UNALA
Unión de Azucareros Latinoamericanos
União do Açúcar Latino-americano –UNALA–

SUSTAINABLE WATER & ENERGY SOLUTIONS NETWORK

ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

7 AFFORDABLE AND CLEAN ENERGY

CASE STUDY:

Activities by members of the Association of Latin American Sugar Producers (UNALA) supporting the implementation of the Sustainable Development Goal 7 (SDG 7) of the United Nations 2030 Agenda for Sustainable Development

UNALA: Association of Latin American Sugar Producers 2025

End Poverty in all its forms everywhere / UNALA

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SDG 7: ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

T.7.1: By 2030, ensure universal access to affordable, reliable and modern energy services.

T.7.2: By 2030, increase substantially the share of renewable energy in the global enerby mix.

T.7.3: By 2030, double the global rate of improvement in energy efficiency.

T.7.a: By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.

T.7.b: By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

Source: United Nations, 2015.

1. CAMARA NACIONAL DE LAS INDUSTRIAS AZUCARERA Y ALCOHOLERA
2. ASAZGUA Asociación de Azucareros de Guatemala
3. izucar
4. ESASA Empresa de Servicios Azucareros S. A.
5. LAICA
6. cael
7. SECTOR AGROINDUSTRIAL DE LA CAÑA asocaña
8. UNICA
9. CENTRO AZUCARERO ARGENTINO
10. empresas iansa
11. PERUCAÑA
12. AZUCALPA Asociación de Azúcares y Alcoholes de Panamá
13. FENAZÚCAR
14. ALUR

THE ASSOCIATION OF LATIN AMERICAN SUGAR PRODUCERS

The Association of Latin American Sugar Producers (UNALA) is a private non-profit organization that brings together the agro-industrial sector of sugarcane and sugar beet of Latin America. The idea of creating UNALA surged in 2017 and it was formally constituted in 2020. It includes representatives from this agroindustry from 14 countries in the region. Its members are strongly committed to the sustainable production of sugar, electricity, and ethanol, among other byproducts. Together, the members of UNALA represent the largest sugar producing and exporting region in the world. UNALA is more than sugar, it is sustainability, energy, and economic development.

UNALA works with all its members to promote:

- Balanced lifestyles and diets
- The efficient and responsible use of natural resources, including water and land
- The production and use of renewable energy
- The use of ethanol as part of diversified energy matrices

According to data published in the Sugar Yearbook 2024 and the Ethanol Yearbook 2024, the countries represented in UNALA produce approximately 30 % of sugar and 30 % of ethanol in the world. Besides generating more than 6.5 million jobs, some of UNALA members also cogenerate renewable electricity and heat from sugarcane biomass, which is key to promote the sustainable development of Latin America.

The members are:

1. National Chamber of the Sugar and Alcohol Industries (CNIAA) - Mexico
2. Association of Sugar Producers of Guatemala (Asazgua/Guatecaña) - Guatemala
3. Distribuidora de Azúcar y Derivados S.A. (DIZUCAR) - El Salvador
4. Empresa de Servicios Azucareros, S.A (ESASA) - Nicaragua
5. Sugarcane Industrial Agricultural League (LAICA) - Costa Rica
6. Sugar Consortium of Industrial Companies (CAEI) – Dominican Republic
7. Association of Colombian Sugar Cane Growers (ASOCAÑA) - Colombia
8. Brazilian Sugarcane Industry and Bioenergy Association (UNICA) – Brazil
9. Centro Azucarero Argentino (CAA) - Argentina
10. Empresas Iansa - Chile
11. Peruvian Association of Agro-Industrial Sugar and Derivatives (PERUCAÑA) - Peru
12. Cane Sugar Industrial Association of Panama (AZUCALPA) - Panama
13. Federación Nacional de Azucareros del Ecuador (FENAZÚCAR) – Ecuador
14. Alcoholes del Uruguay (ALUR) - Uruguay

Vision

UNALA's vision is to be a sugar agroindustry that works together as a region and that operates sustainably in a global context in which its interests are represented.

Mission

UNALA's mission is to be the platform that allows the Latin American sugar agroindustry to operate under fair international conditions, in a competitive market while remaining committed to sustainability.

UNALA works to stimulate the continuous improvement of sustainable practices and thus promote low-carbon energy solutions, as well as actions to improve the efficient use of land and water resources. Therefore, its members have renewed different processes of the production chain allowing an increase in efficiency, an improvement in environmental sustainability, a reduction in the use of water in irrigation and an increase in investment for the preservation of biodiversity.

Objectives

- Facilitate a space for dialogue to promote communication and the development of joint activities that support the sustainable development of member countries in Latin America.
- Represent the Latin American sugarcane and sugar beet sector in regional and multilateral organizations.
- Promote actions, programs and strategies aimed at the sustainable development of the Latin American sugarcane and sugar beet agroindustry.
- Promote the exchange of information and the development of research and technology for the benefit of the sector.

UNALA is committed to advance the objectives and targets of all the Sustainable Development Goals of the United Nations 2030 Agenda for Sustainable Development as well as other global agendas including the Climate Change, Biodiversity and Human Rights agendas. Therefore, UNALA's sustainable development strategy focuses on integrated actions directed to address three key dimensions: people (social), prosperity (economic) and planet (environmental), as the basis for achieving sustainable development.

