

Nuclear Energy in the Czech Republic



EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání
pro konkurenceschopnost

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INVESTICE
DO ROZVOJE
VZDĚLÁVÁNÍ

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- Uranium mining in the Czech Republic
- Nuclear energy in the Czech Republic
- Nuclear power plants in the Czech Republic
- Nuclear fuel cycle in the Czech Republic
- Completion of ETE
- Current situation and future



Uranium mining in the Czech Republic

- Rich history of uranium mining connected to Jáchymov

Milestones:

- 1843
- 1892/1902
- 1908
- 1910
- 1912 (!)
- 1918
- 1930s
- 1938



Uranium mining in the Czech Republic

- 23. 11. 1945 Agreement between the Government of the USSR and the government of Czechoslovakia to expand the mining of ores and concentrates containing radium and other radioactive elements and their subsequent deliveries to the USSR
- After 1948 19 mines were in operation.
- Labor shortages.
- Act No. 247 on the establishment of Forced labor camps by the National Assembly on October 25, 1948.
- TNP (Jáchymov, Příbram)
- The final legislative end to the existence of the camps was made in December 1953 by Act No. 102



Uranium mining in the Czech Republic

- 1953
- The main mining locations until the end of the century: Karlovy Vary, Horni Slavkov, Pribram, Ceskolipsko, Krusne hory, Tachovsko, Zelezne hory, Rychlebske hory, Ceskomoravska vysocina
- 164 deposits were located and investigated for uranium ore occurrences of which 66 were mined, among others: Pribram, Rozna, Straz, Hamr, Jachymov, Zadni Chodov, Vitkov II, Olsi, Horni Slavkov, Okrouhla Radoun
- Total production in the form of uranium concentrate and uranium ore for the period 1946-2000 amounted to 107,080 tons of uranium, which thus ranked Czech Republic for this particular period on 6th place among the largest producer states behind USA, Canada, Germany and others.

