Getting from Goals to Projects in the Ground

Renewable Energy Roundtable

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NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.
The Challenge

Components identify top project(s)

Receive technical assistance from NREL

Completed project!
We will introduce a methodology which serves the intent of actually building “the project” at the end of the day, and driving to that conclusion while managing risk.
Project Motivation & Development
What is RPS?

"and then"

Or? He that doesn't make sense!

Who?!

Me?

YOUR FAULT

And!

Project

&

Development

&

Development

FINANCE

“and then”

When?!
Key Concepts

• Project Context & Motivation
  o What are the basics of your energy environment (e.g. utility relationship, governance structure, energy sources and costs, key decision makers)?
  o Is the project viable, are you motivated?

• Project Development Framework
  o Overall process environment – situational awareness
  o Framework of information management – SROPTTC
  o Process of incremental investment seeking fatal flaws – Risk Management
  o Tools: Pro formas and project checklists.

➢ Use this process to organize the project and determine viability.
➢ Bankable projects can move on to determine the potential for different financing options.
STEP 1  
DETERMINE MARKET FUNDAMENTALS (BEPTC)

STEP 2  
DECIDE: BEHIND THE METER OR UTILITY SCALE?

STEP 3  
EVALUATE PROJECT’s CRITICAL FACTORS (SROPTTC)

STEP 4  
ASSESS & SECURE FINANCING OPTIONS
# Project Fundamentals

<table>
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<tr>
<th>Baseline</th>
<th>Economics</th>
<th>Policy</th>
<th>Technology</th>
<th>Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Resource/Needs</td>
<td>Fundamental Drivers</td>
<td>Conditions for Success or Constraint</td>
<td>What, When, Where, How</td>
<td>Among Decision Makers &amp; Stakeholders</td>
</tr>
<tr>
<td><strong>Current Use</strong></td>
<td>Energy cost projections</td>
<td>Types: Regulatory Government</td>
<td>Tested/Viable</td>
<td>Stakeholder identification</td>
</tr>
<tr>
<td>Electricity</td>
<td>Ratepayer perspective</td>
<td>Government Internal</td>
<td>Appropriate for location</td>
<td>Community strategies</td>
</tr>
<tr>
<td>Fuels</td>
<td>Social: costs/benefits (jobs)</td>
<td>Topics: Energy Standards</td>
<td>Access to resource</td>
<td>Identify key decision makers</td>
</tr>
<tr>
<td>Future Needs</td>
<td>Environmental: costs/benefits</td>
<td>Economic Development</td>
<td>Volume of resource</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interconnection</td>
<td>Integration concerns</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transmission access</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Establish Context and Motivation**
Process for Strong Motivation

Baseline

Consensus

Economics

Technology

Policy

Energy Resource/ Needs

Fundamental Drivers

Conditions for Success or Constraint

Among Decision Makers & Stakeholders

What, When, Where, How
Key Concept: Fundamentals = Motivation

• Developing project concepts into reality requires a strong foundation of drivers to overcome challenges, uncertainty, and maintain forward momentum – we call this project motivation.

• A “motivated project” wants to exist on the fundamentals.

• To manage risk in early stage project development, motivation is first established in a market analysis.
Baseline

• **Purpose**
  - Establishes the key driver or characteristic of the local energy market
  - A good example is something that defines the competition and is the trade-off with renewables
  - Example: Hawaii and petroleum

• **Considerations**
  - Energy sources and fuels
  - Market dynamics; growth, contraction
  - Import or export environment
Economics

• **Purpose**
  - Economic trade-off
  - Competition and market for energy
  - Establish go-no go; acknowledge the environment and make plan to mitigate economic challenges

• **Considerations**
  - Retail vs. wholesale rate(s)
  - Future cost growth of grid power
  - Fuels and inputs, environmental policy, growth
Policy

• **Purpose**
  - Often the pathway to executing project
  - Identify supporting policies
  - Taking steps to mitigate, remove, or deal with impeding policies to create the conditions for success are imperative

• **Considerations**
  - Government (Fed/state/local)
  - Internal (to your organization)
  - Market (regulation, market structure)
Technology

• **Purpose**
  - Preliminary resource assessment

• **Considerations**
  - Assessing commercial technologies
  - Reliability
  - Bankability

