elering
GENERATING OPPORTUNITIES

SECURITY OF SUPPLY REPORT 2018

Extract

Tallinn 2018

TABLE OF CONTENTS

1	**FOREWORD**	**4**
2	**ASSESSMENT OF SECURITY OF SUPPLY**	**8**
2.1	Regional security of supply up to the year 2033	9
2.1.1	Baltic and Finnish security of supply up to the year 2033	9
2.1.2	Assessment	14
2.2	Forecast of electricity consumption up to 2033	14
2.2.1	Economic development	14
2.2.2	Forecast of electricity consumption up to 2033	15
2.2.3	Distribution grids	16
2.3	Generation equipment connected to the Estonian electricity system in 2018	17
2.4	Changes in generation equipment 2017-2027 as notified by electricity producers	18
2.4.1	Changes with respect to 2017	18
2.4.2	Generation equipment to be closed and reduction in capacity of existing generation equipment	18
2.4.3	Thermal power plants, planned or under construction	19
2.5	Assessment regarding the generation reserve necessary for satisfying consumption demand up to 2028	19
2.5.1	Assessment of adequacy of generation capacity in winter	19
2.5.2	Assessment regarding the generation reserve necessary for satisfying consumption demand during the summer period	20
2.5.3	Estonian security of supply up to the year 2033	21
3	**ELERING'S VISION OF THE ELECTRICITY MARKET**	**25**
3.1	Low market prices/fair competition	27
3.1.1	Reduction of market distortions related to subsidies	28
3.1.2	Fair trade of electricity with third countries	30
3.2	Low price sensitivity of consumption/consumer focus	31
3.2.1	Market-based price signals	32
3.2.2	Involving consumption management on the market	34
3.2.3	Digital solutions for enabling flexibility	36
3.3	Finding the right market price/efficient energy market	38
3.3.1	Harmonizing regional markets and developing integrated short-term markets	38
3.3.2	Reforming the balancing market	41
3.4	Deficit in generating capacity/guaranteed generation adequacy	42
3.4.1	Measures outside the energy market – capacity mechanisms	43
3.5	Conclusion	45

1 Foreword

Desynchronization will hedge systemic risk to the electricity supply

Desynchronization from the Russian power system will ensure that Estonian consumers have long-term security of supply. Technically speaking - if the world was made up only of electrons - we could continue to co-habit in the Russian system without undue consequence. Unfortunately, in today's energy world, we are passengers on a bus where we can't trust the one in the driver's seat. The current driver operates according to different values and worldview. Going down the proverbial road like this is a risk - you never know when the doors will open and one is asked to get off the bus. Along with its colleagues from the European Union, including the Baltics, Elering wants to eliminate this risk to electricity supply reliability by 2025. Operating on the same electricity system as Russia is not just a risk to the supply of electricity but to the functioning of society as a whole. Without electricity, nothing works. With the power cut off, communications, water works, district heating, central sewerage and other vital necessities will go down in just a matter of hours,. The chaos that would arise as a result has been described well by Marc Elsberg in his book Blackout.

Naturally, we are taking this step in a manner that ensures that the system will remain reliable and the lights will stay on. Even as an "energy island," the three Baltic states have to be independently capable of keeping the electrical system operational. If a serious problem occurs today, we are able to do so today, but we have to be prepared for a problem in future at every moment, constantly.

We have heard some ask why desynchronization is necessary anyhow. The Baltic and Russia-Belarus power system is so interconnected that the smooth functioning of the system is in the interests of all parties. Creating problems for one's neighbours will bring the problems home to roost as well, the argument goes. Yes, historically this has been the case, but now interdependence is largely a thing of the past. Russia has built its power systems so that they are neutral with respect to the Baltic states; their electrical system is no longer dependent on the connections in the Baltic direction.

Elering has been asked whether we intend to replace the AC connections with Russia with DC ones. This would parallel the way we are connected to Finland via Estlink. No, we don't intend to do so.

In future, we would need electricity connections to Russia only for trade, but we don't anticipate integration taking place in the near future between Estonia/the European Union and the Russian electricity markets. If there is no trade, there is also no point in building and maintaining these connections. As a result, Elering does not plan to replace the existing AC connections between Estonia and Russia with DC lines. In future, a solution may be leaving one electricity connection between Vyborg and Finland, and another in Alytus, Lithuania.

The amount of investment needed to desynchronize Estonia from the Russian system will be around 150 million euros. Paradoxically, leaving the Russian system may result in a drop in the network fee. Most of the investments made for the desynchronization project would have to be made in the next 10 years even in the absence of desynchronization. Without the desynchronization project, these costs would be passed on 100 per cent to the consumers. We hope to involve a considerable share of European Union co-financing in the desynchronization project. This may mean that we have to invest less to the detriment of the tariff than we would have to in the absence of desynchronization.

Generating capacities ensured by a well-organized market

It can be concluded from Elering's assessment that security of supply in the region can be ensured at least until 2025 on the basis of existing generation capacities. At the same time, in the longer term, it is necessary that market prices send investment signals for the introduction of new capacities to the market. To do this, we must think about market design now to provide more precise price signals and eliminate the existing market distortions.

The first challenge for the European electricity market is low prices - subsidies and other administrative measures lower the price of electricity artificially. Second, the low price sensitivity of consumption - consumers do not take part sufficiently in the electricity market. Third, finding the right price - the efficiency of the functioning of the various time horizons of the electricity market (day-ahead, futures, intraday, balancing energy) can be improved so the market can find the right balance. Fourth, the deficit in production capacity - there may be a shortfall of production capacity in future. Elering's electricity market vision offers market-based answers to all these questions.

Administrative measures - i.e. those outside the energy market - should be adopted only as a last resort.

It is very important to understand that high peak prices of electricity are necessary for the functioning of an electricity market that is solely energy based. The alternative is to pay producers for their capacity using subsidies. The cost of the support will ultimately have to be passed on to consumers and the amount of the support is influenced by political decisions. This is a continuation of a centrally planned economy, not a market economy.

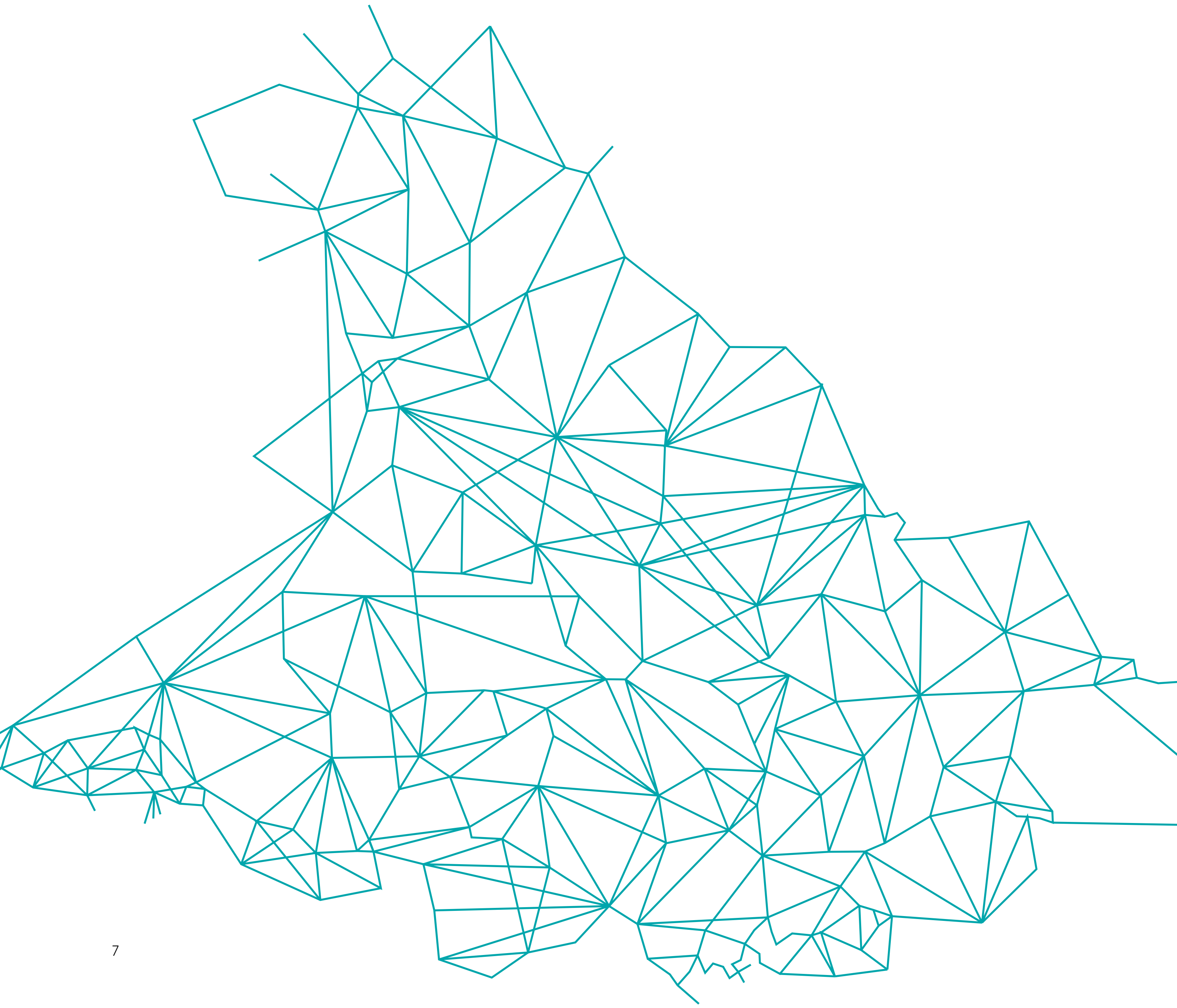
Digitalization will make consumers just as important as producers on the market

Ensuring security of supply in future is not just a matter of larger generation capacities but also better, more actively managed consumption. The precondition for the consumer's active participation on the energy market is that the availability of data be ensured as close to real time as possible, the capability to move massive data volumes, the implementation of IoT principles, and high requirements for cyber security and personal data protection. The first practical step on this path is to collect the data and make it available to all parties in standardized form through a central point. Elering envisions that the digitalization of the Estonian energy system will lead to a vision uniting companies and governments in being a global leader in digitalization of the energy sector. Denmark, Norway and Finland are about to become the next countries in Europe to deal with (above all) digitalization of the electrical system. Putting these experiences, competencies and money in one basket, together we can be in a global leader position in this field.

Of course, digitalization will also entail new risks to the energy system. A changing energy system will result in changing risks. We saw this in 2015 in the case of the cyber attacks against the Ukrainian power grid. We have to constantly be prepared for such attacks so that we can manage to prevent them.

To sum up, Estonia's long-term security of supply is guaranteed both now and in the ten-year term. There are three major requirements for maintaining long-term security of supply: 1) a functioning and efficient European Union electricity market; 2) the operational reliability of the Estonian power grid; 3) desynchronization of the Baltics from the Russian power grid and establishing a connection to the mainland Europe frequency area.

Taavi Veskimägi
Chairman of the Elering management board



2 Assessment of security of supply

2.1	REGIONAL SECURITY OF SUPPLY UP TO THE YEAR 2033	9
2.1.1	Baltic and Finnish security of supply up to the year 2033	9
2.1.2	Assessment	14
2.2	FORECAST OF ELECTRICITY CONSUMPTION UP TO 2033	14
2.2.1	Economic development	14
2.2.2	Forecast of electricity consumption up to 2033	15
2.2.3	Distribution grids	16
2.3	GENERATION EQUIPMENT CONNECTED TO THE ESTONIAN ELECTRICITY SYSTEM IN 2018	17
2.4	CHANGES IN GENERATION EQUIPMENT 2017-2027 AS NOTIFIED BY ELECTRICITY PRODUCERS	18
2.4.1	Changes with respect to 2017	18
2.4.2	Generation equipment to be closed and reduction in capacity of existing generation equipment	18
2.4.3	Thermal power plants, planned or under construction	19
2.5	ASSESSMENT REGARDING THE GENERATION RESERVE NECESSARY FOR SATISFYING CONSUMPTION DEMAND UP TO 2028	19
2.5.1	Assessment of adequacy of generation capacity in winter	19
2.5.2	Assessment regarding the generation reserve necessary for satisfying consumption demand during the summer period	20
2.5.3	Estonian security of supply up to the year 2033	21

- ***Ensuring security of supply is a regional challenge. The solutions are also regional.***
- ***Security of supply in Estonia and the region will be ensured through the combined effect of production and transmission capacities up to 2025.***
- ***To ensure security of supply for the longer term, a functioning electricity market must be guaranteed, as it will draw investments into new generating capacities or the capability of managing consumption.***

2.1 REGIONAL SECURITY OF SUPPLY UP TO THE YEAR 2033

Based on the long-term nature of planning the energy sector and pursuant to the specifications of subsection 39 (7) of the Electricity Market Act, Elering takes a 15-year view of long-term security of supply. In conditions where Europe has an energy union and a single electricity market, Elering takes a regional-level view of long-term security of supply. The analysis of long-term security of supply is twofold. Our analysis first assesses Baltic and Finnish security of supply by taking into account trends throughout the EU. We will then consider Estonian consumption and generation developments in more detail.

2.1.1 Baltic and Finnish security of supply up to the year 2033

In cooperation with TSOs from neighbouring countries - Fingrid, AST and Litgrid - Elering uses two complementary methodologies to assess security of supply at the regional level - deterministic and probabilistic. The advantage of the deterministic method is its simplicity and annual resolution The advantage of the probabilistic analysis is that it is more detailed and provides the option of assessing the likelihood of generation adequacy.

The analysis uses two scenarios, the Baseline Scenario and the Conservative Scenario. The Baseline Scenario and the Conservative Scenario differ from one another mainly when it comes to the assessments of closing and adding generation capacities. The closure of generation capacities and the construction of new capacities depends above all on the market situation, which is extremely difficult to forecast accurately. That is why the system administrators have prepared two scenarios to cover potential future situations. The Baseline Scenario is based foremost on assessments from power producers and on the closure of their old plants or construction of new ones. The Conservative Scenario is based on the most conservative estimates from system administrators where, based on the market situation, old power plants are closed earlier and the construction of new ones is deferred further into the future. The assessment of Estonia's generation adequacy up to 2033, laid out in the following chapter, is part of the Conservative Scenario.

Figure 2.1 depicts, to the best of the knowledge of Baltic and Finnish system administrators, the production and transmission capacities to be used during the period 2018-2033 in the Baseline Scenario in Estonia, Latvia, Lithuania and Finland. The same figure also depicts peak consumption and reserve need forecasts, assuming that synchronization with central Europe will take place in 2025. This analysis does not examine the situation of the Baltic electrical system operating as a separate synchronous zone, as this is an extraordinary situation that would require separate measures. It is important to note that the peak consumption forecast does not reflect the potential of managing consumption in the Baltics, which may be considerable in periods with high power prices.

The analysis shows that today, the Baltics and Finland already depend on the possibilities of import to cover peak consumption and reserve needs. At the same time, the region is already well connected to other regions and the import potential extends up to 4800 MW.

