
Foreword

Natural resources are indispensable for humankind. Among these, mineral deposits and particularly the deposits of caustobioliths (coal, crude oil and natural gas), from which mankind obtained and continues to obtain significant amounts of energy, are of great importance. While crude oil and natural gas deposits play a very limited role and the annual yield of these “noble fuels” covers only a fraction of consumption of the Czech Republic, lignite and bituminous coal are vitally important strategic minerals for our republic (Fig. 1).

Coal mining has a more than 600-year-old tradition in the territory of the Czech Republic. The deposits of coal created conditions for the emergence of important industrial areas in the Bohemia, Moravia and Silesia. Bituminous coal mining in the Central and West Bohemian basins led to the rise and development of industry in the regions of Plzeň and Kladno, and the lignite deposits of the Krušné hory Piedmont basins influenced the development of industry between Ústí nad Labem and Sokolov. The coal deposits of today’s most important European bituminous coal basin, the Upper Silesian Basin, were of particular importance for the emergence of the industrial area in Ostrava. In the second half of the past century, coal

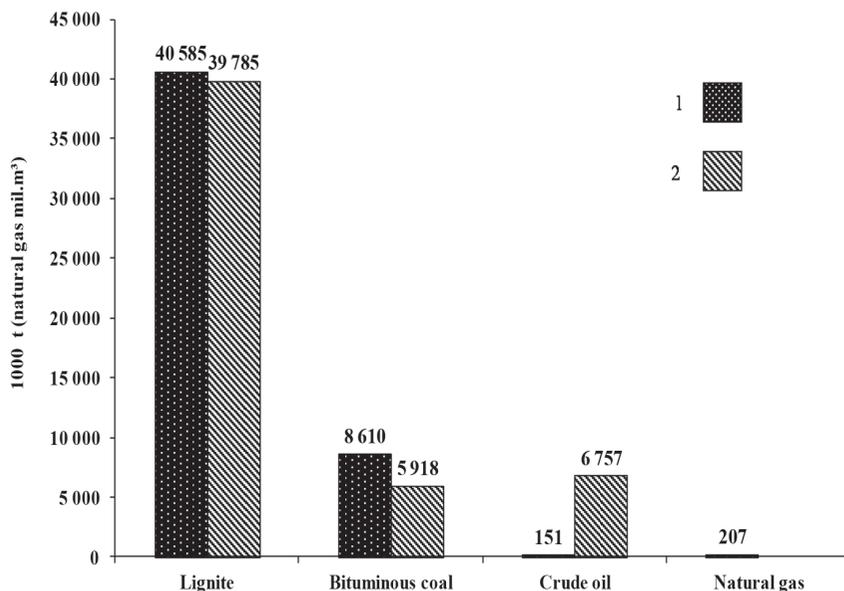


Fig. 1. Output and consumption of coal, crude oil and gas in the Czech Republic in 2013. J. Starý et al. (2014).

Compiled by V. Malečková & M. Sivek. 1 – output, 2 – consumption.

Notice: natural gas consumption is not published in the Czech Republic.

mining in the former Czechoslovakia reflected not only the demands of the economy and the level of technical development, but it was also greatly influenced by the intergration into the so-called Eastern Bloc in 1948. Czechoslovakia occupied an extremely important position in the Eastern Bloc precisely due to the already-developed heavy industry and sufficient supply of especially coaking coal. This is also connected with a significant increase in coal mining for the production of both coke and electricity as shown in Figure 2. It depicts the development of coal mining and electricity production from 1937, i.e. the last year before the dismemberment of former Czechoslovakia as a result of the “Munich Agreement in 1938”, through 1946 (the first full year following World War II) and in five-year periods starting with 1950. Bituminous coal production amounted to 16.1 Mt in 1937 but only to 14.7 Mt in 1946. Since that year, the exploitation of this raw material rose relatively sharply until 1965. Between 1965 and 1985, bituminous coal production fluctuated between 25 and 28.2 Mt. However, it began to decline sharply in 1985. In 2015, it was even less than 8 Mt. A different trend is indicated by the curve showing the production of lignite. Its production increased moderately from 1937, when 18 Mt were produced, until 1946. Since then until 1985, it had registered a linear increase of even up to 18 Mt during the five-year periods. In fact the highest rate of lignite output of about 100 Mt occurred in 1984, when production began to decline sharply, with minor fluctuations in 1995–2000, to 38.251 Mt in 2015. The expansion of opencast mining and its mechanization allowed for an increase in lignite mining of up to 370% in 1984 compared to 1950. The curve for electricity generation also shows a similar trend as indicated by the curve representing the amount of lignite produced in the former Czechoslovakia and, since 1st January 1993, in the Czech Republic (CR). The only discrepancies occur during the periods in 1985–1990, when electricity generation peaked, and for the period in 1994–2015 as well. At that time, the increase in electricity generation stemmed from the electricity produced at first by the nuclear power plant in

