DOE OFFICE OF INDIAN ENERGY

Step 4: Project Implementation
Project Implementation

1. **PROJECT POTENTIAL:** Data Collection and Opportunity Assessment
2. **PROJECT OPTIONS:** Strategy and Detail
3. **PROJECT REFINEMENT:** Planning and Development
4. **PROJECT IMPLEMENTATION:** Financing and Construction
5. **PROJECT OPERATIONS & MAINTENANCE**

- Comprehensive Energy Plan
- Council Check-in

Implementation

1. Potential
2. Options
3. Refinement
4. Operations & Maintenance
Step 4: Implementation

Purpose: Realize physical construction of project

Tasks:
- Finalize preconstruction tasks
- Realize construction and equipment installation
- Realize interconnection
- Realize project commissioning

Output: Completed project (operation)
Step 4: Implementation

1. Pre-construction
   – Project kickoff
   – Design and construction documents, plans/schedules, submittals
2. Construction of project
   – Contract oversight/quality control
   – Change control
3. Commissioning
   – Testing and verification
   – Interconnection verification (utility)

Variable effort relative to project scale
Pre-construction

- Checklists for schedules and each activity based on contract and project documents
- Kickoff meeting
- Utility interconnection process and agreement
- Design (often in stages) and design approvals
- Other possible plans:
  - Utility
  - Construction
  - Management
  - QC
  - Commissioning
  - Environmental Protection
  - Security
Construction of Project

- Project developer orders equipment and begins construction or installation
- Construction manager coordinates work of various trades
- Close coordination with tenants if site is an occupied building
- Frequent communication among all parties to minimize possible issues

Small Wind and Solar on Facility
NREL Photo #19430
Interconnection and Commissioning

• Project interconnected according to utility interconnection agreement and utility process

• Plan may be standardized by developer and technology and may be refined per individual system design

• Witnessing and/or third party independent commissioning may be stipulated

• Commissioning
  – Physical inspection
  – Testing
  – Whole-system performance testing
Commissioning

Planning
- Determine objectives and strategies
- Assemble project team
- Compile and review building and equipment documentation

Investigation
- Conduct site assessment
- Develop functional test and monitoring plans
- Analyze test results
- Compile master list of deficiencies and recommend improvements

Implementation
- Accepted recommendations are put in place
- Repairs and improvements
- Retesting and re-monitoring
- Fine-tuning

Hand-off and Integration
- Final documentation of commissioning effort is presented
- Develop and present plan for future commissioning efforts including recommended procedures for specific equipment, frequency of testing, analysis of results, periodic reporting, key players, and budget requirements
Step 4: Hypothetical – Outputs Implementation

- Completed and operating project
- New ownership organization completed (if needed)

Project Implementation Success

- Project generating electricity
- Project developed within budget
## Project Risk – Post Step 4

<table>
<thead>
<tr>
<th></th>
<th>Risks</th>
<th>Risk Assessment Post Step 4</th>
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<tbody>
<tr>
<td><strong>Development</strong></td>
<td>• Poor or no renewable energy resource assessment</td>
<td>Low; site picked ✓</td>
</tr>
<tr>
<td></td>
<td>• Not identifying all possible costs</td>
<td>Low; detailed model ✓</td>
</tr>
<tr>
<td></td>
<td>• Unrealistic estimation of all costs</td>
<td>Low; detailed model ✓</td>
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<tr>
<td></td>
<td>• Incorrect estimation of long-term “community” energy use</td>
<td>Low; final projection ✓</td>
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<tr>
<td></td>
<td>• Utility rules and ability to offset use with centralized production; interconnection risk</td>
<td>None; executed ✓</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td>• Structural (e.g. rooftop solar, wind loading, soil conditions)</td>
<td>None; addressed ✓</td>
</tr>
<tr>
<td></td>
<td>• Installation safety (e.g., wind tower, hazard for adjacent sites)</td>
<td>None; addressed ✓</td>
</tr>
<tr>
<td></td>
<td>• Site control for safety/security purposes</td>
<td>Low; site secure ✓</td>
</tr>
<tr>
<td><strong>Permitting</strong></td>
<td>• Tribe-adopted codes and permitting requirements</td>
<td>Low; complete ✓</td>
</tr>
<tr>
<td></td>
<td>• Utility interconnection requirements</td>
<td>None; complete ✓</td>
</tr>
<tr>
<td><strong>Finance</strong></td>
<td>• Capital availability</td>
<td>None; finalized ✓</td>
</tr>
<tr>
<td></td>
<td>• Incentive availability risk</td>
<td>None; finalized ✓</td>
</tr>
<tr>
<td><strong>Construction/Completion</strong></td>
<td>• EPC difficulties</td>
<td>None; contracted ✓</td>
</tr>
<tr>
<td></td>
<td>• Cost overruns</td>
<td>None; construction complete ✓</td>
</tr>
<tr>
<td></td>
<td>• Schedule</td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td>• Output shortfall from expected</td>
<td>Assumed low, mitigable or allocatable</td>
</tr>
<tr>
<td></td>
<td>• Technology O&amp;M</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Adapted from Holland & Hart, RE Project Development & Finance & Infocast, Advanced RE Project Finance & Analysis

*NOTE: Underlining signifies that the risk assessment outcome changes during the step at hand.*
OPERATIONS AND MAINTENANCE
Project Implementation O & M

- Set up maintenance schedules and contracts
- Schedule the final blower door on residential energy efficiency
- Schedule final inspections based on completion dates