Figure 2.1
Generation and transmission capacities in the Baltics and Finland in the period 2018-2033

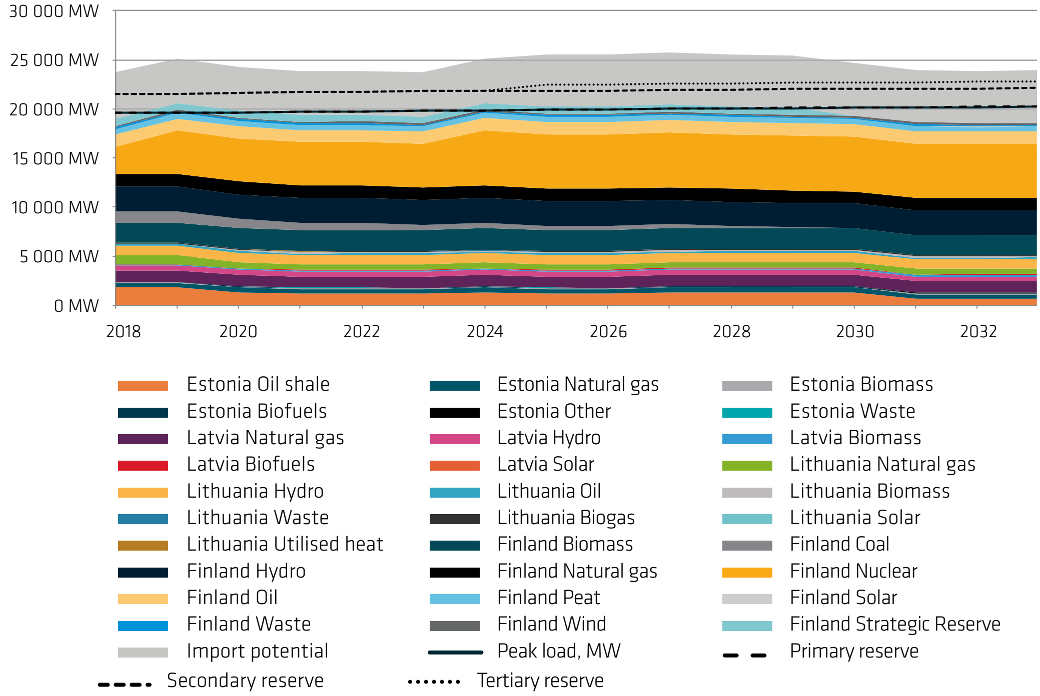
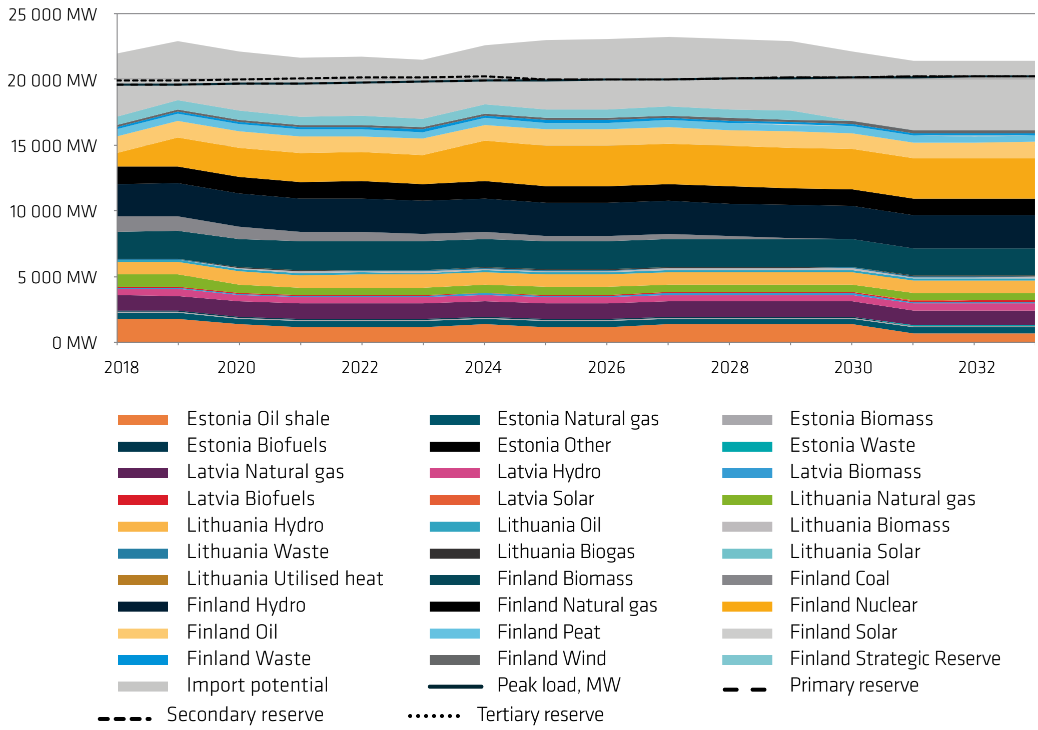


Figure 2.2 shows Baltic security of supply in the event of a severe N-2 disruption situation. An N-2 disruption is used as the standard for security of supply in the deterministic analysis. That means that system must be ready for the two biggest elements being non-operational during peak consumption. It also means that after an N-2 situation occurs, there is no longer the assumption that additional reserves will be kept for the subsequent (N-3 or N-4). The two biggest elements of the Baltic and Finnish electrical systems are the two units of the Finnish nuclear power plant, meaning that the most severe N-2 situation would be simultaneous downtime at two nuclear power plant units. Up to the year 2025, as we see in the figure, reserves will be maintained in an N-2 situation as well based on current agreements between the Baltics and Russia and Belarus. The figure also includes the forecasted peak consumption in the Baltics and Finland and the need for reserves up to 2033.

Figure 2.2
Baltic and Finnish security of supply in an N-2 situation given known generation and transmission capacities



Figures 2.3 and 2.4 depict the ordinary situation and an N-2 situation also in Conservative Scenario. As mentioned earlier, the Conservative Scenario presumes a faster closure of old power plants and the post-ponement of new planned power plant construction.

Figure 2.3
Baltic and Finnish security of supply in the case of the Conservative Scenario

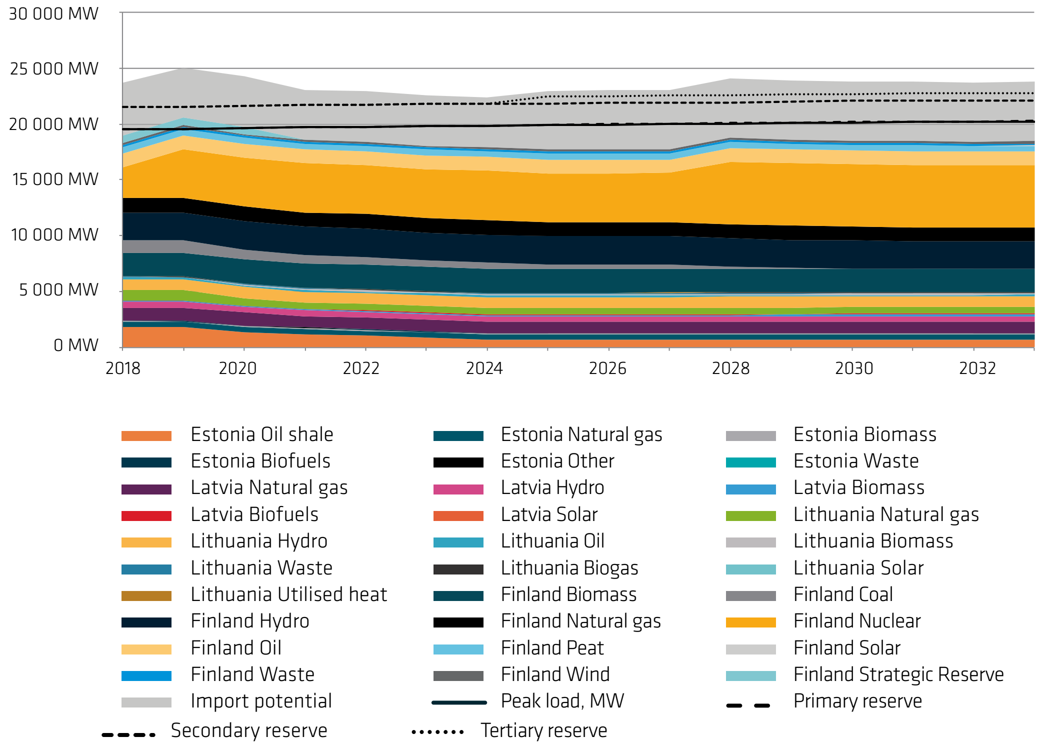
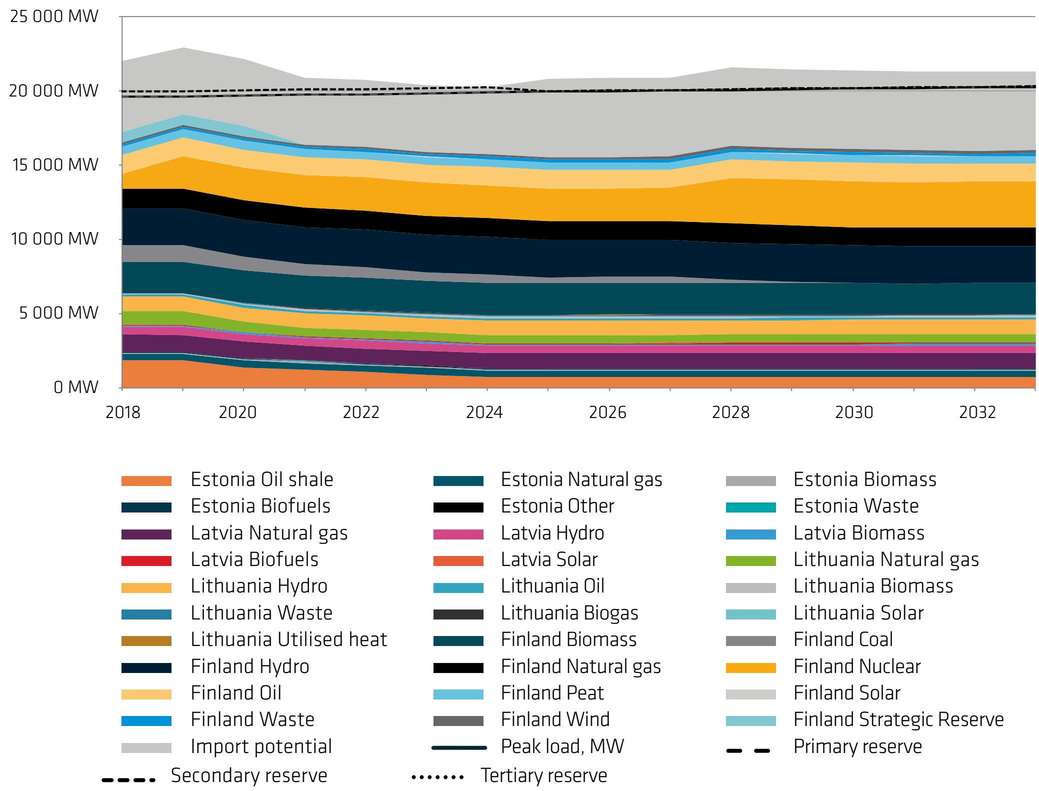


Figure 2.4 shows that surplus security of supply is minimum in an N-2 situation in the case of the Conservative Scenario yet is still sufficient to cover peak consumption and keep the system running.

Figure 2.4
Baltic security of supply in an N-2 situation amidst market conditions favouring generating capacities



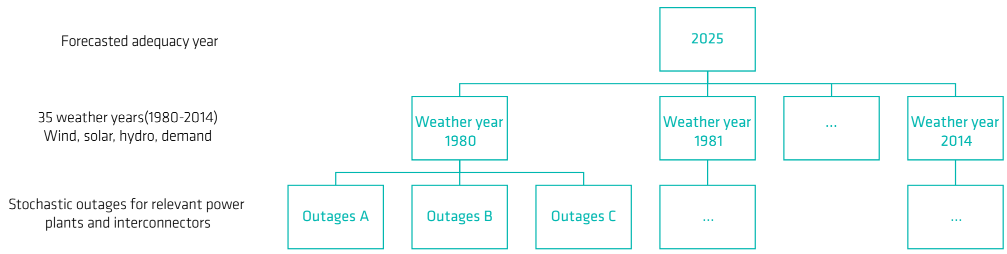
From the standpoint of Baltic and Finnish security of supply, the most important question is the desynchronization of the Baltic from the IPS/UPS system, the timetables for closure of old power plants and the development of new power plants projects. The usability of power plants depends on the investments made to upgrade plants, where exchange of investments and equipment may significantly extend the lifespan of power plants. Making investments into power plants is a question of economic profitability and depends on whether prices on the power market will pay back the investments. As to Baltic and Finnish generation capacities, the question of closure is relevant at the Narva power plants, Lithuania's Elektrenai power plant and Finland's coal-powered plants. As regards new projects, the important ones are Kaunas and Vilnius co-generation plants, where no decision has been made regarding construction, and the Hanhikivi nuclear plant in Finland, where the completion date has not been decided.

Elering sees this deterministic analysis as very conservative and as a result, the likelihood that consumption will have to be limited is very low in the period in question. The analysis is conservative because it views a situation where two of the largest elements in the Baltic and Finnish power system are offline simultaneously, no generation from wind and solar panels takes place, and import from Russia to the Baltics is not possible.

In addition to the deterministic analysis, the Estonian, Latvia, Lithuanian and Finnish TSOs carried out for the first time this year a joint probabilistic analysis of regional generation adequacy. The methodology and source data used by ENTSO-E in the European production adequacy report were used for this purpose. The data gathered by ENTSO-E were supplemented with more detailed data for Estonia, Latvia, Lithuania and Finland.

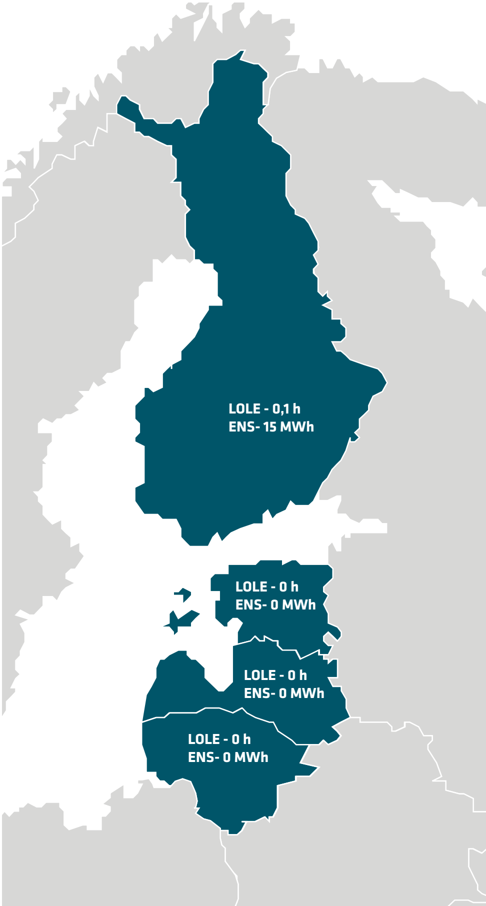
The methodology is based on the Monte Carlo method, which involves a simulation of a large number of years, taking into account changes in consumption, wind generation, solar generation, hydrological situation and malfunctions in system elements. In this analysis, 136 different years were used. Each year has 8,760 hours, which have values for consumption, wind generation, solar generation, hydrological situation and malfunctions. When a very large number of simulations are performed, extreme situations are covered besides an ordinary situation. An example of an extreme situation is where several large power plants suffer a malfunction simultaneously at peak consumption at a time when the renewable energy generation happens to be low.

Figure 2.5
Diagram of Monte Carlo scenarios



Unlike deterministic analysis, such an analysis makes it possible to assess the probability of deficits in generation adequacy. As a result of the simulations, the annual average Energy Not Served (ENS) is calculated along with the average Loss of Load Expectation - LOLE). To read in more detail about the methodology developed by ENTSO-E, see the latest production adequacy forecast (Mid-term Adequacy Forecast – MAF).

Figure 2.6
Baseline Scenario (on the left) and the Conservative Scenario (on the right) results of probabilistic analysis in 2025



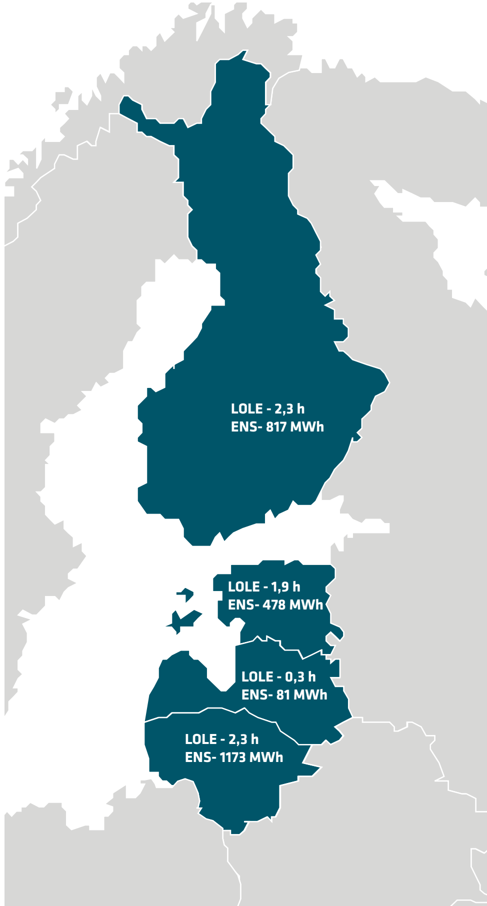


Figure 2.6 illustrates the results in the case of the Baseline and Conservative scenarios. To assess the results, it is useful to know that the widespread value for LOLE in various countries is three hours a year. That means countries consider the security of supply situation adequate if the long-term average is three hours of downtime or less per year. It is important to note that LOLE does not mean that service is interrupted for all consumers but for the most part only to a small share of consumers - i.e. in the extent of the last megawatts that cannot be guaranteed in the given situation. Although the results are displayed only for the Baltics and Finland, the analysis includes all of Europe, i.e. the electricity system data for all of Europe are factored in.

