

# ANNEX 2 – RUSSIA NUCLEAR DEPENDENCIES

Table 18 · Fuel Supply for Soviet-designed Reactors in the E.U. and Ukraine (as of mid-2024)

Country	Nuclear Share 2023	Unit	Type	TVEL (Russia)	Westinghouse (USA/Canada)	Framatome (France)
Bulgaria	40.5%	Kozloduy-5	VVER-1000	Contract until 2025, <sup>1</sup> terminated early, last fuel load for Unit 6 in autumn 2024 <sup>2</sup>	- 10-year supply contract (December 2022) - First load: May 2024 <sup>3</sup>	-
		Kozloduy-6	VVER-1000			-
Czech Republic	40%	Dukovany 1-4	VVER-440	- Fuel reload in October 2023 at Dukovany-4 <sup>5</sup> - Fuel reserve until approx. 2026 <sup>6</sup>	7-year supply contract starting 2024 (April 2023) <sup>7</sup>	Ongoing negotiations as of January 2024; No contract as of July 2024 <sup>8</sup>
		Temelín-1 & -2	VVER-1000	- Supply since 2010 <sup>9</sup> - Contract until 2023 <sup>10</sup> - Fuel reload completed in June 2024 <sup>11</sup>	- Supply 2000-2010 <sup>12</sup> - 6 lead test assemblies loaded in 2019 <sup>13</sup> - 10+-year contract, supply starting 2024 (June 2022) <sup>14</sup>	10+-year contract, supply starting 2024 (June 2022) <sup>15</sup>
Finland	42%	Loviisa-1	VVER-440	Contract until end 2027 <sup>16</sup>	- Supply 2001-2007 <sup>17</sup> - Supply contract (November 2022) <sup>18</sup> - Lead test assembly loaded: 2023 <sup>19</sup>	
		Loviisa-2	VVER-440	Contract until end 2030 <sup>20</sup>		
Hungary	48.8%	Paks 1-4	VVER-440	- "Lifetime" supply contract <sup>21</sup> - Fuel reserve until 2026 <sup>22</sup>		MoU, incl. fuel supply (September 2023) <sup>23</sup>
Slovakia	61.3%	Bohunice-3 & -4	VVER-440	- Supply contract 2022-2026, with option until 2030 (June 2019) <sup>24</sup> - Fuel reserve until 2026-2027 <sup>25</sup>	Supply contract (August 2023) <sup>26</sup>	MoU, incl. fuel supply (May 2023) <sup>27</sup>
		Mochovce1-3	VVER-440			
Ukraine	55% (2021)	Rivne-1 & -2	VVER-440	Supply contract for 8 reactors 2021-2025 (December 2018) <sup>28</sup>	- Since 2010, fuel supplied to 6 VVER-1000 <sup>29</sup> - Full load to South Ukraine-3 in July 2018 <sup>30</sup> - Supply contract for all Ukrainian reactors (June 2022) <sup>31</sup> - First load Rivne: September 2023 <sup>32</sup> - First load Khmelnistkyi: March 2024 <sup>33</sup>	
		Khmelnytskyi-1 & -2	VVER-1000			
		Rivne-3 & -4	VVER-1000			
		South Ukraine 1-3	VVER-1000			
		Zaporizhzhia 1-6	VVER-1000			

## Notes:

1 - TVEL, "TVEL and Kozloduy NPP have contracted supplies of Russian nuclear fuel to Bulgaria through 2025", 19 December 2019, see [https://www.tvel.ru/en/press-center/news/?ELEMENT\\_ID=8140](https://www.tvel.ru/en/press-center/news/?ELEMENT_ID=8140), accessed 19 July 2023.

2 - NEI Magazine, "Kozloduy NPP to end contract for Russian fuel supplies", 30 May 2024, see <https://www.neimagazine.com/fuel-fuel-cycle/kozloduy-npp-to-end-contract-for-russian-fuel-supplies/>, accessed 15 July 2024.

3 - Westinghouse, "Westinghouse Delivers First VVER-1000 Fuel Reload to Bulgaria", Press Release, 29 May 2024, see <https://info.westinghousenuclear.com/news/westinghouse-delivers-first-vver-1000-fuel-reload-to-bulgaria>, accessed 26 June 2024; and Westinghouse, "Westinghouse's VVER-1000 Nuclear Fuel Fabrication Agreement Helps Cement Bulgaria's Energy Security", Press Release, 22 December 2022, see <https://info.westinghousenuclear.com/news/westinghouse-vver-1000-nuclear-fuel-fabrication-agreement-helps-cement-bulgarias-energy>, accessed 7 July 2024.

