Successful Project Development

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What to Expect

Developing a wind / diesel project will require time, patience, and a willingness to hire experience

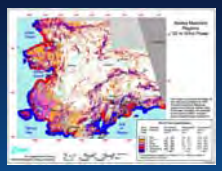
- A long process (2 to 4 years) – Need a champion
- Will need help from people with experience
  - Wind data analysis
  - Geotechnical analysis
  - Wind / diesel power system design / implementation
  - Permitting / environmental experience
- Will be required to spend some money to insure that the project has value to the community
- Need to become a mini-expert in wind systems to understand the options
- Need the implicit support of the whole community (including the people, government, power suppliers)

Initial Screening

3 years

Identify the criteria that you want to use to assess the value of the project.

- Capital cost
- Operational cost and volatility
- Environmental impact
- Community philosophy



Conduct an initial assessment using the data that you have available to determine if it makes sense to invest in a new system - does the project even start to make sense?

- Alaska wind resource map
- Alaska village electric load calculator
- Community discussion
- Looking at other options

Resource Assessment

3 years

Good resource data helps to ensure that

- Project meets economic goals
- System is properly designed

Need to collect some local data

- Install anemometer at a proper site
- Correlate data to long term data sets from local airports, weather stations…

Anemometer loan programs or other sources

Load Assessment

3 years

Need to understand the current and future load in the community to properly assess system options

Measured data (Collect data from the plant)

- Annual or monthly summaries
- Typical days (how does plant power vary)
- Billing Records (then need to include losses)
- Power System Output

Estimated data

- Assess Households, Commercial and institutional loads
- Spreadsheet tools -Alaska village electric load calculator

Other Community deferrable & optional loads

- Water pumping, ice making, battery charging
- Thermal loads (heating and water)

Expected load growth

- Historic simple load growth
- New or planned facilities; schools, water projects etc.

Load management and energy efficiency

Pre-feasibility Study

3 years

What is the most economical way to supply the power to meet the needs of the community

Desired Results

Basic power system design
Estimate of initial and O&M expense
Base line cost of alternatives
Yearly renewable production
Diesel displacement
Reduction in fuel consumption

HOMER

hybrid2

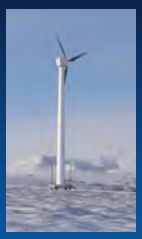
Results need to be discussed with the community … should the project go forwards?

need to be as realistic as possible regarding costs and equipment performance

Final Site Selection

3 years

Need to determine where the new equipment is going to go …



Controls and other equipment

- Space within the power house

Wind turbines

- Land availability (Private / Public)
- Good wind site (on a hill, close to coast)
- Good ground (Geotechnical analysis)
- Proximity to power station
- Road access
- Access to distribution lines

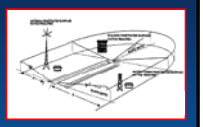
Experience indicates that implementing a wind system as part of a complete power system upgrade makes the most sense.

Again… Community involvement will be required

Identify Permitting Issues

? 3 years

Understanding what permits you will have to contend with will help to determine the project timeline and cost



- Endangered Species
- Avian studies
  - Raptors, Migratory birds
  - Review with interested parties (Fish and Wildlife, Community)
  - Start assessments as needed
- Visual studies – how will the project look
- Historical and archeological studies
- Wetland review
- FAA assessment
- NEPA environmental assessment

Planning for the Future

3 years

Making sure the system lasts as long as it is supposed to...

- Finical sustainability:

  Develop a financial plan to insure system financial sustainability
- Operation & Maintenance Guidance:

  Develop a sound long term operation and maintenance plan for the power systems including warrantees, long term service support
- Training Programs:

  The proper design, installation, operation and maintenance of power systems is dependent on the quality and training of the people used to perform these tasks. A one time training will not suffice

Detailed Design and Cost Estimate

3 years

- What parts of the existing plant will need to be replaced / upgraded
- What other power system improvements can be completed at the same time
- Turbine specification / Identify manufactures
  - Get quotes for different turbines
  - Look at different options: Cold climate, tower types, installation
  - What limits are there on installation, size, foundation type
  - History of company, Alaska involvement
- Conduct detailed system analysis and design
- Development of project timeline (shipping and construction constraints)

Finding Project Funding

? 3 years

Identify funding opportunities

- Private - green tags, corporate loans, alternative funding
- Public – State and Federal grants, loans, bonds

Responding to request for proposals

- Follow the format and address all of the grant requirements
- All involved parties must be included; letters of support, MOU's
- Play to your projects strengths
- You must address the projects deficiencies
- Play to the needs of the granting party
- Play it safe – you will not get negative credit for providing to much information (within proposal limits)
- Always mention local, in-kind contribution - is usually required
- Have a good team with experience in wind/diesel, rural construction and power system maintenance
- Consider consulting with a grant writer

Deploying Projects

3 years

There are basically two processes of project implementation.

- Self developed (you or the concessionaire does it)
- Request for Proposal (RFP) (you oversee everything and others do it)

Key additional issues

- Equipment specification – what to use
- Foundation design
- Equipment integration design (storage, stability)
- Grid stability/load flow analysis (especially with wind turbine connected to distribution)

Final System Design and Implementation

3 years

Determine final system requirements

Contract for design and installation
- Identify critical issues
- Develop RFP for system
- Review proposals
- Oversee installation
- System commissioning
- Obtain manuals and engineering drawings

In-house construction
- Analyze dynamic operation
- Produce engineering drawings
- BOS specification
- Order equipment
- Design and install foundations
- Instalation of system
- System interconnection
- Commissioning

Operating System

Commissioning

3 years

Important step of the implementation process
- Insures proper project implementation
- Sets a baseline for power system operation
- Sets basis for warrantee and equipment service claims

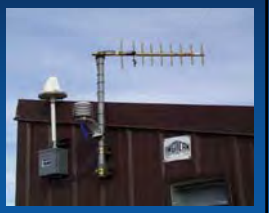
Basic Steps
- Check of system components to be supplied
- Review basic system design
- Checklists for commissioning of different technologies
- Detailed review of system and its operation
- Written and signed documents expressing the results of the commissioning process and detailing required service issues

Usually includes initial training on power system and component operation

Monitoring and Ongoing Operation

3 years

- Monitoring allows oversight of system performance, enabling real time system interrogation and troubleshooting even when off site
- Remote operation can reduce maintenance, maintenance trips and down time
- Need to have on the ground staff with different levels of experience and expertise to provide long term operation and maintenance support.
- Training is not a one time event – generally this needs to be ongoing and continuious



Review

- Development of a community power system is not a simple task – lots of steps
- Wind-diesel systems are complex and companies with experience should be approached to assist
- The operation and maintenance structure should be considered from the beginning
- Projects are developed in a step wise process getting more detailed (and more expensive) as time goes on
- Identifying funding to cover both development and implementation is a difficult hurdle
- High quality system installation and commissioning are critical to project life
- Collaboration of the whole community is critical
- Good Reference: “Isolated Systems with Wind Power - An Implementation Guideline” – Clausen et. al. Risø-R-1257(EN) (http://www.risoe.dk/)

NREL National Renewable Energy Laboratory
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Carpe Ventem

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