

Summary

Swedish climate research – what
are the Swedish costs and
effects? (RiR 2012:2)



RiR 2012:02 Swedish climate research – what are the costs and effects?

Summary

The Swedish National Audit Office has undertaken an audit of Swedish climate research – how much funding it is allocated, which research areas are targeted and what the effects of the research are. The audit has focused on research directed towards reducing emissions of greenhouse gases. Climate research is a central instrument for the achievement of the climate targets in the long term.

Audit Background

Reasons for the audit: Government support to research and development is substantial in relation to other policy instruments in the climate area, and in recent years the funding for climate research has increased. However, because the Government does not provide an overall overview on climate research to the Riksdag, the amount of state funding granted to climate research is not known. Despite the Government's view that research is necessary to promote technical developments in order to achieve the climate objective, there is no comprehensive information on which areas the climate research are aimed at, or on its effects.

Audit Objectives: The objective of this audit is to investigate to what extent Swedish climate research supports the climate targets.

Audit Scope: The Swedish National Audit Office has investigated how much funding the Government allocates to Swedish climate research, which research areas are targeted and the effects of the research. The Government allocates funding to researchers in part indirectly through research councils such as the Swedish Energy Agency and the Swedish Research Council, and in part directly to universities and university colleges. The main focus of the audit is climate research aimed at reducing greenhouse gas emissions and thus achieving the climate targets. This may be research on electric cars or renewable energy production, e.g. wind or solar power. The audit encompasses Swedish climate research carried out in 1994-2010.

Audit Findings

The overall conclusion by the Swedish National Audit Office is that Swedish climate research has the potential to contribute to achieving the climate targets. It is, however, unclear to what extent the climate research actually supports the climate targets and contributes to reduced emissions in the long term. In order for the research to effectively contribute to the long-term climate targets, the Audit Office believes that a comprehensive climate research strategy is required, which should define the elements and scope of the climate research. Climate research needs to be explicitly coordinated with other policy instruments in order to provide effective ways for research results to contribute to the climate targets in practice. Furthermore, the overall costs and results

of the climate research must be comprehensively reported.

Climate research has the potential for contributing towards climate targets ... Funding for Swedish climate research has increased and in 2010 totalled almost 2 billion Swedish kronor, according to Swedish National Audit Office findings. Thus in 2010, climate research comprised almost 7 percent of total government research funding. A number of climate-related strategic research initiatives were prioritised in the Swedish Government's most recent research bill in 2008. These constituted 115 million kronor of the total 2 billion kronor allocated to climate research in 2010. Some 70 percent of government funding for Swedish climate research is allocated to research targeted on reduction of greenhouse gas emissions. The majority of this research is on energy. The findings of the Swedish National Audit Office show that Swedish climate research results in a comparatively large number of scientific papers and patent applications. In comparison with Swedish research in general, Swedish research targeted on reduction of greenhouse gases comprises a larger share of global scientific papers and is more often cited.

... but it is unclear to what extent climate research supports the climate targets. Climate research has several different objectives. Moreover, the objectives are found in several different policy areas, each with its own specific objectives. Research priorities are therefore not governed by the climate targets. This is obvious in the field of energy research. Energy research has several objectives, e.g. industrial/economical, but none of the objectives are expressed in terms of reduced greenhouse gas emissions. In order for climate research to contribute towards reducing greenhouse gas emissions, the research must lead to technical developments and to the commercialisation and use of new products. Neither the Government nor the agencies with responsibility for the commercialisation of Swedish research have evaluated to what extent the results of Swedish climate research has been practically applied. However the Swedish Energy Agency has reported that the commercialisation of Swedish research is lower in Sweden than in other countries. This indicates that while the researchers produce many scientific papers and an increasing number of patent applications, it is not certain that the research is contributing to the transformation of society that is necessary to achieve the long-term climate targets.

Difficult to assess whether more funding has led to more results. In the same period as the funding for climate research has increased, the number of Swedish scientific papers and patent applications within the climate field has also increased. However in countries without the same increase in research funding as in Sweden, the results in the form of scientific papers and patent applications have also increased. It is therefore not possible to ascertain whether it is the substantial increase in funding for Swedish climate research which has led to the increase in the number of scientific papers and patent applications.

