Oslo Centre for Research on Environmentally friendly Energy

Annual Report 2012

Summary

CREE – Oslo Centre for Research on Environmentally friendly Energy was established in 2011 as a social science based energy research centre funded by the Research Council of Norway (FME Samfunn) with an annual grant of NOK 8 million for 5 years, with a possible 3 years extension. The center started its activities in August 2011.

The main focus is on economic research as the research partners include the Frisch Centre, Department of Economics, University of Oslo (ØI), the Research department at Statistics Norway (SSB), and Tilburg Sustainability Center, the Netherlands. Cooperation with Centre for Development and Environment (University of Oslo), Faculty of Law (University of Oslo), SINTEF Energy Research and Institute for Energy Technology broadens the research perspective. The user perspective is ensured by several partners from industry and government.

The main aim of the center is to collect and develop knowledge on the effects of framework conditions in the energy market and on technological development, including innovation and the diffusion of technology for renewable energy, energy efficiency and carbon capture and storage. The centre provides a basis for better framework conditions and policy instruments designed to reach the energy and climate goals established nationally and internationally. CREE will also strive to develop the methodological framework required to reach these goals.

Our portfolio is divided into five working packages studying international climate and energy policy, innovation and diffusion, markets and regulation, evaluation of policy measures, and development of numerical models.

2012 has been the first full year of CREE activities and we have had an extensive publication, seminar and media activity. CREE organized the first user conference (in cooperation with CICEP) and we have had several other user activities. A post doc researcher was employed in 2012, which means that we now have the planned number of junior researchers connected to the center. CREE has also been active in attracting international research funding and has so far been successful in receiving an EU funded project on climate policies (ENTRACTE).

CREE – Oslo Centre for Research on Environmentally friendly Energy

There is an increasing evidence for a changing climate and that this change is mainly due to human activities. The impacts of climate change on the economy, ecosystems and welfare can be significant and may be catastrophic for parts of the world. Thus, there is a need to reduce emissions that affect the climate as well as to adapt to inevitable changes, and it is recognized that technology improvements are an important element for achieving the deep emission cuts.

However, there are several challenges that are not only technological such as how to make it profitable to develop and utilize new technologies and more environmentally friendly energy sources. Another important challenge is to design climate and energy treaties that will help achieving a better social outcome. In this respect effective policy instruments and fair outcomes are important.

The aim of CREE is to make a solid base for policy making on these and other important questions, and contribute to the collection and establishment of knowledge on how different

regulations affect both the energy market and technological development, including innovation and the diffusion of technology for renewable energy, energy efficiency and carbon capture and storage. The centre studies policy instruments designed to reach the goals established in national and international energy and climate policy, but also the possibilities to improve international treaties to be able to reduce the negative impacts of global warming.

The research of the center is primarily grounded in economics as the research partners are the Department of Economics (University of Oslo), the Research Department (Statistics Norway), the Frisch Centre and the Tilburg Sustainability Centre, but it also draws on other disciplinary perspectives as we have a close cooperation with other disciplines within the social sciences, law and technology (IFE, SINTEF Energy and the MILEN network at the University of Oslo).

The center has the following vision:

- We want to be a leading international research centre within energy, environmental and resource economics.
- We will generate knowledge that can contribute to a cost-effective and sustainable exploitation of Norwegian and international energy resources by industry and governments, as well as an effective and fair climate and energy policy, both nationally and internationally.
- We will contribute to recruitment and training at the master, doctoral and post doctoral levels in energy and environmental economics at the University of Oslo. Recruiting women to research will have a particular focus.

This report will briefly summarize the activities and the achievements of the center in 2012.

Research plan and strategy

CREE organizes its research into five different working packages:

Working Package 1: The International Politics of Climate and Energy
(Research Directors: Michael Hoel, Department of Economics, University of Oslo, and Ole Jørgen Røgeberg, Frisch Centre)

The research questions in this working package are basically on:

- Improving the current climate regime – increase incentives to join and comply
- Alternative treaty forms – sector based treaties; research and development (R&D) treaties?
- Dealing with non-signatories – prevent carbon leakages
- Equity issues – intergenerational vs. intragenerational
- Implications for energy market policies

Working Package 2: Innovation and Diffusion policy
(Research Director: Rolf Golombek, Frisch Centre)

Important research questions in this working package are:

- What is the optimal mix of policy instruments to achieve innovation of environmentally friendly technologies?
- What is the optimal R&D policy for a small country with limited demand for carbon capture and storage (CCS), but with good technological competence?
- What types of market failures may arise in the application and diffusion of environmentally friendly technologies and how can we overcome them?

Working Package 3: Regulation and Market
(Research Director: Nils-Henrik M. von der Fehr, Department of Economics, University of Oslo)

This research package focuses mainly on the electricity markets and study questions like:

- Is there a contradiction between the policy to develop more green energy and regulations that will provide more efficiency in the energy market?
- Which policies can provide a sustainable use of energy?

- What is a reasonable level of energy security and how can we ensure that it is achieved?

Working Package 4: Evaluation of Environmental and Energy Policy Measures
(Research Director: Bente Halvorsen, Statistics Norway)

This is an empirical part of the project and studies the success of environmental and energy policy measures so far. Important questions are:

- What amount of energy savings is eaten up by increased consumption (rebound-effect)
- Can regulation of a good have unintended effects on close substitutes?
- What are the effects of soft policy measures?
- Focus on transportation: Does CO_2 taxation lead to higher demand for energy efficient vehicles? How does the increase in cars that run on biofuels and electricity affect emissions from road traffic?

Working Package 5: The Next Generation of Numerical Models
(Research Director: Brita Bye, Statistics Norway)

This working package focuses on developing our numerical models by updating the data, improving the modeling of new technologies, and making innovation processes endogenous. The models will be used to study research questions in the other working packages.

Our strategy is to follow the plans put down in the annual research plans, see http://www.frisch.uio.no/cree/projects.html. The research will benefit from close contact with subcontractors and user partners. For the vision and strategy of the total CREE activity, see the CREE strategy plan which will be finalized in 2013.

Center organization

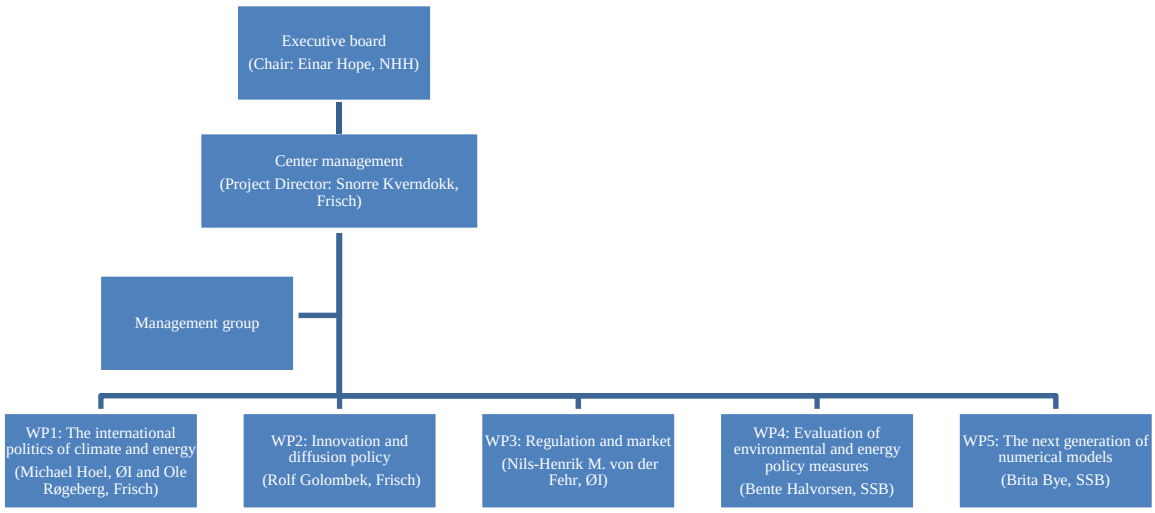
The organization of the center in 2012 was as shown in the figure below.

The chair of the executive board (Einar Hope, NHH) does not represent any of the research partners, user partners or sub-contractors, and is therefore independent of the partners in CREE. The board also consists of one member from each of the three Norwegian research partners (Oddbjørn Raaum, Frisch; Taran Fæhn, SSB; Karine Nyborg, ØI), while the user partners are represented by two members, one from industry (Tor Kartevold, Statoil) and one

from Government (Guro Børnes Ringlund, KLIF). Two of the board members were replaced in 2012. Oddbjørn Raaum replaced Erik Hernæs as the representative from the Frisch Centre, while Guro Børnes Ringlund, KLIF, took over as a user party representative after Tor Arnt Johnsen, NVE, who sadly passed away last year. The board had three meetings in 2012, see http://www.frisch.uio.no/cree/board_meetings.html.

The administration of CREE is located at the Frisch Centre with Snorre Kverndokk as the Project Director and Jørg Gjestvang as the Project Manager.

The administration has regular meetings with the management group consisting of all the working package leaders to discuss matters of importance for the center.



The partners of CREE are divided into research partners and user partners. The research partners are:

Ragnar Frisch Centre for Economic Research (Frisch Centre), Oslo (host institution)
Research department, Statistics Norway (SSB), Oslo
Department of economics, University of Oslo
Tilburg Sustainability Center, Netherlands

As in 2011, CREE had seven user partners in 2012:

Gassnova SF
Norwegian Climate and Pollution Agency (KLIF)
Norwegian Ministry for Petroleum and Energy
Norwegian Water Resources and Energy Directorate (NVE)
Statkraft Energy AS
Statnett SF
Statoil ASA

The project director and CREE-researchers visited all user partners in 2012 as a mean to build a better collaboration between research- and user partners. The user partners of the center contribute with funding and with members in the board, but also to the research with detailed knowledge about markets, technologies and politics.

