EDIN-USVI Approach and Progress to Date

January 2011

Introduction

The international partnership for Energy Development in Island Nations (EDIN) helps islands across the globe adopt energy efficiency measures and deploy renewable energy technologies. Projects undertaken by EDIN will help islands develop clean energy policies, financing, and technologies suited to their unique energy and infrastructure needs and help them reduce dependence on imported fuels. The EDIN partnership between Iceland, New Zealand, and the United States was formed in 2008, and each country has undertaken pilot projects to advance the goals of EDIN. Project initiation for the U.S. Virgin Islands (USVI) pilot project was accomplished by EDIN, at which point the USVI effort grew into its own task.

DOE has tasked NREL to serve as EDIN Secretariat, and to provide leadership and technical assistance necessary to further develop and expand EDIN efforts and impact over the next several years.

The US Virgin Islands (USVI) were selected as the pilot project for the EDIN program because of the territory's interest in energy efficiency and renewable energy, its high-energy prices, its close proximity to the mainland US, and its manageable size and number of islands. The primary stakeholders with whom NREL will be working are the USVI government and the Water and Power Authority (WAPA), owner and operator of the USVI electrical and portable water systems.

Purpose and Goals

With high energy costs, isolated grids, and abundant renewable energy resources, islands are uniquely situated to demonstrate the benefits of deploying energy efficiency (EE) and renewable energy (RE) at scale. By working with islands, DOE hopes to demonstrate that a transformation of a community's energy economy is possible with today's technologies.

The goal of EDIN is to have a meaningful impact in the next three to five years by developing an integrated approach to addressing the unique energy needs of island nations worldwide, helping to reduce their dependence on imported fossil fuels and stabilize energy costs. The integrated approach will include building partnerships and methodologies of implementing clean energy policies, financing mechanisms, and projects whose elements can be replicated on other islands.

The overall goals of the EDIN work are:

1. Advance deployment of renewable energy and energy efficiency technologies in island nations across the globe;
2. Develop expertise and experience to address island energy infrastructure and energy management needs;
3. Collaboratively create a model approach and guidelines to assess and implement RE and EE technologies on developed islands; and
4. Develop relationships to increase interest, attract outside investment, expand the EDIN program and efforts, and replicate success.

The purpose of the USVI EDIN pilot is to have a substantial impact on the energy use and generation of USVI in the next three to five years by developing clean energy policies, financing mechanisms, and projects in the USVI that can be replicated on other islands.

The goal of this effort is to provide a comprehensive technical assistance program in the USVI to move them toward an aggressive energy efficiency and renewable energy position. In 2010, the Governor John deJongh, Jr. of the USVI announced an aggressive goal of reducing the territory's reliance on fossil fuels by 60% by 2025. The plan will be to accomplish this by a 30% reduction in energy use coupled with a 30% renewable portfolio standard. The NREL support outlined will help them achieve this aggressive energy goal. The effort will focus on providing technical, economic, and policy assistance to increase the knowledge base on EE/RE technologies, reduce barriers, create enabling policies, support project development, and implement successful projects.

Approach

By bringing together policy advisors, technical experts, and financial leaders, EDIN works to guide clean energy development and deployment in specific regions and islands. Based on experience gained through direct project assistance, EDIN will strive to develop a working model to address critical energy use and infrastructure issues that can be replicated by developed island nations. The EDIN member

countries (the United States, Iceland, and New Zealand) are currently engaging in pilot projects in order to test methodologies and establish a replicable model.

