Synthesis report of Flagship I: Radical emissions reductions in ETS sectors

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Abstract in Norwegian:

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Synteserapport Flaggskip I: Omfattende utslippsreduksjoner i ETS-sektoren

I denne artikkelen har vi en oppsummering av hva som er gjort av arbeid i Flaggskip I.

I kapittel 1 er det en enkel beskrivelse av hovedtemaer, forskerledere og samarbeidspartnere. Kapittel 2 inneholder de viktigste forskningstemaene og resultatene. I kapittel 3 viser man til de viktigste artiklene som har vært skrevet i dette flaggskipet. I appendikset er det en oversikt over publiseringene.

Synthesis report of Flagship I:

Radical emissions reductions in ETS sectors

1. Overview

In this flagship, we consider emissions reductions in the emissions trading (ETS) sectors. In addition to the 28 EU countries, Norway together with Iceland and Lichtenstein, has joined the EU ETS. The ETS covers about 45% of the greenhouse gas emissions in the EU, and includes CO2 emissions from sectors such as power and heath generation, energy-intensive industries (oil refineries, steel works and production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals) and civil aviation between the ETS countries.[1] In Norway, a slightly larger share, about 50% of emissions, is covered by the ETS.[2]

We concentrate our research on the power market, but we also study other sectors. The aim is to understand the driving forces behind the regulations and the choice of regulatory instruments in these sectors. Further, we analyze how they affect the Norwegian energy system and energy production, including investments in technologies and transmissions. We also study how regulations can be designed to ensure first-best or second-best investment decisions, and finally, we take a further look at environmental costs of investments in the energy system.

Nils Henrik M. von der Fehr

This flagship is headed by Nils-Henrik von der Fehr (Department of Economics, UiO) and Snorre Kverndokk (Frisch Centre), and includes researchers from all the Norwegian researchpartners in CREE and two of our subcontractors (Faculty of Law, University of Oslo; Institute for Energy Technology). In addition, we cooperate with researchers from other Norwegian universities and research institutions in addition to a large number of international researchers. Thus, this flagship is based on substantial collaboration among research partners and

Snorre Kverndokk

[1] It also includes N_2O emissions from production of nitric, adipic and glyoxylic acids, and glyoxal, and PFCs from aluminium production.

[2] The main sectors not included are transport (apart from civil aviation), agriculture and waste disposal. Transport is covered by flagship II.

among research partners and subcontractors. This is particularly true for new projects, with extensive interdisciplinary research. One example is the project "Security of supply in a green power market – The challenges and opportunities of intermittent power" which includes researchers in the field of economics, technology and law. In this project, Ringerikskraft is a valuable user partner. Another example is the project "WINDLAND: Spatial assessment of environment-economy trade-offs to reduce wind power conflicts" which is a collaboration between economists, natural science, technology and law. This project also has substantial user collaboration. CREE user partners also provide valuable input in a less formal role on several projects.

The work on this Flagship is as of December concentrated in 17 projects. Since CREE started in 2011, we have published 74 different publications in this Flagship (October 2018)[3], including 24 articles in international journals, one book and three book chapters (see Appendix). Four master thesis were also written on this Flagship. Note however, that there may be some overlap across flagships as many of the publications cover topics from several flagships.

2. Research questions and main results

The Flagship concentrates on five major themes called masts, where the first three themes study the electric power market:

2.1 Intermittency, Flexibility and Security of Supply

To mitigate greenhouse gas emissions, a transition from fossil fuels to renewable energy are necessary and also ongoing, in electric power production. Some electricity production from renewable energy such as hydropower, can easily be regulated to meet demand. However, most of the renewable production are based on solar and wind, and faces the problem of intermittency, i.e., the available energy used in the production varies over the day or week, as the sun is not always shining and the wind is not always blowing. Thus, to be able to meet the demand for electric power, some flexibility is needed. How this can be achieved may therefore be valuable for policy makers and for the society. Below we summarize some of the recent conclusions in this mast so far.

