

# Renewable Energy Research and Education Network

## Introduction

Increasing global energy consumption and the use of fossil fuel to cover most of this demand as shown in Fig. 1 leads to an increasing concentration of CO<sub>2</sub> in the atmosphere with possibly dramatic consequences on our future climate. The correlation between the rising figures of consumption and the CO<sub>2</sub> content as given in Fig. 2 underlines this tendency clearly. But this is not the only risk of our current energy system: The scarcity of our resources comes immediately into our focus, if instead of a static estimation as normally done and as shown in Fig. 3 the future exponential growth of energy consumption is taken into account. Considering this assumption, the cumulative reserves including uranium, which are already explored today will be exhausted after 56 years as given in Fig. 4. But what is even more severe is the finding that, under the assumption of future growth, even ten time bigger reserves would be fully exhausted after another 70 years as shown in Fig. 5.

Due these circumstances, a radical change of our energy system is without any alternative, and today renewable energies are to become the only major source of energy in future. There have been developed many technologies in this field. To the end of a wider development, however, the lack of information exchange and the lack of education is seen as a big barrier today. It is the purpose of the initiative, which will be presented here, to overcome the problems mentioned above, the basis will be centred around the realisation of appropriate networks.



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## Existing Networks in Renewable Energies Research and Education

To begin with a very successful network, the German Association on Solar Energy Research (FVS), will be presented. It consists of eight