The resources and the organization of CREE make it easier to maintain better contact with the users of energy and environmental research, and to establish a formal meeting point with them. In 2012 we have put a lot of resources in creating such meeting points. The focus has been to create closer ties between research partners, but also between research partners and user partners. The strategy has been to present CREE at seminars at the Norwegian research partners to create greater awareness about the center, and also to have regular meeting places for researchers. To achieve this, we have introduced a CREE luncheon that is held about every second month, as well as other social events around Christmas and summer. We have also coordinated our proposals for new projects and have had two major meetings on this. The result is that the Norwegian research institutions appear largely as a single unit. As a means to create closer ties with the users, the project director and a researcher have visited all user partners during the year. This has led to better communication with them. The Board is also working on strategies to improve user involvement

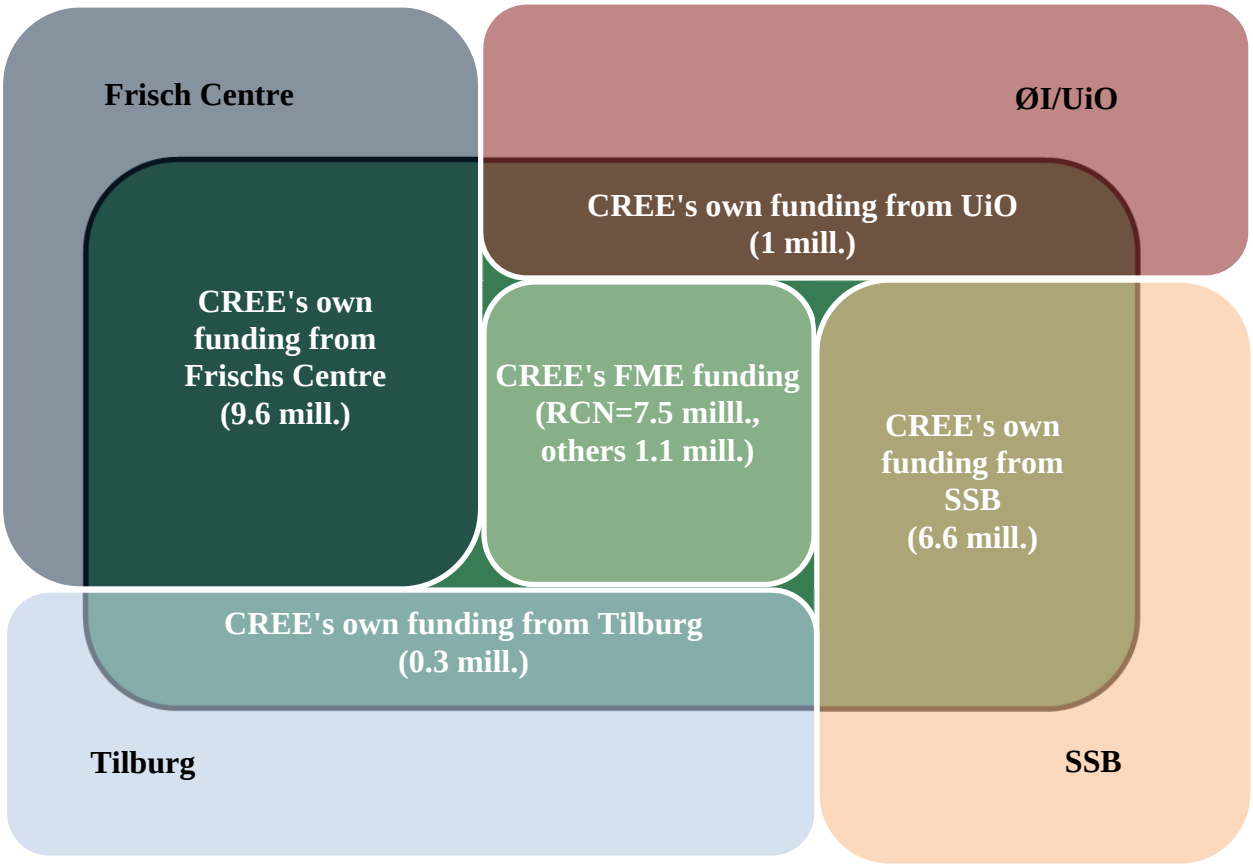
Funding

The funding of CREE in 2012 comes from different sources. The center has an annual contribution from the Research Council of Norway (RCN) of NOK 8 millions, user partner funding of NOK 600.000, and funding from the University of Oslo of NOK 500.000. In addition to this, the center has its own funding which is research money from other sources such as international money and other research council programs. The figure below gives an

overview of the total funding in 2012. Note that in the figure, the funding from RCN is NOK 7.5 million, which is less than the annual grant. The reason is that some of the money is transferred to 2013.

CREE funding in 2012

Total CREE centre funding incl. own funding. (26 mill.)



Own funding = professional work that is beneficial to the CREE centre, but is not part of CREE's direct funding from The Research Council of Norway. Supposed to be at least 25% of the total budget of CREE.

FUNDINGS		
The Research Council of Norway		7,5
Others		1,1
Public funding	*0,5*	
Privat funding	*0,6*	
Own funding		17,5
Frisch	*9,6*	
SSB	*6,6*	
ØI	*1,0*	
Tilburg	*0,3*	
Sum total funding		26,0

Professional activities and results

The professional activities in 2012 have been concentrated on the research in the different working packages described above, the research workshop, CREE seminars, model forum and several user activities including the user conference.

The CREE workshop took place in Oslo (Lysebu hotel) on 24-25 September. About 35 people attended the wokshop, mainly researchers from the research partners and sub contractors in CREE, but also from our international network. Presentations covered research from all our work packages, and on subjects related to the work packages. The program is available at http://www.frisch.uio.no/cree/2nd_research_workshop.html.

The CREE seminar series included 24 seminars in 2012, among them 6 international visitors. The seminars were given at Statistics Norway, Frisch Centre and University of Oslo. For a list of all seminars, see http://www.frisch.uio.no/cree/seminars_earlier_years.html.

The first model forum was held on 2 February, where we discussed the effects on the power sector of climatic changes. In addition to researchers from CREE, the participants included our subcontractors IFE and SINTEF as well as user partners, see http://www.frisch.uio.no/cree/modellforum.html.

The first user conference was held in April and was co-organized with CICEP, another social since FME center. The conference was in Norwegian and the topic was on international climate treaties and national climate policy. About 35 people attended the conference. The program is available at: http://www.frisch.uio.no/cree/Brukerkonferanse_CREE_2012.html.

CREE also organized several user activities in 2012 such as half day seminars at the Ministry of Petroleum and Energy and at the Ministry of Environment, see also “Communication and dissemination” below.

When it comes to publications, the CREE working paper series had 19 titles in 2012, see http://www.frisch.uio.no/cree/working_papers.html and we also had publications in other working paper series. We had 14 papers published in international peer reviewed journals, and several papers have been accepted for publication

(http://www.frisch.uio.no/cree/publications.html#Scientific_Journals). Further, we have published several other publications such as popular science articles (http://www.frisch.uio.no/cree/publications.html#Popular_scientific_articles), a book, book chapters and several reports (http://www.frisch.uio.no/cree/publications.html#Other_publications). The appendix gives an overview of CREE publications in 2012.

It also worth mentioning that CREE researchers received two awards in 2012. Michael Hoel from the University of Oslo, received the price for the best paper published in *the Scandinavian Journal of Economics* in 2011 for his paper *The Supply Side of CO_2 with Country Heterogeneity*, and Bård Harstad was announced one of the 10 best researchers in Norway under 40 years old by the newspaper *Morgenbladet*, see http://www.frisch.uio.no/cree/docs/In%20the%20news/2012/2_tertial/Harstad_Morgenbaldet.pdf.

Below we will give a short overview of the research in the five different research packages in 2012, and go into more detail about one work for each package.

WP1: The International Politics of Climate and Energy

Most of the work in this working package in 2012 can be included in the following subcategories:

1) *Participation in, ambitions of and compliance with international climate treaties.* On question studied is how the pessimistic conclusions of the standard model are altered when the model is expanded to include country heterogeneity, trade and trade barriers, as well as farsightedness?

2) *Climate R&D cooperation and implications for treaties.* Climate R&D reduce future abatement costs - how does cooperation on such R&D affect the prospects of later climate treaties? One aspect of this question is addressed in an ongoing research project that by Aart de Zeeuw (Tilburg) and Michael Hoel. They consider a situation where a coalition of countries does not cooperate on emission reductions but cooperates on the development of new, climate friendly technologies that reduce the costs of abatement. The equilibrium size of such a coalition, as well as equilibrium emissions, depends on the distribution across countries of their willingness to pay for emission reductions. Increased willingness to pay for emissions reductions for any group of countries will reduce (or leave unchanged) the equilibrium size of such a coalition. However, the effect of such an increase in aggregate willingness to pay on equilibrium emissions is ambiguous.

3) *Quota trading and weak international cooperation.* One example is the effect of international emissions trading when the international agreement is based on inefficient bargaining, while another example of work within this project is how a system for deposits could secure compliance of international treaties.

4) *Carbon leakage and climate policies.* How should carbon duties be designed to effectively address carbon leakage issues? Carbon leakage is studied using numerical simulation models.

5) *Equity issues.* Is there a trade-off between equity within a generation and across generations when it comes to climate policies? In a new paper by Snorre Kverndokk, Eric Nævdal and Linda Nøstbakken this has been studied. They assume that countries and regions have inequality aversion in the way that they dislike inequality in consumption between countries. This have large impacts on emissions and energy technology investments for rich and poor countries in a global climate treaty as the optimal climate policy leads to higher investment in clean capital in the rich countries and in dirty capital in the poor countries, thereby allowing the poor countries to pollute more and develop faster.

Research activities in 2012 were in line with expectations, as reflected in the number of published articles. By supplementing the Research Council of Norway's funds from other programs with CREE funds (in line with the Research Council's wish that funds from other programs be used as "self-financing" of CREE), research activities on a number of topics have been expanded. For instance, a NORKLIMA project on international climate treaties which ended mid-year 2012 had a total of 14 papers (some finished, some close to submission), a clear increase relative to the ambitions. Also worth noting is that Bård Harstad begun work as a Professor at the University of Oslo in January 2012, working on topics that fall within this work package.

All four research partners in CREE are involved in this work, which will be primarily theoretical, with exception of number 4 above. In addition to these groups a number of international researchers are involved, such as Larry Karp, Johan Eyckmans, Christopher Böhringer and Samuel Fankhauser. Several of these have been financed by running projects financed by the Norwegian Research Council. Some of these (e.g. NORKLIMA) ended in 2012 year, while others (e.g., MILJØ2015) will run into 2013.

Below is the result from one project related to question 1 above.

