



3.1 Involve Stakeholders in Policy and Operational Reform Efforts

At the end of the opportunity road map process in Phase 2, a Strengths-Weaknesses-Opportunities-Threats analysis identified potential near-term projects on the path to realizing your community's vision. When selecting which ones to pursue, the leadership team and working groups will need to consult subject matter experts as well as stakeholders who may be affected by project implementation.

Many of these stakeholders will have participated in Phase 2 and, based on the priorities they identified then, will likely have input about which projects to pursue first. Without limiting this input, consultations with stakeholders should identify actions that address specific problems with practicable solutions that can be accomplished within a reasonable time frame and defined budget.

Once near-term projects are identified, team members must be ready and willing to explain why they were selected and others were not. This transparency can help maintain stakeholder interest in supporting the overall effort.

Phase 3 describes how to:

- ☐ 3.1 Involve stakeholders in policy and operational reform efforts
 - ☐ 3.2 Identify the human, technical, and financial resources needed to complete near-term projects
 - ☐ 3.3 Set a budget and analyze risks
 - ☐ 3.4 Identify financing options for near-term projects
 - ☐ 3.5 Develop performance, measurement, and reporting plans
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3.2 Identify the Human, Technical, and Financial Resources Needed To Complete Near-Term Projects

Near-term projects can focus on a variety of actions, such as overhauling policies, designing utility-led programs for ratepayers, assessing renewable resources, identifying funding and financing options, conducting feasibility studies, updating the electricity grid, addressing threats to critical loads, filling gaps in resilience, and developing a workforce to increase capacity.

While considering stakeholder input, the team should prioritize projects that will accomplish specific objectives, can leverage or build upon the strengths of project implementers, are central to realizing the vision, and create value for those impacted by the project.

Project selection must balance the level of effort with the expected benefit, taking into account resources and team strengths. Poor decisions can divert resources from more beneficial efforts, erode the confidence of the project team, and dampen momentum among external stakeholders.

3.2.1 Establish a Project Team

Having identified where project priorities align with the Phase 2 road map, stakeholder interests, and the Phase 1 vision, assemble a team that can complete the project. Project teams will vary in size, but each team must have someone to fill the following roles and responsibilities (even if one person has more than one role):

- **Project lead:** The person who ultimately bears responsibility for the success or failure of the project, the project lead oversees plans, budget, and schedules; delegates responsibilities; and closes out the project.

- **Champion:** The person who initially proposed the project or obtained approval for it, the project champion will seek out additional resources as needed to ensure project success and can positively impact decision makers. Although not necessarily a chief executive or agency head, the champion is typically in a senior supervisory role for the initiative.
- **Subject matter expert(s):** People with experience and expertise relevant to the process, policy, technology, or service that is the focus of the project.
- **Project execution staff:** The people responsible for carrying out the actions set out in the project plan, staff members may be in charge of data collection, reporting, construction, and equipment management.

3.2.2 Select at Least One Quick-Win Project in the Initial Round of Projects

Among the near-term actions identified in Phase 2, it is important to select at least one “quick-win” project that will produce a demonstrable benefit in a short time frame. Quick wins are important to build morale among project teams, demonstrate success to potential investors, and maintain community support for medium- and long-term projects.

Quick-win projects generally have some or all of the following features:

- Low financial cost
- Deliverable in less than a year
- Established ability to act according to law and institutional authority
- High likelihood of energy cost savings, threat mitigation, and/or community investment
- High-visibility locations, such as a large public building, airport, school, or church
- Prominent project partners, such as well-respected politicians, businesspeople, and community leaders.

Examples of quick-win projects in the Caribbean include:

- **Solar water heating (SWH):** SWH can save electricity costs and interior square footage with a minimal capital outlay.
- **Streamlined interconnection policies and procedures:** A streamlined, well-documented process will support and encourage the development of a thriving solar distributed generation industry.
- **Distributed generation:** A modest distributed generation installation (e.g., wind or solar) can serve as a pilot project and learning opportunity.
- **Workforce development program:** Educational or utility training resources can be adapted to train workers in energy retrofiting, building energy management, solar photovoltaic (PV) installation, and other technical skills, building local capacity to implement medium- and long-term projects.
- **Energy operations and maintenance (O&M):** Organizing a group of public and private stakeholders in energy system O&M best practices can save money from day one while creating lead-by-example opportunities.

3.2.3 Define Roles and Responsibilities for Government Entities Executing Near-Term Projects

Project teams do not operate in a vacuum. It is important to manage expectations and ensure the adequate participation of everyone involved in a project, both directly and indirectly. One useful analytical tool to aid in this process is a responsibility assignment matrix—Responsible-Accountable-Consulted-Informed (RACI) matrix.

A RACI analysis describes who is responsible for doing work (R), who is accountable for work being completed (A), who must be consulted during the course of work (C), and who must be informed of the progress being made (I).

