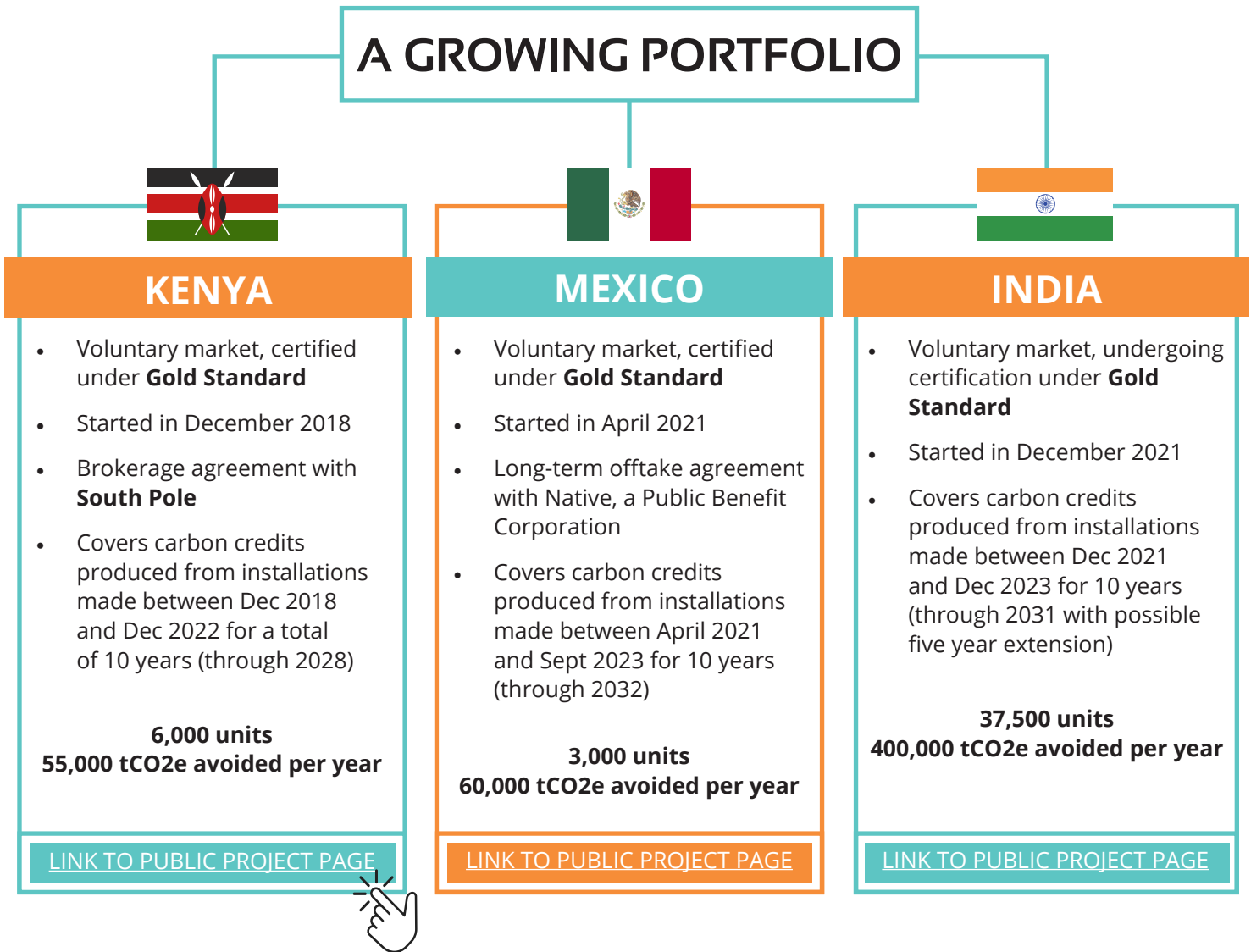
**ESTHER ALTORFER**  
Chief Strategy Officer



### 3.1.2 Carbon Programs

While the Carbon Markets have been showing some fluctuations, in **Sistema.bio** we maintained our position as a **high-quality and high-impact carbon program developer**. The correct carbon project development has provided the right framework to historically create our most robust growth pipeline.