Insufficient Government evaluation of scope, direction and results. No comprehensive reporting on Swedish climate research is provided to the Riksdag regarding its scope, direction or results. The funding allocated to climate research is not described in finance bills, other government bills or in other publications. No common definition of climate research in Sweden has been established by the Government or by the funders of research. This contributes to the lack of insight by the research councils regarding what constitutes climate research and to the lack of information on how much climate research is currently undertaken. Thus no overall picture exists of the scope, direction and results in relation to the statements and expectations of the Riksdag regarding climate research - despite the request by the Riksdag for a comprehensive report on current climate measures and results. Such information is required as a basis for decisions by the Riksdag when allocating research funds.

Lack of coordination of the climate research. Climate research applies to many sectors of society and

involves several government departments and agencies; however no government agency or department has been assigned responsibility for the coordination of climate research and its results. This became evident when the research councils carried out a review of the strategic investment in climate research for the first time in 2010. Funding for different areas of research was found to be presented separately and the results reported were not comparable. It is therefore not possible to gain a comprehensive picture of the costs and results of the strategic investment in climate research, nor of Swedish climate research as a whole.

Climate research should be coordinated with other policy instruments. In addition to research support, many contributing factors and policy instruments are required in order for the results of climate research and development to be commercialised. In several research projects which, according to the research funders, have led to commercialisation, the determining factors for commercialisation have been other than central government research support, e.g. the carbon dioxide tax, government investment support and the availability of risk capital. This shows that climate research is not sufficient in itself to result in the development and commercialisation of new products. Climate research must be explicitly coordinated with other policy instruments to provide effective means for research results to contribute to the climate targets in practice.

The Government lacks an overall strategy for how the climate research shall promote the climate targets. The aims of the Swedish climate research are not clear. It is therefore also unclear how the results should be evaluated. The Government has not clarified how climate research is to contribute towards the climate targets. Similarly, this was not specified when the Government proposed its strategic investment in climate research in 2008. In order for climate research to work as an effective instrument of climate policy, a comprehensive strategy or action plan is required specifying how climate research can contribute towards the climate targets.

Recommendations to the Government

In order for the funds allocated to climate research to effectively contribute towards achieving the climate targets, the Swedish National Audit Office recommends the following measures:

- *The Government should report the total state funding provided for climate research in its financial bills.* No comprehensive reporting of the development of costs or on the results is currently carried out, despite the Government having pointed out the important role of climate research in its climate policy and the request from the Riksdag for a comprehensive report on climate measures and results. In order to enable such reporting the Government should establish a definition of climate research. This definition would also enable the research councils to classify research projects, allowing the identification and evaluation of climate related projects.
- *The Government should establish a strategy which clarifies how the research shall promote the climate targets.* Scenarios describing the changes required to achieve the climate targets by 2050, in Sweden and internationally, could provide a starting point for clarifying the contribution that can be made by climate research. The strategy should also include action plans for how the results from climate research can be commercialised and made useful in other ways.
- *The Government should continually evaluate climate research results and report these to the Riksdag.* If climate research is to be a long-term instrument of climate policy it is important for the Riksdag and the Swedish citizens to be able to take part of climate research achievements to date and how these have contributed to achieving the long-term climate targets. In order to gain sufficient information for such assessments, the

Government should ensure that the research councils systematically evaluate and report the results of climate research, e.g. by utilising comparable indicators.

- *The Government should ensure that climate research is coordinated with other policy instruments in order for the results to be effectively utilised and commercialised.* In addition to research and development funding, many other factors are significant for the commercialisation of research results. It is therefore necessary to coordinate different measures and policy instruments with climate research in order for new technology and products to reach the market.
- *The Government should assign explicit responsibility for the coordination of climate research to enable continuous evaluation of the scope, direction and results of climate research.* To date no such responsibility has been assigned, despite the involvement of several government departments and agencies and despite additional funding being allocated to climate research. Furthermore, according to the Government and Riksdag, climate research is of vital importance for achieving the climate targets. The assignment of explicit coordination responsibility will enhance the potential for Swedish climate research to contribute towards the long-term climate targets.