San Juan-Bayamon-Caguas
Priority Climate Action Plan

San Juan-Bayamon-Caguas Priority Climate Action Plan

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Definitions and abbreviations.

Adaptation: The terminology adaptation means the ability of natural or human systems to adjust to the effect of any changes. In this case climate change includes global warming and its effects.

Alternative Energy: The alternative energy are other forms of energy from non-fossil fuel sources.

Carbon Dioxide: It is the principal greenhouse gas emission produced by the burning of fossil fuels.

Climate Change: Climate changes are attributed directly or indirectly to human activity that alters the composition of the atmosphere. These changes altered the temperature of the planet having directly affects in environment. The definition of this terminology has variation on their significance.

Comprehensive Climate Action Plan (CCAP): narrative report that provides an overview of grantees' significant GHG sources/sinks and sectors, establishes near-term and long-term GHG emissions reduction goals, and provides strategies and identifies measures that address the highest priority sector to help the grantees meet those goals.

Department of Natural and Environmental Resources (DNRE): The DNRE is the agency in Puerto Rico responsible for the protect, conserve, and manage the natural resources of the island.

Department of Transportation (DOT): DOT it is the agency in charge of the transportation sector in the United States including territories.

Emissions: The emissions are the release of greenhouse gases in a period.

Energy Efficiency: Means the radio of energy in a conversion process or a system of energy input.

Environmental Protection Agency (EPA): It is the United Stated Federal Agency in charge of the protection of the environment. This includes states, MSA, territories and tribes.

Federal Emergency Management (FEMA): FEMA it's the federal government agency in charge to assist states and territories before, during and after disasters.

GHG Inventory: It is an inventory report that measures in tons of carbon dioxide equivalent (CO2e) per year. This inventory includes information of the emissions of carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (PFCs) and others. The GHG Inventory includes the sector responsible for the emissions and other recommendations to reduce these.

Global Warming: Global warming is the increase in the planet's temperature. Global warming is a reaction to climate change. Some of the effects of the global warming are the sea level rise, extreme weather and others.

Greenhouse gases (GHG): GHG are the gases responsible for the changes in the atmosphere that cause climate change. These gases are carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (PFCs). The CO2e emissions represent the amount of GHGs emissions and shall be calculated pursuant to federal regulations.

Law 33 of 2019: Act No. 33 of May 22,2019 is the Climate Change Mitigation, Adaptation, and Resilience Law. This law is a public policy of the Government of Puerto Rico to reduce the effects of climate change on the island. It contains a series of measures to implement to reduce the emission of greenhouse gases in different sectors.

Low-Income Disadvantaged Communities (LIDAC): communities with residents that have low incomes, limited access to resources, and disproportionate exposure to environmental or climate burdens. Although the Inflation Reduction Act does not formally define LIDACs, EPA strongly recommends grantees use the Climate and Economic Justice Screening Tool.

Metric tons (TM): The metric tons are the measure used in the GHG gas emissions inventory.

Mitigation: Mitigation refers to the measures and initiatives focused on reducing or eliminating any greenhouse gas emissions.

Priority Climate Action Plan (PPCA): a narrative report that includes GHG emissions inventory, LIDAC analysis, and measures to reduce emissions.

Renewable Energy: Renewable energy is the energy obtained from solar, ocean thermal, energy, wind, hydro, biomass, and any other not derived from fossil fuel.

United States Department of Agriculture (USDA): The USDA is a federal agency in charge of the management of food, agriculture, natural resources, rural development, nutrition, and any related sector based on public policy in the United States including territories.

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Executive Summary

Climate change including the effects of global warming has several significant impacts on islands such as Puerto Rico who are vulnerable to extreme weather events. Some of these impacts are increased temperatures, sea level rise, more intense hurricanes, changes in precipitation patterns and impacts on tourism, ecosystem, economy, health, and more.

To counteract the effects of climate change in Puerto Rico, Law 33 of 2019 was created. The Mitigation, Adaptation, and Resilience to Climate Change (Law 33 of 2019) has as its purpose reduce the greenhouses gas emission transitioning to a more sustainable and renewable energy system. Also, this law includes aims to decrease the vulnerability of the island from the impacts of climate change. The main objective of the Mitigation, Adaptation, and Resilience to Climate Change Law of Puerto Rico is to reduce greenhouse gas emissions and promote the transition to a more sustainable and renewable energy model. Additionally, it aims to decrease the island's vulnerability to the impacts of climate change, ensure access to energy as a common good, and encourage citizen participation in the development and evaluation of climate policies. To reduce greenhouse gas emissions the law establishes a variety of measures like transition to renewable energy, implementing policies that includes mitigation, adaptation, implementation, and resilience strategies. These strategies include initiatives as establishing energy saving and water use efficiency in buildings, waste generation reduction measures and more. Other measures include the transportation sector with the introduction of low carbon dioxide emission vehicles, electrics, or hybrids. Also, this law includes education initiatives; this is related to Implementing a school curriculum on mitigation, adaptation, and resilience to climate change. These measures aim to not only reduce GHG emissions but also promote sustainable development and resilience in Puerto Rico that will include low-income and disadvantaged communities.

This law includes the creation of a committee. In Puerto Rico, the Committee of Experts and Advisors on Climate Change is dedicated to addressing climate change issues. This committee is composed of nine members, including three ex official members with voting rights: the President of the University of Puerto Rico, the Secretary of the Department of Natural and Environmental Resources, and the Secretary of Economic Development and Commerce. The remaining members are appointed by the Governor of Puerto Rico with the advice and consent of the Senate and House of Representatives of Puerto Rico. The committee operates autonomously and independently to advise and prepare the Mitigation, Adaptation, and Resilience to Climate Change Plan for evaluation by the Joint Commission on Mitigation, Adaptation, and Resilience to Climate Change. At this moment, the committee is working on the final version of the Mitigation, Adaptation, and Resilience to Climate Change in Puerto Rico Plan.

To support reducing these gases in States, MSA, and Tribes, the Environmental Protection Agency has created the Climate Reduction Pollution Grant. The Autonomous Municipality of San Juan obtained and is the leader from the Environmental Protection Agency (EPA) of grant 5D 96211700-0 to develop the Plan to Reduce Climate Pollution (CPRG) in English. This program has a grant to develop strategies to reduce climate pollution, including reduction measures

throughout the entire San Juan-Bayamon-Caguas metropolitan area in commitment to vulnerable and low-income communities.

