

CASE STUDY:

Activities by the Guatemala Sugar Agroindustry supporting the implementation of the Sustainable Development Goal 9 (SDG 9) of the United Nations 2030 Agenda for Sustainable Development.



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**BUILD RESILIENT
INFRASTRUCTURE, PROMOTE
INCLUSIVE AND SUSTAINABLE
INDUSTRIALIZATION AND
FOSTER INNOVATION**





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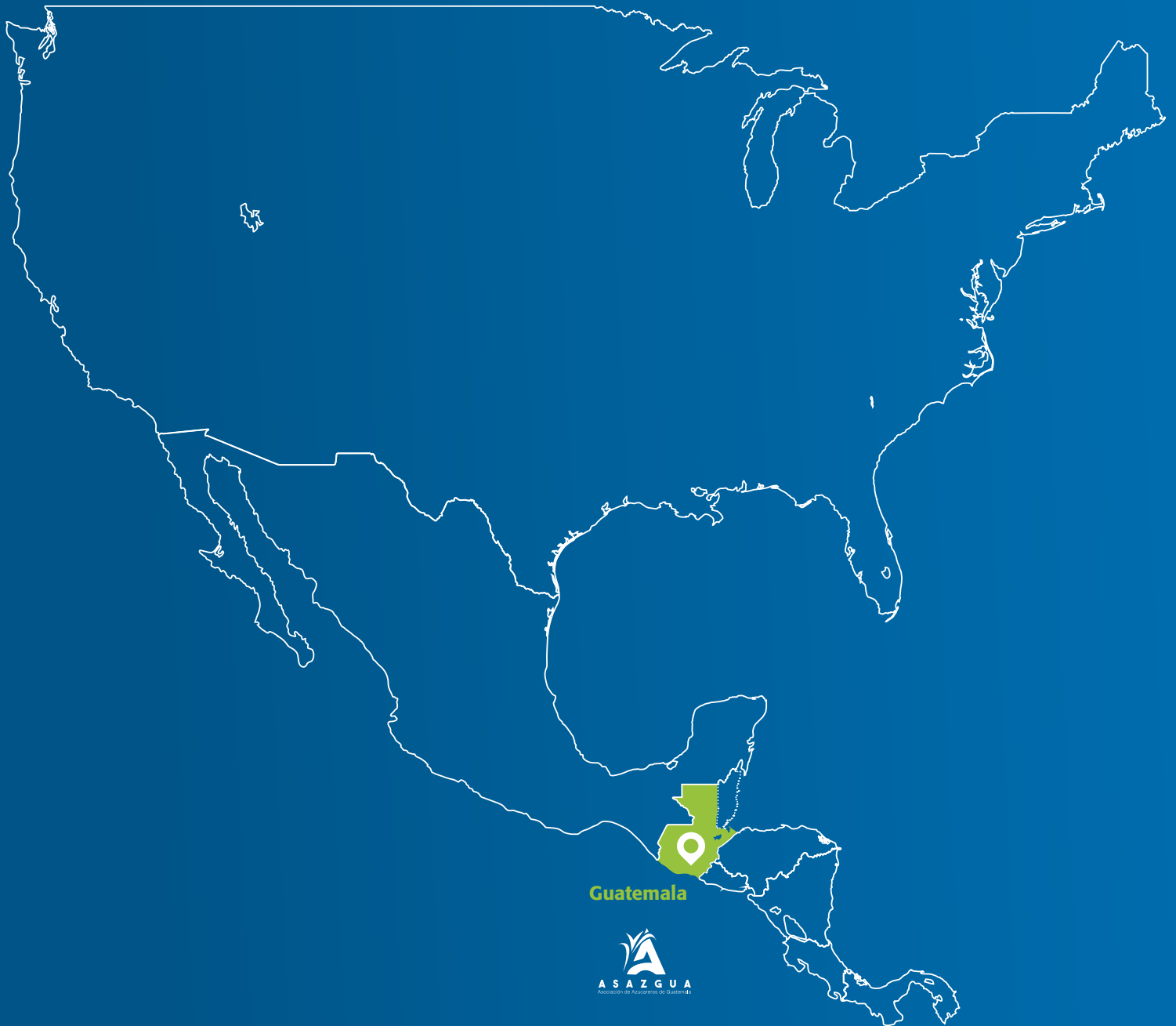
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Guatemala



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BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION



Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

Target 9.2: Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

Target 9.3: Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

Target 9.5: Enhance scientific research, upgrade the

technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.

