Alternatives for the Estonian electricity system

What are the trends and challenges for the Estonian electricity system in the next decade?

Overview of the National Audit Office to the Riigikogu Tallinn, 6 November 2023

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Summary

"The state must plan its energy sector policies at least 30 years ahead, keeping in mind the principles of an open electricity market, the need to ensure the security of supply, EU climate goals and energy policies and the cost of the decision for consumers." This was one of the key messages in the 2012 audit "Alternatives for electricity production" of the National Audit Office. The annual report of the National Audit Office to be presented to the Riigikogu eleven years later, which this time addresses the problems of the energy sector in depth, could start the same way.

The Government of the Republic has not yet found a concrete and realistic solution to ensure that domestic and business consumers have the necessary quantity of electricity at all times and at an acceptable price in the future. Therefore, there may be a risk that in the event of a shortage of electricity in our region, the price of electricity will become too expensive for consumers. A clear perspective and action plan in the energy sector are also necessary for the development of economy and industry, and it would lead to the growth of Estonia's prosperity and competitiveness. In order to achieve security of electricity supply and attract investments to Estonia, it is necessary to invest in energy production, networks, including external connections, and stable availability of electricity at a reasonable price.

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1. The long-term planning of Estonia's energy economy has been difficult for years and years, and many important fundamental decisions regarding the development of the electricity system are still waiting to be made. Although the energy economy development plan 2035+ (ENMAK 2035+) is being prepared, the current working materials already suggest that the planned measures are too general. For example, the materials lack information about who does what and when, and where the funds come from. However, Estonia does not need just another development plan among many development plans; instead, Estonia needs clearly agreed goals, financing sources, concrete action plans, and to operate according to them.

In terms of renewable energy, a goal has been set that by 2030, at least as much energy is produced from renewable sources in Estonia as the total electricity consumed in Estonia in a year, but there is no specific action plan and, according to officials in charge of energy policy, there is no plan to prepare one either.

Security of supply shows whether electricity consumption and production, i.e., electricity supply, are in balance.

For your information

In 2022, more electricity was consumed in Estonia (8.2 TWh) than produced (7.6 TWh).

Estonia is part of the common electricity exchange of the Baltic States and Scandinavian countries and Finland. This means that the electricity produced in all these countries is sold on the electricity exchange, and the electricity consumed in each country is also bought on the exchange.

Electricity flows between countries through external connections. The situation of Estonian electricity supply and the price of electricity therefore significantly depend on the production capacities and external connections of Europe and, above all, neighbouring countries.

For your information

In 2022, according to Elering AS, the share of renewable electricity production was 31.7% of the total annual consumption.

Dispatchable production capacity – electricity production device, the production capacity of which can be quickly adjusted, i.e., produce more or less as needed.

A long-term agreement is needed foremost with regard to **dispatchable production capacities**, speeding up the **construction of wind farms** as well as the **establishment of domestic electricity networks** and **external connections**.

- **According to the electricity system operator Elering AS, dispatchable production capacities will not be added to the Estonian market until at least 2037.** The addition of dispatchable production capacities is hindered by the uncertainty of market participants. The experts interviewed by the National Audit Office during audits[1] considered it unlikely that private investors would want to establish new dispatchable production capacity in Estonia without State support. The reason for this is the non-profitability of the investment as dispatchable production capacity enters the market primarily when there is no wind, the sun does not shine or when the production of other renewable electricity is low.

  According to the European Union regulation on internal market for electricity, a Member State can only support the establishment of production capacities based on renewable sources without applying for a permission for granting state aid from the European Commission. However, renewable sources are mostly not used in dispatchable production capacities.

For your information

A study will be completed by the beginning of 2024, on the basis of which the State will decide whether a nuclear power plant should be built in Estonia.

Renewable electricity production capacities in 2022

Source	MW
Sun	510
Wind	317
Biomass	368
Other	8

Source: Elering, 2022. Report on security of electricity supply. P. 99

- **The potential of renewable electricity has so far been underutilised.** Electricity production from solar energy has made a big leap in Estonia in recent years – from 0.03% of total electricity production in 2016 to 7.4% in 2022, but no major wind farms have been added in ten years, so production of wind energy has not increased either.

  The reasons for this are varied: problems arising from national defence restrictions and their time-consuming resolution, court cases, slow planning and impact assessment procedures, etc. The Ministry of Economic Affairs and Communications (MEAC), which was responsible for the energy sector until the second half of 2023, has not been able to prevent problems in cooperation with other ministries and has instead attempted to resolve them after the fact. In March 2023, amendments to the Planning Act entered into force, which should give some time gain, mostly only a few months, in the planning process lasting approximately 3–5 years. At the same time, it is still necessary, for example, to simplify the process of connecting to the electricity network and speed up the timeframe of conducting environmental studies.

For your information

The National Audit Office performed its audit operations mostly before 1 July 2023. Therefore, throughout the report, references are made to the Ministry of Economic Affairs and Communications as the ministry who was responsible for the area until that time. Future recommendations, however, have been made to the Ministry of Climate, which took over the tasks from the MEAC.

- **The available connection capacities of Estonian electricity networks have been exhausted.** The islands and most of the mainland do not have available connection capacity for new producers. The number of applications, tenders and contracts to connect to the network currently significantly exceeds the amount of

[1] The overview is based on the National Audit Office's reports "Security of electricity supply in Estonia" and "The State's activities in the promotion of wind energy" to be published at the end of 2023.

available network capacity – the applications are approximately twice as many as the network can currently accommodate.

Until now, the development of networks has taken place in locations selected by renewable energy developers based on the capacities of Elering AS, Elektrilevi OÜ and other network operators. The Ministry of Climate should consider how funding for the construction and renovation of networks should continue and resolve the issue of whether and from which sources funding should be provided, so that network investments necessary from the State's point of view could be made much faster than before.

- **In the planning of new external connections for Estonia, neither the profitability of the possible projects nor the financing options have yet been determined.** The Ministry of Climate has considered the construction of the fourth Estonian-Latvian connection, the third Estonian-Finnish connection as well as a submarine cable between Estonia and Germany, but no decision has been made regarding any of the connections because the profitability of the projects has not been analysed and financing options for the construction of the connections are not clear.

- **Entrepreneurs are interested in developing electricity storage options, but the State must decide whether and how to promote the entry of storage capacity into the market.** One of the main obstacles to the development of the storage market is the incomplete vision of the development of the electricity system, i.e., it is not clear how much storage capacity the State wants to use and for what – for example, for frequency control or balancing renewable electricity.

- **In Estonia, there are no solutions for the effective implementation of demand response.** The prerequisite for improving demand response – the ability of consumers to sell their willingness to not consume electricity in a situation where demand is high – is the amendment of the laws. It would be necessary to implement a market model that would allow consumers to be involved in such a way that they would also benefit from lowering electricity consumption when demand is high.

2. There will be enough electricity production capacity until the end of 2026, but then the owner's expectations given to Eesti Energia AS by the State that require the company to ensure Estonian domestic dispatchable electricity production capacity of at least 1000 MW will come to an end. Because in 2027, according to the security of supply analysis, there may not be enough market-based capacity to cover consumption to the prescribed extent[2], the State can request a permission to grant state aid from the European Commission to establish a strategic reserve of electricity production capacity. In all likelihood, the old pulverised oil shale combustion capacities owned by Eesti Energia AS would most likely become a strategic reserve

For your information

Estonia's peak consumption, i.e., the maximum electricity production capacity needed simultaneously, is at approximately 1590 MW in 2023.

[2] According to the network code on the functioning of the electricity market, there may not be more than nine restricted hours per year, and the quantity of electricity not served may not exceed 4.5 gigawatt-hours (GWh/a).

because there is not enough time to plan or build new electricity production capacities by that time.

- **At the end of 2022, both a European level and regional security of supply analyses explicitly stated for the first time that Estonia may have a problem with security of electricity supply in 2027.** Every year, Elering AS has analysed the security of electricity supply with a view of approximately ten years, but until 2022, neither the European level nor regional security of supply analyses of used a methodology that would have taken into account the economic sustainability of electricity production equipment. Therefore, finding a solution to the possible problem of security of supply has only commenced now when options for this are fewer due to the limited time.

  In a situation where the analysis of security of supply shows a capacity deficit, the State can request a **state aid permit** from the European Commission to establish a strategic reserve for electricity production. The permission to grant state aid gives Elering AS the right to organise a reverse auction for electricity production in order to establish a strategic reserve. A tenderer for the strategic reserve may not participate in the market at other times and is compensated for this.

  The Ministry of Climate is planning to submit an application for the permission to grant state aid to the European Commission for the establishment of a strategic reserve for the years 2027–2030 at the beginning of 2024. Elering AS can enter into an agreement to establish a strategic reserve only after the permission has been obtained. Given the fact that there is very little time left to establish a reserve, it is highly unlikely that there is time to plan or build new electricity production capacities. According to Elering AS, the old pulverised oil shale combustion capacities owned by Eesti Energia AS will most likely become the strategic reserve. The late identification of the problem with security of supply has created a situation in which there is unlikely to be meaningful competition in the reverse auction, and new and potentially better, including cheaper, production capacities will not be entering the market.

- If the permission to grant state aid is not obtained from the European Commission, the resolution of the situation will depend on whether and how much renewable electricity and storage capacities will enter the market in the coming years, and how consumption can be further managed.

  If the aforementioned possibilities are not enough, the Ministry of Finance can obligate Eesti Energia AS to maintain adequate dispatchable production capacity at its own expense after 2026 to ensure security of supply. The question is whether and to what extent the entrepreneur is able to bear the loss resulting from this obligation. Among other things, it must be taken into account that keeping the production capacities in working order requires constant maintenance and keeping the necessary people employed, but the generation capacities would probably only be able to enter the market for a few hours a year. However, such operation could damage the entire Eesti Energia Group, including its renewable electricity projects.

For your information

According to Elering AS, as of 2022, the cost of maintaining a strategic reserve of 280 MW would be 18 million euros per year, i.e., for an average Estonian household that consumes about 3,000 kWh of electricity annually, this would mean an additional cost of about 57 cents per month and about 6.8 euros over the whole year.

3. In the event that after 2030, renewable energy is produced in the planned amount, Estonia will have enough electricity production capacities, but there may be a lack of controlled production capacities. Dispatchable production capacities are needed, among other things, to ensure the frequency of the electricity network. The choices and decisions needed to ensure dispatchable capacity must be made as quickly as possible. We must avoid a situation where late action limits options and does not contribute to the market entry of new and better capacities.

4. If the problems with the adequacy of Estonian production capacities and external connections are not resolved, there is a risk that the price of electricity will rise to a level that is unacceptable to our society. If decisions regarding how to ensure resource adequacy in 2027 and especially after 2030 are not made as a matter of urgency, there is a risk that the price of electricity will rise to a level that will worsen the well-being of consumers and become an obstacle to economic development. Ensuring affordable electricity prices to consumers is something that must be addressed now.

