

DOE OFFICE OF INDIAN ENERGY

Renewable Energy Project Development

DOI/BIA Utility-Scale
Solar Energy Development Workshop

Phoenix, Arizona
February 20-22 2013

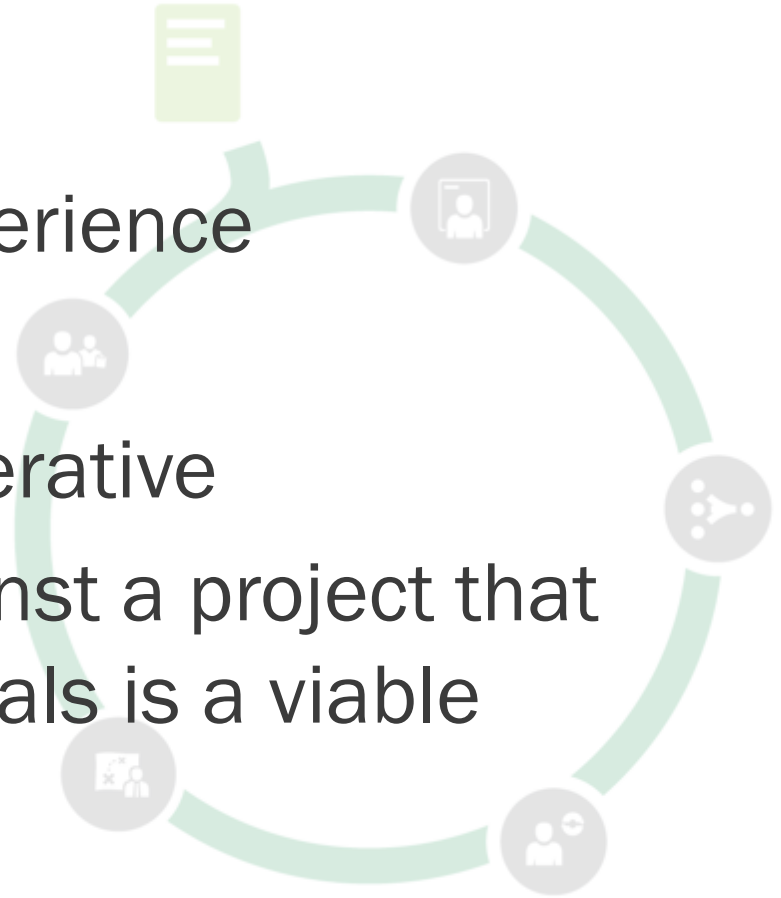


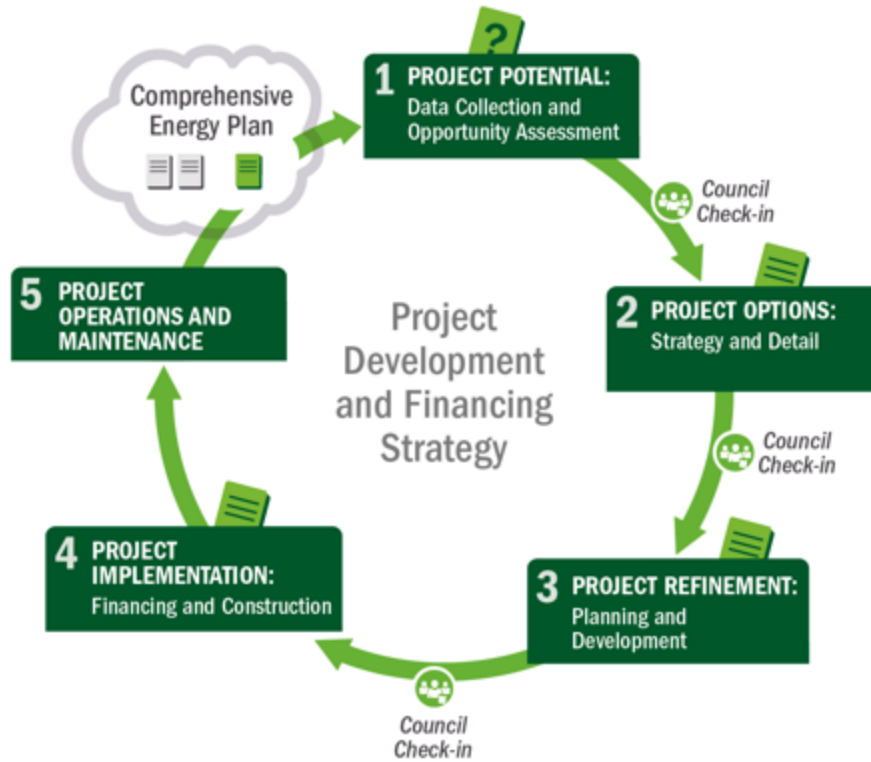
U.S. DEPARTMENT OF
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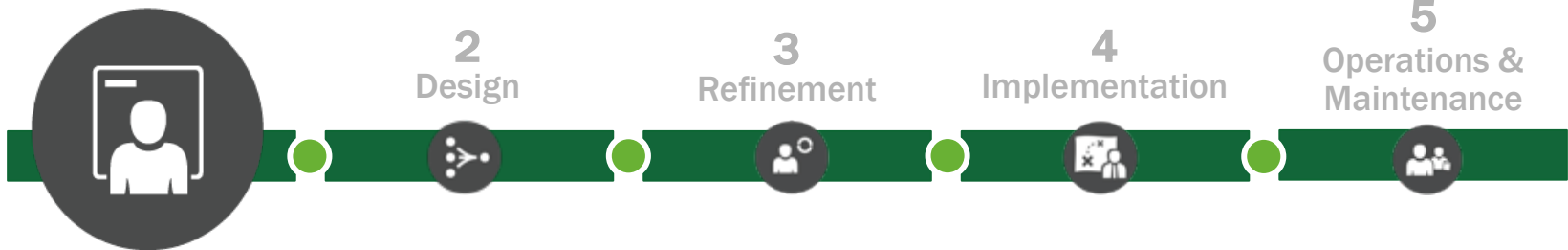
Project Development Process: What is it?