Target 9.a: Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States.

Target 9.b: Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.

Target 9.c: Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020.

Source: United Nations, 2015.



The volcanic soils of southern Guatemala are exceptional for the growth of sugarcane

THE GUATEMALA SUGAR AGROINDUSTRY

As of 2021, Guatemala was the third largest producer in Latin America and the sixth largest exporter of sugar in the world. Sugar is the second agroindustrial product most exported of Guatemala. The Guatemala Sugar Agroindustry generates almost US \$700 million in foreign exchange annually and provides more than 55,000 direct jobs and 278,000 indirect jobs in the country. Besides, the sector receives products and services from more than 6,000 small, medium-sized and large enterprises, which also generate more employment. Only 2.97% of the cultivable land in Guatemala is used for sugarcane production. Asazgua, the Association of Sugar Producers of Guatemala, was created in 1957 to coordinate the activities of the Guatemala Sugar Agroindustry. It includes 11 sugar producers and five technical organizations specialized in research, climate change, sugar exportation and social responsibility (Asazgua, 2020). In addition, since 2022, it counts with an organization specialized in innovation. The sugar producers that are members of Asazgua include: Pantaleón, Concepción, Palo Gordo, Santa Ana, Magdalena, Santa Teresa, La Unión, Madre Tierra, Trinidad (San Diego), La Sonrisa and El Pilar.

The Guatemala Sugar Agroindustry is committed to generating opportunities and prosperity for the people of Guatemala that support the country's sustainable development. It promotes decent and valuable jobs for the wellbeing of the population, while at the same time promoting environmental protection and conservation.

The Guatemala Sugar Agroindustry follows sustainable development principles as reflected by its strategic objectives and integrated actions and programs, supporting social wellbeing, economic growth, industrialization, and environmental protection. The activities of the sugar industry

in Guatemala are recognized as examples of "Good Practices" in the effective implementation of the United Nations 2030 Agenda for Sustainable Development and the Sustainable Development Goals.

Associated organizations supporting specific sustainable objectives of the Guatemala Sugar Agroindustry have been created in the last decades. In 1990 Fundazúcar was launched as the social branch for the development and implementation of programs and projects on health, education and development. In 1992 Cengicaña started research activities to develop new varieties of sugarcane, to have integrated pest management, to study land quality and to implement more efficient processes for the cultivation of sugarcane and for the production of sugar. In 1994 Expogranel, one of the most efficient boarding terminals for sugar export in the world, was launched to cover international markets in a more efficient and competitive manner. In 2010, the Private Institute for Climate Change Research (ICC) was created to perform research, activities and projects related to climate change. In 2022 the Innovation Hub was created to develop a program of innovative projects through the identification and optimization of products, activities, processes and business models of the Sugar Agroindustry.

At the international level, the Guatemala Sugar Agroindustry supports the work of ICC on climate change mitigation and adaptation with other countries of Central America. Also through Asazgua, it participates actively in the Global Network on Sustainable Water and Energy Solutions. This is an initiative led by the Division for Sustainable Development Goals of the United Nations Department of Economic and Social Affairs (UNDESA). The Network promotes integrated water and energy solutions that address climate change objectives worldwide.

SUSTAINABLE DEVELOPMENT STRATEGY

The Sustainable Development Strategy of the Guatemala Sugar Agroindustry is based on its vision, mission and objectives which promote a comprehensive and forward-looking transformative pathway to prosperity and peace for the people of Guatemala, at the same time supporting a healthy and sustainable planet. It follows an integrated approach based on transformation and adaptation to changes expected in the future due to new challenges. With its inclusive participation policy with multi-stakeholder partnerships,

the Sugar Agroindustry, through Asazgua, is committed to coordinating the work of enterprises, governmental entities and civil society to achieve the final goal of prosperity and sustainable development for Guatemala. The Guatemala Sugar Agroindustry is a global example of efficiency and technological advance representing a very relevant factor for the economy of Guatemala with important positive impacts also on the social and environmental dimensions of sustainable development.

