



Feasibility Studies for

Small Community
and Co-Op Wind
Projects

*Western Wind
Power Consulting*

Paul R. Woodin

pwoodin@gorge.net

509.261.0219

There are several Approaches to Wind Projects in the Northwest

Small Home/Farm projects

- Projects use wind, solar, batteries, and generators to take farms off the grid. Some include net metering.

Small Community/Cooperative Projects

- Support distributed generation and sell power through Power Purchase Agreements with local utilities.
- These projects are attractive because they can become community revenue generators, involve schools and local interests, and help supplement future power growth

Large Commercial Projects

- Sited in areas of strong winds, transmission access, and market demand.

Advantages of Small Community and Co-op projects

- It is rare when **single individuals** can afford the expense of large scale wind turbines, yet the newer larger units are far more efficient than the smaller ones available for home purchase.
- **Community Projects** and **Land Owner co-ops** allow groups of individuals to share in small projects without having to finance the entire cost individually.
- Small local projects can provide **revenue for community projects**, improve **tax base**, and provide a focal point for local participation
- Wind projects can spur involvement of **local schools** by providing **real world experience** in technical issues, financial modeling, meteorological exposure, and operational education.

Evaluating the Project

- Large wind farms can spend Hundreds of Thousands of dollars in defining a project before they ever start construction.

Land leases, wind regime, site layout, project costs, turbine choice and contract negotiation, environmental studies, permits, Power Purchase Agreements, project financing, etc.

- Even single turbine projects must answer the same questions as multi-MW wind farm before they know if they have a viable project.

Purpose of Wind Power Feasibility Studies

Wind projects are viable financially when a Power Purchase Agreement (PPA) will finance the costs of a project

Feasibility studies determine:

- Wind Resource
- Project Development Costs
- Power Purchase interest
- Project Financing

to determine if a project is financially viable

Feasibility Studies

Feasibility Studies are generally divided into several Phases

Phase I

- Preliminary magnitude-of-scale **cost estimates**
- Exploration of potential **Power Purchase interest**
- Evaluation of funding – **grants, loans, equity**
- **Economic Modeling** to determine project viability

Phase II

If the project appears viable

- Firm up **project design and cost**
- Help finalize **PPA's**
- Finalize **Economic Modeling** to secure financing
- Help **secure project financing**

Feasibility Studies

Preliminary Studies

➤ Wind Regime

- Work with **meteorologist** to install **met towers** in potential site locations.
- Collect and **analyze** wind data.
- The wind **regime** should be **confirmed** well in advance of other activities
- At least **one year** of met data from the site **or** meteorologist correlated data from other local sites.

➤ Power Purchase Potential

- Establish potential power sales and price potential
- Local utilities, PURPA, utility RFP's, Energy Trust contribution, green tag potential

➤ Transmission/Distribution

- Work with utility to determine line **load capacity**
- If promising, Initiate preliminary utility **integration studies**

Feasibility Studies

Preliminary Studies

➤ Turbine Selection

- Develop **equipment bids** for potential turbine manufacturers
- Turbine choices are guided by **wind regime**, desired **power production**, and **turbine specifications** (reliability, power curves, performance, etc.).
- Determine most economical machine for wind regime based on **power production versus machine all-in cost**

➤ Site Layout

- Work with meteorologist to establish preliminary **turbine siting**
- Develop preliminary project concept designs:
 - **Maps**
 - **Balance of Plant**
 - Roads, crane pads
 - Electrical Infrastructure
 - Sub-station /interconnection point

Feasibility Studies

Balance of Plant Estimates

➤ **Cost Assessment**

➤ Develop order-of-magnitude project cost estimates

➤ **Project Management** costs

➤ **Turbine Installation**

➤ Erection Crews

➤ Cranes

➤ Foundations

➤ Civil Engineering and construction (roads, crane pads, etc.)

➤ Commissioning

➤ **SCADA**

➤ Develop **SCADA** criteria based on project needs:

➤ Remote access **needs?**

➤ **Multiple** Access?

➤ **Remote** site **control?**

➤ Evaluate manufacturer's capability versus 3rd party software

➤ Obtain bids based on project scope

➤ **Operating Costs**

➤ O&M, spare parts, etc.

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Balance of Plant Estimates

➤ **Electrical**

- **Design and Construction estimates of**
 - **Electrical infrastructure**
 - **Wind farm/Utility inter-tie**
 - **Sub-station – metering**
 - **Utility revenue metering**
 - **Safety trip schemes, etc**

➤ **Permitting Costs**

- **Environmental requirements**
 - **Avian studies (Spring, Fall, site Dependant)**
 - **Cultural and vegetation studies**
- **Local and/or State permit process – Conditional Use, EFSC, etc.**
- **FAA permit and lighting requirements (turbines over 200' high)**

Feasibility Studies

Financial Estimates

➤ **Financing**

- **Determine Financial path to fund project**
- **Equity** participants
 - Production Tax Credits (PTC), accelerated depreciation, etc
- **Debt** participants
 - Low interest bonds, low interest loans
- **Other funding**
 - Government matching grants, Green Tags, Energy Trust, BETC, REPI

➤ **Financing**

Financial Institutes look for:

- **Well defined wind regime** with 1 or more years of production level wind data
- **Power Purchase price and length of contract** sufficient to provide debt coverage. **10-15 yr** loans typical
- **Permit and Environmental** details

Feasibility Studies

Economic Analysis

COST

- Earlier components of the feasibility study have gathered the necessary data to perform economic cost analysis
 - **Wind regime**
 - **Turbine selection** and price
 - **Yearly Power Production** based on wind regime and turbine power curve
 - **Balance of Plant costs**

• SIZE

- Data has also been gathered to finalize **project size**
 - Anticipated **Power Purchase price** and **amount** of power desired
 - Utility transmission **capacity** and inter-tie **costs**

Feasibility Studies

Economic Analysis

- Economic **Modeling** of the **costs** and expected **power production** now determine if a project is economically viable.
- Computer Models typically look at:
 - Project **development costs, equity, and debt**
 - Projected **cash flows, debt maintenance**
 - Production **Tax Credits, Depreciation**
 - **Operating Costs, Land owner lease costs**
 - Anticipated **Power production** and sales
- Models can **vary** multiple **inputs** to evaluate various **scenarios** to find optimum project economics

Feasibility Studies

Phase II and beyond

In **Phase I**, sufficient preliminary work is done to **determine** if an **economically viable project** can be developed.

Phase II and beyond can now formalize the project to the point of development

- Formal **negotiation** of Power Purchase **Contracts**
- Final details of **debt and equity financing**
- Final quotes and preliminary design of **Balance of Plant** and **utility inter-tie** can be finalized
- **Environmental** studies can be started
- Project **Permitting** can be done at completion of studies
- Realistic **time lines** of **project development** can be done