5 STEP PROJECT DEVELOPMENT PROCESS
Project Development Process: What Is It?

• Framework based on experience
• Focuses on key decision points
• Shows that project development is iterative
• Emphasizes that delaying or deciding against a project that does not meet current goals is a viable outcome and option

More information available at:

http://www.energy.gov/indianenergy/resources/education-and-training
1 Potential

2 Options

3 Refinement

4 Implementation

5 Operations & Maintenance
Step 1: Site, Scale, Resource, and Community Market Potential

**Purpose:** Determine whether basic elements for a successful project are in place

**Tasks:**

1. Identify possible **sites** for project locations
2. Determine the **energy load/demand** for these sites using past electric bills for these facilities
3. Confirm renewable energy **resource**
4. Review Tribal facility electric cost data, regulations, and transmission and interconnection requirements
5. Evaluate community market potential for renewable sales. **Your community is the marketplace/energy – user.**
6. Assemble or communicate with the right team, those in positions or with knowledge to facilitate, approve, and champion the project

- Analyze risks: financing, permitting, construction costs
- Analyze utility rules: interconnection and transmission
2 Options

1 Potential

3 Refinement

4 Implementation

5 Operations & Maintenance
Step 2: Project Ownership and Local Regulatory Options

**Purpose:** *(Assumption: community-scale project on tribal land)* Determine ownership structure and permitting considerations if any. *(Note: It is likely that internal tribal permitting is required if developed on Tribal lands, however, state and federal permitting may be required if the Tribe is dealing with fee or trust land outside the Tribal land holdings.)*

**Tasks:**
1. Identify final resource and project location
2. Understand ownership structure/Tribal role and risk allocations
3. Narrow financing options and clarify tax-equity structure
4. Initiate engineering, procurement, and construction (EPC) process
5. Understand and plan for permitting, interconnection, and transmitting power to residents within the community

**Resources:**
3 Refinement

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

**Purpose:** Validate decisions and finalize project structure

**Tasks:**
1. Finalize ownership structure and project team identification
2. Finalize permitting including environmental reviews, net metering, and interconnection
3. Finalize technology, financing, and development costs

**Outputs:**
1. Proposed financing/commitments and organization structure
2. Detailed economic models
3. Vendors selected
4. Completed environmental reviews and finalized permits
5. Net-metering and interconnection agreement
6. Transmission finalized, if necessary
4 Implementation

1 Potential
2 Options
3 Refinement
4 Implementation: Financing and Construction
5 Operations & Maintenance
Step 4: Implementation

**Purpose:** Contract for, realize physical construction of project

**Tasks:**
1. Finalize project agreements
2. Finalize vendor contracting process
3. Finalize preconstruction tasks
4. Realize construction and equipment installation
5. Realize interconnection and net metering
6. Realize project commissioning leading to operation

**Output:** Completed project (operation)
Project Development Process

1. Potential
2. Options
3. Refinement
4. Implementation
5. Operations & Maintenance
Step 5: Operations & Maintenance

**Purpose:** Conduct or ensure ongoing operations and maintenance (O&M), including repair and replacement (R&R)*

**O&M Costs:**
- Equipment maintenance and upkeep
- Gearbox/inverter replacement
- Insurance
- Labor
- Extended warranty agreements

**Maintenance:**
- If leasing, lessor often manages maintenance
- If power purchase agreement (PPA), vendor typically manages maintenance

*Especially if owner – role of highest O&M risk

Photo from Florida Solar Energy Center, NREL 14728
Financing Agenda

• Business Structures
• Requirements for Financing
• Federal Tax Incentives: Why should you care?
• Financing Options
BUSINESS STRUCTURE OPTIONS
Importance of Choosing the Right Business Structure

- Protect Tribal assets
- Preserve Tribal sovereignty
- Minimize potential liability
Business Structure Options for Tribes