#### Overview of Sistema.bio's current Carbon Programs





## 3.2 Regional overview

### 3.2.1 East Africa

#### Kenya: 2022 at a glance

2022 was a record-breaking year for Kenya and East Africa in general. We achieved unprecedented growth and success, surpassing most of our expectations, despite it being an election year. All teams worked diligently to ensure this success and it paid off. Esther Altorfer, who led the team in Kenya with passion and dedication left us in the very safe and capable hands of Eng. Madrin Maina.

The sales team crossed the 2,000 mark, hitting 2,030 sales; which is the highest number of sales ever made in a year in Kenya. This was a 12% improvement from the previous year. Our revenue grew by 23% to USD 2.2M. The credit team also broke its record with a USD 1.2M collection; a 44% increase from the previous year. The TechOps team managed 2,103 biodigester installations, compared to 1,619 in 2021.



Kenya is rapidly emerging as Africa's renewable energy superpower, and we are strategically positioned to lead this change within the country and on the continent. The Kenyan government has launched a range of policy interventions to garner activity and investment within the renewable energy sector, combined under the long-term strategy of Kenya Vision 2030.

We also anticipate a big switch from LP gas consumption in the country, due to the constant increase in LP gas prices. With various stakeholders urging the government to address this problem by offering all Kenyans access to sustainable and clean energy sources; we hope to effectively spread the Sistema.bio solution and partner with key strategic people and organizations in the country to make sure that as many Kenyans as possible are able to afford the opportunity to access clean energy at no extra cost.

## Reaching new African countries: Uganda Dairy Biogas and Carbon Program in partnership with Native

[CLICK HERE](#) to watch the video memory and [HERE](#) to read the full press release.

Kampala was the city in which Sistema.bio, in partnership with Native, launched the Uganda Dairy Biogas and Carbon credit Program. The scope of this unique program included 10,000 small and medium dairy farms and contemplates avoiding over 1.5 million tonnes of CO<sub>2</sub>eq over the project's life.

The Uganda program brings clean-renewable energy and biofertilizer to improve the livelihoods of more than 60,000 Ugandans and create hundreds of local jobs. The program has been running for more than 5 months with a focus on the Central region (with Ecosafe as the lead implementing partner), on Mount Elgon region (with Sebei Sacco as the lead implementing partner), and on the South Western region (with UCCU and Bold Energy as the lead implementing partners).



“

This type of project is core to what Native does, supporting innovative companies like Sistema.bio that is having both a measurable GHG emission reduction while also showing progress towards several SDGs. We are thrilled to be expanding our partnership with Sistema.bio in Uganda and continuing to support such important work.

”

said **Nell Achtmeyer**,  
Native's Vice President

### 3.2.2 India

#### Sistema.bio India on an aggressive growth curve



The year 2022 proved to be transformative for Sistema.bio India in a number of ways such as new partnerships, expanding presence within India, record-breaking growth in revenue, and growth in team size, among others.

We sold 16,452 units and generated USD 6.9M in revenue, a whopping 163% growth over 2021 unit numbers and 2X times in revenue. In India, Sistema.bio has already installed 35,000 biodigesters and is planning to install an additional 40,000 units by the end of 2023.

A mission-critical achievement for Sistema.bio India has been getting approval for our innovative biogas technology by the Ministry of New and Renewable Energy (MNRE).

[CLICK HERE](#) to read more about.

With the Indian Government driving the use of biodigesters, especially with smallholder farmers, dairy farmers, etc., the approval of our technology puts us in an excellent position to expand our reach across India,

by giving us the opportunity to participate in all of these governmental programs.

We have already expanded to 21 states and are planning to extend our installations to more geographies in 2023. We have also installed 100 pilot plants for 10 new partners. In 2022, we registered our first carbon program in Gold Standard, which increased the affordability of our biodigesters significantly. Smallholder farmers in India, who constitute the majority of total farmers in the country,



will directly benefit from this program. Another significant development has been the development of partnerships with major dairy cooperatives in India. These partnerships will help us scale up the distribution of our unique biogas digesters by increasing accessibility to smallholder farmers across India.

It goes without saying that such a scale of expansion needs a lot of preparation. We are in the process of capacity building by enhancing our technology and manufacturing capabilities. We have already grown our core team from 70 employees to 118, a 68% increase in headcount, and generated hundreds of direct and indirect jobs.