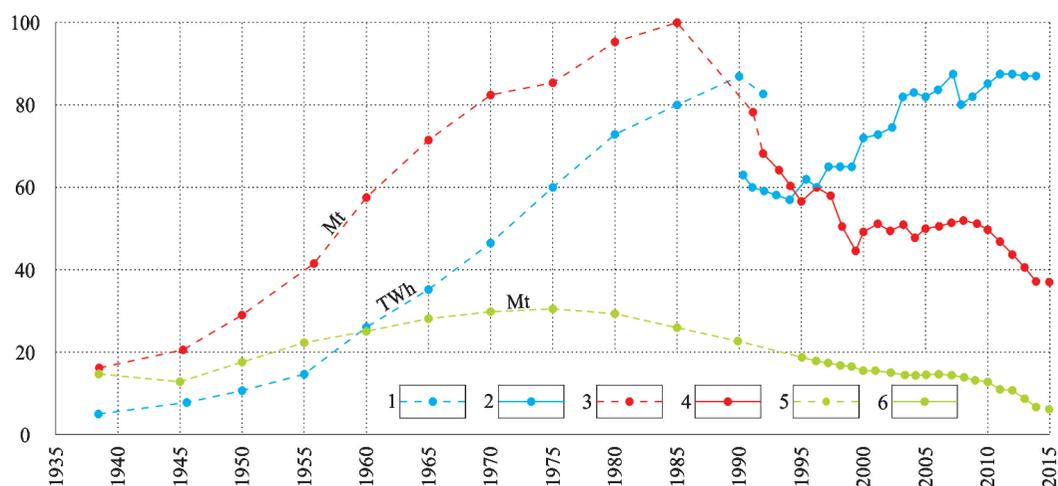


Fig. 2. Bituminous coal and lignite output (Mt) in 1937–2015 and amount of electricity generated in the former Czechoslovakia and in the Czech Republic (TWh) in 1937–2014. Originally compiled by J. Pešek. 1–2 – electricity generation: 1 – in the former Czechoslovakia, 2 – in the Czech Republic, 3–4 – lignite output: 3 – in the former Czechoslovakia, 4 – in the Czech Republic, 5–6 – bituminous coal output: 5 – in the former Czechoslovakia, 6 – in the Czech Republic.

Dukovany and, later on, in Temelín as well. It is clear that the increase in demand for coal also led to a considerable decrease in its reserves.

Significant reserves of coal will be exhausted in the near future due to relatively intensive mining that has lasted for more than 150 years (the first written record of coal mining dates back to the 15th century). However, their role in the economy of the CR is irreplaceable. Current production of lignite and bituminous coal covers not only the demand in the CR, but a portion of the bituminous coal is also exported. Lignite is used mainly for electricity and heat generation, and for residential heating. However, the structure of electricity generation in the CR differs considerably in comparison with its production in the European Union (Fig. 3) because of the different mineral resource base of the CR. The amount of electricity generated covers not only domestic consumption, but a portion of the commodity is exported. That is why the CR is one of the few states of the European Union which export electricity.

The deposits of lignite and bituminous coal generate interest from an economic as well as genetic perspective, which provided suitable conditions for a broad range of applied and basic research. Because of these conditions, Czech coal geology has a more than two-hundred-year-old tradition. Many Czech geologists, paleontologists and other experts contributed to the study of coal-bearing basins with numerous scientific works, which enabled extensive surface surveys and the development of new open pits and underground mines. This trend culminated in the period between the 1950s and the turn of the 1980s and 1990s marked by transition to a market economy.