1. Tribal government entities
   - Unincorporated instrumentalities
   - Political subdivisions
   - Utility authority

2. Section 17 corporations

3. Tribally chartered corporations

4. State law entities
   - State law corporations
   - Limited liability companies (LLCs)

5. Joint venture
Evaluating the Options

<table>
<thead>
<tr>
<th>Business Structure Option</th>
<th>Simplicity and Quick Formation</th>
<th>Shield Tribal Assets from Business Liabilities</th>
<th>Avoid Federal Income Taxes</th>
<th>Separate Business from Tribal Control</th>
<th>Ability to Secure Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribal Instrumentality*</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
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<tr>
<td>Political Subdivision*</td>
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<td>🟢</td>
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</tr>
<tr>
<td>Section 17 Corporation*</td>
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<td>🟢</td>
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</tr>
<tr>
<td>Tribal Law Corporation*</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
</tr>
<tr>
<td>State Law Corporation</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
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<td>🟢</td>
</tr>
<tr>
<td>LLCs/Joint Venture</td>
<td>🟢</td>
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<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
</tr>
</tbody>
</table>

(*Can be protected by Tribal sovereign immunity)
## Requirements for Financing

<table>
<thead>
<tr>
<th>Site</th>
<th>Resource</th>
<th>Off-Take / Energy Users</th>
<th>Permits</th>
<th>Technology</th>
<th>Team</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securing site: No site, no project</td>
<td>Engineering assessment (input)</td>
<td>Power purchases: off-take contract – (revenue)</td>
<td>Anything that can stop a project if not in place...</td>
<td>Engineered system (output)</td>
<td>Professional, experienced, diverse</td>
<td>Financing structure</td>
</tr>
</tbody>
</table>

- Site control
- Size and shape
- Location to load and T&D
- Long-term control
- Financial control
- Clear title
- Lease terms
- Collateral concerns
- Environmental
- Access
- O&M access
- Upgradable

- Volume/ Frequency
- Variability
- Characteristics (power/speed)
- 24-hour profile
- Monthly, seasonal, and annual variability
- Weather dependence
- Data history
- Std. deviation
- Technology suitability

- Credit of counterparty
- Length of contract
- Terms and conditions
- Reps and warranties
- Assignment
- Curtailment
- Inter-connection
- Performance
- Enforcement
- Take or pay
- Pricing and terms

- Permitting/ entitlements
- Land disturbance
- Environmental and cultural impacts
- Resource assessments
- Assignment
- Wildlife impacts
- Habitat
- NEPA, EIS
- Utility inter-connection
- Performance
- Enforcement
- Take or pay
- Pricing and terms

- Engineering design plans
- Construction plans
- Not generic solar panel and inverter
- Engineered resource/ conversion technology/ balance of system designs
- Specifications
- Bid set

- Business management
- Technical expertise
- Legal expertise
- Financial expertise (including tax)
- Transmission interconnection expertise
- Construction/ contract management
- Operations
- Power marketing/sales

- Development equity
- Project equity
- Nonrecourse project debt
- Mezzanine or bridge facility
- Tax equity
- Grants, rebates, other incentives
- Environmental attribute sales contracts (RECs)
- Bond finance

Framework: NREL SROPPTCTM
Federal Tax Incentives

- Investment Tax Credit (ITC)
- Modified Accelerated Cost Recovery System (MACRS) and bonus depreciation
## Comparison of Tax Incentives

<table>
<thead>
<tr>
<th></th>
<th>ITC</th>
<th>Accelerated Depreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value</strong></td>
<td>Tax credit of 10% or 30% of project costs, depending on tech</td>
<td>Depreciation of eligible costs (not all project costs qualify)</td>
</tr>
</tbody>
</table>
| **Select Qualifying Technologies** | • Solar  
• Fuel cells  
• Small wind  
• Geothermal | Depreciation can be taken with either PTC or ITC                                      |
| **Basis**            | Eligible project cost. Credit taken at the time the project is placed in service. Can be combined with depreciation. | **MACRS:** 5-year depreciation schedule  
**Bonus:** 50% first year accelerated depreciation on equipment |
| **Expiration**       | Placed in service before 1/1/2017*                                   | **MACRS:** None  
**Bonus:** 1/1/2014                                                        |
Key Concept: Tax-Equity Partnerships

1. Tribe can benefit from tax-equity incentives without being taxable

2. Tribes can partner with third-party tax investors and/or developers to gain this incentive/advantage
   - Even with IRS ruling, the Tribe needs capital to build a large renewable project

3. Tribe benefits by offering a more competitive price for energy and RECs from the project to a utility
So Why Seek a Tax-Equity Finance Partner?

