# CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Political Studies

Department of Political Science


# Bachelor's Thesis


**2024** **Kryštof John Donovan**

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# The Impact of Russia's War of Aggression against Ukraine on Nuclear Energy Policy in Central and Eastern European Countries

Bachelor's thesis


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Year of the defense: 2024

## Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on 30.04.2024

Kryštof John Donovan

## References

Donovan, Kryštof John. *The Impact of Russia's War of Aggression against Ukraine on Nuclear Energy Policy in Central and Eastern European Countries.* Praha, 2024. 83 pages. Bachelor's thesis (Bc). Charles University, Faculty of Social Sciences, Institute of Political Studies. Department of Political Science. Supervisor doc. Martin Riegl, Ph.D.

**Length of the Thesis:** 96854 Characters

## Abstract

Russia's war of aggression on Ukraine – which started in 2014 with the invasion of Crimea and then escalated in 2022 with the full-scale Russian invasion of Ukraine – has had a major impact on European power dynamics and on European energy markets. Following this aggression, European countries began to rethink their energy dependence on Russia. In particular, this war has impacted the CEE (Central Eastern Europe) region, logically, as they are geographically closer to Russia. CEE also has a history that is more connected with Russia, as it was most recently part of the Eastern Bloc. In this paper I will argue and show that the Russian War of Aggression in Ukraine (starting in 2014 with the invasion of Crimea and escalating with the full invasion of the country in 2022) is having a significant impact on the nuclear energy policy of CEE countries, with most of these countries seeking to shift away from Russian nuclear supply chains amid heightened national security concerns over Russia and great power competition in the region.



## Abstrakt

Ruská útočná válka proti Ukrajině – která začala v roce 2014 invazí na Krym a poté eskalovala v roce 2022 v totální ruskou invazi na Ukrajinu – měla velký dopad na evropskou mocenskou dynamiku a na evropskou geopolitickou scénu. Po této agresi jedna z hlavních věcí, které evropské země začaly dělat, byly přehodnotit svou energetickou závislost na Rusko. Navíc tato válka zasáhla region Středovýchodní Evropy, logicky více než západní Evropu, protože jsou geograficky blíže Rusku. Středovýchodní Evropa má také historii, která je více spojena s Ruskem, v poslední době byla velká část zemí Středovýchodní Evropy součástí východního bloku. V práci budu argumentovat a ukazovat, že ruská útočná válka na Ukrajině (začínající v roce 2014 invazí na Krym a plně eskalující plnou invazí do země v roce 2022) má dopad na jadernou energetickou politiku zemí střední a východní Evropy a že toto politika odráží větší geopolitický posun i velmocenský konflikt v regionu.

## Keywords

Central Eastern Europe (CEE), Ukraine, Russia, Nuclear, Energy

## Klíčová slova

Středovýchodní Evropa, Ukrajina, Rusko, jaderná, energie

## Title

The Impact of Russia's War of Aggression against Ukraine on Nuclear Energy Policy in Central and Eastern European Countries

## Název práce

Dopad ruské agrese na Ukrajině na politiku jaderné energie v zemích střední a východní Evropy

# Table of Contents

## 1. Introduction

Russia's war of aggression on Ukraine – which started in 2014 with the invasion of Crimea and then escalated in 2022 in the full-scale Russian invasion of Ukraine – has had a major impact on European power dynamics and on the European geopolitical landscape. Following this aggression, European countries began to rethink their energy dependence on Russia. In particular, this war has impacted the CEE (Central and Eastern Europe) region, logically, more than it has impacted Western Europe, as they are geographically closer to Russia. CEE also has a history that is more connected with Russia, including as an importer of civilian nuclear power technology from Moscow; as part of the Soviet Bloc, they were under Russian influence and/or occupation, starting roughly from the end of the Second World War until 1989. This thesis will argue that the Russian War of Aggression in Ukraine (starting in 2014 with the invasion of Crimea and escalating with the full invasion of the country in 2022) is having a significant impact on the nuclear energy policy of CEE and neighboring countries, forcing some of them (Bulgaria, Czech Republic and Finland) to reverse previously favorable stances towards Moscow in the market for new nuclear power technology and instead embrace U.S. or non-Russian nuclear technology vendors. In addition, after February 2022, some countries in the region (Czech Republic, Estonia, Poland, Romania, Slovakia, Sweden, Ukraine) announced plans to build even more new reactors (with U.S. or non-Russian vendors) than they had previously planned, in order to strengthen their energy supply security and independence while also seeking to meet climate change goals. This paper will show that these national policies and commercial choices have changed as the result of heightened threat perceptions of Russia that has reawakened realist thinking in CEE capitals, amid a dramatic shift in the great power competition