Buy Coal! A Case for Supply-Side Environmental Policy
Journal of Political Economy Vol. 120, No 1 (February 2012), 77-115
Bård Harstad

Environmental policy historically has been driven by a demand-side mindset — attempting to limit consumption of precious fossil fuels through pollution permits, taxation and multi-national climate change treaties. However, this study shows that actually buying coal, oil and other dirty fossil fuel deposits still in the ground could be a far better way to fight climate change.

The study suggests that the single best policy for a multi-national climate coalition is to purchase the extraction rights of dirty fossil fuels in non-participating countries, and then conserve rather than exploit the deposits. This would be a radical departure from the traditional view that focuses on reducing the demand for fuel.

One of the biggest challenges for multi-national climate agreements is the role of non-participating countries. If a climate coalition reduces demand for fossil fuel, the world price of oil goes down and non-participating countries find it profitable to consume and pollute more. Similarly, if the coalition seeks to reduce the supply or extraction of fossil fuels, the world price increases and these countries find it optimal to supply more. Thus, both on the demand-side and the supply-side, the result is carbon leakage, which is an increase in pollution abroad relative to the emission-reduction at home. To limit carbon leakage, the coalition may set up tariffs or other border measures, but this will distort trade.

In this analysis, it is shown that by letting coalition countries buy extraction rights in third countries — and preserving rather than exploiting the fuel deposits — climate coalitions can circumvent the traditional problems of a demand-side policy.

The most intuitive benefit from this policy is that emissions are reduced if one buys and conserves deposits. Furthermore, the coalition finds it cheapest to buy the marginal deposits (that is, deposits that are not very profitable to exploit, but still quite polluting when consumed). After selling its marginal deposits, a non-participating country's level of supply will be less sensitive to changes in the world fuel price. Consequently, there is no longer carbon leakage on the supply side, and the coalition can limit its own supply without fearing that the non-participants will increase theirs.

This does the trick. After purchasing marginal extraction rights, the coalition implements its ideal policy simply by reducing its supply, not its demand. Fossil fuel prices are then equalized across countries. Also, the resulting fossil fuel price seems high enough to motivate even non-participating countries to invest effectively in new technologies, such as renewable energy sources. For these reasons, the policy is socially optimal in the analysis, even if some countries do not participate.

Most importantly, the analysis shows that progress on international climate policy is best achieved by simply utilizing the existing market for extraction rights. Multi-national companies are already trading extraction rights, climate coalitions should as well.

WP2: Innovation and Diffusion Policy

The work in this working package in 2012 mainly followed two lines of research, theoretical analyses and numerical analyzes on the numerical model LIBEMOD (see under WP5 below), and theoretical analyzes on more general principles. Most of the work is still ongoing and can be included in the following subcategories:

1. R&D in CCS technologies

Using a numerical model of the European energy market, LIBEMOD, and building on game theory as well as the R&D literature, we are examining whether the government should support R&D that will reduce costs of CCS investments or subsidize purchase of CCS technology. Important questions are i) should the government support R&D in CCS technologies? If so, what type of instruments should be used? and ii) will the market provide too much or too little R&D relative to the first-best outcome?

2. The profitability of environmental R&D

Environmental policy will typically increase the profitability of providing environmentally friendly technologies to the market. This sub-project analyzes empirically the causal effect of emission permit regulation on innovation of environmental technologies. It uses a unique Norwegian firm level panel dataset of binding emission permits and environmental patenting, and is a part of the PhD project of Marit Klemetsen, Statistics Norway. Preliminary results indicate that non-market regulations spur innovations in environmentally friendly technologies. This is important because non-markets regulations are much more frequently used as a policy instruments than market-based instruments like taxes and subsidies.

3. Strategic choices for energy infrastructure innovation

This sub-project is conducted by the Tilburg Sustainability Centre (TSC) and Statistics Norway. It examines whether the connected markets for transport lead to specific distortions in the innovation market for the development of new clean energy infrastructure/technologies/platforms.

4. Behavioral economics

Recent studies have demonstrated that individuals may fail to respond to economic incentives in the expected way, and that these failures seem to display regularities that make them likely to appear in the context of consumers' investments in energy-saving equipment. We are

writing a survey on this literature to get a better understanding of the state of the art. The survey will be completed in the first part of 2013.

Below we give more details on one of the projects under this working package. This paper is related to the second subproject above, but is a theoretical paper analyzing how environmental regulation affects induced technology choice.

Prices vs. quantities: Technology choice, uncertainty and welfare
CREE working paper 3/2012
Halvor Briseid Storrøsten

Technological improvements have proven essential in mitigating environmental problems such as climate change, depletion of the ozone layer and acid rain. This paper examines how environmental regulation affects induced technology choice, and how this influences the optimal choice between regulatory instruments.

The paper considers a sector where competitive risk-neutral firms supply a homogeneous good to a product market. One unit of production causes one unit of emissions that is subject to either an emissions tax or tradable emissions permits regulation. There are two sources of uncertainty: demand-side uncertainty represented by random variables in the consumer utility function, and supply-side uncertainty modelled as random elements in the firms' abatement cost functions. The model is solved analytically to find the subgame perfect Nash equilibrium.

The results show that tradable emissions permits and an emissions tax affect the firms' technology choice differently under uncertainty. A tax encourages the most flexible abatement technology if and only if stochastic costs and the equilibrium permit price have sufficiently strong positive covariance, compared with the variance in consumer demand for the good produced. Moreover, the regulator may not, in general, be able to design tradable emissions permits and an emissions tax such that the two regimes are equivalent when technology choice, uncertainty and the product market are taken into account (even in terms of expected values). Finally, the firms' technology choices are socially optimal under tradable emissions permits, but not under an emissions tax. Intuitively, the firms' technology investment decisions affect the fluctuations in aggregate emissions under an emissions tax, and thereby the expected social cost of emissions. This source of externality does not arise under tradable emissions permits where aggregate emissions are fixed.

WP3: Regulation and Market

In this work package, the main question is how regulation of energy markets affects the development of green energy, and how measures to promote green energy impact the functioning of energy markets. It is of particular interest to study the implication of regulation across national borders, especially with respect to infrastructure, since an international regulatory framework is crucial for the exploitation of Norwegian energy and environmental resources, both in traditional areas and in new areas like capture and storage of CO_2. The work is planned mainly as theoretical and empirical studies, but numerical models, either already existing or developed in other work packages, will be utilized also. As such, part of the work within this package will be conducted in cooperation with or as part of Working Packages 4 and 5.

Some of the topics studied in 2012 were:

- *Integration of Wind Power in the Northern-European Power Markets.* In this project, we ask to what extent the existing hydro capacity can accommodate a large-scale expansion of wind power in and around the North Sea, taking account of the possibility of building pumped storage and the cost of constructing large international interconnectors that will provide back up and balancing capacity for the countries both inside and outside of the Nord Pool area.
- *Green Certificates and Energy Markets.* We study the importance of green certificates for electricity markets, and analyze how potentially negative effects may be counteracted by suitable regulation.
- *Interaction between Electricity and Quota Markets.* Important questions in this project are how price variations on the permit market affect the electricity market, and how the interaction between these markets impact incentives to invest in generation and measures to reduce emissions.
- *Natural Resources and Sovereign Expropriation.* An important question for governments of countries endowed with large natural resources is how to govern these resources, including choice of ownership structure and rights to exploitation. This and similar questions are studied in this project.

Below we give more details from a project on green certificates that was published in 2012.

Implementing the EU renewable target through green certificate markets.

Energy Economics, 34, (2012) 992-1000
Finn Roar Aune, Hanne Marit Dalen and Cathrine Hagem

The European Parliament has agreed on a *target* of a 20% share of renewables in the EU's *total* energy consumption by 2020. To achieve the target, the European Council has adopted mandatory differentiated *national* targets for each of the member states. There are no restrictions on how countries may stimulate their renewable energy production. We consider the use of green certificates to reach the renewable targets and we analyze the potential for cost reductions by allowing for trade in green certificates across member states. The green certificate system implies that producers of renewable energy receive green certificates from the authorities, proportional to their output. These certificates are sold to consumers who must hold a share equivalent to a certain percent (percent requirement) of their total energy consumption. The percent requirement equals the renewable target and differs across the member states whenever the national renewable targets differ.

Using a theoretical model, we show that the use of differentiated national targets is not a cost-effective policy to reach a certain renewable share in EU's total energy consumption. This conclusion also holds when there is EU-wide trade in green certificates. In a green certificate market, the consumers' marginal costs of energy differ if the renewable targets vary across countries. This violates the conditions for a cost-effective distribution of energy consumption. Cost-effectiveness is only achieved by imposing a common renewable target for all countries and allowing for free trade in green certificates. However, we show that EU-wide trade can ensure efficiency in total *production* of renewable energy, regardless of the distribution of national targets across countries.

We employ a numerical multi-market energy equilibrium model to assess the impact of the various designs of green certificate markets. The model simulations indicate large gains from trade in green certificates. Given the differentiated national targets set by the European Council, the overall cost of achieving the EU's renewable target can be cut by almost 70% by EU-wide trade in green certificates, compared with no trade across countries. The efficiency loss related to differentiated targets, and hence differentiated increases in consumer prices across countries, is modest. Given trade in green certificates, the EU's total cost can be further reduced by almost 4% by having a common renewable target compared with differentiated national targets.

WP4: Evaluation of Environmental and Energy Policy Measures

This research package is based on empirical studies of the effects of different policy measures. The activity in 2012 has mainly be on the following research topics:

i) *Rebound and adverse effects of energy policy:* We have discussed the question of how increased energy efficiency affects energy consumption through changes in behavior. These rebound effects are illustrated by analyses of how the increased use of heat pumps during the last decade has affected household energy consumption. Also, a considerable labor has been conducted preparing the anthropological analyses (see below) on this and the next topic, ensuring that we may compare results across disciplines at a later state

ii) *The households' response to soft policy measures:* A description of the use of policy tool use (both soft and hard) has been collected, and the analyses of the effects of soft policy tools on household energy consumption, and how soft policy tools affect the efficiency of hard policy measures have also started.

iii) *Environmentally friendly transportation:* How does the policy initiative to increase the number of electric cars in personal transportation affect CO_2 emissions? Data has been collected and analyses have been conducted on this topic (see comment below).

iv) *Indoor temperature and energy consumption in families with children:* The survey for the annual research campaign for the schools for 2012 has been prepared, aiming to shed light on how the choice of indoor temperature vary across households with different heating equipment, and how this affect household energy consumption. The data from the campaign has been collected and prepared for analysis.

v) *Household end-use energy consumption:* We deduce a model for using cross-sectional data for total annual electricity consumption for a sample of households, together with information from energy surveys, to estimate the end uses. Results are compared over time to detect possible trends.

