



TOPIC: Coal-fired power plants

NAME: Dominik Máca

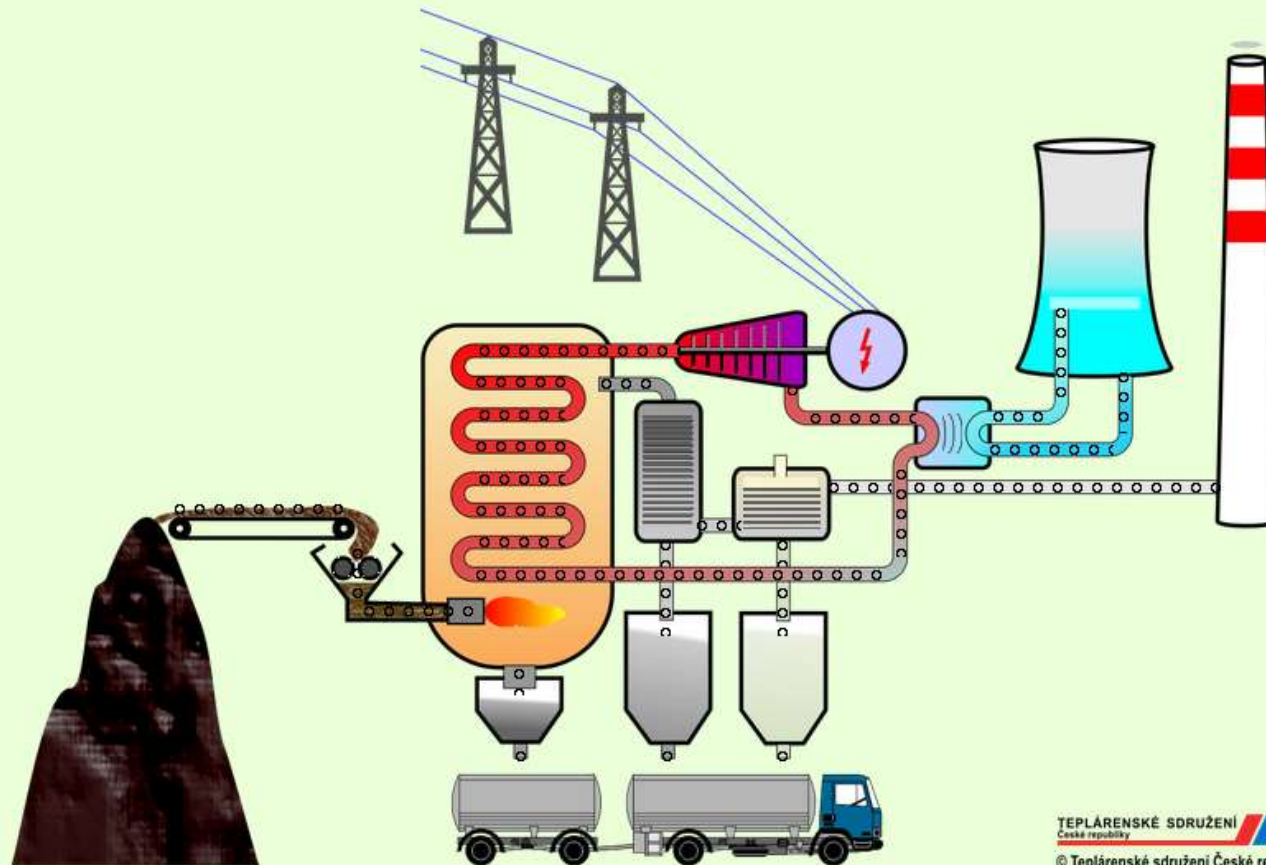
**PROJECT: Comparison of energy potencial of Iceland and the
Czech Republic**

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BASIC INFORMATION

- A coal-fired power plant is a thermal power plant that uses the combustion of coal to generate heat and electricity
- It is a technological unit that generates electricity by converting the chemical energy bound in the fuel lignite or coal through thermal energy.
- The efficiency of energy conversion in modern coal-fired power plants is around 42%.