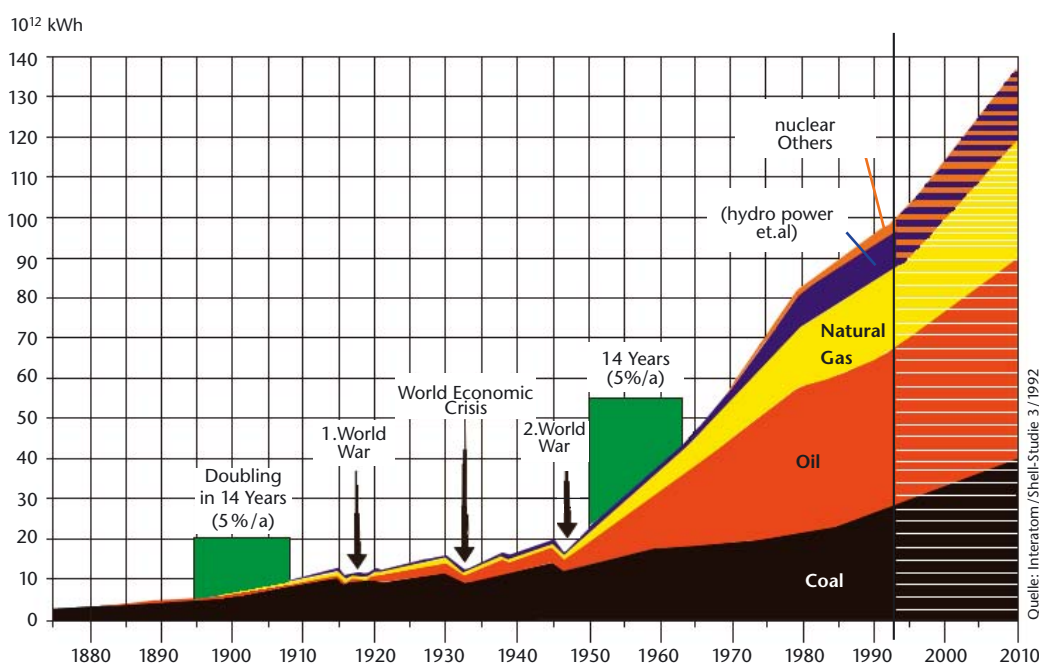


Figure 1  
 Global Energy  
 Situation and Trends

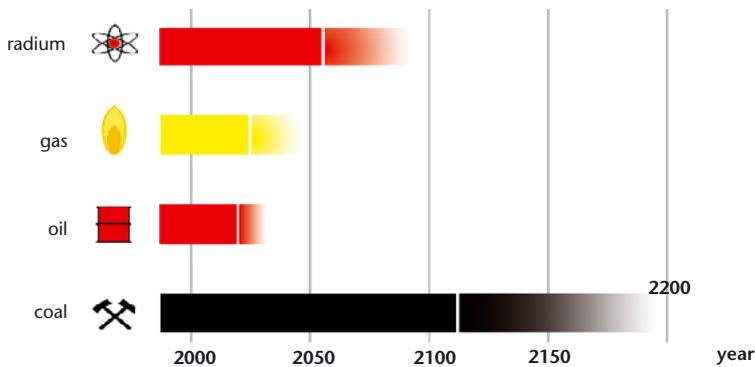
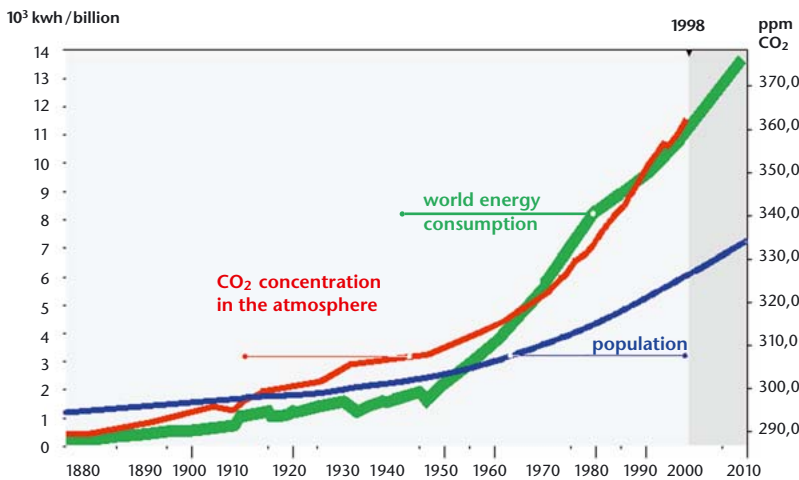


Figure 2 (above) Growth rates for population, energy consumption and CO<sub>2</sub> concentration in the atmosphere

Figure 3 Range of fossil energy resources; source: OECD

research institutes or centres which are shown in Fig. 6. This association covers research in nearly all fields of renewable energies and represents about 80 % of the German research capacity in this area. Besides cooperation, the FVS is organising annual conferences on selected research subjects.

In the European area, the EUREC Agency represents 20 research centres and ten universities. This network has already started a very successful initiative in the sector of education, namely a Master course in Renewable Energies provided by seven leading universities. Fig. 7 shows a description of the consortium. The students of this Master course, which have done their specialisation in hybrid systems in Kassel, are shown in Fig. 8 together with some teachers. As a second network, the European Academy of Wind Energy is shown in Fig. 9 and Fig. 10. This network consists of four European research centres and seven universities performing academy research and education equally.

On a global level, the International Institute for Renewable Energy (IIRE) has been created in 2002. It represents a network of universities and research centres from Australia, Canada, France, Germany and Thailand. The coordinating institute is the School for Renewable Energy at the Naresuan University in Pitsanulok, Thailand.

These networks can be seen as a sound basis for a wider and more systematic information exchange and educational activities on a global scheme. The proposal to establish a renewable energy information and education structure on a global scale can be seen as a result of the situation described above and will be presented in the following chapters.

## Setup of a Renewable Energy Information and Education Network

### Open University for Renewable Energies (OPURE)

There is a lack of information on actual research results, on the application potential, on economic figures etc. on all levels. This situation is true for Germany, but even more for Europe as well as for countries outside of Europe. In general this problem may be characterised as follows: There is very much information existing today but access to this information is difficult. For there is no systematic procedure of such access and the quality of such information is widely scattered. As a consequence effort and money is wasted by doing research on subjects, already performed by others, by delays in product development or its proper use, and by setting up wrong legal framework due to a lack of appropriate and up to date information.