This working package is a collaboration between economists from Statistics Norway (SSB), social anthropologists from Centre for Development and the Environment (SUM), and economists from the Frisch Centre/University of Torino. While the analyses in SSB have gone as planned, the anthropological research and analysis by SUM (see *i)* and *ii)* above) have been delayed due to legal matters that needed to be clarified prior to getting access to the same sample of households as is used in SSBs economic analysis. Also, the planned analyses

at Frisch/University of Torino/ØI (see *iii)* above) are also falling somewhat behind. The reason for the delay is that it has taken longer than anticipated to create the data set, due to problems merging information from different data sources. However, the research in all institutions is now on track.

Below we give more details on the work on the rebound effect done in Statistics Norway in 2012.

How do investments in heat pumps affect household energy consumption?
Forthcoming Discussion Paper, Statistics Norway and CREE working paper
Bente Halvorsen and Bodil M. Larsen

It is often assumed that increased energy efficiency is a cheap and effective way of reducing energy consumption. However, the full energy saving potential of an energy efficiency measure, as measured by the reduction in energy needed to produce the same amount of goods and services, will only be reached if consumers or producers do not change their behavior when the new and more energy efficient technology is applied. Based on economic theory, however, we expect behavior to change as increased energy efficiency will reduce the unit cost of producing a good or a service (often referred to as rebound effects).

In Norway, one of the largest uses of energy in household production is for space heating. One of the major sources of increased energy efficiency in household space heating recently is the increased use of heat pumps in Norwegian homes during the last decade. The question is how this major change in heating technology has affected household electricity consumption and the mix of energy consumed in Norwegian households.

To quantify the rebound effects through these behavioral changes, we develop a behavioral model based on a conditional demand model which is adapted to a household production framework. This model is used to decompose the effects of owning a heat pump on household electricity consumption into different behavioral changes: Do households who own a heat pump hold a different indoor temperature than other households and/or has it changed their energy saving behavior? It is also interesting to analyze whether they use less firewood and wood pellets than other households, as the government also aims to increase the use of bio-energy for space heating. This conditional demand model is estimated on a sample of 1111 households from the Norwegian Survey of Consumer Expenditure for the year 2009, with an additional questionnaire on energy consumption. This analysis helps us understand how Norwegian households have adapted their habits and behavior when this new technology is introduced.

In this analysis, we find that households owning a heat pump use significantly less firewood, but also fuel oils, than other households. They also hold a significantly higher indoor temperature than others. We also find that only those with heat pumps who may use alternatives to electricity for heating are able to save a significant amount of electricity, ceteris paribus. If we summarize all effects on household electricity consumption of owning a heat pump, including the effects on indoor temperature and firewood and fuel oil demand, households with a heat pump have approximately the same electricity consumption as households without this pump. This implies that the rebound effects for the mean household are as large as the energy savings potential of the heat pump, so that the total electricity saving is close to zero.

One important implication of this analysis is that energy efficiency measures are not always a cheap and effective way to combat the climate problem. Energy efficiency measures spark behavioral changes because they decrease the costs of producing household services. The size of the unwanted behavioral responses is an empirical question. Empirical analyses have shown that they may vary from case to case, and from country to country. The rebound effects will increase in magnitude if investments in more energy efficient technology are subsidized, as a subsidy will increase the income effects. One may want to subsidize new technology for other reasons; either to compensate for positive externalities, or for industry policy or distributional reasons. However, the energy savings accomplished by such subsidies are far from obvious.

WP5: The Next Generation of Numerical Models

To analyze policies that stimulate innovation and diffusion of new environmentally friendly technologies, integrated economy-energy-environment models are necessary tools. In 2012 we have developed and updated our energy market model (LIBEMOD); we have extended the set of countries to include all countries in Europe, we have included more environmentally friendly technologies and changed the modeling of some of these relative to earlier versions of LIBEMOD, and we have changed the benchmark year of the model, that is, all variables and parameters used to calibrate the model have been changed or updated. This work will be completed in 2013. Next year the work will concentrate on using these new model versions for different policy analyses.

In 2012 we have also established a new family of integrated macroeconomic Computable General Equilibrium (CGE) models, called the SNoW-models (Statistics Norway World models). In 2013 we will continue developing this family of models and use them for relevant policy analyses.

Below we give some more details on the SNoW-models.

SNoW-models

The SNoW-models (Statistics Norway World models) comprise a new family of integrated macroeconomic Computable General Equilibrium (CGE) models for energy and environmental policy analyses, developed at Statistics Norway in cooperation with Christoph Böhringer (University of Oldenburg). CGE models build upon general equilibrium theory that combines behavioural assumptions on rational economic agents with the analysis of equilibrium conditions. They provide counterfactual ex-ante comparisons, assessing the outcomes with a reform in place to what would have happened if it had not been undertaken. The main virtue of the CGE approach is its comprehensive micro-consistent representation of price-dependent market interactions in a setting with various, existing public interventions. The simultaneous explanation of the origin and spending of the agents' incomes makes it possible to address both economy-wide efficiency as well as distributional impacts of policy reforms.

The global version of the model family, the SNoW-model, is a generic multi-region, multi-sector CGE model of global trade and energy established for the analysis of greenhouse gas emission control strategies. Norway is a separate country in a new version of this model. The model features a representative agent in each region that receives income from three primary factors: labor, capital, and fossil-fuel resources. Labor and capital are intersectorally mobile within a region but immobile between regions. Fossil fuel resources are specific to fossil fuel production sectors in each region. Final consumption demand in each region is determined by the representative agent who maximizes welfare subject to a budget constraint with fixed investment (i.e., a given demand for savings) and exogenous governmental provision of public goods and services. Bilateral trade is specified following the Armington's differentiated goods approach, where domestic and foreign goods are distinguished by origin. CO_2-emissions are linked in fixed proportions to the use of fossil fuels, with CO_2-coefficients differentiated by the specific carbon content of fuels.

The SNoW-model is based on the GTAP 7.1 dataset (a global database detailed on trade, environmental and energy data used for generating models worldwide) which includes national accounts on production and consumption (input-output tables) together with bilateral trade flows and CO_2 emissions for up to 112 regions and 57 sectors. The parameters in the model are partly based on traditional calibration methods as well as more sophisticated econometric estimates. Elasticities of international trade (Armington elasticities) and substitution possibilities in production (between primary factor inputs) are directly provided by the GTAP database. The model has been used for analyses of efficient border tax policies to curb carbon leakage.

SNoW_No is a new detailed CGE model for Norway based on a GTAP database structure and following mainly the modeling structure in SNoW. A pilot version was completed in 2012. The Norwegian database for SNoW_No is established in close cooperation with the National Accounts and Energy and Environmental statistics at Statistics Norway. In 2013 we will continue improving the data and the model structure, especially the modeling of process emissions, dynamic investment and consumer behavior, as well as testing the model. Further plans for model development include extending the SNoW-family of models with linking the disaggregated SNoW_No-model to the global model system elaborated above.

International cooperation

All the Norwegian research partners in CREE have a large international network and it will be difficult to give a detailed report of all the collaboration with foreign researchers. Below we give some examples of this activity.

There is an international research partner in CREE, Tilburg Sustainability Center, and we also have contracts with several foreign researchers who have a part-time position paid by CREE:

Fridrik Baldursson, Reykjavik University
Matti Liski, Aalto University
Christoph Böhringer, Oldenburg University
Jared Carbone, University of Calgary

CREE organizes an annual research workshop where we invite our international research partners, those having a part-time position in CREE as well as other relevant researchers from our network. At this year's workshop (24-25 September) the following international researchers attended:

David Popp, Syracuse University
Fridrik Baldursson, Reykjavik University
Reyer Gerlagh, Tilburg Sustainability Center
Inge van den Bijgaart, Tilburg Sustainability Center
Aart de Zeuw, Tilburg Sustainability Center
Lital Helman, New York University

The center has also organized other workshops where foreign scientists participated. Among those, the Frisch Centre organized a NORKLIMA workshop in June with participation from several countries including Jared Carbone, Cees Withagen, Larry Carp, Marius Oche and Martin Wagner. Frisch Centre has also organized a workshop in November on the project "intergenerational and intra-generational equity in climate policy" (funded by MILJØ2015) with, among others, Johan Eyckmans and Linda Nøstbakken. Moreover, SSB organized a workshop on biofuels policy in March with contributions from, among others Ujjayanta Chakravorty, David Bryngelsson, Carolyn Fischer, Bengt Kriström, Mark Sanctuary and

Håkan Eggert.

During our seminar series year we have organized seminars with numerous foreign scholars, see the chart on our website http://www.frisch.uio.no/cree/seminars.html.

We also have several ongoing collaborative projects with foreign researchers in CREE. Some outcome of these projects are reported in the CREE working paper series, while others have been reported in other series (see the appendix on publications). In addition to this, we have extensive cooperation that has not yet resulted in publications, both under projects that are directly funded by CREE, and also under projects that count as our own funding (RENERGI, MILJØ2015 and NORKLIMA). Finally, CREE researchers are involved in several international organizations such as the IPCC. As a result of this, we have had several visits by foreign researchers the last year.

Finally, it is also worth mentioning that a CREE researcher, Karine Nyborg at the University of Oslo, is currently the president of the *European Association of Environmental and Resource Economists*.

Recruitment

The overall plan for CREE is to recruit two PhD students and one post-doc researcher at the beginning of the project period and to recruit a new PhD student and a post-doc in 2015. Hence, if we get funding for eight years, we will have funded at least three PhD students and two post-docs over the lifetime of CREE.

While two PhD students were recruited in 2011, we recruited one post-doc researcher, Daniel Spiro, in 2012. He has his PhD in economics from the Institute for International Economic Studies at Stockholm University, and is mainly working on work packages 1 and 3.

CREE gives a master scholarship of NOK 20.000 to up to three master students. In 2012, two master students received the grants and started on their master thesises in January 2013. They both have supervisors and offices at Statistics Norway.

