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

U.S. DEPARTMENT OF ENERGY | Office of Indian Energy

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.

Training Program Objective and Approach

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.*

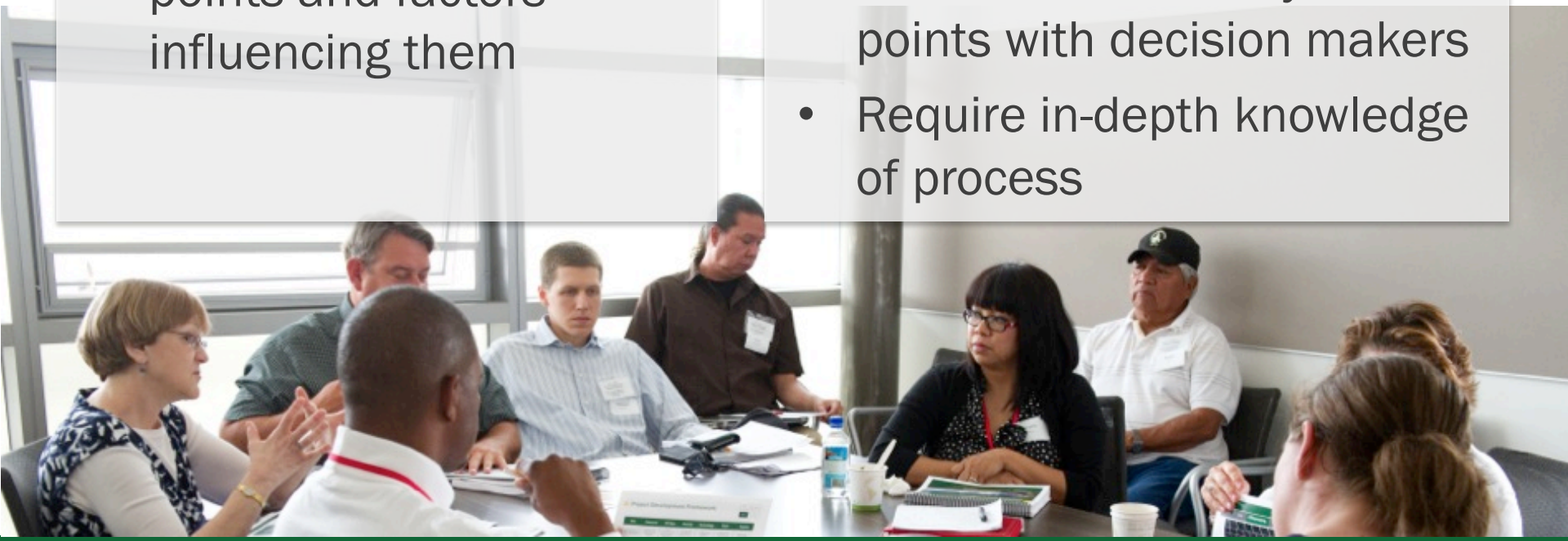
Course Audiences

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

Advanced/In-Depth

Detailed, academic information for deep understanding of concepts
Audience: Project and contract managers

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

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

In-depth information on each key concept available in Advanced Courses

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

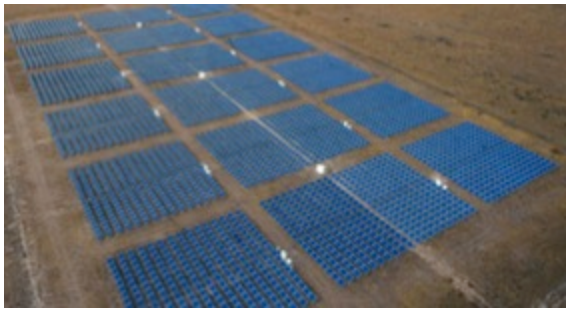


Photo credits: (top to bottom): NC Solar Center, NREL 09373; Orange County Convention Center, NREL 18077; Tucson Electric Power, NREL 13327

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

Project Scale Decision Factors

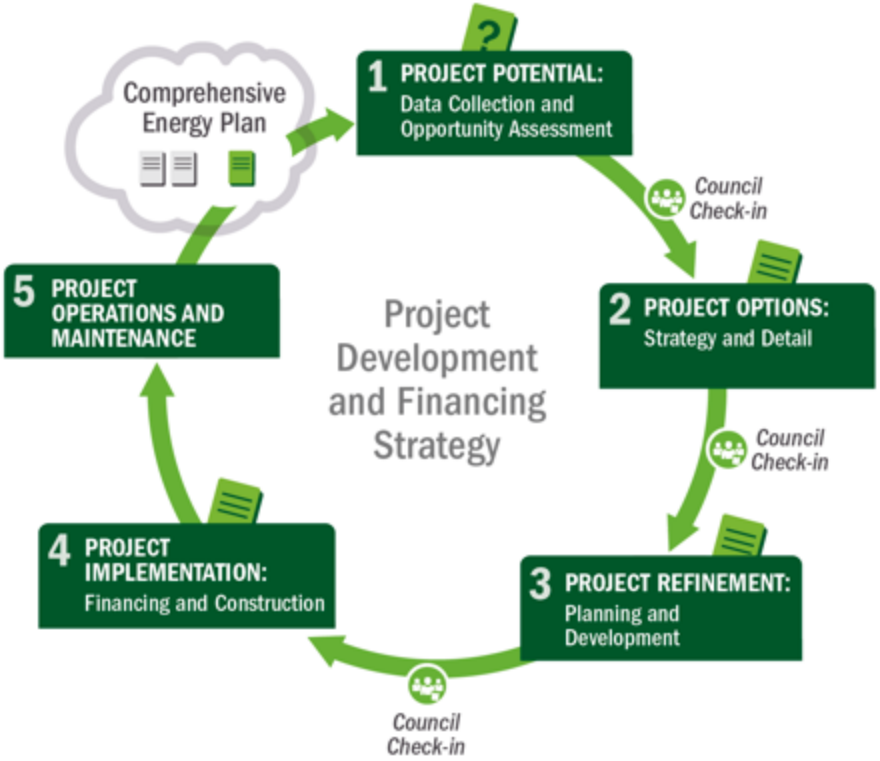
	Facility	Community	Commercial
Definition	Project serves one tribal facility/ building	Project serves more than one tribal facility/building	Project power is sold to a third-party off-taker
Value Proposition	Save $$, reduce electricity cost, energy independence	Save $$, reduce electricity cost, energy independence	Sale of power at competitive market terms whereby Tribe benefits
Tribe's Success Measurement	Cost avoidance	Cost avoidance	Revenue
LCOE Comparison	Retail electricity price	Retail electricity price	Wholesale electricity price
Key Decision Point	Savings/security of supply	Savings/security of supply	Revenue streams

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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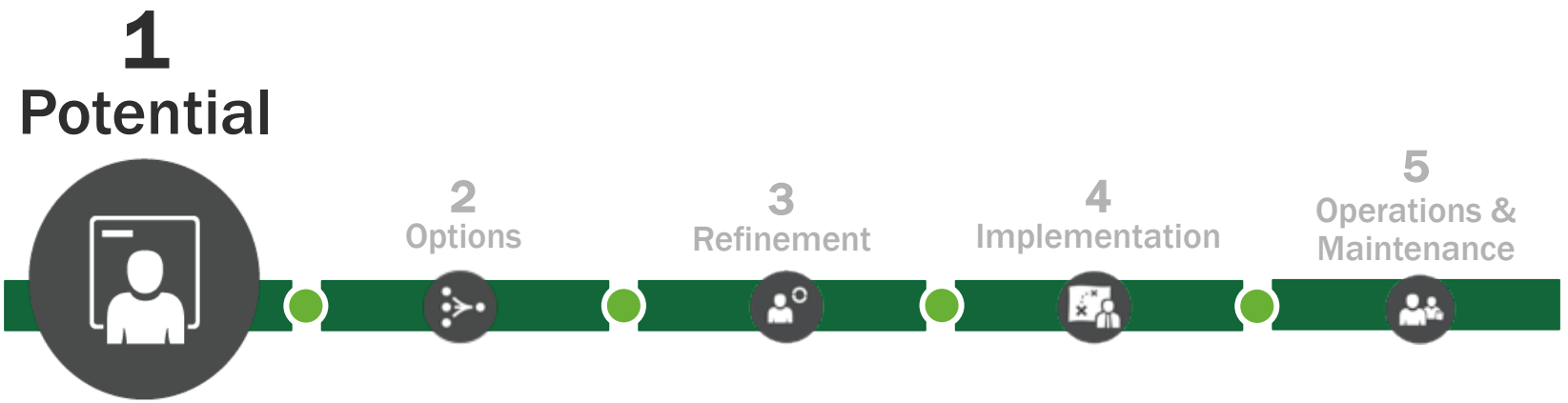
Project Development and Financing Strategy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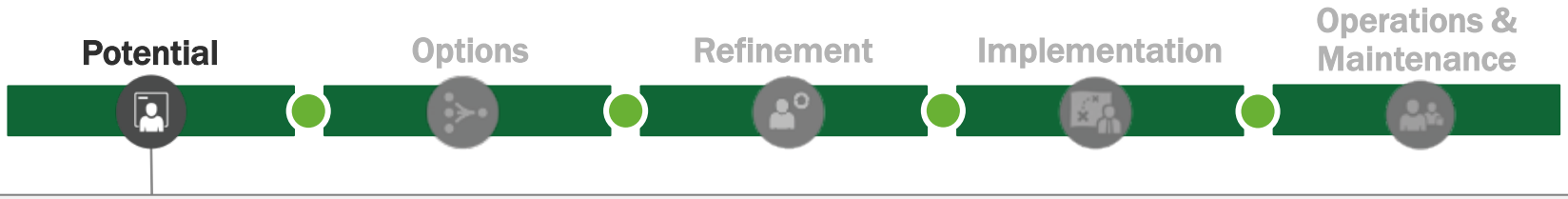
Step 1: Site, Scale, Resource and Market Potential



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

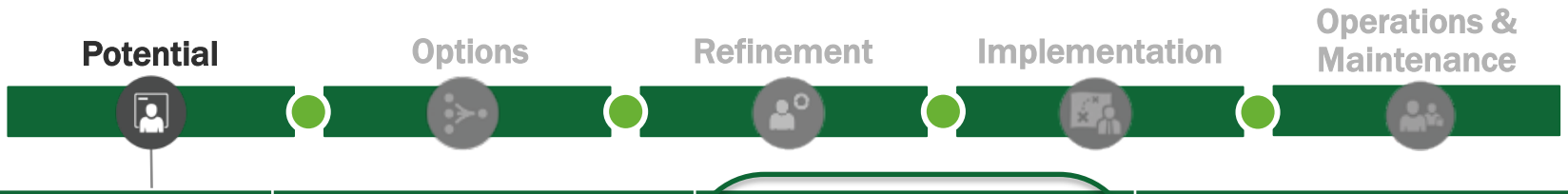
Tasks:

- 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

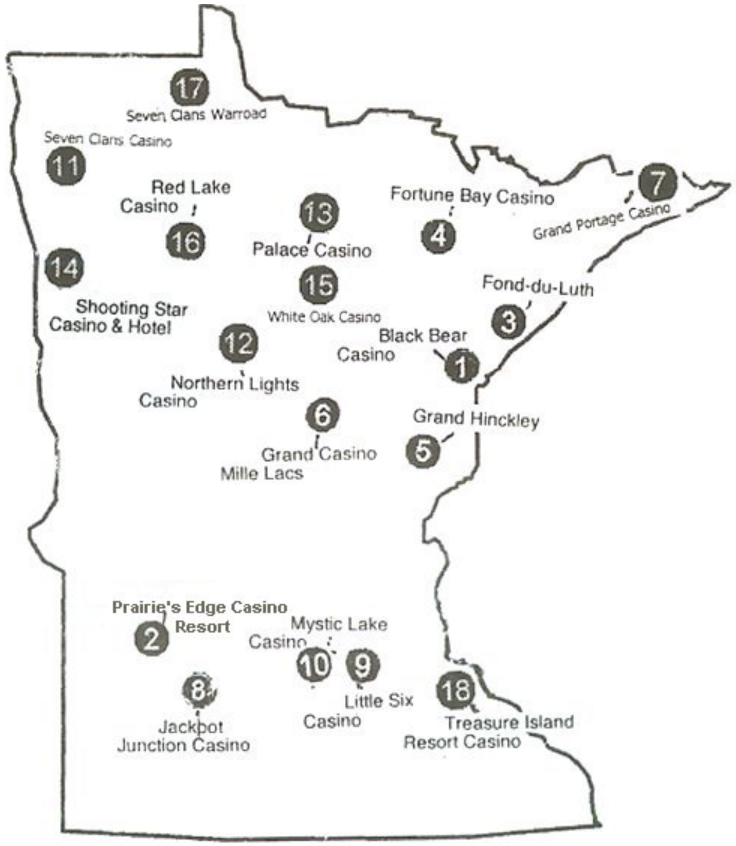


	Facility: California	Community: Minnesota	Commercial: Arizona
Baseline	Solar for peak demand! Solid San Diego market	Large facility (e.g., casino) or many small buildings	Resource size vs. market size
Economics	High cost/kWh Time of use Com, Res: ~16¢ *(Wholesale: 3.65¢)*	Mid cost/kWh Retail Ind., Com,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

Framework: NREL BEPTC™
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

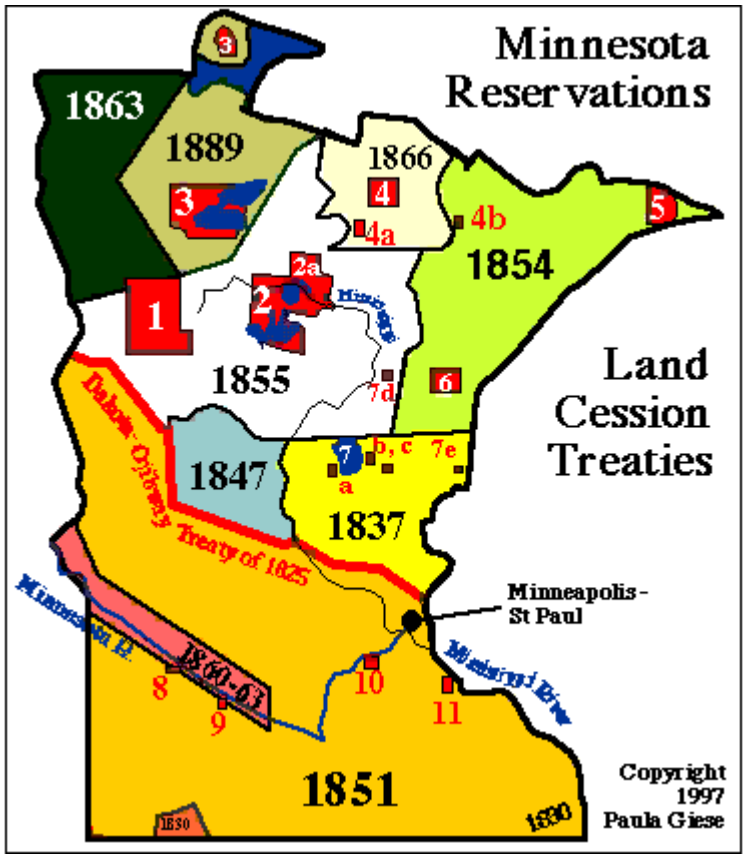
Step 1: Site and Off-take Project Opportunities

Large Facility: Casino



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

Aggregate Across Reservation, or Maybe Across Tribes



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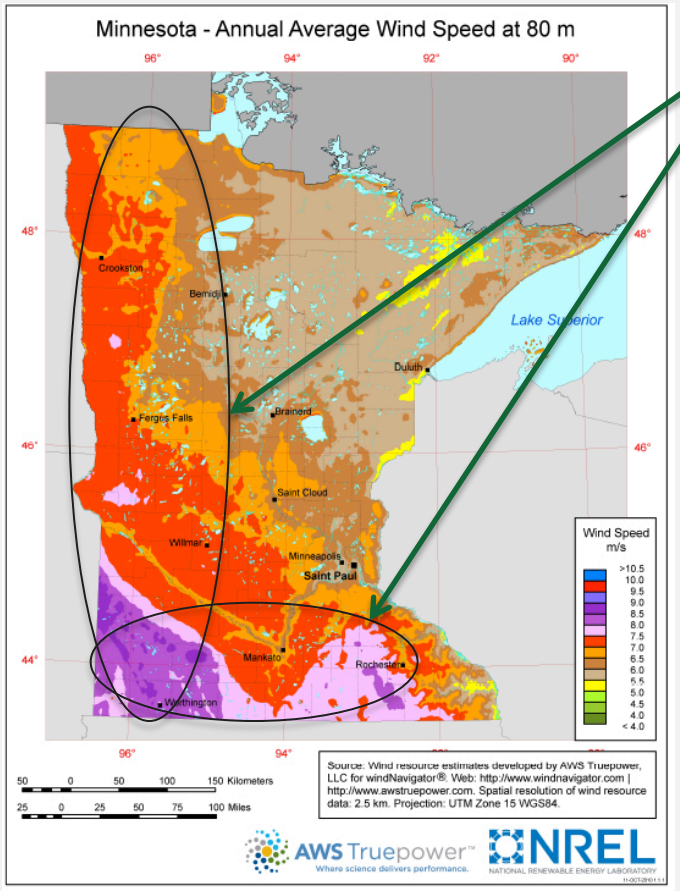
http://www.kstrom.net/isk/maps/mn/mnrezmap.html

Step 1: Resource, Off-take, Production, Savings

Potential | Options | Refinement | Implementation | Operations & Maintenance



Project: 7.2 MW, four-turbine system

Resource: 7-9 m/s – great/excellent resource in south, west! Consider southwest: 8.4 m/s
http://www.nrel.gov/gis/mapstore/

Off-taker:

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

Production:

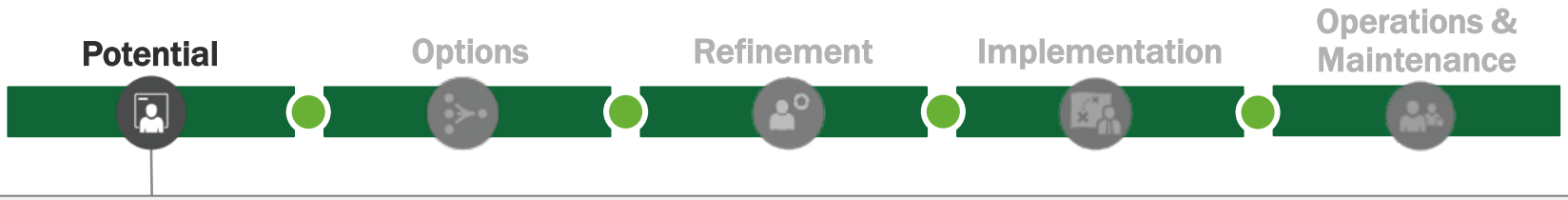
- Estimate using NREL's tool System Advisor Model (SAM): 31-32 million kWh/year
- Cost from SAM: 3rd party: 4.8¢/kWh; Tribe-owned: 7.7¢/kWh

Savings (depends on ownership and financing):

- Best for Tribe used, third-party owned

http://www.nrel.gov/gis/images/80m_wind/awstpspd80on1-1dpi600MN.jpg

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

	Risks	Risk Assessment Post Step 1
Development	• 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	Screened good sites Reduced Reduced Reduced Reduced
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	Unchanged Unchanged Reduced
Permitting	• Tribe-adopted codes and permitting requirements • Utility interconnection requirements	Reduced Reduced
Finance	• Capital availability • Incentive availability risk	High risk, unchanged Reduced
Construction/ Completion	• EPC difficulties • Cost overruns • Schedule	Assumed low, mitigable, or allocatable
Operating	• Output shortfall from expected • Technology O&M	Assumed low, mitigable or allocatable

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.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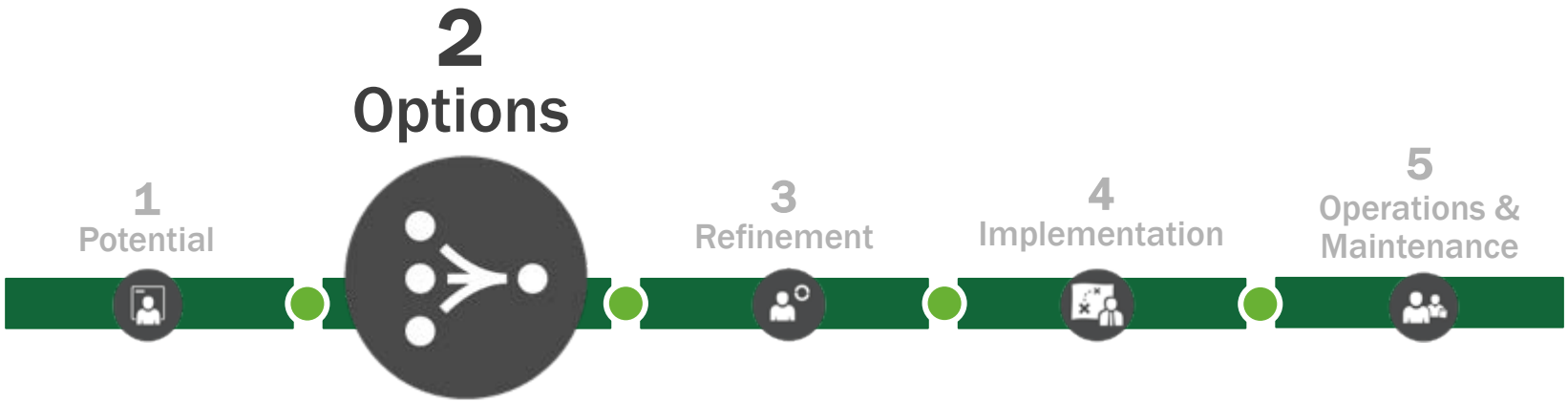
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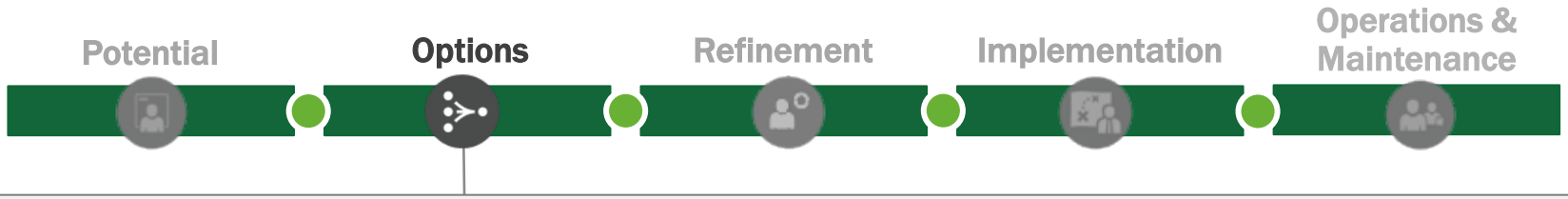
Step 2: Project Ownership and Regulatory Options