- Framework based on experience
- Decision-point based
- Project development is iterative
- Delaying or deciding against a project that does not meet current goals is a viable outcome and option





1 Potential



Step 1: Site, Scale, Resource, Market, Role

Operations &
Maintenance



Is there a viable project?

- Possible sites for project locations
- Tribal facility electric cost data, regulations, and interconnection requirements
- Potential markets and paths to market for project power and renewable sales

➔ Analyze risks: financing, permitting, construction costs

➔ Analyze utility rules: interconnection, net metering, transmission

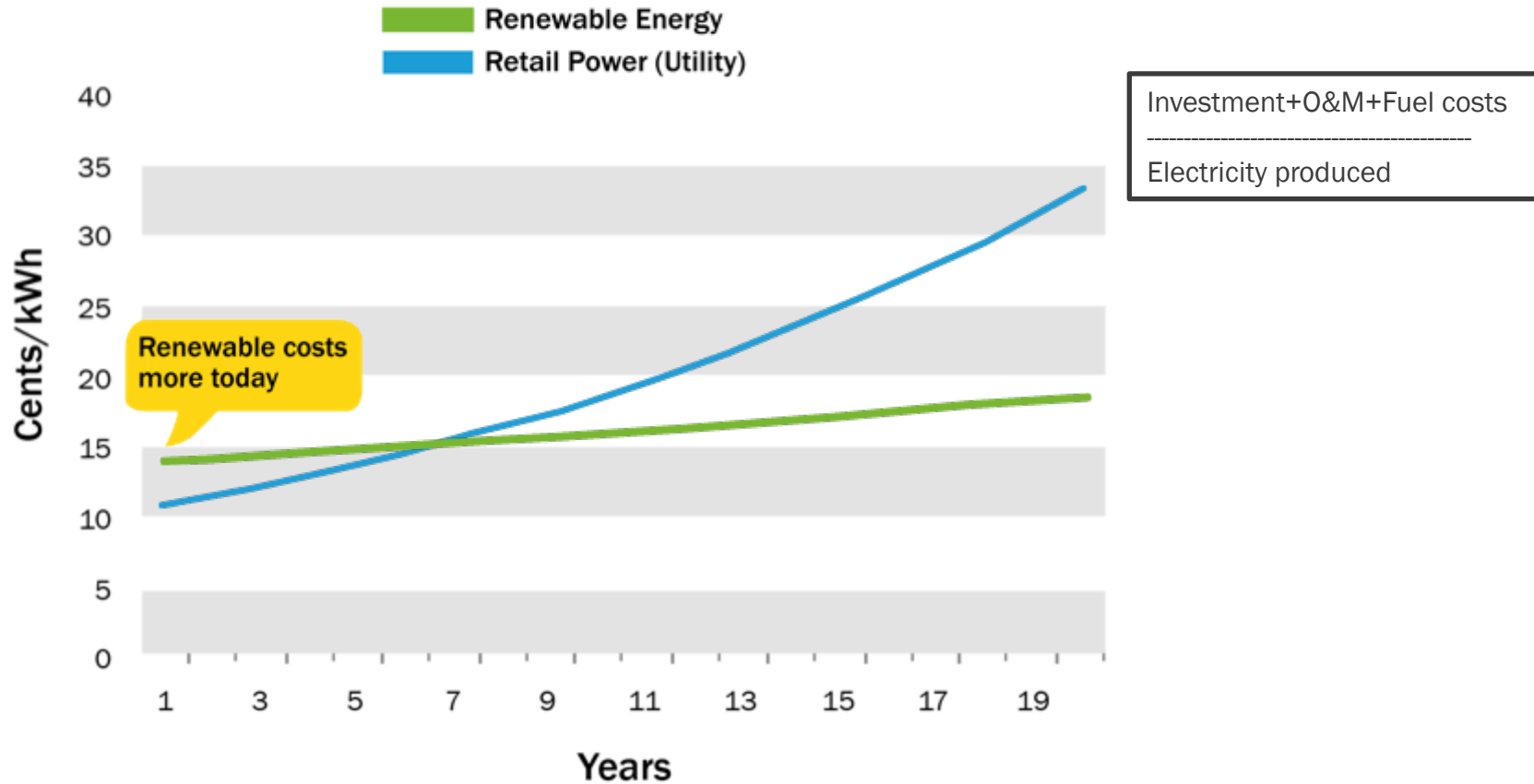
➔ Develop a tribal role balanced with overall goals

