

Potentials of Energy consulting along the lifecycle of buildings

Simon Heinen¹, Nikolaus Möllenhoff², Klaus Marfels³, Martin Frenz¹ und Christopher M. Schlick¹

Abstract:

Sustainable buildings have complex requirements for offering optimized energy use along its lifecycle. Thus, systematic and professional energy consulting services are necessary. Today, only inconsistent standards are available on the market. This causes enormous uncertainties for the customer as well as the service supplier. In the research project the vocational fields of activities have been developed. Essential components and business processes of offered energy consulting have been analyzed and summarized in an activity scheme. The aim of the scheme is to give an overview of all possible components in order to allow definitions of few standardized types of energy consulting. Furthermore, a “sustainable vocational training” for energy consultants is essential as a basis to perform sustainable energy consulting services. Hence, concepts for training energy consultants have been developed. This raises the demand and transparency of the energy consulting industry sector and supports the energy efficiency of the building sector.

Full paper:

Nowadays, in Germany services of energy consulting are unstructured. There are a lot of different and imprecisely defined service offers without unitary standards. Existing standards are often intransparent and customers as well as energy consultants themselves can hardly distinguish between different service offers. This is due to similar denotation of different training programs or service offers and vice versa. Additionally, the education pathways for becoming an energy consultant do not follow a systematic approach. Vocational and further training in energy consulting are unstructured and a lot of different training offers exist. Furthermore, trainees have very different vocational backgrounds, knowledge and qualifications (e.g. architects, engineers, craftsmen in different work areas as interior decorator, systems mechanics or carpenters, etc.) but are obliged to take the same training programs for becoming an energy consultant.

The turnover towards 0-impact buildings and environments includes an efficient and effective handling of energy questions and requires sustainable thinking, planning and acting. The demand of energy-efficient buildings enormously increases the complexity of handling materials, technology and the adapting of both to each other. A lot of different complex and often even conflictive social, ecological and economical aspects have to be considered. More and more sustainable solutions are expected, expressed as a fair balance between conflicts of different aims. These aspects can appear all along a buildings lifecycle.

Experts in energy consulting services are helpful to handle these impacts effective and efficient while considering all requirements and effects in the future. Energy consultants in general are able to sustainably fulfill these work tasks. Until today a lot of work activities are unstructured or not clearly defined. Unitary work standards are often missing. Vocational training programs are also unstructured and often neglect “special sustainable training”.

In our research project “ESysPro” we developed two approaches to solve these problems. One approach starts at the basis: “Energy consultants need a well structured training concept in clearly defined vocational fields of activities”. This is the basis to deliver sustainable, effective and efficient solutions.

There is a lack of concepts for the development of competencies in the energy consultant area, which include on the one hand the reflection of global environmental problems within trade-off-scenarios of sustainable development and on the other hand the solution of local, hands-on practical problems.

This implies the necessity to develop a systematical modular concept of vocational patterns regarding the heterogeneous prerequisites of trainees to sharpen the profiles of service offers and its training programs. This framework is mainly based on the development of the different fields of activities in energy consulting which are structured according to the value chain in energy consulting for specific services. The central idea of our concept is the curricular implementation of a sustainability ethos and to implement a sustainable work performance following the approach of vocational education for sustainable development. A sustainable work performance includes dealing with conflicts of different aims. One has to consider the three dimensions

economy, ecology and society while acting according to the aspects of ecological agreeableness, economical efficiency as well as social responsibility to find a satisfying solution [1, 2]. Energy consultants are confronted with these conflicts of aims in a lot of their work tasks. These conflicts need to be brought forward to the curricular concept to give a basis to learn to deal with finding non-unitary solutions, which satisfy interests of all three dimensions.

In our studies we developed a set of 10 fields of activities as socio-technical systems. Expert workshops for validation were carried out. On that basis a concept of possible vocational patterns for energy consultants on a macro level has been developed. Those vocational patterns and fields of activities of energy consultants can be augmented with detailed key competencies [3]. The fields of activities have been exemplarily compared with the original crafts to survey the benefits and qualification deficiencies depending on trainees' earlier education. With those results a systematical concept of vocational patterns can be developed and special training programs can be adapted [4].

Today, energy consulting services mainly consist of conceptual designs of energy concepts and concepts of modernization. Hence, energy consulting processes do not go along the full value chain in energy consulting and miss the capacity of value adding, at this time. The conceptual work tasks are merely at the beginning of the value chain; thus, as a result of our studies further work tasks, e.g. monitoring buildings, assistance to building design and its realization, have been included in our set of fields of activities.

