

## CASE STUDY:

Activities by the Guatemala Sugar Agroindustry supporting the implementation of the Sustainable Development Goal 12 (SDG 12) of the United Nations 2030 Agenda for Sustainable Development.









# ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS





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Ensure Sustainable Consumption and Production Patterns / Asazgua

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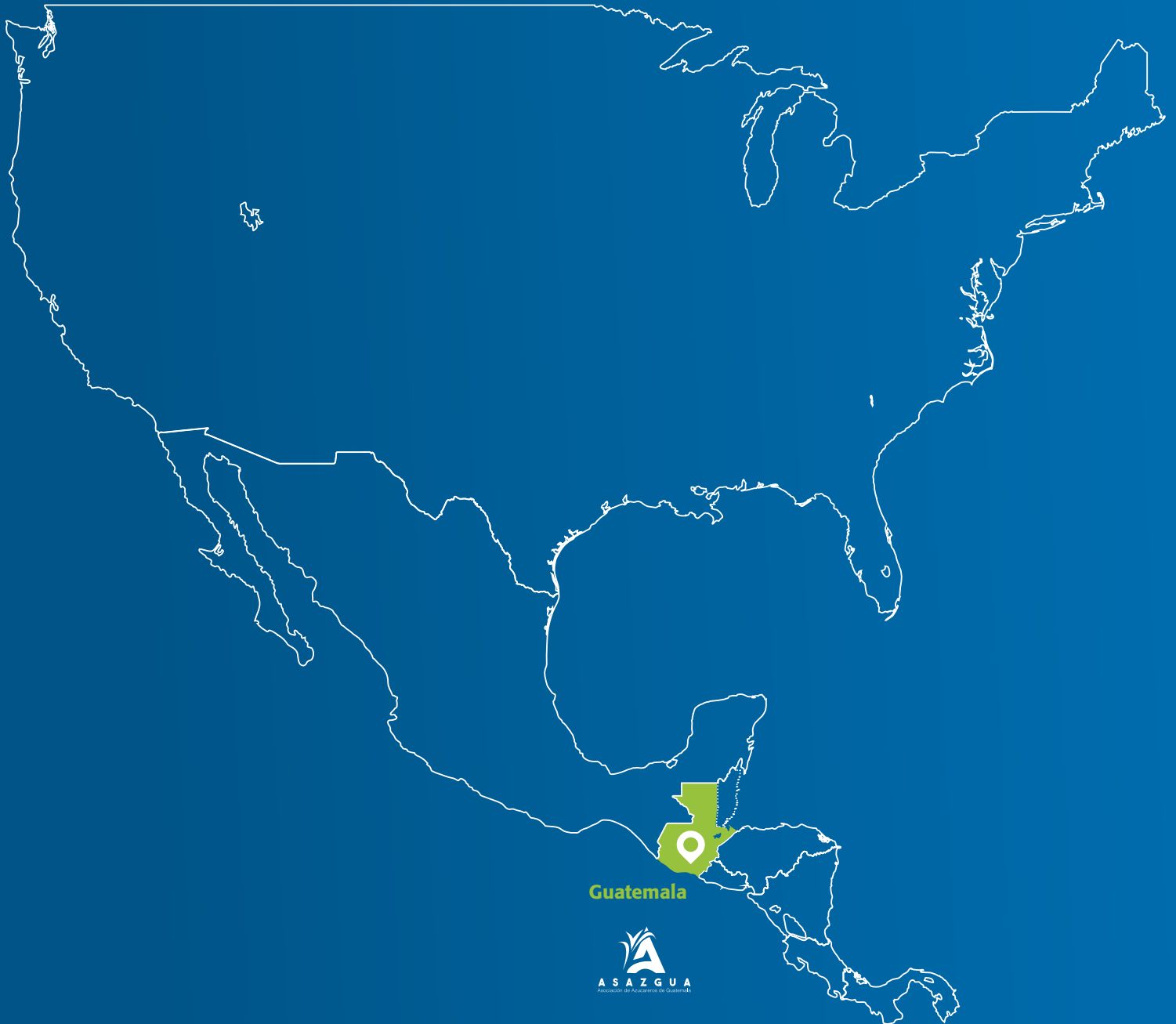
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# ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS



**Target 12.1:** Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries.

**Target 12.2:** By 2030, achieve the sustainable management and efficient use of natural resources.

**Target 12.3:** By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

**Target 12.4:** By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

**Target 12.5:** By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

**Target 12.6:** Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

**Target 12.7:** Promote public procurement practices that are sustainable, in accordance with national policies and priorities.

