

## Solar Energy South Africa

# How to calculate the average cost of wind power generation



## Overview

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How do you calculate the cost of a wind turbine?

The total cost per kWh produced (unit cost) is calculated by discounting and levelising investment and O&M costs over the lifetime of the turbine, and then dividing them by the annual electricity production. The unit cost of generation is thus calculated as an average cost over the turbine's lifetime.

How to calculate the investment level of a wind power project?

When calculating the investment level of the wind power project using the economic evaluation indicator, the detailed information of the annual cash flow and the cost at each stage is required. Currently, it is an effective method to establish a life cycle cost model to estimate the cost and cash flow at each stage.

What factors affect the cost of energy produced by a wind turbine?

The turbine's power production is the single most important factor for the cost per unit of power generated. The profitability of a turbine depends largely on whether it is sited at a good wind location. In this section, the cost of energy produced by wind power will be calculated according to a number of basic assumptions.

How much does a wind turbine cost?

As illustrated, the costs range from approximately 7-10 c€/kWh at sites with low average wind speeds, to approximately 5-6.5 c€/kWh at windy coastal sites, with an average of approximately 7c€/kWh at a wind site with average wind speeds.

How to calculate wind power?

Below you can find the whole procedure: 1. Sweep area of the turbine. Before finding the wind power, you need to determine the swept area of the turbine according to the following equations: For HAWT:  $A = \pi \times L^2$

For VAWT:  $A = D \times H$  where:  $D$  — Turbine diameter.  $H$  — Turbine height. 2.  
Calculate the available wind power.

What are the capital costs of a wind power project?

The capital costs of a wind power project can be broken down into the following major categories: Source: Blanco, 2009. Wind turbine costs includes the turbine production, transportation and installation of the turbine. Grid connection costs include cabling, substations and buildings.

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### Can a Small Wind Turbine Power Your Home? (How ...

A 5kW small wind turbine is enough to power a typical US home that needs about 900kWh per month. This figure assumes you have average wind speeds of at least 12mph (19 kph constantly), good site conditions, and a ...

### Wind Energy in India , Cost, opportunities, production and Government

Wind Energy for power generation Wind Energy, like solar is a free energy resource. The Wind Resource data is an estimation of average and peak wind speeds at a location based on ...



### Wind Energy and Power Calculations , EM SC 470: ...

As you can see, when the velocity doubles, the power increased by a factor of 8 and when the velocity triples, it increases by a factor of 27. This is because the velocity is cubed:  $2^3 = 8$  and  $3^3 = 27$ . Calculating Wind Turbine Output. The ...

### Renewable Power Generation Costs in 2023

In 2023, the global weighted average levelised cost of electricity (LCOE) from newly

commissioned utility-scale solar photovoltaic (PV), onshore wind, offshore wind and hydropower fell. Between 2022 and 2023, utility-scale solar PV ...



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