- 4 - WNN, “Kozloduy and Framatome sign nuclear fuel agreement”, 4 January 2023, see <https://www.world-nuclear-news.org/Articles/Kozloduy-and-Framatome-sign-nuclear-fuel-agreement>, accessed 4 January 2023.
- 5 - *NEI Magazine*, “Dukovany 4 to switch to new generation Russian fuel”, 24 October 2023, see <https://www.neimagazine.com/news/dukovany-4-to-switch-to-new-generation-russian-fuel-11242878/>, accessed 28 June 2024.
- 6 - CEZ Group, “The Americans are going to supply nuclear fuel also to Dukovany, not only to Temelín”, Press Release 29 March 2023.
- 7 - Westinghouse, “Westinghouse Reinforces its Commitment to Energy Security in Czech Republic”, Press Release, 29 March 2023, see <https://info.westinghousenuclear.com/news/westinghouse-reinforces-its-commitment-to-energy-security-in-czech-republic>, accessed 26 June 2024.
- 8 - As of January 2024, it was reported that “Negotiations with Framatome about fuel supplies for the Dukovany power plant are still ongoing”, see David Tramba, “Polovičatá náhrada ruského paliva v Temelíně. Framatome dodá palivové soubory v ruské licenci”, *Ekonomický deník*, 4 January 2024 (in Czech), see <https://ekonomickydenik.cz/polovicata-nahrada-ruskeho-paliva-v-temeline-framatome-doda-palivove-soubory-v-ruske-licenci/>, accessed 28 June 2024.
- 9 - ČEZ, “Temelin will buy fissionable fuel from the Russian TVEL”, Press Release, 17 May 2006, see <https://www.cez.cz/en/media/press-releases/temelin-will-buy-fissionable-fuel-from-the-russian-tvel-70158>, accessed 8 July 2024.
- 10 - ČEZ, “Refueling will start at Temelín. Six fuel assemblies made by Westinghouse Electric Sweden will be tested”, Press Release, 4 April 2019, see <https://www.cez.cz/en/media/press-releases/refueling-will-start-at-temelin.-six-fuel-assemblies-made-by-westinghouse-electric-sweden-will-be-tested-69837>, accessed 8 July 2024.
- 11 - CEZ Group, “The first Temelín Unit produces electricity again. It has been shut down for two months to inspect and replace fuel assemblies”, Press Release, CEZ Group, 12 June 2024, see <http://www.cez.cz/en/media/press-releases/the-first-temelin-unit-produces-electricity-again.-it-has-been-shut-down-for-two-months-to-inspect-and-replace-fuel-assemblies-192183>, accessed 8 July 2024.
- 12 - Daniel Ernst and Lukáš Milisdörfer, “10 years of experience with Westinghouse fuel at NPP Temelín”, ČEZ, as presented at the VVER 2010 Conference, 1–3 November 2010, see [https://inis.iaea.org/collection/NCLCollectionStore/\\_Public/42/016/42016135.pdf](https://inis.iaea.org/collection/NCLCollectionStore/_Public/42/016/42016135.pdf), accessed 2 August 2023.
- 13 - Jan Höglund and Ulf Benjaminsson, “New fuel for Temelín 1”, Technical Lead for Fuel Engineering, and Fuel Marketing Manager, Westinghouse, published in *Nuclear Engineering International*, 3 October 2019, see <https://www.neimagazine.com/analysis/new-fuel-temelin-1-7436970/>, accessed 29 June 2024; and ČEZ, “Temelín’s Unit 1 restored the electricity production”, Press Release, 29 April 2019, see <https://www.cez.cz/en/media/press-releases/temelins-unit-1-restored-the-electricity-production-69835>, accessed 8 July 2024.
- 14 - ČEZ, “We are strengthening the energy security of the Czech Republic: we have signed contracts for the supply of fuel assemblies with Westinghouse and Framatome”, Press Release, 28 June 2022, see <https://www.cez.cz/en/media/press-releases/we-are-strengthening-the-energy-security-of-the-czech-republic-we-have-signed-contracts-for-the-supply-of-fuel-assemblies-with-westinghouse-and-framatome-160156>, accessed 26 July 2023; and Westinghouse, “Westinghouse Advances Energy Security in Czech Republic”, 28 June 2022, see <https://info.westinghousenuclear.com/news/westinghouse-advances-energy-security-in-cz>, accessed 26 June 2024.
- 15 - ČEZ, “We are strengthening the energy security of the Czech Republic: we have signed contracts for the supply of fuel assemblies with Westinghouse and Framatome”, 28 June 2022, op. cit.
- 16 - Fortum, “Sustainability 2023”, March 2024, see <https://www.fortum.com/files/fortum-sustainability-2023/download>, accessed 8 July 2024.
- 17 - Mark Dye, Jan Höglund and Ulf Benjaminsson, “Diversification of the VVER fuel market”, *Nuclear Engineering International*, September 2015, see <https://westinghousenuclear.com/media/15pjkvtk/westinghouse-reprint-vver-fuel-nei.pdf>, 29 June 2024.
- 18 - Westinghouse, “Helping Finland to Secure Its Energy Future”, Press Release, 22 November 2022, see <https://info.westinghousenuclear.com/news/helping-finland-secure-energy-future>, accessed 26 June 2024.
- 19 - Fortum, “Fortum’s Loviisa nuclear power plant generated 8.09 terawatt-hours of carbon-free electricity in 2023”, Press Release, 4 January 2024, see <https://www.fortum.com/media/2024/01/fortums-loviisa-nuclear-power-plant-generated-809-terawatt-hours-carbon-free-electricity-2023>, accessed 4 June 2024.
- 20 - Fortum, “Sustainability 2023”, March 2024, op. cit.
- 21 - Rosatom, “TVEL Fuel Company of ROSATOM will develop a unique modification of nuclear fuel for Paks NPP (Hungary)”, 13 November 2017, see <https://www.rusatom-energy.ru/en/media/rosatom-news/tvel-fuel-company-of-rosatom-will-develop-a-unique-modification-of-nuclear-fuel-for-paks-npp-hungary/>, accessed 8 July 2024.
- 22 - Charles Digges, “Europe doubled its import of Russian nuclear fuel for 2023, data say”, *Bellona*, 15 March 2024, see <https://bellona.org/news/nuclear-issues/2024-03-europe-russian-nuclear-fuel>, accessed 27 June 2024.
- 23 - Framatome, “Framatome signs Memorandum of Understanding with Hungary to extend long-term cooperation in nuclear power”, Press Release, 12 September 2023, see <https://www.framatome.com/medias/framatome-signs-memorandum-of-understanding-with-hungary-to-extend-long-term-cooperation-in-nuclear-power/>, accessed 25 June 2024.
- 24 - SE, “Palivo pre jadrove elektrárne na Slovensku dodá spoločnosť TVEL”, Press Release (in Slovakian), Slovenské elektrárne, 5 June 2019, see <https://www.seas.sk/tlacove-spravy/palivo-pre-jadrove-elektrarne-na-slovensku-doda-spolocnost-tvel/>, accessed 26 June 2024.
- 25 - Charles Digges, “Europe Doubled Its Import of Russian Nuclear Fuel for 2023, Data Say”, *Bellona*, 15 March 2024, op. cit.
- 26 - Westinghouse, “Westinghouse Strengthens Energy Security in Slovakia”, Press Release, 25 August 2023, see <https://info.westinghousenuclear.com/news/westinghouse-strengthens-energy-security-in-slovakia>, accessed 26 June 2024.

