Meeting with
Ministers of Foreign Affairs

Energy and Climate seminar:
Creating a "Green Valley" of Europe - Different Scenarios

Background information about the Study on Enhanced regional energy cooperation in the Baltic Sea Region

4 June 2009

Marienlyst Hotel, Ndr. Strandvej 2, 3000 Helsingør, Napoleon Salon

Organised by:

Baltic Development Forum
sustainable growth - innovation - competitiveness

Meeting sponsors:

DONG energy

Vestas

Energianalyse a/s

Baltic Development Forum

sustainable growth · innovation · competitiveness

Study on
Enhanced regional energy cooperation in the Baltic Sea Region

In 2008-2009, the energy sector of the Baltic Sea Region has gained high interest due to the EU Strategy for the Baltic Sea Region, the European Energy Programme for Recovery, the Baltic Interconnection Plan and the COP 15 Summit in Copenhagen in December during the Swedish EU-presidency.

In this context, the Nordic Council of Ministers (NCM) is co-sponsoring the study *Enhanced Regional Energy Co-operation in the Baltic Sea Region*, carried out by the Baltic Development Forum and Ea Energy Analyses. The study has two parallel objectives. 1) To promote a common energy agenda for the Baltic Sea Region through the involvement of key stakeholders. 2) To provide a substantial basis for discussion of different energy scenarios for the region based on an analysis of energy data of all the countries in the Region. The project has three phases. Phase I was concluded in December 2008. The final report from phase II will be available by Mid June this year, and the whole study will be concluded by the end of 2009.

Main findings of the study and the consultations in phase I and II

- The involvement of various stakeholders on different levels contributes to a better shared understanding of the possibilities and interests in the region.
- The many different renewable energy resources in the Baltic Sea Region are sufficient to achieve a regional target of at least 50 % CO2 –reduction in 2030 compared to 1990.
- Better coordinating of the energy policies across the region, for example to make best use of the resources available, will bring significant economic benefits.
- There is a huge potential for cost-efficient energy savings and energy efficiency measures by end-users and at generation facilities ("low hanging fruits").
- Increasing the utilization of combined heat and power generation and reducing the use of electric heating will lead to very substantial reductions in primary energy consumption and emissions of CO_2.
- There will be benefits of strengthening the electricity transmission grid in the region, particularly connections linking the thermal power based systems in Poland and Germany and

the Nordic power system dominated by hydro power. Strengthening connections between the Baltic countries and the Nordic countries also appear attractive.

- Integrated off-shore wind grids could serve a twofold purpose by connecting the wind farms to the transmission grid at shore as well as closer linking the electricity markets in the region. Kriegers Flak could serve as a pilot project for an integrated offshore grid.

Recommendations based on the findings in the study and the process:

- Develop a shared vision *A Green Valley of Europe* in order to mobilize the strong traditions in the region for public-private co-operation.

- Establish an energy stakeholder forum that includes different cross-border, cross-sector and cross-level actors. Not least the private sector needs a larger international platform in order to go beyond small markets.

- Develop regional projects which could benefit the region as a showcase for comprehensive and sustainable energy systems including R&D and demonstration activities.

- Develop a common interconnector strategy for the region to allow for a higher level of renewable energy penetration including from offshore wind power.

- Launch an action plan for efficient and sustainable heating, involving the larger cities in the region and the district heating companies.

- Establish a common regional training programme to strengthen the capacities in energy planning. Such a programme should aim at developing the exchange of experiences and best practices among officials at local and national level.

More detailed information about the study

Phase I provided an overview of the present energy situation in the Baltic Sea Region and outlined two scenarios for the energy and transport sectors in the region in 2030. The so-called Small-tech scenario focuses on distributed energy generation, energy savings and efficient utilisation of energy through combined heat and power generation, whereas the Big-tech scenario explores the opportunities of more centralised solutions such as nuclear power and carbon capture and storage (CCS). Both scenarios aim at - and achieve - two concrete goals for 2030: a reduction of CO2 emissions by 50 per cent compared to the 1990 level and a reduction of oil consumption by 50 per cent compared to the present level.

At the same time a Joint Platform on Energy and Climate was established consisting of the Union of Baltic Sea States (UBC), Baltic Sea States Sub-regional Co-operation (BSSSC), Baltic Sea Parliamentary

Conference (BSPC) and Nordic Council and Baltic Development Forum. The Platform decided to give full support to the study.

Phase II consists of detailed scenario analyses of the electricity and district heating sector in the consecutive period 2010 – 2030. It is allows to examine how EU's 20 -20 -20 targets may be fulfilled.

The preliminary results indicate that there will be significant economic benefits of closer cooperation in the region. It will be beneficial to up-grade the cross-national electricity infrastructure in the region to make best use of energy resources available as well as to coordinate the policies needed to comply with the climate and energy targets set out. The final report from phase II will be available by Mid June this year including a list of concrete promising infrastructure projects and policy options.

