Energy Policy Studies

History of energy

Edited by Artur Stec

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BGK POLISH DEVELOPMENT BANK

Partner

PGE Fundacja

Special edition of the journal No. 1(9) 2022

IGNACY LUKASIEWICZ ENERGY POLICY INSTITUTE

History of Energy

Edited by

Artur Stec

Ignacy Lukasiewicz Institute for Energy Policy
Rzeszów 2022

Cover design: Aku Studio

Typesetting: Lidia Mazurkiewicz, MSc, Eng.

Publisher: Ignacy Lukasiewicz Institute for Energy Policy
Technological Incubator 4
Jasionka 954E, 36-002 Jasionka
Poland
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www.instytutpe.pl

Strategic sponsor:

Partner:

ISSN 2956-3682
e-ISSN 2545-0859

This special issue of the journal was realised and funded by the 'History of the Energy Sector' project.

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200 years ago, Ignacy Łukasiewicz - inventor of kerosene lamp and founder of the world's first oil mine, was born in Poland. After graduating from pharmaceutical studies in Cracow and Vienna, Łukasiewicz worked in a pharmacy. He conducted research on crude oil, attempting to distill elements useful in the pharmaceutical industry. This research did not revolutionize pharmacy, however it led him to invent kerosene lamp and gave rise to the development of oil industry in Poland. Today, the petrochemical industry is one of the most crucial sectors of the world economy. The products that result from the processing of crude oil include not only fuels but also a wide range of chemical compounds that are used in the production of everyday items. To mark the birth anniversary of this pioneer of oil industry in Europe, Polish Sejm established 2022 as the Year of Ignacy Łukasiewicz.

2022 will go down in history because of the unjustified and criminal armed invasion of Russia on Ukraine. This invasion is connected with Putin's energy blackmail, who in order to compel the approval for his bandit actions, is trying to induce energy crisis in Europe.

We can see clearly today, that energy has great influence on the development of countries and the life of societies. We can also see how important possessing various energy sources and safe, stable delivery sources is. Therefore – just like Łukasiewicz – we need to look forward into the future and seek new solutions.

Green hydrogen may become the fuel of the future. Hydrogen valleys, wind farms that produce green hydrogen, hydrogen busses and trains are the things that are already happening. It is an opportunity for the world for more stable, safe and ecological energy future.

BGK – Polish development bank, that I am honored to manage, would like to play its part in green hydrogen energy development. That is why, among other reasons, we created 3W Idea – the project where we build and integrate the community of scientists, students, entrepreneurs and public sector representatives. In 3W Idea we focus on 3 resources: water, hydrogen and carbon. We want to create an innovative economy sector through a model unprecedented anywhere else in the world, that combines "Water-Hydrogen-Carbon" into a coherent socio-economic ecosystem.

The articles collected in this issue of "Energy Policy Studies" are about the history of Polish oil industry, our contribution to the development of energy. I wish you an exciting read. Let this look back be an inspiration for new explorations, developing energy and building a better future.

Beata Daszyńska-Muzyczka
President of the Management Board

PREFACE

The history of Poland's, and the world's, oil industry began on Polish soil under the Austrian partition, i.e., in Galicia, the northern province of the Austrian monarchy. It was one of the least industrialised regions of the country. A new industry, the oil industry, may have contributed to the modernisation of the Galician economy and society.

The history of the Galician oil industry clearly shows the turning points that determined its development. The first of these was the development by two pharmacists, Ignacy Łukasiewicz and Jan Zeh, of such a method of distilling oil that allowed the elimination of the lightest fractions from the raw material, which protected the preparation from spontaneous combustion, and at the same time allowed the elimination of heavy components, so that the kerosene did not smoke when burned. Following Łukasiewicz's advice, Adam Bratkowski, a well-known Lviv tinsmith, constructed a lamp in which kerosene became the fuel. The first kerosene lamp was lit in a Lviv hospital on July 31, 1853, during a night operation to save a patient's life. This was the best way to promote the invention, and the moment that should be considered the beginning of the oil industry. It was thanks to Łukasiewicz that for many years, until the spread of electricity, the kerosene lamp became the main source of artificial light.

Thanks to Tytus Trzecieski, Łukasiewicz established the world's first oil mine in 1854 on the estate of Karol Klobassa in Bóbrka, Subcarpathia. On Łukasiewicz's initiative, the first industrial oil distillery was built in Ulaszowice near Jasło in 1856. It was also Łukasiewicz who hired engineer Henryk Walter at the Bóbrka mine, who was the first to initiate oil exploration in Galicia in 1862 using drills made with the free-fall system, which was used in Galician oil mining for the next 20 years. This was the beginning of a drilling movement that initially covered only the western part of the province.

The new raw material, which promised great profits, also attracted foreigners to Galicia. One of them was Canadian William Henry Mac Garvey. Soon after his arrival, he became one of the most important entrepreneurs and constructors, and thus a leading figure in the Galician oil industry. It was his company that in 1883 used a new, so-called Canadian, drilling method for the first time in the history of Galician oil mining. The use of the new method made it possible in the late 19th and early 20th century to discover previously unknown oil deposits located in Eastern Galicia. It was another breakthrough in the development of Galician oil mining when the centre of oil mining moved from the area of Krosno, Jasło and Gorlice to such centres as Sloboda Rungurska, Schodnica, Borysław and Tustanowice. Successive improvements were made to the design with which Mac Garvey came to Galicia. The most important improvements were introduced by such Galician oil entrepreneurs as Wacław Wolski, Kazimierz Odrzywolski, Felicjan Łodziński,

Julian Timoftiewicz, and others. Soon there was no longer talk of a Canadian system but of a Galician-Canadian or Polish-Canadian system. Thanks to its newly discovered deposits, until the outbreak of the First World War, Galicia ranked among the world's leading producers of oil. It should also be noted that Galician oilmen developed designs for modern structures adapted for mud drilling. Among them, world fame was won by the "ram" – Wacław Wolski's drilling apparatus. The origins of the Galician oil industry are discussed in this work in articles by Anna Kozicka-Kołaczkowska and Piotr Franaszek.

The turmoil of the First World War left a clear mark on the oil installations of Eastern Galicia. Withdrawing in 1915, Russian troops carted away equipment and set fire to more than 320 shafts. The Austrians, on the other hand, while occupying oil areas, carried out plunderous exploitation of the oil fields. With the end of the war, the area of Eastern Galicia became an arena of Polish-Ukrainian fighting. After the restoration of independence, the oil industry was an important part of the industrial sector of the resurgent Polish state. However, in many respects, the situation in the oil basin differed significantly from that before the war. Despite the difficult political situation and border struggles, the exploitation of Galician land began, mainly by small companies representing small domestic capital. Soon, however, foreign, mainly French, capital took over most of the oil industry.

Beginning in 1919, the Polish government gradually bought back some oil companies from private individuals and oil companies and societies in both the eastern and western oil basins. These plants were combined under a common management. Thanks to this, it was possible to create the most important state oil company, which the "Polmin" Group became. The main enterprise of "Polmin" was one of Europe's most modern refineries in Drohobycz, taken over from the Austrian government in 1918. When, in 1926, Eugeniusz Kwiatkowski became Minister of Industry and Trade, he attempted to put the oil industry in order. When that didn't quite work out, Polish Petroleum Export came into being in 1933. Paradoxically, we had too much oil and the aforementioned products in relation to domestic needs, due to the country's very low degree of motorisation. However, a significant increase in the number of motor vehicles in the country was anticipated over the next few years, and so thought was given to providing sufficient fuel. This was to ensure increased production of petrol and artificially produced fuels.

One of the concepts supported by the Polish authorities to solve the fuel supply problem was the introduction of fuel blends containing spirit. At the same time, it was intended to provide an outlet for alcohol in the face of weakening demand for spirits. However, such actions led to conflict between the interests of the distilleries and some oil entrepreneurs fearing a serious loss of existing profits. Eventually, by decision of the state authorities, although against the interests of the oil sector, spirit fuel blends became a permanent part of the domestic fuel market in the 1930s. Grzegorz Ostasz and Paweł Grata write about the problems plaguing the fuel industry of the Second Republic.

The Second World War brought massive damage to Poland's oil industry. The aforementioned refinery in Drohobycz can be considered a symbol of these losses, with the refinery burning for three weeks as a result of the German bombardment on September 10, 1939, before it was extinguished by the Soviet occupiers who seized the area after September 17. Although the oil basin fell to the Soviets, the resumption of mining and production worked for the Third Reich. After the start of the war with the Soviet Union, the Germans proceeded to rebuild the refinery and make new investments. Once again, the refinery was completely destroyed on June 26, 1944, this time by an air raid by American bombers.

The situation of the Polish oil industry completely changed after the Second World War. On the one hand, Poland lost its richest oil deposits located in the eastern Borderlands of the Republic, as well as the modern refinery in Drohobycz, while on the other hand our country found itself in an economic, centrally planned command and control system modelled on Soviet solutions. In view of such complicated economic and political conditions, the possibilities for both oil exploitation and refining decreased significantly. The decline in the level of oil production at the mines directly affected the operations of the Subcarpathian refineries, and imported supplies by rail transport were neither sufficient nor economically efficient. Although the relatively rapid reconstruction of the plants from war damage proved to be an important achievement, already the implementation of modernisation processes adapting the refineries to the realities of the modern petrochemical industry exceeded the organisational, technological, and financial capabilities of the plants themselves. The Subcarpathian refineries found themselves on the margins of Poland's petrochemical industry when in the mid-1960s the Mazovian Refining Plant in Płock was launched, and when the Gdańsk Refining Plant began operations 10 years later. Issues relating to the fate of the Subcarpathian refineries from the end of the Second World War until the political transformation in the late 1980s and early 1990s are presented by Bartosz Pasterski.

Any historian doing research on the past uses different categories of sources. This is also the case when we describe the history of the Polish oil industry. In such research, archival materials are crucially important. In the early days, the oil industry developed in Western Galicia, mainly in the Gorlice-Krosno region. But the discovery of rich oil deposits in Eastern Galicia made the area a major centre for the oil industry. Both in the Galician period and in the interwar years, Lviv became a kind of administrative centre of this industry, where the managements of many oil companies and the headquarters of many organisations of oil entrepreneurs were located. It is not surprising, then, that it is in the Lviv Central State Historical Archive of Ukraine that the richest archival collections relating to many diverse aspects of the history of the oil industry are located. In his article, Volodymyr Dolinovskyi describes in great detail the most important archival materials covering the issues affecting the oil industry in Galicia.

In researching the oil industry, the professional Galician oil press is also an extremely important source. It became an excellent platform for discussing many

important issues affecting Galician entrepreneurs, reprinting articles from other technical journals, and providing information on many important events taking place both in the Galician oil mining industry and in other countries. Among the Galician oil journals, the most important was "Nafta", published since 1893. Its editorial board included such leading Galician oil drilling activists as Wacław Wolski, Antoni Błażowski and Zenon Suszycki. The reader will find detailed information relating to this periodical in the text written by Grzegorz Zamoyski.

It is not without reason that the year 2022 has been declared the Year of Ignacy Łukasiewicz by the Polish parliament. He was an explorer, innovator, and inventor. He built the foundation of the modern oil sector, which has contributed to the development of civilisation. Through his hard work and entrepreneurship, he became a millionaire. However, he remained a humble and good man, a teacher of the young, a social activist, a politician and a patriot. His figure has made a permanent mark on the economic history of the global energy sector. Łukasiewicz tried to infect other people with his entrepreneurial spirit. He knew that oil offered potential that should serve the community at large. He saw the development of the oil industry as an opportunity to create more companies, something he urged others to do. He was not afraid of competition, but rather sought to create new entities that could cooperate with each other. He was able to reconcile his own innovation and individualism in cooperation with others. His attitude full of a creative and out-of-the-box approach to reality, combined with perseverance and diligence, is not only a role model worthy of emulation, but also a signpost for success. Today, employers are looking for employees endowed with the qualities that characterised Ignacy Łukasiewicz. He showed how to show courage in thinking and to cross barriers that are created mainly in our minds. The relevance of Łukasiewicz's model for modern generations is discussed in their articles by Mariusz Ruszel and Tymoteusz Pruchnik.

For unknown reasons, soon after his death, this outstanding compatriot of ours was quickly forgotten. The recovery of his memory began only half a century after his funeral, but continues to this day. Many monuments have been built and more than one institution today bears his name. However, the most important monument to Ignacy Łukasiewicz became the Open Air Museum of the Oil Industry in Bóbrka, now the Ignacy Łukasiewicz Museum of the Oil and Gas Industry, opened in 1961. It was founded on the site of the world's oldest oil mine. The Bóbrka mine is a monument of the highest national rank, which on December 10, 2018, was declared a monument of history by decree of the President of Poland. The site has a unique, universal historical value and is now claiming recognition as a UNESCO World Heritage Site. A synthetic yet visual description of this magnificent place is provided in the text by Barbara Olejarz and Michał Górecki.

Piotr Franaszek

Black gold – the history of the energy sector

Łukasz Zborowski

Abstract: The history of oil production, processing and use is centuries old. Of course, the kerosene lamp, fractional distillation yielding kerosene of unprecedented purity, industrial extraction of oil, including from beneath the seabed, purification, and pipeline transmission of natural gas, led to the explosion (sic!) of the oil industry, transportation energy, chemistry, pharmaceuticals, and many other fields.

Keywords: Crude oil, kerosene, bitumen, mine, natural gas, Ignacy Łukasiewicz

Introduction

The light of an oil lamp in a Lviv hospital operating room was a symbol of the beginning of a new era. The lamp, equipped with a modified unique combustion system for the gases produced during the combustion of kerosene purified in an unprecedented way in the process of fractional distillation, opened up enormous possibilities for the industrial use of oil and its processed products. Know-how met industrialist and landowner in Bóbrka, the development of chemistry and engineering brought development, progress and economic growth to the whole world. The oil industry forced the cooperation of entrepreneurs with the world of science, the unemployed became labourers, workers became engineers, poverty and illiteracy irrevocably gave way to affluence and education. Ignacy Łukasiewicz, who was born 200 years ago, in order to commemorate his memory at the request of an MP from Krosno – the cradle of the oil industry – was declared the patron of the year 2022 by the Sejm of the Republic of Poland.

The centuries-long history of human interest in the extraction, processing and use of oil, kerosene, tar, and natural gas has been known and described by travellers, medics, and scientists alike. The fascination with fire from the earth, burning water, heat and light are not only worth recalling, but they are also worth preserving in memory and passing on to those who associate light and heat only with a keystroke.

The purpose of this article is to recall and introduce the history of the geology, extraction, processing and use of oil and kerosene in the period before 1853, as well as an incidental mention of the successors of Ignacy Łukasiewicz, the fathers

of the extraction of oil from under the sea floor and the industrial use of natural gas transmitted through pipelines.

History of oil use

The history of oil use and processing is many centuries old. The Sumerians used the compacted products of the natural evaporation of rock oil (bitumen, asphalt) from the earth's surface, mainly as a building material. Added to the mixture of clay, sand and gravel used to make high-strength bricks, it was used to fix stone walls (bituminous glue), cover roads (in fact, they were the first asphalt roads in human history), reinforce the banks of artificial reservoirs, and cover the bottoms of boats, thus making them waterproof. Liquid oil (as lamp fuel) was widely used for interior lighting. The people of Mesopotamia considered oil medicinal – they treated boils and scabies with bitumen ointments, and tried to ease joint pain by bathing in oil fountains. Petroleum products tarred Noah's ark and Moses' basket, the recipe for distilling *oleum incendiarum* was closely guarded in Byzantium, and Marco Polo saw kerosene lamp fires burning in Baku in 1272 (Polo 1975: 78).

Over the past 170 years, oil and the petrochemical industry have changed the world, and have been an engine of progress. North of the Carpathian Mountains, between the Vistula and the San, there are many towns with peculiar names: Ropa, Ropki, Ropianka (near Krosno), Ropienka (near Ustrzyki), Ropica and many others [*Ropa* is Polish for crude oil – transl.]. But the earliest written references to the use of petroleum products in Mesopotamia can be found as early as the Sumerian "Epic of Gilgamesh" and the "Epic of Atrachaz", created in the 3rd-2nd millennium BCE. The story of the global flood and the rescue of people in a wooden boat with an ark tarred with asphalt is laid out on clay tablets. The most famous was the "inexhaustible" bitumen source located in the village of Hit near Babylon, in the area of present-day Baghdad. The ancient Greek historian Diodorus Scillus wrote about it: "Many amazing things can be found in Babylonia, but none of them can be compared to the source of the infinite bitumen discovered here" (Sicilus: 44). The word "naphtha" – in Poland today we use the term "crude oil" – (a liquid mineral, composed of a mixture of natural gaseous, liquid and solid hydrocarbons and other additives) is most likely of Persian origin "**نفت**" (phonetically: naft), entered the language through the Greek "ναφτα"(naphta). There are two versions of the etymology of the Persian word *naft*: according to one, it means "wet" (i.e., oil being a kind of moisture, liquid), according to the other, it comes from the Akkadian verb "to vomit" (that is, it is something thrown up from the ground). Other etymological hypotheses are related to the Akkadian "napatum" – "ignition" (which could reflect the fuel properties of oil) or the median "nafata" – "to leak" (from the bowels of the earth). The Germanic languages, which are less prone to direct borrowing, used half-traces from Latin, such as German Erdöl – "earth oil." In the Slavic languages,

in addition to the borrowed form (*ropa naftowa*), the original name "nafta" was used, which meant not only oil and bitumen, but also a solution of salts (the origin of the term "nafta" is related to their use of substances in medicine, especially for healing wounds). It is no coincidence that we find a significant number of toponyms associated with the word "ropa" in oilfield areas. Galician miners extracting oil were called "ripniks", and the term "ropa" itself appears in written sources from the 16th century. In addition, the oil was called "rock oil" in the areas of Subcarpathia and Transcarpathia.

The Polish stage of oil history

Jan Długosz wrote about the use of rock oil (petrus + oleum = petroleum), Stefan Falimierz in his work "On Herbs and Their Power" (Falimierz 1534: 99) in 1534 writes about the medical use of rock oil. Hieronim Spieczyński in his 1556 herbarium "O ziołach tutecznych i zamorskich" and Marcin Siennik in a work entitled "Herbarz, to jest ziół tutecznych, postronnych i zamorskich opisanie" in 1568. In the herbarium "Herbarz polski to jest o przyrodzeniu ziół i drzew księg dwoje" by Marcin from Urzędów, published in 1595, we read about the method of making candles from rock oil. In Eresma Sykst's work "O cieplicach we Skle, księg troje", published in Zamość in 1617, we read about the occurrence of oil, but also about how to purify it by distillation. He also noted that at the beginning of the 17th century, oil was already being extracted from wells dug near the then Polish city of Drohobycz. Mining engineer Henry Walter (1835-1921), in his article "Beitrag zur Geschichte der galizischen Erdolindustrie", states that in the monastery of the Franciscan friars in Krosno there is a document according to which already in the 16th century the Free Royal Cities of Krosno and Drohobycz had the royal privilege of lighting the city with rock oil mixed with linseed oil (Walter 1916: 3). Albert Tylkowski, in his work "Physica curiosa", published in 1680, mentions oil and natural gas sources in the vicinity of Krosno (NB: in the chapter "De ente rationis" there is a description of a natural gas source near the village of Iwaniec: the Iwonicz gas source "Belkotka"). He also mentions other sources of oil in the Krosno area, and uses expressions like asphalt (*pix natia* – native tar), bitumen, and petroleum to describe liquid bitumen (*Petroleum vocant bitumen liquidum*) (Tylkowski 1680: 106). Fr. Jan Frydwalski writes the first textbook "Minero-Logia Magni Principatus Transilvaniae Seu Metalla, Semi-Metalla, Sulphura, Salia, Lapides, & Aquae" in Latin, published in Cluj, Romania. There are descriptions of attempts at oil distillation, its properties, occurrence and also applications in this manual. Today, Fridvaldszky János is a great mineralogist from Transylvania, a Hungarian hero, not known to anyone in Poland, including in the scientific community. Stanisław Staszic writes about the accumulation of rock oil in dug wells and depressions, mentioning localities: Bóbrka, Harklowa, Iwonicz, Klimkówka,

Kobylanka, Libusza, Potok, Rogi, Ropienka, Równe, Wietrzno, and Węglówka. He also goes on to write that the oil occurrence stretches across 1,484 kilometres of the Carpathian Mountains (Staszic 1815). Few also remember that in 1837, at the Ecole Centrale des Arts et Manufactures in Paris, the scientific fractional distillation of crude oil was carried out and published (in "Recherches chimiques sur les bitumes", Journal de Pharmacie in 1840) by Filip Neriusz Walter (Dębski 1955) (a distinguished Polish chemist) and Pierre Joseph Pelletier (Brzozowski 1994).

History of oil and more in the village of Siary

After crushing Emperor Napoleon I, the Russians made their stand in Paris in March 1814. Standing is a euphemism: they drank and enjoyed other pleasures for days and nights. They didn't have time to participate in dinner celebrations: they frequented lavish establishments, where they sabre-rattled and called for a meal. They rushed the staff by calling out: Bistro, BISTRO!!! [Russian for "quickly" – adopted and to this day in Paris they know what bistro means.... Grand Duke Constantine found Mrs. Teodora Walewska (yes, of those Walewskis...) at the American embassy to organise a grand ball to welcome Tsar Alexander I. The Tsar was welcomed by Tadeusz Kościuszko, who so delighted him that a year later he offered our head of state leadership in the creation of the Kingdom of Poland, the latter, offended by the borders, refused. Mrs. Walewska was accompanied by her 15-year-old son, later Prince Stanisław Jabłonowski of the Prus III coat of arms. The young boy was so eager to become a soldier that he joined the tsar's service, passed the exam and, as a cadet of a positional artillery battery, was sent to the mounted guard, where in two years he was already a lieutenant. Unfortunately, this splendidly promising career ended a year later: conflicted with the Grand Duke (due to Countess Joanna Grudzińska of the Grzymala coat of arms – for whom Konstantin Pavlovich Holstein-Gottorp-Romanov, Grand Duke and heir to the throne, renounced all titles), he resigned and returned to Warsaw. Here he married Maria Wielopolska, thanks to which he acquired an estate in Kobylanka near Gorlice.

It is not a coincidence that between Lviv and Vienna the imperial railway line was used by a young pharmacist's helper, Ignacy Łukasiewicz, who carried petrol from the capital to Piotr Mikulasch's pharmacy "Under the Golden Star". In this pharmacy worked Jan Zeh from Łańcut, who obtained his Master of Pharmacy degree in Vienna on August 8, 1846 (NB: Ignacy at that time had already been imprisoned for half a year in a Rzeszów prison, and after his release on December 27, 1847, thanks to the help of his brother, a lawyer, he obtained his Master of Pharmacy degree at the University of Vienna on July 30, 1852). Zeh had been researching oil distillation for several years, studying different varieties of oil, reading old manuscripts, working nights, reeking of oil, wandering like a madman

through the backstreets of Lviv arguing with himself (Iwanow 2009: 372). In 1852, he was joined by Ignacy Łukasiewicz and in 1852/53 succeeded in obtaining a distillate that was pure, reasonably odourless and "safe". Lviv tinsmith Adam Bratkowski constructed the first kerosene lamp, which illuminated the laboratory and the pharmacy's storefront on March 20, 1853. A tin casing with forced-air vents, a mica window and a burner that allowed secondary burning of the gases reduced smoking. Initially, the lamps were not popular. It wasn't until dozens of kerosene lamps illuminated the operating room of Lviv's General Hospital on July 31, 1853, that interest emerged. Zeh applied in May 1853 for a privilege (patent) for chemical purification of crude oil and received it in December of the same year. He soon set up a store and Galicia's first distillery, and supplied kerosene to light the streets of Lviv, also to Vienna. In 1854, at the Munich Exhibition, he received a diploma of commendation for the excellent quality of his distillate. Until he finally obtained a pure distillate, which he confirmed with a Viennese patent.

In the 17th century, the Mining Court in Drohobycz issued an official government document, the "Order of the Court Chamber", declaring oil a mineral, which bound its extraction to the provisions of mining laws. Oil was produced at the former Svoboda Rungurska (Kołomyszczyna) deposits since at least 1711. At that time, rich oil deposits were also discovered in a strip from Dobromil through Drohobycz to Kuty and on to Romania. The largest deposit of the time appeared in 1800 near the village of Pohar (now Lviv Region), near the Ropianka stream. According to descriptions by Austrian geologist Emil Tietz, up to 260 tonnes of oil per year were extracted here from wells 5-7 to 70 metres deep. Individual attempts to industrialise the Borysław field in 1810-1817 are known, but they did not achieve sustainable development due to the lack of significant demand for petroleum products.