[3] Note that the current Flagship structure was redefined in 2017, so that the publications prior to 2017 was then distributed to the new structure. For a synthesis of the work in CREE in the first five years of center activity, see the CREE annual report 2015 (https://www.cree.uio.no/about/pdf/cree_annual_report_2015_with_appendix.pdf).

The flexibility of the market so that imbalance can be reduced is dependent on features of wholesale market exchanges – such as gate closure, market time unit and bid format. Changes in these features can increase the ability of markets to provide flexibility and reduce imbalances; however, such changes may increase transaction costs and hence the attractiveness of power exchanges, see von der Fehr (2018). Electricity pricing may also have an effect, and smaller geographical price areas may also increase flexibility through better transmission capacities.

One challenge for the European power market is a phase out of nuclear power. Using a numerical simulation model of the European energy industry (LIBEMOD), we find that a complete nuclear phase out in Europe by 2030 has a moderate impact on total production of electricity and only a tiny impact on total consumption of energy. Lower nuclear production is to a large extent replaced by more renewable electricity production, especially wind power and bio power, see Golombek et al. (2016a). With even more strict goals on renewable energy and energy efficiency in the EU (as agreed in June 2018), the share of the supply from renewable electricity and bio energy will be even higher in 2030, see Aune and Golombek (2018). This shows the relatively large flexibility of the European power market to adapt to new energy sources in the medium and long run.

Different policy instruments can incentivize integration of more renewable energy into the power system. However, different instruments affect costs differently. One example is uniform subsidies that may lead to inefficient locations of wind farms and grids, as the producer then has limited incentives to take fully into account the investments costs of the subsequent need for increased grid capacity, leading to an inefficient choice of location, see Bjørnebye (2018).

2.2 Transmission and Integration

As mentioned above, intermittent power generation will vary by time and place, and will frequently be produced in areas that currently have limited transmission capacity. This will require more transmission capacity. The impact of weather stochasticity may be reduced by increasing the capacity of interconnectors (such as the one between the Nordic countries and the rest of Europe). Also, more efficient use of existing transmission capacity is warranted.

Integration of new renewable energy is important to reach renewable energy goals. One example of research in this line is our work on the integration of wind power in the Nord Pool Area and beyond. The main research question is how Scandinavian hydro capacity can cope with a large-scale expansion of wind power both in and around the North Sea, taking into account the possibility of pumped storage and the cost of building international grid interconnections that provide backup and regulate capacity to the countries in the Nord Pool area and beyond. We demonstrate that the exact regulating benefit of hydro depends finely on assumptions about availability of infrastructure, including pumped storage, see Førsund (2015).

One research question is if transmission system operators (TSOs) and regulators are able and willing to facilitate development of transmission networks, in particular where cooperation across jurisdictions is required. The current European model of transmission investment is largely decentralized and relies on the involvement of the nation's directly involved (say, those located on either side of an interconnector). Thus there is a lack of coordination, as this does not always allow for taking proper account of the considerable externalities of transmission investment and hence leads to inefficient (i.e. sub-optimal) investment. A subsidy to sustain the interconnector building is not sufficient to restore the best solution. To reach optimal investment without merging the two TSOs into an international operator that would internalize all the effects from its investment, we need a compensation to be paid to each TSO for the positive externality its internal investment creates abroad, see von der Fehr and Crampes (2018).

2.3 Distributed Electricity and Storage

New technology – including renewable generation, batteries and information and communication technology – is rapidly changing the role, not only of distribution networks, but also of distribution system operators (DSOs).

One research question we have been working on is if there are there barriers to the rolling out of new technologies. One barrier to diffusion of new technologies is commitment, i.e, that governments cannot commit to future climate policies. Policies to overcome this barrier are for instance emissions pricing with a state guarantee scheme whereby the regulatory risk is borne by the government and emission pricing combined with subsidies for upfront climate technology investments, see Fæhn and Isaksen (2016). Another barrier to diffusion of new technology is reluctance by households towards renewable resources such as solar energy, see Khan (2018).

