

Alternatives for electricity production

What does the state need to take into account upon development of its energy sector after the opening of the electricity market?

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This report gives an overview of electricity generation in Estonia and strategic development of electricity generation at the state level in an open electricity market in line with the environmental, climate and electricity market policies of the European Union. The National Audit Office draw attention to the fact that decisions on where and how Estonia will get electricity in 15 or even 30 years must be made soon.

Most of the electricity generated in Estonia is currently generated in two oil shale power plants in Ida-Viru County. Nearly $\frac{3}{4}$ of the generation capacity of these stations has amortised and most of the facilities must be closed down in the next 10-15 years. In order to supply Estonia with electricity, it must be chosen whether to invest in new generation capacities in Estonia, in new power connection lines, new generation capacities in the Baltic countries and in the Nordic countries or, in part, in all of them.

Investments in electricity generation as well as in the development of electricity connections are significant: For instance, state-owned AS Elering will invest 108 million euros in the construction of the submerged Estlink 2 cable between Estonia and Finland, from 2008 to 2012 the construction and use of the generation capacity using renewable energy sources has been supported by nearly 168.5 million euros and the construction of the first section of the new oil shale plant costs approx. 607 million euros. The construction of a second section will cost approx. 470 million euros. According to electricity generators, no new generation capacities in Europe are constructed without state support.

Upon making a decision, the environmental impact of electricity generation must be taken into account as well. Currently, the generation of oil shale electricity accounts for approx. 70% of the entire CO₂ emissions of Estonia, approx. 70% of all non-hazardous waste and approx. 82% of hazardous waste and approx. 80% of the entire water used in Estonia. Thus, regardless of whether the electricity generated in Estonia is consumed in Estonia or exported, the environmental impact arising from generation remains in Estonia.

The state must plan its energy sector at least 30 years ahead, keeping in mind the principles of an open electricity market, the need to ensure the security of supply, the goals of the EU's climate and energy policies and the expensiveness of the decision for consumers. Therefore, it should be decided

- how will the supply of electricity in Estonia be ensured in the open electricity market,
- how much electricity will be generated in Estonia with state or consumer support in the future,
- whether the state supports the generation of electricity from renewable or non-renewable sources and whether the state prefers to generate electricity in a few large power plants or in distributed power plants.

Upon making these decisions, the following must be taken into account:

Construction of new oil shale power plants with state support does not ensure Estonia's security of supply or an affordable electricity price for consumers in the open energy market. The Government has taken the view that, for the purpose of ensuring energy security and an affordable electricity price, Estonia should generate at least as much electricity as it consumes. To that end, the state has decided to support the construction of a new oil shale power plant. However, in the open market the

security of supply does not depend solely on the existence of domestic electricity generation capacity, but also on the fact that there are sufficient generation capacity and electricity connections in the entire Baltic and Nordic market region. It is important to establish electricity connections with the neighbouring states, develop the power grids, replace obsolete generation capacities with competitive production capacities that exert less pressure on the environment and to increase energy saving. Following the full opening of the electricity market in 2013 and the completion of the Estlink 2 cable in 2014, the electricity generated in Estonia will be at the disposal of the entire market region and we will be able to obtain electricity from the entire market region as well. In other words, electricity generated in Estonia cannot be reserved merely for Estonian consumers. The price of electricity will also form in the market and oil shale electricity cannot be purchased at a lower price by consumers. Therefore, it is reasonable to create in Estonia such production capacities whose construction and maintenance are economically as profitable as possible that do not put excessive pressure on the consumer's wallet and the environment and ensure competitiveness in the open market.

Estonia has set the goal of raising the share of energy generated from renewable sources to 25% of the end consumption by 2020. According to the current forecasts, the state will be able to reach the goal even without burning biomass in the oil shale furnaces of the Narva Power Plants.

According to the Statistical Office, the share of generation of electricity from renewable energy sources amounted to 24.3% in 2010, and the co-incineration of oil shale and biomass accounted for approx. 1% thereof. Nevertheless, the Government has justified the supporting of the burning of wood in oil shale furnaces with the need to achieve Estonia's goal of use of renewable energy as easily and inexpensively as possible. As a result, the Narva Power Plants have been the biggest recipient of renewable energy support. Since the efficiency of a thermal power plant is small in comparison with efficient cogeneration plants, the state has rather supported the inefficient use of biomass by supporting the combined incineration of oil shale and biomass and has not thought of reducing carbon emissions in the long term.

