

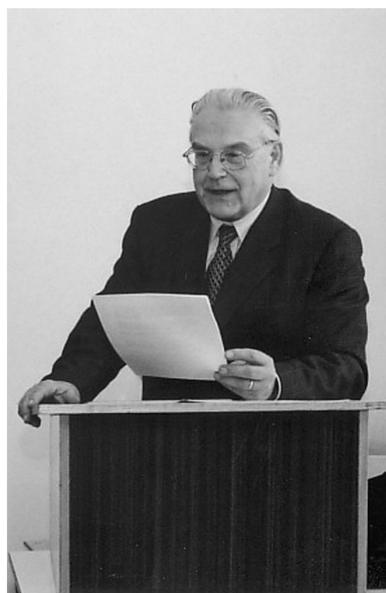
EDITOR'S PAGE

ESTONIAN STATE DEVELOPMENT PLAN OF OIL SHALE UTILIZATION

The reserves of oil shale in the world are immense, exceeding the resources of other solid fuels (coal, lignite, brown coal) all taken together. Estonia is the flagman of oil shale studies. Here technologies of oil shale mining and consuming have been continuously developed during more than 80 years. The only special international oil shale periodical scientific journal has been published in Estonia for more than 20 years. In March 2006 one billion tonnes of oil shale was produced in the Republic. Since the 1960s, Estonia has been the greatest oil-shale producer and consumer in the world. In the 1980s about two-thirds of the world's oil shale output came from Estonia.

By the end of the 18th century Estonian oil shale had attracted scientist's attention, but the mining only started in 1916, when the city of Petrograd was short of fuel during World War I. The first underground mine was put into operation in 1920. In 1921, an oil-shale laboratory and a small oil plant were opened at Kohtla. They were aimed at studying retorting methods and obtaining raw oil. During the independency of Estonian Republic before the Second World War, a bit more than 5 million tonnes of oil shale were mined, and Estonia was independent of fuel from other countries. Oil shale was the cheapest and most available fuel, and its price was stable. Half of produced shale oil was exported.

Up to 1960, the main oil shale consumers were the Kohtla-Järve and Kiviõli shale oil plants and the railway. Fine oil shale was used as a fuel at local electrical power stations. Later large electrical power stations using oil shale were launched – Baltic Thermal Power Station in 1966 and Estonian Thermal Power Station in 1973. With this the structure of oil shale consumption was altered: about 80% of mined oil shale was used for producing energy, and production reached its peak in 1980, when 31.3 million tonnes of oil shale were mined. Now oil shale production has stabilized at a level of



some 15 million tonnes per year, but the fast rise of crude oil prices in the world's market strongly influences the Estonian oil shale industry. Therefore the mining capacity needs regulation, because the production of oil shale and its use as a raw material in the oil and chemical industry and power engineering has caused serious environmental problems. As a result of oil shale combustion, we obtain heat but also many residual or ballast substances. In a thousand tonnes of oil shale, the combustion part forms 350 tonnes and water 100; 550 tonnes remain as ash. From time to time oil shale waste heaps are subject to self-ignition. The most toxic waste comes from the oil shale chemical industry. Great problems are related to the ash fields of thermal power plants and semi-coke hills of oil shale processing enterprises which are both rich in phenols and other hazardous substances. The amount of pitch residues of oil shale industry is estimated at 78,000 and 60,000 tonnes in the semi-coke hills of Kohtla-Järve and Kiviõli, respectively.

Sustainability in the utilization of oil shale in Estonia must be based on the reforms of instruments and institutions, which include technical, administrative, economic and environmental measures. New technologies should be of higher thermal efficiency and produce much less atmospheric emissions and wastes. In July 11, 2006 the Government of the Republic of Estonia decided to compile a State Development Plan of Oil Shale utilization for 2007-2015, and a special working group was established by the Minister of Environment. In the compilation of state plan all counties, towns and parishes of North-East Estonia, nine big enterprises, 14 scientific institutions and 16 NGO-s participated in the discussions. A special round-table meeting was organised in the Ministry of Environment. In the solution of problems we should take into consideration that Estonian power generation and oil shale mining are concentrated in a small area in the north-eastern region of Estonia with mainly nonestonian population. They employ 15-20% of the local people and therefore the problem is not only of economical and environmental, but also of a great social and political importance.

Analyses showed that the negative aspects of oil shale energy could be most significantly reduced by transition from pulverized combustion technology to circulating-fluidized-bed combustion technology. All environmental parameters in new energy blocks should be in accordance with the requirements of EU directives. Already much has been done at the electrical power stations at Narva. After installation of two 215-MW units with new boilers, the emission of carbon dioxide, nitrogen and sulphur compounds has been reduced substantially. Another serious task is to reduce the negative environmental impact due to hydraulic transport of ash to ash fields and release of highly alkaline ash-field water into the surroundings.

During the last decades, two methods were used for shale oil processing. The Kiviter process (vertical retorts with internal heating, some 1000 t oil shale per day) with the use of enriched oil shale ensures the oil yield of 15–17%. Unfortunately high amounts of organic matter get lost with harmful

semicoke which accumulates in large waste piles. The Galoter or TSK-140 process of solid heat carrier with the use of poorer fine oil shale exerts lower environmental impact and is recommended in the state development plan. Narva Power Plant plans to install two new TSK-140 devices, thus bringing the daily throughput of oil shale to 12,000 tonnes, The *Viru Keemia Grupp* in Kohtla-Järve started doing the same, and this brings the total number of solid heat transfer retorts to six with a total throughput of some 6 Mt of oil shale per year in 2012. All this together with the vertical retorts would supply more than seven million barrels of high-quality shale oil per annum.

In the state development plan the oil shale basin is divided into several areas according to the quality and environmental restrictions. More advanced methods of mining are recommended. As oil shale is not a renewable resource, its excavation must be limited to 20 million tonnes per year. This general strategy of sparing and sustainable extraction and protection of oil shale reserves elaborated by specialists and probably being accepted at the governmental/legislative level in the future will be the key document for the long-term rational development of mining and utilization of oil shale and solving of social problems in North-East Estonia.

One of the most important goals of environmental policy is to promote and stimulate environmental awareness of the population. Public participation in the decision-making process during the compilation of the state energy plan introduced a new way of thinking at all levels of society, including parliamentarians, governmental officials, NGO-s, local people and the business sector. Environmental and economic policies in mining and utilization of oil shale were formulated at the national, regional and local levels. Of course, not all problems have been solved yet. Our task is to provide the present population of North-East Estonia with a safe living environment of good quality and to promote a strong and diversified economy without compromising on the needs of future generations. Our state plan is an opportunity to demonstrate to other oil shale mining countries the sustainability in planning of economical development and policy of environment protection.

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