PEOPLE

https://doi.org/10.3176/oil.1993.2/3.16

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KARL LUTS AND PAUL KOGERMAN

Estonian "kukersite" oil shale is a mineral resource of unique composition and properties. The progress in its utilization, above all in its processing for producing oil and chemicals, in Estonia before the World War II was unique in a way as well. It is not a common thing for a small and relatively poor country to develop a large-scale industry based on a new technology - an industry that could take example by the world practice only in the mider sense, without no suitable model worth of copying as a whole.

The honour of being the "starting motor" of oil shale processing industry belongs to the graduate engineer Märt Raud, the chairman of The State Oil Shale Industry (later The First Estonian Oil Shale Company). After all, Märt Raud was the starter of this enterprise (the predecessor of the present Oil Shale Production Association in Kohtla-Järve) during the hard years of the War of Independence, and its director during the whole "Estonian age" — till his arrest in 1941.

Märt Raud was an experienced manager and a good organizer. One must give him credit mainly for his abilities to put into practice the scientific and engineering achievements of his time in the field of fossil fuel processing. Something — only the best - was taken over from abroad, but much was done by themselves. Estonia had lots worth of putting into practice.

The science dealing with the properties and retorting of oil shale and processing products of its dry distillation (so-called oil shale chemistry) in Estonia was inseparable from the activities of two great men — Paul Kogerman and Karl Luts.

It seems to be a general truth that any progress is based on fair competition. That needs at least two competing personalities and two directions. In Estonia one can give examples of competition, sometimes of purely personal rivalry, from any time and field: Jakob Hurt an Carl Robert Jakobson, Konstantin Päts and Jaan Tõnisson, ..., Karl Luts and Paul Kogerman, Agu Aarna and Hugo Raudsepp.

This report attempts to examine the contribution of Karl Luts and Paul Kogerman to the formation of oil shale chemistry.

The scientological background for such a comparative study is highly unfavourable: the merits of Paul Kogerman are wellknown and widely acknowledged, Karl Luts is practically unknown by the wide public also in Estonia; Paul Kogerman has become a symbol of Estonian national science owing to the heritage of the days of Stalin and the subsequent stagnant age (to be exact, in spite of this heritage), Karl Luts is completely buried in oblivion.

There is an objective ground for such a situation. After all, till the end of the 80ies Paul Kogerman belonged to those people whose mentioning in speech and writing — although it was not strictly forbidden — was considered to be improper. All the more one spoke and wrote, one exactly tried to distinguish him. P. Kogermans's connections with the Estonian Academy of Sciences, Tartu University and Tallinn Technical University — the main strongholds of the so-called Estonian high-science of the whole post-war period — where many of P. Kogerman's former students played a leading role naturally contributed to that.

From such Tallinn- and Tartu-centred standpoint Karl Luts was a provincial scientist, an outsider, up to the recent days just one of the numerous repressed people, a public enemy with an unknown date and site of death. It is only natural that many post-war prominent "metropolitans" did not dare (or want) even to mention his name. This oblivion includes both conscious suppression and just ignorance à la "there was nothing here before us". During the whole post-war period Kohtla-Järve has lacked an adequate background concerning technical and Estonian culture which would have allowed to appreciate Karl Luts properly.

Karl Friedrich Luts was born on the 17th (according to other sources on the 15th) of November in 1883 in St. Petersburg. As a youth he learned joinery at the Trade School of the Imperial Technical Society. In 1902—1905 he worked as a draughtsman at the carriage-building plant of St. Petersburg. In 1905 he passed external grammar school finals at the 2nd Corps of Cadets of St. Petersburg and entered the St. Petersburg Technological Institute. In 1907 he proceeded to the faculty of natural sciences of the St. Petersburg University and graduated from it as a chemist in 1913. During the studies at the university and the World War I he earned his living as an assistant at the Institute of Psychoneurology and as a teacher in several schools of St. Petersburg. When in 1918 an estonian secondary school was founded in St. Petersburg (then Petrograd), K. Luts became its headmaster. He was the factual organizer of the school.

