5 kw wind turbine price

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Wind turbines are expensive. Very expensive. But while the initial costs are high,what materials achieve the best cost-benefit ratio, and how best to maintain andprolong the life of their turbines. The current price of raw materials such as steel and copper has an effect on the initial cost, which can fluctuate over the course of a year. Costs are also affected by location, as the price of labor and the availability of materials can drastically affect the cost of building a wind farm. Even more so when you factor in taxes, government incentives, and tariffs.

Manufacturing the wind turbine makes up the vast majority, about 70%, of the total cost. The costs depend on the size, materials used, and country of origin. The components of the wind turbine are manufactured separately, and may even be done at different locations. This is because each component requires specialized engineers, like the blades and the gearbox. The tower is the simplest piece to build, though still makes up a significant portion of the costs. The manufacturing costs primarily consist of labor and raw materials.

Blades make up approximately 20% of the total cost of the turbine. The cost varies based on thematerialsused. Blades are manufactured either with glass fiber or a hybrid of glass and carbon fiber. While glass fiber blades have lower material costs, hybrid blades require less labor.The price difference between the two ends up being negligible.

The size of the blades have a larger effect on price.most wind turbines have three blades, we can say that the entire rotor costs anywhere from $500,000 for average turbines to well over $1 million on larger models.

The nacelle houses the generator, gearbox, and speed brakes. The transmission, axles, and driveshaft are also housed inside. This is where the electricity is generated. The generator components make up about 35% of the turbine"s total cost, and over 50% of the manufacturing costs. The gearbox is the most important piece of the turbine, andmust be durable, reliable, and made with precision engineering.

Though wind turbines are relatively minimalistic, the internal gearbox is a complex system. They are made to last around 25 years, but they require the most attention due to the number of moving parts. The gearbox might crack and fracture due to temperature fluctuations and load changes. Several parts may have to be replaced over the course of its lifetime, and the entire gearbox might even fail.The gearbox constitutes a large part of the service and maintenance cost of the wind turbine.

The tower and yaw mechanism compose around 15% of the total cost of a wind turbine.Taller towerscost more to manufacture in material and labor costs, but lead to lower costs per kW as they can take advantage of the high altitude wind speeds. The current goal is to lower the costs of raising the tower height, which depends on the innovation of new materials. Rolled tubular steel is currently the most common material. New designs incorporating taller concrete tower bases and lattice steel, as well as space frame designs, are in the works.

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The typical 1.5 MW turbine is about 80 m tall, though some can reach as high as 140 to 160 m. Doubling the tower height requires doubling the diameter and quadrupling the amount of material in the tower.The cost of the tower is around $200/kW sts for a 1.5 MW turbine can land around $300,000, while towers for larger turbines can cost over $1 million.

It takes about a year of serious logistical planning and 10 separate loads to transport a single wind turbine. Blades are the most difficult to transport, especially for larger turbines. They are considered oversized loads and require special attention when being transported by truck. Inattentive drivers are prone to drive directly under them if they"re hanging over the back of a cargo truck, increasing the possibility of an accident. The cost of transporting a single wind turbine for a short-haul is between $30,000 and $40,000. Long haul transportation can exceed $100,000 per turbine.

Once the turbines are erected, they must be wired to the electrical grid. The infrastructure for electrical distribution includes the transformer at the turbine base, underground wiring, power substations, and electric power poles. Transformers cost between $15,000 and $50,000 per turbine, and the wires that run down the interior of the turbine cost about $20,000. The costs may run between $40,000 to $200,000 or more, depending on the location and size of the wind farm.

Once manufactured and installed, wind turbines are rather cheap to maintain. Though it is an ongoing expense, the revenue from the electricity generated far exceeds the yearly costs. Maintenance can be broken down into several categories:

Maintenance for offshore wind turbines are higher. Transporting the workers to the worksite and the time-consuming labor make them more costly, and workers must be provided protection from seaside hazards and lightning. Offshore turbines also tend to be larger, meaning higher costs for spare parts and labor.