A structural change in industry and subsequent decrease in its energy intensity was reflected after 1989 in the somewhat hasty closing of supposedly unprofitable mines. This resulted in a sharp decline in the amount of extracted lignite and bituminous coal in the former Czechoslovakia and, subsequently, also in the newly established Czech Republic (Fig. 2). Prior to the depletion of mostly smaller coal reserves, the underground mines in

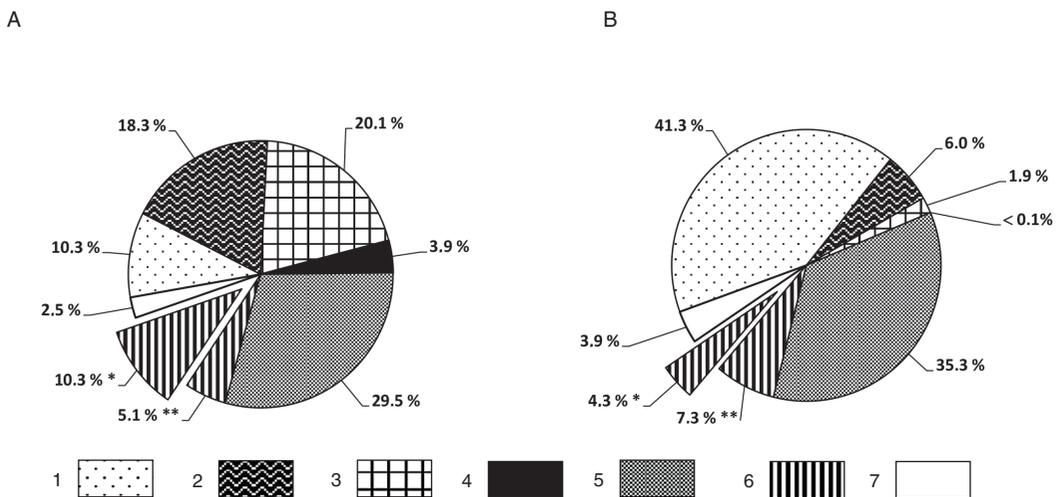


Fig. 3. Comparison of sources of electricity generation in the European Union in 2007 (A) and 2013 in the Czech Republic (B). Sine (2010b) and Starý *et al.* (2014). Compiled by V. Malečková & M. Sivek. 1–2 – coal: 1 – lignite, 2 – bituminous coal, 3 – natural gas, 4 – crude oil, 5 – nuclear energy, 6 – types of renewable sources, except for * hydropower, ** all hydropower types, 7 – additional sources: e.g. wind and solar energy sources, biomass.

