



# Execute & Manage

## Execute projects and ensure quality control

### Phase 4

After selecting a project and designing its components to capitalize on available human and financial resources, the project team can shift to execution—implementing plans, coordinating partners, and keeping the public informed.

### 4.1 Implement Schedules, Performance, Measurement, and Reporting Plans

#### 4.1.1 Identify All Project Permits

Applying for and receiving project permits are critical components of successful energy projects and are typically central to setting realistic schedules and performance plans.

An experienced project permitting partner can help minimize unforeseen costs and delays, but all project partners need to set realistic expectations regarding the permitting process. Making a comprehensive list of needed permits and their requirements is a good first step. Once the team knows what permits are needed, planning for applications and collecting the relevant data in advance will avoid resubmissions and rework.

If relevant government agencies are streamlining their permitting processes, providing accurate information on the permitting experience will help them reduce any inefficiencies.

#### Phase 4 describes how to:

- 4.1 Implement schedules, performance, measurement, and reporting plans
- 4.2 Mitigate adverse environmental and social impacts
- 4.3 Maintain transparency in project and vendor selection processes
- 4.4 Develop a project closeout process; implement when appropriate
- 4.5 Engage stakeholders to keep project successes visible

#### Example Project Permits Questionnaire

- What permits or authorizations are required from the local utility or regulating body?
- If leasing the site, what permits or authorizations are required from the site owner?
- What permits or authorizations are required from local jurisdictions or agencies?
- What permits or authorizations are required from central government agencies?
- What information does each permit or authorization require to be processed?
- Is that information free, or will costs be incurred?
- What are the permitting costs, and when must they be covered to meet the project schedule?
- Who will pay the direct costs or the costs of any work required to achieve approvals, authorizations, or permits?
- Could the timing of permits and authorizations significantly impact project costs or economics? Could that put the project in jeopardy?
- Is litigation of permitting issues expected or probable?
- Will delays in permitting impact financing?
- What if the project is not built? Are any parties in the process expecting reimbursement of some, or all, incurred costs?

Adapted from *Developing Renewable Energy Projects Larger than 10 MWs at Federal Facilities* (Federal Energy Management Program 2013).

## 4.1.2 Set a Realistic Project Schedule

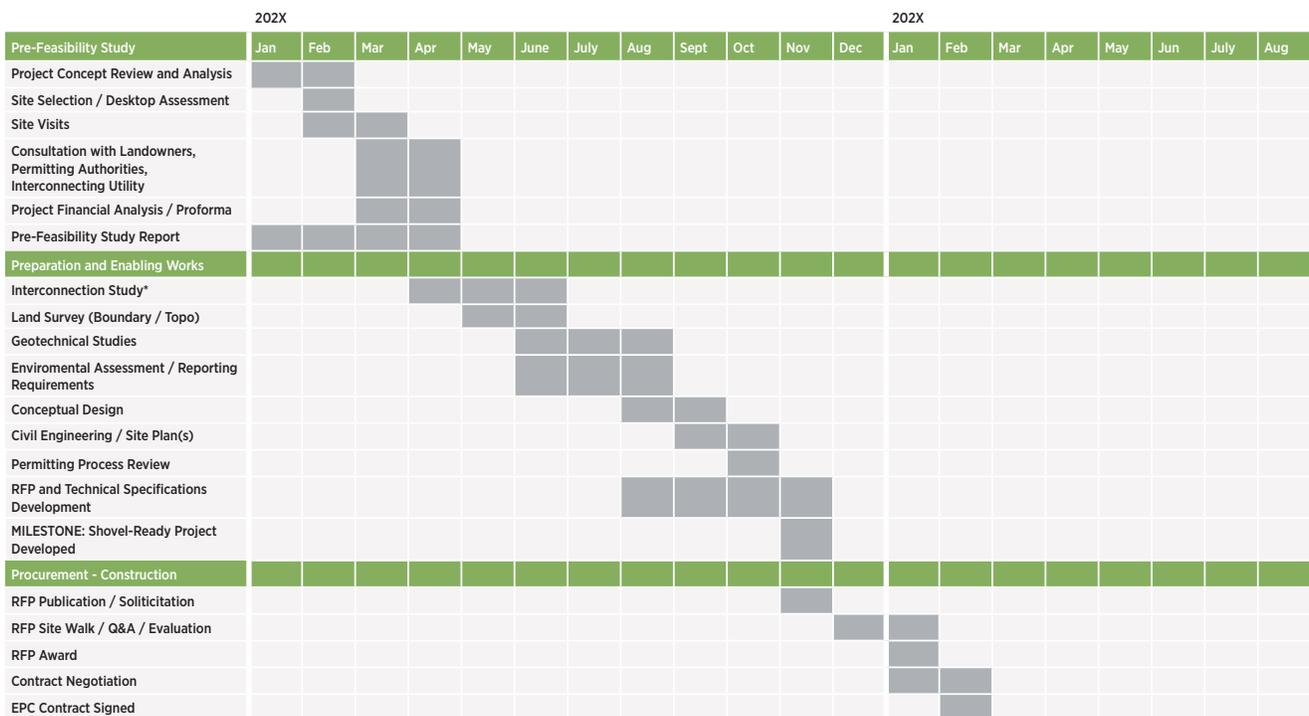
Setting and keeping a realistic schedule is fundamental to project success, in part because it requires the project team to imagine what success looks like and articulate the time and effort required for each step along the way.