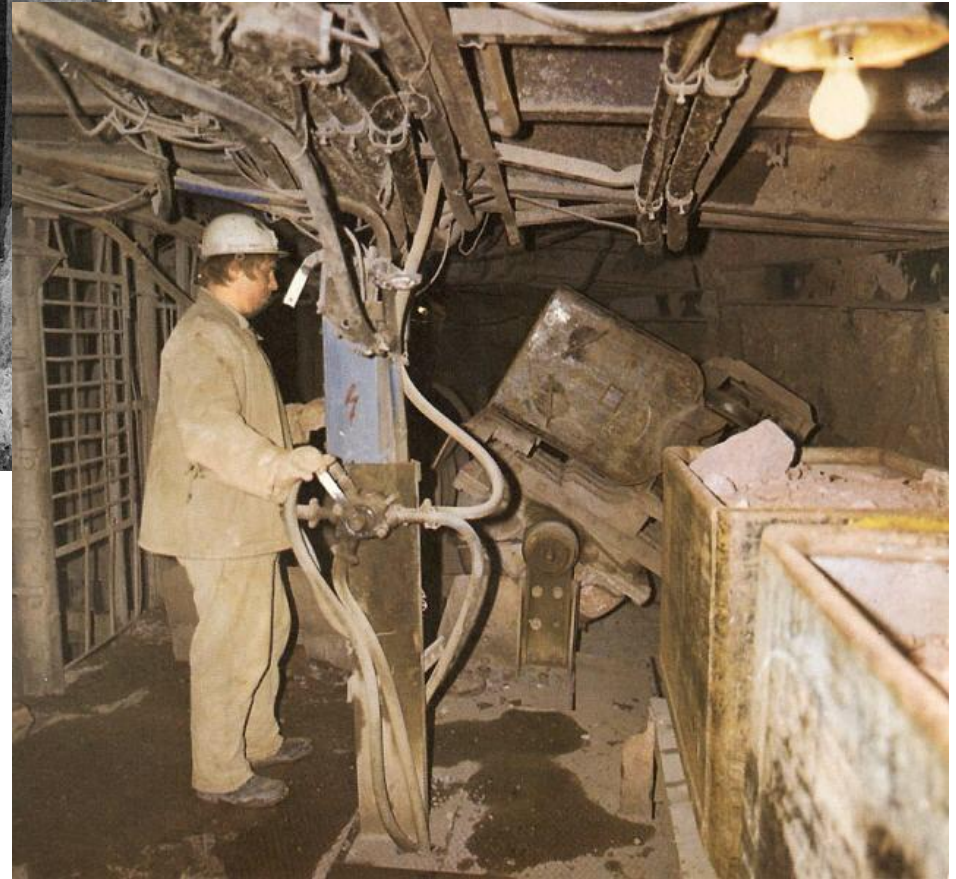


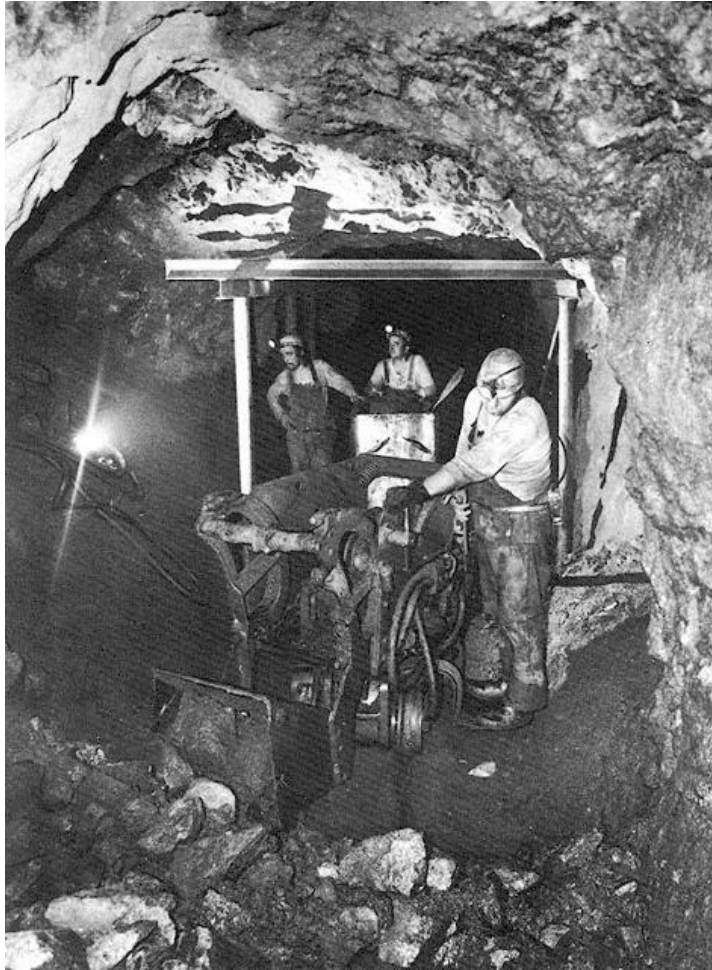
Uranium mining in the Czech Republic

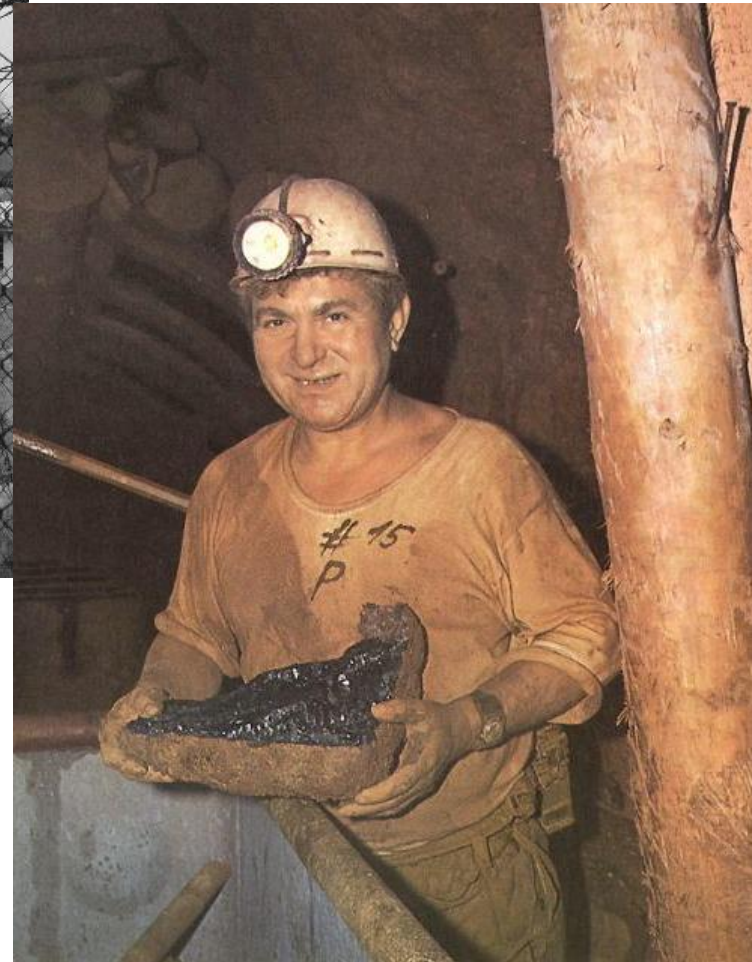
Stages of Czech uranium mining after World War II

| Stage | Years | Characteristics |
|-------|--------------|--|
| 1 | 1946 – 1950s | Restoring of old mines in the Jáchymov district, carrying out exploration work in traditional ore districts, the discovery of deposits in Horni Slavkov and Pribram |
| 2 | 1950s – 1965 | Intensive exploration works |
| 3 | 1965 – 1975 | Intensive mining in the found locations from the previous stage, i.e. in the Krusne hory, Tachovsko, Zelezne hory, Krkonose, Rychlebske hory, Ceskomoravska vysocina a Ceskolipsko |
| 4 | 1976 – 1988 | Further uranium exploration and opening of new mines, major mining operations in the Ceska Lipa |
| 5 | 1989 – today | The final attenuation phase of the uranium mining, setback program |

Source: Majer, 2004, s. 229; Loucká, 2004, s. 227, 330.











- 1989 - the setback program started
- only two of sixteen registered deposits of uranium ore in 1998 were mined under the reduction program (Straz, Rozna).
- In 1995, mining was terminated at the last deep underground mine Hamr I in Straz area
- Currently the Rozna mine in Dolni Rožínka is still mined, which should be closed in the mid-90s. This is the last operating mine in the EU (except for Romania - mine Crucea-Botusana)
- In 2007, the government approved the continuation of mining and processing of uranium in Rožná for the period of economic feasibility, mining is expected to end in 2018.

Uranium mining in the CR - future

- Rožná - depth of 1,200 meters, mining on the 24th floor, in operation already for 50 years, should end in six to seven years
- Brzkov and Veznice deposits not far from Rožná, exploration in 1976-1990, the assumption of 3,100 tons of metal (1992)
- Brzkov mine was discarded and buried within the reduction program after ten years of exploration and mining preparation. The reintroduction of this site to mining would thus require a billion CZK investment.
- Preparatory works would last six to seven years. Subsequent mining would then supposedly brought miners back to work for about 16 years. 900 people works in DIAMO.
- Prime minister Sobotka at the end of March 2014 supported the intention of the company and plans to present it to the government.

Uranium mining in the CR - future

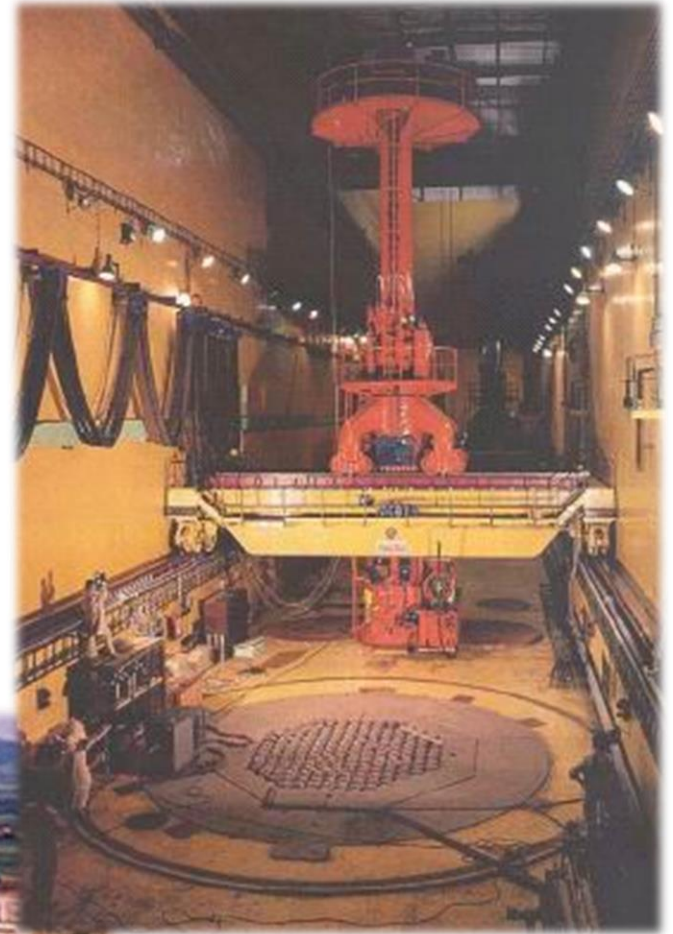
Raw Minerals' Policy:

- a) Mine out the rest of exploitable resources
- b) Find the best alternative mining location and proceed with required studies and legal steps
- c) Use the time window (25 to 30 years) for RandD of mining and processing technology

Nuclear Energy in the Czech Republic

- After World War II it was clear that coal will not be enough for long-term development of energy sector.
- With supplies of uranium from Czechoslovakia, the USSR was willing to forge deeper cooperation, as part of mined uranium under the Agreement of 1945 remained in CSSR, and thus the supply of essential raw material was ensured.
- 1955 Agreement between Czechoslovakia and the Soviet Union for assistance in research and use of nuclear energy and the construction of the Nuclear Research Institute in Rez near Prague
- 1956 Agreement between the Governments of Czechoslovakia and the Soviet Union of Soviet aid in the construction of a nuclear power plant A-1

- 1958
- 1972
- 1972
- 1977 (!)



