



EUROPEAN
COMMISSION

Community Research

THE EUROPEAN RESEARCH AREA

for a sustainable energy future

Research is becoming increasingly complex, multidisciplinary and expensive to perform. The fragmented approach that has typified European research and development for many years is no longer adequate to meet today's challenges.

This is as true for the field of sustainable energy systems as for any other area of research and development. Advances in energy research involve long-term research programmes requiring resources beyond the capacity of any one Member State in Europe. The pressure of international competition necessitates an integrated European response.

This is the aim of the European Research Area (ERA). It will bring together research resources across Europe as never before. However, the creation of the ERA will not happen overnight. Preparatory work – and a fundamental shift in policies and structures – will be needed over a sustained period in order to create the necessary conditions for a single unified research market in Europe.

Work towards this goal has started under the Fifth Framework Programme and is under way in all the research areas within the broad field of sustainable energy systems. The Sixth Framework Programme will reinforce and consolidate this process.



Future fuel cell-based power plant (Courtesy of PROCON consortium and ALSTROM).

Medium- and long-term research for sustainable energy systems

Working towards a sustainable and secure energy supply for Europe, based on renewable energy sources and clean energy carriers and technologies.



SIXTH FRAMEWORK
PROGRAMME

Why is a new approach needed?

A future hydrogen-based energy economy is an example of sustainable energy systems research that is multidimensional and integrative, demanding large-scale, transnational programmes and harmonised national policies, regulations and infrastructures.

The challenges facing research in sustainable energy systems are urgent and complex, with profound implications for society and the environment:

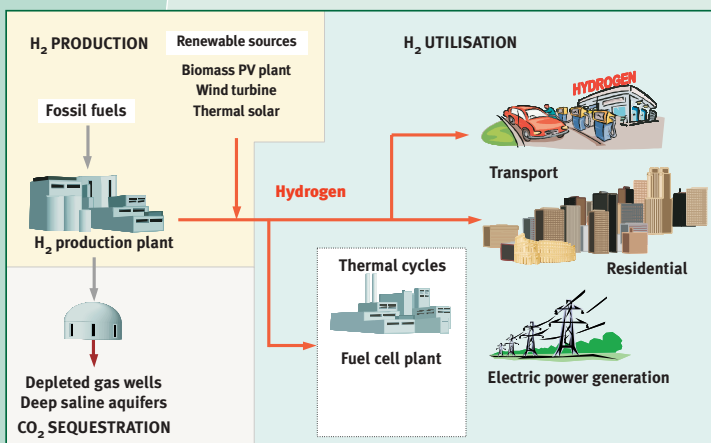
- The research issues cross national frontiers and in many cases require pan-European solutions.
- Research into sustainable energy systems requires not only technological but also infrastructural, regulatory, policy, economic, societal and cultural approaches.

- Solutions often draw on research resources from numerous disciplines including energy, engineering, physics, chemistry, information and communications technology, biology, geology, economics and sociology.

- Sustainable energy technologies provide massive opportunities for European industry to compete in global markets.

- Research into European sustainable energy systems faces stiff competition from other large countries with significant, well co-ordinated programmes in strategically critical areas.

The challenges described are of a scale and complexity that require a paradigm shift in Europe's current fragmented approach to research. A new culture needs to develop where European, regional and national programmes complement one another, do not overlap or conflict, but add value to one another. Research and development into sustainable energy systems needs the new vision of a European Research Area to compete effectively against international competition.



The European Research Area (ERA)

Progress towards the ERA will transform research and development (R&D) in Europe. The vision of the ERA is of:

- An internal research market in which conditions permit major research efforts to cross national boundaries.
- Ambitious research projects integrating a critical mass of resources and expertise to respond to European challenges.
- Researchers and facilities shared between European Centres of Excellence, and integrated research programmes focused on an agreed set of European priorities.
- Much greater co-ordination of European, national and regional research programmes so that resources can be used in the most effective way,

and research can be conducted on the scale needed to tackle major problems and compete with other international programmes.

- Development of coherent European, national and regional research policies which address the necessary financing of R&D, and other factors such as increased participation by industry, in particular small and medium-sized enterprises (SMEs), and the training and mobility of scientists and engineers needed to allow research to play an effective and central role in society.

This is a long-term vision; conditions as ambitious as these will not be created overnight. However, the result will be a transformation of European energy research. Energy research and development will benefit, given the magnitude of the challenges faced in the energy field.