- Tax incentives such as Modified Accelerated Cost Recovery System (MACRS) and either Production Tax Credit (PTC) or Investment Tax Credit (ITC) can represent up to half the project value, or reduce project capital costs by ~50%.

- Tax incentives can help to achieve a competitive price of power.

- Many projects also require state-level incentives to be economic.
PROJECT FINANCING OPTIONS
Step 3: Ownership and Financing Options

- Direct ownership (cash)
- Grants
- Incentives
- Debt
- Energy savings performance contracts (ESPCs)
Possible Sources of Capital

Potential Capital Financing Sources:
- **Tax Equity**
- **Debt**
- **Cash Equity**
- **Other**

Tax-Equity Investment Structures:
- **Partnership Flip**
- **Sale Leaseback**
- **Inverted Lease**

Primarily for facility and community-scale projects

Tribe purchases a renewable energy system with its own funding

Over time, investment recouped from utility bill savings

The Tribe is the owner in this structure and self-generates its electricity

Project Company/Pass-Through Entity

Project

Tribe and Electricity Users

Payments

Remaining Energy Needs

Utility
### Direct Ownership

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maximum reduction in electricity bills</td>
<td>• Need the resources to pay for the project</td>
</tr>
<tr>
<td>• Lower finance costs (or none depending on source)</td>
<td>• Don’t fully benefit from available tax incentives given tax-exempt status</td>
</tr>
<tr>
<td>• Full control over a project: design, operations, and risks</td>
<td>• Responsibilities of ownership (operations &amp; maintenance)</td>
</tr>
<tr>
<td>• Own renewable energy credits (RECs) and can choose to retain or monetize</td>
<td>• Possible electricity rate impacts for tribe (increase or decrease)</td>
</tr>
<tr>
<td>• Might be only option for small projects</td>
<td></td>
</tr>
</tbody>
</table>

30
The Tribe is the host in this structure and agrees to buy electricity generated by the renewable energy system.

Benefits:
1. No/low up-front costs
2. No O&M
3. Save on electricity costs
PPA Considerations to Weigh

Disadvantages
- May not beat current electricity rates
- Tough economics for small projects
- Higher transaction costs
- Renewable energy credit (REC) and project ownership requirements

Advantages
- No/low up-front costs
- No O&M
- Benefit from tax incentives
- Locked-in energy price
- Path to ownership
Community Project PPA: Eventual Tribal Ownership Example

- Developer and investor form a special purpose vehicle/entity to develop a solar/wind/biomass/MSW power plant
- Tribe executes a PPA with wind project to purchase power
  - Hopefully at a discount to current power price
  - Discount will depend on project economics and local rates
- At end of 6 years (ITC) or 10 years (PTC)
  - Investor ownership “flips” from 99% down to 5%
  - Developer buys investor 5% ownership at “fair market value”
- In year 7 or 11, developer can sell project to Tribe, which assumes the project’s debt
  - Project price is substantially reduced compared to Tribe project development from year 1
Grants

• Do not need to be repaid
• Must be used for specific purpose
• Grantee must meet eligibility requirements
• Typically funded by state or federal government
Grants – State, Local, Utility, & Private Sponsored

Grant Programs for Renewables

Notes: This map only addresses grant programs for end-users. It does not address grants programs that support Research & Development, nor does it include grants for geothermal heat pumps or other efficiency technologies.
## Grants – Federal Government Sponsored

<table>
<thead>
<tr>
<th>Program</th>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Rural Energy for America Grant Program (USDA)** | Grant     | • $2,500–$500,000 or 25% of project costs, whichever is less  
• Requirements: Borrower must be rural small business or agricultural producer  
• Technology: biomass, solar, wind, hydro, hydrogen, geothermal  
• Applications: equipment, construction, permitting, professional service fees, feasibility studies, business plans, land acquisition |
| **High Energy Cost Grant Program (USDA)**    | Grant     | • $75,000–$5,000,000  
• Requirements: Community's average home energy costs must exceed 275% of national average  
• Technology: Solar, Wind, Biomass, Hydro  
• Applications: Energy generation and transmission and distribution  
• No open solicitations |
| **Tribal Energy Program Grant (DOE)**        | Grant     | • Amount varies  
• Requirements: Varies by solicitation  
• Technology: Solar, wind, biomass, hydro, geothermal  
• No open solicitations |
| **Energy and Mineral Development Program (DOI)** | Grant     | • Amount varies  
• Applications: Evaluation of energy and mineral resources on tribal lands.  
• Annual solicitations |
Incentives – Rebates

