

# WIND ENERGY

*Shaping our world*



# Wind Energy – a Sustainable Energy Supply Solution

Energy is our passion, and has been for more than 50 years. With great success – as authenticated by our clients – Lahmeyer International is dedicated to delivering expertise in planning, engineering and consulting services in the energy sector.

Renewable Energy is gaining increasing importance. Photovoltaic, biomass, solar thermal as well as wind energy have become significant parts of the current energy markets and will stay as such also in the future. Especially wind energy has started a tremendous success story in the 90s which is continuing till today. Wind energy projects have shown that they can contribute cost efficiently and sustainably to modern energy generation.

Within this framework, the provision of consulting services for wind energy projects is one of our core competences within the context of renewable energy.

## Lahmeyer International – Market Leader as Wind Energy Advisor

Lahmeyer International, as a company of consulting engineers, has been implementing wind energy projects for decades.

Today Lahmeyer International is a worldwide market leader for overall wind energy technical services which are based on a broad pool of experts, the sophisticated methodology models, and state-of-the-art technology for onshore and offshore projects.

## Pool of Experts

Our project managers provide our clients with long-term experience in project development, assessment, construction and operation. They are supported by numerous in-house specialists.

This cooperation permits an in-depth know-how for all kinds of wind energy projects. Our team has its roots in more than 10 nations and is fluently speaking many languages which is the base for our high intercultural competence.

## World-wide Presence in Wind Energy

With wind energy projects in more than 75 countries, Lahmeyer International has gained experience in complex terrain, multicultural environments and diverse markets.

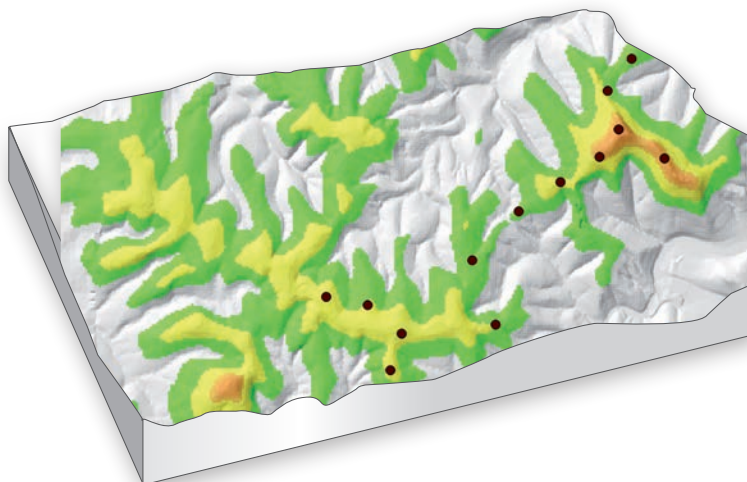
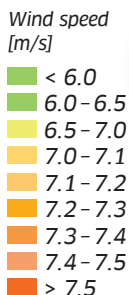


**12** Lahmeyer project experience in **76** countries, Lahmeyer affiliated consolidated companies, branches in **27** countries

### Our Clients and Markets

Lahmeyer International provides its services for the whole range of the wind energy market, from first pilot projects in developing markets to studies for large size portfolios for financing institutions in established markets:

- For governmental institutions and international development organisations we provide in developing wind markets mainly Owner’s Engineering Services.
- Local project developers we often support as Owner’s Engineer in planning and realizing of their projects especially in emerging markets.
- For institutional investors and commercial as well as development banks we act in established markets mainly as Lender’s or Investor’s Engineer.



*Wind resource maps in complex terrain, calculated with suitable non-linear model*

### Key References

- Wind measurements, more than 265 masts installed
- Countrywide wind mapping for 14 countries
- Wind potential evaluations for more than 1,400 wind farms
- Feasibility studies for more than 180 wind farms (9,500 MW)
- Tendering support for more than 110 wind farms (6,200 MW)
- Due diligence studies for more than 1,000 wind farms (30,000 MW)
- Construction supervision for more than 110 wind farms (3,650 MW)
- O&M supervision for more than 90 wind farms (2,500 MW)



*Ordonea wind farm, Italy*



*Turbine Transport in Morocco*





- Site identification
- Planning and execution of wind measurement campaigns
- Analysis of wind measurement data
- Wind mapping by use of different models (e.g. CFD) for complex and flat terrain
- Long-term correlation
- Wind resource assessment studies accredited according to DIN EN ISO/IEC 17025:2005

Wind Potential



- Site suitability assessment
- Wind park layout (micro siting)
- Access road survey / planning
- Environmental impact assessments (EIAs)
- Turbine technology assessment
- Grid integration (study) concept
- SCADA systems layout
- Cost estimates (assessment of investment and O&M cost)
- Time scheduling

Engineering & Planning



- Preparation of tender documents
- Evaluation of bids
- Contract preparation/ negotiation (EPC, PPA)
- Financial close support
- Due diligence studies

Tendering & Contracting

Operation & Maintenance

- Supervision of O&M services
- Training of O&M personnel
- Revision of wind forecasts
- Preventive maintenance supervision
- Condition monitoring supervision
- Regular inspections
- Repowering advise
- Dismantling support

Implementation

- Contract management
- Complete site management
- Factory inspection
- Supervision of construction of offshore and onshore projects
- Supervision of turbine erection
- Supervision of substations and network equipment installation

- Commissioning, witness of acceptance tests, taking over certificates
- Site calibration



Installation of turbines, Poland



Construction in Korea



## Special Topics



### Hybrid Systems

- Wind / diesel / PV systems
- Combination with batteries
- Wind / desalination systems
- Rural electrification



### Electrical Engineering

- (High voltage) network stability calculation
- Offshore and onshore electrical network design
- Isolated grids
- Substation design



### Offshore Wind Farms

- Planning and design services
- Project management services
- Due diligence services
- Technical risk assessment
- Market studies, strategic advice



### Energy Economics and Planning

- Planning and design services
- Project management services
- Technical risk assessment
- Market and strategy analyses



## Worldwide Competence – Made in Germany

As a leading international engineering company, Lahmeyer International offers a broad range of planning and consultancy services. Our services relate primarily to complex infrastructure projects in the energy, hydropower and water resources sectors.

The Lahmeyer name stands for experience, quality and international competence, as can be seen not only in the developing and emerging economies of Africa, Asia and South America, but also in Germany and Europe generally. Project concepts are successfully realised through the application of German and international standards.

Since December 2014 the Lahmeyer Group belongs to TRACTEBEL, and thus is part of the ENGIE Group. Lahmeyer International is one of the few certified laboratories accredited by Deutsche Akkreditierungsstelle GmbH (DakKS) according to DIN EN ISO/IEC 17025:2005 to carry out tests in the fields of determination of wind energy potential and energy efficiency of wind power plants as well as analysis of wind measurements.

**Lahmeyer International GmbH**  
Friedberger Str. 173  
61118 Bad Vilbel, Germany

Phone: +49 6101 55-0  
Fax: +49 6101 55-2222  
info@de.lahmeyer.com  
www.lahmeyer.de



**4,500**  
employees



**33 countries**  
worldwide



**605 M€**  
turnover

**150**

**More than 150 years**  
of experience



Loading of offshore wind energy components