CES Nordic Project on Climate and Energy Systems

Climate and Energy Systems, 2007-2010

Risk Assessment working group

http://en.vedur.is/ces

The Climate and Energy Systems; Risks, Potential and Adaptation is in many ways a follow up on the Climate and Energy (CE) Nordic-Baltic research project (2003-2006), both funded by Nordic Energy Research (www.nordicenergy.net) and the Nordic energy sector. The main objective of the CE project was to make a comprehensive assessment of the impact of climate change on renewable energy resources in the Nordic area including hydropower, wind power, bio-fuels and solar energy.

Main objectives of the CES Project

An increase of uncertainty about the future of renewable resources under climate change is a key issue for the energy sector. Some renewable energy resources are likely to increase their productivity, on the other hand, changes in the seasonal and geographical patterns of production and demand need to be managed. Disturbances and costs due to possible changes in extremes as floods, droughts or storms need to be dealt with. Uncertainty translates into riskier decisions within the sector including operational and market issues, short term responses or investments. It also calls for adaptation measures including, for example, ensuring dam safety. The goal of the new Climate and Energy Systems project is to look at climate impacts closer in time and assess the development of the Nordic electricity system for the next 20–30 years. It will address how the conditions for production of renewable energy in the Nordic area might change due to global warming. It will focus on the potential production and the future safety of the production systems as well as uncertainties.

Risk Assessment

An evaluation of risk under increased uncertainty in order to improve decision making in a changing climate was carried out through the following steps:

1) Review of risk and uncertainty management approaches used in the energy sector; and
2) Integration of risk and uncertainty in decision support tools.

A risk management framework, developed by VTT of Finland, according to the emphasis of the industrial partners, has since been tested and applied in various energy sectors (e.g. hydro, CHP, bio, wind, etc.).

The target user group for the tool, which is aimed to be a first step in determining a strategy for identifying potential risks associated with climate change, is decision makers at the plant level in power companies. The qualitative approach is intended to be flexible, and includes supporting tools.

While not directly aimed at professional risk managers, the tools can be utilised by laymen as a first step in developing a strategy for dealing with changing weather patterns over the life time of existing and new power infrastructure investments.

Risk Assessment Framework

The Risk Assessment Framework encompasses a 6-step procedure for identifying, evaluating, assessing and documenting the risks and opportunities associated with a specific energy production system. The flexible nature of the framework allows the currently qualitative tools to be developed and supplemented as desired.

Once a particular case has been specified, the relevant data needs to be collected and the regional climate scenarios defined. The Functional Model (Fig.1) provides an overview to those functions of the power plant which are to be taken into account in the risk analysis process. In any studied case, it could be separately decided to which extent the risks and opportunities are examined.

During a full-scale examination, the energy source, power plant and distribution network are all identified a section at a time. In some cases, however, it might be more valuable to focus only on a certain part of functional model.

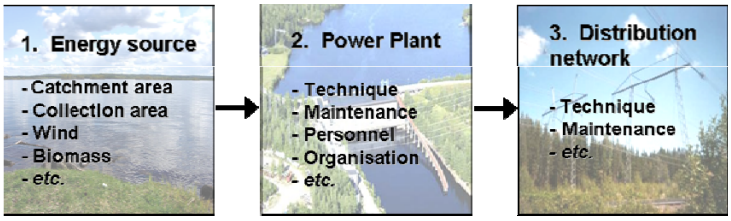

Fig.1. Functional Model.

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Supporting decision-making

The results of the risk analysis are represented visually in a fourfold table. (Fig.2) The main idea of the table is to provide a readily interpretable overview of the highlighted risks and opportunities in relation to the likelihood of the examined scenarios and the likelihood of the risks and opportunities identified.

The different quadrants of the table (act, prepare and monitor) guide the user in the identification of the order and significance of the action plans made to manage the specified risks and opportunities. With the aid of the visual summary it is also possible to represent, for the decision makers or other stakeholders, the risk analysis results in a efficient and compact way.

Having already been applied in various case studies, the Risk Assessment Framework and its tools have been shown to aid visualisation of the risks and opportunities associated with climate change in the energy sector, and could be seen to support corporate decision-making processes.

Because risk is now also more often seen as a missed opportunity, it is essential for any new methods to be able to account for future potential. The Risk Assessment Framework also accounts for the identification of opportunities, and subsequently also encourages their consideration in the decision-making process.

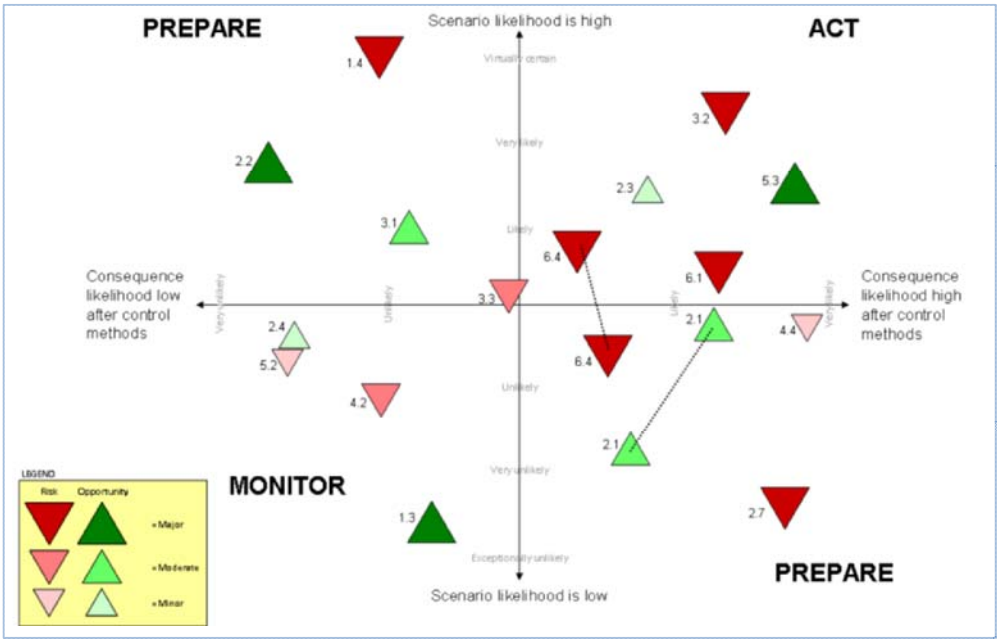

Fig.2. Fourfold Table.

Collaboration

The work in the Risk Assessment working group is being carried out by a Nordic network of researchers and stakeholders from a range of institutes and organisations:

- Ea Energy Analyses (EaEA, Denmark)
- Center for International Climate and Environmental Research (CICERO, Norway)
- Swedish Environmental Research Institute (IVL, Sweden)
- National Laboratory for Sustainable Energy (Risø DTU, Denmark)
- VTT Technical Research Centre of Finland (VTT, Finland)

With assistance from:

- Finnish Environment Institute (SYKE)
- Finnish Meteorological Institute (FMI)
- University of Eastern Finland

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