PROJECT DESIGN PHASE 2

CUSTOMER JOURNEY

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Project Name	Predicting the energy output of wind turbine based on weather condition

Wind power generation has tripled over the past decade — and continues to grow as renewable energy gains momentum. However, the small wind market (<100 kW), dominated in the past by residential customers, has largely been supplanted by solar installations. By comparison, commercial and industrial companies have installed over 360 onsite wind turbines. Excluding independent power producers and municipals, the average installation size is roughly 800 kW ranging from 50 kW to 3 MW in size according to the **United States Wind Turbine Database**. Before investing in wind power, your utility's commercial and industrial customers need to understand the keys to wind power success.

Wind power safety issues:

In high wind conditions, the generator and gear box can run too fast and overheat. All wind turbines disengage the generator at some predetermined cutout wind speed (typically 55 mph). A wind turbine will also need lightning protection.

What's the best wind turbine size?

The turbine size will depend on your customer's energy use, the average wind speed at their site, the diameter at the blade tips and the height of the wind turbine, all of which will affect the amount of energy it generates. When wind turbine capacity is augmented by energy storage (during slow wind conditions), energy storage is sized to provide only about 14% of turbine full capacity.

Financial analysis and incentives for wind power:

The Taxpayer Certainty and Disaster Tax Relief Act of 2020 extended the deadline for wind projects started in either 2020 or 2021 to qualify for a **Production Tax Credit** (PTC) of $0.015/kWh on the electrical output for 10 years.Wind projects can receive the tax credit based on either the year the project begins operation or the year in which 5% of the total capital cost for the project has been spent and construction has begun. The credit is claimed by completing IRS Form 8835, "Renewable Electricity Production Credit." The Investment Tax Credit (ITC), previously at 30%, is no longer available for on-shore wind projects.

Conducting a simple investment analysis for your customers can help them understand the financial obligations of wind power more clearly. For example, the assumptions and calculation below outlines how to estimate the total net cost and payback of an average-size onsite wind turbine.