



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

 2007 DE



Working session C

Electricity



Chair: Michel Colombier

Rapporteur: Nils R. Sælthun



Presentations

- **Sten Bergström - Sweden:** A northern European perspective: climate change and the hydropower industry
- **Sylvie Parey - France:** Water related impacts of climate change on the French electricity sector
- **Otto Pirker - Austria:** Climate change and hydropower - Consequences and challenges
- **Niklas Dahlbäck – Sweden:** Climate change and electricity systems



Observations

- **Electricity demand:** Regardless of energy demand management, there will be increasing demand for electricity. Electricity has special qualities that will always be needed in energy systems.
- **Increased uncertainty:** Uncertainty in water resources data (precipitation, runoff averages and extremes) has increased strongly with climate change. Decision making under uncertainty is a central element of adaptation strategies
- **Regional aspects:** Model estimates indicate that hydropower production will increase in North Europe, decrease in South Europe, while the outcome is uncertain in the rest of Europe, including the Alps.



Discussion results/conclusions

- **Dam safety issues:** It is uncertain how to what extent and in what direction the risk of dam overtopping is changing. Increased safety margins are called for.
- **Thermal power plants:** The supply of cooling water in prolonged drought periods and the impacts on water temperature and river ecology is a matter of serious concern. Substituting water with air cooling reduces efficiency.
- **Integrated river management:** A logical response to mitigation of the water use problems and ecological issues arising in extreme events (floods, drought) is integrated river basin management.



Discussion results/conclusions

- **Reservoirs:** Water reservoirs are management tools that in the future may have other values and additional uses than what is implemented by the present operational rules and restrictions.
- **The production and distribution system:** The vulnerability of the electricity systems is high and probably increasing under climate change, and the societal dependency on electricity is increasing. **Assessment** of present vulnerability of electricity supply under extreme events – large storms, extended drought etc is called for, and identification of a future system with high robustness and efficiency.



Discussion results/conclusions

- **Biomass:** The role and importance of biomass in the future electricity production system is unclear. The potential for biomass production in boreal forests may increase under climate change, intensive biofuel cultivation will affect the water resources, and there are competing uses for biomass in energy production.
- **Demand management:** Energy demand management is a central mitigation strategy, and will have important implications for adaption strategies in the electricity sector.
- **Public participation:** How to integrate consumers in focused adaptation strategies and prevent unsustainable adaptative behaviour?

Research needs

- **Climate change scenarios:** Better predictions and better quantification/understanding of uncertainty is needed.
- **Extreme events:** Better methods for downscaling/extraction of extreme events.
- **Decision making:** New methods for decision making and investments under uncertainty.
- **Impact research:** More research on climate change impacts on the sector is needed.
- **Adaptation research:** Mechanisms that facilitate adaptations and structural/institutional hindrances to adaptation.
- **Synergies:** Better use of existing research data, cross-sectorial approaches and dialogs.



Research needs

- **Joint research ventures:** Joint research with industry is efficient at addressing critical issues and improves communication between researchers and decision makers. The electricity industry has a track record of being genuinely occupied with climate change issues.
- **Biofuels:** More comprehensive studies of the role of biomass and the competing use of it in energy supply is needed.
- **Design floods:** International comparative studies and „best practise“ guidelines.



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**- everything changes, not only
climate -**