

South African Wind Energy Center (SAWEC)

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***Training and Education Structures
in the Field of
Wind Energy in Germany***

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T&E Measures in the German Education System



Basic Training Structure

- Up to 100k employees in the wind industry in Germany
- A number of institutions offering **training and academic education to meet the requirements of the market**
- Typical for Germany: **very decentralized approach**
- A first vocational training takes place in a company in a kind of an apprenticeship usually 2 to 3.5 years organized in a **dual system** (training in a company 4 days, 1 day theory at the vocational school)
- Further vocational training for **different educational levels in different training centers**
- **Academic education** carried out at several universities

Training Centers, Universities, Academies,... (1) Vocational Training

A number of training centers offering specific courses on design, mechanics, electrical engineering, hydraulics, management, legal issues,... Partly different focus of the entities. Training costs depending on the topic and duration between €3k and 10k

- BZEE Bildungszentrum fuer Erneuerbare Energien e.V (Husum) (together with WAB Windenergieagentur Bremerhaven/Bremen e.V. or WEQUA Weiterbildungs/ und Qualifizierungsgesellschaft mbH)
- BfW Berufsbildungswerk Bremen
- DEWI – Deutsches Windenergie-Institut GmbH, Wilhelmshaven
- WAB Wind Energie Agentur Bremen / Bremerhaven e.V.
- edWin GmbH Bremen / Wirtschaftsakademie Schleswig –Holstein / Bildungswerk Pasewalk GbmH / Hedocat GmbH Luebeck / GL Academy (German.Lloyd, Hamburg), ...

Vocational Training

BZEE e.V.

Wind energy assembly technician (onshore)

Admission requirements

Vocational education
in electrical or
mechanical
engineering

4,5 month
fulltime incl. 3
weeks
internship

Approx.
€ 3000,-

Course Program

Introduction in **technology of wind power plants**
Mechanical engineering technology I: **Materials science**
Mechanical engineering technology II: **Mechanics**
Mechanical engineering technology III: **Hydraulics**
Electrical engineering
EDP
Operational logistics I: **Merchandise management**
Operational logistics II: Hooking and lifting of loads
Operational logistics III: Forklift and crane
Environment protection
Work safety standards and health protection in production
companies
Introduction in **quality assurance**
Technical and operational communication

Other companies providing training programs – e.g.

- edWin GmbH, Bremen
- a) Technician for the **Erection** of Wind Energy Plants 3 months, **fulltime, 440 lessons, €5047**
 - b) Service Technician for Wind Energy Plants, 6 months, fulltime, 920 lessons, € 10.553
- Wirtschaftsakademie Schleswig-Holstein
- a) **Service technician** for wind energy plants 6 months, fulltime, 1040 lessons, € 5720
 - b) Service technician for repairing rotor blades, 2 month, fulltime, 400 lessons, € 3200
- FA- Bildungswerk Pasewalk GmbH
- Tower building** for wind energy plants, 7 months, fulltime € 3600
- Hecodat GmbH Lübeck
- Service technician for wind energy plants, 8 months, fulltime (2 months in-firm training), Costs On request

Universities, Academies,...

(2) Academic Education

- Currently more than **110 University courses** containing aspects of wind energy
- Several Universities and training centers **offer certified study programs and bachelor programs** (bachelor degrees in mechanical, electrical or electrical energy systems engineering, economic engineering, some also extent architecture)
- **Universities:** Kassel, Oldenburg, Bremen, Magdeburg, Stuttgart, Hannover, Bremerhaven, Flensburg, Kiel, ...
- **Master programs wind energy:** Universities Kassel, Oldenburg, Bremen, Magdeburg, Stuttgart, Hannover, Bremerhaven (M.Sc.)

Master Program

FH Flensburg/
Kiel

M. Sc. Wind Engineering

Admission requirements

Bachelor in
Mechanical or
Electrical Engineering

16 month
fulltime incl. 6
months Master
Thesis
Internship

€0,.

Curriculum

1st Semester, Flensburg

Noise & Vibration
Structural Strength & Materials
Aerodynamics and Aero Elastics
Sustainable Energy Systems
Shaping Sustainable Energy
Systems

Optional courses:

Power Train Components
Environmental Science,
Advanced
External Costs of Energy
Trading Energy
Measurement and
Certification
Business Economics

2nd Semester, Kiel

Grid Integration and High
Voltage
Generator and Power Electronics
Control Systems and Automation
Environmental Science, Basics
Optional courses:

Advanced Wind Turbine
Systems
Off-Shore
Advanced Engineering
Mathematics
Measurement and
Certification
Business Economics

Postgraduate Studies

Examples

- **REMENA** – Renewable Energy and Energy Efficiency for the Middle East and North Africa Region; for engineers, nat., soc. and econ. scientists; duration 20 Mths; tuition fee: € 10k-15k; M.Sc. (University Kassel)
- **EUREC Master** – European Master in Renewable Energy; for engineers, natural and economic scientists; duration 1Mths; tuition fee: € 11k; M.Sc. (University Kassel)
- **PPRE** - Postgraduate Program Renewable Energy; for scientists, engineers; duration 16 Mths, tuition fee: € 3k (Uni Oldenburg)
- **Others:** Universities Hannover (ForWind), Stuttgart, Kiel, ...

