

Bundesinstitut für Berufsbildung (BIBB)

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Competence-Oriented in the Tension Field between Energy Efficiency and Renewable Energy
Knowledge Map 4E: „Career Education for Renewable Energies & Energy Efficiency in Germany“

Abstract

Sustainable Development means: Economic activities without harming the livelihood of today's and future generations without extracting more of nature than it can regenerate. In short, the question is: Living today not at the expense of tomorrow and not to the disadvantage of others. But a sustainable development is only possible, when many people follow this idea as a maxim of action, support this strategy and help to put it into practice. VET also can and has to make its contribution, as it is in the context with the promotion of professional action for more sustainability within the comprehensive chain of value creation and the increase of the efficiency what resources and energy is concerned. VET and particularly VET for a sustainable development (BBNE) as „education in the focus of an occupation“ has furthermore the indispensable task to make it possible to have a share in shaping society.

It is our objective to conceive a knowledge map „competence orientation in the tension field between energy efficiency and renewable energy“ with a special focus on a sustainable energy management, which explains the context concerning the subject and at the same furnishes practical support in anchoring the subject in dual and school education pathways as well as implementing teaching and learning arrangements at learning places of initial and further training. Thus we furnish a substantial and clearly arranged orientation under the heading of „acquisition of competence for a sustainable energy management“ in the broader range of BBNE. This is a useful manual for interested actors, working in the field of regulation of VET, but furthermore for representatives working in research institutions, scientific organisations and institutions dealing with further training.

Knowledge Map 4E: „Career Education for Renewable Energies & Energy Efficiency in Germany“

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| <p>Learning Locations and Fields of Action:</p> <ul style="list-style-type: none"> Vocational Schools Vocational Training Centers Firms in the Fields: Wind Energy Solar Technology Geothermal Appl. House Techniques Energy-Advisor Sustainable Energie-Services In Building Facility Man Mobility | <p>Means & Methods of Learning:</p> <p>Learning for sustainability means the learning-process has to be shaped according to the principles of sustainability:</p> <ul style="list-style-type: none"> Discovery and inquiry Learning Project-Learning: Solar-School-Roofs Learning by doing <ul style="list-style-type: none"> by scouting by experimenting School Firms Junior Firms |
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Apprenticeship

Vocations for Production, & Maintenance

Curricula

Learning – Equipments

Means and Multimedia

Evaluation and Transfer of „Good Practice“

Knowledge Map

Where ? What?

How? Benefit for Firms and Workforce

Dr. Klaus Hahne

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Outline of the problem

„The term „education for a sustainable development“ means education enabling people to anticipate global problems, to confront with them and to solve them. Moreover the term signifies an education promoting values and principles being the basis for a sustainable development. In the end it signifies an education which accentuates the complexity and the mutual dependency of three dimensions : Environment, society and economy.“ 1)

The guiding idea of a sustainable development will be a litmus test for the future prospects of development in society, technology and economics. The different dimensions, i.e. social justice, ecological compatibility and economic performance are objectives of this concept, which have the same priority („triangle of sustainability“). That makes us inevitably look at conflicts and contradictions. Aspects which are ecological are not at the same time economic, social aspects are not at the same time ecological etc. Detecting these contradictions, acting actively in the face of these conflicts and to make responsible decisions is the objective of an education for a sustainable development. This objective is also called „competence for shaping the future“. „Competence for shaping the future means the ability of looking ahead, which enables the modification and modelling of societies your living in, in actively participating in the sense of a sustainable development“ (De Haan/Harenberg 1999).

The competence of shaping the future as the uppermost educational objective subsumes manifold key qualifications according to the orientation context “education for a sustainable education“ of the commission of the Federation and the States. Examples for key qualifications are: The ability to think in networks and in problem-solving categories, the ability to think in categories of participation, team, dialogue and conflicts, methodological competence and the ability of organizing of learning processes.