*Photo from Alstom 2010, NREL/PIX 18207*
Consensus

• **Purpose**
  - Once factual data exists, share it!
  - Use the framework to establish consensus
  - This support will be needed later; looking for commitment based on the facts

• **Considerations**
  - Stakeholders
  - Patience – don’t move ahead without this
  - If unable to get it, should you go forward?
Summary of Market Fundamentals

Key Elements of Market Fundamentals

- **Baseline**: existing energy “reality”
- **Economics**: fundamental driver(s)
- **Policy**: create conditions for success
- **Technology**: what, when, where, how many?
- **Consensus**: establish, advance, defend

Establish and maintain motivation using this framework as a guide – “BEPTC™”

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Project Development & Finance Road Map

STEP 1: DETERMINE MARKET FUNDAMENTALS (BEPTC™)

STEP 2 DECIDE: BEHIND THE METER OR UTILITY SCALE?

STEP 3 EVALUATE PROJECT’s CRITICAL FACTORS (SROPTTC™)

STEP 4 ASSESS & SECURE FINANCING OPTIONS

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Step 2: Directional Decision

Two Paths Forward:

THIRD PARTY PARTNERSHIP
Utility Scale – Sell to Utility

- Is access available to get energy to the market? (e.g. Transmission) - Interconnection/Regulation); Legal Environment. If yes, does the market have an appetite? At what price? Is that economic for project? YES / NO?

DIRECT OWNERSHIP
Behind the Meter: facility buys output

- If not commercial, will community scale work? What is interconnection/regulatory environment? Is behind the meter allowed? How? FIT, Net Metering, Other? Is it economic?
Project Development & Finance Road Map

**STEP 1:** DETERMINE MARKET FUNDAMENTALS (BEPTC™)

**STEP 2**
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Risk Mitigation

• Project Development is a risky endeavor
• Successful risk management and effective capital budgeting are two of the factors associated with rewarding developers
• Renewable Energy Project development risk include:
  o Federal policy uncertainty
• Inform about some risks and providing risk management tool/process
• Will instruct on how these tools have been put in practice that is relevant for Indian Country
$\textbf{Unknowns}$

- Site
- Resource
- Off-take
- Permits
- Technology
- Team
- Capital

$\textbf{Risk}$

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Sponsor investment in early stage development

Private developer investment in later stage development through COD and Beyond

Ongoing sponsor participation as project counterparty
Using this framework to visualize the development process:

- **Best practice**: process is iterative; each iteration aims to find a fatal flaw and end project – manage development risk.

- **Best practice**: not making the GO/NO-GO decision until the end; incremental decisions followed by incremental investments, managed investment risk.

- **Best practice**: focus on (invest in) pro forma inputs incrementally, maximizing yield on every dollar invested.

**Pitfalls:**

1. Mistaking each iteration for final “go/no-go,” vs. “go forward/stop”
2. Not getting out early enough on bad projects (even if investment would be lost)
3. Not investing for fear “it won’t work;” BEPTC™ probably not fully developed, which may indicate that doing nothing is riskier than investing under uncertainty
# Framework for Information

<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>No Site, No Project</td>
<td>Engineering Assessment</td>
<td>Off-take Contract – (Revenue)</td>
<td>Anything that can stop a project if not in place...</td>
<td>Engineered System</td>
<td>Professional, Experienced, Diverse</td>
<td>Financing Structure</td>
</tr>
</tbody>
</table>

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

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

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

- Permitting/entitlements
- Land disturbance
- Environmental
- Cultural impacts
- Resource assessments
- Wildlife impacts
- Habitat
- NEPA, EIS
- Utility interconnection
- Performance
- Other utility or PUC 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
- Utility interconnection expertise
- Construction/contract management
- Operations
- Power marketing/sales

- 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

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**CONTINUOUS, ITERATIVE PROCESS**

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Iterative Process

- Site
  - No Site, No Project
- Resource
  - Engineering Assessment
- Off-take
  - Off-take Contract – (Revenue)
- Technology
  - Engineered System
- Team
  - Professional, Experienced, Diverse
- Capital
  - Financing Structure
- Permits
  - Anything that can stop a project if not in place...
Site

- **Purpose:**
  - Understanding site availability and characteristics.

- **Considerations:**
  - Site control
  - Size and shape
  - Distance to usable transmission
  - Upgradeable
  - Road access for operations and maintenance
Resource

• **Purpose:**
  o Understanding what renewable resources are available and usable on site.

