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**Capacity Building in Renewable Energy for Developing Countries:**  
*From E-learning to Rural Village*  
- UNDP/Nepal and SESAM Experiences -

**General:**  
Energy and development are closely related and were the prerequisite for the first industrial revolution 200 years back in the now so-called developed countries. But the signs are visible that the unrestrained use of limited natural resources endangers sustainable development on the local and global level.  
At the same time the transition towards a knowledge-based information society is causing again revolutionary changes in technology, work, economics, environment and society, not only in industrialised nations but also in the developing world. Transfer of knowledge, life-long learning and professional training already play a key role in international competition and co-operation.  
In order to tackle the core problems of environmental degradation, diminishing natural resources and increasing poverty an important “tool” in this process is the use of sustainable energy systems which represent an essential precondition for social and economic development of a country - together with the changing of attitudes, community mobilisation and transfer of knowledge.

**Approach, Innovation and Relevance:**  
To analyse, understand and solve the complexity of problems it is no longer suitable to just have a “tunnel” view which means just narrowing the view on aspects you like to see and not being capable to understand interdependancies with related aspects.  
Typical for tunnel views are technical solutions for non-technical problems and under this category also falls “energy technology for development”.
Project evaluations and research studies clearly prove that the failures in implementation of energy technologies are mainly non-technical reasons:

“In general, economic and information / awareness barriers were the most important barriers across the countries and RETs (renewable energy technologies, author). This points to the low level of awareness and information on RETs among the potential users. Therefore, better ways to raise awareness are required ….Small size of market, unfavourable policies, and subsidy to competing conventional fuels were other reasons that affected the economics of RETs further”. (Painuly J.P./Fenhann, J.V. (2002), p.37)

“A further factor that constrains the effectiveness of decentralised planning is the lack of sufficiently skilled people to carry it out. While collecting data …it is necessary, in addition, to introduce higher level training of planners.” ….. “A further important lack of information is the one felt by rural people themselves. Although they know a great deal about traditional energy supplies and end-use options, very few of know about the potential of new technologies and modern fuels, making it difficult for them to contribute meaningfully to much of the planning process.” (World Energy Council 1999, p. 101)

Therefore the international MSc course “SESAM-Sustainable Energy Systems and Management” aims to prepare participants to work in leading positions in national and international organisations as well as in businesses in order to promote sustainable development strategies and to implement energy concepts in the context of sustainable development. Of great importance in this context are key qualifications:

- ability to view problems/solutions in their entirety, i.e. a holistic approach
- creativity and openness to innovation
- inter-disciplinary approach
- problem-solving ability
- social competencies and the ability to operate in teams.

Besides interdisciplinary study phases on technology and management with emphasis on renewable energy, project management and development strategies, environment and economy and socio-cultural aspects (10 months in Germany) participants will take part in a five months international study programme: two months with all participants as a group in an “International Classroom” and three months as individuals in field research.

The international phase is in collaboration with partners like United Nations Development Programme (UNDP) in Nepal with its “Rural Energy Development Programme REDP” or the “Highlands and Islands Enterprises” in Scotland. The partnership is to provide opportunity to apply the theoretical knowledge and skills in practical local or regional projects.

The process of life-long learning is a challenge to continue with training and exchange of experience as a follow-up work when the graduates are working in their home countries. The modern information technology can offer new ways in continuous networking and seminars, i.e. internet based e-learning.
Experiences of the International Classroom with UNDP Nepal:

Every year in September-October the SESAM group went to Nepal to visit and evaluate rural energy projects and to learn the phases of project implementation. Vice versa staff members of REDP/UNDP participated in project orientated seminars in Nepal during the International Classroom and staff members were also taken for full SESAM MSc study course who within their own field research also evaluated technical, economical and socio-cultural changes, benefits and failures.

The experience of different rural development programmes taking energy systems as an entry point for economic development and poverty alleviation has shown significant results in Nepal: although the same type of energy technology was introduced or promoted the socio-economic changes and sustainability show remarkable differences. Main experience is that
- renewable energy as a tool for social changes, for creating awareness and changing the role of gender is an encouraging perspective for rural development
- basic energy services alone do not bring positive changes in the society: for sustainability people’s participation is a must. Bringing people or mobilizing them (both men and women) into the mainstream of development process is essential before any kind of technology intervention
- renewable energy projects are not automatically sustainable: economic aspects with generating additional income is the most challenging task and
- income generating activities through locally produced goods and services also depend on access to markets, number of potential customers (difficult in remote areas), diversification of products, and purchasing power in the villages.

Experiences of E-learning:
E-learning via internet is now available and practicable even with low transfer rates in developing countries. The experience shows that suitable options of long distance learning are an encouraging option for global education.

Conclusion:
- Choosing the UNDP supported Rural Energy Programme in Nepal as International Classroom for MSc students has contributed in a significant way to the competency of the participants preparing them for leading positions in international organisations as well as in business being capable of promoting sustainable development strategies and programmes
- A decentralized development programme taking the establishment of community based renewable energy systems and social mobilisation as point of departure can lead to steady and sustainable poverty alleviation
- Energy alone is not initiating a process of development: to use (renewable) energy as an effective tool for sustainable socio-economic development must be combined with “non-technical” strategies.
- One time study programme does not meet the demand of continuous learning. To let experts in developing countries participate in latest experience the e-learning option is a new and promising option.
References


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