It should be noted that the imperfect distillation of rock oil has been known since ancient times, even ancient physicians (in particular, Cassius Felix) and mediaeval Arab alchemists used it. Among the industrialists who distinguished themselves with the introduction of primary oil refining technologies are the Arkhangelsk mineralogist Fyodor Priadunov, who built an industrial oil distillation plant at the settlement of Ukhtyn in 1746; the Dubynin brothers, who invented the oil distillation cube and applied it in 1823. in the Mozdok fields; mining engineer Mykola Voskobojnikov, under whose leadership the first oil refinery was built in Abszeron (1837) (Biletskyi, Hayko, Orlovsky 2019). Pharmaceutical processing of crude oil to the level of "shale oil" had been successfully carried out in Italy. Work on the industrial processing and refining of crude oil in the UK began in 1851. But all these technologies did not provide pure distillate. The resulting substances burned in the lamps (as well as vegetable oils and animal fats) gave dim light,

a stench, and lots of soot, which quickly contaminated the lamp, reducing the transparency of the mica (used for lack of glass as window protection). In 1852, Piotr Mikulasz, the owner of a Lviv pharmacy, set up a chemical-pharmaceutical laboratory (distillery), bought from Drohobycz businessman A. Schreiner, centnar of Borysław, an imperfect mountain oil distillate and commissioned Zeh to distil (rectify) this product to the degree of the so-called "album Oleum petrae" ("rock oil"), which was delivered to the pharmacy from Italy. After weeks of numerous laboratory experiments, in which Ignacy Łukasiewicz participated, full distillation and separation of the oil into separate fractions was carried out for the first time. The pharmacists used concentrated sulphuric acid and soda solution to clean the oil. In May 1853. Zeh submitted invention materials (the "privilege") for chemical oil purification and received them in Vienna in December of the same year. In 1854, at the World Economic Exhibition in Munich, Zeh received "commendable recognition for the complete distillation of oil". 1854 is when the Bóbrka mine is established. The road to it led Łukasiewicz through Rzeszów, Łańcut, Lviv, Cracow and Vienna. But it also led through Gorlice, where oil had long been known and used to light up cities: Łukasiewicz, after a conflict with Zeh in 1853, left Lviv and took a job in Gorlice at Ludwika Bartkowa's pharmacy. Here he saw the development of oil activity: the oilmen collecting black oil from puddles and ponds in the village of Łosie, here he watched the 30 fathoms deep diggings – wells with oil built there for centuries and then developed by Prince Jabłonowski, here he watched his factory of asphalt and lubricants, which the whole world already knew about. Here he also witnessed major disasters, fires in mines, explosions in primitive distilleries. Here he learnt about Jabłonowski's trips to the Krosno area, seeking oil-bearing areas. This is how he became a partner with other industrialists, the founders of the mine in Bóbrka were: Ignacy Łukasiewicz – the modest pharmacist; Tytus Trzecieski – a landowner and initiator of the founding of the mine; and Karol Klobassa-Zrencki – owner of the village of Bóbrka. Thanks to the concerted cooperation, commitment and high operability of the creators, the world's first multidimensional oil company was created. A refinery was built in Chorkówka (Pilecki 1957: 97), a steel mill and smelting furnace in Polanka, a forge producing augers and mine equipment in Potok, a drillers' school in Wietrzno, a gas-fired Krosno Basin Power Plant in Brzezowka (now Męcinka) (on the site of Alfred Nobel's gold mine...) and in 1873 a real school with a department for training electricians. From this area, Polish industrialists and mine workers went on apprenticeships to the United States and Canada, to technical universities throughout Europe, here went the "Baciarzug" – the train carrying drillers to Drohobycz and Borysław. Here investors, labourers, carpenters, roofers, locksmiths were drawn from half of Europe, bridges, roads, railways, banks, insurance companies, health insurance companies, annuity

companies were built. Here, in Krosno, next to the Stawiarski Refinery, the Russians built their first airport, and the gas helped to create a glass, linen-making area. Here, Karol Klobassa-Zrencki funded a spa in Bóbrka, where mineral waters and balneological treatments treated 5,000 patients a year in the 19th century. This was the *perpetuum mobile* of Poland's development.

Successors of Ignacy Łukasiewicz

There are many such names, but it is worthwhile when writing about oil to stop and recall one more: Witold Leon Julian Zglenicki. He was a graduate of the Faculty of Mathematics and Physics at the Warsaw Main School (now University of Warsaw), a pupil of Mendeleev at the Mining Institute in St. Petersburg, and considered the "father of Bakiya kerosene" or the "Polish Nobel". Inventor, scientist, industrialist, and philanthropist. 30% of the world's oil production comes from offshore drilling – which he devised, designed, and patented. Shah Mozaffar ad-Din Shah Qajar awarded him the Order of the Lion and Sun for his geological discoveries in Persia. He was a partner of the Nobels and Rothschilds in business, while suffering from diabetes he established the Foundation for the Promotion of Science (on May 20, 1991, the Józef Mianowski Fund was reactivated as the Foundation for the Promotion of Science) and donated a huge fortune to it for the development of Polish science. The amounts at the time were estimated to be in the vicinity of $220 million with a $150 million Nobel fund. This "modernised estimate" makes it possible to claim that the value of the funds of the Foundation for the Promotion of Science can be estimated at more than $4,000,000,000 today. Unfortunately, the property was seized and squandered by the Soviet and Polish communist authorities, who, despite numerous requests from heirs and representatives of science, do not respond to demands for the return of the Foundation's assets. His bequest to the Mianowski Fund surpassed (...) the bequests of Queen St. Jadwiga – for the restoration of the Cracow Academy, or its foundation in the 14th century by King Casimir the Great," wrote Marek Zawadzki, president of the Polish Science Foundation. Today, the Polish Science Foundation is a charitable institution, donating modern laboratory equipment in the field of power electronics to Polish technical schools – secondary and higher education.

Conclusion

Ensuring the continuity of fuel supplies is a concern of politicians, polemologists and economists today. Looking with pride at the more than four hundred outstanding Poles associated with petrochemistry and influencing progress on all continents – we must remember that the preservation of their testament today – depends on us. Ignacy Łukasiewicz died by a wood-burning fireplace, today, thanks to the work of this humble pharmacist, processed petroleum is not only aspirin and

ibuprofen, clothing and cosmetics, it is first and foremost the basis of the energy industry, the automotive industry, we will meet paraffin in hair shampoo and in the cellphone, in the propulsion of vehicles, machinery and equipment. The world and humankind owe much to Łukasiewicz and many other nameless contributors to development and progress.

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Łukasz Zborowski MA – is a Krosno resident, an *Abiturient* of the Ignacy Łukasiewicz School of the Ministry of Mining and Energy Complex in Krosno, who in 1984 was belted as a miner-oilman, a graduate of the Ignacy Łukasiewicz Rzeszów University of Technology in Rzeszów, an employee in the Polish Energy Group, an analyst, a specialist in the field of energy, cyber-security, and security in the energy industry, cross-border security, regionalist fascinated by the Krosno Lands, the oil industry, history and geopolitics.

That's oil!...The Apothecary and the Blood of the Earth

Anna Kozicka-Kołaczkowska

Abstract: Petroleum was of little interest to analytical chemistry scholars until the mid-19th century, as they considered it unhelpful to experiment with an explosive chemical compound with niche utility value. The discovery of oil's potential is credited to Polish pharmacists Ignacy Łukasiewicz and Jan Zeh, who performed the chemical separation of oil in a pharmacy laboratory using the scientific method of fractional distillation. The isolation of the kerosene fraction from oil was exploited by Ignacy Łukasiewicz, who created an innovative design for a lamp. Lighting with cheap kerosene became the idea of the explorer, who, with the help of Polish investors, organised the first oil mine and refinery in 1854, laying the foundation for the oil mining and petrochemical industry. Łukasiewicz's lamp, entering mass use, initiated global demand for oil. The accounts of Polish and Austrian historians on the pioneering role of Łukasiewicz in this regard support the arguments from the field of physics and analytical chemistry developed by Wojciech Roeske, who demystifies the amateurish, intuitive methods of oil purification of Łukasiewicz's predecessors, documents the merits of the Pole as a pioneer – an ancestor of the oil industry derived from the tradition of Polish pharmacy.

Keywords: Ignacy Łukasiewicz, kerosene lamp, kerosene, fractional distillation, oil mining, petrochemicals

Introduction

In 1882, the year at the beginning of which Ignacy Łukasiewicz (8.03.1822 - 7.01.1882) died, Thomas Edison lit up California's Menlo Park with hundreds of light bulbs on September 4. This was a harbinger of the inevitable arrival of electric light, although Łukasiewicz's kerosene lamp still served people until the middle of the 20th century, when about a century had passed since July 31, 1853, when Ignacy Łukasiewicz, a pharmacy graduate from the "Pharmacy under the Golden Star," delivered lamps for the new petroleum fuel to the Lviv hospital (Tomanek 1928; 22-24). And today you can still meet people who spent their evenings by a kerosene lamp. This date of Łukasiewicz's public lamp exodus – "lighting the first kerosene lamp" – is sometimes celebrated in Poland as a symbolic day for the birth of a new industry (Tomanek 1928; 73-75). Thanks to the lamp, the world entered the era of oil civilisation, as within ten years of 1853, the oil mining that Łukasiewicz inaugurated had already transformed into a professional oil mining

and refining industry. The Polish kerosene industry infected the world with oil fever. It was a world power for several decades in the 19th century, and made Vienna an oil hub and stock exchange headquarters.

The state of oil research in the 19th century

Before Łukasiewicz, oil remained outside the circle of interest of European earth sciences of the 19th century (Szajnocha 1881; 3), although its occurrence was reported by physiographers. Surface oil seeps in Poland are evidenced by geographical names like Ropa, Ropianka, Ropica, Ropka. It was of interest to tanners, wheelwrights and quacks. The ancients wrote about oil. Egyptians prepared mummies with it.

In Poland, in the 16th century, Stefan Falimirz recommended the healing properties of oil. He explained that "*petroleum"*, is *"an oile which comes from stone"* (Falimirz 1534; 231)**.** Oil and its forms were described by Polish scholars of the past centuries – Gabriel Rzączyński (1721), Krzysztof Kluk (1781; 196-208), and Stanisław Staszic (1815; 277-283).

Pharmacists played a special role in the development of Earth sciences in the 19th century. With pharmacy laboratories at their disposal, they had a chance to join the trend of scientific discoveries in physics and chemistry that accounted for the technical leap of the century of "steam and electricity". Independent chairs of scientific pharmacy, which were separated from medical departments, were established in Polish universities as early as the 18th century in Warsaw, Cracow and Vilnius, and their tradition was carried on by generations of scholars in the 19th century (Rembieliński, Kuźnicka 1987; 100-122). The Department of Pharmacy at the Jagiellonian University was established during the reign of the last Polish king in 1783. Its first university professor was Jan Szaster, whose most prominent continuators were Józef Sawiczewski, and during Łukasiewicz's studies, Florian Sawiczewski, Rafał Czerwiakowski and Ludwik Zejszner (Roeske 1974; 31-35).

Professor of pharmacognosy, history of pharmacy and long-time director of the Museum of Pharmacy at the Jagiellonian University in Cracow Wojciech Roeske saw Łukasiewicz's work, unlike the other contenders for his pioneering position, not as the result of spontaneous chance, but the success of a well-educated pharmacist, the culmination of the tradition of Polish scientific pharmacy – the "*primus inter pares*" of the 19th-century oil industry. He evidenced this thought and expressed it in the words:

"The mother of petrochemistry and the oil industry is the Polish pharmacy, the cradle is the pharmacy laboratory" (Roeske 1991; 84).

First fractional distillation of crude oil in 1853

After graduating from the fourth grade of the Rzeszów Gymnasium, fourteen-year-old Ignacy Łukasiewicz, as a pharmacist's apprentice, began his path to becoming a pharmacist. These were years of laboratory work from dawn to dusk,

studying and taking exams in physics, chemistry, drug preparation, pharmacognosy, medicine, toxicology, geology, zoology, dendrology, herbal medicine, and materials science. By the time he earned his master's degree, Łukasiewicz had completed fourteen years of pharmacy work and study, as well as a year and a half of university study in Cracow and a diploma semester in Vienna. The pharmacy of his time produced a great number of medical, perfume, food, and household preparations, which required comprehensive knowledge of and acquaintance with laboratory techniques.

Ignacy first saw crude oil only as a thirty-year-old master pharmacist in June 1852. Years later, he recounted in an interview the day that the village innkeeper Abraham Schreiner showed up at his pharmacy *"with a flask of liquid red like blood"* (Morawski 1871; 50) – as Łukasiewicz was the first to compare oil to blood (Krajewski 2018, Klare 2006). The compound with the Latin name *petroleum* was already known to him. He heard about it during his studies in Cracow from Professor Zejszner (Morawski 1871; 50), and purified oil from Italy was a luxury drug known to apothecaries. What was new to him was that rock oil could be obtained in close proximity.

With the approval of the pharmacy's principal Mikolasch, Łukasiewicz set about experimenting on the hitherto scientifically unexplored compound with his senior colleague Jan Zeh. The masters used the fractional distillation method and fairly quickly "decomposed" the crude oil into light gasoline fractions, medium fractions and heavy hydrocarbon fractions from the group of technical oils and asphaltenes. When testing their properties, it was found that the fraction isolated between 250 and 350 degrees Celsius burnt with a bright, even, non-explosive flame. It was also called kerosene. This was a pioneering success and a testament to the highest professional qualifications of the two pharmacists. A patent for a method of laboratory distillation of crude oil was issued to them at the Vienna patent office with a date of December 2, 1853. Its essential passage was: *"Zeh Johann und Mag. Der Pharmazie Ignatz Lukasiewicz Erfindung die naturliche Bergnaphte auf chemische Wege so zu lautern dass Sie dadurch zur technischen Zwecken unmittelbar verwendbar werde. Provilegium Urkunde 2 Dezember 1853. Civil. Dauer 2 Jahre Geheim.*" (Roeske, 1974;. 85).

Based on Anczyc's description of the method used by the masters (Anczyc; "Kłosy "1882, 885), Roeske was able to conclude that this procedure *"in principle is still in use today"* (Roeske: 1974; 42). Commenting as a specialist in analytical chemistry on the complex process of fractional distillation, Roeske argues that news of all discoveries guided by intuitive empiricism must be mystifications.

Ignacy Łukasiewicz's first kerosene lamps

The initial success of obtaining light kerosene, shared with his colleague, could only be multiplied by Łukasiewicz. He mentioned:*"I'm trying to shine, of course, with the oil lamps. The tank ignites inside, bursts it and almost burned me*

(...). I'm going to the famous tinsmith Bratkowski. (...)We try, we improve..." (Morawski 1871; 52)

The thing was to harmonise the design of the lamp with the physicochemical peculiarities of kerosene. For Roeske, this meant definitively resolving the pioneering position of Łukasiewicz's prototype through his proprietary solutions for the air supply to the holed burner, the features of the wick and its adjustment, the kerosene container, the shielded flame, the polished mica part, and the method of drawing out exhaust. (Roeske 1974; 47).

Roeske contrasts Łukasiewicz's lamp with the features of Sambor's lighting from the beginning of the century. On the basis of Höfer and Engler's description of the Samborian lamps in the rock oil monograph, Roeske shows that the product used in them was not kerosene, but a random mixture of light gasoline fractions obtained at 70-120 degrees Celsius without a scientific theoretical basis or appropriate method. The compound was volatile and required an air supply *"smaller than the smallest pin* (Roeske 1974; 47), because it burned with a living flame, which precluded the use of a wick and the regulation of light and was a dangerous experiment. Understanding among specialists in analytical chemistry and laboratory technology of the principle of the appropriateness of the properties of kerosene for the construction of the Łukasiewicz lamp, Roeske found in almost all of Europe. At numerous scientific conferences, the Cracow professor presented this problem and handed out replicas of Łukasiewicz's lamps, which he described in his diary of these sojourns (Roeske 1991).

Guided by scientific rationale, Roeske also contradicted the view that American Benjamin Silliman obtained combustible distillate from oil in 1855. His opinion is confirmed by the fact that Yale University, at the hands of Professor of Technical Sciences Jerzy Hołubiec, submitted a written statement that Silliman had never constructed a lamp (Roeske, 1974; 48-49). Łukasiewicz's pioneering position is also described by historians and Austrian officials of his time, who were not necessarily positive about Polish successes. Industrial inspector Navratil testifies: *the first public edifice on the entire globe lit by petrol was the general hospital in Lviv. It was illuminated by Łukasiewicz's petrol."* (Roeske: 1974; 47). This fact is confirmed by geologist, author of works on kerosene Hans von Höfer (Roeske 1974; 84).

Although the first designs of Łukasiewicz's lamps could hardly be called exclusive, their creator was not so much interested in their fabrication as in perfecting the quality of kerosene as part of the "living room" genre, without unpleasant odour or smoke. He confessed:*"Then they proclaim the new illumination: pinolin, camphine! I can't sleep for jealousy* (Morawski 1871; 52). So, for encouragement, he also called kerosene the *"new camphine.* He purchased oil from village gatherers, distilled it, and sent offers to Germany, France, and Vienna. Twenty years later, this was described by the Austrian Gintl, who personally encountered Łukasiewicz: *"Es war in den Jaren 1853/4 als Herr J.B.Heindl gegenwärtig Besitzer der chemischen Fabrik zu Ottakring, vom Hernn Łukasiewicz in Lemberg*

Proben von Destillaten sammt Lampen erhielt, um diesen Leuchtstoff in Wien bekannt zu machen und ein Kapital zur Ausbeute dieses Mineral-Oelszu acquiriren nachdem hierfür weder in Lemberg noch in andern Orten Galiziens ein Interesse erweckt werden konnte. Zu gleicher Zeit sandte Łukasiewicz solche Oelprobe durch den gegenwärtigen Central-Direktor der Carl-Ludwig Bahn Herrn Louis de Lens nach Paris und an den Prof. Redtenbacher in Wien, um die Aufmerksamkeit der wissenschaftlichen Welt aud diese Stoffe zu lenken und ihnen praktischen Eingang zu verschaffen. (...) „Doch bleiben diesen Bemühungen ohne ersehnten Erfolg." (Gintl 1873; 5). Łukasiewicz patiently invested, experimented with oil and made a living in pharmacy (Brzozowski, 1974; 64).

The world's first oilman

In 1854, Łukasiewicz left Lviv to run his own pharmacies in Gorlice, Krosno and Brzostek. Luckily, he met investors there who entrusted him with an oil-bearing site in the Bóbrka estate for the world's first mine.

"*If I am not mistaken, this is oil, in mercantile terms – kerosene!"* (Morawski 1871: 55), Łukasiewicz exclaimed enthusiastically at the sight of a sample brought by future investor Tytus Trzecieski (Brzozowski 1974; 84-87). The mine was in operation in 1854, even though the owner of Bóbrka, Karol Klobassa already had an expert report on his oil from the Liebieg Institute in Munich. *"This is fat without value"* – ruled the German scholars (Morawski 1871; 56) and this fact, too, verifies the information about Łukasiewicz's predecessors typified even from ignorant scientists, such as the kerosene merchant Schreiner (Brzozowski 1974; 85-87). Quite quickly, Łukasiewicz abandoned the idea of lamp production without regret. Coming across a rich oil deposit in 1861 eventually prevented him from managing pharmacies as well (Brzozowski 1974; 118).

It was not until five years later, in 1859, artesian well digging expert Colonel Drake came across an oil deposit in Pennsylvania, and so the first oil well on American soil was established (Brzozowski 1974; 72-73). Meanwhile, the Regional Museum in Jasło has in its collection Łukasiewicz's diploma from an industrial fair for petrochemicals and light kerosene from 1858. (Bonusiak 2018; 115). At the time of his death, Łukasiewicz, in addition to being a shareholder in the Bóbrka mine and owner of a refinery, was co-owner of more than a hundred shafts in mines in Ropianka, Smereczna, Nowosielce, Uherce Mineralne and Solina. (Bonusiak 2018; 126).

Thanks to the fortune made in kerosene, he was a sponsor, lender and donor to countless people and public institutions, and was tireless in social activities. He was a member of the national parliament, creator of the world's first workers' insurance and "fraternal funds", builder of schools, and educator of the people, who called him "father". He initiated the oilmen's association and the trade newspaper "Górnik" (1882).

Łukasiewicz world pioneer of petroleum science and ambassador of Polish pharmacy – summary

Informed by Schreiner of Łukasiewicz's discoveries, the Viennese factory of the Ditmar brothers switched from oil to kerosene lamp production within a few years. In 1864, without an agreement with the Polish inventor, they patented the design of the burner, an essential component of Łukasiewicz's lamp (Roeske 1974; 49), which became known worldwide as the "Ditmar lamp." In Bóbrka, Łukasiewicz trained oil mining personnel – miners, technical personnel, and engineers. Polish and foreign investors were hired to study, come as guests, copy equipment, inventions. (Franaszek 1991). Kerosene from under Łukasiewicz's supervision and logistics to the end of his life topped the rankings of quality exchanges, at national exhibitions and in Vienna (Tomanek 1928; 39-43). John Rockefeller also sent his engineers to him from the US for know-how (Brzozowski 1974; 141). Łukasiewicz's students and employees dispersed over time as sought-after petroleum professionals across the continents.

Feted by the elite, Łukasiewicz was decorated by the Pope with the order and dignity of papal chamberlain (Tomanek 1928; 71-72) and by Emperor Franz Joseph with a medal and the title of baron (Tomanek 1928; 73-75). He received these honours with exasperation. To the end, he treated people for free and, although he was a Polish nobleman of the Łada coat of arms, did not allow people to call him anything other than "Mr. Pharmacist".

The end of his century brought a global crisis of oil overproduction, but soon the role of the lamp that started and unleashed the race for oil was taken over by internal combustion engines. Oil took over completely in the twentieth century and rules until now. The era of Łukasiewicz – the apothecary, ambassador of Polish pharmacy, who deciphered the mystery of oil, recognised its power and personally implanted it in the bloodstream of civilisation – continues.

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The contribution of Galician engineers and entrepreneurs to the development of oil drilling methods

Piotr Franaszek

Abstract: Ignacy Łukasiewicz's development of a method for distilling crude oil caused the resource, long known in the Subcarpathian region, to be exploited for industrial purposes. In order to meet the rapidly growing demand for oil, it was necessary to develop effective methods of discovering oil deposits. In Galicia, since the early 1860s, the so-called free-fall drilling method was used for about 20 years. But it wasn't until the introduction of the Canadian method in the early 1880s that the richest deposits were discovered in the Borysław and Tustanowice areas. Galician engineers and technicians made enormous contributions to improving this system. Independently, they developed designs for modern structures suitable for mud drilling. Among them, world fame was won by the "ram" – Wacław Wolski's drilling apparatus. Technical progress in the Galician oil mining industry was possible thanks to the high professional standard of those deciding on the development directions of this new industry.

Keywords: Galicia, oil industry, technical progress, free-fall, Canadian, mud, drilling methods

Introduction

People living in the Subcarpathian region had used oil in various ways for centuries, including for lubricating carts, but also for treating people and animals (Sulimirski 1913: 480). Attempts were also made, albeit unsuccessfully, to use oil for room lighting. Only the achievements of Ignacy Łukasiewicz made it possible to successfully overcome the gloom of darkness. It was thanks to him that they learned to obtain kerosene from oil, used for lighting rooms and streets (Franaszek et al. 2021).

Oil collected in natural seepage areas, especially on the surfaces of water bodies and in pits. When the need for oil exploitation arose, shafts began to be dug by hand (Jabłoński 1885: 1-21; Szajnocha 1881: 3). However, this new branch of production on an industrial scale could begin to develop only after drilling methods were introduced into oil exploration. This took place in the late 1850s and early 1860s. The so-called Pennsylvania drilling method was first used in August 1859

by Captain Edwin Drake near Titusville, in the Pennsylvania oil fields. Not much later, a similar event took place in eastern and western Galicia.

Depending on how the rock is crushed, one speaks of percussion and rotary drilling. In Galicia, percussion drilling methods were used when conducting drilling operations. This type of drilling was free-fall drilling, commonly used in Galicia until the early 1880s, as well as – used after it – the Canadian drilling method. Depending on how the bottom of the borehole is cleared of borings, mud drilling and dry drilling methods are distinguished. Both the free-fall method and the Canadian method are among the so-called dry drilling methods, as a bucket, a pipe ending in a valve at the lower end, was used to remove spoils from the bottom of the hole, allowing the borings to be picked up. Another way of cleaning boreholes is mud drilling, which involves cleaning the drilled hole with a pumped liquid called mud. The mud method allows drilling work to be done much faster.

Free-fall drilling and attempts to improve it in Galicia

Galician oil drilling began with drillings made in the early 1860s using the free-fall system with Fabian's shears. During the downward movement of the drill pipe, the auger hooked into the so-called Fabian shears and was lifted with the movement of the drill pipe. At the highest position of the auger, the driller made a sudden rotary motion with the drill pipe, which caused the release of the auger's hooks in the shears and its free fall to the bottom of the drilled hole from a height of about 1-1.5 metres. The auger hitting the ground with the blade caused the rocks to crumble. The next task was to pick out the crushed rocks with the auger, that is, to clean the hole, called spooning (Franaszek 1991: 57). The first shaft with this system was drilled by Robert Doms in Borysław in 1861. The following year, using the same system, Henryk Walter drilled the well in Bóbrka, the most important Galician oil mine at the time, whose director was Ignacy Łukasiewicz. This event marked a breakthrough and an important caesura in the development of Galician oil mining. The free-fall method was widely used in Galicia over the next 20 years (Kuźniarski 1973: 7; Fabiański 1929: 326-329). A major improvement to this method was the introduction of a steam engine to drive the crane, thus eliminating manual labour. In Galicia, this occurred in the late 1860s, early 1870s. This was accomplished independently by Albert Fauck, drilling in Klęczany, and William Schütte in Męcina (*Wiertnictwo* 1912: 5; Rosenberg 1924/25, no. 28: 11-12, no. 29: 10-11, no. 30: 11-12, no. 31: 11-12, No. 32: 11-12). Subsequently, Albert Fauck introduced machine drilling in Bóbrka (Cząstka 1973: 271-272; Wais: 2014: 6).