• **Considerations:**
  o Resource availability
  o Resource variability
  o 24-hour resource profile
  o Weather dependence
  o Technology suitability

*Photo from SkyFuel, Inc., NREL/PIX 18227*
Off-Take

• **Purpose:**
  o Understanding the power buyer and utility interactions.

• **Considerations:**
  o Utility operations
  o Regulatory governance (e.g. PUC)
  o Interconnection agreement
  o Parameters
  o Pricing and terms

NREL/PIX 19498
Permits

• **Purpose:**
  - Understanding necessary regulatory requirements for the project

• **Considerations:**
  - Interconnection
  - Environmental (NEPA, EIS)
  - Cultural
  - State use permits
Technology

• **Purpose:**
  - Identifying specific technology type to develop the resource.

• **Considerations:**
  - Engineering design plans
  - Construction plans
  - Technology specifications development for bid

*Photo from Jenny Hager Photography, NREL/PIX 15989*
Team

- **Purpose:**
  - Ensure all relevant players (internal and external) are engaged in the project at the right time, levels, and roles

- **Considerations:**
  - **Engage:**
    - Decision Makers
    - Project & Business Management
    - Professionals & Staff
  - **Employ Experts:**
    - Legal & Financing
    - Technical & Construction
    - Power Marketing

*Photo from Central and South West Services, NREL/PIX 06594*
Capital

• **Purpose:**
  o With all other elements in place, capital can be attracted to the project.

• **Considerations:**
  o Business Structures
  o Achievable Capital Structure
  o Timing
  o Perception of Risk/Reward
STEP 1: DETERMINE MARKET FUNDAMENTALS (BEPTC™)

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Renewable Project Finance

- **Economics are Dependent on Tax Equity/Other Policy**
  - Governments/non-profits have no tax appetite
  - Utilities may value Renewable Energy Credits (REC) to satisfy legal requirements
  - 3rd party finance is the solution

- **Key Contract: Power Purchase Agreement (PPA)**
  - A long term, financeable commitment to buy project output – in kWh’s and/or attributes (like RECs)
  - Allows developer to monetize tax or other policies

- Several common financing structures and financing sources are used by the renewable energy industry to finance a PPA
Project Finance

- Project Site (Lease)
- Resource and Technology
- Permits
- Off-Take (PPA)
- Capital Financing
## Project Finance Capital Examples

(For Illustration Only)

<table>
<thead>
<tr>
<th><strong>Investor Universe</strong></th>
<th><strong>Project Debt</strong></th>
<th><strong>Tax Equity</strong></th>
<th><strong>Lease Equity</strong></th>
<th><strong>DOE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bank</strong></td>
<td><strong>Private Bond</strong></td>
<td><strong>Term Loan</strong></td>
<td><strong>Levered</strong></td>
<td><strong>Unlevered</strong></td>
</tr>
<tr>
<td>Commercial Banks</td>
<td>Private or 144A Offering</td>
<td>Institutional investors w/energy focus</td>
<td>Financial investors and some corps. with tax appetite.</td>
<td>Lease equity market, institutional</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Target Rating</strong></th>
<th><strong>Market Capacity</strong></th>
<th><strong>Indicative Pricing</strong></th>
<th><strong>Tenor</strong></th>
<th><strong>Sizing Profile</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>“Investment Grade” no rating needed</td>
<td>Up to $1 Billion; up to 1.0XDSCR in Low Case</td>
<td>L+250-350 2007: 100-150 +fees 1.5-2.0%</td>
<td>5-7 years typical, up to 15</td>
<td>DSCR Requirements 1.30-1.40X; lockbox; PPA ‘Tail’; EPC with credit support; LIBOR Swaps; Reserves</td>
</tr>
<tr>
<td>BBB-/NAIC 2</td>
<td>+$1.0 Billion</td>
<td>7% Area; T + 5%-6% Fixed</td>
<td>Term of PPA (20-25); Prepayment Penalty</td>
<td>1% amortization with cash sweep</td>
</tr>
<tr>
<td>B is doable; BB is preferred</td>
<td>$750 Million</td>
<td>L+250-500; 425 - 450 Libor floor;</td>
<td>Up to 7 years</td>
<td>Downside flip dates: +3 years in downside; +6 years in severe downside</td>
</tr>
<tr>
<td>NA (Investment Grade Offtaker)</td>
<td>Sized to target IRR</td>
<td>11-13.5; IRR by Flip</td>
<td>Target IRR reached by year 10 with PTC; 6-7 with ITC</td>
<td>1.30-1.40 “RSCR” Like Project Debt</td>
</tr>
<tr>
<td>NA (Invest. Grade Offtake)</td>
<td>9-10.5% IRR by Flip</td>
<td>9.0-12.5% after tax yield</td>
<td>80% of Useful Life</td>
<td>Driven by required Ratings</td>
</tr>
<tr>
<td>NA</td>
<td>9.0-12.5% after tax yield</td>
<td>T+75-100 bps</td>
<td>Up to 30 years</td>
<td></td>
</tr>
<tr>
<td>No Limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **DOE**
  - DOE supports 100% or 80%