In November 1918, after the departure of Germans from Estonia, the Provisional Government was formed in Tallinn. Karl Luts who was still in St. Petersburg was appointed its Minister of Education. Unfortunately K. Luts could not start his work as a minister in Estonia — in December 1918 he was arrested by Bolshevists in St. Petersburg and was kept as a hostage in Russia. Therefore the Estonian Government had to relieve him of the ministry already in February 1919. He was released from prison in December of the same year and was allowed to move to Estonia at the beginning of 1920. Here at once M. Raud invited him to work in Kohtla-Järve where K. Luts began to organize building of a pilot plant (so-called experimental oil factory) and to install a laboratory. The laboratory (with a provisional floorage of 40 m^2) was opened at the beginning of 1921, experiments on oil shale processing in shaft retorts ("oil generators" or "gas generators") designed by the German company "Julius Pintsch" (7 tonnes of feed oil shale per day) started on the 3th of August 1921.

The first industrial retorting unit (so-called oil factory, 6 retorts, 10,000 tonnes of raw oil per year) was put into operation in December 1924, the following two units in March 1936 and May 1938 (8 and 16 retorts, 20,000 and 40,000 tonnes of raw oil per year, respectively). The latter is still in exploitation. For raw oil processing in Kohtla-Järve there were built a bitumen unit in 1927, a gasoline (cracking) unit in 1931, and a gas spirit unit (LPG-unit) in 1936.

In October 1926 the graduated engineer V. Vöhrmann (a former member of the board) was substituted for K. Luts "to devote his full abilities to directing the laboratory and to scientific studying of the methods of oil shale processing". K. Luts coped with this task

splendidly — in a short time he turned the laboratory into a scientific centre. In 1929 the laboratory disposed of a working surface of 130 m^2, its equipment was worth 18,000 kroons, its library — 2,600 kroons. In 1938 the expenses of the laboratory were about 25,000 kroons, the total sum spent on the laboratory amounting to more than 200,000 kroons. The library subscribed to 17 scientific journals (9 in German, 3 in English, 2 in Russian, and 3 in Estonian).

The laboratory repaid for the expenses to the full. In spite of the little number of co-workers (at first in addition to K. Luts only a chemist and two laboratory assistants, later two chemists and four assistants) the laboratory managed, besides its everyday analyses, to work out technology for producing a great number of oil shale products (automobile gasoline, motor petrol, light and heavy diesel fuels, Estoasphalt, oil emulsions, impregnating oils, Estokarbolineum, fruit-tree carbolineum, roof and iron varnish, insect poison "Puttox" etc.). Still K. Luts did not consider this work to be the main task of the laboratory. This he formulated as "long-scale scientific studies to explore the characteristics and composition of our oil shale". The success and high level of this work are demonstrated, for instance, by the fact that two co-workers at the laboratory — J. Hüsse and A. Puksov — defended their doctor's theses on the basis of these results. Karl Luts himself published, in addition to a voluminous monograph "Der estländische Brennschiefer, seine Chemie, Technologie und Analyse" (1934, 336 pp.), a number of scientific papers and reviews.

Unfortunately, K. Luts could not devote himself entirely to the laboratory for a longer time. At the beginning of the 30ies he was commissioned to direct, besides the laboratory, the retorting and bitumen units as well. He remained at this post until his arrest at the beginning of 1941.

Documentary data about the further fate of K. Luts are still buried in hidden chambers of KGB. The only information concerns his transport from Tallinn to Leningrad in summer 1941. As he was brought onto the ship ill and lying on a stretcher, there are reasons to assume that his life ended the same year. His last words that have reached to us are, "Allik, see what they have done to me!" (Anatoli Allik was a mining engineer arrested and transported on board of the same ship).

As scientists, Paul Kogerman and Karl Luts will remain in the history of Estonian science and technology above all as the founders of oil shale chemistry. They were the initiators — either from his own aspect — of the first researches to determine the chemical structure of organic matter of the "kukersite" oil shale, to discover the regularities of the thermal destruction of "kukersite", and to study chemical composition and properties of "kukersite" oil. These studies have become classics cited to this day.

Paul Kogerman's studies on oil shale chemistry were of a theoretical, in a sense even of an academic character. They expressed rather distant aims and flight of the imagination than detailed solutions. On the contrary, the studies of K. Luts are distinguished by closeness to actual life, rustic solidity, and filigree preciseness, from the present-day point of view maybe even a certain pedantry. However, only such a pedantry has enabled the physical constants of oil shale

and its products determined by K. Luts (calorific value, specific heat, expansion coefficients etc.) and his elemental composition to stay unsurpassed in regard to their reliability. The veracity of his data was guaranteed by special investigations dealing with the analytical problems.