Being a Member State of the European Union, we are bound by the ambitious goal of the climate policy to reduce the CO₂ emissions of energy generation at least 93% by 2050. This calls for changes of principle in the technology of electricity generation. Currently, the state is planning on contributing financially the most to the development of the technology that uses oil shale. Among other things, Eesti Energia will get free CO₂ allowances for partial coverage of the investment expenses of the new oil shale sections and, in addition, the supporting of the use of biomass will continue. Yet the state is aware of the fact that the further development of the renewable energy sources that have the greatest potential in Estonia, i.e. wind and biomass, depends directly on large investments in the power networks and on widening the opportunities for the cogeneration of electricity and heat. Thus, the current strategic choices of the state do not make it clear how the state intends to reduce the CO₂ emissions created upon generation of electricity by at least 93%.

If the price of the emissions allowances of the European Union rises, the competitiveness of the power plants using oil shale will decrease considerably. According to the European Commission, the trade in CO₂ emission allowances is an important tool of influencing the climate policy. Although the price of the CO₂ allowances is, according to the Commission itself, too low, the allowances trading system will be reformed in such a manner that it will reduce the competitiveness of electricity produced from carbon-rich fuels in the open market in comparison with renewable energy or nuclear energy. The construction of generation capacities using oil shale works against the goal of carbon-free electricity production and it should be taken into account that the price of the CO₂ allowances is of key importance when it comes to the competitiveness of electricity produced in such a manner. Thus, in the future, trading in the electricity market may depend on how much the state is prepared to support oil shale electricity in order to ensure its competitiveness.

Upon continuing the production of oil shale electricity, the massive inevitable adverse environmental impact must be taken in account. Mining and processing oil shale for many decades has considerably harmed the natural environment and surface water and groundwater in Ida-Viru County, caused millions of tons of waste and air pollution and ruined the landscape. The impact of pollution on health has not been investigated to date. Although the sulphur and nitrogen compounds created upon production of oil shale electricity can be reduced, there is currently no method for reducing CO₂, waste and water pollution that would result in considerably smaller waste. The state has so far decided to tolerate these effects, supporting the generation of oil shale electricity both directly as well as indirectly, in order to provide consumers with an affordable electricity price. Yet, these damages that have been caused to the environment will be paid for by the Estonian state for decades following the termination of the production of oil shale energy and it must also be done for exported electricity.

The state has so far favoured oil shale energy in order to provide Estonian consumers with a lower electricity price and give a competitive advantage to the Estonian economy. Following the complete opening of the electricity market, the situation will change, because in the market the price will form in competition with other generators. Therefore, the current reason for the direct or indirect support of oil shale electricity generation will cease to exist. Indirectly, the state supports the generation of oil shale electricity by not reflecting all the generation-related expenses in the price: The environmental charges relating to oil shale energy are lower than other environmental charges, the price of CO₂ allowances is small compared to the environmental damage caused and, unlike other undertakings, electricity generators do not have to pay the CO₂ pollution charges. Furthermore, the state-regulated price of oil shale is lower than its actual value. As a direct support, the state has allocated free CO₂ allowances for electricity generators. For instance, Eesti Energia received allowances worth 680 million euros through 2008 to 2012. Over the same term, the state has supported the incineration of biomass in oil shale furnaces with at least 51 million euros and spent 9 million on the safer depositing of oil shale ash. Thus, the state has annually supported the generation of oil shale electricity with, on average, 148 million euros, while supported the generation of electricity from renewable sources with, on average, 34 million euros per annum. Largely due to these subsidies the Estonian electricity price is currently one of the lowest in the European Union.

Estonia's electricity sector should be planned in advance not for ten years as has been the case so far, but for more. In order to reform the supply of electricity, huge investments in the modernisation of electricity generation and transmission are required. This calls for timely decisions on the part of the state, incl. legislative amendments, as well as time, human resources, technological resources and financial resources. Structural changes in the technology of production of electricity and in broadening the possibilities of transmission of electricity cannot be implemented while relying on short-term strategic choices. Due to the lack of long-term plans, it is currently unknown where will Estonia get electricity in 25-30 years when most of the sections of the oil shale power plants have been closed down due to becoming obsolete and not complying with environmental requirements.

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