Responsibility Assignment Matrix

PROJECT: Issue RFP*		DEPARTMENT: Public Utility			UPDATED: Jan. 20XX		
Step/ Action	Description	Project Lead	Subject Matter Expert	Utility Leadership	Energy Ministry	Public Works Ministry	Governor
1	Define project size and eligible technology	R	C	A	C/I	I	I
2	Draft RFP	A	C	I	I		
3	Publish RFP			R	A	I	C

* Request for proposals

Completing a RACI matrix like the example above can guide decision making and communications through each step of the project, helping the right people contribute to a project in a timely fashion on path to project success.

3.3 Set a Budget and Analyze Risks

With projects selected and teams identified, setting budgets become the priority. The budget establishes project costs, described in hours dedicated and dollars spent, adjusted for project risks. Along with consulting subject matter experts and project participants, the project lead should and look at costs for similar projects—even in other jurisdictions. Experience may save the team from repeating mistakes and missing opportunities

Project costs typically include:

- Staff time
- Project management
- Communications/stakeholder outreach and education
- Travel and meetings
- Data collection and reporting
- Materials procurement
- Information technology license fees
- Insurance
- Site acquisition and preparation
- Capital expenses, training, and specialized equipment
- Consultant services.

As often as possible, base these cost estimates on experience and information from suppliers. Contingency costs are typically expressed as a percentage of total cost and should be included to allow for impacts from risk.

U.S. Virgin Islands School Retrofits Deliver Solid Return on Investment, Validating Ongoing Investments in Energy Efficiency

The Energy Development in Islands Nations (EDIN)-U.S. Virgin Islands (USVI) project provides an example of how achieving significant success early in an energy transition builds support and momentum.

As an EDIN project partner, the USVI was able to tap into a broad spectrum of technical assistance and project development support from the U.S. Department of Energy (DOE) and the National Renewable Energy Laboratory (NREL).

That support included identifying optimal energy efficiency and renewable energy solutions and a road map for achieving the territory's goal of reducing fossil fuel use 60% by 2025. NREL's initial USVI resource assessments identified energy efficiency measures as "low-hanging fruit"—projects with potential to achieve the greatest energy savings for the least cost.

In October 2011, the USVI achieved one of its most visible and impactful successes toward the 60% goal with the completion of building energy efficiency upgrades in 11 schools. The energy services company that performed the retrofits guaranteed the USVI

government an annual cost savings of \$1.2 million, and the results exceeded expectations.

Ongoing monitoring by the Virgin Islands Energy Office showed the retrofits saved \$1.3 million in energy costs the first year and \$1.7 million the next, which helped offset operational costs for the Department of Education. To build on this success, the USVI government authorized \$35 million in funding in 2013 to install lighting and water retrofits in 34 more schools and other Department of Education facilities.

Energy efficiency measures offer significant savings with minimal up-front cost and therefore present a prime opportunity to build momentum early in an energy transition. By exceeding cost-savings projections and providing a highly visible example of progress, the school retrofits built credibility for the EDIN-USVI project.

This early win also validated ongoing government investments in energy efficiency by yielding strong returns over the first 2 years. This, in turn, helped build momentum for the EDIN-USVI project by motivating stakeholders and inspiring the community to become engaged in the effort.

3.3.1 Analyze Project Risk

Effectively mitigating risk begins with an analysis of a project's known risks and response options, which include changes to the schedule, budget, and staffing. Phases 1 and 2 will have laid the foundation for determining risk.

The goal in Phase 3 is to articulate root causes of specific risks and assign each a probability value—low, medium, or high. Analyzing and addressing a project's risks can be critical to its "bankability" and attracting the right vendors.

Identified risks can be entered into a matrix that plots the severity of impact and likelihood of occurrence to visually represent which ones justify advance planning. Also, risks can be entered into a "risk register" that can be updated for the life of the project.

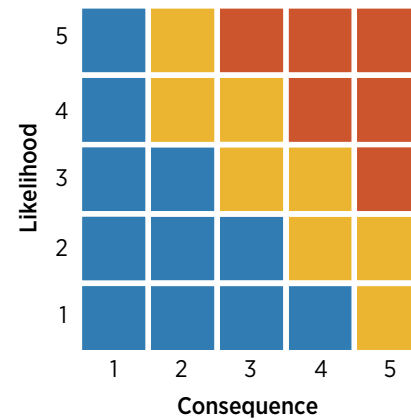
3.3.2 Common Types of Risk

Project risks can be dealt with in several ways. One is changing the project plan to avoid risks. Another is changing the project structure to transfer risks to the party that can most effectively bear them. Certain kinds of risk may require addressing the root cause before it arises. This is known as mitigation or contingency planning and can be critical to shaping bankable agreements.

Risk Reporting Matrix

Likelihood

Level	Likelihood	Probability
1	Not Likely	~10%
2	Low Likelihood	~30%
3	Likely	~50%
4	Highly Likely	~70%
5	Near Certainty	~90%



Consequences

Level	Technical Performance	Schedule	Cost
1	Minimal or no impact	Minimal or no impact	Minimal or no impact
2	Minor reduction in performance	< 1 month schedule slip	< 1% cost increase
3	Moderate reduction in performance	1-2 months schedule slip	< 1-4% cost increase
4	Significant degradation in performance	3-5 months schedule slip	< 5-9% cost increase
5	Severe degradation in performance; will not meet key technical thresholds	≥ 6 months schedule slip	≥ 10% cost increase

Source: DOD, Risk Management Guide for DOD Acquisition

Common types of risk and approaches to addressing them are described below.