In the late 1870s-early 1880s, Fauck made the most serious attempt to modify the free-fall system. He intended to remove the most serious drawback of the Fabian's shears, which was the need to manually drop the auger when it was in its highest position in the hole being drilled. This activity required a lot of effort on the part of the driller and was not always effective. Fauck, using what is known as the Degouse

manifold, developed a shear that automatically released the auger at its highest position in the hole being drilled. The progress of the work with Fauck's shears was about 25% greater than the results achieved with Fabian's shears (Olszewski 1884: no. 17/18: 117-122, no. 19: 129-130; Brunicki 1884: 42-43). Unfortunately, Fauck's innovations coincided with the appearance in Galicia of the Canadian drilling method, which soon completely ruled the Galician oil fields, displacing the free-fall system.

The Canadian crane and its improvements under Galician conditions

The Canadian drilling method was brought to Galicia by William Henry Mac Garvey, a Canadian entrepreneur who was married to Helena Wesołowska, the daughter of Polish emigrants ("Nafta" 1904: 177-179). In 1881, as manager of the "Continental Oil Company," Mac Garvey conducted drilling work in search of oil in Germany. It was there that he met John S. Bergheim, a Viennese banker whose capital enabled him to form a company called "Bergheim and Mac Garvey". The company was further cemented by the marriage of Mac Garvey's son to Bergheim's daughter ("Ropa" 1912: 104). In 1883, the company came to Galicia and in Uherce, in a mine owned by the Berlin Society, Mac Garvey used the Canadian method for the first time in the history of Galician drilling. The very good results obtained with the Canadian system aroused great interest among local entrepreneurs ("Górnik" 1883: 166-167). However, the design of the Canadian crane was closely guarded by Mac Garvey, eager to maintain a monopoly on this type of drilling operations. Thanks to their operability, Galician technicians, engineers and drillers learnt the secret of building the Canadian crane relatively quickly. Soon the new system became widespread throughout the oil basin, helping to reduce the cost of ongoing work. Mac Garvey himself also understood that it was more profitable for his own interests to cooperate with domestic companies than to compete.

The Canadian method was perfectly suited for drilling in the geologically difficult Galician deposits. It also intrigued Galician oilmen from the beginning, including a group of skilled mining engineers. Successive improvements were made to the so-called "old crane", as the design with which Mac Garvey came to Galicia was called. Soon there was no longer talk of a Canadian system but of a Galician-Canadian or even a Polish-Canadian system. This emphasised the improvements made in Galicia to the Canadian crane (Bielski 1927: 385-390).

Thanks to the improvements, it was possible to reach oil seams located at levels of 1,000 and even more than 1,500 metres below the surface. The improvements were aimed at strengthening the crane's design, better, more efficient power transmission, and, most importantly, at replacing tedious spooning (clearing drill holes) on poles, with much simpler and faster spooning on a line. The widespread shift to line spooning was closely linked to changes in the drilling technique itself, particularly the ability to move so-called casing pipes directly behind the auger to protect the drilled hole from backfilling and flooding by groundwater. The use of casing pipes was made possible by the widespread use of the so-called eccentric auger of Mac Garvey's patent, although in 1897 the Polish company "Wolski

i Odrzywolski" also obtained a patent for the eccentric auger type from the Austrian Ministry of Trade ("Nafta" 1907: 247).

The old Canadian crane used only one cable to lower the drill pipe with the auger or bucket. The improved designs use two lines. This required extending the crane with a second drum, designed for the bucket line. A number of solutions emerged, differing in where the bucket drum was mounted and how the drive was transmitted to it. One of the first to try to introduce line spooning in the second half of the 1880s was Mac Garvey himself. In his design, the bucket drum was at a high height, making it very uncomfortable to operate.

From 1891, the Schodnica workshop produced a structure designed by Wacław Wolski and Kazimierz Odrzywolski, with a line spooning system developed by Felicjan Łodziński, based on solutions used in the so-called Pennsylvania crane (Klebert 1907: 17-20, 25-27, 29-31, 37-41, 45-46). A similar design was developed in 1899 by W. Wolski and Władysław Pruszkowski. Wolski was the co-developer of yet another design, developed by the "Wolski, Weydlich, Korsak i Ska" company. From 1903, the "Perkins, Mac Intosh and Perkins" factory in Stryj produced a model of crane, which was often used to drill wells in Galician oil fields. Władysław Włodarczyk's crane, developed in 1907, was also an original design. It allowed drilling operations to be carried out both on a rigid pipe and on a line. Also new in Włodarczyk's design was a crank, providing the ability to adjust the amount of auger lift. Another solution for the Canadian crane was introduced by Julian Timoftievich, who placed each of the two drums on one level, on separate stands, on either side of the rocker arm. To emphasise the native origin of the structure, its creator called it "a Polish drilling crane with an accelerated spooning device".

Strengthening of the entire structure was achieved by replacing spruce wood with oak wood, wooden parts with metal parts, and by increasing the dimensions of the various assemblies. In the tappet of the old Canadian crane, the gear wheel was locked by a spring-loaded metal pawl. The friction of metal against metal caused sparks, the cause of many fires. Therefore, mining and police regulations issued by the Drohobych Mining Authority prohibited the use of this mechanism. It was replaced by other types of tappets – such as the Zdanowicz, Perkins and Mikutski designs. To weaken the internal tension of the rod, elastic, spring-loaded buffers were incorporated between the drill pipe and the balance beam. For the same purpose, Fred, son of William Mac Garvey, mounted a balance mounted on springs to cushion its sudden jerks. The manila line used for spooning was replaced with steel, and cast-iron cranks were replaced with steel ones. Wooden wheels and drums were reinforced with tin fittings, and soon replaced with iron wheels (Okólnik 1907: 55-58; Katalog 1911: fig. no. 113; Petit 1900: 293-297).

The improvements made to the Canadian crane allowed the development of Galician oil mining on an unprecedented scale. On the one hand, much deeper oil deposits in the western part of Galicia were reached, and, much more importantly, the richest Galician deposits were discovered in eastern Galicia, in such places as

Słoboda Rungurska, Schodnica, Borysław and Tustanowice (Olszewski, 1902: 133-137; Długosz 1929: 329-332).

Work on the application of mud drilling apparatus in Galicia

Two drilling mud structures were developed by Albert Fauck. One of them was the "Rapid" crane and the other was the "Express" crane. Test drilling with the "Rapid" crane was carried out by Fauck in June 1896 in Marcinkowice near Klęczany (*Rezultaty* 1899: 309-310; Fauck 1900: 99-102). In 1901-1906, Fauck drilled with an "Express" crane in Borysław on behalf of the "Towarzystwa Akcyjnego dla Przemysłu Naftowego" (Bielski 1904: 129-134). Both trials performed below expectations and the designs did not find wider use. Drilling by the "Austro-Belge de Petrol" joint-stock company in Schodnica in 1897 performed similarly poorly. Drilling works were carried out by the mud method using the "Raky" crane (J. D. 1900: 385-386).

In the field of mud drilling, a number of constructions were born in Galicia, on the one hand as outstanding as Wacław Wolski's ram, others less well-known, and also those, as Wolski wrote, that had only "museum value" (Wolski 1901: 1-4, 17-21). In 1901, a major revelation was the drilling of a 510-metre deep shaft in Borysław by Leon Mikutski, using a crane of his own design, in just two months. Wiktor Petit, on the other hand, conducting trials in 1909 with a mud apparatus of his own invention, obtained results 50% better than the Canadian method (*Nowy system* 1901: 130-134: Petit 1911: 278-284; Petit 1914: 278-282, 297-300). In 1899, Józef Howarth and Władysław Pruszkowski first built a mud drilling rig with the engine located in the hole, directly above the auger. In addition to them, Bonifacy Wiśniewski, Stanisław Janiszewski, Walery Siterski and Wacław Wolski worked on similar structures in Galicia.

A complete innovation was the attempts to use the phenomenon of the water hammer in drilling structures created by the sudden stopping of an accelerated stream of water pumped under high pressure. The water hammer technique was used by Wacław Wolski in his design, for which the name – "drilling ram" – was adopted. It was during this period that Wolski's "ram" was the pinnacle of technical advances in improved mud drilling designs. It has been recognised by many professionals, including those from other countries, as one of the best ideas in global drilling technology. In 1903, the "ram" participated in a kind of race organised in Westphalia for the speed of drilling boreholes. Nearby, two German companies were drilling with mud systems. Despite the difficult geological conditions, the results obtained by the "ram" were significantly better than those of the German companies. However, as early as 1902, two German companies bought the right to use the "ram" patent for the dizzying sum of 600,000 marks. To keep up appearances, they pledged to continue improving the system and advertising it. In fact, fearing competition, they did not allow its use to continue (Plutinsky 1966: 397-416; Fauck 1911: 421-423).

In the search for a modern drilling system that could effectively replace the "Canada" method, a mud rotary system was brought to Galicia. In May 1913, the company "Galicyjskie Karpackie Naftowe Towarzystwo Akcyjne, dawniej Bergheim i Mac Garvey" began drilling the “Wageman III” well in Tustanowice with a rotary drilling apparatus named the "Karpath Rotary." The drilling results confirmed the great capabilities of the rotary drilling method. However, the outbreak of World War I halted further experiments and progress in this area (*Wiercenie rotacyjne* 1913: 218-221; *System rotacyjny* 1913: 168-170).

Conclusion

The magnificent flowering of Galician technical thought in oil drilling would not have been possible without the proper theoretical and practical preparation of the people giving direction to the changes in drilling technology. A unique opportunity to present the theoretical achievements and practical technical solutions in the oil industry was provided by international oil congresses. By 1914, three such congresses had been held – the first in 1900 in Paris, the second in 1905 in Liége, and the third, in 1907, in Bucharest, i.e., in the capital of a major oil-producing country (*O kongresie naftowym* 1907: 301-305;*Sprawozdanie z działalności* 1909: 33). Economic oil activists from Galicia actively participated in all these congresses. Galician oil drillers represented a high standard of knowledge of oil drilling and an excellent mastery of the drilling craft. Therefore, Galician engineers, technicians, drillers and oil workers became a sought-after professional force for oil mining work in all countries where oil was exploited (Sulimirski 1929: 330-331; Sulimirski 1913: 479-485, 502-507; Strzetelski 1902: 79-81; "Nafta" 1907: 172).

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The Oil Industry in the Second Republic. Light and Shadow

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Abstract: This text is an attempt to outline the main challenges facing the Polish oil industry in the interwar period. It discusses the achievements of the second half of the 19th century and the first decades of the following century. It discusses the process of reconstruction and development of the oil industry, primarily in the field of mining and processing of extracted raw material. It reveals the most important issues, related to the domestic situation, foreign markets, the economic crisis, and capital challenges. The article also signals attempts to improve and develop the oil industry, including those based on exploration of new fields and cooperation with the automotive industry.

Keywords: Second Republic, oil industry, refineries, automobiles

> *"Oil occupies a prominent position in the social economy, for its distillates are indispensable articles in every home.Oil provides an opportunity for the existence and development of mineral and chemical oil factories, contributes to the emergence of ancillary industries, such as pipe factories, wire rope factories, belt factories, etc.Oil is of momentous importance in the inventions and experiments of our century. Diesel engines, automobiles, aeroplanes, these harbingers of new times, today make possible ventures formerly considered impossible. These gains allow active participation in the depths of the sea and the skies of the world and are therefore a crucial factor in the defence of the state in case of the turmoil of war.Drilling for oil requires large inputs" (Loewenhertz 1937: 3).*

At the beginning of the 20th century, oil extraction and processing were still new, but very vigorously growing strategic industries. This importance resulted from the transportation revolution – the emergence of the automobile and aviation industries, but also the new propulsion of ships and warships, as well as diesel locomotives. Independent Poland boasted 19th-century research and discoveries that initiated global demand for lighting oil, as well as oil deposits in the Carpathian Mountains and Subcarpathia, considered at the time to be the richest in the world. However, the economic reality of the Second Republic – laboriously stitched together after a long period of statelessness – fell short of ambitions, as the fate of the oil industry clearly demonstrated.

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The symbolic date of the founding of the Polish, and the world's oil industry, is 1854, when the first oil company was formed in indigent, agricultural Galicia, and the world's first oil mine was established in Bóbrka. Oil, or more specifically, its most coveted product at the time – lighting kerosene – quickly captured markets, attracted the attention of big capital, and became a product in international trade.

The first years of the oil sector in Galicia were a period of formation as an independent industry and the growth in its importance. It was not free from crises of overproduction and economic fluctuations, caused by high drilling costs, the time-consuming nature of drilling work, and competition (mainly American). The leading role in the "oil rush" was played by human capital and new technologies – free-fall drilling cranes, initially manual and later powered by steam engines, mainly locomotives, pump cranes (nodding donkeys), and the Canadian drilling method (Franaszek 2009: 205-208). However, technical change in poorly industrialised Galicia was slow, and oil production did not keep pace with demand and production growth in other countries.

There was a marked improvement from the second half of the 1890s. The oil industry began to expand. “With the development of oil mining, Galicia was becoming [...] one of the leading countries in scientific and technological progress” (Franaszek 2022).New oil deposits were discovered in the Carpathian and Subcarpathian regions. Soon the Borysław basin was supplying 94% of Galicia's crude, and the oil industry was becoming a modern industry and an engine of economic development for the entire region. They began to invest in tanks, compressor stations, transport equipment (including pipelines), modern refineries (Glinnik Mariampolski, Jasło, Trzebinia, Limanova, Peczeniżyn). In 1912, a large oil refinery (*odbenzyniarnia*) was put into operation in Drohobycz.

In 1895, oil production was nearly 215,000 tonnes, in 1907 it exceeded 1 million tonnes, and in the record-breaking 1909 it exceeded 2 million tonnes, accounting for more than 5% of world production (*Polski*... 1932: 7). Galicia was among the largest global oil producers. From 1902, mining in Galicia met Austro-Hungarian demand.

As new fields were discovered and production increased, interest in the Galician oil industry grew among financiers, initially Austrian (Viennese) and Hungarian, then also British, American, German and French. The oil industry of Galicia became profitable, hence the wide influx of capital and the revived “Gründerzeit”. Of course, problems were not avoided. Increased oil supply with an underdeveloped refining industry resulted in overproduction and price volatility. The war years of 1914-1918 were a dead-end for the Galician oil industry, which was mobilised for war purposes. In August 1915, the Austrian authorities introduced the sequestration of oil and petroleum products and began plundering under military management. Entente companies were confiscated and placed under receivership. The retreating Russian army took oil installation equipment and facilities out of Galicia, causing severe losses in oil basins (more than 300 wells were destroyed).

In 1918-1919, Polish-Ukrainian battles took place in the oil-bearing area of Galicia. Not surprisingly, the industry required costly reconstruction, new equipment, expert personnel, and considerable capital.

The World War confirmed the importance of oil – as a strategic resource – which influenced the outcome of the conflict and determined the economic development of countries and nations[1]. Interest in oil from private capital and state policy increased. The goal of governments was their own sovereign oil industry. Oil and related matters became the axis of numerous conferences and political deals. There was a feverish search for new deposits around the world. The share of countries in world oil production changed.

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After 1918, the Polish oil industry had to reorganise and adapt to the new customs borders. The oil sector of the Republic saw a regrouping of ownership and capital engaged (Bielski 1939: 1). Lost markets were replaced by new ones – the recent Russian and German partitions.

The oil industry resumed production in late 1918 and early 1919. Despite the difficult political situation and border struggles, the exploitation of Galician land began; mainly by small companies representing small domestic capital. By 1919, nearly 400 companies were already extracting oil from more than 3,000 wells. Large foreign capital, which held ownership of most major industrial facilities, only began to activate after 1920. The French became interested in Polish oil, vigorously buying up companies previously owned by the partitioning powers (Franaszek 1986: 234). American, English, and Belgian investments soon followed. In 1930, the share capital of 119 oil companies in Poland amounted to more than PLN 314 million, of which PLN 242 million was foreign capital. The French dominated, with a 50.3% share of the Polish oil market. Not surprisingly, most of the oil companies' profits went abroad (Fryc 1930: 97; Kohl 1919: 5-14).

A hallmark of the economic life of the first years of the independent Republic was the relatively smooth reconstruction of industry “in an atmosphere of prosperity created by inflation” (Saryusz-Zaleski 1930: 271). The various industries supported and complemented each other. For example, the Polish Machine and Wagon Factories received most of their orders from the reactivated oil industry, which needed oil tankers. Commodities requiring a constant supply of liquid fuel, such as Titan's “kerosene” tractors (*Instrukcja*...), went on sale.

[1] In 1918, French Prime Minister Georges Clemenceau telegraphed to US President Thomas Woodrow Wilson: "one drop of gasoline is worth as much as one drop of blood”. (Bielski Z., W sprawie przyszłości polskiego kopalnictwa naftowego, “Przegląd Górniczo-Hutniczy” 1939, n. 2 p. 3).

Numerous initiatives sprung up around the oil industry. However, the importance of research and new technologies was not always appreciated. Against this background, the refinery in Drohobycz – the State Oil Plant (later the State Mineral Oil Plant – "Polmin") – gained the rank of a model modern refinery. The state-owned Drohobycz refinery used the original gasoline rectification method, high-vacuum distillation of oils, and expanded the paraffin plant. They drew on the experience and analysis conducted at Lvov Polytechnic (Mierzecki 1999: 66-67). As a result, in the 1930s the capacity of "Polmin" was greater than all domestic oil production. Unfortunately, oil companies with foreign or domestic capital did not always focus on production. It was not uncommon for them to speculate in land or industrial facilities affected by the decline in the value of the Polish brand.

Despite the obstacles, the lively drilling movement in the mines continued. Wells, but also refineries were expanded and modernised. Pre-war business contacts were restored. Good prospects for the future, based on the post-war commodity deficit and attractive prices at home and abroad, and on top of the depreciation of the national currency (in a mild form at first), meant that with cheap labour and materials, the companies' profits looked impressive. Not surprisingly, the 1919-1923 period became a time of "high prosperity". Intensive drilling work was undertaken in the Mraźnica area of the Borysław basin, and later near Bytków. Despite this, production did not even come close to pre-war levels. The largest output – 831,000 tonnes – was recorded in 1919, which accounted for 1.12% of world production. The 800,000-tonne barrier was exceeded only once more, in 1925. (*Polski*... 1932: 7) Despite this, Poland still ranked third in Europe, with good profits from oil exports. About 60% of the Polish oil industry's production went abroad.

In August 1922, the Polish government abolished the sequestration of petroleum products, and provided customs protection for the oil industry, liberalised commodity prices, and introduced tariff concessions on drilling equipment and materials (Majewski 2009: 131). In 1925, influenced by the deteriorating situation, the sales tax on foreign sales was abolished and the high domestic prices maintained by the oil industry were accepted.

The successful development of Poland's oil industry, full of plans, collapsed in early 1924. One reason was the depression in international markets. As a result of the post-war economic reconversion and increased production, and as a result of the saturation of world markets, prices of petroleum products began to fall as early as 1923. In 1924, exports rom Poland became unprofitable. The big English and American corporations played their part, vying for a dominant place in the trade. Prices obtained by the Polish oil industry in 1924-1925 were lower than production costs. A temporary improvement in 1926 was brought by the English general strike, but already in 1927-1929, as a result of global overproduction, prices fell sharply again. From 1927, Poland's oil production declined to less than 0.5% of world production (*Polski*... 1932: 7). In the following decade it stabilised at about 0.5 million tonnes, four times less than in the record year of 1909. Meanwhile, Romanian competition was growing. While the Romanians reached 5% of

global production and dominated the Central European region, Poland lost the Hungarian and Balkan markets and reduced its influence in the Austrian and Czech areas. In June 1925, the customs war with Germany began and Polish industry lost its largest customer after Czechoslovakia. The situation in foreign markets turned the spotlight on the domestic sector, intensifying competition and driving down prices.

The condition of Polish refineries was affected by the overestimation of the production capacity of oilfields and investments beyond what was possible and necessary. The 37 refineries and 27 gas plants competing against each other were only utilising 60% of oil processing capacity. The currency reform of 1924 showed the low value of companies' own capitals, caused a shortage of working capital and an expensive labour force, which affected the profitability of the oil industry.

The main threat to the industry was the deposits of raw material. New ones could not be discovered, and those long exploited were quickly exhausted. From 1926, Polish oil production declined regularly. At the same time, the cost of deeper and deeper drilling was rising. Their value was many times higher than in the United States, even despite a similar geological structure. The reasons were the overly fragmented land ownership structure, high administrative costs, and the existing oil laws (Fingerchut 1926). Not surprisingly, declining profits did not prompt foreign companies to invest in oil exploration. Big capital was withdrawing from investment loans and focusing on the funds needed to run enterprises, which did not guarantee technical and organisational upgrades.

On the other hand, competition was growing in strength. After Latin America, rich and exploitable oil deposits were discovered in Persia and Iraq, and in 1924 in Saudi Arabia. The hope for Poland may have been to step up its own efforts. To this end, the "Pionier" Joint Stock Company for the Exploration and Mining of Bituminous Minerals was established in January 1928. Field research, which was carried out over a large area – about 12,000 km^2 from the Romanian border to Tarnów – did not yield the expected results (instead, it resulted in patents and the development of drilling techniques).

As part of the recovery from the economic crisis, solutions were sought for the profitable operation of inefficient oil and gas wells. It was recognised that old, slowly wearing out wells and oil fields "require immeasurable care and diligence in handling and accuracy in observations", which should reduce operating costs. Hence, following the American example, it is necessary to surround "with care [...] above-ground facilities, so towers, cranes, buildings, etc., for their poor condition require maintenance expenditures, which will fall off with their impeccable maintenance" (Bielski 1935: 3; Bielski 1931). Patterns overseas also emphasised the role of the professional worker.

As early as 1928, improving profitability depended on lowering the costs of oil production and processing (which also entailed high salaries for professional staff), mastering the domestic market and rationally organising exports (Bóbr 1928: 30). The desired results depended on the discovery of new oil areas, which

proved impossible. Nevertheless, experts stressed that "the concern for oil will continue to absorb the industry and it will be the thread of the activities; the course of events in this field will be the exponent and history of the industry" (Fryc 1930: 118).

The sanation of the industry was seen in the reorganisation and monopolisation of Polish oil companies. Some companies entered into mergers, which were expected to yield administrative savings and a stronger financial base. In December 1924 a group of large oil companies established the Economic Union of Mineral Oil Refineries, headquartered in Warsaw. The syndicate was supposed to regulate prices in the domestic market. However, it failed to live up to expectations and was disbanded in late 1926. The industry's position further deteriorated. Under pressure from the government, another agreement was established on November 12, 1927 – the Oil Industry Syndicate, based in Lvov. An oil convention was worked out to regulate the purchase of oil, a carriage contract to set prices for kerosene, gasoline and gas oil, and an agreement to regulate the paraffin trade (Franaszek 2020: 314-317). In 1933, the Polish Oil Export was established, which forcibly united all refineries and oversaw the dumping of oil exports. Throughout the interwar period, the main customer for Polish petroleum products was Czechoslovakia (which received more than 40% of exports), followed by the Free City of Danzig.

The problem was the legislation, based on the Austrian General Mining Law of 1854 and the Oil Laws of 1907 and 1908. Unfortunately, the Polish industry did not live to see worthwhile legal solutions, although the Oil Office was established as early as 1919. It was still based on pre-1914 regulations. After a decade, another attempt was made to reorganise the industry and improve its structure. They sought independence from foreign influence (Dunikowski 1931: 75-88).

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An air of optimism for the oil industry came between 1927 and 1930, when domestic consumption of petroleum products increased. It is only a pity that it was more as a result of the spread of archaic kerosene lighting than the increase in the number of motor vehicles. In contrast, new patents and innovations emerged. Again, the number of employees in the oil industry increased, and in 1927 the number of workers exceeded 17,000. However, the mines and refineries were soon hit by the great global crisis. Expenditures on oil exploration declined, and crude production fell (the demand of an impoverished society decreased). Poland lost its third place in Europe in terms of oil production and fell behind Germany.

Recovery from the collapse was not easy. In 1936, crude oil production fell again; by 414 tanks (1 tank = 10 tonnes) compared to 1935. Crude processing suffered an even bigger bump (by 1,998 tanks). Refinery output was also lower by as much as 1,875 tanks. Although domestic consumption increased, with prices falling, this did not translate into higher profits for producers (Morawski 2016: 44). In 1930, petrol was sold in Poland for 58 million zlotys. In 1936, the takings for this

product were only 28 million zlotys. No less telling is the comparison between 1932 and 1936. The difference in petrol sales between these years amounted to 150 tanks, and more than 11 million zlotys in takings. Exports were similarly disastrous, declining by more than 1,000 tanks in 1936 compared to 1935. In 1928, exports of 6,200 tanks of various petroleum products brought in 27 million zlotys. In 1936, 5,600 tanks were sold abroad for just over 8 million zlotys (Mikucki 1937: 2-3). No other Polish industry suffered such a drastic drop in revenue.

