Risk in deregulated electricity markets

Workshop, March 23 - 24, 2006, ETH Zurich, Switzerland

Speakers
Göran Andersson, Jörg Doege, Martin Eschle, Massimo Filippini, Juri Hinz (Chair), Hans-Jakob Lüthi, Martina Wilhelm

Organized by
Centre for Energy Policy and Economics
Institute for Operations Research
Power Systems Laboratory
Over the last two decades, a process has been underway worldwide to privatize state enterprises and to liberalize markets for services of infrastructure industries, such as telecommunication, transportation and electricity. As a rule, privatization and liberalization in electricity industry is effected by the introduction of commercial interfaces between the functions of generation, transmission, distribution and retailing. The enforced competition raises various problems concerning security of supply, efficient market design as well as financial risk analysis and management. Companies involved in electricity business are exposed to different types of risk, the most important among them are
- operational
- market design / regulations
- market risks.

In liberalized power markets participants have to face this high complexity in order to achieve strong market positions and business excellence.

Thus, to succeed in a new environment, firm management has to set up a robust quantitative framework to value and to optimize strategic decisions. At this stage, there are at least three aspects to take into consideration:
- Economical criteria, which include crucial reform elements and present state of deregulation, factors of firm competitiveness, benchmarking, economical attributes of power utilities, interrelation and diversification effects in a power-generating portfolio.
- Technical constraints, such as network access and utilization, security of supply, capacity and outage management, load forecast and load regulation.
- Financial aspects related to risk measurement, valuation of flexibility, efficient risk reduction and hedging, risk estimation in compound structures, fair valuation of financial products.
The core of our methodology is to compose all details of electricity related risk to a consistent pattern. Instructed by recognized experts, course participants will get an extended view on the flexibility as an intrinsic instrument for risk handling. Thereby, a significant attention is paid to the correct valuation of flexibility from both the firm and the market perspectives: The firm perspective interprets the flexibility as an "insurance“ against adverse events which affect the earnings. Consequently, its valuation is firm-specific, depending on the corporate risk policy. In contrast, the market perspective treats flexibility as a financial contract. In this context, its value is determined by no-arbitrage arguments, so techniques from financial mathematics apply to price electricity options.

Risk managers from power industry, financial institutions, other interested audience. Basic knowledge in economy, corporate administration, finance and/or electricity business are presumed.
program march 23, 2006

08:45  Hans-Jakob Lüthi
       Welcome

09:00  Massimo Filippini
       Reform of the electric power sector:
       Elements of an electric power reform
       Discussion of some case studies

10:00  Coffee

10:15  Massimo Filippini/Jörg Doege
       Competitiveness of the hydropower companies:
       Investment appraisal
       Discussion of some case studies

11:00  Massimo Filippini/Jörg Doege
       Benchmarking costs in the electric power sector:
       Benchmarking and regulation
       Parametric and non-parametric approaches
       Discussion of some case studies

12:00  Lunch

14:00  Göran Andersson
       Technical/economical properties of power generation plants:
       Operational characteristics, controllability and dispatchability, system integration

15:00  Göran Andersson
       Congestion management:
       Overview of different schemes: market coupling/splitting, explicit/implicit auctions, counter trading

15:45  Coffee

16:00  Göran Andersson
       Power flow control with FACTS devices:
       Technical characteristics of FACTS devices, congestion management with FACTS devices, security enhancement by use of FACTS devices

17:00  Round table (Facilitator: Juri Hinz)

18:30  Dinner (optional)
program march 24, 2006

09:00  Hans-Jakob Lüthi/Jörg Doege
Energy risk management:
Coherent risk measurement, efficient risk reduction
and hedging, dynamic risk engineering

10:00  Coffee

10:15  Hans-Jakob Lüthi/Jörg Doege
Valuation of flexibility:
Notion of flexibility, modeling of utilities, dispatch
management and cross-border trading, case study

11:00  Martin Eschle
Management of transmission grid in a
deregulated market:
Arbitrage and bottlenecks

12:00  Lunch

14:00  Juri Hinz
Market view:
Flow commodity market under change-of-numeraire
transformation, results from fixed-income markets for
commodity price models

15:00  Martina Wilhelm
Market View:
Model calibration based on historical futures data,
valuation of caps, floors, and cross-commodity swaps,
modeling by examples

15:45  Coffee

16:00  Hans-Jakob Lüthi
Closing remarks:
From strategic to operational risk management

16:30  End of workshop

Minor changes of program are reserved.
**speakers**

**Göran Andersson**

Professor in Electric Power Systems, ETH Zurich.

