EMS Annual Meeting Abstracts
Vol. 10, EMS2013-13-2, 2013
13th EMS / 11th ECAM

Implications of the North Atlantic Oscillation for a UK-Norway Renewable Power System

C. Ely (1), D. J. Brayshaw (1), J. Methven (1), J. Cox (2), and O. Pearce (3)

(1) University of Reading, Department of Meteorology, United Kingdom (c.r.ely@pgr.reading.ac.uk), (2) Poyry Management Consulting, Oxford, United Kingdom, (3) Poyry Management Consulting, Vantaa, Finland

Wind power capacity in the UK is increasing, and new transmission links are proposed with Norway where electricity is primarily produced through hydroelectric generation. The impact of climate variability on an interconnected power system incorporating different renewable sources therefore merits investigation. This study examines the effect of the North Atlantic Oscillation (NAO), a large scale pattern of atmospheric variability affecting northern Europe, on an integrated UK-Norway power system with growing reliance on wind power. Wind and temperature data from the NCEP/NCAR reanalysis (1948-2010) are used to model demand and wind power using simple models. 'Demand net wind' (DNW) is estimated for positive and negative NAO, focusing on March when Norwegian hydropower reserves approach their minimum and the combined system might be most susceptible to meteorological variations. It is found that the cold and still conditions associated with the NAO negative state (compared to NAO positive) result in greater demand and decreased wind production. The associated NAO-induced difference in DNW under a 2020 scenario would be equivalent to an approximately 50% increase in the rate of Norwegian hydropower usage during March, and represents a marked increase in the magnitude of the system's sensitivity to climate compared to the present day.