Purpose: Decide ownership structure and determine permitting considerations

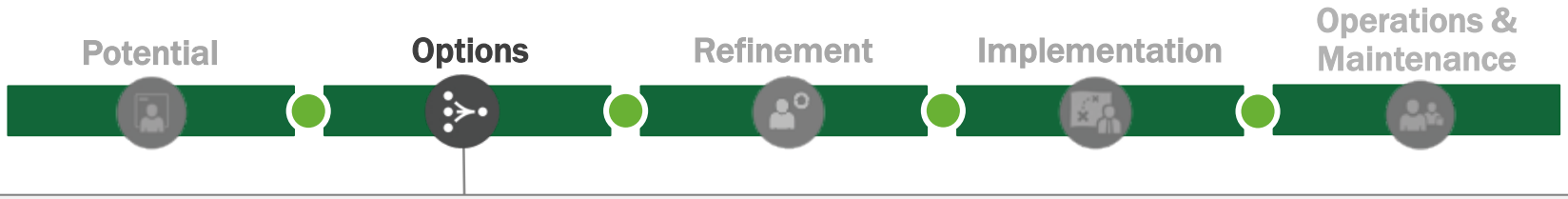
Tasks:

- 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:

DOE Office of Indian Energy renewable energy technology-specific webinars: http://www.energy.gov/indianenergy/resources/education-and-training.

Step 2: Paying for Project



Three Major Costs to Develop a Project:

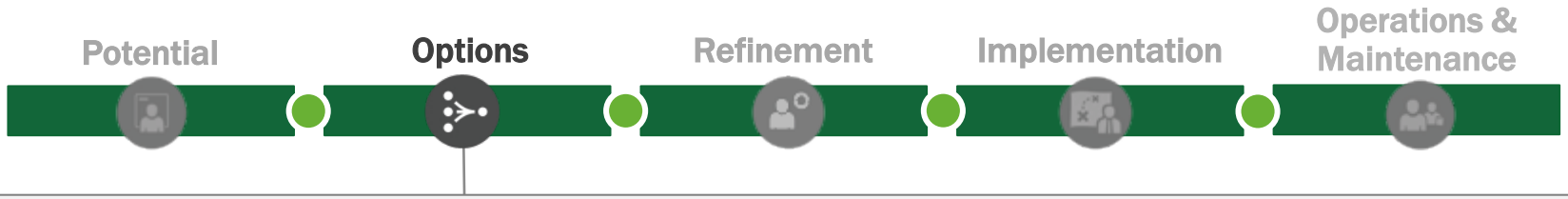
1. **Feasibility** – this is the potential analysis
2. **Preconstruction** – permitting, environmental
3. **Construction** – engineering, procurement of equipment, and actual construction of plant

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



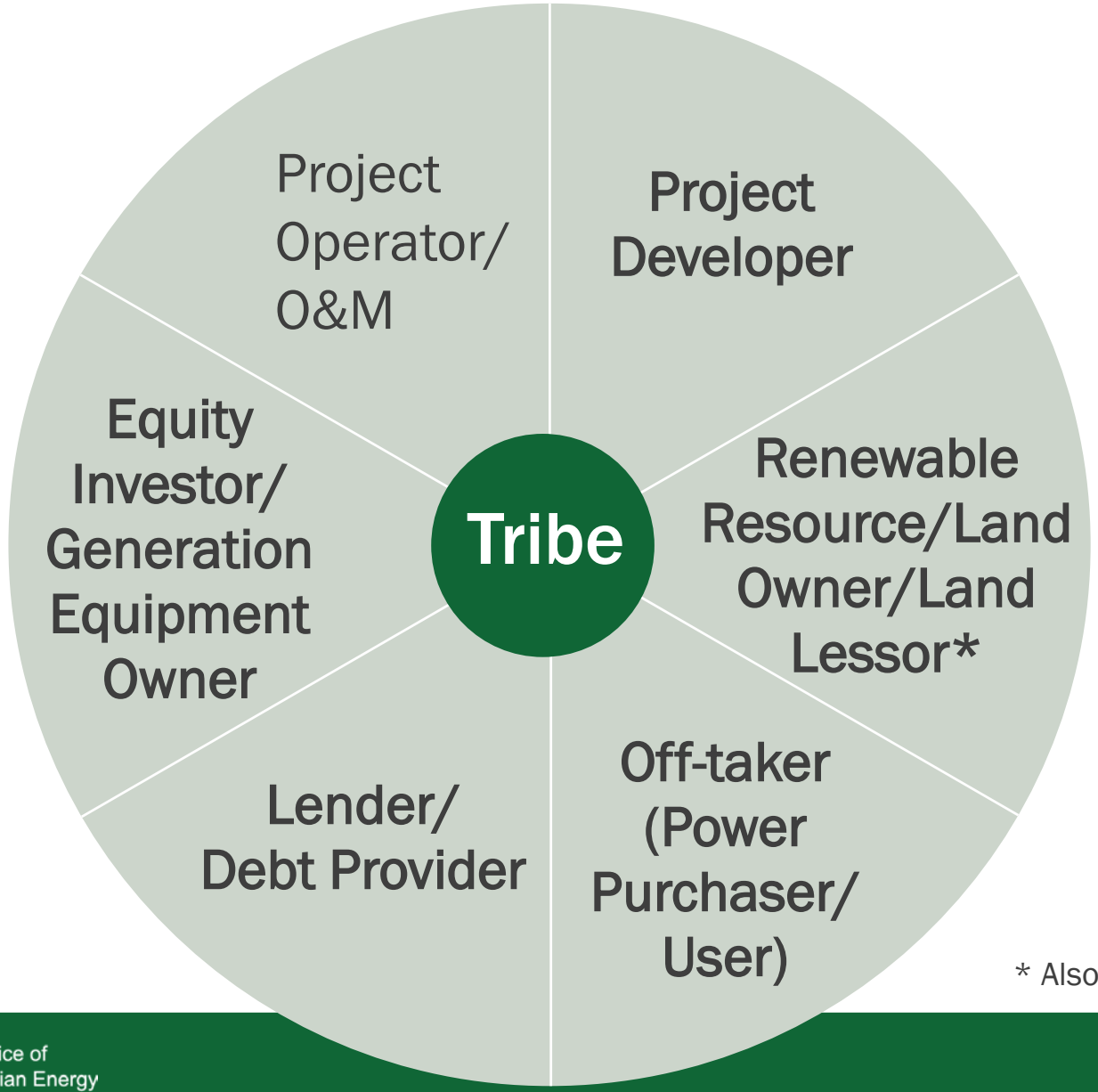
- Direct ownership (cash)
- Third-party power purchase agreement (PPA)
- Bond markets
  - New Market Tax Credits (NMTCs)
  - Qualified Energy Conservation Bonds
- Bond + third-party PPA ("Morris Model")
- Energy savings performance contracts (ESPCs)
- Equity investment partnering

Key Question: What viable ownership structure options are attractive to the community?

Key Concept: Project Role Definitions

Title	Role
Project Company	Legal entity that owns the project, also called special purpose entity
Resource/Landowner	Legal and/or beneficial owner of land and natural resources
Sponsor/Developer	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
EPC Contractor	Construction contractor provides design, engineering, and construction of the project
Operator	Provides the day-to-day O&M of the project
Feedstock Supplier	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)
Product Off-taker	Generally enters into a long-term agreement with the project company for the purchase of all the energy
Lender	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
Tribal Host	Primary sovereign of project site

Key Concept: Tribal Role Options

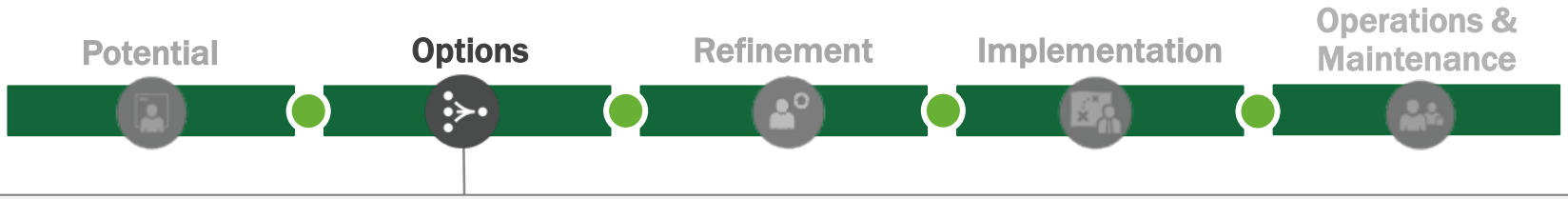


* Also called Tribal Host

Key Concept: Tribal Role Options

Role	Opportunity	Constraints	Comments
Resource/ Land Owner	Land rent/royalty, taxes. Low risk, known reward, consistent income.	Limited project control. Must provide site access.	Limited upside potential, limited risk
Off-taker/ Energy User	Tribe purchases or uses all power on-site. Could include an "on-site" provider; security.	Limited investment, economic development for on-site projects, and capacity-building opportunity	Must have demand to use power; still requires utility interconnection agreement (if on the grid). Med risk.
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

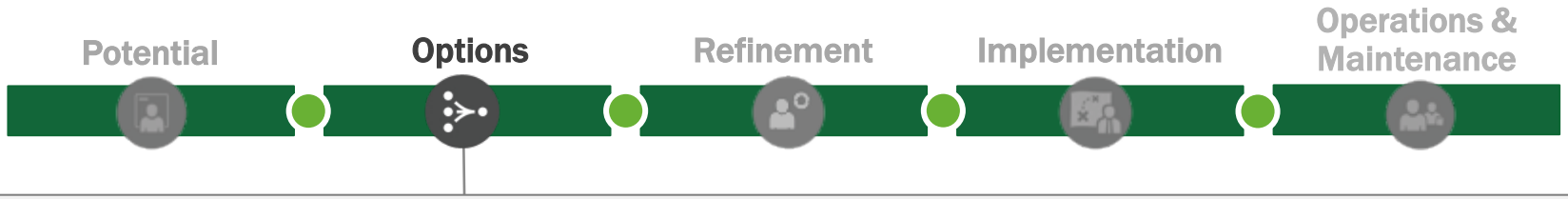
Step 2: Project Options and Strategies



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

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Finance	• Capital availability • Incentive availability risk	High risk, reduced Reduced
Construction/ Completion	• EPC difficulties • Cost overruns • Schedule	Low; allocate to EPC or developer
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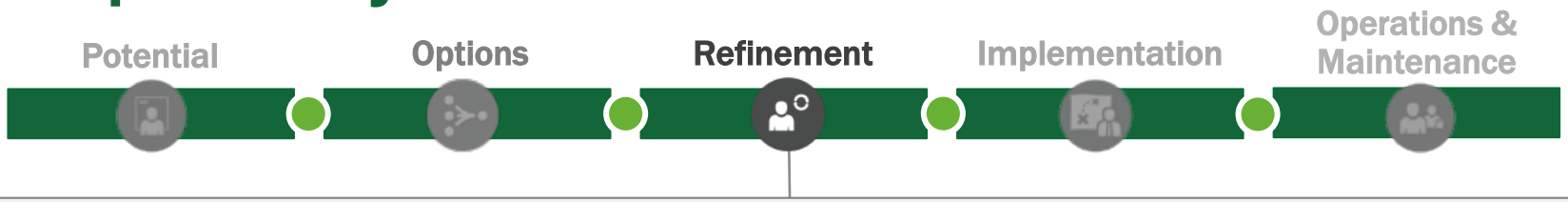
Step 3: Project Refinement