People

The sugarcane and sugar beet agroindustry of Latin America is committed to ensure the well-being of its collaborators and the communities that surround their operations. UNALA members generate decent employment, which translates into better quality of life and more opportunities for development. UNALA members generate a total of more than 6.5 million jobs.

Prosperity

The sugarcane and sugar beet agroindustry in Latin America, in total, represents the major producer and exporter of sugar in the world. Along its entire value chain, the sugar agroindustry represents economic development for countries. Sugar means opportunities for investments, innovation, and businesses.

The sugarcane agroindustry is also key for national economies due to its contribution to energy matrices including ethanol production for transport and electricity generation from sugarcane biomass.

Planet

In addition to working on all the issues related to the sustainable production and consumption of sugar, UNALA members work directly addressing many issues related to the efficient use of water and the reduction of contaminating waste-water discharges. Another major priority work area is the production of renewable energy that supports climate change objectives including the production of ethanol as an alternative fuel to fossil-fuels for use in the transportation sector and the cogeneration of electricity and heat using sugarcane residues, including bagasse, for self-consumption and to support national energy grids.

UNALA members also conduct programs and projects specifically designed to address other Sustainable Development Goals including: sustainable consumption and production, poverty eradication, decent jobs, ending hunger through improvements in agriculture productivity, sustainable production systems, inequality reduction, protection of biodiversity and aquatic and terrestrial ecosystems, quality education, improvements in health services and industrial processes and promotion of advanced technologies and innovation.

UNALA promotes sustainable development and cooperation of the sugar agroindustry of the region through work in three priority areas:

Sugar. Promoting balanced diets that recognize the importance of sugar with four objectives: (1) participate in regulatory processes related to sugar; (2) inform and educate about sugar and substitutes in the diet; (3) show the positive impact of the value chain of the sugar agroindustry; and (4) share knowledge and experiences about the consumption, education and regulation of sugar consumption.

Sustainability. Promoting the sustainability of the sugar agroindustry including: (1) sharing and promoting knowledge and experiences about sustainability practices in the social, economic and environmental dimensions; (2) closing the knowledge gaps in issues related to sustainability; (3) participating and creating partnerships with international organizations related to sustainable development; and (4) communicating information about the sustainability practices being implemented by the sugar agroindustry.

Renewable energy. Recognizing the importance of increasing the use of renewable energy through activities that: (1) promote the generation of renewable electricity using sugarcane residues; (2) promote the use of ethanol in Latin America; (3) exchange knowledge and experiences in the generation of renewable electricity and the production of ethanol; (4) develop new innovative opportunities for the use of sugarcane and beets; and (5) inform the public about the importance of the sugar agroindustry in the generation of renewable electricity for self-consumption and its contribution to the energy matrices of Latin American countries.

UNALA and the SDG 7

The members of UNALA have multiple initiatives in place that support the objectives of SDG 7 on ensuring Access to Affordable, Reliable, Sustainable and Modern Energy for All. Some examples of these important activities include: Biomass / Generation of Renewable Energy, Centro Azucarero Argentino (CAA), Ledesma Sugar Mill, Argentina; Sustainability in the Sugar-Alcohol Agroindustry, Obispo Colombres Agro-industrial Experimental Station (EEAOC), Argentina; Biogas: Responsible Production and Consumption, Brazilian Sugarcane Industry and Bioenergy Association (UNICA), Brazil; Renewable Energy Program, Empresas Iansa, Chile; Access to Electricity: The role of The Sugar Agroindustry as a provider of renewable, reliable and sustainable electricity to Guatemala, Asazgua/Guatecaña, Guatemala; and the Sugarcane Agroindustry efforts to increase the share of renewable energy in Guatemala Asazgua/Guatecaña, Guatemala.

BIOMASS / GENERATION OF RENEWABLE ENERGY
Centro Azucarero Argentino (CAA)
Ledesma Sugar Mill
Argentina

Objectives and Description

Located in the Ledesma Agro-Industrial Complex, in Jujuy, the objective of the Biomass / Generation of Renewable Energy Program of the Ledesma Sugar Mill is to contribute with the global goal of ensuring universal access to affordable, reliable and sustainable energy services by 2030. This is achieved by replacing its natural gas demand with energy from biomass, through an integrated and sustainable approach.

Ledesma Agro-Industrial Complex's energy demand is supplied by a thermoelectric plant which operates on natural gas or sugarcane fiber and by hydropower. During the off-harvest season this thermoelectric plant generated energy from gas only. During the harvest season the plant generates energy from gas and sugarcane marrow and fiber. Natural gas is responsible for more than 50 % of the total emissions of Jujuy's agro-industrial complex, its replacement with renewable energy reduces GHG emissions equivalent to the volume of gas replaced.

The specific objective of the project is to replace natural gas as the primary source of energy with biomass (sugarcane harvest residues left in the field). Today, the Ledesma Sugar Mill, through this program and management approach, has successfully increased the use of renewable resources from 38 % to 52 %.

