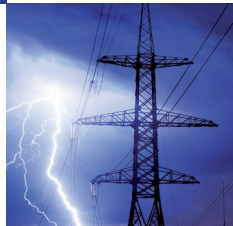
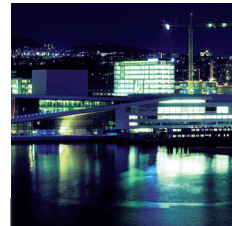


# Work Programme In effect from 2018

Large-scale programme  
Energy research – ENERGIX



## Large-scale Programmes

The RCN initiative  
to meet national  
research priorities



# Work Programme

In effect from 2018

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Large-scale programme  
Energy Research - ENERGIX

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# ENERGIX Work Programme

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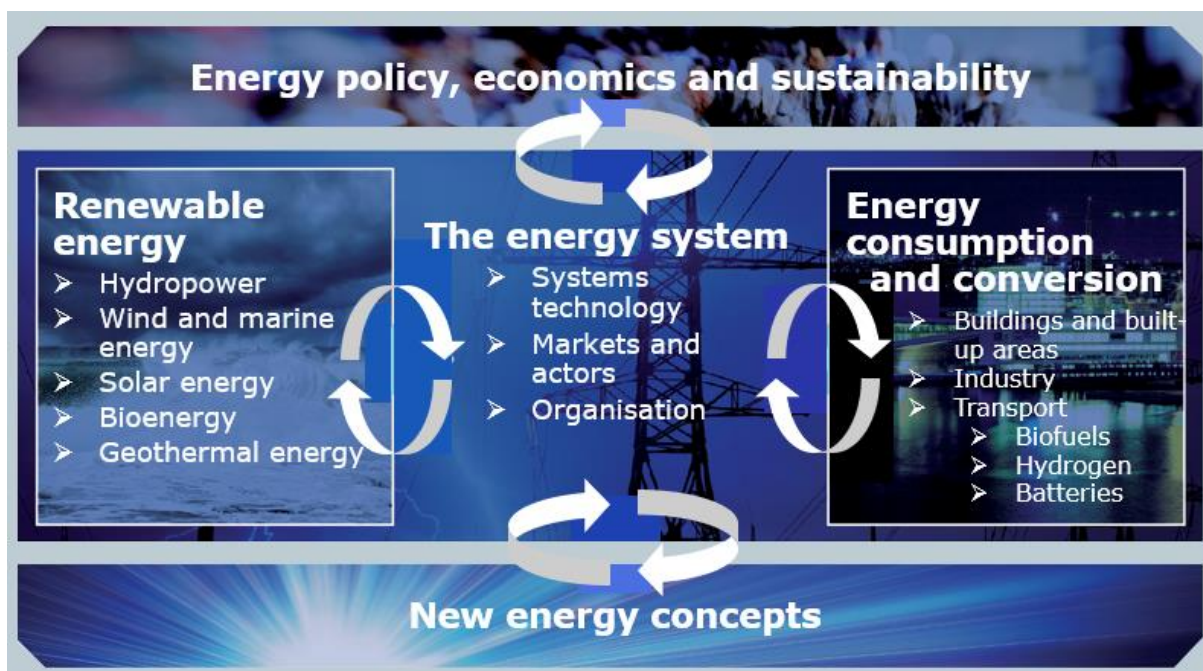
## Summary

The Large-scale Programme for Energy Research (ENERGIX) was launched in 2013. The primary objective of the programme is to generate new knowledge and new solutions that promote the long-term, sustainable development of the energy system. At the same time, this will enhance the competitiveness of Norwegian trade and industry and facilitate the transition to a low-emission society.

The programme will support the development of knowledge and solutions to achieve the following secondary objectives:

- Sustainable utilisation and consumption of renewable energy resources;
- Reduction of Norwegian and global emissions of greenhouse gases;
- Enhancement of Norway's security of supply;
- Strengthened innovation in Norwegian trade and industry and the public sector;
- Further development of Norwegian research and educational institutions.

The scope of the programme encompasses development of renewable energy and the management and efficient use of energy in the energy system and in buildings, industry and transport. Knowledge about environmental impacts is vital in all of these areas. Activities under the programme are concentrated in the following thematic priority areas:



The ENERGIX programme will help to achieve energy and industrial policy objectives and is a key instrument in the implementation of the Government's Energi21 R&D strategy. The programme will also promote the broadest possible range of research activities to open the door to new thinking and innovative concepts. The programme is targeted towards Norwegian companies and research institutions.

This work programme establishes the formal framework and focus of the ENERGIX programme and provides guidelines for R&D actors seeking funding under the programme. The ENERGIX programme board conducts annual analyses of the project portfolio and development trends in the thematic priority areas. These analyses, together with the work programme, provide the basis for annual funding announcements for R&D projects. The programme budget for 2018 is NOK 417 million.

## Background and challenges

The dramatically increasing need for energy and aspirations to reduce global greenhouse gas emissions together form the backdrop for the development of national and international energy policy.

Norway has targets for increasing the share of renewable energy, further developing the energy system and enabling Norwegian commercial actors to position their products and solutions on the national and international market. To meet these targets, we will need new solutions for the energy supply, vast improvements in energy efficiency and enhanced knowledge about framework conditions and instruments. Norwegian energy and grid companies are to ensure flexibility and safeguard security of supply. Norwegian research and educational institutions must provide knowledge, solutions and competent personnel if ambitious targets in the energy sphere are to be achieved.