Rebate Programs for Renewables
www.dsireusa.org / January 2013

16 States + Washington DC and 2 territories offer rebates for renewables

Notes: This map does not include rebates for geothermal heat pumps, daylighting or other energy efficiency technologies.
<table>
<thead>
<tr>
<th>Program</th>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
</table>
| Rural Development Biorefinery Assistance Program (USDA)                | Guarantee| • Up to 90% of loan amount  
• Technology: Commercial-scale bio refinery  
• Applications: Equipment, construction, permitting, land acquisition, cost of financing |
| Power Project Loan Fund (Alaska Energy Authority)                     | Loan     | • Amount varies  
• Technology: Solar, wind, MSW  
• Applications: For development or upgrade of small-scale power production (<10 MW), conservation facilities, and bulk fuel storage, includes transmission and distribution |
| Indian Affairs Loan Guaranty, Insurance, and Interest Subsidy Program (DOI) | Guarantee| • Max 90%; Interest subsidy covers the difference between the lender’s rate and the Indian Financing Act rate  
• Requirements: Borrower must have 20% tangible equity in the project. This is for business development. |
| Rural Energy for America Loan Guarantee Program (USDA)                | Guarantee| • Up to 85% of loan amount  
• Requirements: Borrower must be rural small business or agricultural producer  
• Technology: Biomass, solar, wind, hydro, hydrogen, geothermal  
• Applications: equipment, construction, permitting, professional service fees, feasibility studies, business plans, land acquisition  
• No open solicitations |
New Market Tax Credits

- Up to $5B available in CY 14
- 39% tax break
  - 5% in first 3 years
  - 6% in last 4 years
  - Net value: 20% due to financing complexity, number of parties
- CDE can shop credits to investors
  - Renewable energy project must be aligned with CDE mission
  - CDEs take time to establish
- Examples
  - 1 MW PV City of Denver's buildings
  - 1.65 MW PV in Salt Lake City

Sources:
1 http://www.nrel.gov/docs/fy10osti/49056.pdf
2 http://nationaldevelopmentcouncil.org/blog/?p=2242
An ESPC is a **no up-front cost** contracting mechanism between a site customer and an energy service company (ESCO). Energy conservation measures and on-site generation are financed and implemented by an ESCO, which is **repaid through energy savings**. This would be done as a PPA, in conjunction with energy efficiency, to bring costs down.

Over 90 DOE-Qualified ESCOs, including:

Ameresco · McKinstry · Chevron · Siemens
Honeywell · Tetra Tech · Johnson Controls · Trane

For full DOE Listing: [http://www1.eere.energy.gov/femp/financing/espcs_qualifiedescos.html](http://www1.eere.energy.gov/femp/financing/espcs_qualifiedescos.html)
ESPCs Reallocate Current and Future Energy Spending

- No ESPC
- During ESPC
- After ESPC

- Customer's Savings
- Guaranteed Savings for ESCO Services Fee and Financing
- Energy and Operations and Maintenance Costs
Community (or Shared) Solar

- Off-site solar project that allows customers of a utility to directly benefit from a PV project without having to install the system on their own premises
- Various ownership options including utility owned and third-party owned
- Participants make a one time up-front payment or monthly payments
- Participants receive a bill credit either in kWh or $
- Numerous examples around the country

Example pricing
- $780 per solar panel
- $3.15/Watt
- $3 per 150 kWh per month (TEP)
- $3.38-$25.72/month (e.g., Sacramento Municipal Utility District [SMUD])
Why Community Solar?

There are many potential interested consumers of solar who are unable to install a PV system on their roof

Why?

