

U.S. DOE Energy Initiatives for the USVI and Puerto Rico



Climate Change in the Caribbean 2011

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USVI Energy Initiatives

www.edinenergy.org/usvi.html

USVI Recovery Act Funding

U.S. DOE American Recovery and Reinvestment Act funds
invested in the USVI -- **\$31.8 Million**

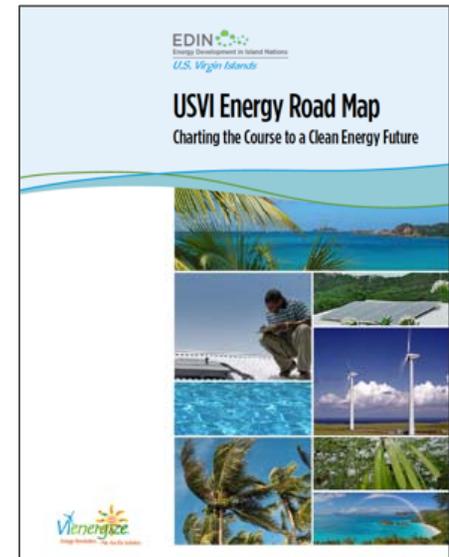
- Weatherization Assistance Program - \$1.4M
 - Weatherize ~ 450 homes across all 3 islands, address health and safety, prioritize for elderly and lowest income
- Energy Efficiency and Conservation Block Grants - \$9.6M
 - Develop, promote, implement and manage local EE programs; improve WAPA T&D system; PV and wind systems
- State Energy Program - \$20.7M
 - Energy audits for government buildings; expand Energy Star® rebate program; EE design, construction, and maintenance training; education and outreach program
- Energy Efficiency and Conservation Rebate Program - \$104k
 - Consumer rebates for Energy Star appliances; appliance recycling

www.energy.gov/recovery

Integrated Deployment Concept for USVI:

Goal: Enable Deployment of Renewable Energy and Efficiency Technologies and Practices at a Material Scale in an Aggressive Approach

- A Strategic Approach to Sustainable Development
 - Comprehensive, multi-technology approach driven by overall goals
 - Address supply & demand – Includes electricity, fuels, vehicles, buildings
 - Tailored to indigenous resources and infrastructure
- Addresses Technology, Policy, and Market Factors
- A multi-year effort that focuses on transformational, systemic change
- Requires inclusive stakeholder engagement



EDIN - US Virgin Islands Pilot Project

Goal: Reduce fossil fuel use by 60% by 2025!

Purpose

- Transform the energy market in the USVI – stabilize costs, enhance energy security, and reduce GHG emissions
- Create a Guidebook for other island nations to follow
- Support USVI economy by stabilizing energy prices and creating green jobs
- Demonstrate high-penetration deployment of EE and RE in isolated grid

Background

- Residential power is currently \$0.42/kWh (spiked to \$0.52/kWh in 2008)
- Median household income is \$28,553
- 33% of population below poverty line
- 100% of power and drinking water production comes from oil
- >15% of GDP is spent on electricity