**Target 12.8:** By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

**Target 12.a:** Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production.

**Target 12.b:** Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products.

**Target 12.c:** Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities.





**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.

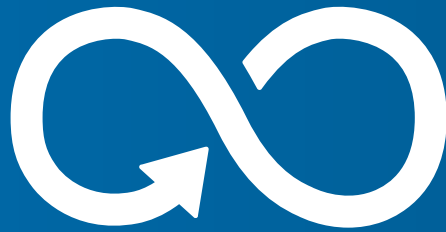
Given its policy of unified action, proactive attitude and strong socioeconomic support, the Sugar Agroindustry leads as a positive agent of change for integral development, boosting the progress of its members and the country.

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 12**

The Guatemala Sugar Agroindustry has initiatives in place with the aim of promoting and ensuring sustainable consumption and production patterns which are the main objectives of SDG 12. Activities aim at developing, implementing and scaling up sustainable consumption and production initiatives that increase the net contribution to resource efficiency and productivity, poverty eradication, social development and environmental sustainability.

The most important activities of the sustainable development strategy of the Sugar Agroindustry supporting the objectives of SDG 12 include the use of bagasse from sugarcane for the generation of electricity and the reuse of water in different processes of the cycle for the production of sugar.



# 1. GENERATION OF ELECTRICITY

## 1.1. Generation of Renewable, Reliable and Sustainable Electricity Using Bagasse

### Objectives and Description

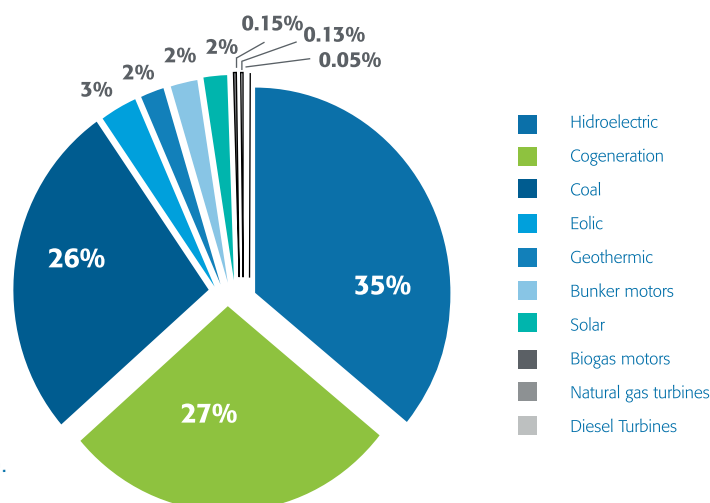
Guatemala's economy increasingly depends on export-oriented agriculture with sugarcane and sugar production playing a leading role. Sugar mills have used the bagasse from sugarcane for power generation since the 1990s. Bagasse or sugarcane biomass is a by-product of the sugar production process. It is the fibrous residue left behind when sugarcane stalks are crushed to extract their juice. The use of bagasse for electricity generation represents an important example of the commitment by the Guatemala Sugar Agroindustry to achieve the sustainable management and efficient use of natural resources and its support for sustainable consumption and production.

The Guatemala Sugar Agroindustry has played an important role in the growth of electricity access in Guatemala in the last several decades. 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 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 is generated using sugarcane bagasse.

**Figure 1: National Electric Matrix (November 2021 to May 2022)**



Source: Cengicaña (2022).

During the 2021-2022 harvest, the contribution of the sugar industry to annual power generation accounted for 27% as shown in Figure 1. 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. The contribution of electricity from sugarcane bagasse to the National grid is allowing to avoid increases in electricity prices during the dry season. 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.