Nuclear Energy in the Czech Republic

- Although the plant was shut down, experts gained immense experience
- 1970 Agreement between the Government of the Czechoslovak Socialist Republic and the Union of Soviet Socialist Republics on cooperation in the construction of two nuclear power stations in the Czechoslovak Socialist Republic
- It was reactors Voronezh VVER 440 type V 230 of 440 MWe for Bohunice (identified as V-1) and Dukovany (V-2).
- 2 units in EBO as well as 2 units in EDU



Nuclear Energy in the Czech Republic

- In 1975 the V-2 project was converted into EBO units 3 and 4 and it was decided that four units will be in EDU, too.
- Thanks to this decision EDU obtained more advanced unit types of second generation V-213 with specific type of vacuum containment.
- In the event of accident the pressure is suppressed in the hermetic areas of nuclear power plant (reactor primary circuit piping) to minimize the risk of leakage of radioactivity outside these areas.
- December 17, 1978 - EBO V-1 is connected to the network.
- August 20, 1984 - EBO V-2 is connected to the network.

Uranium mining in the Czech Republic

| Plánovaný program uvádění bloků VVER 1000 do provozu (70. léta 20. století) | | | | |
|---|--------------------|-------|----------------------------|-------------------------------|
| Název JE | Rozpočtové náklady | Číslo | Typ a výkon reaktoru (MWe) | Uvedení do zkušebního provozu |
| Jaslovské Bohunice V-1 (SK) | 5 | 1 | VVER 440 | 3/1979 |
| | | 2 | VVER 440 | 6/1980 |
| Jaslovské Bohunice V-2 (SK) | 10,5 | 1 | VVER 440 | 10/1984 |
| | | 2 | VVER 440 | 9/1985 |
| Dukovany (CZ) | 21,3 | 1 | VVER 440 | 3/1985 |
| | | 2 | VVER 440 | 3/1986 |
| | | 3 | VVER 440 | 12/1986 |
| | | 4 | VVER 440 | 7/1987 |
| Mochovce (SK) | 28,3 | 1 | VVER 440 | 10/1989 |
| | | 2 | VVER 440 | 10/1990 |
| | | 3 | VVER 440 | 6/1991 |
| | | 4 | VVER 440 | 3/1992 |
| Temelín (CZ) | 52,0 | 1 | VVER 1000 | 11/1992 |
| | | 2 | VVER 1000 | 5/1994 |
| | | 3 | VVER 1000 | 5/1997 |
| | | 4 | VVER 1000 | 8/1998 |
| Kecеровce (SK) | - | 1 | VVER 1000 | 2000 |
| | | 2 | VVER 1000 | 2001 |
| Blahutovice (CZ) | - | 1 | VVER 1000 | 2003 |
| | | 2 | VVER 1000 | 2004 |
| Tetov (CZ) | - | 1 | VVER 1000 | 2006 |
| | | 2 | VVER 1000 | 2007 |
| | | 3 | VVER 1000 | 2009 |
| | | 4 | VVER 1000 | 2010 |

Nuclear Energy in the Czech Republic



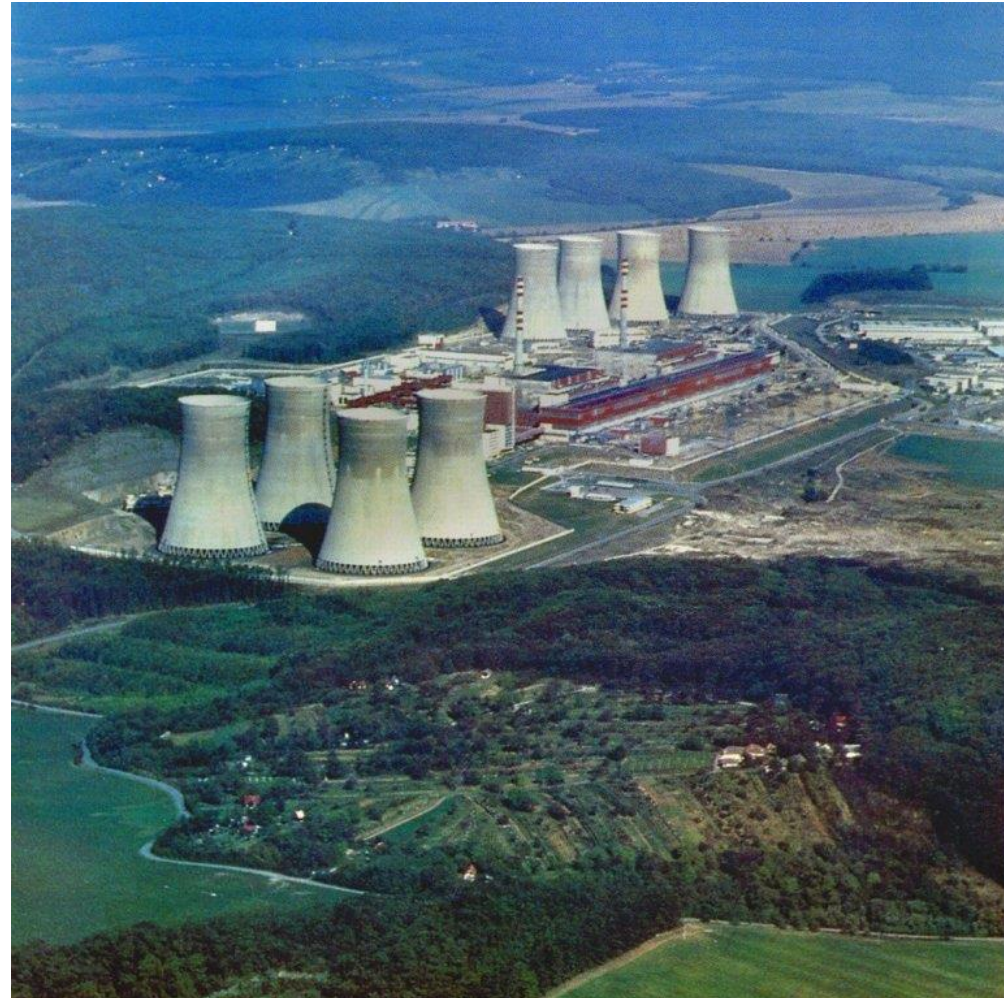
Nuclear Energy in the Czech Republic

- The cooperation agreement of COMECON countries on the development of nuclear energy
- The cooperation program between Czechoslovakia and the USSR in the field of nuclear energy development until 1990
- Thanks to these agreements the Slovak Republic in the years 1982-1999 was able to built Mochovce NPP and in 1998 and 1999 two VVER 440 type V-213 units were connected to the grid
- In 1985-1988 4 units of Dukovany were connected to the grid

Nuclear Energy in the Czech Republic

- Only 2 units are in operation in Mochovce since 1998 and 1999
- Due to lack of funding the 3rd and 4th unit construction started on November 3, 2008 with expected completion construction in 2019/2020 (originally 2013).

As of 1/2019 the work progress was 98.3 and 86.6 % (Units 3, 4)



Nuclear Energy in the Czech Republic

- In 1978 it was decided to build NPP Temelin as 4×1000 MWe NPP (VVER 1000 type 320) on the basis of an agreement with the USSR.

- 1981
- **1986**
- 1989
- 25. 10.1989



- **1990**
- **1993**

- Austrian resistance escalated
- 12. 12. 2006



Nuclear Energy in the Czech Republic

The contents of the Melk agreements of 12. 12. 2000

- Czech Republic agreed to the EIA according to Western standards
- The Czech Republic has agreed with direct information system, which will inform of all events at NPP Temelín
- The Czech Republic agreed that Austria has established a monitoring station close to the NPP
- It was agreed on closer cooperation between the two countries in energy research, improvement and effective systems for renewable energy
- Both countries agree to respect the rules on free movement of persons and goods
- Both countries have agreed to support the EU enlargement

Source: Höth & Drábová, 2006, s. 18.

