Research Cooperation with China on Energy

Application type: International Calls
Application deadline: 12. June 2019, 13:00 CEST
Relevant thematic areas for this call: Environment-friendly energy and CO2 capture and storage
Target groups: Research organisations
Funding scale: NOK 15,000,000-25,000,000
Amount of funding presumed available for this call for proposals: NOK 75 000 000
Project duration: 24-36 months
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Purpose
The MoST - RCN Joint Funding Call on Consortium Collaboration on Energy aims to promote academia-industry consortia in both countries to collaborate in the field of environment-friendly energy.

Important dates
22 May 2019
Open for applications
12 Jun 2019
Application deadline
31 Dec 2019
Latest date for announcement of projects that will receive funding
01 Jan 2020
Earliest permitted project start
31 Dec 2023
Latest permitted project completion date

About the call for proposals
MoST (Ministry of Science and Technology) and the Research Council of Norway (RCN) will finance a common call within the energy topics offshore wind, combined cooling, heating and power generation, and new energy vehicles. The call is only published in English.

The English text is legally binding.

You can apply for funding for projects on the following:

Research on smart operation control technologies for offshore wind farms
Scheduling and operation control algorithms for offshore wind farms to minimize wake loss, reduce turbine loads and comply with grid constraints.

Wake effect is a major factor that causes the loss of power generation in offshore wind farms. Numerical simulation algorithms and smart operation control technologies are the main measures to improve profitability of wind farms balancing the sometimes conflicting objectives of maximising production, reducing turbine loads and complying with grid constraints. Accuracy and efficiency of the developed models and control algorithms should be validated against laboratory or full-scale measurements in an offshore wind farm. Testing and demonstration can be carried out in an existing wind farm without any major modifications, e.g. to measure/demonstrate impact of parked upstream turbines or these operating at reduced power in a wind farm. In addition to full-scale tests in offshore wind farms, laboratory set-ups and high-fidelity numerical models can be applied.

Research is expected to be carried out addressing five tasks:
1. Wind prediction (nowcasting) for wind farm control
2. Rapid calculation of wake flow in offshore wind farms
3. Integrated modelling of wind farms for control applications including bottom-fixed and floating wind turbines
4. Development of control algorithm(s) and codes for maximising production, reducing turbine loads and complying with grid constraints
5. Demonstrations in large offshore wind farms or laboratory in China or Norway

Expected assessment indicators are:

1. Accurate (with less than 10% uncertainty) and fast (within 1-10 minutes) nowcasting for wind farm control.
2. Real-time calculation of wake flow in offshore wind farms with sufficient precision for the optimal control.
3. New control algorithm(s) will be validated from SCADA measurements in offshore wind farms or high-fidelity models in laboratory
4. Operation control algorithms of offshore wind farms to increase the profitability by more than 2%

Key technologies and demonstration of combined cooling, heating and power generation for low-carbon neighbourhoods/buildings with clean energy

The research tasks of this thematic area are:

- To propose a novel combined cooling, heating and power generation system that meets the needs of low-carbon neighbourhoods to fully absorb renewable energy.
- To develop the load peak-shaving technology of renewable energy based on solar energy with thermal energy storage (TES), as well as the new solar-thermal converting devices, the high-temperature heat pump and compact energy storage system (PCM) and so on.
- In the scenario of 100% clean energy, to achieve a high proportion of renewable energy acceptance by energy supply systems in large public buildings or small-scale neighbourhoods, and construct project demonstration.

The research topics include

1. Integration and peak-shaving characteristics of the photovoltaic/thermal (PV/T) hybrid system coupled with thermal energy storage (TES):
   - To research on integration of distributed PV/T hybrid systems,
   - To develop technologies of 1) full-spectrum and cascade solar energy utilisation, and 2) combined heat and power generation.
   - To reveal the peak-shaving characteristics of PV/T hybrid systems coupled with medium-temperature TES, especially under fluctuating power loads.
   - To investigate the matching rules between the TES capacity and PV/T system configurations.
2. Efficient consumption of electrical power and combined cooling and heating cogeneration technology based on green or natural working fluid heat pumps and compact thermal storage:
   - To develop the new working fluids and the matched compressors.
   - To study the medium and high temperature electric heat pump technology with green or natural working fluids, reveal its cooling and heating characteristics and transport potential.
   - Research the dynamic characteristics of electric heat pumps under fluctuating power loads, to realise the economic utilisation and efficient consumption of renewable energy, such as wind and solar energy.
3. Simulation platform and operation adjustment strategy of combined cooling, heating and power generation by multi-energy systems
   - For the characteristics of user-side energy demand, carry out system flow design of multi-energy and trigeneration system.
   - To conduct the real-time matching research on multiple energy modes and multiple user demands.
   - To develop simulation platforms for combined cooling, heating and power generation with multi-energy complementary systems.
   - To obtain the cooling, heating and power load satisfaction rate of the users and the renewable energy utilisation rate of the multi-energy system under different operation strategies.
4. Demonstration of low-carbon neighbourhood and large-scale buildings for combined cooling, heating and power trigeneration
   - To construct the engineering application demonstration of low-carbon neighbourhoods/buildings by clean energy trigeneration.
   - To verify the full-scale operation regulation strategy and the energy consumption indicators under various energy load demands.