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 and responsible in its activities.

## Related Targets

The use of bagasse for the generation of renewable electricity by the Guatemala Sugar Agroindustry provides strong support for the advancement of Target 12.2 on achieving the sustainable management and efficient use of natural resources. It also supports the objectives of Target 12.5 on substantially reducing waste generation.

## Challenges

The Guatemala Sugar 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 machineries but also with respect to the commercial and managerial areas.

The managerial strategy of this agroindustry has placed the cogeneration with bagasse 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 hydro 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.

## 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, a by-product of sugar production, 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.



## 2. WATER REUSE

### 2.1 Water Reuse

#### Objective and Description

The Guatemala Sugar Agroindustry operates within the framework of an environmental management policy of union compliance that has allowed the standardization of practices in the management and use of water, air quality, use and application of agrochemicals, solid waste management and conservation of biodiversity.

Water is essential for living and for agricultural and industrial processes. Due to climate change impact, and natural phenomena (such as El Niño), the sugar industry has come to implement better management practices to make a rational use of the resource reducing water consumption and reusing wastewater in some of its processes. These activities support the objectives of increasing sustainable consumption and production patterns.

The Sugar Agroindustry participates in Technical Tables with community, local authorities, institutions and governmental and human rights organizations, as well as other companies and sectors, to coordinate the rational use of water from

the rivers, with the objective that everyone can enjoy the water resource. Water use in agricultural processes has been reduced by implementing more efficient irrigation systems and application of new technologies and processes. Investment by the Sugar Agroindustry in irrigation systems has allowed the development of practices for the rational use of water in agriculture.

In the industrial process, used water is sent to cooling systems (towers or sinks) to be reused later in the process. Industrial wastewater from the sugar production is also reutilized after being treated for fertigation which allows a timely supply of water and fertilizer application. Sludge treatment systems are connected to irrigation systems to allow the conditioning of soils with essential nutrients for the growing of crops.

The Sugar Agroindustry has sewage water monitoring systems in all the sugar mills in order to ensure the fulfillment of parameters established by the environmental regulation in force since 2006.<sup>1</sup>

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<sup>1</sup> ACUERDO GUBERNATIVO 236-2006: Use and management of sewage water and sludge treatment, issued by the Ministry of Environment.





**In the industrial process, used water is sent to cooling systems (towers or sinks) to be reused later in the process.**





In 2018 studies were initiated on the water footprint of sugar and sugarcane. This refers to the quantity of water used in production, including rainwater (green water footprint), both ground and surface water (blue water footprint), as well as wastewater (grey water footprint). The average water footprint of sugarcane cultivation in Guatemala is estimated at 110.35 m<sup>3</sup> of water per ton of sugarcane, which is 38% below the world average. Some 73% of the water used for the sugarcane crop in Guatemala is provided by rainfall and 21% by irrigation from surface and underground sources (ICC, 2020a).

The sugar agroindustry has implemented procedures and practices for the significant reduction and rational use of water in the production and processing of sugarcane. Industrial

waste waters from sugar production go through a treatment process allowing them to be charged with essential nutrients for use in systems of fertilization-irrigation. Also, the most efficient sugarcane variety has been developed in Guatemala which allows the reduction by 14% of the use of water per ton of sugar produced.

### **Related Targets**

The activities related to water reuse are directly related to Target 12.2 which calls for achieving the sustainable management and efficient use of natural resources. These activities also support Target 12.5 on reducing waste generation through prevention, reduction, recycling and reuse.



## Challenges

One major challenge is the coordination of activities with communities, local authorities, institutions and governmental and human rights organizations, as well as other companies, to ensure the rational use and reuse of water avoiding the disposal of contaminated water in terrestrial and water ecosystems. The knowledge dissemination and the creation of awareness for the responsible and efficient use and reuse of water is a task that needs constant attention. Another major challenge is the need to modify water efficiency practices to adapt to the new impacts from climate change.

## Lessons learned

The participation and involvement of the communities and local authorities, in addition to the association of all the sugarcane producers, is essential to ensure the efficient

use and reuse of water resources. Also, it is clear that the investment in innovative technologies and software is necessary to continue improving the efficiency in all water and wastewater processing systems.