These challenges and opportunities in and of themselves and the existing time perspective do not necessarily offer adequate incentives for stakeholders to finance research activities on their own. The ENERGIX programme is designed to compensate for the market failure this entails by supporting projects that would not be realised without this support, or would be realised on a smaller scale. Funding from the programme will be awarded to projects that have anticipated major socio-economic or commercial benefits and that will promote the sustainable energy transition. Funding will also be awarded to projects that meet the needs of trade and industry and society at large for long-term competence-building.

The ENERGIX programme is funded by the Ministry of Petroleum and Energy, the Ministry of Climate and Environment, the Ministry of Transport and Communications, the Ministry of Agriculture and Food, the Ministry of Education and Research, and the Ministry of Trade, Industry and Fisheries. These ministries represent a wide range of sectors with challenges and opportunities that touch on or lie within the energy sphere, and their involvement enhances the reach of programme.

Important overall objectives of the allocations from the Ministry of Petroleum and Energy to energy research are to increase long-term competence-building and strengthen Norway's competitiveness in the energy sector, particularly in areas where Norwegian actors have specific competitive advantages. Research activities are also to help to reduce climate and environmental impacts, generate more knowledge as a basis for policy design and lay the foundation for optimal management of energy resources.

The Ministry of Petroleum and Energy established the Energi21 national strategic body to provide advice on the desired course of energy research in Norway. The 2014 Energi21 strategy (revised in 2018) is one of the steering documents for the ENERGIX programme. The Energi21 mandate was expanded in 2016 to include environment-friendly transport. Thus Energi21, Enova and the ENERGIX programme have a well-aligned strategic platform in the energy and transport sphere.

Beyond the stipulations of the Energi21 strategy, the ENERGIX programme also has a broad responsibility to ensure the overall incorporation of a sustainability perspective into areas including energy policy, climate and environmental impacts of energy production facilities, and sustainable development and management of biomass for energy purposes.

## Objectives for the programme

The ENERGIX programme is a large-scale, high-profile programme in the energy sphere and is of strategic importance for Norway's long-term restructuring to become a low-emission society.<sup>1</sup> The scope of the programme encompasses development of renewable energy and the management and efficient use of energy in the energy system and in buildings, industry and transport. Knowledge about environmental impacts is vital in all of these areas.

### Primary objective:

The ENERGIX programme will promote the long-term, sustainable development of the energy system to enhance the competitiveness of Norwegian trade and industry and facilitate the transition to a low-emission society.

### The programme will help to generate new knowledge and cutting-edge solutions aimed at achieving five secondary objectives:

- Sustainable<sup>2</sup> utilisation and efficient consumption of renewable energy resources in the short and the long term by developing new knowledge, technology and solutions for:
  - using energy properly and using the proper energy;
  - promoting value creation based on Norway's unique energy resources.
- Reduction of Norwegian and global emissions of greenhouse gases by:
  - enhancing knowledge about societal factors relating to policy design, development of markets and diffusion of new technology within the energy system;
  - developing new knowledge, technology and solutions in areas in which Norway has special expertise.
- Enhanced Norwegian security of supply in light of the increasing internationalisation and digitalisation of the energy system by developing new knowledge, technology and solutions for:
  - ensuring sound management and optimal consumption and transmission of energy;
  - improving the security, resilience and flexibility of the energy system.
- Strengthened innovation in Norwegian trade and industry and the public sector with the aim of achieving restructuring in Norway and increasing exports by:
  - developing new knowledge, technology and solutions to strengthen the innovation capacity of companies vis-à-vis national and international markets;
  - helping the public sector to develop and implement cost-effective, future-oriented solutions.
- Further development of Norwegian research and educational institutions in priority areas by:
  - enhancing technological, natural science and social science-based knowledge for the development of a sustainable energy system;
  - facilitating radical, ground-breaking research on future development trends and long-term knowledge needs.

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<sup>1</sup> Norwegian Climate Act: By 2050, Norway's greenhouse gas emissions are to be reduced by 80 to 95 per cent by 2050 relative to 1990 levels.

<sup>2</sup> Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). economic development, social development and environmental protection. Sustainable development consists of three pillars: 1) economic development, 2) social development, and 3) environmental protection (NOU 2009:16), where "environmental protection" entails considerations of the natural environment, ecosystem services, climate, hazardous substances and other pollution.



The framework for meeting these secondary objectives is continually shifting to reflect economic and industrial developments; environmental, social and cultural conditions; and national and geopolitical factors, among other key elements. Thus, an understanding of this complex overall context will be essential to ensuring that the research activities adequately target the implementation of new knowledge and application of results. The programme will give priority to research that complies with sound ethical principles, is sustainable and incorporates diversity, including gender perspectives. The programme will also develop relevant funding instruments to achieve its objectives.

## Thematic priority areas

The thematic priority areas are designed to help to achieve the objectives of the ENERGIX programme as described above. The figure below illustrates the organisation of the programme's activities into five thematic priority areas. Knowledge about environmental impacts is vital in all of these areas.