Person suffering from energy poverty – a person living alone or a family who has received subsistence benefit at least once in the last six months and those whose income per family member in the previous month does not exceed the minimum wage.

- **In Estonia, there is an unjustified regional inequality in the support of persons suffering from energy poverty.** According to the European Union directive on internal market for electricity, the Member States must ensure, in particular, adequate protection of vulnerable domestic consumers, i.e., persons suffering from energy poverty. These consumers are supported through subsistence benefit. Although subsistence benefit is state aid, the limits for housing expenses, including regarding the costs related to the consumption of electricity, are established by the local government.

  The limits for housing expenses are different in local governments, which is why the subsidies paid by the State to compensate for the high price of electricity are not the same for the recipients of subsistence benefit and they are not treated equally in different parts of Estonia. This, in turn, means that in some local governments, the support fully covers the electricity bills, while in others it does not, because the actual costs exceed the established limits. The price of electricity, however, does not differ in local governments. As of 24 July 2023, the difference between the largest and the smallest limit for reimbursable electricity is 16 times in local governments, similar to the results of the previous audit[3].

For your information

- The highest limit for reimbursable electricity was in Saue and Lääne-Nigula rural municipalities – 400 euros per the first member of the household per month;
- the lowest limit for reimbursable electricity was in Kiili rural municipality – 25 euros per the first member of the household per month. The limit was established in 2015.

- **We should prepare for exceptionally high electricity prices and develop possible support schemes that would be based on the support needs of consumers and that could be implemented quickly.** The high price of electricity in 2021/2022 showed that in certain situations even those consumers who are not directly classified as persons suffering from energy poverty or less privileged are sensitive to the price of electricity. However, the MEAC had not developed an opinion on what is an affordable price to the consumer or what measures should be implemented should the price exceed this limit. Therefore, the State was forced to urgently seek solutions to keep high electricity prices affordable, which ultimately resulted in

[3] 2023 audit of the National Audit Office "Management of subsistence benefit as national social assistance"

the introduction of blanket subsidies for everyone. In 2021–2023, almost 190 million euros were spent from the state budget to support (domestic) consumers.[4]

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The transformation of Estonia's electricity supply requires the State to make timely decisions, including amendments to legislation, as well as sufficient time, human, technological and financial resources. Unfortunately, this knowledge is also borrowed from the 2012 audit "Alternatives for electricity production" of the National Audit Office.

However, the difference compared to 2012 is that everything has to be done under even greater time pressure than before because many important decisions regarding the future of the energy sector have not been made in the intervening time. Due to its location and the security situation, Estonia must also be prepared for some part of the electricity system going out of order, in which case it must be possible to replace one element of the system with another. In such a situation, in order to avoid a deficit of production capacities, it is necessary to deal with external connections, renewable energy capacities as well as dispatchable capacities, including the control of electricity consumption and storage.

Unfortunately, in the autumn of 2023, the National Audit Office has to admit that we as a State do not currently know how to ensure security of supply and be ready to replace lost production capacities and external connections where necessary in four years. Our situation would be better if we could prepare reasonable and realistic plans for more years in advance.

What next? It is not easy to make choices because there are many variables, there are different options, and each of them has its pros and cons. When choosing one or another alternative for ensuring security of supply, it is important to find a balance point so that the choices are also affordable to consumers. It is nearly impossible to predict whether the decisions made now based on today's knowledge would be considered the best possible in retrospect sometime in the future. But it should not make decision-makers seize up. Worst of all is to not make decisions at all.

Janar Holm
Auditor General

6 November 2023

[4] In addition to this, subsistence benefits paid by local governments to persons suffering from energy poverty. The subsidy for the 2021/2022 heating period also includes subsidies allocated to business consumers, as the MEAC does not have separate data on domestic consumers.

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Overview of the topic area

1. The electricity system means a technical system for the generation, storage and transmission of electricity, which is composed of power stations located in the territory of Estonia, of the network which connects the power stations to one another as well as consumers[5] and the power systems of other countries, and the technical systems that support it.[6]

Electricity market – platform intended for trade in electricity, capacity and flexibility as well as ancillary services.

Source: Directive of the European Parliament and of the Council on the internal market for electricity

2. Since 2013, the Estonian electricity system has been part of the European single open electricity market. This means that the owners of electricity production capacities sell produced electricity to the common electricity exchange of the Baltic States, Scandinavian countries and Finland, from where electricity sellers can purchase it for resale to consumers. As such, the availability and price of electricity in Estonia depends, among other things, on the production of neighbouring countries and external connections.

3. Electricity consumption in Estonia in 2022 was 8.2 TWh.[7] According to a study commissioned by Elering AS, electricity consumption will increase to 11–14.6 TWh by 2050.[8] Electricity production in 2022 was 7.6 TWh.[9]

4. The forecast for peak consumption, i.e., the maximum electricity production capacity required simultaneously, is approximately 1590 MW in 2023.[10]

5. As of 2022, there is a total of 2543 MW of production capacity in Estonia[11], of which 1340 MW[12] are electricity production capacities using oil shale and 835 MW[13] are capacities that produce electricity from renewable sources (sun, wind and water). In addition, Estonia has two electricity connections to Finland – EstLink 1 and EstLink 2 – and three electricity connections to Latvia. The maximum transmission power of all electricity connections is a total of 3706 MW.[14]

6. The Ministry of Economic Affairs and Communications (MEAC) was responsible for planning the development of the electricity system and managing the implementation of the goals until 1 July 2023, and at the

For your information

Although the total Estonian production capacity exceeds peak consumption, this does not mean that consumption is covered by production at all times.

The potential production capacity that can actually be used is less than the available maximum capacity due to the effects of repairs and breakdowns of production equipment and the fact that the ability of some generation capacities to produce electricity depends on the availability of wind, solar and hydro resources.

Source: Website of Elering AS

[5] The report takes into account all electricity consumers, unless there is a limitation to domestic and/or business consumers.

[6] Electricity Market Act, passed 11 February 2003

[7] Source: https://dashboard.elering.ee/et. Added to this are losses, which make up about 4% of the total consumption.

[8] Study to determine Estonian electricity demand scenarios. Elering AS, Energex Energy Experts OÜ, Ea Energianalyse A/S, 20 September 2022

[9] Electricity supplied to the network by fuel type (Excel table). Website of Elering AS, 15 June 2023

[10] Report on security of electricity supply in Estonia. Elering AS, 2022, p. 97

[11] Report on security of electricity supply in Estonia. Elering AS, 2022, p. 99. Added to this the Kiisa Emergency Power Plant with a capacity of 250 MW.

[12] According to the data of Eesti Energia AS

[13] Report on security of electricity supply in Estonia. Elering AS, 2022

[14] According to the data of Elering AS, EstLink 1 is 350 MW, EstLink 2 is 650 MW and the connections between Estonia and Latvia total 2706 MW, including 1259 MW of capacity towards Estonia and 1447 MW of capacity towards Latvia.

time of publication of the report, the Ministry of Climate is the responsible ministry.

7. The manager, i.e., operator, of the Estonian electricity system is the state-owned company Elering AS, in which the interests of the owner are represented by the Ministry of Climate.

8. One of the most important tasks of the electricity system operator is to ensure the safe and reliable operation of the system, including that production and consumption are in balance at all times. For this reason, Elering AS is also responsible for the security of electricity supply and the operation of the transmission system or network.

Transmission system or network – electricity network through which produced electricity is transported over long distances closer to consumers. This also includes international connections.

9. According to the interpretation of Elering AS[15], security of supply shows whether electricity consumption and production are in balance to the required extent, and its task in ensuring security of supply is to assess whether the necessary electricity is available for the next ten years.

10. One of the goals of the European Union's long-term strategy for energy supply is to ensure, in the interests of the well-being of its citizens, the uninterrupted availability of energy, including electricity, on the market at a price that is affordable to all consumers.[16] The International Energy Agency[17] also refers to the same goal, believing that electricity, which is considered one of the basic necessities of life, should be available at an affordable price to everyone at all times. Security of electricity supply is guaranteed when there is enough electricity and its price is affordable.[18]

11. However, Elering AS does not take the electricity price component into account when analysing security of supply. The task of the Ministry of Climate is to ensure that, in addition to ensuring the adequacy of electricity, the price aspect is also taken into account when designing energy policy.

12. At the level of the European Union, the electricity system is mainly regulated by the regulation on the internal market for electricity[19] According to this regulation, production capacities are established on the basis of the electricity market, and without a state aid permit, a Member State can only support the establishment of production capacities that use renewable energy sources.

[15] According to the website of Elering AS

[16] European Commission Green Paper. Towards a European strategy for the security of energy supply, 29 November 2000

[17] International Energy Agency (IEA)

[18] Samantha Ölz et al. Contribution of renewables to Energy Security. Information Paper. International Energy Agency, 2007, p. 13

[19] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity

Reliability standard – an indicator consisting of two components:

- expected energy not served, i.e., EENS; and
- loss of load expectation, i.e., LOLE expressed through the number of restricted hours.

Source: "Report on the electricity and gas market in Estonia" by the Competition Authority, 2021

13. The Regulation places on the Member States the obligation to calculate the reliability standard. This shows how many hours with possible consumption restrictions and to what extent over the course of a year are socio-economically bearable for the country without excessive costs to society and the economy due to loss of energy.[20]

14. According to the Estonian reliability standard, there may not be more than nine restricted hours per year, and the quantity of electricity not served may not exceed 4.5 gigawatt-hours (GWh/a). This means that the number of hours when electricity consumption can be restricted even by a few percent may be nine in one year, and the total scope of this restriction may not exceed 4.5 GWh per year.[21]

15. The reliability standard is used in the European assessment of security of supply, i.e., the adequacy of resources, to determine whether, taking into account the known production and transmission capacities and probabilistic scenarios (see in more detail in clause 24 and onwards), security of supply is ensured without causing excessive costs to society and the economy.

Targets of the European Union climate and energy policy for 2030:

- Reduction of greenhouse gas emissions by at least **55%** compared to 1990 levels

  Source: European Climate Law
- Share of energy from renewable sources in the gross final consumption of energy is at least **42.5%**

  Source: Directive of the European Parliament and of the Council on renewable energy
- Reduction of energy consumption of at least **11.7%** compared to the projections of 2020

  Source: Directive of the European Parliament and of the Council on energy efficiency

16. In addition, in terms of security of supply, it is also important to take into account the targets that the European Union and Estonia have set for sources of electricity. There is no agreed target for renewable electricity for 2030 at the level of the European Union.

17. However, Estonia has, by amendment to the Energy Sector Organisation Act[22] In 2022, established the target that by 2030, electricity produced from renewable energy sources will make up at least 100% of the final electricity consumption (hereinafter also referred to as the RE100 target). This means that in 2030, at least the same amount of renewable electricity is produced as the total amount of electricity consumed during the year.

