Shortly after a program ends or a project closes out, collecting insights from team members and stakeholders can provide critical information for improving the next project.

By incorporating the learning that comes from project development and execution into subsequent projects, the team will accelerate progress toward the Phase 1 vision and help ensure that the progress made to date will contribute to lasting change.

After completing a few projects, communities can use the information project teams collect in Phase 6 to reassess opportunity pathways from Phase 2 under new conditions and ensure that the next round of Phase 3 project selections accelerate the energy transition.

### 6.1 Conduct Closeout Interviews with Project Partners and Stakeholders

The project team, project partners such as vendors, and other stakeholders such as customers and neighbors, all have unique perspectives on the conduct and outcomes of a project.

The project lead should solicit specific feedback on the accuracy of schedule and budget estimates, the process of changing schedules or budgets, team member performance, risk identification and management, and project communications from those involved with the project.

Stakeholders whose input was considered in Phases 1–4 should also be consulted, and a project review can identify to what extent the project met their expectations.

Closeout interviews should ask respondents to identify lessons learned or areas for improvement, as well as rate their overall satisfaction with the project.

### 6.2 Collect Lessons Learned and Identify Skills Development Opportunities

Regardless of success or failure, the experience gained from each project can highlight opportunities to improve the next project. For example, the project team may have identified a way to streamline the permitting process, facilitate communications between project partners, select the most suitable vendor, or even improve project documentation processes.

Through closeout interviews, project teams should identify lessons learned from their experiences. By articulating these lessons, teams can leverage the experiences from one project to improve project planning, preparation, and execution in the next iteration of Phases 4 and 5. This process can also help them balance maintaining consistency of approach with tailoring processes to meet their unique needs.
Over the course of a project, project teams usually develop existing skills and gain new ones. By keeping track of these developments, they can inform the project identification process in the next iteration of Phase 3.

6.2.1. Lessons Learned Key Features

- Provide basic information on who, what, where, and why.
  - The [technology/program/policy] project completed by [who] in [where] represents/demonstrates successful implementation of [Phase #].

- Identify the common challenge for the lessons learned.
  - When undertaking this type of project, one will need to address [common challenge in Phase #].

- Explain why this is a common challenge, with as much specificity as possible.
  - This common challenge arises because it involves [technology risk/financing risk/social risk/changing status quo]. This results from [add detail on challenge that relates to solution].

- Discuss replicable actions (i.e., the how).
  - [Who] addressed [common challenge] in completing the project by [how].

- If appropriate, provide history of reaching the decision point to provide context for course of action taken.
  - [Who] chose this project because [it lowers costs, etc.].

- Highlight reasoning behind decision (i.e., the why).
  - [Who] chose this solution because [why].

- Indicate alternatives that may suit different circumstances.

- Conclude, emphasizing replicable actions, decisions, or paths to success.
  - This [solution] addressed [common challenge] by [resolving tech/social conflict, etc.], and may be useful for others as they [implement Phase #].

6.3 Report Results of Review to Management, Project Partners, and the Public

The project review process will generate useful information that can help save time and resources in the next project, so it is important to communicate the results. As the final step in any project, share the lessons learned, skills developed, and other information with other project teams, senior leadership, project partners, and stakeholders.

Beyond demonstrating that the project review was worth the effort, sharing this information is important if policy changes or other larger issues need to be addressed for future projects. It also demonstrates to project participants, partners, and stakeholders that their input was valued and was put to good use, not only to complete the project but to benefit others.

6.4 Accelerate the Energy Transition

Insights gained from all phases should be documented in Phase 6, not just to inform the next individual project opportunity, but also to accelerate the community’s clean energy transition.

After committing to a transition (Phase 0), setting a vision (Phase 1), identifying pathways and near-term projects (Phase 2), preparing initial projects (Phase 3), implementing those projects (Phase 4), maintaining and monitoring their operation (Phase 5), and documenting lessons learned (Phase 6), communities can move more quickly to scale their transitions more broadly, rather than moving forward one project at a time.

Advancing multiple efforts at once will require dedicated resources, both people and funding. Having a clear long-term plan with commitment from key stakeholders can ensure that the necessary resources are
Updates to Generator Interconnection Minimum Technical Requirements in Puerto Rico

After identifying a significant opportunity to develop renewable energy resources, Puerto Rico revised its interconnection procedures. These procedures govern how generating facilities, including renewable resources, are incorporated into the electric grid and address minimum technical requirements (MTRs).