## Results

The Sugar Agroindustry has been able to effectively reduce the use of water through the implementation of efficient water use techniques and reusing systems. Major water savings have continued to increase through the years. Today the Guatemala Sugar Agroindustry has a water footprint of sugarcane cultivation which is considerably below the average for the world.

**Industrial waste waters from sugar production go through a treatment process allowing them to be charged with essential nutrients for use in systems of fertilization-irrigation.**



## INTERLINKAGES WITH OTHER SDGs

Activities by the Guatemala Sugar Agroindustry related to sustainable consumption and production (SDG 12) include interlinkages with other SDGs. A clear interlinkage is Energy (SDG 7), as the Sugar Agroindustry generates renewable electricity with the use of bagasse a by-product from sugar production. These activities are also related to water (SDG 6), as water reuse is a major activity of the Sugar Agroindustry that contributes to the sustainable management of this natural resource. It is also related to terrestrial ecosystems (SDG 15) since the use of bagasse for electricity generation and the treatment of wastewater support the reduction of waste and potential contamination of terrestrial ecosystems.

Investment by the Sugar Agroindustry in irrigation systems has allowed the development of practices for the rational use of water in agriculture.





## CONCLUSIONS

The Guatemala Sugar Agroindustry recognizes the importance of implementing sustainable consumption and production initiatives and policies. Its efforts through relevant programs such as the cogeneration of renewable, reliable and sustainable electricity and heat using bagasse and the reuse of water in different steps of the sugar production cycle demonstrate its commitment to a more responsible way of life conducive to sustainable development and prosperity in Guatemala. These efforts represent a critical part of the integrated approach followed by the Sugar Agroindustry in its social, economic and environmental strategy.

The Sugar Agroindustry is an example in cogeneration using sugarcane bagasse. Its electricity contribution to the National Electricity Matrix of 27% during the 2021-2022 harvest demonstrates the important role it plays in supporting the availability of electricity in Guatemala without higher prices especially during the dry season.



## REFERENCES AND SOURCES FOR ADDITIONAL READING

Asazgua (2021), Memorias de Labores 2020. Asociación de Azucareros de Guatemala. 2021.

---

Asazgua (2021): Uso de Bagazo en Guatemala para garantizar el acceso a energía asequible, confiable y sostenible (ODS 7).

---

Asazgua (2020): Azúcar de Guatemala: Evolución de la Agroindustria Azucarera de Guatemala. <https://www.azucar.com.gt/>

---

Asazgua (2020), Memorias de Labores 2019. Asociación de Azucareros de Guatemala. 2019.

---

Asazgua/Cengicaña (2020): Cogeneración en Guatemala: Plantas de Energía con Biomasa de caña de azúcar, Guatemala, 2020.

---

Cengicaña. (Centro Guatemalteco de Investigación y Capacitación de la Caña de Azúcar). 2020. Informe Annual 2019-2020. [www.cengicana.org](http://www.cengicana.org)

---

Cordón (2020): "The Guatemalan Sugar Industry and its alignment with the UN 2030 Agenda for Development: Case Studies". Isabel Cordón, Asazgua. Presented at the HLPF event on Sustainable Water and Energy Solutions. July 2020.

ICC (Instituto Privado de investigación sobre Cambio climático) (2020): Huella Hídrica en la Producción de Azúcar de Guatemala, Zafra 2019-2020. Diciembre 2020.

---

ICC Instituto (Privado de investigación sobre Cambio climático) (2020a): Informe de Labores 2010-2020, Guatemala, 2020.

---

International Sugar Organization (2022): "Sugar Year Book 2022", Londres, 2022.

---

Guerra, (2019): "Sharing experiences on integrated water and energy management for sustainable development and climate action: the Guatemalan Sugar Industry." presentation at the 2019 United Nations HLPF side event of the Sustainable Water and Energy Solutions, Alex Guerra, New York, July 2019.

---

United Nations (2015): Transforming our World: the 2030 Agenda for Sustainable Development, A/RES/70/1.

<https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>





SUSTAINABLE  
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