DOE OFFICE OF INDIAN ENERGY

Renewable Energy Project Development and Financing: Community Scale

Detailed Hypothetical Example of How to Use Renewable Power in Your Tribal Community
Course Outline

What we will cover...

- About the DOE Office of Indian Energy Education Initiative

- Community-Scale Process: Hypothetical Example
  - Project development and financing concepts
  - Project development and financing process and decision points
  - Community project as an investment
  - How to pay for community project

- Additional Information and Resources
Introduction

The U.S. Department of Energy (DOE) Office of Indian Energy Policy and Programs is responsible for assisting Tribes with energy planning and development, infrastructure, energy costs, and electrification of Indian lands and homes.

As part of this commitment and on behalf of DOE, the Office of Indian Energy is leading education and capacity building efforts in Indian Country.
A specially designed curriculum was created to give tribal leaders and professionals background information in renewable energy development to:

- **Present foundational information on strategic energy planning, grid basics, and renewable energy technologies**
- **Break down the components of the project development process on the facility, commercial, and community scale**
- **Explain how the various financing structures can be practical for projects on tribal lands.**
Course Audiences

Tribal Leaders
- Primary decision makers
- Understand terminology
- Understand key decision points and factors influencing them

Staff/Project Management
- May be self-managing project or managing consultants
- Communicate at key points with decision makers
- Require in-depth knowledge of process
How This Advanced/In-Depth Course Fits

**Essentials**
Basic process, decisions, and concepts for project development
**Audience:** All involved in project

**Facility**
Comprehensive, in-depth process pathways for project development and financing by project scale
**Audience:** Decision makers and project and contract managers

**Community**
Comprehensive, in-depth process pathways for project development and financing by project scale
**Audience:** Decision makers and project and contract managers

**Advanced/In-Depth**
Detailed, academic information for deep understanding of concepts
**Audience:** Project and contract managers

**Commercial**
Comprehensive, in-depth process pathways for project development and financing by project scale
**Audience:** Decision makers and project and contract managers
Terminology in These Courses

**Why Is It Important?**
- Provides common language for internal discussion
- Assists in interaction with external organizations
- Increases credibility in project development

**What Does It Include?**
- Common terms and language for project development
- Acronyms for and roles of:
  - Federal agencies
  - Common federal and state policies

Your resource for reference: DOE-IE Course Terminology Guide
Key Concepts

- Risk and Uncertainty
- Levelized Cost of Energy (LCOE)
- Tax-Equity Partnership
- Roles of the Tribe
- The Project Team
About the Speaker

Karlynn Cory

- Senior Analyst at the National Renewable Energy Laboratory (NREL)
- Creator of the Renewable Energy Project Finance Analysis team at NREL that identifies, analyzes, and communicates project financing innovations
- Nationally recognized tax and incentive policy expert with more than 17 years experience on renewable policies and markets
Agenda

• Project development and financing concepts for a **community-scale** project

• Project development and financing process and decision points for a **community-scale** project

• How to pay for a community-scale project
PROJECT DEVELOPMENT AND FINANCING CONCEPTS: COMMUNITY SCALE
Terminology: Project Scale

Facility
**Definition:** single building system
**Primary purpose:** offset building energy use

Community
**Definition:** multiple buildings, campuses
**Primary purpose:** offset community energy costs, energy self-sufficiency

Commercial
**Definition:** stand-alone project
**Primary purpose:** revenue generation, financial self-sufficiency

Photo credits: (top to bottom): NC Solar Center, NREL 09373; Orange County Convention Center, NREL 18077; Tucson Electric Power, NREL 13327
Why Elect to Do a Community-Scale Project?