Technology risk: This risk arises from the main technology's failure to meet output specifications despite proper design, manufacturing, and installation. Root causes can be addressed as follows:

- Complete assessments to match the technology to the project location and needs.
- Rely on previously demonstrated or commercial technologies.
- Train the workforce in the proper use and maintenance of the technology.
- Identify alternative technologies that may be used in a contingency plan.

Once a technology has been chosen, adequate warranties from a vendor that can honor them addresses this risk.

Legal risk: Legal risk stems primarily from changes in law, or the application of law, that would negatively impact the project. Through the collaborative efforts of diverse stakeholders in Phases 1 and 2, many legal risks will be mitigated. Contract provisions, such as indemnity, conditions present, and warranties can also address legal risk.

Performance risk: Many performance risks can be controlled by drafting suitable project specifications and selecting of capable, experienced vendors. The latter depends in part on transparency in the selection process. In negotiations with vendors, risk can be addressed through adequate warranties and liquidated damages provisions as well as construction bonding requirements.

Other performance risks have operational barriers as root causes, such as interconnection and dispatch requirements. In some instances, changing these root causes becomes a project in itself, but relationship management and facilitated meetings can address them independently.

Even with the best project partners, unexpected equipment delivery delays or labor shortages can arise, so be sure to account for performance risks in the budget.

Payment risk: Payment risk is addressed through a combination of creditworthy customers and suppliers, credit enhancements, firm obligations to pay for performance, and credit insurance, as appropriate.

Cooperation problems: For specific projects, cooperation problems can be reduced by setting up joint trainings between the project team and the implementing government agencies. These trainings or other facilitated meetings can help establish realistic expectations to avoid serious disagreements that would impact project schedule or budgets. An independent alternative dispute resolution or mediation agency may be appropriate as a last resort.

3.3.3 Consider Project Resilience

In preparing specific projects, resilience is an important consideration to ensure the project is not under- or overdesigned and is built to withstand potential external shocks. A prime example of this for many islands is solar PV projects.

At a system level, solar PV can increase community resilience by using a local resource rather than imported fuels for generating power in strategic locations to serve crucial loads during an extended grid outage. However, if the solar PV is not designed and installed to proper standards, the project may not be resilient to an external shock.

This was demonstrated during the 2017 Atlantic hurricane season, when some solar PV systems survived the hurricane impacts and others suffered severe damage, leaving them unable to continue operating after the storms.

RMI and regional partners investigated successful and failed solar PV installations after hurricanes Irma and Maria, summarizing the best practices in a series of reports titled [Solar Under Storm](#). Solar PV systems that survived Category 5 hurricane winds had the following common characteristics:

- Appropriate use of or reliance on ballast and mechanical attachments
- Sufficient structural connection strength
- Through-bolted module retention or four top-down clips per module
- Structural calculations on record
- Owner's engineer with QA/QC program
- Vibration-resistant module bolted connections.

Incorporating Category 5 resilient considerations in solar PV projects will result in an average increase of approximately 5 percent in engineering, procurement, and construction cost compared to the current industry standard (Category 3 or 4 rated solar PV installations). When considering lifetime project costs, the additional risk mitigation costs may be money well spent for those exposed to hurricanes, typhoons, and other high-wind events.

Other technologies may require other considerations in the design and installation phases to prepare for the potential impacts of an external shock and incorporate resilience as needed.

3.4 Identify Financing Options for Near-Term Projects

Many potential financing sources, including private debt and equity and public international or multilateral funds, are available to energy infrastructure projects. Financing solutions and partners will vary by project size, technology, partners, and other project- and location-specific factors. The sources and options described below can be combined or adapted to suit the needs of a particular project.

3.4.1 Sources of Funding and Capital

Organization for Economic Co-Operation and Development (OECD): Under the Sector Understanding on Export Credits for Renewable Energy, Climate Change Mitigation, and Water Projects, OECD countries have agreed that public trade finance support for renewable energy and energy efficiency projects will have interest rates at least 1.2% above 10-year OECD country debt and a maximum term of 18 years. This support often depends on a certain percentage of project value or project partner ownership originating in the OECD country providing the support.

Multilateral development banks and finance institutions: These international public institutions, which include the Caribbean Development Bank and the Global Environment Facility, often have climate change mitigation or adaptation programs that could support renewable energy generation or energy efficiency projects. Unlike bilateral public support, there are not typically any domestic content requirements, but other requirements do often impact the type of project, project design, and/or repayment.

Private financial institutions: Although international public financial participation in a deal can lower interest rates, private foreign direct investment is by far the largest source of possible funds. The latter is based on the creditworthiness of project partners, not their home jurisdiction or other predefined eligibility requirements, such as additionality.

Private capital markets: For large projects or a portfolio of projects—typically more than \$10 million U.S. dollars (USD)—private capital markets may be willing to participate in the financing structure. Institutional investors, such as pension funds, are beginning to show an appetite for long-term clean energy infrastructure bonds.