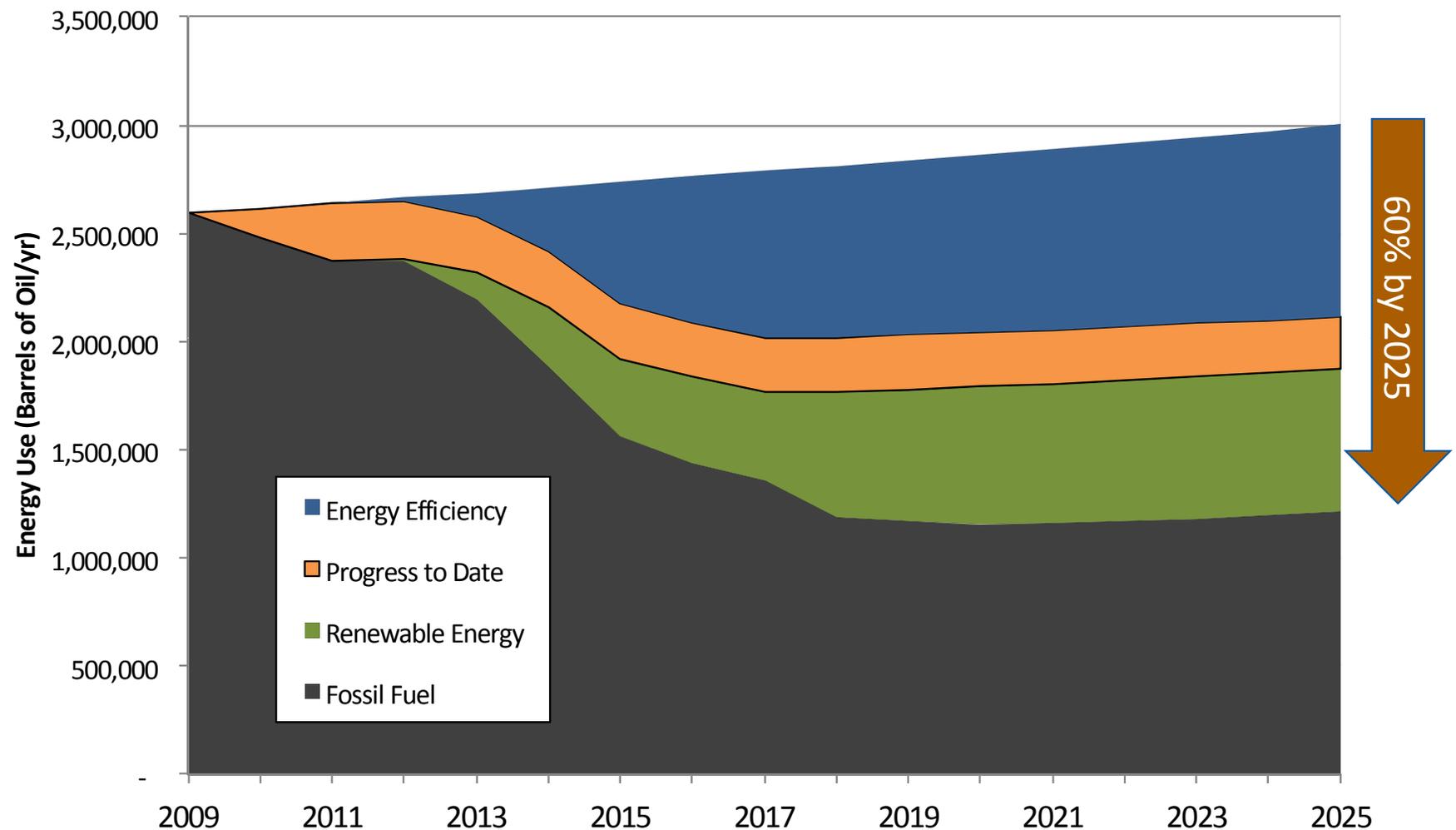
Goals

- **60% reduction** in use of fossil fuels by 2025
- Comprehensive **Energy Roadmap** with input of all stakeholders (2010) ✓
- Execute utility-scale RE projects – **Wind, Solar, and Biomass/WTE** (2011-2013)
- Execute territory-wide **Energy Efficiency program** by attracting ESCOs to USVI (2010) ✓
- Lead intra-island interconnection study with **Puerto Rico and British Virgin Islands** (2011) ✓

Shared Vision Among Stakeholders



60% Reduction Requires Mix of EE and RE



Fossil fuel reduction over time compared to business as usual (BAU)

USVI Key Accomplishments

Renewable Energy

- 451 kW PV System – *largest in region*
- 16.5 MW Waste-to-Energy PPA signed
- 27 Solar PV Proposals to utility for 5-20 MW
- >200kW in distributed generation PV
- Feasibility study for interconnection with Puerto Rico including wind/PV impact study