The decline in "the output of Polish kerosene mines" was analysed on an ongoing basis by experts, including from the Association of Polish Petroleum Engineers. The difficulties in investing and modernising in the "mining" and refining departments were highlighted. Attention was drawn to the lack of funds for geological surveys and pioneer drilling. A reduction in production in the Borysław basin was noted; only the mines of the Central Industrial District offered moderate optimism. According to Zygmunt Bielski of the Cracow Mining Academy, the industry's troubles were masked by the fact that declining manufacturing was outstripping internal demand for petroleum products anyway. However, it was feared that domestic consumption would exceed production. Bielski predicted that "probably as early as 1939 we will lack lighting kerosene, and in 1941 our own petrol for our cars". Besides, if motorisation gained momentum – as was desired – there would be problems with fuel for cars as early as 1940 (Bielski 1939: 1). Rescue was seen in intensive exploration of new oil fields; well-funded, rationally organised, with exploration wells as deep as 3,000 metres. In parallel with drilling work in various areas of the country, studies were conducted on the quality and size of oil deposits and their geological structure (Bielski 1937: 4; Nieniewski, Trześniowski 1933: 3; Świderski 1939: 3-11; Katz 1936: 3-37).

The signalled opportunity for the oil industry was linked to "automobilism"[2]. However, motorisation in Poland was clearly lagging behind the world and European leaders, and despite the fact that on it "the further development of the oil industry depended for the most part, it unfortunately did not get off the ground in 1935" (Mikucki 1936: 5; Majewski 2017). Modernising and upgrading the Polish Army was in the realm of planning. Hence, although there was an increase in fuel turnover, there was a decline in the position of the oil industry compared to the period before the Great War. In 1924, demand for petrol and gasoline (light gasoline made from natural gas) was 18,000 tonnes. Then, by 1927, it had increased to 40,000 tonnes per year. In turn, in 1930 (during the Great Depression) it reached almost 98,000, to then stabilise at 70-80,000 tonnes per year (Majewski 2009: 140; Majewski 2018: 504).

Unfortunately, the number of cars and trucks fell in the 1930s. At the beginning of the decade, there were 47,331 registered motor vehicles, and in 1936 only 25,734. Meanwhile, compared to Czechoslovakia, there should have been about 200,000

[2] In the 19th century, demand for this raw material was generated mainly by kerosene lamps. New global markets were launched by the automotive industry.

cars on Polish roads. Specialists from the Ministry of Communications gave the alarm that "the state of motorisation presents itself [...] catastrophically, as a result of which Poland was ranked among the last, being overtaken by smaller and poorer countries" (Korbal 2021: 81). Such an arrangement not only affected economic development and the oil industry, but also lowered the country's military potential. In 1937, there were 8 cars per 1,000 residents in Poland, compared to 12 in Romania, 60 in Portugal, 71 in Czechoslovakia, 93 in Finland, 197 in Ireland and as many as 242 in Belgium (Korbal 2021: 83). The State Road Fund, established in February 1931, which was intended to support the country's crisis-stricken automobiles, only exacerbated the problems, and the fiscal burden on fuel in Poland had a disastrous effect on automotive development. To expand the road network and improve its quality, a number of taxes and fees were introduced, including on the sale of fuel and lubricants and even on petrol station advertising. As a result, the price of fuel reached 0.70 gr per litre and was one of the highest in Europe. The petrol station infrastructure was poor. By the end of the 1920s, there were only 300 of them nationwide (the first one opened in 1924), and before the outbreak of war, the network of "petrol pumps" amounted to about 1,500 and was concentrated in large urban centres (Korbal 2022: 97-98)[3].

Nevertheless, progress in the development of "automobilism" was noticeable. The number of motor vehicles was expected to exceed 100,000 in 1940. Possible problems with petrol supply were to disappear with blends and artificial fuels. Not insignificant was the intensive highway construction that was undertaken in 1937. Henceforth, Poland went from being an exporter to an importer of asphalt. Not surprisingly, the Ministry of Industry and Trade focused on ensuring adequate quantities of liquid fuels and other petroleum products. There was a growing awareness of the strategic – military – importance of oil. The Polish Army's modernisation plans included the creation of fuel facilities for the army. Concrete action, however, was overdue. The transformation of the Polish Oil Export into the War Oil Union, which included all refineries and oil and gas mines, on September 2, 1939, did not allow the oil industry to be subordinated to the army's wartime needs.

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A decisive blow to the limping oil industry came with World War II. A symbolic example was the fate of "Polmin" in Drohobycz. First, on September 10, 1939, the refinery was the target of a German air raid. In June 1944, further damage to "Polmin" was caused by Allied, American bombs.

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Support or hindrance to action? Spirit fuel blends in the Polish oil industry in the interwar period

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Abstract: The situation of the Polish oil industry after independence was difficult. Cut off from pre-war markets, the weakness of the internal market and increasing competition in external markets resulted in low profitability and a successive decline in production volumes. Competition also became a new threat from the state-backed distillery industry, which was pushing the concept of marketing fuel blends containing spirits. Their entry into the market, despite the objections of oil companies, meant that some gasoline had to be replaced with spirits and their ability to sell on the domestic market was limited. The negative effects of this were consistently raised by oil industry representatives. It wasn't until an improvement in the economy in the second half of the 1930s that a gradual change in the perception of spirit propelled blends appeared. Under conditions of growing domestic demand with relatively constant production volumes, a significant reduction in fuel exports became possible, and spirits were able to become a desirable additive to diesel blends, as evidenced by the increase in their purchases by oil companies.

Keywords: Second Republic, petroleum industry, spirit propellants, distillery industry

Introduction

The interwar period was a period of stagnation for Poland's oil industry. Among the factors contributing to this were difficult mining conditions, being cut off from former markets, the weakness of the domestic market and, caused by the discovery of new deposits, increasing competition on world markets. Another dangerous development was to become the competition that emerged from the distillery industry. The introduction of spirit fuel blends into the market under heavy pressure from state authorities meant that some gasoline had to be replaced with spirit, thus limiting the ability to sell petroleum products on the domestic market.

It is worth taking a look at this relatively little-known episode in the history of Poland's oil industry and reflecting on the role of spirit fuel blends in the functioning of the oil market in the specific conditions of the 1930s, especially in the markedly improving economy in the second half. Indeed, along with it came a gradual increase in fuel sales, which, with the clearly visible phenomenon of

depletion of domestic extraction capacity, over time cast doubt on the initially unequivocally negative assessment from the point of view of the oil industry of the economic importance of the introduction of spirit fuel blends.

Problems of the Oil Industry in the Second Republic of Poland

The restoration of independence brought serious difficulties for many industries developing on Polish soil at the turn of the 20th century. The loss of the previously extensive markets of the partitioned countries meant that the size of the business had to be adapted to the decidedly smaller demand capacity of the domestic economy than before the war, combined with the export difficulties that persisted for most of the interwar period. In a situation of previous development of manufacturing potential significantly beyond the absorption capacity of Polish lands, the new realities brought a structural mismatch between the stock of individual industries and the actual capacity of their utilisation.

An example of this situation was the fate of the oil industry, a symbol of Galicia's industrialisation, which had to limit its sales opportunities to an internal market incomparably smaller than the former Austro-Hungarian monarchy. Under such conditions, it was difficult to expect significant exploration investments from foreign owners as a rule, who held about 75% of the capital involved in oil production and refining, which in turn meant an apparent stagnation in the operation of the industry (Franaszek 2018: 38-39).

Confirmation of the fundamental change in the position of the oil industry was to be the dimensions of production and sales of petroleum products. While more than 2 million tonnes of oil were produced in Galicia in 1909, the best year in this regard between the wars was 1925, with production of 812,000 tonnes. Later, it was already gradually declining, stabilising in the second half of the 1930s at around 500,000 tonnes. Significantly, gasoline production increased during the period under review. In 1928, 97,000 tonnes were obtained, while ten years later it was 141,000 tonnes. Sales of petrol (including gasoline) rose from about 40,000 tonnes in the mid-1920s to about 100,000 tonnes at the turn of the decade, and in the 1930s were about 80-90,000 tonnes, to exceed 140,000 tonnes just before the war (*Mały...* 1939: 129; Morawski 2016: 40).

An important part of the problem in the operation of the oil industry was the lack of coordination of the activities of the numerous companies in the market, a source of disruption in the trade of oil and petroleum products. Measures taken by state authorities in this regard since the 1920s did not bear fruit for a long time, and only in late 1932 did the Ministry of Industry and Trade decide to set up a forced organisation to bring together large refineries and organise exports abroad, which were much less profitable than trading on the domestic market. The resulting Polish Oil Exports monopolised Polish exports from the spring of 1933, becoming a guarantor of the industry's stability (Kawalla 2015: 258-270).

The origins of spirit fuel blends in Poland

There were two main considerations behind the idea of using diesel blends. The first was the declining demand for the products of the alcoholic beverage industry, resulting from a significant decline in consumption (Missala 1939: 385-387)[4]. The second was becoming unfavourable for the trade balance of countries without their own oil reserves and the increase in demand for liquid fuels, which was continuing with the development of motorisation. In the face of the theories already popular in the early 20th century about the depletion of the world's oil reserves, the combination of these two coinciding phenomena brought the development of research into the possibilities of using spirits in propulsion blends.

Their breakthrough came in the 1920s with the development of technology for obtaining dehydrated spirit using the Ricard-Allenet system. This, along with strong pressure from the agricultural lobby, translated into the creation of solutions to force importers of petroleum products to use diesel blends during the Great Depression. They were forced by the largest spirit producers in Europe at the time, namely France and Germany, and were followed in time by other countries such as Hungary, Italy and Spain (Grabiański 1931: 14).

The rapid growth of spirits sales for propulsion purposes in the countries applying blending compulsion also worked on the imagination of Polish producers, suffering heavily from the loss of pre-war production capacity. Faced with a reduction in production from about 2.5-2.6 million hectolitres before the war to a few hundred thousand hectolitres after it ended, they looked for avenues for improvement primarily through the sale of non-consumable spirits (Grata 2002: 145-146). Research into the possibilities of using spirit for diesel blends was undertaken with the support of the Directorate of the State Spirits Monopoly (DPMS) in the mid-1920s, and as a result, the Monopoly Directorate signed a contract in 1927 for spirit dehydration with the Kutno Chemical Plant, which built a plant with a capacity of 5 million litres per year (Rotstein 1932: 133).

Thus, opportunities for the development of the production and sale of spirit fuel blends emerged in Poland. The path to this, however, was not easy. While the problem of the excessive cost of producing dehydrated spirit was solved by the introduction in 1932 of changes in the organisation of the system of production and purchase of spirit for non-consumption purposes (Grata 2002: 266-269), the oil companies operating in the country were strongly opposed. For them, the use of spirits in a liquid fuel meant competing with the gasoline they produced and thus depleting their sales volumes. The result had to be increased and much less profitable exports (*Bezpośrednia...* 1932: 529-530; Mikucki 1932: 554-556). The plans formulated by supporters of domestic distilling to introduce spirit blends were not only described as domestic dumping, but were also treated, with some exaggeration, as an outright threat to destroy the basis for the existence of the oil

[4] Between 1885 and 1935, the size of spirits sales for consumption decreased in Europe from about 4 litres per capita to less than 1 litre.

industry. There were both factual arguments indicating the pointlessness of using spirit admixtures in fuels in a country with its own oil reserves, as well as demagogic ones referring to possible technical risks to engines (*Minister*... 1932: 35; Schätzel 1932: 578-580).

Adherents of spirit blends, recalling the economic importance of agricultural distilleries, pointed to the need to support this industry, which was in danger of collapse. It was argued that, according to popular opinion, domestic oil fields were gradually depleting, which meant that the introduction of blends could allow them to be exploited for longer. Extrinsic arguments were not forgotten either, among which the fact that measures were taken to support the distilling industry in the hands of Polish landowners at the expense of the oil industry, which remained mostly in the hands of foreign capital, was emphasised (J. Z. 1932: 541-546).

Introduction of propellant compounds to the market

Amid clashing opposing interests of the distillery community and the oil sector, reaching an agreement on spirit blends long remained impossible. The Oil Industry Syndicate was opposed to their introduction into the trade, as a result of which the DPMS signed its first contracts for the sale of dehydrated spirit from the autumn of 1928 with the State Mineral Oil Factory "Polmin" in Drohobycz. Finally in 1930 the syndicate banned "Polmin" from continuing this cooperation. At that time, the monopoly authorities already had to negotiate directly with the association, which only in the first half of 1931 agreed to introduce small amounts of spirits into the fuel trade (Mateńko 1939: 192-193).

In this situation, the Economic Committee of Ministers on August 5, 1931, adopted a resolution to recognise the sale of spirits for propulsion purposes as a "state necessity" (*Minister*... 1932: 114; *Sprawozdanie*... 1938: 263-264). Accordingly, despite the signing of agreements with the Syndicate's unaffiliated two fuel trading companies, the strategic goal became the systemic regulation of the introduction of spirit fuel blends into the market. Part of this plan were the aforementioned changes regulating the management of non-consumable spirits, as well as the possibility (threat) of the Council of Ministers forcing the use of spirits for propellant mixtures, which was enshrined in the containing Presidential Decree of July 11, 1932. At the same time, the government, in exchange for signing an agreement on the matter, guaranteed the oil industry the establishment of a compulsory organisation, advocated by most companies, to organise the export of petroleum products (OJ 1932: 63/586; Franaszek 2020: 324-325).

This is what soon happened. The government, by decree of October 12, 1932, established the Polish Petroleum Export, a compulsory organisation for the export of petroleum products (Kawalla 2015: 259), and on January 27, 1933, a contract was signed between the DPMS and companies belonging to the dissolved Oil Industry Syndicate. It required affiliated oil companies to purchase and sell in fuel blends dehydrated spirit in an amount equal to 9% of gasoline sales on the domestic market in the previous year. It was to be in effect until the end of 1938, and two

types of fuel mixtures were put on the market according to its provisions. The first, intended for agricultural tractors, and the second, more important and intended for other propulsion purposes, consisted of 16-22% spirit and 78-84% gasoline. Distributors of mixed spirits were to be marked with the letter "M". The price of spirits sold by DPMS was dependent on gasoline prices to guarantee the profitability of blend sales to fuel producers. The contract was executed by the Petroleum Industry Trading Company, which was part of the liquidated Petroleum Industry Syndicate (Grata 2011: 205-206).

Another agreement regulating the sale of propellant mixtures was signed on December 20, 1938 (it went into effect at the beginning of 1939). It was concluded for an indefinite period and increased the presence of alcohol in the fuel market. Oil companies were obliged to purchase quantities of dehydrated alcohol equivalent to 15% of the previous year's sales, and Polish Petroleum Exports handled the execution of the contract. The new agreement also brought a 25 percent increase in the price paid by oil companies for the spirit they bought (*Analiza*... 1939: 44-45; *Zmiany*... 1939: 105).

Spirit blends in the fuel market

Pushed through by state authorities against the opinion and interests of the oil sector, in the name of fulfilling the economic needs of the distillery industry, spirit fuel blends became a permanent feature of the domestic fuel market in the 1930s. Oil companies tried to fight the "uninvited guest" that spirit in blends was considered to be. A dispute over the interpretation of the agreement signed in January 1933, which ended in arbitration, continued for some time. Initially, too, fuel distributors tried to discourage buyers from buying blends by setting higher prices or labelling distributors with "pure gasoline" placards that contained fuel without alcohol admixture. As late as August 1936, representatives of the oil industry made a demand at a meeting of the Inter-Ministerial Commission to abolish the obligation to collect spirits and use them for propulsion purposes, arguing that spirits were displacing gasoline for export and thus worsening the industry's revenues. They also pointed out that "the damage done to the oil industry by the use of spirits for propulsion purposes is completely disproportionate to the benefits to agriculture" (*Postulaty*... 1936: 101).

Over time, the situation normalised, and oil companies adapted to the binding rules of cooperation. In the second half of the 1930s, as domestic demand for fuel increased, more oil companies joined the contract (e.g., "Standard Nobel" and "Gazolina"), and in 1938 the oil companies bought 1.3 million litres of spirit over the required quota. Significantly, the pricing rules stipulated in the agreement were favourable from the point of view of the oil sector, which was confirmed by the statements of critics of the introduction of diesel blends, who considered the price

of 25-26 groszy per litre of dehydrated spirit to be profitable, which in practice became mandatory (Grata 2011: 207)[5].

The conclusion of the agreement in 1933 brought a significant increase in spirits sales for propulsion purposes. In the first years of its presence on the market, the size of sales of such alcohol was small, and as a rule was within a few hundred thousand litres. In 1933/34, the first full year of the agreement, 8.7 million litres were sold, and with some fluctuations at this level, sales stabilised in subsequent years (the affiliated oil companies purchased about 5 million litres of dehydrated spirit annually). Significant progress was made as the economy improved, with sales already at more than 11 million litres in 1937/38, more than doubling to 22.6 million litres in 1938/39, and oil companies purchasing as much as 13.1 million litres, a result not only of the new DPMS contract that went into effect in January 1939, but also a marked 36 percent increase in gasoline sales. Since the first agreement was signed with DPMS, the affiliated oil companies distributed about 60% of the spirit destined for propulsion purposes. The relative importance of military authorities, which initially covered more than 20% of total sales, was considerable, while later their share exceeded 30%. A few percent was purchased by the unaffiliated fuel company "Drago," which in the first period of the development of sales of mixtures was sometimes the only buyer of dehydrated spirit, and after signing an agreement with the oil industry its quota was strictly limited until the end of 1938 (Grata 2011: 211-213).

Conclusion

In the harsh realities of the Polish oil industry of the interwar period, the forced *de facto* introduction of spirit fuel blends to support the agriculturally-related distillation industry could hardly be considered a favourable move for the oil industry. With few fuel outlets on the domestic market, the need to supplement blends with dehydrated spirit directly had to limit the size of sales of gasoline alone and displace part of production to much less profitable exports. Thus, at the expense of the interests of the refining industry, the authorities sought to support a branch of the economy associated with a strong landowner lobby. On the other hand, it is worth remembering that the advantage of the entry into force of the DPMS agreement was that the state authorities forcibly regulated relations in the oil industry and organised its export activities, so that they could become much more rational than before, while improving the situation of the entire industry.

Over time, as the economy improved, the new liquid fuel component, previously unwanted, became less and less of a burden imposed on the operation of the

[5] In the late 1930s, the following oil companies performed the contract with the Monopoly Directorate: "Polmin", Galician Carpathian Oil Joint Stock Company, "Galicia" Joint Stock Company, "Natural Gases" Joint Stock Company, Polish Union Rock Oil Refineries, "Fanto" Joint Stock Company, "Nafta" Joint Stock Company, "Vacuum Oil Company", "Limanowa", "Gazolina" Joint Stock Company, and Standard Nobel in Poland.

oil industry. Contrary to earlier fears, the prices paid for it were in line with industry expectations and increasing domestic gasoline sales in the second half of the 1930s allowed the simultaneous increase in sales of both petroleum industry products and dehydrated spirit.

In the second half of the 1930s, voices critical of the very idea of selling spirit fuel blends quieted somewhat, the problem of spirits displacing some domestically produced gasoline for export still remained. However, the latter allegation also lost its relevance just before the war, when in 1938 domestic sales of gasoline finally exceeded the pre-crisis level, and its exports fell to just 12,000 tonnes, already five times lower than in the early 1930s (the share of the internal market in the development of domestic gasoline production was approaching 80%). Thus, in an environment of declining oil production, with a growing domestic market for fuels, this meant that dehydrated spirits could in time become an important supplement to the production of the oil sector.

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The refining industry in south-eastern Poland in 1944-1989

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Abstract: The purpose of the article is to present the activities of the oil refineries in Jedlicze, Jasło and Gorlice in 1944-1989 in the context of their post-war reconstruction, modernisation, technological development and technical progress. It presents the results of crude oil refining at three south-eastern refineries and indicates their share of nationwide refining. The structure of refinery production (the range of products produced) and issues of economic efficiency of oil refining plants were also analysed. A separate space is devoted to describing the failed refinery consolidation process in 1976-1981. The article concludes with the gradual marginalisation and regression of the development of the south-eastern refineries in Jedlicze, Jasło and Gorlice after the petrochemical combines in Płock and Gdańsk were launched.

Keywords: refining industry, oil processing, Jasło refinery, Jedlicze refinery, Glinik-Gorlice refinery, history of the refining industry

Introduction

The refining industry in south-eastern Poland developed within the oil-bearing areas of the Western Petroleum Basin from Gorlice to Ustrzyki Dolne. Its beginning and intensive development took place in the last decades of the 19th century and the beginning of the 20th, when in different years there were dozens of larger and smaller refineries, established near the discovered and exploited oil fields (including in Ustrzyki Dolne, Jedlicze, Krosno, Chorkówka, Dukla, Jasło, Libusza, Gorlice, Stróża, Limanowa). In the interwar period, however, there was a gradual reduction in the development of the industry in the area and the liquidation of some plants, such as those in Libusza, Krosno and Ustrzyki Dolne, due to depletion of deposits and strong competition from the Eastern Petroleum Basin, among other factors. The years after the Second World War brought a further reduction in ownership, resulting in only three refineries operating in the area between 1945 and 1989: in Jedlicze, Jasło and Glinik Mariampolski (Gorlice) (Kachlik 1994: 407-418).

The oldest of these, the refinery in Glinik Mariampolski near Gorlice, was established through the efforts of William Mac Garvey on the site of an old distillery in 1883-1885 and quickly became the largest plant of its kind in all of Galicia. In the interwar period, it belonged to the Dąbrowa Oil Company and had one of

the largest refining capacities in Poland. The refinery in Jasło (Niegłowice) was founded in 1888, and its construction was completed in 1895. It belonged to the Dutch concern Petinag A. G. Gartenberg et Schreier – Amsterdam. Finally, the refinery in Jedlicze was built in 1899 by the Hanoverian Galician Oil Company in Krosno. In 1911, it became the property of the French company Du Nord, from 1923 it belonged to the Galician Carpathian Oil Company (part of the "Dąbrowa" concern), and from 1926 it was part of the "Małopolska" concern. All three refineries were taken over by the Germans during the Second World War and intensively exploited. The passage of the war front in 1944 and 1945 caused a lot of damage in them, and the refinery in Jasło suffered the most (Bratyczak, Kossowicz, Pęski 2007: 13-19).

The purpose of the article is to present the activities of the refineries in Jedlicze, Jasło and Gorlice in the period from the end of the Second World War to the time of Poland's political transformation. The operation of the plants is discussed in the context of their post-war reconstruction, organisation, technological development, and technical progress, as well as throughput volumes, refinery production structure and economic efficiency.

Jedlicze Refinery

After the passage of the war front in September 1944, the reconstruction of the relatively less damaged refinery in Jedlicze began. Initially, 80% of the refinery's products were destined for the Red Army. At the time, processing was about 3,000 tonnes per month. In January 1945, production of lubricating oils and asphalt began, and in 1947 a paraffin plant and a gasoline stabilisation plant were put into operation. A year later, a new propane plant was built for de-asphalting oil residues and processing them into engine and cylinder oils (Pasterski 2022: 168-170; Dorynek, 1999: 27).

In 1954, the expansion of the kerosene and fuel refining system was completed, and in 1955-1957, further investments were made: an oil refining plant with decolourising earth, asphalt drum fabrication, an asphaltene oxidation plant, leach agitators for oil refining, and an oil refining plant with furfural. In 1962, asphalt drum fabrication began operations, in 1964, the processing of used oils began, and two years later, a plant for contacting oils with "Filtrol" decolourising earths was put into operation, as well as a plant for nitrogen production. In 1971-1979, a series of further investments were put into operation in Jedlicze: a gear oil inhibiting plant (1975), an oil packaging plant (1976) and a plastic lubricant plant (1977). In the 1980s, as a result of the economic crisis, only minor investments and modernisation were carried out at the Jedlicki plant. In 1987, a tube-and-tower distillation upgrade was completed (Dorynek 1998: 75; Janik [2002]: 242).

Glinik Mariampolski Refinery in Gorlice

The refinery in Glinik began operations shortly after the front passed in early 1945. In a short time, a paraffin plant, a refining plant, and at the end of the aforementioned year, the "Carburol" cracking distillation plant began operating. The 1950s brought a number of new investments. One of the most important was the commissioning of a modern oil dewaxing plant using the Barisol method on July 1, 1952. In 1958, a modern three-stage tube-and-tower distillation plant was put into operation, thanks to which the refinery's processing capacity increased threefold (APR-S, PPRNGLwG, ref. 299, *Rys gospodarczy Rafinerii z lat: 1887-1972*, k. 1, 2; Kolijewicz, Swidrak 1968: 129; Wrona, Drozdz, 1965: 17).

