

Strategies for Reducing Greenhouse Gas Emissions: Renewable Energy and Energy Efficiency Initiatives and Strategies



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Public Policy: Goals and Strategies

- Goals:
 - Diversify our sources of electricity and energy technology infrastructure.
 - Reduce our dependency in oil based power generation.
- Strategies to Reduce Greenhouse Gases Emissions:
 - Energy Conservation and Energy Efficiency Measures.
 - Power Generation from Renewable Energy Technologies.

- Energy Conservation and Energy Efficiency:
 - Energy Conservation Codes
 - Building Retrofits- Commercial, industrial, government and non for profit organizations
 - Weatherization Assistance Program (Residential)
 - Energy Savings Performance Contracting (Government)
- Power generation from renewable energy technologies:
 - Utility Scale Projects
 - Distributed Generation

Building Energy Conservation Codes

- Minimum Requirements for Design and Construction 
More Efficient 
- Set specific measures to reduce energy consumption in buildings and residential structures.
 - **Residential Buildings**
 - Energy Savings equal or greater than International Energy Conservation Code 2009
 - **Commercial Buildings**
 - Energy Savings equal or greater than ASHRAE 90.1 – 2007
- Plan to achieve 90% compliance by 2017

Building Energy Conservation Codes

- Regulation # 7965 – 2011 = Puerto Rico Building Code
 - Adopted in January 1st, 2011
- Implementation of these building energy codes, will reach at least **35% energy savings** on both residential and commercial buildings.

Building Occupancy Groups	Effective Date
Group A-1, A-2, A-3, A-4, A-5 / Group E / Group H-1, H-2, H-3, H-4, H-5 / Group S-1, S-2	January 1, 2013
Group F / Group I-1, I-2, I-3, I-4, I-5 / Group R-1, R-2	January 1, 2014
Group M / Group U	January 1, 2015
Group B / Group R-3, R-4	January 1, 2016

- A total of **90 buildings** are been impacted.
- Representative Business Sectors:
 - manufacture, hotels, hospitals, universities, etc.
- Reductions of **17,166 Metric Tons of CO²** emissions.
- Savings of **27,725,953.76 kWh** per year.
- 20 years forecasting: **554,519,075 kWh**

Government Building Retrofit and RE

- Project description:
 - The GEP provides grants for the purchase and installation of renewable energy systems within the different government buildings.
- A total of **7 buildings** are been impacted.
- A total reduction of **1,053 metric tons of CO²** emissions.
- Savings :
 - **6,029,406 kWh**
- 20 years forecast: **120,588,120 kWh**

Residential: Solar Water Heaters

- Project description:
 - The Solar Water Heater Rebate Program provided rebates to homeowners when they purchase a new solar water heater.
 - \$1000 per household/applicant.
- A total **282 home owners** were impacted.
- A total reduction of **483 metric tons of CO²** emissions.
- Savings: **705,000 kWh**
- 20 years forecast: **141,000,120 kWh**

EECBG- Non for Profit Organizations

- Program description
 - PREAA issued a Funding Opportunity Announcement (FOA) designed for the nonprofit community base organizations of Puerto Rico. (November 2009)
- Amount of buildings impacted: 12
- Representative Non for Profit Sectors
 - Hospitals
 - Schools
 - Community Organizations

EECBG- Non for Profit Organizations

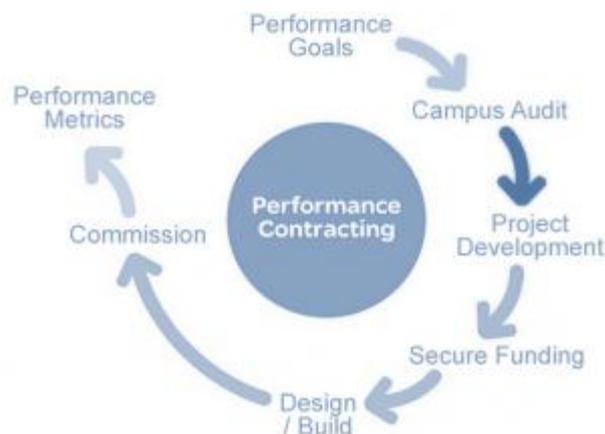
- Reductions in CO₂
 - Building Retrofit
 - **603 Metric Tons**
 - PV Systems
 - **54.6 Metric Tons**
- Savings in Kwh
 - Building Retrofit
 - **874,408 kWh**
 - PV System
 - **79,164 kWh**
- 20 yrs forecasting
 - Savings : **19,071,433 kWh**
 - Reduction in CO₂ of **13,152 Metric Tons**

Weatherization Assistance Program

- Enables low-income families to permanently reduce their energy consumption and electricity bills by effectively employing energy efficient appliances and equipment.
- **9,950** units impacted
- **6,369,592 kg CO²** Annual Reductions
- **12,535,508 Kwh** Annual Savings
- **Reduction of 127,390,646 kg** in CO² emissions (20 yrs forecasting)

Energy Savings Performance Contracts

- Energy Savings Performance Contracts (ESPCs) is a partnership between a energy service company (ESCO) and its customer.
- The ESPC is formed for the purpose of financing and implementing energy saving measures.



