**ERASMUS+ PROGRAMME 2014-2020**
**Mobility of Individuals – Mobility of VET learners**

# Alternative and Renewable Energies

## Description and Goals

Experiencing professional training in Germany, thus getting to know its culture and regional differences and specialties paired with the latest developments in education, research, and the labour market in the sector of alternative and renewable energies are the essence of this training programme.

The training experience comprehends knowledge about renewable energies, their advantages over traditional energy sources and their role in times of impending climate change. In particular, the students will deal with solar energy and wind energy. They will be enabled to evaluate the pros and cons of different types of solar and wind energy and will learn how to do basic calculations, determining the necessary framework and effects of both energy types.
Case studies and visits of different companies using or producing alternative energies will further enhance the students understanding and give them an insight into the German labour market. Furthermore, the students will work on a project about renewable or alternative energies in groups and present their results to an audience. All topics will be covered by professionals formerly or currently working in that field, respecting the latest trends in that industry and applying a hands-on approach.

In addition to the technical content of the programme the learners will get the chance to improve their language and soft skills and experience Dresden through cultural visits and other free time activities.

## Target group

VET Learners of public or private schools training in civil engineering, electronics, and other professions who would like to expand their skill set by discovering relevant aspects and approaches of training in the field of renewable energy sources in Germany as well as German culture.

The intensity and complexity of the Units can be varied according to the previous knowledge and qualification of the participants.

## Learning outcomes

### Professional Competences

*Unit 1: Basic understanding on energy and renewable energy sources*

- Giving an overview of global energy consumption and explaining the role of renewable energies
- Explaining the concept of sustainability in energy production and consumption
- Describing the reasons of climate change and the role of non-renewable energies
- Naming alternative and renewable energies and their advantages
- Reflecting on the history of energy production and its principles
- Defining the need of alternative and renewable energy sources

## General Information

**Place**
WBS TRAINING AG Dresden (other places on request and availability)

**Duration**
2 weeks, lessons from Monday – Friday 9.00 – 14.30 (longer hours are possible on request)

**Number of participants**
14-20

**Training Language**
English or German (level A2 required)

## Contact

For further information on the training programme and for support with the project application, please feel free to contact:

WBS TRAINING AG
Hugo-Junkers-Ring 5
01109 Dresden
GERMANY

**Stefanie Heinitz**
Head International Education Projects
Stefanie.Heinitz@wbstraining.de

Fon +49 351 888 63 61
Fax +49 351 888 63 50

**Laura Byfut**
Coordinator International Education Projects
Laura.Byfut@wbstraining.de

Fon +49 351 888 63 66
Fax +49 351 888 63 50

*Unit 2: Defining alternative and renewable energy sources*

- Defining the principles of wind energy as well as types of wind turbines and their use
- Defining the principles of a hydroelectric power station
- Defining the principles of geothermal power
- Defining the principles of solar thermal heating
- Defining energy production from bio mass
- Defining the principles of Low-energy house, Passive house and Active house conceptions
- Defining the principles of electro mobility
- Defining the challenges of grid integration
- Defining the principles of energy storage and its innovation

*Unit 4: Comparing alternative and renewable energies*

- Comparing different types of alternative and renewable energy sources
- Evaluating the process of energy production of different RES considering various aspects (e.g. required technology, geographical location)
- Applying theoretical knowledge on RES reviewing and evaluating practical case studies
- Visiting DLR school lab for completing practical experiments on organic photovoltaic, super-caps and thermoelectric generator

*Unit 4: Defining the principles of photovoltaic systems*

- Defining the theory of solar cells: history, physics, function, cell manufacturing, materials and the Photovoltaic market worldwide
- Defining electrical characteristics of PV cells
- Describing solar panel construction and manufacturing
- Completing practical experience on cells and modules
- Defining the potential of solar energy considering geographical conditions
- Defining types of photovoltaic systems
- Distinguishing principles of grid-connected and off-grid systems
- Describing the installation and planning of PV systems