The CPRG program is divided into two phases. Phase 1 is planning grants, and the second phase is the competitive implementation grants. This planning phase has three deliverables over 4 years. The first document, the PCAP includes priority short-term greenhouse gas reduction measures and is a prerequisite for the grant. This is the document we are elaborating. To elaborate the PCAP we used the Puerto Rico 2019 and 2021 Greenhouses Gas Emission Inventory Report.

Puerto Rico 2019 and 2021 Greenhouses Gas Emission Inventory Report provide us with information related to the quantity of emission, types of gases, measures, and more. The report shows us that the three highest gas emissions are power supply, transportation, and waste management.

Introduction

The Climate Pollution Reduction Grant from the Environmental Protection Agency (EPA) provided the MSA a way to plan for the decrease of greenhouses gases, a serious cause of global warming. This program was funded to develop strategies to reduce climate pollution, including reduction measures throughout the entire San Juan-Bayamon-Caguas Statistical Metropolitan Area in commitment to vulnerable and low-income communities.

This Priority Climate Action Plan (PCAP) includes priority short-term greenhouse gas reduction measures being undertaken in the MSA. For support, this document also includes vital elements for its development such as: GHG Inventory, GHG reduction measures, benefits analysis for each measure Review of authority to implement for each measure, intersection with Other Funding Availability and next steps.

CPRG overview

The Climate Pollution Reduction Grant has as its purpose decreased the greenhouses gas emission. This grant is part of the Environmental Protection Agency efforts to combat the effects of climate change and global warming.

PCAP Overview and Definitions

This section will include a brief overview with definitions of the PCAP elements.

- GHG Inventory: The GHG Inventory is the instrument to account the greenhouse gas emissions. In the case of San Juan-Bayamon-Caguas Metropolitan Statistical Area, this instrument was elaborated making developing inventories for 2019 and 2021 years. This inventory includes greenhouses gases such as CO2, CH4, N2O, SF6, NF3, HFC-23, HFC-32, HFC-41, HFC-41, HFC-125, HFC-134a, HFC143a, HFC-236fa, C2F6, C3F8, C4F8 and C02 Biogenic.

- GHG emission projections: The GHG emission projections are an estimate of the emissions based in different scenarios. This includes the years from 2023 through 2041.

- GHG reduction targets: The GHG reduction targets are the goals to minimize emissions. These are in qualitative form. For the case of Puerto Rico, one of the principal goals is minimizing the emissions in 50% for 2025.

- GHG reduction measures (priority measures, at a minimum, are required): GHG reduction measures are priority measures to be implemented to decrease the GHG emissions.

- Low Income and Disadvantaged Communities benefits analysis: The low income and disadvantaged communities benefit analysis includes information relating to risk, impacts and effects of the greenhouse gas emissions in the municipalities inside of the MSA. Also, include future efforts to decrease these emissions.

- Intersection with Other Funding Availability: The intersection with Other Funding section describes other funding sources that could help to finance the projects. These funds were found in the Department of Transportation, Housing and Urban Development, Department of Energy, United States Department of Agriculture, and Environmental Protection Agency.

- Next Steps: This section refers to the next steps to develop the CCAP.

Scope of the PCAP

San Juan-Bayamon-Caguas Metropolitan Statistical Area includes 40 municipalities from the island of Puerto Rico. These municipalities are:

Table 1: Municipalities include in MSA of San Juan-Bayamon-Caguas

San Juan	Bayamon	Carolina	Caguas
Guaynabo	Toa Baja	Toa Alta	Trujillo Alto
Humacao	Vega Baja	Rio Grande	Gurabo
Canovanas	Cayey	Cidra	Manati
Juncos	Las Piedras	San Lorenzo	Vega Alta
Dorado	Corozal	Yabucoa	Fajardo
Morovis	Barranquitas	Naranjito	Naguabo
Loiza	Aguas Buenas	Cataño	Barceloneta
Aibonito	Orocovis	Comerio	Luquillo
Ciales	Florida	Ceiba	Maunabo

The low-income and disadvantaged community analysis includes data from every municipality inside the MSA.

San Juan-Bayamón-Caguas Metropolitan Statistical Area

Legend

- San Juan Metropolitan Statistical Area
- Municipalities
- Ocean

Municipio Autónomo de San Juan

Sources:
Metropolitan Areas (OMB, 2020); Municipalities (JP, 2015); Ocean (OPOT, 2014).

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Scale: 1:405,000

0 1.75 3.5 7 Miles

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Approach to Developing the PCAP

San Juan-Bayamon-Caguas Metropolitan Statistical Area (MSA) PCAP is a meticulously crafted document aimed at examining various aspects of greenhouse gas (GHG) emissions, including inventories, emissions forecasts, mitigation measures, and more. It draws upon a wide array of documents detailing related efforts, with Law 33 of 2019 standing out as the cornerstone. This legislation, known as the Mitigation, Adaptation, and Resilience to Climate Change Law of Puerto Rico, sets the legislative framework for addressing climate change within the territory. Additionally, the Puerto Rico Department of Natural and Environmental Resources (DNER)'s 2019 and 2021 Greenhouse Gas Inventories Report is highlighted as a key resource for GHG emissions data. Furthermore, the San Juan MSA benefits from the guidance of the Puerto Rico Climate Change Council, which has published the Puerto Rico State of Climate report for 2014-2021

Participation in the PCAP is wide-ranging, encompassing multiple agencies and municipalities within the MSA. These entities have formalized their involvement through letters of consent, which are to be appended to the PCAP document.

The GHG inventory methodology is tailored to each sector, employing diverse approaches and protocols. For the electrical supply sector, the "reference approach" methodology is utilized, while data analysis incorporating information from various sources is applied to both transportation and waste management sectors.

The analysis has identified the three sectors with the most significant impact on GHG emissions: power supply, transportation, and waste management. These areas are prioritized for the implementation of emission reduction strategies.

To effectively implement alternatives aimed at reducing emissions, the establishment of authoritative bodies is crucial. These entities are currently tasked with executing the measures outlined in the PCAP, with the ambitious goal of achieving a reduction in greenhouse gas emissions by more than 50% by the year 2050.

San Juan MSA Context

The Census of United Stated defines the Metropolitan Statistical Area as "*a geographic entity delineated by the Office of Management and Budget for use by federal statistical agencies".* The MSA is associated with an urban area that has a high degree of socioeconomic integration with 50,000 or more population. This MSA area referred to as "core based statistical areas".