Energy Efficiency

- Phase 1: ESCO work with 11 schools with University oversight (workforce development)
- Phase 2: ESCO work on all schools & hospitals
- Solar hot water revolving loan program (>500 systems)
- Heat recovery steam generators (HRSGs) & Reverse Osmosis installed
- Plans for EE business unit at utility



Submarine Cable Study – Key Findings

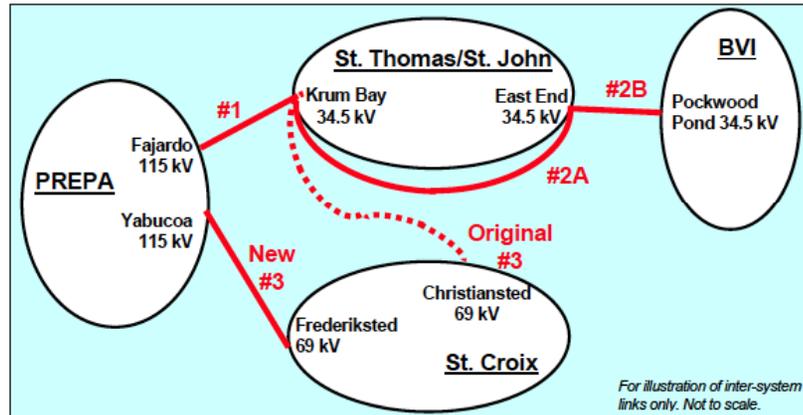


Figure 1-1. Proposed Interconnections

- PR-STT interconnection can be constructed with both HVDC or HVAC
- STT – STX interconnection must be HVDC due to distance and depths:
 - 100 MW HVDC - ± 80 kVDC VSC possible

Table 9-1. Cost Comparison of Interconnection Options

Options	Inter-connection 1 Cost	Inter-connections 2A & 2B Cost	Inter-connection 3 Cost	Other System Upgrade Costs	Total
With 200 MW DC in Interconnection 1	\$186.1M	\$124.5M	\$99.8M	\$36.3M	\$446.7M
With 200 MW AC in Interconnection 1	\$173.3M	\$124.5M	\$98.8M	\$36.6M	\$433.2M
With 100 MW DC in Interconnection 1	\$139.9M	\$124.5M	\$99.8M	\$36.3M	\$400.5M
With 100 MW AC in Interconnection 1	\$124.1M	\$124.5M	\$98.8M	\$36.3M	\$383.6M

Puerto Rico Energy Initiatives

Recovery Act Funding

U.S. DOE American Recovery and Reinvestment Act funds
invested in Puerto Rico -- ***\$141.1 Million***

- Weatherization Assistance Program - \$65.3M
 - Weatherize ~ 5,500 homes, workforce training and education, field monitoring and technical assistance
- Energy Efficiency and Conservation Block Grants - \$34M
 - Develop, promote, implement and manage local EE programs
- State Energy Program - \$37.1M
 - EE retrofit rebates for business and government facilities, rebates for solar energy systems, LED traffic lights retrofit, improved building codes, education and outreach program
- Energy Efficiency and Conservation Rebate Program - \$3.8M
 - Consumer rebates for Energy Star appliances