- November 29, 2001 "Every State has the sovereign right to their own energy policy"
- Disputes faded until inspection of the plant in 2006.
- Again came back to the surface in connection with the completion ETE.

Nuclear Energy in the CR



Nuclear Energy in the CR



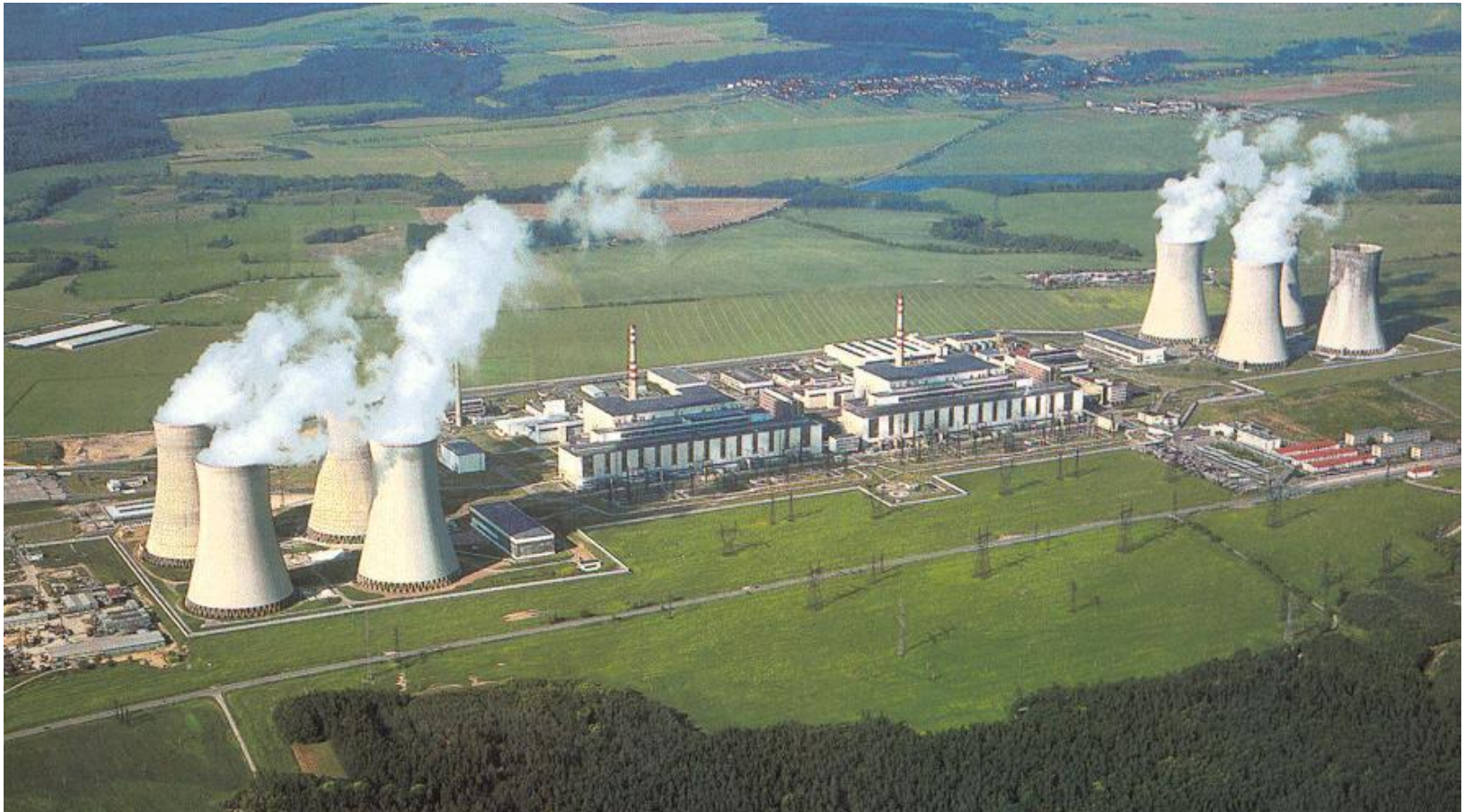
Nuclear Energy in the CR

| Nuclear Units in the Czech Republic | | | | |
|---|-----------------|---------------------|---------------|--------------------------|
| Reactor | Type | Power Output | Status | End of life-cycle |
| Dukovany 1 | VVER-440/V-213 | 510 MWe | Operating | 2015/extended |
| Dukovany 2 | VVER-440/V-213 | 510 MWe | Operating | 2016/extended |
| Dukovany 3 | VVER-440/V-213 | 510 MWe | Operating | 2016/extended |
| Dukovany 4 | VVER-440/V-213 | 510 MWe | Operating | 2017/extended |
| Temelín 1 | VVER-1000/V-320 | ≈1,080 MWe | Operating | 2020 |
| Temelín 2 | VVER-1000/V-320 | ≈1,080 MWe | Operating | 2022 |
| ÚJV Řež LR-0 | LR-0 (TR-0) | 5 kWt | Operating | - |
| ÚJV Řež LVR-15 | LVR-15 (VVR-S) | 10 MWt | Operating | - |
| FJFI ČVUT Praha | VR-1 Vrabec | 1-5 kWt | Operating | - |
| Source: Energetický regulační úřad, 2010b, p. 89; open sources; updated and modified by T. Vlcek. | | | | |

