The January power peak – what happened on 7.1.2016? How to manage power better in the future?

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Abstract [*Full text available in Finnish, see:* https://el-tran.fi/analyysit/]

In January 2016 Finland's electricity supply was put to the test with a peak in demand in which the average hourly electricity consumption reached a new record of over 15 100 Megawatts. This prompted key actors in the energy system to consider issues of the sufficiency of electricity supply more seriously than before. An imbalance in the electricity supply could cause serious disruption and thus also various problems for key functions in society.

In this analysis we ask: 1) What consumption was it that contributed to the 2016 peak? 2) What factors are most likely to cause new peaks in Finland? We also consider the management of capacity and make recommendations for measures to be taken.

The power peak of January served to expose a longstanding and multifaceted problem in the demand for power. In the future both a momentary need for power and variation in the generation of electricity are likely to further increase. The shift to a more climate-neutral energy system heralds the electrification of society. Electricity and supply thereof are becoming ever more important to society.

The peak in January cannot be explained by the needs of industry; at that time industrial production consumed power equivalent to the average across the year. In our analysis we attempt to describe what factors contributed to the peak and to what extent. According to our initial estimate, consumption of electricity in buildings, not including electricity used for production, accounts for over two thirds of the peak (see Figure 1). The remaining third is attributed mostly to industrial production. Consumption was increased in smaller parts by agricultural production, construction work, traffic, public electricity consumption, and loss from the network. One of our main observations concerns a need to know more – currently there is no agency in Finland able to account precisely for what caused the power peak.

Our main conclusion is that the electricity supply system needs to be controlled more strictly than before based on power efficiency, not only regarding control and the market, but also consumer pricing and consumption. Another core conclusion concerns the role of electricity in heating systems. Recent years have witnessed an attempt to reduce actual electricity-powered heating in buildings, but the heating options of buildings are simultaneously being driven back towards the use of electricity. A third conclusion concerns the significance of buildings to the need for power. Although in our analysis we only present a preliminary estimate, it can be assumed that the share of buildings may in general have been underestimated in Finland. The need for electrical power in buildings should be accorded greater significance in energy policy.

A factor underlying the power peak problem which should be acknowledged and predicted

more widely in Finland is the future increase in cases of extreme climatic conditions. As extreme climatic conditions become more common the number of days of hard frosts increases. Conversely the number of really hot days is increasing annually. As the number of days with hard frosts increases, so too does the need for heating in buildings. This exacerbates problems with power peaks and should be prepared for. In the recommendations of this analysis we note especially development areas in data collection, keeping statistics and applying information obtained.

Figure 1: Estimation of the electricity consumption on 7.1.2016 at 5:00 pm. The average outdoor temperature weighted with building stock location was -25 degrees. (Heljo 2016; Statistics Finland 2016)