



Choosing Wind Energy Projects

There are thousands of mid-scale wind energy projects currently operating or being developed for construction in the United States. When choosing the right investment opportunity, investors should consider three issues: what type of project it is, where it is located, and who the project partners are.

Project Type

Wind projects can be new, operating, or scheduled for repowering. Each has its pros and cons.

- **New** projects benefit from the flexibility of allowing their developers to choose the most appropriate and cost-effective site and equipment. However, they carry the risks that come with a location and wind resource that is not yet tested or permitted.
- **Operating** projects have a few years of generation behind them, so it is clear how their performance compares with development-phase expectations. However, the turbines will have experienced wear, and may require increasingly expensive maintenance.
- **Re-powering** involves upgrading the technology at an operating wind project, usually by installing new turbines. Design improvements often mean that new turbines will generate more electricity from the same site. However, there may be physical or contractual constraints to the size and capacity of new turbines.

Project Location

Siting issues apply equally to new, operating and repowered projects. Each issue has one or two key points to consider.

- **Wind resource** is described in an Energy Yield Assessment, a report forecasting the average amount of electricity the project is expected generate. It is typically based on at least 3 years of wind data collected on site, as well as the performance characteristics of the proposed turbines, and their proposed layout.
- **Point of interconnection** is the location at which electricity from the wind park is delivered to the grid. The project is responsible for building and maintaining transmission lines from the interconnection point to the park, and the costs of construction and maintenance increase with distance. The likelihood of curtailment, (an order from the grid operator to reduce or cut off generation) can also depend on the interconnection point, and the relative mix of load and generation between the wind park and viable markets.
- **Community** support is critical for project development. When sized appropriately, projects can use local businesses as service providers, and may have some community ownership. A locally-based developer can bring connections to local stakeholders and invaluable insights on engaging with the community.
- **Endangered species**, and in particular birds and bats, can be a concern for wind projects. Site-specific risks are described in an Environmental Impact Assessment (EIA). The EIA evaluates the project's potential environmental impacts, and proposes appropriate measures to manage them.
- **Regulatory environment** varies significantly from state to state. Regions with more renewable projects, like the Midwest, are more likely to have clear, well-documented, and consistently applied regulations.

Project Partners

Partnerships for any project are usually governed by a few key relationships:

- The **Offtaker** can buy electricity generated by the project under a **Power Purchase Agreement (PPA)**. Their credit-worthiness and experience in intermittent renewable energy are important considerations. Alternatively, projects can sell directly onto wholesale electricity markets, in which case they are referred to as merchant wind.
- Many projects benefit from financing from a **lender** for construction, interim, or long-term project debt. Different lenders have different levels of experience with the industry, and comfort with its complexity.
- A **tax equity partner** can be a source of funding for renewable energy projects by making an investment in the project company and in exchange receiving the projects' tax credits and depreciation benefits.



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- **Landlords** and grantors of easements often represent the primary point of contact between projects and the community. Their support of a project is essential to its success.
- The **Original Equipment Manufacturer (OEM)** supplies the turbines, and in many instances will also provide a contract for maintenance. Their credit-worthiness and performance track record are important considerations, since the turbine design life is 20 years or more. Presence of the OEM's turbines in nearby or similar sites can give an idea of how the machines perform in similar conditions.
- **Operations and Maintenance (O&M)** services may be performed by the OEM or by an independent provider, particularly for components outside of the turbine (known as Balance of Plant, or BOP). The provider should have enough nearby projects to ensure that staff is frequently in the area and able to respond quickly to incidents.

With this basic understanding of core attributes of each project, investors are well placed to choose the wind assets that best fit their portfolio.

References and Further Reading

[1] United States Geological Survey (USGS), The U.S. Wind Turbine Database & Interactive Map (2021): <https://eerscmap.usgs.gov/uswtodb/>.

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[3] Heibel, J. and Durkay, J., "State legislative approaches to wind energy facility siting" (2016): <http://www.ncsl.org/research/energy/state-wind-energy-siting.aspx>. National Conference of State Legislatures.

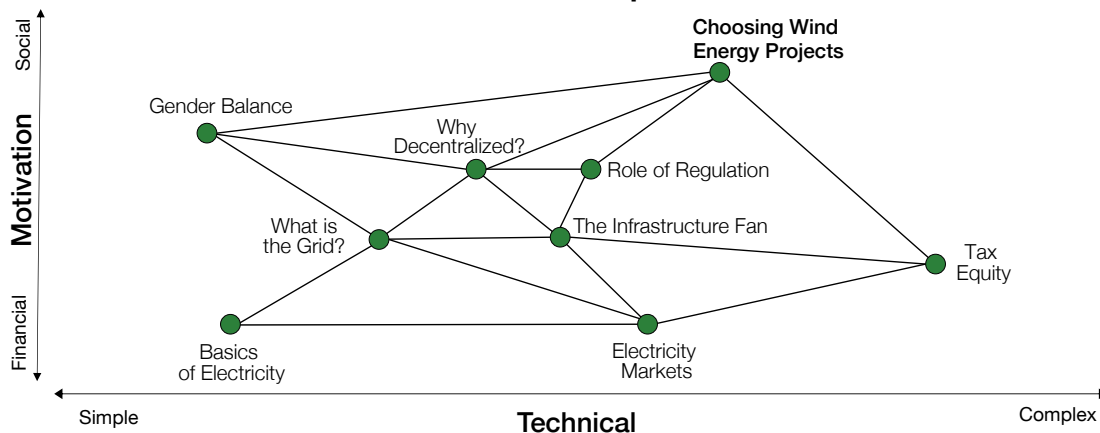
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United States National Parks Service, "Onshore wind energy" (2016): <https://www.nps.gov/subjects/renewableenergy/onshorewind.htm>

See also: <https://globalwindatlas.info/>.

Where this White Paper Fits In



About Treehouse Investments: Treehouse Investments is a minority-owned firm dedicated to addressing climate change. We are a family business, founded by a family from Puerto Rico. We target direct investments in both publicly traded and private entities. Our focus areas fall under the broad description of decentralized infrastructure: companies and projects that contribute to building sustainable and resilient energy, water, and waste systems.