Paul Kogerman's greatest achievements in the field of oil shale science seem to be his studies on the regularities of the genesis and thermal destruction of "kukersite" shale whose basic principles have endured up to the present day. Nevertheless, at that time they were not met with unanimous approval (K. Luts: P, Kogerman has expressed his individual standpoint concerning the oil shale genesis). The activities of K. Luts are undoubtedly distinguished by his discovery of everlasting importance that the chemical and elemental composition of the organic matter of "fresh" kukersite shale is quite stable notwithstanding the layer and the location of the mining field. This statement has become an axiom. One must also bear in mind that it was K. Luts whose conviction was decisive in choosing the main type of the unit for processing Estonian oil shale - shaft retort ("oil generator") with internal heating. In principle this decision has justified itself up to this day.

Development of international contacts may be considered an indisputable merit of both great men. Here again, both of them made it in their own way. Paul Kogerman who had studied and worked abroad took part also in a great number of international meetings (Paris, 1922; Cambridge, 1923; Copenhagen, 1924; Berlin, 1930; Milan, 1932; London, 1933; Paris, 1937 and others) and lectured as a visiting professor in Finland, Sweden and Germany. He was a chevalier of the French Legion of Honour and a foreign member of Finnish Chemical Society. It was only natural that K. Luts who was bound to manufacturing by his post could not compete with P. Kogerman in this field. However, he could develop international contacts even in his everyday work. They arose by itself - every year more than 200 foreign scientists and engineers visited his laboratory. One can say therefore that P. Kogerman took Estonia to Europe while K. Luts brought Europe to Estonia.

Today when eastern connections are looked down on it is worth mentioning that the contacts of neither P. Kogerman and K. Luts were directed only to the West. Both of them had close contacts with many scientists from the Soviet Union. They evolved greatly due to the fact that the monograph by P. Kogerman, K. Luts and J. Hüsse "Chemistry of Estonian Oil Shales" based on their earlier papers was translated into Russian and published in the Soviet Union in 1934. A great deal of articles by P. Kogerman and K. Luts (mostly translated, some of them written originally in Russian) were published there as well.

Most of the students and co-workers of P. Kogerman have characterized him as a composed and tolerant person free of authoritative manners and raised tone. He was a well educated man who undoubtedly belonged to the "high" intellectuals of his time. His tolerance reveals itself clearly in his papers as well — he never criticizes the standpoints not coinciding with his own views; he prefers to ignore them.

Karl Luts as a personality has been appreciated as an obliging and steady, but at the same time a most punctual and strict man ("A fine man. Didn't stand only drinking"). In science K. Luts valued truth above all. That is why he often got engaged in a heated discussion, but his arguments were always most well-grounded. By the way, his invitation to come to Kohtla-Järve — as one's own eye sees the best — served sometimes as an additional argument. This argument

seems to have convinced even G. Stadnikov, a world-famous name in the fossil fuel chemistry of this time. It evidently settled the question as the latter was not able to visit Kohtla-Järve (in 1937-56 Stadnikov did work in his special field right enough but it occured in a prison camp in Vorkuta where a laboratory had been installed for him).*

The erudition, diverse interests and sense of duty of Paul Kogerman and Karl Luts are well illustrated by the fact that they considered it necessary to write, besides scientific works, articles on public matters and popular science dealing with different spheres of life. P. Kogerman's manual of organic chemistry for the university and numeral editions of schoolbooks of natural history and the K. Luts's books "Galileo Galilei" (1920) and "Oil Shale — Our National Treasure" (1939) are undoubtedly worth of mentioning as well.

Although Paul Kogerman did not belong to any political party, he inevitably had to take part in political life on account of his post as a rector of the Technical University he belonged to the State Assembly). On the contrary, Karl Luts pronouncedly avoided politics. Naturally this did not prevent him from eagerly taking part in society activities and from being even one of the main promoters of such activities in Kohtla-Järve.

Paul Kogerman and Karl Luts are doubtless personalities whose work will remain in the history of Estonian science and technology. Let us only have energy and brains to develop all they have created.

The author expresses his thanks to the graduate engineer Arvo Kruus and to the director of Kohtla-Järve Oil Shale Museum Arthur Ruusmaa for their kind co-operation in obtaining information about the activities of Karl Luts.

Translated by L. Laanest from "Insenerikultuur Eestis", Tallinna Tehnikaülikooli Kirjastus, 1992, P. 103—110. The biography of P. Kogerman has been omitted as these data have been published in OIL SHALE, 1991, vol. 8, P. 289—305.

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Received March 03, 1993

*Stadnikov's abilities, enterprise and working conditions can be illustrated by the fact that he himself prepared calcium chloride, a laboratory dessicator from local limestone when he needed it.