In the 1960s, a number of important investments were made that were vital to the development of the plant. In 1960, the first production of odourless paraffin was launched in Poland. In 1961, the acid oil refining plant was upgraded. In 1963, facilities for the production of petrolatum, gasoline leaching (replacing the obsolete gasoline rectification plant) and ŁTG maintenance lubricants for rolling bearings began operations. In the 1970s, the process of modernising the Gorlice refinery continued. In 1970, a diesel leaching plant began operation there. The following year, a modern and fully automated production and oil inhibition unit began operating. The lubricant manufacturing division was also upgraded. In 1973, the "Barisol" installation was improved. In 1975, an installation for the collation of wax specifics was put into operation (APR-S, PPRNGLwG, ref. 460, *Dzieje Rafinerii Nafty "Glimar" w Gorlicach z okresu 1883-1989*, k. 11, 14; Boczoń 2000: 47; Wrona, Drożdż, 1965: 17).

In contrast, there were no significant investments in the Gorlice plant in the early 1980s. The work performed was mainly related to environmental protection and the expansion and modernisation of the facilities. In 1984, the Gorlice refinery began operating under the name Rafineria Nafty "Glimar" w Gorlicach (APR-S, PPRNGLwG, ref. 406, *100-lecie Rafinerii Nafty "Glimar"*, k. 115; Ibid, ref. 454, *Rys gospodarczy Rafinerii Nafty "Glimar" za 1981-1987*, k. 2.).

Jasło Refinery

The Jasło refinery, heavily damaged after the passage of the front in January 1945, was demined and initially secured. The process of *ad hoc* reconstruction of the plant and searching for the necessary equipment at other defunct refineries in the country then began. Eventually, the Jasło plant was not reopened until September 28, 1946. On that day, the tube-and-tower distillation began operation, and in the following months coke and oil distillation and partial redistillation (APR-S, PPRNJwJ, ref. 134, *Historia Rafinerii Nafty Jasło od 1888 do 1946 roku*, k. 7; Wieliczko 1974: 36, 38; Zimowski, 1997: 178).

In the 1950s, selective cresol refining (1950), gasoline rectification (1952), "Saprol" boiler distillation (1955), and two-stage tube-and-tower distillation were put into operation. In 1960, a reconstruction and upgrade of the oil refinery was

carried out. Along with the expansion of the refinery, a chemical wastewater treatment plant and an asphalt drum factory were built (APR-S, PPRNJwJ, ref. 1612, *Konferencja naukowo-techniczna na 100-lecie RN Jasło. Historia, dorobek, perspektywy*, k.22; Wygonik 1988: 37).

However, the most important achievement of the period in question was the development and implementation of a modern carbon black installation at the Jasło plant. This was an undertaking of great importance, since Polish refineries had not previously carried out such production, and the development of motorisation and the need to produce more and more car tires were affecting the demand for carbon black. The project was completed in 1969 and production of HAF-type carbon black began. The following year, construction began on more lines to produce other types of carbon black: FEF and ISAF (under Soviet license). However, since the installations were not working properly, it was decided to purchase modern technology under Japanese license. Thanks to this, new types of carbon black in the JAS series were introduced. In the 1980s, investments were limited to modernisation and overhaul of production lines. An expansion of the detergent plant was completed in 1985. In the following year, construction of an air-drying station was completed and the Viskonyl plant was upgraded. In 1986, modernisation of the asphaltene oxidation department also began (completed in 1988). (Mikulski, Wygonik 1988 [n.n.s.]; Kachnik 1994: 405).

Subcarpathian Refining Plants

Since the reconstruction, the south-eastern refineries functioned independently as separate enterprises with their own organisational structure, production and distribution divisions, technical and social departments. However, in 1976-1981, there was a formal merger of the refineries in Glinik, Jasło and Jedlicze and the creation of a joint enterprise called the Ignacy Łukasiewicz Podkarpackie Zakłady Rafineryjne, based in Jasło. The rationale behind this idea was to create a large enterprise with ample financial resources, a larger staff, and wider development opportunities. The goal was also supposed to be greater efficiency, better management and coordination of tasks, and refinery specialisation. However, these assumptions proved illusory, and the company operated only until 1981, when it was split again into three independent refineries as a result of management and economic inefficiencies. The attempted consolidation was a failed organisational and economic experiment that must be noted as an example of the ill-conceived and ineffective measures taken under a centrally planned economy (Pasterski 2020: 107-108; Pasterski 2022; 163-167; Cygan, Dorynek, 2018: 16.).

Oil processing and product mix

The volume of oil processing in south-eastern Poland in the first post-war years was low due to the need to rebuild plants from war damage, complete and start up installations, ensure steady supplies, and implement a new organisational

structure. Once the pre-war capacity was restored, production was increased relatively quickly, using both domestic and imported raw materials. The share of the three refineries from the former Western Basin in total crude oil processing in Poland between 1945 and 1989 was initially dominant but showed a steady downward trend over time. In 1960, their throughput totalled 519,046 tonnes, which at that time still accounted for 59.23% of Poland's total throughput, in 1965 production at 561,266 tonnes accounted for only 15.96%, but already in 1970, the record total of 691,396 tonnes meant only 9.25%. Of key importance was 1964, when the Mazovian Refining and Petrochemical Plant in Płock and the "Friendship" pipeline were launched. Then came the already indicated sharp decline in market share. The result of 2.60% in 1989 emphatically confirmed the permanence of this situation. It showed a fundamental decline in the importance of the south-eastern refineries in favour of plants established in the 1960s and 1970s. Detailed data on the size of crude oil processing at the three refineries and their percentages of domestic production are shown in Table 1.

Table 1. Crude oil processing in the refineries of the South-east from 1956 to 1989 (in tonnes)

Year	Jedlicze	Jasło	Gorlice	Total	Oil throughput in the country (in thousands of tonnes)	Share of south eastern refineries in domestic throughput (in%)
1950		44,561	59,783	104,344	270,700	38.54
1956	123,542	143,193	85,817	352,552	723,300	48.74
1960	179,436	178,228	161,382	519,046	876,300	59.23
1965	177,206	176,503	207,557	561,266	3,516,500	15.95
1970	272,640	211,864	206,892	691,396	7,470,600	9.25
1975	130,000	240,000	250,000	620,000	13,515,500	4.58
1980	115,000	183,000	172,000	470,000	16,126,000	2.91
1984	101,111	124,200	160,000	385,311	13,647,000	2.82
1989	114,702	132,000	150,000	396,702	15,238,000	2.60

Sources: APR-S, PPRNGLwG, Ref. 544, *CSO reports on the execution of the production plan by quantity and value for 1956*, k. 35. Ref. 748, *Annual Balance Sheet for 1960*, k. 4, 8. Ref. 753, *Balance sheet for 1965*, k. 111. Ref. 760, *Annual balance sheet for 1970*, k. 89. Ref. 20, *Financial affairs and balance sheet for 1950. Balance sheet closing*, k. 16. PPRNJwJ, ref. 101, *Jasło Oil Refinery Balance Sheet for 1956*, k. 2, 6. Ref. 110, *Jasło Oil Refinery Balance Sheet for 1965*, [n.n.k.] ref. 1047, *Jasło Oil Refinery Balance Sheet for 2970*, k. 99. Ref. 812, *General characteristics of the development of the Oil Refinery in Jasło in 1960-1975*, k. 28. Ref. 956, *The company's business activity report for 1989*, k. 2. PPRNJEDwJED, ref. 31, *[Plant Activity Reports 1956]*, k. 1, 4. Ref. 493, *Production, employment, labour productivity in 1945-1975 /five-year periods/*, k. 10, 11, 29. *Statistical Yearbook of Industry 1945-1965*, Warsaw 1967, p. 556. *Small Statistical Yearbook 1958*,

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*Estimates.

In the early post-war years, the range of refinery production at the three refineries looked modest and consisted of gasoline, kerosene, gas oil, lubricating oil, paraffin, asphalt, solid lubricants, and intermediates. In the early 1950s, the refinery in Jasło produced gasoline, lighting kerosene, diesel fuel, and oils: spindle, light machine, medium machine, engine, cylinder, industrial asphalt, paraffin, naphtholene, petroleum coke. From the early 1960s, the Jasło plant began producing oil additives, pharmacy gasoline, plastic paraffin and performance additives for engine oils. In the next decade, production of technical carbon black began. In the 1980s, the following products were produced: gasolines, fuels, oils, propane butane gas, asphaltenes, lubricants and vaselines, tackifiers and louches, special gasolines, drum bottoms, candelissa, technical carbon blacks, detergents, paraffin, waxes, and additives (Pasterski 2022: 207-209).

The refinery in Jedlicze initially specialised in the production of asphalt drums and oils. In 1956, the Jedlicze plant produced gasoline, oils, asphaltenes, cable compound, tackifier, and asphaltose. In the 1960s and following decades, high-grade oils, gasolines, kerosene, asphaltenes, paraffin, intermediates for the paint and varnish industry, and petroleum grease were produced (APR-S, PPRNJED-wJED, ref. 493, *Production, employment, labour productivity in 1945-1975 /five-year periods*, k. 1.).

The Gorlice refinery produced crude gasoline, petroleums, kerosene, oils, paraffin paste, petroleum jelly, lubricants, asphalts, "K" insulating paste, naphthenic soaps, and petroleum coke. In the 1960s and later decades, the product range was expanded to include pharmacy petroleum jelly, naphthenic soaps, paraffin wax, floor and shoe polish solvent, ATK aviation fuels and Marinol marine oils (APR-S, PPRNGLwG, sygn. 548, *Analysisof the Refinery's operations for 1958*, k. 15; Ibid, ref. 299, *Refinery's Economic Drawing from the Years: 1887-1972*, k. 2; Ref. 1205, *Industry Monograph of the Oil Refinery in Glinik*, k. 87).

Conclusion

The operation of the refining industry in south-eastern Poland in 1944-1989 was influenced both by the difficult post-war conditions and political transition, as well as the broader development processes of the national economy. Reconstruction from the destruction went hand in hand with the reconstruction of the existing model of operation, adapted to the principles of a nationalised and centrally planned economy. The comments made allow us to formulate three main conclusions. First, the refining industry of the former Western Basin was primarily dependent on oil production from the region's mines. Therefore, the decline in the

level of oil production at the mines directly affected the operations of the refineries, and imported supplies by rail transport were neither sufficient nor economically efficient. For this reason, in the first post-war decades, the importance of the south-eastern refineries was still high, and by 1964 the three refineries in the Subcarpathia region and the plants in Trzebinia and Czechowice-Dziedzice provided the vast majority of domestic oil production. Secondly, the relatively rapid reconstruction of the plants from war damage proved to be an important achievement, but already the implementation of modernisation processes adapting the refineries to the realities of the modern petrochemical industry exceeded the organisational, technological, and financial capabilities of the plants themselves. Although many important investments were made in them, they were not able to provide them with real development. Thirdly and finally, the final marginalisation of the refineries in Jedlicze, Jasło and Gorlice was sealed by the launch of the Mazovian Refining Plant in Płock and the Gdańsk Refining Plant. Their much higher technological level, broad range of operations and better transportation location (access to pipelines and shipping) led to the regression of the older south-eastern refineries. As a result, there was a sharp decline in their percentage share of domestic oil refining, and thus their importance in the country's economy. And in such a marginal role, the south-eastern refineries survived until the political transition.

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The Oil Industry in Galicia until 1918 in Light of the Records of the Galician Governorate in Lviv

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Abstract: The files kept at the Central State Historical Archive of Ukraine in Lviv are of fundamental importance for research into the issues of the oil industry in Galicia. Of particular note is the largest ensemble in the archive – fond 146: Galician Governorate in Lviv, containing the records of the central government of Galicia. This collection has preserved a rich collection of materials representing various aspects of the development of the oil industry. They dealt with issues of the occurrence of crude oil in Galicia, the acquisition and exploitation of oil plots, the extraction and processing of oil, and the construction and operation of wells and refineries. The information on the state of the oil mines in Galicia, especially in terms of meeting technical conditions, fire protection and occupational safety, is valuable. An important place is held by files depicting issues of the creation of industrial infrastructure, including the construction and maintenance of oil pipelines, the construction of storage facilities, and the railway connection to the plants. The files also contain information on the establishment and activities of domestic and foreign oil companies and joint stock companies in Galicia. Also of interest are materials on the development of the labour movement.

Keywords: records of the Galician Governorate in Lviv, kerosene, oil industry, mines, oil companies and joint stock companies

The Central State Historical Archive of Ukraine in Lviv is the oldest and one of the richest historical sources in Ukraine. The stock of this archive currently includes more than 1 million archival units (about 12,000 m. b. of files). These materials are an inexhaustible source of information allowing research to be conducted on the history of the political, cultural, social, and economic history not only of Ukraine and Poland, but also of other countries of Central and Eastern Europe (Central State Historical Archive of Ukraine in Lviv 2005).

This text aims to present the most important materials on the issues of the oil industry in Galicia during the Austrian partition. The largest group in the archive was selected for analysis: fond 146 – the Galician Governorate in Lviv, which collects the records of the central government of Galicia (Dziadzio, Mataniak 2018: 137-167; Ślusarek 2014: 163-174). A total of 198,689 archival units have been

identified in the fond, which are grouped into 109 smaller series, called Descriptions. The large number and wide range of topics covered by the files make it possible to conclude that it is an inexhaustible source for research into the past of the Austrian partition. Files on oil industry issues are in 19 descriptions. The preserved documentation has been used in part by researchers dealing with the development of the oil industry and labour movements in Galicia (Grytsak 1986; Hrytsak 2006; Khonihsman 1958; Khonihsman 1971; Makitra, Semenyuk 2013: 108-118; Najdus 1960: 123-150). The study is a source study and was prepared on the basis of archival inventories and a search conducted in selected archival units.

Description 1 contains documents related to the formation of the government and administrative division of Galicia and the establishment of new laws. Among these files, a file on the establishment of a Galician directorate for the extraction and sale of crude oil dated 1792 was found (CPAHUL, f. 146: NGwL, o. 1, p. 194).

In Description 4, containing the files of the Presidium Department of the Galician Gubernium, there is a whole group of cases preserved called "Files on the situation of the oil industry in Galicia" from 1861-1913 (CPAHUL, f. 146: NGwL, o. 4, pp. 3,411-3,422). There you will find ordinances, reports, correspondence, proclamations, narrations, draught laws, and other materials on the issues of oil industry organisation. These included the conduct and technical supervision of oil extraction, fire safety, mine construction and the safety of those working there. The results of inspections of oil distillation and storage facilities in Drohobycz and Gorlice counties have also been preserved, especially in terms of meeting technical conditions. In order to maintain strict records and control of these facilities, reports were requested on the development of a master plan and register of pipelines and oil tanks. Much space was devoted to the issue of pollution of public waters by waste generated by the production of petroleum products and the installation of protective devices to safeguard rivers and watercourses from possible flash flooding with oil. Also valuable are the preserved oil well plans and situational sketches. Of interest to the researcher are oil taxation projects and tariffs. Correspondence is also preserved between the National Department and the Governor's Office regarding the provision of statistical news about the state of the mines in 1879-1888 by the districts or counties where there were oil mines (Bohorodczany, Brzozów, Dolina, Drohobycz, Gorlice, Grzybów, Jasło, Kołomyja, Kałusz, Krosno, Lisko, Sanok and others). In addition, we also find statistical data on the number of workers employed in the enterprises of the Borysław oil basin.

From the files of Description 4, we also learn about the opening of new shafts, such as "Lithuania," "Vilnius," and "Oil City" in Tustanowice. The reports noted information about damage caused by the deliberate release of oil from tanks and the setting of kerosene on fire, accidents spoiling equipment in mines, and mishaps in wells. Cases of fires were also mentioned, including: at the mine in Słoboda Rungurska (April 17-18, 1881), at the "Laura" shaft of the Berhand Goldstein company in Tustanowice (December 17, 1909), and the oil tanks of the "Galician Society for Transportation and Storage of Oil" in Bania Kotovska near Borysław

(September 16-19, 1909). In the wake of these events, there was talk of the need for the police to conduct inspections to better supervise oil well operations. Decisions were also taken on the construction of new oil tanks.

Intense oil production and difficulties in selling the oil caused the tanks to be overflowing. As a result, the remaining quantities of oil were simply poured away, often forming entire lakes, quite often set on fire. In order to reduce oil production, some entrepreneurs even went so far as to destroy wells (CPAHUL, f. 146: NGwL, o. 4, p. 3,413, k. 137). The way out of this situation was to provide subsidies for the construction of additional tanks and refineries.

In the files grouped under Description 4, we can also find information about the establishment and activities in Galicia of oil joint-stock companies, such as: "Galician-Carpathian Oil Society of Mac Garvey and Bergheim" (with American capital), "Austrian Joint-Stock Society for the Oil Industry", and the joint-stock societies "Borysław", "Dziedzice", "Schodnica", "Trzebinia". In addition to joint stock companies, there were other private companies.

Mention should also be made of files relating to the acquisition of land by owners of mines or *odbenzyniarnias* (a type of refinery). It was not uncommon for these lands to be seized from the local population without providing due compensation.

The materials preserved in Description 4 also deal with the development of the labour movement, especially the formation of workers' societies and the participation of workers in political rallies (CPAHUL, f. 146: NGwL, o. 4, p. 3,621, k. 252-255; p. 3,623, k. 75; o. 25, p. 483, k. 3). Also preserved are reports, cipher telegrams, written accounts, correspondence, and other records on the oil workers' strikes in Borysław and Krosno districts in the summer of 1904 (CPAHUL, f. 146: NGwL, o. 4, pp. 3,771-3,775). The widespread strike of oil workers in Borysław in June-July 1904 is described in detail. They demanded the introduction of an eight-hour working day at the mines and due social conditions. The number of strikers continued to grow and amounted to more than 2,000 people. Due to various threats and attacks on mines, the decision was taken to reinforce military police posts and send in the army to guard tanks and pipelines. However, these measures proved insufficient to protect businesses (CPAHUL, f. 146: NGwL, o. 4, p. 3,421, k. 60).

The subject of strikes by oil workers in the Drohobycz district is also covered by materials kept in Description 8 (CPAHUL, f. 146: NGwL, o. 8, pp. 62-63, 313, 342, 345). Inter alia, there are reports here from the Borysław district commissar containing information about incidents of shafts being set on fire by workers participating in the 1904 strike.

Also included in this description is correspondence between the Governor's Office and the district administration in Drohobycz regarding the closure of the refinery of the "Händel Brothers" company (1904), and materials regarding a complaint by an oil company in Galicia about abuses by local authorities with a request

to establish a police station in the area of the Borysław oil basin (1918) (CPAHUL, f. 146: NGwL, o. 8, p. 408, 2,722).

Description 6 preserves secret documentation (group G – "Geheime") of the Presidium of the Galician Gubernium. These fascicles also contain separate files on the development of the oil industry. Among them can be found a letter from the Ministry of the Interior in Vienna to the Governor's Office regarding the establishment of the Archduke Franz Ferdinand I Oil Society in Galicia (this news was posted in the newspaper "Węgierski Przemysł Górniczy") and an order from the Governorate sent to the district administration of Stary Sambor ordering verification of this information (1908) (CPAHUL, f. 146: NGwL, o. 6, p. 111, pp. 99-102). Also of interest are the reports of the district offices of Brzozów and Limanowa on the supervision of the activities of the English and French oil companies in Brzozów, Gumniska, Grabownica Starzeńska, and Sowliny (1915) (CPAHUL, f. 146: NGwL, o. 6, p. 118, k. 208, 229-231, 289-290, 687). Also preserved is a 1918 report by the national military police commander in Chernivtsi containing information on 16,000 Galician workers employed in the oil industry (CPAHUL, f. 146: NGwL, o. 6, p. 121, k. 1945).

Documentation of oil matters also appears in Description 7. This is correspondence between the Galician Gubernium (and also the Governorate), the Ministry of the Interior, the National Department in Lviv, the Presidium of the Imperial and Royal Higher National Court in Lviv, and tax offices. It dealt, inter alia, with the question of the occurrence of kerosene in Galicia (1841), draught amendments to the regulations of the National Commission for Mining and inspection of the oil industry (the statutes of this commission and a list of oil companies from 1885 to 1888 are attached), anti-Semitic speeches in the oil mines of Schodnica (1897) (CPAHUL, f. 146: NGwL, o. 7, pp. 2,348, 4,371, 4,689).

Among the documentation collected in Description 23, correspondence, cost estimates, and other materials relating to the oil industry infrastructure between 1886 and 1919 deserve our attention (CPAHUL, f. 146: NGwL, o. 23, pp. 36, 88, 282, 401, 428, 450-453, 456, 457, 465, 468, 541, 543, 546, 570, 602, 649, 701, 702, 705, 1321, 1,325, 1,394, 1,560, 1,561, 1,564, 1,566, 1,718, 1,846, 1,857, 2,765, 2,766, 4,174, 4,292, 4,982, 5,825, 6,225, 6,226). The preserved materials detail the issues of construction and maintenance of oil pipelines in Boryslav, Dobrohostów, Kołomyja, Kosmacz, Modrycz, Truskawec, Tustanowice and others. Here one can find records of the sale of land plots for the construction of kerosene processing plants, designs and plans for the construction of oil storage and tanks, a laboratory and outbuildings at the Drohobycz refinery. In addition, in correspondence between oil companies and railroad boards, the topic of building a rail link to refineries (e.g., in Nadworna, Rychcice, Trzebinia) was present. Some of the units include site plans of railway stations and projects related to the construction of separate oil tanks in their vicinity (Brody, Khodory, Kołomyja, Cracow, Przemyśl, Rawa Ruska and others).

The issue of oil industry infrastructure is also addressed in separate units, found in Description 57. The documentation they contain from 1897-1908 includes ordinances of the Land Department in Lviv and correspondence with district offices on issuing permits to entrepreneurs to install oil pipelines under roads and railways, as well as designs for these installations (CPAHUL, f. 146: NGwL, o. 57, pp. 632, 639 660, 693, 694, 703, 710, 722, 744).

Description 62 holds documentation on the issuance of permits for the construction of refineries and oil distillation plants in Galicia (CPAHUL, f. 146: NGwL, o. 62, pp. 584-588, 843). Of particular interest are the reports of the inspector of general industry for Galicia and Bukowina and the inspectors in Cracow, Lviv and Stanisławów from 1884-1890 and 1902 on the development of the oil industry (CPAHUL, f. 146: NGwL, o. 62, pp. 97-104.).

Correspondence, minutes, statistical news, cost estimates, bills, regulations and technical plans, and other materials relating to the construction and operation of buildings and oil tanks in the localities of Drohobycz district (1909-1914) are also found in Description 68 of the Governorate set (CPAHUL, f. 146: NGwL, o. 68, pp. 3,378-3,406).

Descriptions 25, 25a, 58 and 70 collect materials on the establishment and activities of domestic and foreign oil companies and joint stock companies. Here one can find statutes of societies, lists of societies and their members, statistical statements, minutes of meetings, financial reports, etc. Documentation of the following societies and companies has survived: Towarzystwo Wiertników "Wiertacze", the oil workers' society "Pomoc Wzajemna" in Borysław, "Borysławskie Towarzystwo dla Transportu i Magazynowania Ropy" in Lviv, "Izba naftowa" in Lviv, "Towarzystwo dla Przerabiania Nafty", "Przemysł Naftowy" in Drohobycz, "Borysławskie Towarzystwo Naftowe", "Towarzystwa Nafciarzy" in Borysław, "Galicja", oil association in Iwonicz (*Societe nouvole des petroles d'Ivonicz*), "Galicyjskie Karpackie Towarzystwo Naftowe" in Glinik Mariampolski, "Ropa", "Galicyjska Bazy Naftowa", "Trzebinia", oil associations in Kołomyja and Stanisławów, an affiliate association "Companie Austro-Belge de Petrole in Brüssel" in Stryj, Spółka Akcyjna dla Przemysłu Naftowego in Trzebinia, "The Petroleum Company Limited" in London and its branches in Lviv and Stryj, "Renta Naftowa", "Beskid", "Pierwsza Galicyjska Spółka Akcyjna dla Przemysłu Naftowego" in Vienna, "Związek Galicyjskich i Bukowińskich Rafinerii Nafty", "Związek Techników Wiertniczych", "Spółka Urzędników Przedsiębiorstw (firm) Naftowych Galicji", "Związek Producentów Naftowych w Galicji", "Spółka Przemysłowców Naftowych", "Lwowska Spółka Naftowa", "Spółki Akcyjnej dla Przemysłu Naftowego" in Trzebinia and other places (CPAHUL, f. 146: NGwL, o. 25, pp. 398, 469, 891, 1,032, 1,431, 1,433, 1,642, 2,490, 2,561, 2,584, 3,198; o. 25 a, p. 94; o. 58, pp. 241–243, 1,373, 1,849–1,859, 1,905, 2,599, 2,631–2,633; o. 70, pp. 97–100, 103, 139, 150, 151, 154, 160, 162, 184, 197, 198, 226, 228).