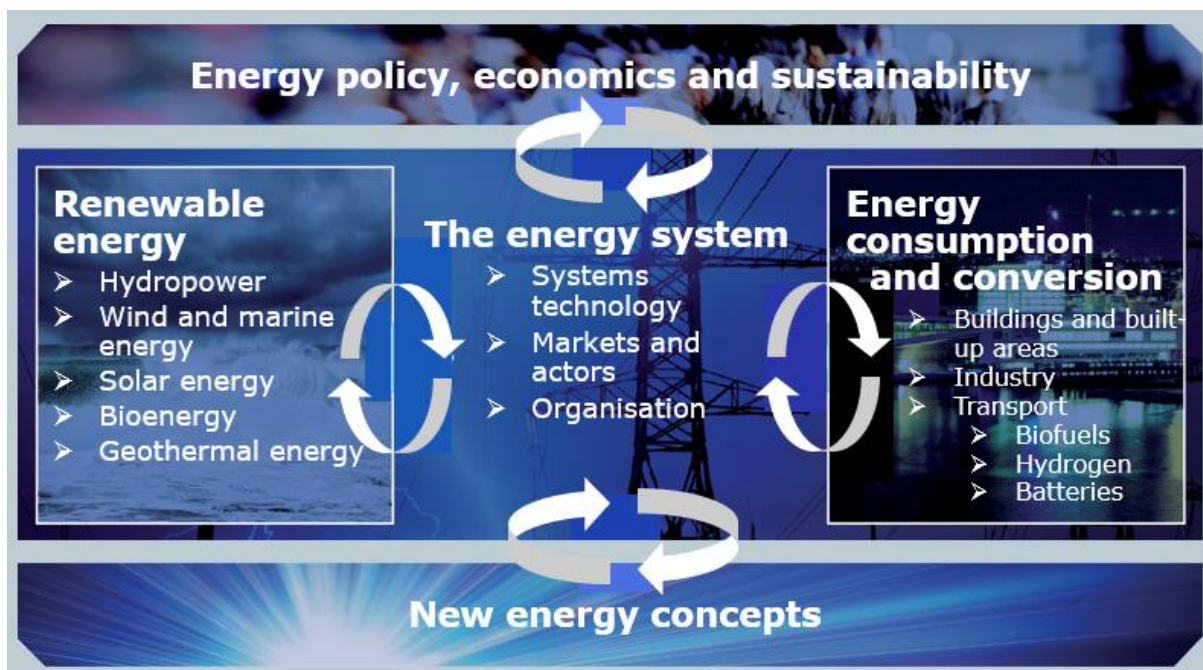


Figure 1. Thematic priority areas of the ENERGIX programme.

### Thematic priority area 1: Energy policy, economics and sustainability

Research activities in this thematic priority area will help to achieve all five secondary objectives of the ENERGIX programme.

Research-based knowledge on economics, restructuring, sustainability and behaviour in the energy sphere is an important basis for the long-term energy strategies of the authorities and trade and industry. Renewable energy production, the energy system and efficient use of energy are key elements here. A broader understanding of how societal framework conditions pose barriers to as well as open up opportunities for change is needed.

Research activities in this thematic priority area will help to encourage greater knowledge and new solutions in the following areas:

- **Policy and economics:** This includes knowledge about management, the statutory framework, financial instruments, national and international markets and more. This area also encompasses analysis of political objectives and cooperation between public and private stakeholders.
- **Industrial development, innovation and technology diffusion:** This includes knowledge about characteristics of innovation processes, how to exploit and further develop Norwegian specialist expertise, and the interaction between new technology and society.
- **Sustainability and resource efficiency perspectives:** This includes knowledge about resource efficiency, lifecycle perspectives and sustainability in relation to natural resources and the environment.
- **Society and behaviour:** This includes knowledge about consumer behaviour, societal structures, the attitudes and actions of the various stakeholders, as well as research on power structures, public planning and other democratic processes that affect the transition to a low-emission society.

## Thematic priority area 2: Renewable energy

Norway is in a unique position when it comes to the ability to produce clean, renewable energy on a large scale. It is imperative that production is sustainable. Nearly all of Norway's electricity production is based on hydropower technology, but the amount of heat produced from biomass, waste and low-grade energy sources is on the rise. Research is needed to promote knowledge-based innovation and industrial value chains that can maintain the flexibility, security of supply, industrial development and export value provided by renewable electric and thermal energy.

The thematic priority area "Renewable energy" is divided into five sub-areas, all of which fill different roles in relation to the objectives of the ENERGIX programme. Combined, research activities in this thematic priority area will help to achieve all of the programme's five secondary objectives.

Research activities in this thematic priority area will help to encourage greater knowledge and new solutions in the following areas:

- **Hydropower:** Activities to promote the renewal of Norwegian expertise and ensure recruitment as well as strengthen the competitiveness of Norwegian suppliers in an international market.
- **Wind and marine energy:** Activities to enhance the innovation capacity of Norwegian suppliers of products and solutions for an international market, including opportunities for knowledge transfer from other sectors.
- **Solar energy:** Activities to bolster the entire emerging value chain, from development of materials to end-user applications. Emerging companies must be strengthened and encouraged to participate.
- **Bioenergy:** sustainable value chains and utilisation of bioenergy resources and waste management that promote value creation.
- **Geoenergy:** Activities to develop Norwegian expertise and technology for an international market with focus on knowledge and technology transfer from other sectors.

## Thematic priority area 3: The energy system and markets

Research activities will help to further develop and manage an energy system that can efficiently accommodate unregulated and distributed energy production with low marginal cost, new energy consumption patterns, rising consequential loss values and greater digital vulnerability, while at the same time safeguarding security of supply, consumer privacy and ethical perspectives. This will call for integration between energy carriers and with other countries' national energy systems, as well as more knowledge about stakeholder roles, marketplaces, framework conditions and business models

that promote the innovation and dynamics needed to make the energy system sustainable. The digitalisation of the power sector will be of key importance here.

Research activities in this thematic priority area primarily address the ENERGIX programme's objective of strengthening Norway's security of supply, but also aim to enable integration and efficient utilisation of Norway's renewable energy resources as well as promote industrial development.