In connection with the recruitment of candidates, we are also engaged in research training through teaching and supervising at Tilburg University and the University of Oslo. Further,

we are involved in MILEN's research school. This is an interdisciplinary research school for PhD candidates in energy and environment at the University of Oslo. Several of the CREE researchers are engaged in organizing the lectures and seminars for this research school for 2012.

Cooperation with other FME centers

When it comes to cooperation with other FME, our main contact is CICEP. This is mainly due to common research subjects as well as geographical proximity. We coordinate among other things some of our user partner events such as the annual user conference that is held in April every year. Some research cooperation has been undertaken, but we hope to expand this and have planned two internal workshops in 2013.

Cooperation with the other FME centers is mainly about joint events. One example is the seminar on the energy report (Energiutredningen) that was held in May and as a collaboration between the three social science FME centers. We also have cooperation through MILEN's research schools when it comes to joint seminars and workshops, and through the research school for all FME centers; NORREN. In addition, we hope to get a stronger connection to other FME centers through the new Energy Initiative (UiO:Energi) at the University of Oslo.

A final type of cooperation is invitations to seminars. We invited Odd Jarle Skjelhaugen from CenBio in March to talk about the center and discuss possible future cooperation. In addition to this, CICEP researchers have also given seminars in our seminar series in 2012.

Communication and dissemination

CREE has invested heavily in communication in 2012, for instance through an internal reward system for communicating through the media. We have a dedicated a website for news on CREE research, see http://www.frisch.uio.no/cree/CREE_in_the_news.html,
and had over 40 reports in the media in 2012, a huge increase compared to last year. Researchers from CREE has been involved in key debates in the media over the past year on subjects such as green certificates, biofuels, electric vehicles and the design of climate treaties.

When it comes to user-oriented communication measures, we have also had a lot of activity in 2012 with about 90 events. This includes meetings with all user partners, half-day seminars at

the Ministry of Petroleum and Energy and the Ministry Environment, public hearings in the Parliament (Stortinget), as well as seminars, workshop and conferences.

CREE has prepared a communication plan that is provided on our website, see http://www.frisch.uio.no/cree/adm/Strategi_Komunikasjon/Communication%20plan%20CREE%20October%202012.pdf

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Annual report: CREE
Appendix:

A1 Personnel

Key Researchers

Name	Institution	Main research area
Golombek, Rolf	Frisch Centre	Environmental Economics, Energy Economics, Applied Game Theory
Hallre, Hilde	Frisch Centre	Environmental Economics
Hauge, Karen	Frisch Centre	Environmental Economics
Kittelsen, Sverre	Frisch Centre	Production theory, Efficiency measurement, Regulation, Health Economics, Energy Economics
Kverndokk, Snorre	Frisch Centre	Environmental and Resource Economics, Health Economics
Nævdal, Eric	Frisch Centre	Resource Economics, Economic management of ecological systems, dynamic optimization, modeling of the risk of disasters, animal behavior
Røgeberg, Ole	Frisch Centre	Welfare analysis, endogenous preferences, rational addiction theory, consumer theory
Strøm, Steinar	Frisch Centre	Microeconomics
Asheim, Geir	Department of Economics, University of Oslo	Game theory, intergenerational justice, green national accounting
Brekke, Kjell Arne	Department of Economics, University of Oslo	Behaviroal Economics, Experimental Economics, Resource and Enviornmental Economics, Real options and stochastic analysis
Førsund, Finn	Department of Economics, University of Oslo	Resources, energy, environment, production theory, productivity
Harstad, Bård	Department of Economics, University of Oslo	Political Economics, Public Economics, Contract Theory, Environmental Economics
Hoel, Michael	Department of Economics, University of Oslo	Energy and climate economics, environmental economics, resource economics
Lund, Diderik	Department of Economics, University of Oslo	Resources, energy and environment, economics
Nyborg, Karine	Department of Economics, University of Oslo	Environmental economics, economic analysis of social and moral norms, behavioral economics.
Vislie, Jon	Department of Economics, University of Oslo	Microeconomics, environmental economics, incentives, public economics
Von der Fehr, Nils	Department of Economics, University of Oslo	Microeconomics, Industrial Economics, Regulation, Competition Policy.
Aune, Finn Roar	Research Department, Statistics Norway	Energy and environmental economics
Bye, Brita	Research Department, Statistics Norway	Macroeconomic
Fæhn, Taran	Research Department, Statistics Norway	Macroeconomic
Greaker, Mads	Research Department, Statistics Norway	Energy and environmental economics
Grimsrud, Kristine	Research Department, Statistics Norway	Energy and environmental economics
Hagem, Cathrine	Research Department, Statistics Norway	Energy and environmental economics
Halvorsen, Bente	Research Department, Statistics Norway	Energy and environmental economics
Holtsmark, Bjart	Research Department, Statistics Norway	Energy and environmental economics
Isaksen, Elisabeth Thuest	Research Department, Statistics Norway	Energy and environmental economics
Larsen, Bodil Merethe	Research Department, Statistics Norway	Energy and environmental economics
Rosendahl, Knut Einar	Research Department, Statistics Norway	Energy and environmental economics
Rosnes, Orvika	Research Department, Statistics Norway	Energy and environmental economics
Storrøsten, Halvor	Research Department, Statistics Norway	Energy and environmental economics
Gerlagh, Reyer	Tilburg Sustainability Center	Climate Change, Economics, Energy economics, Environmental economics
de Zeeuw, Aart	Tilburg Sustainability Center	Sustainability, Dynamic game theory, Environmental economics, Environmental policy, Mathematical economics

Post Doc students with financial support from the Centre budget

Name	Funding	Nationality	Period	Sex M/F	Topic
Spiro, Daniel	CREE		2012-2016	M	Energy and environmental economics

PhD students with financial support from the Centre budget

Name	Funding	Nationality	Period	Sex M/F	Topic
Ciccone, Alice	CREE	Italian	2011-2015	F	Economic of the climate change with econometric applications and climate technologies diffusion
Klemetsen, Marit	CREE	Norwegian	2011-2015	F	Innovation in energy- and environmental technology industries: Identifying knowledge externalities and effects of policies
Michielsen, Thomas	CREE	Dutch	2010-2014	M	Innovation in energy marked

PhD students working on projects in the centre with financial support from other sources

Name	Funding	Nationality	Period	Sex M/F	Topic
Midttømme, Kristoffer	Department of Economics, University of Oslo	Norwegian	2011-2014	M	Technology diffusion
Dalen, Hanne Marit	Research Department, Statistics Norway	Norwegian	2009-2014	F	The use of multiple instruments in energy and environmental policy.
Bråten, Ragnhild Haugli	Frisch Centre	Norwegian	2008-2012	F	Measuring environmental behavior with lab experiments
Jensen, Svenn	Frisch Centre	Norwegian	2008-2012	M	Global challenges in oil and gas markets: Market developments and reactions to climate and energy security policies
Mideksa, Torben	Department of Economics, University of Oslo	Swedish	2012-2016	M	Primary Concentration: Contract Theory Seconday Concentrations: Environmental Economics and Political Economics
Holtsmark, Katinka Kristin	Department of Economics, University of Oslo	Norwegian	2012-2016	F	Development Economics, Natural Resource Economics, Microeconomics

A2 Statement of Accounts

(All figures in 1000 NOK)

Funding

	Amount
The Research Council	7 520
Research Partners	
Frisch Centre (Host Institution)	9 560
Statistics Norway	6 600
Department of Economics, UoO	1 000
Tilburgs Sustainability Center	250
User partners	
Statkraft Energy AS	100
Statnett	250
Statoil ASA	250
Public partners	
University of Oslo	500
Total	26 030

Costs

Research Partners	
Frisch Centre (Host Institution)	14 311
Statistics Norway	8 241
Department of Economics, UoO	2 154
Tilburgs Sustainability Center	500
Centre for Development and the Environment, UoO	250
The Faculty of Law - Natural Resources Law, UoO	100
MILEN Centre for Development and the Environment, UoO	95
Institute for Energy Technology (IFE)	200
SINTEF	180
Total	26 031

A3 Publications and presentations in 2012

Journal Papers

Aune, F. R., H. M. Dalen,C. Hagem: Implementing the EU renewable target through green certificate markets, *Energy Economics* 34: 992-1000.

Baldursson, F. M., N.-H. M. von der Fehr: Price Volatility and Risk Exposure: On the Interaction of Quota and Product Markets, *Environmental and Resource Economics* 52(2): 213-233,

Böhringer, C., J C. Carbone, T. F. Rutherford: Unilateral Climate Policy Design: Efficiency and Equity Implications of Alternative Instruments to Reduce Carbon Leakage, *Energy Economics* 34 (Supplement 2): S208-S217

Böhringer, C., B. Bye, T. Fæhn, K. E. Rosendahl: Alternative designs for tariffs on embodied carbon – a global cost-effectiveness analysis, *Energy Economics* 34 (Supplement 2): S143-S153

Gabriel, S.A., K.E. Rosendahl, R.G. Egging, H. Avetisyan, S. Siddiqui: Cartelization in Gas Markets: Studying the Potential for a "Gas OPEC", *Energy Economics* 34(1): 137-152.

Golombek, R., S. A. C. Kittelsen, I. Haddeland: Climate change: impacts on electricity markets in Western Europe, *Climate Change* 113(2): 357-370.

Hagem, C., B. Holtsmark: Is the clean development mechanism compatible with an ambitious climate agreement? *Environmental Economics* 2(3): 24-35.

Harstad, B: Climate Contracts: A Game of Emissions, Investments, Negotiations, and Renegotiations, *Review of Economic Studies* 79 (4): 1527-57.

Harstad, B: Buy Coal! A Case for Supply-Side Environmental Policy *Journal of Political Economy* 120(1): 77-115.

Hoel, M., B. Holtsmark: Haavelmo on the Climate Issue. *Nordic Journal of Political Economy* 37(5): 1-22.

Holtsmark, B: The outcome is in the assumptions: analyzing the effects on atmospheric CO_2 levels of increased use of bioenergy from forest biomass, *GCB Bioenergy*.

Holtsmark, B., D. E. Sommervoll: International emissions trading: Good or bad?, *Economics Letters* 117(1): 362–364.

Holtsmark, B., M. Hoel, K. Holtsmark: Optimal harvest age considering multiple carbon pools – A comment, *Journal of Forest Economics* 19(1): 87-95.

Hovi, J., M. Greaker, C. Hagem, B. Holtsmark: A credible compliance enforcement system for the climate regime, *Climate Policy* 12(6): 741-754.