NREL is leading the DOE technical assistance to the Hawaii Clean Energy Initiative (HCEI). While HCEI is not an EDIN project, the integrated deployment approach, development strategies, and current results are providing valuable lessons learned in development of the EDIN approach. The U.S. Virgin Islands (USVI) were selected as the United States' pilot project for EDIN with the goal of helping the Territory reduce dependence on imported fossil fuel through a comprehensive approach to developing policies and advancing energy efficiency and renewable energy use; lessons from HCEI are being incorporated, and additional lessons from USVI will inform the development of the EDIN Guidebook for comprehensively addressing island nations' energy needs. At the organization level, NREL will work with EDIN partners to initiate additional pilot projects, exchange information and expertise, develop solutions, and disseminate information through workshops and conferences. We will assist the EDIN efforts in developing relationships with other nations, financing institutions and international organizations to expand EDIN knowledge base and reach.

By developing a model approach for comprehensively addressing energy infrastructure needs on islands, EDIN will have a tool that allows for replication of successes. The approach to replication will be to identify additional projects requiring support, strategically grow EDIN membership (projects, country partners, financing institutions, and international organizations), and train others to apply the model approach to their situations.

USVI Approach

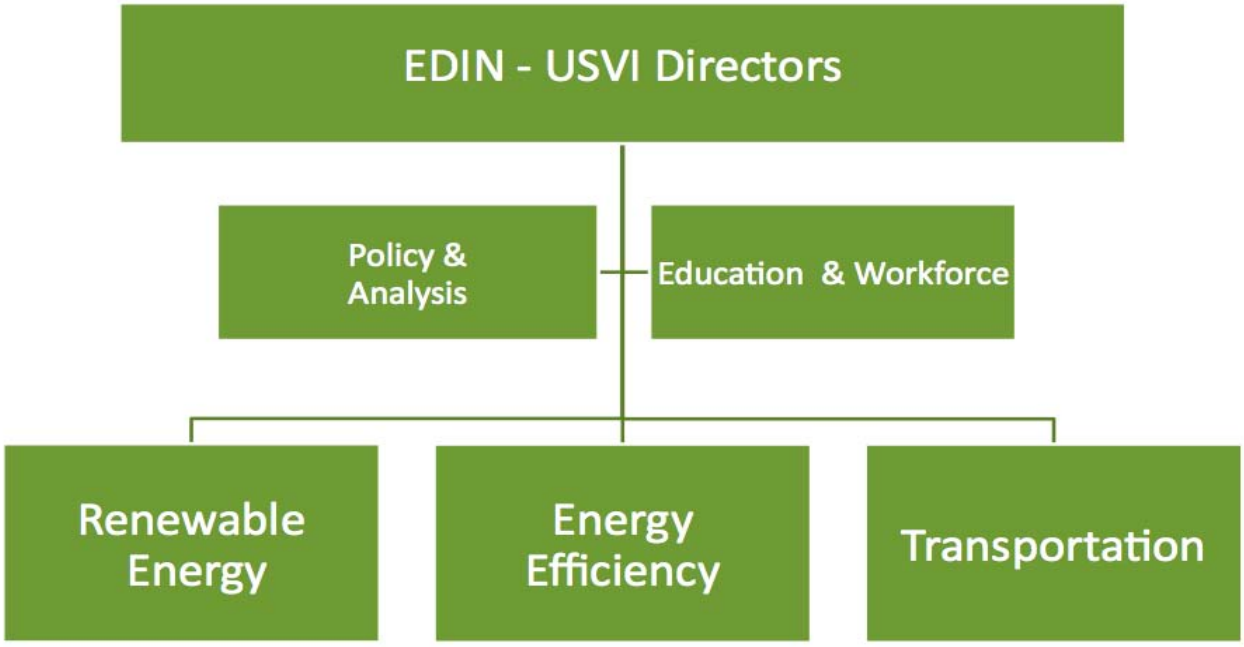
The effort in USVI will focus on deploying the renewable energy and energy efficient technologies required to achieve the 60% target by 2025. The approach will mirror the effort underway in Hawaii with both projects being comprehensive, multi-year, multi-island efforts. The support will follow the Integrated Deployment development model with work focused on the following areas:

- Establishing stakeholder relationships
- Developing technical and financial industry engagement
- Providing macro analysis to assist in policy and regulatory change and inform project feasibility decisions
- Assisting project development by determining technical and economic viability, and addressing policy considerations for high impact projects
- Working viable projects through the contract and selection process to achieve a high-quality and technically sound outcome

Our approach is to create a broad-based, sustainable Energy Action Team to meet the challenges of introducing renewable energy and energy efficiency to an island where almost 100% of energy needs are met by fossil fuels. This Energy Action Team is directed by DOE, DOI, and by the two major stakeholders in the territory – the VI Energy Office and the local utility, the VI Water and Power Authority (WAPA). Other governmental and non-governmental stakeholders are addressing specific energy efficiency, renewable energy, and transportation issues. Currently, we are engaged with a number of governmental agencies in the territory including:

- University of Virgin Islands
- Port Authority
- Waste Management Authority
- Housing Finance Authority
- National Park Service
- Governor's Office
- Legislature (VI Senate)

- Water and Power Authority
- Energy Office
- Public Service Commission
- Department of Education
- Transportation Authority
- Workforce Development Board



The approach in the USVI will be to focus much of our efforts in developing functional excellence and project development skills in the VI Energy Office and WAPA. Currently, the territory does not have sufficient staff dedicated to clean energy work, nor does the utility. The assistance of DOE is particularly important given the $31M in American Recovery and Reinvestment Act (ARRA) funds that the USVI Energy Office is responsible for managing. Before the extended USVI team can become effective, we need to raise the level of knowledge and understanding in these areas. It will be critical to provide workshops, outreach, education, training, and technical experts on-island to raise awareness and address questions as they arise.

The local utility, WAPA, needs assistance addressing the integration of a large percentage of renewable energy into the existing generation, transmission, and distribution systems. Grid impacts from variable-power renewable generation are a specific issue needing significant analysis to address. The USVI has two grid

systems that will need to be analyzed, the St. Thomas and St. John system (joined via an existing under-water cable) and the St. Croix grid. With the peak loads being 88 MW and 55 MW respectively, large utility-scale variable-power renewable systems may be challenging from the grid integration standpoint. However, without a large-scale project, it will be impossible to meet their 60% reduction goal or to bring the necessary industry interest to the islands.

Project Accomplishments to date

The EDIN-USVI accomplishments to date are reported below by working group.

EDIN Directorate

Accomplishments

- Helped form integrated leadership team comprised of DOE, DOI, the utility, the governor's office, and the energy office
- Memorandum of Understand signed by DOE, DOI, and USVI governor
- Received commitment from USVI government for 60% reduction in fossil fuel use by 2025
- Formed integrated Working Groups with representation from local businesses, environmental advocates, local government, and utility.
- Supported the formation of University of VI Caribbean Green Technology Center by the University of the Virgin Islands

Significance / Impact

- Succeeded in pulling together disparate and often adversarial group to work together on a shared mission – 60% by 2025.
- Developed new, on-the-ground organizations and affiliations that should be in place after DOE's work in USVI is finished.

Renewable Energy Working Group

Accomplishments

- Updated solar maps for USVI using satellite data
- Developed RFP and led proposal review for 400 kW PV project, first PV system of size in the territory. Groundbreaking scheduled for first quarter 2011.

- Developed RFP and led proposal review for a set of solar measurement stations that will be used to estimate the effect of large-scale PV on the electrical system.
- Developed RFP for 10 MW Solar PV system for Utility. RFP to be released in March 2011.
- Performed HOMER Analyses to determine the most cost effective mix of RE technologies
- Leading integrated team in oversight of $475k Inter-island cable study that will determine if a transmission cable between USVI, British Virgin Islands, and Puerto Rico is feasible
- Developed RFP and led proposal review for a set of wind measurement stations that will be used to obtain "bankable" wind data in the USVI
- Supported utility and developer in the development of a 16.5 MW waste-to-energy plant planned for St. Croix. Groundbreaking scheduled for first quarter 2011.
- Leading an effort in conjunction with local environmental group and university to quantify and qualify the biomass potential in the island.

