De-Risking Island Energy System Investments

Lessons from Hawaii, USVI, Puerto Rico

October 2015

IEA EGRD
Energy Transition Initiative: Islands

The *Energy Transition Initiative: Islands* is an opportunity for insular areas to define and realize their own vision for a clean economy.

**Our Goal/Mission:**

- Accelerate commercial opportunities to transition island economies off imported fossil fuels by focusing on local resources.

**Anticipated Outcomes:**

- Eliminate the dependence of island economies on imported fuels.
- Replicable solutions for others around the world.
# Islands Are Deployment Leaders

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Island</th>
<th>City</th>
<th>City with Municipal Utility*</th>
<th>State with Regulated Monopoly</th>
<th>State with Generation Separated</th>
<th>Federal (Non-PMA)</th>
<th>RTO/ISO</th>
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<tbody>
<tr>
<td>Central Power Stations</td>
<td>✓</td>
<td>Siting*</td>
<td>✓</td>
<td>✓</td>
<td>(IPPs get special treatment)</td>
<td>Hydro only (IPP PURPA?)</td>
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<tr>
<td>Distributed Generation</td>
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<td>Capacity Requirements</td>
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<td>Can be shared with Regional Interconnect (not MISO)</td>
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<td>Interstate wires / Bulk Power System</td>
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<td>✓</td>
<td></td>
<td>PURPA</td>
<td>Wholesale participation</td>
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<td>✓</td>
<td>✓</td>
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<td>Delegated authority from Fed</td>
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<td>Transmission</td>
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<td>Shared with Federal</td>
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<td>Shared with States</td>
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<td>Public Transportation</td>
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<td>Shared with Cities &amp; Fed</td>
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<td>Some</td>
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<td>Shared with States</td>
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*NB: U.S. Focus.*

*Siting authority of local governments varies under state law*
“The Islands Playbook (the Playbook) provides an action-oriented guide to successfully initiating, planning, and completing a transition to an energy system that primarily relies on local resources to eliminate a dependence on one or two imported fuels. It is intended to serve as a readily available framework that any community can adapt to organize its own energy transition effort.”
Islands Playbook Content

• **Highlights the process - the *how* - of organizing an energy transition and implementing projects**
  o Eliminating a dependence on imported fuels requires iteration

• **Lessons learned from islands work to date**
  o USVI and Hawaii
  o Aruba, Barbados, Canary Islands

• **Downloadable worksheets and templates**
  o Community organizing tools, such as stakeholder and donor coordination matrices
  o Project management tools, such as a Risk Register and Strengths-Weaknesses-Opportunities-Threats matrix

[www.energy.gov/islandsplaybook]
Playbook Themes

• Focus on people
  o Engaging stakeholders proactively
  o Empowering the community to set vision
    – Not just the government and not just the utility
  o Developing human capital
    – Effort not dependent on one administration or one person

• Focus on projects
  o Identifying near-term actions that support long-term goals
  o Tracking progress to maintain momentum
  o Improving execution for the next project(s)
Based on experience of USVI and Hawaii

- **Hawaii Energy Goal from 2009**: 70% clean energy goal by 2030, with 40% renewable and 30% efficiency
  → Recently increased to 100% by 2045

- **Hawaii Success Indicators**:
  - Met its 2015 renewable electricity target two years early
  - 226 MW oil-fired generation is scheduled for retirement by 2016
  - Doubled the percentage of electricity supplied from renewable resources

For more background info: [http://www.hawaiicleanenergyinitiative.org](http://www.hawaiicleanenergyinitiative.org)
Examples of World-Class Leadership

• 2nd in Ernst & Young’s U.S. Renewables Attractiveness Indices (2013)
  o Before innovative financing, 100% target in past years
• Solar growth of 40X, wind power capacity growth of 200%
  o Solar capacity has almost doubled every year since 2006
• Substantial energy efficiency retrofits
  o Highest ESPC investment per capita
  o Net-zero Affordable Housing
• Most charging stations per capita in US
• Oil use at levels not seen since 20th century
  o HECO use has fallen 16% since 2008
• Pushing the boundaries for distributed generation finance, penetration, and interconnection

⇒ Required Entrepreneurial Spirit of Private Sector, DBEDT, and Legislature
Based on experience of USVI and Hawaii

• **USVI Set Energy Goal in 2010:** Achieve 60% reduction in fossil fuel-based energy consumption by 2025 through renewable energy generation and energy efficiency.

→ After 6 years, fossil fuel use is down 30%, electricity rates down 35%

• **USVI Supporting goals:**
  o Minimize dependence on fossil fuels
  o Reduce energy costs
  o Enhance energy affordability and reliability
  o Reduce environmental threats associated with global warming
  o Build a thriving clean energy sector that generates local green jobs
  o Preserve the natural beauty that is the lifeblood of the islands
USVI Energy Leadership

• **2014-2015 – USVI recognized as regional leader.** Begins to share best practices with others in Caribbean.