Research activities in this thematic priority area will help to encourage greater knowledge and new solutions in the following areas:

- **Systems technology:** Technical solutions that cost-effectively, and with high security of supply, support integration of renewable energy, new forms of utilisation and the seamless exchange of electricity, grid services and customer services – locally, nationally and across national boundaries.
- **Markets and actors:** Development of the services, actors and marketplaces needed for developing, operating and utilising a reliable, renewable and cost-effective energy system.
- **Organisation:** Sector regulation and framework conditions that encourage innovation and development projects beneficial to society on the way to the future energy system.

#### **Thematic priority area 4: Energy consumption and conversion**

This thematic priority area encompasses energy for stationary purposes and transport and is primarily targeted towards achieving the ENERGIX programme's objectives of promoting sustainable utilisation and efficient consumption of Norway's renewable energy resources and reducing Norwegian emissions of greenhouse gases.

Research activities are to address the use of energy in buildings and built-up areas as well as in industry and the transport sector. They will also help to develop solutions for producing biofuels and hydrogen as well as battery systems and other energy storage solutions. This will require new materials, new technological solutions, increased user competence and insight into non-technological barriers. Research activities will also help to boost competitiveness and increase value creation for the business sector.

Research activities in this thematic priority area will help to encourage greater knowledge and new solutions in the following areas:

- **Buildings and built-up areas:** New energy-efficient solutions for new and existing buildings, as well as for energy-flexible areas such as neighbourhoods, cities and regions, including energy storage and flexible heating systems.
- **Industry:** Solutions for phasing in renewable energy carriers, more energy-efficient production processes, better utilisation of waste heat, and energy cooperation within industrial clusters or areas. This will expand the opportunities for Norwegian industry in an international market.
- **Transport:** Technology and solutions for the transition to renewable energy sources and reduced energy consumption in vehicles, vessels and aircraft as well as for the transport sector overall.
- **Hydrogen:** New materials, conversion processes and solutions for production and use of hydrogen as an energy carrier.
- **Biofuels:** New technology and processes for energy-efficient collection and conversion of waste, forestry raw materials and other sustainable biomass to biogas and biofuels.
- **Batteries:** New materials and solutions for batteries and battery systems, with focus on increased energy density and improved fire and explosion safety.

## **Thematic priority area 5: New concepts in the energy sphere**

The ENERGIX programme seeks to cultivate ground-breaking innovation for the development of entirely new energy concepts within the scope of the programme: the development of renewable energy and the management and efficient use of energy in the energy system and in buildings, industry and transport.

Research activities are to promote radical and ground-breaking solutions – novel approaches and radically innovative technologies that may result in major leaps in improvement in efficiency, use or cost levels throughout the energy chain, from energy resources to energy consumption.

### **Further specification of the thematic priority areas**

Attachment 1 to this work programme provides a more detailed description of the five thematic priority areas. The attachment outlines some of the main overall challenges, identifies important opportunities, and specifies which funding instruments will be used in the respective areas to achieve the programme's objectives.

### **Priorities for structuring the research effort and use of funding instruments**

Projects funded under the ENERGIX programme are to support strategic knowledge development, development of industry-oriented competence, and innovation in the first segment of the innovation chain as illustrated in the figure on page 12.

Constructive cooperation with the Centres for Environment-friendly Energy Research (FME) and the public agencies in the research and innovation system, both nationally and internationally, is crucial to providing reliability for users, generating top-quality results and ensuring successful achievement of objectives.

The ENERGIX programme employs the following funding instruments (application types) for research and innovation activities:

- Researcher Projects;
- Knowledge-building Projects;
- Innovation Projects;
- Funding for new, ground-breaking concepts in the energy sphere;
- The PILOT-E scheme;
- Incentive schemes to increase international participation

The programme will also work to further develop these funding instruments to, among other things, better enable new companies to establish themselves in immature markets and to promote more innovation in the public sector. The programme will promote the broadest possible range of research activities to open the door to new thinking and innovative concepts. In addition, the programme will take active steps to introduce other types of activities that promote research and innovation, including efforts to increase participation, establish meeting places and disseminate information.

#### **Researcher Projects**

Researcher Projects are to promote scientific renewal and development of disciplines and/or to generate new knowledge in areas where there is a need for strategic basic research. Researcher

Projects involve both social science research and natural science research, and are of relevance in areas where it is too early, or inappropriate, for the business sector or other user partners to have a managing role in a project or participate in funding it. The Project Owner (formal applicant) must be a Norwegian research organisation.

### **Knowledge-building Projects**

Knowledge-building Projects are to contribute to industry-oriented researcher training and long-term competence development in the Norwegian research community within topics that are crucial to the development of business and industry in Norway. Participating companies must be able to show that their future production or development of products or services will need the competence to be developed. The companies must play an active role in the management of the project. The Project Owner (formal applicant) must be a Norwegian research organisation. Funding announcements for Knowledge-building Projects will be open to high-quality grant proposals in all of the thematic priority areas defined in the ENERGIX work programme.

The Energi21 strategy is one of several important documents that set the agenda for energy research, and projects that support the objectives of the strategy will be given priority. The energy sector is undergoing wide-ranging changes. The ENERGIX programme will seek to further develop Knowledge-building Projects as a funding instrument to encourage greater involvement of the public sector. These efforts will be viewed together with the use of Researcher Projects. Knowledge-building Projects and the FME centres constitute a key part of the energy research portfolio.