• They rent
• They own a condo
• Their roof is shaded
• They can’t afford an entire system
• They are not allowed (HOA restrictions)
• Their roof does not have the proper roof orientation
• They want to “dip their toe in the water”
Common Community Solar Project Structures

① Developer owns project
② Developer sells electricity to utility under a PPA
③ Utility structures community solar program around the output from the PV system

PV System → Solar Developer → Utility

Community Solar Participants/Subscribers
- Monthly payments
  - SMUD SolarShares (1 MW)
Further Resources

- Shared Renewables HQ: www.sharedrenewables.org
- IREC Shared Renewables Program Catalog: www.irecusa.org/regulatory-reform/shared-renewables/

Slide from presentation given by Erica M. Schroeder. 2013. Interstate Renewable Energy Council, Inc. (IREC)
Thank you

Paul Schwabe
Senior Finance Analyst
National Renewable Energy Laboratory
Paul.schwabe@nrel.gov
303 384 7468
March 8, 2013 IRS Private Letter Ruling – 111532-11

• An Indian Tribal government is not considered a “governmental unit” or “tax-exempt organization” for purposes of solar energy tax subsidies

• This presumably could permit tribal governments to enter into an inverted lease structure without jeopardizing access and use of federal tax incentives (potentially BIG change)

• Yet to be executed in the market; perhaps only applicable to the Tribe that applied; it would be wise to seek legal counsel


Solar Rewards REC Purchase Contract
Customer-Owned PV Systems
Greater than 10 kW DC nameplate capacity

This Contract is made and entered into this [today's date], by and between Public Service Company of Colorado ("Public Service" or "Company"), 1000 Larimer Street, Denver, Colorado 80202-5513, <Customer Name> ("Customer"), each of which may be referred to herein individually as a "Party" or collectively as the "Parties." Except as otherwise provided herein, capitalized terms shall have the meanings set forth in Section 3052 of the Rules Regulating Electric Utilities of the Colorado Public Utilities Commission, 4 Code of Colorado Regulations 723-3-1052, as of the date of this Contract.

1. Purchase and Sale. On the terms and subject to the conditions set forth in this Contract, Customer agrees to sell and Public Service agrees to purchase Renewable Energy Credits ("RECs") as described herein. The photovoltaic solar system (the "PV System") from which the RECs will be generated is to be installed by Customer at the location identified below which is located within the electric service territory of Public Service and where Customer receives or will receive electric utility service from Public Service ("Service Address"). The PV System will have a rated output current (DC) nameplate capacity of [system size] kW. Customer shall sell and Public Service agrees to purchase all RECs generated by the PV System at the Service Address for the term hereof, as provided in Section 5(e) below.

Service Address: <Premise address>

2. Purchase Price. The purchase price for the RECs hereunder shall be expressed in cents per kilowatt hour (kWh), with one REC being generated for each kWh of power generated by the PV System. Public Service shall pay Customer the price of $<REC price> per kWh for RECs purchased hereunder. Such purchase price shall be payable in monthly installments, based upon Public Service’s receipt of RECs generated by the PV System in the immediately preceding month, in accordance with subsection 5(e) below.

3. Incorporation of Terms. The Parties shall abide by, and this agreement shall be subject to, the Company’s applicable electric tariffs related to photovoltaic systems, as filed with the Colorado Public Utilities Commission and as may be revised from time to time. In the event of any conflict between the terms of this Contract and Company’s electric tariff, the provisions of the tariff shall control.

4. Representations. Customer hereby makes the following representations and warranties to Public Service:
   a) Customer warrants that the person signing this Contract on behalf of Customer is individually authorized and competent to sign this Contract and to bind Customer to the terms hereof.
   b) Customer will own the PV System at the Service Address set forth above, and the primary business at the Service Address is not the generation of electricity for retail or wholesale sale and is the person or entity in whose name electric service is listed at the Service Address.