Puerto Rico have a multiples MSA but the most important it is the San Juan-Bayamon-Caguas Metropolitan Statistical Area. This is composed of forty municipalities with large socioeconomics activities. San Juan is the capital of Puerto Rico and the municipality with most population density. These municipalities include urban and rural areas, and eighteen are on the coast. Also, every municipality inside the San Juan MSA count with a water natural resource.

Table 2: Municipalities with population in 2010 include in MSA of San Juan.

Municipality	**Population to 2010**
San Juan	335468
Bayamon	178192
Carolina	153779
Caguas	128937
Guaynabo	86937
Toa Baja	77810
Toa Alta	72864
Trujillo Alto	66338
Humacao	52507
Vega Baja	52192
Rio Grande	49613
Gurabo	46910
Canovanas	45588
Cayey	43785
Cidra	39607
Manati	38836
Juncos	38780
Las Piedras	37499
San Lorenzo	37209
Vega Alta	37106
Dorado	36803
Corozal	33500
Yabucoa	33499
Fajardo	31111
Morovis	30962

Barranquitas	28393
Naranjito	28112
Naguabo	26075
Loiza	25778
Aguas Buenas	25748
Cataño	24271
Barceloneta	24079
Aibonito	22988
Orocovis	20982
Comerio	19224
Luquillo	18224
Ciales	16513
Florida	11697
Ceiba	11515
Maunabo	10776

Priority Climate Action Plan elements

3.1 Greenhouse Gas (GHG) Inventory

Puerto Rico's Greenhouse Gas (GHG) Inventories for the years 2019 to 2021 have been compiled and published by the Department of Natural and Environmental Resources (DNER), covering the entire territory. This comprehensive report is the result of collaborative efforts among various expert groups, including the Puerto Rico Inventory Project Team, an Expert Panel, the Committee of Experts and Advisors on Climate Change (CEACC), staff from the Puerto Rico Department of Natural and Environmental Resources, and participants in the Environmental Defense Fund's Climate Corps Program. This report includes all the Puerto Rico Island including the inventory to 2019 and 2021 and projections for 2023 through 2041. This report includes emissions greenhouses gases such as CO2, CH4, N2O, SF6, NF3, HFC-23, HFC-32, HFC-41, HFC-41, HFC-125, HFC-134a, HFC143a, HFC-236fa, C2F6, C3F8, C4F8 and C02 Biogenic.

The GHG emissions in Puerto Rico were recorded at 33.4 million metric tons of CO_2 equivalent (MMT CO_2e) in 2019, with a slight increase to 34.3 MMT CO_2e in 2021. Notably, this 2021 figure represents a significant reduction of 36 percent from the levels recorded in 2005, marking a milestone in Puerto Rico's efforts to mitigate climate change.

Each methodology is specific for each sector. Next, we will be elaborating on it:

1. **Electrical Supply**: Electrical supply is the sector that generates the most gases; however, it is the most important. It generates the electricity that is supplied to the entire island. Currently, we work with the burning of fossil fuels such as natural gas or oil, which emit greenhouse gases such as CO2, CH4, N2O, and SF6. These gases are emitted during the process of generation, transmission, and distribution of electrical energy. For the methodology, the “reference approach” was used, which allows for calculating the emission of greenhouse gases from the combustion of all fuels. These estimates are compiled using general units, multiplying them by the content of their emissions and assigning them to the corresponding sectors. Data from PREPA, the U.S. Energy Information Administration (U.S. EIA), the Department of Regulations, and LUMA, the U.S. Energy Agency, were used for this purpose. EPA and the Emissions Database for Global Atmospheric Research (EDGAR).
2. **Transportation:** The transportation sector is the third sector with the highest emissions within the greenhouse gas inventory. Its emissions come from the combustion of fuel for all motor vehicles, including land, sea, and air. These include inside and outside Puerto Rico if their emissions impact the island. Data for gasoline utilization was obtained from U.S. data. EIA for consumption in Puerto Rico.
3. **Waste Management:** The waste management sector includes all solid waste. These are divided into two: Solids, which include landfills and composting, and wastewater

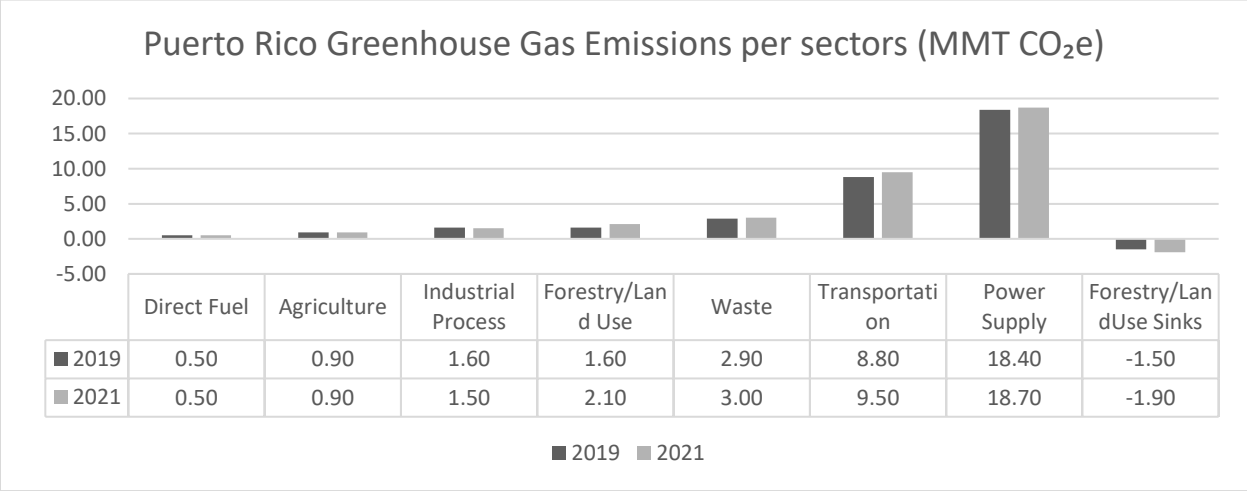
treatment, which includes wastewater treatments, septic tanks, latrines, among others. All solid waste generates CH4 and N2O through composting and burning. Wastewater management generates CH4 and N2O during treatments. Data used were ADS, AAA, National Pollutant Discharge Elimination System, Water Pollution Loading Tool, Landfill Methane Disclosure Program, and LandGEM model results.