In the case of the Baseline Scenario, Estonia lacks ENS and LOLE. What this means is that in none of the simulated 136 years was there, in any hour, a deficit of electricity. In the case of the Conservative Scenario, there were an average of 1.9 LOLE hours per year and 478 MWh of ENS per year. As a result of the analysis, it can be said that in 2025 Estonia's production adequacy will be ensured in the case of the Baseline Scenario and that indicators will be good even in the case of the Conservative Scenario for development of generating capacities. Even in the case of the Conservative Scenario, the value of LOLE will be below the level of three hours a year, the widespread standard in Europe. Elering believes that the realization of the Conservative Scenario by 2025 is unlikely but even in such a situation, the reliability of the Estonian power supply will be within the limits of internationally common standards.

2.1.2 Assessment

To sum up, security of supply in Estonia and the region will be ensured up to 2025 through the combined effect of generation and transmission capacities. To ensure security of supply in the longer term, additional power plants will have to be constructed in the region as compared to today's known capacities, or the potential of managing consumption will have to be increased. Throughout the period, in Estonia, the Baltics and Europe as a whole, the reserve security of supply will be decreasing and Elering is actively analysing further developments.

In Elering's view, the likelihood of electricity deficits in Estonia and the region will be low even after 2025. Still, transmission capacities with other regions play an important role here and consequently, so does the level of security of supply in Europe as a whole. For instance, a Finnish deficit could spread to neighbouring countries, including to Estonia. As a result, the question of security of supply has become salient for all of the Energy Union; either the question cannot be resolved by local measures or such solutions will be inefficient. In Elering's view, the design of the electricity market will have to be developed so that it would send out precise price signals for investment decisions and thereby ensure security of supply. Work is taking place in this direction and the European Commission is resolving the issue with a Clean Energy Package published in late 2016.

Elering follows trends when it comes to generation capacities and consumption to ensure security of supply to Estonian consumers in the long term. For its part, Elering contributes actively to simplifying grid access and increasing the capacity for managing consumption. The price sensitivity of consumption allows consumption to be decreased through market-based signals and prevents the need for administrative restrictions on consumption. On the basis of the report on security of supply, the Competition Authority has the right to oblige Elering to obtain additional generation capacity. Elering believes that for the single European energy market, security of supply is an issue that spans borders and developments in the region and in Europe as a whole are relevant. In Estonia, it is not possible to make investments into power plants on a scale that would guarantee adequacy throughout the region. That is why pan-European measures are important for ensuring the necessary investments into generation and transmission capacities. Pan-European measures include, above all, improvement of the design of the energy market such that the value for the generation capacities market would be fairly priced and consumers would be able to participate on the market on equal terms. With the Clean Energy Package, Europe has taken an important step toward developing the design of the energy market. Elering considers it very important to develop the power market and has brought out its suggestions in the Elering vision of the power market. The vision is laid out in Chapter 7 and is meant to supplement the Clean Energy Package with Elering's positions.

2.2 FORECAST OF ELECTRICITY CONSUMPTION UP TO 2033

The following section of this paper gives an overview of the forecasted consumption in the Estonian electricity system and preconditions that could potentially influence consumption. Elering's general forecast of consumption has remained unchanged in recent years. If necessary, the forecast will be fine-tuned based on statistics and new research findings.

2.2.1 Economic development[6]

Economic growth in the Eurozone has been strong: internal demand is supported by the recovering labour market and growth of real incomes. Low loan interest rates, favourable borrowing terms and improved demand all support recovery of investment. The outlook for economic growth in Estonia's main trading partners continues to improve. In 2017, Latvian and Lithuanian economic growth accelerated to close to 4%, and Swedish growth approached 2.9% and that of Finland, 3.3%.

Estonia's economic growth in 2018 will wind up being slower than in 2017 due to the slower growth in the first half of the year, and will slow down from 4.3% to 2.4%. Economic growth in 2019 and 2020 will continue to slow, as economic growth is limited by factors on the supply side. The economy will grow by 3.1% and 2.7% in these two years.

The economy is growing rapidly in 2018 thanks to several temporary factors. Growth of exports will also pick up, as the influence of the electronics sector - which exerted a braking effect in 2017 - will recede. Export will also have a stronger role in economic growth, but because imports will grow as investments recover, net export will have a negative contribution toward economic growth.

2.2.2 Forecast of electricity consumption up to 2033

In previous reports on security of supply, a growth rate of 1% per year was used to estimate the growth of consumption. For a more detailed forecast, Elering AS commissioned a study on forecasted loads from the Tallinn University of Technology in 2017. To forecast the loads, a model based on an Excel spreadsheet was devised. It can be used to find the estimated load on various levels. The substation level, regional level, and the entirety of the Estonian power grid. Three different scenarios were developed using this model: medium (baseline), rapid and slow development. Table 2.1 describes consumption using two indicators: annual consumption and peak load. In the consumption forecast view, the basis is the Medium Scenario in the abovementioned load forecast study.

Table 2.1 Summary of statistics and forecast for consumption and peak load up to 2033

Consumption statistics		
Year	**Annual consumption, TWh**	**Peak load, MW**
2005	7,2	1331
2006	7,8	1555
2007	8,2	1526
2008	8,3	1525
2009	7,8	1513
2010	8,2	1587
2011	7,9	1572
2012	8,1	1433
2013	7,9	1510
2014	7,8	1423
2015	7,9	1553
2016	8,2	1472
2017	8,3	1474

Consumption forecast		
Year	**Annual consumption, TWh**	**Peak load, MW**
2018	7,7	1505
2019	7,9	1534
2020	8,0	1564
2021	8,2	1594
2022	8,3	1609
2023	8,4	1623
2024	8,4	1636
2025	8,5	1649
2026	8,6	1661
2027	8,6	1674
2028	8,7	1680
2029	8,7	1685
2030	8,7	1690
2031	8,7	1695
2032	8,8	1701
2033	8,8	1706

To this point, overall power consumption is showing a growth trend, but the peak loads on the power grid have remained essentially unchanged in the last decade – between 1500 and 1710 MW. It should nevertheless be considered that there will be some peak load growth due to rising consumption in the next 10 years and subsequent decrease in the peak load. The forecast of peak loads at Elering up to 2033 is laid out in the figure below (Figure 2.7).

Figure 2.7 Statistics and forecast for peak loads up to 2033

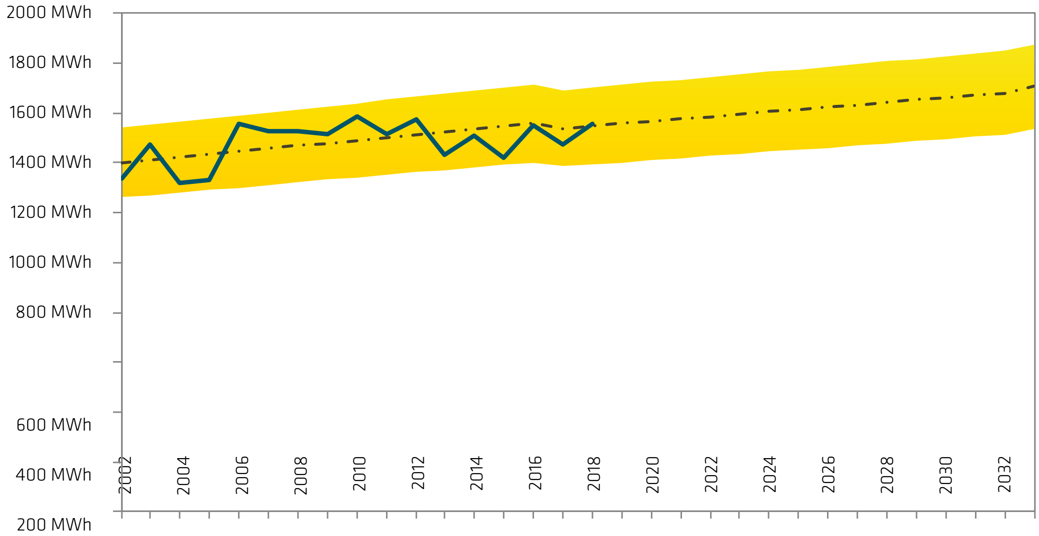


Figure 2.7 describes how the actual peak load fluctuates between the standardized peak load - and in a ±10% interval. According to this forecast, peak load will also be 1600 MW or less in 2020, although it will have grown to over 1700 MW by 2033.

According to the university's load forecast, the growth in average peak load will be on the order of 1.93% in the period 2019-2021, but after that it will start to decrease and from 2028 it will grow by 0.31% per year.

The changes in peak load over the years will be significantly impacted by weather patterns. Changeable weather means that actual peak loads may temporarily go beyond the forecast range. A recurrence of the warm winters of recent years may also accelerate the decrease in peak loads in future.

New projects and consumer connections have not been taken into account in the general forecast, as connecting such capacity (the metal industry, cellulose plant and, in recent years, server farms) that would have a material effect on consumption is an extraordinary occurrence. If such major consumers should accrue in Estonia, they would be treated separately.

2.2.3 Distribution grids

Pursuant to subsection 66 (2) of the Electricity Market Act, distribution grid companies must each year provide the Competition Authority with a written assessment of what the expected total demand will be in their service areas, from the time of submission to seven years later. Pursuant to subsection 66 (3) of the Electricity Market Act, Elering must, on the basis of the materials filed by the distribution grid companies, submit to the Competition Authority an assessment that is as accurate as possible regarding what kind of total demand is expected on the national transmission grid, starting from the time of submission to seven years later. Taking into account the data submitted by distribution grid companies in 2018, total consumption capacity demand should remain in the range of 1545 to 1614 MW in the period 2018-2024. Taking into account possible cold winters (10% reserve), actual demand in distribution grids could be in the range 1700-1776 MW (see table 2.2).

Table 2.2 Distribution grids' estimate of total demand for consumption capacity in 2018-2023

Year	Total demand for distribution grid consumption capacity, MW	Total demand for distribution grid consumption capacity with reserve, MW
2018	1545	1700
2019	1560	1716
2020	1575	1732
2021	1596	1756
2022	1603	1763
2023	1609	1770
2024	1614	1776

The consumption capacity provided in the forecast can be covered by Elering using existing and planned connections. In the case of unexpected new major consumers connected to the grid, there may be a need to re-configure the grid, but each new connection will be treated separately and this will not be taken into account in this assessment.

2.3 GENERATION EQUIPMENT CONNECTED TO THE ESTONIAN ELECTRICITY SYSTEM IN 2018

Based on data obtained from producers as of April 2018, the total installed net generating capacity is 2828 MW and of the capacity usable during peak periods 1848 MW. An overview of the generation equipment connected to the Estonian electricity system in March 2018 is provided in the following table (see Table 2.3).

Table 2.3
Generation equipment connected to the Estonian electricity system in 2018

Power plant	Installed net capacity, MW	Possible generating capacity, MW
Eesti Power Plant	1355	1021
Balti Power Plant	322	224
Auvere Power Plant	274	252
Iru Power Plant	111	111
Põhja Thermal Power Plant	78	78
Lõuna Thermal Power Plant	0	0
Sillamäe Thermal Power Plant	16	8
Tallinn Power Plant	39	39
Tartu Power Plant	22	22
Pärnu Power Plant	20.5	21
Enefit	10	9
Industrial CHP and mini-CHP	84	61
Hydroelectric plants	8	4
Wind farms	481	0
Solar power plants	1.4	0
Microproducers	7.6	0
Total	2828	1848

Microproducers and miniproducers under 15 kW capacity in the Estonian system, taking into account generating equipment connected in previous years:

- Electric wind turbines 222.7 kW;
- Solar panels 8248.1 kW;
- Hydroelectric plants 29.5 kW.

Starting 1 March 2017, the following were connected to the national transmission system or expected to be connected in 2018:

- 2017 Aidu Tuulepark, 6.8 MW – planned synchronization during 2018.

Starting 1 March 2017, the following were connected to the distribution grid or expected to be connected in 2018:

- AS Eesti Elekter Salme wind farm – 6 MW;
- Five Wind Energy OÜ wind farm – 5.9 MW;

2.4 CHANGES IN GENERATION EQUIPMENT 2017-2027 AS NOTIFIED BY ELECTRICITY PRODUCERS

Pursuant to the amendment (16 February 2016) to Section 132 of the Grid Code, "Production reserve necessary for satisfying consumer demand", all electricity producers must submit to TSO Elering AS by 1 February of each year, the data specified in Annex 3 of the Grid Code for the next 10 years in order to assess the adequacy of the power system's reserves. This year, all of the major power producers and most smaller power producers submitted data. In the case of some of the smaller power plants, the data filed in previous years concerning the planned closure of power generation and/or generation equipment were taken into account.

As of the current time, Elering has been notified for 2018-2028 of an increase of up to 1 MW of generation capacity with a pre-planned production cycle; at the same time, a reduction of scheduled capacities up to 631 MW is planned.

2.4.1 Changes with respect to 2017

Compared to security of supply data published for the previous year, 2017, the biggest changes in the data presented by power producers are as follows:

Enefit Energiatootmine AS:

- At Eesti Power Plant, a number of units are undergoing scheduled repairs in summer 2027 with a total capacity of 367 MW;
- Balti Power Plant's TG11 unit with a capacity of 192 MW in scheduled repair during summertime in 2018-2028;
- Auvere unit with a capacity of 274 MW will be in scheduled repair in the summer period during 2018-2028 and it will lack potential generating capacity during the summer;
- Enefit Power Plant's Enefit 280 equipment will be undergoing scheduled repairs in the years 2018-2028 and this power plant lacks potential summer production capacity.

VKG Energia OÜ:

- The Lõuna Thermal Power Plant, connected to the power grid in 1996, with a capacity of 7 MW, ended operations and starting in 2018, no longer generates electricity.

Hydroelectric plants:

- Decrease in capacity by 215 kW, which derives from the conserving of depreciated hydroelectric plants and updating of data;

Wind farms:

- Increase in capacity is 88 MW, which stems from connection of new power plants and updating of data. The data submitted by power producers in 2018 are set out in Annex 1.

2.4.2 Generation equipment to be closed and reduction in capacity of existing generation equipment

Elering currently has been notified of the following closures, capacity reductions and conservations of generating equipment:

- 2017-2023 restrictions on old units operating on the basis of IED exemption - 619 MW;
- 2024 Closure of the Eesti Power Plant units, 489 MW;
- 2024 Closure of the Baltic Power Plant unit, 130 MW;

Total production capacity to be closed by 2026: 620* MW.
* the capacity to be closed includes capacity to be used with restrictions

2.4.3 Thermal power plants, planned or under construction

Elering currently has been notified of the following major additions of generating capacity:

- 2019 Fortum Tartu Raadi PV-park, 50 MW;
- 2019 Tootsi Wind Farm, 138 MW.

TOTAL: 188 MW

Electricity generating equipment, construction of which has been reported to the system operator but which cannot be taken into consideration as a definite project, is the following:

- 2018-2028 – other new plants (mainly wind farms) up to 1505 MW.

TOTAL: 1505 MW

All of this electricity-generating equipment, construction of which has been reported to the system operator, cannot be taken into consideration as definite decisions to construct power generation equipment. Some projects are in the construction phase, and some are also in the planning phase, without a final investment decision having been made. At the same time, it can be assumed that not all of the generation equipment in the planning phase will reach investment decision and that in addition, it is not certain which years these projects will actually be completed in.

2.5 ASSESSMENT REGARDING THE GENERATION RESERVE NECESSARY FOR SATISFYING CONSUMPTION DEMAND UP TO 2028

The assessment in this report as to the generation reserve needed to satisfy consumption demand was put together in light of what Elering sees as the most likely development trends governing generation capacity as not all of the source data submitted to the TSO can be taken into account as projects certain to be realized in future.

2.5.1 Assessment of adequacy of generation capacity in winter

The projected scenario takes into account new power plants that are currently being built or where a firm investment decision or closing date has been communicated to the TSO. Elering believes the likely development scenario for generation capacities is one where it will be possible to continue to use ten units at Eesti Energia Power Plants up to 2023, and in addition, take into account new power plants where an investment decision has been made. At the same time, Eesti Energia has provided notice of its plan to use up, as quickly as possible, the units' use-hours subject to IED restriction.