Related Targets

The Biomass / Renewable power generation program's important developments in replacing the non-renewable energy sources with renewable ones contribute to Target 7.2 on substantially increasing the share of renewable energy in the global energy mix, and to Target 7.b on expanding the infrastructure and upgrading technology for supplying modern and sustainable energy services in its communities of influence.

Challenges

The program and its managerial approach met with the challenge of the implementation of the waste management system as it meant an important cultural change for the company's employees. The change had to be brought about gradually and well supported by training in standards and procedures and an internal communication strategy. However, to date, the waste separation and classification at source concept persists a challenge as the improper mixture of waste still complicates the processing of materials.

Another major challenge has been the lack of sufficient local customers for recyclable materials which include iron scrap, cardboard and kraft. These materials represent 65 % of recyclable waste and they are marketed in the province of Jujuy, contributing to income for the regional economy.

Lessons Learned

One of the major lessons learned has been the need to increase employees' awareness regarding standards and procedures considering cultural adjustments. This required the creation of a well-structured and integrated

employees' training program supported by a long-term communication strategy. Also, it was necessary to activate monitoring initiatives to oversee and follow-up the effectiveness of the communication strategy.

Another lesson learned has to do with the implementation of a communication strategy aimed at the community to increase awareness regarding the recyclable residue generated by the program. The community needed to be educated about the benefits of renewable waste commercialization.

Results

Since its beginning, in 2010, this program has increasingly used the residues of its 40,000 hectares of sugarcane harvest to replace its natural gas energy demand. It has successfully made possible to: (a) provide greater security of energy supply and cost control to the company; (b) increase the use of renewable energy which implies, at current values, to stop consuming 30 % of gas per year; (c) generate 100 new jobs in a community where unemployment is one of the main social concerns; (d) mitigate GHG impacts, generated in high percentage by the use of non-renewable fuels; and, (e) reduce (with green harvesting) the negative impact on air quality.

Interlinkages with other SDGs

The program's objective of increasing the use of renewable energy (SDG 7) has important interlinkages with: SDG 8 on Decent Work and Economic Growth, through its sustained, inclusive, full and productive employment and decent work for its area of influence; SDG 9 on Industry, Innovation and Infrastructure, by building resilient infrastructure, sustainable industrialization and foster innovation; SDG 12 on Responsible Consumption and Production, SDG 13 on Climate Action, by carrying out projects to combat climate change and its impacts; and, SDG 17 on the various important partnerships established.

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SUSTAINABILITY IN THE SUGAR-ALCOHOL AGROINDUSTRY
Centro Azucarero Argentino (CAA) Estación Experimental Agroindustrial Obispo Colombres (EEAOC)
Argentina

Objectives and Description

The primary objective of the Agroindustry Sustainability Program, implemented by EEAOC, is the analysis and integration of the production stages of raw materials, products, and by-products. It specifically targets the evaluation of the agricultural and agro-industrial environmental impact of these components from a life cycle perspective. The program estimates environmental emissions and establishes sustainability metrics across the different agro-industrial chains, including sugarcane, sugar, bioethanol, sugarcane harvest residue, bagasse, and derivatives.

Since 2001, Argentina has promoted the development of renewable energy sources with the aim of diversifying its energy matrix. A large part of the national renewable energy is provided by biofuels such as bioethanol and biodiesel. Bioethanol is produced from sugarcane (13 plants) and corn (6 plants) with a production capacity of 1,400 million liters/year in the northwest of Argentina, especially in the province of Tucumán. Biodiesel is produced in the central area of the country from soybean (36 plants) with a capacity of 5 billion liters/year, being one of the largest biodiesel producers in the world.

Tucumán is known for its sugarcane and lemon production. The province is responsible for 60% of the country's sugar production with 294,470 sugarcane hectares (ha) planted, and it is the world's leading lemon producer with 42,317ha planted. This feedstock is processed through 15 sugar mills and 8 citrus processing plants. Corn and soybean are also especially important crops with more than 90,280ha and 166,880 ha, respectively. The province has a significant surplus of biomass resources for energy purposes, consisting mainly of sugarcane, native forests and citrus.

Agricultural production and crop industrialization have environmental, social and economic impacts throughout the value chain. These must be quantified and assessed with tools such as Life Cycle Assessment (LCA), according to ISO standards 14040 and 14044.

Life Cycle Assessment (LCA) is a major tool for generating sustainability indicators through a comprehensive approach. LCA assesses environmental impacts across the life cycle of a product, process or activity. Environmental indicators such as Carbon Footprint, Water Scarcity, Cumulative Energy Demand, among others, are used. Social metrics cover areas like Forced Labor, Protection of Cultural Legacy, among others. Combining economic, environmental and social aspects into single indicators is not a consensual practice; however, subsequent separate evaluations and stakeholder analyses are necessary and revealing.

Tucumán offers significant bioenergy potential, due to its abundant and diverse biomass resources. The government has established laws to encourage biomass energy, biofuel use, and renewable electricity generation; however, specific sustainability standards are lacking. Overcoming institutional, legal, economic, technical, and socio-cultural hurdles is essential to fully integrate bioenergy into the national energy framework, matching its potential.