The problems highlighted by the National Audit Office in 2012 are largely still unresolved

18. The National Audit Office also analysed[23] alternatives and options for electricity production in 2012. At the time, the National Audit Office drew attention to the fact that it is important to plan the energy sector long in advance – at least 30 years, keeping in mind the principles of an open electricity market, the need to ensure the security of supply, the goals of the European Union climate and energy policies, and the cost of the decision for consumers.

19. The National Audit Office pointed out that in the future the production of electricity from oil shale may turn out to be uncompetitive, and the production of renewable electricity and the electricity network supporting it, including connections with other countries, should be promoted. The National Audit Office also pointed out in the report that, based on this, it should be decided from which sources and in what ratio production capacities should be available in Estonia and how much of the cost of their establishment and maintenance should be paid by people as consumers or the State, i.e., people in the role of taxpayers.

[20] Report on the electricity and gas market in Estonia 2022. Competition Authority, 2023
[21] Network code on the functioning of the electricity market, passed 14 February 2019
[22] An Act Amending the Energy Sector Organisation Act, passed 12 October 2022
[23] Alternatives for electricity production. National Audit Office, 2012

20. At the end of 2023, the National Audit Office will publish two audit reports on electricity: one on the promotion of wind energy and the other on the security of electricity supply. The audits revealed that the problems discussed in the National Audit Office's 2012 report are still unresolved.

21. According to security of supply analyses, Estonia may be short of production capacity in four years. This is due to the fact that the owner of electricity production capacities using oil shale may decide to close these production capacities as electricity produced from oil shale may not be competitive on the electricity market.

22. At the same time, the Ministry of Climate is working on several activities to resolve the problem. Among other things, efforts are being made to promote the introduction of more generation capacities producing electricity from renewable sources to the market, make the legal environment more favourable for demand response and storage capacities, and develop electricity networks. However, the ministry does not have specific targets in any of these areas or there is no action plan for the realisation of the targets set.

23. As the National Audit Office performed its audit operations related to energy mostly before 1 July 2023, the report consistently refers to the Ministry of Economic Affairs and Communications as the ministry responsible for the area until that time. Future recommendations, however, have been made to the Ministry of Climate, which is currently responsible for the area.

The long-term planning of the energy sector has been difficult

24. The narrower interpretation of security of supply, i.e., whether consumption is also covered by production in the future, without taking into account the price of electricity, is analysed at the Estonian level by Elering AS and at the European level by ENTSO-E (European Network of Transmission System Operators – electricity).

25. If the security of supply analysis reveals that the reliability standard cannot be adhered to, the State must first submit a plan for the elimination of market failures and distortions to the European Commission. If the elimination of market failures is not enough to ensure security of supply, the State can request a state aid permit from the European Commission to resolve the problem of production capacity deficit, i.e., to establish a capacity mechanism. (The National Audit Office addresses this topic in more detail in the report "Security of electricity supply in Estonia" to be published in November 2023).)

Capacity mechanism – a temporary measure to ensure adequate capacity, whose owners are remunerated for resource availability and readiness.

Source: Regulation of the European Parliament and of the Council on the internal market for electricity

The issue was explicitly raised for the first time in security of supply analyses in 2022

26. The ENTSO-E analysis published at the end of 2022 directly highlighted the problem of capacity adequacy for the first time. Should the scenario on which the analysis is based come to be, there will be 9.7 hours in Estonia in 2027 when there is not enough production capacity to cover consumption in the amount prescribed by the network code. The basis of the analysis is a situation where, from 2027, the old production

capacities using oil shale are no longer economically sustainable in Estonia, and the owner may decide to close them. (See more in clauses 75–85.)

Even after 2030, there may not be enough dispatchable production capacities

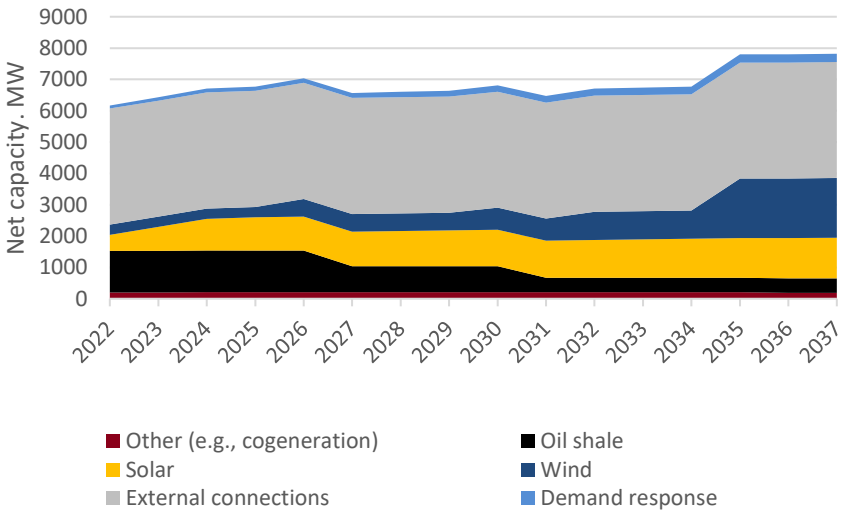
Dispatchable production capacity – electricity production capacity, the production of which can be increased and decreased as required.

27. Although, according to the ENTSO-E analysis, the reliability standard will not be exceeded in 2030[24], the transmission system operator Elering AS has pointed out in its 2022 security of supply analysis[25] that after 2030 there will be enough production capacities, but they are mostly intermittent capacities (which use renewable sources) and there is a lack of dispatchable production capacities.

28. According to Elering AS, given the current production portfolio, Estonia must have about 1000 MW of dispatchable capacity in order to ensure the safe operation of the electricity system, i.e., that, where necessary, it is possible, for example, to compensate for the shortage in production capacity or control the frequency of the electricity network.

29. According to data of Elering AS, Estonia will have a maximum of 883 MW of dispatchable capacity in 2031[26] (see also Figure 1). However, the data of Elering AS do not take into account the analysis of economic sustainability carried out by ENTSO-E, according to which the use of oil shale for electricity production will become uncompetitive from 2027. Elering's data includes 464 MW[27] of power plants using oil shale.

Figure 1. Production and transmission capacities and consumption management in 2022–2037



Source: National Audit Office based on the data of Elering AS

30. Eesti Energia AS also confirmed to the National Audit Office that their strategic goal is to stop producing electricity from oil shale by 2030 and in the future produce electricity only from biomass or waste gas, i.e.,

[24] According to the ENTSO-E 2022 analysis, there will be a total of eight hours in 2030 when consumption needs to be restricted even a little. 4.5 hours in 2025.

[25] Report on security of electricity supply in Estonia. Elering AS, 2022

[26] According to the data sent to the National Audit Office by Elering AS

[27] It is the net capacity of stations, not the actual production. Actual production may be less than net capacity.

shale gas generated during the production of shale oil. In electricity production, timber is mainly used as biomass.

31. However, according to the action programme approved by the Government of the Republic on 18 May 2023, the burning of timber in industrial electricity production will cease, including in the newest power plant of Eesti Energia AS, the Auvere power plant. The Minister of Finance has explained that wood waste, such as construction waste, which cannot be used for other purposes, could still be burned together with shale gas in the power plants of Eesti Energia AS.

32. Although it is currently unknown and Eesti Energia AS has not analysed how much the implementation of the plan of the Government of the Republic would affect the production capacity of Eesti Energia AS, it can be assumed that Eesti Energia AS would not be able to produce as much electricity in the future as is currently predicted by using only shale gas and wood waste.

33. Given that Eesti Energia AS is planning to end the use of oil shale in electricity production in 2030 and the Government of the Republic is planning to ban the burning of timber in electricity production as well, the deficit of dispatchable capacities from 2030 may be even greater than Elering AS has forecast.

In order to ensure security of supply, it is necessary to decide which solutions and to what extent need to be developed

34. If there are not enough resources for electricity production in the future, this means that without the addition of new production capacities or external connections, a situation may arise where the price of electricity is too expensive for consumers, i.e., not affordable to them (see clauses 120–145). There are several ways to avoid the situation, but all of them require the intervention of the Ministry of Climate.

35. In terms of both the price of electricity and the European Union regulation on the internal market for electricity, power plants based on renewable energy sources, such as wind turbines and solar plants, are preferred. However, these are non-dispatchable or intermittent production capacities as they depend on the weather conditions – whether the sun is shining and the wind blowing – and they cannot be regulated according to whether the demand for consumption is higher or lower at a given moment.

36. Therefore, alongside production capacities based on renewable sources, it is important to develop dispatchable capacity, including storage and demand response. External connections, which enable Estonia to use electricity produced in other countries, also play an important role in ensuring the adequacy of production capacities.

37. The Ministry of Climate (formerly the MEAC) has been addressing all the aforementioned topics, but no decisions have been made regarding some of them, and there is no certainty that Estonian consumers are guaranteed electricity at an affordable price in 2027 and from 2030 onwards.

Inadequacy of resources also affects the price of electricity

For your information

The price of electricity produced by each production installation and sold on the electricity market depends on the variable costs of the power plant, including the price of raw materials and environmental fees.

The variable cost of production installation based on renewable energy sources is the lowest because raw materials, i.e., renewable energy source, such as wind and sun, are free, and in most cases such power plants do not have to pay environmental fees, such as the price of a CO_2 quota.

Demand response, i.e., consumption management, means control of electricity consumption load where a consumer changes their consumption independently or through an aggregator by decreasing or increasing it.

Aggregator is a person who provides aggregation service, i.e., brings together and makes a joint offer to a system operator to sell or purchase consumers' consumption load or producers' production capacity.

Source: Electricity Market Act

Strategic reserve – reserve capacity mechanism where the transmission network operator organises reverse auctions in the event of a shortage of production capacities, in which the owners of electricity production capacities determined by a procurement can submit tenders. At other times, these capacities do not participate in the electricity market and the owners of electricity production capacities are compensated for it.

Source: Capacity Remuneration Mechanism for Estonia: Models and Assessment. A Report to Elering AS. AFRY, 2020

38. This report addresses the target related to renewable electricity (clauses 40–55); the necessity of developing electricity networks (clauses 56–64), including international connections (clauses 102–109); alternatives and obstacles to the addition of dispatchable production capacities (clauses 65–74); the topic of establishing a strategic reserve (clauses 75–85) and the potential of consumption management and storage (clauses 86–101).

39. However, the National Audit Office has not discussed in its report, for example, the use of hydrogen for electricity storage or the development of hydrogen infrastructure.

The potential of renewable electricity is underutilised in Estonia

40. The European Network of Transmission System Operators – electricity, i.e., ENTSO-E, has pointed in its resource adequacy analysis that the problem of the shortage of production capacities will be solved in 2030, provided that a large amount of production capacities based on renewable energy are added. A corresponding target – RE100 – is also set in the Energy Sector Organisation Act.

