

## **Energy economy – a problem or possibility?**

### ***Summary and proposals of the Energy Day Round Table organized by the Estonian Academy of Sciences***

On the Energy Day held at the Estonian Academy of Sciences on 21 November 2022, large-scale energy consumers, energy companies, researchers and community representatives discussed the options and strategic vision for energy policy. The Round Table was a follow-up event to the Academy's energy conference on 30 May, which presented relief measures for the consequences of the energy crisis and the prerequisites necessary for developing a long-term energy strategy.

At the Round Table, competitiveness of the industry was addressed *as a problem* due to excessive fuel and energy prices, price fluctuations and questionable security of supply.

The *main topics* of the discussion were ensuring a balance between the security of energy and fuel supply, affordability and environmental impacts, the sufficiency of the energy demand and production structure, controllable production, consumption management and the need for storage.

The *aim* of the discussion among energy market participants was to formulate the preconditions for developing an energy policy that would meet the needs of society. The focus was on the competitiveness of privately owned industrial consumers and energy companies, mitigation of investment risks and access to natural resources, and legal regulation, as private owners have clearly defined interests and responsibilities.

### ***Background***

In a world that is becoming more complex, economic and political competition is intensifying, having led to a global clash of ideologies. Replacing fossil fuels in electricity generation requires a fourfold increase in non-fossil generation, based on the electricity generation structure in 2020. Moreover, it requires large-scale extraction of minerals and new marketable replacement technologies. The task is much greater than the current paradigm allows.

So far Estonia has been successful in meeting the EU target numbers, but the problems are accumulating. The first significant constraint is the lack of qualified employees and engineers in the energy sector and more broadly in manufacturing industry. According to the OSKA analysis, we will lack 2/3 of engineers by 2030. The goal set by the Energy Sector Organisation Act to cover the state's electricity consumption need by 2030 with annual production from renewable electricity assumes storage capacity, controlled electricity generation and consumption management. Security of supply in the electricity system is not guaranteed only by investments in weather-dependent generation capacities. Based on the 2021 statistics, the utilization factor of wind farms was 0.28 and of solar parks 0.11. In the modelling of the electricity system by increasing the capacity of wind farms by up to 11 times (up to 3500 MW, 5 offshore wind farms in building permit procedure with a total capacity of 3884 MW), the capacity of solar power plants by up to 4 times (up to 2000 MW) and the capacity of pumped-hydroelectric plants 3 times (up to 1500 MW), the results show that security of supply of the electricity system is still not guaranteed. In addition, the high (57%) share of biomass in

renewable energy production may become a problem in the future. Confidence is also diminished by the knowledge that the nationally required controllable electricity capacity of 600–1000 MW is not always available.

Main *positions and proposals* of the participants of the Academy's Energy Day Round Table

- **We have to define the problems impeding the development of society, to plan changes and formulate the prerequisites for the changes, to agree on actions and predict the results of the changes as well as to establish who are responsible.** The strategy for science, development, innovation and entrepreneurship (T&A&I&E) has identified key areas for Estonia's development and drawn up roadmaps, but the actions are rather general, the resources conditional and the responsibilities vague.
- **In ensuring the state's sustainability and its image as a state of technology, in the field of STEM (science, technology, engineering and mathematics) the priority is students' interest and development opportunities across different school levels.** The visibility and attractiveness of STEM, including the narrower field LTT (natural and exact sciences, and technology), is a precondition for generating interest. For that a joint contribution by the state, employers and educators is needed to modernize the learning environment and content. It also involves exhibiting of the products of scientists and engineers, learning laboratories, joint working and learning environments for scientists, engineers and students, as well as valuing of the technological heritage. The most optimal solution is an Estonian science and technology centre to be jointly funded by the public and private sectors, and a cooperation network for the parties in a science-based information space. Estonia needs a centre for promoting a culture of technology, where the parties contribute to the development of the broader STEM.
- **The energy sector is the foundation of the operation of information society.** Sustainable decrease or increase in prosperity is in correlation with energy consumption. We have to analyse prescriptive decisions in energy economy, their broader impact and, if necessary, to jointly correct them. Prohibitions and commands will not ensure sustainability of energy economy.
- **The precondition for sustainable energy economy is a balance between security of supply, affordability and environmental impacts.** Security of supply is a service with a price. The state has to support investments in energy security with its guarantees since the market does not stimulate it. Flexibility in the electricity system, including controllable generation capacities, storage capacity and, as the fastest and most cost-effective option, consumption management, is essential in ensuring security of supply. The price and affordability of energy inputs should also enable competitiveness of the product or service on the global market as well as solvency of a household consumer. The electricity market is oriented towards a day-ahead and intra-day market, in order to give a market advantage to the energy producer with lower production costs, provided that market supply exceeds demand. Today's situation is the opposite and therefore the electricity market has to adapt to new conditions as well. Electricity consumers need to be provided with a wide range of options for purchasing electricity, also from neighbouring countries through transnational interconnectors. The environmental

impacts of electricity generation have decreased considerably in our country, but we have to limit it even more in the future. The solutions lie in new technologies, including CO<sub>2</sub> capture and its further processing. Here we expect national cooperation and cooperation across the European Union to improve the relevant technologies.

- **The state lacks a long-term vision for energy policy, including an action plan with measurable results and backed by resources.** We are in a situation of insufficient supply and growing demand. National measures to increase domestic energy production and agreements with neighbouring countries on developing the structure of new generation capacities are needed, without excluding any forms of energy production and ways of ensuring flexibility in the electricity system. Then the actual cost of energy produced from different energy sources and the environmental footprint of the whole life cycle should be calculated and the economic and socio-political impact analysed. The availability of local natural resources, the best-known technologies, further processing and use of by-products and residues from the whole process in the circular economy are essential from the perspective of energy security and social added value. After that we can make a science-based choice of the technological solutions that are marketable and guarantee the balance of the electricity system and security of supply for consumers. These have to be communicated to society, discussed publicly and implemented with a state guarantee.
- **The energy sector is the foundation of broad-based national defence.** We have to conclude inter-agency agreements on the distribution of resources, actions and responsibilities for developing and ensuring the continuity of the energy production structure and the energy infrastructure. The objectives, principles and responsibilities of cooperation between the public and private sectors have to be defined.
- **Taking on and fulfilling the commitments of the green transition in the world does not go hand in hand.** Global expansion of the EU Green Deal initiative is impeded by scarcity of resources and different levels of development across countries and regions. On economic grounds, production with more polluting and cheaper technologies is moving out of Europe, burdening the environment of the new host country. Engaging society requires clear messages, investment security for entrepreneurs and cooperation guarantees between the public and private sectors.
- **The electricity market and the quota market of greenhouse gas emissions should not be distorted by political deals.** Intervention in the market economy through administrative or political decisions violates the principle of equal treatment, jeopardizing economic sustainability. Implementation of unjustified political priorities by reallocation of resources does not ensure sustainable development.
- **To partially compensate for the rise in energy prices, a national relief package is unavoidable, as in other EU member states.** Estonia's situation in the overall energy crisis is aggravated by inflation of up to 25%, reducing consumers' purchasing power and diminishing confidence. The rapid rise in energy input prices drives industrial production out of competition, in the food industry it jeopardizes food security and rural economy.

- **In order to activate community energy cooperatives, we have to update legal regulation to promote consumer engagement on the energy market.** Local energy production, storage and consumption management presupposes a national programme. Citizens' associations in the energy sector are part of the solution, supporting their actions and engaging them at the beginning of the decision-making process is decisive.

## PARTICIPANTS

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