On the other hand, new technologies in the ICT sector can provide a powerful tool to a fast, interactive exchange of information to an unlimited member of users. Such a platform could be realised with a small budget or even be integrated into the existing "Bildungs-Server" of the German BMBF (Federal Ministry for Education and Development). The remaining

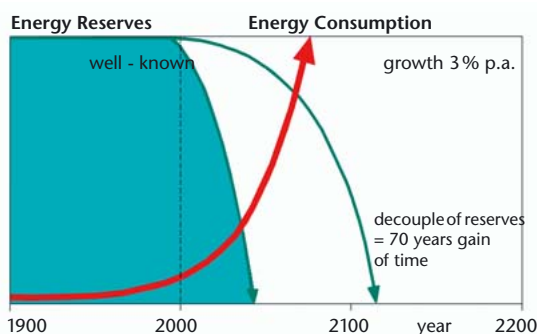
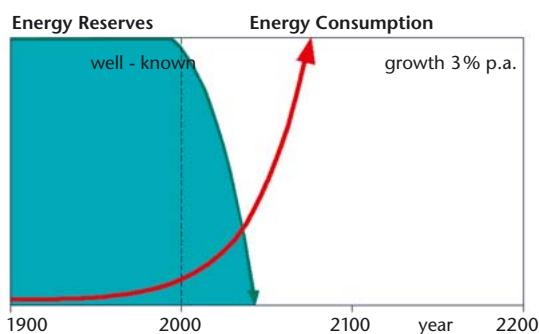


Figure 4  
Range of the well-known energy reserves for a constant growth of the energy consumption of 3%

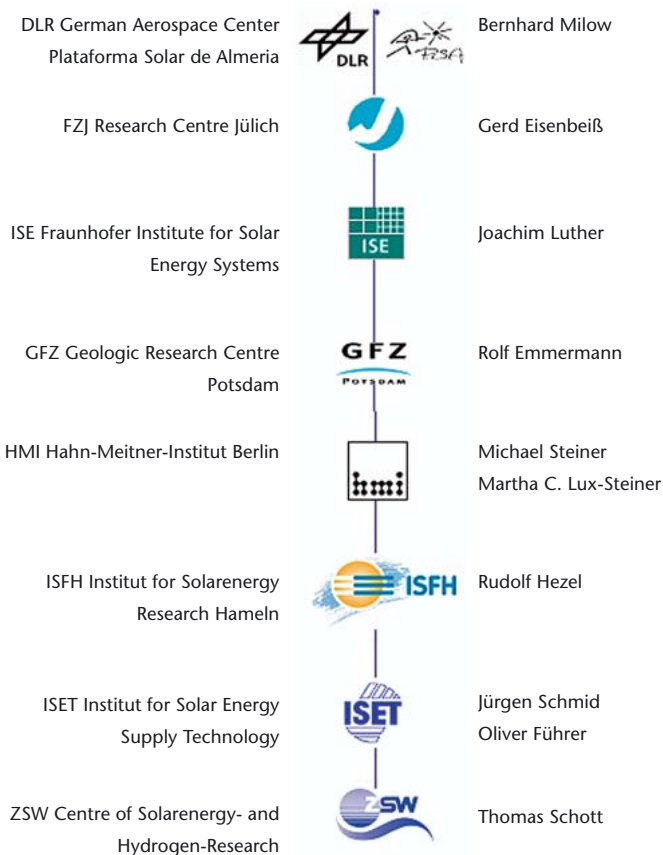
Figure 5  
Range for a decouple of the well-known energy reserves for a constant growth of the energy consumption of 3%

problem is to organise the collection, the review, the grading or certification of the information and the provision of education material in a systematic way. Since it is expected that success of this initiative will heavily depend on its proper functioning in the initial phase, a multi-step process in the build-up is proposed:

- In a first step, which is the subject of the current proposal, this structure will be set-up in Germany. Languages of the material will be German and English.
- In a second step, the structure will be extended to Europe. For this step it is planned to seek for a support from the European Commission. Translation of information material into different languages will need to be provided in this phase.
- After successful implementation of the second phase, the system will be extended to global coverage with a special emphasis on developing countries. In addition to translation of languages, the transformation into different cultures will need careful adaptation of the information material and, as a consequence, the involvement of professionals from the anthropological, psychological and pedagogical sector.

in the same way as is traditionally done in high level, peer-reviewed scientific journals. As a consequence the process for scientific material is identical, which means a full text review including interaction with the author by at least three peers. Regarding education material, the level and quality of information, including ECTS-credits, will be classed by the review committees. As it is tradition in the scientific community, all committee members will act on a voluntary basis free of charge, but their names will be shown in the editorial sector.