The topic we are taking up about the development of the oil industry is also covered by separate archival units of Descriptions 33 and 51 b. Included in them is correspondence from 1902-1907 between the Galician Governorate, the Ministry of the Interior, and the Drohobycz and Gorlice district authorities. It dealt with the following issues: anonymous reports of Hubice village residents regarding the transfer of the gathering land plots to the "Lewakowski and Company" oil company, the provision of fire protection at the site of mines and enterprises in the Borysław oil basin (1904-1906), the protest at the Karpackie Towarzystwo Naftowy in Glinik Mariampolski regarding the imposition of an additional tax (CPAHUL, f. 146: NGwL, o. 33, pp. 2,123 a, 3260; o. 51 b, p. 151).

Oil industry matters are richly represented in Description 55 (CPAHUL, f. 146: NGwL, o. 55, pp. 3, 13, 16, 17, 19, 20, 22, 28-32, 34-36, 38, 39, 42, 44, 45, 48, 52, 53, 55, 59, 61-63, 65-67, 70, 71, 73, 74, 76-81, 83, 84, 86-92, 94-97, 99-101, 103-109, 111, 113, 114). Dating from 1860-1900, the documentation depicts various aspects of the oil industry. An important place among these files is occupied by, inter alia, decrees of the Governor's Office, reports of the National Treasury Directorate, tax offices, correspondence of the Ministry of the Interior, the Higher National Court and the Higher Mining Office in Lviv, district authorities on the exploitation of natural resources in Galicia, the conduct of geological surveys for oil exploration, compensation to municipalities for land plots taken over and the drilling of shafts on them, the construction of oil storage facilities and oil pipelines, and materials on the issuance of permits for exploratory and construction work. The issue is also addressed by records of protests by municipalities or individual owners regarding the taking of land.

There is extensive correspondence between the above institutions on appeals by mining and oil entrepreneurs against penalties imposed by the Governorate for violations of the law of exploitation of natural resources, protests by oil entrepreneurs regarding restrictions on the rights to drill new wells and exploit oil plots, and on tax issues, including requests by entrepreneurs not to sell property at auction for non-payment of taxes, and materials regarding the imposition of the sequester on oil companies (e.g., in the village of Kobrin near Schodnica).

Also valuable is information from the Drohobycz district office on the condition of the oil mines in Borysław, reports on the technical condition of equipment at the mines, materials on the removal of irregularities at the mines, the closure of oil wells in the Stryj district due to failure to comply with occupational safety rules, and reports from the Kołomyja district office on the pollution of the Prut River.

Also preserved are the statutes of the municipalities (Borysław, Mraźnica, Orawa, Schodnica, Truskavec, Tustanowice) regarding the maintenance of order at oil wells, reports on the necessity of organising local police in Borysław for the protection of the wells, and materials on the protests of entrepreneurs from the Stryj district on the establishment of police control at oil companies.

The Ministry of Agriculture's statistical yearbooks from 1885-1895, found in this description, include mining and oil companies. Separate units deal with the

affairs of workers employed in the oil industry, especially the issue of payment of wages and the introduction of labour books.

Description 60 preserves correspondence with the Ministry of the Interior and the Drohobycz district administration regarding the acquisition of land parcels in and around Borysław for the purpose of constructing a mine and related protests by landowners (1908-1913) (CPAHU Lviv, f. 146: NGwL, o. 60, pp. 1,337, 1,338, 1,341, 1,344). Correspondence with the Ministry of Public Works concerns the question of the use of various measures in fighting fires in oil mines in Galicia (1908) (CPAHU Lviv, f. 146: NGwL, o. 60, p. 1,339).

One case in Description 71 contains correspondence with county authorities for the years 1890-1903 regarding the issuance of permits for the establishment of law firms brokering contracts for the purchase and sale of oil plots in the Jasło area (CPAHUL, f. 146: NGwL, o. 71, p. 41).

Description 80 preserves lists of patents and licences for inventions related to methods of kerosene distillation (CPAHUL, f. 146: NGwL, o. 80, p. 97, k. 173, 323).

To summarise the consideration of the files stored in fond 146: The Galician Governorate in Lviv and their usefulness to the study of the history of the oil industry in Galicia of Austrian times, three important points should be noted. Firstly, the quantity of preserved materials is very large. The comments made are certainly not exhaustive of this subject; they are intended only to present the most important materials. Secondly, the wide range of topics in the surviving files makes it possible to study various aspects of the oil industry during the period in question. Thirdly, it is necessary to conduct further studies of the archival resource to develop other assemblies of central, judicial, or fiscal authorities. Such efforts could result in the preparation of an informative booklet or inventory with a characterisation of the contents of the materials.

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The Lviv-based journal "Nafta" in 1893-1914

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Abstract: The article describes the Lviv-based journal “Nafta”, which was published between 1893 and 1914. The journal was published as a monthly or biweekly and its editorial board was composed of professors of Lviv universities and Galician economic activists. "Nafta" was not the first journal devoted to the issues of the oil industry – methods of its extraction, economic questions on this branch of the economy, information on the functioning of the oil industry in other countries or the actions of national and state authorities towards this industry. Such journals had already been published earlier in Gorlice and Krosno and, after the publication of "Nafta" began, also in Jasło (Pawłowski 1995: 366). However, these journals were ephemera, and the Lviv-based "Nafta", as the long-standing organ of the National Petroleum Society and earlier the Society of Petroleum Technicians, was published until the end of July 1914.

Keywords: Galicia, Lviv, oil industry in Galicia, Polish journals in Galicia

Introduction

The development of oil production in Galicia occurred in the last decades of the 19th century and the beginning of the 20th century. Certainly, the growing interest in mining this resource was influenced by the possibility of winning substantial revenues. In addition, the initial use of oil and its derivatives as a source of energy used mainly for lighting rooms gradually expanded to the use of this raw material also as a source of heating or propulsion.

The first primitive methods of extracting oil generally took place where it appeared directly on the surface of the earth. To get it out of deeper wells, it was necessary to use new drilling techniques and also to take advantage of the geological knowledge that could point to drilling sites. This required exploration, co-operation, and knowledge acquisition. Lviv – which was the scientific centre of Galicia at the time – was therefore a natural centre, bringing together scientists, activists and entrepreneurs interested in developing knowledge about oil exploration and research in the broadest sense. The centre of this institution was the University and Lviv Polytechnic School and the oil research conducted there (Brzozowski 1995).

Genesis of the journal

In July 1893, the first issue of the monthly "Nafta", the organ of the Society of Petroleum Technicians in Lviv, which was founded in 1893 on the initiative of the National Petroleum Society, was published in Lviv. The journal's editor-in-chief was Dr. Rudolf Zuber – a geologist and then an associate professor at Lviv University. The title page of the journal included a call *To the Readers!*, outlining the reasons for the establishment and goals of the journal. The editors pointed out "*the acute lack of communication and means of communication between workers in the various oil industries scattered throughout the country and abroad*" and the fact that "*no means can lead more effectively to such a goal as the publication of its own organ*". At the same time, it was recognised that the periodical did not aspire to deal with problems scientifically, but "*we only want to enable individuals working in this profession to communicate and instruct each other by publicly expressing their discoveries, insights, experiences and needs*". In order for this goal to be realised, the editors appealed to readers to co-operate by "*as numerous and frequent correspondences and reports from all our mining and refining areas as possible*" ("Nafta" 1893; 1).

Initially, the journal was published as a monthly, but regular publication was halted as early as August 1894, as only one issue covering five months of the year was published. In the message addressed to readers *From the Editor* the reasons for the "*several months of stagnation in the publication of the journal*" were not given in order "*not to bore our Dear Readers*". At the same time, it was announced that from the beginning of 1895 the journal would be published twice a month ("Nafta" 1895: 113). This announcement was realised and the following year 24 issues of the magazine were published, appearing on the 15th and 30th of each month. However, from the beginning of the following year, there was again a break of several months in the continuity of the periodical's publication, which lasted until May 20, 1896, when the first issue of that year appeared, again published as a monthly; it was to be published on the 20th of each month. The headpiece in the journal provided information that Adolf Strzelecki had become the new editor in charge and the editors again did not indicate the reasons for the interruption, informing laconically that "*without going into a dissection of the causes of this interruption – causes completely beyond the control of the previous and present editors – we must assure you that with the exertion of all our energies we will strive to ensure that henceforth a new period in the life of the journal will begin, a period of steady and successful development*" ("Nafta" 1896: 1).

In the next issue, the editors announced that the magazine had gone from being a biweekly to a monthly and would henceforth go out in an increased volume of approximately 40 pages. At the same time, it was reported that the editors would seek to enter into close contact with the Petroleum Society and the editors of the "Reports" published by the Society ("Nafta" 1896: 17). During the year, there were

further changes. In the October issue, there was information that the journal, hitherto the organ of the Society of Petroleum Technicians (SPT) in Lviv, would be published jointly with the National Petroleum Society (NPS) and the editors would strive to "*create and maintain close communication among the general members of our oil industry*". Leading editorship was assumed by Stanisław Schnür-Pepłowski, and administrative editorship by Dr. Stanisław Olszewski, secretary of the NPS. The editors invited more than a dozen specialists – including Klaudiusz Angerman, Julian Fabiański, Stanisław Margulec, Zygmunt Nowosielecki and Ludwik Zdanowicz ("Nafta" 1896: 85). By the decision of the NPS department, it was decided that from November 1 the periodical would be published by the joint efforts of both oil associations and "Nafta" would remain under the leadership of a committee formed by August Gorayski (chairman), Stanisław Szczepanowski (deputy) and Kazimierz Gąsiorowski, Leon Syroczyński, Wacław Wolski, Roman Załoziecki, Rudolf Zuber and edited by S. Schnür-Pepłowski ("Nafta" 1896: 97).

The last issue of the journal in 1896 announced the decision of the editorial committee to publish "Nafta" again as a biweekly from 1897 ("Nafta" 1896: 121). Between 1896 and 1898, its headpiece reported that "Nafta" was a periodical devoted to the affairs of the domestic oil industry.

In August 1897, the Society of Petroleum Technicians, chaired by W. Wolski, who had been the founder of "Nafta", was dissolved and the reason for this was the organisation of a technical section by the NPS, which was joined in large numbers by existing SPT members. The NPS undertook to publish a periodical on its own ("Nafta" 1897: 182). As a result, the journal became the publication of the National Petroleum Society in Galicia.

This state of affairs did not last too long, because from the beginning of 1900, the NPS "*separated 'Nafta' from its scope of activities and thus it ceases to be its organ"*. The editors asked readers for material support and help in publishing the journal. As a result, the journal became the organ of the "Galician oil industry" – not untilin 1905 again the organ of the National Petroleum Society and from the 2nd issue of 1914 the joint organ of the NPS and the Chamber of Employers in Borysław, because "*the Chamber of Employers, which has goals related to the National Petroleum Society, acceded with all readiness to sustain our journal"* ("Nafta" 1914: 1) and agreed to subsidise it.

At the same time, it was reported that a German-language version of the magazine ("Naphta") was being printed, the content of which was to differ slightly from the Polish-language version ("Nafta" 1899: 328). The German-language edition of the journal was published from 1900 to 1908 as "Naphta. Zeitschrift für die Petroleum-Industrie und Bohrtechnik. Organ des Galiz. Landes Petroleum Vereines" and its editor was R. Załoziecki (Katalog 1931: 72). Due to financial difficulties and declining support from industrialists, the German-language version of the periodical was discontinued at the end of 1908 ("Nafta" 1901: 1). As reported in the TPS report for 1908, the arrears at the printing house amounted to K6,000, which the TPS undertook to pay, as well as to settle the deficit from the printing

of "Naphta" in the amount of K2,500 ("Nafta" 1909: 22). Due to a typesetters' strike, the last 24th issue was not published in 1913 ("Nafta" 1914: 1).

Journal editorship

Initially, the journal's editorial and administrative offices were located at 4A Piekarska Street, and in 1896-1898 it was located at 27 Zyblikiewicza Street. The headquarters of the journal's editorial office and administration often changed and was associated with changes in the publisher's headquarters – the Society of Petroleum Technicians or the National Petroleum Society in Lviv. Starting in October 1898, the editorial office, after moving from Zyblikiewicza St. was located in the so-called "Oil House" at 17-19 Chorążczyzna St., to move from the early 1900s to 10 Zofii Chrzanowskiej St. and already the following year to the building "Roman Villa" at 39 Krzyżowa Street. This was not the editorial office's last move – the address was changed twice in 1905 – first, in January, it was returned to 17 Chorążczyzna St., to occupy, as of July 1, the premises at 3 Słowackiego St., where the editorial office was located until the end of June 1907. From 1907 to 1912, the journal's administration and editorial offices were located at Kraszewskiego Street – first at number 1 and from October 1909 at number 5. In the last years before the outbreak of World War I, the editorial office moved from October 1, 1912 to 32 Batorego St. and a year later to 6 Senatorska St.

The first editors of "Nafta" were Antoni Błażowski, Kazimierz Gąsiorowski, Alfons Gostkowski, Zenon Suszycki, Dr. Paweł Wispek, Eng. Wacław Wolski, and Dr. Rudolf Zuber. The number of editors decreased from the beginning of 1894 due to the death of A. Błażowski, president of the Society of Petroleum Technicians and owner of the Schodnica mine ("Nafta" 1894: 9, 33-34). The work of the editorial board until the end of 1895 was headed by Dr. Rudolf Zuber as editor-in-chief.

In 1898, the editorial board continued to be made up of August Korczak Gorayski (chairman), Stanisław Prus Szczepanowski (deputy), members Kazimierz Gąsiorowski, Dr. Stanisław Olszewski, Leon Syroczyński and Wacław Wolski and the responsible editor remained S. Schnür-Pepłowski, replaced from issue 7 onward by Roman Załoziecki, who headed the editorial board as publisher and editor until 1905, and from issue 5 in that year until the end of 1908 together with Stefan Bartoszewicz. Bartoszewicz was the responsible editor of "Nafta" from 1909 to 1914. Changes in the composition of the journal's editorial board occurred from 1901, when the editorial committee consisted of A. Niekrasz from Chorkówka, Dr. S. Olszewski (Lviv), and Eng. W. Wolski (Schodnica). In the same year, from No. 3, Jan Sholman (Schodnica) was a member of the committee, replacing S. Olszewski. This composition of the editorial board lasted until early 1904, when the editorial board included Eng. Klaudiusz Angermann, Dr. Stefan Bartoszewicz, Władysław Długosz and Stanisław Mars. In the following years, the magazine's headpiece did not indicate the composition of the editorial board.

Journal layout. Content characteristics

In 1901, the journal's headpiece included the year of publication, the place and date of issue (day or month), the issue's sequential number during the year; the title, information about the publisher, and the frequency of publication. Further down the headpiece was information about the cost of subscribing, the composition of the editorial committee, the editor and publisher, the address of the editorial office and administration, and the table of contents of the issue (e.g., "Nafta" 1901: 1). The print was double-spaced, and the article titles were centred and separated by enlarged and bold font. Due to the modest volume of the periodical (usually amounting to 12-16 pages, often including 2-4 pages of advertisements), larger studies were published in subsequent issues of the journal (e.g., R. Załoziecki, *Jakich środków użyć by dążyć do rozszerzenia zastosowania produktów naftowych* [*What measures to use to seek to expand the use of petroleum products*], 1906). From 1894, advertisements were accepted by Julian Topolnicki's agency in Lviv, and advertisers had to pay 18 zlotys for a whole page of text, for half a page the fee was 10 zlotys, and for repetitions the "Nafta" administration could apply a discount according to an individual agreement.

In 1893-1895, the journal was printed at the Polish Printing House, located in Lviv at 6 Sykstuska Street. From 1896 to 1897, the periodical was printed in the printing house of E. Winiarz, and from 1898 until the last issue – at the "Słowo Polskie" printing house, initially (until 1902) under the management of Z. Hałaciński, after whom the management of the printing house (until the end of 1912) was taken over by J. Ziembiński. In the last years before the outbreak of World War I, the management of the printing house was in the hands of L. Nowakowski. The journal's circulation was limited by the financial capacity of sponsors and demand – as members of the Society of Petroleum Technicians and later the TPS received copies for free. It is known that in 1908 the journal's circulation in Polish was 450 copies and in German – 400 ("Nafta" 1908: 28). In 1894, subscriptions to "Nafta" for non-SPT members in Austria-Hungary were 5 zlotys per year, 2.50 semi-annually; in Germany, 10 and 5 marks, respectively; in franc-currency countries, 12 and 6 frs; in the UK, 10 and 5 shillings; in Russia, 5 and 2.50 roubles. From 1901 to 1907, the annual subscription was 12 crowns, rising to 16 crowns from 1908 to 1914 – throughout this period, TPS members received copies of the periodical free of charge. Subscriptions from non-members of the TPS were accepted by the journal's administration and Gubrynowicz and Schmidt's bookstore in Lviv's Cathedral Square ("Nafta" 1898: 1).

The layout of the content published in the periodical changed. In the first years of the journal's publication, its layout was typical – the issue opened with various articles, followed by numerous correspondence, then the Chronicle, containing information from the oil industry world – price movements, personal information, economic results of oil companies, etc. The issue ended with advertisements and announcements. From 1897, the layout of the journal was formalised and divided into two clearly named sections – I. Oil Association Affairs and II. Information

Section. The content of the issue was supplemented by the Correspondence, Literature, and Chronicle sections. This layout remained in place until the end of 1899, to return to the less formal layout of the publication, in which the topics of the articles presented were in two main areas – issues of oil and natural wax production and exploitation and, towards the end of the publication's run, natural gas and economic issues.

The subject matter of the articles on oil issues in the broadest sense was based on several well-known authors – first and foremost W. Wolski, the author of numerous studies, e.g., *O ujęciu gazów naftowych* [*On oil gas intakes*], *O gwintach stożkowych* [*On tapered threads*], *W sprawie reformy rur wiertniczych [On drilling pipe reform*], *O taranie wiertniczym* [*On drilling rams*], and Roman Zuber author of, *inter alia, Kilka uwag o teoriach powstawania nafty* [*Some remarks on theories of kerosene formation*], *Uwagi krytyczne nad nowoczesnymi hipotezami o powstawaniu nafty* [*Critical remarks on modern hypotheses of kerosene formation*], *Kilka słów o geologii Kaukazy* [*A few words on the geology of the Caucasus*]. Several articles were also published by Klaudiusz Angerman (e.g. *Borysław pod względem geologiczno-tektonicznym* [*Borysław in terms of geology and tectonics*]), Jan Shelman (e.g. *Nóż do ucinania rur i prucia rur hermetycznych w otworach świdrowych* [*A knife for cutting off pipes and breaking hermetic pipes in auger holes*]), Marian Wieleżyński (e.g. *Metody używane do oznaczania wartości opałowej produktów naftowych* [*Methods used to determine the calorific value of petroleum products*]), A. Fauck (e.g. *Nowe postępy techniki głębokich wierceń* [*New advances in deep drilling technology*]), Wiktor Petit (e.g. *O wyciągaczach rur* [*On pipe extractors*]), Paul Stein (e.g. *Wiercenie szybko udarowe i jego rozwój* [*High speed percussion drilling and its development*]), J. Gruszkiewicz (e.g., *O gazie naftowym* [*On petroleum gas*]) and Władysław Szaynok (e.g., *Zastosowanie przegrzanej pary w kopalnictwie nafty* [*Application of superheated steam in petroleum mining*]).

Very interesting topics were also presented in this group of articles on geology by E. Dunikowski (*Geologiczne warunki występowania ropy w dobrach państwowych w Galicji* [*Geological conditions of oil occurrence in state property in Galicia*]), J. Grzybowski (*Mikroskopowe badania namułów wiertniczych z kopalń naftowych* [*Microscopic studies of drilling muds from oil mines*]), W. Szajnocha (*Pochodzenie karpackiego oleju skalnego* [*Origin of Carpathian rock oil*]), L. Gawroński (*Dzisiejsze poglądy na geologię Karpat i drugorzędne złoża ropy* [*Today's views on the geology of the Carpathians and secondary oil deposits*]), M. Miączyński (*Geologiczne stosunki Borysławia i Tustanowic* [*Geological relations of Borysław and Tustanowice*]); in the field of mechanical engineering – G. Potworowski (*Regulator do motorów naftowych i gazowych* [*A regulator for oil and gas engines*]) and Wit Sulimirski (*Kilka słów o świdrze ekscentrycznym* [*A few words about the eccentric auger*]), methods of extraction and oil processing – B. Pawlewski (*Z technologii nafty* [*From kerosene technology*]), F. Siudak (*Spostrzeżenia nad systemem wiertniczym Raky'ego* [*Observations on the Raky*

drilling system]), G. Schneider (*Wiercenie obrotowe piłującymi dłutami* [*Rotary drilling with saw chisels and hardened steel shot*]), Z. Bielski (*Rzut oka na nowsze sposoby głębokiego wiercenia* [*An observation of the newer methods of deep drilling*]), F. Brugger (*Rozwój galicyjskiego systemu wiercenia* [*Development of the Galician drilling system*]) or A. Łukaszewski (*Wieże wiertnicze, rezerwuary ziemne i gromowody* [*Drilling towers, earth reservoirs and lightning conductors*]). Some of the articles appearing in "Nafta" were reprints from other – usually German – specialist journals; or they were published lectures by authors, delivered at international and national conventions and congresses, and many of the published papers were unsigned – so they probably expressed the position of the entire editorial board.

The second thematic area of publication in the periodical was broad economic issues and oil statistics. Throughout the period of publication of "Nafta", statistics of the oil industry in Galicia were published (e.g., *Statystyka kopalń nafty i wosku ziemnego w Galicji w 1896 r.* [*Statistics of kerosene and natural wax mines in Galicia in 1896*], *Spis kopalń nafty w okręgach górniczych Jasło, Drohobycz i Stanisławów w 1902 r.* [*List of kerosene mines in the mining districts of Jasło, Drohobycz and Stanisławów in 1902*]) and later also monthly production volumes in the partitioned territory. From 1906, "Nafta" reported on the monthly results of oil production in Borysław and Tustanowice. The amount of oil production and trade in Galicia and Austria-Hungary was reported annually, with interest also in the statistics of its production in Romania, Russia or the USA (e.g., S. Olszewski, *Statystyczny przegląd przemysłu naftowego w Baku 1896-1898* [*Statistical Review of the Oil Industry in Baku 1896-1898*], K. Pietrusky, *Przemysł naftowy w Stanach Zjednoczonych Ameryki w roku 1908* [*The oil industry in the United States of America in 1908]*). These studies were often based on Austrian and national official publications and the studies of S. Olszewski (e.g., *Przywóz i wywóz produktów naftowych Austro-Węgierskiej Monarchii w r. 1895* [*Import and export of petroleum products in Austro-Hungary in 1895*], *Przemysł naftowy w Galicji w latach od 1884 do 1901 r.* [*The petroleum industry in Galicia from 1884 to 1901*]). A significant role was played by the substantial correspondence both from the localities where the oil mines were located (at first primarily from Schodnica and later from Borysław and Tustanowice), as well as from Romania, Russia or even from the Dutch East Indies.

Its editors – both Roman Załoziecki and Stefan Bartoszewicz – published in "Nafta" frequently. In 1897-1906, Załoziecki published more than a dozen articles on various topics (e.g., *O zużytkowaniu odpadów fabryk naftowych* [*On the use of oil factory waste*], *O zastosowaniu olejów i odpadków naftowych do opalania* [*On the use of oil and waste oil for fuel*], *Jakość naszej nafty eksportowej* [*The quality of our export kerosene*]. Similarly, in 1899-1908, S. Bartoszewicz wrote (e.g., *Organizacja eksportowa naszego przemysłu naftowego i przemysł naftowy amerykański* [*The export organisation of our oil industry and the American oil industry*, S. Bartoszewicz, *Spirytus i produkta naftowe jako materiały do oświetlania*

i wytwarzania siły motorycznej [Spirits and oil products as materials for lighting and generating motive power], *Traktat handlowy z Niemcami* [*The trade treaty with Germany*], *Historia i stan ekonomiczny przemysłu naftowego w Galicji* [*The history and economic condition of the oil industry in Galicia*], *Pogląd na dzieje przemysłu naftowego i środki sanacyjne* [*A view of the history of the oil industry and Sanation measures*].

Beginning in 1909, the nature of the journal changed – occasional articles on technical subjects related to oil production and processing were published. The periodical took on the character of an overview of legal and economic issues, focusing on the current situation in the oil industry.

Conclusion

Oil extraction and processing was a major industry in Galicia. The extraction of this resource inspired the development of other industries – primarily the engineering industry, producing for the oil mines. The needs of the oil industry accelerated the development of road, rail, and telecommunications infrastructure in Galicia, changing the socioeconomic character of a sizeable part of its territory. The development of this sector was also possible thanks to extensive international scientific and technical exchanges involving oil scientists and practitioners from the Austro-Hungarian monarchy (including Galicia), Germany, Russia, Romania and France. This exchange was possible due to the growing interest of Galician scientific centres in Lviv and Cracow in the problems of the hard sciences – such as chemistry or geology, and the successes achieved in this field. The development of the oil industry also resulted in the education of a large group of excellent Galician mining engineers at Austrian universities and led to efforts to establish the Mining Academy in Cracow. It was successfully completed in 1914, but the outbreak of war prevented its launch.

All the above-mentioned descriptions of phenomena can be found by browsing the pages of Lviv's "Nafta". The journal was published for 22 years, facing a number of problems during this time – mainly financial. The periodical was completely apolitical – no texts on political issues appeared in it, although they were mentioned when describing the situation during the oil mine strikes in Russia in 1905.