- Available, Tribe-controlled, *appropriate* location
  - May/may not be Tribe-owned
- Offset electricity costs for community (primary use is on-site)
- Minimize environmental impact
- Diversify energy supply with local, renewable sources
- No other power off-taker is interested
- Not enough capital for a large-scale project
- Job development (construction and maintenance)
- Self-sufficiency, pride

Photo from Native Energy, Inc., NREL 17589
<table>
<thead>
<tr>
<th>Project Scale Decision Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facility</strong></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td><strong>Value Proposition</strong></td>
</tr>
<tr>
<td><strong>Tribe’s Success Measurement</strong></td>
</tr>
<tr>
<td><strong>LCOE Comparison</strong></td>
</tr>
<tr>
<td><strong>Key Decision Point</strong></td>
</tr>
</tbody>
</table>
Key Concepts Throughout Steps

- Risk and Uncertainty
- LCOE
- Tax-Equity Partnership
- Roles of the Tribe
- The Project Team

In-depth information on each key concept available in Advanced Courses
PROJECT DEVELOPMENT AND FINANCING: PROCESS AND DECISION POINTS FOR COMMUNITY SCALE
1 Potential

2 Options

3 Refinement

4 Implementation

5 Operations & Maintenance

Comprehensive Energy Plan

Project Development and Financing Strategy

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 AND MAINTENANCE
Step 1: Site, Scale, Resource and Market Potential

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

**Tasks:**

- Identify possible **sites** for project locations
- Confirm renewable energy **resource**
- Review tribal facility electric cost data, regulations (**permitting** and incentives), and interconnection requirements
- Assemble or communicate with the right **team**—those in positions or with knowledge to facilitate, approve, champion the project

- Analyze risks: financing, permitting, construction costs
- Analyze utility rules: interconnection, net metering, and transmission (if applicable)
### Step 1: Project Potential Example

<table>
<thead>
<tr>
<th>Potential</th>
<th>Options</th>
<th>Refinement</th>
<th>Implementation</th>
<th>Operations &amp; Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>Facility: California</td>
<td>Community: Minnesota</td>
<td>Commercial: Arizona</td>
<td></td>
</tr>
<tr>
<td><strong>Economics</strong></td>
<td>Solar for peak demand! Solid San Diego market</td>
<td>Large facility (e.g., casino) or many small buildings</td>
<td>Resource size vs. market size</td>
<td></td>
</tr>
<tr>
<td><strong>Policy</strong></td>
<td>High cost/kWh Time of use Com, Res: ~16¢ (Wholesale: 3.65¢)</td>
<td>Mid cost/kWh Retail Ind., Com, Res: 6.5¢–11.0¢ (Wholesale: 3.75¢)</td>
<td>Low cost/kWh Wholesale: 3.54¢ (if BTM, Retail Ind, Com: 6.6¢–9.5¢)</td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>RPS: 33% (2020 GAP) Solar incentives</td>
<td>RPS: 25% by 2025 No transmission needed (Net metering &lt;40 kW)</td>
<td>Gap meeting 15% RPS Net metering (no limit; only if selling behind the meter [BTM])</td>
<td></td>
</tr>
<tr>
<td><strong>Consensus</strong></td>
<td>Solar resource rich; solar dominates Southern CA</td>
<td>Wind resource rich; not nearly as much solar</td>
<td>Solar (photovoltaic [PV] or concentrating PV) strong, commercial</td>
<td></td>
</tr>
</tbody>
</table>

Framework: NREL BEPTCTM

Information sourced from Thomas, Pilar; “Briefing the Senate Natural Resources Committee and Senate Indian Affairs Committee,” May 18, 2012. 2011 retail and wholesale rates: Energy Information Administration
Step 1: Site and Off-take Project Opportunities

Large Facility: Casino

Aggregate Across Reservation, or Maybe Across Tribes

http://minnesota.casinoguide2.com/mn_indian.html

Text, maps and graphics copyright – Paula Giese, 1996
http://www.kstrom.net/isk/maps/mn/mnrezmap.html
Step 1: Resource, Off-take, Production, Savings

**Project:** 7.2 MW, four-turbine system

**Resource:** 7-9 m/s – great/excellent resource in south, west! Consider southwest: 8.4 m/s


**Off-taker:**
- Tribe uses: vs. retail rate (6.5¢–11.0¢/kWh)
- Sold to utility: vs. wholesale (3.75¢/kWh)

**Production:**
- Estimate using NREL’s tool System Advisor Model (SAM): 31-32 million kWh/year
- Cost from SAM: 3rd party: 4.8¢/kWh; Tribe-owned: 7.7¢/kWh