Dr. Andersson was born in Malmö, Sweden. He obtained his M.S. and Ph.D. degree from the University of Lund in 1975 and 1980, respectively. In 1980 he joined ASEA:s, now ABB, HVDC division in Ludvika, Sweden, and in 1986 he was appointed full professor in electric power systems at the Royal Institute of Technology (KTH), Stockholm, Sweden. Since 2000 he is full professor in electric power systems at ETH Zurich, where he heads the powers systems laboratory. His research interests are in power system analysis and control, in particular power systems dynamics and control involving HVDC and other power electronics based equipment. Göran Andersson is Fellow of the Institute of Electrical and Electronic Engineers (IEEE), member of the Royal Swedish Academy of Sciences, and member of the Royal Swedish Academy of Engineering Sciences.

**Jörg Doege**

Jörg Doege is a practice specialist in the European risk management practice at McKinsey & Co., Inc., in Frankfurt. He recently finished his PhD at the Institute for Operations Research (IFOR) at ETH Zurich. In his dissertation, which was done under the supervision of Prof. Hans-Jakob Lüthi, a new risk engineering approach was developed to value the embedded flexibility within a utility’s portfolio. Jörg has also worked on several risk management related projects such as with Axpo/NOK, the Centre for Energy Policy and Economics (CEPE) and UBS.

Before coming to Zurich, Jörg obtained a Master of Science in Finance degree from the Williams Risk Management Center in Tulsa (USA).

**Martin Eschle**

Martin Eschle is an executive member of the “Nordostschweizerische Kraftwerke AG” (NOK) Trading and Sales Division and responsible for the Risk and Portfolio Management.

He received his Diploma in Physics from the Swiss Federal Institute of Technology in Lausanne (EPFL) in 1991. In 1996 he obtained the diploma in business economics from the Business School of the University in Lausanne (HEC). In 1997 he graduated in physical chemistry at the EPFL. After his studies he worked for over four years for McKinsey & Co. Switzerland mainly in the fields of banking, telecommunications and electricity companies. In 2002 he started at Axpo AG, now a subsidiary of NOK AG, as Head of Risk Management for the trading and sales activities. In developing the risk management at NOK/Axpo he focused his interests on the integration of new business models for liberalized markets and valuation methods for flexible contracts in an asset-based portfolio.

**Massimo Filippini**

Prof. Filippini holds a dual professorship in economics at the ETH Zurich and the University of Lugano since October 1999 and is one of the directors of CEPE, Centre for Energy Policy and Economics (ETH Zurich). Professor Filippini was born in 1963. He studied economics...
at the University of Zurich, where he also received his doctorate. With various research grants, he has been a research fellow at the Economics Department of Harvard University and at the J.F.K. School of Government of the same university. He completed the requirements for his postdoctorate degree "Habilitation" at the University of Zurich in 1996. In 2003 he was given the title of a Professor in economics at the University of Zurich. Professor Filippini’s main research areas are the regulation and measurement of the efficiency of public and private firms, the estimation of the economic value of public goods, the analysis of energy demand and the deregulation of the electricity and gas sectors. Massimo Filippini has published books and articles on the following subjects: transport economics, public economics and energy economics.

Hans-Jakob Lüthi
Prof. Dr. H.-J. Lüthi studied mathematics at the Swiss Federal Institute of Technology (ETH) Zurich and obtained a doctorate degree in 1973. He was a lecturer at ETH in operations research, visiting professor at the Pontificia Universidade Catolica, Rio de Janeiro, Rensselaer Polytechnic Institute, Troy NY and Center of Operations Research at MIT. Before joining the department of mathematics of ETH in 1993 as Professor of Operations Research he was directing a consulting firm in the area of information and organizational engineering. His main research areas are mathematics of OR, applications of OR in risk management and the design of intelligent decision support systems in operations management.

Juri Hinz
Juri Hinz is a senior scientist at ETH Zurich, where he leads the Financial Engineering Group at the Institute for Operations Research. Before joining ETH Zurich, he was Assistant Professor at the University of Tuebingen. His current research focuses on applications of financial mathematics to problems arising form liberalization in the energy industry. His publications deal with portfolio optimization, real-time auctions on electricity, modeling day-ahead electricity prices, pricing commodity derivatives, and applications of real option theory. He supervises the research project «Optimal Dispatch of Hydro-Electric Plants» at ETH Zurich and consults energy-related companies in Switzerland, Germany and Mexico.

Martina Wilhelm
Martina Wilhelm is currently a PhD-student at the Institute for Operations Research at ETH Zurich. She holds a diploma in mathematics and obtained the well-known Walter- Saxter-Preis in 2004 for her diploma thesis on the topic of continuous time portfolio problems, which was done at the University of Waterloo (Canada). Martina’s main research interest focuses on stochastic control problems and on pricing derivatives in commodity markets.
Registration for the Workshop

"Risk in deregulated electricity markets"

March 23 - 24, 2006

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Deadline: February 15, 2006 (limited number of participants)
Fee: CHF 1600.- (incl. Lunches and Documentation)

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Name

First Name

Company

Position

Street/No

Zipcode City

Country

Tel Fax

e-mail

Date Signature