Starting 1 January 2016, the Eesti Power Plant's 1st, 2nd and 7th unit and the Balti Power Plant's 12th unit will be operated based on Article 33 (1) of the Industrial Emissions Directive (limited life time derogation), according to which a company is allowed to operate these energy units during the period 1 January 2016 to 31 December 2023 not more than 17,500 operating hours. Based on the number of operating hours used in 2016, it can be assumed that the company will use the operating hours intended for the energy units operating based on the Eesti Energia limited life time derogation much earlier than the deadline stemming from the Directive (31 December 2023) permits. As the actual use of the operating hours set out in the limited life time derotation depends on the price levels that will take shape on the power wholesale market, Enefit Energiatootmine AS says it is not currently possible to announce the time for planned closure of the energy generating units. This will be done as soon as possible after the company management board has made the relevant decision and the information has been sent to the power exchange for publication.

In 2018, Eesti Energia's Narva Power Plants (Balti, Eesti and Auvere) have, along with the six units furnished with desulphurization equipment (1058 MW), four existing limited-operating-hour units (619 MW) and one unit launched in Auvere in 2015 (274 MW), a total of 1951 MW.

In the winter period in 2028, the forecasted peak load based on the projected load scenario is 1680 MW and the usable generation capacity 2611 MW. Considering the data sent by the producers and the information known to Elering, the generation reserve is sufficient up to 2023 for satisfying consumption demand - even factoring in the 10% reserve for extraordinarily cold winters. After 2023, a large part of the existing generation equipment will be closed at Eesti Energia Narva Power Plants, but taking into account the electrical connections and generating capacity on the regional electricity market, there are sufficient generation capacities for Estonia for the next ten years. Domestic generating capacity used on the electricity market covers consumption demand during the peak winter period. In case of a malfunction in international connections, the capacity of Elering's emergency reserve power plants can be used; factoring these in, the domestic consumption capacity is covered by domestic generation capacities during peak periods. The forecast for generation capacities used on the electricity market is listed in the figure below (see Figure 2.8). For more information on security of supply in Estonia, the Baltics and the Baltic Sea region up to the year 2033, see chapter 2.5.3.

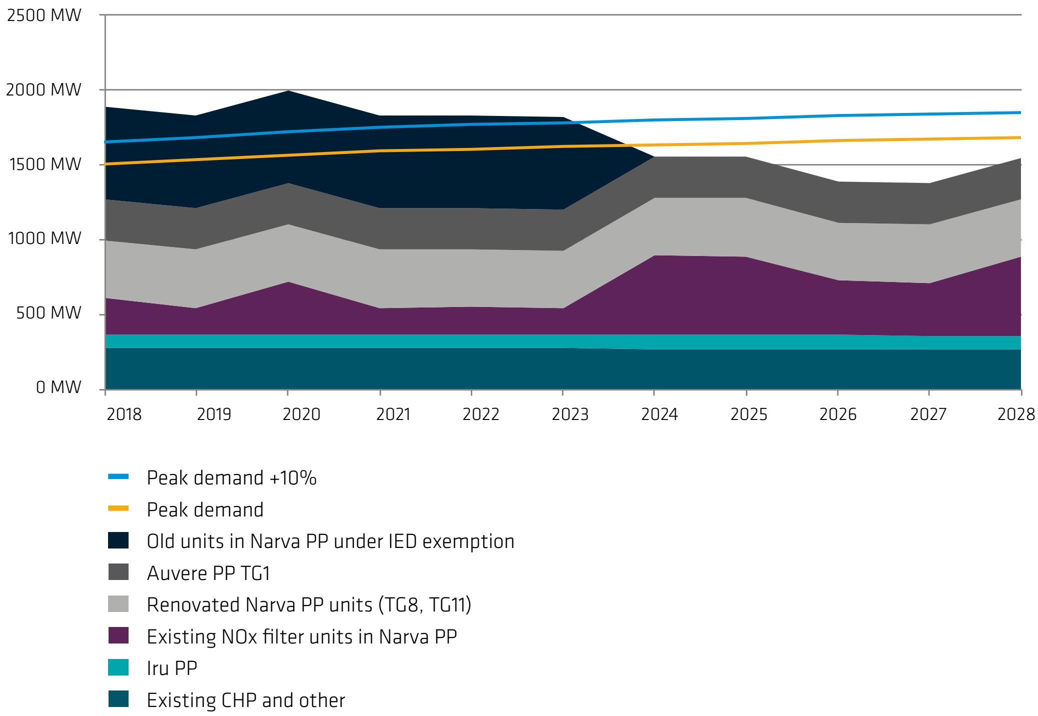


Figure 2.8 Forecast for generation capacities to be used and peak demand in winter

In addition to the above forecast, the power generation capacities of other countries in the Baltic Sea region can be counted on for covering peak load, based on the difference in peak load period and the possibility of using cross-border electrical connections. Due to the third Estonia-Latvia connection to be completed in 2020, the capacity on the Estonian-Latvian border will increase from 750 MW to 1050 MW. Elering believes that the cross-border connections and generation capacities in neighbouring systems are sufficient to ensure the functioning of the Estonian power system in the years ahead, even in a situation where consumption outstrips forecasts or the existing generation equipment is closed before the currently forecasted closure date. The precondition for use of neighbouring systems' generation reserves is a functioning regional power market and reliable international connections with Finland and Latvia.

2.5.2 Assessment regarding the generation reserve necessary for satisfying consumption demand during the summer period

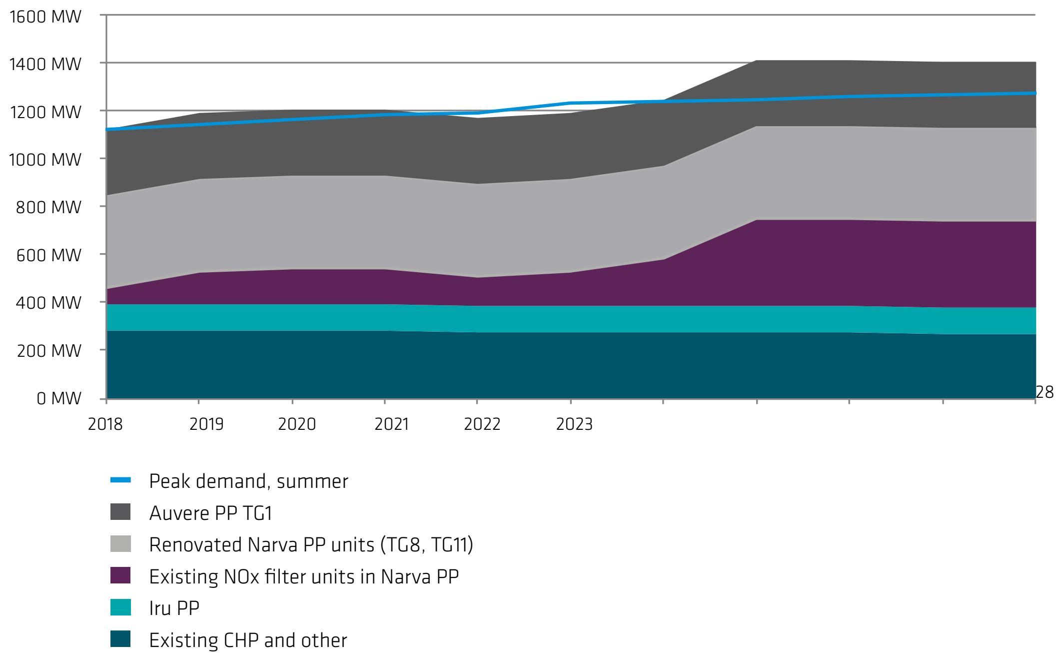
According to data submitted by the power plants, the capacity not used in the 2018 summer period includes 1179 MW of generation capacities. The non-used capacity includes conserved production units (23 MW), other restrictions (19 MW), production units with a non-plannable production cycle (all renewable plants except for hydro - 487 MW), all microproducers (7.58 MW) and the capacity not supplied by industrial and mini-CHPs in the summer period (23.3 MW). In addition, until the closure year (2023) the units with operating hours restricted on the basis of IED at Narva Power Plants shall not be taken into account; these have a total capacity of 619 MW.

Figure 2.9 describes the forecast for generation capacities and peak demand during the summer period. According to data submitted by Enefit Energiatootmine AS, no planned repairs or renovations that would impose restrictions on generation capacities are envisioned at Eesti PP in the summer period starting from 2024. For this reason, the figure (see Figure 2.9) shows the increase of the usable generation capacities starting in 2024.

From 2019 on, we can see the forecasted maximum load rise over the usable production capacity in connection with the depreciation of the Narva power plants, renovations and reduction in capacity. Yet considering the existing international connections and the capacity of the emergency backup power plant, no problems are envisioned when it comes to covering consumption.

Figure 2.9 describes the forecast for generation capacities and peak demand during the forecast's minimum consumption period (summer).

Figure 2.9 Forecast for generation capacities to be used and peak demand during the minimum consumption period (summer).

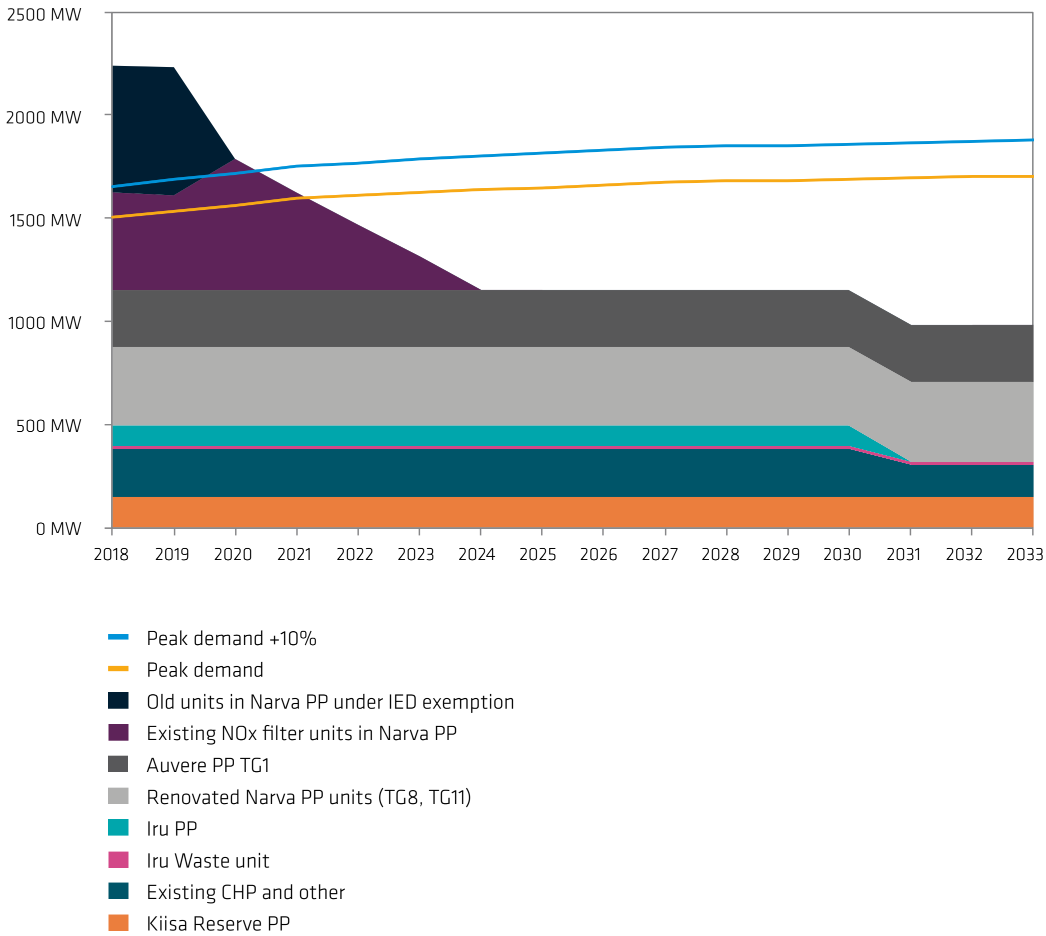


2.5.3 Estonian security of supply up to the year 2033

The following analyses Estonian security of supply up to 15 years into the future. In the conditions of a European single energy market, Elering views Estonian security of supply in the regional perspective, as a combination of local generation capacities and transmission capacity. Elering's analysis views severe situations from the standpoint of security of supply and does not express how power plants are used in ordinary market conditions.

Figure 2.10 expresses Elering's assessment regarding the currently known and usable generation capacities in Estonia up to 2033. Here, proceeding from the conservative position, it is presumed that some of the closures of power plants will be expedited compared to the data submitted by producers upon assessing the production reserve necessary for satisfying consumption demand in the Estonian electrical system. Unlike the data from producers, downtime has not been factored in here. The possibility of malfunctions is taken into account in an N-1-1 situation (see Figure 2.11). It is presumed that the Narva Power Plants units that fall under the IED derogation will be phased out in 2019. In reality, these units are permitted to use 17,500 operating hours from early 2016 to end 2023. This means that, as market conditions permit, the said generation capacities may be available for a longer period of time than presumed in the analysis. In addition, the incremental closing of the Narva PP units equipped with deSOx filters is assumed to occur from 2020 to 2024. This is a conservative presumption, as these units could be in operation longer judging by environmental restrictions and their technical condition. In reality, the duration for which the old power plants will be kept in operation depends on market conditions - can the costs of maintenance and the necessary investments be recouped on the electricity market? Elering's task here is to consider severe security of supply situations, and as a result, the analysis relies on conservative presumptions regarding closure of power plants.

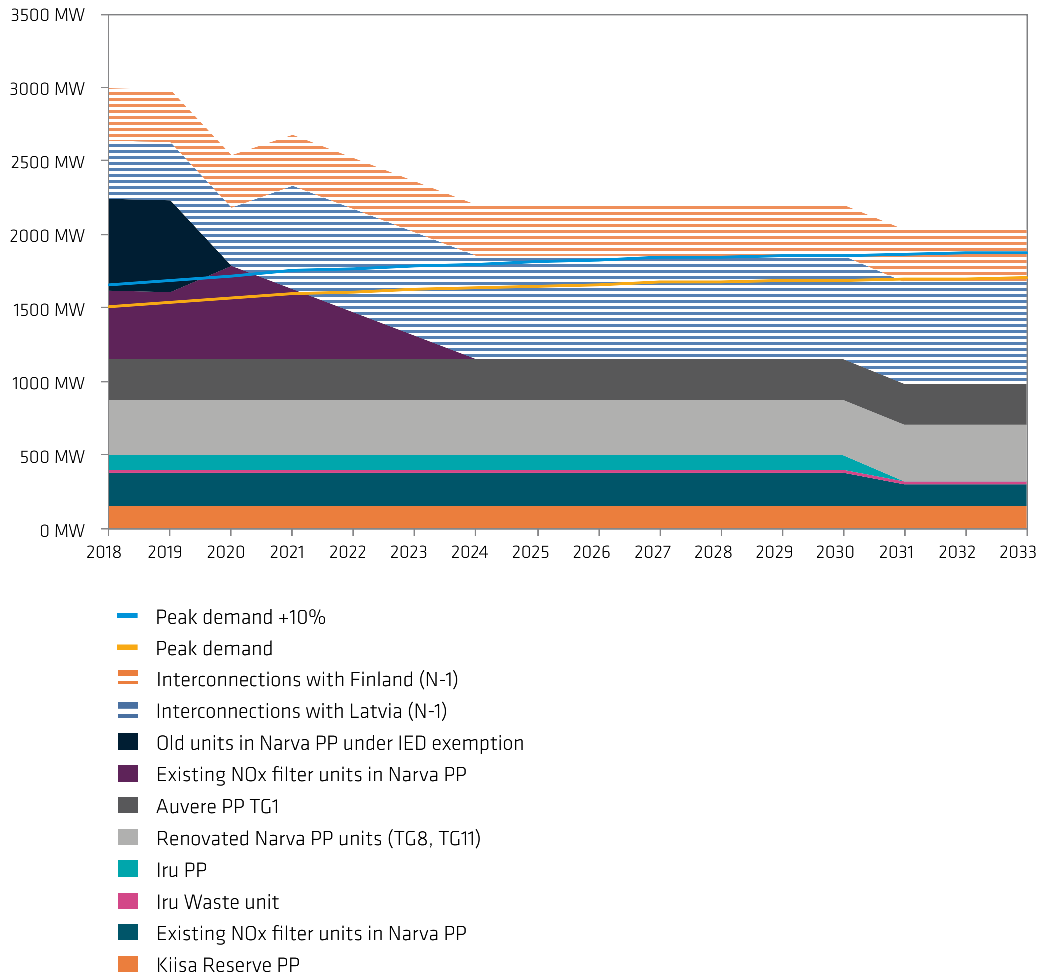
Figure 2.10 Assessment regarding the structure of generation capacities up to 2033



Starting in 2020, Estonia will have, according to current plans, over 2,000 MW of international connections. That means greater import capacity than Estonian peak consumption forecasted for this period, and as a result, the potential closure of local generation capacities will not cause problems for security of supply in an ordinary situation.