With the opening of the India manufacturing facilities, at the end of 2021, we can proudly say that our high-quality, nationally manufactured biogas digesters are not just being installed in India, but are also being exported to other countries like Kenya and Uganda.

In conclusion, achieving 16,452 unit installations in the year 2022 was the equivalent of 3x of what we attained in India between




2018 – 2021. The credit for this accomplishment goes to the passion and drive of the entire India team. It is on the basis of this same enthusiasm to impact the lives of farmers, as well as the approval of our technology by the MNRE and the Government of India, that we set ourselves an ambitious target of installing 40,000 units in 2023 with 10 to 15 new partnerships. This will also create a perfect launch pad for Sistema.bio India to absolutely dominate the Indian market in 2024 – 2025.

# 2022


## A Year of Transformation

We at Sistema.bio have completed 13 years of our operations and the year 2022 has turned out to be a transformative year for Sistema.bio India in many aspects




2

Inked **partnerships with major dairy cooperatives** in India to scale our distribution and increase accessibility




4

We have installed **45,000+ biogas digesters globally** and intend to double these numbers in 2023




6

Approval from the **Ministry of New and Renewable Energy (MNRE)**, Govt of India, for our innovative biogas technology




1

Registered our **1<sup>st</sup> Carbon Program in Gold Standard**, which increased the affordability of our biogas digesters significantly



3

Expanded our presence to **21 states and are planning to reach more geographies** in 2023



5

Our **technology impacted over 220,000 users globally**

We are gearing up to set up new benchmarks to reduce the usage of LPG and firewood in turn contributing to a cleaner environment. While working on our commitments to good health and well-being of people, food security, and poverty

Let us begin this year with a renewed focus on starting new projects that will create a positive impact on the lives of our farmers.

### 3.2.3 LATAM

## Focusing on growth and organization

As we kick off this year we are getting closer and closer to our goals of reaching +290,000 farms by 2025 in all the LATAM region and contributing to the reduction of global warming.

2022 was the year of organization and strategic focus for the LATAM team. Although Mexico was the founding country of Sistema.bio and the place for testing and improving our technology and implementation model, today the operations in Kenya and India have exceeded the biodigesters sold in the LATAM region. This effect was mainly attributed to differences in the market maturity between countries and also, due to the support provided by the Global team in the East Africa and Asia Pacific expansion.



Nonetheless, the LATAM region remains with high potential. In 2021 alone, Latin America contributed around 25% of global emissions, compared to 12% the previous year. Still, Mexico, Colombia, and the rest of Latin American countries have a huge potential to bring sustainable farming practices and clean-cooking solutions.

Therefore, 2022 aimed to provide full support for the Latin America team to grow and consolidate. The journey started by bringing onboard the new, fresh, and highly-experienced direction of Almendra Ortiz-Tirado. Almendra is an inspiring Mexican leader who has worked to build the Latin America team. She has a human leadership and in only 6 months she has managed to unite and motivate the Mexico, Central, and South America teams. With her experience in data management and analysis, she has managed to develop and monitor the implementation of information capture, which allows for better control of the impact of Sistema.bio LATAM.



Among the LATAM 2022 achievements are the change of Commercial Strategy and massive price optimization, which allowed us to achieve sales of more than 300 biodigesters in less than 1 month, one third of our global annual sales, and lead to close the year with a +12% growth vs 2021.

Additionally, the Central and South America offices initiated a transition to a Business-to-business strategy focusing on impact and distribution partnerships. For example, in Central America, we focused on our growth and partnership with NegaWatt in Guatemala [CLICK HERE](#) to learn more about the distributor model and the creation of a new relationship with Alteco group and Heifer International in Honduras. While in South America, we strengthened our previous relationship with distributors in Colombia, Uruguay, and Peru giving us the opportunity to expand our technology to more farmers and productive projects.



Sistema.bio Mexico certified a voluntary emissions reduction project through Gold Standard that has a Verified Emissions Reductions Purchase Agreement with Native, a Public Benefit Corporation. The project, which started implementation in April 1st, 2021 and continued in 2022, will benefit 3,000 dairy and swine farmers in Mexico through the installation of biodigesters.





## 4. CASE STUDIES

### 4.1 East Africa

#### The Africa Enterprise Challenge Fund; REACT RBF 2022

In December 2020, The Africa Enterprise Challenge Fund (AECF) launched a Results-Based Financing Programme (RBF) aimed at unlocking new markets for clean energy companies in Kenya. It aims to expand access to low-cost clean energy for households across the country, with additional incentives for companies to reach the poorest families. Financing is offered through a results-based framework.

