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HISTORICAL

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STUDENTS' SOCIETY "LIIVIKA" AND ESTONIAN OIL SHALE INDUSTRY

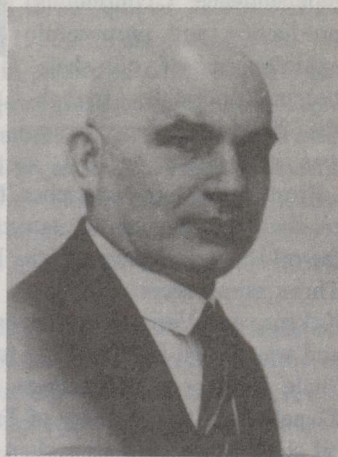
Märt Raud is the person who may be considered to be both the founder of the Estonian oil shale industry and the founder of Estonian Students' Society in Riga - the Students' Society "Liivika" and its Old Boys' Association being the chairman of the latter till the vanishing of the Estonian Republic, and also the president of the joint-stock company "First Estonian Oil Shale Industry".

Hence in connection with the 85th anniversary of "Liivika" this paper attempts to give a short survey of the beginning and development of oil shale industry in Estonia.

In fact the honour of being the starter of oil shale exploitation in Estonia belongs to the wartime Petrograd Fuel Committee (1916). Three oil shale mines were designed and their construction started in Kohtla-Järve and Kukruse. However, their building discontinued in 1917 when the Bolshevik Revolution resulted in the liquidation of the corresponding companies. Märt Raud, a civil engineer, graduated from Riga Polytechnical Institute was on active service in Petrograd at that time. At the Petrograd Fuel Committee he succeeded in getting acquainted with all details of these projects and trials carried out at Petrograd Gas Works with the purpose of exploitation of Estonian oil shale.

M. Raud returned to his native land in August 1918 with the information and projects gathered in Petrograd which served as the fundamental basis for the foundation of oil shale industry in Estonia.

A friend of M. Raud and a fellow member of "Liivika" Juhan Kukk, the first Estonian Minister of Public Properties and Finance acting as the deputy Prime Minister of the Provisional Government at the time expected to use oil shale resources as a guarant for a possible foreign loan or, as proposed by M. Raud, for the foundation of a common joint-stock company basing on Estonian and German investments, as the mines whose construction had been begun by Russian companies were now in possession of the German company "Internationales Baukonsortium", Estonia being under the German occupation. But the German Army had to retreat before the Bolsheviks, and with the help of a state mandate on the 25th of November, 1918, M. Raud operatively succeeded in taking over "the oil shale quarries" under the administration of the Estonian Provisional Government. He even sent oil shale samples to Tallinn Gas Works as the Germans had done during the occupation. However, already on the 7th of December, 1919, the mine area was occupied by the Bolsheviks again for 40 days. The area was set free on the 16th of



Dipl. Eng. Märt Raud (1928),
the director of the "State Oil-Shale
Industry".

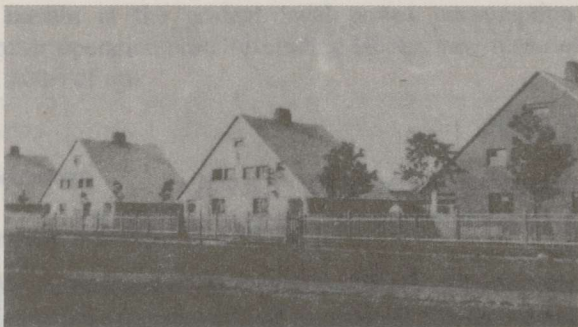
January by Kalev military unit at the price of life of 10 warriors.

The work at Kohtla mine began again on the 5th of May, 1919, thus 75 years ago. Only then, during Estonian independence, continuous production and purposeful exploitation of oil shale became possible though the War of Independence was still going on.

From the 25th of November, the date of taking over the oil shale quarries, the state oil shale industry started its activity under the leadership of Dipl. Eng. M. Raud as the oil shale department of the Ministry of Trade and Industry credited by the state. Three mines were completed: an open-cast pit and mine in Kohtla and mines in Kukruse and Vanamõisa. The latter was situated east of the Rakvere-Kunda railway and was leased in May 1922 for 99 years to a private company the "Estonian Oil-Shale Development Syndicate, Limited". This company was founded by George Menell from the Ministry of Trade and Industry. Near the Kohtla open-cast pit an oil shale processing pilot plant for shale oil production was built. A vertical retort with internal heating specially designed by J. Pintsch and Co., Berlin (under the leadership of Dr. H. Rosenthal), for processing Estonian oil shale was installed there. It was put into operation on the 3rd of August, 1921, and it started to operate successfully with the throughput of 7-8 tonnes of oil shale per day.

Good results of oil shale marketing and shale oil experimental manufacturing on commercial scale permitted to change the organization of the industry: on the 15th of July, 1922, the oil shale department of the Ministry of Trade and Industry was reorganized into a state enterprise the "State Oil-Shale Industry" acting as a corporate body.