**Savings (depends on ownership and financing):**
- Best for Tribe used, third-party owned

[http://www.nrel.gov/gis/images/80m_wind/awstpspd80on1-1dpi600MN.jpg](http://www.nrel.gov/gis/images/80m_wind/awstpspd80on1-1dpi600MN.jpg)
Step 1: Hypothetical Community Example – Outputs

- **Technology** – wind, at this scale and location
- **Project scale** – community scale (7.2 MW)
- **Resource and market context** – excellent in Minnesota
- **Production potential and savings** – 31–32 million kWh/year; savings depends on utility rate, ownership and who uses the power
- **Preliminary sites options** – Tribe’s land, federal land
- **Team** – assume Tribe and tribal leaders are in favor, support, champion the project
- **Tribal role options** – own, purchase renewable energy or partner with tax equity investor
## Community-Scale Project Risk – Post Step 1

<table>
<thead>
<tr>
<th>Risk Area</th>
<th>Risks</th>
<th>Risk Assessment Post Step 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>• Poor or no renewable energy resource assessment</td>
<td>Screened good sites</td>
</tr>
<tr>
<td></td>
<td>• Not identifying all possible costs</td>
<td>Reduced</td>
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<td>• Unrealistic estimation of all costs</td>
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<td>• Installation safety (e.g., wind tower, hazard for adjacent sites)</td>
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<td>Permitting</td>
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</tr>
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<td></td>
<td>• Utility interconnection requirements</td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>• Capital availability</td>
<td>High risk, unchanged</td>
</tr>
<tr>
<td></td>
<td>• Incentive availability risk</td>
<td>Reduced</td>
</tr>
<tr>
<td>Construction/Completion</td>
<td>• EPC difficulties</td>
<td>Assumed low, mitigable, or allocatable</td>
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<tr>
<td></td>
<td>• Cost overruns</td>
<td></td>
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<td>• Schedule</td>
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<td>• Output shortfall from expected</td>
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*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
2 Options

1 Potential

3 Refinement

4 Implementation

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

**Purpose:** Decide ownership structure and determine permitting considerations

**Tasks:**
- Identify final resource and project location
- Understand ownership structures/tribal role and risk allocations
- Narrow financing options
  - Clarify tax-equity involvement (if any)
- Initiate EPC procurement process
- Understand and plan for permitting, interconnection (and transmission)

**Resources:**
Three Major Costs to Develop a Project:

1. **Feasibility** – this is the potential analysis
2. **Preconstruction** – permitting, environmental
3. **Construction** – engineering, procurement of equipment, and actual construction of plant

For Community-Scale Projects, Either:

A. The tribal community pays for the development ($$)
B. The Tribe engages a developer and/or tax-equity partner to pay the up-front costs ($)
Step 2: Ownership and Financing Options

- Direct ownership (cash)
- Third-party power purchase agreement (PPA)
- Bond markets
  - New Market Tax Credits (NMTCs)
  - Qualified Energy Conservation Bonds
- Bond + third-party PPA (“Morris Model”)
- Energy savings performance contracts (ESPCs)
- Equity investment partnering

Key Question: What viable ownership structure options are attractive to the community?
# Key Concept: Project Role Definitions

<table>
<thead>
<tr>
<th>Title</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Company</td>
<td>Legal entity that owns the project, also called special purpose entity</td>
</tr>
<tr>
<td>Resource/Landowner</td>
<td>Legal and/or beneficial owner of land and natural resources</td>
</tr>
<tr>
<td>Sponsor/Developer</td>
<td>Organizes all of the other parties and typically controls project development. Makes an equity investment in the company or other entity that owns the project</td>
</tr>
<tr>
<td>EPC Contractor</td>
<td>Construction contractor provides design, engineering, and construction of the project</td>
</tr>
<tr>
<td>Operator</td>
<td>Provides the day-to-day O&amp;M of the project</td>
</tr>
<tr>
<td>Feedstock Supplier</td>
<td>Provides the supply of feedstock (i.e., energy, raw materials) to the project (e.g., for a power plant, the feedstock supplier will supply fuel)</td>
</tr>
<tr>
<td>Product Off-taker</td>
<td>Generally enters into a long-term agreement with the project company for the purchase of all the energy</td>
</tr>
<tr>
<td>Lender</td>
<td>A single financial institution or a group of financial institutions that provides a loan to the project company to develop and construct the project and that takes a security interest in all of the project assets</td>
</tr>
<tr>
<td>Tribal Host</td>
<td>Primary sovereign of project site</td>
</tr>
</tbody>
</table>
Key Concept: Tribal Role Options