Related Targets

The program, aligned with SG 7, relates to: Target 7.2 on increasing substantially the share of r enewable energy in the global energy mix, by promoting the use of sugarcane biomass for biofuel production such as bioethanol and biodiesel, and diversifying the industry's energy matrix; Target 7.3 on doubling the global rate of improvement in energy efficiency, by aiming to improve energy efficiency in the production process of sugarcane and its derivatives; and Target 7.b on expanding infrastructure and upgrading technology for supplying modern and sustainable energy, by implementing new technologies for more efficient biofuel production and adopting tools for generating sustainability indicators.

Challenges

Challenges encountered during the implementation of this program include:

- Building a reliable database. Collecting comprehensive data from various stages of production to build a robust database of the agro-industries (life cycle inventories) from which other production scenarios can be studied.
- Development of environmental profiles of the products, services or activities.
- Development of proposals to improve the production chain.
- Optimization of agro-industrial processes to increase efficiency and sustainability.
- Existing institutional, legal, economic, technical and socio-cultural barriers that must be overcome.
- Keeping pace, as far as policy makers and public sector are concerned, with the changes requested by the private sector to implement improvements in the sustainability of processes and to reap benefits from greater sustainability.

Lessons learned

Some important lessons have been learned during the implementation of this program including:

- The implementation of environmental assessment tools, such as Life Cycle Assessment, Carbon Footprint and Water Footprint, is essential to measure the environmental impact of products or services throughout their life cycle.
- A large number of international guidelines and standards for environmental assessments are being adopted worldwide. These should be evaluated and considered to align this agroindustry with the standardization of these practices.
- It is imperative that the political will and motivation of private enterprises allow the adoption of these tools. It requires a comprehensive approach that includes policy reform, legal adjustments, economic incentives, technological innovation, and socio-cultural engagement.
- It is essential for Tucumán, as an important producer of goods for national and international markets, to guarantee sustainable production and consumption to meet market demands.

Results

Significant results have been achieved during the implementation of the program including:

- Sugarcane production systems with different technological levels were established in the province of Tucumán which allowed the estimation of sustainability indicators, such as energy use and greenhouse gas (GHG) emissions. The results allowed the optimization of the production process through changes in the type of nitrogen fertilizer, adoption of biological options, and the technological impact of changing from manual to mechanized operations as harvest and planting. Additionally, a general adoption of trash blankets in sugarcane fields was observed.
- Non-traditional energy crops (sweet sorghum and fiber sorghum) were developed on a semi-commercial scale, complementary to sugarcane cultivation. These crops were used for bioethanol and energy production in marginal areas, and for diversifying the production system.
- The first environmental analysis of sweet sorghum bioethanol production in Tucumán was conducted, including field production and processing at the mill. Different impact categories were identified, leading to adjustments to be made both in the agronomic management of the sweet sorghum crop and its industrialization.
- Rational use of industrial water and the application of recovery and reuse methodologies were studied to significantly minimize water consumption and wastewater generation.
- To make energetic use of residual biomass from the sugarcane harvest, this renewable source was analyzed, and collection, logistics and storage systems were evaluated for its use in boilers. In addition, combustion tests were carried out in bagasse boilers and the energy rate of return was determined as a fundamental indicator of the system's sustainability.
- Based on energy evaluations in the steam production and consumption sectors, it was possible to increase thermal efficiency and reduce steam consumption in the heating, evaporation and cooking systems.
- The environmental profile of sugarcane bioethanol was determined

using the life cycle approach. A comparative environmental study was conducted on the use of this biofuel with fossil fuels, showing the advantages of its use in blends.

- Based on the results obtained, publications and presentations were made at international and national congresses and conferences, as well as various media publications.
- Based on R&D results, national and international grants were awarded to support transfer projects for small sugarcane growers and to advance evidence-based policymaking on sustainability issues.

Interlinkages with other SDGs

The program's multi-dimensional comprehensive approach, framed within SDG 7, interlinks with: SDG 6 on Clean Water and Sanitation, shown by the EEAOC's approach to renewable energy sources and innovative technology whereby water pollution is addressed with the rational use of industrial water and the application of recovery and reuse methodologies; SDG 12 on Responsible Consumption and Production, through advocating for sustainable production practices and encouraging responsible energy consumption; and SDG 13 on Climate Action since the program contributes to climate change mitigation through reducing greenhouse gas emissions via sustainable practices.

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BIOGAS: RESPONSIBLE PRODUCTION AND CONSUMPTION
UNICA
Brazil

Objectives and Description

Since 1980, the sugar-energy sector has been searching for technological alternatives to make viable the anaerobic biodigestion of vinasse and its energetic use.

The vinasse technological model aims to produce energy without losing its fertilizer potential. Based on a biorefinery model promoted by RenovaBio, it uses waste and replaces fossil and chemical inputs. This requires a combination of vinasse concentration and anaerobic biodigestion technologies. Anaerobic biodigestion is used to produce biofertilizer and biogas, and/or biomethane. This process generates clean water that can be returned to the industrial process, further reusing this important resource.

The combination of these two technologies contributes to the economic viability of projects and makes possible vinasse's adaptation for sustainable management, thereby facilitating its agronomic and energetic use.