Tribal Examples: BEPTC™

Illustrative; not intended to be comprehensive	South Dakota	California	Arizona
B aseline	Rural Coal/wind	<ul style="list-style-type: none"> •Peak Demand! •20X size of S.D. market 	Resource size vs. Market size
E conomics	Low cost/kWh W – ¢3.4 R – ¢7.6	High cost/kWh W – ¢ 3.0 R – ¢13.0	Mid-cost/kWh W – ¢3.0 R – ¢8.7
P olicy	No RPS (Goal) No net meter No Trans.	RPS – 33% (2020 GAP) Net meter	RPS – 15% Net meter Gap on RPS
T echnology	Biomass/Wind rich; solar up to 30% less intense	Resource rich; solar dominates South. CA	Solar (PV or concentrating) strong, commercial
C onsensus	Given facts, should Tribe pursue?	Given facts, should Tribe pursue?	Given facts, should Tribe pursue?

Key Concept: Levelized Cost of Energy (LCOE)

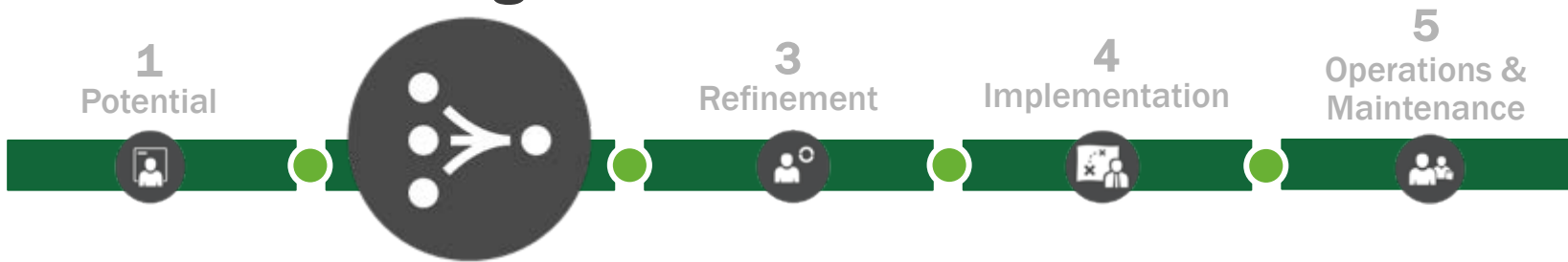
Cost of Energy Comparison (constant demand)



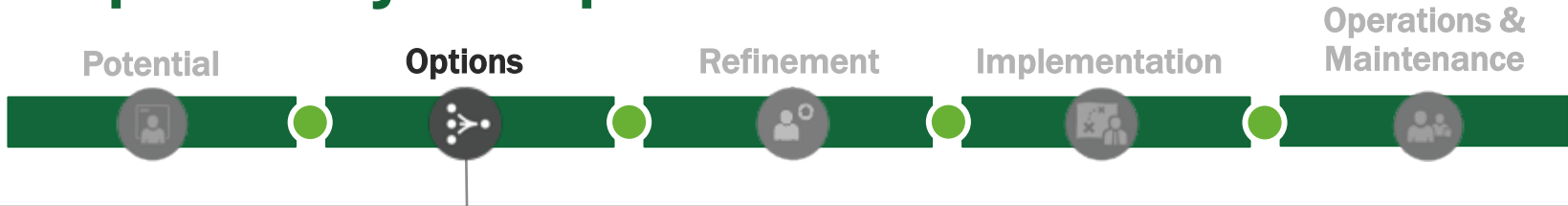
Renewable has a lower LCOE, compared to retail LCOE. How much lower depends on project specifics.



