SOCIETAL IMPLICATIONS OF ENERGY TRANSPORT AND STORAGE

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INTRODUCTION

Even though wide support exists for turning away from fossil fuels and the growing use of the use of solar and wind power, with many even accepting billions in subsidies in return, citizens are often reluctant to accept the need to construct the facilities needed for the transport and storage of energy [1].

For instance, citizen opposition groups do form wherever new swathes of forests are to be cut, demanding that if new power cables are necessary, they should only be buried deep underground. This is often five times as expensive as installing above-ground transmission lines.

SOCIETAL ACCEPTANCE OF NEW TECHNOLOGIES

The lack of societal acceptance could seriously delay the implementation of expansion projects, not to mention the difficulties that crop up when new technologies are being introduced.

The High Voltage Direct Current, HVDC systems considered for new long distance grid systems are considered relatively vulnerable, particularly the giant converter stations that convert direct current into alternating current. For instance, the connection between the Netherlands and Norway was out of commission for three months in 2009 because of a cable defect.

The expansion of the alternating current grid is causing problems. Because today's high-voltage grid, with a maximum capacity of 380 kilovolts, is reaching its limits, the construction of individual 740-kilovolt lines is under consideration. The 70-meter-high pylons are large in size and they require a 100 meterswide corridor, an unlikely alternative in densely populated regions.

The focus on a few, heavily loaded transit hubs poses the risk that a breakdown could jeopardize the stability of the entire network.

SMART METERING

It is uncertain that consumers will take advantage of the possibilities smart meters offer. To save a few cents, will they give up the convenience of being able to wash their clothes at any time instead of only when electricity is cheaply available. A large proportion of customers do not savor nor desire changes in their existing habits.

The current electric meters tend to be of limited intelligence, and communication with electronic devices in the household often fails because of a lack of standards.

Privacy groups warn that smart meters are not hacker-proof. Being connected to a home computer system, they could present a way of breaking into it

The contribution consumers make to the grid revolution will likely remain modest. Instead, the speed at which the power lines and storage facilities are upgraded and expanded will have a decisive impact on the smart grid. Political will is also a critical factor.

ECONOMICAL AND TECHNOLOGICAL HURDLES

A strange consequence results from the different approaches to promoting renewable energy. The Dutch network operation Tennet is considering laying an underwater cable from the Netherlands to Denmark, but it will not connect the German wind farms to the cable, even though they are located halfway along the proposed route. The reason is that German consumers subsidize wind power by paying a fixed price for it, and that price is significantly higher than the Danes or the Dutch would be willing to pay.

The 50 Hertz frequency in Europe and 60 Hz in the USA indicates to the grid operators a sacred equilibrium that is proving more and more difficult to maintain. Larger reserve capacities are needed to be placed on standby. The situation would already be critical if the frequency dropped from 50 to 49.8 Hertz. In this case reserves must be activated. If the frequency were to slide down even farther, brownouts and blackouts would be inevitable.

REFERENCE

1. Alexander Jung, “Building the Internet of Energy Supply,” Der Spiegel, May 12, 2010.