Three production routes have been identified for the energetic use of vinasse: i) Biodigestion followed by concentration with a membrane system; ii) Biodigestion followed by concentration with an evaporation system; and iii) Concentration of vinasse followed by its co-digestion. Currently, the main plant producers are Cocal, Raizen, São Martinho and Tereos group in Brazil.

Related Targets

The biogas development and production, promoted and carried out by the sugar-energy sector in the State of São Paulo, supports the objectives of Target 7.2 on substantially increasing the share of renewable energy in the global energy mix, as shown by promoting biogas and biomethane production and their use within the energy mix; Target 7.a on promoting investment in energy infrastructure and clean energy technology as shown by the on-going projects, pilot and large-scale facilities and the promotion of new biogas projects within the sugarcane industry;

and, Target 7.b on expanding the infrastructure and upgrading technology for supplying modern and sustainable energy services nationwide by promoting the production, distribution and use of biogas and biomethane.

Challenges

There is no specific regulation on the production of biogas in Brazil, not even a guiding public policy for promoting this practice in the sugar-energy sector. This has been a major challenge. The pilot projects conducted to date have followed generic authorization and operation guidelines.

Lessons learned

The need for a properly regulated framework, specific to the biogas industry, has been one important lesson learned. A comprehensive framework is necessary that includes technological developments, legal structure, governmental support, financial resources, incentives and commercialization. It should be aligned with Brazil's policies on alternative energy production, environmental and social protection, and sustainability.

Biomethane is a renewable solution that can replace natural gas of fossil origin in all its uses. By purifying biogas to meet the conditions established by the National Agency for Petroleum, Natural Gas and Biofuels (ANP), biomethane is obtained and can be injected into the natural gas network for domestic, industrial and biofuel use. Specific regulation for the production, commercialization and use of biomethane through the existing natural gas infrastructure has also been found necessary.

Results

São Paulo State Sanitation and Energy Regulatory Agency (ARSESP) has estimated a production of 20 million m3 per day, or more than 7.3 billion m3 per year. This, according to the São Paulo Energy Plan, could be converted into 4.4 TW/year of electricity from the biodigestion of vinasse.

Preliminary results obtained in November 2020 by the Research Center for Gas Innovation (RCGI) concluded that biomethane has great potential to increase the supply of natural gas. It can replace up to 46 % of the natural gas consumed in São Paulo, or the equivalent of nearly 6% of the electricity consumed in the State in 2014.

According to the Brazilian Biogas Association (ABIOGÁS) and the National Agency for Petroleum, Natural Gas and Biofuels (ANP) rules (ANP Resolution No. 8/2015 and ANP Resolution No. 685/2017), the potential biogas production in Brazil has been estimated at 21.1 billion Nm3/year in the sugar-energy sector, 6.6 billion Nm3/year in agricultural production, 14.2 billion Nm3/year in the animal protein sector and 2.2 billion Nm3/year in sanitation waste management.

The potential to convert biogas into electricity is 170,912 GWh/year. It could also be converted into biomethane to replace 40.8 billion liters of diesel.

Interlinkages with other SDGs

In addition to supporting the objectives of SDG 7 on energy, the Biogas initiative has very important interlinkages with: SDG 6 on clean water and sanitation, on the vinasse technological model generating clean water that is returned to the industrial process; SDG 8 on the

generation of productive employment by the biogas and methanol producing plants and the work they generate for their communities; SDG 9 by promoting resilient infrastructure, sustainable industrialization and fostering innovation through the development of pilot, large-scale and full industrial biogas production facilities; SDG 11 by making cities and human settlements sustainable through incorporating environmental sustainable biofuel use into the community; SDG 12 on ensuring sustainable consumption and production patterns; SDG 13 Climate Action, by carrying out biogas and methane projects aimed at reducing CO2eq emissions; and SDG 17 by the important partnerships achieved with government, associations and sugar mills.

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RENEWABLE ENERGY PROGRAM
Empresas Iansa
Chile

Objectives and Description

The Renewable Energy program, based on its Sustainability Policy and Global Warming and Climate Change Declaration, reflects the company commitment regarding energy towards 2025. This commitment indicates that more than 95% of its third-party energy supply comes from renewable sources.

Empresas Iansa acknowledges that the reduction of its carbon footprint is closely linked to the use of non-polluting energies. In its direct emissions, known as Scope 1, the categories that contribute most to the environmental impact are related to the consumption of fossil fuels.