Expected assessment indicators are:

1. To develop a PV/T hybrid system with medium temperature TES, of which the electrical and thermal efficiencies are over 15% and 60% respectively, and the TES temperature is over 90°C.
2. To develop the high temperature electric heat pump using green or natural working fluid, which the hot side outlet temperature can reach to 100 °C, the temperature rise can exceed 50°C, and the COP of the heating system can exceed 3.5.
3. To develop the simulation platform for system design and operation strategy for the combined cooling, heating and power generation by multi-energy complementary system.
4. To establish the demonstration of 100% renewable energy trigeneration systems for more than 20,000 m² of building area. The heating and cooling energy consumption is reduced by more than 30% compared with that of the conventional methods.

New Energy Vehicles

Transportation is a major contributor to gaseous emissions both in China and Norway, and a more sustainable system is crucial for achieving greenhouse gas emission reduction and improving air quality. The proposed research initiatives focus on related emerging technologies and include the following aspects:

1. Develop an integrated terminal device that is capable of sensing, safety forewarning and travel service; develop and test an information management platform for electric vehicles in Norway based on the Chinese platform technology; based on data collected from both platforms (China and Norway), conduct characteristics analysis of EV users, charging infrastructure planning optimisation, ecological driving behaviour
2. Based on previous experience with wireless charging technology in Norway, develop high-efficiency and high-safety wireless charging systems for EVs; prototype in China and test in Norway.
3. Investigate the degradation mechanisms of battery systems; develop high-fidelity models, SOC/SOH/SOP co-estimation algorithms and fault diagnosis methods; BMS functionality verification in the Norwegian environment.

Expected assessment indicators are:

1. A Norwegian information management platform for new energy vehicles with a service capacity of no less than 2 million units and a data update frequency of less than 30s;
2. Demonstration operation of Chinese EV products in Norway with a fleet of no less than 10 units (expected to be funded outside the research project);
3. Wireless charging system for EV application with a misalignment tolerance of no more than 150 mm and a maximum system efficiency of no less than 92 % (Grid to Battery);
4. To achieve vehicle demonstration and application of the developed battery management technologies.

Who is eligible to apply?
The call is open for Norwegian research partners in FMEs and the two former FMEs on offshore wind.

Approved Norwegian research organisations can apply to this call for proposals.

Who can participate in the project?

Requirements for the Project Owner
The organisation that is listed as Project Owner in the application form must approve that you submit the proposal.

Requirements for collaboration partners
Only research organisations are eligible to be collaboration partners and receive funding under this call for proposals.

To apply, the Chinese applicants should organise a collaborative consortium of academic and industrial partners and should jointly apply with Norwegian partners from FMEs (Centres for Environment-friendly Energy Research). On the Norwegian side, the call is open for research institutions which are partners of a Norwegian FME, or – within offshore wind – the two former FMEs. The proposals must be supported by the FME. A letter signed by the FME manager or the manager of one of the former offshore wind FMEs, to confirm the support of the proposal, must be attached.

China/Norway partners need to collaborate on the basis of complementarity, equality and mutual benefit. Both sides should have balanced inputs and work packages in a project.

China/Norway partners need to have a signed Consortium Agreement, including IPR regulations, ready before applying.

A plan for personnel exchange must be included in the proposal.

China/Norway partners need to submit their applications to MoST/RCN respectively. Applications submitted only to one side are invalid.

Requirements for user participation

Industry participation must be included and letter(s) of intent from industry partner(s) must be attached. Direct financial contribution from industry is not mandatory, but will be positively evaluated with regard to the implementation.

What can you seek funding for?

Under this call for proposals, you may seek funding to cover the following:

- Payroll expenses. Please refer to the Research Council's guidelines for payroll and indirect costs. For academic positions in the university and university college sector and all doctoral and post-doctoral research fellowships in Norway, the amount sought must follow the following rates.
- Operating expenses, including procurement of R&D services and costs related to the operation and depreciation of scientific equipment. Please refer to the Research Council’s guidelines for depreciation of equipment. See this page for what to enter into the budget.
- You may apply for overseas research grants for doctoral and post-doctoral fellowship-holders in the project at a later time. See here for more information about the Utenlandsstipend scheme (this call is currently available only in Norwegian); if you wish to apply for overseas research grants for the project manager and/or other project participants, you must include this as part of the Research Project grant application.
- Payroll expenses. Please refer to the Research Council’s rules for calculating payroll and indirect costs. For academic positions in the university and university college sector and all doctoral and post-doctoral research fellowships in Norway, the amount sought must follow the following rates. You may apply for funding to cover the following positions:
  - Doctoral research fellowships for up to three years and post-doctoral research fellowships for up to three years. Hiring procedures, employment periods, work duties, education plans, etc., must comply with the regulations concerning terms and conditions of employment for the posts of post-doctoral research fellow research fellow, research assistant and resident (this page is in Norwegian only) laid down by the Ministry of Education and Research.
  - Academic positions.