Domestic policy support: Although likely not sufficient to finance a project, domestic policies can lower the overall financing cost of capital and infrastructure projects. These types of policies include modified tax treatment, such as investment incentives or accelerated depreciation; government backstops, such as loan loss reserves or other interest rate buy-downs; and dispatch incentives, such as feed-in tariffs or loading orders.

Repurposing public funds: For smaller projects, public funds may be eligible for repurposing to support a project, such as relying on educational resources for the bulk of a workforce development program. Additionally, energy use reduction equipment could receive priority treatment in the commitment of facilities maintenance funds.

Refining legislative authority: Some public finance support structures can be built through amendments to the legislative authority of existing institutions. This approach can sometimes take longer but can also be very effective as part of a package to implement the Phase 1 vision.

3.4.2 Finance Structures

The simplest finance structure is a private financial institution making an unsecured loan directly to a consumer. More complex financing structures are justified when banks perceive undue risk, whether due to consumer credit history or technology, or where consumers perceive high transactions costs, such as identifying reliable service providers or products.

Public financial participation in projects can serve as credit enhancement to reduce these transaction costs for private financial institutions and consumers as well as eliminate the financial and administrative resources needed for direct public funding. Some credit enhancements are described on the next page.

Avoiding Excessive Solar Curtailment on Kauai

Because island grids are small, the impact of adding variable generation—either at the sub-transmission or the distribution level—can have a negative impact on the central generating plants and the quality of power delivered to customers.

In anticipation of these challenges, the Kauai Island Utility Cooperative (KIUC) reached out to DOE and NREL in 2010 for more information on ways to overcome integration challenges and for potential solutions. One of KIUC's primary concerns about meeting its commitment to generate at least 50% of its electricity using renewable energy by 2023 was coordination with its under-frequency load-shedding schemes.

To address these concerns, the DOE and NREL team performed an economic and technical analysis examining how to model PV inverters in the electricity grid and modeling an initial base case of electricity production and use on Kauai. Different types of PV inverter models were analyzed to ensure the stability of the electrical system during disturbances.

Additionally, the team conducted power system modeling and simulations to accurately plan for overall grid quality. At the time of the study, KIUC only had about 7% renewable energy installed on its system. Because so much diesel power was used, the study reviewed potential renewable-diesel hybrid electrical power systems to supply required loads. Because these types of systems may include fossil fuel generators along with renewable energy, the components have to be combined with storage devices, inverters, and charge controllers to meet load demands. However, adding variable generation such as PV can create potential high ramping rates on the diesel generators.

Given this additional challenge, the team analyzed electrical power system models to better understand the impacts of high penetrations of PV on the power system, finding that the planned projects by KIUC had a balanced mix of renewable energy and would have a low impact on the generation system.

Following the studies, KIUC installed a 1.2- MW solar PV system on one of its electrical distribution feeders demonstrating high penetration levels of solar. The preliminary results from monitoring the circuit indicated overall power quality was not compromised, helping Kauai supersede its goal and achieve 56% renewable electricity generation by 2019.



Analysis indicating high penetration of variable renewable generation would not compromise grid stability or power quality helped de-risk the installation of this 1.2-MW PV array on Kauai. *Photo by Jamie L. Keller, NREL 21774*

Loss reserve (partial sovereign guarantee): A loss reserve uses a pool of public resources to reduce repayment risk on loans made by private lenders in support of projects imbued with a public purpose. In exchange for active participation of private lenders at lower interest rates, the reserve will disburse funds on nonperforming debt in a given portfolio, up to the amount of the reserve.

This approach improves the credit evaluation of loans that are negatively impacted by a lack of borrower credit history or technology performance. Loss reserves can partially wrap a portfolio of loans or a bond series, depending on project needs.

Loss reserves, compared to direct subsidies, consume fewer public administrative resources and rely on the ability of private lenders to minimize transaction costs. Property Assessed Clean Energy programs, in which consumers repay loans for distributed generation or energy efficiency retrofits through their property tax bill, typically include a loss reserve.

Sovereign guarantee (full wrap): In contrast to loan loss reserves, which partially wrap a portfolio of smaller projects, this form of contingent explicit liability is capped at the amount of the total project. Sovereign guarantees are sometimes sought for large infrastructure projects when lenders or vendors perceive disproportionate legal, foreign exchange, or political risks.

Utility-led energy services and on-bill repayment: Increasingly, electric utilities are offering nontraditional services, such as distributed generation or efficiency retrofit financing. Because utilities often have access to lower-cost capital than individual consumers do, this structure can allow the utility to broaden its energy business while lowering transaction costs—in part because the consumers repay through their utility bills.

3.5 Develop Performance, Measurement, and Reporting Plans

With an idea about the project focus and financing structure, the project team can begin to shape performance and reporting plans. Regular communication throughout the project term increases the chances of success by identifying potential problems in time to develop effective solutions. To ensure value in this communication, the project team should determine the actions and metrics it requires vendors and others to prioritize.

