

# Research Objectives 2004

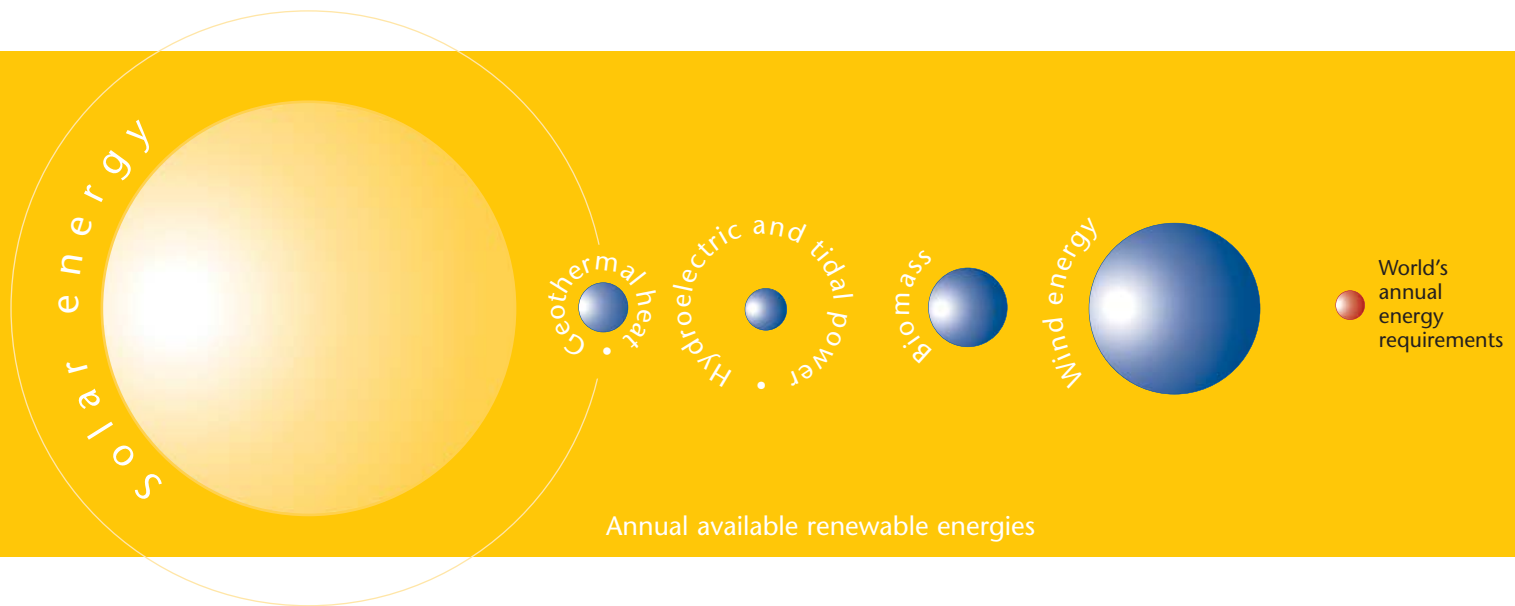
## Joint Research for the Energy of the Future



**FVS** ForschungsVerbund  
Sonnenenergie

Solar Energy Research Association

# Sun – the energy of the 21<sup>st</sup> century



The FVS • ForschungsVerbund Sonnenergie (Solar Energy Research Association) is working for a sustainable energy supply designed to meet the requirements of today's society. The renewable energy sources provide an essential starting point for this, as the natural renewable energy sources such as sun, wind, water and geothermal heat are inexhaustible measured on a human scale and can be exploited by using efficient and innovative technologies.

## Sustainable energy supply

The Solar Energy Research Association's strategic aim is for renewable energies to become a central pillar of sustainable energy supply, targeting:

- **Ecological viability**

In setting their energy and environmental objectives, the German government and the EU are guided by the international target which aims to cut carbon dioxide emissions (based on 1990 levels) by about 80 % in industrialised countries by the middle of the century. Renewable energies can make a significant contribution to this and help to reduce the extent of climate change caused by humans.

- **Reliable resources**

The foreseeable depletion of reserves of fossil energy sources means that renewables will soon be needed as substitutes for coal, oil and gas. Geostrategic developments are also a compelling reason for the speedy and vigorous expansion of renewable energies.

- **Social justice**

Renewable energies are a clean and safe source of energy that is available to everyone and which will become increasingly affordable in the future. In developing and emergent countries in particular, the use of renewable energy sources can be combined with the creation of regional jobs and the raising of living standards through local wealth creation and decentralised economic structures. Renewables offer a wide range of possibilities for overcoming economic underdevelopment in many parts of the world, as they are freely available and non-finite sources of energy.

- **Economic effectiveness**

When renewable energies are able to make full use of their potential for cutting costs, they guarantee an economic energy supply at a stable price. Utilisation of renewable sources is increasingly driven by the prospect of positive economic effects. Production of technical components and systems for utilising renewable energy sources will become an essential element of global economic activity.

## Priority for renewable energies

The German government's long-term target is to cover about 50 % of energy demand using renewable energies by 2050. The European Union recommends generating approx. 20 % of electricity from renewable energy sources by 2010. In order to reach these energy policy targets, the process of introducing renewable

energy technologies will need to be speeded up quite considerably. This should be achieved by introducing strategic economic policy measures and by commitment to market introduction programmes. The basic condition for the accelerated development of renewable energy technologies, however, is still efficient research and technology development.