2.4 Regulatory Instruments and Impacts

Reductions of emissions in the ETS sectors can be achieved with different instruments, including emissions quotas and taxes, quality standards, subsidies to green energy sources and an outright ban on the use of certain resources. Information of the impacts of different regulatory instrument is important for the efficiency and costs of achieving energy and climate goals.

What is the experience with the various instruments? Using a rich Norwegian panel data set, we have studied the effects of various environmental regulations on environmental performance of firms measured as changes in emission intensities. There is evidence that direct regulations promote persistent effects. Indirect regulations will, on the other hand, only have potential persistent effects if environmental taxes are increasing over time, see Bye and Klemetsen (2018).

Another example of the different impacts of policy instruments is our study on how renewable energy policy instruments affect competition on electricity markets, see von der Fehr and Ropenus (2016). We demonstrate that markets for green certificates allow generators with market power to squeeze the margins of their competitors, as a generator that is vertically integrated into network activities might do. Further, we find that whether or not a dominant firm is vertically integrated into network activities, it can disadvantage competitors in the renewables segment by distorting certificates prices, thereby inducing cost inefficiency in the generation of renewable energy. We compare green certificates to a system of feed-in tariffs, where a similar margin squeeze is not possible, concluding that these policy instruments have very different implications for competition and overall efficiency.

We have written several studies on the effects of carbon taxation. One example are studies on carbon taxes used on traded goods to reduce emissions when not all countries have restrictive climate goals. One such study concludes that such tariffs do reduce foreign emissions, but can increase rather than decrease the global cost of emission reduction. The main effect of carbon tariffs is to shift the economic burden of developed-world climate policies to the developing world, see Böhringer et al. (2016).

2.5 Carbon capture and storage

Carbon capture and storage (CCS) may be necessary to contain global warming below 1.5 or 2 degrees Celsius, as is the current political ambition. Adoption of CCS technology in the power sector, however, has by been far behind predictions. Research results on the barriers to implementation may therefore have a large impact on policy design and, in the end, on whether we are able to reach the climate goals specified in the Paris agreement.

An interesting research question is therefore, why has the technology not been implemented in a large scale as many model scenarios show is necessary to reach the Paris goals in a cost-effective way? We have written a survey article where we go through the arguments in the literature for the low implementation of CCS, see Golombek et al. (2019). In particular, we point to market imperfections in the three markets capture, transport and storage as a main reason, as well as the use of a large number of policy instruments to reach the climate targets in the EU. While a price on CO_2 is necessary for CCS to be implemented, the EU has targets for renewable energy and energy efficiency in addition to the emissions targets. This reduces the CO_2 price substantially in the EU-ETS, see Aune and Golombek (2018). One of our studies show that a substantial CO_2 tax is necessary for CCS to play an important role in the European energy market. According to our model simulations, subsidies are necessary unless there is a very high carbon tax. Our simulations show that with a tax of $90 per ton CO_2 in 2030, CCS will be installed without subsidies, see Golombek et al. (2011). This is far above the present carbon price in the European permit trade system.

Can CCS be economically profitable without government support? Based on our studies, this is likely not the case in the near future. A study on the design of support shows that subsidies to CCS are more efficient if they are provided to development of the CCS technology in Europe than to the use of the technology, see Golombek et al. (2016b). Support to development gives Europe a strategic benefit, while support to use will benefit all developers. In addition, support to CCS in coal production should be larger than for gas production due to the higher CO_2 content in coal than gas, and du to terms of trade effects. Support to CCS can, however, only be justified if there are market imperfections or barriers so that the investors or owners of power plants do not find CCS profitable even if it is socially optimal. We find that such support may be justified as there may be network effects in the energy market, and this may be a barrier to the implementation of CCS, see Velten (2017).