in the region between Russia and the United States–a shift that on the energy supply front now clearly favors Washington (and not only on nuclear power).[1]

This thesis will focus on the CEE region, but not only. The Organization for Economic Co-operation and Development (OECD) defines CEE as the countries of "Albania, Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, Slovenia, and the three Baltic States: Estonia, Latvia and Lithuania"[2]. I am not going to specifically analyze all of these countries but only the ones which are the most relevant to the thesis. In addition, this thesis will examine Finland, Sweden, and Ukraine. Finland and Sweden are technically not part of this region but are directly relevant to this paper because of their close proximity to Russia, historic linkages to Moscow on nuclear power and their starkly changing national security positioning– as their historic neutrality has now come to an end with their entry into NATO.[3] Furthermore, Ukraine will be included for obvious reasons, namely, as it is central to the topic of this paper and has a strong history of nuclear power use which continues to this day. Indeed, Ukraine's shift away from Russian nuclear power supply chains and towards American ones predates the February 2022 invasion and has only intensified since then. In short, this thesis will analyze what is defined as the CEE region with an additional focus on Sweden and Finland as well as Ukraine. That being said, I will use the term CEE to refer to the countries being analyzed as the majority of the countries covered in this thesis hail from that region.

I will demonstrate that, CEE countries, with the notable exception of Hungary[4], are shifting away from Russian nuclear energy supply chains as part of

[1] Gavin, "Europe's New Energy Risk: Trading Russia for America."
[2] "Central and Eastern European Countries."
[3] Clark, "Pentagon Welcomes Sweden, Finland in Ceremony Marking NATO Anniversary."
[4] "Nuclear Power in Hungary."

efforts to reduce or eliminate their broader energy dependence on Russia, in addition to climate change considerations. The reason for this is that almost all countries in the region have signaled that they see Russia as a greater threat to their national security in light of its aggression in Ukraine, than they had previously. This became evident immediately after Russia's full invasion of Ukraine in February 2022, when most CEE countries rushed to support Ukraine by sending or pledging to send the country weapons for its defense, including the so-called Tallinn Pledge made by 11 European countries, including several from CEE, in January 2023.[5] Reflecting views expressed by many of his counterparts across the region, Czech Prime Minister Petr Fiala said that by supporting Ukraine with weapons, the Czech Republic and other countries in the region were also taking "vital steps towards our own survival"[6]:

> "Ukraine's fight is our fight too. The Czech Republic's fight, the European Union's fight, the whole of Europe's fight. Our own geopolitical prospects depend on the outcome of this war. The fate of Ukraine is directly linked to the international order in which we must live, and it will decide what the aggressors of the world will be allowed to do in the future. Therefore, without a free Ukraine, there is no free Europe. And if Russia destroys Ukraine, it is us — Central and Eastern Europe — who are standing right behind it, waiting in line to be attacked next."[7]

This heightened perceived threat in CEE from Moscow was also fuelled by years-long attempts by Russia to weaponize energy against Europe, particularly during the winter of 2022/23 when "Vladimir Putin hoped to bring Europe to its knees over the winter season by drastically cutting Russian gas supplies".[8] Russia's

[5] Gotev, "Eleven European Nations in Estonia Pledge Weapons for Ukraine."
[6] Fiala, "Czech PM: Ukraine's Fight Is Our Fight Too."
[7] Fiala, "Czech PM: Ukraine's Fight Is Our Fight Too."
[8] Sabadus, "Putin Failed to Freeze Europe but Russia's Energy War Will Continue."