### **Innovation Projects**

Innovation Projects for the Industrial Sector are to stimulate R&D activity in trade and industry, particularly activities that promote innovation and sustainable value creation. The Project Owner (formal applicant) must be a Norwegian company/organisation. An Innovation Project for the Industrial Sector is an R&D project that is designed to lead to innovation (value-creating renewal) for the companies participating in the project. Funding announcements for Innovation Projects for the Industrial Sector will be open to grant proposals in all the thematic priority areas defined in the ENERGIX work programme. Private-sector innovation is crucial for the future energy system and for export-oriented trade and industry. The programme's aim is for Innovation Projects for the Industrial Sector, including the Pilot-E scheme, to comprise roughly 40 per cent of the project portfolio.

Current and future energy challenges must be solved to a greater degree by, and in close cooperation between, the planning authorities, the municipalities and municipal entities. The ENERGIX programme is hoping to issue a call for proposals for Innovation Projects in the Public Sector at some point in the next four years.

### **New, ground-breaking concepts**

The ENERGIX programme provides support for radical, ground-breaking research and encourages new and as yet unknown ideas and concepts under calls for proposals in the thematic priority area "New concepts in the energy sphere". Projects must incorporate basic research that lies within the thematic scope of the ENERGIX programme. They must employ concepts and approaches that challenge the current state-of-the-art and/or current methods and be of potential major importance for the energy sphere. A higher level of scientific risk will be accepted in these projects. Separate criteria have been drawn up and a special application review procedure has been introduced in which applicants with the best proposals present their projects before an international referee panel.

### **The PILOT-E scheme**

The PILOT-E scheme provides funding for Norwegian trade and industry, and was launched as a collaboration between the Research Council, Innovation Norway and Enova. The scheme is designed

to help Norwegian industrial actors to scale up environment-friendly energy technology solutions more quickly for national and international markets. The PILOT-E scheme coordinates the funding schemes available to the various actors and entails higher predictability with regard to support. Calls for proposals under the Pilot-E scheme are targeted towards concrete societal challenges where there is a need for both research activity and industrial development, and where there is likely to be major Norwegian public-driven demand. Separate criteria are drawn up and a special application review procedure is developed in order to satisfy the requirements of the three stakeholders. The Project Owner (formal applicant) must be a Norwegian company/organisation.

### **International cooperation and incentive schemes to increase international participation**

International cooperation on research and development is becoming increasingly important and is to:

- help to deal with global challenges;
- enhance the quality and capacity of Norwegian research;
- supplement Norwegian research as needed in specific areas;
- ensure that Norway has access to international knowledge production;
- strengthen the competitiveness of Norwegian trade and industry;
- promote Norway as a leading research and innovation nation in selected areas.

The ENERGIX programme primarily promotes international research cooperation through its ordinary funding instruments, and Researcher Projects and Knowledge-building Projects in particular set clear requirements for international cooperation. The programme will continue to further develop instruments to support and encourage cooperation with the EU (see a more detailed description on page 12), and will support international cooperation through, among other things, collaboration with the country-specific programmes at the Research Council.

The ENERGIX programme has developed a funding scheme (*Medvirkningsordningen*) to encourage Norwegian research groups to participate in and head activities in EU and International Energy Agency (IEA) strategy forums. The programme is also providing more support for participation in ERA-NET activities, and will offer funding for Personal Overseas Research Grants and Personal Visiting Researcher Grants in connection with ENERGIX-funded projects.

### **Prioritising funding instruments**

Long-term objectives and stable framework conditions for companies and research-performing environments are given high priority under the ENERGIX programme. At the same time, the programme is designed to maintain the flexibility required to adapt to changing needs and opportunities over time. Ongoing strategic planning and assessment form a basis for finding the right balance of funding for various technologies, branches of industry and topics. Such flexibility will also be crucial when prioritising funding instruments/types of projects. Different technology areas will require the use of different funding instruments. For instance, there may be a need for long-term competence-building in one area over a certain period of time, while there may be a need to promote industrial innovation in another. The programme board will weigh such considerations on an ongoing basis, while striving to ensure that the need for stability is met.

### **Broad portfolio of funding instruments and importance for achieving programme objectives**

The figure below shows how the broad portfolio of funding instruments presented above will contribute in different ways to achieving the objectives for the ENERGIX programme. The attachment to the work programme provides further details on the use of funding instruments by thematic priority area.

		FUNDING INSTRUMENTS – APPLICATION TYPES				
		Researcher Projects and projects on new concepts in the energy sphere	Knowledge-building Projects for Industry	Innovation Projects for the Industrial Sector and PILOT-E projects	Innovation Projects for the Public Sector	Incentive schemes to increase international participation
THEMATIC OBJECTIVES	Sustainable utilisation of national renewable energy resources	The entire portfolio of ENERGIX instruments will be used to achieve the programme's thematic objectives. The make-up of the consortia, type of applicant and time perspectives will be decisive in determining which instruments will be relevant.				
	Reduction of greenhouse gas emissions					
	Norway's security of supply					
STRUCTURAL SECONDARY OBJECTIVES	Innovation in trade and industry	Generate knowledge at research groups that can lead to innovation	Ensure that national R&D institution can fulfil industry's needs ahead	Key targeted funding instrument	New public sector requires new solutions from industry	Develop arenas for cooperations for the industry and market opportunities
	Develop Norwegian research groups	Key targeted funding instrument	Key instrument - relevance to industry - knowledge for the public sector	Applied research on industry challenges develop the industry		Give research groups the opportunity to learn about and be part of the international forefront

Figure 2. Relationship between the ENERGIX programme's secondary objectives and the use of funding instruments.

## Cooperation with related activities and programmes

Together with the ENERGIX programme, the Centres for Environment-friendly Energy Research (FME) scheme, Enova and Innovation Norway are the most important stakeholders in the national research and innovation system for achieving the political targets in the energy sphere. Instruments employed by the ENERGIX programme must be closely coordinated with these in order to achieve their common objectives. In addition, the programme must ensure effective coordination and division of tasks with other Research Council programmes, EU R&D instruments under the European Strategic Energy Technology Plan (SET Plan) and Horizon 2020, and joint calls for proposals under ERA-NET Cofund.

