The NorthWind® 100: Wind Diesel Case Studies

Brett Pingree: VP, Community Wind
Wind Energy Focus

- Community Wind/Wind Diesel Turbine: **NorthWind® 100**
- 1.5 & 2.2 MW direct drive PM generator
- Advanced MW-scale power converters
- Wind/diesel integration & controls
Northwind 100 Turbine Technology

- Direct Drive (Gearless) Architecture
- Permanent Magnet Generator
- Low Maintenance/High Reliability System Design
- Optimized for Remote Rugged Conditions and Low Wind
- Integrated Power Electronics
- Advanced DSP Microprocessor Based Controls
  - *Full Embedded Controller*
- Custom Blade Design
- Tubular “Soft” Tower
- SmartView® Monitoring
Major Subsystems

- Nacelle
- Generator
- Rotor
- Tower
Critical Mass: Northwind100 in AK

Fundamental Change in Market and Operations

- Operational and Market Efficiencies
  - Twenty Sold 2001-2007
  - Twenty Sold 2008-2009
  - Forty to Sixty 2010-2012

19 Scheduled Installations: Summer 2009
Specific Conditions That Support Shift in Market: *New and Existing*

- Increased Incentives for Market
- Growth In Customer Base: AVEC
- Highly Capable Partner: STG, Inc
- Increase in Additional Opportunities
- Energy Crisis in Rural AK
- Growing Support Infrastructure
- Demand for Employment
- Great Natural Resources
Examples of Growing Trend

• Funding For Projects in Rise (federal, state and private)
• Highly Concentrated Installations Increasing
• Regional Partner Opportunities Growing
• More Native Training Programs
• Regional Support Hubs
  • Kotzebue
  • Nome
  • Bethel
  • Unalakleet
Wind Diesel Case Studies

Alaska and Newfoundland
Ramea Island, Newfoundland Labrador

- Customer: NLH Utility
- 3 x Northwind 100’s
- 5 x 65kW Windmatics Refurb’s
- 3 x Diesel Engines
- Med Penetration
- Avg. Annual Wind Speed: 7.3 m/s
- Hydrogen generator integration

*Install June 2009*
Savoonga, AK

• Customer: AVEC
• 2 x Northwind 100’s
• 3x Diesel Engines
• Low Penetration (limited controls)
• Avg. Annual Wind Speed: 8.5 m/s
• Diesel Consumption Offset: ~10%

Extreme Polar Environment
Gambell, AK

- Customer: AVEC
- 3 x Northwind 100’s
- 3 x Diesel Engines
- Supervisory Controls
- Low Penetration
- Avg. Annual Wind Speed: 8.9 m/s
- Expected Diesel Consumption Offset: 10%

Install Summer 2009
Toksook Bay, AK

- Customer: AVEC (AK Village Elec.)
- 4 x Northwind 100’s
- 3x Diesel Engines
- Secondary Load Controller w/Dump Load Boiler (*Sustainable Automation*)
- Intertie w/ Tununak and Nightmute
- Avg. Annual Wind Speed: 7.4 m/s
- Diesel Consumption Offset: ~25%
Kasigluk, AK

- Customer: AVEC
- 3 x Northwind 100’s
- 3x Diesel Engines
- Secondary Load Controller w/Dump Load Boiler (*Sustainable Automation*)
- Intertie w/ Nunapitchuk and Old Kasigluk
- Avg. Annual Wind Speed: 6.9 m/s
- Diesel Consumption Offset: ~25%
Hooper Bay, AK

- Customer: AVEC
- 3 x Northwind 100’s
- 3x Diesel Engines
- Secondary Load Controller w/Dump Load Boiler
- Med Penetration
- Avg. Annual Wind Speed: ~6.8 m/s
- Diesel Consumption Offset: ~24%

*Foundation Challenges*
Kotzebue, AK

- **Customer:** Kotzebue Elec. Assoc.
- **1 x Northwind 100**
- **17 AOC’s/Entegrity’s**
- **1 Vesta V17 Refurb**
- **3 x Diesel Engines (5 MW Load)**
- **Low Penetration (SCADA)**
- **Avg. Annual Wind Speed: 6.7 m/s**
St. Paul Island, AK

Wind Only, High Penetration, Wind Diesel

- Customer: TDX Power, Utility
- Northern: (EPC) Engineer, Procure, Construct
- 1x V27 (Vestas 225kW)
- Integration Equipment:
  - Dump Load Boiler
  - Synchronous Condenser
Chevak, AK

- Customer: AVEC
- 4 x Northwind 100’s
- 4 x Diesel Engines
- Secondary Load Controller w/Dump Load Boiler
- Med Penetration
- Avg. Annual Wind Speed: 6.7 m/s
- Diesel Consumption Offset: 22%

Install Summer 2009
Mekoryuk, AK

- Customer: AVEC
- 2 x Northwind 100’s
- 3 x Diesel Engines
- Secondary Load Controller w/Dump Load Boiler
- Med Penetration
- Avg. Annual Wind Speed: 6.7 m/s
- Expected Diesel Consumption Offset: 22%

Install Summer 2009
Quinhagek, AK

- Customer: AVEC
- 3 x Northwind 100’s
- 3 x Diesel Engines
- Secondary Load Controller w/Dump Load Boiler
- Med Penetration
- Avg. Annual Wind Speed: 7.1 m/s
- Expected Diesel Consumption Offset: 21%

Install Summer 2009
Kasigluk & Toksook AK
Questions?