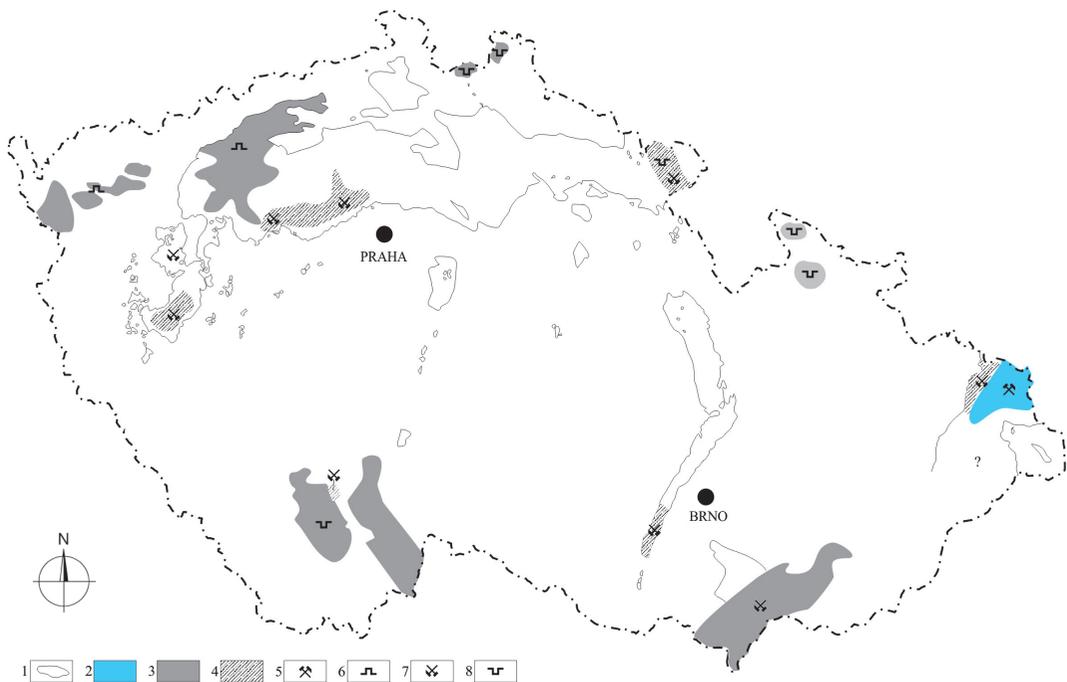


Fig. 4. The most important Upper Palaeozoic and Tertiary basins of the Czech Republic and their coal deposits. J. Pešek, original.

1 – limits of the Upper Palaeozoic basins, 2 – recently extracted bituminous coal deposit, 3 – limits of the Tertiary basins, 4 – the most important abandoned bituminous coal deposits, 5–6 – recently extracted coal deposit: 5 – underground mining, 6 – surface mining, 7–8 – the most important abandoned coal deposit: 7 – underground mining, 8 – surface mining.

the Plzeň, Radnice, Kladno-Rakovník and Intra-Sudetic basins as well as in the Boskovice Graben were abandoned. All the mines in the Ostrava and Petřvald parts of the Upper Silesian Basin were closed as well. In addition, mining is currently not taking place in the South Moravian Lignite Coalfield, and underground mining was terminated in the Sokolov and North Bohemian Lignite basins (Fig. 4). Furthermore, the ownership of mines changed and new mining companies were established. As a result of the altered perspective on anticipated demand of primarily bituminous coal, the initial workings prepared for the development of untouched bituminous coal reserves were backfilled in the Slaný Mine in the Kladno-Rakovník Basin and sealed off in the Frenštát Mine in the Czech part of the Upper Silesian Basin.

Several important monographs were produced based on the scientific insight gained from frequently hasty surveys and development of new coal deposits. The observations from the Czech part of the Upper Silesian Basin and from terrestrial bituminous coal basins were compiled by Dopita *et al.* (1997) and by Pešek *et al.* (2001), respectively. A slightly different situation exists in the lignite basins, which were the subject of various works such as the book on the North Bohemian Lignite Basin by Malkovský *et al.* (1985) and by Hurník (2001). There also exist the works on the South Moravian Lignite Coalfield by Honěk *et al.* (2001), the Large Chronicle of Brown Coal (Valášek & Chytka 2009) and the

collective works on all the lignite coal basins in the CR (Pešek *et al.* 2010a). These works were preceded by the publication of three compendiums following World War II, whose authors dealt in detail with the coal deposits in the former Czechoslovakia. These include the work of Šuf from 1952, the second part of a three-part compendium by Havlena (1964), and the work of Dopita *et al.* (1985). After more than 25 years since the publication of the last book and after significant changes in coal mining in all the basins in the CR, we deemed it necessary to write a new concise treatise on the coal-bearing basins of the CR and their deposits. Considering the fact that relatively significant bituminous and lignite coal deposits occur in several currently unmined basins and that coal mining in several basins was terminated prematurely or did not even commence due to unprofitability, this publication includes relatively detailed descriptions of the aspects of all the Upper Palaeozoic and Tertiary basins. In fact, the interest in non-traditional use of several deposits of coal or bituminous sediments cannot be excluded either. For the sake of completeness, this work briefly mentions the occurrences and mining of coal and the geology of the Cenomanian in Bohemia and Moravia.

The writing of this book was aided by the findings summarized in the newest publications – mainly the works by Dopita *et al.* (1997) and Pešek *et al.* (2001, 2010a). A number of new observations also comes from the grant project GAČR 16-240625. Many experts and mining engineers were consulted regarding the aspects concerning individual basins. We would like to thank all of them for their help in providing the necessary information.

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