Example: REMENA, University of Kassel, Public University, Dept. of Electrical Engineering/ Informatics

Course	Renewable Energy and Energy Efficiency for the Middle East and North Africa Region (REMENA)
Target Group	Engineers, natural scientists, economic scientists, social scientists
Main pgr. focus	Technical and managerial knowledge in the renewable energy and energy efficiency (RE&EE) sector and with intercultural competencies
Specialization	Bio energy, solar thermal systems, solar thermal power, photovoltaic, wind energy, energy economics, energy efficiency and conservation
Duration	20 months
Admission	bachelor degree in engineering, natural sciences, economics, requirements social sciences, two years working experience
Degree	M. Sc.
Tuition fees	€ 10k to 15k
Location	Cooperation of the University of Kassel and the Cairo University Students follow this 20 months program at three different locations (Kassel, Cairo and location for master thesis).

Extra-Occupational Training

Different possibilities to gain **extra-vocational training** in parallel to the job – training programs during **week-ends** or **on-line programs** (partly parallel to work)

- University of Kassel, 7 weeks training course “Energy and Environment Design System Planning”; certified examination, € 950
- Fraunhofer IWES, Trainings from 1 day to 4 Months, € 16k-24k; (cooperating with University Kassel for a M.Sc. Progr Wind Energy Systems)
- ForWind Academy (Oldenburg, Hannover, Bremen), Wind Energy Technology and Management (online), 11 Months, € 8.6k
- RENAC (Renewable Academy AG), Berlin, Courses for rotor blades of wind turbines, rotor blade damages, inspection & repair

Private Consultants

with Activities in the Wind Sector

Private Consultants offer services in planning, operating, manufacturing, research, consulting-seminars, e.g.

- Deutsche WindGuard GmbH (Berlin, Bremerhaven, Varel; staff 30)
- DEWI GmbH, Dt. Windenergie-Institut , Wilhelmshaven, Oldenburg, Cuxhaven, staff 90
- Lahmeyer International GmbH, Bad Vilbel, Dresden, Dept. for Wind; total staff 870
- Fichtner GmbH, Stuttgart, staff wind 5-10
- GL Garrad Hassan Dtlid GmbH, Oldenburg, staff wind 130
- MVV decon / others,

Types of R&D Structures

Model I	Model II	Model III	Model IV
<p><i>No central coordination</i></p> <ul style="list-style-type: none">- <i>Project orientated research activities</i>- <i>No financial expense</i>	<p><i>Coordinating office</i></p> <ul style="list-style-type: none">- <i>PR work</i>- <i>Coordination of research activities</i>- <i>Low financial expense</i>	<p><i>Basic Institute</i></p> <ul style="list-style-type: none">- <i>PR work</i>- <i>Coordination of research activities</i>- <i>Research Service</i>- <i>Basic Research</i>- <i>Higher financial expense</i>	<p><i>Central Institute</i></p> <ul style="list-style-type: none">- <i>PR work</i>- <i>Coordination of research activities</i>- <i>Research Service</i>- <i>Complex Research</i>- <i>Very higher financial expense</i>
GER, GB	S		DK, NL, ES, USA

Source: IWR 2008

Examples for R&D Networks in Germany

Center for Wind Energy Research (ForWind)

Headquarter	University of Oldenburg, GER
No. of Institutions	4
Kind of Institutions	Institutes related to the Universities
Members	University of Hannover University of Oldenburg University of Duisburg-Essen (Partner) University of Stuttgart (Partner)
Founded	2003
Tasks/Aim	- Technology transfer between industry and research - Studies for industry and the public authorities - Networking, Education
Fields of Research	e.g. Wind power for caste, Life time for caste, Offshore-meteorology
Financing Source: IWR 2008	Period 1/ 2005-2007: EU, Period 2/ from 2008: 80% EU 20% Industry, Owner

Examples for R&D Networks in Germany

Kompetenzzentrum Windenergie (CEwind)

Headquarter	Flensburg, GER
No of Institutions	10
Kind of Institutions	Universities
Members	University of Flensburg, Kiel; Universities of Applied Sciences Flensburg, Kiel, West Coast, Lübeck IFM GEOMAR, GKSS Research Centre, Academy of North Germany, Centre for Research and Technology West Coast
Founded	2005
Tasks/Aim	<ul style="list-style-type: none"> - Development of a Centre for the region - Fostering cooperation between Universities and Industry - Networking, Education, Joint R&D Projects, etc.
Fields of Research	e.g. Condition Monitoring, Operation of Wind power plants, Impact of Offshore wind parks on the ocean ground and fauna
Financing Source: IWR 2008	Period 1/ 2005-2007: EU, Period 2/ from 2008: 80% EU 20% Industry, Owner

Examples for R&D Networks in Germany

Kompetenzzentrum Rotorblatt

Headquarter	Fraunhofer IWES (Bremerhaven)
No. of Institutions	7
Kind of Institutions	Fraunhofer Institutes, Producer of Wind power plants,
Members	Fraunhofer IWES, Abeking & Rasmussen, Bard, Enercon GE Energy, Sinoi, Repower Systems
Founded	2006
Tasks/Aim	<ul style="list-style-type: none"> - Development of testing systems , methods and procedures - Development of material and technology for offshore wind power plants - Production of components and prototypes - Test center for rotor blades, etc.
Fields of Research	- Rotor blades, Components of rotor blades
Financing	EU financing for the foundation, Industry and Projects

Source: IWR 2008

Thank you for your attention.