- Tribe
- Project Developer
- Renewable Resource/Land Owner/Land Lessor*
- Off-taker (Power Purchaser/User)
- Lender/Debt Provider
- Equity Investor/Generation Equipment Owner
- Project Operator/O&M

* Also called Tribal Host
## Key Concept: Tribal Role Options

<table>
<thead>
<tr>
<th>Role</th>
<th>Opportunity</th>
<th>Constraints</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource/Land Owner</td>
<td>Land rent/royalty, taxes. Low risk, known reward, consistent income.</td>
<td>Limited project control. Must provide site access.</td>
<td>Limited upside potential, limited risk</td>
</tr>
<tr>
<td>Off-taker/Energy User</td>
<td>Tribe purchases or uses all power on-site. Could include an “on-site” provider; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited investment, economic development for on-site projects, and capacity-building opportunity</td>
<td>Must have demand to use power; still requires utility interconnection agreement (if on the grid). Med risk.</td>
</tr>
</tbody>
</table>
| Project Operator/O&M              | Control and self-determination of project; potential for profits (and losses) is minimal | • Investors require experience  
• Only consider as a new business (multiple projects in a portfolio)  
• Tribes investing $ may not want this high risk/return investment | • High risk, complex  
• Tribes may be best served by outsourcing  
• A project pipeline/portfolio mitigates some risks |
| Lender/Debt Provider              | Participate financially in project (e.g., cash or NMTC with lower risk)     | • Requires ready capital  
• May be cost-prohibitive to document and manage a single debt transaction (multiple more cost-effective) | • Med-risk, more complex  
• Requires lending knowledge  
• Option for Tribes with limited lands, lots of $ |
| Equity Investor/Gen. Owner         | Provide cash or NMTC for project development. Less capital than commercial-scale. | Higher risk than debt lending. Requires ready capital, or unique source of capital that provides market advantage (like NMTC). | • High risk, more complex  
• Competes with other investments  
• Option for Tribes with limited lands, lots of $ |
| Project Developer                 | Self-determination of project; potential for profits (and losses) is moderate. Tribes with $ don’t need investors. | • Investors require experience  
• Only consider as a new business (do multiple projects for diverse portfolio)  
• Tribes investing money may not want this high risk/return investment | • High risk, complex  
• Tribes may be best served by outsourcing  
• A project pipeline/portfolio mitigates some risks |
Financial Capital Sources

• Financing structure is highly dependent on capital used for a given project:
  – **Tribal capital**: Tribal investment ($$$) to purchase project equipment
  – **Tribe-private sector capital sharing**: Tribe contributes some resources ($) and partners with third-party capital to leverage tax equity ($$)
  – **Non-Tribe capital**: Developer equity, tax equity, bank debt. Tribe participates in other ways.

• Responsibility to generate capital, collect revenues, and monitor returns will vary according to project structure

• If all framework elements are fully developed and meet market conditions, the project is ready to attract capital
Step 2: Hypothetical Community Example – Outputs

✓ Finalize resource type – MN wind – collect bankable data
✓ Determine tribal role/ownership structure
✓ Initial financing options considered, including potential role for tax-equity investment partner
✓ Procurement process initiated – RFP written for the EPC
✓ Permit needs and process – understand for all jurisdictions (city, county, MN permits understood)
✓ Utility interconnection and transmission – process initiated
## Community-Scale Project Risk – Post Step 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Risks</th>
<th>Risk Assessment Post Step 2</th>
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<tbody>
<tr>
<td>Development</td>
<td>• Poor or no renewable energy resource assessment</td>
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<td>Low; allocate to EPC or developer</td>
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3
Refinement

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

Purpose: Validate decisions and finalize project structure

Tasks:
- Finalize ownership structure and project team identification
- Finalize permitting (including environmental reviews), interconnection
- Finalize financing, and development costs