The "State Oil-Shale Industry" was administered by its director M. Raud and the directorate consisting of three committeemen, commissioned by the state government, with its activity supervised by a 5-member council. The stock was amounted to 250 million marks got from the state with the repayment duty in the course of 50 years. Such a change put a firm basis to a prosperous growth of the "State Oil-Shale Industry" in Kohtla-Järve - the production of oil shale enlarged, and in January 1925 in Kohtla-Järve the first large oil retorting plant with a battery of 6 retorts (with total throughput of 200 tonnes per day) was put into operation. The retorts of the first plant were



Dwelling-houses in Kohtla (1928)



The village hall of Kohtla mine (1928)

designed and constructed by J. Pintsch and Co. basing on the experience obtained in 1921-1924. Their capacity exceeded that of the test retort 4 times and they operated till the year 1985, i.e. for 60 years!

The growing capacity of the production required an enlargement of the capital stock to 3.5 million kroons in 1927. The enterprise had to pay taxes and local rates on the common basis with private enterprises. 50 % of the yearly net profit, instead of the previous 10 %, was paid to the industry enlargement fund, the workers ceased to belong to the "government officials".

In 1936 the second plant with 8 retorts and a total throughput of 320 tonnes of shale per day was put into operation and worked till 1985 like the previous one.

Due to the continuous extension of manufacture, in particular of oil export, the "State Oil-Shale Industry" was reorganized into a joint-stock company the "First Estonian Oil-Shale Industry" on the 1st of September, 1936. After the world economic crisis in 1929-1933 the export of shale oil began to grow intensively. In 1932 10 % of oil production was exported, in 1939 — export constituted already 50.3 % of the production which itself had increased almost 5 times as well.

In 1938 the third plant with a battery of 16 retorts and a total throughput of 640 tonnes per day was started. It is still in operation.

Thereafter the construction of the 4th plant was commenced, but it was completed only during the war in 1943 when the "First Estonian Oil-Shale Industry" had been taken over by the German "Baltische Öl GmbH". The big test retort at the first oil plant with its throughput amounting to 100 tonnes of shale per day remained the last Pintsch-type retort in Kohtla-Järve.

Among the alumni of the Students' Society "Liivika" working at the "State Oil-Shale Industry" and/or at its successor, the joint-stock company "First Estonian Oil-Shale Industry", the first place of honour belongs to the director and chairman Dipl. Eng. Märt Raud. His assistant and procurator was the economist Johannes Luikmil and the "basic stock" bookkeeper Hermann Lang belonged to the alumni, too.

Among the 11 members of the council Prof. Jaan Kopvillem and Dipl. Eng. Anton Uesson, the deputy mayor of Tallinn, were the alumni of "Liivika" as well. The mine-master Dipl. Eng. Aleksander Müürissepp, the head of the workshops and the power station Dipl. Eng. Richard Käbin, the head of a department, the mechanical engineer Jaak Kase belonged to the same society. The lawyers Jaanus Ülavere and Johannes Pekkar, economist Hermann Evert, Rein Randveer (83 years old now) and Otto Virkhaus, as well as the economic student Ferdinand Markson and some other people worked at the administrative apparatus and accounts department.

The success of the "State Oil-Shale Industry" in the 20's inflamed the interest of private companies in oil shale production and utilization in Estonia. By May 1924 the Ministry of Trade and Industry has delivered 37(!) concessions for oil shale researches, production and processing on the territory covering over 1,000 km² mostly to foreign companies. In 1927-1936 the industrial scale producing of shale oil at private oil plants was started: in Sillamäe ("Estonian Oil Consortium Company"), in Kiviõli ("Eesti Kiviõli Ltd." - "Estonian Shale-Oil Company") and in Kohtla-Nõmme ("New-Consolidated Gold Fields Ltd.") each of them having its own mines, and oil shale mines in Püssi ("Kütte-Jõud Company") and in Uhja near Kunda ("Port-Kunda Company"). The private oil factories were each installed with their own original technology for oil shale thermal processing. The "First Estonian Oil-Shale Industry" covered about 38-40 % of the total output of Estonian oil shale industry; "Eesti Kiviõli Ltd." was of almost the same capacity.

Tunnel ovens of the "Eesti Kiviõli Ltd." oil plant were designed at the design office of the factory "Franz Krull" managed by P. M. Scheloumov, a previous professor of Peterburg Institute of Technology. A licence of the German company "Lurgi" and the results of profound test runs carried out in Kiviõli were applied for designing these tunnel ovens. The equipment was produced and installed by an engineering plant within the first half of 1930. At the same design office in 1938 the example of the Kiviõli plant was followed for designing a two-tunnel-oven oil plant for the Australian company "National Oil Property Ltd." who erected it in Glen Davis, Australia. The engineering students, members of "Liivika" Felix Jürgens (76) and Ilmar Öpik (76) took part in the designing work. The plant was accomplished in 1940 and produced 3 % of the liquid fuel used on this continent in the war-time.