Performance plans are often organized around milestones, or key actions that need to take place in sequence to successfully proceed toward project completion. Performance plans should include schedules, anticipated approval pathways, and risk and change management strategies, particularly for longer projects.

Milestones depend on project type and project participants, but can include:

- Equipment delivery and acceptance from procurement schedules
- Percentage of workers trained
- Number of installations, such as homes retrofitted or solar water heaters installed
- Attaining financing or completing RFP awards
- Passing key risks into new project stages, such as obtaining all permits and beginning construction
- Communications for performance recognition, such as dollars raised or spent.

Reporting plans should provide a uniform, simplified way to gather the key information the project team and other stakeholders need to track progress. Report information, the timing of reports, and the report approval process should be consistent and reflect who needs what information when. The specific information required varies based on project size and type but should generally include:

- Project name, any identifying number, date of submission, and period covered by report
- Status summary
- Performance and milestone updates
- Progress toward reaching metrics
- Issues that have arisen or have a reasonable likelihood of arising and mitigation strategies
- Budget status and expenditures.

3.6 Tools and Resources

Worksheets and Templates

Responsible-Accountable-Consulted-Informed Matrix

Manage expectations and define roles of project participants

Risk Register Matrix

Plot the severity of impact and likelihood of identified project risks

Sponsor Coordination Matrix

Organize projects and funding sources

Request for Proposals (RFP) Template

Develop an RFP for a grid-tied renewable energy system

Commercial Power Purchase Agreement (PPA) Template

Develop a PPA for grid-tied solar PV system

Case Studies

Ten Microgrids at Puerto Rico Schools Provide Resilience Following an Aggregated Project Preparation Process

In 2019, two years after hurricanes Irma and Maria devastated Puerto Rico and left millions without power, Rocky Mountain Institute (RMI), Save the Children, and Kinesis Foundation installed renewable microgrids in 10 schools in central Puerto Rico. The project provided 400 faculty members and 3,600 students with access to clean, resilient power that supported communities during the earthquakes of early 2020.

What common energy transition challenge or need did the project solve or address?

Like all energy infrastructure projects, microgrid projects must be prepared and de-risked prior to installation. Aggregating projects offers economy of scale but also creates challenges associated with preparing individual projects at multiple sites.

Why is this a common challenge for communities pursuing resilient energy transitions?

Bundling clean energy infrastructure projects exacerbates typical energy project preparation challenges, particularly in remote locations where the organizations that benefit most from these solutions lack the technical resources to execute them.



Teacher training delivered by the project team created an opportunity for students to learn about their school's microgrid system as part of their classroom curriculum. *Photo from RMI*

“The impact of the blackout on the education in Puerto Rico is an unprecedented case in the history of the United States. Thirteen million collective hours of education were lost in Puerto Rico due to Hurricane Maria; there is a very important relationship between the continuity of education and the access to electrical power.”

—Luis Soto, Save the Children's Puerto Rico Director

How did the community address this challenge or need?

A request for proposals (RFP) was prepared seeking an engineering, procurement, and construction (EPC) firm to install the solar and battery systems and provide long-term operations and maintenance (with pre-established funding). Including structural information on the buildings, desired capacity, and other location-specific technical specifications identified through the project preparation process in the RFP enabled bidders to respond with certainty and competitive pricing.

What key decisions were integral to this project?

- Identifying and prioritizing schools to include and getting buy-in from local stakeholders
- Understanding critical needs at each school to determine minimum system size
- Evaluating existing infrastructure at each site to determine the optimal locations and sizes of solar PV systems and battery energy storage as well as basic system design

Who decided on this course of action and why?

The project required collaboration among several stakeholders, including the Puerto Rico Department of Education, nonprofits, EPC contractors, the school population, and families from affected communities.

This project leveraged key strengths of the various stakeholders, from the initiative and financial support of Save the Children to the project management and technical expertise of RMI to the support of government institutions and the participation of the community.

What key takeaways or lessons learned might benefit other communities?

Thorough project preparation was pivotal to various positive outcomes that impacted the overall success of the project:

- Including allocations in the project budget for infrastructure improvements enabled the inclusion of roof waterproofing and energy efficiency retrofits such as LED lighting.
- Prioritizing stakeholder engagement was key to successful operation of the microgrids and the incorporation of climate change and renewable energy education into classroom curriculum. The project team delivered training for teachers and administrators on system installation as well curriculum support for teachers.
- Installing sufficient battery and solar capacity to power the critical loads of the school libraries, administrative offices, kitchens, refrigerators, and water pumps indefinitely in the event of an outage enabled the schools to directly support community resilience.

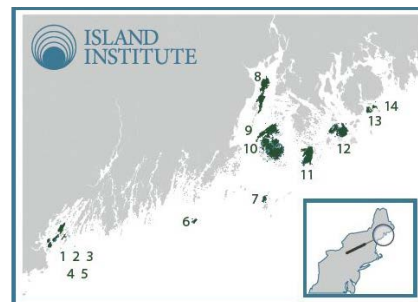
The Puerto Rico school microgrid project demonstrated how linking preparation with implementation can drive success. Focusing on key project preparation steps while aggregating smaller projects across multiple locations may be an effective approach for other communities in Phase 3 of an energy transition.