When setting a schedule, it is important to include “slack time” for when resources are unavailable, and time for regular meetings, which are an integral yet time-consuming part of project execution. If schedules change, document the changes and file correspondence explaining why the schedule required adjustment and obtaining sign-off on the changes from affected parties.

Several tools, including a Gantt chart and Critical Path Analysis, can aid in setting and monitoring schedules. Templates for these charts are sometimes included with or available for spreadsheet software. Free online tools offer similar functionalities.

Regardless of whether the project team employs a formal method, an arrow diagram may help the project team visualize what resources will be required and in what order to achieve project milestones.

**Sample Utility Scale Solar Project Milestone Gantt Chart**



A sample schedule for the major milestones in an energy project, from initial concept to final commissioning. This example is based on a typical schedule for a utility-scale solar photovoltaic project and can be used as a starting point for other energy projects. While some steps can and should be completed in parallel, focusing on prefeasibility assessments unlocks the preparation and enabling work that supports successful procurement and project implementation.

Adhering to a schedule requires coordinating with management and other governmental entities involved in, but not responsible for, project success. For example, permitting construction can involve nonenergy agencies, yet their review is necessary to stay on schedule.

The Responsible-Accountable-Consulted-Informed (RACI) diagrams (Phase 3) can be useful in determining which other agencies will participate in project development; in addition, working project schedules into performance plans can help ensure that this coordination proceeds effectively. If the team faces a challenge it is unable to overcome after a good-faith effort, a project champion (if identified in Phase 3) can often help troubleshoot.

### 4.1.3 Performance Plans

Success will depend on many factors, including the performance of the project team. The initial steps in project execution can involve requests for proposals, technology evaluation, or data collection. But the first and most important step is a phone call or an email from the project lead. Setting expectations for team members helps ensure they all understand their roles and their contributions to the project's success.

A performance plan clearly outlines roles and responsibilities for team members and can identify the training and resources they need to achieve the expected results. It can also link responsibilities to the project schedule to ensure individual team members understand when they need to complete certain tasks to deliver the results on time.

Performance plans also help the project team appreciate the value of their teammates and allow for recognition of individual and team performance.

### 4.1.4 Using Metrics To Track Progress

Although some responsibilities are task-oriented, focusing on outcomes will ensure that processes achieve desired results. Metrics do not need to count numbers but can track results critical to project success. Outcomes that may be useful to track are:

- Finalizing equipment specifications
- Timely issue of permits
- Close of negotiation with vendors and/or finance partners
- Timely delivery of equipment
- Trainings completed
- Testing and accepting equipment
- Issuance of purchase orders
- Timely reporting with appropriate data
- Equipment in use
- Public engagement activities.

### 4.1.5 Project Reporting

Beyond ensuring that the project is on track to succeed, project progress reporting is one of the most important tools to communicate progress throughout government and to partners and the public. Building on the planning in Phase 3, simple processes to collect and present progress data clearly and uniformly can document successes and help maintain support for the project.

Although data requirements, reporting frequency, and responsibility for compiling reports will vary by project type, risk, and partner expectations, all ensure that project status is summarized effectively. Because the reporting process involves collecting information from project staff for management and other stakeholders, team leads or project managers are likely in the best position to compile and finalize reports.