The period of the publication of "Nafta" coincided with a period of intense development of oil production and processing. In Galicia, the number of wells grew, employment in the industry increased, new oil extraction technologies were introduced and exploration for new oil and also natural gas deposits was carried out. These changes were accompanied by new technical, professional, and social problems – which is why the journal's editors extensively discussed issues of the conditions of the oil industry in Galicia and the Habsburg monarchy. It pointed to its economic position, legal arrangements, and the terms of international agreements. It presented statistical information in numerous official materials and each issue contained materials on the current activities of social organisations of the

time, operating in the circle of the Galician oil industry – especially the National Petroleum Society and the Society of Petroleum Technicians.

The information contained in the 335 issues of this Lviv-based journal is essential for understanding the history of Galician industry and for better understanding the history of this part of the Polish lands.

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What can the modern generation learn from Ignacy Łukasiewicz?

Mariusz Ruszel

Abstract: Ignacy Łukasiewicz is commonly referred to as the founder of the oil industry. Most people associate him with the invention of the kerosene lamp. He was also, however, an accomplished pharmacist, an advocate of Polish independence, social activist, and philanthropist. It is worth recalling that he was the co-founder of the world's first oil mine and distillery. He made a lasting mark on the economic history of the world. Łukasiewicz was not only the inventor of the oil lamp; his achievements were broader. He operated in difficult times and had to overcome many private, political and economic adversities. Yet they did not break his attitude, which was unfailing. He proved that being an innovator and an entrepreneur is not incompatible with maintaining admirable social convictions. What can we, living in the 21st century, learn from Ignacy Łukasiewicz? This article brings to the fore several qualities of his that are well are worth noting. It aims to present the values that characterize the person of Ignacy Łukasiewicz – values, the emulation of which, would serve the present generation well.

Keywords: Ignacy Łukasiewicz, entrepreneurship, kerosene lamp, personal qualities

Introduction

Ignacy Łukasiewicz was an indomitable man who transcended the times in which he lived. He had great courage of thought and was able to act independently of accepted and prevailing opinions. His unconventional and unique attitude was exemplified in his extraordinary research focused on seeking solutions that could contribute to improving the lives of future generations. On July 31, 1853, in a hospital in Lviv, Łukasiewicz's lamps, made by the designer/constructor Bratkowski, were used to illuminate the room where the surgeon Zaorski performed an appendectomy on Władyslaw Cholecki. It is estimated that one lamp gave as much light as 10-15 candles. This illustrates how his achievements had a practical impact on the local community. At the same time, this stance can be a model for today's generation to constantly look for new out-of-the-box solutions that can contribute to improving society - especially today, in an era of increased competition between economies that are looking for sources of competitive advantage. The pursuit of

innovation and the development of new ideas and patents requires tenacity, perseverance and courage. Ignacy Łukasiewicz, despite various adversities and a difficult financial situation, did not give up on his successive goals, which he tried to achieve. These values are timeless and can be a source of inspiration for modern researchers and students who should take the example of Ignacy Łukasiewicz.

The values of Ignacy Łukasiewicz

First of all, Ignacy Łukasiewicz was an **extremely hardworking** man. Born in 1822 in the village of Zaduszniki, he grew up in an impoverished family. As a young man, his family struggled to support itself, and at the age of 8 his father, Joseph, died. The mother of the family was ailing and the oldest brother decided to continue his education. Thus the younger brother — Ignacy — had to start working in a pharmacy in Łańcut at the age of 14. He was raised to be hard-working, conscientious, and consistent. His organizational and entrepreneurial talents were quickly recognized, complemented by a constant hunger for knowledge and a drive to discover new things. Today, people who are impatient in pursuing goals or have trouble defining them should take Ignacy Łukasiewicz's example of tenacious experimentation. He had an extraordinary courage that allowed him to discover new things and constantly acquire skills, which he used for the benefit of the people around him. Such an attitude is especially important today. Young people, through the convenience of computers, are losing the need to discover their passions, including the essential element of a researcher's workshop: that of constantly asking questions and seeking answers to them. Łukasiewicz not only combined these abilities but at the same time remained extremely entrepreneurial and patient. Even in the face of setbacks and difficulties in life, he did not give up on pursuing his goals. He was able to use his knowledge, diligence, persistence, skills and talent, as well as his passion, to conduct his successive projects, which then contributed to the development of the region in which he lived and of society in general. With his diligence, he helped develop a pioneering method of oil production. It was both effective and efficient. As a consequence, Łukasiewicz had visits from numerous American oilmen, hoping to copy his refining methods.

Secondly, Ignacy Łukasiewicz was an example of a man who **worked well in a team**. Together with Jan Zeh, he was able to successfully distil oil. From surviving documents, we can read: "and there was a pharmacist, a good friend of mine, a certain Zeh. I showed him the oil, and we hashed out how to purify it further. We added acids, passed it through an alembic and immediately obtained pure kerosene" (Brzozowski 1974: 47). When creating the actual kerosene lamp, he collaborated with Adam Bratkowski, a Lviv tinsmith. Ignacy Łukasiewicz said: "I try to bring forth light, in the oil lamp, of course. The lamp's reservoir ignites from the inside, bursts and almost burns me. Then they proclaim a new type of illumination: using pinoline and camphine. I can't sleep from envy, I thus go to the famous tinsmith Bratkowski" (Brzozowski 1974: 47). This shows how talent and skills can

be developed in a collaborative environment, which we refer to today as teamwork. This environment is built on proper communication skills and in an atmosphere of mutual trust, being the necessary framework for effectively achieving common goals. Cooperation today is often obscured by rivalry. That is exactly why Ignacy Łukasiewicz's attitude is worthy of imitation. Furthermore, it is through teamwork that we achieve synergy between different outlooks on the one hand and the skills and knowledge that we all possess, on the other. To emulate Łukasiewicz means to be able to use social potential to foster the common good of our community and of future generations.

Thirdly, Ignacy Łukasiewicz had an **innovative approach to his employees**. He was able to create, back in his the time, a unique business model, in which the *individual* was respected. He generously compensated his employees who worked in oil production, and introduced extra allowances for work conducted in difficult conditions; he also recognized efficient work and good results by paying bonuses. He used an incentive system that increased production efficiency and contributed to a better atmosphere among employees who often risked their lives during doing their job. This distinguished him from many other entrepreneurs who did not use such incentives. In 1866, he established the first workers' fraternity fund to exist in the Austrian partition of Poland – this fund was a welfare and insurance system for workers. Its premise was to make it compulsory for each worker to deposit 3 cents of every Rhenish zloty earned into the fund. The accumulated funds were used to cover the cost of medical treatment for ill employees, to provide sick pay for each day of their incapacity, to pay for the funeral expenses of a deceased employee, to pay an invalid's pension and to provide an allowance for widows and orphans. It also introduced an allowance in the event of a fire at home. These measures were innovative and very few employers provided such benefits. These benefits built public confidence and a sense of stability. Łukasiewicz tried to reduce the risk of accidents, so he imposed an absolute ban on alcohol for mine workers. He promoted workplace safety on his own initiative, despite the lack of adequate regulations in this area. These practices over time became common standards — in this respect, too, he transcended the era in which he lived. He left behind a legacy that later generations should expand upon. By Łukasiewicz's example, especially important in our era of robotization and computerization, we can see that the true sources of competitive advantage are knowledge and human capital.

Fourthly, Ignacy Łukasiewicz was an **exemplary economic and national patriot**. He took risks serving the ideals he believed in. He took part in illegal and underground patriotic activities, for which he was imprisoned for two years. In today's age of digitization, patriotism is not as popular, especially among the younger generation. The stress and high pace of everyday life, as well as our ever present consumerism, is now confronted with the uncertainty caused by the war in Ukraine, which began with the Russian invasion in February 2022. This situation has affected the economic and social situation of citizens in most European countries. Regardless of particular challenges, the Poles have shown great solidarity

with the people of Ukraine in these difficult times. We were able to see the needs of others, just as Ignacy Łukasiewicz did, who gave refuge to and financially supported participants of the January Uprising of 1863. He was also involved in politics, as a district councilman of Krosno, and as a deputy to the National Sejm in Lviv. His political activity yielded practical results, as he was able to help improve infrastructure in the Polish regions. He wanted in this way to contribute to the economic development of the Poles. Łukasiewicz also wanted to expand the oil industry in Galicia, so he sought to pass laws favorable to entrepreneurs. Ignacy Łukasiewicz's patriotism had two sides — on the one hand, he worked in favor of his homeland, his Fatherland, and on the other, he fostered the industrial and economic potential of his region. What does patriotism mean for young people living in the 'global village'? How do they define patriotism and what can they learn from Ignacy Łukasiewicz? First of all, it seems that being a patriot means working for the betterment of one's region, one's own country and for the development of its economy. Today, in most cases, this would not mean participating in a revolution or insurrection. It would rather be made up of local activities contributing to the development of one's region and for the benefit of future generations. Such activity is within everyone's capability. It might also consist of promoting an attitude of selflessness and cultivating diligence among others. Most long-term effects on society stem from grassroots work, which is a form of patriotism. Such work can be started anywhere — at home, at work, at school, at the university, and in the local community where one lives. Everyone should define for themselves a way of realizing patriotism that will not only make the world a better place now but also for future generations. It doesn't have to be in the form of a discovery or invention that will revolutionize humanity, industry or the economy. It is important to keep an open heart to human injustice and poverty, an open mind to new solutions and ideas, and to cultivate a personality that is ready not only to go against the grain but also to derive joy and satisfaction from doing good. Future generations must remain hungry for knowledge and passionate about their development.

Fifthly, and finally, Ignacy Łukasiewicz was a **social activist, philanthropist and a promoter of sustainable development**. He looked at problems from a national (Polish) perspective even though he lived in the Austrian partition of Poland. He was aware of the issues and social needs of his neighbors. When he became a man of increasing wealth, his empathy did not change. He was a true philanthropist in the sense that he never expected anything in return. This is admirable especially from today's perspective, in a world where we rather live with our self-interest in mind. Modern philanthropy often takes the form of donating whatever wealth is 'extra' and is then used for publicity. Łukasiewicz cared deeply about increasing the accessibility of education. He founded a school in Chorkówka in 1865, and a lace school for girls in 1876. The latter school was run by his wife Honorata Łukasiewicz. Together with the entrepreneur Karol Klobassa, he also financed the establishment of schools in Bóbrka, Zręcin, and Żeglce. Łukasiewicz himself attended a general secondary school in Rzeszów, which today houses that city's

High School No. 1. The more schools he helped establish, the more opportunities he created for future generations. He provided interest-free loans to peasants, as well as financial assistance and patronage to the children of peasants who wanted to attend school. Apart from establishing schools, he employed teachers and paid their salaries. He funded scholarships for the talented to pursue education at universities in the US and Canada. This was his way of investing in the intellectual development of the local population. He carried out his philanthropic activities without much publicity. On top of that, together with Karol Klobassa, he funded a neo-Gothic parish church in Zręcin, which serves today as the Parish of St. Bishop Stanisław the Martyr in Zręcin (church in Zręcin).[6] He contributed to the creation of a chapel in a manor in Chorkówka and to the conservation work of the parish church in Biecz in 1871. He also allocated funds for other churches, including Orthodox churches in the Przemyśl diocese, and provided free kerosene for lighting. He was also instrumental in the establishment of the Museum of Oil and Gas Industries in Bóbrka, as he founded an obelisk in 1879 with the founding date of the Bóbrka mine, which to this day remains the centerpiece of the museum. This demonstrates his ability to realize projects and fund initiatives that continue working even after his death and that can remind us of his achievements and teach new generations how to live by his example for the common good of society.

Ignacy Łukasiewicz as an entrepreneur

In addition to his philanthropic activities, Ignacy Łukasiewicz was able to invest in the foundations of economic development. He was well aware that the most important thing is infrastructure, which contributes to economic development, trade, new jobs and the cultivation of a region's overall prosperity. That is why he financed the creation of roads and bridges — to increase mobility and increase the competitive advantage of one region over another. Such infrastructure also has strategic significance, because its allows for the development of further economic sectors. Polish lands were historically less developed compared to Western Europe. His example of selflessness and charity gave him the nickname *Father Ignacy*. He was remembered as a father figure even after his death: "He was called Father by everyone in the district, in the country — under the wings of the late Ignatius they fled, you would not find a single man who left him without obtaining from him consolation and wise counsel in times of difficulty, in poverty generous material assistance, in sickness medicine, in misery a shelter and rare hospitality. Having acquired knowledge and wealth with toil and labor, he knew their value; it is no wonder, therefore, that he used his wealth where and how it should be used" (Franaszek, Grata 2021: 94). The best evidence of his generosity was that Pope Pius IX granted him the dignity of papal chamberlain in 1873 and the right to wear

6 The founders of the church were: Karol Klobassa-Zrenicki, contributing 50 thousand Rhine zloty; Ignacy Łukasiewicz, contributing 10 thousand Rhine zloty; and the parishioners, the value of whose work was estimated at 40 thousand Rhine zloty.

the insignia of the Order of St. Gregory (patron saint of schools [?]). The way he helped others is worthy of emulation for today's and future generations. He had future generations in mind also when funding the planting of fruit trees on the roads from Chorkówka to Bóbrka and Zręcin in 1879 so that travelers could treat themselves on their journeys. His attitude can be summed up by the phrase: 'grassroots work'.

It should be remembered that Łukasiewicz established the world's first oil mine, of which he was also the manager. It is impressive that his innovation did not end with that discovery, but that he strived to constantly modernize the mine and the refinery. He understood perfectly that continuous development was necessary. This attitude would now be referred to as the practice of continuous improvement, searching for new solutions, optimizing production and constantly improving efficiency. These strategies can be found in the business models of the biggest companies in the world. His passion for exploring the world was infectious. He realized what potential oil had for the betterment of future generations. He saw the development of the oil industry as an opportunity to start more companies, which he urged others to do. The amazing thing is that he was not afraid of competition. On the contrary, he urged others to create their businesses. He believed that this would bring more cooperation, and so he cultivated entrepreneurship. He inspired others with his passion for innovation. He founded the *National Oil Society* in 1877 [Krajowe Towarzystwo Naftowe] which first operated under the name *The Society of Care and Development of the Oil and Mining Industries in Galicia* [Towarzystwa dla Opieki i Rozwoju Przemysłu i Górnictwa Naftowego w Galicji]. This organization supported the development of mining in Polish areas and was also active in the period between Poland's regaining independence in 1918 and the outbreak of World War II in 1939. It led to the passage, after his death, of the Oil Act. Łukasiewicz's attitude was filled with creative and unconventional ideas on how to approach problems. Together with admirable perseverance and diligence, he is not only a model worthy of emulation but also a signpost for achieving success. Modern-day employers are searching for people with Łukasiewicz's qualities, even if they are not aware of it. In times of often unfair competition one should keep one's integrity when pursuing one's goals – as did Łukasiewicz. He showed us how to think independently and how to overcome barriers (barriers that are often only in one's mind). He saw what no one else saw. He took risks where others retreated. He walked paths that others had not walked before, and as history has shown, others followed his footsteps later. He was able to recognize trends earlier than others. He proved that innovation is a multidimensional process and cannot be limited to working in a lab, but must also include organizational skills, management, business strategies, communication, cooperation and teamwork, as well as solutions in the legislative sphere.

Summary

From Ignacy Łukasiewicz we can learn detachment from wealth and selfish profit. His life has shown that the greatest value is not to focus on oneself but on others. That is the reason why, even long after his death, he is remembered as *Father Ignacy*. Today's generation is focused on profit and consumer goods. It can learn a great deal from Ignacy Łukasiewicz. This humble Pole has left a mark in the hearts and minds of generations. His work made a lasting impact on the economic history of the global energy sector. Despite the noise and hustle of everyday life, it is worth stopping and finding time to reflect on whether the decisions we are making are adequate to our abilities and skills. Let's have the courage to look for what we don't see every day, let's go beyond the accepted norms and expectations for the betterment of present and future generations. Let us remember that the values that characterized Ignacy Łukasiewicz in his personal and professional life, such as industriousness, the ability to work in a team, innovative outlook on the environment, patriotism and the spreading of the idea of sustainable development, are universal values worth recommending to society at large, and especially to the younger generation.

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Be like Ignacy, live like Ignacy

Tymoteusz Pruchnik

Abstract: Ignacy Łukasiewicz is a person who went down in Polish and world history as the inventor of the kerosene lamp and pioneer of the oil industry. Ignacy Łukasiewicz is an example of a person who in his personal and professional life went far beyond the mediocrity of those living in the 19th century. The purpose of this article is to present the professional successes of Ignacy Łukasiewicz in the development of the oil industry and to show him as a pioneer of corporate social responsibility (CSR). The article uses available literature on the life and work of Ignacy Łukasiewicz and selected literature on CSR.

Keywords: Ignacy Łukasiewicz, petroleum, Corporate Social Responsibility

Introduction

As the oil industry developed in Subcarpathia and the living conditions of the Subcarpathian people improved, the legend continued to be recounted in the Krosno and Jasło areas long after Łukasiewicz's death that he was a heaven-sent comforter who came to feed the hungry and clothe the poor.

How is it that one man was able to change life for the better for so many people and make them see the value of these changes? The answer to this question is the combination, in one person, of exceptional personality and character traits, supported by undeniable talent and great diligence. All this made up the picture of an outstanding Polish inventor, a man ahead of his time, whose creative thought gave the world epochal values, and whose genius for nearly a century and a half has set the course of the humanistic development of mankind.

This great Pole, indefatigable pharmacist, outstanding inventor, and industrialist has been named Patron of the Year 2022.

The purpose of this article is to describe the life and professional successes of Ignacy Łukasiewicz related to the development of the oil industry in Poland.

The life and work of Ignacy Łukasiewicz

Ignacy Łukasiewicz's parents showed considerable intuition in choosing a name for their son, the root of which is found in the Latin word *ignis* – fire – and means a man with a fiery heart. Łukasiewicz, with his entire life and actions, confirmed the truth of this claim and proved that he was a man with a big and warm heart, not only for his own family, but most importantly for Poland and the Poles.

He came into the world in 1822 as a representative of the generation about which Adam Mickiewicz wrote – "*born enslaved, chained in my crib*", a generation that produced characteristically outstanding figures of Poles devoted to God and the Homeland, socially committed, active in many fields, uncommon. For Poland, he was ready for anything, as he proved during his entire life, full of passion, hard work and, in the end, the invaluable merits that he left behind for the use of then and future generations of Poles.

Ignacy Łukasiewicz was the fifth child of Józef and Apolonia Łukasiewicz, and as it turned out years later, the greatest pride of this not very wealthy family and of Poland as a whole. Born in Zaduszniki, close to the border with the Russian partition, on an estate leased by his parents, he was brought up in the spirit of love for his homeland and for others. He was moulded into a strong, conscious, and determined man, a righteous citizen who acted with dignity and was guided by the moral law, a good Pole. Not without influence on such an image of the young Łukasiewicz was the education he received from his earliest years. First from the home tutor, the former colonel, Woysyn Antoniewicz, and then, when the Łukasiewicz family moved to Rzeszów in 1830, from teachers at the Piarist gymnasium, which was called the "school of characters" for good reason. He was educated there from 1832 to 1836, remaining in the memories of his contemporaries as a talented and kind man: "*...we came to know him as one of the brightest and most diligent students and the best colleague. He worked strenuously, and facilitated the study of less capable colleagues with private, selfless lectures. At that time, there was not yet such a plethora of scholarships (...), along the thorny road of scarcity, the greater part broke through forward, and in the last need a colleague saved a colleague. Łukasiewicz was one of the first in this regard and shared his last penny with those in need.* (Anczyc 1882).

The Rzeszów period was a time of conspiratorial activity for young Ignacy, for which in 1846 he was arrested by the Austrian authorities and imprisoned in a local prison, then forcibly sent to Lviv. Upon his release from prison, he was classified as "a dangerous individual for the future who should be placed under special police supervision".

While in Lviv, he managed to take a job at the pharmacy of Piotr Mikolasch, one of the leading pharmacies in Galicia, with extensive laboratory testing capabilities. It was there that Łukasiewicz first encountered rock oil and enthusiastically began experimenting with its use for lighting. Unfortunately, lack of funds and adequate knowledge prevented him from achieving his goal. His employer, however, seeing his uncommon abilities, helped him get an education. Łukasiewicz completed his pharmaceutical studies in Cracow and then travelled to Vienna to study analytical chemistry. With his master's degree, he returned to work at Mikolasch's pharmacy and began researching oil distillation and its use.

"Open-mindedness", an unconventional, often risky way of doing things, achieving success, allowed him in 1852, after weeks of hard work together with Jan Zeh, to obtain o preparation devoid of such light fractions as gasoline and to

separate it in the apparatus from other heavy hydrocarbons such as asphaltenes, technical oils, and others.

This is what Łukasiewicz himself said of this success: *"...I succeeded at last in so purifying and heating the crude of this distillate that my product was an excellent material for illumination and could compete boldly with the best Italian rock oil."* (Morawski 1871; 34).

A year later, Łukasiewicz constructed the first prototype cylindrical kerosene lamp, which Lviv tinsmith Adam Bratkowski helped him make. It first shone in Mikolasch's pharmacy in March 1853, while in July of the same year its public use took place during a night operation in Lviv's Lychakiv hospital. This day, July 31, 1853, is taken as the beginning of the Polish oil industry and the date of the world's first "oil transaction".

In 1854, Łukasiewicz, together with Tytus Trzecieski and Karol Klobassa, founded the world's first oil company to extract and exploit oil. During this time, he moved out of Lviv and relocated near the oil fields. The company began oil production in Bóbrka, and two years later launched the distillery in Ulaszowice.

Throughout his life, Łukasiewicz was active in the development of the oil industry, setting up more mines and refineries and working relentlessly to improve oil processing, which resulted in the awards he received for oil products at exhibitions in Jasło, Lviv, and Vienna. He also constantly improved the drilling techniques used in the mines, innovating in this area.

Łukasiewicz said of oil: "*...this liquid is the future wealth of the country, it is the prosperity and well-being of its inhabitants, it is a new source of earnings for the poor people and a new branch of industry that will bear abundant fruit*" (Brzozowski 1974; 86).

Łukasiewicz, thanks to his attitude, quickly became a wealthy and widely respected man, which enabled him to purchase a landed estate. Łukasiewicz's manor house in Chorkówka soon became a place teeming with "Polish" life, where veterans of the struggle for independence, many of whom ended up in Galicia after the collapse of successive national uprisings, found refuge. As a man known for his noble character and altruism, Łukasiewicz was eager to share his wealth with others. He was wont to say: *"It is a great art to be rich, and also a great responsibility",* and to the emerging criticism that not all the recipients deserved his help he replied: *"I'd rather give to 99 unneedy people than to abandon one needy person".* (Sozanski 2004; 43).

The atmosphere of the Łukasiewicz home was brilliantly painted in her memoir by Anna Potocka née Dzialynska: *"As I walked through the dining room, I was amazed by the number of place settings in the home of a childless couple and thought I had found some kind of reception area. But when we sat down for afternoon tea, I found that it was only seats for domestic and regular guests, who slowly descended. The first was introduced by two men: a veteran cripple with grey hair and a noble face, a victim of the maltreatment at the Warsaw Citadel. Behind him came in a few more veterans, and further on, in contrast, youths high and savage,*

who came from various universities and foreign professional schools for vacations to the Łukasiewiczes, who not only provided the numerous peasant youth with the means of education, but gathered them truly like a family home. It was also among this group, in addition to reverence and gratitude, that filial confidentiality prevailed. Soon the conversation revived. Discussions began. Father Łukasiewicz (for he was not called by any other name in the neighbourhood) gave the youngsters a pep talk, only occasionally with a benevolent smile, experience and advice curbing too exuberant impulses(...). All this together constituted a feature of a true Polish court and a grace indescribable!" (Honarata ze... 2005; 48)

During this time, Łukasiewicz developed large-scale philanthropic activities. He built schools, churches, roads and bridges, and promoted the establishment of courts. In Bóbrka, he opened a therapeutic iodine-bromine bathing facility, in Chorkówka a chapel for the local population, and in Zręcin he and his partner Klobassa founded a church in the neo-Gothic style. He also founded a Lace School for girls in Chorkówka, which was run by his wife Honorata. He was a founder and member of many societies and associations. He sought and cared for the development of education and culture, as well as the education of oil workers, resulting in the establishment of a mining school.

As a member of the Galician parliament of the fourth term, he led to the convention of industrialists at which the idea of forming an association of oil owners and entrepreneurs was conceived, as a representation of their common interests. This initiative resulted in the Congress of the Oil Industry, during which the most important issues related to the functioning of the Subcarpathian oil industry were discussed, and its aftermath was the establishment of the National Oil Society for the Care and Development of the Oil Industry and Mining in Galicia, based in Gorlice. The formation of an association representing the interests of one of the most important industries at the time was an unprecedented event and once again testified to Łukasiewicz's perspicacity and his ability to introduce innovative solutions, necessary in a changing reality.