### Centres for Environment-friendly Energy Research (FME) scheme

The FME centres play a key role within the research and innovation system in achieving renewable energy targets. The FME scheme is an important component in long-term competence-building in the environment-friendly energy sector, and is a vital instrument for recruitment within the sector together with the ENERGIX programme and the Norwegian RD&D CCS Programme (CLIMIT). The FME centres bring together leading research groups and relevant industry players in selected priority areas, and focus on long-term research, with clear objectives and work packages.

The FME centres help to structure the strategies of Norwegian energy research through their long-term, binding collaboration. Centre activities open up new opportunities for innovation, raise new questions and identify new research needs, while the ENERGIX competitive arena helps to ensure that the best projects to address these are given funding. The knowledge base for new calls under the ENERGIX programme is based on the entire body of energy-related projects in Horizon 2020 and ERA-NET, research activities carried out by the FME centres, as well as the ENERGIX programme's entire existing portfolio.

In this way, the interaction between the FME scheme and the ENERGIX and CLIMIT programmes provides a good structure, dynamic and competitive focus throughout the centres' period of operation.

### National research infrastructure and other Research Council programmes

Renewable energy is an area of strategic importance to Norway as a nation, and the ENERGIX programme cooperates with the Division for Science at the Research Council on strengthening national research infrastructure. The programme also works closely with other thematic

programmes at the Research Council to address common research questions. These include the Large-scale Programme on Climate Research (KLIMAFORSK), the IKTPLUSS initiative on information technology and digital innovation (IKTPLUSS), the Innovation Programme for Maritime Activities and Offshore Operations (MAROFF), the Large-scale Programme for Petroleum Research (PETROMAKS2), the Large-scale Programme on Aquaculture Research (HAVBRUK), the Large-scale Programme on Nanotechnology, Microtechnology and Advanced Materials (NANO2021), the Research Programme on Sustainable Innovation in Food and Bio-based Industries (BIONÆR) and the Programme for User-driven Research-based Innovation (BIA).

**Enova and Innovation Norway**

Enova and Innovation Norway are important partners. The figure below shows the areas of interface and coordination with the other public agencies within the research and innovation system, aside from the Research Council. The Research Council channels funding for renewable energy research via the ENERGIX programme (red dotted frame) and the FME centre scheme.

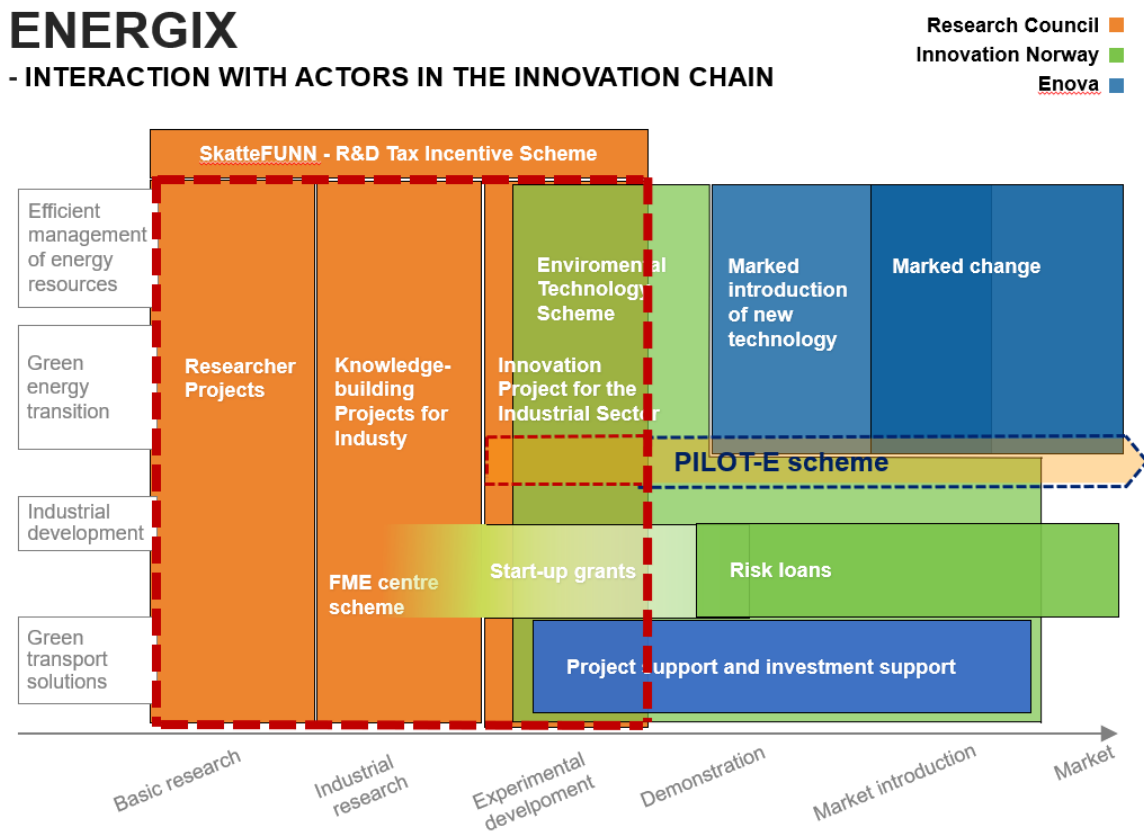


Figure 3. The ENERGIX programme’s interaction with other actors in the research and innovation system.