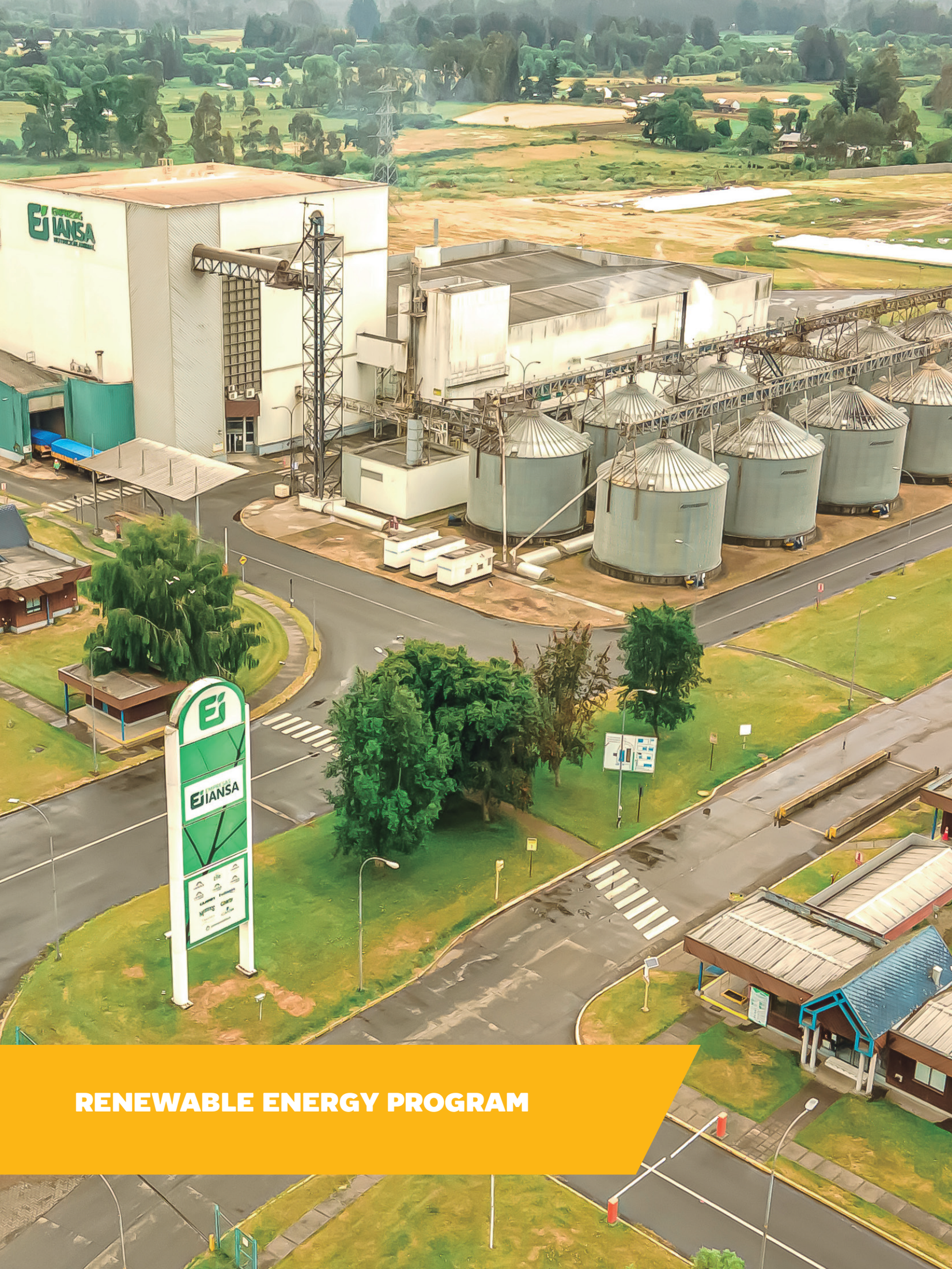
The company is committed to improving energy efficiency in its production processes. As part of this effort, Patagoniafresh has obtained ISO 50,001 certification, which guarantees its energy efficiency and constitutes part of the company's comprehensive policy. Under this regulatory framework, the electricity and fuel consumption of all its plants is monitored and reported annually.

During 2022, the energy efficiency training program, "Energy Manager, implemented in alliance with the Ministry of Energy," had the participation of 20 % of Patagoniafresh employees. Likewise, promoted by the Ministry of Energy, the ESCO Model was implemented. This model focuses on supporting investments in energy efficiency for both public and private clients. It helps to finance and execute projects that seek to improve energy use, thereby reducing costs and environmental impact.

Currently, 95 % of the energy purchased by Empresas Iansa comes from renewable sources, specifically non-conventional renewables (NCRE). The objective is to maintain or exceed this percentage, while keeping the agreements with suppliers and simultaneously entering clean energy projects (e.g., wind). The goal is to exceed 95% reliance on NCRE.

Related Targets

The Renewable Energy Program supports the objectives of SDG 7 through the following targets: Target 7.1 on ensuring universal access to affordable, reliable and modern energy services, by the program's actions on expanding access to electricity by investing in renewable energy sources; Target 7.2 on increasing substantially the share of Renewable Energy, as shown by the company's commitment to guarantee that more than 95% of its energy supply comes from renewable sources; and, Target 7.3 on improving Energy Efficiency through adopting efficient non-conventional renewable energy sources from third parties while simultaneously improving efficiency of its own clean energy projects.



RENEWABLE ENERGY PROGRAM

Challenges

The implementation of the Renewable Energy program has encountered important challenges including:

- Addressing the environmental impact of the company's production processes and value chains has been a complex and ongoing challenge.
- Investment in Infrastructure. Upgrading physical and technological infrastructure across the company's facilities has represented a major and continuous challenge.
- Financial challenges have been significant and crucial for the development of the NCRE program.