Less than a third of the target for the use of renewable electricity has been met

41. According to the forecast of Elering AS, 9.4 TWh of electricity will be consumed in Estonia in 2030.[28] As at 2022, 2.6 TWh of electricity was produced using renewable energy sources.[29] This means that less than a third of the RE100 target has been met. The main energy sources were biomass, wind and sun.

42. With the support of state support schemes, the production of electricity from solar energy has made a big leap in recent years – according to Elering AS, solar power plants in Estonia produced approximately 559 GWh[30] of electricity in 2022 (see also Figure 2).

For your information

Onshore wind turbines operate approximately 3,100 h per year;

Offshore wind turbines approximately 4,400 h;

Solar power plants approximately 1,000 h.

Source: Danish Energy Agency and Energiatalgud

43. However, in order to reach the targets of renewable electricity, it is important to promote wind energy, as the Government of the Republic wants to end the industrial burning of wood for the production of electricity[31] and hydroelectric potential is almost non-existent in Estonia. Solar energy is also significantly less efficient (i.e., the number of hours during which electricity is provided) than wind energy.

44. No major wind farms have been added in the last decade, and therefore the production of wind energy has not increased significantly either (see also Figure 2).[32] This is primarily due to the problems arising from national defence restrictions and their time-consuming resolution, court actions, slow planning and impact assessment procedures. (The National Audit Office addresses this topic in more detail in the report "The State's activities in the promotion of wind energy" to be published at the end of 2023.)

[28] Report on security of electricity supply in Estonia. Elering AS, 2022, p. 97

[29] According to the website of Elering AS

[30] According to the website of Elering AS

[31] Action programme of the Government of the Republic 2023–2027, underlying principle 6.1.23

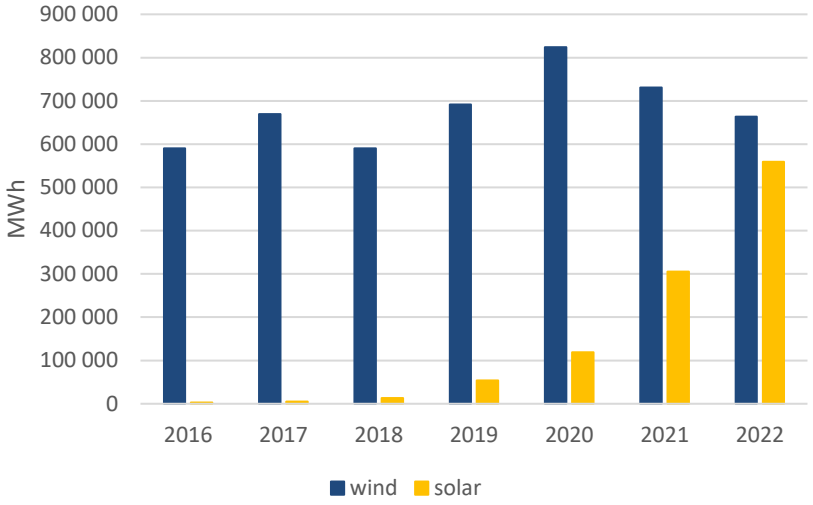
[32] According to the website of the Estonian Wind Power Association

For your information

In the Estonian marine waters, 2,439 km^2 have been approved as suitable areas for the development of wind energy by maritime spatial plans, the production capacity of which has been estimated at **15–17 GW.**

Source: Consumer Protection and Technical Regulatory Authority

Figure 2. Quantity of electricity produced from wind and the sun in 2016–2022



Source: Elering AS

There is a target for the production of renewable electricity, but there is no specific plan to achieve it

There is no action plan to achieve the renewable electricity target

45. The National Audit Office finds it questionable how the target of 100% renewable electricity provided for by the Energy Sector Organisation Act[33] is planned to be achieved. The target is specific, but the action plan necessary to achieve the target has not been developed. According to the Ministry of Climate, there are no plans to do this either.

46. The transition to large-scale renewable energy production will bring significant changes to both the electricity system and society in general, and for this, as the experiences of other countries show, a comprehensive analysis and action plan with an appropriate financing plan are needed. Among other things, the need to develop the electricity system should be taken into account so that it could maintain stability in case of large-scale renewable energy production.

47. In order to achieve the target, the necessary administration procedure should be established, i.e., how tasks are distributed between state institutions and how is their cooperation organised.

For your information

Prior to the decision of the Government of the Republic in November **2019** to acquire new radars and alleviate height restrictions, only **14%** of Estonia's mainland was suitable for the development of wind farms due to national defence height restrictions.

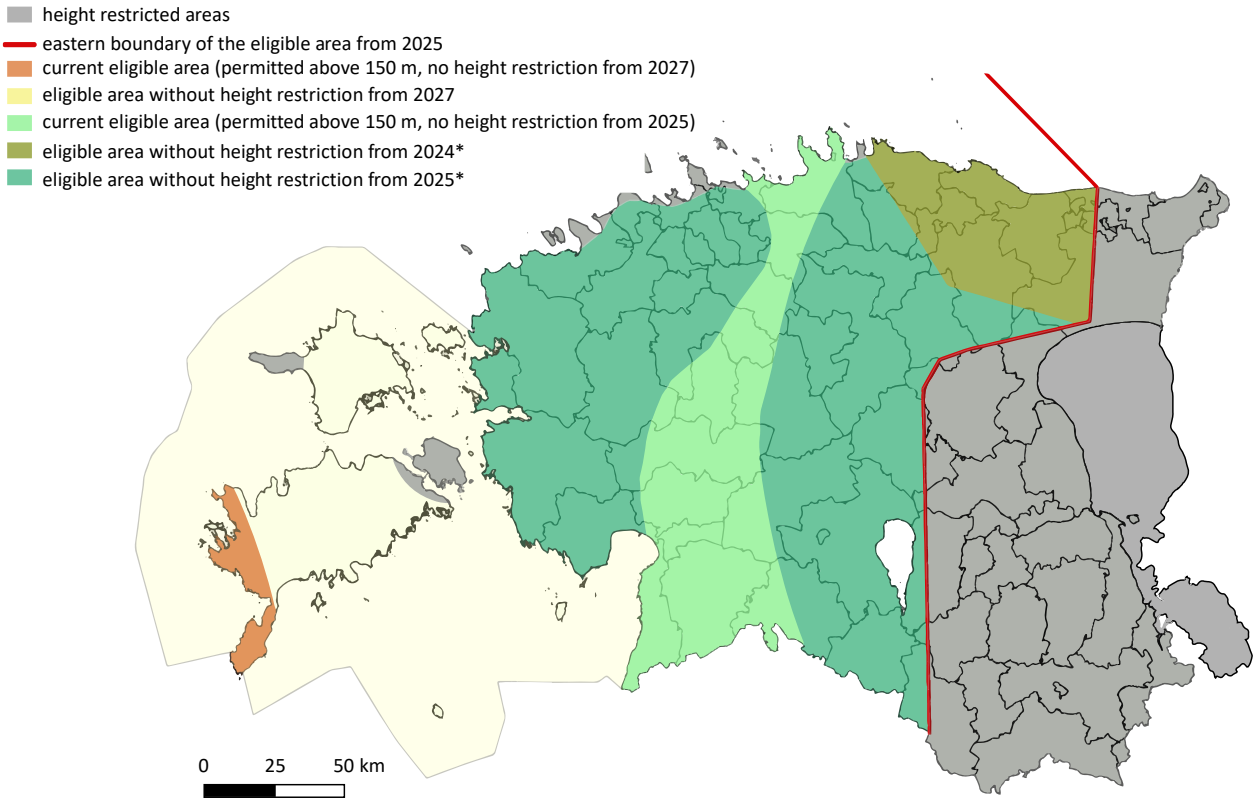
48. According to the MEAC, there have been lengthy preparations for the transition to renewable electricity, and the main focus has been on creating opportunities for new production capacities to enter the market. For example, charge for compensation for environmental nuisances has been established, which allows local governments to receive remuneration for the construction of wind turbines on their land.[34] (The National Audit Office addresses this topic in more detail in the report "The State's activities in the promotion of wind energy" to be published at the end of 2023.)

[33] Energy Sector Organisation Act, section 32[1]

[34] Environmental Charges Act, Chapter 3 (1)

49. The ministry also pointed out that, in cooperation with the Ministry of Defence, it has made investments in new radars, which would enable the construction of onshore wind turbines in Estonia in such a way that it would not interfere with the operation of the radars[35] (see also Figure 3).

Figure 3. Areas freed from national defence restrictions



* Except in the area of the eastern boundary and near the radars.

Source: National Audit Office according to the data of the Ministry of Defence and the Ministry of Regional Affairs and Agriculture

50. In addition, the ministry has invested in the transmission network of electricity in cooperation with Elering AS. The Ministry pointed out that a requirement was added to the expectations of the owner of Elering AS at the beginning of 2023 to commence with the development of the Saaremaa transmission network so that the new production area of offshore wind energy, which is intended to be built on the west coast of Saaremaa according to the Estonian maritime spatial plan, could be connected to the Estonian electricity system.[36]

51. It is a preparatory project for the wind area and transmission network being developed in cooperation between the Ministry of Climate and the Ministry of Economy of Latvia, which allows granting the area to the disposal of wind farm developers through an auction. The construction of the offshore wind farm should commence after 2030, and its expected output is 3 TWh/year, which is slightly more than a third of Estonia's current electricity consumption.[37]

[35] Uued radarisüsteemid vabastavad suure osa Eestist elektrituulikute kõrguspiirangutest – Tehnikamaailm, 21 June 2023

[36] Expectations of the owner to Elering AS. November 2022

[37] According to the website of the Elwind project

For your information

The assessment of the environmental impact of wind farms is prolonged, for example, by the fact that the Environmental Board has not gathered information on the results of studies carried out in wind farms and the results of follow-up assessments of operating wind farms.

Therefore, existing knowledge cannot be used, and new studies must be carried out when planning a wind farm. It also forces persons assessing the impact to spend more time searching for information about the impact of wind turbine, and the proposed mitigation measures may not be relevant and/or effective.

The National Audit Office addresses this topic in more detail in the report "The State's activities in the promotion of wind energy" to be published at the end of 2023.

52. At the meeting held in May 2023, the MEAC confirmed to the National Audit Office that it would also analyse whether and to what extent the State should support producers or give them guarantees (especially for offshore wind farms). The goal is to use taxpayers' money as economically as possible in order to reach the target of increasing the production of renewable electricity in Estonia by 2030 to at least the level of the total amount of electricity consumed in Estonia during the year (RE100 goal).