To sum up, the research in this Flagship finds that the energy market faces several challenges due to the transition to renewable energy. More flexibility is needed to reduce possible imbalance in the market. This again requires increased investments in transmission capacity. Another challenge is that many decisions are decentralized. Policy instruments therefore, have to take this into account to avoid inefficiency. A final important challenge is how to achieve negative emissions to meet the long-term climate targets. Even though CCS is regarded as a necessary technology in the long run, it is barely implemented due to lack of appropriate carbon pricing as well as support. This also points to the design of policy instruments as introducing many regulations at the same time as in the EU, reduces the carbon price and creates incentives for other energy investments than in CCS.

3. Highlighted publications

Below we will give one example of research from each of the five masts.

3.1 Optimal location of renewable power

One example of a study from the first mast is a study by Bjørneby et al. (2018). This is a study from the project "Security of supply in a green power market" and is a good example of interdisciplinarity as it is a cooperation by researchers within, law, economics and technology. The research question is how the location of renewable power is influenced by different policy instruments. A decarbonization of the energy sector calls for large new investments in renewable energy production, and several countries stimulate renewable energy production through economic instruments, such as feed-in premiums or other kinds of subsidies. When choosing the location for increased production capacity, the producer has typically limited incentives to take fully into account the investments costs of the need for increased grid capacity. This may lead to inefficient choices of location. This paper explores analytically the design of feed-in premiums that secure an optimal coordinated development of the entire electricity system. One conclusion is that with binding electricity transmission constraints, feed-in premiums should differ across locations. By the use of a numerical


Henrik Bjørnebye


Cathrine Hagem


Arne Lind

energy system model (TIMES), the potential welfare cost of a non-coordinated development of grids and wind power production capacity in the Norwegian energy system is investigated. The result indicates that grid investment costs can be substantially higher when the location decision is based on uniform feed-in premiums compared with geographically differentiated premiums However, the difference in the sum of grid investment cost and production cost is much more modest, as location based on uniform feed-in premiums leads to capacity increase in areas with better wind conditions.

3.2 European electricity markets and the need for reform

In a study on the European electricity market, see von der Fehr (2017), takes as a starting point that the European electricity market is under pressure. This is mainly due to ambitious renewables policies that have resulted in considerable market volatility, both with regard to quantities and prices. The paper provides a discussion of how this development challenges the current regulatory regime, and the extent to which reform is needed in order to alleviate the pressure and ensure an efficiently working electricity market. There are several key points that policy makers have to take into account: First, developing market design will allow for more responsiveness and flexibility of supply and demand. Further, coordinating generation and network expansion will ensure better balance between generation and network capacity.

Integrating networks and system operations will increase the effective capacity of existing infrastructure, and facilitating market integration will take advantage of gains from trade. In addition, strengthening European-level regulation will ensure a level playing field and better integration of electricity markets. Finally, facilitating demand-side flexibility will better accommodate inflexible renewable generation.

3.3 Diffusion of climate technologies in the presence of commitment problems

There may be barriers to the diffusion of new technologies. This is the focus

Taran Fæhn

Elisabeth Isaksen

in Fæhn and Isaksen (2016). The main problem is that publicly announced greenhouse gas (GHG) mitigation targets and emissions pricing strategies by governments may suffer from commitment problems; they cannot commit future governments to continue the same strict policy. When emission prices such as carbon taxes, are perceived as short-lived, socially cost-effective upfront investment in climate technologies may be hampered. The study compares the social abatement cost of a uniform greenhouse gas pricing system with two policy options for overcoming such regulatory uncertainty: One combines emissions pricing with a state guarantee scheme whereby the regulatory risk is borne by the government, and one combines the system with subsidies for upfront climate technology investments. A technology-rich computable general equilibrium model is applied that accounts for abatement both within and beyond existing technologies. The findings suggest a tripling of abatement costs if domestic climate policies fail to stimulate investments in new technological solutions. Since the cost of funding investment subsidies is found to be small, the subsidy scheme performs almost as well as the guarantee scheme.

