



Water, Biomass and Energy Nexus: Electricity Generation from Sugarcane Biomass in Guatemala



Sustainable Development Goals Addressed



Organization, Institution or Company
Association of Sugar Producers of Guatemala (ASAZGUA)
Location of project site, Country
Guatemala
Brief narrative description of objective/project/activity/initiative
<p>Guatemala's economy increasingly depends on export-oriented agriculture with sugarcane and sugar production playing a leading role. Sugar factories have used bagasse for power generation since the 1990s. Sugarcane is also the main agricultural base for ethanol / biofuel production. With growing domestic and international demand and competition for land, water and energy understanding their interlinkages and identifying opportunities for synergies and efficiency is of great importance in Guatemala. The Association of Sugar Producers of Guatemala (ASAZGUA) and the Private Institute for Climate Change Research (ICC) of Guatemala have undertaken important research in this field.</p> <p>Guatemala faces considerable challenges in terms of water resources management. Several parts of the country suffer from water scarcity. Public investment in water infrastructure and services is often low. However, there has been significant progress in the sugarcane growing regions. Several roundtable multi-stakeholder consultations were organized by local governments to facilitate dialogue on water needs and water use between local communities, agro-export companies, governmental organizations, and municipalities.</p>
Economic, environmental and climate benefits, challenges and lessons learned
<p>The average water footprint of sugarcane cultivation in Guatemala is estimated at some 129 m³ of water per ton of sugarcane, which is 38 per cent below world average. Some 72 percent of the water used for the sugarcane crop in Guatemala is provided by rainfall and 22 per cent by irrigation from surface and underground sources. Sugarcane cultivation in Guatemala covers around 260,000 hectares, and 80 per cent of this land is irrigated, leading to concerns about the impact of the industry on water resources. However, sugarcane plantations and sugar mills have been taking many initiatives over the past 20 years to increase the efficiency of irrigation. This includes research, investment and installation of efficient irrigation technology. There have also been many efforts to reduce the water footprint in the sugarcane mills through improvement of efficiency, water re-use, and the elimination of washing of cane.</p> <p>Electricity from sugarcane biomass (bagasse) in Guatemala is a significant component of the energy matrix. Sugar companies started generating electricity from bagasse in the 1990s to meet own needs and to sell to the grid. During the past five years (2014 to 2018) the</p>

contribution of the sugar industry to annual power generation accounted for 10.7 to 18.1 per cent. Power generation from bagasse is typically seasonal from November to April. It complements electricity generation from hydropower, which is typically low during the same period.

Total electricity generated from sugarcane biomass has increased substantially from around 400 GWh during the 1997-1998 harvest season to 2,500 GWh in the 2017-2018 harvest season. This increase has resulted from growth in cultivated area, and from achieving higher efficiency in biomass-based power generation. Sugar companies in Guatemala use about 34 per cent of the electricity they generate for their own industrial processes, especially sugar production. The remaining 66 per cent is sold to the national grid.

In Guatemala, during the harvest season biomass from sugarcane can in part replace the use of coal for electricity generation. During the harvest season 2017-18 around 3.8 million tons of CO₂e were avoided through the use of bagasse. The carbon footprint of electricity from sugarcane biomass averages some 0.24 kg CO₂e/kWh (2019), whereas the overall national average is about 0.367 kg CO₂e/kWh (2017).

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 the Paris Agreement. The reduction potential is estimated at some 233,333 tons CO₂e/year.

Additional information: website addresses and contacts

Private Institute for Climate Change Research (ICC, 2019): *Inventario de emisiones de Gases de Efecto Invernadero (GEI) de la generación de energía eléctrica de la Agroindustria Azucarera de Guatemala; Zafra 2017-2018. 9 P.*

ICC (2019): *Estrategia de Reducción de Emisiones de Gases de Efecto Invernadero -GEI- en la Producción de Azúcar de Guatemala. 70 P.*



Photos by Asazgua Association and ICC