As regards security of supply, it is important to consider emergency situations in the system as well. This analysis views the disruption situation N-1-1, where the two biggest elements of the system are non-functional. In the period up to 2033, to the best of our knowledge, the two biggest elements in the Estonian system will be the submarine cable EstLink 2 and one of the transmission lines between Estonia and Latvia. In such a situation, the capacity of Estonian international connections will decline in the period 2020-2033 and as a result, the import capacity will drop to 1050 MW - 700 MW from Latvia and 350 MW from Finland. In the event of the scenario described, Estonia will have enough production and transmission capacity for the entire period in question. In addition, a 10% reserve is ensured for satisfying higher growth of demand. Figure 2.11 illustrates the disruption situation N-1-1, where the two biggest elements of the electricity system are non-functional. The figure also shows Elering's backup power plants, representing 150 MW, which in an ordinary situation, supply the reserves needed for the electricity system, but in a situation of diminished reserves due to need in the N-1-1 situation, the 150 MW can be considered usable generation capacities.

Figure 2.11. Estonian security of supply of electricity in an N-1-1 up to 2033



The analysis shows that through the combination of generation capacities and transmission capacity, it is possible to produce enough electricity to cover peak consumption and to import electricity in severe emergency situations. Also ensured is the 10% peak consumption reserve for unexpected peak load changes.

3 Elering's vision of the electricity market

3.1	LOW MARKET PRICES/FAIR COMPETITION	27
3.1.1	Reduction of market distortions related to subsidies	28
3.1.2	Fair trade of electricity with third countries	30
3.2	LOW PRICE SENSITIVITY OF CONSUMPTION/CONSUMER FOCUS	31
3.2.1	Market-based price signals	32
3.2.2	Involving consumption management on the market	34
3.2.3	Digital solutions for enabling flexibility	36
3.3	FINDING THE RIGHT MARKET PRICE/EFFICIENT ENERGY MARKET	38
3.3.1	Harmonizing regional markets and developing integrated short-term markets	38
3.3.2	Reforming the balancing market	41
3.4	DEFICIT IN GENERATING CAPACITY/GUARANTEED GENERATION ADEQUACY	42
3.4.1	Measures outside the energy market – capacity mechanisms	43
3.5	CONCLUSION	45

- ***Elering's vision of the electricity market proposes actions to strengthen the power market's price signals and thereby the ability of the market to attract the necessary investments for security of supply.***

- ***The necessary activities are reducing market distortions, bringing consumers to the market, bringing trading closer to real time and regionalization of the market system.***

The basis of security of supply is a functioning electricity market where the price of electricity is determined by the balance between supply and demand, sending market participants a signal as to when there is a lack of power. This means that as the supply of power approaches a shortage, market signals will rise precisely as high as needed to ensure the necessary generation capacities or introduction of consumption management on the market. Market-based signals ensure that no more than needed is spent on supply of electricity and electricity is generated where it is most cost-effective.

It can be concluded from Elering's assessment that security of supply in the region can be ensured at least until 2025 on the basis of existing generation capacities. At the same time, in the longer term, it is necessary for market prices to send investment signals for the introduction of new capacities to the market. To do this, work with market design must take place now to provide more precise price signals and eliminate the existing market distortions.

Security of supply is one of the fundamental principles in both the Estonian energy economy development plan (ENMAK) and European energy policy. Security of supply can be organized much more effectively and competitively in an integrated European electricity system supported by a functioning uniform electricity market than it can on the state level. In November 2016, the European Commission released the so-called Clean Energy Package, one of the goals of which is to adapt the existing market rules to meet future trends in the development of the electricity system. Undistorted price signals should promote the free movement of electricity to regions and markets (day-ahead, intraday, balancing, network restrictions, reserves markets) where the value is greatest, while ensuring effective cross-border competition, integrating consumers on the market and promoting the necessary investments.

The purpose of this vision document is to propose specific solutions for creating market design at the regional level that supports reliable supply. In today's situation, transboundary electricity systems are significantly better integrated than before, and digitalization and smart network solutions will open new doors for balancing the system.

ENMAK highlights two important objectives: in 2030, Estonia will have a free, unsubsidized and open fuels and electricity market and security of supply will be guaranteed. These objectives are the linchpin of Elering's vision of the market.

Elering favours a market-based, regional approach, because we believe that market-based solutions are ultimately cheaper for consumers than are administrative solutions. We also believe that regional solutions are more efficient as they help the systems to derive benefits from the resources of neighbouring systems.

Elering supports digital and consumer-inclusive solutions because the signals from consumers are essential for the market. We have got to the point with technology and digital solutions where consumers can now, either manually or automatically, make their contribution to the market, stating when and at what price they are prepared to consume. Engagement with consumers on the market and digital solutions enable the supply of electricity at lower costs, as it avoids overinvestment and also makes use of the most cost-effective energy sources.

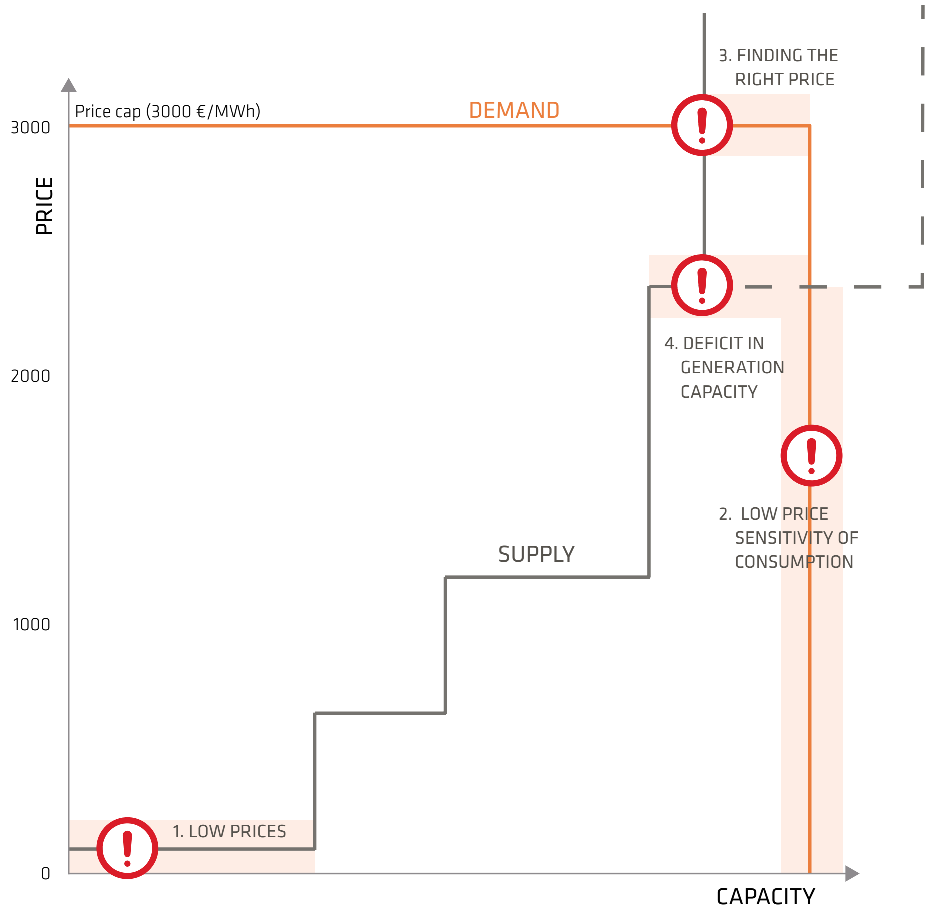
Ensuring security of supply is important, as without electricity other vital services will not be functional. In Elering's view of the market, we see four categories that are important to address to achieve the right price signals and allow the market to operate as efficiently as possible for ensuring security of supply.

Figure 3.1 illustrates the abovementioned problem with a supply-and-demand graph and categorizes the reasons for the problem into the four categories illustrated in the figure. The categories are:

1. Low electricity prices – subsidies and other administrative measures artificially distort the price of electricity.
2. Low price sensitivity of consumption – consumers do not currently take part in the electricity market to send demand-side price signals.
3. Finding the right price - the efficiency of the functioning of the various time horizons of the electricity market (day-ahead, futures, intraday, balancing energy) can be improved so the market can find the right balance.
4. Deficit of generation capacities – in future, there may be a shortfall of generation capacities, due to which adoption of capacity mechanisms may be justified.

The following discusses in greater detail the four abovementioned categories and the recommended actions under each one.

Figure 3.1
Problems in the current power market design. The figure characterize power markets with different time perspectives, the price is formed at the intersection of supply and demand



PRIMARY PROBLEMS IN CURRENT POWER MARKET DESIGN:

1. Low prices
2. Low price sensitivity of consumption
3. Finding the right price
4. Deficit in generation capacity

3.1 LOW MARKET PRICES/FAIR COMPETITION

Power generation from renewable energy sources continues to increase. Due to renewable and fossil fuels subsidies and other market distortions, the price on the electricity market today and in the near future will remain too low. As a consequence, the market lacks fair competition and thus non-subsidized generation capacity does not have access to the market (see Figure 3.2). Scrapping subsidies and other market distortions will increase certainty that the average price of the power market will rise to the sufficient level at the necessary moment and send market-based signal for investing into new generation capacities or consumption management capability.

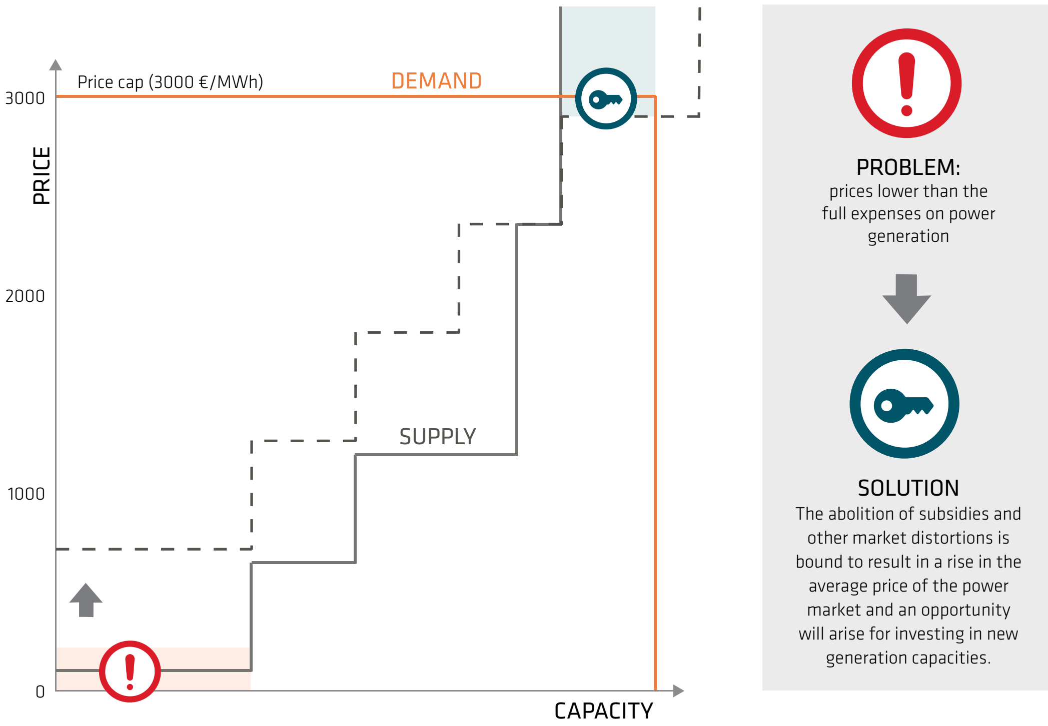


Figure 3.2.
Low market prices. The rise of prices promotes investments into new generation capacities, which will help to reduce the deficient supply

3.1.1 Reduction of market distortions related to subsidies

The European Union's goal is for the share of energy from renewable sources to reach at least 27% of end-consumption by 2030; every member state will be obliged to maintain and increase its domestic renewable energy consumption percentage agreed with the Commission and set forth in the annex to the directive.

The main emphasis in the 2020 objectives lay on each member state's own contribution; the objective for 2030, on the other hand, must be achieved more through cooperation and harmonization of activities between member states. Increasing the share of renewable energy consumption must be achieved using the method that is the most cost-effective for consumers, without jeopardizing general security of supply.

From the standpoint of supporting renewable energy, the following is currently the greatest problem both in the European Union and in Estonia:

a) subsidization of renewable energy using measures outside the energy market, which in turn prevents investments into non-subsidized generation units. The renewable energy predominantly being developed consists of weather-dependent production resources, and introducing it onto the market forces out non-subsidized production equipment and at the same time requires additional flexibility due to the changeability of production;

b) principles, measures and support schemes for developing renewable energy that place producers from different countries in an unequal market situation. Lack of a regional and pan-European vision has in some cases led to the inefficient use of public resources;

The Clean Energy Package sets out an array of initiatives for resolving the aforementioned problems. Subsidies for renewable energy should be based on public, transparent auctions and be connected to countries' needs to fulfil both state and pan-European goals.

An all-encompassing pan-European objective involves limiting greenhouse gas emissions. Renewable energy subsidies should decrease in the long term and be replaced with market-based emissions trading, which based on market logic leads us to prefer production of cleaner electricity.

As a separate objective, the broader use of Guarantees of Origin is promoted as this will contribute to engagement of consumers and electricity sellers in developing renewable energy and allows cooperation between various countries to be improved when it comes to support for renewable energy. Such a measure, which values the origin of energy, lays preconditions for promotion of consumption of renewable energy and a rise in consumer awareness and allows trading of renewable energy to be developed within and among countries.

The Clean Energy Package devotes attention to the rapid development and adoption of energy storage technologies, which allows the prices of bringing renewable energy to market to be reduced, directing weather-dependent electricity output to the market at precisely the times when there is demand on the market. Combining storage technologies with local production equipment will make it possible to significantly increase the security of supply in the state or region.

Elering welcomes all changes that the Clean Energy Package offers for integrating renewable energy more effectively with the market.

It is very important to carry out the proposed subsidy rate reductions, rapidly implement auctions, gradually open auctions to other countries' producers and, in the longer term, replace support with emissions trading based on equal principles and in line with market rules. Such a development will lay the groundwork for the disappearance of market distortions arising from subsidization, which will also allow other market mechanisms to start working efficiently.

Also to be welcomed are the proposed solutions for addressing another problem pertaining to the regional dimension. The broader implementation of statistics trading and cooperation projects will help harmonize the situation of producers and competition conditions in different countries, make renewable energy tradable between countries, develop renewable energy in the most effective manner and, in short, ensure security of supply with a more regional vision.

Connecting international and regional cooperation and larger renewable energy capacities (such as offshore wind farms) with the grids of different countries simultaneously is essential as it will make it more efficient to integrate renewable energy into energy markets and ensure security of supply in the region.

In Elering's opinion, development and adoption of storage technologies will play an important role. In smaller countries, it will be complicated to achieve commercial profitability with major storage technology projects, but the adoption and implementation of storage technologies in the interests of all market participants would help to improve general security of supply and allow the system's balancing services to be used in the interests of all market participants while contributing to bringing renewable energy to the market.

Subsidized power output currently makes up over 50% of producers' income in both Estonia and the rest of Europe. At the same time, subsidies are currently in no way linked to ensuring security of supply and are only minimally linked to market mechanisms and curtail their functioning. The impact of market and price mechanisms on producers' activities is so marginal that they do not serve as an incentive to develop renewable energy based on interests in guaranteeing general security of supply. Our recommendation is that the conditions for renewable energy auctions should take into consideration the need to promote the introduction of renewable energy through investing into generation equipment and technologies that simultaneously take part in ensuring security of supply and covering peak demand.

Guarantees of Origin are certificates issued to producers and substantiate the origin of the electricity. GOs are the basis for market participants' transfers of renewable energy between member states and trading of renewable energy. Consumers' awareness of consumption of renewable energy is low, however, and Elering's goal is to use Guarantees of Origin to start visualizing for consumers the origin of the electricity they consume and supplied by their electricity seller. Also a problem is the low price of Guarantees of Origin, i.e. renewable energy, and Elering's vision calls for renewable energy to have greater value on the markets and serve as a significant trading instrument. The basis for international statistics trading could be market-based transfers of Guarantees of Origin among market participants.