*Unit 5: Applying photovoltaic principles in a practical way*

- Measuring the intensity of solar energy on solar panels under different influences as well as the electronic resistance
- Completing practical work experience with photovoltaic system: selecting inverter and panel and calculating yield
- Completing a practical project: Planning a photovoltaic system

**Personal Competences**

*Unit 6: Giving a presentation on a professional topic*

- Researching information on the internet using filters, comparing sources and filing it in folders on the hard drive
- Defining the issues of a complex professional task and their solutions
- Preparing a presentation about the project work in MS PowerPoint
- Presenting the work results in English or German using adequate terminology

*Unit 7: Working in a team confidently and self-responsibly*

- Setting work priorities and applying effective time management

**Project Funding**

The costs for this training programme can be fully or partially (depending on the number of participants) covered by project funding from the Erasmus+ programme (Key Action 1: Mobility). Please contact your National Agency for information on funding details.

- Sharing information with the team
- Listening to other team members' ideas and phrasing feedback adequately
- Assuming the own role and taking responsibility for own activities

## Methods

The practical training course uses a learner-centred approach. After an introductory lecture by the trainer, the learners will mainly work in pairs or groups to fulfil various tasks assigned to them by the trainer and their work group members in order to simulate real work situations.

An essential element of the training is the project work, which the learners will carry out in groups, and which requires and improves skills such as autonomous work planning and team work. During the lessons the trainer as well as the learners will use different tools of visualization such as PowerPoint, pinboard, whiteboard and flipchart.

The learners will also experience some units through guided tours and study visits which will be prepared and debriefed in order to direct the focus onto the learning objective.

Other methods used in the training course will be:

- Brainstorming and mind mapping
- Interviews with classmates or clients/customers – field study
- Observing and describing
- Group discussions
- Presentation and demonstration

## Assessment and Certification

In order to obtain reliable statements on whether all learning outcomes have successfully been achieved, a final assessment will be carried out. For this purpose, during the second week of their practical training, the learners will be assigned a practice-oriented task. This task will resemble a typical project work of the training field according to working life requirements. For the performance of this task, the learners will have to use their newly acquired knowledge, skills and competences. The participants will work in groups of 3 to 5 learners to complete their project work and will be supervised by their trainer. The actual assessment will take place on the last training day: The learners will give a presentation about their work, justifying the working progress and results.

To assess the work results, the trainer will work with standardised assessment sheets, which cover assessment criteria such as:

- Effective teamwork
- Correctness of work results
- Structure of the presentation as well as the quality and creativity of visualization

Upon successful completion of the mobility, the learners will receive a certificate by WBS TRAINING, supplemented by the description of learning outcomes according to the European Credit System for Vocational Education and Training (ECVET) principles. ECVET facilitates the transfer and recognition of learning outcomes acquired in another country and supports transparency of qualifications. WBS TRAINING also supports the sending organization in issuing the Europass mobility.

### Accommodation and Subsistence

Accommodation, subsistence, public transport tickets and cultural programme can be organised according to your wishes.

Please see financial offer for further details of the included services.

## Cultural Programme

Dresden offers a wide variety of cultural, free time and physical activities. With plenty of museums, such as the famous *Historic Green Vault*, the *Old Masters Picture Gallery*, the *Technical Museum*, or the *German Museum of Hygiene*, everyone's taste can be met. Parks and gardens with the option to relax, to work out or to play a ball game, picturesque viewpoints, and many other places of interest just wait to be discovered. Not to forget the city Dresden itself: More than 800 years old, the city looks back to a long and exciting history. The lively *New Town* as well as the *Old Town* with its historical buildings – mostly reconstructed and renewed after the World War II – and the river *Elbe* are definitely worth seeing!

We will provide you an overview about all the things in and around Dresden and help you to decide, what to do. Depending on entrance fees, extra costs for transport, and/or different costs for services, additional expenses may arise.

