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Energy Utilities and Heat Pumps in Norway

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Introduction

With electricity in Norway generated almost entirely from hydro power, government and utilities in Norway are working hard to encourage consumers to switch from fossil fuels to electricity. But, as the world's most intensive user of electricity, Norway is also taking measures to promote efficient energy systems such as district heating and cooling using heat pumps.

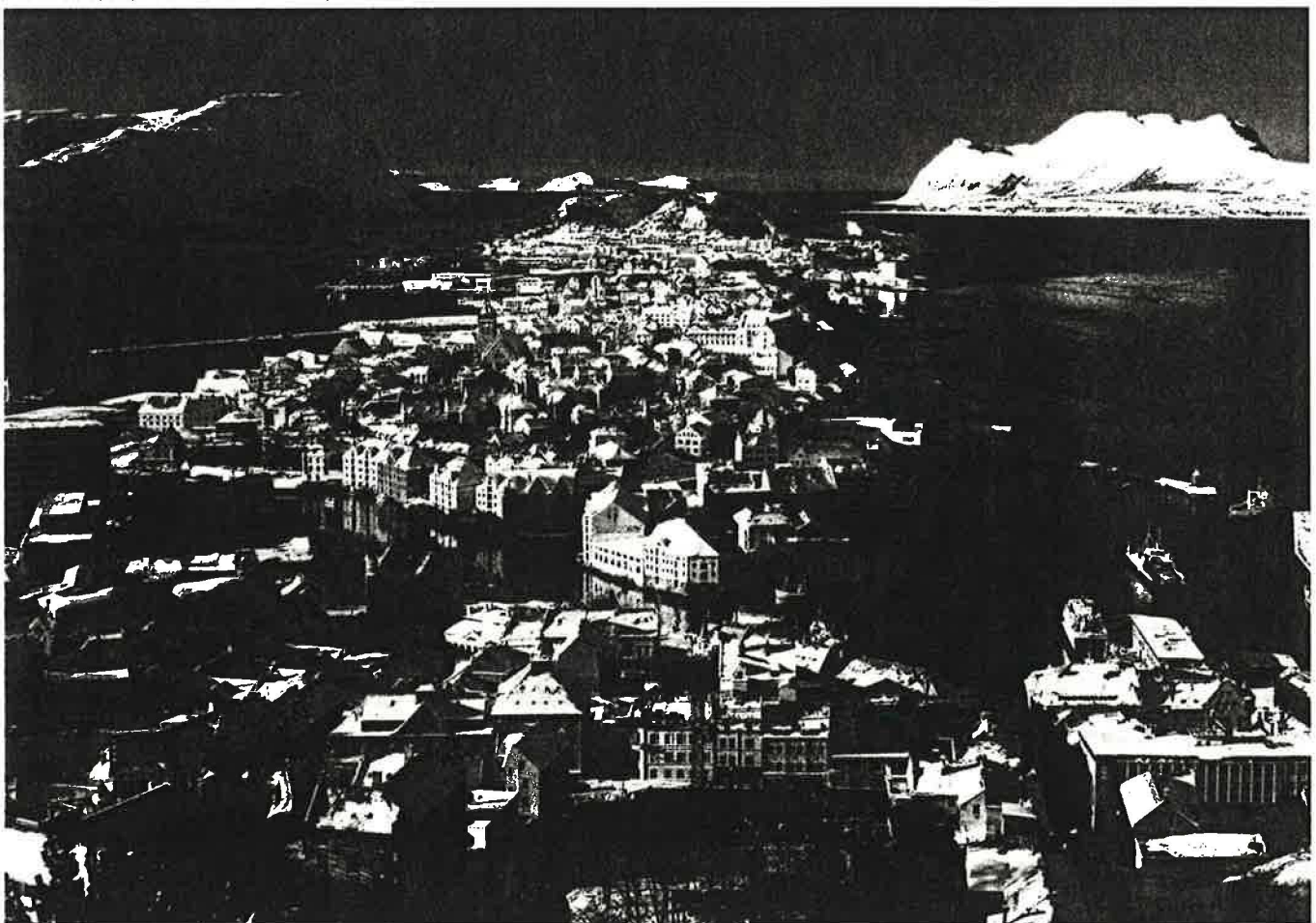
The Norwegian Energy System

Norway makes more intensive use of electrical energy than any other country in the world, based on consumption per capita. Norway is also the world's fifth largest producer of hydro electrical power. In 1990, 50% of the energy delivered to consumers was electricity. Petroleum products covered 38% and solid fuels 12%. District heating represents approximately 0.5%.

Hydro power production in 1990 was 121 TWh, plus 0,5 TWh of thermal power. This is the highest annual production ever in Norway. Climatic conditions for the utilization of hydro power are characterized by the seasonal variations. Precipitation and melting snow are highest during the period May to October. Mild winds from the sea normally result in high precipitation in western regions even during autumn and early winter.

The gross firm power consumption (consumption of standard hydro-

The City of Ålesund, Norway, is Served by a District Heating System with a Heat Pump.



electric power) was 99,3 TWh in 1990. The total consumption of occasional power (surplus hydro-electric power resulting from favourable conditions and sold tax-free) for electric boilers has been estimated at 6,1 TWh in 1990. The sale of light fuels has been reduced by more than 40% from 1980 to 1990, while the sale of heavy fuel oil has reduced by over 70%. These reductions are due to a mild winter in 1990, increased consumption of occasional power and a substitution of fuel oils by firm hydro-electric power. Throughout the summer it was necessary to let considerable quantities of water bypass operational machines, resulting in a production loss of more than 6 TWh.

The average price for electric power (01.01.91) delivered to households and agriculture was NOK 0.47 kWh (USD 0.075/kWh), all taxes included. Several utilities have begun experiments with rebates to domestic customers with a relatively high electricity consumption level. This must be viewed against the background of a favourable power balance and a desire to substitute oil by electricity.

The Government and Heat Pumps