DIAGRAM OF A COAL-FIRED POWER PLANT



COAL PREPARATION

- The coal must first be sorted from impurities and re-sorted in the coal preparation plant, where it is crushed to the required size
- It is then transported by conveyor belts to the power plant to the charging section
- The coal is mechanically raked from the bunkers onto conveyor belts which transport the coal to the boiler house
- From the "bunker" the coal is transported to the mill, where it is ground to the finest fraction and, together with the preheated air, is blown by burners directly into the boiler combustion chamber.



COAL COMBUSTION

- The pulverized coal is "injected" into the boiler, where it is burned more efficiently
- The flue gases from coal combustion are passed through an electrostatic precipitator and through filters for desulphurisation



ENERGY CONVERSION

- The heat generated by the combustion of crushed coal in the boiler heats treated water in the primary circuit
- The water is gradually converted into steam in the boiler at temperatures of up to 525 °C, modern units even over 600 °C and with a pressure of more than 6 MPa.
- This superheated steam is fed into the turbine, where it spins the turbine blades. The turbine is coupled to an alternator in which electricity is generated.
- Electricity at voltages up to 15 kV is fed into transformers in which the voltage is adjusted to distribution or transmission voltage levels of 110 to 400 kV

COOLING

- The steam, which has transferred its energy in the turbine, is discharged into the condenser
- In the condenser, the steam is cooled by raw water. This cooling water is heated here and is therefore led from the condenser to the cooling towers, where it is cooled and returned to the cooling circuit.
- The loss of cooling water due to evaporation in the towers is replenished from the water flows.

COAL-FIRED POWER PLANTS IN THE CZECH REPUBLIC

- List of the most important coal-fired power plants in the Czech Republic:
- Prunéřov
- Tušimice
- Počerady
- Ledvice
- Komořany
- Mělník
- Dětmarovice - burns black coal



MODERNISATION AND GREENING OF COAL RESOURCES

- The biggest event in the modern history of the Czech coal power industry was the "cleaning" of power plants
- A total of 6 462 MW of installed capacity was desulphurised.
- Thanks to the implementation of the desulphurisation programme, emissions were reduced compared to the level at the beginning of the 1990s:
 - SO₂ by 92 %.
 - fly ash particulates by 95%
 - emissions of nitrogen oxides by 50 %
 - carbon monoxide by 77 %.

LEDVICE POWER PLANT

- Located between Ledvice and Bílina
- In addition to the production of electricity, the power plant also produces heat, which it supplies mainly to Bílina and Teplice.
- In 2018, a new lookout tower was opened at 144 metres at the top of the boiler room of the new power plant unit, which is the highest lookout tower in the Czech Republic. It can accommodate a maximum of 40 people per day.



LEDVICE - POWER

| Block | Installed power | Commissioning | Desulphurisation | Decommissioning |
|-------|-----------------|---------------|------------------|-----------------|
| 1. | 200 | 1966–1968 | – | 1998 |
| 2. | 110 | 1966–1968 | 1996 | 2013 |
| 3. | 110 | 1966–1968 | 1996 | 2015 |
| 4. | 110 | 1966–1968 | 1996 | – |
| 5. | 110 | 1966–1968 | – | 1994 |
| 6. | 660 | 2017 | – | – |

THANK YOU FOR YOUR ATTENTION

- Sources: https://cs.wikipedia.org/wiki/Elektrárna_Ledvice ,
https://cs.wikipedia.org/wiki/Uhelná_elektrárna , <https://www.cez.cz/cs/o-cez/vyrobní-zdroje/uhelne-elektrarny-a-teplarny> ,
<https://oenergetice.cz/elektrina/uhelne-kondenzacni-elektrarny>

Dominik Máca