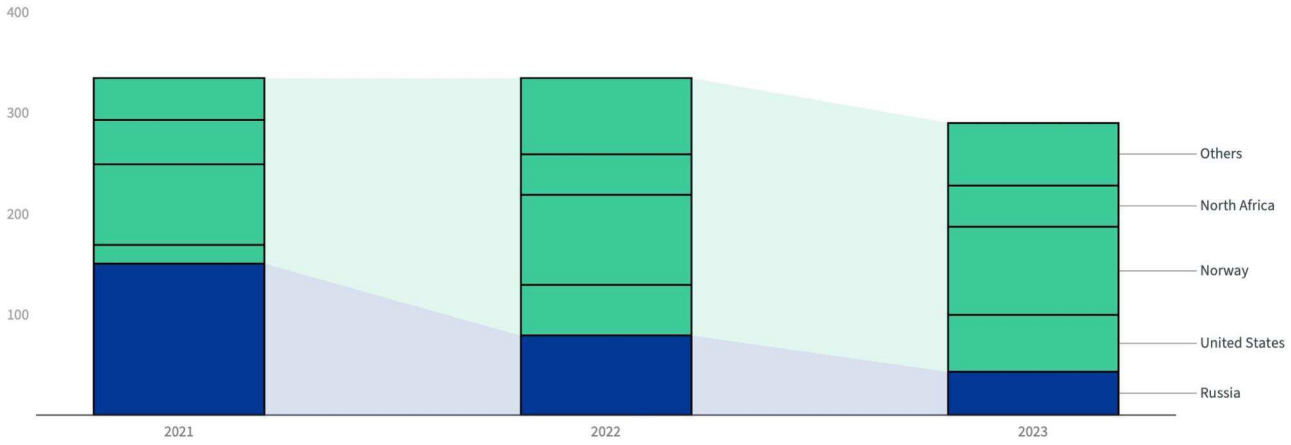
significant leverage over Europe in terms of energy supply security had been years in the making, as described in an October 2022 article in *Atlantic Council*.

> "This is the latest and most extreme escalation in Vladimir Putin's long-running energy war against the West. For years, the Russian dictator has used energy as a weapon in his efforts to subjugate Ukraine and divide Europe. He now hopes to freeze Ukrainians into submission while also using supply cuts to pressure European leaders into abandoning their support for Ukraine … Europe's reliance on Russian energy resources predates Putin and can be traced all the way back to the height of the Cold War. In 1972, Soviet deliveries accounted for around 4% of European gas consumption. By 2021, Russia was providing almost 40% of Europe's gas. As Moscow's market share has gradually risen, Russia's ability to manipulate prices and trigger crises has also increased. Most Europeans now acknowledge that this reliance on Russia represents a major strategic blunder. Thankfully, it is not irreversible."[9]

Collectively, since February 2022, Europe has made significant strides to reduce its reliance on Russian natural gas, with Russia's overall share of the EU gas market dropping from 40% in 2021 to 15% by 2023, as the following table from the European Commission shows (as measured in billions of cubic meters of natural gas).[10]

<u>European Import of Natural Gas:</u>[11]

[9] Yatsenyuk, "Europe Must Make This the Last Winter of Weaponized Russian Energy Exports."
[10] "Where does the EU's gas come from?"
[11] "Where does the EU's gas come from?"



