Project Development Steps and Power Purchase Agreements

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Scott Haase
Office of Indian Energy and Economic Development
Division of Energy and Mineral Development
The US needs to add 360,000 MW of power generation capacity over the next 25 years just to keep pace with projected increases in demand for electricity due to population and economic growth.
Current Renewable Portfolio Standards
(National RPS on the way?)

State Goal

- PA: 18% by 2020
- NJ: 22.5% by 2021
- CT: 10% by 2010
- MA: 4% by 2009 + 1% annual increase
- WI: requirement varies by utility; 10% by 2015 goal
- IA: 105 MW
- MN: 25% by 2025; (Xcel: 30% by 2020)
- TX: 5,880 MW by 2015
- *NM: 20% by 2020 (IOUs)
- *10% by 2020 (co-ops & large munis)
- *WA: 15% by 2020
- OR: 25% by 2025
- CA: 20% by 2010
- NV: 20% by 2020
- CO: 20% by 2020 (IOUs)
- AZ: 15% by 2025
- HI: 20% by 2020
- MN: 25% by 2025; (Xcel: 30% by 2020)
- CT: 10% by 2010
- NY: 24% by 2020
- NJ: 22.5% by 2021
- PA: 18% by 2020
- MD: 9.5% in 2022
- DE: 10% by 2019
- DC: 11% by 2022
- VT: RE meets load growth by 2012
- ME: 30% by 2000; 10% by 2017 goal - new RE
- NH: 23.8% in 2025
- RI: 15% by 2020
- MA: 4% by 2009 + 1% annual increase

*Minimum solar or customer-sited requirement
* Increased credit for solar or customer-sited

¹PA: 8% Tier I / 10% Tier II (includes non-renewables); SWH is a Tier II resource

Existing IRP and RPS Renewable additions

New RE Supported by WGA State Standards 2000-2015

MW Installed Capacity

- 2,000 4,000 6,000 8,000 10,000 12,000


- Texas
- New Mexico
- Nevada
- Hawaii
- Colorado
- California
- Arizona
Project Development Steps

• Phase I
  – Strategic plan completed
  – Initial project planning meeting(s)
  – Project team/company formed
  – Secure early stage funding (grant? equity investment?)
  – Feasibility assessment
  – Go/No-Go

• Phase II – Development
  – Permits, interconnect, PPA, finance

• Phase III - Construction
Feasibility Study

Last chance to spend a little money before you spend a lot

- Site analysis/site selection
  - interconnection, water, roads, host site, nat gas, rail
- Resource assessment
- Market analysis (on-site vs. export)
- Technology characterization
- Preliminary environmental review
- Economic and financial analysis
- Barriers and opportunities
Biomass Resource Assessment

• Biomass supply is single most important issue for a biomass project
• Locate and quantify all potential sources of biomass
  – Forests: Tribal, state, local, private, urban
  – Residues: sawmill, construction, urban
  – Crops and crop residues
• How much is produced? How much can you actually collect? Sustainable?
• Competing uses (opportunity cost)
• Quality – chemical analyses
  – Moisture content, energy content, physical form, chemical composition
• Seasonality
• Collection, transport, storage: Cost? Who?
Biopower Supply Curve (Forest and Mill Residues)

Graph showing the cumulative quantity (GT/year) against average cost ($/GT) for different sites.

- Baker site
- Union site
- Wallowa site

Key:
- Blue line = Baker site
- Purple dotted line = Union site
- Red line = Wallowa site
Wind Resource Assessment

- Site selection for anemometer(s)
- GIS overlays
  - Initial NREL wind data
  - Detailed meteorological models
  - Proximity to transmission lines
  - Ownership – tribal vs. allotted
- Preliminary cultural and environmental screening
- Categorical exclusion permit from BIA for met tower install
- Procure towers, use qualified installers
- Arrangements for data collection and analysis
  - Include other local data as available (weather stations, airports, DOT)
Wind Monitoring