At the Baltic Sea Region Energy Cooperation (BASREC) Energy Ministers' conference in February 2009, Secretary General of NCM, Mr. Halldor Asgrimsson, informed Ministers about the on-going study. European Commissioner for Energy Andris Piebalgs commented positively on the study underlying the need for a combination of the two scenarios, taking into consideration the policies of the different countries around the region. Furthermore, the importance in showing possible benefits of closer regional cooperation within areas such as wind power planning, interconnectors, demonstration of new technologies and energy markets was underlined. At the BASREC-meeting, BDF proposed to Ministers that a larger stakeholder conference was organized comprising of Energy Ministers, cities, regions, business representatives in the sector and others as a way of advancing regional co-operation. The proposal was very favorably received by the chair.

The BSPC and the Group of Senior Energy Officials of BASREC have given valuable feed-back on the scenarios as well as the other Platform organizations. Furthermore, the scenarios were presented at the BDF Summit in December 2008. Together with NCM, an enhanced dialogue with Russian partners will be initialed during a workshop in Kaliningrad 10-11 June 2009 entitled "Energizing Sustainable Growth in the Baltic Sea Region".

Phase III will explore the opportunities for industries and energy companies in the region to be frontrunners in development of new energy technologies and provide a platform for regional knowledge sharing between public and private stakeholders. The vision is to use the positive momentum and to create a *Green Valley on Top of Europe*. The seminar in connection with the CBSS Ministerial meeting will introduce this final phase.

Results from Phase I: Energy scenarios for the future

To shed light on different pathways towards achieving the long term strategic goals of the region, two essentially different developments have been explored through the so-called Small-tech scenario and the Big-tech scenario. Both scenarios aim at achieving two concrete goals for 2030: reducing CO2

emissions by 50 per cent compared to the 1990 level and reducing oil consumption by 50 per cent compared to 2005. Similar terminologies and goals have been applied in a similar scenario study for the EU27 carried out for the European Parliament1.

The Small-tech scenario focuses on distributed energy generation, energy savings and efficient utilisation of energy through combined heat and power generation. This scenario assumes a high level of interconnection of the electricity grids in the regions to allow for the integration of a high share of non-dispatchable wind power. The so-called smart grid technology and improved communication between the different parts in the energy system are a key in providing an optimal dispatch and efficient utilization of the energy infrastructure.

The Big-tech scenario explores the opportunities of more centralised solutions. In the Big-tech scenario, almost all new coal and natural gas power plants established from 2020 and onwards are equipped with carbon capture technologies (CCS) - and the nuclear power capacity is increased by 35 per cent compared to today. New nuclear generation capacity is presumed to be built in Finland, Lithuania and Poland, as well as no phase-outs in Germany, Sweden and North West Russia. In addition, it is assumed that newest large coal power plants, commissioned in the period 2010-2020, are prepared for CCS and retrofitted in the subsequent decade.

In both scenarios the transport sector undergoes fundamental changes in order to comply with the target on 50 per cent oil reduction. In both the Small-tech and the Big-tech scenarios the critical assumption is that the technical potentials for improving the fuel economy of conventional vehicles are partly realised. Moreover, in the Small-tech scenario, electric vehicles and plug-in hybrids displace oil consumption, and information and communication technologies are put in place to decrease the demand for "physical" transportation. In the Big-tech scenario, 2nd generation biofuels and natural gas are important means, in addition to the electrification of the transport sector.

However, the requirements for transformation differ significantly in the two scenarios.

In the Big-tech scenario, the existing structure of the energy supply system remains essentially unchanged, and the large suppliers of electricity become the main actors. Hence, the implementation of the Big-tech scenario depends on relatively few decision-makers. Partnerships for the demonstration of the CCS technology provide an obvious opportunity for regional cooperation in the Big-tech scenario.

[1] More info on the European project can be found on the website of the Danish Board of Technology: http://www.tekno.dk/subpage.php3?article=1442&survey=15&language=uk

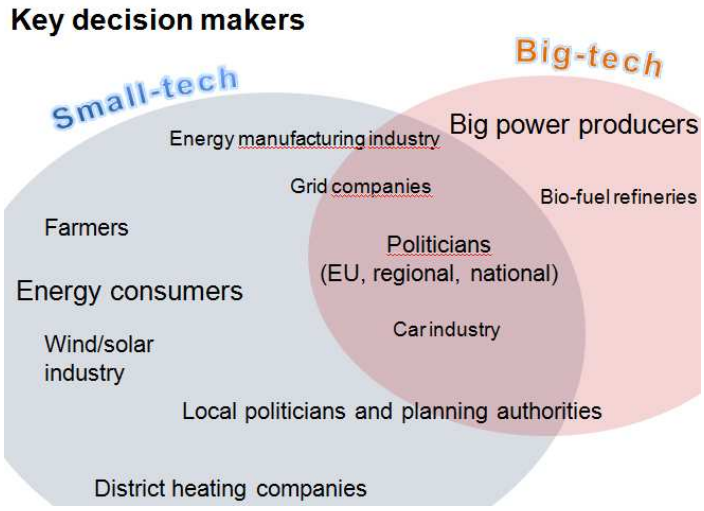

Figure 1 - Key decision makers in the two scenarios

In the Small-tech scenario, citizens play an important role as "active" consumers of energy who respond to price signals from the energy markets and invest in energy-efficient appliances and buildings. The grid owners develop their systems to accommodate renewable energy technologies and the suppliers of energy invest in distributed units located closer to the consumers. In the Small-tech scenario the integration of fluctuating energy sources calls for a high level cooperation on energy markets and new infrastructure projects, particularly concerning off-shore wind. Local authorities and cities are crucial for the facilitation of district heating grids and sustainable transport systems. The need for more efficient supply and demand technologies provides new business opportunities in many industry branches.