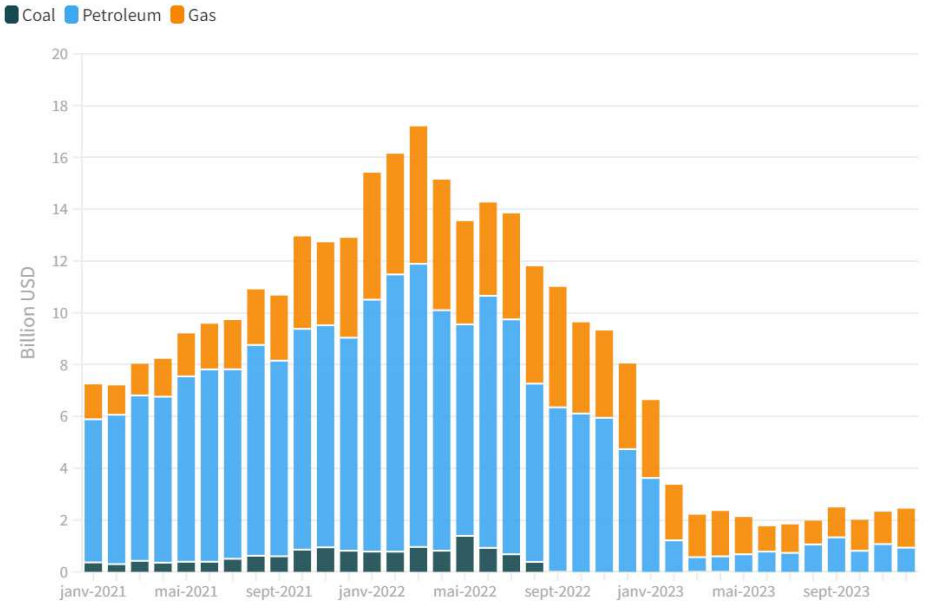

Source: European Commission based on ENTSO-G and Refinitiv

When trade in oil is added to this picture, it emerges clearly that two years on from Moscow's full invasion of Ukraine, the European Union has largely succeeded in eliminating its reliance on Russian fossil fuel energy products. Between January 2021 and December 2023, EU imports of Russian oil and natural gas decreased from about $16 billion in monthly trade to $1 billion, as the following chart from the Brussels-based think tank Bruegel illustrates.[12]

Russian Energy Exports from the EU:[13]

[12] "The European Union-Russia Energy Divorce: State of Play."
[13] "The European Union-Russia Energy Divorce: State of Play."

**Figure 1: Russian energy exports to the EU, $ billions, Jan 2021 – Dec 2023**




Source: Bruegel (Darvas et al, 2022).

This shift in European energy policy has had an additional dynamic in the CEE region, related to the closer history it has had with Moscow compared with Western Europe as well as its decades-long ties with Russia's nuclear power industry. Despite the CEE region's adverse history with Russia – specifically, during the Soviet period but in some situations dating even farther back – after the collapse of the Soviet Union and democratization efforts in Russia, CEE countries looked to Russia as a trading partner seemingly moving in a democratic direction.[14] This was also reflected in these countries' nuclear energy policy, as they looked towards collaborating with Russian companies in building new nuclear power plants and establishing and maintaining the already existing nuclear fuel supply chains with Russia, which often dated back to the Soviet period.[15] But as with Europe's larger pull-back from Russian fossil energy in the wake of the February 2022 invasion of Ukraine, the CEE region's desire to work with Russia on nuclear energy has largely

[14] Brands, "Six Propositions."
[15] Jack and Cooper, "Russian Nuclear Fuel."

faded as Russia continues to wage war in Ukraine. With the exception (so far) of Hungary,[16] CEE countries have concluded that it is of strategic importance for them to swiftly move away from reliance on Russian nuclear supply chains and to strengthen their ties with non-Russian nuclear energy suppliers.[17]

This paper will examine how the Russian aggression in Ukraine is affecting nuclear energy policy in CEE countries, including their plans to build new reactors and to shift away from Russian nuclear fuel for their existing reactors, as part of the overall energy policy changes taking place in Europe as a result of the war in Ukraine. I will do this by analyzing the chronological policy decisions of CEE countries with regards to nuclear energy. The time frame covered mostly concerns the months and years after February 2022, because Russia's full invasion of Ukraine clearly led to most of the changes in policy that this thesis is considering. However, policy changes in some countries also occurred after the events in Ukraine of 2014 and even before then, and therefore we must look at these events as well, as they directly relate to the dynamics under consideration and constitute signposts in the larger U.S./Russian great power competition in the region as articulated in the market for civilian nuclear technology. In addition, I will pair these empirical observations with considerations about IR theories and opinions by experts on the shifting geopolitical dynamics. This paired form of analysis – applying IR theory and scholarly opinions to chronological policy analysis – will attempt to answer the following research questions:

1. What concrete steps have CEE countries taken to change their nuclear energy policy, including shifting away from Russian nuclear supply chains, due to national security concerns in the wake of Russia's war in Ukraine?