In addition to renewable energy subsidies, subsidies that cause market distortions should also be avoided in regard to other market participants as well. This means that conventional power plants or management of consumption should not receive subsidies outside the market unless there is good reason. Sending the right price signals is important to encourage as large a proportion of the cash flows associated with electricity generation and consumption to pass through the electricity market. In the case of conventional production, an effort must be made to turn all external costs, such as costs caused for the environment, into input costs.

Proposed actions for implementing the vision:

Elering proposal:	Who?	What?	Elering action
Reduce the market distortions stemming from renewable energy subsidies and increase promotion of a market-based approach	EU and member states	Changing the schemes for subsidies	Presenting proposal to decision-makers and lobbying for it
Implement market-based renewable energy subsidy auctions	Elering	Designing auctions that have the least market-distorting influence	Finding and implementing the best auction methodology if the state has a need for additional renewable energy.
Harmonize the procedure for holding renewable energy auctions, support mechanism and the levels of subsidies among member states at least regionally	EU and member states	Ensuring equal market conditions for enterprises operating in different countries	Presenting proposal to decision-makers and managing support scheme
Developing broader adoption of Guarantees of Origin and cross-border exchange of information	Member states, Elering	Using Guarantees of Origin for certifying origin of electricity, including across borders	Continuing to develop further the system of Guarantees of Origin in Estonia, constantly improving cross-border movement of Guarantees of Origin and trading opportunities. Notifying consumers through Guarantees of Origin regarding the origin of electricity. (2018)
Reduction of market distortions related to subsidies			

3.1.2 Fair trade of electricity with third countries

An important topic when it comes to creating a single European energy market is the agreements to be entered into concerning electricity trading and grid access on third countries' boundaries. Third countries for our purposes shall mean countries outside the European Economic Area that border on the Baltic states. The electricity market system and requirements on producers are significantly different to the market procedure applied in European countries, which in turn leads, through market distortion, to an unequal situation between market participants and constitutes a risk to market security. The nature of the problem can broadly be divided into two categories:

a) The model of the electricity market used by Europe is termed an energy-based market - producers are compensated for the electricity they generate based on the principle of margin pricing. On the other hand, the Russian market is a capacity-based market, where producers are compensated both for the electricity they generate as well as for maintaining capacities. This is why Russia's energy-based prices are lower than in Europe. The difference in market system leads to unequal treatment of producers and an uneven distribution of well-being among consumers and producers. This in turn has a significant impact on security of supply, as it forces European producers to close capacities.
b) The requirements imposed on production in Europe are different to the ones imposed in third countries. The challenging environmental goals that support the development of a competitive, secure and sustainable pan-European electricity system and related environmental protection requirements imposed on production will require major investments from our producers. This in turn will lead to increased competitiveness of electricity generated in third countries and pressure for closing generation capacities in Europe.

Unfair competition situation and closure of capacities in Europe will, in addition to problems with security of supply, lead to carbon leaks out of Europe, which goes against Europe's climate goals.

This problem has long been salient at different levels, but as yet no uniform position has been developed in Europe. The new Clean Energy Package does not regulate trading with third countries.

To support the existence of long-term investments needed to maintain regional generation capacities and to ensure fair competition in trading with third countries, it will be important to lay down equal opportunities and transparent rules for traders on both sides of the border. Regulatory and market system changes must be implemented to ensure non-discriminatory treatment of traders and to enable bidirectional trading under equal conditions and neutralize the impact stemming from different production-related demands on competition.

Achieving the foregoing is a long-term process and requires regional cooperation and an agreement on an action plan with respect to third countries setting forth the necessary changes and solutions and laying down a specific action plan. The biggest changes will require informing the market, providing all market participants enough time to adjust to the new situation. In the short-term view, it will important to implement buffering measures as the first phase in the so-called transition period.

The proposal from Elering, which will require lengthier preparation, is to implement a fee, harmonized between the Baltics and Finland, for balancing the competition situation on the border with third countries, taking into account the capacity fee, environmental protection and other aspects that lead to an unequal competition situation. As long as such a fee has not been established, the restriction of third-country trading should be considered to eliminate unequal treatment of market participants during the transition period as well.

In the short-term view, the compensation of expenses related to use of the transmission grid should also be considered, if the transmission fee established on borders with third countries is one aspect in regard to unequal treatment of traders. Baltic system operators have already started coordinated analysis for the development of a transmission tariff that would be non-discriminatory and through which expenses related to the transmission grid could be funded proceeding from transparent costing methodology.

Proposed actions for implementing the vision:

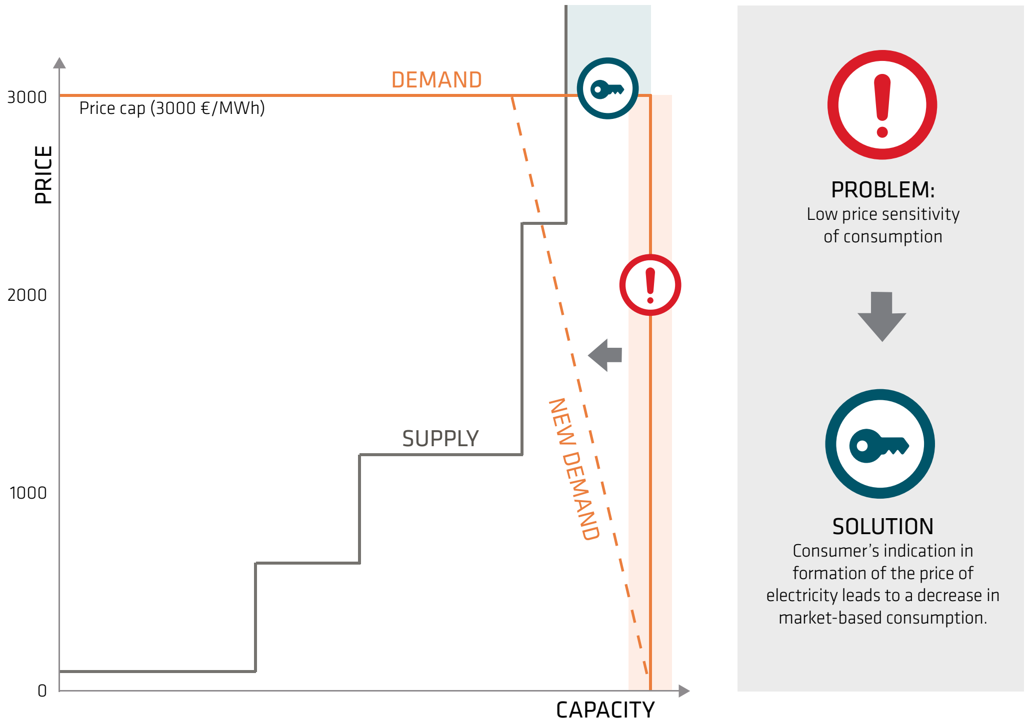
Elering proposal:	Who?	What?	Elering action
Analyse the possibility of implementing regional transmission fee on borders with third countries.	Ministries and TSOs of the Baltic states	Developing and establishing transmission fee	Analysing feasibility of establishing a fee
Implement a fee for balancing the competition situation on the border with third countries, taking into account the capacity fee, environmental protection and other aspects that lead to an unequal competition situation.	Ministries and TSOs of the Baltic states	Developing and establishing trading fee	Analytical support for development of the fee
Consider restricting trade until such time as fair competition situation is ensured	Ministries of the Baltic states	Ending trading with third countries for the interim period	Analytical support for process
Treating all borders of third countries equally and harmonizing the applicable measures, at least on regional level	Ministries and TSOs of the Baltic states and Finland	Implementing uniform methodology in trading electricity with third countries	Analytical support for process
Fair trade of electricity with third countries			

3.2 LOW PRICE SENSITIVITY OF CONSUMPTION/CONSUMER FOCUS

Participating of consumption on the electricity market is important for at least two reasons: 1) introduction of renewable energy with a changeable production cycle requires more flexibility from the electricity system and 2) as it approaches deficient generation capacities, the market needs demand-side price signals for efficient pricing. For that reason, the participation of consumers on the power market is becoming increasingly critical.

Price sensitivity of consumption means market-based consumption management. Today's electricity market is not consumer focused and power consumers participate in the market to a very limited extent. In the power market of the future with a low surplus of capacity, efficient price formation will require signals from consumers as to what price they are prepared to buy electricity for. This will enable market-based restriction of consumption (unlike administrative restriction), which will create market-based value for the last MWh and thereby a possibility for investment signals (see Figure 3.3).

Figure 3.3
Low price sensitivity of consumption. Active participation of consumers on the market leads to less market-based consumption as a result of price signals.



3.2.1 Market-based price signals

Technically, it is currently possible for consumers to take part in the power market. With equipment that enables flexible consumption, participation in the market is possible automatically - without direct consumer intervention. One reason that home consumers participate in the power market only to a limited extent is the lack of incentive price signals.

At the European level, the opening of retail markets is a significant omission - in many countries, home consumers' power prices are still regulated and do not reflect the relationship of supply and demand. Thus, price signals do not reach the consumer and consumers cannot adjust their consumption accordingly. The deregulation of the Estonian power market is a European success story. The retail market is characterized by health competition and sales margins are among Europe's lowest. In addition, European retail markets are fragmented and the merging of retail markets can offer closer competition and, as a result, significant value.

The European Commission's Clean Energy Package encourages member states to gradually move away from regulated power prices on the retail market. During the transition period, a regulated price may be established for protected consumers.

Furthermore, the participation of consumers on the power market is curtailed by the fact that the price of electricity makes up a relatively small part of the end consumer's power bill and therefore there is no motivating price signal. Electricity bills currently consist of the following components:

1. Price of electricity
2. Network fee
3. Renewable energy charge
4. Taxes

To amplify the power market's price signals, the network fee, renewable energy charge and taxes can be made dynamic. Making various components of the power bill dynamic means, above all, that today's fixed fees become variable - for instance, on the basis of the market price of electricity or total Estonian consumption. The dynamic quality may be hourly or based on a longer period as well; the options are not limited by the price of electricity and consumption. An impact analysis should be conducted beforehand to see whether the amplification of price signals outweighs the expenses related to the change.

Estonia currently uses energy-based network fees that do not depend on the market situation or consumption profile (energy tariff, €/MWh). Network fee methodologies have the potential to make the collection of network fees more expense based, introducing a capacity basis and thereby supporting effective network investments and making consumption more dynamic by amplifying price signals and thereby supporting consumer participation on the electricity market.

To make network fees more expense based, Elering plans to establish a capacity component alongside the current energy component of the network fee. Paying network fees on the basis of a capacity-based component would be more in line with the actual expenses on the power grid, where the majority of the costs of operation, maintenance and construction are fixed costs. Only a few expenses depend on how much energy the network lets through - and there the energy component is justified. In connection with the solution for direct lines and broader use of dispersed production, network fees are disproportionately borne by consumers who have no generation capabilities. A more expense-based transmission fee would allow better investment decisions to be made in the longer term by both network operators and consumers, and this would result in more economical network service.

From the standpoint of involving consumers on the power market, Elering considers the top priority to be the opening of retail markets at a brisk pace and ending subsidization of the electricity price for domestic households. In this way, consumers would be able to participate in the power market efficiently. Elering considers it important for network fees to be expense based and that they not cause inefficient network use and related costs. We consider it a wise idea to consider dynamic network fees if this does not pose a risk to the expense-based nature of network fees and increases the participation of consumers in the power market. Taking the above into consideration, Elering proposes a change in the methodologies for transmission fees and distribution grid network fees. Changes in the network fees should be considered in harmonized fashion within the European Union to avoid geographical discrimination in consumption and production. Dynamic fees and fees that are in correlation with the power market might also be considered with regard to renewable energy charges and taxes.

We wish to emphasize that although the consumer does not take part sufficiently in the power market due to the lack of sufficiently strong price signals, this does not mean that the power market is non-functional. The electricity price signals currently indicate sufficiency (surplus) of electricity and taking into account the addition of strong renewable energy production, this is an accurate signal. As the surplus of generation capacities decreases, prices of electricity in peak hours will start rising, reaching what we could currently consider extreme highs at extreme peak hours. Electricity prices, which express the total expenses on the last necessary MW of generation capacity, are also sufficiently high to make a share of consumers price sensitive.

Elering supports non-discriminatory access for market participants to all information on price and consumption. For prosumers, aggregators, flexibility service providers and other business models to work, it is important that there be the possibility of access to data, allowing the consumer to choose whom they share their data with.

Proposed actions for implementing the vision:

Elering proposal:	**Who?**	**What?**	**Elering action**
Open retail markets to all European electricity consumers and end regulation of electricity prices	European Union and member states	Abolishing the last regulated prices on electricity retail market	Communicating the proposal to decision-makers
Establishing network fees with a capacity component for both distribution and transmission grids	TSOs and DSOs	Making a proposal for methodology of transmission tariff with a capacity component and implementing a network fee on the basis of the methodology (2021)	
Consider making network fees dynamic	TSOs	Analysing the changeover to dynamic energy component of network fees (2018)	
Consider making the size of renewable energy charges and state taxes dynamic for the consumer	Ministries and TSOs	Analysing the changeover to dynamic renewable energy charges and state taxes (2018)	
Market-based price signals			

3.2.2 Involving consumption management on the market

Along with technological advances, the current model of the energy industry is changing, transitioning to a smarter system that offers both producers and consumers new opportunities to take part in the market and thereby contributes to easing the deficit of capacity and also, potentially, to optimizing costs of network development. Furthermore, the increase in the proportion of renewable electricity and dispersed production will lead to growing instability in maintaining the balance and thereby help create a need for effectively harnessing the flexibility vested in the power market and the creation of flexible products. In the Baltic region, an additional need for flexibility products stems from the desynchronization from the Russian electrical system that will take place in the coming years.

Unfortunately, for countries that are more advanced in this area, flexibility services in this field are a reality only on balancing markets - only in a few countries have flexibility services reached the day-ahead and intraday market. Mostly, consumers are able to take part on the market only indirectly, responding to dynamic tariffs. The obstacles to the broader spread of flexibility services have thus far been the lack of sufficient motivation for taking part in the market, this is seen on the producers, consumers and storage solutions side. Here a major role is played by creation of a suitable market framework that would create sufficiently incentivized possibilities to supply flexibility services to the market.

The European Commission's Clean Energy Package sets the goal for a competitive, consumer-centred, flexible and non-discriminatory power market. To attain the goal, the member states will need to ensure that their national legislation does not impose unnecessary restrictions, including on participation of consumers in the market through consumption management measures, or to making investments into flexible production and energy storage, etc. The proposal also includes various requirements that should help assist in the better integration of flexibility services on the market.

Under the proposal, countries would have the obligation to promote participation of end consumers and aggregators (which consolidate end consumers) in consumption management at all market stages (not only system services and regulatory markets).

It is planned to impose on TSOs and DSOs the obligation to treat consumption management on equal grounds with other system services providers. To realize all of this, the Commission's proposal envisions as an important step the guarantee of accessibility of data (as regards both access rights and data formats).

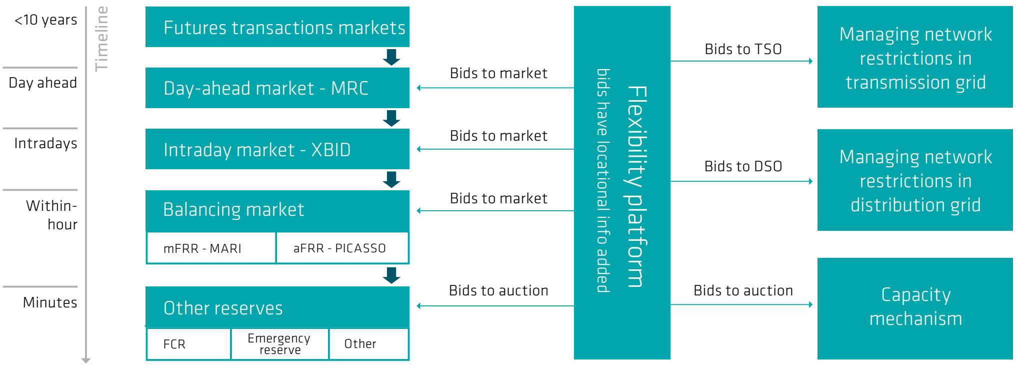
In Elering's opinion, consumers will have an important role in resolving the challenges of the future on the electricity market. We support the participation of end consumers and aggregators on markets with different timeframes (day-ahead, intraday balancing, reserves and network restrictions market) and the establishment of uniform requirements with regard to different (energy) products. In regard to flexibility services, Elering supports regional cooperation as well as cooperation between TSOs and DSOs. Based on the European Commission's vision in the Clean Energy Package, Elering envisions, for the purpose of better introducing flexibility services to the market and increasing liquidity on the balancing market, the need to enable participation in the market by all parties able to provide service - both integrated aggregation, independent aggregation and independent production/consumption that is able to fulfil the minimum supply requirement without the need for aggregation. Greater liquidity on the market should result in lower balancing energy prices and thereby have a positive effect on market participants, including balance administrators and consumers.