5. Terms and Conditions.
   a) Customer shall be responsible for ensuring that the PV System equipment installed at the Service Address is new equipment and meets all applicable codes, standards, and regulatory requirements at the time of installation.
   b) Customer represents that the PV System shall be sized to supply no more than one hundred twenty percent (120%) of the average annual consumption of electricity by Customer at the Service Address. Customer acknowledges that Public Service’s Solar Rewards Program is only available to PV systems where the estimated annual generation, as determined via PWA/TES, is not more than 120% of historical average annual electric consumption at the Service Address.
   c) “Commercial Operation” is achieved when (a) 100% of the nameplate capacity of the PV System is installed, (b) the PV System has operated without experiencing any abnormal or unsafe operating conditions, (c) all permits necessary to operate the production and, if applicable, delivery to Public Service of Renewable Energy generated by the PV System have been obtained; (d) all necessary metering has been installed, and (e) any necessary interconnection Agreement with Public Service has been entered into for purposes of connecting the PV System to Public Service’s electric system.
   d) “Date of Commercial Operation” shall be the first calendar day following the date Customer has met all of the criteria of subsection 5(c) above.
   e) This Contract shall become effective upon its execution by the Parties and shall continue in effect for a term of twenty (20) years from and after the Date of Commercial Operation.
   f) The PV System shall be located at the Service Address at all times during the term of this Contract.
   g) The PV System shall have a nameplate Direct Current output capacity greater than 10 kW and less than or equal to 500 kW.
   h) Customer shall maintain the PV System and the individual components of the PV System in good working order at all times during the Term of this Contract. If during the Term of this Contract the PV system or any of the individual components of the system should be damaged or destroyed or otherwise fail to function properly, Customer shall promptly repair or replace the equipment to its original specifications, title and orientation at Customer’s sole expense. All of Public Service’s obligations hereunder during the period of such repair or replacement shall be suspended, except for making payment for any RECs generated prior to such damage or destruction, provided, however, that if the time period for repair or replacement is reasonably anticipated to exceed 180 days, Public Service shall have the right, exercisable at its sole option, to terminate this Contract upon not less than 30 days written notice, with no further obligation of the Parties to perform hereunder following the effective date of such termination. In all other situations, if the PV System is out of operation for more than ninety (90) consecutive days during the Term of this Contract, the proposed PV System nameplate capacity in kilowatts (kW) DC does not exceed the Service Address service entrance capacity.
   i) if any of the above representations of the Customer are false or incorrect, such false or incorrect representation shall constitute an event of default under this Contract.

2014
## Facility-Scale Project Risk – Post Step 3

<table>
<thead>
<tr>
<th>Risks</th>
<th>Risk Assessment Post Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development</strong></td>
<td><strong>• Loss/waste of development resources</strong> Medium; now with more assurance of success</td>
</tr>
<tr>
<td></td>
<td><strong>• Improper orientation or project affected by shade</strong> Low; some may be assumed by host</td>
</tr>
<tr>
<td></td>
<td><strong>• Inadequate foundation or structural integrity</strong> Assumed low; developer to assess</td>
</tr>
<tr>
<td></td>
<td><strong>• Site control for challenges for safety/security purposes</strong> Assumed low</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td><strong>• Tribe-adopted codes and permitting challenges</strong> Low; permitting completed</td>
</tr>
<tr>
<td></td>
<td><strong>• Utility interconnection challenges</strong> Reduced</td>
</tr>
<tr>
<td><strong>Permitting</strong></td>
<td><strong>• Capital constraints</strong> Low; PPA elected and confirmed</td>
</tr>
<tr>
<td></td>
<td><strong>• Incentive unavailability or insufficiency</strong> Low; allocate to developer to facilitate</td>
</tr>
<tr>
<td><strong>Finance</strong></td>
<td><strong>• Engineering, procurement, and construction difficulties</strong> Low; allocate to EPC or developer</td>
</tr>
<tr>
<td></td>
<td><strong>• Cost overruns</strong> Low; allocate to EPC or developer</td>
</tr>
<tr>
<td></td>
<td><strong>• Schedule overruns</strong> Low; allocate to EPC or developer</td>
</tr>
<tr>
<td><strong>Construction/Completion</strong></td>
<td><strong>• Output shortfall from expected</strong> Low; allocate to owner</td>
</tr>
<tr>
<td></td>
<td><strong>• Technology O&amp;M failure</strong> Low; allocate to owner or O&amp;M contractor</td>
</tr>
</tbody>
</table>

**NOTE:** Underlining signifies that the risk assessment outcome changes during the step at hand.

Sources: Adapted from Holland & Hart, RE Project Development & Finance & Infocast, Advanced RE Project Finance & Analysis
## Project Risk – Community-Scale Post Step 3