Solar panels on the roof of one of 10 Puerto Rico schools where solar and storage microgrids were installed to power critical loads. *Photo from RMI*

Maine Islands Achieve Quick Win Through Vendor Coordination, Community Engagement

On 15 Maine islands, citizen groups seeking to reduce vulnerability to energy supply disruptions and improve the resilience of their year-round communities began looking toward new energy technologies as potential solutions. These grassroots energy transition leaders sought support from the Island Institute, a local nonprofit dedicated to sustaining Maine's island and remote coastal communities through strong economies, education and leadership, and shared solutions.



Between 2012 and 2017, more than 380 island homes on 14 Maine Islands participated in Weatherization Weeks, saving \$126,400 annually.

What common energy transition challenge or need did the weatherization project solve or address?

Several Maine coastal islands faced barriers to executing a “quick win” energy efficiency project, including limited supply chain, high transportation costs, and skewed public perceptions of the costs and benefits of energy efficiency retrofits.

Why is this a common challenge for communities pursuing resilient energy transitions?

Remote and islanded communities typically face significant cost barriers related to their geographic isolation, including lack of economies of scale. Stakeholders are often skeptical about energy projects because they lack knowledge and experience.

How did the communities address this challenge or need?

Working collaboratively with the Island Institute, several islands decided to launch a collective purchasing project called “Weatherization Weeks.” The Island Institute led coordination within and among the communities through outreach to vendors and consumers as well as community engagement.

What key decisions were integral to this project?

Project leaders prioritized addressing two major project barriers: stakeholder misperceptions and the high transportation costs associated with cost of delivering retrofit services to their communities.

Who decided on this course of action and why?

The decision to prioritize stakeholder engagement created an opportunity to share an accurate, empirically-based assessment of energy retrofit benefits with community members. It also raised the visibility of the Island Institute’s innovative solution to the transportation cost barrier—banding together to increase economies of scale.

Lining up eight houses a week reduced transportation costs more than 80% and enabled homeowners to take advantage of incentives offered by Efficiency Maine to work with certified contractors who would not normally serve those communities.

What key takeaways or lessons learned might benefit other communities?

- Focus on executing a quick-win project to build momentum for island energy transitions by increasing local interest and engagement in clean energy solutions.
- Hold initial informational meetings to help community members understand project benefits while enabling project leaders to identify barriers to success.
- Engage stakeholders early to help pave the way for developing and executing locally relevant outreach strategies deployed by local volunteers.
- Combine energy audits and initial retrofit work to lower costs and increase efficiency.
- Pursue bulk purchasing to create efficiencies of scale that reduce the delivered cost of energy retrofit materials.

By combining energy audits and initial retrofit work, the inaugural Weatherization Weeks project saved homeowners an average of \$350 per year in energy costs. As word of the benefits spread, many communities hosted subsequent Weatherization Weeks. Collectively, the retrofits have resulted in more than \$2.3 million in savings for homeowners.

These initiatives have also increased local interest and engagement in clean energy solutions for public buildings and community-owned renewable energy, demonstrating the potential of a quick-win project to build momentum for island energy transitions.

Focused, Streamlined Team Effort Lays Groundwork for a Quick Win in Turks and Caicos

In 2016, the utility in the Turks and Caicos Islands (TCI), FortisTCI, partnered with experts from the Islands Energy Program at Rocky Mountain Institute (RMI) to issue an RFP for an engineering, procurement, and construction (EPC) company to construct and install a 1-megawatt solar PV system across five sites.

What common energy transition challenge or need did the project solve or address?

The TCI utility needed to identify and implement a project that made economic and technical sense, was good for its customers, and ensured the company was on track to deliver against its renewable energy goals for 2025.



FortisTCI and RMI sign a memorandum of agreement to jointly develop and commercialize the first utility-scale solar project across five islands in the Turks and Caicos Islands. *Photo from FortisTCI*

Why is this a common challenge for communities pursuing resilient energy transitions?

Completing a project efficiently at a competitive cost is a common challenge for energy projects because there are many moving parts and multiple players.

How did the community address this challenge or need?

To keep pace with its aggressive timeline, FortisTCl adopted a collaborative approach to project preparation that fostered swift and decisive in-parallel actions aimed at compressing some of the most important early steps in the process.

What key decisions were integral to this project?

Adopting a well-thought-out and strategic approach to project preparation allowed FortisTCl to jump-start the integration of renewable energy and gain momentum while planning for medium- and long-term energy transition goals.

Who decided on this course of action and why?

Identifying viable sites, evaluating interconnection points, conducting technical studies, and implementing the procurement process were key tasks the project team undertook to inform higher-level decisions FortisTCl needed to make to create a strong foundation for a successful renewable energy project.

The project team's focused, synchronous action led to a smooth procurement process and identification of an experienced EPC contractor to complete the project efficiently and cost-effectively.

What key takeaways or lessons learned might benefit other communities?

- Assemble a strong, integrated project team with diverse skills, experience, and expertise to accelerate all aspects of project preparation.
- Streamline project preparation through focused, synchronous teamwork.
- Work in parallel to evaluate project sites, verify renewable energy generation capacity, issue requests for proposals, and complete other key project preparation tasks.