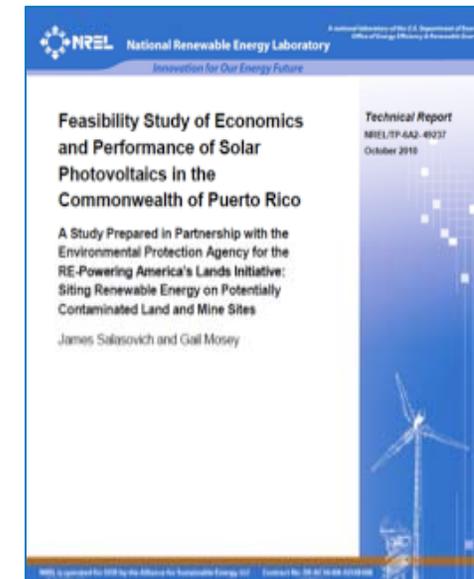
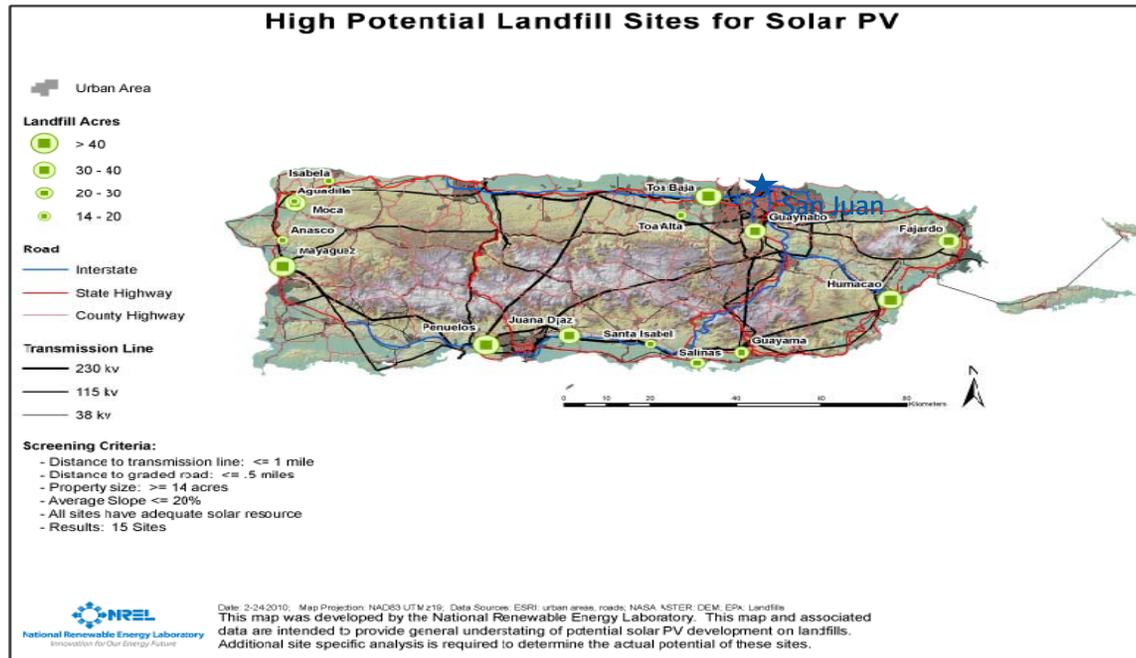
<http://www.energy.gov/recovery>

Energy Savings Performance Contracting

PR Energy Affairs Administration (PREAA) developing ESPC program with DOE Assistance

