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Stockholm 10 February 2020

## **Energy transitions - a systemic approach**

### **Call for stage one proposals and announcement of funding**

*The Swedish Foundation for Strategic Environmental Research (Mistra) invites research groups, jointly with relevant stakeholders in the community, to submit their vision for a new research programme. The submitted proposals should address significant environmental problems faced by society, with an emphasis on developing long-term solutions. The focus of this call is the transition of the energy sector towards the elimination of greenhouse gas emissions through the development of a new energy mix and effective infrastructure.*

### **A two-stage process**

The evaluation of proposals to this call will be made in two stages. In stage one, applicants should submit a five page proposal that will be evaluated by an international panel. Stage two will be by invitation only.

Proposal planning grants of up to SEK 150 000 will be available for the groups invited to submit stage-two proposals.

### **Background**

Following the Paris climate agreement and the United Nations sustainable development goals, the Swedish government has adopted a goal of achieving a society with net zero greenhouse gas (GHG) emissions by the year 2045. In order to reach this goal, the various sectors of society will need to eliminate, or negate GHG emissions. To achieve the overarching target of a fossil free society, an energy intense transition of the current industrial system will need to take place. This will require a system perspective, new societal structures, transformative approaches and the introduction of new technologies, some of which have not yet been developed or, perhaps, even thought of.

In the Swedish and European context, a number of public and private initiatives are ongoing to prepare our society for the transition of the energy system. These initiatives have, or are soon expected to, produce reports describing the problems ahead and suggesting some potential solutions. These reports provide important insights into how different sections of society view the current situation and how it may be developed.

As a step towards meeting the challenges mentioned, Mistra asked an international expert group to prepare a background paper on the topic at hand. This paper highlights some central challenges and areas of research and serves to instigate discussion.

## Focus

The majority of current research funding in Sweden tends to focus either on purely technological issues, or to a lesser extent, questions that fall squarely in the field of social science. We envision a programme that more clearly recognises and addresses the links between different aspects of future energy system development pathways, drawing upon an array of research fields working together via inter- and transdisciplinary research.

The research programme should address and recognise the multi-faceted character of the energy challenge. This requires a systemic view that can span the entire technological spectrum of the energy system from demand, through distribution of energy carriers, to energy conversion and supply, including new technologies such as artificial intelligence. We believe that exploring drivers of demand of energy services, institutional aspects of innovation and similar non-technical aspects can add value compared with other research efforts in the area.

The first-stage proposal must clearly define the strategic environmental problems that are to be addressed including an account of how the research results are expected to contribute to problem solution. Goal conflicts between different sustainable development goals could also be important to consider in this context. Benefits should be described together with relevance for Swedish competitiveness.

The background paper identifies several potential research areas, some of which should be addressed in the envisaged research programme:

1. *Energy demand*

Electricity and district heating are essentially free from GHG-emissions in Sweden. However, optimisation of demand may create an energy surplus that can be used to reduce GHG-emissions in other areas. Motivating various sections of society to carry out such an optimisation can be challenging, as the argument of resulting reductions in GHG-emissions may seem remote.

2. *Developing infrastructure*

Effective systems for the production, distribution and storage of energy need to be developed based on the systems in place today. The introduction of new production entities in the form of prosumers offers both opportunities and challenges. The new infrastructure will need to be rapidly adaptive as energy demands may become more dynamic while production tends to greater volatility. Coupling of sectors in new ways will be essential as will decoupling of others. Questions arise as to how a system with greater variability can be maintained.

3. *Prosperity*

As long as the administrative structures present today are maintained, there will be little incentive to drastically change the system. The role of government at both national and international levels is essential in promoting the required transition. The use of incentives, new business opportunities and other benefits need to be understood in order to transform the energy sector in a manner which is beneficial for Swedish competitiveness.

#### 4. *Just transition*

Given the goals set out and the set time schedule, it is essential that all sections of society work in a concerted manner. Uneven distribution of incentives, costs and workloads will need to be addressed in order to avoid possible conflicts, which may lead to counterproductive outcomes. Various tools such as pricing, tariffs, taxes and rewards require clear policies to ensure a fair distribution of the burden across society.

#### 5. *Progress*

Knowledge of the effect of GHG-emissions from fossil fuels on climate has been available since 1966 for the coal industry and 1972 for the oil industry and yet society continues to make little headway in implementing policies to curb the emissions. Research results and innovations need to be implemented with greater urgency, requiring supportive legislation.