2 Design



Step 2: Project Options



Purpose: Narrowing down the project options

Tasks:

- Identify final resource
- Determine Tribal role/Ownership Structure
- Clarify Tax Equity Structure
- Narrow Financing options
- Initiate Procurement process
- Identify permits

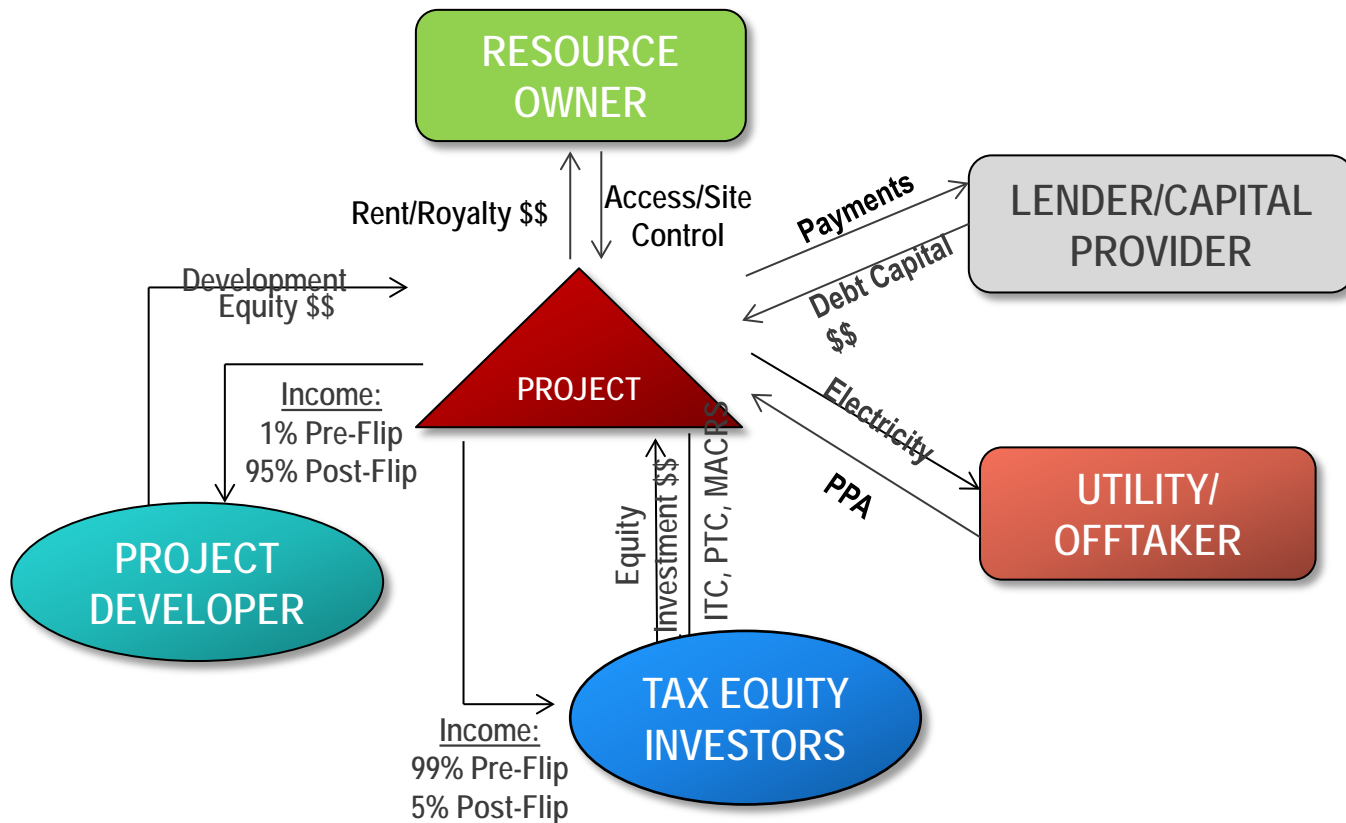
Resources:

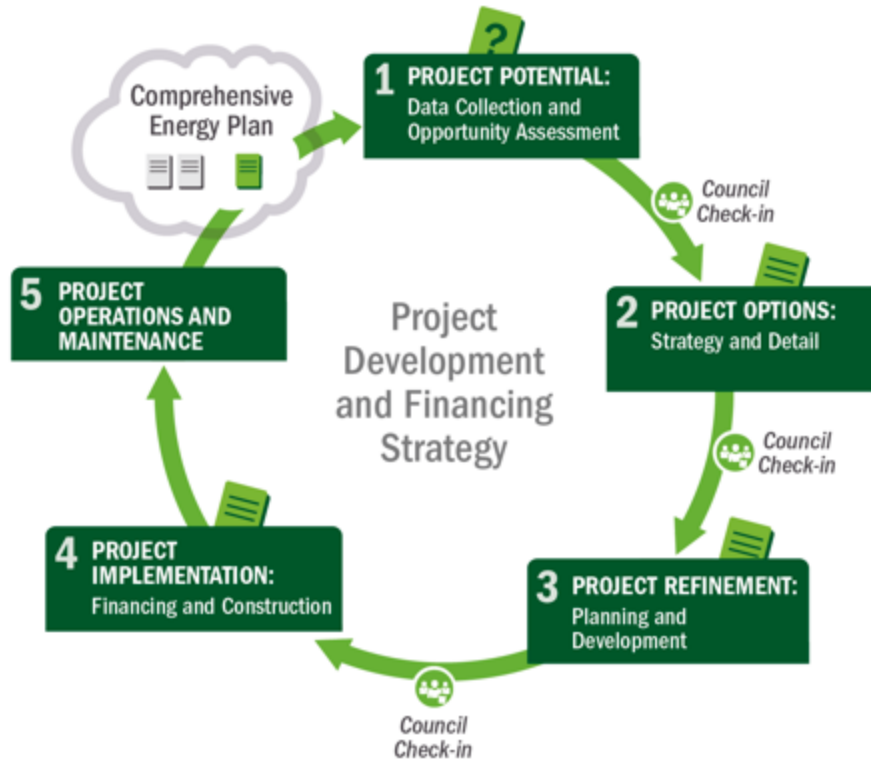
- DOE-IE technology specific webinars:
www.energy.gov/indianenergy/resources/education-and-training