<table>
<thead>
<tr>
<th>Risks</th>
<th>Risk Assessment Post Step 3</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Poor or no renewable energy resource assessment</td>
<td>Low; site picked</td>
<td>✓</td>
</tr>
<tr>
<td>• Not identifying all possible costs</td>
<td>Low; detailed model</td>
<td>✓</td>
</tr>
<tr>
<td>• Unrealistic estimation of all costs</td>
<td>Low; detailed model</td>
<td>✓</td>
</tr>
<tr>
<td>• Incorrect estimation of long-term “community” energy use (energy efficiency first)</td>
<td>Low; final projection</td>
<td>✓</td>
</tr>
<tr>
<td>• Utility rules and ability to offset use with centralized production</td>
<td>Reduced</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Structural (e.g. rooftop solar, wind loading, soil conditions)</td>
<td>Assumed low; assessed</td>
<td>✓</td>
</tr>
<tr>
<td>• Installation safety (e.g., wind tower, hazard for adjacent sites)</td>
<td>EPC assumes risk</td>
<td>✓</td>
</tr>
<tr>
<td>• Site control for safety/security purposes</td>
<td>Low; site secure</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Permitting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tribe-adopted codes and permitting requirements</td>
<td>Low; complete</td>
<td>✓</td>
</tr>
<tr>
<td>• Utility interconnection requirements</td>
<td>Low; complete</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Finance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Capital availability</td>
<td>Low; PPA complete</td>
<td>✓</td>
</tr>
<tr>
<td>• Incentive availability risk</td>
<td>Low; risk on developer</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Construction/Completion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• EPC difficulties</td>
<td>Low; allocate to EPC or developer</td>
<td>✓</td>
</tr>
<tr>
<td>• Cost overruns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Schedule</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Output shortfall from expected</td>
<td>Assumed low, mitigable, or allocatable</td>
<td></td>
</tr>
<tr>
<td>• Technology O&amp;M</td>
<td></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.*
### Tax Credit Bond
- Governments only
- $3.2 billion
- Covers 70% of the “qualified tax credit” up front

### State Managed
- Allocations have been made by Treasury
- Large local governments >100,000

### Some Differences
- No sunset date (good)
- Up to 30% for private sector entities
- Either issues as reduced interest coupon or direct payment

For more information on QECBs, see [http://www.nrel.gov/docs/fy11osti/49450.pdf](http://www.nrel.gov/docs/fy11osti/49450.pdf)
Bonds – Clean Renewable Energy Bonds (CREBs)

• CREBs
  – Apply to the IRS for an allocation
  – Federal tax credit to bond owner in lieu of interest payment from bond issuer
  – May be more attractive than tax-exempt municipal bonds
    • Issuer only pays back bond principal (for most part)

• Total allocation of $1.2 B
  – Up to 62.5% for public sector projects (rest: coops)
  – Round 1: 401 of 610 public sector PV projects
  – Round 2: $262M for public-sector PV projects
  – Additional rounds possible
Bonds – CREBs cont.

Challenges

• Not truly equivalent to interest-free bond
  – Assumes bond issuer is equiv. to AA corporate
  – Public entities with weaker credit must either:
    1. Make supplemental interest payments, or
    2. Sell the bond at a discount

• Transaction costs are high
  – Allocations made from smallest to largest projects
  – Solution: MA bundled 12 projects (1 MW)

• First principal payment due in December of the year the CREB is issued
Bonds – Green Bonds

• Finance tool for green projects: projects and activities that promote climate and other environmentally sustainable purposes
  – Renewable energy
  – Energy efficiency
  – Sustainable waste management
  – Clean transportation

• Nascent market for institutional investors who have climate considerations in their investment objectives
  – Currently led by international organizations (World Bank, International Monetary Fund)
  – Some states beginning to look at these instruments (MA has issued some green bonds)
Hybrid – Morris Model

• Uses NMTC, QECB, or other bonding

• Combines tax benefits of third-party ownership with low-cost capital from public debt
  – Ownership transferred to the developer
  – Developer payments pays off bond principal and interest

So far, only used by counties in New Jersey; has promise elsewhere, and for Tribes

https://financere.nrel.gov/finance/content/municipal-bond-power-purchase-agreement-model-continues-provide-low-cost-solar-energy

http://www.nrel.gov/docs/fy12osti/53622.pdf
Monetizing Green Attributes: Renewable Energy Credits

Renewable Energy Credits (RECs)

- Used to track renewable energy production for state renewable portfolio standards (RPSs)
- Utilities may purchase RECs to fulfill state requirements
- Producer usually owns REC, but varies by state
- Transactions regulated by state
  - State may require contract with minimum length (e.g., 20 years)
  - Some states sponsor/facilitate market
  - Some states allow private/direct transactions