Lessons learned

In response to the stricter environmental regulations on environmentally harmful technologies, some of the most important lessons learned throughout the various actions implemented by Empresas Iansa on its Renewal Energy approach include:

- The environmental impact of the company's production processes and value chains require comprehensive and ongoing addressing, from the harvesting of raw materials to the commercialization of its products.
- The requirement for upgrading physical and technological infrastructure across the company's facilities has been a significant lesson learned. It demands foresight, planning, resources and focus, and should be a component of a comprehensive program.
- It has been crucial to identify and access funding sources that enable the adoption of sustainable energy sources. Financial resilience for NCRE projects is an essential issue requiring a clear and robust financial strategy, and a comprehensive approach.
- Active engagement and advocacy from political entities is crucial and has been essential to ensure that the company's renewable energy policies remain a priority.
- Research and Development is necessary to overcome technical barriers and reduce costs associated with NCRE adoption.

Results

The company's comprehensive strategic approach to Renewable Energy Adoption has evolved through meaningful results. Some include:

- In 2018, Empresas Iansa signed a contract for the supply of Non-Conventional Renewable Energy (NCRE). The contract covers most of the company's facilities in the country, with a supply of 42.79 GWh. The certification implies that 95 % of the energy injected from the Central Interconnected System (CIS) comes from NCRE generation sources.

- As of 2020, management controls were increased to improve the company's progress, in a more rigorous manner, in becoming a sustainable food company.
- In 2022, the energy efficiency training program "Energy Manager, in alliance with the Ministry of Energy" was conducted. 20% of Patagoniafresh employees participated in the training.
- Patagoniafresh obtained ISO 50,001 certification, guaranteeing its energy efficiency.
- The replacement of lighting fixtures at the Molina and San Fernando plants, incorporating LED and solar devices, providing savings and greater durability was implemented.
- In 2022, the Ñuble plant achieved a decrease in oil consumption, a

reduction of 77 % compared to the previous period.

Interlinkages with other SDGS

The Renewable Energy program, framed within SDG 7, is interlinked with: SDG 9 on Industry, Innovation and Infrastructure through the development of sustainable and resilient infrastructure for responsible energy production; SDG 12 on Responsible Consumption and Production as evidenced by the program's actions supporting sustainable and efficient consumption and production of energy; SDG 13 on taking urgent action to combat climate change and its impacts as demonstrated by the company's comprehensive approach to reducing reliance on fossil fuels and lowering its greenhouse gas emissions; and SDG 17 on Partnerships for the Goals since the program benefits from partnerships, investments, and technology sharing as shown by ongoing collaborations with the communities of influence, government institutions (Ministry of Energy), the Sofofa Hub, the International Renewable Energy Agency (IRENA), among others.

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ACCESS TO ELECTRICITY ASAZGUA/GUATECAÑA Guatemala

Objective and Description

The Guatemalan Sugarcane Agroindustry (Guatecaña) 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. Guatecaña's members operate 11 power plants that generate electricity and heat for both internal consumption and to feed the national grid (Guerra, 2019). Nine of these 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.

The rapid increase in the national electrification index from 61.3% to 91.2% during the 1996-2020 time-period coincides with the beginning of the generation of electricity by the sugar agroindustry and its contribution to the national electricity grid.

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 from around 400 GWh during the 1997-1998 harvest season to 2824 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). Currently about 91% of the electricity used for the sugar agroindustry during the 2021-2022 harvest season was generated using sugarcane bagasse.

During the 2021-2022 harvest, the contribution of the sugarcane industry to annual power generation accounted for 27%. Cogeneration with sugarcane bagasse represented the second largest generator of electricity only after hydropower. Power generation from sugarcane bagasse complements electricity generation from hydropower, which is typically low during the harvest period. Electricity from the Sugarcane Agroindustry has covered up to 32% of the national electricity demand during the harvest season (Cordon, 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. The energy generated with sugarcane biomass represents only 18% of the overall emissions from the

total energy generation by the sugar agroindustry. This allows savings of a considerable amount of foreign exchange since less imported fossil fuel is needed.

It is important to note that the sugarcane producers are sometimes called by the national electricity market in critical times for the country to generate electricity even during the non- harvest season. This has forced sugar producers to make investments and even to keep coal reserves for national emergencies during years with winters with little rain.

Guatecaña 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 six months of the dry season, all by using 100% of the sugarcane bagasse obtained during sugar production.

Related Targets

The electric generation activities being conducted by the Guatecaña provide strong support for the advancement of Target 7.1 of SDG 7 on ensuring access to affordable, reliable and modern energy services. The contribution is substantial at the national level providing critical electricity during times that the hydropower option might be limited. These activities support Target 7.b given the continuous expansion and upgrading of infrastructure and technologies for supplying modern and sustainable energy services in Guatemala. They also support Target 7.a by enhancing international cooperation to facilitate access to clean energy through electricity exports to other countries in Central America and to Mexico.

Challenges

The Guatemalan Sugarcane Agroindustry became an example 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 machinery 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.

This 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 and discover better energy processes 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 Sugarcane Agroindustry has been able to prove the extraordinary value of using bagasse for the generation of renewable electricity, 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, electricity generation from sugarcane bagasse represents one of the most important sources of electricity for Guatemala contributing to the social, economic, and environmental dimensions of sustainable development.