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

Site	Resource	Off-Take	Permits	Technology	Team	Capital
Securing site: No site, no project	Engineering assessment (input)	Power purchases: off-take contract – (revenue)	Anything that can stop a project if not in place…	Engineered system (output)	Professional, experienced, diverse	Financing structure
• 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 • Charac-teristics (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 • Intercon-nection • Performance • Enforcement • Take or pay • Pricing and terms	• Permitting/ entitlements • Land disturbance • Environmental and cultural impacts • Resource assessments • Wildlife impacts • Habitat • NEPA, EIS • Utility inter-connection • 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) • 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 • Environ-mental attribute sales contracts (RECs) • Bond finance

Step 3: Project Refinement – Risks Addressed

Site	Resource	Off-Take	Permits	Technology	Team	Capital
Securing site: No site, no project	Engineering assessment (input)	Power purchases: off-take contract – (revenue)	Anything that can stop a project if not in place…	Engineered system (output)	Professional, experienced, diverse	Financing structure
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

More info: http://www.nrel.gov/docs/fy13osti/57963.pdf

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:

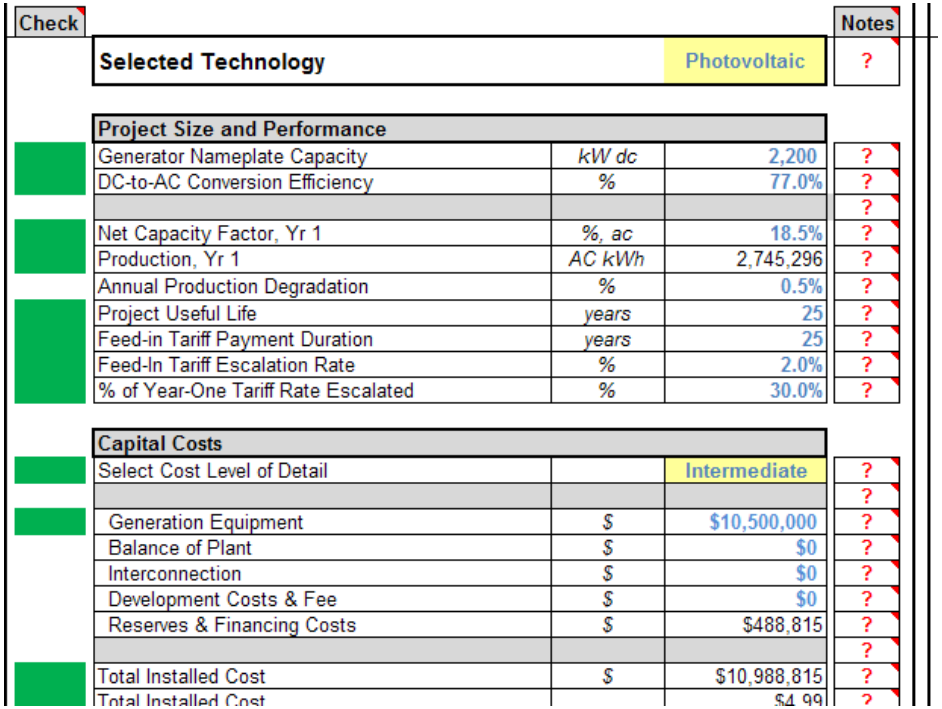
- Designed to give public utility commissions (PUCs) and others a tool and methodology to quickly evaluate LCOE
- Can handle simple or complex level of inputs (user's choice)
- Simple to operate—no macros
- Outreach and interaction tool:
  - PUCs
  - Utilities
  - Other stakeholders
- Solar, geothermal,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

White Paper:

Describes each term in LCOE and weighs choices for analysis methodology

Renewable Energy Cost Modeling: A Toolkit for Establishing Cost-Based Incentives in the United States

http://www.nrel.gov/docs/fy11osti/51093.pdf



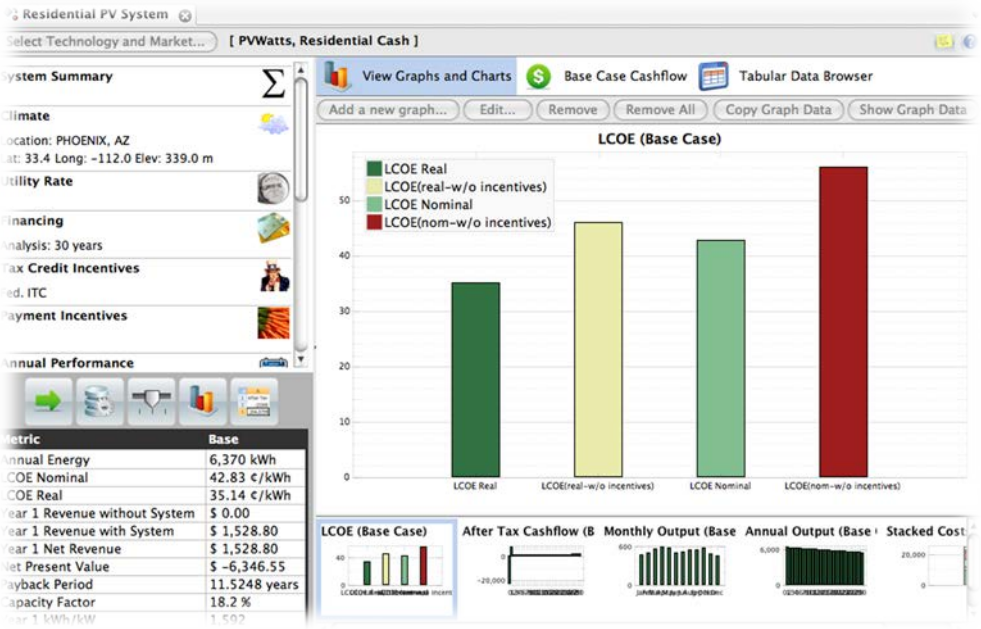
Check				Notes
	Selected Technology		Photovoltaic	?
	Project Size and Performance			
	Generator Nameplate Capacity	*kW dc*	2,200	?
	DC-to-AC Conversion Efficiency	%	77.0%	?
				?
	Net Capacity Factor, Yr 1	*%, ac*	18.5%	?
	Production, Yr 1	*AC kWh*	2,745,296	?
	Annual Production Degradation	%	0.5%	?
	Project Useful Life	*years*	25	?
	Feed-in Tariff Payment Duration	*years*	25	?
	Feed-In Tariff Escalation Rate	%	2.0%	?
	% of Year-One Tariff Rate Escalated	%	30.0%	?
	Capital Costs			
	Select Cost Level of Detail		Intermediate	?
				?
	Generation Equipment	$	$10,500,000	?
	Balance of Plant	$	$0	?
	Interconnection	$	$0	?
	Development Costs & Fee	$	$0	?
	Reserves & Financing Costs	$	$488,815	?
				?
	Total Installed Cost	$	$10,988,815	?
	Total Installed Cost		$4.99	?

Advanced Tool: NREL's System Advisor Model

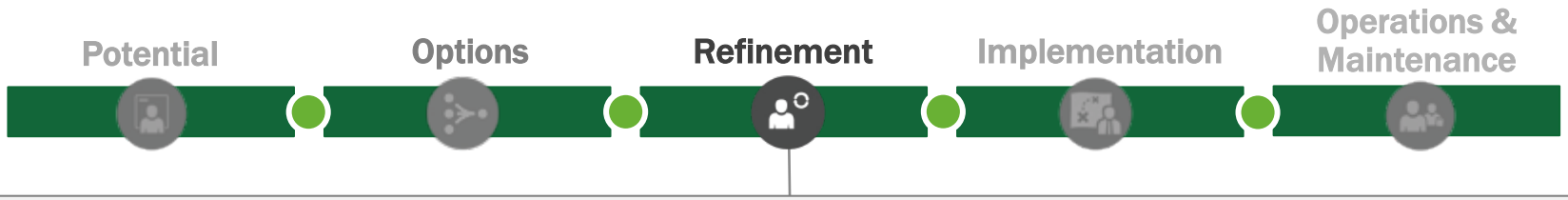
Available at: https://www.nrel.gov/analysis/sam/

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

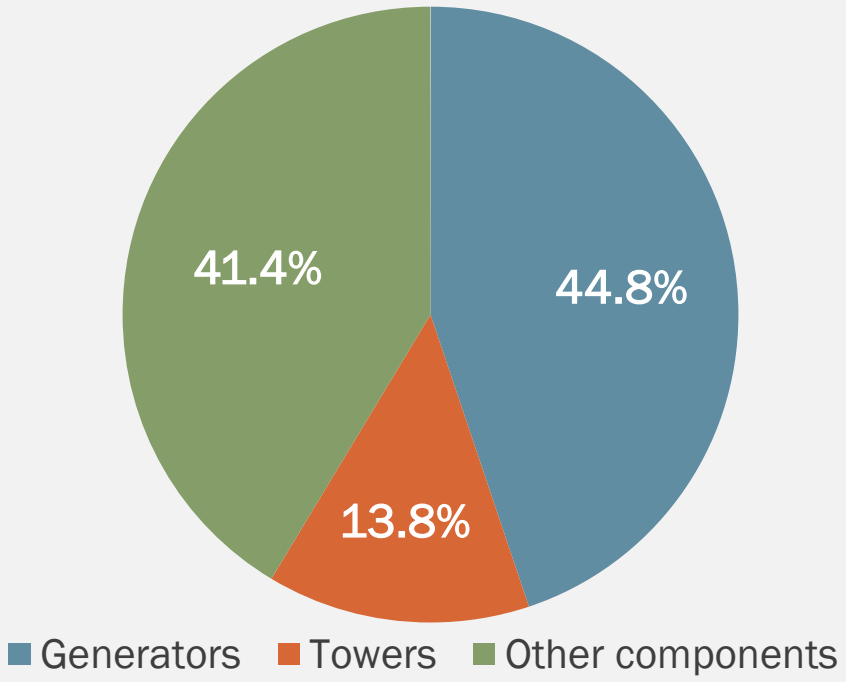
Assumed capacity factor: 50%

MN Wind LCOE:

~4.8¢/kWh

(2.7¢/kWh – 7.0¢/kWh, Depending on specific site)