[16] Gizińska and Sadecki, "Russia's nuclear project in Hungary: France's growing role."
[17] Brands, "Six Propositions."

2. What other factors (such as climate change and energy system reliability and affordability) have contributed to the changing nuclear energy policies in CEE, beyond concerns about reducing energy reliance on Russia?
3. In what ways does IR theory help to illuminate the nuclear policy changes underway in the CEE region, and what role has great power competition played in these developments?

## 2. Methodology

As stated above, to answer these questions, this paper will rely on a methodology that combines empirical evidence drawn from a multiple case study of CEE countries, together with an analysis of historical and present-day nuclear energy policy in Europe as well as considerations of how today's changing climate and energy landscape, together with IR theory and geopolitical considerations including the decades-long competition between Russia and the US in CEE, can help to shine a light on the motivations driving policy changes across the region.

Given the nature of this thesis and the fact that this topic is very current and is still developing, a lot of primary sources, in the form of newspaper and journal articles, for example, will be used. This is especially true for the part of the thesis that analyzes the policy actions of the individual CEE countries, particularly their decisions about which foreign companies they will contract for building new nuclear power reactors and supplying nuclear fuel. This includes such information as official tenders for new reactors as well as statements by CEE nuclear companies, EU and national leaders, and governments (sometimes as quoted in media articles, sometimes taken from official government sources), as well as data and other information and analysis provided by relevant international organizations in the nuclear sector, such as the World Nuclear Association (WNA) and the International

Atomic Energy Agency (IAEA). A number of secondary sources are also used, especially in framing the theoretical aspect, describing my methodology, during the literature review, and also when discussing earlier historical context (rather than recent and current events).

## 3. Theoretical Framing and Literature Review

Before delving into the details of the CEE countries in the context of our topic, let us briefly discuss IR theory. Specifically, realist theory and notions of great power competition will be discussed. Subsequently, a brief literature review of scholarly perspectives on Russia's evolving position in the world will be conducted in order to acquire a better and more critical understanding of this thesis topic.

Realism is highly relevant when talking about power interests and shifting dynamics of influence in the IR and geopolitical contexts. To be more concrete, realism in IR is a theory claiming that the primary motivation behind the foreign policy of states is national economic and geopolitical interest. Also defined as "political realism"[18], it focuses on and emphasizes the conflictual side and interest-oriented side of international politics while placing less emphasis on the cooperative nature of international politics.[19] Realism is often contrasted against liberalism (another school of IR theory) because liberalism focuses on international cooperation rather than international conflict and national self-interest.[20] Moreover, liberalism "posits that international law organizations and nongovernmental organizations are equally important factors in world politics while rejecting the realist theory that international relations are a zero-sum game"[21].

[18] "Political Realism in International Relations."
[19] "Political Realism in International Relations."
[20] "Political Realism in International Relations."
[21] "7 Components of Liberalism."

In the context of the changing power dynamics in Europe (and the world) in the wake of the Ukraine war, realism seems to have made a comeback in the study of IR as scholars reawaken to the enduring relevance of realism and the shortcomings of liberalism in IR analysis. This marks a departure from the post-Cold War period, when realism had been thought to be a thing of the past as the West increasingly championed the idea of a universally triumphant liberal world order. This rather fanciful notion, in hindsight, was most famously articulated by American scholar Francis Fukuyama following the end of the cold war. "What we may be witnessing is not just the end of the Cold War, or the passing of a particular period of postwar history, but the end of history as such: that is, the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final form of human government".[22] Aaron Freidber, a leading IR scholar describes the general arc of this idea propagated by Fukuyama, among others, as well as its eventual bankruptcy:

> "Starting in the early 1990s the explicit aim of U.S. and wider Western policy towards both Russia and China was to transform them eventually into liberal, democratic, status quo powers. As they joined an increasingly integrated global economy, it was assumed that both countries would face overwhelming pressure to fully liberalize their own economies, reducing the power of the state and expanding the role of the market. Economic growth, in turn, would give rise to an expanding middle class, a segment of society whose members have historically been among the strongest advocates and defenders of democratizing political reforms. In time the two Eurasian giants would enter what some political scientists referred to as the "democratic zone of peace," a community of like-minded nations in which disputes would be

[22] Fukuyama, "The End of History?"