To better involve consumers in the electricity market and make more effective use of flexibility services, it will be important to allow the flexibility existing in the grid to take part simultaneously in supplying different products (various system services, regulation reserve) and to offer products simultaneously to different users - both TSOs and DSOs and other producers and consumers and electricity sellers. To make such effective use of flexibility, it will be key that flexibility enters all market levels and that we create an environment suitable for it (in the form of a market framework and flexibility platform) that would allow the various market players to engage in coordinated relations and the optimum use of flexibility in resolving grid problems as well as from the standpoint of enabling the maximum profit for resource owners. To enable flexibility to enter the local market, it will be necessary for DSOs and TSO and other market participants to work closely together.

Besides the introduction of flexibility into local markets, a need is seen in Europe for connecting flexibility markets and the corresponding trading environments across borders, which, enabling greater market and more involvement of market participants, would also lead to an opportunity to supply greater services and simultaneously lower market prices. Considering the small size of Estonia and the Baltics in general and the low liquidity in the Baltic regulation market, Elering's vision also provides for the creation of a regional flexibility market in the Baltic region and, if possible, in the Nordic region as well.

Our use of the term "flexibility market" refers to a market framework and flexibility platform as a marketplace, which connects various flexibility products and makes it available to various electricity market stages. The following diagram illustrates the flexibility platform:

Figure 3.4
Links between flexibility platform with various stages of the electricity market



Proposed actions for implementing the vision:

Elering proposal:	Who?	What?	Elering action
Create a regulative framework in Europe for integrating flexibility services in the market, including changing the rules with regard to an incentive framework for network development.	EU and member states	Propose definite principles for a market framework for involving flexibility for all market levels. Developing uniform standards for and usage principles for flexibility markets and developing principles for settlement and suitable baseline model.	Deal with the topic regionally in cooperation with other Baltic TSOs, also engage in close cooperation on the topic with Nordic TSOs, above all Fingrid, with the goal of proposing a regional market model primarily on the regulatory market and, in the longer term, for taking part in all market stages, and to develop suitable baseline methodology. Treating the data exchange principles in the Horizon2020 project EU SysFlex.
Treat consumption management on equal grounds with other system services providers.	TSOs	Designing auctions that have the least market-distorting influence	Procuring system services from all market participants on the basis of a standard regulation contract.
Elering and other TSOs should promote a market-based approach to consumption management, at first on the balancing market, but in the longer term in other market phases, allowing the consumer and aggregator to take part in the market without the Seller's consent for aggregating consumption and proposing ways of integrating aggregators on the market.	Member states' TSOs	Taking into account aggregated capacities in procuring system services.	Procuring system services from all market participants on the basis of a standard regulation contract.
Developing a regional flexibility market and flexibility platform.	TSOs and DSOs in the region	Mapping regional needs and developing flexibility services requirements. Developing principles for data exchange and coordination among TSOs and DSOs and across borders.	Treating the data exchange principles in the Horizon2020 project EU SysFlex. Creating a regional flexibility platform, in cooperation with Estonian, Latvian and Finnish TSOs and DSOs.

Involving consumption management on the market

3.2.3 Digital solutions for enabling flexibility

To bring consumers to the market, including for using managed demand on the system services market, it will be important for market signals and information to reach the consumer to allow them to make decisions with sufficient efficiency. Elering supports the introducing of smart solutions to the market as regards flexibility of consumption and production and energy efficiency by way of ensuring non-discriminatory access to consumers' data.

The adoption of both smart and remote-read meters will allow hour-based, and eventually close-to-real-time price signals to reach consumers In Estonia, all metering points are equipped with remote-read meters.

In implementing consumer-side solutions, the availability of information and data is of key importance alongside the dynamic pricing of energy, network fees and various other charges. Availability of data will make possible the following:

1. Introducing consumption management solutions to market - metering data necessary to prove that reconfiguration of the electrical connection did indeed take place.
2. Consumers can make informed choices as regards energy packages
3. Offering energy efficiency and energy monitoring solutions for a greater number of customers on the basis of existing metering data
4. Allowing new business models and services (e.g. repairing energy consuming equipment before a malfunction occurs, after a deviation in consumption data is detected and much more)

As to organizing data management, we highlight three principal points.

First of all, it is of critical importance that access to data takes place without discrimination. The organization of data management must not be within the power of a single market participant but should rather be organized neutrally, as otherwise the free functioning of the market will not be ensured. Thus, it would be suitable for the state-owned TSO - which does not have a position on the market - to organize data management.

Secondly, the organization of data management must be consumer centred. The European Commission initiative envisions that member states are obliged to organize data management and exchange of data. Access to data must be simple and it must be possible for end consumers to choose whom to share their data with. Member states must determine and certify a data manager, and all interested parties (sellers, aggregators, network enterprises, energy service undertakings, etc.) must have access, with the consumer's consent, to the consumer's data. In organizing data exchange, it must be guaranteed that vertically integrated companies have no advantage when it comes to accessing data. The formats and procedures for European data exchange shall be established. Member states must also ensure the existence of a comparison website. The package aims to prohibit fees related to changing one's electricity seller, other than fees related to the premature termination of a fixed-term contract. In addition, the process of changing the electricity seller must be as economical, simple and rapid as possible.

In Elering's opinion, it is necessary to define the consumer as the owner of energy consumption data, and to ensure the availability of data on consumption and other relevant data to the consumer themselves and, if authorized by the consumer, to third parties, to implement a central data exchange platform at least nationwide, to organize data exchange by an independent party, to harmonize pan-European rules on data exchange and cyber security requirements, and to enable cross-border exchange of information.

Third, it is also necessary to consolidate data sources and energy-efficiency applications in one environment in a manner convenient to the client, e.g. an app enabling rapid and free-of-charge change of seller, in the form of a solution that enables a means of comparison or aggregation of consumption. Combining and consolidating data sources and applications will stimulate both the development of new, innovative solutions and lead consumers to consume more intelligently; using several applications will also magnify the savings effect for the consumer.

The smart network platform being developed by Elering, Estfeed, supports these principles. At Elering, we are now taking the next step toward enhancing data through further development of Estfeed, allowing the energy databases in Estonia and hopefully in future across Europe to be integrated into a single digital energy platform.

Elering envisions that the digitalization of the Estonian energy system will lead to a vision spanning companies and governments to be a global leader in digitalization of the energy sector. Denmark, Norway and Finland are about to become the next countries in Europe to deal with (above all) digitalization of the electrical system. To achieve the status of global leader, it will necessary to engage in cooperation as by itself every country is too small a market to offer a major platform for scaling. The availability of energy metering data across borders will make it possible to connect energy services markets and energy retail markets.

Proposed actions for implementing the vision:

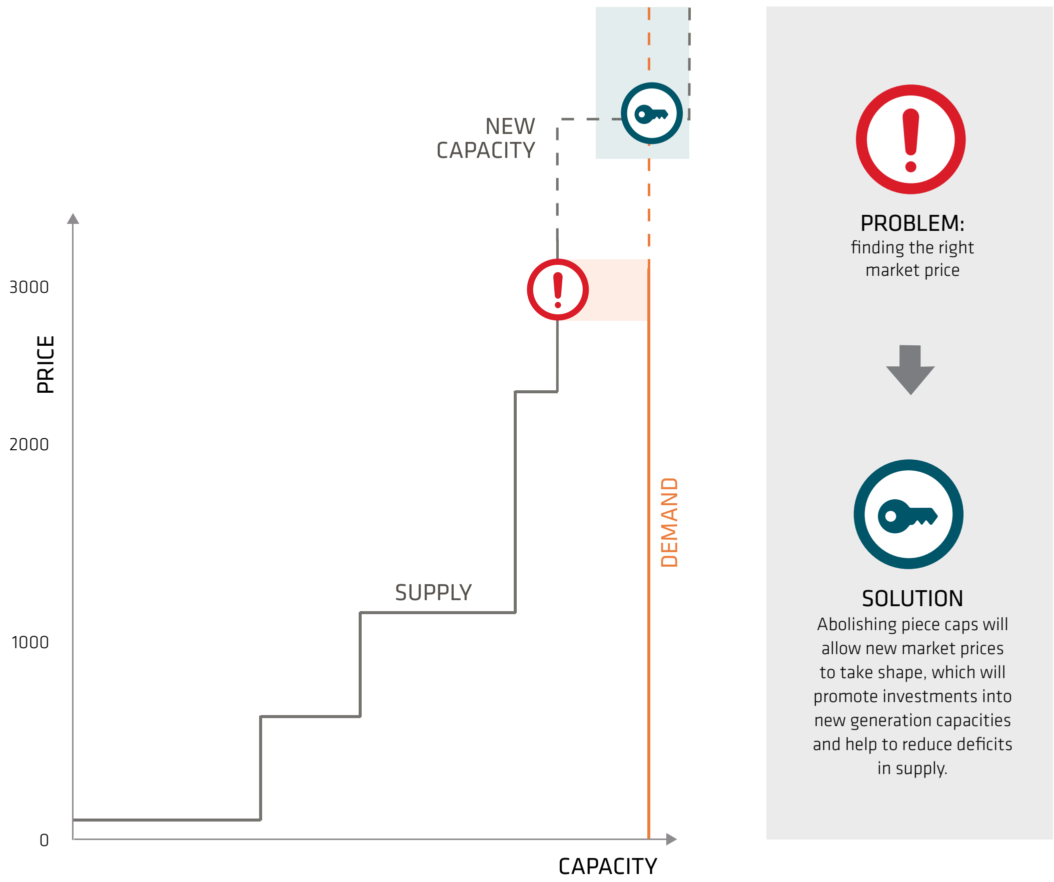
Elering proposal:	**Who?**	**What?**	**Elering action**
Regulate, in legal acts, the ownership of data, data exchange and access to data	EU and member states	Setting forth the consumer as the owner of consumption data, establishing a European data exchange standard.	Address the topic in the Horizon 2020 EU SysFlex project; support data exchange through a smart network platform
Launch regional data exchange to enable innovation, access to data and simple change of seller	TSOs in the region	Launching regional data exchange	Regional data exchange pilot projects
When installing metering systems, take into account their capability to send out data in close to real time (15 min)	DSOs	Installing new remote-read metering systems with near-real-time data exchange capability	Supporting exchange of near-real-time data through smart network platform, addressing the topic in the Horizon 2020 EU SysFlex project
Separating DSO from vertically integrated company	Member states	Ensuring equal access to data though separating DSOs from electricity generation companies	Ensuring equal access to data though smart network platform

Digital solutions for enabling flexibility

3.3 FINDING THE RIGHT MARKET PRICE/EFFICIENT ENERGY MARKET

Finding the market price on the power market is in essence a technical process, taking into consideration various time horizons and the mechanisms for reconciling supply and demand. All individual parts of the power market can be improved and made more market-based. The focus today is on development of short-term markets to allow renewable energy to be brought to market and to raise the liquidity of the market by integrating new solutions on the market (see Figure 3.5).

Figure 3.5
Finding the right market price. Abolishing price caps will allow new market prices to take shape, which will promote investments into new generation capacities and help to reduce deficits in supply



3.3.1 Harmonizing regional markets and developing integrated short-term markets

If the market rules for different time horizons are different by area and region and cause market distortions, prices will not reflect the actual value of power, as all parties will not be able to trade equally on integrated markets and use the possibilities of cross-border trading. In such a case, market integration would also be inefficient.

Today's short-term markets do not completely take into account the possibilities of using transmission capacities and prefer traditional day-ahead trades. This, however, means that the effectiveness of the markets is limited. In actuality, different market participants require transmission capacity in different time horizons. For instance, renewable energy plants with a variable production cycle will be able to trade more efficiently close to real time, as their actual production capacity and price will become clear only close to real time. At the same time, fossil-fuel-based plants can trade only a longer period ahead of time. In addition, the trading times and products vary by area, and this curtails cross-border trading even further.

Today's rules also accept market distortions such as agreed-upon price caps that keep prices from rising to fair value. When price caps are applied, the price does not reflect the actual relationship of supply and demand and therefore producers do not earn a fair fee in a situation where there is a deficit of generation capacities.

The EC's clean energy package emphasizes that the EU is able to cope with investments into the energy transmission system in a cost-effective manner only if markets are completely integrated. In the Clean Energy Package, the European Commission has taken the position that implementing Commission regulation 2015/1222, which establishes guidelines for distributing capacity and managing overload (hereinafter CACM) and the draft regulation on balancing the electricity system (Commission regulation 2017/2195, hereinafter GLEB) are the precondition for continuing integration of markets and making cross-border trading more effective.

In the Clean Energy Package, the European Commission envisions further steps for further development of more liquid and better integrated short-term markets. To ensure that renewable energy producers have opportunities to enter the market and compete against other market participants on equal terms, the European Commission recommends bringing gate closure for intraday trading transactions closer to real time and standardizing the properties of products traded on short-term markets (15min/60min, minimum bid amount, period, base load/peak load, etc).

To strengthen short-term and long-term markets and abolish market distortions, the maximum price caps should be set at least to Value of Lost Load (VOLL) level based on the bidding area. This will ensure fair price signals for making investments into new generation capacities and technologies.

In addition, the EC recommends that regional operational centres (ROCs) be established to standardize processes related to integration and to raise increasing cooperation between TSOs. The proposal is to give ROCs decision-making power on many regional issues as well.

In Elering's view, it will be important to establish fair and non-discriminatory market rules for cross-border trade of electricity in all time horizons and, in this manner, to increase competition on the internal electricity market, taking into account the specifics of domestic and regional markets.

On one hand, to ensure that renewable energy plants also have access to the market and also, as the actual value of electricity becomes clear only at the moment at which it is used, Elering considers it important to bring the trading time as close to the actual moment of consumption as possible. Along with the closest neighbouring TSOs, and the power exchange Nord Pool, Elering started a pilot project in 2016 where it shifted the gate closure for intraday trading (Elbas) to 30 minutes before the beginning of supply. The project has been successful and it has shown that the readiness and need of market participants to use a shorter time clearly does exist. Elering feels that the gate closure for intraday trading should already now be 30 minutes before the start of supply and that the length of the balancing period should be moving toward 15 minutes. For balancing settlement on the retail market, initial estimations indicate that it will be sufficient to divide the hourly metering data by four (if it is not possible to get more precise data than one hour).

The 15-minute balancing period would allow more accurate planning of balancing (more precise forecast data) and thus supports maintaining the frequency in the system (controllable production equipment will maintain the balance more precisely - every 15 minutes, not 60 minutes). This will become especially important after desynchronization from the Russian electricity system. In addition, it can be said that if the reserves controlled by the system keep the system more precisely in balance, it is possible, given the same reserves, to add more non-controllable generation equipment (such as wind turbines) to the system. This will allow the price of the consumed electricity generated to be valued more precisely, as the value of electricity is different at any given moment due to supply and demand. A shorter balancing period will provide better valuation of the flexibility that electricity so needs - on both the production and consumption side of things. This will create more efficient ways of managing consumption, which may make it complicated to make hour-long bids to the intraday market and markedly easier to put in 15-minute bids.

To increase the liquidity of short-term markets, Elering sees a number of possibilities. In addition to the harmonization of tradable products proposed in the Clean Energy Package by the European Commission, Elering considers it important that state (intraday) markets also take part in integrating the markets, to avoid the creation of parallel cross-border and domestic trading platforms. As an example, we can cite Germany's intraday markets, where a 15-min product is for domestic trading but cross-border trading relies on a 60-minute products. This will essentially lead to the inception of parallel markets, which will reduce liquidity.

In addition, Elering considers it important to take into consideration the fact that the actual value of electricity may be greater at the moment of consumption than was forecasted in the day-ahead time horizon. Thus, it may prove economically more beneficial to reserve part of the transmission capacity for the balancing market, when the electricity's value and this the value derived from use of transmission capacity are greater. It is important to emphasize that in the absence of creating value-added, it is not wise to reserve transmission capacity "just in case". Elering therefore considers it important to analyse whether and in what extent the reservation of transmission capacities for the use of the intraday and regulation market would increase general socioeconomic benefits and enable market access for renewable energy.