The sectors identified as the largest contributors to GHG emissions include Power Supply, Transportation, and Waste Management, underscoring the areas where targeted actions can have the most substantial impact in reducing overall emissions.

As we mentioned before, the largest emissions come from power supply, transportation, and management. To the power supply, these emissions change from 18.40 in 2019 to 18.70 for 2021. In the case of the transportation sector, these emissions change from 8.80 in 2019 to 9.50 for 2021. For the waste management sector, these changes were from 2.90 in 2019 to 3.00 in 2021. It is important to implement.

The sectors with the lowest emissions are direct fuel and agriculture. These two sectors do not present changes from 2019 through 2021.

Graphic 1: Puerto Rico Greenhouse Gas Emissions per sectors (MMT CO_2e)

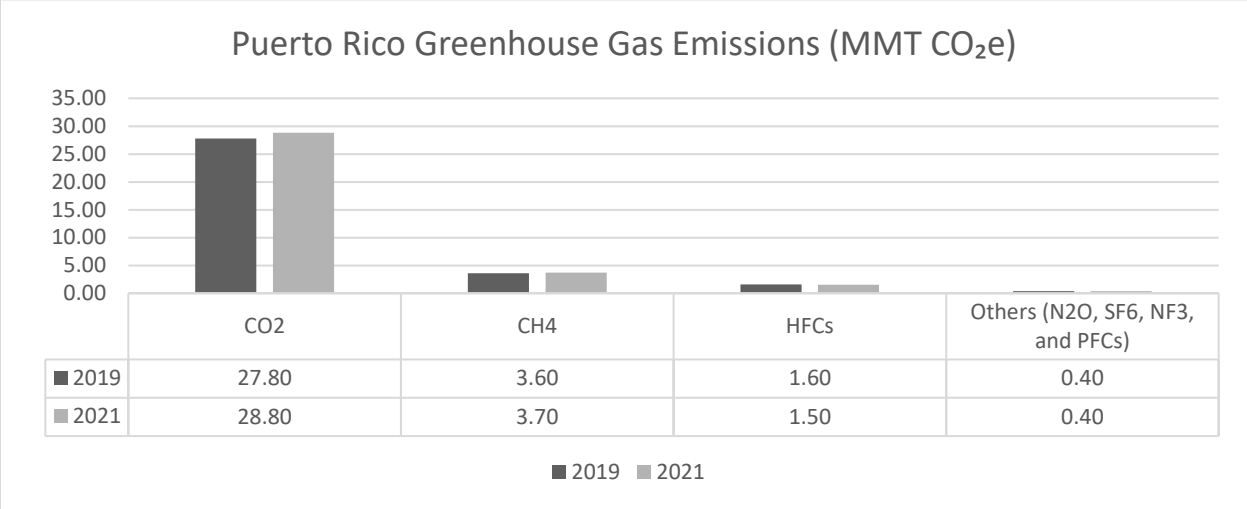


	Direct Fuel	Agriculture	Industrial Process	Forestry/Land Use	Waste	Transportation	Power Supply	Forestry/LandUse Sinks
2019	0.50	0.90	1.60	1.60	2.90	8.80	18.40	-1.50
2021	0.50	0.90	1.50	2.10	3.00	9.50	18.70	-1.90

Source: Puerto Rico 2019 and 2021 Greenhouse Gas Inventory Report.

The next graphic shows the emission by gases. In Puerto Rico, carbon dioxide is the most emission with 84% in 2021, second was methane with 11%. The other 5% are related to HFC's, N2O, SF6, NF3 and other gases. The sectors with the most carbon dioxide in Puerto Rico are the power supply and transportation. In the case of methane, the sectors with highest emissions are power supply, direct fuel, transportation, agriculture, forestry, other land use and waste management.

Graphic 2: Puerto Rico Greenhouse Gas Emissions (MMT CO_2e)



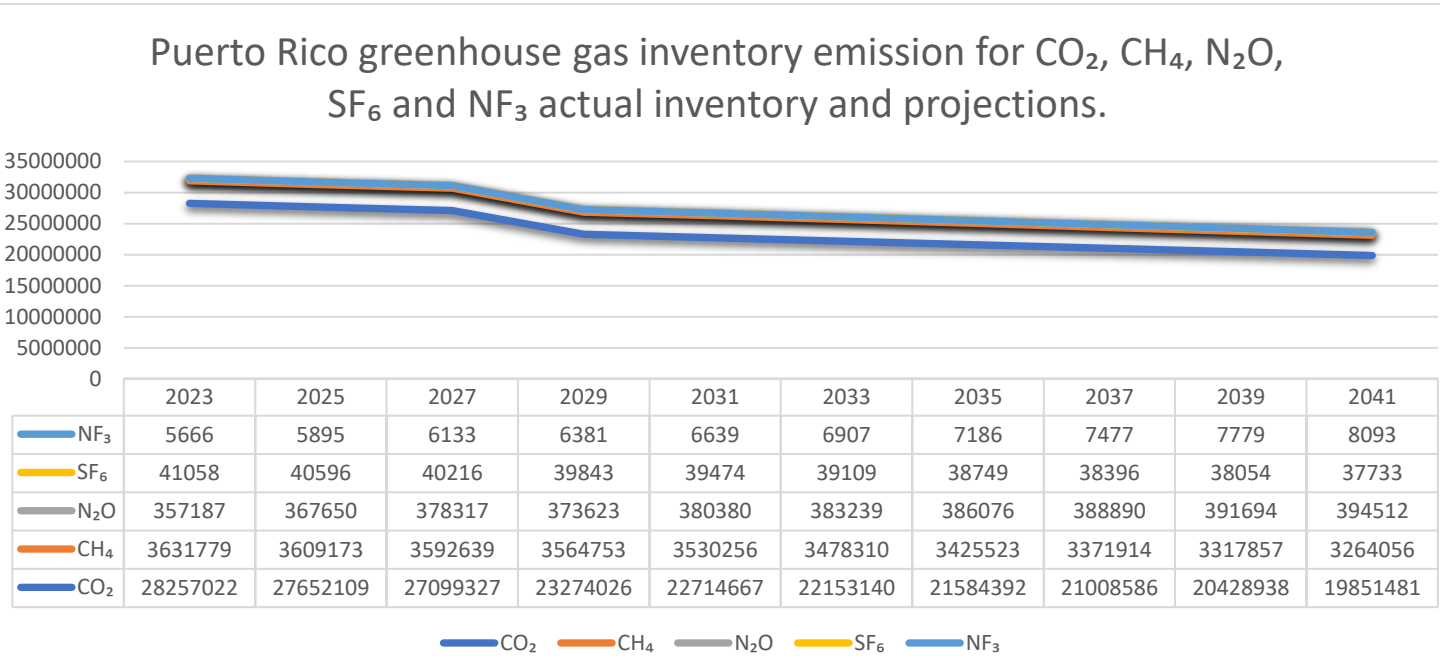
	CO2	CH4	HFCs	Others (N2O, SF6, NF3, and PFCs)
2019	27.80	3.60	1.60	0.40
2021	28.80	3.70	1.50	0.40

Source: Puerto Rico 2019 and 2021 Greenhouse Gas Inventory Report.