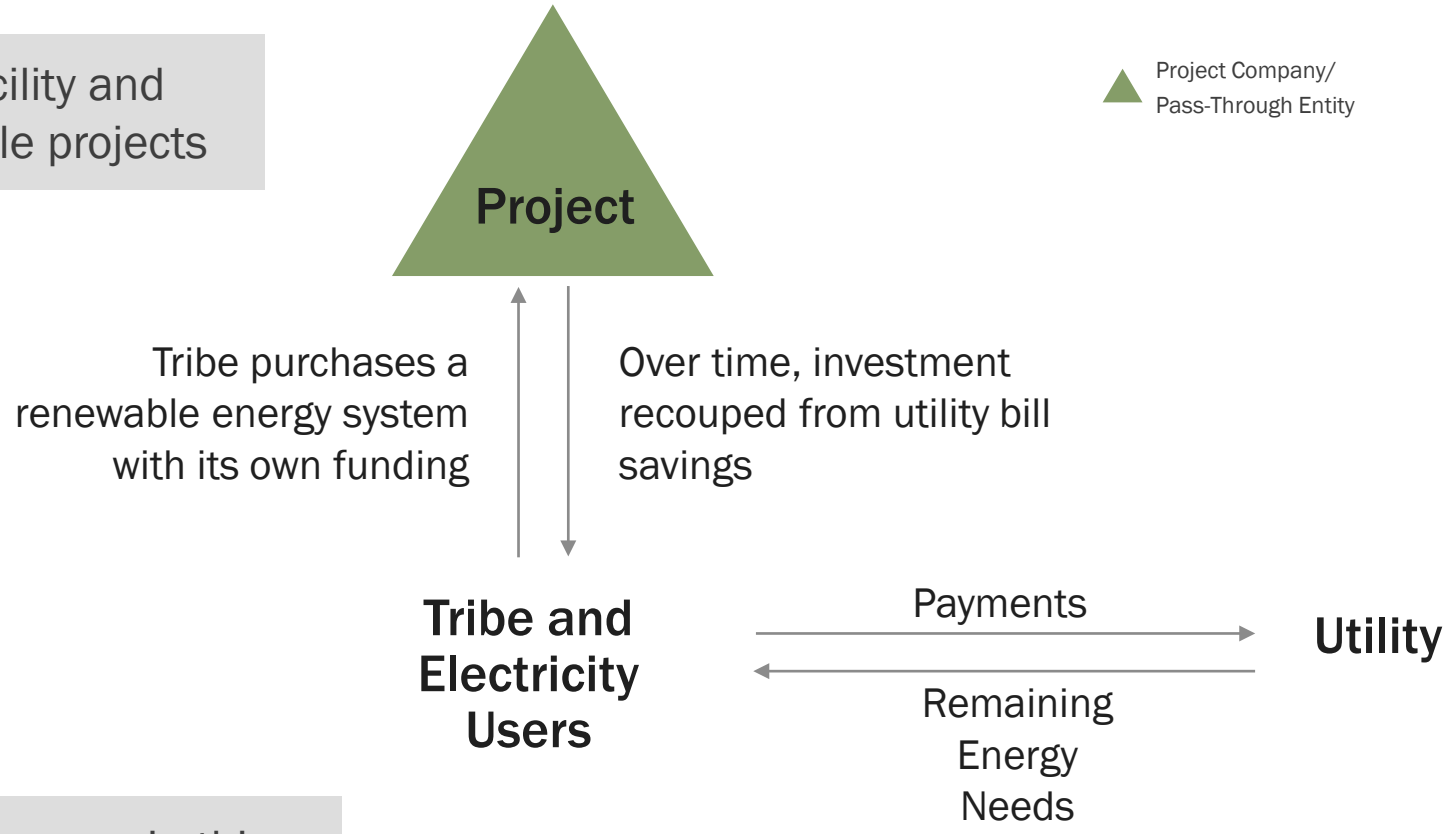
Wind System Cost (%) 2011



Total System Cost: $28–$56 Million

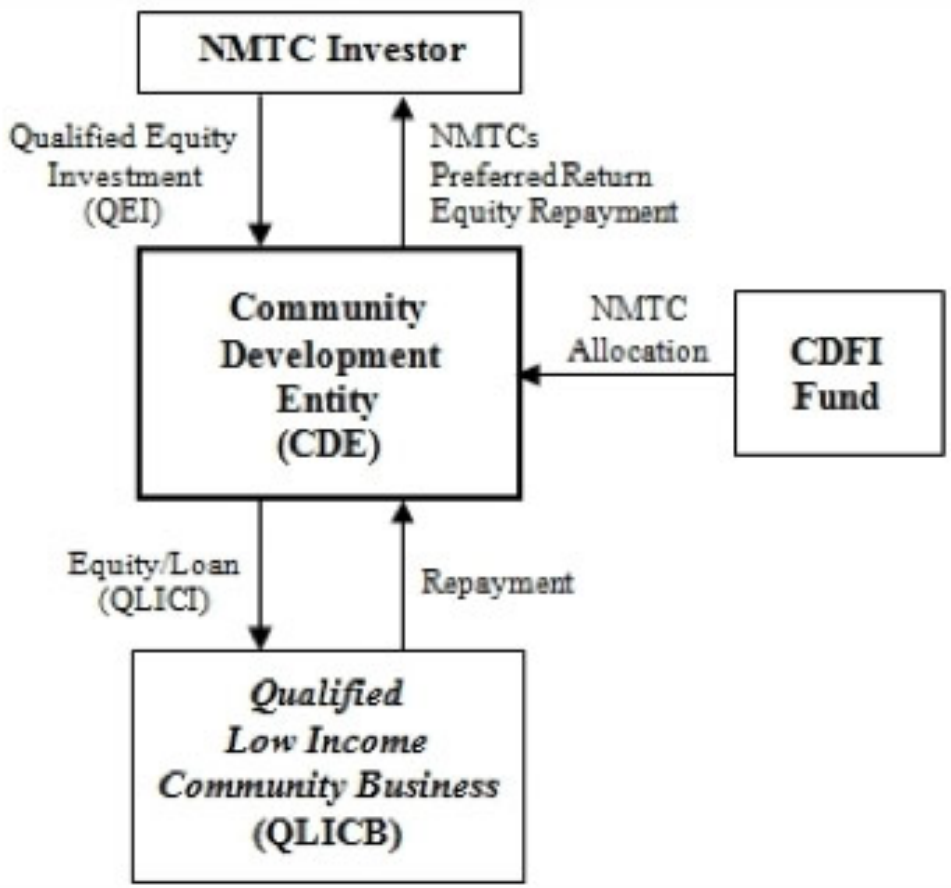
Step 3: Direct Ownership Structure

Primarily for facility and community-scale projects



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

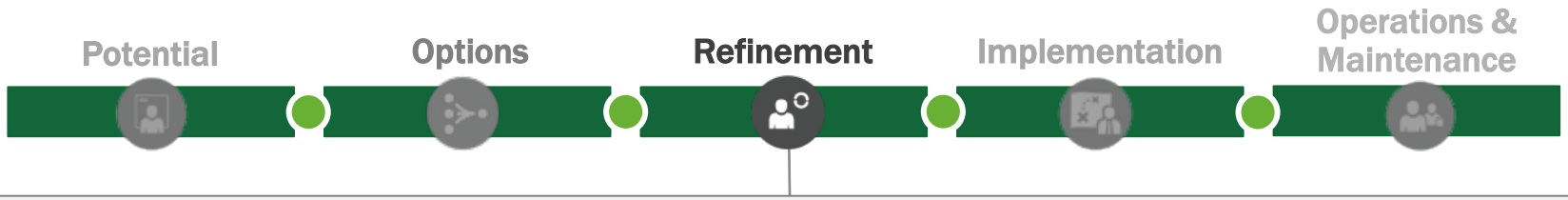
New Market Tax Credits



- **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]

1. http://www.nrel.gov/docs/fy10osti/49056.pdf
2. http://nationaldevelopmentcouncil.org/blog/?p=2242

Qualified Energy Conservation Bonds (QECBs)



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
- States very busy with other deadlines so setting up the process may take awhile

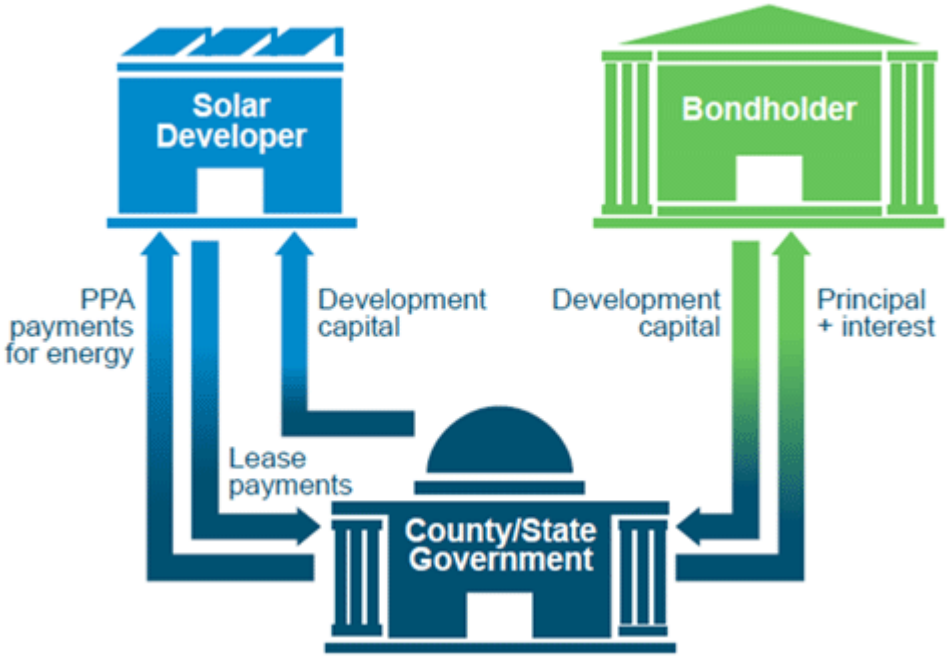
Some Differences

- 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

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 pays 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