The potential world market for photovoltaic (PV) technologies is large and growing. Countries such as the US and Japan have large, well coordinated RTD programmes in this area (between 80 and 100 M€/year). Current US exports of PV systems to Europe considerably exceed European exports to the US.

A research priority is to reduce the cost of PV electricity by a factor of four to five. Although Europe's total expenditure on PV research is close to that of the US or Japan, its RTD effort is mostly organised on a national basis, and is largely uncoordinated. To compete effectively Europe must build a critical mass of well coordinated RTD.



Preparing for the ERA

Plataforma Solar de Almería Test Facilities, located in Spain. In the foreground, the Direct Steam Generation parabolic trough installation concentrates solar radiation to produce over 300kWth. The heliostat field in front of the CESA-1 tower can focus up to 7MWth of solar radiation. (Courtesy of Ph.Schild).

Movement towards the ERA in sustainable energy systems requires a great deal of preparation. This necessary work includes:

- Mapping European, national and regional research policies, priorities and programmes and benchmarking the progress made to date in research.
- Identifying existing scientific excellence in Europe, together with its research fields, priorities, activities and resources.
- Creating co-operative links between the European research community and industry, in order to work collaboratively towards shared research programmes and integrated efforts.
- Developing suitable structures to facilitate evolution towards a truly coordinated European research programme.
- Identifying what prenormative research work is needed to enable effective implementation of R&D results. This includes contributions to developing standards, test procedures, regulatory frameworks and infrastructures.

A great deal of work is presently going on in sustainable energy systems to ensure that the priority areas will be able to develop further towards achieving the ERA. Full exploitation of the opportunities offered by the Sixth Framework Programme will serve as an important driver for the European Research Area.



Work in progress

Collection of forest residuals
(courtesy of Timberjack).

Examples of preparatory activities include:

- In the area of hydrogen and fuel cells, a running project (FHIRST) is studying alternative management, advisory and networking structures for ERA. A parallel initiative by the Commission proposes a *Fuel Cells and Hydrogen Technology Platform* to bring all existing activities into an overall structure. The aim is to permit the development of comprehensive R&D strategies and balanced and active participation of all stakeholders including industry, academics and national administrations.
- In some topics, existing large projects already involve a critical mass of important European researchers in activities that embody a long-term R&D strategy. The *DISPOWER (distributed generation)* project brings together around 40 key actors such as electrical utilities, power industry, consultants and research institutions in a structure that already incorporates many features of the proposed integrated project model.

- The PVNET thematic network within the field of photovoltaics (PV) technologies is developing a comprehensive road map for PV research and development based on a broad consensus within the European PV community. A "sister" network PV-EC-NET is benchmarking national and European programmes as a first step towards achieving its objective of better coordinated national PV activities.
- The Commission is developing a series of *Scientific and Technology References and Indicators* providing research benchmarks and goals for all of the areas of sustainable energy systems research.

Similar activities are under way in all areas of sustainable energy systems, including clean coal, gas turbines and combined heat and power (CHP), oil and gas, bioenergy, wind and wave energy, socio-economic research and energy in buildings.



Refuelling a hydrogen
powered car
(Courtesy of BMW).

*Putting Carbon Back
in the Ground
(Courtesy
IEA GHG R&D Programme).*



Moving on

Progress has been made in establishing the ERA, and many existing actions are expected to bring together the principal European actors in sustainable energy systems R&D together as never before. This collaboration has already resulted in the submission of a set of well-conceived Expressions of Interest addressing the main priorities identified for the Sixth Framework Programme.

An independent study carried out for the Commission in mid-2002 concluded that excellent progress is being made in establishing the necessary linkages and structures needed to develop coordinated R&D strategies in the key research areas for sustainable energy systems. More work will be needed to establish effective European structural links between existing activities and the new kinds of action being developed in the Sixth Framework Programme.

Further efforts will be needed to map existing R&D work being carried out at a national or regional level, and to coordinate such programmes so that meaningful research can be carried out at a European level. This is a fundamental task involving Member State help in achieving the ERA.

Establishing the ERA is vital to the ability of research into European sustainable energy systems to compete on a global stage. The opportunities that a successful ERA will provide in terms of knowledge generation and competitive edge are immense.



*Fuel cell bus
(Courtesy of
SCANIA).*

FOR FURTHER INFORMATION

Go to: http://europa.eu.int/comm/research/energy/index_en.html

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