3.2 GHG Emissions Projections

The next graphic includes the GHG emission projections. These includes from 2023 through 2041. The projections in this graphic are the Puerto Rico Total Greenhouse Gas Emissions by Gas in MT Co2e for business-as-usual reference. The Puerto Rico 2019 and 2021 Greenhouse Gas Inventory have multiples inventories for projections. These include High Economic, Low Economic, Decarbonization, Decarbonization: High Economic, Decarbonization: Low Economic, Severe Hurricanes, Severe Hurricanes: Low Economic, Severe Hurricanes High Economic. These projections are presented in TM and metric tons.

Graphic 3: Puerto Rico greenhouse gas inventory for CO_2, CH_4, N_2O, SF_6 and NF_3 actual inventory and projections



	2023	2025	2027	2029	2031	2033	2035	2037	2039	2041
NF_3	5666	5895	6133	6381	6639	6907	7186	7477	7779	8093
SF_6	41058	40596	40216	39843	39474	39109	38749	38396	38054	37733
N_2O	357187	367650	378317	373623	380380	383239	386076	388890	391694	394512
CH_4	3631779	3609173	3592639	3564753	3530256	3478310	3425523	3371914	3317857	3264056
CO_2	28257022	27652109	27099327	23274026	22714667	22153140	21584392	21008586	20428938	19851481

Source: Puerto Rico 2019 and 2021 Greenhouse Gas Inventory Report.

3.3 GHG Reduction Targets

Puerto Rico has targets by the law 33 of 2019 focused on minimizing greenhouses gas emissions. These measures are focused on collaborations to maintain global warming below 2 °C. Another measure include in the law is reducing the greenhouse gas emissions to 50% in 2025. This includes reducing the power supply consumption by 1% a year for 10 years. The main goal is 10% less in 2010 taking into consideration population density.

Also, reducing the use of fossil fuels in the energy sector and replacing them with renewable energy 40% by 2025, 60% to 2040 and 100% to 2050. Other measures in energy include the reduction of the consumption of power supply in public facilities. These measures are vital taking into consideration that the power supply sector has the biggest emissions.

For the transportation sector, it is necessary the replacement of the government public vehicles with hybrid, electric, solar energy, hydroelectric and others by 2028. This measure is important, taking into consideration that the transportation sector is the second with the biggest emissions on the island.

Related to the waste management sector, the third sector with high emissions, the measures are focused on reducing solid waste deposited in landfills by 60% by 2030. Other measures include reforestation by planting 500,000 native and endemic trees by 2025.

These and other measures will be available in detail in the CCAP.

3.4 GHG Reduction Measures

The following measures will be focused on reducing greenhouse gas emissions.

- Centro Más Salud – Dr. Gualberto Rabell: This is the first project that will be part of nine other projects that will be an electrical microgrid thru San Juan. The location of this project is 900 Calle Cerra, Santurce, San Juan, 00907. This project will have an Electrical Microgrid utilizing Combined Heat and Power generation and 500 Tons of chilled water (1X 500 Tons Multi Energy w/Direct Fired Absorption Chiller); two (2) 1.2 MW dual fuel reciprocating engines would be used to produce a total of 2.4 MW of power.

- Parque Central de San Juan: This is the second project that will be part of the electrical microgrid through San Juan. The location of this project is Expreso John F. Kennedy (PR-2) with PR-1, San Juan, 00907. This project will have an Electrical Microgrid utilizing Combined Heat and Power generation and 400 Tons of chilled water (1X 400 Tons Multi Energy w/Direct Fired Absorption Chiller); two (2) 1.2MW dual fuel reciprocating engines would be used to produce a total of 2.4MW of power. This project is approved.

- Municipal Tower: This is the third project that will be part of the electrical microgrid. The location of this project is 160 Ave. Carlos E. Chardón, San Juan, 00918. This project will have an electrical microgrid utilizing Combined Heat and Power generation and 500 Tons of chilled water (1X 500 Tons Multi Energy w/Direct Fired Absorption Chiller); two (2) 1.2MW dual fuel reciprocating engines would be used to produce a total of 2.4MW of power. This project is approved.

- San Juan Sport Complex: This is the fourth project from the electrical microgrid. The location is Intersect Ave. Franklin Delano Roosevelt with PR-18, San Juan, 00920. This project will count with an electrical Microgrid utilizing Combined Heat and Power generation and 4,000 Tons of chilled water (4X 1,000 Tons Multi Energy w/Direct Fired Absorption Chiller); four (4) 3.3MW dual fuel reciprocating engines would be used to produce a total of 13.2MW of power. The project is approved.

- Rebekah Colberg: This project is part of the electrical microgrid. The location is Sport Complex Rebekah Colberg - Intersect. Turia Street with #40 Street, San Juan, 00923. This project will count with an electrical microgrid utilizing Combined Heat and Power generation and 300 Tons of chilled water (1X 300 Tons Multi Energy w/Direct Fired Absorption Chiller); two (2) 1.2MW dual fuel reciprocating engines would be used to produce a total of 2.4MW of power. The project is approved.

- Dr. Javier Anton Diagnostic and Treatment Center: This project is part of the electrical microgrid. The location of this project is Intersect. Piñero Street with Camelia Soto Street, Rio Piedras, San Juan, 00925. This project will have an electrical microgrid utilizing Combined Heat and Power generation and 400 Tons of chilled water (1X 400 Tons Multi Energy w/Direct Fired Absorption Chiller); two (2) 1.2MW dual fuel reciprocating engines would be used to produce a total of 2.4MW of power. The project is approved.