**The EU, the SET Plan and other international cooperation**

There is an increasing trend towards co-financing of research projects and programme cooperation across countries. This is accompanied by the emergence of new funding instruments and extends to a growing number of arenas for cooperation.

The *EU Energy Union* and the *European Strategic Energy Technology Plan (SET Plan)* set out priority areas for energy research in Europe. The ENERGIX programme will coordinate its activities in relation to these, but will also encourage focus on Norway’s unique needs. The development of the SET Plan and Horizon 2020 has entailed stronger focus on programme cooperation under various



instruments. The programme will allocate funding for such efforts. Measures to encourage R&D groups and industry players to participate in EU cooperation and have a hand in shaping strategy will be assessed on an ongoing basis.

In addition to EU projects, important research is being performed at the Nordic level under the auspices of the International Energy Agency (IEA) and under bilateral agreements with a number of different countries. The global Mission Innovation initiative can also open up networks and arenas for cooperation that can prove valuable for Norwegian research groups. The ENERGIX programme will enhance the Norwegian research community’s awareness of and access to networks by serving in an advisory capacity, providing a meeting place and offering targeted support for researcher mobility. The programme may also facilitate cooperation with leading international research groups.

### Anticipated results, impacts and societal outcomes

The ENERGIX programme will seek to create a research portfolio that delivers results within all five of its secondary objectives. The aim is not necessarily for the contribution to be equal for each objective, but rather to ensure that there are relevant, effective activities targeted towards all of the objectives. The portfolio will be reviewed on an annual basis and will be presented in graph form as shown below.

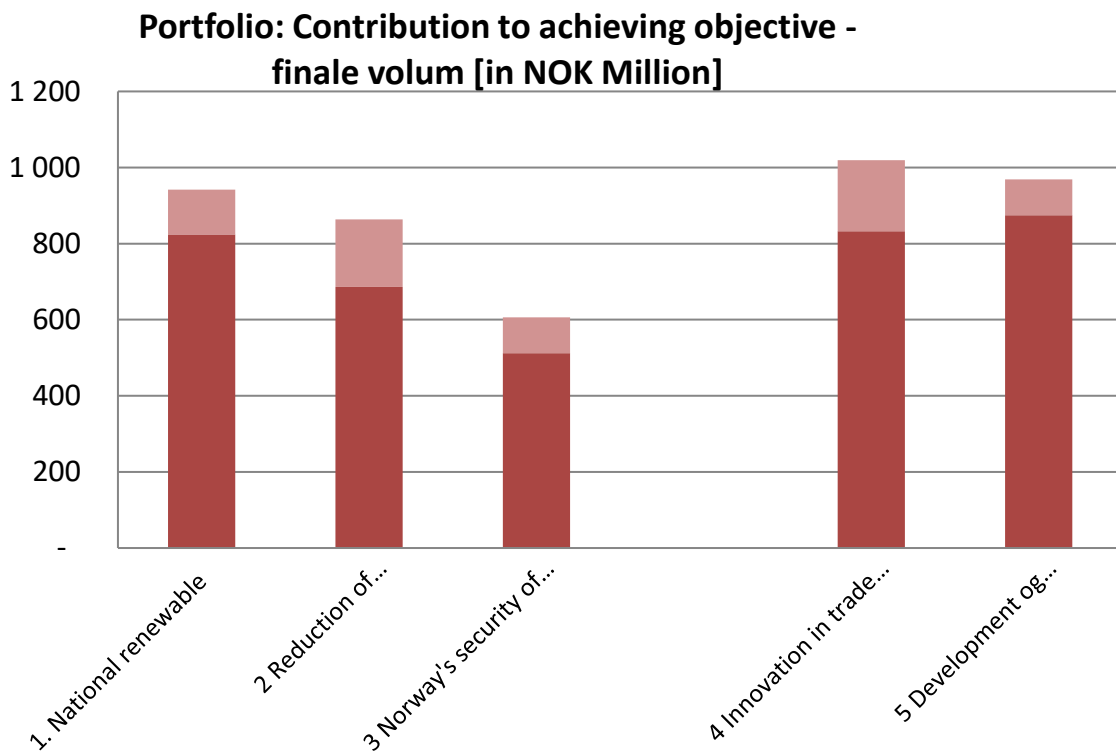


Figure 4. ENERGIX portfolio – contribution to achieving objectives.

The secondary objectives of the ENERGIX programme also comprise the programme’s desired societal outcomes. Thus a good indicator for the programme in this context will be whether the funding announcements result in a project portfolio that helps to achieve all the objectives.

Additionality<sup>3</sup> is another key indicator for ensuring that the programme is facilitating innovation and strengthening the actors' R&D efforts.

A large share of the research must be carried out in and for trade and industry and the public sector if the research is to be applied and the project results are actually to advance the achievement of the objectives. A high share of Innovation Projects in the total project portfolio will be another important indicator in this context, and the programme's target is a share of close to 40 per cent.

The results of ENERGIX-funded projects will be summarised in fact sheets and reports that document long-term impacts. Follow-up research over time will be important to determining whether the overall portfolio of projects in important areas is producing the desired results. The ENERGIX portfolio should be viewed together with the portfolio of the FME centre scheme, or together with other instruments, when this is relevant.