3.4 The impacts of alternative policy instruments on environmental performance

Marit Klemetsen has written a PhD funded by CREE where she has been working on a rich Norwegian panel data set that includes information about


Marit Klemetsen

environmental regulations such as environmental taxes,non-tradable emission quotas and technology standards, as well as all kinds of polluting emissions. In one of her papers written together with Brita Bye, see Bye and Klemetsen (2018), they analyze the effects of direct and indirect environmental regulations on environmental performance measured as emission intensity, where economic instruments such as environmental taxes is an example of the indirect regulations, while non-tradable emission quotas and technology standards are examples of direct regulations. They find positive and significant effects of both direct and indirect policy instruments. Moreover, they test whether the two types of regulations lead to positive and persistent effects on environmental performance, and find evidence that direct regulations promote such effects. Indirect regulations, on the other hand, will only have potential persistent effects if environmental taxes are increasing over time.


Brita Bye

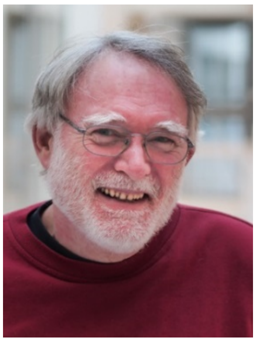
3.5 Promoting CCS in Europe

Rolf Golombek

Mads Greaker

Even if most long term studies conclude that CCS is necessary to reach the 2-degree Celsius target, which is the aim of the Paris agreement, CCS is only to limited extent implemented, and monetary support is needed for CCS to be profitable unless there is a high rise in carbon taxes. Golombek et al. (2016b) study the design of such support. In particular, they study to what extent promotion of CCS in Europe should be through subsidizing development and production of CCS technologies – an upstream subsidy – or by subsidizing the purchasers of CCS technologies – a downstream subsidy.

Simen Gaure



Sverre Kittelsen

Knut Einar Rosendahl

This question is examined theoretically in a stylized model and numerically by using a LIBEMOD, an energy market model for Europe (EU27, Iceland, Norway and Switzerland), developed by Frisch Centre and Statistics Norway. In the numerical study, a new approach is developed that integrates strategic trade policy with CGE models. The numerical simulations confirm the conclusion from the theory model that upstream subsidies should be preferred over downstream subsidies. Support to development gives Europe a strategic benefit, while support to use will benefit all developers. Furthermore, the numerical simulations cover effects that are not included in the theoretical model. These are the welfare effects of lower CO_2 emissions, obtained through increased use of CCS, and terms-of-trade effects, reflecting that the EU is a major importer of both coal and gas and demand for these fossil fuels increases when CCS subsidies are offered. Both factors rationalize a higher subsidy to CCS coal than to CCS gas.

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Bye, B. and M. E. Klemetsen (2018): The impacts of alternative policy instruments on environmental performance: A firm level study of temporary and persistent effects, *Environmental and Resource Economics*, Vol. 69, No. 2, 317–34.