Energy Savings Performance Contracts

- Administration projects:
 - **S.B. 2372** (Senate Bill)- Approved in both Chambers on Nov. 2011
 - **H.B. 3686** (House of Representatives Bill)
- PREAA:
 - Through its Energy Savings Performance Contracting (ESPC) Program, sought proposals from Energy Services Companies (ESCOs) to be pre-qualified for as-needed Energy Savings Performance Contracting services, including preliminary auditing and assessment services for government facilities within the Government of Puerto Rico.
 - Evaluation process to qualify ESCOs- **October, 2011**
 - Notification of qualified ESCOs – **December, 2011**
 - Signed 1st ESPC is projected for the **1st quarter of 2012**

- Renewable Portfolio Standard
 - Mandatory percentage of sustainable or alternative renewable energy required of any retail energy provider.
 - Sets the following targets of renewable energy production (generation):
 - **12% by 2015**
 - **15% by 2020**
 - **20% by 2035.**

- Renewable Energy Certificates

- Is an asset that is a tradable good or security that can be bought, sold, assigned and transferred between individuals for any lawful purpose, and as a whole, indivisible asset, it is equivalent to one (1) Megawatt-hour (MWh) of electricity generated by a source of sustainable or alternative renewable energy and, in turn, **comprises all the environmental and social attributes.**

- Environmental and Social Attributes

- All the qualities and properties of RECs that are **inseparable and include benefits to nature, the environment and society, resulting from the generation of sustainable or alternative renewable energy**, but excluding energy attributes.
- “environmental and social attributes” includes, but is not limited to, **the reduction of air pollutants**, such as carbon dioxide and other gas emissions that produce the greenhouse effect.

Act # 82 of July 19th, 2010

Utility Scale Projects

MUNICIPALITY	TECHNOLOGY	INSTALLED CAPACITY	GENERATION (YEAR)	CO ² EMISSIONS AVOIDED (YEAR)	CO ² EMISSIONS AVOIDED (20 YEARS)
Guayama	solar	15 MW	50,000,000 kWh	15,191 metric tons	303, 830 metric tons
Guayanilla	wind	40 MW	90,000,000 kWh	54,014 metric tons	1,080,286 metric tons
Guayama	solar	20 MW	32,412,000 kWh	20,255 metric tons	405,107 metric tons
Loíza	solar	20 MW	33,726,000 kWh	20,255 metric tons	405,107 metric tons
Salinas	solar	10 MW	24,389,426 kWh	10,127 metric tons	202,553 metric tons
TOTAL		105 MW	230,527,426 kWh	119,842 metric tons	2,396,883 metric tons

Note: Sample of registered utility scale projects and expected average of CO² avoided emissions.

Act # 83 of July 19th, 2010 Green Energy Fund

- Incentives for Distributed Generation –
 - **Projects below 1 MW of installed capacity.**
 - Tier 1 (\$8M)
 - Residential and Commercial
 - System capacity: 100 kW or less
 - First come – First Served
 - Tier 2 (\$11M)
 - Commercial and Government
 - System capacity: 101kW up to 1 MW
 - Competitive process
 - Quarterly Applications

Act # 83 of July 19th, 2010

Green Energy Fund

- Current eligible Green Energy Technologies:
 - Solar Photovoltaic (PV)
 - Wind
- Available Funds:

Fiscal Year	Funds
2011-2012	\$20,000,000
2012-2013	\$20,000,000
2013-2014	\$25,000,000
2014-2015	\$30,000,000
2015-2016	\$35,000,000
2016-2020	\$40,000,000 (each year)
Total	290 Millions

Green Energy Fund Program

- Projects of the GEF
 - Tier 1 (First semester 2011) - **1,500 metric tons**
 - Tier 2 (Two quarters 2011) - **3,500 metric tons**

45,000 Metric Tons of CO² avoided in **next 9 years**

Note: Expected average of CO² avoided emissions.

State Energy Program-ARRA Sun Energy Program

- The Sun Energy Program provides rebates for the purchase and installation of solar energy systems in homes, and businesses.



State Energy Program-ARRA Sun Energy Program

- A total **121 buildings** are been impacted.
- Representative Business Sectors:
 - Schools, residential homes, farms, etc.
- Reduction of **1,737 metric tons of CO²** emissions.
- Production: **1,715 kWh**
- 20 years forecast: **34,311 kWh**

State Energy Program-ARRA Wind Energy Program

- Provided rebates for the purchase and installation of small wind (<20kW) energy systems in businesses facilities.
- A total of **2 buildings** are been impacted.
- Representative Business Sectors:
 - Hotels and banks.
- Reduction of **54 metric tons of CO²** emissions.
- Production: **40 kWh**
- 20 years forecast: **800 kWh**

Ballaja Complex



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