For all his greatness, Ignacy Łukasiewicz was seen as an extremely humble man. This is how Kazimierz Chlędowski characterised Łukasiewicz: *"He was an interesting man: modest and even exaggerated in modesty, with downcast eyes and a gentle smile, always wearing a long grey chamois, always at work. He gave himself appearances, as if he endured this wealth as an admission of God, as a burden placed on him by Providence. He also did immeasurably more good"* (Chłędowski 1951; 158). His all-around charitable work and his attitude toward others led Pope Pius IX to confer on him the title of Papal Chamberlain and award him the Order of Saint Gregory in recognition of his charity.

Ignacy Łukasiewicz died in 1882 at the age of 60 at his estate in Chorkówka as an ardent patriot, social activist, initiator of the economic rebirth of Galicia and a noble positivist, who not only illuminated the Polish lands with the kerosene lamp, but thanks to which a ray of a better life came to the peasant cottage in the Subcarpathian region.

Ignacy Łukasiewicz as the pioneer of CSR in the Polish field

In the modern world, a great deal of attention is paid to corporate social responsibility, commonly known as CSR, and it would seem that it is a brilliant invention of our times, an indispensable part of the activities of modern companies. Nothing could be further from the truth, however, as CSR has been known and practised around the world since ancient times, although its modern concept originated in the second half of the 19th century, when entrepreneurs such as John H. Patterson and John D. Rockefeller laid the foundation for the philanthropic movement. Throughout this period, CSR has been dynamically evolving to adapt to the changing world. In the 1970s, the first widely accepted definition of CSR emerged by Archie Carroll, identifying economic, legal, ethical, and philanthropic responsibility. At the same time, the first CSR code was established. And now we are seeing a proliferation of various standards and the emergence of more CSR guides and codes that emphasise the emerging changes and needs of the modern world, such as care for the environment.

If we wanted to define corporate social responsibility, we would briefly say that it is a responsible way of functioning of a company in the social, economic, and natural space. Because CSR has many facets – from investing in human resources, to environmental protection, to community relations (Bernatt 2009). Such a strategy of action can be adopted by anyone – a large corporation and a small enterprise from a small town, because a socially responsible business is one that cares about the environment and its inhabitants. It takes into account the interests of the local community and supports its employees to develop and pursue their passions. And more than anything, it boils down to one thing – clarifying and reorienting the goals facing the business. It is a misunderstanding to say that the sole purpose of business is to make profits and benefits. These are merely means to an end, which is to serve society by providing it with safe and high-quality products and services that contribute to an increased quality of life without deteriorating ecological and social systems (Buglewicz 2017).

Having a general idea of what CSR is, let's return to the person of Ignacy Łukasiewicz. Can he be called the prototype of CSR in the Polish field? The man who laid the foundation for the idea of corporate social responsibility? I think so, although in the beginning it was a CSR that was somewhat romantic, although it was already going beyond the traditional philanthropy of creating eateries or shelters for the poor. One might even be tempted to say that Poland was one of the motherlands of today's CSR ideas, although it took shape under somewhat different conditions than elsewhere in the world. After all, Ignacy Łukasiewicz became famous as a philanthropist in social service at a time when Poland was not on the maps of Europe, so the social responsibility he introduced was based primarily on values such as patriotism.

When, at the end of the 19th century, many of the world's industrialists were bloodily suppressing workers' strikes, Ignacy Łukasiewicz created the largest labour package in Europe at the time, and his refinery a dream workplace. Workers

employed by Łukasiewicz worked 12 hours at a time, but then had a 24-hour break, which was unheard of at the time. He was the first businessman in Europe to introduce a compulsory fraternal fund, to which employees paid 3% of their earnings. In return, they could count on medical coverage, disability, and family benefits, and after 20 years of service, a decent pension. He also financed the education of his employees' children.

Łukasiewicz's activities were not limited to the construction of social facilities, but reached far in serving the local community. Łukasiewicz established credit unions, and financed the construction of roads, bridges, schools, and churches. In the Krosno poviat, it was said that the roads there were paved with Łukasiewicz guldens. Pensions, free medical treatment, education for children, in a 19th century famous for predatory capitalism, this was a real novelty.

We can read about his activities for the benefit of the immediate area in Edward Windakiewicz's work on Galician industry, published in 1875:*"...the impact of this industry on the surrounding population is very beneficial. One need only see the roads, the cultivation, the dwellings of the small and larger owners on the way to Bóbrka, in order to experience such an impression as if one had been transferred to some better cultivated area of Germany or France. Good roads, trees planted everywhere and fields criss-crossed by water ditches, further clean and extensive buildings and factories, peculiarly in Zręcin and Chorkówka, and in addition to this well-fed, clean-dressed peasants, all this makes a good impression, for a certain prosperity can be seen everywhere, which also caught my eye while visiting the mines; namely, I saw that the workers during the lunch hour cooked meat and baked pork fat, which, by the way, I had never seen anywhere in Galicia. In Chorkówka there is also a school, an Advance Fund, so that the landowner, who usually sends two people to work, is quite freed from the hands of usurers. The greatest merit in all this is due to the director of the mine and the owner of Chorkówka, Mr. Ignacy Łukasiewicz, who tirelessly goes to the people in every way and is truly their father."* (Windakiewicz 1875; 52).

The best confirmation of the importance of the best practices introduced by Łukasiewicz is the introduction in independent Poland of pension insurance, already available to workers in Bóbrka, throughout the country. In the opinion of his contemporaries *"...by this deed Łukasiewicz erected for himself a monument more durable than bronze in the hearts of the workers, who, in recognition of his extraordinary merits in relation to them and to human misery in general, bestowed upon him a direct filial affection and called him Father Łukasiewicz, by which name the whole country knew him"* (Bielski 1932).

The situation of the workers in Bóbrka contrasted with what was happening at other factories and mines at the time. This is reflected in a description of the working conditions created by Łukasiewicz, presented in 1872 in the "Gazeta Lwowska": *"...in Bóbrka the workers have an advance fund and a kind of savings bank arranged by the manager and owner of the kerosene distillery in Chorkówka, Mr. Łukasiewicz. The relationship which Mr. Łukasiewicz has established between*

his numerous workmen and craftsmen is to be counted among the most beautiful in the country: every worker will find help from him in time of need and rescue in case of illness, and a certain patriarchality shines through in the whole apparatus and becomes a special contrast to the factories and plants in which the head of the company, preying only on the exploitation of the last strength of the worker, does not care at all about the improvement of his moral and material existence. Not a utopia in carrying out his devices, but a strictly practical man, Mr. Łukasiewicz was able to bring order and tidiness to his factories, characterising the best foreign factories of this kind, and to win the sincerest respect from his neighbours. How far the development of any enterprise, even an oil enterprise, hung on the nobility of the man at the head, the best proof of this is to be found in many other mines in the Carpathian foothills, where the great quantity of oil extracted serves the people only to pay the vendor and is a stimulus to great depravity, the neighbourhood of Bóbrka, meanwhile, is rising materially, and the poor people make good use of their earned pennies." (Chłędowski 1872; 158).

This opinion was corroborated by others, writing:*"...in Bóbrka you can see contentment on the face of each worker, everyone here works crisply and eagerly, because everyone knows that only true work will find recognition from the administrator"* (Teleżyński 1870; 15), *"...the people have learned to work. Those who formerly went on the road behind oxen to Multany and Wołoszczyzna, today he prefers to work smeared*" (Morawski 1871; 34).

These words are a confirmation that Ignacy Łukasiewicz in his time was able to create a unique business model in which people played an important role. The principles and best practices incorporated gave workers a sense of stability and built public trust. In turn, over time, they became universally valid standards, although at the time of their introduction they went far beyond the framework of the era in which their promoter lived.

Even today, the domain of CSR activities of company managers is not only personalised identification with the success of a particular company, but the introduction of objective and reliable programmes that motivate employees and bond them to the company. At the same time, it is the best example of respect for a person, their work, their skills often backed up not only by talent, but also by perseverance to achieve their own success and that of the company. Without a doubt, Ignacy Łukasiewicz embodied ideals that place him among the ranks of outstanding individuals ahead of his era, and perhaps several eras.

An explorer and inventor, a titanic worker, an innovator and teacher of youth, an entrepreneur and millionaire, a philanthropist and social activist, a patriot and politician, but above all a good humble man dedicated to others. Such was Ignacy Łukasiewicz and such should the world know him.

Undoubtedly, he built the foundation of the modern oil sector and contributed to the development of civilisation by becoming part of the economic history of the world's energy industry. He combined his knowledge, skills, and managerial abilities with the courage to strive to discover new things and chart new directions.

However, he proved that being an entrepreneur and innovator does not exclude social and philanthropic – simply human – attitudes. As a pioneer of social business engagement, he changed many human stories for the better.

The words of John Paul II seem significant in the context of Łukasiewicz's lifetime achievement; he said: "*Profit is important, but it is not a measure of success. There are also the people, who make up a company's greatest asset*" (Encyclical *Centesimus Annus* 1991).

Conclusion

Summarising the consideration of Ignacy Łukasiewicz's pioneering CSR activities, it should be said that the legacy he left behind in this regard should be continued and emulated. The world needs modern-day Łukasiewiczes.

For example, the energy policy of the 21st century is characterised by the need to constantly anticipate emerging changes and take advantage of opportunities arising from multiple variables. Its primary goal is to achieve energy security and competitive advantage. The example of Łukasiewicz is also a good reference point for building energy and power strategies. This is because it indicates that innovation in thinking, as well as courage and consistency in action, should be the guiding principles. At the same time, innovation should be multidimensional and not be limited to work in the laboratory, but also include work organisation, business management, business models, communication, cooperation, and teamwork, as well as legislative solutions. Effective energy policy requires determination, consistency, and perseverance.

If we forget these principles and values, then let the Museum of the Oil and Gas Industry in Bóbrka named after Ignacy Łukasiewicz be a reminder – a unique facility worldwide where you can learn about the genesis and see for yourself the cradle of the Polish oil industry in the world's oldest and still operating oil mine.

Ignacy Łukasiewicz believed to the end of his life that his discoveries and inventions should serve not only profit, but the common good of the people, while the money from oil should support the development of local communities. He was wont to say: "*A man in the world is like a soldier on guard duty, and as long as he lives, he must work, and what he earns he does not take to the grave, it is useful here for other people."* (Stokłosa, Wojcik 2019: 32).[12] His beautiful biography shows that there is not a shadow of exaggeration in these words. However, it should be clearly noted that in the current world, corporate social responsibility is developing on a completely different basis than in the days of the "Sheikh of Galicia". Companies, when undertaking CSR activities, do so mainly to strengthen their position and to arouse positive associations in the minds of consumers, which, it should be noted, in a competitive and free market environment is no bad thing. Modern CSR has nothing in common with 19th-century philanthropy or charity. It is a well-planned and well-considered effort to increase the value of the company.

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Bóbrka - history of the site. A 19th-century mine in the Ignacy Łukasiewicz Oil and Gas Industry Museum

Barbara Olejarz, Michał Górecki

Abstract: The 19th-century oil mine in Bóbrka has retained much of its authenticity due to the fact that it has been in continuous operation since 1854. The technical facilities have survived in excellent form, and, above all, the historical spatial and landscape layout remains. This is what makes the facility not only of national, but also international importance. Due to the continuity of extraction and its industrial form, the Bóbrka mine can be described as the world's oldest, oil extraction site and thus the cradle of the oil industry.

Keywords: Crude oil, Ignacy Łukasiewicz, mine, Bóbrka, kerosene, museum

Introduction

From time immemorial in the Bóbrka Forest, there was a source of oil, which, collecting on the surface of the ground, was of great interest to local residents. The place, characterised by bubbling black crude oil, was called "Wrzanka" or "Wrzączka" [“Boiling” - trans.] and was attributed with magical properties. However, many years had to pass before industrial oil production began in Bóbrka. It also took decades before the mines were recognised as a site of great cultural heritage importance and appropriate conservation measures were applied.

The Mine

In 1854, an oil mine was established in Bóbrka, which was co-founded by: Ignacy Łukasiewicz, Tytus Trzecieski and Karol Klobassa-Zrencki.

The start of the mine was a ditch 120 metres long and 1.20 metres deep, which was dug at a site where abundant rock oil spills were observed. The next stage in the development of the mine was the drilling of oil wells known as *kopanki*.

The first wells were not abundant in rock oil. The breakthrough year turned out to be 1855, when such a high tide of rock oil was encountered in the “Wojciech” mine that in 1856 Lukasiewicz established a three-boiler oil distillery in Ulaszowice. In 1858, the "Małgorzata" well produced 1,000 pots of oil per day, which determined the success of the mine (Klein 1912: 70).

Around 1861, the three men formed a partnership. Tytus Trzecieski donated funds for its development, Karol Klobassa provided the land for the mine, while Ignacy Łukasiewicz took charge of the entire enterprise. Income from the mine allowed Łukasiewicz to buy the village of Chorkówka, and he also built a modern refinery there. In 1871, Łukasiewicz decided to give up his stake in the company and remain just the director of the Bóbrka mine. The mine was famous for its modern drilling and mining methods, as well as its excellent organisation.

Being the director of the mine, Łukasiewicz continued to take great care of the workplace, using the expert advice of the authorities in the field of geology and drilling at the time, he introduced many modernisations to the mine. The Bóbrka mine played a significant role. in the local community, as reported in 1874 by Edward Windakiewicz: *"(...) the impact of this industry on the surrounding population, and the entire area in general, is very beneficial. One need only see the roads, the cultivation, the dwellings of the small and larger owners, and finally the people themselves on the way to Bóbrka, in order to experience such an impression as if one had been transferred to some better cultivated area of Germany or France*" (Windakiewicz 1875: 75).

In 1861, Henry Walter arrived in Bóbrka. Together with Łukasiewicz, he began work on introducing technical improvements at the mine. Some of the most important changes that Walter introduced were improvements in the operation of fans that supplied air to the miner who worked at digging the shafts, the introduction of a method of closing the spring with bags filled with flax seeds and broad beans. In 1862, Walter introduced a hand-held impact drilling device. Through the use of this device, Walter became one of the pioneers in the development of drilling technology and contributed to the development of oil exploration in Poland, and the Bóbrka mine embarked on a new path of development. This technology enabled the drilling of deeper and more efficient shafts.

In 1868, while digging one of the shafts, mineral waters were encountered. Plans to establish a spa in Bóbrka were derailed by the appearance of oil in the mineral water wells. In 1869, steam engines were used at the mine for the first time, serving as a drive for pumps pumping water and later oil from the "Mineralna" dig site.

An important figure at the Bóbrka dig site was Adolf Jabłoński, a pharmacist and participant in the January Uprising, who was employed at Bóbrka in 1870. Jabłoński's commitment to the activities and development of the mine was recognised by Łukasiewicz and Klobassa, who financed the trip of Adolf and his son Wiktor to the United States. The result of Jabłoński's trip to the United States was to learn about the technology used in the oil industry there, and to apply it to the Bóbrka mine. From 1873, Jabłoński became the mine manager.

Łukasiewicz, on the other hand, dealt entirely with oil processing, obtaining exceptionally good grades of kerosene, in which the world's oil industry giants took an interest. He combined industrial activity with public and social activities.

In 1866, he created the "Brothers' Funds", which were the first insurance institutions in Poland and Europe to protect in case of illness and disability.

After the death of Łukasiewicz, Jabłoński became the director of the mine, followed by Zenon Suszycki, during whose reign drilling using the Canadian method was introduced at the mine, which contributed to an increase in oil production. According to an 1897 estimate, some 200,000 hundredweight of oil were produced in Bóbrka between 1861 and 1868 (Bonusiak 1987:10).

The mine in Bóbrka survived the war effort. In the 1950s, new oil wells began to be drilled again. Unfortunately, the Bóbrka deposits are no longer as rich in raw material as they were in the 19th century, but nevertheless, pumpjacks are still operating at the mine, pumping black gold from inside the earth.

The Museum

Exactly on the centenary of the founding of the Bóbrka mine, an oil exhibition was organised at the PTTK Museum in Krosno, which provided the impetus for activities aimed at organising an "Open Air Oil Museum" in Bóbrka. After many difficult and arduous negotiations, the museum was established in 1961 on the site of the active 19th-century oil mine. The Society of Petroleum Engineers and Technicians took custody of the newly established facility, and financial maintenance was provided by oil and refining companies.

Initially, the museum area was to cover less than 7 hectares of wooded land, at the same time a mining area. Over the years, the institution has significantly expanded its boundaries, collecting valuable and unique exhibits that bear witness to the history and development of the oil industry.

Since 2004, the facility has been managed and financed by the Ignacy Łukasiewicz Petroleum and Natural Gas Industry Museum Foundation, which also looks after the further development and promotion of the oldest oil mine. The entire area was placed under conservation protection as recently as 1991, and in 2018, by decree of the President of the Republic of Poland *"the 19th-century oil mine in Bóbrka, now in the area of the Ignacy Łukasiewicz Museum of the Oil and Gas Industry"* has been declared a Monument of History, thus joining the pantheon of Poland's most important heritage sites.

Thanks to the fact that the 19th-century mine has been in continuous operation since 1854, it has largely retained its authenticity. The collected artefacts remain in a natural and historical setting and have not been stripped of their natural context. The realism of the place is prevalent and allows visitors to feel the atmosphere of the old Łukasiewicz mine. Thanks to the iconography from the early days of the mine and especially the 1879 mine plan, we can see that the scale of the transformation has not been huge, and that the 19th-century mine infrastructure buildings are located in the places marked on the plan. The site is appropriately presented, while at the same time all buildings and exhibits correspond perfectly with the surroundings, creating a harmonious and clear view of the original, but still active, black gold-oil mining company.

The most valuable artefacts that have survived intact and date from the early days of the mine are the deep wells, or shafts, from which oil is still extracted. The "Franek" digging pit of 1860 and the "Janina" digging pit of 1878 are perfectly preserved and are a unique testimony to the continuity of mining, and at the same time evidence of the craftsmanship of 19th-century oil workers.

In recent years, the museum has reconstructed, in accordance with the art of 19th-century oil mining, five diggings, which are actually abandoned mine workings. Using archival documentation, sinkholes were found and cleaned and secured. Reconstructions reflecting the various supplies of the original shafts have been built in place of the former diggings. The reconstructions of the *mill-fan*, the so-called *vestry* – a place for storing tools – are not only attractive to tourists, but also provide educational value when learning about the mine's work in pioneer times.

"The historic oil mine complex in Bóbrka is preserved fragmentarily, and its elements form distinct enclaves within the Museum's boundaries. At the same time, these are elements of the highest documentary value, as they are testimony to the beginnings and continuity of the mining enterprise in the area *"(...)The museum coexisting with the active mine appears as a natural continuation of the history of the place. The result of such evolution is a second layer of land use, which consists of reconstructions and original exhibits related to the history of oil and gas production. It is possible to define this layer as an added value, not depreciating the most worthy historical values of the place. The consequence of the evolution of the site, subordinated to its value, and at the same time formally complementing the compositions of the site*" (Szmygin, Fortuna-Marek, Siwek 2017: 32-33).

In addition to the most valuable, authentic mine shafts that are still in operation, the original buildings have been preserved, dating back to the time when the Bóbrka mine was beginning to be a model in terms of management and organisation:

- a stone obelisk from 1872, which was funded to commemorate the founding of the mine
- a mine forge from 1856, the place where blacksmiths made tools for digging wells while upgrading parts for drilling and mining equipment
- mine workshop from 1864 equipped with original antique machinery and tools
- boiler house from 1867, where the boiler produced steam, the primary source of energy at the time
- a warehouse and group well pumping wheel from 1875
- an oil pump, "Drapper" type, from the 19th century
- a prototype of a pumping wheel from the second half of the 19th century.

The building popularly known as the "Łukasiewicz House" requires special attention. This is a building that served as the management's office during the days when Ignacy Łukasiewicz was director of the mine. The building, which probably

dates back to 1864, currently houses a pharmacy exhibition, a laboratory, Łukasiewicz's lounge, as well as a collection of kerosene lamps.

In addition to the oldest sector of the mine in the Museum, it is also worth visiting the sectors where slightly younger, but equally priceless and valuable objects have been sited. All the artefacts collected at the Bóbrka Museum have historical value and, together with the oldest sector, constitute a unique picture of the formation and development of the oil, gas and refining industry. All the equipment is authentic and is proof of the competence and proficiency of the old petroleum engineers.

The scientific and educational significance of the Bóbrka mine is overwhelming and is based on authentic buildings, boreholes, and drilling and mining equipment. The authenticity of the facilities is undeniable and represents a unique example of a mine complex that, despite continued activity, already plays a significant historical role. In addition to the collection of heritage property in the museum, there are documents, publications, and photographs that speak of the people who laid the foundations and later cared for the quality of the Bóbrka oil company.

"*On the nationwide scale, the historic oil mine in Bóbrka is a unique monument to history – the first oil mine, a complex illustrating the Polish contribution to the development of the oil industry, with preserved original and reconstructed technological artefacts representing the heritage of the oil extraction industry and the art of engineering; a place associated with the activities of a prominent Pole – Ignacy Łukasiewicz, known primarily as the inventor of the kerosene lamp, and with many famous pioneers of the oil industry in this part of Europe – prominent mining engineers, geologists, entrepreneurs (...)*"

And although Poland is not currently a potentate in the world oil industry, without the mine and museum in Bóbrka, knowledge of the origins of the world oil industry would be incomplete. The historic mine in Bóbrka, an outstanding technical monument with all the richness of its history and preserved material evidence of it (buildings, equipment and relics of the mine landscape) undoubtedly bears unique testimony to a civilisation that is still alive and whose importance for the progress of the modern world cannot be overestimated. It is also a place with a set of technical buildings preserved in situ, which represents an extremely important stage in human history – the pioneering, specific period of development of the oil industry.

Regardless of the findings adopted in various countries and various studies as to the location of the world's first mine, there is no doubt that Poland belongs – along with Romania, Russia, the USA and Canada – among the few countries in the world that launched the global career of this industry, and the mine in Bóbrka is of fundamental importance for the development of the oil industry in south-eastern Europe" (Szmygin, Fortuna-Marek, Siwek 2017: 82-83).

One of the most important recommendations arising from the above-quoted *Management Plan* is the preparation of the site, and the subsequent preparation of documentation aiming to be inscribed on the prestigious UNESCO World Heritage

List. The work is well advanced, and the chances are quite considerable and real, as the universal values of the site and its clear dominance over similar sites in the world are unquestionable.

The Museum in Bóbrka is not only an institution that safeguards and cares for the proper preservation of the 19th-century mine, but also an institution that strives to properly expose and advertise the cradle of the oil industry.

In this regard, the museum seeks to "*utilise the assumptions and principles of heritage interpretation that serve to present heritage in a reliable but also interesting way for visitors (...) Appropriate interpretation is based on six principles: (...) it should be provocative (...), it should be revealing (...), it should appeal to experience (...), it should be creative (...), it should be reliable (...), it should be tailored to the audience (...)*" (Dziedzictwo... 2016: 188). The above recommendations are implemented through a number of activities: organisation of interesting exhibitions, lectures, conferences, museum lessons, workshops, and finally science picnics. The more interesting the form of presentation, the wider the response of satisfied tourists, and thus the assumption from the statutory activity is fully realised: popularisation and promotion of the Museum and knowledge of the history of the oil and gas industry. Museum promotion not only includes the organisation of permanent and temporary thematic exhibitions, but also the maintenance of a website, a profile on Facebook, Instagram and a YouTube channel. Extensive publishing activities (brochures, guidebooks, albums, leaflets), organising and co-organising cyclical cultural events (including Night of Museums, the Lighted City, Oil Picnics, European Heritage Days), and finally a wide range of workshops and museum lessons also serve to promote and popularise the site. It should be noted that the presentation of the historic mine is attractive not only because of the wide variety of tourist offerings, but also due to its location in a natural landscape. A walk among the museum's alleys is pleasant, not only for technology enthusiasts, but also for lovers of nature and active recreation. Thanks to modern multimedia exhibitions, visitors to the museum experience a kind of journey into the past, when Polish lands occupied one of the leading places in terms of oil production. Artificial inclusions in the form of holograms are located in special places, so that with their modernity they do not interfere with what is most important in the museum – the heritage. It seems that promotional activities are being carried out correctly, and tangible results can be seen in visitor statistics.

Conclusion

When the Bóbrka oil mine was established in 1854, probably none of the organisers predicted that this first rock oil extraction enterprise in the world would survive for so many years. Meanwhile, in spite of the sometimes very difficult situation and unfavourable economy, it has been possible to maintain not only mining, but also to save historic machinery, equipment and, finally, mining pits.

The strength of the industrial heritage of the Bóbrka mine is fulfilled in the natural context that surrounds it. Machines dating back to the 19th century are not

stripped away from the past and embedded in an ossified message from a bygone era, as they remain in an environment that evokes images of the mine's heyday, easily recreating the toil of the time and the efforts of our ancestors. Covering the topic of the difficult mining situation, the dangers of the hazards that accompany digging or drilling for oil was easy in that it did not require the introduction of foreign content to the mine.

The Bóbrka mine is a monument of the highest national rank, which on December 10, 2018, was declared a monument of history by decree of the President of Poland. The site has a unique and universal historical value, and thus has the potential to be considered a UNESCO World Heritage Site.

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ISSN: **2956-3682**
e-ISSN: **2545-0859**