AKE 2: Renewable Energy: Hydro Power, Osmosis

Time: Monday 10:00–10:45 Location: A 151

Invited Talk AKE 2.1 Mon 10:00 A 151

Hydro Electricity and Storage Capabilities in Norway, can they be useful for Europe? — •Wilhelm Gerard Jacob Rondeel — Telemark University College, Norway

The electricity supply of Norway is nearly 100% based on hydro power. More than half the production capacity is from storage reservoirs, primarily established for coping with annual fluctuation in inflow to the reservoirs and variation in power demand. Existing connections with thermally based power systems in neighbouring countries are basically built for hourly power exchange (day and night), and for handling the power balance in dry or wet years, with energy shortage or surplus respectively. In a normal year the Norwegian system is approximately in balance. The paper describes the present power system, including possibilities and limitations for further expansion. Within the economic, political and technical framework of the present regime, the conditions for a substantial exploitation of Norways hydro power resources as a storage system to deal with the large fluctuations in production from intermittent wind and/or solar energy is presented. Partly based on economical factors, one of the main conclusions may be that an expansion of the exchange capacity between Norway and the Continent most probably will compete with the installation of more gas fired power in Northern Europe.

AKE 2.2 Mon 10:30 A 151

Osmotic Power Plants — •Florian Dinger, Ulrich Platt, and Tobias Tröndle — Universität Heidelberg, Institut für Umweltphysik

An energy of around 1.4 MJ per cbm is released when fresh water mixes with oceanic salt water (e.g. at a river mouth). This form of renewable energy is called osmotic power and is linked to the mixing entropy. Global osmotic power resources have a theoretical potential of 14000 TWh/a (equivalent to 70% of the global electric power consumption in 2008). Osmotic power could therefore be an option to complement renewable power production from wind and solar plants. The talk will describe the principle of an osmotic power plant and which settings are essential for the optimal performance. Under present economic conditions an osmotic power plant is not yet competitive. However, even with present membrane technologies profitability could be achieved when electricity prices will increase somewhat: generating costs between 6 and 13 cents/kWh appear feasible. A discussion of potential locations for osmotic power plants will conclude the talk.