Rosnes, O., H. Vennemo: The Cost of Providing Electricity to Africa. *Energy Economics* 34(5): 1318-1328.

Strand, J., K.E. Rosendahl: Global Emissions Effects of CDM Projects with Relative Baselines, *Resource and Energy Economics* 34: 533-548.

Working Papers

Brekke, K.A., J. Konow, K. Nyborg: Cooperation is Relative: Income and Framing Effects with Public Goods. Memorandum 16/2012, Department of Economics, University of Oslo.

Bruvoll, A., H. M. Dalen, B. M. Larsen: Political motives in climate and energy policy, CREE Working Paper No. 18/2012, ISSN/ISBN 1892-9680/978-82-7988-134-6

Böhringer, C. B. Bye, T. Fæhn, K. E. Rosendahl: Alternative Designs for Tariffs on Embodied Carbon: A Global Cost-Effectiveness Analysis, CREE Working Paper No. 1/2012, ISSN/ISBN 1892-9680/978-82-7988-110-0

Böhringer, C., C. Fischer, K. E. Rosendahl: Cost-Effective Unilateral Climate Policy Design: Size Matters, CREE Working Paper No. 5/2012, ISSN/ISBN 1892-9680/978-82-7988-116-2

Fischer,C., M. Greaker, K. E. Rosendahl: Emissions leakage and subsidies for pollution abatement. Pay the polluter or the supplier of the remedy?, CREE Working Paper No. 12/2012, ISSN/ISBN 1892-9680/978-82-7988-125-4

Førsund, F. R..: Phasing in large-scale expansion of wind power in the Nordic countries, CREE Working Paper No. 6/2012, ISSN/ISBN 1892-9680/978-82-7988-118-6

Førsund, F. R..: Pumped-Storage Hydroelectricity, CREE Working Paper No. 14/2012, ISSN/ISBN 1892-9680/978-82-7988-127-8

Greaker M., P. E. Stoknes, K. H. Alfsen, T. Ericson; A Kantian approach to sustainable development indicators for climate change, CREE Working Paper No. 17/2012, ISSN/ISBN 1892-9680/978-82-7988-133-9

Greaker, M.,Tom-R. Heggedal: A Comment on the Environment and Directed Technical Change, CREE Working Paper No. 13/2012, ISSN/ISBN 1892-9680/978-82-7988-126-1

Greaker M., M. Hoel, K. E. Rosendahl: Does a renewable fuel standard for biofuels reduce climate costs?, CREE Working Paper No. 15/2012, ISSN/ISBN 1892-9680/978-82-7988-130-8

Hagem C, B. Holtsmark, T. Sterner: Mechanism design for refunding emissions payment, CREE Working Paper No. 19/2012, ISSN/ISBN 1892-9680/978-82-7988-135-3

Harstad B., M. Liski: Games and Resources, NBER WP 18519

Hoel, M., B. Holtsmark, K. Holtsmark: Faustmann and the Climate, CREE Working Paper No. 8/2012, ISSN/ISBN 1892-9680/978-82-7988-121-6

Hoel, M., B. Holtsmark: Haavelmo on the climate issue, CREE Working Paper No. 10/2012, ISSN/ISBN 1892-9680/978-82-7988-123-0

Hoel, M.: Second-best climate policy, CREE Working Paper No. 2/2012, ISSN/ISBN 1892-9680/978-82-7988-111-7

Holtsmark, B., M. Hoel, K. Holtsmark: Optimal harvest age considering multiple carbon pools, CREE Working Paper No. 11/2012, ISSN/ISBN 1892-9680/978-82-7988-124-7

Kverndokk, S., E. Nævdal, L. Nøstbakken: The Trade-off between Intra- and Intergenerational Equity in Climate Policy: Can Carbon Leakage be Justified?, CREE Working Paper No. 9/2012, ISSN/ISBN 1892-9680/978-82-7988-122-3

Kverndokk, S.: Moral positions on Tradable Permits Markets, CREE Working Paper No. 4/2012, ISSN/ISBN 1892-9680/978-82-7988-113-3

Rosendahl K. E., J. Strand: Emissions trading with offset markets and free quota allocations, CREE Working Paper No. 16/2012, ISSN/ISBN 1892-9680/978-82-7988-132-4

Sletten, T. M.: A Framework for Studying the Environmental Impact of Biofuel Policies, CREE Working Paper No. 7/2012, ISSN/ISBN 1892-9680/978-82-7988-120-9

Storrøsten, H. B.: Prices vs. quantities: Technology choice, uncertainty and welfare, CREE Working Paper No. 3/2012, ISSN/ISBN 1892-9680/978-82-7988-112-4

Books and article in books

Nyborg, K.: *The Ethics and Politics of Environmental Cost-Benefit Analysis*. Routledge Explorations in Environmental Economics, London/New York: Routledge. 2012

Rosnes, O., A.-F. Sinner, B. Tennbakk: Forecasting CO_2 Prices in the EU ETS. In *Handbook of CO_2 in Power Systems*, Q.P. Zheng, S. Rebennack, P.M. Pardalos, M.V. Pereira, N.A. Iliadis (eds.), pp. 243-274. ISBN 978-3-642-27430-5 (hardcover), ISBN 978-3-642-27431-2 (e-book). Springer-Verlag Berlin Heidelberg. 2012

Popular scientific articles

Bye, B., K. E. Rosendahl: Karbonlekkasje: Årsaker og virkemidler, *Samfunnsøkonomen* nr 1 2012

Böhringer, C., B. Bye, T. Fæhn, K. E. Rosendahl: Karbontoll som virkemiddel mot karbonlekkasje – en sammenlikning av ulike tollscenarioer, *Økonomiske Analyser* 2/2012, Statistisk sentralbyrå.

Fæhn, Taran: Utvikling av klimateknologier - hvordan kan Norge bidra? *Økonomiske analyser* 6/2012, Statistisk sentralbyrå

Golombek, R., S. A.C. Kittelsen, K. E. Rosendahl: Tildeling av klimakvoter i Europa. *Samfunnsøkonomen* Nr 2 2012

Hagem, C.: Klimameldingen – svake mål og svake virkemidler, *Samfunnsøkonomen* Nr 5 2012

Holtsmark, B.: Bioenergi fra skog gjør trolig mer skade enn fossil olje – et tilsvar, *Samfunnsøkonomen* Nr 6 2012

Holtsmark, B.: Elbilpolitikken – virker den etter hensikten?, *Samfunnsøkonomen* Nr 5 2012

Holtsmark, B.: Skog, bioenergi og klima, *Samfunnsøkonomen* Nr 4 2012

Kverndokk, S., K. E. Rosendahl: Oil price effects of transport regulations, *EAERE-Newsletter* Autumn 2012

Lund, D.: Er petroleumsvirksomheten subsidiert?, *Samfunnsøkonomen* Nr 4 2012

Other publications

Fæhn, T., B. Strøm: Modellering av klimakvotesystem for fremskrivninger i MSG6; dokumentasjon og veiledning, Notater 2012/53, Statistisk sentralbyrå. 2012

Fæhn, T., K. Jacobsen: Makroanalyser i tilknytning til Klimameldingen 2012, rapporter 22/2012, Statistisk sentralbyrå. 2012

Halvorsen, B.: Utviklingen i strømforbruket, prisfølsomheten og strømmarkedet, Rapporter 2/2012, Statistisk sentralbyrå. 2012

Wessman, S., B. Halvorsen, B. M. Larsen: Særavgifter relatert til husholdningenes energiforbruk - Dokumentasjon 1970-2012, Notater 66/2012,

Wessman, S., B. Halvorsen, B. M. Larsen: Statlige og kommunale tilskuddsordninger for elektrisitetssparing i husholdninger - Dokumentasjon 1970-2012, Notater 67/2012, Statistisk sentralbyrå.

Conference and seminar presentations

Baldursson, F. M., N.-H. M. von der Fehr: Natural Resources and Sovereign Expropriation, 2nd CREE Research Workshop, 25 September 2012.

Baldursson, F. M., N.-H. M. von der Fehr: Natural Resources and Sovereign Expropriation, 5th Atlantic Workshop on Energy and Environmental Economics, A Toxa, Spain, 25 June 2012.

Baldursson, F. M., N.-H. M. von der Fehr: Natural Resources and Sovereign Expropriation, Seminar at HECER, Aalto University. 27 February 2012.

van den Bijgaart, I.: Effective environmental policies with internationally pooled technology, CREE 2nd research workshop. Lysebu 24-25 September 2012

Bye, B.: Alternative designs for tariffs on embodied carbon – a global cost-effectiveness analysis, presentation at the EAERE conference in Prague, 27-30 June 2012

Carbone, J. C.: The Strategic Value of Embodied Carbon Tariffs, NORKLIMA Workshop, Oslo, Norway. 11 June 2012.,

Carbone, J. C.: The Strategic Value of Embodied Carbon Tariffs, Carbon Leakage Session, AEA Annual Meeting, Chicago. 6 January 2012.

Carbone, J.C.: Carbon Taxes and Deficit Reduction, NBER Summer Institute, EEE Program, Cambridge, MA. 23 July 2012.

Fæhn, T.: Alternative designs for tariffs on embodied carbon: a global cost effectiveness analysis, Presentation on the SURED Conference, Ascona, 4-7 June 2012

Fæhn, T.: Norsk økonomi og klimapolitikk, presentasjon på Brukerkonferanse CREE, Håndverkeren Oslo, 17 April 2012

Fæhn, T.: Norske klimambisjoner – en diskusjon av noen virkemidler, presentasjon på åpen høring om Klimameldingen i Stortingets energi- og miljøkomité, 14 May 2012

Fæhn, T.: Utvikling av klimateknologier – hvordan kan Norge bidra?, Presentasjon på Samfunnsøkonomenes høstkonferanse, Oslo, 23 October 2012

Fæhn, T.: Modeller til studier av effekter (impacts) av klimaendringer - Brukerseminar CREE, Oslo, 2 February 2012

Førsund F. R.: Pumped storage, 2nd research workshop CREE – Oslo Centre for Research on Environmentally friendly Energy. Lysebu, Oslo, 24-25 September 2012

Førsund, F. R.: Phasing in large-scale expansion of intermittent power in a hydro-dominated country4. PSR, Rio de Janeiro, 6 September 2012

Førsund, F. R.: Phasing in large-scale expansion of wind power in the Nordic countries. ASSA annual meeting IAEE/USAEE Session Chicago, 6-8 January 2012

Førsund, F. R.: Phasing in large-scale expansion of wind power in the Nordic countries2. Bergen Economics of Energy and Environment Research conference (BEEER2012) NHH, 15-16 May 2012

Førsund, F. R.: Phasing in large-scale expansion of wind power in the Nordic countries3. Guest lecture NTNU, 23 April 2012

Golombek, R.: Modeling Uncertainty in Numerical Equilibrium Models, CREE 2nd research workshop. Lysebu, 24-25 September 2012

Golombek, R.: Price and welfare effects of emission quota allocation. Workshop on the Economics of Climate Change. Collège de France, Paris, 3 October. 2012

Golombek, R.: Deltakelse i paneldabatt om utviklingen av energimarkedene mot 2030. Pension Fund Forum, Oslo, 20 March 2012.

