Ea Energianalyse

Baltic Development Forum

sustainable growth · innovation · competitiveness

Energy Scenario Analyses with the Balmorel model

Copenhagen, 25-29 January 2010

Required tools

In order to participate in the course you must bring a computer with MS Office 2007 and GAMS (General Algebraic Modeling System) installed. A trial version of GAMS may be downloaded from www.GAMS.com and is sufficient for the course.

A one month full license to GAMS and CPLEX has been sent to you by email (gamslice.txt). The license is a text file named “gamslice.txt”. To activate: copy the license file to the GAMS installation directory on your computer (fx. C:\program files\GAMS23.3).

Also sent to you by email are the four pdf files:

- ✓ Balmorel model structure
- ✓ Balmorel theoretical background
- ✓ Balmorel tutorial
- ✓ Balmoral output handling.

Location

Frederiksholms Kanal 4, 3.rd floor, 1220 København K (large grey-blue gate, opposite Café Katz). A sign reading “Balmorel course” will be visible on the gate.

Nearest **train** station is Copenhagen Central station (Københavns Hovedbanegård), 800 metres.

Nearest **metro** station is Kgs. Nytorv, 1,100 metres.

Both stations have direct connections to Copenhagen Airport.

Course description

Aim of introductory course:

- ✓ To provide insights into the energy policies and energy systems;
- ✓ To introduce the Balmorel model, which will allow participants to carry out their own analyses with the model;
- ✓ To present the selected studies on regional wind power integration, new interconnectors, as well as operation and optimization of combined heat and power system;
- ✓ To provide an understanding of challenges and opportunities for the energy companies in the Baltic Sea Region.

Concept:

- ✓ Learn energy system and scenario analyses;
- ✓ Combine lecture style instruction with hands-on group work;
- ✓ Pass on basic modeling skills and exercise on relevant regional and interregional issues;
- ✓ Use the Balmorel model for Scenario Analyses.

Fun:

- ✓ After gaining basic proficiency, syndicate groups define their own scenario objectives for their sub region;
- ✓ Work is interrupted by policy announcements and announcements of mayor investments which affect the groups' scenarios;
- ✓ Simulated group presentations to stakeholders, such as industry experts or board level executives.

Networking and cooperation:

- ✓ Group learning with group crossover at the middle of the week;
- ✓ Integration of scenarios in order to demonstrate interaction and interdependency;
- ✓ Discussion and implementation of wider regional approaches;
- ✓ Extension of network activities leading to user groups and other regular contacts.

The Baltic Sea Region is used as a showcase in the course, due to the diversity of its energy systems, such as substantial representation of coal, oil, gas, nuclear, hydro, wind and biomass based production, as well as challenges related to electricity transmission /bottlenecks, extensive use of district heating and combined heat and power generation.

Lecturers:

- ✓ Lars Bregnbæk, M.Sc. Engineering, Applied Mathematics, Ea Energy Analyses (course leader)
- ✓ Hans Ravn, M.Sc. Engineering, Ph.D., Dr.Techn., RAM-løse edb
- ✓ Peter Meibom, Ph.D., Senior Scientist, Risø DTU

Programme	Monday, 25th January, 2010
09.00	Welcome *Hans Brask, Director, Baltic Development Forum* *Lars Bregnbæk, Ea Energy Analyses* Introductions and breakfast *Everyone* Practicalities *Jeannett Beyer, Coordinator, Ea Energy Analyses*
09.30	First look at Balmorel *Hans Ravn, RAM-løse edb* Group forming *Hans Ravn, RAM-løse edb*
12.00	Lunch
13.00	The Balmorel structure *Hans Ravn, RAM-løse edb* *Hands-on exercise* *Group exercise* Presentation of baseline scenario *Lars Bregnbæk, Ea Energy Analyses*
14.45	Break
15.00	Output handling – orientation *Lars Bregnbæk, Ea Energy Analyses* Output handling – hands on *Group exercise* Wrap-up of the day *Lars Bregnbæk, Ea Energy Analyses*
17.00	Free
Evening	Read through baseline scenario – consider local objectives *Night work*

	Tuesday, 26th January, 2010
09.00	Lecture: Baltic Sea Region energy scenarios *Anders Kofoed-Wiuff, Ea Energy Analyses*
09.45	Introduction to GAMS *Hans Ravn, RAM-løse edb* Hands on - GAMS syntax *Group exercise* Introduction to scenario analyses *Kaare Sandholdt, Ea Energy Analyses* Group discussions (scenario definitions) *Plenary*
12.00	Lunch
13.00	Hands on - scenario implementation *Lars Bregnbæk, Ea Energy Analyses* Q&A: plenum on challenges *Plenary discussion*
14.45	Break
15.00	Announcement: Regional Energy Policy *Hans Ravn, RAM-løse edb* Hands on policy implementation *Group exercise* Announcement: Large energy technology investment *Lars Bregnbæk, Ea Energy Analyses* Hands-on technology implementation *Group exercise*
17.00	Free

	Wednesday, 27th January, 2010
09.00	Lecture: Wind power integration *Peter Meibom, Risø*
09.45	Scenario finalisation – syndicated *Hans Ravn, RAM-løse edb* Feed-back session with each group (problem resolution) *Plenary* Preparation of scenario presentation *Group exercise* Wrap-up + information on afternoon programme *Lars Bregnbæk, Ea Energy Analyses*
12.00	Lunch
13.00	Surprise *Ea Energy Analyses*
17.00	Refreshment and introduction to the Baltic Development Forum *Hans Brask, Director, Baltic Development Forum* *Address:* Nygade 3, 5th Floor
18.30-21.30	Joint dinner *Address: Farvergade 27* Scenarios presentations *Group presentations* Debate *Plenary discussion with guest opponents*

	Thursday, 28th January, 2010
09.00	Cross syndicate groups *Hans Ravn, RAM-løse edb* Discussion of regional strategies *Plenary* Hands on implementation of regional strategies *Group exercise*
12.00	Lunch
13.00	Hands on - scenario implementation *Lars Bregnbæk, Ea Energy Analyses* Q&A: plenum on challenges *Plenary discussion*
14.45	Break
15.00	Announcement: Request from the BoD *Lars Bregnbæk, Ea Energy Analyses* Output handling – economic module *Lars Bregnbæk, Ea Energy Analyses* Hands on – preparing an executive summary scenario presentation *Group exercise*
17.00	Break
18.30-21.30	Joint Workshop Dinner *Address:* Farvergade 27 Scenario summary presentations *Group presentations*

	Friday, 29th January, 2010
09.00	Model applications overview *Lars Bregnbæk, Ea Energy Analyses* Application: Hourly dispatch simulation *Hans Ravn, RAM-løse edb* Hands on hourly dispatch simulation *Group exercise* Modelling best practices *Hans Ravn, RAM-løse edb*
12.00	Lunch
13.00	Learning review *Lars Bregnbæk, Ea Energy Analyses* Questions & answers *Plenary* Course evaluation *Plenary* Closing remarks *Hans Brask, Director, Baltic Development Forum*
15.00	Goodbye