The program is part of the larger REACT Sub-Saharan Africa (REACT SSA); funded by the Swedish International Development Authority (Sida) to support renewable energy in 8 countries in Sub-Saharan Africa (SSA).

The REACT RBF aimed to support:

- Transformational business models adapt to target markets in order to accelerate access to low-cost, clean energy i.e. cleaner fuels, cook stoves, and alternatives to grid power.
- Commercially viable companies and markets.
- Innovative ideas that stimulate next-generation approaches in the renewable energy sector.

Through this financing, Sistema.bio Kenya was able to run a project which benefited 882 farmers from 18 selected counties across the country between January and December 2022. 882 digesters of varying sizes (Sistema 6, 8, 12, and 16) were installed ensuring that the farmers

now have access to a clean and affordable cooking solution (biogas), as well as high-quality organic fertilizer for their farms.

From these beneficiaries, a total of 762 households have reported improved energy access; with 346 of these households being female-headed. There is a reported annual increase in household income or decrease in household expenditure resulting from using our biodigesters of USD 1,042.

10 small and medium-sized enterprises (SMEs/Businesses) also benefited from the RBF project. An annual increase of USD 240,000 was reported in SME revenue resulting from their participation in the RBF project's supply chain.

One of the project's beneficiaries is Ms. Roise Muthoni Karanja, a 61-year-old mother, who heads her family of four. Muthoni's main source of income is dairy farming. Before the project's intervention, she used USD 30 on firewood, USD 25 on LP gas,

and USD 250 on chemical fertilizers every month. She is now able to save up to USD 305 every month. She says that her health has also greatly improved, as she is no longer exposed to firewood smoke. The education Ms. Muthoni received from the technical team has helped her reap maximum benefits from the biofertilizer, which has led to healthier crops and increased yields in her farm. This success story is echoed by all the other beneficiaries.

The 2023 phase of the RBF project is already underway and the team hopes to beat last year's results and impact even more lives.

## 4.2 India

### Reaching the last mile: Sistema.bio India partners with dairy Federations and cooperatives



The Government of India is driving the use of biogas plants, especially with smallholder farmers and dairy farmers, and creating a value chain that will immensely contribute to enhancing the livelihoods of dairy farmers and promoting green energy.

However, while biogas plants have existed in India for over six decades, the acceptance levels were very low due to high costs, the amount of land they occupied, the required civil construction, minimal or no training, and no support in post-installation to maintain them.

The biodigesters we provide are designed to offer farmers sustainable waste-to-energy solutions, open avenues for generating additional income and reduce greenhouse gas emissions in farms by up to 80%, reducing their monthly costs for LPG cylinders and chemical fertilizer.

Our first carbon program in India is registered under the Gold Standard, giving farmers a cost-effective option. Additionally, our biogas technology is backed by a 10-year warranty, requires minimal land, is easy to install and use, and provides comprehensive training and after-sales support to farmers.

However, the first task was to overcome the farmers' mindset, demonstrate these advantages of our technology to them, and convince them that our innovative biogas plants have the potential to overcome the challenges presented by old biodigesters.

We initially started reaching out to farmers individually with our on-ground teams going door-to-door. However, we soon realized that this B2C model is less effective and cannot reach the scale we are trying to achieve.

We then changed our focus from B2C to B2B and initiated discussions with Dairy Federations, cooperatives, and farmer producer organizations that were directly connected to the farmers in more than one way. We started with a pilot project showcasing the innovative technology behind our biodigesters, the ease of use, minimal land usage, and most importantly, the affordability.

We also started educating farmers on the scientific use of cattle dung to fulfill their cooking fuel needs through individually owned biogas plants and also promote the usage of bio-slurry produced directly or as an organic fertilizer through the sale of slurry-based products for agriculture interventions in an enterprise mode.



This approach has helped us sign partnerships with a number of Dairy Federations and Cooperatives in India. The aim is to reach over 25,000 farmers with biogas plants in this year, and our vision is to serve 300,000 dairy farms in the next three years.

Given that India has 130 million rural households (67% use firewood) and 70 million dairy farmers, our partnerships prove to be an all-around win-win proposition for all by helping us reach the last mile i.e., farmers.