53. At the beginning of October, the Ministry of Climate presented a memorandum to the Cabinet of Ministers, where it outlined three possible measures to speed up the introduction of new renewable electricity production capacities to the market. According to the memorandum, the number of employees of local governments should be increased – this would enable spatial plans to be processed more quickly. The ministry would also instruct Elering AS to pre-develop a network for the planned production capacities and create advantages for major consumers consuming renewable electricity.

54. The memorandum, on the basis of which these three measures were chosen, did not reveal the expected impact, cost and schedule of these measures. According to the ministry's explanations, the measures were analysed. However, the results were not presented to the National Audit Office in writing.

55. The steps taken by the MEAC in abolishing restrictions on the introduction of renewable electricity production capacities on the market have been positive but driven by problems that have already occurred. For example, the elimination of all important obstacles in the planning and environmental impact assessment of wind farms and connection to the electricity network has not been addressed.

In order to add renewable electricity, investments also need to be made in the electricity network

56. ENTSO-E has highlighted in its vision document[38] that the production of renewable energy on a large scale requires the strengthening of electricity networks, i.e., increasing and developing the capacity of the network. The electricity system operator plays a very important role in the development of networks. According to the expectations of the owner of Elering AS, Elering's task is to develop the transmission network.[39]

57. Electricity system operators must identify and measurably determine the long-term needs of the system and communicate this information to the public. Based on this information, market participants can make investment decisions. Operators also play an important role in planning the electricity network and the necessary investments (also for balancing production and consumption through the development of storage capacities).

Estonia does not have a plan for the development of electricity networks

58. According to the National Audit Office, the Ministry of Climate should coordinate the cooperation of various state institutions and network operators and give Elering AS and Elektrilevi OÜ specific guidelines for the development of the electricity network in order to

[38] ENTSO-E Vision: A Power System for a Carbon Neutral Europe. ENTSO-E, 2022
[39] Expectations of the owner to Elering AS. November 2022

ensure the development of the network necessary to achieve the national target, including the RE100 target.

59. The MEAC, however, did not have a long-term network development strategy or plan, which would include the necessary investments, for example, to accommodate the RE100 target, the increase of electricity consumption, the electrification of transport or additional demand response and storage capacities. The Ministry of Climate, who has taken over the management of the area, does not have such a strategy or plan either. Elering AS or Elektrilevi OÜ, the largest distribution network operator, do not have a development plan either.

Distribution network – electricity network through which electricity supplied using the transmission network is directly distributed and delivered from the connection points of the transmission network to consumers.

60. Until now, the development of networks has taken place in locations selected by renewable energy developers based on the capacities of Elering AS, Elektrilevi OÜ and other network operators. The number of applications to connect to the network currently significantly exceeds the amount of available network capacity. According to Elering AS, as at the beginning of March 2023, there are applications, offers and contracts for connecting to the transmission network in various stages in the amount of about 7,000 MVA (1 MVA = 1 MW), which is about twice as much as the network can currently accommodate.

61. According to Elering AS, the amount of production capacity can be additionally connected to the Estonian electricity network without major reconstruction works depends on which region of Estonia the production capacity is planned for. The islands and most of the mainland do not have available connection capacity for new producers. However, Western Estonia is economically the most favourable for building wind farms, especially offshore wind farms. It would therefore be necessary to increase the capacity of the electricity network especially there.

62. According to the National Audit Office, the Ministry of Climate should consider how to finance the construction and renovation of networks. It should be decided whether and from which sources funding should be provided so that the necessary network investments could be made faster from the State's point of view. Otherwise, there is a risk that the achievement of the RE100 target will also get stuck behind the development of the network. (The National Audit Office addresses this topic in more detail in the report "The State's activities in the promotion of wind energy" to be published at the end of 2023.)

What did the National Audit Office find?

63. Although a goal has been set for 2030 to produce at least the same amount of electricity from renewable sources as is consumed during the year, the National Audit Office found that there is no action plan which would highlight what needs to be done to achieve the goal, who is responsible, how much money it would take and where it would come from.

64. The National Audit Office also found that the MEAC has not coordinated the development of electricity networks and has not given network operators guidelines to develop a network that would support the achievement of the set goal. According to the National Audit Office, the Ministry of Climate should establish specific activities (including the development of the electricity network of Elering AS and Elektrilevi OÜ) that are needed to achieve the goal of renewable energy production.

Market-based dispatchable production capacities are not known to be added

65. Due to the logic of the electricity market, problems with resource adequacy and high prices should signal the private sector to establish new production capacities. However, according to the data of Elering AS, new dispatchable production capacities, i.e., capacities operating on non-renewable energy sources or, for example, biogas, will not be added at least until 2037 (see also Figure 1).

The addition of production capacities is hindered by the uncertainty of market participants.

66. At the same time, discussions are taking place in Estonia about the possible construction of a nuclear power plant. As at 2023, the final report of the nuclear energy working group is still pending and should be completed in January 2024 according to the action programme of the Government of the Republic. The working group's interim report completed in October 2022 states that the possible nuclear plant will be completed in 2035 at the earliest.[40]

67. According to the Ministry of Climate, the purpose of the report is to point out both the risks and opportunities that the construction of a nuclear power plant would give. The report should be followed by a discussion and a decision on whether there is a place for nuclear energy in Estonia.

68. According to the ministry, private investors have shown interest in whether Estonia would need a power plant that uses gas as raw material, but there are no confirmed projects under development. Experts in the energy sector interviewed by the National Audit Office, however, pointed out that it is unlikely that private investors would want to build a gas-powered plant in Estonia without State support, as it may not be profitable. Consumption should be largely covered by renewable electricity as early as 2030, and there are not too many hours when the wind does not blow and the sun does not shine, i.e., when gas-powered plants could enter the market.[41]

Until 2026, oil shale production capacities of Eesti Energia AS will help to ensure security of supply

69. In August 2019, the Ministry of Finance announced for the first time that Eesti Energia AS, which is owned by the State and is also Estonia's largest electricity producer, is expected to guarantee at least 1000 MW of electricity production capacity in Estonia until the end of 2023.

70. Back then, it was a decision made on socio-economic considerations, among other things.[42] Eesti Energia AS[43] wanted to close some of the older units using oil shale in 2019 for economic reasons. However, this would have resulted in hundreds of people losing their jobs. The guideline was also extended in the current document on the owner's expectations, updated on 25 August 2022[44], until the end of 2026. This time, the goal was clearly to maintain domestic dispatchable production capacity.[45] Although, on the one hand, it ensured the availability of domestic production capacity in the situation of high electricity prices,

[40] Eestisse saaks tuumajaama ehitada 2035. aastaks. ERR, 17 October 2022

[41] Energy roadmap update – roadmap 2023. Rohetiiger, 2023

[42] Eesti Energia koondab kavandatust vähem. 3 September 2019

[43] According to an interview with the former chairman of the management board of Eesti Energia AS

[44] The owner's expectations for Eesti Energia AS. 25 August 2022

[45] Materials of the meetings of Cabinet of Ministers of the Government of the Republic on 17 March 2022, 14 April 2022 and 24 August 2022

according to experts, such State intervention increased the uncertainty in making new investments.

71. Both the MEAC and Elering AS have confirmed to the National Audit Office that the problems related to the competitiveness of capacities producing electricity from oil shale have been known for a long time. In its 2012 overview of alternatives for electricity production, the National Audit Office pointed out that as the price of CO_2 quotas rises, power plants producing electricity from oil shale become uncompetitive and that the focus should be on developing renewable electricity production capacities and the electricity network supporting them, including connections to other countries.

72. However, because the analyses of the security of electricity supply did not directly reveal the problem, and without a respective result of the analysis it is not possible to apply for a permission to grant state aid, the problem was resolved by extending the expectations of the owner of Eesti Energia AS, and the owner instructed them to maintain the dispatchable electricity production capacity in Estonia at least 1000 MW even if it is unprofitable for Eesti Energia AS.

73. There is also no clarity as to whether, in the future, there is a plan to extend the obligation of Eesti Energia AS to maintain production capacities using oil shale even after 2026 by updating the owner's expectations. This becomes especially acute in the event of a failure to obtain a permission to grant state aid form the European Union in order to establish a strategic reserve.

What did the National Audit Office find?

74. The National Audit Office pointed out already in its 2012 overview that the MEAC should decide what the electricity production portfolio of the Estonian state should be, i.e., it would be necessary to clarify to investors which production capacities are welcome here and which are not. When carrying out the audits that were the basis of this report, the National Audit Office had to once again admit that the Estonian investment environment is uncertain for the establishment of new electricity production capacities and there is no expected increase in market-based dispatchable production capacities.

To resolve the problem of resource adequacy, the Ministry of Climate is applying for a permission to grant state aid, but obtaining it can be difficult

75. Based on the ENTSO-E analysis, which highlighted that Estonia may not have enough production capacity in 2027 to meet the reliability standard, Elering AS recommended to the MEAC to apply for a state aid permit from the European Commission in order to establish a strategic reserve.

76. The Competition Authority is preparing a plan for eliminating market failures in order to prepare the application for a permission to grant state aid. The Ministry of Climate and Elering AS are compiling the materials needed to apply for a state aid permit from the European Commission for the establishment of a strategic reserve.

77. The application is planned to be submitted to the European Commission at the beginning of 2024, and after receiving the permission, Elering AS can enter into an agreement to establish a strategic reserve.

For your information

The Competition Authority[46] has calculated that each MWh not served costs the society 7,287 euros.

According to the ENTSO-E analysis[47], if the assumptions were to materialise, 1.75 GWh would not be served in 2027, the cost of which to the society would be **12.75 million euros.**

According to Elering AS, the cost of maintaining a 280 MW strategic reserve would be **18 million euros**[48] per year, i.e., 6.8 €/a when distributed among all electricity consumers[49].

The establishment of a strategic reserve requires obtaining a permission to grant state aid from the European Commission

The size of the reserve will be determined during the preparation of a procurement and depends on the prevailing market situation at that moment. The cost of the reserve will also become clear when it is determined what capacity of the reserve is offered.

78. According to the Ministry of Climate, it is most likely that, as a result of the procurement, the same power plants of Eesti Energia AS using oil shale, which according to the ENTSO-E analysis may not be competitive in 2027 without State support, will become a strategic reserve. According to the ministry, the reason is that there is very little time to establish a reserve, and it is therefore unlikely that new plants are built.

79. The application is based on the ENTSO-E analysis. According to the regulation on the internal market for electricity, the analysis must also be approved by the Agency for the Cooperation of Energy Regulators (ACER).

80. ACER did not approve the 2022 ENTSO-E analysis because, in the opinion of ACER, there are errors in the methodology.[50] ACER pointed out in its decision that the 2022 ENTSO-E analysis should not be the basis for identifying problems with the security of supply, i.e., for applying for a permission to grant state aid and establishing a strategic reserve.

81. The Ministry of Climate has confirmed that the application for a permission cannot be based on the 2022 analysis. According to the ministry, the basis will be the 2023 report, which is expected to be completed in December 2023.