Golombek, R.: Flere kabler – mindre kullkraft. OED,19 June 2012

Golombek, R.: Hvor går fremtidens energibruk? Norges Energidager, Oslo, 18. October 2012

Golombek, R.: Investeringer i energisektoren under usikkerhet, SSBs forskningsseminar, 18 September 2012

Golombek, R.: Is electricity more important than natural gas? Partial liberalizations of the Western European energy markets Mannheim Energy Conference, 25-26 June 2012

Golombek, R.: Usikkerhet i energisektoren. Statkraft, 21 August 2012

Golombek, R.: Usikkerhet og lønnsomhet av netttinvesteringer, Statnett, 6 June 2012

Golombek, R.: Virkninger på kraftsektoren av klimaendringer. CREE modellforum, SSB, 2 February 2012

Greaker M.: Blending mandates for biofuels: Are they likely to reduce climate costs? CREE 2nd research workshop. Lysebu, 24-25 September 2012

Hagem, C.: International environmental agreements. No success without developing countries participation and compliance enforcement mechanisms. 9th Energy Economics Policy Seminar in The Hague, 26 September 2012

Hagem, C.: The incentives for strategic behavior in the permit market. MOCAP Workshop, Potsdam, 3-5 October 2012

Hagem, C.: Cost effectiveness as a criteria for good climate policy. Seminar CICERO, 15 February 2012

Hagem, C.: Effektive virkemidler i klimapolitikken. Styringseffektivitet og kostnadseffektivitet, Workshop i TEKNA, 7 June 2012

Hagem, C.: Kan en depositumavtale bidra til at land overholder klimavtaler?, CREE seminar i Miljøverndepartementet, 20 September 2012

Hagem, C.: Mechanism design for refunding emissions payments, BEEER conference. Bergen, 5 May 2012

Hagem, C.: Mechanism design for refunding emissions payments. CESifo, Area Conference on Energy & Climate Economics, Munich, 9-10 November 2012

Hagem, C.: Nasjonal klimapolitikk: Hvilke politiske virkemidler er best? Innlegg på Energidagen, UiO, 29 March 2012

Halvorsen, B.: How do investments in heat pumps affect household energy consumption?. 12th IAEE European Energy Conference, Ca'Foscari University of Venice, Italy, 9-12 September 2012.

Halvorsen, B.: How do investments in heat pumps affect household energy consumption?. 2nd CREE - Research workshop at Lysebu, Oslo. 24-25 September 2012.

Halvorsen, B.: Faglig ansvarlig for MILEN-seminar: The effects of environmental policy measures:potentials and challenges, Oslo, 5-6 June 2012.

Harstad, B.: Participation and Duration of Environmental Agreements, Instruments to Curb Global Warming conference , Paris october 2012

Harstad, B.: The Dynamics of Climate Agreements, Høstkonferansen for samfunnsøkonomer, Nov 2012

Harstad, B.: Buy Coal! A Case for Supply-Side Environmental Policy, OED seminar: 1/11 2012

Harstad, B.: Utvinningsrettigheter som klimapolitikk. Brukerkonferanse CREE, Oslo, 17 April 2012.

Helman, L.: Dynamic Regulation and Technological Competition: A New Legal Approach to Carbon Capture and Storage, CREE 2nd research workshop. Lysebu 24-25 September 2012

Hoel, M.: Klimapolitiske virkemidler sett i sammenheng, Brukerkonferanse CREE, Oslo, 17 April 2012.

Hoel, M.: Cost effectiveness vs. political feasibility in climate policy.Fellesseminar med CICEP på Litteraturhuset, 7 May 2012

Hoel, M.: Supply Side Climate Policies and the Green Paradox, CREE 2nd research workshop. Lysebu, 24-25 September 2012

Holtsmark B.: Bioenergipolitikken: Velment, men kortenkt. Brukerkonferanse CREE, Oslo, 17 April 2012.

Kittelsen, S. A. C.: The stochastic scenario method for modeling uncertainty in computable equilibrium models, presented at staff seminar, Department of Business and Economics, University of Southern Denmark, Odense, 10 April 2012

Kittelsen, S. A. C.: The stochastic scenario method for modeling uncertainty in computable equilibrium models, presented at staff seminar, Department of Environmental and Business Economics, University of Southern Denmark, Esbjerg, 17 April 2012

Kverndokk, S.: Presentasjon av CREE for inGAP, Kjemisk institutt, UiO, 13 March 2012

Kverndokk, S.: Presentasjon av CREE . NVE, 29 February 2012

Kverndokk, S.: Presentasjon av CREE . Gassnova, 1 March 2012

Kverndokk, S.: Presentasjon av CREE . OED, 13 March 2012

Kverndokk, S.: Presentasjon av CREE . Klif, 24 April 2012

Kverndokk, S.: Presentasjon av CREE . Statkraft, 15 June 2012

Kverndokk, S.: Presentasjon av CREE . Statoil, 29 August 2012

Kverndokk, S.: Presentasjon av CREE. MD, 20 September 2012

Kverndokk, S.: Presentasjon av CREE . Statnett, 23 October 2012

Kverndokk, S.: Seminar om Energiutredningen i regi av NFR: Kommentarer til energiutredningen - litt om virkemidlene. 30 May 2012

Kverndokk, S.: Åpen høring i Stortingets energi- og miljøkomité om Klimameldingen: Litt om klimapolitiske virkemidler. 14 May 2012

Kverndokk, S.: The Trade-off Between Intra- and Intergenerational Equity in Climate Policy: Can Carbon Leakage be justified? CREE 2nd research workshop. Lysebu, 24-25 September 2012

Lind, A.: Analysis of the EU Renewable Energy Directive by using a Techno-Economic Optimisation Model. 2nd research workshop. 24 September 2012

Lind, A., K. A. Espegren.: Impact of climate change on the power sector. CREE Modellforum (SSB). 2 February 2012

Midttømme, K.: Environmental policy in the presence of network effects, CREE 2nd research workshop. Lysebu, 24-25 September 2012

Nyborg, K.: Can We Nudge Our Way to Green Growth? 19th Annual Conference of the European Association of Environmental and Resource Economists, Praha, 27-30 June 2012

Nyborg, K.: Cooperation is Relative: Framing and Income Effects with Public Goods (with K.A. Brekke and J. Konow), research seminar CER-ETH Zürich, 1 October 2012

Nyborg, K.: Cooperation is Relative: Income and Framing Effects with Public Goods (with K.A. Brekke and J. Konow), research seminar, University of Gothenburg, 2012

Nyborg, K.: Fair weather and other social dilemmas: An experimental study of cooperation, fairness and framing (with K.A. Brekke and J. Konow), Researchers' Annual Meeting for Economists, Ås 3-4 January 2012

Nyborg, K.: One Reason Why Environmental Valuation is Controversial. 19th Annual Conference of the European Association of Environmental and Resource Economists, Praha, 27-30 June 2012

Nyborg, K.: Reciprocal climate negotiators. NORKLIMA Workshop, Lysebu ,11 June 2012

Nyborg, K.: The Ethics and Politics of Environmental Cost-Benefit Analysis. The Stockholm Seminars, Stockholm Resilience Center, 9 February 2012.

Popp D.: Necessity as the Mother of Invention: Innovative Responses to Natural Disasters, CREE 2nd research workshop. Lysebu 24-25, September 2012

Richard G.: Electricity Markets and Market Design, presentation at the Norren Summer School for PhD students, Asker, 10 August 2012,

Rosendahl, K.E.: Climate technology policy for emission intensive industries, Seminar, Universitetet i Oldenburg, February 2012.

Rosendahl, K.E.: Climate technology policy for emission intensive industries, Torsdagsseminar, Statistisk sentralbyrå (med Mads Greaker), February 2012.

Rosendahl, K.E.: Global oil supply and biofuels policies, Workshop om biofuels, Hafjell, March 2012.

Rosendahl, K.E.: Price and welfare effects of emission quota allocation, Forskermøtet i økonomi, UMB, January 2012.

Rosendahl, K.E.: Redusert oljeutvinning og karbonlekkasje, Energiseminar, UMB, March 2012.

Rosendahl, K.E.: Strategic technology policy as supplement to renewable energy standards, Europeisk IAEE-konferanse, Venezia, September 2012.

Rosendahl, K.E.: Strategic technology policy for emission intensive, traded industries, SURED conference, Ascona (Sveits), June 2012.

Rosendahl, K.E.: Supplementing Quota Markets with Carbon Tariffs, BEEER Conference, Bergen, May 2012.

Rosendahl, K.E.: Supply side responses to demand reductions in fossil fuel markets, Seminar, DIW (German Institute of Economic Research) og TU Berlin, May 2012.

Rosendahl, K.E.: Unintended effects of climate and energy policies, Forelesning, UMB, September 2012.

Rosendahl, K.E.: Avveininger i energipolitikken – en kommentar, Debattmøte om Energiutredningen, Oslo, May 2012.

Rosendahl, K.E.: Den grønne utviklingsmekanismen (CDM), Seminar, MD; September 2012.

Rosendahl, K.E.: Effekten av virkemidler i energimarkedene, Forelesning i energiøkonomi, UMB, April 2012;

Rosendahl, K.E.: Hvordan hindre at strenge klimatiltak i Norge gir økt utslipp der ute?, Klimaseminar, SSB, May 2012.

Rosendahl, K.E.: Karbontoll: Løsningen på problemet med karbonlekkasje?, Fagseminar, Zero (Oslo), August 2012.