Conditions for support

Support for a research organisation should go to the organisation’s non-economic activity. It therefore does not constitute state aid. The Research Council assumes that the necessary accounting separation is in place.

The Research Council does not award state aid under this call for proposals. Companies defined as "undertakings" under the state aid rules cannot receive support to cover project costs. Nor can they receive indirect support through the project, and the consortium agreement must ensure that this is not done. They may, however, be the supplier of R&D services to the project. See here for more information about the state aid rules.

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Archiving of research data

The Project Owner is responsible for selecting the archiving solution(s) to use for storing research data generated during the project. The Project Owner must specify the planned solution(s) in connection with the revised grant proposal.

Other information relating to projects that receive funding from the Research Council

Reporting

The project will submit an annual progress report to the Research Council and a project accounting report shall be submitted by 20 January each year.

Disbursement of funding

The funding from the Research Council is paid automatically for the first and second four-month periods. Payment for the third four-month period takes place after an approved accounting report.

Relevant thematic areas for this call

Environment-friendly energy and CO2 capture and storage

Renewable energy, wind, Environment-friendly transport, electric (batteries), Other environment-friendly energy, energy efficiency, buildings

Requirements for this application type

Application requirements

- The proposals must be written in English.
- All attachments must be in PDF-format.
- A plan for personnel exchange must be included in the proposal.
- The proposals on Chinese and Norwegian side must have identical titles and partner lists.

Mandatory attachments

- Project description, max. 10 pages, use the designated template (see below).
- CVs for central participants, use the designated template (see below).
- A one-page summary of project activities, identical in the proposals to Norway and China. This summary should list the planned activities/work packages and clearly show which partner will be involved in the different activities.
- Letter of Intent from FME (or former FME’s within offshore wind) leaders.
- Letter(s) of intent from industry(ies).
- Consortium agreement.
- Proposal of three experts for evaluating the proposal.

Excellence

The extent to which the proposed work is ambitious, novel, and goes beyond the state of the art

* Scientific creativity and originality.
* Novelty and boldness of hypotheses or research questions.
* Potential for development of new knowledge beyond the current state of the art, including significant theoretical, methodological, experimental or empirical advancement.

The quality of the proposed R&D activities

* Quality of the research questions, hypotheses and project objectives, and the extent to which they are clearly and adequately specified.
* Credibility and appropriateness of the theoretical approach, research design and use of scientific methods. Appropriate consideration of interdisciplinary approaches.
* Where relevant, the extent to which appropriate consideration has been given to ethical issues, safety issues, gender dimension in research content, and appropriate use of stakeholder/user knowledge.

Impact

Potential impact of the proposed research

The extent to which:

* the potential impacts are clearly formulated and plausible.
* the outputs of the project address important present and future scientific challenges.
* the outputs of the project address important present and future challenges for the sector(s).
* the developed competence and expected results will promote future value creation, in the industry and/or development of the public sector?
* the outputs will address relevant UN Sustainable development goals.
* the project will be undertaken in a responsible manner, with reference to relevant methodology for achieving this.
Communication and exploitation
* Quality and scope of communication and engagement activities with different target audiences, including relevant stakeholders/users.
* Involvement of the stakeholders/users in dissemination and utilization of the project results.

Implementation
The quality of the project manager and project group
* The extent to which the project manager has relevant expertise and experience, and demonstrated ability to perform high-quality research (as appropriate to the career stage).
* The degree of complementarity of the participants and the extent to which the project group as a whole encompasses the expertise needed to undertake the research effectively, and provides added value.
* The quality of the project organization and management.
* Effectiveness of the work plan, including the extent to which resources assigned to work packages are aligned with project objectives and deliverables.
* Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role.
* Appropriateness of the proposed management structures and governance.
* Appropriateness of stakeholder and user participation in the implementation and governance of the project.

Overall assessment of the referee/panel
The mark is derived from the panel's assessments of the three criteria Excellence, Impact and Implementation.

Relevance to the call
The extent to which the project satisfies the guidelines and stipulations set out in the call for proposals.

The level and quality of the international collaboration will be assessed both by external experts and the ENERGIX administration. On the basis of the "Overall assessment" from the external experts and the assessment of the relevance to the call, the administration will give the applications an overall grade.

The level and quality of the international collaboration will be assessed by the ENERGIX administration.

In addition, the proposals will be assessed according to the "Expected assessment indicators" given for each of the three topics. The proposals must show how these, or some of these, targets will be met through the planned work.

Administrative procedures
The proposals will be assessed separately according to the rules of procedure in each country. The proposals submitted to the RCN will be assessed by external experts and the administration. MoST and RCN will implement a joint decision-making procedure to determine the outcome of the call as per the existing evaluation procedure at MoST and RCN. Projects must receive a high assessment score in both countries to be funded. Final decision on funding from RCN will be taken by the board responsible for energy research or a person given mandate from this board.

The Research Council expects to fund three projects, preferably one for each of the three topics.

Application templates for download
- Project description template for research cooperation with China on energy (docx)
- CV-mal for forskere/CV template researchers (docx)
- CV-mal for ikke-forskere/CV template non-researchers (docx)