The focus of BBNE is the development of education of competencies via the medium of profession. Thus, people are to be enabled to shape professional and vital action fields in the sense of the guiding idea of sustainability. For that purpose, the ecological , economic and social relations must be pondered and clarified. The promotion of a sustainable development cannot only be understood as an obligation of Vet to implement a guiding idea. It also offers new chances to increase the quality and the modernisation of VET. A sustainable development must be illustrated by comprehensible examples on the company level. There are no sustainable developments isolated from a context. Sustainability aims at shaping the future and widens the scope of professional action competence: additional competencies are:

- **Reflexion and evaluation of direct or indirect effects of professional action on the environment as well as the living and working conditions of today`s and future generations,**
- **Examination of one`s own professional action, of the action of the company and its products and services with regard to its ability to cope with the future,**
- **Competent co-shaping of work, economy and technology,**
- **Implementing a sustainable energy and resources management in the professional and vital context on the basis of knowledge, system of values and competencies,**
- **Participation in dialogues on a sustainable development in companies and society**

Even if sustainable development as well as BBNE cannot be reduced to questions on the management of efficiency with regard to energy and resources, they are nevertheless in the focus of the discourse of a BBNE in the face of the energy crisis and the climatic upheaval shows decisive reasons for a concentration on these problems: The facts of a climatic change, caused by ourselves (mankind), can no longer be denied scientifically. In the face of the climatic change and a subsequent climatic upheaval, which is inevitable if we do not change our attitudes towards energies and resources,.

The foreseeable depletion of the resources of fossile primary energies are of minor interest. The scenarios of a climatic change clarify that our attitudes towards energy services – to begin with a cozy temperature in our flats, the production of goods and services up to the mobility - have to be shaped under the aspect of sustainability. Every accomplishable reduction of carbon dioxide that we can put into practice or neglect as employed persons, as consumers or by our socio-political participation will only come into effect after decades, but it can make the difference between the survival of our civilisation or its decline as the consequence of the climatic change. The crucial question is, if the climatic change in the 21th century will bring about a global warming of 2 degrees (e.g. an expected sea level rise of app. 2 ft.) or of 6 dregrees (melting of the Greenland and Antarctica ice and an expected sea level rise of about 20ft.). Not to mention the uncalcuable increase of storms, blazes, the expansion of deserts , shortages of water, floods and its consequences for peoples and cultures affected by them.

In the face of these menacing scenarios, which can be somewhat managed by quick and decive action on all social levels, the development of competencies for a sustainable energy services respectively sustainable energy technology must be in the focus of a VET for sustainable development. Just because the implementation of a more abstract perception of BBNE can cause considerable problems, the concentration of the development project on the Problems Energyefficiency and rebewable Energies is indispensable. With the term“sustainable energy service and the principles of a sustainable enery management“ in the broader frame of a sustainable resource management we will gain an interprofessional perspective combining the ecological, social and economic perspectives to a very high degree.

Sustainable energy and resource management means that:

- **The energy and resource productivity is increased (efficiency)**
- **The resources – if they are not regenerative – are preserved and replaced by regenerative ones (sufficiency)**
- **The environment-friendly consistency of material and energetical streams are tested and improved (consistency) This also includes the following points, which are frequently mentioned in enumerations**
- **No longer needed resources are not abolished but recycled (cycles of materials)**
- **Pollutants and waste must not not overcharge the environment (atmosphere, water, soil)**

Objectives of the project:

The conception of a „**Knowledge Map 4E: Career Education for Renewable Energies & Energy Efficiency in Germany**“ is an essential objective of this project, which documents and combines existing approaches of this action field of Innovations in Initial and Further Training for Energy Efficiency and Renewable Energies

This map offers information on:

- Competence centers/Learning places
- Learning concepts, media, expositions on experiments
- Innovative approaches in initial training
- Innovative approaches in further training
- Examinations/certifications

Proceedings within the action field

- Comparative exploration and analysis of learning places and Competence Centers and further educational institutions
- Comparative Evaluation of Career Concepts and Curricula for initial and further training Energy efficiency and renewable energies

Additional Products

- Guiding text: What does sustainable energy and resource management mean?
- Competence for advisory services on energy for house-owners and small firms in the building sector
- Handout: How can a sustainable handling of energy (energy efficiency and renewable energies) be considered, when new regulations are conceived or old ones are revised?