To illustrate the consequences of the two scenarios, the key indicators – the development in gross energy consumption and the emission of CO2 – are compared with historic data as well as with a reference for 2030 resembling the most recent projection from the European Commission2 [Ref. 5].

The scenarios show that resources and technologies are available to achieve the targets set out.

In the Small-tech scenario, it is foreseen that the gross energy consumption is reduced by approx. 20 per cent in 2030 compared to 2005. In the Big-tech scenario, gross energy consumption increases by 13 per cent compared to today. This increase, which is slightly higher than in the 2030 reference projection, is mainly due to increased utilisation of carbon capture and storage technologies which are expected to require a considerable expenditure of energy, particularly for the capture and transportation of CO2. In the Big-tech scenario, compliance with the CO2 reduction target is secured by storing almost 150 Mt of CO2 underground in 2030.

The average annual economic growth rate is assumed to be just above two and a half per cent in the period until 2030 in both reduction scenarios.

[2] For North-West Russia the reference has been made based on data from the International Energy Agency.

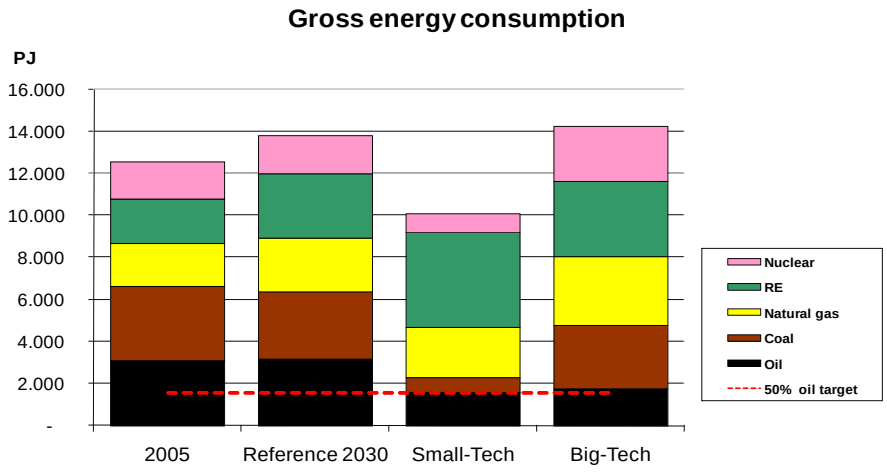

Figure 2: Gross energy consumption in 2005 and projections for 2030 (excluding fuels for non-energy purposes).

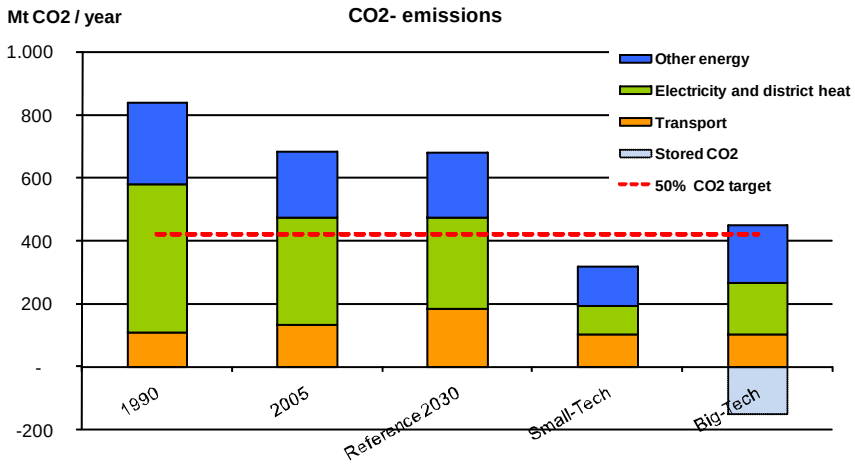

Figure 3: CO_2 emissions from the energy and transport sectors in 1990, 2005 and projections for 2030. "Other energy" includes oil, gas and coal used in households, industry and the trade/service sector.

The actual implementation of the scenarios and associated benefits depend on a number of critical assumptions. Most important in the Small-tech scenario is the assumption that it is possible to realise a substantial share of the huge theoretical potential for energy savings, best practice policies at the local level to facilitate district heating and sustainable transport systems.

In the Big-tech scenario, the access to and availability of gas, coal and uranium at reasonable prices is probably the most critical assumption. Moreover, the scenario is dependent on the commercialisation of the CCS technology.