Common status reporting periods occur quarterly or semiannually. It is important to note that larger projects often have more comprehensive annual reporting requirements. RACI diagrams can help identify the appropriate audience for reports and, in turn, the appropriate information to include in them, such as:

- Summary of activities since the last report
- Budget status and rate of expenditure (burn rate)
- Milestone and metric status
- Any upcoming challenges for management awareness.

## Engage and Educate Stakeholders Early and Often

As part of the Energy Development in Island Nations initiative launched in early 2010, the U.S. Virgin Islands (USVI) began working with the U.S. Department of Energy and the National Renewable Energy Laboratory to develop a strategy for reducing the territory's 100% reliance on fossil fuels 60% by 2025.

Based on preliminary modeling and analysis, the Virgin Islands Water and Power Authority identified waste-to-energy (WTE) as a significant opportunity because municipal solid waste was an abundant renewable resource—in fact, landfills were nearing capacity and were in violation of U.S. Environmental Protection Agency standards.

As such, the USVI identified WTE as a key pathway to its 60% goal, representing 8%–12% of the envisioned 2025 energy mix. But the proposed project ultimately failed, offering a valuable lesson on the importance of proactively addressing a common barrier: lack of stakeholder buy-in.

While the project team did not attempt to keep the project a secret, they did not put much thought or effort into communicating the risks and benefits to stakeholders. Rumors spread about the environmental impacts and costs of the project, and an official announcement about a signed WTE agreement caused an immediate public outcry.

Stakeholders had legitimate concerns about the legal, financial, and environmental ramifications of various aspects of the deal. Faced with intense community opposition, the senate in 2010 rejected a land lease that was a linchpin of the original plan.

In response, the developer modified the plan, eliminating the use of petroleum coke and proposing a single plant on St. Croix. The project partners held events to educate the public on their extensive pollution control measures and released a well-researched technical report on WTE presenting the hard data needed to address concerns.

But public opposition had reached critical levels, and the senate voted down a second proposed land lease agreement, effectively killing the project.

The project team failed to anticipate and address stakeholder concerns about WTE and underestimated the power of public opinion. As a result, the team missed the small window of opportunity early in the project preparation phase to address concerns proactively through a carefully managed stakeholder outreach, education, and engagement strategy.

### Key Takeaways

- Consult with key stakeholders about issues and barriers early in the planning stages.
- “Get out in front of the story,” responding directly to concerns with hard data and key messaging that is substantively responsive to concerns.
- Educate and inform key stakeholders about proposed technologies and project specifics early and often.
- A transparent approach to information management is a key to successfully developing stakeholder buy-in and winning the public's trust.

## 4.2 Mitigate Adverse Environmental and Social Impacts

Although, generally, energy efficiency and small to midsize renewable energy projects will not require significant environmental mitigation, even small construction projects can have adverse impacts on neighboring communities. Thus, it is important to take steps to mitigate such impacts.

Waste management; noise and vibration; land and water use; and biological, cultural, and coastal zone management are some of the key considerations when evaluating the potential environmental and social impacts of a project. For example, appropriate siting can mitigate potential impacts from wind projects, such as glare from solar panels or noise and light pollution.

### 4.3 Maintain Transparency in Project and Vendor Selection Processes

Transparency in Phase 4 demonstrates deliberate and thoughtful decision-making, which mitigates a variety of project risks, facilitates stakeholder support, and ultimately improves the chances of project success.

Transparency can be maintained by articulating a few key components of a successful project and communicating those expectations to project partners and potential vendors. Articulating components of success and their relative importance can help set expectations for the project team and outside stakeholders, paving the way for public recognition of successful projects.

### 4.4 Develop a Project Closeout Process; Implement When Appropriate

Some projects, such as facility construction, may benefit from a project closeout process. During closeout, the project lead accepts final delivery of the work, so this may be when warranties begin and insurance needs transfer from the contractor to facility owner. It is also another opportunity to ensure that facility operators have received the necessary training to operate and maintain project assets.

Typically, closeout involves calculating and documenting all costs and expenses, and includes written statements confirming that the work is being accepted and equipment has been tested and meets specifications. This documentation is often required to release final payments and provides the opportunity to compare the planned budget to actual expenditures.

Along with financial information, other project documentation—such as plans, correspondence, relevant meeting notes, schedules, deliverables, scope changes, and status reports—should be collected and archived. This documentation can provide a key record of project decision-making, not only for future projects or project reviews, but also warranty claims. It also allows for knowledge transfer from the project team to equipment owners or operators.