- **Market Capacity**
  - Up to $1 Billion; up to 1.0XDSCR in Low Case
  - Sized to 20-49% of Capital Stack
  - No Limit

- **Indicative Pricing**
  - L+250-350 2007: 100-150 +fees 1.5-2.0%
  - 7% Area; T + 5%-6% Fixed
  - L+250-500; 425 - 450 Libor floor;
  - 11-13.5; IRR by Flip
  - 9-10.5% IRR by Flip
  - 9.0-12.5% after tax yield
  - T+75-100 bps

- **Sizing Profile**
  - DSCR Requirements 1.30-1.40X; lockbox; PPA ‘Tail’; EPC with credit support; LIBOR Swaps; Reserves
  - 1% amortization with cash sweep
  - Downside flip dates: +3 years in downside; +6 years in severe downside

- **Target Rating**
  - “Investment Grade” no rating needed
  - BBB-/NAIC 2
  - B is doable; BB is preferred

- **Tenor**
  - 5-7 years typical, up to 15
  - Target IRR reached by year 10 with PTC; 6-7 with ITC
  - 80% of Useful Life
  - Up to 30 years
## Tax Equity Financing Structures

<table>
<thead>
<tr>
<th>Options</th>
<th>How Tax Equity Return is Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Partnership Flip</strong></td>
<td>Tax equity invests capital to achieve target IRR. Upon achievement to target IRR ownership interest automatically “flips” down to contract percentage.</td>
</tr>
<tr>
<td><strong>Sale Leaseback</strong></td>
<td>Tax equity buys project and leases it back to developer for a term of years.</td>
</tr>
<tr>
<td><strong>Inverted Lease</strong></td>
<td>Tax equity invests capital for a preferred return that includes a “pass through” of credit by operation of tax election.</td>
</tr>
</tbody>
</table>
Capital/Cash Flows and Deal Structuring

• **Partnership Flip Example – Anatomy of a Deal**
  – An illustration of participants’ roles in a partnership flip transaction
  – A PPA is assumed to be in place – for kWh sales and/or REC sales
  – We will visualize the cash flows for each participant

• **Key Contract: PPA**
  – A long term, financeable commitment to buy project output – in kWh’s and/or attributes (like RECs)
  – Allows developer to monetize tax or other policies
Financing Option: Partnership Flip

- **PROJECT**
  - Development
  - Revenue: 1% Pre-Flip, 95% Post-Flip
  - Electricity

- **UTILITY/OFFTAKER**
  - PPA

- **PROJECT DEVELOPER**
  - Development
  - ITC, PTC, MACRS

- **TAX EQUITY INVESTORS**
  - Revenue: 99% Pre-Flip, 5% Post-Flip

Cash Flows in Time - Illustration
THANK YOU!

Robert Springer:
Robert.Springer@nrel.gov
Useful Resources

- Incentives: [http://www.dsireusa.org/](http://www.dsireusa.org/)

Useful Resources

**PROJECT DEVELOPMENT & FINANCE “GENERAL”**

**PROJECT DEVELOPMENT “RESOURCES”**
- See RE 101 Slides from Andy Walker

**PROJECT DEVELOPMENT “OFF-TAKE”**
### Useful Resources (Cont’d.)

#### PROJECT DEVELOPMENT “PERMITTING”


#### PROJECT DEVELOPMENT “TECHNOLOGY”

- General resource/technology page at: [http://teeic.anl.gov/er/index.cfm](http://teeic.anl.gov/er/index.cfm)

#### PROJECT DEVELOPMENT “CAPITAL”