82. If the new methodology for analysing security of supply is also flawed, there is a risk that the problem continues to exist, but no strategic reserve can be established to resolve the problem without a permission to grant state aid. The State does not have a back-up plan for such an event, as the ministry has been in a wait-and-see position, hoping that the European Commission would propose alternative solutions to address the problem with security of supply, which could be considered should the permission to grant state aid be denied. According to the National Audit Office, however, the Ministry of Climate should not wait for the results of subsequent security of supply analyses but should promptly develop measures in case it is not possible to obtain the permission to grant state aid.

83. It would also be necessary address alternative measures to resolve the problem of dispatchable capacities, which will remain even after receiving a permission to grant state aid and the establishment of a strategic reserve. The ministry has remained in a wait-and-see position in

[46] Decision no. 7-26/2020-007 of 3 July 2020 of the Competition Authority to determine the price of energy not served

[47] European Resource Adequacy Assessment 2022. ENTSO-E

[48] Draft concept for a strategic reserve. Elering AS, 2022

[49] Elering: aastal 2027 võib tekkida probleem elektri varustuskindlusega. Ministeerium soovib luua strateegilise reservi. Äripäev, 14 March 2023

[50] Decision No 04/2023 of the European Union Agency for the Cooperation of Energy Regulators

this regard as well and has admitted that if future ENTSO-E analyses show that the problem of production capacities continues to exist even after 2030, a new procurement will be organised.

What did the National Audit Office find?

84. Although the Ministry of Climate has continued with the preparations started by the MEAC to apply for a permission to grant state aid in order to establish a strategic reserve, obtaining the permission may be hindered by a flawed methodology. As of now, the permission to grant state aid would not cover the period from 2030 onwards when, according to the ENTSO-E analysis, there is enough production capacity, but lack of dispatchable production capacity according to the analysis of Elering AS.

85. According to the National Audit Office, however, the Ministry of Climate should not wait for the results of subsequent security of supply analyses but should promptly develop measures in case it is not possible to obtain the permission to grant state aid. The following subchapter outlines possible mitigation measures for the problem with production capacity problem – storage solutions and demand response.

Increasing the capacity of demand response and storage would also help alleviate the problem of balance between consumption and production

86. In addition to building new production units and keeping old ones in working order, there are also other solutions that contribute to the supply of electricity. According to Elering AS, storage capacities can be successfully used, for example, to manage the electricity system. In the event of a shortage of production capacity or faults in the electricity system (for example, a possible frequency fluctuation), stored electricity can be quickly fed into the network or its feeding into the network can be stopped. Demand response can also reduce peak consumption and thus the required production.

87. Although all the most important strategy documents – for example, the Energy Sector Development Plan (ENMAK 2030+) and the National Energy and Climate Plan (REKK 2030) – provide that both storage and demand response play a very important role in terms of security of supply and affordability of electricity prices, there are no direct goals for the development of demand response and storage.

The potential of electricity storage is great, but it has not been decided whether and how the entry of storage capacities into the market should be promoted

Water storage facility – a technological solution that consists of pumping water from a lower place to a higher place at a time when electricity is cheap, and using the energy generated by lowering this water again to produce electricity at a time when electricity is expensive.

88. According to an analysis[51] commissioned by the MEAC, the potential of electricity storage capacity in Estonia in 2030 is estimated to be 1625 MW. Two large water storage facilities with a total capacity of 725 MW are currently being planned in Estonia with the support of the European Union.

89. The largest is the storage facility of Energiasalv Pakri OÜ[52] (500 MW) planned in Paldiski, which would be able to supply 6000 MWh of electricity to the network in one operating cycle, i.e., 12 hours, or a little more than the average need of all domestic consumers in Estonia during that time. The second is the planned water storage facility (225 MW) of

[51] Analysis and proposals for the launch of the energy storage market. FinantsAkadeemia OÜ, 2022. Pp. 16–17

[52] According to the website of Paldiski energy storage

Eesti Energia AS in Ida-Viru County.[53] The company also plans to acquire a storage facility with a capacity of 25 MW as a pilot project in Ida-Viru County.[54] All three storage facilities are so-called long-term energy storage solutions.

90. Short-term storage, which allows storing a maximum of 6 hours of electricity, mostly battery banks (e.g., storing solar energy in sunny weather and consuming it in cloudy weather) is more problematic because purchasing such storage facilities is expensive. The State has not set conditions for the installation of storage facilities at solar parks, nor has it supported it very much.[55]

91. According to the analysis commissioned by the MEAC, the development of the storage market is mainly hindered by the fact that the strategic vision for the development of the electricity system is incomplete. It is not clear how much storage capacity is intended to be used and for what purpose – for frequency control or balancing of renewable electricity.

92. According to the analysis, regulatory obstacles, including the bases for calculating network charges, have also been a problem. However, according to the MEAC, the plan is to amend the legislation so that when calculating network charges, storage is not treated on the same grounds as the so-called normal production capacities. One alternative is, for example, that when it comes to storage, network charge is not required for all the electricity purchased from the network, but only for the difference between the purchased and sold electricity, i.e., network loss.

93. According to the MEAC, there are also plans to commission a study that would highlight the socio-economic impact of storage depending on how much storage capacity is established. The study should be completed at the end of 2023, after which the ministry plans to prepare a draft legislation to revive the storage market.

94. According to the MEAC, whether storage solutions require state guarantees is also under investigation. In an interview with the National Audit Office, the ministry pointed out that storage solutions are such a new technology that banks may initially be noncommittal when granting loans. Therefore, state support may be needed. The ministry collects information on international practice and input from related market participants. The information used is also planned to be used in the preparation of the draft legislation for revitalising the storage market.

95. In addition, according to the ministry, the system operators of the three Baltic States will launch two flexibility service markets after connecting to the continental European frequency band, i.e., at the beginning of 2025 at the earliest, which will create an opportunity to participate in the market for storage solutions.

Flexibility service – a service that permits, in a cost-effective way, to reduce the need to increase or replace the throughput capacity of the network by expanding the electricity market, among others, to producers of electricity from renewable sources, to distributed producers, to market participants participating in demand response, to undertakings operating energy storage activities, and to providers of reserve capacity required for system management.

Source: Electricity Market Act

[53] Water storage facility of Eesti Energia AS

[54] Eesti Energia soetab Eesti esimese energia suursalvesti. ERR, 31 May 2023

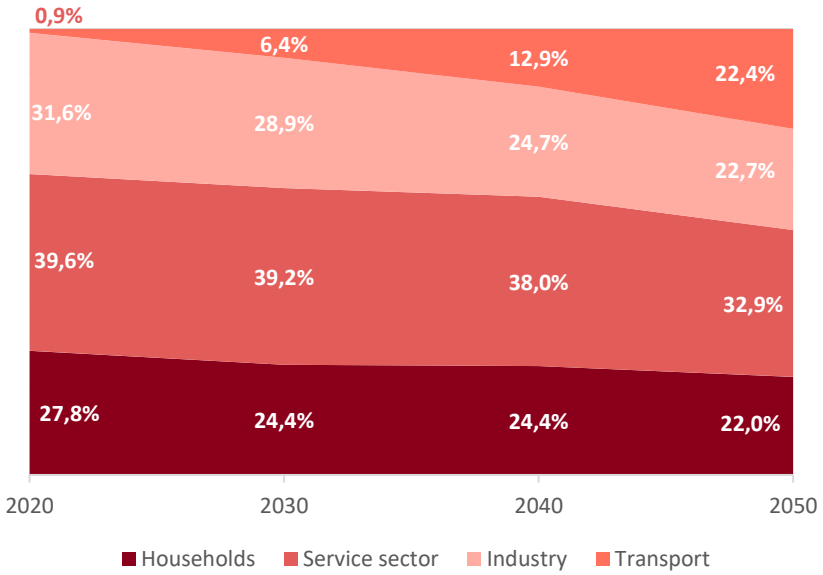
[55] In 2023, the Environmental Investment Centre financed electricity storage with 1.5 million euros from the measure for the development of pilot projects for energy storage installations.

Laws need to be amended to take advantage of the potential of demand response

96. These markets can also be participated in through demand responset. In terms of security of supply, demand response allows reducing peak consumption. The electricity system then needs less electricity production capacity to cover peak consumption, and this in turn means that the load on the electricity network is lower.

97. According to the data of Elering AS[56], households accounted for 27.8% of total consumption in 2020, and their share will decrease to 22% by 2050. See also Figure 4 for more detail.

Figure 4. Projected proportion of electricity consumption by sector



Source: Elering AS

The two flexibility service markets to be established will trade the following reserves:

aFRR (automatic frequency restoration reserve), which starts up in minutes;

FCR (frequency containment reserve), which starts up in seconds.

Elering AS assesses the need for both products, and based on this, the corresponding capacities are procured. In addition to the two new markets, it is already possible to participate in the market for **mFRR** (manual frequency restoration reserve). However, these are generally considered to be a slow reserve.

Source: MEAC and the Competition Authority

98. In all the sectors indicated in Figure 4, it is possible to significantly control consumption, i.e., shift consumption to another time. However, the potential of demand response was last assessed in 2014. Back then, Elering AS and Tallinn University of Technology found that the potential could be on average 213–407 MW per hour.[57] According to the analysis, households have the greatest potential (e.g. by implementing the automation of buildings and equipment). Theoretically, it would be possible to reduce peak consumption by one-third through demand response.

99. According to a recently published analysis[58], the biggest obstacle is the establishment of such a market model, which would enable the involvement of domestic consumers in such a way that they would also benefit from it. The so-called aggregation of consumers, where different consumers whose "non-consumable" electricity can be traded on the market are grouped together, is technologically complex as well as expensive.

Aggregation – the activity consisting in combining the consumption load of consumers or the generation capacity of producers for sale or purchase in the electricity market.

Source: Electricity Market Act, section 3

[56] Report on security of electricity supply in Estonia. Elering AS, 2022

[57] Argo Rosin et al. 2014. Tarbimise juhtimine. Suurtarbijate koormusgraafikute salvestamine ning analüüs tarbimise juhtimise rakendamise võimaluste tuvastamiseks. Elering AS, Tallinn University of Technology. P. 54

[58] Energy roadmap update – roadmap 2023. Rohetiiger, 2023

100. The MEAC, in cooperation with the Competition Authority and Elering AS, has formed a demand response working group, which has been analysing the establishment of a demand response market framework since at least the beginning of 2020. According to the Ministry, the aim is to create an opportunity, through a law, for independent aggregators to operate on the day-ahead market[59]. For this purpose, it is necessary to include a day-ahead demand response compensation model to the law, which would enable both energy-based and financial accounting between aggregators and balance providers of end consumers. The problem so far has been that market participants have different views on what the model should be. According to the ministry, as of October 2023, it has not yet been possible to find a consensus on a suitable approach.