• **Examples**
  - Carbon War Room’s 10 Island Challenge
  - Caribbean Regional Energy Forum (CREF)
  - Vice President’s Caribbean Energy Security Initiative (CESI)
  - Energy Transition Initiative (ETI)
Meeting 60% by 2025

USVI Makes Headway Toward Goal to Reduce Fossil Fuel 60% by 2025

- Energy Development in collaborations (EDC) partnership launched
- Virgin Islands Water and Power Authority (VIWA) signs purchase agreement for 145/ barrel
- Oil prices spike to over $145/barrel and price of electricity reaches $8.50/kWh in USVIs
- VIWA begins developing Vienergize Services Network to assist customers with energy efficiency
- VIWA signs agreement to move from diesel to propane, lowering fuel costs by an estimated 30% and greenhouse gas emissions by 10%
- Oil prices drop to $55/barrel as a result of electricity rate drops to $6.42/kWh in 2015.

LEGEND

- TURF
- Solar
- Wind
- Energy Efficiency
- Biomass
- Gas
- Coal
- Oil

VIWA begins developing Vienergize Services Network to assist customers with energy efficiency.

VIWA signs agreement to move from diesel to propane, lowering fuel costs by an estimated 30% and greenhouse gas emissions by 10%.

Oil prices drop to $55/barrel as a result of electricity rate drops to $6.42/kWh in 2015.
Meeting 60% by 2025

→ Rates down to ~$0.33/kwh in 2015, from height of >$0.50/kWh in 2008

→ Propane use will reduce GHG pollutants and particulate matter by over 65%

- Virgin Islands Water and Power Authority (VIWA) signs waste-to-energy (WTE) power purchase agreement (PPA)
- VIWA installs waste heat recovery plant, adding 19 MW of power without burning a single drop of additional oil
- VIWA awards nearly $1 million to USVI nonprofits for energy efficiency and renewable energy projects
- Working groups are formed to develop detailed road map to 60x25
- VIWAPA campaign launched

<table>
<thead>
<tr>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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- Ground breaking for 46 T-WF solar PV system at Cyril E. King Airport, St. Thomas
- Energy savings performance contracting company (ESCCO) completes upgrades, saving USVI schools an estimated $1.7M/year
- VI Waste Management Authority breaks ground on 800-KW biomass/anaerobic digester project
- Reverse osmosis plants shut down
- VIWA adopts improved interconnection process to increase the speed and scale of renewable energy adoption in the USVI
- Study shows the St. Thomas and St. Croix systems are capable of handling a combined 65 MW of wind and solar without adversely affecting grid stability
- VIWA receives grant to install advanced metering infrastructure
- VIWA installs 972 LED street lights
- WAPA installs 300 kW photovoltaic array at Lurinae Village Apartments on St. Croix — the largest in the territory
- VI Energy Development Office (VIENDO) launches San Power Loan Program
- VIENDO announces installation of more than 900 solar water heating systems since SunPower/Loan Program launched in March 2010
- 4-MW solar project breaks ground on St. Croix
- University of the Virgin Islands signs 3-MW solar PPA
- Some hotels drop off the grid and rely on generators
- VIENDO completes collection of 1 year of "bankable" wind data on St. Thomas and St. Croix
- VICO releases new solar RFP to replace failed PPAs
- ESCOs begin to work to improve efficiency of hospitals and health centers
- 200-HP wind turbine installed at Lurinae Village Apartments on St. Croix — the largest in the territory

- WAPA begins to reduce energy use by over 65%
DOE Technical Support For Energy Transition Activities

• **Technical Assistance** from DOE and its national labs:
  - Conducted energy resource and site assessments
  - Performed policy, grid, technology, and financial analyses
  - Helped develop interconnection policies and procedures to encourage distributed solar
  - Supported development of energy road map / strategy
  - Helped utility develop and execute requests for proposals for solar project development
  - Compiled Playbook tools and lessons learned to support more energy transition efforts in other islands
PHASE 0
Committing to an Energy Transition

U.S. Virgin Islands Leadership Embraces Inclusiveness to Ensure Community Ownership of Clean Energy Vision

In 2010, U.S. Virgin Islands (USVI)—serving as a pilot project for the Energy Development in Island Nations Initiative—set a goal to reduce its almost 100% dependence on imported fossil fuels. At an inaugural workshop in February 2010, USVI Gov. John P. de Jongh Jr. announced his goal to reduce the territory’s dependence on fossil fuel by 60% by 2025. In support of this goal, Gov. de Jongh worked to charter and empower an effective, inclusive leadership team to engage stakeholders and set a generated stakeholder buy-in from the start for meeting the goal. By appointing local energy champions and other technical experts, the USVI was able to pave the way for future successful projects in support of the 60% by 2025 goal.