Objectives

1. Increase productivity through development and improvements in the field and in sugar refineries
2. Provide technical training and capacity building for human resources
3. Develop projects and programs that increase the capacity of the production systems in the field and in sugar refineries, in distribution and commercialization of products, and of the export boarding systems.

Vision

Before 2025 the Guatemala Sugar Agroindustry will be the most respected productive sector of the country due to diversification, competitive efficiency, generation of dignified jobs, and respect for the environment, suppliers and communities with whom it relates.

Given its policy of unified action, proactive attitude and strong socioeconomic support, the Sugar Agroindustry leads as a positive agent of change for integral development, boosting the progress of its members and the country.

One of the objectives of the Guatemala Sugar Agroindustry is to Increase productivity through development and improvements in the field and in sugar refineries.



Mission

The Guatemala Sugar Agroindustry mission includes the following: to act in united manner to cultivate and process sugarcane to produce sugar, electricity, ethanol and other products; to undertake other activities to increase the value of the associated enterprises with a positive impact on the integrated development of the country; to innovate constantly improving competitive efficiency; to facilitate national and international commercialization of sugar; and to ensure sustainability while building trust responsibly.



THE GUATEMALA SUGAR AGROINDUSTRY AND THE SDG 9

The Guatemala Sugar Agroindustry has multiple initiatives in place with the aim of building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation which are the main objectives of SDG 9.

The Guatemala Sugar Agroindustry has been a strong engine for many decades in the country building important infrastructure and supporting industrialization while fostering research, development and innovation. The Sugar Agroindustry is committed to the sustainable development and prosperity of Guatemala as demonstrated by actions and policies including the construction of Expogranel in 1994 which is one of the most efficient boarding terminals for sugar export in the world. It has also been supporting industrialization through the construction of power plants and the generation of clean and reliable electricity for use not only by the Sugar Agroindustry but also to feed the electrical national grid of Guatemala. The numerous advanced programs being implemented by Cengicaña for the production of sustainable sugarcane are fostering innovation through the use of state-of-the-art technologies, methods and systems inducing more efficient and environmentally sound processes. Also, the Innovation Hub was created in 2022 to develop capacities, technologies and infrastructures in transformative and new areas that will support a balanced program of innovative projects through the optimization of products, activities, processes and business models of the Sugar Agroindustry.

1. EXPOGRANEL



Expogranel represents a very important infrastructure for Guatemala supporting the Sugar Agroindustry and providing jobs that induce sustainable development.

1.1. Expogranel

Objectives and Description

Expogranel is the boarding terminal of the Guatemala Sugar Agroindustry responsible for receiving, inspecting, storing and shipping sugar from all sugar mills in Guatemala. It is located at Puerto Quetzal in the Pacific Ocean shore in the south coast of Guatemala about one hundred kilometers away from Guatemala City. Expogranel uses very specialized equipment and has highly trained staff. It is considered one of the most efficient terminals for loading sugar in the world and unique in its class in Guatemala.

Expogranel was built with the aim of being efficient and competitive in international markets. It has the capacity to store 407,020 metric tons of sugar in bulk and in sacks. It also has the capability of loading a ship at a rate of about 2,000 tons of sugar in bulk per hour on average. Expogranel was named in 2015 the most efficient cargo terminal in the world sugar industry by a report of the International Service of Agriculture of the Department of Agriculture of the United States. Expogranel represents a very important infrastructure for Guatemala supporting the Sugar Agroindustry and providing jobs that induce sustainable development.

Expogranel has a laboratory accredited at the international level that verifies the quality of the sugar received, stored and embarked. It is considered a high-technology laboratory that utilizes best practices providing services to other countries in the region.

Related Targets

Expogranel supports the objectives of Target 9.1 as a quality, reliable, sustainable and resilient infrastructure that supports economic development and human wellbeing in Guatemala.