Existing training courses for further training in Germany – A Comparative Study

- Solator
- Specialist for solar technology
- Specialist for regenerative energy technology and resource preserving energy technology
- Specialist for thermal insulation technology
- Energy consultant in the crafts
- Technician for photovoltaics
- Technician for solar heat
- Technician for wind-energy engineering
- Consultant for building maintenance in the crafts sector

By means of the knowledge map 4E (2) „Competence-Oriented in the Tension Field between Energy Efficiency and Renewable Energy“ the existing competence and education centers are described with their didactic approaches and experimental equipments in this field. Under the aspect: „Descriptively learning by structures“ the handling of energy in TVET must be taught credibly and descriptively in the sense of a sustainable handling of energy. The Career Advisors and TVET-staff should becoming familiar with the varieties of leeways in open training regulations, additional qualifications and a combination of schooling and dual training and academic pathways. There is a confusing variety of certified measures by chambers or other institutions or the national or European level (e.g. specialist for solar technology – solator), for which the knowledge map offers a comparative overview as well as recommendations for a federal-wide certification of pathways of further training. For the central field of the consultancy on the energy of buildings a competence is being developed, which is based on the concept of a systemic and shaping competence for a sustainable development (3).

Those two competencies are an indispensable package in a BBNE: **Systemic and Shaping Competence** as Relevant Bundlings of Competencies for a Sustainable Development. Both can easily be combined with the conventional competence model of VET – self-competence, expertise, methodological and social competence. **Shaping competence** refers to the ability to shape working processes, - products , services and key situations in the sense of a sustainable development. The advisory service for customers in the crafts or the advisory service on the energy of buildings are important key situations, where shaping competence is indispensable. In these cases the social and self competence gain a particular importance , because expertise and the personal behaviour must be combined adequately with negotiating skills and empathizing with the client`s needs, expectations and demands.

Systemic competence refers to the complexity of energy systems in houses, production-processes and mobility. F.E.: The energetic status of a building as to heat generation and preservation is registered against the background of energy standards and legal regulations and allocated with a series of aligned suggestions of improvement (heat insulation, doors, windows, heating installations, solar heat, photovoltaics, geothermal energy or combined heat and power. This process is called systemic. But very soon it becomes apparent that technical systems must be understood as a part of social constructs in the context with customer orders (optimization of heating installations, energetic renovation). That refers to the basis context of systemic competence and advisory skills.

Transfer

With the aid of the knowledge map „Competence Orientation in the Tension Field between energy efficiency and renewable energies“ with its description of competence centers and „good practice“ in initial and further training, the transfer to the regulation of VET as well as to practical training aspects is guaranteed. International cooperation in career-building for energy-efficiency and renewable energies will be enhanced by such knowledge map.

Concretion

Methodical procedure

Explorations in selected competence centers, companies, vocational schools and further institutions as a description of learning places and their equipment and experimental equipment as to energy efficiency and renewable energies

Research work in the internet and evaluation of good practice documents as to the development of quality criteria on the basis of didactics and vocational education.

Analyses of selected training regulations and practical guidelines in the action field energy efficiency/renewable energies .

Interviews with experts in the fields of competence development as to energy efficiency/ renewable energies

Two expert workshops in the fields (1) innovations in initial and further training as to energy efficiency /renewable energies, competence-based sustainable resource and energy management.

Contact

If you want to make contributions to the knowledge map 4E or if you want to be registered, please contact :

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Section 4,1: Structural issues Related to Regulatory Work, Examination Systems and Implementation Concepts

Key activities: VET for a sustainable Development

Energy Efficiency /Renwable Energy

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1) German UNESCO-Commission /National Committee for the UN-Decade (ed.): Education for a Sustainable Development. Bonn 2008

2) Knowledge maps offer a suitable structure of a knowledge management and make not only the derivation of qualification and consultancy concepts possible, but also the conception of handouts, implementation guides or learning arrangements for VET and further training.

3) Cooperation with the ESysPro (the Systemic Promotion of Energy Consultancy), a project sponsored by BMBF. This project is conducted by the University of Aachen.

In the

<http://www.bibb.de>