What did the National Audit Office find?

101. Although the Ministry of Climate is preparing amendments to the law and preparing analyses, neither the target for storage nor demand response nor the activities to achieve it have been determined. Since both demand response and storage are measures to alleviate the problem of inadequate production capacity, according to the National Audit Office, the ministry should decide to what extent it wants to develop storage and demand response and what changes need to be made, among other things, in legislation, the electricity network or subsidies.

In order to ensure resource adequacy, it is necessary to invest in external connections, but relevant decisions have not been made

In addition to the domestic electricity network, it is also necessary to develop external connections

102. In terms of security of supply and export, in addition to establishing new production and storage capacities and demand response, it is important to develop connections to other countries. According to the Communication from the European Commission[60], Member States should improve cross-border electricity connections if even one of the following criteria applies:

- the price differential exceeds an indicative threshold of 2 €/MWh between Member States, regions or bidding zones;
- the nominal transmission capacity of interconnectors is below 30% of their peak load;
- the nominal transmission capacity of interconnectors is below 30% of installed renewable generation capacity.

103. According to the updated version of Estonia's National Energy and Climate Plan (REKK 2030)[61], one of the three criteria has been realised as of 2021. The average price differential of the exchange price of electricity at the Estonian-Finnish border was 14.39 €/MWh. Based on

[59] The day-ahead market is the part of the electricity market where physical electricity supplied the next day is traded on the stock exchanges for each market period (in 2022, the market period was one hour).

[60] Communication on strengthening Europe's energy networks. COM(2017) 718. Brussels, 23 November 2017

[61] Estonia's 2030 National Energy and Climate Plan (REKK 2030). Draft of the updated version for submission to the European Commission. The draft was submitted on 9 August 2023.

the guidelines of the European Union, electricity connections between Estonia and Finland should therefore be improved.

104. External connections are also important for ensuring security of supply because in the case of a deficit in one country, it can be compensated by the overproduction in another country.

105. According to the Ministry of Climate, the establishment of the fourth Estonian-Latvian connection, the third Estonian-Finnish connection as well as the construction of the submarine cable between Estonia and Germany are being studied. According to the information of the ministry, the expected capacities of the fourth connection between Estonia and Latvia are 700–1000 MW, the connection between Estonia and Germany is 2000 MW, and the third connection between Estonia and Finland (EstLink 3) is 700 MW.

106. According to initial plans, EstLink 3 should start operating in the early 2030s.[62] According to the ministry, the cost of the project was estimated at 630–720 million euros a few years ago. In the meantime, however, prices have risen and risks have increased significantly, and according to the ministry, it is expected that establishing a connection will therefore become significantly more expensive.

107. The third Estonian-Finnish connection and the fourth Estonian-Latvian connection are listed as planned connections in the ten-year development plan for the pan-European electricity network, and both are included in the list of projects of common interest of the European Union. The final list will be published in the spring of 2024, and being included in the list enables applying for co-financing from the European Union for the implementation of projects.

108. According to the ministry, Elering AS is preparing an overview for the Government of the Republic on the possibilities of establishing new external connections, and it should be completed by the end of November 2023. The government can then decide whether and what it wants to do.

What did the National Audit Office find?

109. Although the Ministry of Climate is planning a number of electricity interconnections, no decision has been made regarding any new connections, and their establishment depends on the profitability of the projects and financing opportunities.

Estonia does not have an up-to-date energy strategy to guide the development of the energy sector

110. As was revealed above, there are several options for addressing the problems of security of supply, but Estonia does not have a long-term, up-to-date strategy that would set the directions for the development of the electricity system.

111. The importance of a long-term strategy has also been emphasised by several energy-related parties and researchers. A strategy which

[62] Eesti-Soome elektriühendused kataks EstLink 3 valmimisel siinse tiputarbimise. ERR, 28 June 2022

establishes the long-term goals of the area also gives entrepreneurs, including energy-intensive industries, confidence in making investments.

For your information

Finland's newest nuclear power plant, Olkiluoto 3, was approved by the Finnish Government in February 2005, but the plant did not start producing electricity regularly until the spring of 2023.

Source: website of the nuclear power plant Olkiluoto 3

Energy security – secure, safe and affordable availability of energy. Energy security also includes security of supply.

Source: International Energy Agency

112. In 2017, the Government of the Republic approved the new Energy Sector Development Plan 2030. However, the industry experts interviewed by the National Audit Office pointed out that ten years is too short a time for planning the energy sector, as implementing changes, such as planning and establishing new production capacities, is resource-intensive and time-consuming.

113. A long-term view is presented in the General Principles of Climate Policy 2050, approved by the Riigikogu in 2017.[63] According to the National Audit Office, however, the strategy does not cover opinions on important issues, such as whether to support the achievement of energy security in electricity production through local, i.e., scattered production; whether and to what extent to use the potential of (offshore) wind energy; whether the Government should coordinate the development of electricity networks and hydrogen infrastructure for renewable energy production. The strategy is also already outdated, as it does not recognise, for example, climate neutrality, RE100 targets or later climate and energy policy targets adopted at the European Union level.

114. The current Energy Sector Development Plan 2030+ is also outdated in terms of content, failing to recognise up-to-date climate and energy policy targets set at the level of the European Union and Estonia. The Ministry of Climate is therefore preparing a new development plan – Energy Sector Development Plan 2035+. The development plan should be completed in 2025. This means that there is currently no up-to-date development strategy for the energy sector, and the new development plan once again only covers a ten-year period.

The measures of the working version of the new development plan are too general

115. The reports of the working groups for the preparation of the new development plan include targets and measures that already include the issues of network development and financing model, supporting renewable electricity production through several activities, storage and demand response, and creating flexibility solutions as well as supporting community electricity production.

116. At the same time, the measures of the new development plan are also too general. In some cases, there is no detailed description of the measures, and all the measures lack more precise activities. There are also no financing sources for the measures.

117. The current development plan and the development plan being prepared describe various technologies and areas related to energy, but do not establish specific activities to develop electricity production.

What did the National Audit Office find?

118. In the opinion of the National Audit Office, the Ministry of Climate should establish and present fundamental opinions to the Government of the Republic in order to make a decision, including on the basis of which sources and which production capacities the State wants to promote in the future, and what is the State's role in storage, distributed production and demand response.

[63] General Principles of Climate Policy 2050. Adopted by the Riigikogu on 5 April 2017.

119. A risk analysis should also be performed and an assessment should be prepared on what level of energy security Estonia wants and how to ensure it. In doing so, it should be analysed how much electricity needs to be produced in a distributed manner, how much we want to depend on external connections, where do the fuel and materials for electricity production and the establishment and maintenance of production capacities come from, etc. It should be decided to what extent dispatchable production capacities are needed in order to ensure the operationof the electricity system, and how it is planned to ensure these capacities. In addition, it should be established in which direction and in which schedule the electricity network should be developed and which financing sources will be used for it. According to the National Audit Office, all this should be written down in the long-term strategy for the area.

If problems with production capacities and external connections are not resolved, there is a risk that the price of electricity will rise to a level that is beyond the means of Estonian society

120. Although the Ministry of Climate has different solutions in the works to address the problem of potential security of supply – including the ministry has set a goal to increase the proportion of renewable electricity and is analysing matters related to storage and network development – there is still a risk that the planned activities are not enough to resolve the problem. Consequently, there is also a risk that the price of electricity will rise to a level that is unaffordable to consumers and will also affect the competitiveness of the economy.

121. On the one hand, the State supports consumers on the basis of need as part of the framework of subsistence benefits and a support measure for less privileged families. On the other hand, support measures were applied to all consumers in the autumn of 2022, regardless of whether or not they needed support. In total, (domestic) consumers[64] received support (excluding subsistence benefits) in 2021–2023 in the amount of 190 million euros to mitigate the increase in electricity prices.

The State has an obligation to support the so-called persons suffering from energy poverty

Estonia has linked the so-called energy poverty to subsistence benefit

122. According to the Directive on the internal market for electricity[65], Member States must take appropriate measures to protect consumers and ensure, in particular, adequate protection of vulnerable consumers. To this end, each Member State must define the concept of vulnerable consumers.

[64] The subsidy for the 2021/2022 heating period also includes subsidies allocated to business consumers, as the MEAC does not have separate data on domestic consumers.

[65] Directive (EU) 2019/944 of the European Parliament and of the Council on common rules for the internal market for electricity and amending Directive 2012/27/EU. 5 June 2019

123. The definitions of "vulnerable domestic customers" and "energy poor household" are transposed into Estonian law as the term "persons suffering from energy poverty".

124. According to the Energy Sector Organisation Act[66], this term refers to a person living alone for the purposes of the Social Welfare Act[67], or a family who has, at least once during the last six months, received a subsistence benefit and whose income per family member in the last month does not exceed the minimum wage.

125. Those whose net income, after the deduction of housing expenses from their income, is below the subsistence level are entitled to the benefit. Subsistence benefit is therefore intended to make up for the shortage in income to obtain the basic necessities of life.

Subsistence level is established by the state budget for each year based on minimum expenses made on consumption of foodstuffs, clothing, footwear and other goods and services which satisfy the primary needs.

From June 2022, the subsistence level for an adult living alone or the first adult in a family is **200 euros per month.** The subsistence level of a minor child in the family is 120% of this, and the subsistence level of each subsequent adult in the family is 80%.

Formula for calculating subsistence benefit:

BENEFIT = *subsistence level + justified housing expenses – net income*

For example, in the case of a three-member household with two children and one adult, whose income is 500 euros and housing expenses are 700 euros, the benefit amount would be 880 euros, i.e. 680 euros (subsistence level for the household) + 700 (expenses) – 500 (income).

There is regional inequality in supporting persons suffering from energy poverty

126. Although it is state support and the subsistence level is the same across the country, the limits of housing expenses, for example regarding expenses related to the consumption of electricity, are established by the local government. This means that how much of the justified electricity costs are compensated varies from region to region, and not all local governments have ensured that recipients of subsistence benefit have money to the extent of the subsistence level provided for by law left over.

127. In the audit "Management of subsistence benefit as national social assistance"[68], the National Audit Office reviewed how the subsistence benefit measure has been managed at the level of the State and whether or not it has been implemented in local governments in such a way that there is no unjustified inequality between local governments when calculating support funds.

For your information

Excess cost is the share of justified electricity costs that exceeds the limit, i.e. that is not compensated by local governments.