Closeout can involve the reassignment of project resources, including team staff time, and performance reviews for staff and contractors. Devoting time to staff transitions can give project team members confidence about their next position, helping ensure that they remain through closeout and minimizing disruptions to staff availability at the close of a project.

### 4.5 Engage Stakeholders To Keep Project Successes Visible

Continued public support is important to individual projects and to the overall vision. Major project milestones, such as permit applications and beginning of construction, provide opportunities to communicate progress to the public and solicit feedback from key stakeholders, such as project neighbors or consumers.

Events such as groundbreakings and ribbon cuttings can raise the profile of projects and give partners and stakeholders opportunities to interact. Although not directly related to project success, a communications plan that emphasizes highlighting the value of projects and demonstrating the community's capacity to realize its energy vision is a powerful catalyst.

### 4.6 Tools and Resources

#### Worksheets and Templates

##### Gantt Chart

*Set a schedule for completing major project milestones*

##### Periodic Report

*Document project expenditures, milestones, and scope changes*

## Case Studies

### U.S. Virgin Islands Clears the Way for Unprecedented Levels of Solar Energy

In 2010, the U.S. Virgin Islands (USVI) identified larger and distributed solar resource development as a pathway to achieving its clean energy vision. Thanks to an excellent solar resource and policies in Phase 3 that paved the way for an early win, the territory succeeded in installing the largest airport solar system in the Caribbean, paving the way for additional solar development.

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

To secure financing and attract quality developers, the USVI needed to demonstrate the technical and economic viability of integrating 10 MW of distributed solar into the grid and mitigate project risks.

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

Utilities and developers are key partners and stakeholders in clean energy projects, but they need to balance community clean energy goals with their operational and economic priorities, including return on investment, long-term profitability, and reliable service delivery.

#### ***How did the community address this challenge or need?***

The Virgin Islands Water and Power Authority (WAPA) tapped into the analysis and project development expertise of the U.S. Department of Energy (DOE) and the National Renewable Energy Laboratory (NREL) for project development and decision support on resource assessment, optimal siting, policy changes, and grid integration.

#### ***What key decisions were integral to this project?***

- On June 4, 2012, WAPA signed six power purchase agreements (PPAs) for a combined 18 MW of solar energy.
- The agreements committed three companies to investing a total of \$65 million to install 18 MW of solar in the USVI—9 MW on St. Thomas and 9 MW on St. Croix.



The USVI prioritized stakeholder outreach and education to amplify the success of its energy transition and build community support. *Photo from Don Buchanan, Virgin Islands Energy Office, NREL 20152*

I don't know of another area or jurisdiction anywhere that has that significant of a portion of their peak demand in a renewable resource such as solar, so this is not only a significant event for the territory but for solar energy everywhere.”

—Hugo Hodge Jr., WAPA Executive Director

### ***Who decided on this course of action and why?***

WAPA signed PPAs to purchase renewably generated power at an average cost of approximately \$0.18/ kWh over the 25-year term of the projects—significantly less than the utility’s cost to produce the same amount of diesel-generated power at its plants. Solid project preparation and de-risking efforts in Phase 3 paid off, building a strong case for technological and economic viability of the project.

Tapping into the technical expertise and renewable energy project development experience of DOE and NREL, WAPA was able to break down common project development barriers by:

- Helping identify optimal sites for solar PV systems
- Identifying policy and regulatory changes that would address current barriers, such as uncertainty, around interconnection procedures and agreements
- Updating the USVI’s solar resource assessment to more accurately gauge the potential impact of solar energy in the territory
- Modeling the WAPA grid and developing a strategy to avoid grid integration issues by distributing PV systems geographically
- Analyzing financial and resource data—including one-minute data from a 451-kilowatt-hour (kWh) solar PV system installed at the St. Thomas airport—to model the effects of high-penetration renewable energy on the existing WAPA generation system and grid.

### ***What key takeaways or lessons learned might benefit other communities?***

To de-risk renewable energy projects, leverage the technical and analytical support of objective, credible experts to:

- Identify optimal sites for siting new renewable energy generation
- Ensure the accuracy of resource assessments in gauging the potential impact of various resources on the energy system
- Identify and implement policy and regulatory changes that can address project barriers
- Model the impacts of increased variable renewable energy generation on the grid.

These PPAs represented a groundbreaking shift in the territory’s energy economy—and set a new standard for community renewable penetration. The USVI’s successful execution of these solar projects provides a model for other islands to follow by showcasing the technical and economic viability of renewable energy on islands.