Key Concept: Tribal Role Options



Project Participants

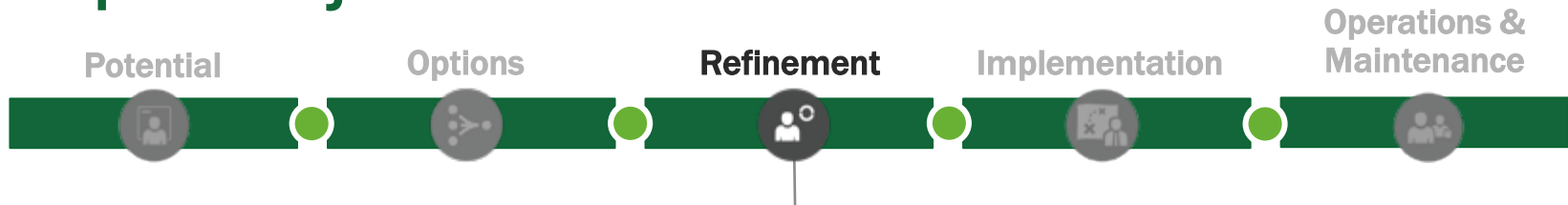




3 Refinement



Step 3: Project Refinement



Purpose: Financing Design, Vendors, Environmental Reviews, and Finalizing the Off Take Agreement

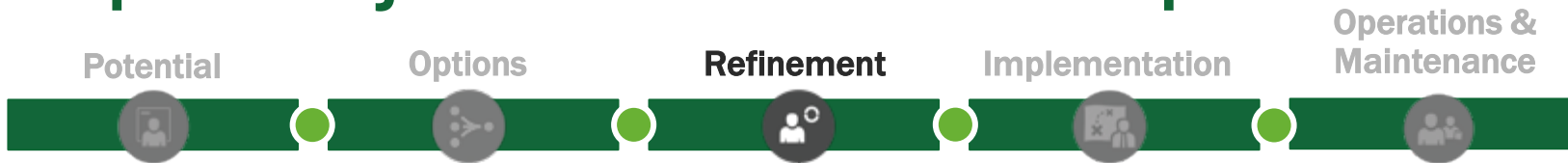
Tasks

- Finalize Ownership structure and Project team identification
- Finalize Permitting (including environmental reviews), interconnection
- Finalize Technology, financing, and development costs

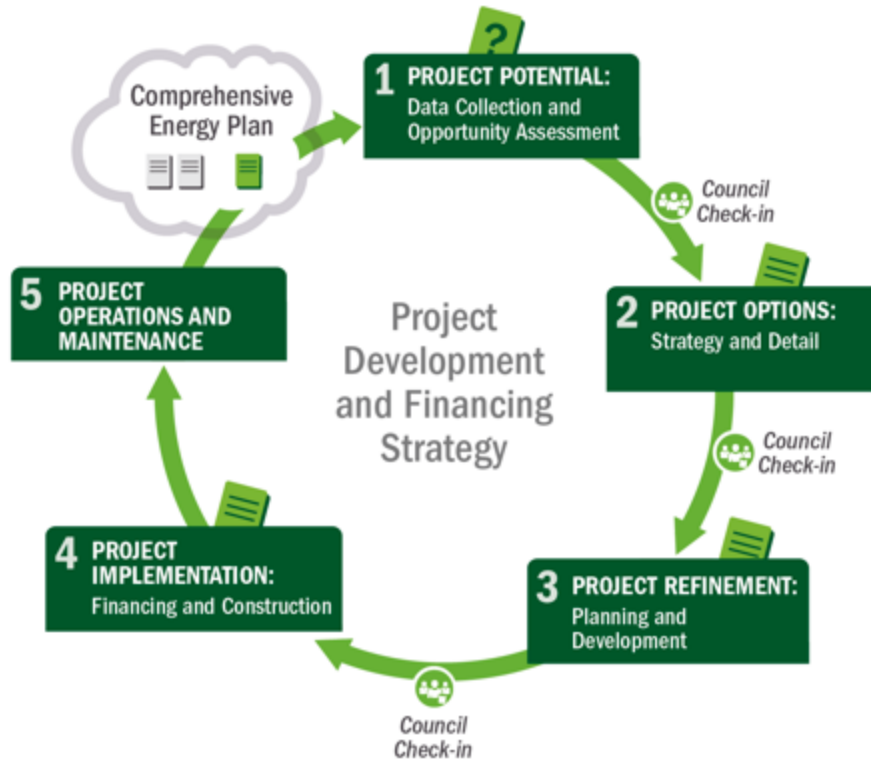
Outputs

- Proposed financing/commitments and organization structure
- Detailed economic models
- Vendors selected
- Completed environmental reviews and finalized permits
- Offtake and transmission/interconnection agreement