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# Programme proposal
# Alternative and Renewable Energies (2 weeks)

| Date | Programme |
|---|---|
| Sunday,<br>Day 1 | **Welcome** at Dresden Airport/Main Station<br>**Arrival** at Hostel |
| Monday,<br>Day 2 | **08:15 Pick up at your hostel**<br>**09:00 - 09:30 Introduction**<br>• Clarification of organisational issues, introduction of the project and the tasks for the following weeks, introduction to the Training Course, meeting your trainer<br>• presentation of the host organisation<br>**09:30 – 14:30 Training section: Energy**<br>• Why Renewable Energy?<br>• Definition: What is energy?<br>• The Energy Conservation law<br>• Physics of Energy and Work<br>• Energy forms<br>• History of Energy consumption<br>• Post fossil era: the future of energy use<br>• Energy carriers and sources<br>• The sun: An infinite source |
| Tuesday,<br>Day 3 | **09:00-12:30 Training section: Energy from wind, water, earth and sun**<br>• Wind turbines<br>• Hydroelectric power stations<br>• Geothermal power<br>• Solar thermal heating and power generating<br>• Energy from Bio mass<br>**13.30 Field Trip**<br>• **To hydroelectric plant** |
| Wednesday,<br>Day 4 | **9:00 – 11:00 Visit to the DREWAG Energy museum**<br>**11:00 - 14:30 Training section: Photovoltaics 1: Solar cells – from sand to solar power**<br>• History<br>• Physics: Interaction Light à matter<br>• Function of Solar cell<br>• Cell manufacturing overview<br>• Silicon and alternative cell materials<br>• PV cell market worldwide |
| Thursday,<br>Day 5 | **10:00 Studiy visit**<br>• **To pump storage station**<br>**12:00 - 14:30 Training section: Photovoltaics 2 - Solar panels**<br>• Electrical characteristics of PV cells<br>• Cell test<br>• Solar panels construction<br>• Solar panels manufacturing overview<br>• Practical experience on cells and modules |

| Date | Programme |
|---|---|
| Friday,<br>Day 6 | **09:00 - 14:30 Training section: Photovoltaics 3: PV systems**<br>• Solar potential<br>• Geographical conditions<br>• Types of PV systems<br>• Grid-connected systems<br>• Off-grid systems<br>• Installation of PV systems<br>• Electrical installation<br>• Planning of PV systems<br>• Return analyzes |
| Saturday,<br>Day 7 | *Weekend at the disposal of the students, WBS makes suggestions for the students and helps to organize weekend activities, e.g. trip to Dresden* Green vault, Saxon Switzerland* |
| Sunday,<br>Day 8 | |
| Monday,<br>Day 9 | **09:00 – 14:30 Training section: save energy and self-made power**<br>• Low-energy house, Passive house, Active house conceptions<br>• Plan your own PV system (introduction to the final project) |
| Tuesday,<br>Day 10 | **09:00- 14:30 Training section: Trends and future of renewable energy**<br>• The challenges of grid integration<br>• Energy storage<br>• Electro mobility |
| Wednesday,<br>Day 11 | **09:00-10:30 Field Trip**<br>• **To Power Plant**<br>**11:00-14:30 Field Trip**<br>• **at DLR School Lab: Experiments on organic photovoltaic*** |
| Thursday,<br>Day 12 | **09:00 - 14:30 Training section: Practical experience**<br>• Calculations for the final project<br>• Inverter and panel selection<br>• Yield calculation<br>**13:00 Field Trip**<br>• **To sewage plant** |
| Friday,<br>Day 13 | **09:00 - 11:15**<br>• **Preparation** of Final Presentations<br>**12:00 - 14:30**<br>• **Final presentations** of the students about their project, final evaluation of the project and handing out of certificates |
| Saturday,<br>Day 14 | **Departure** |

***Field trips**

*Please note, that extra sightseeing and excursions on weekend are not included in the price of the programme

**This is a preliminary programme.**
We ensure you that we will do our best to keep the visits and appointments. Programme dates can always change because of organizational reasons.
**Last updated: 27.11.17**