

REPORT 2011: ENERGI21 NATIONAL STRATEGY FOR RESEARCH AND DEVELOPMENT

Summary and conclusions

Ambitions for energy research must be high in the years to come if we are to succeed in finding solutions to current and emerging European and global energy and climate challenges. The development of such solutions will generate substantial growth in markets for new technology.

Meeting the needs of the national and international energy markets of the future will require international cooperation on access to resources, technological development and commercialisation. Multidisciplinary research cooperation across national borders will be crucial.

Norway has resources, expertise and fully-matured industrial activities in many of the areas in which activities must be intensified.

The mandate of the Energi21 board was to set priorities and evaluate on a scientific basis technologies and areas for research, development and demonstration (RD&D) of climate-friendly energy technology, and to submit recommendations for various types of instruments to be implemented. Priority focus areas have been defined based on the primary objectives of the Energi21 strategy: to boost value creation, facilitate energy restructuring with the development of new technology and cultivate internationally competitive expertise. The board has also taken into account the ambitions and plans of business and research communities in the relevant focus areas as well as the degree to which Norway has competitive advantages in these. The board further analysed the focus areas in relation to the potential future scenarios described in the strategy.

The Energi21 board has decided to give priority to strengthening six of the 14 thematic and technology areas under the broader Technology Target Areas analysed in connection with the revision of the strategy.

Recommendations

The new Energi21 strategy recommends increasing RD&D activities in the following thematic and technology areas:

Solar cells – enhanced industrial development

The solar energy industry has experienced tremendous growth in the past 15 years, and this growth is expected to continue. The Norwegian solar energy industry, including an emerging supplier industry, and Norwegian research groups are at the international forefront, and Norwegian players have great potential in the segments of the value chain in which they have competitive advantages.

Offshore wind power – industrial development and utilisation of resources

Norway has a number of competitive advantages with regard to the rapidly growing market for offshore wind power. The wide range of expertise obtained from the

petroleum and maritime industries places the country in an excellent position to provide value-creating deliverables to this market.

Improved utilisation of resources using balance power

Norway has significant potential as a producer and supplier of balancing services, which will enhance utilisation of renewable power in an integrated European market. This will require RD&D activities across a wide spectrum, which will in turn facilitate growth in value creation and a rise in the share of renewable energy in Europe.

Generating and safeguarding value creation through CO₂ capture, transport and storage

Carbon capture and storage (CCS) is a pivotal technology for achieving climate targets. Norway has already invested considerable resources in development activities in this field, and has made great strides in the design of cost-effective solutions. Good solutions will also increase the value of Norwegian gas reserves in the future.

Flexible energy systems – smart grids

Achieving progress in all of the strategic priority areas described in the strategy will require flexible energy systems that integrate renewable energy and offer reliable operation within a far more complex totality.

Utilisation of energy – converting low-grade heat into electricity

Utilisation of waste heat and conversion of low-grade heat into electricity is a field characterised by many unsolved problems but with vast untapped potential in Norway and internationally. More efficient utilisation of energy will play a vital role in efforts to deal with climate challenges.

Scientific and international integration is vital

The Energi21 strategy emphasises that value creation in the energy sphere must be built on international task-sharing as well as on multidisciplinary processes and close cooperation between sectors. These components have been incorporated into the designation of priority focus areas, as well as in the determination of recommended instruments. The strategy calls for increased coordination between relevant sectoral authorities and close cooperation between industry and educational institutions.

Research institutions and the business sector must also cooperate to a greater degree on long-term research and development.

Better coordination between stakeholders

Experience in the wake of the broad-based political agreement on climate policy achieved in the Storting (Norwegian parliament) in 2008 shows that increased investments have boosted research activity and triggered innovation in the organisation of and funding instruments for energy research, such as the establishment of the scheme for Centres for Environment-friendly Energy Research (FME) under the Research Council of Norway. The Energi21

strategy highlights the need for a common strategic foundation underlying the coordination of various objectives and instruments. Among other measures, the strategy recommends the introduction of a top-level management forum for the public agencies within the research and innovation system. Along the same lines, setting up a meeting-place for stakeholders from this system and the research community is recommended.

Strengthened support for testing and demonstration facilities

Instruments must be differentiated in relation to the type of technology to be developed and the location along the innovation chain. The Energi21 strategy recommends strengthening support for testing and demonstration facilities for offshore wind power, hydropower/pumped-storage hydroelectricity, and transmission/distribution grids.

Support for testing and demonstration facilities must encompass funding as well as adapted regulatory instruments.

New research centre for future flexible energy systems

The Energi21 strategy also recommends the establishment of a new FME centre focusing on flexible energy systems for the future. Analyses indicate that tomorrow's energy systems will consist of parallel infrastructure and will require a much higher degree of flexibility than today's energy systems. Key research questions to be addressed by the new FME centre are facilitation of balancing services, integration of intermittent generation capacity, and new types of consumers.

Energy restructuring, increased value creation and improved security of supply

Many of the strategy's recommendations could be realised immediately by establishing and adapting market incentives, and effective support schemes already exist in certain areas. The strategy further identifies and prioritises a number of areas in which more public investment is still needed. This need is estimated to represent twice the current public investment in research, development and demonstration in the field of renewable energy.

Broad-based innovation and targeted activities in strategic priority areas

Growth in the budget for energy research resulting from the broad-based political agreement on climate policy has had a strong mobilising effect. It has led to a significant increase in the number of high-quality grant proposals submitted under the Research Council's funding announcements in programmes across all of the priority areas defined in the initial Energi21 strategy.

Support for innovation projects within the entire scope of energy research must be continued alongside the intensification of strategic activities in the focus areas defined in this revised strategy. There is an estimated need for a doubling of public investment in research, development and demonstration in the fields of renewable energy, energy-efficient solutions and CCS.

Faster-paced innovation – a key success factor

It is also vital that the commercial players in the energy sector understand that creating future energy solutions will require investment in research and development on a much larger scale

than previously in segments of the Norwegian energy sector. Heightening the pace of innovation in the business sector will be a key factor for achieving success in future energy markets.

The expansion of focus sought in the wake of the broad-based political agreement on climate policy has been achieved. The energy industry has mobilised its forces and is well equipped to take on a leading role in important areas in the field, thereby ensuring the development of effective energy solutions and future value creation in a rapidly-growing international market.