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

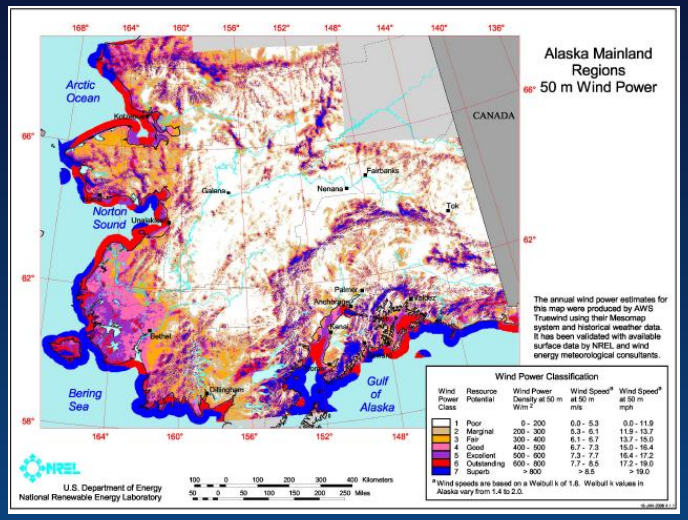
- A long process (2 to 4 years) – Need a champion
- Will need help from people with experience
  - Wind data analysis
  - Geotechnical analysis
  - Wind / diesel power system design / implementation
  - Permitting / environmental experience
- Will be required to spend some money to insure that the project 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.

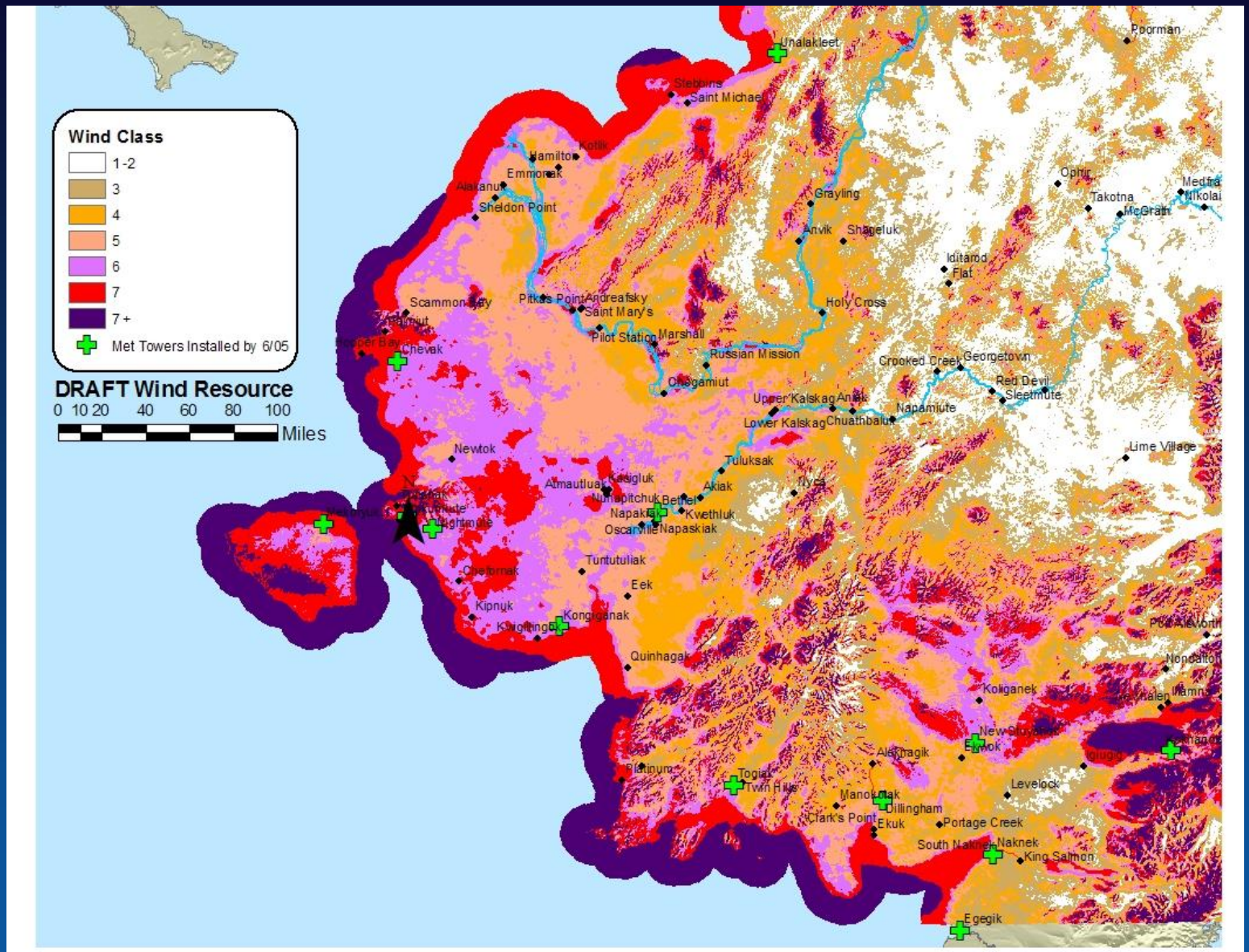
- Capital cost
- Operational cost and volatility
- Environmental impact
- Community philosophy