Interlinkages with other SDGs

The interlinkages between Energy Access activities of the Guatemalan Sugarcane Agroindustry and other SDGs are considerable. The strongest interlinkages are in relation to economic growth (SDG 8) and poverty eradication (SDG 1), given the fact that the Sugar Agroindustry is generating renewable energy in the form of electricity and ethanol with positive consequences to the overall economy of the country and at the same time helping to reduce poverty by providing access to electricity when is most needed to the national grid. There is also a strong interlinkage to partnerships (SDG17), since the Guatemala Sugarcane Agroindustry has many partnerships with national, local, regional and international organizations that support the generation of sustainable energy and the pursuit of sustainable development in Guatemala and Central America.

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INCREASING THE SHARE OF RENEWABLE ENERGY ASAZGUA/GUATECAÑA
Guatemala

Objective and description

In Guatemala, hydropower plants and the cogeneration based on sugarcane bagasse provide critical energy to the national system during the dry season. The sugar producers have installed generating capacities with alternative fuels replacing thermal technologies that are more expensive. It also complements hydropower generation during dry years.

Since 1997 cogeneration using sugarcane bagasse has grown considerably improving the energy generating capacity year after year and the sales to the national electricity grid. During the 2021-2022 harvest the sugar agroindustry generated 27 % of the electricity demand by the country from November to May. It was the second largest generator only after hydropower at 35%. Coal power plants were the third generators at 26 %. Other renewable energies (biogas, geothermal, wind and solar) maintained their share in relation to the previous harvest at around 7 %.

The low efficiency of wind and solar systems in Guatemala is allowing cogeneration by the sugar agroindustry to be the most stable and durable option after hydropower in the short and mid-term. Bunker-C was a fossil fuel utilized by the sugar agroindustry in the past, but it has been gradually replaced using bagasse very successfully.

During the harvest season, cogeneration generates energy with the most stable declared variable cost. It represents the second lowest cost only after other renewable energies. Cogeneration controls and reduces the spot price of energy in the market. It does not require reserves, nor forced generation; therefore, it reduces operational costs so that energy reaches the users at a lower price.

Another renewable fuel produced by the Guatemalan Sugarcane Agroindustry (Guatecaña) is ethanol. The sugar agroindustry in Guatemala has the capacity to produce up to 250 million gallons of ethanol every year. Ethanol from sugarcane can potentially make an important contribution to reduce national GHG emissions in Guatemala. According to the National Low Emission Development Strategy, a 10 per cent blend of domestically produced ethanol in gasoline may help to reduce emissions from motor vehicles, improve air quality in towns and cities, reduce gasoline imports, and help the country accomplish its commitments to the Paris Agreement. The reduction potential is estimated at some 233,333 tons CO2eq/year (Guerra, 2019).

The Sugarcane Agroindustry is also actively involved in research and development of different agricultural waste that could be used to generate renewable energy. The agricultural wastes of the green harvest have considerable energetic potential not only in Guatemala but around the world where sugarcane is grown and harvested. These biological wastes have the same or more calorific value than sugarcane bagasse. Millions of tons in the world could be collected in an efficient manner to be used as a key component of the biofuel matrix.

Research and tests have been conducted with wood splinters from the energy forests planted by the industry. Also, experiments have been performed with the leaves that remain in the field after the sugarcane green harvests. The results have been promising and some of the sugar producers already have experience with these organic waste as efficient and cost-effective biofuels.

Related Targets

Guatecaña provides active support for the advancement of Target 7.2 of SDG 7 on increasing substantially the share of renewable energy not only for internal use but for the overall country. The contribution of electricity using renewable biomass is substantial at the national level both during the time of the harvest and at other times. The activities by the Agroindustry related to the production of ethanol provide an option to increase the use of renewable energy in the transport sector. In addition, the research and development activities on other biomass residues with potential application as energy fuels represent a promising alternative to keep increasing the share of renewable energy in Guatemala.

Challenges

In the past, the major challenge has been to keep performing the necessary activities and programs to effectively expand the generation of electricity and heat using renewable sugarcane biomass and securing the necessary investment to implement these activities.

Another challenge is to continue research and development activities to identify other forms of efficient and cost-effective

biomass for use in the energy field.

Lessons learned

The Sugarcane Agroindustry understands the need to follow an integrated approach to sustainable development in which renewable energy plays an important role. Therefore, it has been necessary to have a strong and continued support for activities that help to successfully substitute fossil fuel with renewable energy sources.

Results

The Sugarcane Agroindustry has been very successful for almost three decades in its effort to replace fossil fuel with sugarcane bagasse. Today, it is able to generate about 14 % of annual national electricity demand and 27 % of the electricity demand during the harvesting period using renewable energy. Additionally, its activities on research and development continue in the search of other forms of renewable energy based on biomass that could further support the expansion of bioenergy in Guatemala.

Interlinkages with other SDGs

The interlinkages between Renewable Energy activities of the Guatemalan Sugarcane Agroindustry and other SDGs are considerable. The strongest interlinkages are in relation to climate change (SDG 13), water (SDG 6) and sustainable cities (SDG 11). Another strong interlinkage is with respect to partnerships (SDG17), since the Guatecaña has many partnerships with national, local, regional and international organizations that support the generation of sustainable energy and the pursuit of sustainable development in Guatemala and Central America.

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