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Puplications Flagship I

1. Scientific Journals			
Author	Title	Publication	Year
Kaushal, K.R.,Rosendahl, K.E.	Optimal REDD+ in the carbon market.	Revise-and-resubmit in Land Economics.	2020
Kaushal, K.R.,Rosendahl, K.E.	Taxing Consumption to Mitigate Carbon Leakage	Environmental and Resource Economics. Vol. 75, Issue 1, 151-181	2020
Klemetsen, M.E., K.E. Rosendahl, A.L. Jakobsen	The impacts of the EU ETS on Norwegian plants' environmental and economic performance (CREE Working Paper 03/2016)	Revise-and-resubmit in Climate Change Economics	2020
Abrell, J.,S. Rausch, H. Yonezawa	Higher Price, Lower Costs? Minimum Prices in the EU Emissions Trading Scheme	The Scandinavian Journal of Economics 2019. Volum 121.(2) s.446-481	2019
Rosendahl, K.E.	EU ETS and the waterbed effect.	Nature Climate Change 9, 734-735.	2019
Baldursson, F. M., N.-H. M. von der Fehr	Natural resources and sovereign expropriation	Journal of Environmental Economics and Management, Vol. 92, November 2018, 580-607	2018
Baldursson, F. M., E. Lazarczyk, M. Ovaere, S. Proost	Cross-Border Exchange and Sharing of Generation Reserve Capacity	The Energy Journal, Vol. 39(4), 57-84.	2018
Bjørnebye, Henrik, C. Hagem, A. Lind	Optimal location of renewable power	Energy, Vol. 147, 1203-1215	2018
Bye, B., M. E. Klemetsen	The Impacts of Alternative Policy Instruments on Environmental Performance: A Firm Level Study of Temporary and Persistent Effects	Environmental and Resource Economics, Vol. 69, Issue 2, 317–34	2018
Leroux, J., D. Spiro	Leading the unwilling: Unilateral strategies to prevent arctic oil exploration	Resource and Energy Economics, Vol. 54. 125-149	2018
Skjerpen, T., Storrøsten, H.B., Rosendahl, K.E., P. Osmundsen	Modelling and forecasting rig rates on the Norwegian Continental Shelf.	Resource and Energy Economics, 53, 220-239.	2018
Brekke, K. A., R. Golombek, M. Kaut, S.A.C. Kittelsen, S. W. Wallace	Stochastic energy market equilibrium modeling with multiple agents	Energy, Vol. 134, 984-990	2017
Brekke, K. A., J. Konow, K. Nyborg	Framing in a Threshold Public Goods Experiment with Heterogeneous Endowments	Journal of Economic Behavior and Organization 138, 99-110.	2017
Bye, B., M. E. Klemetsen	The impacts of alternative policy instruments on environmental performance: A firm level study of temporary and persistent effects	Environmental and Resource Economics, Vol. 69, Issue 2 317-341	2017
Böhringer, C., J. C. Carbone, T. F. Rutherford	The Strategic Value of Carbon Tariffs.	American Economic Journal: Economic Policy, Vol 8 Issue 1, 28-51.	2016
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Green, R.J., D. Pudjianto, I. Staffell, G. Strbac	Market Design for Long-Distance Trade in Renewable Electricity.	The Energy Journal, Vol. 37, Bollino-Madlener Special Issue, 5-22	2016
Staffell, I., R.J. Green	Is there merit in the Merit Order Stack?.	IEEE Transactions on Power Systems, Vol. 31, Issue 1, 43-53	2016
von der Fehr, N.H.M., S. Ropenus	Renewable Energy Policy Instruments and Market Power.	Scandinavian Journal of Economics, Vol. 119, Issue 2, p 312-345	2016
Gavenas, E., K.E. Rosendahl, T. Skjerpen	CO2-emissions from Norwegian oil and gas extraction.	Energy, Vol. 90, Part 2, October 2015, 1956–1966	2015
Rosendahl, K.E., H. Storrøsten	Allocation of emission allowances: impacts on technology investment.	Climate Change Economics. Vol.06, Issue 03, August 2015.	2015
Rosendahl, K.E., J. Strand	Emissions Trading with Offset Markets and Free Quota Allocations.	Environmental and Resource Economics. Vol. 61, Issue 2, 243-271	2015
Castagneto-Gissey, G., R.J. Green	Exchange Rates, Oil Prices & Electricity Spot Prices: Empirical Insights from EU markets.	Journal of Energy Markets, vol. 7, no. 2, 3-33	2014
Framstad, N.C.	When can the environmental profile and emissions reduction be optimised independently of the pollutant level?.	Journal of Environmental Economics and Policy, , Vol. 3, Issue 1, 2014 , 25-45	2014
Staffell, I., R.J. Green	How does wind farm performance decline with age?.	Renewable Energy, vol. 66, June, 775-786,	2014
Storrøsten, H.B.	Prices Versus Quantities: Technology Choice, Uncertainty and Welfare.	Environmental and Resource Economics, Vol. 59 - Issue 2, p 275-293	2014
Golombek, R., K.A. Brekke, S.A.C. Kittelsen	Is electricity more important than natural gas? Partial liberalizations of the Western European energy markets.	Economic Modelling. Vol. 35, September, 99-111	2013
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von der Fehr, N.H.M.	Transparency in Electricity Markets.	Economics of Energy & Environmental Policy , 2 (2), 71-89	2013
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Golombek, R., S.A.C. Kittelsen, I. Haddeland	Climate change: impacts on electricity markets in Western Europe.	Climate Change, Vol. 113, Number 2, 357-370,	2012
Hoel, M., S. Jensen	Cutting costs of catching carbon-Intertemporal effects under imperfect climate policy.	Resource & Energy Economics , Vol. 34(4), 680-695	2012
Böhringer, C., K.E. Rosendahl	Greening Electricity More Than Necessary: On the Cost Implications of Overlapping Regulation in EU Climate Policy.	Journal of Applied Social Science Studies (Schmollers Jahrbuch) 131, Issue 3, 469-492.	2011
Golombek, R., M. Greaker, S.A.C. Kittelsen, O. Røgeberg, F.R. Aune	Carbon Capture and Storage Technologies in the European Power Market.	Energy Journal , Vol. 32, No. 3, 209-238	2011