Nuclear Energy in the CR



Nuclear Energy in the CR



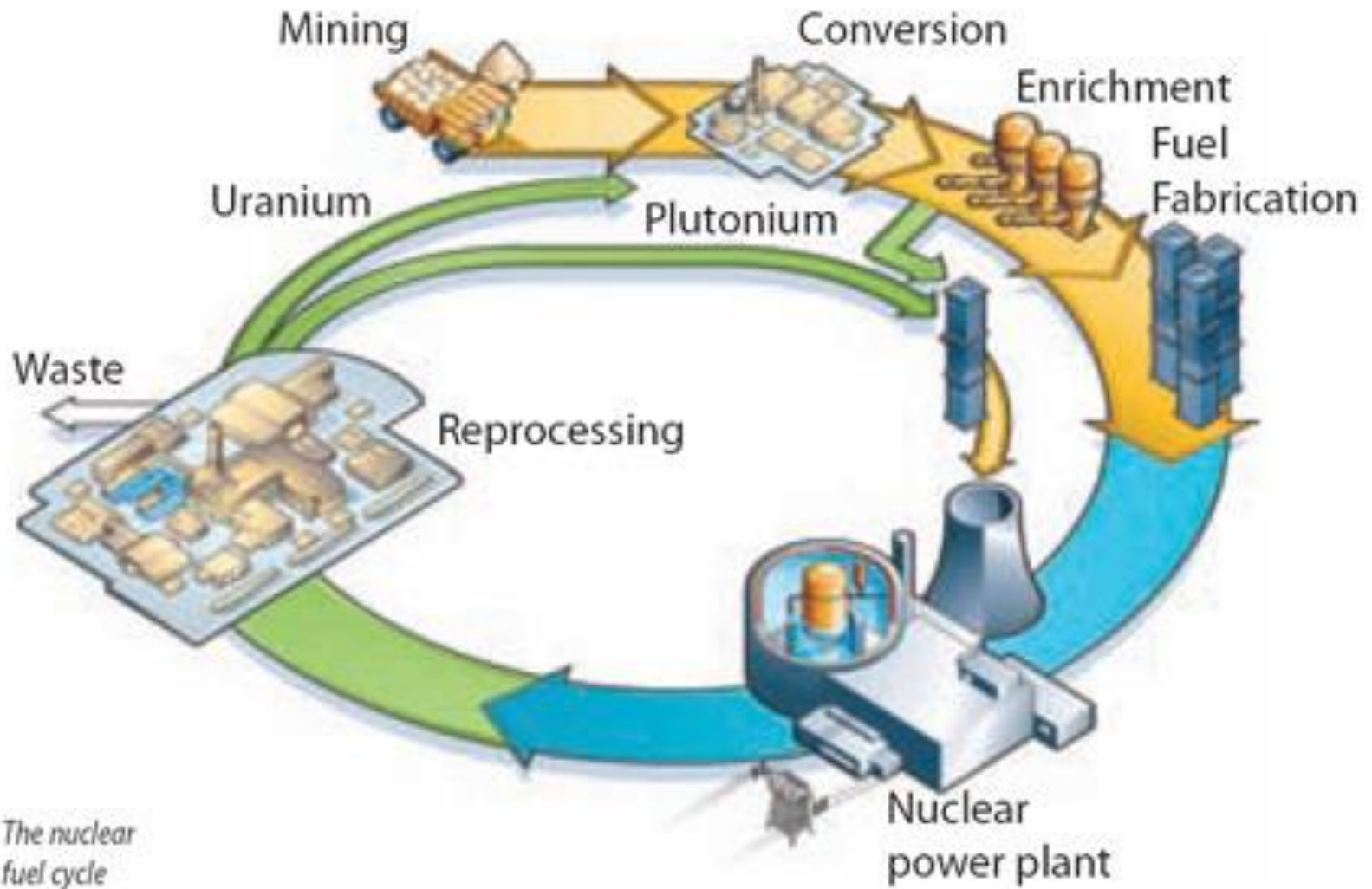
Nuclear Energy in the CR



Nuclear Energy in the CR



Nuclear Fuel Cycle in the CR



Nuclear Fuel Cycle in the CR



Nuclear Fuel Cycle in the CR

- Since clean uranium in the Czech Republic at the present time has an average of 0.16 % of uranium ore, first it needs to be cleaned of so called waste rock.
- Cleaned up ore is then grinded and, following a chemical treatment with sulfuric acid, processed into so called uranium concentrate - triuranium octoxide U_3O_8 (yellow cake in English).
- This DIAMO's intermediate product was purchased predominately by a single customer, namely CEZ, a. s. Other customers were France, Germany, Canada and Russia. In 2009, it bought a total of 270.4 tons of concentrate.
- Domestic production, however, did not satisfy CEZ's demands as the spending of uranium concentrate in the nuclear power plants Dukovany and Temelin ranges between 600 and 700 tons per year.

Nuclear Fuel Cycle in the CR

CEZ, a. s., therefore, either buys the additional supplies at the world market or it purchases a directly enriched fuel.

Since the end of 2009, when the Russian company OAO TVEL initiated its fuel supplies for both Dukovany and Temelin nuclear power plants, CEZ, a. s. has been purchasing only a final product, therefore, an enriched fuel, while DIAMO, state enterprise, sells the domestic products at the market.

In 2010, a selection process for a new supplier took place, which was won by Russian OAO TVEL by submitting a financially uncompetitive offer. **OAO TVEL will be until 2020, therefore, the exclusive fuel supplier for both Czech nuclear power plants. The contract for EDU was prolonged in 2014 until 2028.**

NYMEX Uranium Futures price of uranium concentrate (U₃O₈)

| 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|-------|-------|-------|-------|-------|--------|--------|--------|-------|--------|--------|-------|
| 21.16 | 22.71 | 34.17 | 46.30 | 82.67 | 165.35 | 171.96 | 110.23 | 93.70 | 158.73 | 114.64 | 97.01 |

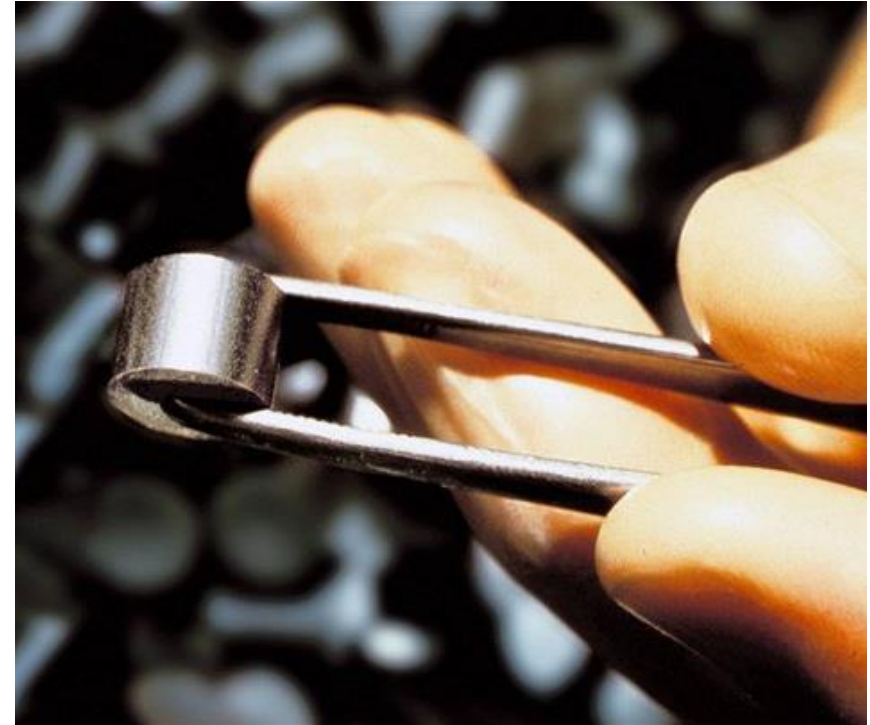
Note: Values always as of January of the particular year. Data indicated in USD per kilogram.

Source: *UraniumMiner*; calculated by T. Vlček.

Nuclear Fuel Cycle in the CR



Nuclear Fuel Cycle in the CR



Nuclear Fuel Cycle in the CR



Nuclear Fuel Cycle in the CR

- In the **first phase**, the fuel is actively cooled in a pool next to the reactor. After five-ten years they are put into dry containers and passively cooled in interim storages.
- Dukovany NPP annually produces less than one container of spent fuel. Temelin NPP annually produces two full containers of used fuel.
- The dry interim storage facility is constructed to store fuel for about 80 years.
- The **second phase**, i.e. transport phase, is/will be provided by rail.
- The **third phase** is the underground geological repository

