Getting from Goals to Projects in the Ground

Renewable Energy Roundtable

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March 27, 2012

NREL/PR-7A40-54591
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
Who?! Me?

Project Development

What is RPS?

or? He that doesn’t make sense!

and then

Project

And

Project Motivation & Development

& Development

FINANCE

"and then"

NATIONAL RENEWABLE ENERGY LABORATORY
Portfolio Context

STEP 1  →  STEP 2

STEP 3  ←  STEP 4
Key Concepts

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

• **Project Development Framework**
  - Overall process environment – situational awareness
  - Framework of information management – SROPTTC
  - Process of incremental investment seeking fatal flaws – Risk Management
  - 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.
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
## Project Fundamentals

<table>
<thead>
<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>Current Use Energy</td>
<td>Energy cost projections</td>
<td>Types: Regulatory Government</td>
<td>Tested/Viable</td>
<td>Stakeholder identification</td>
</tr>
<tr>
<td>Fuels Future Needs</td>
<td>Ratepayer perspective</td>
<td>Internal</td>
<td>Appropriates for location</td>
<td>Community strategies</td>
</tr>
<tr>
<td></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></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>
</tbody>
</table>

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

1. Baseline
   - Energy Resource/Needs
   - Fundamental Drivers
   - Conditions for Success or Constraint

2. Consensus
   - Among Decision Makers & Stakeholders

3. Economics
   - What, When, Where, How

4. Technology

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

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

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

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

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

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

• Purpose
  o Preliminary resource assessment

• Considerations
  o Assessing commercial technologies
  o Reliability
  o Bankability

Photo from Alstom 2010, NREL/PIX 18207
Consensus

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

• **Considerations**
  o Stakeholders
  o Patience – don’t move ahead without this
  o 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™”
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 (SROPTTCTM™)

STEP 4: ASSESS & SECURE FINANCING OPTIONS

BEPTC™ and SROPTTCTM™ are trademarks of the Alliance for Sustainable Energy, LLC, the operator of the National Renewable Energy Laboratory.
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?
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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:
  - 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
Development Risk Capital → Project Finance (Construction) → Asset Finance

Time

Ununknowns

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

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
- 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

CONTINUOUS, ITERATIVE PROCESS

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Iterative Process

Site -> No Site, No Project

Capital

Resource

Team

Financing Structure

Professional, Experienced, Diverse

Engineered System

Technology

Off-take

Permits

Off-take Contract – (Revenue)

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:**
  - Understanding what renewable resources are available and usable on site.

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

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

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

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

NREL/PIX 19498
Permits

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

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

*Photo from Catherine Hart; Greensburg GreenTown, NREL/PIX 17013*
Technology

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

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

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

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

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

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

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

• **Considerations:**
  - Business Structures
  - Achievable Capital Structure
  - Timing
  - Perception of Risk/Reward
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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

- Resource and Technology
- Site (Lease)
- Permits
- Off-Take (PPA)

Capital Financing
## Project Finance Capital Examples (For Illustration Only)

<table>
<thead>
<tr>
<th>Investor Universe</th>
<th>Project Debt</th>
<th>Tax Equity</th>
<th>Lease Equity</th>
<th>DOE</th>
</tr>
</thead>
<tbody>
<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>

| Target Rating | “Investment Grade” no rating needed | BBB-/NAIC 2 | B is doable; BB is preferred | NA (Investment Grade Offtaker) | NA (Invest. Grade Offtake) | NA |

| Market Capacity | Up to $1 Billion; up to 1.0XDSR in Low Case | +$1.0 Billion | $750 Million | Sized to target IRR | 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 |

| Tenor | 5-7 years typical, up to 15 | Term of PPA (20-25); Prepayment Penalty | Up to 7 years | Target IRR reached by year 10 with PTC; 6-7 with ITC | 80% of Useful Life | Up to 30 years |

| 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 | 1.30-1.40 “RSCR” Like Project Debt | Driven by required Ratings |
## 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>
• **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

Cash Flows in Time - Illustration
THANK YOU!

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Useful Resources

**PROJECT MOTIVATION “POLICY”**

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

**PROJECT MOTIVATION “TECHNOLOGY”**

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”**
- [http://www1.eere.energy.gov/tribalenergy/guide/permitting_licensing.html](http://www1.eere.energy.gov/tribalenergy/guide/permitting_licensing.html)
- [http://www1.eere.energy.gov/tribalenergy/guide/regulatory_agencies.html](http://www1.eere.energy.gov/tribalenergy/guide/regulatory_agencies.html)

**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”**