Significance / Impact

- RE work is laying the foundation for a significant shift in the generation mix of the local utility, from 100% diesel fuels to approximately 30% renewable.
- RE group will deliver a number of early wins in 2011, such as the airport PV system and the deployment of anemometry. These early wins help gain creditability for the program and encourage continued support by key stakeholders.

Energy Efficiency Working Group

Accomplishments

- Led selection of Energy Service Companies (ESCOs) that will address EE measures at all the local schools in USVI. This is the first ESCO activity in the territory.
- Developed tropical home energy models that are used to determine the efficacy of EE measures in the Caribbean.
- Supporting VI Port Authority on the development of an EE strategy that includes the installation of smart meter, lighting upgrades, and a PV project at CE King Airport.
- Leading effort to improve EE for low-income housing community. This work involves design and modeling at a building and community level.

- Heat Recovery Boilers were installed in 2010 at the utility's plant in St. Croix. These systems will improve heat rate by approximately 40%.
- Reverse Osmosis systems are replacing multi-effect distillation for water desalinization, improving efficiency by over 50%.

Significance / Impact

- Attraction of ESCOs to the territory and promotion of ESPC has the potential to dramatically lower local governmental, commercial, and industrial energy use.
- There is significant confusion by many in the public on which EE tactics are appropriate. The EE working group has helped educate the general public and encourage demand reduction.

Transportation & Fuels Working Group

Accomplishments

- Leading an effort in conjunction with local environmental group and university to quantify biofuel potential in the island. Early efforts are focused on waste oil.
- Working with Department of Public Transit to improve their 20-year plan currently in draft form. Report will focus on reducing miles driven and improving vehicle efficiency.
- Developed a "wedge analysis" to demonstrate that a 60% reduction in fossil fuel use by 2025 is feasible.
- Supporting effort to quantify and reduce excess fuel use due to congestion

Significance / Impact

- Demonstration of the potential for reduction in miles driven and fuel usage has given the team credibility and has led to inclusion of energy matters into the formal 20-year plan for transportation in the territory.

Stakeholder Outreach & Education Working Group

Accomplishments

- Led an integrated team to develop a communication strategy for gaining community support and buy-in for EDIN goals and related EERE efforts in USVI

- Established a Web presence to support EERE efforts in the USVI http://www.edinenergy.org/usvi.html
- Held three well-attended workshops in past year. These workshops are used to educate general public on EERE and to coordinate efforts and discuss successes of EERE working groups.
- Developed an integrated communication strategy, including web-site, posters, newsletters, video, and radio jingle.

Significance / Impact

- Succeeded developing a shared mission: "60% by 2025"
- Collaborated with a broad group of USVI stakeholders to successfully launch "VIenergize" education and outreach effort, which has resulted in increased public awareness of the EDIN effort (through press coverage) and generated increased interest and involvement

Policy & Analysis Working Group

Accomplishments

- Developed a comprehensive energy strategy for the territory. This strategy analyses various EE and RE scenarios on a technical and economic basis. The goal is to reduce fossil fuel usage by 60% from business as usual by 2025.
- Supported development of an on-line carbon calculator that allows USVI residents to calculate their carbon footprint and investigate strategies to reduce their emissions
- Supported the development of a Green jobs estimator in the USVI.
- Evaluated and improved the proposed Solar Hot Water Heater policy, rebate, and revolving loan program. This successful program has lead to over 100 systems installed.

Significance / Impact

- Demonstrated the importance of thorough policy analysis to the effectiveness of energy efficiency measures (for example, solar water heater program)
- Demonstrated to feasibility of achieving 60% by 2025 through a rigorous, flexible projection of the potential for EERE improvements in the territory.