Challenges

A major challenge for Expogranel is related to its operation within the state-owned Quetzal Port. The infrastructure of this port has not been improved since 1994 and its limited maintenance makes the efficient operation of the Expogranel terminal more challenging.

Another challenge for Expogranel is to continue being one of the most competitive and efficient boarding terminals for sugar export in the world. The technological systems and infrastructures need to be adapted according to the latest innovations and following international standards in order to remain competitive providing optimum trading services.

Lessons Learned

A major lesson learned from the experience of Expogranel is the important role this boarding terminal is playing as logistic facilitator in the trading of sugar. It provides flexibility allowing the export of sugar in bulk or in sacks in containers as necessary.

Another important lesson from the experience of Expogranel is that building a sustainable, reliable and efficient infrastructure translates into important benefits not only for the Sugar Agroindustry but also for the people of Guatemala. Expogranel supports economic growth and prosperity that contributes effectively to the sustainable development of Guatemala.

Results

Expogranel is playing a key role in the successful exportation of sugar from Guatemala. Sugar exports from Guatemala reach the five continents and Guatemala is the sixth largest exporter of sugar in the world. Sugar is the second agroindustrial product most exported in Guatemala. The Guatemala Sugar Agroindustry generates more than \$700 million in foreign exchange annually.

2. INDUSTRIAL INFRASTRUCTURE

About 97.5% of the electricity used by the sugar agroindustry for the 2020/2021 harvest season was generated using sugarcane bagasse.



2.1. Industrial Infrastructure for the Generation of Renewable, Reliable And Sustainable Electricity In Guatemala

Objective and Description

The Guatemala Sugar Agroindustry has played an important role in the growth of electricity access in Guatemala in the last several decades. Guatemala's economy increasingly depends on export-oriented agriculture with sugarcane and sugar production playing a leading role. Sugar mills have used the bagasse from sugarcane for power generation since the 1990s.

The sugar producers have installed electricity generation plants along the south coast of the country in the Pacific Ocean. Asazgua's members operate 11 power plants that generate electricity and heat for internal consumption (Guerra, 2019). Nine of these power plants provide electricity to the country's grid interconnected national system. The installed capacity of these nine plants is over 933 MW distributed in units that vary in capacities from 5 MW to 60 MW.

Electricity from sugarcane biomass or bagasse in Guatemala is a significant component of the country's energy matrix. Power generation from bagasse is typically seasonal from November to May. Total electricity generated from sugarcane biomass has increased substantially from around 400 GWh during the 1997-1998 harvest season to 2,824 GWh in the 2021-2022 harvest season. This increase has resulted from growth in cultivated area, higher yields per hectare, and from achieving higher efficiency in biomass-based power generation. Sugar companies in Guatemala use on average about 34% of the electricity they generate for their own industrial processes, especially sugar production. The remaining which is on average about 66% contributes to the national electricity grid (Guerra, 2019). About 91% of the electricity used by the sugar agroindustry for the 2021/2022 harvest season was generated using sugarcane bagasse.

Power generation from sugarcane bagasse complements electricity generation from hydropower, which is typically low during the harvest period. Electricity from the Sugar Agroindustry has covered up to 32% of the national electricity demand during the harvest season (Cordón, 2020). Additionally, the electric generation of the industry has provided in the past 16% of the electricity exports from Guatemala to the Central American market and 7.8% of the electricity exports to Mexico. (Asazgua/Cengicaña, 2020).

During the 2021/2022 harvest season, the agroindustry contributed 1,925 GWH/harvest to the National Electricity Market. This corresponds to about 14% of annual national electricity demand and 27% of the electricity demand during the harvesting period that goes from November until May. During this harvest season, 76% of the electricity generated by the sugar agroindustry contributed to the national electricity grid and 24% was used internally. This allows savings of a considerable amount of foreign exchange since less imported fossil fuel is needed.

It is important to note that on some occasions the sugar producers are called by the national electricity market during critical times for the country to generate electricity even during the non-harvest season. This has forced sugar producers to make investments to provide help for national emergencies in years with winters that have little rain.

The Guatemala Sugar Agroindustry has as one of its major objectives for the year 2030 to generate all the electricity needed for the operation of the sugar mills and to cover at least 30% of the electricity demanded in the country during the three months of the dry season, all by using 100% of the sugarcane bagasse obtained during sugar production.