### 4.3 LATAM

## Sistema.bio technology improving people's lives in the Casasano Shelter in Mexico

[CLICK HERE](#) to watch the video memory.

Casasano Shelter in the state of Morelos, Mexico is a shelter that hosts more than 180 laborers and their families that work in the sugar cane harvest. The workers visit the shelter each year during the cane-cutting season, which happens every six months, and stay there to prepare, work and rest.

The project started in July 2022 as a tripartite agreement and investment between Sistema.bio, Nestlé Colombia, and Ingenio Beta San Miguel, one of the biggest sugar cane organizations in the country. The main objective of the project was to find a solution for the high LP gas consumption for food preparation during the stay of the laborers, their families, and the staff in the shelter. Meanwhile, Nestlé Colombia was interested because they are the main buyers of the sugar that the Casasano sugar mill produces. With this context, Sistema.bio proposed the installation of a series of biodigesters that could use the cattle dung to produce biogas and provide the Albergue Casasano with an alternative to combat the increasing energy costs, as well as an option to make the investment profitable with the possibility of commercializing the biofertilizer.

The agreed solution was the installation of an interconnected Sistema 160 with the capacity to receive 1,400 liters of organic material (cattle dung) per day and BioStoves in the kitchen. With this implementation, there is a possibility to produce 51.8m<sup>3</sup> of biogas per day which is



the equivalent production of 665 kg of LP gas per month. This amount of biogas provides energy to 8 grills in the kitchen that serve 3 meals a day. Also, the production of biofertilizer is about 4,200 liters, the equivalent of fertilizing 153.3 ha/year.

The case has been successful and there is a plan to test in the following months the use of the biofertilizer in substitution of chemical fertilizers in the production of sugar cane. With this, the project seeks to reduce the spending on fertilization costs and reconstitute the soil that has been lost.

## IRRI-Mexico: Sanitation, sustainable energy, and food security in the Yucatan peninsula

The collaborative project called "Sanitation, sustainable energy, and food security in the Yucatan Peninsula" between the Kellogg Foundation, the Instituto Internacional de Recursos Renovables, A.C. (IRRI-Mexico), and Sistema.bio began its first stage in 2012 with IRRI-Mexico's implementation of the Biogas Program, waste treatment, energy generation, and organic agriculture systems in the Yucatan Peninsula, Mexico.

The objective of this project was the technology transfer of an integral organic waste management system for small producers that would have an impact on food security and energy security, and at the same time reduce water pollution. As a result of this collaboration, the book *The Dragon of the New Fire* was published in partnership with the ConcentrArte Project,

a Mexican non-profit organization, focused on disseminating IRRI-Mexico's experience in energy, food security, and sustainability in schools in the region.

Since the beginning of the project in 2012, more than 2,000 biodigesters have been installed in the Mayan communities, impacting 12,000 Mayan people. The current phase which started in 2021 and will end in 2023, aims to install 1,500 biodigesters, which have the potential to mitigate 13,500 tCO<sub>2</sub>eq every year.

Particularly in 2022, a second phase of the evaluation was carried out with the project's beneficiary communities and between August and November, workshops on social appropriation and strengthening of technology usage were held in the communities of Mayapan, Yucatan, and Bolonchen, Campeche.

At the beginning of the project, six specific goals were set and these are some of the results achieved so far.

**Goal 1: Increase the resilience of households and communities by reducing poverty, promoting economic independence, and access to affordable, reliable, modern, and clean energy.** Before the project, 88% of the participating households used to burn wood between 1 to 3 times a week. With the appropriation of the biodigesters, this figure was reduced to 36%.

**Goal 2: Promote sustainable agricultural practices implementation for land conservation and restoration.**



79% of the families use biofertilizer in their backyard garden/farm, while more than 70% of the savings generated by displacing firewood and the purchase of LP gas, is now transferred to food and household expenses.

**Goal 3: Provide tools and support for effective project implementation and adoption by improving local capacities.** 93% of the smallholder farmers said that the training provided by the IRRI-Mexico team with technical support from Sistema.bio was sufficient to know how to efficiently use the technology and its benefits.