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## Resources

### Implement Schedules, Performance, Measurement, and Reporting Plans

**Environmental, Health, and Safety Guidelines Website**—Current versions of the World Bank Group Environmental, Health, and Safety Guidelines. Applicable to all sectors, the guidelines contain performance levels and measures that are normally acceptable to the World Bank Group and are generally considered to be achievable in new facilities at reasonable costs by existing technology.

**GAO Schedule Assessment Guide**—A consistent methodology for developing, managing, and evaluating capital program cost estimates that includes the concept of scheduling the necessary work to a timeline.

**Life Cycle Asset Management: Quality Assurance**—A DOE guide to developing and implementing quality assurance programs for energy projects.

**Quality Assurance Framework for Mini-Grids**—An NREL technical report that describes a quality assurance framework comprising defined quality assurance measures that can be applied to the mini-grid market sector.

**Quality Assurance Framework Implementation Guide for Isolated Community Power Systems**—An NREL technical report that defines a range of service levels that ensure safe, quality, and affordable delivery of basic grid-parity service; provides an accountability framework that can be used to determine whether an agreed-upon service level is delivered.

**Quality Assurance Guide for Project Management**—Information to assist DOE federal project directors and their integrated project teams to plan, develop, and implement a project-specific quality assurance program that satisfies quality assurance requirements throughout the critical decision process.

### Mitigate Adverse Environmental and Social Impacts

**Environmental Impacts of Renewable Electricity Generation Technologies: A Life Cycle Perspective**—An NREL presentation that covers sustainability analysis, life cycle assessment, and environmental impact studies on topics such as greenhouse gas emissions, water use, and land use.

**A Guidebook on Equitable Clean Energy Program Design for Local Governments and Partners**—A guide to resources local governments and partners can use to advance social equity in clean energy program design and implementation in their communities, including an inventory of best practice programs and four in-depth case studies.

**Life Cycle Assessment Harmonization**—Results from NREL’s review, analysis, and harmonization of published life cycle assessment estimates for multiple energy generation technologies, including wind, solar, biopower, geothermal, hydropower, and ocean energy.

**Fostering Equity in Local Clean Energy Policy**—Lessons from the American Council for an Energy-Efficient Economy’s 2019 City Clean Energy Scorecard, which uses five dimensions to evaluate how cities and local utilities are creating, promoting, and supporting socially equitable clean energy strategies.

**Greenlining: Energy Equity**—Resources to help ensure energy policies that build a clean energy future center and prioritize communities of color, opening doors for historically redlined communities.

**Sudden Influxes of Resource Wealth to the Economy: Avoiding ‘Dutch Disease’**—A World Bank policy brief that takes a systematic look at “Dutch Disease” (a macroeconomic phenomenon in which a sudden increase of resource wealth from an extractive sector undermines other areas of the economy) and summarizes policies aimed at preventing or mitigating its harmful long-term economic effects.

## **Maintain Transparency in Project and Vendor Selection Processes**

**Asia-Pacific Economic Corporation Government Procurement Experts Group Non-Binding Principles on Government Procurement: Accountability and Due Process**—A set of elements established to promote transparency in government procurement, including illustrative examples.

**OECD Principles for Integrity in Public Procurement**—A set of principles that serve as a policy instrument for enhancing transparency and integrity throughout the public procurement cycle.

**Standard Contracts and Securitization Resources**—An NREL collection of real-world renewable energy contracts, including requests for proposals.

**Vietnam Solar Competitive Bidding Strategy and Framework**—World Bank Group strategy document developed to support the Government of Vietnam’s goal to scale up solar generation sustainably and affordably by shifting from feed-in tariffs to a competitive bidding mechanism.

## **Develop a Project Closeout Process; Implement When Appropriate**

**Best Practices in Project Management Closeout**—DOE Office of Science project closeout process overview.

**Capital Construction Project Closeout Checklist**—A real-world example of the various components of a large project closeout from the National Science Foundation.

**Project Closeout: Guidance for Final Evaluation of Building America Communities**—An NREL technical report that presents Building America Communities project closeout guidelines, which are applicable to most energy projects.

## **Engage Stakeholders to Keep Project Successes Visible**

**NIST Guide Brief: Short-Term Implementation Tasks**—Suggestions from the National Institute of Standards and Technology on short-term activities and solutions to support continued engagement in community resilience planning until longer-term solutions are implemented.