- ~ $20,000 for met tower and install
- You will most likely need more than one tower
- You can do this step on your own,
- Or bring in a developer/partner
  - Be sure to negotiate major terms and conditions first
  - What will relationship be if a project gets developed?
    - Define the major terms before hand
    - Tribes must co-own the data
    - Annual payment to tribe in exchange for exclusive right to monitor and develop
Market Analysis

- Define product(s)
  - Electricity, Renewable Energy Credits (RECs), heat
- Wholesale vs. offsetting your retail use (net metering) vs. off-grid
- Identify local, regional or national market outlets
  - Utilities, federal facilities, industry
- Identify opportunities for selling RECs separately or bundled
- Evaluate demand for renewable power by utilities
  - Quantity, type, price range
  - Mandated RPS? Growth?
- Preliminary interconnection discussions and transmission pathways
Load Assessment

- Determine energy use (kWh), peak demand (kw) and cost ($) at candidate locations
  - Start with commercial and industrial loads
  - Multiple sites vs. single site (e.g. sawmill)
- Grid connected or off-grid
- Gather both electric and thermal
- Historical analysis (5-10 years back)
- Rate structures
- Obtain data from tribal records or utility
- Use results to identify opportunities and evaluate economics

### Avg Monthly Cost Per Building

<table>
<thead>
<tr>
<th>Building</th>
<th>Avg Monthly Cost</th>
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<tbody>
<tr>
<td>Casino</td>
<td>$28</td>
</tr>
<tr>
<td>Blackbird Center</td>
<td>$1,793</td>
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<tr>
<td>Community Center</td>
<td>$873</td>
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<tr>
<td>Casino 2</td>
<td>$605</td>
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<tr>
<td>Tribal School</td>
<td>$204</td>
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<tr>
<td>Fire Hall</td>
<td>$999</td>
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<tr>
<td>Roads</td>
<td>$210</td>
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<tr>
<td>Head Start</td>
<td>$235</td>
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<tr>
<td>Youth Building</td>
<td>$251</td>
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<tr>
<td>Clinic</td>
<td>$494</td>
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<td>Birch Hill Fire Hall</td>
<td>$496</td>
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<td>Water and Sewer 2</td>
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<td>$496</td>
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<td>Water and Sewer 1</td>
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<td>Decane</td>
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<td>Commods</td>
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<td>Commods</td>
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<td>Casino Admin Admin</td>
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<tr>
<td>Water and Sewer 3</td>
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</table>

### Calculated Energy Consumption, Profile

![Graph showing energy consumption profile](image)
Technology Characterization

- Match the available resource to the application (e.g. for biomass - heat, power or liquid fuels?)
- Size of system based on resource
  - For biomass, target 50% of total
  - Area of tribal land for wind?
- Investigate various vendors, talk to other owners, independent reports
- Estimate expected performance (efficiencies, capacity factor, expected generation, steam flow, emissions)
- Capital costs? O&M costs?
- Ultimate goal is to feed data to the economic analysis on your output and costs
<table>
<thead>
<tr>
<th>Category</th>
<th>Units</th>
<th>3-MW Stoker</th>
<th>3-MW STRPG</th>
<th>3-MW Chiptec</th>
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<tbody>
<tr>
<td>Capacity</td>
<td>kW</td>
<td>3,000</td>
<td>3,000</td>
<td>2,875</td>
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<tr>
<td>Capacity Factor</td>
<td>%</td>
<td>90%</td>
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<tr>
<td>Energy content</td>
<td>Btu/dry lb</td>
<td>8,640</td>
<td>8,640</td>
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<tr>
<td>MC</td>
<td>%</td>
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<tr>
<td>Energy content</td>
<td>Btu/wet lb</td>
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<tr>
<td>Consumption</td>
<td>wet lb/hr</td>
<td>12,153</td>
<td>6,000</td>
<td>11,213</td>
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<tr>
<td>Consumption</td>
<td>Btu/hr</td>
<td>63,001,152</td>
<td>31,104,000</td>
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<td>Heat Rate</td>
<td>Btu/kWh</td>
<td>21,000</td>
<td>10,368</td>
<td>19,376</td>
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<tr>
<td>Efficiency</td>
<td>%</td>
<td>16%</td>
<td>33%</td>
<td>18%</td>
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<tr>
<td>Consumption</td>
<td>dry tons/hr</td>
<td>3.7</td>
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<td>Consumption</td>
<td>dry tons/yr</td>
<td>28,744</td>
<td>14,016</td>
<td>25,048</td>
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</table>
Preliminary Environmental Review