From the various prewar retorting methods only vertical retorts established by the "State Oil-Shale Industry" have been preserved and developed by the present time. The oil plant of the Estonian Power Station with two rotating horizontal solid heat carrier retorts processing oil shale fines (the throughput of 3,000 tonnes oil shale per day each) has been added in 1981/1982.

Next about the further course of the "First Estonian Oil-Shale Industry". Under "Baltische Öl GmbH" in Kohtla-Järve one more oil plant with two Lurgi-type tunnel ovens was erected. It operated till 1968. Under the Soviet regime the Kohtla-Järve oil plant was enlarged to a chemical integrated plant with 4,000 workers, the mines were administratively separated from the oil factory. When the oil shale reserves had been exhausted in Kukruse and Käva mines which were founded by the "State Oil-Shale Industry", new mines for the mining enterprise "Estonian Oil Shale" were constructed in the previous concession area of the "First Oil-Shale Industry" (Estonia, Viru, Tammiku). The oil factories in Kohtla-Järve belonged to the Oil Shale Processing Integrated Plant which was given the task to supply Leningrad with domestic gas produced from oil shale since 1948. The output of gas amounted to over 0.5 milliard m³ per year but died out in the 1980's supplanted by cheap natural gas.

For obtaining generator gas for heating chamber ovens foreseen for producing domestic gas, the 5th oil plant with the same vertical retorts of internal heating was erected. According to their new basic function the retorts were called "gas generators".

Nitrogen fertilizers produced from natural gas, sulphuric acid, and products from petroleum pyrolysis oil made up the main output of the integrated plant in the 1970's. The plant was renamed as the Kohtla-Järve Oil Shale Processing Association.

In order to maintain and enlarge shale oil production an experimental retort with the throughput of 1,000 tonnes per day was built in 1981 and in 1987 the 6th oil plant with two retorts was erected, with the daily throughput of 1,000—1,200 tonnes each. The construction of the 7th plant was started (with a battery of 4 retorts, 1,400 tonnes per day each), but suspended due to the investment problems.

In 1992 the Estonian Ministry of Industry and Energetics raised the question about reorganization of the Kohtla-Järve Oil Shale Processing Association, aiming at separation of the non-shale production from the oil shale processing industry. By the autumn of 1993 the state joint-stock company "Kiviter" was founded on the basis of the association, and through the Estonian Privatization Enterprise, the fertilizer plant was sold to a St.-Petersburg gas company, the former supplier of the plant with natural gas. The production capacity of the "Kiviter" is at present 250,000 tonnes shale oil per year.

The capacity of oil production has remained on the level of the 1980's in spite of the present general large fall of industrial production in Estonia. This fact gives evidence of the profitability of shale oil manufacture under the marketing conditions. The total output of shale oil was 0.367 million tonnes in 1993, and the output more than 0.4 million tonnes is predicted for 1994. "Kiviter" has become the successor of the "State Oil-Shale Industry" and of the oil industry of the "First Estonian Oil-Shale Industry". Its main task lies in preserving and enlarging shale oil production in Estonia.

A member of "Liivika", Professor of Tallinn Technical University Hugo Raudsepp has played a special role in the developing of oil shale researches and in teaching oil shale chemists. M. Sc. of Tartu University H. Raudsepp owned a chemical plant in Tartu before the nationalization by communists, afterwards he had to devote himself only to science. He succeeded splendidly in this sphere, soon deserving the professor's degree.

A number of chemists - members of "Liivika" - Alfred Haldma, Aleksander Linnolt, Peeter Rätsep (78), Leho Ründal and Boris Torpan - worked at the postwar Tallinn Technical University together with Prof. H. Raudsepp and close to this special field.

Mechanical engineer Harry Veide (85) published the results of his researches on combustion of oil shale in fluidized bed, the method being now the most perspective one for combustion of oil shale. Professor I. Õpik who succeeded in graduating from Tallinn Technical University in 1940 has during his 50 years of engineering and scientific activity been occupied practically in every field of oil shale industry: as a mine mechanic, a designer and postwar renovator of oil works, an active installer of new rotary kilns to oil shale heating in cement industry, a founder of a basis for designing and constructing of boilers for oil shale power stations.

In the field of oil shale production and combustion as well as of the utilization of the mineral residue a remarkable work has been made by the following members of "Liivika": Heino Joosti (80) and Feliks Kiviselg in industry of building materials, scientists in agronomy Richard Kalmet (83), Udo Järvan (55) and Evald Raudväli (67) at the utilization of oil-shale ashes as a lime fertilizer for neutralization of soils and peat substrata.

Docent Jüri Pastarus (50) teaches prospective mining engineers at the Institute of Mines of Tallinn Technical University, and Prof. Andres Õpik (47) is the Dean of the faculty of chemistry of the same university.

This paper stands for no study. It represents the author's recollections and summarizes some historical data published in the periodicals of oil shale industry in 1925, 1928, and 1938. However, it ought to give an evidence of the essential role of the Estonian Students' Society "Liivika" in Estonian oil shale industry showing the merits of hundreds of prominent academic people from engineers to professors.