Nuclear Fuel Cycle in the CR

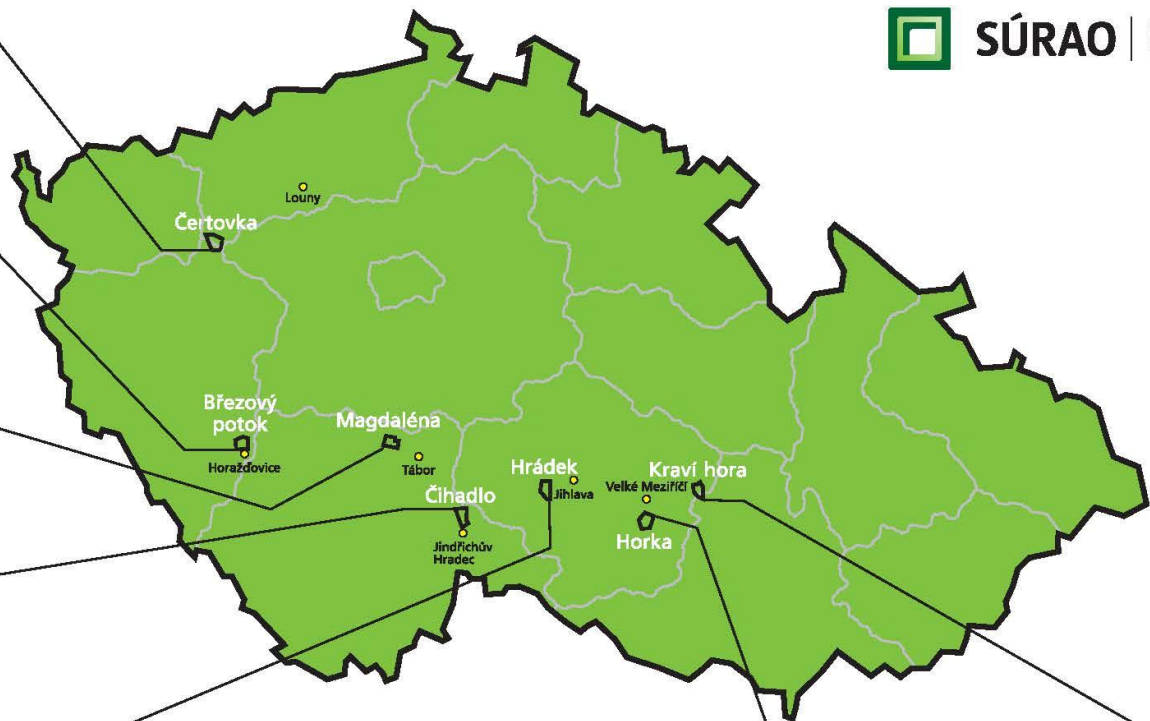


Nuclear Fuel Cycle in the CR

- Localities for building a deep geological repository
 - Březový potok u Pačejova
 - Čertovka u Lubence
 - Horka u Budišova
 - Hrádek u Rohozné
 - Čihadlo u Lodhěřova
 - Magdaléna u Božejovic
 - Kraví hora



PŘEHLED PRŮZKUMNÝCH ÚZEMÍ A ROČNÍCH FINANČNÍCH PŘÍSPĚVKŮ JEDNOTLIVÝCH LOKALIT



Lokalita: Čertovka

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Blatno | 13,424151 | 4 000 000 Kč |
| Lubeneč | 9,499686 | 3 449 906 Kč |
| Tis u Blatna | 4,787860 | 2 036 358 Kč |
| Žihle | 1,359414 | 1 007 824 Kč |
| Celkem | 29,071111 | 10 494 088 Kč |

Lokalita: Březový potok

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Chanovice | 6,579339 | 2 573 802 Kč |
| Velký Bor | 8,562038 | 3 168 611 Kč |
| Pačejov | 2,924166 | 1 477 250 Kč |
| Maňovice | 2,829812 | 1 448 944 Kč |
| Olšany | 1,353224 | 1 005 967 Kč |
| Kvášňovice | 0,864983 | 859 495 Kč |
| Celkem | 23,113562 | 10 534 069 Kč |

Lokalita: Magdaléna

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Jistebnice | 17,437767 | 4 000 000 Kč |
| Nadějkov | 4,785981 | 2 035 794 Kč |
| Božetice | 1,349120 | 1 004 736 Kč |
| Celkem | 23,572868 | 7 040 530 Kč |

Lokalita: Čihadlo

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Lodhěřov | 14,878511 | 4 000 000 Kč |
| Deštná | 5,213349 | 2 164 005 Kč |
| Světky | 3,642110 | 1 692 633 Kč |
| Pluhův Žďár | 2,356508 | 1 306 952 Kč |
| Celkem | 26,090478 | 9 163 590 Kč |

Lokalita: Hrádek

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Rohozná | 7,184791 | 2 755 437 Kč |
| Nový Rychnov | 6,074868 | 2 422 460 Kč |
| Milíčov | 2,968314 | 1 490 494 Kč |
| Hojkov | 4,308423 | 1 892 527 Kč |
| Cejle | 2,020374 | 1 206 112 Kč |
| Dolní Cerekev | 1,755480 | 1 126 644 Kč |
| Celkem | 24,312250 | 10 893 675 Kč |

Příspěvky z průzkumu:

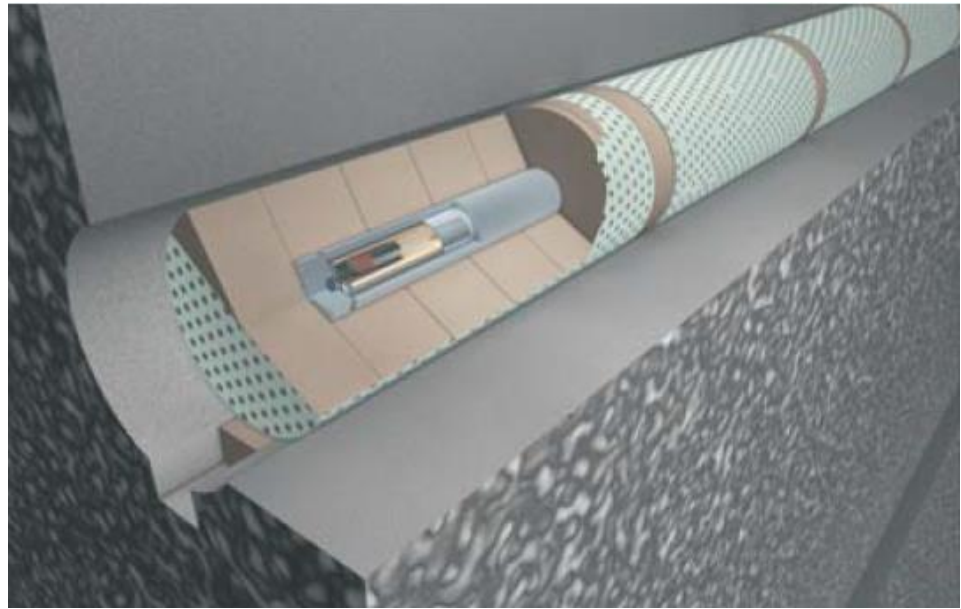
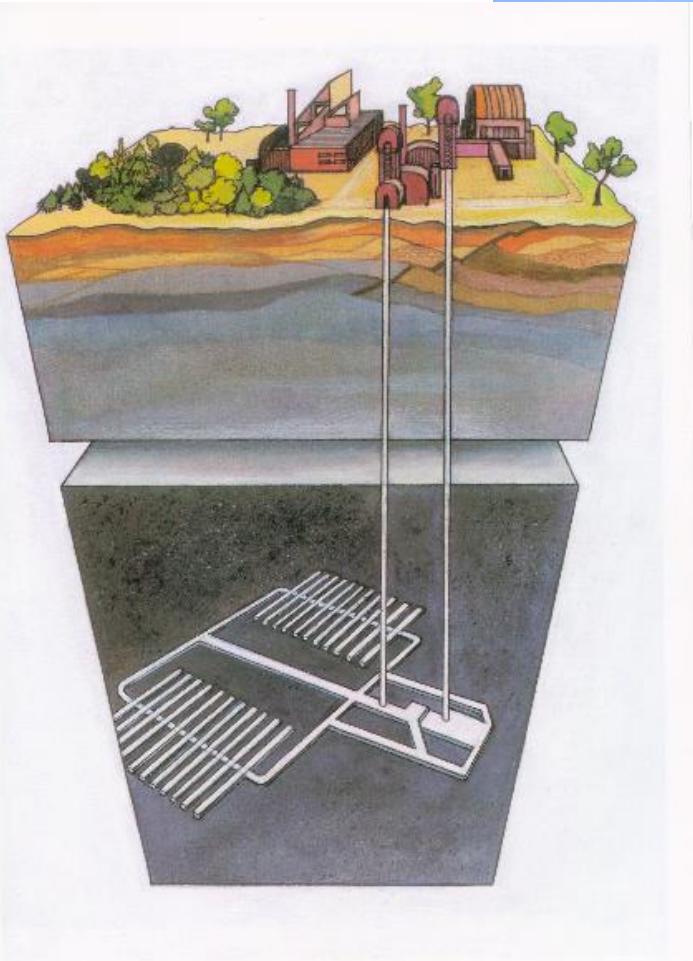
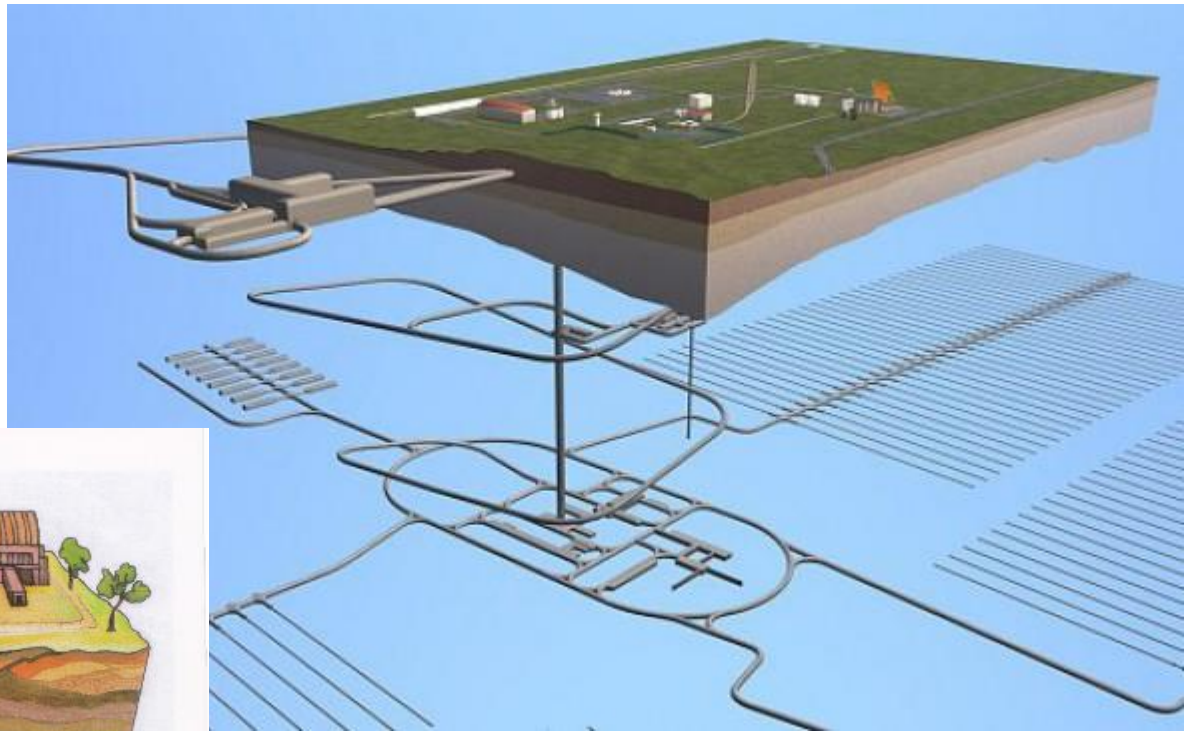
- Roční příspěvek 600 tisíc pro každou obec
- 30 haléřů za každý metr čtvereční katastrálního území obce, na němž bude stanoveno průzkumné území
- Maximální částka pro obec je 4 miliony korun ročně

Lokalita: Horka

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Hodov | 9,600379 | 3 480 114 Kč |
| Rohy | 5,371884 | 2 211 565 Kč |
| Oslavčická | 3,414927 | 1 624 478 Kč |
| Budišov | 2,928363 | 1 478 509 Kč |
| Nárameč | 2,254690 | 1 276 407 Kč |
| Vičatín | 1,865850 | 1 159 755 Kč |
| Osové | 1,034598 | 910 379 Kč |
| Rudíkov | 0,990977 | 897 293 Kč |
| Oslavice | 0,798283 | 839 485 Kč |
| Celkem | 28,259951 | 13 877 985 Kč |

Lokalita: Kraví hora

| Zásah stanoveného průzkumného území do katastrů obcí | | Roční příspěvek |
|--|----------------------------|--------------------------|
| Obec | Zásah PÚ v km ² | Podle NV č. 416/2002 Sb. |
| Střítež | 5,775041 | 2 332 512 Kč |
| Drahonín | 3,474158 | 1 642 247 Kč |
| Moravské Pavlovice | 3,427197 | 1 628 159 Kč |
| Bukov | 1,830774 | 1 149 232 Kč |
| Věžná | 2,168012 | 1 250 404 Kč |
| Sejtek | 0,330972 | 699 292 Kč |
| Milasin | 0,069181 | 620 754 Kč |
| Olší | 0,033889 | 610 167 Kč |
| Celkem | 17,109224 | 9 932 767 Kč |



Nuclear Fuel Cycle in the CR

| Scheme of the End of the Nuclear Cycle in the Czech Republic | | | |
|---|--|---|--|
| Spent fuel dwell | App. 5 - 13 years | App. 80 years | Permanently or until potential re-processing |
| Location | Pools of spent fuel in the nuclear power plants Dukovany and Temelin | Storages in the nuclear power plants Dukovany and Temelin, backup repository Skalka | Deep geological repository |
| Responsible | CEZ, a. s. | | SURAO |
| Supervised by | State Office for Nuclear Safety | | |
| Financial means | Corresponding budget CEZ, a. s. | | Nuclear account (CEZ, a. s. contributions) |
| Source: Otčenášek, 2005, p. 540; modified by T. Vlček. | | | |

Temelin NPP

- On August 3, 2009, CEZ, a. s. has released the announcement about opening a call for tender for two new nuclear blocks for the nuclear power plant Temelin.
- After awarded, the overall administrative tender process will last for roughly 7 to 8 years (together with the construction, 15 years), which means that the connection of new blocks is estimated for around 2024.
- The tender's finale and the signing of the contract by its winner was set at the end of 2011, in October 2010 it was, however, decided that selecting the construction works' supplier must be postponed by 2013 for unpreparedness of suppliers, which will naturally lead to the delay of the entire process.
- The function of the Government's Commissioner for the nuclear tender CEZ, a. s. was granted to Mr. Vaclav Vartuska, Special Envoy for Energy Security of the Czech Republic.
- The price was expected to CZK 200-300 billion