# Research and development policy aims of FVS

## Renewable energies are key technologies

Renewable and solar energy technologies have been declared key technologies with respect to research policy. The large-scale use of renewable energies will result in an evolutionary process that will change the processes for energy generation, as well as the tasks of energy supply companies, the supply structures, the economic and financial relationship between energy producers and consumers, the structure and number of stakeholders in the energy sector, and the technologies used everywhere from the construction industry to transport engineering.

such a process will extend over decades, mainly driven by the feedback from market application experience to further R&D.

## Ensuring and developing technological diversity

In order to meet the German and EU targets for doubling the share of renewables by 2050 and the associated energy policy objectives, every renewables energy source with promising contribution potential to the aggregate energy supply – each varying in availability/quantity and according to region – will have to play its part. The strength of renewables lies precisely in the diversity of their possible applications.

## Leaders now and in the future

German research and development achievements in the field of renewable energies and related system technologies are top-rated world-wide. On this basis, high-grade energy technologies and an industry with increasing export potential have developed. Short innovation cycles are a sure sign of rapid transfer of technology into the market and confirm that research and development is efficient and application-oriented. Although many technologies have been successfully deployed and are beginning to find wide application, research and development continue to be necessary in order to mobilise the full potential of these technologies, which, basically, are still in their early development stages. Experience from other technological fields shows that

## Excellent basic research coupled flexibly with technological development

Excellent basic and application-oriented research on the utilisation of renewable energies is and will remain in future an essential condition for the development of ever-improving conversion technologies and ever more cost-effective and sustainable energy supply systems. It will be necessary to promote application-oriented basic research and the development of technology close to the market in equal measure, because in principle there are still many paths of energy conversion which could lead to successful outcomes.

The linking of science and research to industrial innovations is not a one-way street, but rather an interactive system with many feedback loops. Problems of application turn into new challenges for basic research. The dynamics of the marketplace and short innovation cycles demand that all activities be carried out parallel to each other and in a flexible way.

## Developing system optimisation

As current energy supply structures in Germany undergo further evolution, consideration of the growing use of renewable energies becomes necessary. This applies especially to the structure of the electricity grid, which will have to accommodate both greater decentralisation of energy generation as well as expanded networks, sometimes extending over greater distances. The use of wind energy is a present illustration of this. By 2020, around 60 % of the German power station capacity will have to be replaced, creating the opportunity for farreaching changes in the type of energy supply. Replacements that will be necessary within the next twenty years in the fleet of German power stations will therefore create the room for manoeuvre required for farreaching changes in the type of energy supply. Changes in the power station structure brought about by the need to construct new plants must be made part of the equation for optimising the technology used in the whole system. There is a partial shift in electricity supply towards the site of its use, brought about by the considerable expansion of combined heat and power generation and the increase in power generation from renewables.

In future, intelligent control systems must coordinate these decentralised power generation facilities efficiently. It will become increasingly necessary and appropriate to match energy generation to its consumption by using a sophisticated grid-wide demand side management system. In the heat supply sector, structural changes in system technology – to much higher degree than has so far been the case – will be necessary to achieve an optimal integration of renewables.

This will involve, in particular, local heat supply systems and modern efficiency technologies,

such as innovative, decentralised combined heat and power generation technologies and new building energy supply technologies adapted to the use of renewables and to lower energy needs.

## Promoting the rational use of energy

To achieve overall optimisation of the energy supply system, greatly improved efficiency in energy utilization is necessary in parallel to the deployment of renewable energies. An essential precondition for the creation of a sustainable energy supply will be a considerable annual increase in energy productivity, in order to protect the environment and conserve natural resources. Hence specific research and development efforts in efficiency technologies are an additional focus of the FVS research programme.

## Integrating renewable energies into society

Integrating renewable energies into the energy supply means that ecological, sociological and economic issues will have to play their part already in the early stages of research and development. If Sustainability is at issue, research will have to address non-technical issues as well. Interdisciplinary and cross-disciplinary research will play a vital role, especially in system analyses and in the evaluation of technologies. Market introduction programmes and targeted subsidy instruments must be accompanied by research into social acceptance, environmental impacts and the integration effects of renewables into our entire economic system.



## Global perspectives

The global character of environmental problems and the global contribution potential of renewables to their solution necessitates an international approach. For applications in southern climate zones and in Eastern Europe, research and technological developments are increasingly playing a more important role.

Here it will be necessary to include the very wide range of user requirements into the promotional concepts, such as providing an energy supply to neglected rural areas, meeting energy requirements of conurbations and providing drinking water. The use of renewables will have to be closely linked to a very rational deployment of energy.

# Pooling research capacities



The aim of the Solar Energy Research Association is to develop a sustainable energy supply. Intensive cooperation in research and development is required to develop the technologies, for their efficient use, and to integrate the various energy sources into the energy supply systems.

The Research Association has formed a decentralised cooperative structure in Germany for this purpose and developed it into an efficient research network by doing the following:

- Organising the division of labour to enable efficient research
- Facilitation of cooperation in order to generate synergies
- Supporting competition to stimulate creativity
- Working together in networks, in order also to cooperate to good advantage with research institutions outside of the Research Association

Today, the approximately 1,000 employees of the member institutes comprise the largest expertise network in Europe in the field of renewable energies. Together with the **business community**, FVS sets itself new research tasks. FVS offers the **political community** the chance jointly to canvas support for a sustainable energy supply with regenerative energies. For the **public**, FVS organises conferences and workshops on themes relating to solar and renewable energies research and discusses the future opportunities and prospects for regenerative energies.