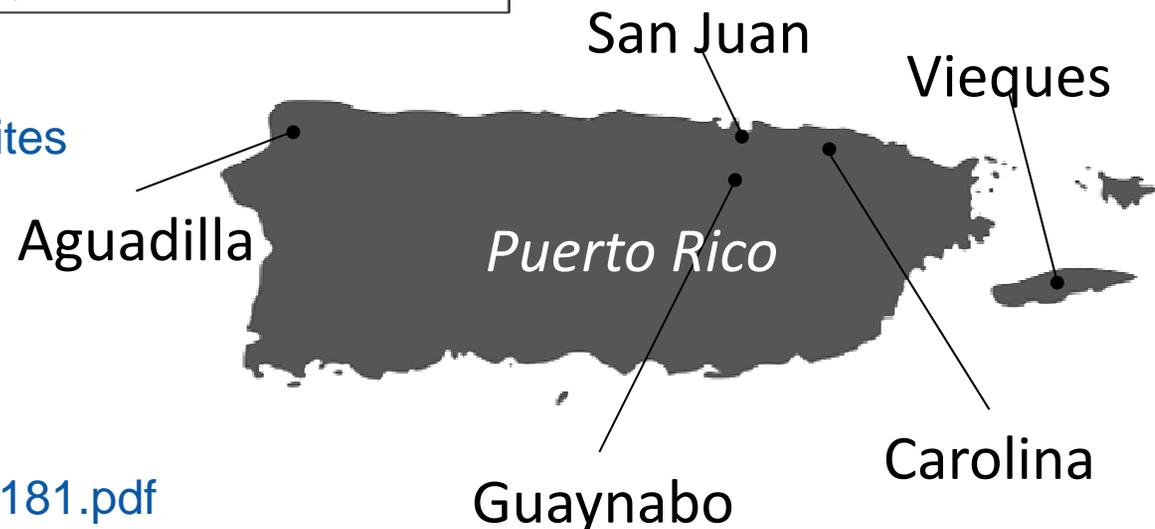
- The approach: “The government is reinvesting in sustainable infrastructures in its buildings to improve quality using avoided energy costs to pay for the improvements”
- Energy efficiency strategy for PR
 - Government as a leading example for the Commonwealth
 - Developing a local workforce
- ESPC in government buildings - ~25 agencies with high initial potential
- DOE Technical Assistance Program (TAP) assistance:
 - First pass building audits
 - Estimate costs and benefits
 - Process guidelines that work for PR
 - RFQ development and evaluation to select ESCOs to work in PR
 - Financing strategy

Re-Powering America PV Landfill Study



- Prescreening resulted in 8 sites selected for assessment
- Study shows five sites of interest for development

Report available at:
www.nrel.gov/docs/fy11osti/52181.pdf



Landfill PV Opportunities

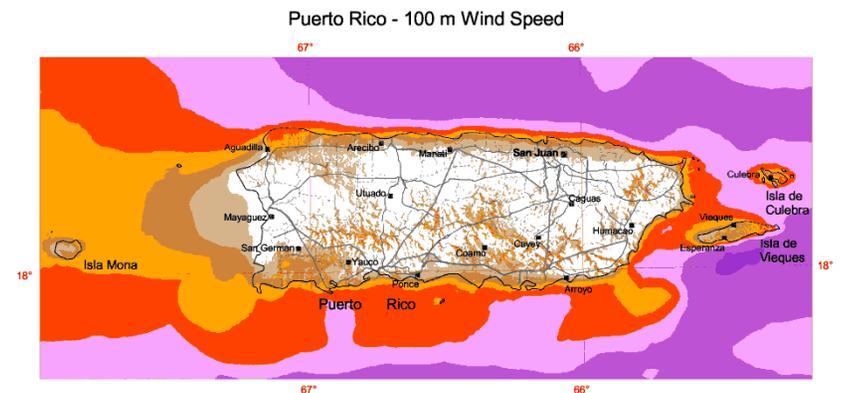
Description	Potential System Size (kW)	Annual Energy Output (kWh)	Number of Households Powered*	Annual Cost Savings (\$)	Annual O&M (\$)	System Cost Estimates with Incentives (\$)		Simple Payback Estimates (years)	
						Assuming \$3.50/Watt	Assuming \$7.00/Watt	Assuming \$3.50/Watt	Assuming \$7.00/Watt
Aguadilla Landfill	800	1,281,600	134	\$166,608	\$4,760	\$1,860,000	\$3,820,000	11	24
Carolina Landfill	800	1,281,600	134	\$166,608	\$4,760	\$1,860,000	\$3,820,000	11	24
Guaynabo Landfill	300	480,600	50	\$62,478	\$3,570	\$635,000	\$1,370,000	10	23
Guaynabo Recycling Center Roof	50	80,100	8	\$10,413	\$793	\$110,000	\$226,550	11	24
San Juan Landfill	7,500	12,015,000	1,252	\$1,561,950	\$89,250	\$18,275,000	\$36,650,000	12	25
Former Vieques Landing Strip	9,000	14,418,000	1,502	\$1,874,340	\$107,100	\$21,950,000	\$44,000,000	12	25
Old Camp Garcia Landfill on Vieques	10,000	16,020,000	1,669	\$2,082,600	\$119,000	\$24,400,000	\$48,900,000	12	25
Former Vieques Municipal Landfill	1,000	1,602,000	167	\$208,260	\$11,900	\$2,350,000	\$4,800,000	12	24