**Goal 4: Ensure that farmers are aware of relevant sustainable practices and biodigester information, guaranteeing their daily adoption and replication.** In the year 2022, IRRI-Mexico and Sistema.bio started the creation of community spaces seeking biodigester and agroecological farming, as well as sustainability knowledge and experience exchange.

**Goal 5: Ensure that stakeholders and farmers know the biogas technology and its impact to**

**build trust during the project development.**

By the end of 2022, more than 82% of the families said they used the User Manual, which allowed them to learn more about the biodigester technology and consult the instructions for its use, maintenance, and troubleshooting, and even to train another member of the family.

**Goal 6: Provide tools and financial education to the families, specifically in relation to savings through the use of biodigesters.** In 2022, the project started to create community spaces for financial workshops, yet to be implemented in 2023.

Users have also become more environmentally conscious. Families are no longer constantly cutting down trees and the jungle vegetation recovers naturally. In addition and above all, the sense of community is recovered, and the impact among neighbors and families is enormous. The biodigester not only benefits the nuclear family that is the owner of the technology but the whole community is indirectly impacted as well.





## 5. IN THE SPOTLIGHT

### 5.1 Comms performance

Overview of the growth in our social media following and engagement.

#### 2022 RESULTS

**158.8M**  
people reached

**143**  
notes & articles  
published in earned channels

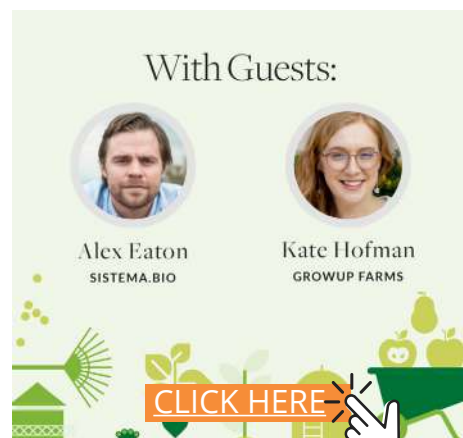
**69.7K**  
fans & followers  
11 channels

### Farmers as agents of change against climate change



[CLICK HERE](#)

### Unreasonable Impact: Food Solutions "Changing How We Grow"



[CLICK HERE](#)

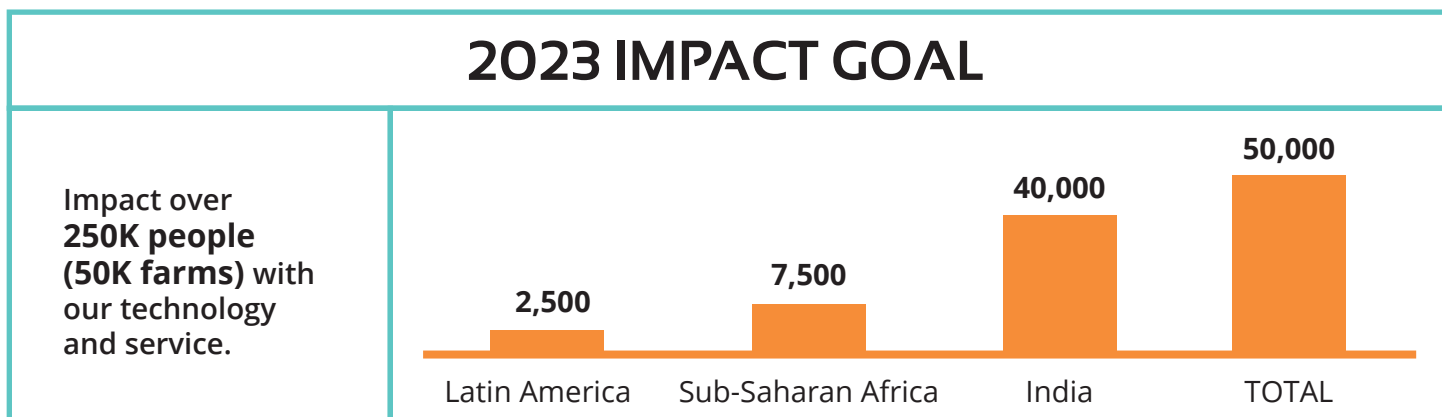


## 6. OUTLOOK FOR THE UPCOMING YEARS

### 6.1 Central goals and objectives



### Growth projections:












FOR MORE INFORMATION, VISIT:

[www.sistema.bio](http://www.sistema.bio)


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