This project, the first of this type undertaken in the TCl, supported FortisTCl's goal to integrate renewable energy levels identified in the company's integrated resource plan, which also identified an optimum energy mix based on the principle of reliable, least-cost energy.

Creative Financing Options Pave Way for Solar Water Heating in Barbados

To achieve the strategic goal of offsetting high fossil fuel costs Barbados sought to use its abundant solar resources to power solar water heaters (SWHs) across the island. The island successfully overcame market barriers to widespread implementation of SWHs thanks to local high-level government champions, financial incentives, and a locally sensitive marketing strategy that won consumer acceptance.

What common energy transition challenge or need did the project solve or address?

Lack of access to start-up capital and low consumer awareness and confidence in solar technology posed barriers to deploying a solar water heating program in Barbados.

Why is this a common challenge for communities pursuing resilient energy transitions?

Because of their size and geographic isolation, remote and island communities often face significant project financing and funding challenges. These barriers can be exacerbated by high up-front costs, historically inconsistent financial incentives, and stakeholder skepticism.

How did the community address this challenge or need?

In lieu of bank financing, the Barbados Institute of Management and Productivity provided a loan. To incentivize public participation in the program, credit unions and distributors allowed consumers to spread unit costs over 3 years.

What key decisions were integral to this project?

- The government introduced measures to support the industry, such as mandating SWHs for all new government housing developments.
- Credit unions and distributors offered financial support. Matching the credit term to the 3-year payback time of the SWH units meant that some consumers spent less money than if they had continued heating their water with gas.
- Consumer acceptance was also key to SWH industry growth in Barbados. Once consumers saw that the technology was sized for their households and worked well, their confidence grew.



A rooftop solar water heating program in Barbados met with success thanks to effective financial incentives and government support. *Photo from iStock 6923507*

“It was very important that successive governments were consistent in their support. ... Governments need the fortitude to commit to [financial and regulatory support] for the long term.”

—Leonard Nurse, Barbados Special Envoy for the Environment

What key takeaways or lessons learned might benefit other communities?

- Local finance partners can establish channels of funding for pioneering companies that are struggling to access credit.
- Financial incentives, such as tax credits, can spur adoption of new technology.
- A stable regulatory framework can provide confidence for investors and consumers.
- Consumer credit schemes from manufacturers, distributors, or installers can lower up-front costs to consumers.
- Developing an effective product and ensuring that the size of the SWH is appropriate for each household is crucial for maintaining sufficient water temperature. This was key to boosting consumer confidence and buy-in in Barbados.

Today, the SWHs designed in Barbados are sold throughout the Caribbean, and Barbados is recognized as a leader in the SWH field.

Although challenges may vary by location, Barbados offers an example of why energy champions, financial incentives, and consumer confidence and acceptance are key to ensuring widespread adoption of a renewable energy technology to help offset high energy costs.

Greensburg Implements High-Efficiency Building Codes to Achieve Long-Term Energy Savings

In 2007 a massive tornado struck Greensburg, Kansas, killing 11 people and damaging or destroying more than 90% of structures, most vehicles, and the electricity infrastructure. City and community leaders and residents committed to rebuilding the town as a model sustainable community.

What common energy transition challenge or need did the project solve or address?

As one pathway to rebuilding sustainably, the City of Greensburg sought to formalize green building codes. However, it faced concerns about how residents, business owners, and builders would respond to perceived higher building costs and how city staff would learn the new codes and program requirements.



Greensburg rebuilt its K-12 school to LEED Platinum standards. *Photo from Joah Bussert, Greensburg GreenTown, NREL 19952*

Why is this a common challenge for communities pursuing resilient energy transitions?

Project leaders implementing policy reforms often face resistance from community stakeholders who are wary of mandates and resistant to change.

How did the community address this challenge or need?

City leaders relied on credible, objective technical experts to analyze and summarize the rapidly changing field of green building codes and green building programs for city leaders and present several options for consideration.

What key decisions were integral to this project?

After many discussions, the City of Greensburg:

- Approved a voluntary Greensburg Green Building Program that included partnering with the Kansas Building Industry Association to offer training, discount some services, and support public awareness about green building while giving builders a chance to understand green building techniques gradually
- Opted to encourage or incentivize architects and builders to use ASHRAE's Advanced Energy Design Guides
- Adopted the International Energy Conservation Code as the basic energy code because it applied to the residential and commercial sectors and had reasonably achievable energy requirements.

Who decided on this course of action and why?

By seeking unbiased, third-party expertise on rebuilding with energy efficiency, Greensburg was able to explore numerous building energy code options, educate its leaders and residents on those options, and gain stakeholder support for voluntary programs that led to the completion of numerous new and renovated buildings that meet or exceed the city's energy goals.

What key takeaways or lessons learned might benefit other communities?