- Determine the emissions limits for the project site if looking at biomass
- Preliminary contact with federal, state and local officials to discuss the project
- Hire experienced environmental consultant for quick screen, or use internal tribal staff
- Want to be sure there are no show stoppers
- Develop the process steps for development phase
- BIA is lead agency for NEPA process, so talk to RO early in the process
Economic Analysis

- Jack Whittier will give detailed talk tomorrow
- 20 year pro-forma model
- Use conservative cost assumptions
- Add 20% to capital cost estimates
- Labor, O&M, interest, discount rate, inflation, escalation
- Tax credits, green tags
- Calculate levelized cost of energy over the 20 year period
- Net present value, IRR, debt service coverage ratio
Results/Recommendations

- Fuel supply?
- Market for product?
- Environmental showstoppers?
- Interconnection potential?
- Economically feasible?
- Go/No-go decision
Phase II – Development Steps

• Get technical, legal, financial help
• 3 – 10 year process
• Interconnection application – follow FERC process
  – Small generator vs. large generator
  – **Get in the queue**
• Engineering
• Power Purchase Agreement
• NEPA process/permits
• FERC QF certification – make sure your generator is compliant with FERC rules
• REC certification
• Project structure/tax partners
• Financing strategy
Interconnection Procedures (After Filing Application)

• Pre-certified, less than 2 MW
  – Super expedited
  – UL listed, plug and play
  – Limited fees

• Small generator interconnection procedures (SGIP) (< 20 MW)
  – Expedited process
  – Follows LGIP steps but reduced fees

• Large generator interconnection procedures (LGIP)
  – Scoping meeting
  – Feasibility study ($10k)
  – Facilities study ($50k)
  – System impact study ($100k)
Engineering

• Hire an owner’s engineer
  – Banks and lenders will do this as well
• Project implementation method?
  – Design-build
  – Design-bid-build
  – Construction management
• Design-build shown to have lowest cost overruns
• Delivery schedule
• Performance guarantees
• Capital cost risk
PPA Overview

- When developing a utility scale power plant, you (seller) must sign a power purchase agreement (PPA) with a buyer (utility)
- Competitive solicitation and/or bilateral negotiation
- PPA used to secure financing
- Either way, utilities will want you to provide certain information
- The better prepared you are, the greater your chances for success
  - Get help: legal, technical, financial
What are you selling?

- Selling two things:
  - Electricity
  - Green attributes (called RECs or Green Tags)

- Each commodity has value
  - Can be separated or bundled together
  - If bundled, the purchase price should be higher

- In RPS states, utilities will want RECs and power bundled together
The Process

• Identify potential purchasers
• Local as well as regional
  – To sell to regional utilities, must consider cost and availability of transmission
• Approach
  – Direct contact
  – Respond to Requests for Proposals (RFPs)
General Information Required by Buyers (and lenders, investors, vendors)

• Non-disclosure or confidentiality agreement
• Project location
• Site control
  – Site maps
  – Ownership
  – Evidence of legal agreements from tribe and/or landowners to use the land for the project
  – Aerial photos
• Technology description
  – Size and type of turbines
  – Manufacturer specs
  – Equipment performance guarantees
• Power production estimates (generation by hour for an entire year) and engineering calculations used
• Plant schematic and one line drawings showing layouts for generation equipment, buildings, roadways, interconnection
• Describe all interconnection equipment (transformers, switchgears, substations, new lines, delivery points)
Fuel Supply

