



# Roses for the future: long-term yield forecasts

Careful site selection is critical to the success of renewable energy projects. As subsidies decline and competition increases, accurate long-term yield forecasts are essential for ensuring profitability and sustainability. 4cast explores the key strategies and technologies driving effective site assessment.

Determining the optimal location is a fundamental aspect in planning and implementing renewable energy projects. It forms the basis for their technical feasibility, economic efficiency and environmental compatibility. Careful site selection is increasingly important in a rapidly changing energy market.

In the past, lower yields due to planning errors or suboptimal location decisions could be partially offset by higher subsidies or technological advances. However, because of shrinking subsidies and increasing competition, this scope is far more limited today. Wrong decisions when choosing a location can therefore not only

jeopardize the profitability of a project, but also its feasibility.

Choosing the right location can make the difference between a profitable and an unprofitable project. According to a study by IRENA (2023), suboptimal siting decisions can reduce energy production by up to 20%.



Site selection is a complex undertaking that goes beyond mere land availability. It involves the detailed analysis of geographical and topographical conditions, meteorological data, and ecological features and technical, social, and legal framework conditions. Each of these aspects requires specific expertise and the use of advanced analysis methods.

Furthermore, the location is not only relevant for the initiation phase of projects. It plays a central role over the entire life cycle, influencing ongoing operating costs, maintenance requirements, and ultimately the decommissioning of the systems. Prudent, forward-looking planning is therefore essential to achieve optimum results over the entire duration of a project.

The result is a multi-faceted picture that characterizes site assessment as a key discipline within the planning and implementation of renewable energy projects. This is where the following tips come in. Both proven approaches and innovative methods and technologies are presented that enable precise, efficient, and sustainable site selection. There are also upstream methods for site selection, such as land evaluation, which uses less information to produce rough estimates for comparing different locations.

With this sound understanding of the importance and challenges of site selection, six essential tips are presented below to help planners and project developers put their projects on a solid footing. These tips range from the use of geographic information systems to biodiversity assessment and socioeconomic analysis to ensure that projects are not only economically viable but also socially and environmentally sustainable.

In today's world of changing weather conditions and volatile energy markets, long-term yield forecasts are becoming increasingly important. Using advanced analytics, we can better navigate this uncertain future. Rather than simply monitoring the current performance of renewable energy plants, these forecasts allow us to look into the future.

Compliance with legal and regulatory requirements is essential for the successful implementation of a project. It is important to find out about the relevant regulations and approval procedures at an early stage and to follow them. These official requirements also lead to losses under licensing law, which must be considered in long-term yield estimates besides technical availability and grid losses. If no specific losses and figures are available, TR6 (Technical Guideline 6, FGW e.V., Fördergesellschaft Windenergie und andere

Dezentrale Energien, Fachausschuss Windpotenzial) provides a remedy with general values that should be used as a basis in such cases.

#### **Preparation of long-term yield forecasts**

Creating long-term yield forecasts is based on highly developed analytical methods. Besides historical operating data, current weather data, which can vary due to climate change, is also considered.

#### **Data analysis**

The forecasts are based on extensive data collection, including meteorological data, production histories, and technological parameters. Models that combine physical and statistical methods provide particularly accurate predictions.

#### **Service providers**

Specialized service providers play a central role in creating and interpreting these forecasts. They use advanced software and cloud-based systems to deliver fast and accurate results. These providers carry out comprehensive site analyses, analyze available data, and create detailed models for renewable energies. They take into account the roughness of the terrain, the effects of neighboring plants, and other micro meteorological factors.



### Understanding the limits of forecasts

Despite advanced methods, forecasts are never certain. Rather, they provide a probability estimate based on the information currently available. Nevertheless, it is crucial to deal with the underlying uncertainties and to know how these can influence the forecast.

### Practical steps

#### 1. Analyze legal framework and regulations

- **Legal analysis:** analyze the legal and regulatory framework in the region where the project is to be implemented. For example, in Germany, federal and state laws such as the Renewable Energy Sources Act (EEG) and the Building Code (BauGB) must be considered.
- **Requirements:** make sure you understand and can follow all relevant regulations and requirements, such as the environmental impact assessment (EIA) and nature conservation requirements.

#### 2. Understand the approval process

- **Processes:** understand the required approval procedures and ensure that all necessary permits are obtained promptly. For example, the approval process for a wind turbine in Germany can take up to 24 months and requires the submission of extensive documents, including environmental impact assessments and noise protection analyses.
- **Authority contacts:** establish and maintain contacts with the relevant authorities to facilitate the approval process. This may include the local building authority, the nature conservation authority, and the Ministry of the Environment.

#### 3. Commission a long-term yield estimate

- **Yield forecasts:** commission precise and reliable long-term yield forecasts to ensure the long-term profitability of the project, even in the early phases.

Use automated yield forecasts to give you a solid basis for decision-making. For example, a long-term yield forecast can output the annual yield production of your planned turbines at the acquired site. In addition, average wind speeds can also be a sufficient basis for installing wind turbines. This information can be used to model the expected production over a utilization period of 20 years, for example.

#### 4. Clarify financing

- **Equity or debt capital:** decide whether the financing should be equity or debt capital. Clarify the relevant financing models and secure financing for the project. Example: financing a 5 MW wind



turbine can cost between 5 and 7 million euros and may require the involvement of banks or investors.

#### 5. Commission a wind report

- **Site analysis:** have a comprehensive wind report prepared to provide financiers with a basis for deciding on your project. The report takes a close look at the wind conditions at the site which can take several weeks. Allow time and additional costs for this.

#### 6. Future planning and contact with forecasting service providers

- **Operational management:** if you take over operational management yourself, plan it carefully for the future. Seek contact with forecasting service providers to obtain ongoing accurate performance forecasts and operate the systems optimally. For example, continuous performance forecasts can help better plan maintenance work and maximize energy production.

#### Conclusion: the future of site assessment

By using advanced technologies and taking regulatory and environmental requirements into account, planners and developers can ensure the profitability and sustainability of their projects. Modern technology such as geographic information systems (GIS) and remote sensing allows sites to be analyzed accurately and efficiently.

Automated yield forecasts provide fast and accurate predictions that speed up decision making processes and improve the quality of decisions. This leads to cost-efficient projects and better use of natural resources.

A provider like 4cast helps professionals make informed decisions and develop sustainable projects by minimizing uncertainty and providing accurate, timely data.

#### Quick clarity thanks to automated yield estimates

Efficiency and accuracy are crucial when determining where renewables are. This is where 4cast excels by effectively using automated yield forecasting. Using advanced, data-driven methods, accurate predictions can be made quickly and decision-making processes accelerated.

#### 4cast can help you with the following:

- **Efficiency:** by automating individual process steps, you save time and resources.
- **Speed:** our in-house developed analysis software, which relies on a cloud-based infrastructure, is highly scalable and optimized for fast delivery.
- **Precision:** extensive data analysis and physical models that take into account park layout and wake effects, among other things, ensure accurate yield forecasts.
- **Assessment of uncertainty:** we take uncertainties into account in our forecasts and provide clear information on the accuracy of future yields.
- **Gross yield, net yield, and wind rose:** our services include the preparation and delivery of the gross yield, net yield, and a wind rose. If desired, the delivery can also include the wind speed at hub height.

We offer you the chance to test our long-term yield forecasts at an introductory rate. Book your appointment now for a no obligation consultation by email: [hello@4-cast.de](mailto:hello@4-cast.de) or scan this QR code:



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