128. The National Audit Office also repeated the data analysis as part of the audit of the security of electricity supply and established that, based on the applications for subsistence benefits granted in the period from 1 February 2022 to 31 January 2023, the proportion of excess cost of electricity was 9% of the actual cost, and the cost exceeding the limits of electricity supplied for heating was on average 4% of the actual cost (see also Figure 5). This means that to this extent, local governments did not

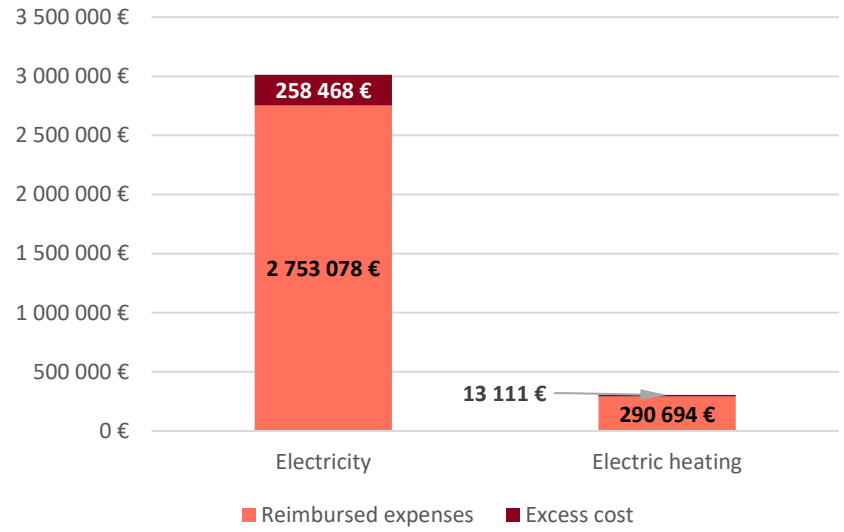
[66] Energy Sector Organisation Act, clause 2 (7^2). Passed 16 June 2016

[67] Social Welfare Act, passed 9 December 2015

[68] Management of subsistence benefit as national social assistance. National Audit Office, 16 January 2023

reimburse persons suffering from energy poverty for their justified electricity costs, as they exceeded the limits set by local governments.

Figure 5. Reimbursed electricity costs for recipients of subsistence benefits and costs exceeding the limit



Source: National Audit Office of Estonia on the basis of the data from the Ministry of Social Affairs

129. In the applications granted during the period under review where justified electricity costs exceeded the reimbursable limit, the average excess cost was 41 euros. This means that, on average, these people had at least[69] 41 fewer euros left over than the nationally established subsistence level.

The limits for reimbursable electricity costs differ 16-fold

The highest limit was **in Saue and Lääne-Nigula rural municipalities** – €400 per month for the first member of the household.

The lowest limit was **in Kiili rural municipality** – €25 per month for the first member of the household. The limit was established in 2015.

130. During the 2023 subsistence benefits audit, the National Audit Office established that the lower the limit for electricity cost, the more often the cost exceeding the limit occurred. The analysis carried out during the security of supply audit showed that, as of 24 July 2023, the difference between the largest and the smallest limit for reimbursable electricity cost is 16 times in the comparison of local governments, similar to the result of the previous audit.

131. If, under similar circumstances, the actual costs are covered when calculating the benefit in one local government, but not in another, this means that the benefit is smaller in the second case and that, after paying the housing expenses, the person has less money than then subsistence level for basic necessities. Given that it is a state support measure and the price of electricity does not differ in local governments, such inequality is not justified.

132. Therefore, in the audit report on subsistence benefits published in 2023, the National Audit Office also recommended the Minister of Social Protection to guide the practice of local governments in establishing the limits, including by improving monitoring by the ministry.

133. According to the Minister of Social Protection, taking the recommendations of the National Audit Office into account, the plan is to

[69] If other housing expenses exceed the limits set for these expenses, this amount may be higher.

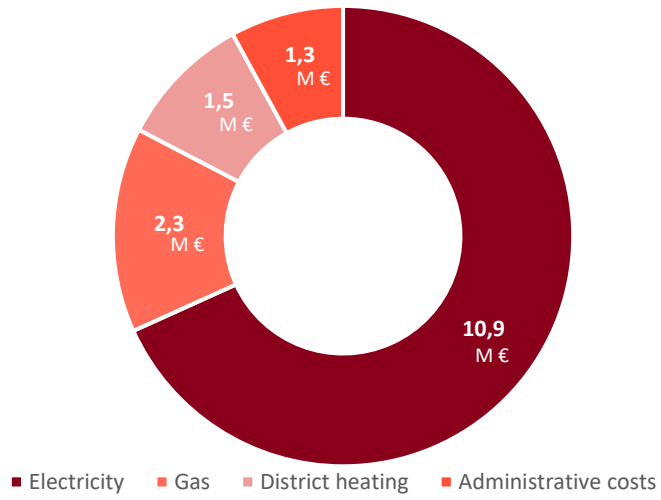
review the subsistence benefits system in 2023 and commence with continuation and implementation activities of the new system in 2024.

Less privileged families were compensated for the increase in the price of electricity

134. In addition to supporting persons suffering from energy poverty, a measure was implemented from September 2021 to the end of March 2022, which aimed to support less privileged families in a situation of rising energy prices.[70] Such families were compensated for 80% of the price increase of a specific type of energy (electricity, gas or heating) based on electricity, gas and heating bills during the period.

135. The measure was developed by the Ministry of Finance and was financed through the Ministry's budget, and applications for support were processed by local governments. According to the Ministry of Finance, 16.01 million euros were allocated from the 2021 state budget to finance the measure, of which 14.74 million euros went to pay benefits. 74% of the benefit was used to cover electricity costs. See also Figure 6 for more details.

Figure 6. Distribution of the costs of the measure to mitigate the increase in energy prices for less privileged families



Source: National Audit Office based on the data of the Ministry of Finance

In order to alleviate the high price of electricity during heating periods, blanket subsidies were also established as a matter of urgency

Blanket subsidies are expensive and do not take into account consumer needs and possibilities

136. At the same time, the autumn of 2021 and 2022 showed that consumers who are not directly classified as less privileged or as persons suffering from energy poverty are also sensitive to the price of electricity. However, the MEAC has not developed an opinion on what is an affordable price to the consumer or what measures should be implemented should the price exceed this limit. The State has therefore been forced to find urgent solutions to keep high electricity prices affordable. In doing so, without analysing in advance from which price and which consumer groups and to what extent should be supported and how support measures affect electricity consumption.

[70] Minister of Public Administration Regulation No. 31 "Mitigation measure for energy price increase for less privileged families", passed 23 November 2021

137. This is how, by a regulation of the Minister of Economic Affairs and Infrastructure, a support measure for partial reimbursement of the final price of electricity and gas for both domestic and business consumers was established in autumn 2021[71]. Support was allocated through the budget of the MEAC, and 113 million euros were spent to reimburse electricity bills.

Universal service – sale of electricity to a consumer of universal service in the Estonian region. Consumers of the universal service are both domestic consumers and people who purchase electricity to transmit and sell it to domestic consumers to the extent of the electricity needed for this purpose and to whom the universal service is provided.

138. In a situation of the sudden increase in the price of electricity caused mainly by the energy crisis due to the price of natural gas, the Riigikogu adopted a decision as a matter of urgency in autumn 2022[72], to supply consumers with electricity that was cheaper than the market price at the time, i.e., universal service with a regulated base price.[73] The production cost of the universal service approved by the Competition Authority is 15.4 cents/kWh.[74] The justified cost related to the provision of the service, the seller's profit and value added tax are added to this price.

The State supported the reduction of the price of electricity for domestic consumers

139. In addition, the State paid electricity sellers 66.1 million euros from 1 October 2022 to 31 March 2023[75] in order to alleviate the high price of electricity for domestic consumers (see also Figure 7).

Figure 7. Subsidies paid to reimburse the price of electricity for domestic consumers (October 2022 – March 2023)

Source: National Audit Office based on the data of the MEAC

140. As part of the temporary measure, electricity sellers automatically reduced the unit price of electricity on electricity bills issued to domestic consumers, provided that the consumer pays 8 cents/kWh of the price of electricity consumed during this period and the State reimburses electricity sellers up to 5 cents/kWh for the amount exceeding this.

[71] Minister of Economic Affairs and Infrastructure Regulation No. 62 "Conditions and procedure for partial reimbursement of the final price of electricity and gas", passed 9 November 2021

[72] On 15 September 2022, the Riigikogu approved amendments to the Electricity Market Act, on the basis of which sellers could offer electricity as a universal service to domestic consumers from 1 October 2022.

[73] From 1 October 2022 to 30 April 2026, Eesti Energia AS is obligated to sell electricity as a universal service to both domestic consumers and all electricity distributors.

[74] Website of the Competition Authority

[75] Benefits were paid based on the Minister of Economic Affairs and Infrastructure Regulation No. 72 "Conditions and procedure for partial reimbursement of the price of electricity" of 15 September 2022, subsection 4 (1).

Therefore, only consumers whose price of electricity was equal to or exceeded 13 cents/kWh received the maximum reimbursement.[76]

141. The partial reimbursement of the final price of electricity, the universal service and the State's reimbursement measure for high electricity prices are not related to the consumers' income and do not take into account whether a consumer actually needs support. Quite a few energy sector experts, including Elering AS[77], have been critical of such blanket support for all consumers.

142. The University of Tartu has found in its study[78] that the price sensitivity of consumers should be used as an input in the development of energy policy. The National Audit Office also found in the audit on the security of electricity supply that the Ministry of Climate should analyse which electricity price is affordable for different consumer groups, and that its task is to ensure that, in addition to ensuring the adequacy of electricity, the price aspect is also taken into account when developing energy policy.

What did the National Audit Office find?

143. According to the National Audit Office, there is no justification for a situation where, at the same electricity prices, due to the limit price established by a local government, persons suffering from energy poverty do not have the money left over required for subsistence by law.

144. Due to high electricity prices, a support measure for less privileged families was added in the 2021/2022 heating period. In addition, in 2021–2023, consumers' expenses on electricity were reduced to the amount of 179.1 million euros through measures that did not take into account whether a consumer actually needed support. At the same time, an opportunity was created for domestic consumers to connect to the universal service.

145. According to the National Audit Office, the Ministry of Climate should develop a methodology that could be used, where necessary, to calculate the tolerable or affordable price of electricity for consumers, for different consumer groups. A plan should then be developed on what to do if the price of electricity turns out to be higher than the limit calculated based on the methodology. State support, where implementing support is decided, should be aimed at those who really need it, and it should take into account, among other things, the possible impact on the management of electricity consumption in such a way that main consumption does not fall during peak load times.

[76] Prices are exclusive of value added tax. The price of electricity inclusive of value added tax was 9.6 cents/kWh and the State's reimbursement was 6 cents/kWh, i.e. in total of 15.6 cents/kWh. This means that if the electricity bill was between 9.6 and 15.6 cents/kWh, the consumer paid 9.6 cents/kWh.

[77] Report on security of electricity supply in Estonia. Elering AS, 2022

[78] Andres Võrk, Helen Poltimäe. Universaalteenuse juurutamise mõju kodutarbijate elektritarbimisele. – Riigikogu Toimetised, 47/2023