Outputs:
- Proposed financing/commitments and organization structure
- Detailed economic models
- Vendors selected
- Completed environmental reviews and finalized permits
- Off-take and interconnection agreement
- Transmission finalized, if necessary
## Step 3: Project Refinement – Outstanding Risks

<table>
<thead>
<tr>
<th>Site</th>
<th>Resource</th>
<th>Off-Take</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>
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- 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
- Interconnection
- Performance
- Enforcement
- Take or pay
- Pricing and terms

- Permitting/entitlements
- Land disturbance
- Environmental and cultural impacts
- Resource assessments
- Wildlife impacts
- Habitat
- NEPA, EIS
- Utility interconnection
- Other utility or PUC approvals
- Lease and/or ROW approvals

- 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)
- Engineered resource/conversion technology/balance of system designs
- Specifications
- Bid set

- Development equity
- Project equity
- Nonrecourse project debt
- Mezzanine or bridge facility
- Tax equity
- Grants, rebates, other incentives
- Environmental attribute sales contracts (RECs)
- Bond finance
# Step 3: Project Refinement – Risks Addressed

<table>
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<th>Resource</th>
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| Tribal land secured for community-scale project: 10 acres to provide wind power for tribal use | Wind resource data favorably evaluated | Understand how much the community will use versus what is put back on grid | Necessary permits and interconnect. agreement secured | System design prepared to bid to secure EPC contractor | Team identified and engaged | **Determine finance structure:** base it on available capital and ability to mitigate risks |

Simple LCOE Tools: Geo, Wind, PV, Digester

Available at: http://financere.nrel.gov/finance/content/CREST-model

Cost of Renewable Energy Spreadsheet Tool (CREST) Model:

- Designed to give public utility commissions (PUCs) and others a tool and methodology to quickly evaluate LCOE
- Can handle simple or complex level of inputs (user’s choice)
- Simple to operate—no macros
- Outreach and interaction tool:
  - PUCs
  - Utilities
  - Other stakeholders
- Solar, geothermal, wind, and anaerobic digester

White Paper:
Describes each term in LCOE and weighs choices for analysis methodology


NREL’s System Advisor Model (SAM) is a free computer program that calculates a renewable energy system’s hourly energy output over a single year and calculates the cost of energy for a renewable energy project over the life of the project.

- Solar, wind, geothermal, and other renewable and fossil technologies available
- These calculations are done using detailed performance models, a detailed cash flow finance model, and a library of reasonable default values for each technology and target market
MN Wind System Cost Example

2011
Total cost: $1,400 – $2,800/kW
System capacity: 7.2 MW
Assumed capacity factor: 50%

MN Wind LCOE:
~$4.8/kWh
(2.7/kWh – 7.0/kWh, Depending on specific site)

Wind System Cost (%) 2011

- Generators: 44.8%
- Towers: 13.8%
- Other components: 41.4%

Total System Cost: $28–$56 Million
Step 3: Direct Ownership Structure

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

Tribe and Electricity Users

Project

Payments

Remaining Energy Needs

Utility

Project Company/Pass-Through Entity
New Market Tax Credits

• 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\(^1\)
  – 1.65 MW PV in Salt Lake City\(^2\)

2. [http://nationaldevelopmentcouncil.org/blog/?p=2242](http://nationaldevelopmentcouncil.org/blog/?p=2242)
Qualified Energy Conservation Bonds (QECBs)

Potential:
- Governments only
- $3.2 billion
- Covers 70% of the “qualified tax credit” up front

Options:
- Allocations have been made by Treasury
- Large local governments >100,000
- States very busy with other deadlines so setting up the process may take awhile

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

Implementation:

Operations & Maintenance:

For more information on QECBs, see http://www.nrel.gov/docs/fy11osti/49450.pdf
NMTC, QECB, or other Bonding, Plus PPA

- Combines tax benefits of third-party ownership with low-cost capital from public debt
- Bond proceeds passed to the developer through a lease-purchase agreement
  - Ownership transferred to the developer
  - Developer payments pay off bond principal and interest
- Tribe may be able to enter into a PPA with the developer to buy the power
- Public debt effectively buys down the developer’s cost of capital; in exchange, the Tribe could receive a reduced PPA price

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
Step 3: Energy Savings Performance Contracting

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

- **Customer's Cash Flow**
- **Customer's Savings**
- Guaranteed Savings for ESCO Services Fee and Financing
- Energy and Operations and Maintenance Costs

<table>
<thead>
<tr>
<th>No ESPC</th>
<th>During ESPC</th>
<th>After ESPC</th>
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<tbody>
<tr>
<td>100%</td>
<td>80%</td>
<td>70%</td>
</tr>
<tr>
<td>20%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
So Why Seek a Tax-Equity Finance Partner?