- "Plaza del Mercado in Rio Piedras": This project is part of the electrical microgrid. The location is 1114 Vallejo Street, Rio Piedras, San Juan, 00925. This project will have an electrical Microgrid utilizing Combined Heat and Power generation and 400 Tons of chilled water (1X 400 Tons Multi Energy w/Direct Fired Absorption Chiller); two (2) 1.2MW dual fuel reciprocating engines would be used to produce a total of 2.4MW of power. Additionally, a 1.4 MW Battery Energy Storage System (BESS) would be implemented. The project is approved.

- San Juan Police & Emergency Complex: This project is part of the electrical microgrid. The location is 125 Jose de Diego Avenue, San Juan, 00927. This project will have an Electrical Microgrid utilizing Combined Heat and Power generation and 500 Tons of chilled water (1X 500 Tons Multi Energy w/Direct Fired Absorption Chiller); three (3)1.2MW dual fuel reciprocating engines would be used to produce a total of 3.6MW of power. Additionally, a 1.4MW Battery Energy Storage System (BESS) would be implemented. This project is approved.

- Ramallo, Rondo Park, and Industrial Complex: This project is part of the electrical microgrid. The location is PR 1, KM 25.5, Quebrada Arena, San Juan 00725. This project will have an electrical microgrid utilizing Combined Heat and Power generation and 4,000 Tons of chilled water (4X 1,000 Tons Multi Energy w/Direct Fired Absorption Chiller); four (4) 3.3MW dual fuel reciprocating engines would be used to produce a total of 13.2MW of power. The stage of this project is approved.

These projects are part of the electrical microgrid in San Juan. This electrical microgrid will offer a more reliable energy service reducing the dependency from the electrical service and reduce CO2 and ensure continuity of services during blackouts events. This project will benefit up to 30,000 houses of low-medium income (LMI) and will reduce the CO2 emissions by 7,678 tons. The actual funding for these projects is CDBG-DR ER2 from HUD.

Other measures included in this PCAP are:

- San Juan Police Department Electrical vehicles replacement: This project will replace all the motor vehicles from the police department to electrical vehicles. The project is linked with Law 33-2019. The Municipality has draft ordinance No. 48 Series 2021-2022 which provides for compliance with Law 33-2019 for the purchase of hybrid vehicles. The location of this department is #125 Jose de Diego Avenue, San Juan 00927. This initiative will reduce CO2 emissions, the quantity will be determined. This project is in the planning phase.
- Electrical Charging System: This project includes the construction and implementation of a charging and alternative fuel supply system for electric vehicles in the Municipal Tower and the San Juan Police Department. This project will be the charging facility for electric cars. The locations are #160 Ave. Carlos E. Chardón, San Juan, 00918 and #125 Jose de Diego Avenue, San Juan, 00927. This initiative will reduce CO2 emissions, the quantity will be determined. This project is in the planning phase.

The actual proposed funding for both projects is CDBG-DR.

3.6 Preliminary Low Income Disadvantaged Communities Benefits Analysis

The Low-Income and Disadvantaged Communities (LIDAC) were determined using the Climate and Economic Justice Screening Tools and the Environmental Justice Screening and Mapping Tool. These tools provide us the data relevant for energy, pollution, transportation, housing, projected flood risk and more. This PCAP will include information related to the federal poverty line, properties at risk of flood in 30 years, energy burden, diesel particle exposure and traffic proximity and volume. All the information will be in the table and include their percentile and quantity. The information is related to GHG emission and global warming that could be important to the developing of strategies. The original table of the Climate Economic Justice Screening Tools includes multiple data per municipality. With the purpose of simplifying the information, average calculations were made for the percentages and sum for the quantities.

In this first table the total population and the adjusted percent of individuals below 200% federal poverty Line. Almost all the municipalities count with a high percentage of individuals below 200% federal poverty line, but 7 municipalities have more than 98%. The municipalities of Naguabo, Orocovis, Comerio, Ciales, Florida, Ceiba and Maunabo registered percentages between 98.6% and 99%.

Table 3: Compare between total population and adjusted percent of individuals below 200% Federal Poverty Line in San Juan-Bayamon-Caguas MSA.

Municipality	**Total population**	**Adjusted percent of individuals below 200% Federal Poverty Line (percentile)**	**Adjusted percent of individuals below 200% Federal Poverty Line**
Aguas Buenas	25,748	0.971666667	4.1
Aibonito	22,988	0.971666667	4.29
Barceloneta	24,079	0.98	2.9
Barranquitas	28,393	0.983333333	0.72
Bayamon	178,192	0.881290323	33.6
Caguas	128,937	0.901212121	19.28
Canovanas	45,588	0.893333333	7.62
Carolina	153,779	0.85375	20.63
Cataño	24,271	0.92	8.1
Cayey	43,785	0.93	6.87
Ceiba	11,515	0.9875	3.08
Ciales	16,513	0.99	3.24
Cidra	39,607	0.942	6.52
Comerio	19,224	0.986	3.98
Corozal	33,500	0.98	4.38
Dorado	36,803	0.875714286	3.8

Fajardo	31,111	0.964444444	6.23
Florida	11,697	0.985	1.54
Guaynabo	86,937	0.713478261	9.58
Gurabo	46,910	0.855	4.2
Humacao	52,507	0.945	7.85
Juncos	38,780	0.96	4.08
Las Piedras	37,499	0.96	4.09
Loiza	25,778	0.974	7.26
Luquillo	18,224	0.964	3.48
Manati	38,836	0.971111111	6.38
Maunabo	10,776	0.986666667	2.35
Morovis	30,962	0.973333333	4.3
Naguabo	26,075	0.9875	3.19
Naranjito	28,112	0.974	3.53
Orocovis	20,982	0.987142857	5.5
Rio Grande	49,613	0.943636364	7.1
San Juan	335,468	0.837560976	68.64
San Lorenzo	37,209	0.96	6.18
Toa Alta	72,864	0.859230769	6.87
Toa Baja	77,810	0.8984	14.49
Trujillo Alto	66,338	0.785333333	6.85
Vega Alta	37,106	0.967142857	4.81
Vega Baja	52,192	0.956923077	8.86
Yabucoa	33,499	0.97875	5.78

Source: Climate and Economic Justice Screening Tool.