Learn more about how the USVI engaged stakeholders to develop its clean energy vision.

More than 25 government leaders, energy office officials, and utility company executives from the USVI attended a workshop at NREL in Golden, Colorado, in February 2010. Photo by Adam Warren, NREL.

Screenshot from Playbook website
Playbook Lessons Learned

• The Lessons Learned provide brief studies of how a common problem has been addressed by another island, such as:
  - Energy Permitting Wizard Helps Reduce Project Barriers in Hawai'i
  - Assessing Pathways in Aruba
  - Solar Hot Water Heater Industry in Barbados
  - U.S. Virgin Islands Clears the Way for Unprecedented Levels of Solar Energy

• Designed to support decisions in other locations – Not dictate them or prescribe solutions
# Playbook Worksheets & Templates

## Template: Donor Coordination Matrix

<table>
<thead>
<tr>
<th>Donor Name</th>
<th>Project Scope and Name</th>
<th>Project Partners and Consultants</th>
<th>Timeline (Start &amp; End)</th>
<th>Funding Amount</th>
<th>Point(s) of Contact</th>
</tr>
</thead>
<tbody>
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- **Downloadable tools for personalized use, such as:**
  - Periodic project reporting templates
  - Donor coordination matrix
  - Responsible-Accountable-Consulted-Informed (“RACI”) matrix
Playbook Phases

• Phase 0: Committing to a Transition
• Phase 1: Setting the Vision
• Phase 2: Assessing Opportunity Pathways
• Phase 3: Project Preparation
• Phase 4: Project Execution and Quality Control
• Phase 5: Operations and Maintenance
• Phase 6: Process Improvement

USVI Dates
2008-09
2009-10
2010-11
2011-13
2011-15
2013 +
2015-16
Next items

- Reduce Capital Costs of Energy Efficiency
- Continue to Modernize Grid Infrastructure
- Diversify Utility-Scale RE
- Deploy Alternative Fuel Vehicles
- Identify Paths for Distributed Generation
- Apply Entrepreneurial Spirit to Policy Development
- Take a fresh look at paths to success with updated wedge analysis
Phase 6 Example: “HCEI 2.0”

• “Hawaii has made great strides in achieving its clean energy goals and now finds itself in a new energy ecosystem. HCEI 2.0 will help drive the formation of this new ecosystem by implementing grid modernization and interconnections, as well as bridging the gap between conventional and renewable energy sources with transitional fuels.”

• HCEI 2.0 Organization
  o Core Executive Management Team (EMT), primarily public sector representatives, will focus on achieving Hawaii’s clean energy goals
  o Advisory Board from private, academia, and non-profit sectors, engages directly with the EMT to provide input on priority issues
  o Charrettes are ad hoc groups of stakeholders vital to a particular hot button issue to provide critical thinking around those developing issues
    – Each charrette will be designed around the unique needs of the subject matter. Outcomes from the charrettes will help inform future HCEI actions and can result in the formation of “strike teams”, or action groups, to delve even deeper into specific issues.
USVI Phase 6: Energy Roundtable

- **Experience tell us** success depends on collaboration among the public and private stakeholders whose commitment is foundational to the energy transition.
- **Fresh look** at paths forward, given progress to date.
- **Energy Roundtable** can provide the forum for the USVI to plan and execute the next stage of its transition.
- **Such as . . .**
  - Next 20% of fossil fuel reduction target
  - Increasing fuel diversity
  - Tailoring grid to expectations for electric service
  - Scaling energy efficiency services
  - Deploying alternative fuel vehicles
  - Adding clean energy jobs
  - Reducing energy cost further
  - . . .
USVI & Hawaii Next Steps

• **Build** on exceptional starts

• **Plan** for next tranches of reduction in fossil fuels
  - Integrated Resource Plan
  - Distributed Solar
  - Policy Development
  - Advanced Metering / Smart Grid
  - Utility-Scale Renewables

• **Energy Roundtable and Charettes** will provide forum for constructive, on-going dialogue among stakeholders about next five years of progress
Questions and Discussion

Thank you for your time

Island Playbook Website:
www.energy.gov/islandsplaybook

ETI web-site:
http://energy.gov/eere/technology-to-market/energy-transition-initiative

Island Energy Snapshots:
http://energy.gov/eere/about-us/island-energy-snapshots

Stephen Walls
Stephen.Walls@ee.doe.gov