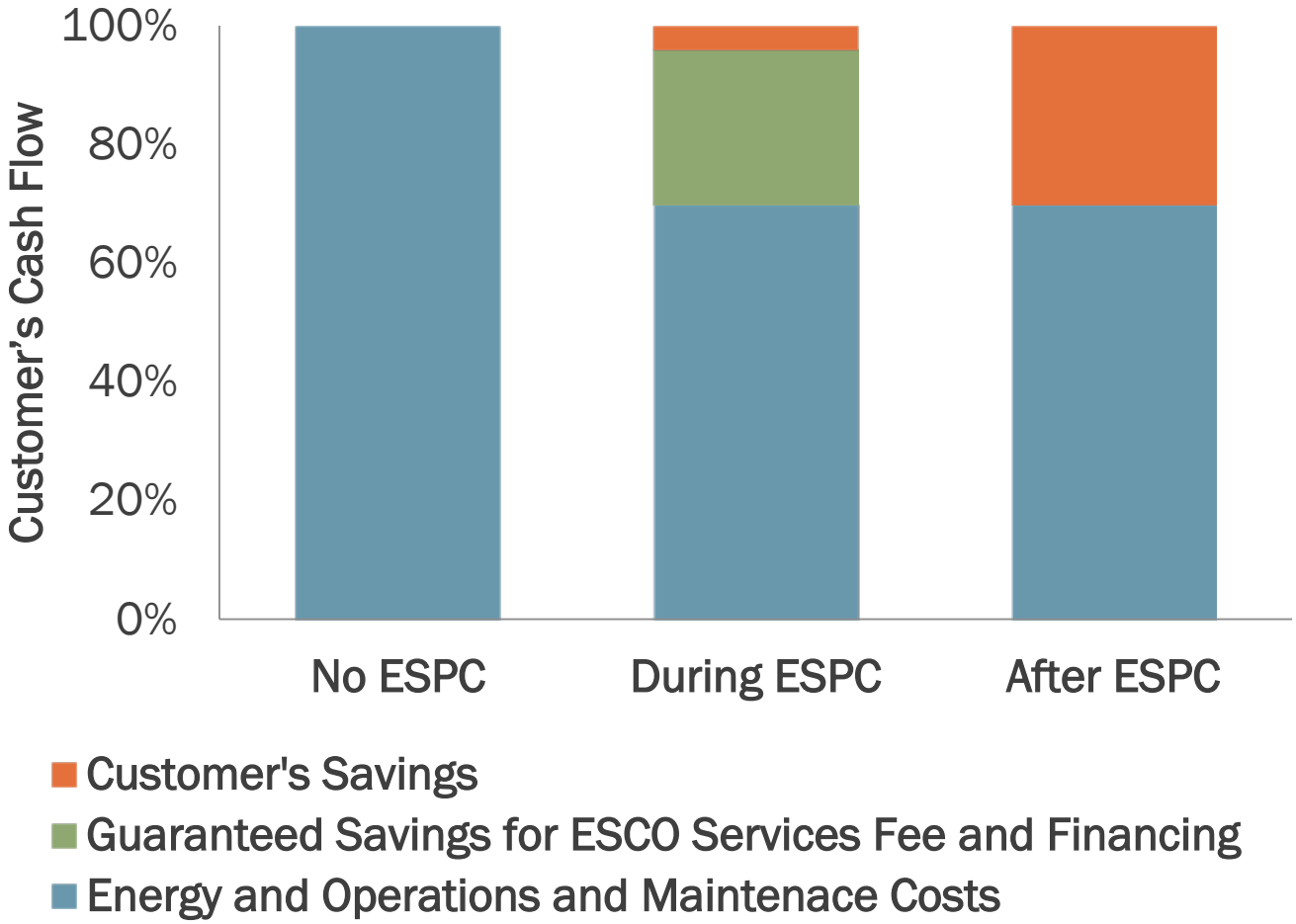
An ESPC is a **no up-front cost** contracting mechanism between a site customer and an energy service company (ESCO). Energy conservation measures and on-site generation are financed and implemented by an ESCO, which is **repaid through energy savings**. This would be done as a PPA, in conjunction with energy efficiency, to bring costs down.

Over 90 DOE-Qualified ESCOs, including:

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

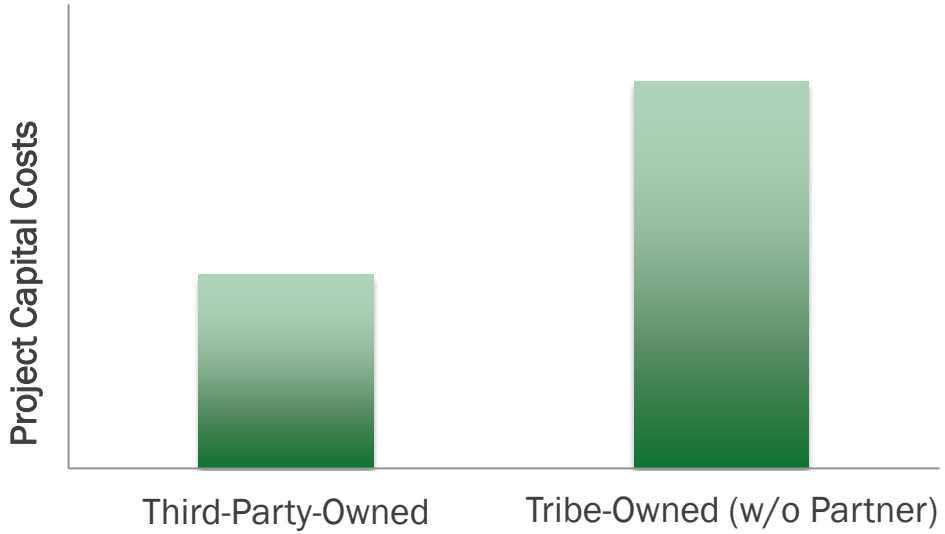
For full DOE Listing: http://www1.eere.energy.gov/femp/financing/espcs_qualifiedescos.html

ESPCs Reallocate Current and Future Energy Spending



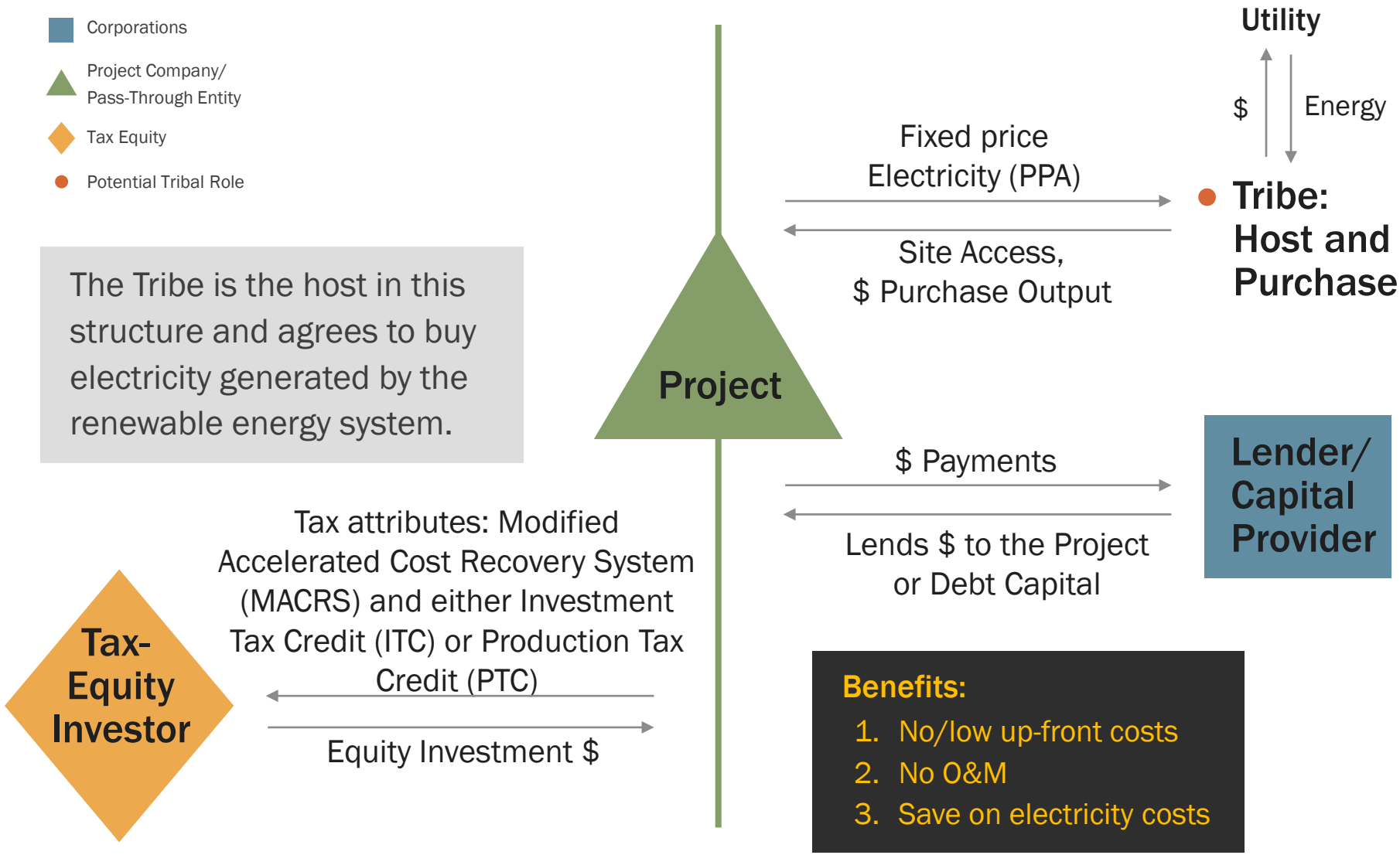
So Why Seek a Tax-Equity Finance Partner?

- Tax incentives (MACRS and either PTC or ITC) can represent up to half the project value or reduce project's capital costs by ~50%

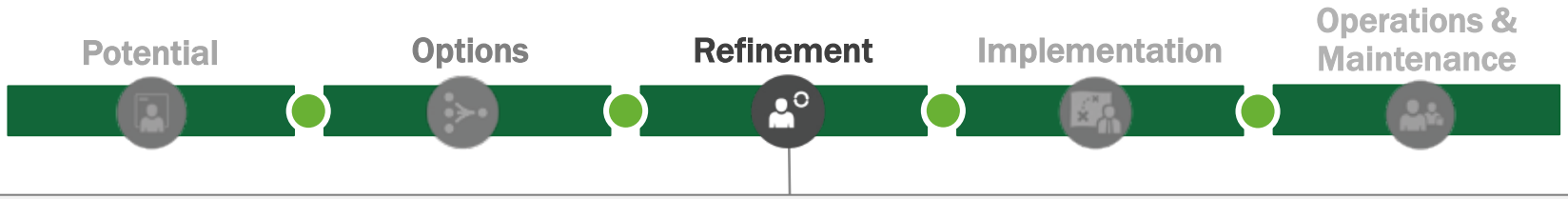


- Tax incentives can help to achieve a competitive price of power
- Many projects also require state-level incentives to be economic

Third-Party Financed Power Purchase Agreement



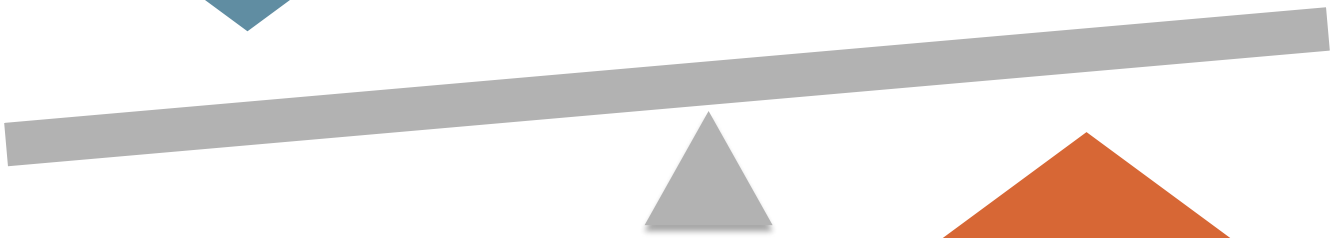
Community Project PPA: Eventual Tribal Ownership