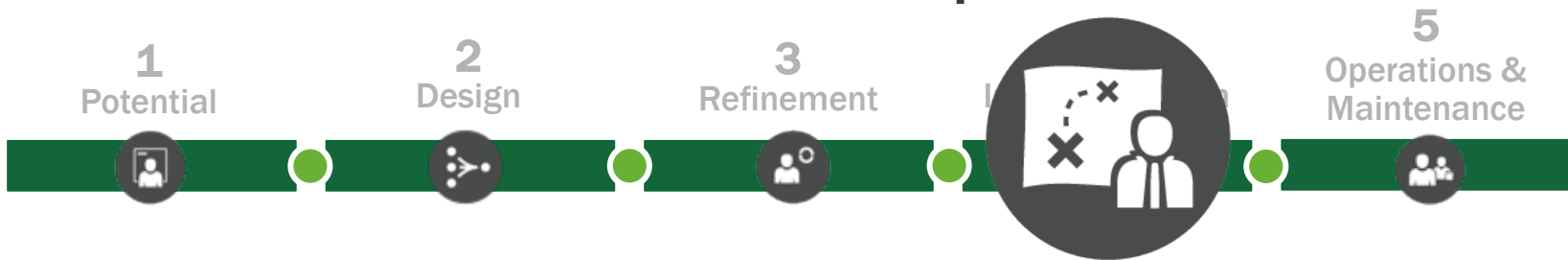
Step 3: Project Refinement Example



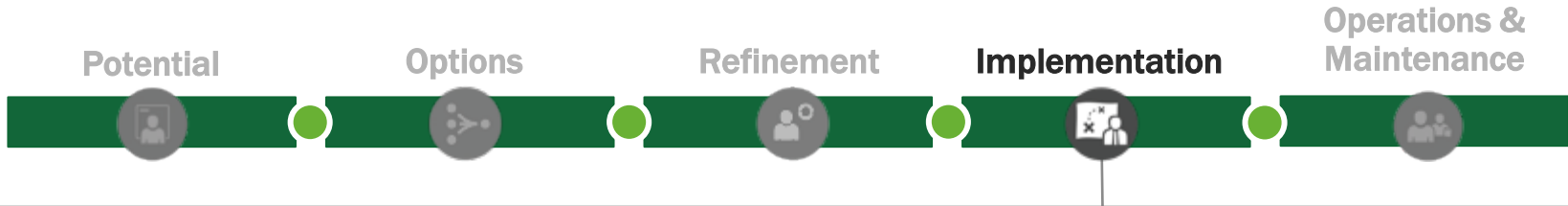
Site	Resource	Off-Take	Permits	Technology	Team	Capital
Securing Site: No Site, No Project	Engineering Assessment (Input)	Power Purchases: Off-take Contract – (Revenue)	Anything that can stop a project if not in place...	Engineered System (Output)	Professional, Experienced, Diverse	Financing Structure
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Volume/ Frequency • Variability • Characteristics (power/speed) • 24-hour profile • Monthly, seasonal and annual variability • Weather dependence • Data history • Std. Deviation • Technology suitability 	<ul style="list-style-type: none"> • Credit of counterparty • Length of contract • Terms and conditions • Reps and warranties • Assignment • Curtailment • Interconnection • Performance • Enforcement • Take or pay • Pricing and terms 	<ul style="list-style-type: none"> • Permitting/ entitlements • Land disturbance • Environmental • Cultural impacts • Resource assessments • Wildlife impacts • Habitat • NEPA, EIS • Utility inter-connection • Other utility or PUC approvals • Lease and/or ROW Approvals 	<ul style="list-style-type: none"> • Engineering design plans • Construction plans • Not generic solar panel and inverter • Engineered resource/ conversion technology/ balance of system designs • Specifications • Bid set 	<ul style="list-style-type: none"> • Business management • Technical expertise • Legal expertise • Financial expertise (including Tax) • Transmission interconnection expertise • Construction/ contract management • Operations • Power marketing/ sales 	<ul style="list-style-type: none"> • Development equity • Project equity • Project debt • Mezzanine or bridge facility • Tax equity • Grants, rebates, other incentives • Environmental attribute sales contracts (RECs) • Bond finance • Non-recourse project finance
Tribal land site secured for commercial-scale solar PV project: 200 acres with transmission access	Solar resource data favorably evaluated	Electric utility offtaker identified and contracted	Necessary permits secured including interconnection agreement	System design prepared to bid	Team identified and engaged	<i>Determine finance structure</i>



