Workshop tirsdag 18. november 2014
Usikkerhet og investeringsrisiko i energisektoren

Kun for inviterte gjester.

Økonomisk analyse av hvordan politisk, markedsmessig og teknisk usikkerhet påvirker beslutninger i energisektoren: hvorvidt det blir investert, hvem som investerer, hvilken teknologi som blir valgt, tidspunktet for investeringen, størrelsen på anlegget og optimal drift.

Workshopen bygger direkte på de to EnergiX-prosjektene: «Uncertainties in the European Energy Market: Modelling approaches and policy issues» (CREE) og «Investment under uncertainty: EU renewable energy and climate policies beyond 2020» (CenSES/CICEP).

Program

10.00 -10.10	Velkommen (Lett servering fra kl. 09.30)
10.10-12.20	Innlegg
12.20-13.20	Lunsj
13.20-17.15	Innlegg

Adresse: NTNU Gløshaugen, Gamle fysikk, rom 217. Sem Sælands vei 5, 7034 Trondheim.
For veibeskrivelse, klikk her.

Parkering:
Det er innført parkeringsavgift på alle NTNUs områder.
Som besøkende kan du betale via nett, app for smarttelefon ("SmartPark") eller betalingsautomat når du parkerer på NTNUs områder. Pris per time for besøkende er 25 kroner. Velg «NTNU Besøkende» når du betaler.
For mer info om parkering ved NTNU og betalingsmetoder, vennligst se: www.ntnu.no/parkering

Hotell: Rica Nidelven
Send mail til: rica.nidelven.hotel@rica.no
Eller ring: +47 73 56 80 00
Oppgi kode: Workshop181114.grp
Frist: 6. november 2014
Bestillingen må garanteres med kredittkort ved bestilling. Etter fristens utløp garanteres ikke rom/pris.

'Med vennlig hilsen,

Stein-Erik Fleten	Kristin Linnerud	Rolf Golombek
Professor	Seniorforsker	Seniorforsker
NTNU, Institutt for industriell	CICERO	Frischsenteret
økonomi og teknologiledelse		

Program

9.30   Registration. Coffee and snack

10.00   Welcome   Stein-Erik Fleten (NTNU)

10.10   Session I: Numerical equilibrium models

10.10   The European energy market model LIBEMOD: Stochastic equilibrium modeling,
             results and extension to learning
             Rolf Golombek (Frisch Centre) and Kjell Arne Brekke (UiO, Dept of Economics)

11.00   Break

11.20   A multi-period stochastic equilibrium model for global energy markets -
             MultiMod
             Zhonghua Su (NTNU, Dept of Industrial Economics and Technology Management)

11.50   Natural gas markets, equilibrium modeling, risk aversion and investment
             Ruud Egging (NTNU, Dept of Industrial Economics and Technology Management)

12.20   Lunch

13.20   Session II: Power sector investment under policy uncertainty. Real options

13.20   Real options in peak power plants: Estimation of switching costs
             Stein-Erik Fleten (NTNU, Dept of Industrial Economics and Technology
             Management)

13.50   Revisions of renewable energy support schemes
             Kristin Linnerud (CICERO, Climate Economics Unit)

14.20   Coffee

14.40   Comparative statics for real options on oil: What stylized facts to use?
             Diderik Lund (UiO, Dept of Economics)

15.10   Session III: Solar and climate. Information asymmetry. Inertia risk.

15.10   Sun and Lemons: Getting over Information Asymmetries in the California Solar
             Market
             Johannes Mauritzen (NHH, Dept of Business and Management Science)

15.40   Modelling catastrophic risk in natural resource problems
             Eric Nævdal (Frisch Centre)

16.10   Break

16.30   Anticipative transmission planning under uncertainty
             Verena Hagspiel (NTNU, Dept of Industrial Economics and Technology Mgm)

17.00   What's next?   Kristin Linnerud (CICERO)

Abstracts

Rolf Golombek and Kjell Arne Brekke
Stochastic LIBEMOD; modelling of uncertainty, application and expansion to multiperiod model.

Zhonghua Su
Title: A multi-period stochastic equilibrium model for global energy markets - MultiMod
Abstract:
I will present the latest research status of the multi-period stochastic equilibrium model for global energy markets (MultiMod). MultiMod captures everyday economic operations, infrastructure investments, fuel substitution, CO2 tax, market power in a unified framework. It includes players in the supply chains of various fuels, including production, trade, storage, transformation, transmission, consumption, emission permit auction. By using multi-horizon scenario trees, uncertainties are classified into long-term and short-term uncertainties, both of which affect strategic investment decisions (e.g., production capacity expansion) and operational decisions. Further, we suppose that all players have symmetric information of scenarios. By solving this one-level game model, equilibriums are reached, which are contingent on scenarios.