A significant consequence of the broad spread of renewable energy and sole use of the energy-based market model is a significant rise in peak prices. If the price of electricity is allowed to rise freely in deficit conditions, the market will give the right price signals to promote sufficient profitability for power plants and thereby promote investments as well. To preserve sufficient generating capacity for ensuring security of supply, the average prices on the electricity market must be close to the cost price of generating electricity. At the same time, however, renewable energy with low margin costs will, in most hours, take the price of electricity to a very low level. Elering supports the initiative to improve the price signals on the electricity market and thus is in favour of abolishing price caps.

Elering wishes to emphasize that it does not support the Commission's proposal to establish ROCs. Creation of ROCs would jeopardize security of supply through dispersing responsibility and a reduction in local competence. In addition, economic efficiency would also decline as the actions of TSOs and ROCs would be redundant. The ROC initiative does not take into account the already effectively functioning cooperation between TSOs. The digital, dispersed solutions of the energy system enable, through a coordinating platform, effective fulfilment of the objectives placed on TSOs, without the abovementioned risks ever being realized. Instead of concentrating system management in the hands of one central building, it is more efficient to provide standards protocols for data exchange, which the control centres in different countries would use to coordinate their own activities. A dispersed but interoperable system is more secure, efficient and reliable than central control.

Proposed actions for implementing the vision:

Elering proposal:	**Who?**	**What?**	**Elering action**
Implement intraday trading gate closure 30 minutes before start of supply	TSOs	TSOs harmonize gate closure on all borders 30 minutes before the start of supply	Making gate closure 30 minutes before start of supply on Estonian borders permanent; sharing experience with other TSOs; holding negotiations with Baltic TSOs for adjusting the balancing market gate closure closer as well
Shift in the direction of shortening the balancing period (and products traded on the power exchanges) up to 15 minutes	TSOs and power exchanges	Implementing 15-minute balancing period	In cooperation with Nordic and Baltic TSOs, transition to a 15-minute balancing period so that trading would proceed without a hitch
Consider reserving transmission capacities for the use of intraday and regulation market	TSOs	Assessing transmission capacity on intraday and regulation market	In cooperation with the other Baltic TSOs, analysing the need and potential socioeconomic benefit of reserving capacity based on experience of other countries
Shifting price caps to a level that would not limit the creation of price signals that would reflect the correct price of electricity, needed for making investments	EU and member states	Establishing new VoLL-based price caps	Supporting the proposal to shift price caps higher, supporting Estonian value of lost load (VoLL) calculation.
Harmonizing regional markets and developing integrated short-term markets			

3.3.2 Reforming the balancing market

Due to the shortcomings in the harmonization of balancing markets, balancing energy products do not move freely between countries, as a result of which the resources offered by balancing energy are not used efficiently. The European single energy market model includes both rules for the functioning of cross-border trade and the objective of harmonized balancing rules. The latter varies quite substantially across countries starting from the possibility of intermediating regulation energy across borders to different rules and products on the regulation market. For the purpose of creating a single energy market, harmonized balancing rules coupled with a regulation market will be obligatory for member states through GLEB.

GLEB will lay down clear objectives and harmonization requirements to remedy the current shortcomings, for example:

a) Intermediation of cross-border regulation energy and common regulation bidding lists on the basis of identical standard products and harmonized balancing market pricing rules.
b) Single European balancing market platform - all information about the balancing market must be available through a Europe-wide platform. Among other things, the market can also include methodologies and algorithms. Currently every country or region has its own information system and there is no consolidated platform.
c) Balancing responsibility for every market participant - all market participants, including renewable energy producers, must fulfil the balancing responsibility, which in the case of some countries means ending derogations.

The package of European Commission proposals includes the requirement of establishing balancing responsibility regardless of type of market participant or delegating the responsibility to market participants that are higher in the hierarchy. Deviations due to inaccuracies in forecasts of market participants must be settled on the basis of the actual value of electricity during the relevant trading period, and the price caps established on regulation markets should also be scrapped as they hinder price formation in circumstances where there is truly a shortage of electricity.

The rules for the regulation market and products must be adjusted such that they would take into account the ever increasing accrual of variable production sources, increase in flexible regulation capacity and the advent of new technologies. Technological capacity for accepting the flexibility market is growing; thus, it is possible to enable better conditions for flexibility (e.g. lower minimum bids). Whereas to this point regulation bids are activated by telephone, in the future it will be automatic, allowing a greater number of activations to be made.

Regulation energy must be procured based on the region's needs, by direction (up and down separately), transparently and based on a common regulation platform, based on margin price, without taking into account the fees for keeping reserve capacities. The regulation market must increase the level of operational reliability of the power market, ensuring maximum cross-border transmission capacities that are efficient as possible in all market timeframes.

On 1 January 2018, the common regulation market was launched in the Baltics, which is based on a single list of bids and based on a uniform principle. The regulation bid based on standardized products, activated to offset the imbalance in the Baltics, is now settled on the basis of margin price. In parallel to the launch of the regulation market, the Baltics also began to:

a) manage the system's capacity balance with a coordinated goal of increasing the cost-effectiveness of managing the electricity system, including to reduce the total imbalance in the Baltics through the functionality of offsetting imbalances within the Baltics (in real time);
b) clarify the calculation of systems' balances and balance administrators' balancing energy prices in coordinated fashion through the role of Settlement Coordinator with the goal of ensuring financial neutrality of the system operators as well as an imbalance pricing methodology that is as market-based as possible.
c) publish all regulation market and balancing area data on a single data platform, (https://dashboard.electricity-balancing.eu/).
d) apply the same balancing model for balance responsible parties and the same imbalance price methodology;

By applying all of the above, the Baltics prepared to implement the requirements of the electricity system's balancing grid code. On the basis of a new agreement between TSOs in 2018, the development of the balancing markets will be continued as follows:

- further development of Nordic-Baltic cooperation in the field of regulation reserves;
- implementing 15-minute balancing period by 2021;
- integration with the pan-European regulation market, including:

  a) all Baltic TSOs have joined MARI - the European mFRR balancing market project. The integration of the Baltic regulation market (2020+) is planned to be carried out through the single Baltic management IT platform (to be completed January 2019). The goal of MARI is to create a single manual frequency restoration reserve (mFRR) for Europe, which would ensure economically effective purchasing of regulation energy from manually activated FRRs and guarantee the uniformity of regulation energy products and closer cooperation between European TSOs.
  b) Baltic TSOs have agreed to carry out a study of implementation of automatic frequency reserves (aFRRs) by 2020. An input for the latter will be the assumption of joining the European aFRR balancing market platform as well (PICASSO).
  c) implementation of the pan-European electricity system balancing grid code methodologies.

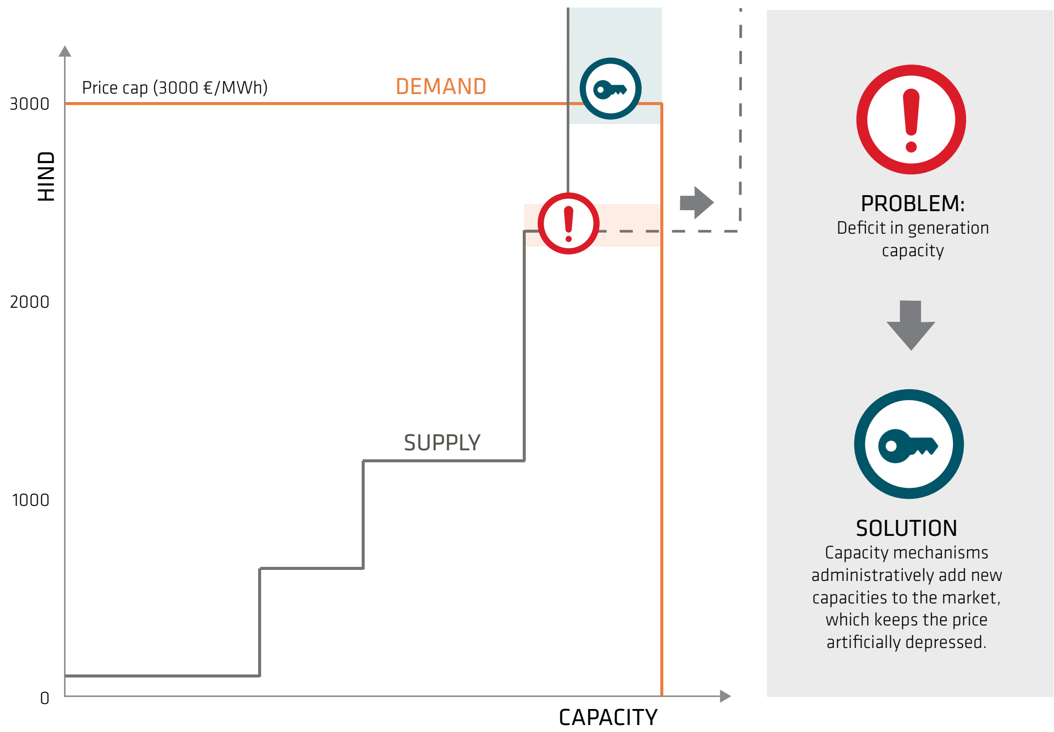
Proposed actions for implementing the vision:

Elering proposal:	Who?	What?	Elering action
Cross-border brokering of regulation energy, common bid list, harmonized principles)	TSOs	Harmonizing regulation market principles and enabling cross-border trading of balancing energy	Single Baltic regulation market 2018, cooperation at European level for creation of a common regulation market
Integrating local balance management smart network IT solutions with single European balancing market platform	Elering	Joining the pan-European project Manually Activated Reserves Initiative (MARI) to be ready to join the single European regulation market platform when it is launched	
Balancing responsibility - all market participants must fulfil the balancing responsibility obligation	EU and member states	Setting forth the balancing responsibility of all market participants in legal acts	Communicating the proposal to decision-makers
Reforming the balancing market			

3.4 DEFICIT IN GENERATING CAPACITY/GUARANTEED GENERATION ADEQUACY

If it is not possible to achieve, in an energy market-based manner, a sufficient level of security of supply, it is possible to administratively create (outside the energy market) investment signals for the necessary generating capacity and flexibility (see Figure 3.6). Such administrative investment signals may be described using the common denominator capacity mechanisms.

Figure 3.6
Deficit of generating capacity
Capacity mechanisms administratively add new capacities to the market, which keeps the price artificially depressed.



3.4.1 Measures outside the energy market – capacity mechanisms

In a situation where the aforementioned measures to develop the energy market are not applied or they lack sufficient impact, there may be a need for capacity mechanisms. Capacity mechanisms mainly have their effect outside the energy market to ensure security of supply. In addition, there may be a need for such measures during the transition period where energy market signals are not yet sufficient for bringing generating capacities or managed consumption capacities to the market.

The EC's Clean Energy Package calls for evaluation of pan-European and country-by-country generation adequacy. Based on these results, decisions can be made as to the necessity of the capacity mechanisms. According to the proposal, the abovementioned methodology for evaluating adequacy must be developed by ENTSO-E (organization of European TSOs) and approved by ACER (institution for cooperation between European energy regulators). In addition, before establishing capacity mechanism on the basis of ENTSO-E methodology, member states must compute the security of supply standard expressed as the energy not served or loss of load expectation. The member states must lift all regulatory measures that cause market disruptions. Only once the market disruptions are lifted may member states establish capacity mechanisms. Suitable capacities from other countries must also be allowed to take part in capacity mechanisms.

There are many measures that can be categorized as capacity mechanisms. Two of the most common are 1) strategic reserve and 2) capacity market.

Put simply, strategic reserve means procurement and maintenance of a special reserve meant for ensuring security of supply. The generation capacities under such a reserve do not take part in power markets on a daily basis; this prevents such a measure from having a distorting effect on the market. The consumption or generation capacities included in a strategic reserve are activated only when needed - in a situation where the capacities on the market do not ensure that consumption is covered.

The question when it comes to a strategic reserve is what impact it has on increasing security of supply, as capacities that would otherwise take part in the market with the total sum of capacities remaining the same might be reserved. The likely outcome of a strategic reserve is the postponement of closure of uncompetitive generation capacities, as they will be ensured a certain income level. A strategic reserve is not a suitable long-term measure as it is expensive to introduce new capacities to the market. Examples of countries that use strategic reserve mechanism are Finland and Sweden.

Put simply, a capacity market is an auction of capacities to the lowest bidder. Administratively the necessary level of generation capacities that will definitely be used is determined and market participants supply their existing or new generation capacities. The price of the auction is the lowest bid that covers the predetermined level of generation capacities, and this price will be paid as a fee per every MW of necessary capacity. The capacity fee ensures that the producers' investment is profitable, and this ensures security of supply.

Theoretically, expenses on electricity should be the same on solely the energy market as well as the energy market + capacity market, but due to its administrative nature, the capacity market may lead to additional market distortions. For example, in general a high generation capacities level is assigned at auctions, due to which more greater security of supply than would be economically reasonable is procured. For this reason, the total costs in the case of a capacity market are almost always higher.

Due to its nature of being outside the market, additional market distortions can be expected in the case of capacity mechanisms. In the case of well-designed capacity mechanisms, it is possible to reduce such distortions. Due to the growth in total societal expense, Elering's position is to use capacity mechanisms only as a last resort and only for a specific term, to resolve a specific security of supply problem. In other situations, the energy market should be sufficient to ensure security of supply and also the most cost-effective solution. In addition to this, Elering considers it important to establish potential capacity mechanisms with as broad a geographic range as possible. The most expensive ones for consumers are capacity mechanisms for a single country as they do not take into account other countries' capacities and the different peak periods in different countries.

Proposed actions for implementing the vision:

Elering proposal:	**Who?**	**What?**	**Elering action**
Avoid establishing capacity mechanisms before need is clear	EU and member states	Setting out in legal acts that established capacity mechanisms as a last resort	Preparing annual assessments of security of supply, explaining the principle to decision-makers
In a situation where the need for capacity mechanisms has been proved, and for the purpose of avoiding market distortions and excessive costs for consumers, establish a strategic reserve or capacity market over as broad a geographic areas as possible	EU and member states	Setting forth in legal acts that in the case of establishing capacity mechanisms, the mechanism is to be established over as wide a geographic area as possible	Preparing annual assessment of security of supply, explaining the principle to decision-makers
Measures outside the energy market – capacity mechanisms			

3.5 CONCLUSION

It is clear that the design of the electricity market has a determining role for ensuring security of supply at the local, regional and European level. Elering's vision of the electricity market proposes activities for developing the power market in such a manner that it would ensure the price signals necessary for security of supply. Enabling high peak prices and other recommendations herein Is necessary for the functioning of an electricity market that is solely energy based. The alternative is to pay producers for their capacity administratively, i.e. using capacity mechanisms. In such a case, profitability of generation capacities would be created in return for consistent payments for capacity. In Elering's view, both options are possible, but it is recommended to stick with the energy market. Capacity mechanisms are essentially additional administrative schemes to address existing market distortions, which will lead to new distortions and ultimately will be more costly for consumers.

Gradually abolishing production-oriented subsidies (including renewable energy subsidies and subsidies for conventional power plants) has a very important role in battling artificially low market prices and thereby creating fair competition. So does establishing fair trade rules vis-à-vis third countries.

To increase consumer price sensitivity and thus bring more consumers to the market, it is important to make available to consumers market-based dynamic price signals on the retail market through network fees and other charges and taxes. The integration of flexibility services with the market must be supported through the various measures in the Clean Energy Package. Harmonization and regulation of exchange of data that advances the cause of integration must also be given support.

In the energy system of the future, less energy and more information will circulate. If information belongs to consumers, the consumer will be stronger than ever before on the energy market. The Clean Energy Package must give all European consumers this opportunity. We want to "arm" the consumer with digital tools - to bring the fruits of liberalization of the European wholesale market to the individual consumer on a single retail market.

Security of supply will be supported by an efficient power market that allows the right market price to be determined on every timescale. Intraday trading must be brought closer to real time, the reserving of transmission capacities for short-term markets must also be considered and price caps that distort the market must be abolished, allowing price peaks to form.

The balancing market would be supported by more efficient cross-border distribution of regulation energy, a pan-European balancing market platform and establishing balancing responsibility for all market participants.

Administrative measures beyond the energy market should be adopted only as a last resort if the measures above cannot be implemented or did not have the expected impact. Capacity mechanisms should be structured on the principle that market distortions and expenses to consumers should be minimized.

Today's power market and the factors that impact it have undergone fundamental changes over the last almost 10 years. In designing the electricity market's future, important keywords are market-based, regional, promoting free competition, minimizing consumer costs and supporting introduction of renewable energy to market, while ensuring adequate security of supply in the whole region.

elering
GENERATING OPPORTUNITIES

Kadaka tee 42 / 12915 Tallinn
Phone: 715 1222
Fax: 715 1200
E-mail: info@elering.ee

www.elering.ee/en