Temelin NPP

| Technical Characteristics of the Projects Proposed by Single Nuclear Tender Applicants | | | |
|---|---|-----------------|---|
| Company | Westinghouse Electric Company, LLC | Areva SA | SKODA JS, a. s., Atomstrojexport, a. s., OKB Gidropress, a. s. |
| Project | AP1000 | EPR™ | MIR 1200 (AES 2006) |
| Thermal capacity(MWt) | 3,415 | 4,590 | 3,200 |
| Electrical capacity (MWe, net / gross) | 1,117 / 1,200 | 1,590 / 1,700 | 1,113 / 1,198 |
| Efficiency (%) | 33 | 36 | 33.7 |
| Capacity factor (%) | 93 | 90.3 | >98* |
| Number of cassettes in the active zone | 157 | 241 | 163 |
| Number of rods in cassettes | 264 | 265 | 312 |
| Number of steam generators | 2 | 4 | 4 |
| * Such a high value results from shorter maintenance and refueling breaks and prolonged fuel campaigns. Source: Bílý, 2011, p. 268; Company's official documents; selected and modified by T. Vlček. | | | |

Temelin NPP

- **Westinghouse Electric Company, LLC**

- 67 % Toshiba Corporation (67 %)
- 3 % Ishikawajima-Harima Heavy Industries Co. Ltd.
- 20 % The Shaw Group (20 %, americká strojařská společnost)
- 10 % Kazatomprom NAC (kazašská státní společnost)

- **Areva SA**

- 73,03 % Commissariat à l'énergie atomique (franc. vládou financovaná technologická výzkumná instituce)
- 10,17 % francouzský stát
- 4,82 % korejská automobilka Kia Motors
- 11,98 % další společnosti, zaměstnanci a veřejně obchodovatelné akcie

- **ZAO Atomstrojexport**

- 44 % VPO Zarubežatomenergostroj (kontrolován Federální agenturou pro jadernou energii – Rosatom)
- 6,2 % OAO TVEL (kontrolován Federální agenturou pro jadernou energii – Rosatom)
- 49,8 % OAO Gazprombanka

Temelin NPP

- **March 2013**
- Announcement of the order of participants for tender
- 4 categories of review:

| <u>Technology</u> | <u>Price</u> | <u>Safety</u> | <u>???</u> |
|-------------------|--------------|---------------|------------|
| AP1000 | MIR.1200 | MIR.1200 | MIR.1200 |

- **Overall:** **AP1000** **80/100 points**
- **MIR.1200** **66,5/100 points**

Temelin NPP

- „ While originally the project was due to the market price of electricity and other factors fully economically recoverable, today are threatened all investments into electrical energy sources, whose income depends on the sale of electricity on the open market..“ (Daniel Beneš, 10. 4. 2014)
- The price of electricity over the past 5 years decreased by 60% (4/2014 - the price of € 34/MWh, historical minimum)
- CO2 allowances are worth about 113 CZK (€ 4.2), the plan was at least 15-20 euro
- Neither the EU nor the Czech Republic at the moment does not plan to provide guarantees or stabilization mechanism for the construction of low-carbon sources (contract for difference, etc.).
- A risk that the government will require higher dividend from CEZ on their projects.
- To the construction of two units in Temelin be economically recoverable, ČEZ would need either electricity prices over 70 euros per megawatt hour (according Candole Partners least 115), or state aid.
- "CEZ is capable of doing, but it constrain all investments in other programs, which the company does not like." Václav Bartuška, government commissioner for Temelin, Hospodářské noviny, 15 June 2012

Temelin NPP

- CEZ has concentrated on Dukovany, whose license ended in 3/2016
- CEZ would like to operate EDU until 2035, about 20 years longer

Minister of Industry Jan Mládek said that he expected that the company will announce new tender within five years.

And if everything goes well, it could be even in two to three years, said Pavel Cyrani, Director of Strategy in CEZ.



Current situation

- ČEZ is preparing tender to allow Westinghouse to compete with TVEL for return to Temelin (23.1.2016)
- Should there be a new tender for ETE, the French will participate again (23.8.2015)
- *„... Second, I believe that the decision not to declare the result of the tender was correct. If you take the construction of a nuclear power plant seriously, a tender is the last thing you should do. Nobody in the world builds a nuclear power plant on the basis of a tender and no one in this manner chooses a supplier of nuclear technology.“* (Kirill Komarov, 1st vice president of Rosatom, 25.9.2015)
- EDU received life-extension permission for operation beyond 2015 for indefinite time (31.3.2016)
- <https://www.sujb.cz/jaderna-bezpecnost/jaderna-zarizeni/jaderna-elektrarna-dukovany/dulezita-rozhodnuti-k-provozu-edu/>
- Vienna plans to ask EC for crossborder EIA

Current situation

- National action plan for the development of nuclear energy in the Czech Republic
 - Particularly in order to maintain continuity of production in Dukovany the construction of new units in Dukovany and its launch no later than in 2037 is crucial
 - Based on the material, it is desirable to immediately start preparations for the construction of one nuclear unit at Dukovany and one in Temelin with the possibility of extending the scope to two blocks in both plants

Current Situation (SEP 2015)

- Promote and expedite the process of negotiation, preparation and execution of the construction of new nuclear units at the existing locations of nuclear power plants with a total capacity of up to 2,500 MW (20 TWh annual production) in the period of 2030-2035 including all necessary steps.
- Create conditions for extending the life-cycle of the Dukovany NPP for 50 years, and if possible, for 60 years (with respect to technology, security, economy and EU rules).
- Target any construction of new units around the expected shutdown of EDU (ie. after 2035).

Current situation

- National action plan for the development of nuclear energy in the Czech Republic
 - **1) investment by the owner and operator of existing nuclear power plants (CEZ) or its fully/partially-owned subsidiary (vendor)**
 - 2) investment through private group of investors (mankala model, strategic partner)
 - 3) direct construction by the state through newly established state company

Current situation

- During the visit of Xi Jinping in the CR the China General Nuclear and Czech Energy Alliance signed Memorandum of Understanding:
- Content: *cooperation on information on nuclear power plant procurement, construction, commissioning, operation and maintenance, repair and renovation of nuclear fuel cycle facilities, the training of nuclear power plant workers and cooperating in European Utility Requirements (EUR) certification*
- *The Czech Energy Alliance was created in September 2015 and brings together, under the leadership of CEZ subsidiary Skoda Praha, 13 other leading Czech engineering companies: Alta, Doosan Ltd, Elektro Kroměříž, IBC Praha, Kralovopolska RIA, Modrany Power, MSA, Sigma Group, Skoda JS, OSC, Skoda Power, Vítkovice, ZAT and ZVVZ Group. One of the aims of the Alliance is to partner with large foreign firms in supplies for the construction of nuclear power plants.*
- *The Chinese company formally applied to EU in May 2015 for certification of the Hualong One reactor design.*

Current situation

- 6 out of 9 approached companies replied and met Minister of Industry and Trade for consultations:
 - *Rosatom* (Russia) VVER 1200
 - *EDF* (France) EPR 1650 MWe
 - *Westinghouse* (Japan) AP1000
 - *KHNP* (Korea) APR1400
 - *China General Nuclear Power* (China) Hualong 1 1080 MWe (merger of CPR-1000 and ACP1000)
 - *Areva + Mitsubishi* (France, Japan) Atmea 1 1100 MWe



Thank you for attention