2. Popular Science Journals			
Author	Title	Publication	Year
Golombek, R., M. Greaker and S. Kverndokk	Hva er framtiden for CCS?	Samfunnsøkonomen 2019 (5) s.54-65	2019
Kaushal, K. R., L. Lindholt, H. Yonezawa.	Effects of changes in electricity prices on the power-intensive industries and other sectors in Norway towards 2030.	Rapporter 2019/43, Statistisk sentralbyrå	2019
Traeger, C., Perino, G., Pittel, K., Requate, T. Schmitt, A.	Das Flexcap – eine innovative CO2-Bepreisung für Deutschland	ifo Institut, München, 2019 ifo Schnelldienst, 2019, 72, Nr. 18, 38-45	2019
Baldursson, F.M., E. Lazarczyk, M. Ovaere, S. Proost	Cross-border exchange and sharing of generation reserve capacity.	IAEE Energy Forum, Bergen Special Issue 2016, 29-30.	2016
Golombek, R., F.R. Aune, H.H. Le Tissier	Phasing out nuclear power in Europe.	IAEE Energy Forum Index, Bergen Special Issue 2016, 11-12	2016
Aune, F.R., R. Golombek, H.H. Le Tissier, S. Jaehnert, S. Völler, O. Wolfgang	Mot et grønnere Europa: Virkninger av EUs klimapolitikk for 2030.	Samfunnsøkonomen, Nr 3 2015	2015
Hagem, C.	Vindkraft.	Samfunnsøkonomen, Nr 3 2015	2015
Gavenas, E., K.E. Rosendahl	Hva påvirker CO2-utslippene på norsk sokkel?.	Samfunnsøkonomen Nr. 8 2014, 22-31.	2014
Rosendahl, K.E.	Elektrifisering og klimapolitikk.	Samfunnsøkonomen Nr. 5 2014, 14-17.	2014
Fæhn, T., C. Hagem, K.E. Rosendahl	Norsk olje- og gassproduksjon: Effekter på globale CO2-utslipp og energisituasjonen i lavinntektsland.	SSB Raporter 31/2013	2013
Fæhn, T., C. Hagem, L. Linholt, S. Mæland, K.E. Rosendahl	Oljekutt og klimapolitikk.	Samfunnsøkonomen, Nr 9 2013	2013
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