- 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

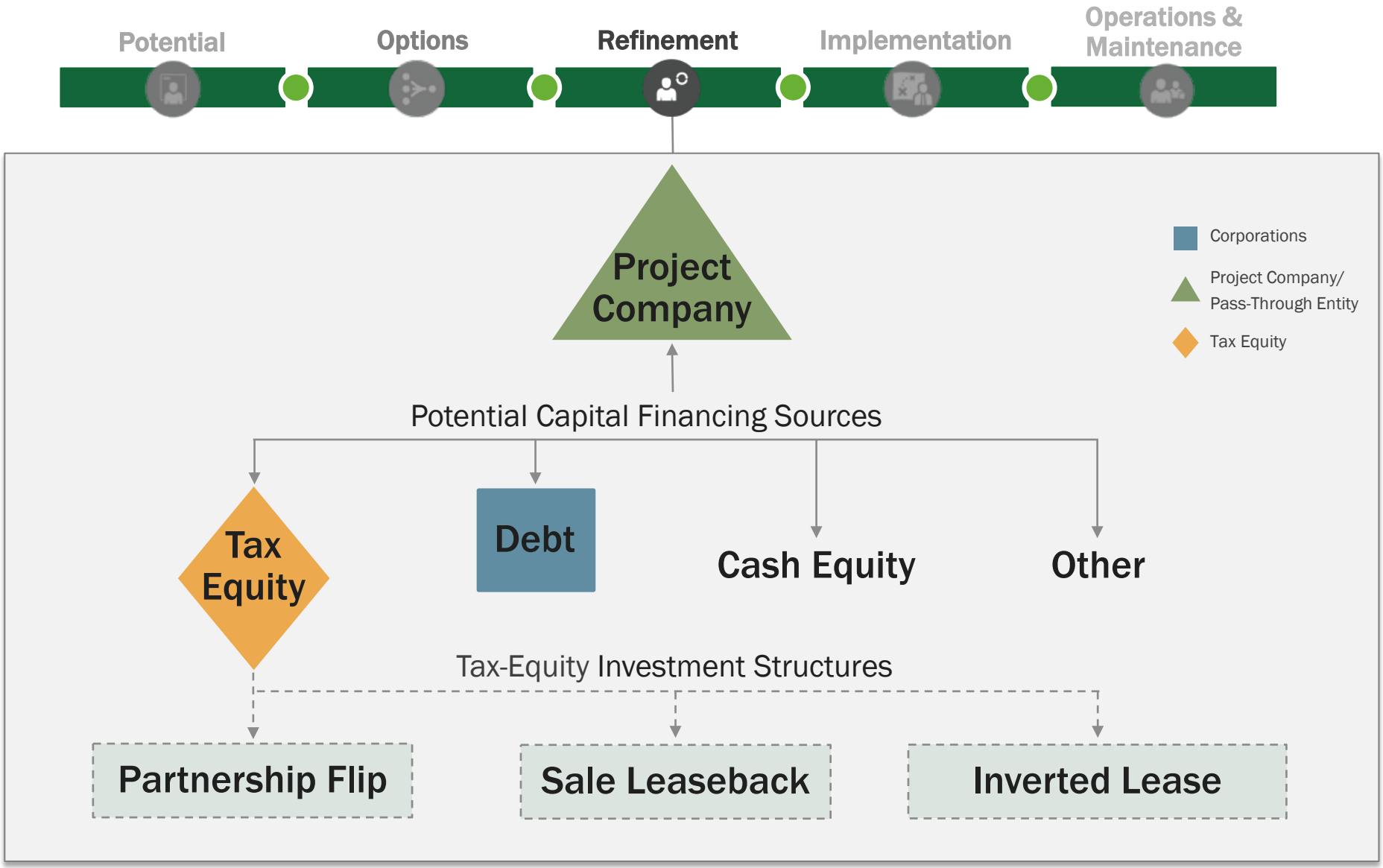
PPA Considerations to Weigh

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



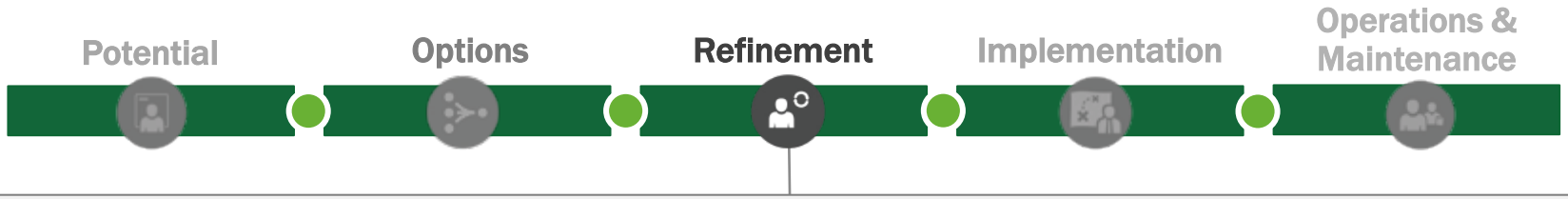
- No up-front costs
- No O&M
- Benefit from tax incentives
- Locked-in energy price
- Path to ownership

Capital Structure with Tax Equity



Source: Graphs adapted from "Renewable Energy Project Finance in the U.S.: An Overview and Midterm Outlook" (Mintz Levin Green Paper, 2010)

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)

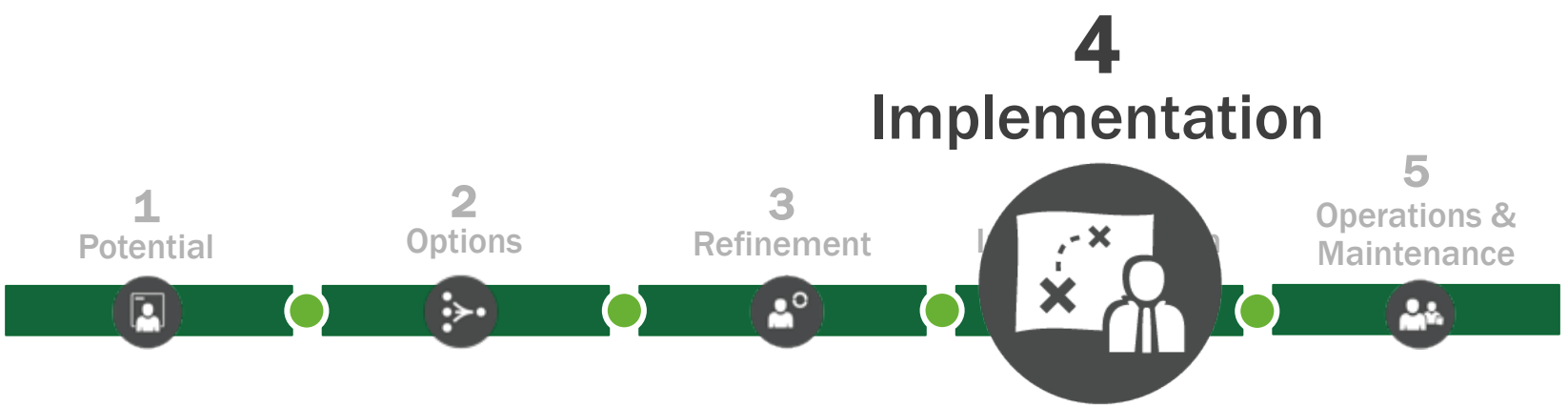
Community-Scale Project Risk – Post Step 3

	Risks	Risk Assessment Post Step 3
Development	• 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 Reduced
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	Assumed low; assessed EPC assumes risk Low; site secure
Permitting	• Tribe-adopted codes and permitting requirements • Utility interconnection requirements	Low; complete Low; complete
Finance	• Capital availability • Incentive availability risk	Low; PPA complete Low; risk on developer
Construction/ Completion	• EPC difficulties • Cost overruns • Schedule	Low; allocate to EPC or developer
Operating	• Output shortfall from expected • Technology O&M	Assumed low, mitigable, or allocatable

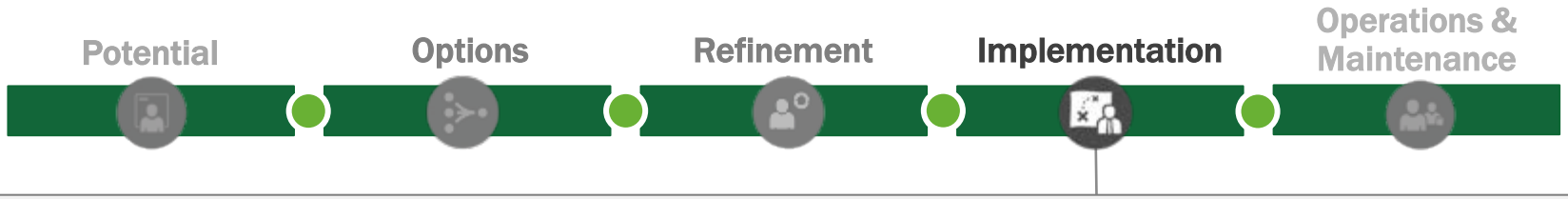
Sources: Adapted from Holland & Hart, RE Project Development & Finance & Infocast, Advanced RE Project Finance & Analysis

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


Comprehensive Energy Plan
1 PROJECT POTENTIAL: Data Collection and Opportunity Assessment
Council Check-in
2 PROJECT OPTIONS: Strategy and Detail
Council Check-in
3 PROJECT REFINEMENT: Planning and Development
Council Check-in
4 PROJECT IMPLEMENTATION: Financing and Construction
5 PROJECT OPERATIONS AND MAINTENANCE
Project Development and Financing Strategy


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

Step 4: Implementation



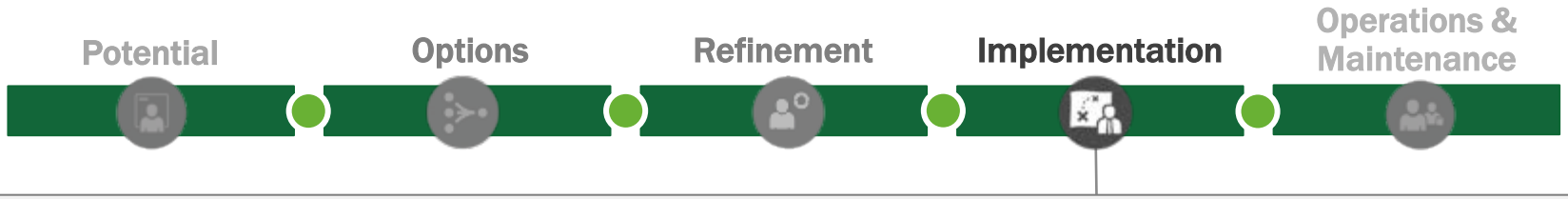
Purpose: Contract for, realize physical construction of project

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)

Step 4: Project Implementation Example



Check:

- Ensure permitting is complete
- Ensure on-site activities will not interfere with construction and vice versa
- Communicate and plan with the vendor/contractor

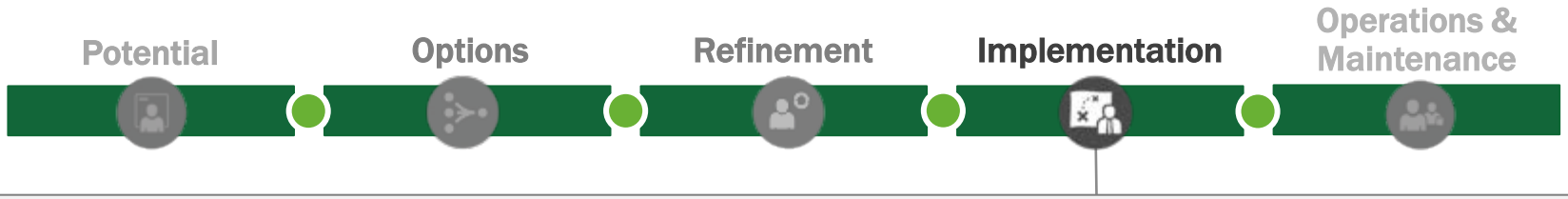
Interconnection:

- 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

	Risks	Risk Assessment Post Step 4
Development	• 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 None; executed
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	Assumed low, mitigable or allocatable