The implementations measure to reduce greenhouses gas (GHG) emissions in Puerto Rico have positive and negative impacts in low-income and disadvantaged communities. The positives impacts include the improvement of the air quality, job creatin and every cost savings. In the case of improved air quality, reducing the GHG emissions can lead to improved air quality, benefiting the health of residents in low income and disadvantaged communities who may be more vulnerable to respiratory issues and have more difficulties to get medical treatments. In economic aspects, job creations, transitioning to renewable energy sources and implementing energy efficiency measures create new jobs opportunities in sectors such as clean energy, which can benefit low income and disadvantaged individuals. Also, energy cost savings have energy efficiency programs and renewable energy initiatives can help lower energy costs which translates to economic relief.

Properties in risk of flood in 30 years

The San Juan-Bayamon-Caguas MSA includes 40 municipalities which 18 are on the coast. Also, almost every municipality inside the MSA counts with a water natural resource. The municipalities with the highest percentile of properties are Barceloneta and Florida; both municipalities are coastal. The municipalities with more properties are San Juan and Carolina, both municipalities are coastal with high population density and low elevation.

Table 4: Properties in risk of flood in 30 years in San Juan-Bayamon-Caguas MSA.

Municipality	Share of properties at risk of flood in 30 years (percentile)	Share of properties at risk of flood in 30 years
Aguas Buenas	38.66666667	32
Aibonito	62.16666667	70
Barceloneta	81	79
Barranquitas	53	59
Bayamon	48.83870968	559
Caguas	57.75757576	402
Canovanas	60.66666667	164
Carolina	69.2195122	670
Cataño	43.0625	248
Cayey	72.63636364	157
Ceiba	63.75	54
Ciales	45.5	26
Cidra	48.5	74
Comerio	64	126
Corozal	38.33333333	33
Dorado	62.57142857	95
Fajardo	78.11111111	159
Florida	91.5	65
Guaynabo	63.26086957	302
Gurabo	69.875	104
Humacao	71.16666667	170
Juncos	65.5	69
Las Piedras	50	50
Loiza	76.7	191
Luquillo	67.4	60
Manati	75.66666667	163
Maunabo	76.66666667	44
Morovis	45.5	45
Naguabo	79.75	76
Naranjito	54	64
Orocovis	51.28571429	67

Rio Grande	62.54545455	126
San Juan	50.8046875	1635
San Lorenzo	71.33333333	130
Toa Alta	34.76923077	65
Toa Baja	68.32	423
Trujillo Alto	39.4	90
Vega Alta	71	98
Vega Baja	67.69230769	172
Yabucoa	78.75	157

Source: Climate and Economic Justice Screening Tool.

Energy Burden

Table # 5 is related to the energy burden per municipality. The energy burden is the percentage of gross household income spent on energy costs. In the MSA, the municipalities with the most energy burden percent are Comerio, Orocovis, Ciales, Barranquitas, Corozal, Maunabo, and Cataño. The municipalities with the most quantity of energy burden is Cataño, Comerio, Ciales, and Corozal.

Table 5: Energy Burden in San Juan-Bayamon-Caguas MSA.

Municipality	Energy Burden percent	Energy Burden
Aguas Buenas	80	4
Aibonito	81.33333333	4
Barceloneta	84.5	4.25
Barranquitas	90.83333333	5
Bayamon	74.87096774	4
Caguas	74.81818182	4
Canovanas	79	4
Carolina	66.875	3
Cataño	89.45454545	7
Cayey	69.90909091	4
Ceiba	85	4
Ciales	91.75	6
Cidra	73.4	4
Comerío	94.6	6
Corozal	90.66666667	6
Dorado	73.42857143	4
Fajardo	83.44444444	4
Florida	85	5
Guaynabo	59.65217391	3
Gurabo	63.125	3
Humacao	78.5	4
Juncos	83.16666667	4

Las Piedras	78.33333333	4
Loiza	88.9	5
Luquillo	82.4	4
Manati	82.77777778	4
Maunabo	90.33333333	5
Morovis	83.66666667	4
Naguabo	81.75	4
Naranjito	87.6	5
Orocovis	93	5
Rio Grande	80.45454545	4
San Juan	67.89430894	4
San Lorenzo	84	5
Toa Alta	77	4
Toa Baja	84.16	5
Trujillo Alto	61.66666667	3
Vega Alta	87.14285714	5
Vega Baja	84	5
Yabucoa	87.75	5

Source: Climate and Economic Justice Screening Tool.

Diesel particule exposure per municipality.

The diesel exposure is related to high concentrations of DE/DPM and could cause minimal to severe health complications. The municipalities with the highest diesel particle exposure by percentile are San Juan, Bayamon, and Guaynabo. The municipalities with the highest diesel particles by quantity are Guaynabo, Cataño, and San Juan. These three municipalities count on power supply facilities.

Table 6: Diesel particle exposure in San Juan-Bayamon-Caguas MSA.

Municipality	**Diesel particulate matter exposure (percentile)**	**Diesel particulate matter exposure**
Aguas Buenas	3.666666667	0.29
Aibonito	0.01	0.12
Barceloneta	2.75	0.16
Barranquitas	1.333333333	0.025
Bayamon	39.09677419	12.21
Caguas	6.939393939	
Canovanas	0.916666667	0.27
Carolina	10.36585366	3.24
Cataño	69	5.22
Cayey	1.454545455	0.27
Ceiba	0	0.01
Ciales	1	0.11

Cidra	1.8	0.32
Comerio	1.6	0.15
Corozal	4.166666667	0.3
Dorado	20.42857143	0.84
Fajardo	4.111111111	0.32
Florida	2	0.06
Guaynabo	70.13043478	8.52
Gurabo	3.25	0.35
Humacao	1.083333333	0.26
Juncos	1.666666667	0.19
Las Piedras	3.5	0.26
Loiza	0.3	0.16
Luquillo	0	0.05
Manati	4.222222222	0.46
Maunabo	0	0.03
Morovis	3.166666667	0.26
Naguabo	0	0.04
Naranjito	5	0.28
Orocovis	0.857142857	0.14
Rio Grande	0	0.11
San Juan	59.38888889	40.55
San Lorenzo	1.333333333	0.23
Toa Alta	18.15384615	1.46
Toa Baja	45	5.55
Trujillo Alto	20.53333333	1.8
Vega Alta	13	0.63
Vega Baja	7.538461538	0.91
Yabucoa	0.5	0.13

Source: Climate and Economic Justice Screening Tool.

Traffic Proximity and volume per municipality

The traffic proximity and volume are the count vehicles per day at major roads within 500 meters. The municipalities with more percentage of traffic proximity and volume are San Juan, Caguas, and Guaynabo. In quantity, the municipalities with more traffic and proximity volume are San Juan, Bayamon, and Caguas. These results are compatible with the high population density and the number of people with vehicles within these municipalities. Also, these municipalities have important highways and main roads.