Related Targets

The installation of power plants for the generation of renewable electricity by the Guatemala Sugar Agroindustry provides strong support for the advancement of Target 9.1 on developing quality, reliable, sustainable and resilient



The Guatemala Sugar Agroindustry has as one of its major objectives for the year 2030 to generate all the electricity needed for the operation of the sugar mills

infrastructure. It also supports the objectives of Target 9.2 on promoting sustainable industrialization and the objectives of Target 9.4 on increasing resource-use efficiency and greater adoption of clean and environmentally sound technologies.

Challenges

The Guatemala Sugar Agroindustry became a pioneer in self-generation of electricity after the General Law of Electricity established in the country during the 1990s as a response to the energy crisis. Since that time this vigorous industry has been a major innovator in a field that has not received sufficient attention throughout the industrial history of the country. For over 25 years, innovation in energy technologies has gone through a series of challenges, adaptation and major changes not only in relation to equipment and machineries but also with respect to the commercial and managerial areas.

The managerial strategy of this agroindustry has placed the cogeneration by the sugar producers in second place in renewable electricity generation in the country only after the hydropower industry that has a clear advantage given the country's abundant natural resources. Therefore, the sugar agroindustry has accepted the major challenge of providing considerable electricity access to the country and is committed to continue producing clean, renewable, accessible and sustainable energy for its own consumption and to support the national electricity grid.

The generation of electricity has been a 25-year journey with multiple challenges that had been overcome successfully as a consequence of the vision of the Sugar Agroindustry of always being sustainable, renewable and responsible in its activities.

Lessons Learned

The national cogeneration by the agroindustry has used all the necessary economic resources to innovate, advance, discover and build better energy processes and sustainable power plants to be able to cover the system deficit. Bagasse, the biomass resource used for electricity generation, has proved to be an abundant and inexpensive resource that provides a renewable energy fuel that is efficient, clean and cost effective.

The long-term financial and technological efforts have made the cogeneration of the sugar agroindustry an important platform that supports the renewable electricity matrix of the country contributing to stable and low prices of electricity particularly during the summer.

Results

Through decades of work and innovation, the Sugar Agroindustry has been able to prove the extraordinary value of using bagasse for the generation of renewable electricity and has built the corresponding power plants, allowing electricity access for internal use and for the national grid. Additionally, this access has allowed the reduction of GHG emissions, and has avoided the consumption of fossil fuels. Today, power plants and related industrial infrastructure for electricity generation from sugarcane bagasse built by the Sugar Agroindustry contributes to the social, economic, and environmental sustainability of Guatemala.

3. CENGICAÑA

Cengicaña has created a research and technological development system for sugarcane.



3.1 Cengicaña: Guatemalan Sugarcane Reserch and Training Center

Objectives and Description

The Guatemala Sugar Agroindustry conducts important activities designed to promote the sustainable production of sugarcane. Most of these activities are implemented by Cengicaña through all its innovative research and development programs.

Cengicaña has created a research and technological development system for sugarcane. Thus, it has established policies, regulatory framework, plans, organization, quality management, and a technology management system. The center includes a number of facilities built to perform its activities related to research, demonstration and innovation.

The main programs by Cengicaña related to the sustainable production of sugarcane include the Program on Sugarcane Varieties and the Program on Agronomy. The Program on Sugarcane Varieties includes Plant Breeding, Plant Pathology and Biotechnology. The Program on Agronomy includes Fertilization and Crop Nutrition, Irrigation and Precision Farming.

The area of Plant Breeding is responsible for obtaining and developing new varieties of sugarcane with characteristics of economic importance: high sugar concentration, high sugarcane yield, good stunting ability, resistant to major

pests and diseases and good adaptability to different climate conditions, soil and management of the Guatemalan sugarcane area. The breeding strategy consists of the enrichment of the genetic base by introducing varieties obtained by the exchange with other programs in the world and by crossbreeding to give rise to new complex hybrids. This strategy also includes the selection program and the release of new varieties and the support to increase adoption. The Phytopathology area conducts studies of resistance and effect on disease production in varieties and is responsible for import quarantine and export of varieties. In addition, the area offers analysis services for the detection of pathogens in seedlings. Modern biotechnology has emerged, comprising three groups of techniques: tissue culture, molecular markers, and genetic engineering. Cengicaña uses modern biotechnology techniques as tools that contribute to the genetic improvement process of sugarcane, through DNA and RNA analysis for disease diagnosis, genetic diversity analysis, assisted selection with markers and varietal identification.