#### 6. *Digital enablers*

The emergence of the internet, various sensors, data collection and above all artificial intelligence have huge potential to help accelerate a transition to an energy effective society.

### **Who can apply**

This call addresses research groups in all academic disciplines working at Swedish higher education institutions, research institutes, government agencies and companies, as well as public sector and civil society. Researchers and organisations active outside Sweden may participate, but the principal applicant and planned programme host must be a Swedish organisation.

### **Application process and review**

This call for research programme proposals consists of two stages. The first stage proposal, which **must not exceed five pages in length**, should be written in English and will be evaluated by an international evaluation panel. In addition to the five-page proposal, a maximum of **CVs for up to five key people** should be attached (maximum of one page per person).

Key concepts in focus for the evaluation of the first stage proposals are **transdisciplinary and interdisciplinary approaches, strategic environmental problems** addressed and a **systemic perspective**.

The first stage proposal is expected to include the following **sections**:

1. Vision, aims and expected impacts
2. Relevance for strategic environmental problems
3. Outline of the consortium including programme host and actors

## Evaluation criteria

The following criteria will be used:

1. Approach, i.e. how far the programme has a central, coherent idea and an innovative direction  
Scientific proficiency
2. Societal impact
3. Management and organisation, i. e., an outline of how the program will be governed and structured

The international evaluation panel will review the first stage proposals submitted. Based on their recommendations, the Mistra board will invite a small number of applicants to submit full programme proposals. Submission of stage-two proposals is thus by invitation only. Writing grants of up to SEK 150 000 will be made available as a contribution to the cost of preparing the stage two proposals.

Note that Mistra is subject to GDPR legislation and to the principle of public access to official records. This means that all documents received by Mistra, including proposals, are public. For more information, see Mistra's data privacy policy (<https://www.mistra.org/en/data-privacy-policy>).

## Time schedule

### 2020

10 February	Call for stage one proposals opens
8 April	Call for stage one proposals closes
April-May	Evaluation of stage one proposals by an international panel
June	Decision by Mistra's board based to invite stage two proposals
15 October	Stage two proposals must be submitted
November	Evaluation of stage two proposals by an international panel
December	Award decision is taken by Mistra's board

### 2021

March	Programme start (preliminary)
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<b>Expected programme budget</b>	A total of SEK 57.5 million over four years.
<b>Mistra's financial contribution</b>	A maximum of SEK 50 million.
<b>Co-funding</b>	Corresponding to at least 15 % of Mistras financial contribution.
<b>Length of first stage research proposal</b>	First stage proposal maximum 5 pages plus 5 CVs.
<b>First stage research proposals to reach Mistra not later than</b>	Wednesday 8 April 2020 at 4:00 pm. The proposal must be sent to mail@mistra.org as a single PDF file.
<b>Appendices</b>	<ol style="list-style-type: none"> <li>1. Background paper: <i>"The future energy landscape for Swedish industry and society"</i></li> <li>2. Allowable costs and co-funding in Mistra projects</li> </ol>
<b>Contact person</b>	Christopher Folkeson Welch, +46 70-732 3074, chris.welch@mistra.org.

### Relevant material

"Accelerera energiomställningen för ett hållbart samhälle"

(<https://www.regeringen.se/4adaf7/contentassets/839904375fb64140a06616e4c0eb5450/energimyndigheten.pdf>)

"Näringslivets kraftsamling för elförsörjningen"

(<https://www.svensktnaringsliv.se/fragor/elforsorjning/>)

"Högre elanvändning 2045" (<https://www.svensktnaringsliv.se/fragor/miljo-energi-klimat/hogre-elanvandning-ar-2045-samhallsutvecklingen-och-klimatomställning-746596.html>)

(<https://www.svensktnaringsliv.se/fragor/miljo-energi-klimat/hogre-elanvandning-ar-2045-samhallsutvecklingen-och-klimatomställning-746596.html>)

"Färdplan el – för ett fossilfritt samhälle" (<https://www.energiforetagen.se/sa-tycker-vi/energiforetagen-arbetar-for-ett-fossilfritt-sverige/fardplan-el--for-ett-fossilfritt-samhalle/>)

(<https://www.energiforetagen.se/sa-tycker-vi/energiforetagen-arbetar-for-ett-fossilfritt-sverige/fardplan-el--for-ett-fossilfritt-samhalle/>)

"The European Green Deal" Brussels, 11.12.2019 COM(2019) 640 final