Because many MTRs were written to address relatively large fossil fuel-fired power plants, they often present barriers to the development of renewable and distributed energy projects.

At Puerto Rico’s request, the U.S. Department of Energy and the National Renewable Energy Laboratory (NREL) compared the applicable MTRs in Puerto Rico to the generally accepted utility practices in the United States and Europe, as well as the technical aspects of wind and solar photovoltaic projects. Improvements were recommend in several categories, including:

- Voltage fault ride-through
- Voltage regulation system, reactive power, and power factor requirements
- Short-circuit radio influences
- Frequency ride-through and response
- Ramp rate control
- Power quality.

Staff from the Puerto Rico Electric Power Authority (PREPA) participated in the review and ultimately incorporated some recommendations into revised MTRs in August 2012. Utility engineers presented technical rationale for not modifying other requirements.

By seeking out and considering the results from the analysis, Puerto Rico was able to address some of the barriers to high renewable penetration and provide project developers and other stakeholders with clear guidance on the MTRs and the rationale behind them.

As part of its analysis, NREL developed this comparison between low-voltage ride-through requirements and high-voltage ride-through requirements for PREPA, North American Electric Reliability Corporation, and other islands systems such as the Hawaiian Electric Company and EirGrid while also incorporating Institute of Electrical and Electronics Engineers Standard 1547 clearing times. *Figure by NREL*
allocated, and building in clear targets in the more near term (for example, five years) can create helpful focus and certainty in the clean energy market.

Some examples of opportunities to accelerate a successful clean energy transition include:

• Aggregating multiple sites together to achieve a more significant scale, such as combining energy efficiency retrofits with solar photovoltaic (PV) installations at government buildings
• Siting solar PV and energy storage at multiple critical infrastructure locations
• Implementing a community solar approach to create opportunities for increased participation
• Increasing electric mobility, focusing on government, taxi, and utility fleets for immediate beneficial impact.

By continually iterating through the phases of the Playbook, without needing to fully complete one project before moving to the next, communities can keep advancing toward their vision while demonstrating global leadership in clean energy transition.

6.5 Tools and Resources
Worksheets and Templates

Project Skills Register
Collect lessons learned and identify skills development opportunities

Project Closeout Form
Use this CDC form as a guide to close out energy projects

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Case Study
Integrated Distribution Planning Helps Hawaii Chart the Course for Ongoing Growth in Distributed Generation

In 2015, Hawaii became the first U.S. state to establish a renewable portfolio standard (RPS) target of 100% by 2045. Having set its sights higher, the state faces near-term challenges to meeting its goals, including an interim RPS target of 30% by 2020 and 40% by 2030. To address these challenges, Hawaii is applying lessons learned in the first iteration of its energy transition.

A few years after the Hawaii Clean Energy Initiative’s launch, the pace of solar energy adoption surpassed the technical understanding needed to integrate distributed energy resources (DERs) into the existing grid infrastructure and incorporate new technical solutions, such as advanced inverters. Under this dynamic, the interconnection process became a bottleneck for DER adoption and caused significant frustration for customers and DER providers.
What common energy transition challenge or need did the project solve or address?

Market mechanisms (net metering, standard interconnection agreements, feed-in tariffs) designed to encourage distributed generation (DG) growth in Hawaii outpaced initial expectations. As a result, friction arose between customers eager to install solar photovoltaic (PV) systems and utilities concerned about reliable electricity delivery and profitability.

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

When policy changes spur market growth that outpaces the technology and regulatory progress, utilities must confront technological and financial risks associated with striking a balance between integrating increasing levels of renewable generation and maintaining system reliability and bottom line growth.

What key decisions were integral to this project?

- Facing disagreement among energy stakeholders about whether the feed-in tariff program would continue to be part of Hawaii’s energy transition, the Public Utilities Commission (PUC) decided to phase out net metering.
- As an interim solution, the PUC adopted a “self-supply” nonexport option that featured a battery/inverter/PV solution the market was not quite ready to supply.
- This, along with an interconnection backlog, contributed to a marked decline in DER adoption beginning in 2013.

How did the community address this challenge or need?