## Resources and budget

The ENERGIX programme is funded by the Ministry of Petroleum and Energy (OED), the Ministry of Climate and Environment (KLD), the Ministry of Transport and Communications (SD), the Ministry of Agriculture and Food (LMD), the Ministry of Education and Research (KD), and the Ministry of Trade, Industry and Fisheries (NHD/NFD). These ministries represent a wide range of sectors with challenges and opportunities that touch on or lie within the energy sphere, and their involvement enhances the reach of programme. The Ministry of Petroleum and Energy provides around two-thirds of the overall allocation and is the most important stakeholder in the programme.

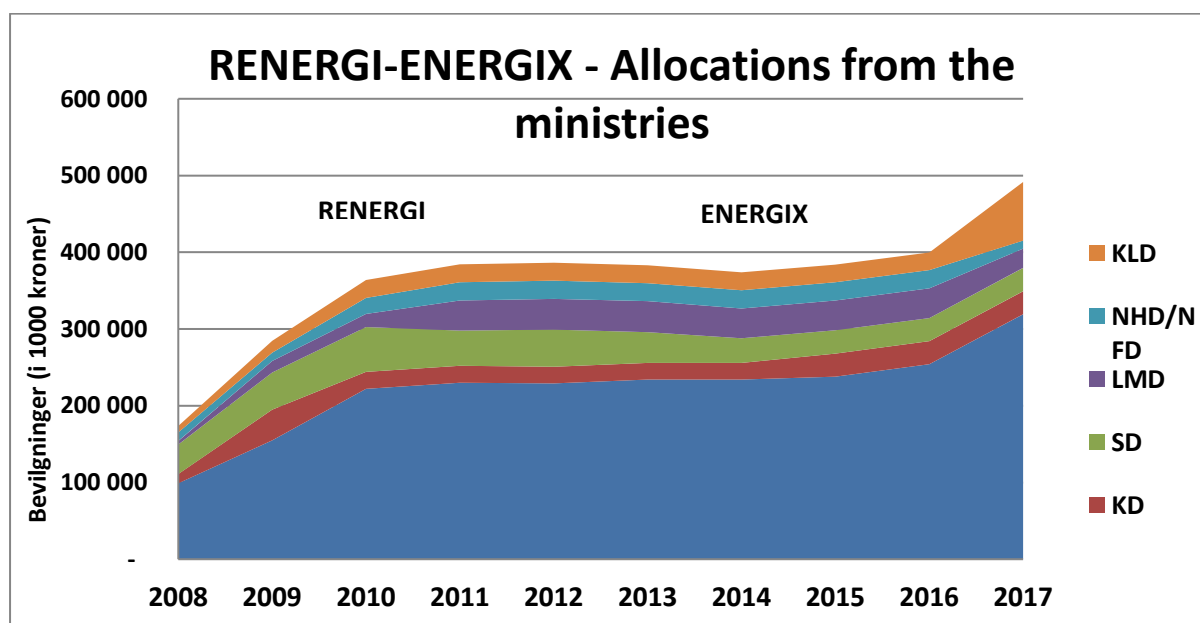


Figure 5. Allocations to the RENERGI and ENERGIX programmes from 2008 to 2017.

<sup>3</sup> In connection with the mid-term evaluation of the ENERGIX programme (Oxford Research AS, 2016), 85 per cent of the project managers and 65 per cent of the projects denied funding stated that the project was dependent on programme funding if it was to be realised at the planned scale and according to the planned schedule. Thus the programme has very high additionality. Over half the respondents said it is difficult or impossible to find alternative funding sources.

In light of the challenges in the energy and climate spheres, a high level of allocations to the ENERGIX programme is still warranted. In connection with the negotiations at the UN Climate Change Conference in Paris (COP 21) in December 2015, Norway joined Mission Innovation, a global initiative launched by the US Department of Energy in which 22 countries and a prosperous group of nearly 30 international investors are participating. The Norwegian Government has stated that the country will as a minimum double public investment in research, development and innovation in environment-friendly energy over the course of a five-year period. This includes support for research, development, testing and introduction of renewable energy, energy transmission, energy efficiency and carbon capture and storage (CCS).

## Governance and organisation

The programme board of the ENERGIX programme is appointed by and reports to the Research Board of the Division for Energy, Resources and the Environment. The programme board is charged with administering the instruments at its disposal to achieve the programme's objectives. This is to be carried out in accordance with the intentions and objectives of the Research Council's overall strategy, the guidelines from the Council's Executive Board and the Research Board of the Division for Energy, Resources and the Environment, and the ENERGIX work programme.

The programme's priorities, research tasks and financial framework will be assessed and adjusted in relation to changes in the national budget and annual allocation letters from the funding ministries. The programme board's activities must be in compliance with the Research Council's overall principles and guidelines for the establishment, operation and conclusion of research programmes. The programme board acts on behalf of the Research Council and reports to the research board via the executive director.

The *ENERGIX programme administration* is responsible for carrying out the day-to-day tasks of the programme and consists of a programme coordinator assisted by personnel with scientific and administrative expertise. The programme administration carries out the scientific and administrative functions of the programme and facilitates the programme board's activities as well as implementation of the programme board's decisions. The programme coordinator reports to the programme board and takes a proactive role in ensuring that the programme is carried out in accordance with the approved work programme.

### *Application review process*

Grant applications for Researcher Projects, projects on new concepts in the energy sphere, and Knowledge-building Projects for Industry will primarily be assessed by international referees. When feasible, the referees will be convened in panels for discussions and decisions by consensus. This process provides the formal basis for application review, and the programme administration will incorporate the referee assessments into its recommendation to the programme board. Applicants who wish to have their applications for innovation projects treated confidentially must explicitly request this. In such cases applicants will have the opportunity to comment on the proposed referees.

The ENERGIX programme will strive to achieve balance in the gender, age and international scientific expertise of the participants taking part on the external referee panels.



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