- Determine gaps and opportunities by comparing current local codes with the latest international standards.
- Educate key stakeholders, including city and business leaders and residents, about the benefits of the proposed changes and why updated codes should be used to meet the community's goals.
- Explore partnerships with reputable building organizations to leverage their expertise and resources.
- Demonstrate success with highly visible public buildings that can serve as living laboratories for incorporating energy efficiency and renewable energy into building designs.

By seeking unbiased, third-party expertise on rebuilding with energy efficiency, Greensburg was able to explore numerous building energy code options, educate its leaders and residents on those options, and implement programs that led to the completion of numerous new and renovated buildings that meet or exceed the city's energy goals.

"The technical assistance provided by DOE and NREL staff assures that Greensburg's city and county governments, businesses, and other buildings will continue to save large sums of money for a long time to come."

—Daniel Wallach,
Executive Director and
Founder, Greensburg
Greentown

Resources

Involve Stakeholders in Policy and Operational Reform Efforts

Climate Information for Electric Utilities—Interactive National Oceanic and Atmospheric Administration website focused on identifying, developing, and implementing strategies to increase power system resilience to events that can cause large-area, long-duration outages by helping utilities recognize their potential exposure to climate-related hazards.

Community Resilience Planning Guide for Buildings and Infrastructure Systems: A Playbook—National Institute of Standards and Technology's (NIST's) six-step process for resilience planning, from team formation through plan development, implementation, and maintenance.

Guide Brief: Forming a Collaborative Planning Team and Engaging the Community—Information communities can use to accomplish the first step of the NIST Community Resilience Planning Guide, with best practices and lessons learned from the Federal Emergency Management Agency's Building Resilience with Diverse Communities Program. Also includes resources to assist community leaders in forming collaborative planning teams and engaging the community at large.

Promoting Resilience in the Energy Sector—An Asia-Pacific Economic Cooperation (APEC) report about a 3-day capacity-building workshop on the methodology for evaluating and addressing climate change risks to the power sector in the APEC region.

Identify the Human, Technical, and Financial Resources Needed To Complete Near-Term Projects

Key Principles for Effective Strategic Workforce Planning—A U.S. General Accounting Office report describing the key principles of strategic workforce planning, including illustrative examples.

Template: Forming a Collaborative Planning Team—Template tables from NIST providing examples of planning team members and their roles from local government, business and service professionals, and volunteer organizations.

Set a Budget and Analyze Risks

Building Blocks to Support Cybersecurity in the Power Sector—NREL and USAID recorded webinar presenting a cybersecurity framework and building blocks focused on technical, policy, planning, and regulatory considerations across advanced power system technologies.

Guidelines for Climate Proofing Investment in the Energy Sector—An Asian Development Bank report providing guidance for project teams as they integrate climate change adaptation and risk management into each step of project processing, design, and implementation.

Integrating Variable Renewable Energy into the Grid: Key Issues and Emerging Solutions—A recorded webinar from the Clean Energy Solution Center addressing challenges of integrating significant quantities of variable renewable energy into the grid and highlighting emerging solutions policy makers and grid operators have implemented to integrate wind and solar.

Microgrid-Ready Solar PV: Planning for Resiliency—An NREL fact sheet on microgrids and up-front considerations that can be added to solar project procurement or requests for proposals to help ensure PV systems are built for future microgrid connection.

Solar Under Storm—An RMI report consisting of a two-part guidebook for designing resilient PV systems (ground-mounted and rooftop) and policy-making best practices for improving PV system survivability to intense wind-loading events.

Identify Financing Options for Near-Term Projects

Climate and Disaster Resilience Financing in Small Island Developing States—A report highlighting the latest trends in concessional financing available for climate- and disaster- resilient development in small island developing states.

Financing Energy Improvements on Utility Bills: Market Updates and Key Program Design Considerations for Policymakers and Administrators—A DOE guide to on-bill energy efficiency financing programs offering actionable insights about key program design considerations.

Funding & Financing for Energy Projects—Information about energy project funding and financing opportunities for state, local, and tribal governments.

Green Banks—An NREL resource for state, local, and tribal governments seeking low-cost capital for clean energy projects at favorable rates and terms.

State-Based Financing Tools to Support Distributed and Community Wind Projects—A guide to specific financing assistance and tools states can provide to support smaller-scale wind projects in the future. Many of the tools are applicable to a broad range of renewable energy technologies.

Develop Performance, Measurement, and Reporting Plans

Developing Renewable Energy Projects Larger Than 10 MWs at Federal Facilities—A Federal Energy Management Program (FEMP) guide containing project development checklists relevant to U.S. utility-scale projects that could provide a basis for tailored project development checklists in other jurisdictions.

The Energy Data Management Guide—A step-by-step approach to establishing a robust and sustainable energy data management program.

Measurement and Verification Operational Guide: Renewable and Cogeneration Applications—A guide to the International Performance Measurement and Verification Protocol, including practical tips, tools, and scenario examples to assist with decision making, planning, measuring, analyzing, and reporting outcomes of energy projects.

M&V Guidelines: Measurement and Verification for Performance-Based Contracts— FEMP procedures and guidelines for quantifying the savings resulting from energy-efficient equipment, water conservation, improved operation and maintenance, renewable energy, and cogeneration projects installed under performance-based contracts.