• Biomass
  – Copy of supply study
    • quantity, availability, cost, location
  – Delivery arrangements, fuel supply contracts
  – On-site storage amount
  – Cost risk – who bears it?
  – Competing markets

• Wind
  – Copy of seller’s wind resource report
  – Verified by third party meteorologist/engineer
Evidence of Community Support

- Community meetings – plans for conducting, or results from completed ones
- Tribal Council resolutions
- Lease agreements from landowners
- Letters from local environmental groups
Interconnection

- Follow FERC process
- Usually, must be able to deliver power to purchasing utility system
  - Seller must arrange for third party service/wheeling
- Seller must file interconnection requests, or describe plans for filing
- Copies of any completed applications
- Copies of any agreements or completed Feasibility Studies, System Impact Studies or Facility Studies
- Copies of any agreements for network upgrades
- Copies of any executed interconnection agreements
• Seller is responsible for NEPA and obtaining all permits
• A written description of all applications, permits and approvals required to construct and operate the facility and all associated interconnecting utilities, including but not necessarily limited to:
  – Conditional Use Permit; Air Emission Permit; Authority to Construct; or Certificate of Public Convenience and Need.
  – A description of Seller’s progress toward obtaining the necessary applications, permits and approvals.
• Copies of any permits and approvals that have already been received
• Copies of any applications filed with a state or local authority seeking authorization of the construction or operation of the facility
• A table which summarizes the air emission levels Seller anticipates will be established for the Generating Facility by the appropriate air permitting agency, if applicable, including:
  – Oxides of Nitrogen (NOx); Carbon Monoxide (CO); Volatile Organic Compounds (VOCs); and Particulate Matter (PM)
• A written description of the operating limitations that the permits have or expect to have which may constrain the operation of the facility including the maximum number of operating hours.
Schedule

- Milestone chart and schedule
- Show key activities
- Critical path items
  - Design
  - Engineering
  - Permits
  - Interconnection
  - Financing
  - Procurement
  - Construction
  - Commissioning
Team Qualifications

- Describe corporate structure of project entity (partners, ownership levels, managing partners)

- Fully describe roles and capabilities of each participant including
  - development team, management team, legal counsel, financial advisor
  - owner’s engineer, construction contractor, transmission consultant, environmental consultant
  - construction period lender, operating period lender
Pricing Terms

- Prices are quoted in U.S. dollars and considered firm unless expressly stated otherwise.
- Prices should be quoted as an all-in levelized cost, in terms of dollars per Megawatt-hour ($/MWh).
- The Seller will be responsible for compliance with all applicable existing and future environmental requirements during the term of a PPA.
- If the Seller’s pricing policy involves escalation or an index, the escalation terms and conditions or specific index must be included for evaluation.
  - Indexes used should be published and publicly available.
Financial Considerations

- Utilities want credit worthy sellers
- Provide annual financial reports and independent audits of each entity in the ownership group
- DUNS #, S&P, Moody’s debt ratings
- Description of project financing plan and all arrangements for equity/debt financing of the project
• Begins the PPA negotiation process in earnest
  – This will be a long, complicated legal document (200 plus pages)
• Seller will be asked to sign exclusivity agreement with Buyer for a certain time period
• Buyer will usually have to post a deposit for negotiations ($500 - $3,000 per MW)
• Development security
• Performance assurance
  – If negotiations are successful, Seller may have to post guaranty of 6-12 months revenues by the commercial on-line date (COD)
Summary

• It is never too early to start
  – Project development can take 5-10 years

• Development/planning process for utilities is long
  – Looking out 5-10 years

• Even very early stage projects (e.g. wind resource assessments not complete) can begin the process
DEMD Renewable Energy Contact Information

Scott Haase, Mechanical Engineer
720-407-0667