Next Steps and Potential Assistance

DOE is working with Puerto Rico Governor's Office, PREAA, and PREPA to determine near term technical and policy assistance needs

Potential areas of focused assistance:

- Initial grid analysis to determine strategies for high level of RE electrical grid penetration, overall grid capacity for RE, and infrastructure needs
- Policy assistance to develop EEPS or incorporate into RPS
- Continued ESPC support
- EE/RE Trainings and/or Boot Camps



Reducing GHG Emissions through EE

Energy Efficiency and Conservation is one of the most inexpensive and effective ways to reduce GHG emissions.

- Potential for immediate financial payoff along with long-term environmental benefits.
- Commercial and industrial buildings in the U.S. contribute 45% of our national emissions of greenhouse gases. Average of **30%** of the energy consumed in commercial buildings is wasted.
- If the energy efficiency of commercial and industrial buildings in the U.S. improved *10 percent* – which can be done at little to no cost -- organizations would save ~\$20 billion and reduce GHGs equal to the emissions from almost **30 million** vehicles.

Energy Efficiency for GHG Reduction

The most energy efficient businesses and organizations use about 30% less energy than their competitors, thereby significantly reducing their GHG emissions and saving money (energy, operations and maintenance).

ENERGY STAR: an EPA/DOE program that provides many tools and resources that can help companies, government entities, and others save money, improve their energy efficiency, reduce GHG emissions, and gain recognition for their energy leadership.

Example of ENERGY STAR tools: ***Portfolio Manager***

- Free on-line interactive tool that enables you to track and assess your organization's energy and water consumption within individual buildings as well as across your entire building portfolio
- Lets you know how your building's energy efficiency compares with that of similar buildings nationwide
- Calculates GHG emissions of your building(s)
- Has a built-in financial tool that helps you set energy-related investment priorities

Energy Star Buildings

Buildings or manufacturing plants can qualify for the ENERGY STAR label by earning a 75 or higher on EPA's 1-100 energy performance scale.

Many types of buildings, such as schools, hospitals and hotels, can earn the ENERGY STAR.

Businesses, local governments, non-profits, etc. can take part in the **ENERGY STAR Challenge** and help improve the efficiency of commercial and industrial buildings by 10 percent or more.

- ENERGY STAR Challenge participants are encouraged to:
 - Measure and track their energy use;
 - Develop a plan for energy improvements;
 - Make energy efficiency upgrades; and
 - Help spread the energy efficiency word to others

To learn more about how to increase energy efficiency and how to become an ENERGY STAR Partner, go to

www.energystar.gov

Additional Resources

DOE Office of Energy Efficiency and Renewable Energy

- <http://www.eere.energy.gov/>
 - EE, RE, and vehicle technologies; education programs; tools

EPA State and Local Climate and Energy Program

- <http://www.epa.gov/statelocalclimate/index.html>
 - Lead by Example best practices, tools, GHG tracking methods

ASHRAE Advanced Energy Design Guides

- <http://www.ashrae.org/technology/page/938>
 - *FREE!* EE design guides for multiple building types by climate zone

Energy Development in Island Nations

- <http://www.edinenergy.org/>
 - Case studies, USVI project updates, Island Clean Energy Toolkit coming in 2012

Thank You!

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