Figure 6  
Members of the German Solar Energy Research Association



## Organisations of the Review Committees

For each subject and for each level (scientific, school-level or professional practitioners' skills) a committee will be organised, which will evaluate the information and education material

Figure 7 (left)  
Research Centres and Universities of EUREC Agency



Figure 8 (right)  
Participants of the EUREC Master Course 2004



Since the presentation and discussion of the basic structure of the proposal during the Science Forum on the Renewables 2004 Conference in Bonn, many stakeholders have expressed their interest to support or to participate in the proposed initiative.

## Supporting Public Institutions in Germany

For Germany the following institutions have offered support:

1. BMWA – Dr. Knut Kübler
2. BMU – Dr. Wolfhart Dürschmidt
3. BMVEL – State Secretary Matthias Berninger (tbc)
4. dena – Stephan Kohler
5. DBU – Dr. Wulf Grimm
6. FVS – Dr. Gerd Stadermann and Dr. Gerd Eisenbeiß



Figure 9  
European Academy of Wind Energy

## Participating Institutions in Germany

7. ISET – Jürgen Schmid
8. Universities:  
Kassel, Magdeburg, Berlin, Oldenburg
9. Technical Colleges:  
FH Berlin, Aachen, Hamburg, Biberach, Internet-FH

## European Institutions

- EUREC-Agency – Didier Mayer (10 Universities, 20 Research centres)
- European Academy of Wind Energy – Jürgen Schmid (7 Universities, 4 Research Centres)
- KFPE-Switzerland – A.-C. Clottu Vogel

## Global Institutions

- International Institute for Renewable Energies Thailand (4 Universities, 3 Research Centres)
- UNESCO GREET-Programme, Paris

## Organisation of the Programme

- General Coordinator: ISET, Kassel
- Coordination of scientific committees: FVS, Berlin
- Coordination of membership: University of Magdeburg
- Coordination of education for professional practitioners (vocational education) DBU, Osnabrück
- Coordination of schools
- Coordination of hardware infrastructure: ISET, Kassel
- Coordination of European actions: EUREC-Agency, Brussels
- Coordination of Global actions: UNESCO GREET-Programme, Paris

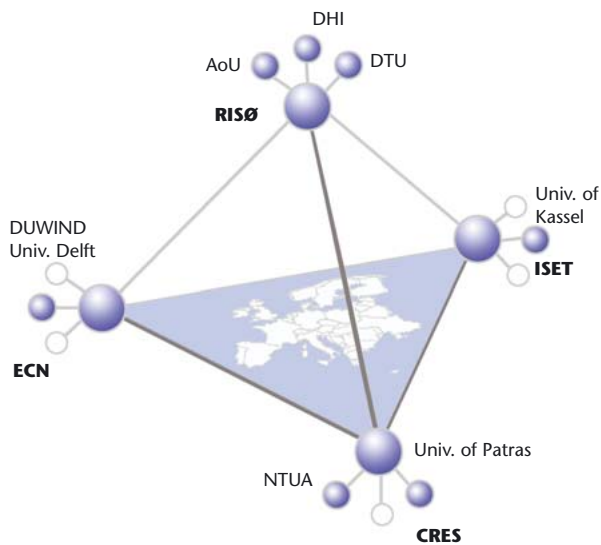


Figure 9  
Member Institutes of  
the European Academy  
of Wind Energy

## Work Programme

1. Building of a management team (one secretary, one scientist, one ICT technician)
2. Formation of the review panels
3. Set-up of a flyer and homepage explaining the target and content of the initiative
4. Hardware realisation
5. Organisation of annual meetings for all programme participants and supporters

## Review Committees

1. Rational use of energy
2. Systems analysis and scenarios
3. Resource assessment for solar, wind, hydro, biomass, geothermal
4. Solar buildings
5. Thermal collectors and systems
6. Solar thermal electric power systems
7. Photovoltaics
8. Wind energy systems
9. Hydro power plants
10. Marine energy systems
11. Biomass energy systems
12. Geothermal systems
13. Storage devices and applications
14. Hybrid systems and minigrids
15. Social aspects
16. Grid design and grid management
17. Economics of renewable energies