Ruud Egging
Title: Natural gas markets, equilibrium modeling, risk aversion and investment
Abstract:
We consider risk aversion by natural gas supply companies considering investments in conventional and shale gas resources in a mixed complementarity problem. Uncertainties considered include political risk and resource sizes. We discuss investment decision results and expected welfare loss due to risk aversion.
Keywords: Natural gas markets, equilibrium modeling, risk aversion, investments.

Stein-Erik Fleten
Title: Real options in peak power plants: Estimation of switching costs.
Abstract:
We introduce a method for structural estimation based on a nonparametric representation of the dynamics of the exogenous state variable. The method is illustrated in the context of switching options. Our goal is to uncover economic primitives associated with the irreversible cost of switching. Our approach extends recent contributions in structural estimation, combining nonparametric statistics with nonlinear programming. Our case study is that of mothballing, starting up, and abandoning peak power plants. We arrive at economically meaningful estimates of maintenance costs and switching costs.
Co-authors: Alois Pichler (NTNU), Erik Haugom (NTNU/HiL), Carl Ullrich (James Madison U)

Kristin Linnerud
Title: Revisions of renewable energy support schemes
Abstract:
Worldwide, many renewable energy projects are granted production support to ensure competitiveness. As these technologies mature, governments may eventually want to terminate these support schemes or revise them in ways that make them more in line with market mechanisms. Using a real options approach, we examine how investors respond to such prospects. The aim is to provide policymakers with a better understanding of the consequences of different policy actions. We show that: (1) in contrast to commonly held beliefs, market-oriented schemes may not necessarily expose investors to more market risk; (2) an expected scheme revision will often result in gradual changes in investments, as compared with an unexpected revision; (3) an expected scheme termination will slow down investments if it is retroactively applied, but speed up investments if it is not; and (4) the termination effect can be substantial, especially if it is

retroactively applied. We conclude the paper by discussing the division of risk between investors and the government.
(Co-author: Trine K. Boomsma, University of Copenhagen)

Diderik Lund
Title: Comparative statics for real options on oil: What stylized facts to use?
Abstract:
An important application in the real options literature has been to investments in the oil sector. Two commonly applied "stylized facts" in such applications are tested here. One is that the correlation of the returns on oil and the stock market is positive, the other that it is invariant to changes in oil price volatility. Both are rejected in data for 1993–2008 for crude oil and the S&P 500 stock market index. Based on real options theory, consequences are pointed out. Higher volatility need not imply increased value and postponed investment.
Co-author: Ragnar Nymoen

Johannes Mauritzen
Title: Sun and Lemons: Getting over Information Asymmetries in the California Solar Market
Abstract:
Solar panel systems are significant investments for households and businesses that need to last at least a decade in order to be financially profitable even with significant subsidies. At the same time, individual homeowners or small contractors would incur great costs in verifying the quality of the main component of a solar system: the solar panels. In this way the market for Chinese solar panels resembles the market for ``lemons" in the seminal article by Akerlof. Without information on the quality of Chinese manufacturers, households can be expected to prefer established manufacturers of solar panels where quality can more easily be verified. In turn, this provides a barrier to entry to new manufacturers and some pricing power to established manufacturers. In turn, this information asymmetry could potentially have delayed or even blocked a switching to cheaper Chinese panels even if the quality of Chinese panels are competitive with that of established manufacturers. Using a large sample of data from installations of solar panels in California between 2007 and 2014 and both single- and multi-level regression models, I provide evidence that contractors were able to gain market share and significantly bring down total system costs by both switching to cheaper Chinese panels as well as introducing a leasing model for sales. I argue that these companies were successful in overcoming the information asymmetries by owning the panels themselves since they are able to absorb the information asymmetry and associated risk - verifying the quality of the panels as a wholesaler.

Eric Nævdal
Title: Modelling catastrophic risk in natural resource problems
Abstract:
We examine a new framework for modelling catastrophic risk in natural resource problems. This framework, inertia risk, is characterized by actions that induce partially persistent changes in the probability of a catastrophe over time. This as opposed to the literature where risk is either perfectly persistent for any given action or is instantaneous and dissipates completely after the action has been executed.

Verena Hagspiel
Title: Anticipative Transmission Planning under Uncertainty
Abstract:
Transmission system operators (TSOs) build transmission lines to take generation capacity into account. However, their decision is confounded by policies that promote renewable energy technologies. Thus, what should be the size of the transmission line to accommodate subsequent generation expansion? Taking the perspective of a TSO, we use a real options approach not only

to determine the optimal timing and sizing of the transmission line but also to explore its effects on generation expansion.

Co-authors: Afzal S. Siddiqui, Trine K. Boomsma