4 Implementation



Step 4: Implementation



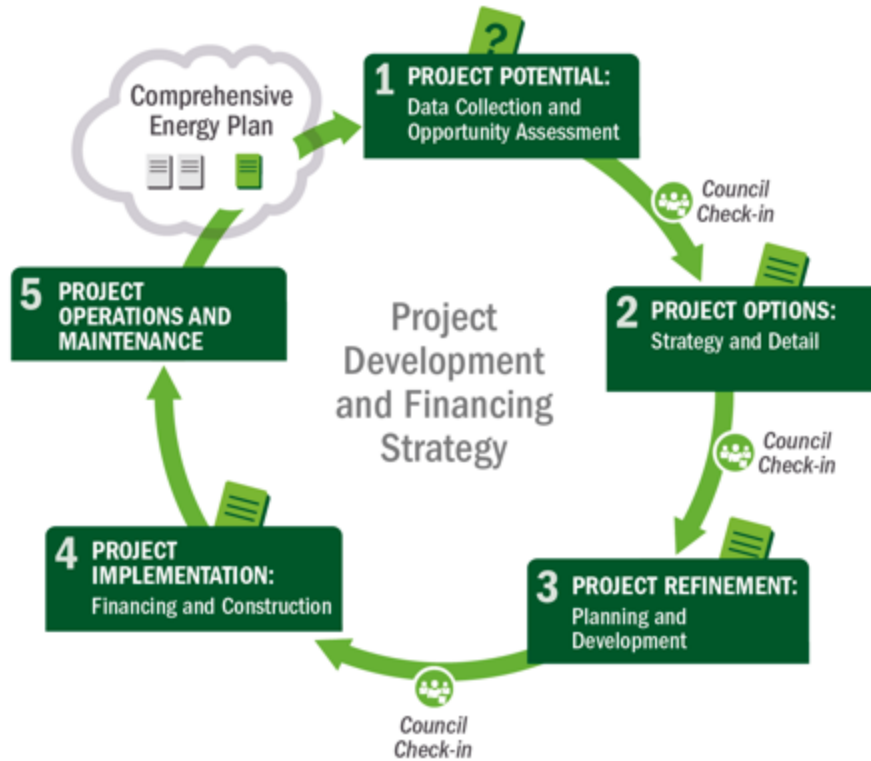
Purpose: Complete physical construction of project

Tasks:

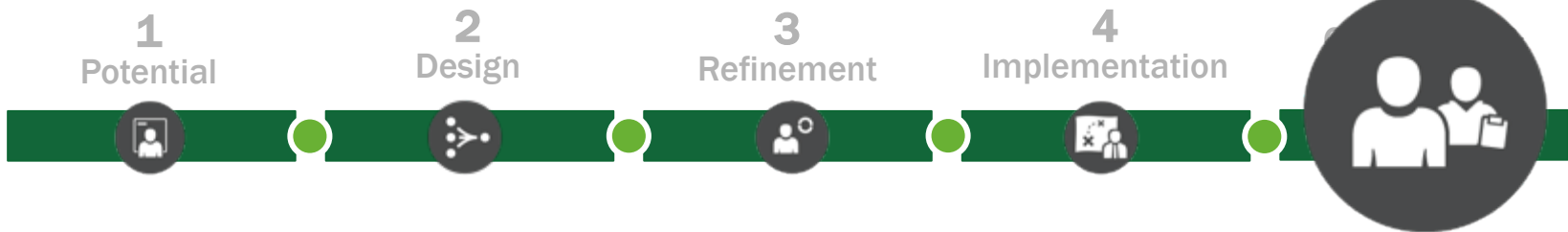
- Finalize project agreements
- Finalize vendor contracting process
- Finalize pre-construction tasks
- Complete construction and equipment installation
- Complete interconnection
- Commission project leading to commercial operations

Output:

- Completed Project (commercial operation)



5 Operations & Maintenance



Step 5: Operations and Maintenance



Purpose: Implement operations and maintenance plan (contract or self)

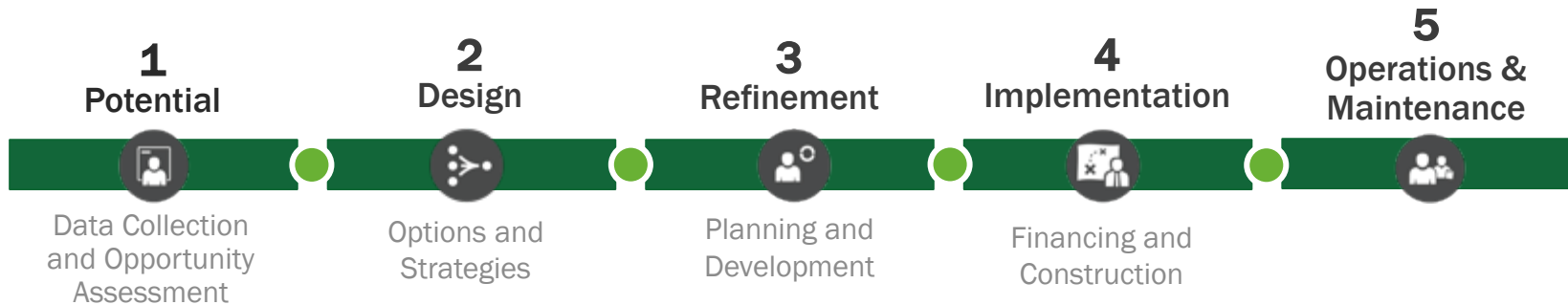
O & M Costs:

- Equipment maintenance and upkeep
- Inverter replacement
- Insurance
- Labor and staffing
- Extended warranty agreements



Photo by NREL/PIX 14952

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, begin to identify offtakers, partners, vendors

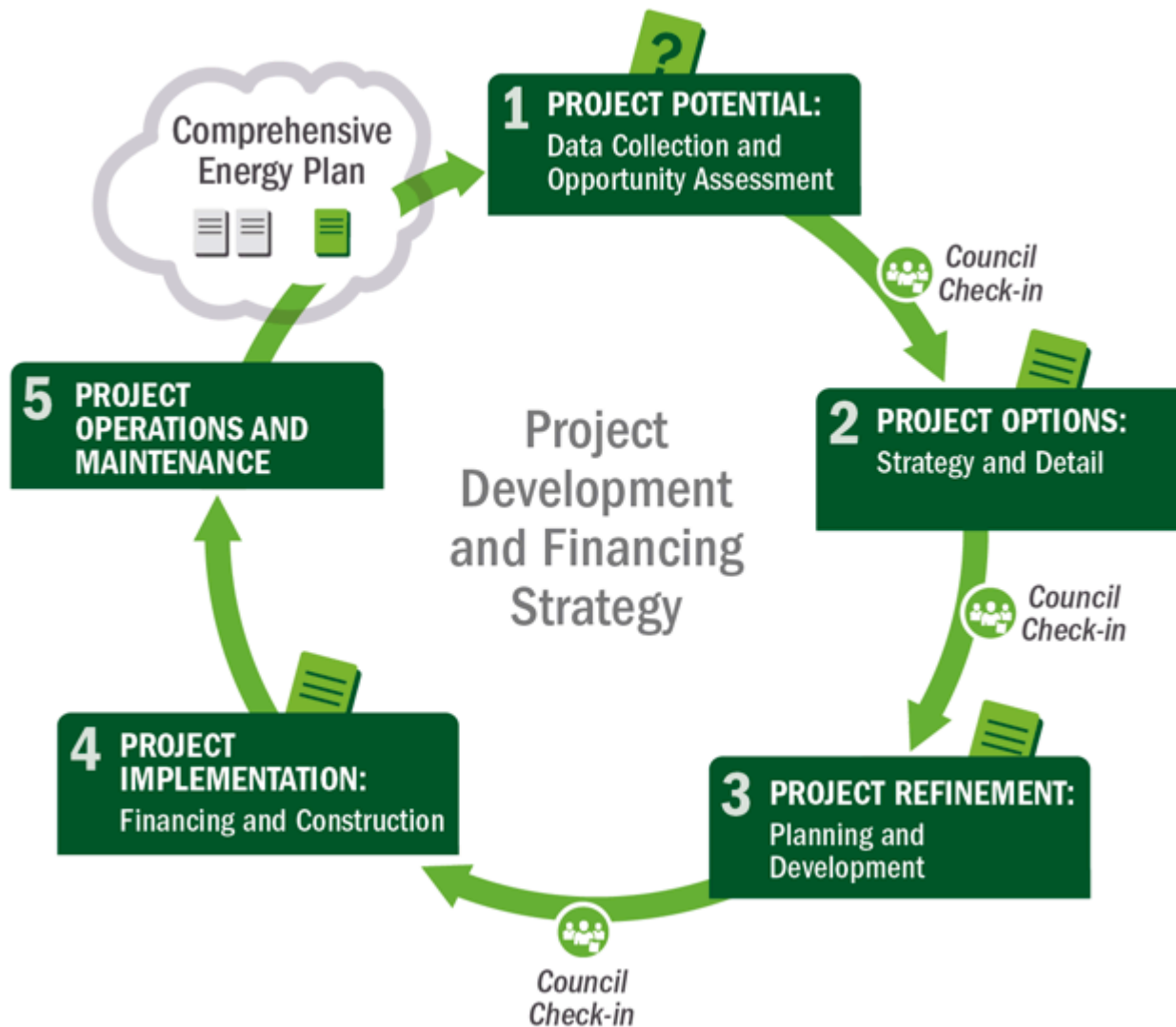
Step 3: Finalize economic assumptions and roles, interconnection and offtake agreements, partnerships, ownership structure

Step 4: Financial close and construction; vendor contracting completion; project commercially delivered

Step 5: Maintenance plan implementation

Celebrate!

Wrap Up: Project Development Process



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THANK YOU

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