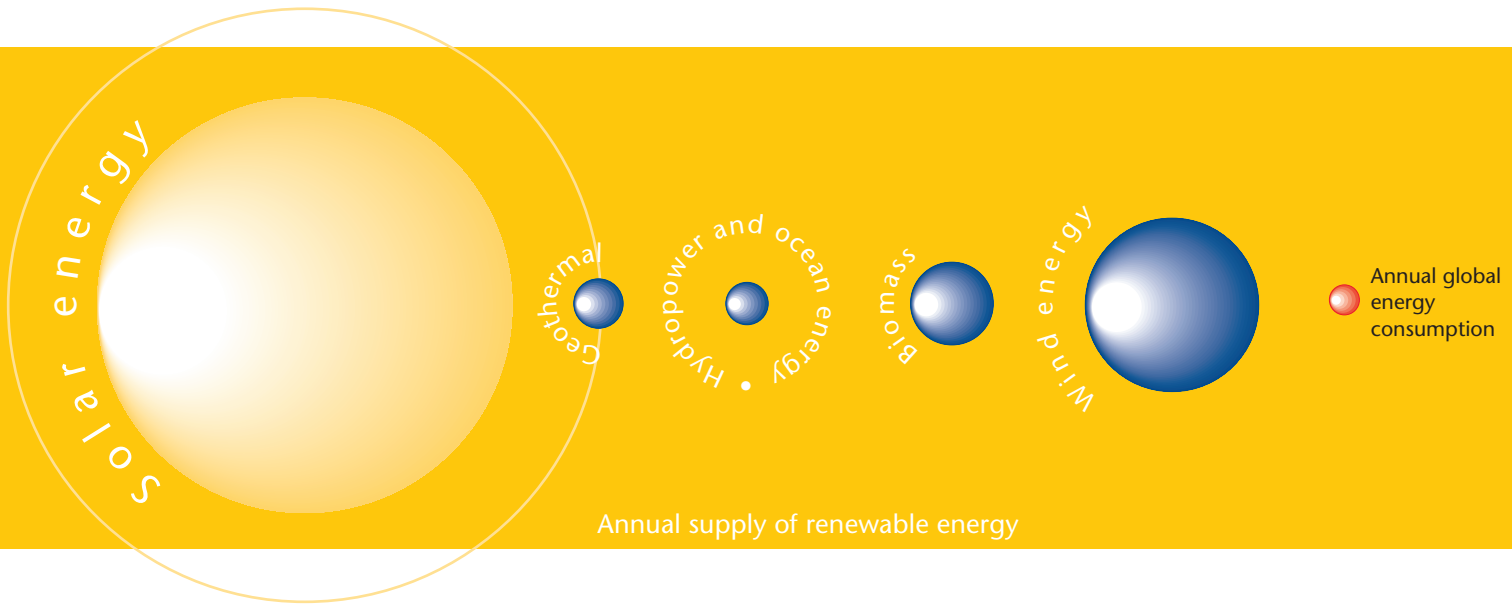


Research and development policy aims of FVS



Potential:

The annual supply of renewable energy is 20,000 times greater than global energy consumption.

Renewables are key technologies

Renewable and solar energy technologies have been declared key technologies with respect to research policy:

- Renewables are used on a large scale.
- In an evolutionary process renewables will change the energy generation, as well as the tasks of energy supply companies, the supply structures, the economic and financial relationship between energy producers and consumers.
- Decentralized energy generation will change the structure and number of stakeholders in the energy sector, and the technologies used everywhere from the construction industry to transport engineering.

Leaders now and in the future

Germany has a leadership role in research and development for renewables and related system technology. Short innovation cycles are a sure sign of rapid transfer of technology into the market and confirm that research and develop-

ment 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 are basically still in their early development stages. Experience from other technological fields shows that the linking of science and research to industrial innovations is not a one-way street, but rather an interactive system with many feedback loops.

Taking account of technological diversity in development

Every renewable source of energy with substantial potential for expansion will have to make its contribution relative to regional potential if the German government and the EU are to reach their energy policy goals. The great variety of applications for renewables is an advantage towards this end.

Flexibly connecting excellent basic research with technology development

Excellent applied basic research on the use of renewable energy sources is and will remain a prerequisite for the development of constantly improved conversion technologies and increasingly inexpensive sustainable energy supply systems. Both applied basic research and the development of technologies for market release need to be equally promoted because so many energy conversion paths are promising. At the same time, the path between scientific research and industrial innovation is not a one-way street, but rather an interactive system with many feedback loops in which application problems can become new challenges for basic research. Market dynamics and short innovation cycles require that all activities be conducted flexibly alongside each other.

Developing system optimisation

As current energy supply structures in Germany undergo further evolution, consideration of the growing use of renewables becomes necessary. This applies especially to the structure of the electricity grid, which will have to accommodate both greater distributed energy generation and expanded grids, 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 far-reaching 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 provide the leeway required for far-reaching 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 distributed electricity

generation facilities efficiently. It will become increasingly necessary and appropriate to match energy generation to its consumption by using a sophisticated grid-wide demand 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, decentralized 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 renewables. An essential precondition for the creation of a sustainable energy supply will be a considerable annual increase in energy productivity 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 renewables into society

Integrating renewables into the energy supply means that ecological, sociological and economic issues will have to play their part even 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.

Taking global perspectives into account

The global character of environmental problems and the global contribution potential of renewables to their solution necessitate an international approach. For applications in southern climates and 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 energy supply to neglected rural areas, meeting energy requirements of urban centers and providing drinking water. The use of renewables will have to be closely linked to energy conservation.