> resolved through negotiation and compromise rather than the threat or use of force. Even before this transformation was complete, however, leaders in both Moscow and Beijing would come to see that their nations' interests were best served by accepting the rules and norms of a U.S.-led international system. Engagement would help Russia and China grow richer and stronger faster than they could otherwise have done. But it would also change them in ways that made their newfound power unthreatening to the interests and values of the established democracies … This strategy for incorporating Russia and China into a truly global, liberal order has now clearly failed."[23]

Other experts draw even stronger conclusions about the shortcoming of liberalism while emphasizing the importance of realism. For example, John J. Mearsheimer, professor of political science at the University of Chicago, claims that if "American policymakers adopted a realist foreign policy after the cold war ended in 1989, the world would be considerably less dangerous today"[24]. Mearsheimer goes on to argue that between 1991 and 2017, "both Democratic and Republican administrations abandoned realism and tried to create a global order based on the values of liberal democracy — rule of law, market economies and human rights — under the benign leadership of the US. Unfortunately, this strategy of 'liberal hegemony' was a near-total failure, and it played a major role in creating the troubled world of 2023"[25]. When looking specifically at the impacts of Russia's aggression in Ukraine, this becomes even more evident as "Vladimir Putin's aggression suggests that the patterns of hostility between East and West have not disappeared and are coming back with a vengeance. Instead of blurring boundaries and peaceful relations, we seem to be witnessing a new Cold War, with NATO reinforcing its Eastern flank as a

[23] Friedberg, "How the West Got Russia and China Wrong."
[24] Mearsheimer, "Great Power Rivalries: The Case for Realism."
[25] Mearsheimer, "Great Power."

bulwark against Russia and its allies while the latter are seeking to bolster their influence in the former Soviet space"[26]. As a consequence, most "commentators see current events as a vindication of (neo)realism"[27]. In a March 2022 article in *Foreign Policy*, Stephen M. Walt, a leading IR scholar and Harvard University professor, also argued that the Ukraine war highlights the importance of realism:

> "… it is obvious to me that these troubling events have reaffirmed the enduring relevance of the realist perspective on international politics. At the most general level, all realist theories depict a world where there is no agency or institution that can protect states from each other, and where states must worry about whether a dangerous aggressor might threaten them at some point in the future. This situation forces states—especially great powers—to worry a lot about their security and to compete for power. Unfortunately, these fears sometimes lead states to do horrible things. For realists, Russia's invasion of Ukraine (not to mention the U.S. invasion of Iraq in 2003) reminds us that great powers sometimes act in terrible and foolish ways when they believe their core security interests are at stake. That lesson doesn't justify such behavior, but realists recognize that moral condemnation alone won't prevent it. A more convincing demonstration of the relevance of hard power—especially military power—is hard to imagine. Even post-modern Germany seems to have gotten the message."[28]

While Walt points out the importance of acknowledging the realist political motivations behind Russia's invasion of Ukraine, as opposed to the ideological ones, he also highlights that it "made perfect sense that states in Eastern Europe wanted to

[26] "Russia's War and the Future of European Order."
[27] "Russia's War and the Future of European Order."
[28] Walt, "An International."

get into NATO (or as close to it as possible), given their long-term concerns about Russia"[29].

Whatever the intricacies of each different perspective on the situation may be, this literature review suggests that, as the Ukraine war progresses, the realist perspective is making a significant comeback as scholars and governments recognize the shortcomings of liberalism and the evident and, now, ever-so-obvious failure of the post-Cold War ambition to create a liberal world order.