To solve the deficiencies in competencies, the first exemplary items for further training have been developed. They are based on the earlier mentioned qualification concept, e.g. modules about an introduction into identifying vital work task related aspects of communication with the customer have been developed. Additionally, a course work has been devised with the objective of advancing participants in competencies regarding sustainable conduct in exemplary work tasks for certain fields of activities, e.g. for planning the heating of a housing estate.

Based on this systematic qualification concept it is possible to determine training programs which fit to energy consulting service offers and have unitary standards.

The other approach is to develop the essential components and business processes of offered energy consulting, which have been analyzed and summarized in an activity scheme. The aim of the scheme is to give an overview of all possible components in order to allow definitions of few standardized types of energy consulting.

Up to now there are no general rules for the processes and essential components of energy consulting. The offer of energy-related advisory services is multifaceted in components and labeling. Neither the consumer nor the consultant knows an exactly meaning of an offered service. Furthermore in our research project "ESysPro" we identified by internet surveys and evaluation workshops a widely spread customer dissatisfaction about range und professional competence of energy consulting. There for we create standards of subject matters and processes to enhance energy efficiency and customer satisfaction.

The main existing guidelines for these services are found at governmental promotion of energy consulting. Nevertheless these guidelines are not legitimated for other services then the promotion case. Also these services mostly finished by hand out and explain the report.

To develop the activity scheme we summarized all possible parts and components of energy consulting. Therefore we abstract various activities and different sub-processes out of all founded energy-related advisory services. Afterwards we generate a classification of energy-related activities in a tree structure with different levels of detail. The more abstract level of sub processes is valid and adaptive on all energy consulting. The more detailed level shows an overview about all possible components, regarding on different trades, energy and calculation standards. It will be completed with check lists of what to do in special cases und situations based on a systematic of Total-Quality-Management.

1 Chair and Institute of Industrial Engineering and Ergonomics (IAW), RWTH Aachen University

2 Chair of Construction Business and Building Services (BGT), RWTH Aachen University

3 Adapton Energiesysteme AG

The activity scheme allows definition of a few standardized types of energy consulting. For these definitions we identified three main classification criterions:

- The scale of inspection considers the number of related trades or problems. The aim of the energy consulting can be an overview of the energy situation of a building complex or a defined question of a constricted problem.
- The depth of inspection differentiates the level of detail for calculation. Differentiations are possible for calculation options for energy aspects also for economic efficiency calculations. The level of detail is also depending on the job definition and the customer objectives. Relevant aspects are the project phase and the investment budget.
- The breadth of inspection regard the four main sub processes of the first level of detail:
 1. Diagnostic and functional analyses,
 2. Conceptual design,
 3. Construction supervision and
 4. Efficiency control / energy monitoring.

For a professional and efficient energy consulting these entire four sub processes are necessary. Diagnostic and functional analyses as well as conceptual design is part of a standard offered service. Mostly the energy consulting ends with the report of results. The third and fourth sub processes are the innovative aspect of energy consulting. Lots of building performance based on well done energy concepts. But for all that the calibration and control modes are bad installed or adjusted. With this focus there is a large field of expertise. Working on this sub process will help to save energy and enforce energy efficiencies.

The regulation of definitions regards on the degree of strength of the three classification criterions. It is important to find definitions to standardize the contents. The consultant knows exactly about the method and components of an energy consulting type. It is possible to show the quality of the conceptual design and to approve the calculated reduction of energy and costs. Also the customer is able to compare the services as well as compare the quality of energy consulting. After finishing the reorganization measures consultant and customer can evaluate the service. Finally we all benefit from saving energy by professional and efficient energy consulting finishing with an efficiency control and a sustainable reducing of CO₂-emission.

References:

- [1] De Haan, Harenberg 1999, Bund-Länder-Kommission Heft 72: Bildung für eine nachhaltige Entwicklung. BLK, Bonn
- [2] Hahne 2006, Kompetenzen und Berufe für erneuerbare Energien im Konzept einer Berufsbildung für nachhaltige Entwicklung. In: Lernen & Lehren, Elektrotechnik-Informatik, Metalltechnik, 81. Band, S. 20-25
- [3] Rychen 2001, Defining and selecting key competencies. Göttingen
- [4] Heinen 2009, Beruflichkeit in der Energieberatung – Eine Analyse der curricularen Strukturen. In: Fenzl, Spöttl, Howe & Becker: Berufsarbeit von morgen in gewerblich-technischen Domänen. Bielefeld: Bertelsmann.