Rosendahl, K.E.: Oljepolitikk versus klimapolitikk, Brukerkonferanse CREE, Oslo, April 2012.

Rosnes, O.: Wind power requires flexible market and subsidy design. IAEE Energy Forum 3-2012

Røgeberg, O. Hvorfor får vi ingen klimaavtale som monner? Brukerkonferanse CREE, Oslo, 17 April 2012.

Spiro, D.: Tragedy of the Commons versus the Love of Variety. CREE 2nd research workshop. Lysebu, 24-25 September 2012

Spiro, D.: Resource Prices and Planning Horizons, Seminar at SSB Oslo, 6 November 2012

Spiro, D.: Resource Prices and Planning Horizons, Seminar at Umeå University, 24 October 2012

Storrøsten, H. B.: Prices vs. quantities: Technology choice, uncertainty and welfare, 2nd CREE Workshop, 22 October 2012.

de Zeeuw, Aart: Asymmetries in International Environmental Agreements, 2nd CREE Workshop, 22 October 2012.

Voigt, C.: Hvor forpliktende er internasjonale avtaler egentlig? - Om Canada, Kyoto og sanksjoner, Brukerkonferanse CREE, Oslo, 17 April 2012.

Wolfgang, O.: Konsekvenser av klimaendringer for kraftmarkedet i Norden, CREE modellforum, SSB, 2 February 2012

CREE in the Media (in Norwegian):
Debatt om elbiler, startet av CREE og SSB forsker Bjart Holtsmark. (*Nettavisen* jan/feb 2012) - 3 artikler - Holtsmark, B.

SSB-forskar går i rette med dei politisk gitte elbil-fordelane. Forskaren Bjart Holtsmark ved Statistisk sentralbyrå vil ha debatt om dei mange fordelane ved kjøp og bruk av elbil, går på kostnad av kollektivtrafikken. (*Nationen* 30 januar 2012) - Holtsmark, B.

Smarte Nett - Hva er det? Skrevet av Einar Hope, professor emeritus ved Norges Handelshøyskole og styreleder for CREE.(*Energi* 01 2012) - Hope, E.

Petroleumsskatt er ikke subsidier - Diderik Lund fra Økonomisk Institutt (*Dagsavisen* 14. feb 2012) - Lund, D.

Full krangel om klima og trær - Flere utrykker seg om miljøgevinst ved vedhogst, deriblant Bjart Holtsmark, forsker ved Statistisk sentralbyrå og forskningssentret CREE (*Aftenposten* 23. feb 2012) - Holtsmark, B.

El til havs gir økte utslipp - Michael Hoel; Økonomisk institutt, Universitetet i Oslo og forskningssenteret CREE (*Dagens Næringsliv* 24. feb. 2012) - Hoel, M.

Langsiktige kraftavtaler i industrien - Skrevet av Einar Hope, professor emeritus ved Norges Handelshøyskole og styreleder for CREE.(*Energi* 02 2012) - Hope, E.

De små klimaavtalene - Karine Nyborg, Økonomisk institutt, Universitetet i Oslo og forskningssenteret CREE (*Aftenposten* 2. mar. 2012) - Nyborg, K.

Kvotehandel = pengeflytting? Fersk forskning, oppsiktsvekkende funn, ny innsikt? - Bjart Holtsmark, forsker ved Statistisk sentralbyrå og forskningssentret CREE (*Dagens Næringsliv* 3. mar. 2012) - Holtsmark, B.

Slag og slagsider i klimaforskningen - Essay av Lars Risan hvor Bjart Holtsmarks arbeider omtales (*Morgenbladet* 9.-15. mar. 2012) - Holtsmark, B.

Den evige veksten - Intervjuer med flere økonomer, deriblant Taran Fæhn, forsker ved Statistisk sentralbyrå og forskningssentret CREE (*Aftenposten* 20. mar. 2012) - Fæhn, T.

”Ingen effekt av att Sverige går före i klimatpolitiken” - skriver Michael Hoel, forsker ved Økonomisk Institutt og forskningssentret CREE (*DN.se* 26. mar. 2012) - Hoel, M.

Klimaortodoksi - Sosialøkonomer kritisert for å gi intrykk av at ingenting nytter. Her er professor Michael Hoel brukt som eksempel.(*DN.no* 28. mar. 2012) - Hoel, M.

Energieffektivisering - Mye tyder på at energieffektivisering vil bli vektlagt sterkere fremover. Skrevet av Einar Hope, professor emeritus ved Norges Handelshøyskole og styreleder for CREE.(*Energi* 03 2012) - Hope, E.

Debatt om hogst mellom Bjart Holtsmark, forsker ved Statistisk sentralbyrå og forskningssentret CREE og Harald Kvalen, forsker Skog og Landskap (*Nationen* mar/apr. 2012) - 3 artikler - Holtsmark, B.

Kinkig klimaløsning - Hva er god klimapolitikk for et lite land? Michael Hoel, forsker ved Økonomisk Institutt og forskningssenteret CREE. (*DN.no* 14 apr. 2012) - Hoel, M.

Ta usikkerheten i energimarkedene på alvor. Kronikk, 19.4.2012, *Dagens Næringsliv*. - Golombek, R.

Flere kabler - mindre kullkraft. Kjell Arne Brekke, professor ved Økonomisk Institutt og forskningssentret CREE og Rolf Golombek, seniorforsker ved Frischsenteret og forskningssenteret CREE. (*DN.no* 19 apr. 2012) - Brekke, K. A., R. Golombek

Vil kjøpe oljesand. Bård Harstad, professor ved Økonomisk Institutt og forskningssenteret CREE. (*DN.no* 20 apr. 2012) - Harstad, B.

Karbontoll - et kinderegg. Brita Bye, Taran Fæhn og Knut Einar Rosendahl, forskere i Statistisk sentralbyrå og deltagere i CREE (*DN.no* 24 apr. 2012) - Bye, B., T. Fæhn, K. E. Rosendahl

Må finne alternativer til store internasjonale klimaavtaler. - Norges forskningsråds artikkel om CREEs brukerkonferanse 17. april 2012 (*www.forskningsradet.no*) - CREE

Professor Fridrik Baldurssons, Reykjavik University tilknytning til CREE er nevnt i den Islandske avisen Morgunbladid.(*Morgunbladid (Island*) 9 mai 2012) - Baldurssons, F.

I forbindelse med Klimameldingen var Snorre Kverndokk og Taran Fæhn i åpen høring på Stortinget. Snorres inlegg starter 22:30 og Tarans 33:40 (*Stortingets Videoarkiv Høringer* 14 mai 2012 kl 12:30) - Kverndokk, S., Fæhn T.

Klimameldingen – ambisiøs eller uforpliktende? (Kronikk i *VG* 14. mai 2012.) - Greaker, M., K.E. Rosendahl

Referat fra Forskningsrådets debatmøte om NOU 2012:9 Energiutredningen - 30 mai 2012. CREE var representert med Snorre Kverndokk og Knut Einar Rosendahl. *www.forskningsradet.no* - Kverndokk, S., K. E. Rosendahl

Taran Fæhn nevnt i leder i *Dagens Næringsliv*. (DN.no 04 juni 2012) - Fæhn, T.

På VVS forums sider blir Snorre Kverndok referert til i forbindelse med Energiutredningen. *VVS forum* - Kverndokk, S.

"Buy Coal" - I forbindelse med Bård Harstad artikkel i Journal of Political Economy ble han intervjuet og nevnt i *flere amerikanske tidsskrifter og aviser*. - 13 artikler - Harstad, B.

Vi bruker mindre strøm. - Forsker Bente Halvorsen i SSB og CREE forklarer noe om hvorfor vi bruker mindre strøm. (*Aftenposten* 20 juni 2012) - Halvorsen, B.

I forbindelse med Forskingskampanjen 2012: Innetemperatur i boliger er CREE nevnt flere steder. Det er nevnt med navnet CREE og sitt norske navn Senter for energi- og miljøøkonomisk forskning. *www.forskningsrådet.no - www.miljolare.no - www.nysgjerrigper.no* - 3 artikler - Halvorsen, B.

Jørg M.Gjestvang har skrevet en artikkel om CREE i *Wikipedia*. - Gjestvang, J.

Morgenbladet har kåret Bård Harstad til en av de 10 beste forskerne i Norge under 40 år. *Morgenbladet* 24.-30. Aug 2012. - Harstad, B.

Det er så rart, for mamma fryser alltid! En samling artikler om *Forskningskampanjen 2012: Ta hjemmetempen!* der CREE forskere bidrar. - 9 artikler - Halvorsen, B.

Elbiler - virker den etter hensikt? En samling kommentarer om Bjart Holtsmarks publikasjon "Elbiler - virker den etter hensikten?" i *Samfunnsøkonomen*. Bjart Holtsmark er forsker hos SSB og deltager på prosjektet CREE . - 15 artikler - Holtsmark, B.

Et slag i luften? En samling kommentarer til *NRK Brennpunkt* 25.sep.2012 der professor Michael Hoel og forsker Bjart Holtsmark deltar. Hoel er ansatt på Økonomisk Institutt, UiO og Holtsmark er ansatt på Statistisk Sentralbyrå. Begge er vitenskapelige ansatte på CREE. - 15 artikler - Hoel, M., Bjart Holtsmark.

Oljesand som klimapolitikk. Professor Bård Harstad på Økonomisk Institutt UiO og forsker på CREE argumenter for kjøp av oljesandfelter som klimapolitik. *Aftenposten* 28 sep. 2012 - Harstad, B.

Bjart Holtsmark kritiserer pelletsanlegg på vestlandet. I *Dagsnytt 18* okt. 2012 er det et innslag hvor Holtsmark kritiserer statlig tildeling av midler til pelletsanlegg på Vestlandet. - Holtsmark, B.

Avgjørelser på grunnlag av innsikt. *Aftenposten* 14.09.12.- Nyborg, K

Rettferdig byrdefordeling: Et eksperiment. *Aftenposten* 26.10.12. - Nyborg, K.

Blir det grønn teknologi av kvoter? Kommentar om klimkvoter av Bård Harstad , professor på Økonomisk Institutt UiO og forsker CREE. *Aftenposten* 16 nov. 2012 - Harstad, B.

Unngå vinterskader i kulda. Bente Halvorsen, forsker på SSB og CREE, kommenterer sparepotensialet ved etterisolering av hus. *TV2* 12 des. 2012 – Halvorsen, B