- Tax incentives (MACRS and either PTC or ITC) can represent up to half the project value or reduce project’s 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.
Third-Party Financed Power Purchase Agreement

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

Tax attributes: Modified Accelerated Cost Recovery System (MACRS) and either Investment Tax Credit (ITC) or Production Tax Credit (PTC)

Equity Investment $
• Developer and investor form a special purpose vehicle/entity to develop a wind 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,
  – Investor ownership “flips” from 99% down to 5%
  – Developer buys investor 5% ownership at “fair market value”

• In year 7, 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
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 up-front costs
- No O&M
- Benefit from tax incentives
- Locked-in energy price
- Path to ownership
Capital Structure with Tax Equity

Potential Options Refinement Implementation Operations & Maintenance

Potential Capital Financing Sources

Tax Equity Debt Cash Equity Other

Tax-Equity Investment Structures

Partnership Flip Sale Leaseback Inverted Lease

Step 3: Hypothetical Facility-Scale Example – Outputs

- Financing structure, Tribe organization – third-party owned PPA
- Detailed economic models – modeled in SAM – wind power, commercial PPA
- EPC vendors selected – sign contract
- Completed environmental reviews and finalized permits, as required by third-party investors
- Off-take agreement – PPA signed (if needed)
- Utility interconnection – working with utility to complete
- Transmission agreement (if necessary)
## Community-Scale Project Risk – Post Step 3

<table>
<thead>
<tr>
<th>Risks</th>
<th>Risk Assessment Post Step 3</th>
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</thead>
<tbody>
<tr>
<td><strong>Development</strong></td>
<td></td>
</tr>
<tr>
<td>• Poor or no renewable energy resource assessment</td>
<td>Low; site picked</td>
</tr>
<tr>
<td>• Not identifying all possible costs</td>
<td>Low; detailed model</td>
</tr>
<tr>
<td>• Unrealistic estimation of all costs</td>
<td>Low; detailed model</td>
</tr>
<tr>
<td>• Incorrect estimation of long-term “community” energy use (energy efficiency first)</td>
<td>Low; final projection</td>
</tr>
<tr>
<td>• Utility rules and ability to offset use with centralized production</td>
<td>Reduced</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td></td>
</tr>
<tr>
<td>• Structural (e.g. rooftop solar, wind loading, soil conditions)</td>
<td>Assumed low; assessed</td>
</tr>
<tr>
<td>• Installation safety (e.g., wind tower, hazard for adjacent sites)</td>
<td>EPC assumes risk</td>
</tr>
<tr>
<td>• Site control for safety/security purposes</td>
<td>Low; site secure</td>
</tr>
<tr>
<td><strong>Permitting</strong></td>
<td></td>
</tr>
<tr>
<td>• Tribe-adopted codes and permitting requirements</td>
<td>Low; complete</td>
</tr>
<tr>
<td>• Utility interconnection requirements</td>
<td>Low; complete</td>
</tr>
<tr>
<td><strong>Finance</strong></td>
<td></td>
</tr>
<tr>
<td>• Capital availability</td>
<td>Low; PPA complete</td>
</tr>
<tr>
<td>• Incentive availability risk</td>
<td>Low; risk on developer</td>
</tr>
<tr>
<td><strong>Construction/Completion</strong></td>
<td></td>
</tr>
<tr>
<td>• EPC difficulties</td>
<td>Low; allocate to EPC or developer</td>
</tr>
<tr>
<td>• Cost overruns</td>
<td></td>
</tr>
<tr>
<td>• Schedule</td>
<td></td>
</tr>
<tr>
<td><strong>Operating</strong></td>
<td></td>
</tr>
<tr>
<td>• Output shortfall from expected</td>
<td>Assumed low, mitigable, or allocatable</td>
</tr>
<tr>
<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.*
Step 4: Implementation