Table 7: Traffic Proximity and volume in San Juan-Bayamon-Caguas MSA.

Municipality	Traffic proximity and volume percent per municipality	Traffic proximity and volume
Aguas Buenas	30.83333333	914.46
Aibonito	30.5	959.46
Barceloneta	41.25	1067.96
Barranquitas	16.5	339.3
Bayamon	57.24193548	43269.28
Caguas	67.18181818	38223.74
Canovanas	41.41666667	3622.87
Carolina	62.17073171	34094.51
Cataño	53.42857143	8302.38
Cayey	60.18181818	6870.56
Ceiba	36.25	812.3
Ciales	31	741.41
Cidra	34.6	1894.02
comerio	16.2	226.29
Corozal	33.5	1264.85
Dorado	45.14285714	2656.05
Fajardo	49	3619.46
Florida	20.5	121.39
Guaynabo	62.60869565	22267.65
Gurabo	47.5	4015.54
Humacao	41.41666667	4312.38
Juncos	50	3002.12
Las Piedras	41.83333333	1868.34
Loiza	34.57142857	1636.27
Luquillo	45.2	1861.33
Manati	56.55555556	4354.63
Maunabo	26	375.19
Morovis	36.5	1282.41
Naguabo	29.75	474.68
Naranjito	37	1088.58
Orocovis	4.428571429	48.63

Rio Grande	55	5426.11
San Juan	75.93650794	219490.17
San Lorenzo	28.66666667	1397.04
Toa Alta	35.15384615	2423.35
Toa Baja	53.44	11070.44
Trujillo Alto	44.2	5850.1
Vega Alta	44	2427.05
Vega Baja	52.58333333	6240.54
Yabucoa	25.875	1307.13

Source: Climate and Economic Justice Screening Tool.

As part of the measures to include citizen participation in this program, multiple meetings will be held. During them there will be a presentation of the program, clarification of doubts, and exchange of important information that will be part of the CCAP. In addition, spaces will be provided to establish the needs, concerns, and suggestions of the communities to ensure that the needs are addressed. LIDAC receives the worst impacts of global warming and has the fewest resources to mitigate and prepare for them.

Other measures will be the collection of additional information that LIDAC can provide us that includes but is not limited to the effects of climate change on their homes, quality of life, education, health, among others. Knowing this information is vital for the development of initiatives more focused on reducing the effects of climate change on the island. In addition, these meetings will help us to have the support of these communities who, with sustainable practices, will be able to impact on a larger scale, achieving compliance with the measures established as provided by Law 33 of 2019.

3.7 Review of Authority to Implement

The MSA has multiple authorities and organizations that are actively working to reduce greenhouse gas (GHG) emissions and address climate change. These are:

1. Governors' Office: The Governor of Puerto Rico, through executive orders as OE-2013-018 and OE-2018-045 is committed to response for climate change and reducing greenhouse gas emissions. This office has an important role in climate policy and coordination efforts.

2. Legislature: The legislature of Puerto Rico oversees the implementation of laws and policies related to climate change mitigation and greenhouses gas emissions reduction. Acts No. 82 of 2010 are an example of legislative efforts to promote sustainable and renewable energy sources.

3. Department of Natural and Environmental Resources (DNRE): This department is the official agency in charge of environmental conservation and management in Puerto Rico. The greenhouses inventory report was in charge and published by this agency. Also, this agency oversees the Committee of Experts and Advisors on Climate Change.

4. Committee of Experts and Advisors on Climate Change: This committee is part of law 33 of 2019. This committee is responsible for elaborating resilience and adaptation plans that help reduce the effects of climate change and global warming in Puerto Rico. This committee is below the DNRE.

5. Puerto Rico Climate Change Council: The Puerto Rico Climate Change Council (PRCCC) is a voluntary association with more than 140 experts in different sectors who evaluated the impacts of the climate changes in Puerto Rico. The council published the Puerto Rico State of Climate 2014-2021.

The municipality of San Juan prepared invitation letters to agencies and municipalities to be part of this program. A total of 60 letters, 39 to municipalities and 21 to agencies, were sent in September 2023. At the time of preparing this PCAP, we received a total of 12 letters of consent to be part of this program. These letters and other information will be available in the CCAP.

The municipalities that are part of this program at this moment are:

- Municipality of Barceloneta
- Municipality of Caguas
- Municipality of San Lorenzo
- Municipality of Toa Baja
- Municipality of Vega Baja
- Municipality of Florida

The agencies that are part of this program at this moment are:

- Planning Board of Puerto Rico
- Department of Natural and Environmental Resources
- Transportation and Highways Authority
- Electrical Energy Agency
- University of Puerto Rico
- San Juan University College

3.8 Intersection with Other Funding Availability

1. Environmental Protection Agency (EPA): EPA offers funding opportunities for projects related to greenhouse gas emission reduction such as the Climate Pollution Reduction Grant.

2. Department of Energy (DOE): The Department of Energy offers funding opportunities for clean energy initiatives that could include renewable energy, efficient upgrades, carbon capture, and other technologies with the purpose of reducing greenhouse gas emissions.

2. Department of Transportation: The Department of Transportation offers funding for multiple transportation initiatives focused on decreasing the use of motor vehicles. This program is focused on public transportation, pedestrian walkways, bike, and other transportation use, and more. Examples include the complete streets and safety streets for all.

3. Department of Agriculture (USDA): The Department of Agriculture has multiple funding sources related to renewable energy projects, sustainability in farming, conservation, and more with the purpose of reducing greenhouse gas emissions.

5. Department of Housing and Urban Development (HUD): The Department of Housing and Urban Development offers funding opportunities for projects related to sustainable housing and community development projects. This project includes green infrastructure and energy efficiency with the purpose of reducing greenhouse gas emissions.

6. Federal Management Agency (FEMA): The Federal Management Agency has multiple funding resources focused on net zero project for GHG emissions through FEMA's Hazard Mitigation Grant Program (HMGP), Hazard Mitigation Grant Program Post Fire, Pre-Disaster Mitigation (PMD), Building Infrastructure and Communities (BRIC), and Public Assistances Programs (PA).

These and other funding sources in detail will be available in the CCAP.

4.0 Next Steps

At this moment, the Municipality is in an RFP process.

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