To plan for DER growth and anticipate future limitations of its six islanded grids, Hawaii adopted a two-pronged approach informed by modeling and analysis, including:

- An evolutionary model that included functional and market objectives deemed best suited to support each stage of distribution system evolution, followed by a summary of the key planning, operations, and market functions required to support DER growth as the state progressed toward its 2045 goal
- Hosting capacity studies to quantify the technical limits of each island and circuit to integrate additional distributed solar based on current infrastructure.

Who decided on this course of action and why?

State energy planners proposed the use of a conceptual model for the evolution of distribution systems. Transition partners Hawaii Natural Energy Institute and More Than Smart adapted the model to Hawaii’s unique market structure, operational characteristics, and utility specifications, and established appropriate functional objectives.

The PUC mandated the hosting capacity studies to provide a transparent, quantitative basis for understanding current and projected grid limitations.

What key takeaways or lessons learned might benefit other communities?

- In rapidly changing energy markets, analysis and planning are key to striking the delicate balance required to address the competing priorities of various stakeholders in advance of deployment decisions.
• By anticipating functional requirements of the system caused by increasing amounts of DERs, utility investments in planning, operations, and markets can be staged and phased more economically.

• The next growth phase of DER systems will require a more systematic transition to “Smart DER” systems because each island is nearing limitations to add more rooftop PV without advanced capabilities during peak solar hours.

Through the modeling and analysis performed as part of Hawaii’s effort to improve processes, regulators, utilities, and other stakeholders are applying lessons learned to address the common challenge of maintaining system reliability and utility health as DG increases with the evolution of the energy transition.

As Hawaii looks ahead to a new growth phase of more advanced DER technologies and increasing the levels of variable renewables, the lessons from this recent experience and best practices from other jurisdictions can be incorporated in future planning efforts.

As other communities seek to strike a balance between maintaining project momentum and ensuring system reliability through process improvements, Hawaii’s data-driven approach to process improvements may prove useful.

Resources

Communities transitioning to clean, resilient energy may find these resources useful in Phase 6:

Conduct Closeout Interviews with Project Partners and Stakeholders

**Cornell University Project Manager’s Desk Guide**—A guidebook developed for project managers at Cornell that provides helpful project management templates, including a project closeout checklist.

**Project Closeout: Guidance for Final Evaluation of Building America Communities**—An NREL guide to the project closeout process based on a real-world example of a comprehensive closeout review of a large project.

Collect Lessons Learned and Identify Skills Development Opportunities

**City of Nashua Hazard Mitigation Plan Update 2019**—An overview of the planning process and public participation efforts conducted as part of Nashua, New Hampshire’s, five-year Hazard Mitigation Plan review that serves as a model for involving community stakeholders and neighboring communities in monitoring plan implementation and collecting lessons learned.

**Federal Crowdsourcing and Citizen Science Toolkit**—U.S. General Services Administration toolkit comprising five basic steps for planning, designing, and carrying out a crowdsourcing or citizen science project to engage the public in research and data collection and collaboratively access information that might otherwise be out of reach.

**Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments**—A detailed, easy-to-understand process to help local, regional, and state government decision-makers prepare for climate change with climate risk assessment, resilience and adaptation planning, and project implementation and management. Chapter 12 offers guidance on regularly measuring progress, reviewing, and updating plans, and sharing lessons learned.
Solar Under Storm: Select Best Practices for Resilient Ground-Mount PV Systems with Hurricane Exposure—Summary of RMI’s recent field observations and expert analysis of solar PV system failures in the wake of Hurricanes Irma and Maria in the Caribbean, including actionable recommendations for increasing resilience of PV installations with hurricane exposure.

Report Results of Review to Management, Project Partners, and the Public

Boulder County Collaborative: CDBG Disaster Recovery—An information hub formed in response to devastating floods to coordinate regional project and program implementation throughout the disaster recovery process; offers one example of continuous reporting on program updates, public hearings, resources, and successes.

Climate Adaptation Knowledge Exchange—A platform for increasing awareness of adaptation opportunities and engaging the broader community to develop the field of adaptation, including climate change adaptation case studies, tools, and resources along with a calendar of conferences and trainings, job and funding opportunities, and a directory of field practitioners and organizations.

Accelerate the Transition

The CARILEC Renewable Energy Community—A community of energy professionals and utility engineers implementing renewable energy and energy efficiency projects on islands for a more sustainable future (login required).