Purpose: Contract for, realize physical construction of project

Tasks:
- Finalize project agreements
- Finalize vendor contracting process
- Finalize preconstruction tasks
- Realize construction and equipment installation
- Realize interconnection
- Realize project commissioning leading to commercial operations

Output: Completed project (commercial operation)
Check:
• Ensure permitting is complete
• Ensure on-site activities will not interfere with construction and vice versa
• Communicate and plan with the vendor/contractor

Interconnection:
• Sometimes contracted and completed by system owner in cooperation with utility
• Sometimes involves host
• Often coordinated by contractor/system owner

Construction/commissioning: diligence of each party as appropriate to its assumption of risk as:
• PPA energy seller (or purchaser) – least diligence for tribal entity – economic due diligence needed
• Energy system seller (or purchaser/owner) – technical diligence and capability for tribal entity
Step 4: Hypothetical Community Example – Outputs

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

**Commercial Operating Date (COD) Success**

- Project generating electricity
- Project developed within budget

Photo from Byers and Renier Construction, NREL 18221
# Community-Scale Project Risk – Post Step 4

<table>
<thead>
<tr>
<th>Development</th>
<th>Risks</th>
<th>Risk Assessment Post Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></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 (energy efficiency first)</td>
<td>Low; final projection</td>
</tr>
<tr>
<td></td>
<td>• Utility rules and ability to offset use with centralized production</td>
<td>None; executed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site</th>
<th>Risks</th>
<th>Risk Assessment Post Step 4</th>
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</thead>
<tbody>
<tr>
<td></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>
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</table>

<table>
<thead>
<tr>
<th>Permitting</th>
<th>Risks</th>
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</tr>
</thead>
<tbody>
<tr>
<td></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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Finance</th>
<th>Risks</th>
<th>Risk Assessment Post Step 4</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Capital availability</td>
<td>None; finalized</td>
</tr>
<tr>
<td></td>
<td>• Incentive availability risk</td>
<td>None; finalized</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction/Completion</th>
<th>Risks</th>
<th>Risk Assessment Post Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating</th>
<th>Risks</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Output shortfall from expected</td>
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<td>• Technology O&amp;M</td>
<td></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
5
Operations & Maintenance

1 Potential
2 Options
3 Refinement
4 Implementation
Purpose: Conduct or ensure ongoing O&M, including repair and replacement (R&R)*

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

If leasing, lessor often manages maintenance

If PPA, vendor typically manages maintenance

* Esp. if owner – role of highest O&M risk
In our hypothetical case, the Tribal community elected the PPA third-party ownership model.

- Tribe has no responsibility for O&M
- If O&M is not conducted and the system doesn’t produce, the Tribe still only pays for delivered energy
- The vendor is incented to keep the system in good working order so that it continues to receive revenues
Ensure responsible party carries out O&M/R&R*
Measuring and tracking success
Correlation with business plan and strategic energy plan
Revenue management
Contract compliance
Reporting of generation

* Esp. if owner

Photo by Warren Gretz, NREL 04119
## Community-Scale Project Risk – Post Step 5

<table>
<thead>
<tr>
<th>Development</th>
<th>Risks</th>
<th>Risk Assessment Post Step 5</th>
</tr>
</thead>
</table>
|             | • Poor or no renewable energy resource assessment  
• Not identifying all possible costs  
• Unrealistic estimation of all costs  
• Incorrect estimation of long-term “community” energy use (energy efficiency first)  
• Utility rules and ability to offset use with centralized production | Low; site picked  
Low; detailed model  
Low; detailed model  
Low; final projection |
| Site        | • Structural (e.g. rooftop solar, wind loading, soil conditions)  
• Installation safety (e.g., wind tower, hazard for adjacent sites)  
• Site control for safety/security purposes | None; addressed  
None; addressed  
Low; site secure |
| Permitting  | • Tribe-adopted codes and permitting requirements  
• Utility interconnection requirements | Low; complete  
None; complete |
| Finance     | • Capital availability  
• Incentive availability risk | None; finalized  
None; finalized |
| Construction/Completion | • EPC difficulties  
• Cost overruns  
• Schedule | None; contracted  
None; construction complete |
| Operating   | • Output shortfall from expected  
• Technology O&M | Being managed by appropriate party |