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

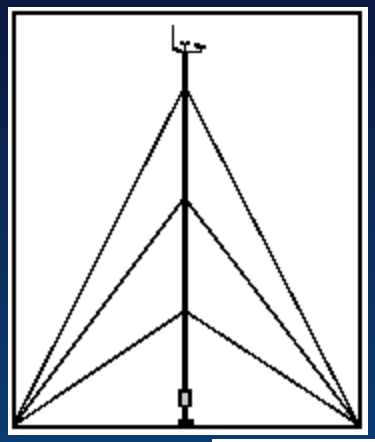
http://www.eere.energy.gov/windandhydro/windpoweringamerica
http://www.akenergyauthority.org


Wind Class
1-2
3
4
5
6
7
7+
Met Towers Installed by 6/05
DRAFT Wind Resource
0 10 20 40 60 80 100
Miles
Unalakleet
Poorman
Stebbins
Saint Michael
Kotlik
Hamilton
Emmonak
Alakanuk
Sheldon Point
Grayling
Anvik
Shageluk
Ophir
Takotna
McGrath
Medfra
Nikolai
Iditarod
Flat
Scammon Bay
Hooper Bay
Chevak
Pitka's Point
Andreafsky
Saint Mary's
Pilot Station
Marshall
Russian Mission
Holy Cross
Crooked Creek
Georgetown
Red Devil
Sleetmute
Napamiute
Upper Kalskag
Lower Kalskag
Aniak
Chuathbaluk
Chuloonawick
Newtok
Tuluksak
Lime Village
Atmautluak
Kasigluk
Akiak
Nunapitchuk
Bethel
Napaki
Kwethluk
Oscarville
Napaskiak
Tuntutuliak
Eek
Kipnuk
Kongiganak
Quinhagak
Koliganek
Ekwok
Togiak
Twin Hills
Manokotak
Dillingham
Clark's Point
Ekuk
Portage Creek
Naknek
King Salmon
Egegik

Resource Assessment

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…

AEA anemometer loan program

http://www.akenergyauthority.org/programwindlanemometerloan.html

Load Assessment

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

Measured data (Collect data from the plant)

- PCE reported load data (provides a basic overview) - http://www.akenergyauthority.org/programspce.html
- 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

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

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

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

Controls and other equipment

- Space within the power house

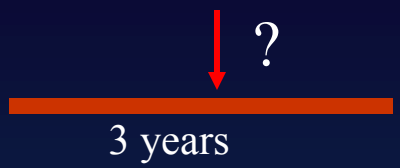
Wind turbines

- 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.

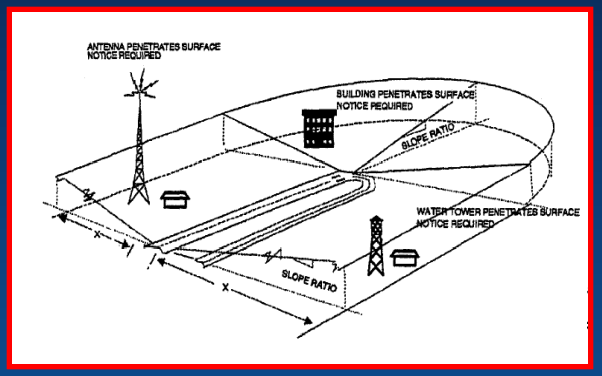
Again… Community involvement will be required

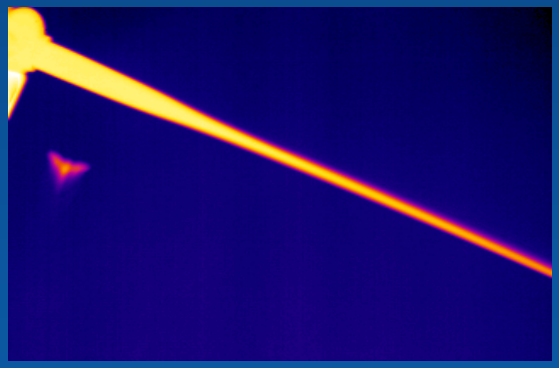
Identify Permitting Issues



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

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

- 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

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

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

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

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 Remote Access

3 years

- Allows oversight of system performance
- Enables real time system interrogation and troubleshooting even when off site
- Can reduce maintenance and down time
- Long term monitoring of allows
  - Assess warrantee
  - Provide feedback on energy usage
  - Support the expansion of the project when it is needed
  - Improve system efficiency
  - Documentation of benefits

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 develop 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
- System installation and commissioning are critical to project life
- Collaboration of the whole community is critical

Thank You!

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