The objective of the Fertilization and Plant Nutrition area is to generate recommendations for the optimal use of fertilizers and soil modifiers for the different environments in which sugarcane is grown in the region. The objective of the activities on Irrigation is to generate, validate and transfer technology to optimize the use of water for irrigation purposes through the management of water resources at the basin level. The activities help to determine the optimum time and amount of irrigation as well as the best methods. Precision Farming aims to identify homogeneous climatic and edaphological zones within the great variability of environments that exist in the region. This is achieved in two stages. The first consists of the grouping of soils from the region, soil fertility, agroclimatic and crop management mapping, as well as identification of limiting factors at lot level. The second stage is related to general information, validation and feedback, as well as implementation.

Related Targets

The activities by Cengicaña support the objectives of Target 9.1 on developing resilient infrastructure and of Target 9.2 on promoting sustainable industrialization. They also support the objectives of Target 9.5 on enhancing scientific research and encouraging innovation.

Challenges

One of the main challenges in the sustainable production of sugarcane is the continuous need to implement very innovative technologies and methodologies in different areas and processes following an integrated approach that allows the satisfaction of major objectives in the environmental, economic and social dimensions of sustainable development.

Lessons Learned

A major lesson learned from the implementation of the complex and integrated process for the sustainable production of sugarcane is that there should be a continuous and dynamic planning of activities and actions. Research, testing and demonstration of innovative technologies and methods are key activities to continue improving the efficiency and sustainability of sugarcane production. These actions are particularly important for the strengthening of capacities for adaptation to climate change impacts.

Results

The Sugar Agroindustry has been very successful in the last decades achieving high levels of efficiency and increasing sugarcane productivity as a result of numerous initiatives and programs with multiple benefits. The statistics demonstrate the effectivity of the programs on Plant Breeding, Plant Pathology and Biotechnology as well as on Fertilization and Crop Nutrition, Irrigation and Precision Farming. These programs demonstrate that Cengicaña promotes sustainable industrialization and innovation.

4. INNOVATION HUB



3.1 Innovation Hub

Objectives and Description

In 2022 the Innovation Hub was created by the Guatemala Sugar Agroindustry to develop capacities, technologies and infrastructures in transformative and new areas that will support a balanced program of innovative projects through the optimization of products, activities, processes and business models of the Sugar Agroindustry. This newly created institution will focus on the development and optimization of the Guatemalan innovative ecosystem in order to achieve a sustainable competitive advantage that supports the economic growth of the nation. Its mission is centered in five areas: sustainability, optimization, competitiveness, ecosystem and development.

In the area of sustainability, the Innovation Hub will undertake projects and activities with positive impact on the environment. The objective is to ensure the efficient use of natural resources, the elimination or minimization of negative externalities and a neutral carbon operation. The Hub will promote the use of clean energy technologies and the reuse and saving of energy resources. It will support the wellbeing of the most vulnerable people and communities in the area of influence of the Sugar Agroindustry contributing to good health, education and basic infrastructure.

In relation to optimization, the Innovation Hub will perform research and develop innovation for the optimization, efficiency enhancement, better use of resources and cost reduction of agricultural, industrial and logistical operations. With respect to adjacencies, the Hub will focus on developing other products, processes or activities related to sugarcane that will substantially increase its value in comparison to traditional uses. The focus will be on supporting the use of solutions based on agriculture technology, agriculture 4.0 and biotechnology for the development of new products for different markets and clients.

In terms of competitiveness, the innovative projects will center on the development of new adjacencies including byproducts and disruptive projects. The goal is to develop a sustainable competitive advantage that supports the Sugar Agroindustry and its members while continuing having a responsible approach to the population and the environment. The Hub will become a reference in Guatemala as a model of successful innovation that brings together investment funds, potential technologies and business models that will allow to escalate the innovations at the international level.