27 - Framatome, “Framatome signs Memorandum of Understanding with Slovenské elektrárne to extend long-term partnership”, Press Release, 31 May 2023, see <https://www.framatome.com/medias/framatome-signs-memorandum-of-understanding-with-slovenske-elektrarne-to-extend-long-term-partnership/>, accessed 25 June 2024.

28 - WNA, “Nuclear Power in Ukraine”, World Nuclear Association, Updated 25 March 2024, see <https://world-nuclear.org/Information-Library/Country-Profiles/Countries-T-Z/Ukraine>, accessed 28 June 2024.

29 - WNA, “Nuclear Power in Ukraine”, Updated 25 March 2024, op. cit.

30 - Westinghouse, “Full Core of Westinghouse Fuel Achieved at South-Ukraine Nuclear Power Plant Unit 3”, 19 July 2018, see <https://info.westinghousenuclear.com/news/full-core-of-westinghouse-fuel-achieved-at-south-ukraine-nuclear-power-plant-unit-3>, accessed 24 June 2024.

31 - Westinghouse, “Energoatom and Westinghouse Reaffirm Clean Energy Partnership, Announce Expanded Cooperation on Westinghouse-supplied VVER Fuel and AP1000® Plants to be Built in Ukraine”, 3 June 2022, see <https://info.westinghousenuclear.com/news/energoatom-and-westinghouse-reaffirm-clean-energy-partnership>, accessed 9 July 2024.

32 - Westinghouse, “Westinghouse Delivers First VVER-440 Fuel Assemblies to Energoatom”, Press Release, 12 September 2023, op. cit.

33 - Energoatom, “The first batches of Westinghouse nuclear fuel delivered to Khmelnytsky NPP”, 8 March 2024, see <https://energoatom.com.ua/en/post/1594>, accessed 4 September 2024