Analyzing Prices and Regulations in the Swedish Electricity Network Market: What Can We Learn from Our Neighboring Countries?

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Summary

In recent years, the regulation of Swedish electricity distribution networks has been criticized by representatives of both customers and distribution system operators (DSOs). The customer side has pointed to the sharp increase in network prices over the past decade, which they claim is due to the regulations being weak and calibrated in favor of the network companies. The DSOs, on the other hand, argue that these price increases have been necessary as they have made extensive, cost-inflating investments due to the maintenance of old networks, connections to wind turbines and increased international trade. The Swedish Energy Markets Inspectorate has claimed that the rate of price increases cannot be explained solely by investments.

The first question we ask in this report is whether the relatively extensive expansion of wind turbines can explain the price increases observed in Sweden in the last decade. We answer this question by comparing the price development and wind turbine expansion in Sweden with that in other countries. We focus in particular on the neighboring Nordic countries, which have a similar climate and similar electricity network structure with relatively many and small networks.

In absolute terms, the Swedish adjusted purchasing power prices in 2020 were only slightly above the Nordic average, but comparing absolute prices is difficult. Norway, for example, has a lower population density than Sweden, which results in a cost disadvantage compared to Sweden. At the same time, electricity production in Norway occurs closer to the end consumer, which results in a cost advantage. Thus, the differences in price level cannot be used to determine how well network regulations work in each country. It is more relevant to com-

pare how the price has developed over time in order to see whether the regulations have been successful in exerting long-term pressure on costs and prices. Even with this type of comparison, however, it is important to be alert to changes in the underlying cost structure in different countries (e.g., changes arising as a result of investments in local electricity production such as wind power).

The analysis shows that Sweden has experienced a relatively large price increase during this period. In the Nordic countries, the inflation-adjusted price increase for an average household customer in the period 2010–2020 was 0 percent in Norway, 3 percent in Denmark, 29 percent in Finland and 37 percent in Sweden. The price increases in Finland and Sweden are high also in comparison with other European countries – the corresponding price change for the rest of the EU-14 is -7 percent, while it is -16 percent for the rest of the EU-27. Using regression analysis, we find that the price increase in Sweden is to some extent explained by the expansion of wind turbines, but this does not explain the entire increase. Thus, it cannot be ruled out that Swedish network regulations have been relatively weak during the last decade.

In addition to the problem described above, DSOs have claimed that regulations must be adjusted to allow operators to expand the networks more rapidly than they were able to do in the past. More specifically, the Electricity Act (SFS 1997:857), Chapter 5, Section 7, states that only assets used in the current regulatory period may be included in the asset base that determines the revenue cap: "The capital base must be calculated based on the assets that the DSO uses to operate the network […] during the current period." Several representatives of DSOs have expressed that they should also be allowed to include assets not used in the current regulatory period in the regulated asset base. Other organizations, and the Swedish Climate Policy Council in particular, have also stated that more investments in electricity grids are needed and that the current regulations are not fit for purpose. If DSOs are also given compensation for assets they do not use in the current period, but which they intend to use in future periods, there is a risk that they overinvest and that these costs are passed on to the customers. More generous investments thus require the regulator to have access to tools and processes that eliminate, or at least substantially reduce, the risk of overinvestments.

As a direct consequence of the conclusion above, one more question is asked in the report, namely whether the efficiency requirements imposed by the Swedish Energy Markets Inspectorate have worked as intended. The purpose of the efficiency requirement is to give network companies incentives to operate the networks efficiently. The regulator uses this requirement to create different types of incentives: first, so that inefficient companies catch up with efficient ones and, second, so that the entire industry (even the efficient DSOs) increase their efficiency. If past requirements have led to greater efficiency, it is easier to recommend that the Inspectorate implements stronger investment incentives. If, on the other hand, the requirements have not had any effect, the Inspectorate should first develop more effective benchmark tools.

Looking at the past outcome, the larger DSOs have on average met lower efficiency requirements, and the differences between large and small DSOs have increased over time. In terms of ownership, private companies have faced the lowest requirements and cooperatives the highest. On average, cooperative companies face a requirement more than twice as high during the current regulatory period (2020–2023) than during the previous period (2016–2019). Municipal DSOs are situated in-between the private and cooperative averages and have had roughly the same requirements in the current and previous periods.

Our econometric analysis tests whether the efficiency requirements have led to a reduction in relative inefficiency as inefficient grid companies get closer to the efficient ones. This is one of the main goals of the efficiency requirement, and it must be considered a minimum requirement for the use of benchmarks. The results show, however, that there is no statistically significant relationship between the efficiency requirements and the DSOs' reported cost measures.

This report explains why electricity networks must be regulated and which general objectives the regulatory structure should achieve. One part of the report focuses on the scientific literature, but also contains details specific to Sweden, such as issues recently discussed in court decisions. The essential conclusions are: (i) electricity network regulations have several goals, (ii) these goals vary in importance and (iii) the most important goal is that customers do not pay excessively high prices. For household customers, a high price means that their budget margin is reduced, and for the electricity-intensive industry, it means a lower return on investments, which leads to reduced investments

and/or that some of the investments are transferred to other countries.

The report also contains a part on how electricity network regulations are utilized in the neighboring Nordic countries, with a particular focus on how the efficiency requirement is determined. The most developed efficiency requirement is found in Norway, where both capital costs and variable costs are included in the requirement. In Denmark too, capital costs are covered by the efficiency requirement, even if the Danish regulations are otherwise relatively similar to the Swedish ones. Finland has an efficiency requirement based on variable costs (i.e., like in Sweden), but the application is stricter, as the most inefficient companies face a higher efficiency requirement. Finland has also developed its own econometric model for calculating the efficiency potential, while Sweden has used the same generic model in all regulatory periods.

In addition – and something that is not directly related to the efficiency requirement – we note that in Sweden, there is no requirement to register connection investments separately, which is remarkable since connection investments are financed directly by the connecting customer. Since the general return on investment also applies to connection investments, this leads to an overcompensation for investments financed via interest-bearing loans or equity. The same applies to investments financed via capacity charges. We also note that, unlike in Norway, there is no requirement to adjust the main network tariffs downwards when capacity charges increase. Finally, we note that the Swedish network companies, unlike those in Norway and Finland, are not allowed to raise the revenue cap to finance relevant costs for research and development (R&D).

The report concludes with a number of recommendations on what needs to be studied more thoroughly in order to improve Swedish electricity grid regulations:

- Analyze the calculation of the efficiency potential (i.e., the benchmark model)
- Analyze how the efficiency potential is translated into the efficiency requirement
- Analyze the possibility of adjusting the return requirement for investments financed via connection fees or capacity fees

- Analyze the possibility of including capacity charges in the revenue framework
- Analyze the possibility of allowing expenses for research and development

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