



UNIVERSITÉ DE GENÈVE

**CENTRE UNIVERSITAIRE D'ÉTUDE
DES PROBLÈMES DE L'ÉNERGIE**

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CYCLE DE FORMATION 2003/2004

et

SÉMINAIRE ÉNERGIE ET ENVIRONNEMENT

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sur

**Perspectives of an Electricity Entirely with Renewables
Engaging HVDC Transmission
on Large European and Transeuropean Scale**

jeudi 5 février 2004 à 17h.15

**Auditoire D 185 - Bâtiment D - Battelle
7, route de Drize
1227 Carouge**

PROCHAIN SEMINAIRE :

Jeudi 11 mars 2004 à 17h.15

L'orateur

Gregor Czisch, agriculturist and physicist, has worked in R&D at the Information and Energy Economy Division of the *Institut für Solare Energieversorgungstechnik (ISET)* in Kassel since 1997. He has concentrated on the analyses of worldwide potentials of renewable energies and the development of scenarios for a CO₂-neutral electricity supply. He has also worked in the field of energy supply at the Technical University of Munich, as well as the DLR Stuttgart, at Fraunhofer ISE in Freiburg and the Max-Planck Institute for Plasma Physics (IPP) in Garching, where he was dealing with topics such as solar building engineering, biomass, wind energy, the use of hydroelectric power, primary energy analyses and emission analyses, as well as high temperature heat storage and solarthermal power plants.

La conférence

In view of the resource and climate problems ahead of us, it seems obvious that we must change our energy system to one using only renewable energies. However, how should it be structured, which techniques should be used and, of course, how much will it cost ? This also raises the question of how far we can go with the existing technologies and what expenses are to be expected if one applies them, as a worst assumption, at today's costs. This question was the focus of a study in which the cost optimum of an electricity supply for Europe and its closer Asian and African neighbourhood, an area with 1.1 billion inhabitants and an electricity consumption of about 4000 TWh, was investigated. The result is that a totally renewable electricity supply is possible with today's technology, delivering the electricity at costs only slightly above the current costs of electricity.

This is the result of a mathematical optimisation which decides over the system configuration, as well as the temporal dispatch (3 hourly) of all components, and thus searches for the minimum cost system. The resulting optimal configuration is a system dominated by wind power which is spread over the more windy areas within the whole supply area. A HVDC transmission connects not only the good wind sites with the demand centres, but also strongly integrates the existing storage hydropower, which provides a backup coequally assisted by regional biomass power and supported by solar thermal electricity production.

Other systems were found for scenarios with reduced investment costs for different technologies (e.g. photovoltaics, geothermal electricity, etc.). Further scenarios demonstrate the influence of possible new technologies or of different limitations such as restrictions in transnational electricity exchange. The purpose of these other scenarios is to obtain a broader view of various possibilities for a future electricity supply with renewable energies and thus to provide a basis for political decisions. The scenarios provide the aspired basis and show that the shift towards a totally renewable electricity system is much less a technical or economic problem, but almost entirely a problem which could be solved by a shift in political attitude and subsequent political decisions.

Tram 13, ~20 minutes depuis la Gare, ou tram 12 depuis le centre ville, arrêt Rondeau de Carouge.