The environmental effects of energy consumption have been at the centre of discussions concerning energy policy during recent years. In Norway, this increased environmental concern has led to an energy policy to reduce the use of fossil fuels. Greater weight is given to the development of renewable and environmentally sound sources of energy. The Government now promotes the use of heat pumps and the development of CFC alternatives. The Government has proposed an arrangement with subsidies for energy-saving measures in commercial and industrial premises and a preliminary loans arrangement for energy-saving in the private

housing sector. Heat pump installations are supported with subsidies of up to 40% of the investment cost.

Energy Utilities and Heat Pumps

There are about 215 energy utilities in Norway. The seven largest utilities supply about 31% of the subscribers. The 51 utilities with 10,000 or more subscribers, supply about 72% of the subscribers. During the past five years, many electrical utilities have changed name to become energy companies. These companies are now responsible for energy production and distribution in general, not only electricity. All energy systems are considered for each new area of development. The system which offers the lowest overall cost (and consumer price) will be selected, unless environmental or other aspects are of greater importance.

Today, many district heating and cooling projects based on heat pumps have a lower cost compared to new hydro power with electric heating and individually driven air conditioners. However, energy utilities are reluctant to invest in this technology. The main reasons are:

- For energy utilities, heat pumps and district heating/cooling systems are new technologies which they are not used to. It is much easier for the utilities to work with direct electrical heating than heat pumps;
- In Norway today, there is a surplus of electricity from hydro power and the price level for electricity is relatively low. This makes it difficult for energy utilities to make an investment that may not give a payback for the next 10-15 years.
- The low oil price means that heat pumps are only financially beneficial in industries with a long utilization period.

Despite these drawbacks, energy utilities are building up their knowledge on heat pumps. There is a general understanding that centralized heat pumps for heating and cooling minimize the use of primary energy resources. And, the environmental aspects of these systems cannot be underestimated. With the heat pump subsidies available from the Government, it is expected that utilities in Norway will build more heat pump systems over the next few years.

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