The Innovation Hub will lead and coordinate the current disperse efforts of the Guatemalan innovation ecosystem. The innovation ecosystem will be optimized by innovative projects focused on sustainability, climate change mitigation and the efficient development of the Sugar Agroindustry. The Hub will promote cooperative undertakings and research through strategic partnerships and “open innovation” projects with innovation laboratories, crowdsourcing, universities and research institutions, the international community and suppliers and specialists in diverse areas.

The development of capacities will be a major priority for the Hub. The objective is to ensure that Guatemala will count with sufficiently qualified experts to develop effective innovations. The focus will be on digitalization, communications, technologies, engineering and science. The Hub will add value by developing skills and aptitudes in the communities that could be affected by the replacement of the labor force due to technological advances. Support will be provided to motivate and boost ideas that could translate into sustainable undertakings that generate jobs fomenting inclusive industrialization and promoting social and operational stability.

The Hub will promote technology development in key areas such as communication, agriculture 4.0, artificial intelligence, machine learning, automatization, robotization, internet of things, augmented reality, digitalization and software that simplifies processes. Other areas include: the use of advanced equipment, sensors and GPS for the reduction of time in the delivery of raw material and finished products; optimization of irrigation, sugarcane variety activities, plague control, soil fertilization and water consumption; and biodiversity, sustainable ecosystems, synthetic biology, nanotechnology, biofuels, alternative energy, robotics, autonomous vehicles, and others.

In relation to infrastructure, the Innovation Hub is committed to develop and create technological laboratories (robotics, chemicals, agriculture, computational – artificial intelligence, deep learning, XML, AML, etc.), experimental stations, capacity centers, and others. Also, the Hub will coordinate cooperation among its members to develop common infrastructures such as road networks, communication infrastructure, ports and others that will be resilient to the impacts of climate change.



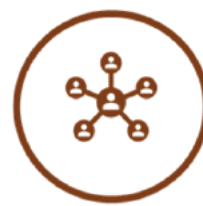
Sustainability



Optimization



Competitiveness



Ecosystem



Development

Related Targets

The activities by the Innovation Hub support the objectives of Target 9.5 on enhancing scientific research and encouraging innovation and of Target 9.1 on developing

resilient infrastructure. They also support the objectives of Target 9.2 on promoting sustainable industrialization.

INTERLINKAGES WITH OTHER SDGs

There are strong interlinkages between activities by the Guatemala Sugar Agroindustry related to infrastructure, industrialization and innovation (SDG 9) and other SDGs. One clear interlinkage is Energy (SDG 7) as the Sugar Agroindustry has built power plants that generate renewable and clean electricity for internal and external use. A strong interlinkage relates to economic growth (SDG 8) given the contribution of infrastructures, industrialization and

innovation to economic development. Another major interlinkage is in relation to sustainable agriculture (SDG 2) since many of the research, development and innovative activities are designed to achieve the sustainable production of sugarcane. These activities are also related to SDG 17, as multiple partnerships among different stakeholders are required in order to fully implement the Sugar Agroindustry's SDG 9 initiatives.



CONCLUSIONS



The Guatemala Sugar Agroindustry has important activities in its sustainable development strategy strongly supporting the building of necessary infrastructures, inducing industrialization and promoting innovation in Guatemala. These activities include the construction and efficient operation of Expogranel for the export of sugar, the operation of power plants for the generation of renewable electricity and the numerous advanced programs being implemented by Cengicaña, for the production of sustainable sugarcane, fostering innovation through the use of state-of-the-art technologies, methods and systems. Also, the newly

created Innovation Hub will boost sustainable innovation by developing a program of innovative projects through the identification and optimization of products, activities, processes and business models of the Sugar Agroindustry. These activities allow the Guatemala Sugar Agroindustry to be recognized as one of the most successful and efficient sugar industries in the world. The effort represents a critical part of the integrated approach followed by the Sugar Agroindustry in its social, economic and environmental strategy for the sustainable development of Guatemala.

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