*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
Summary of Actions by Step

1. **Potential**
   - Data Collection and Opportunity Assessment

2. **Options**
   - Options and Strategies

3. **Refinement**
   - Planning and Development

4. **Implementation**
   - Financing and Construction

5. **Operations & Maintenance**
   - Maintenance plan implementation (conduct or ensure ongoing O&M, R&R)

**Step 1:** Gather all relevant data in order to make first pass at potential project, understand Tribal role options

**Step 2:** Estimate value to Tribe, consider ownership approach, begin to identify off-takers, partners, vendors, begin planning permitting and site use

**Step 3:** Finalize economic assumptions and tribal roles, finalize permitting, interconnection and off-take agreements, and determine financial partnerships, ownership structure

**Step 4:** Finalize agreements (incl. vendor contracting); Financial close and construction; project commissioning, begin operation

Celebrate!

**Step 5:** Maintenance plan implementation (conduct or ensure ongoing O&M, R&R)
Not Quite Done!

- Check back in with planning document – update as necessary
- Identify next potential project from plan
Wrap-Up: Project Development Process

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 AND MAINTENANCE

Comprehensive Energy Plan

Council Check-in
Key Concepts Review

- Risk and Uncertainty
- LCOE
- Tax-Equity Partnership
- Roles of the Tribe
- The Project Team

In-depth information on each key concept available in Advanced Courses
These courses were designed in coordination with Tracey LeBeau and Pilar Thomas of the DOE Office of Indian Energy by a team including Dan Beckley, Karlynn Cory, Elizabeth Doris, Travis Lowder, Paul Schwabe, and Bob Springer of the National Renewable Energy Laboratory; Joe Cruz and Matt Ferguson of Cohn Reznick; Paul Dearhouse of the Dearhouse Group; and Carolyn Stewart of Red Mountain Energy Partners.

Questions, comments: indianenergy@hq.doe.gov
For more information: www.energy.gov/indianenergy
Additional courses: www.nterlearning.org

THANK YOU
INFORMATION ON THE CURRICULUM PROGRAM AND OFFERINGS
Curriculum Structure and Offerings

Foundational Courses
Provide an overview of foundational information on renewable energy technologies, strategic energy planning, and grid basics

Leadership and Professional Courses
Cover the components of the project development process and existing project financing structures
## Foundational Courses

<table>
<thead>
<tr>
<th>Energy Basics</th>
<th>Renewable Energy Technology Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Assessing Energy Needs and Resources</td>
<td>• Biomass</td>
</tr>
<tr>
<td>• Electricity Grid Basics</td>
<td>• Building Heat &amp; Hot Water</td>
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<td>• Strategic Energy Planning</td>
<td>• Geothermal</td>
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<td>• Hydroelectric</td>
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<td></td>
<td>• Solar</td>
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<td>• Wind</td>
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All courses are presented as 40-minute webinars online at: [www.nterlearning.org](http://www.nterlearning.org)
## Essentials

**Project Development and Financing Essentials**
- Key concepts
- Process overview
- Decision points

## Advanced/In-Depth

<table>
<thead>
<tr>
<th><strong>Project Development</strong></th>
<th><strong>Project Finance</strong></th>
<th><strong>Project Scale</strong></th>
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<tbody>
<tr>
<td>• Concepts</td>
<td>• Concepts</td>
<td>• Facility</td>
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<tr>
<td>– Risk and uncertainty</td>
<td>- LCOE</td>
<td>- Community</td>
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<td>– Tribal project roles</td>
<td>- Business</td>
<td>- Commercial</td>
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<td>- structures</td>
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<td>- Tax-equity</td>
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<td>– Understanding the</td>
<td>– Flip</td>
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<td>energy market</td>
<td>– Leaseback</td>
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<td>– Project team</td>
<td>– Inverted lease</td>
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<td>– Procurement</td>
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