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.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Council Check-in
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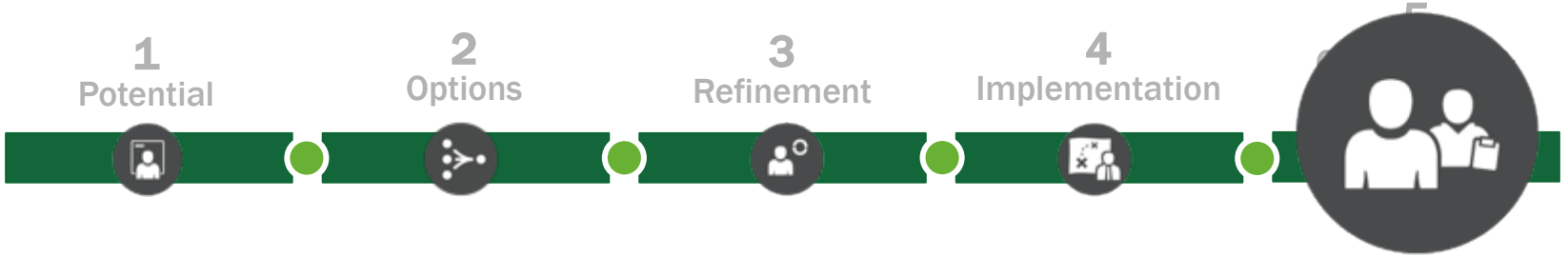
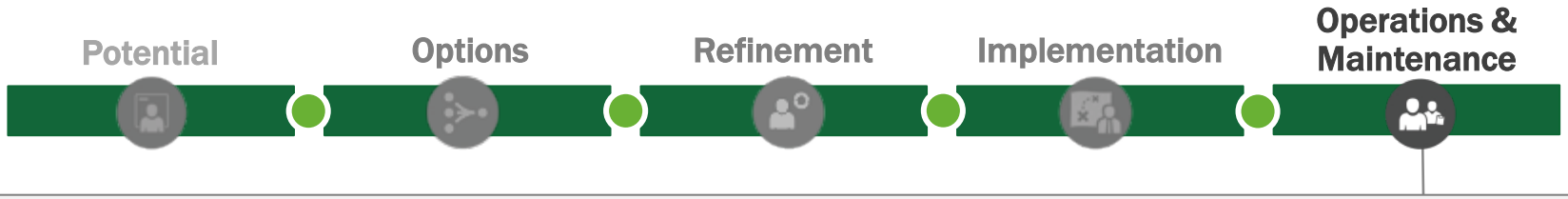
Project Development and Financing Strategy


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

Step 5: Operations & Maintenance



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

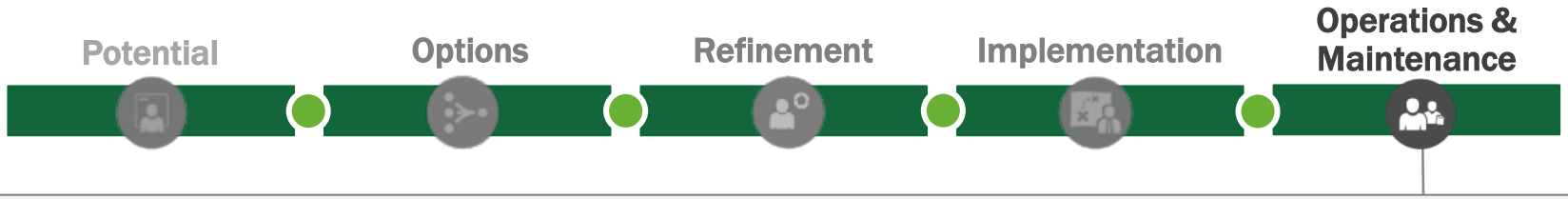
If leasing, lessor often manages maintenance

If PPA, vendor typically manages maintenance

* Esp. if owner – role of highest O&M risk

Photo by Warren Gretz, NREL 08684

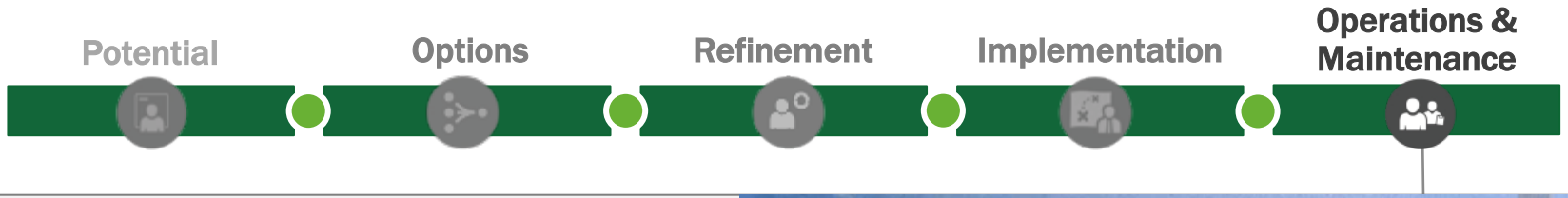
Step 5: O&M Example



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

Step 5: Hypothetical Community Example – Outputs



- ✓ 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

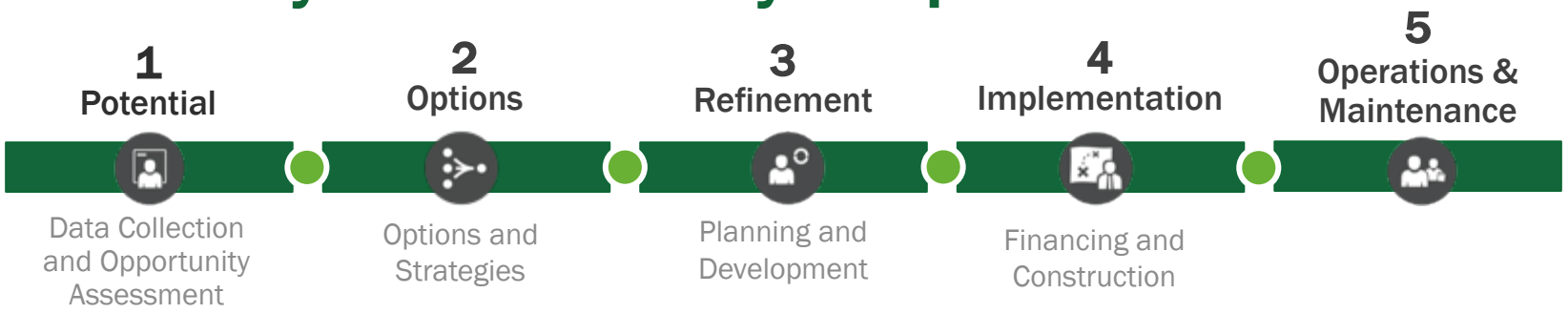
Community-Scale Project Risk – Post Step 5

	Risks	Risk Assessment Post Step 5
Development	• 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 None; executed
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

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.

Summary of Actions by Step



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

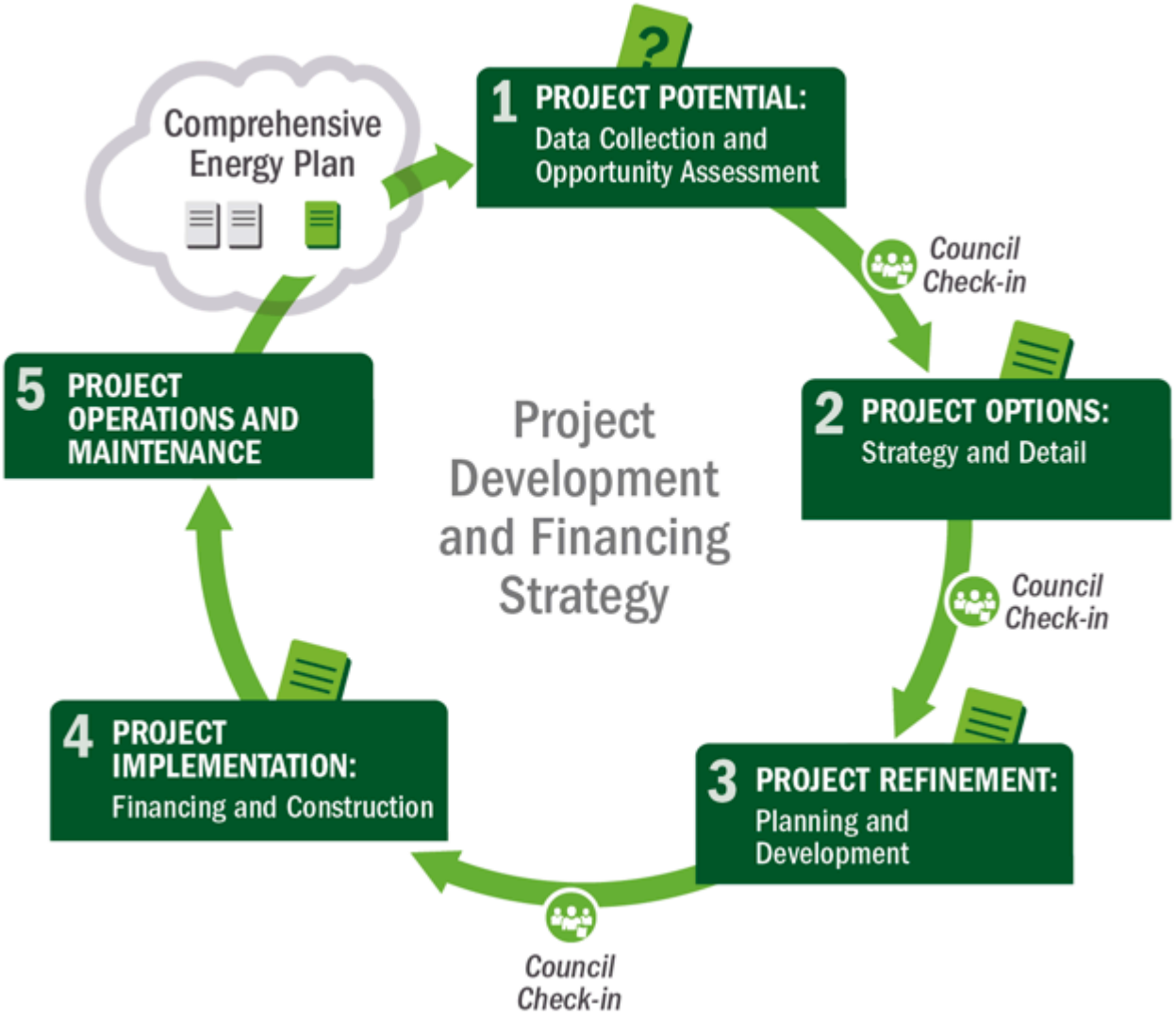
Celebrate!

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



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

Energy Basics

- Assessing Energy Needs and Resources
- Electricity Grid Basics
- Strategic Energy Planning

Renewable Energy Technology Options

- Biomass
- Building Heat & Hot Water
- Geothermal
- Hydroelectric
- Solar
- Wind

All courses are presented as 40-minute webinars online at: www.nterlearning.org

Leadership and Professional Courses

Essentials

Project Development and Financing Essentials

- Key concepts
- Process overview
- Decision points

Advanced/In-Depth

Project Development

- Concepts
  - Risk and uncertainty
  - Tribal project roles
  - Policies and renewable energy (federal & state)
- Process
  - Project scale decision factors
  - Understanding the energy market
  - Project team
  - Procurement

Project Finance

- Concepts
  - LCOE
  - Business structures
  - Tax-equity partnerships
- Process and Structures
  - Direct ownership
  - Flip
  - Leaseback
  - Inverted lease

Project Scale

- Facility
- Community
- Commercial