Another key feature of IR theory that merits discussion – and ties into the above-mentioned realist claims about the Ukraine conflict – is Great-Power Competition (GPC). Daniel Nexon, a professor at Georgetown University, stated in a 2021 article in *Foreign Affairs* that "competition among great powers cannot return, because it never really went away".[30] GPC is defined as a "a permanent, compulsory, comprehensive, and exclusive contest for supremacy in a region or domain among those states considered to be the major players in the international system. The contest varies in intensity over time and space but remains a persistent aspect of the international system of sovereign states".[31] Indeed, the military interventions conducted by Russia from 2008 to 2022, including in Georgia and Syria as well as Ukraine, "suggests that dissatisfied great powers have the capability and willingness to use subversion, political and information warfare, covert operations, and even large-scale military action in the great-power contest for power, security, and status".[32] Hal Brands of the Johns Hopkins University School of Advanced International Studies (SAIS) makes a similar argument:

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[29] Walt, "An International."
[30] Nexon, "Against Great Power Competition: The U.S. Should Not Confuse Means for Ends."
[31] DiCicco and Onea, "Great-Power Competition."
[32] DiCicco and Onea, "Great-Power Competition."

> "...great-power competition and revisionism are sharper today than at any time since the end of the Cold War. We are seeing that competition in the geopolitical realm, in the sense that Russia and China are increasingly seeking to carve out spheres of dominant influence within their respective 'near abroads,' to undermine U.S. alliances and partnerships in these areas, and to develop military capabilities needed to achieve regional primacy and project power even further abroad."[33]

This highlights that in the opinions and arguments of many IR experts, competition and self-interest based theories are highly relevant, particularly when combined with an emphasis on GPC – in this case, on Russian competition with NATO/USA.

Realist and GPC theories are highly relevant when talking about Russia and CEE and, specifically, in the context of this essay: nuclear energy policy. One can glimpse the threads of these theories being played out in the situation we are analyzing. When Russia took steps towards becoming a democratic country in the 1990s, it was seen as an economic partner moving in a liberal direction rather than a threat (as it is seen nowadays).[34] In fact, a lot of CEE countries continued and/or established nuclear fuel supply chains with the new Russian state.[35] This is, for example, true for countries such as Hungary and the Czech Republic. Hungary still relies on Russian nuclear for its Russian built nuclear reactors and the Czech Republic until recently also relied fully on Russian nuclear fuel but is now diversifying its fuel supply chain with American Westinghouse fuel[36]. GPC theory helps to illuminate the backdrop of the current crisis, as both Russia and the U.S. have competed fiercely in the CEE over the last two decades on nuclear power

[33] Brands, "Six Propositions," 2.
[34] Brands, "Six Propositions."
[35] Ciobanu et al., "Central Europe's Nuclear Plans: Hot Stuff."
[36] Jack and Cooper, "Russian Nuclear."

technology. The Czech Republic, in particular, has been a theater of this competition; one need only recall the 2012 visit to Prague of then-Secretary of State Hillary Clinton, who strongly argued for the Czechs to choose Westinghouse nuclear technology over Russia's, citing security concerns.[37] But with Putin's gradual invasion of Ukraine starting in 2014, Russia generally came to be seen as more of a threat to the national self interest of CEE countries, rather than as a potential partner contributing to economic growth and prosperity through the provision of nuclear technology,[38] as will be further demonstrated throughout this paper. Thus, following this recognition of a more threatening and potentially dangerous Russia, we see the shift away from CEE collaboration with Russia – as, in the context of this paper, marked by the move away from planning to build reactors with Russian companies, the attempt to sever Russian nuclear fuel supply chains, and the establishing of nuclear supply chains with non-Russian companies. This course of action fits within the context of a realist IR worldview amid a backdrop of GPC, where state foreign policy is determined by national self interest and by the weighing of threats and benefits to national self interest, while also influenced by the priorities of the prevailing great power of the moment.[39]

## 4. Nuclear Power in Europe

Let us now examine nuclear power within the context of Europe pointing to history and the current state of the European Union (EU) debate on nuclear energy, as it is crucial to the topic of this thesis. CEE inevitably plays a fundamental role in this debate and, also, is consequently heavily affected by EU energy policy. It is important to point out that one of the main pillars on which the EU was founded and

[37] Richter, "Westinghouse Win Would Enhance Your Energy Security, Clinton Tells."
[38] Brands, "Six Propositions."; "RECOMMENDATIONS AND CONCLUSION."
[39] Simon, "How America Is Pushing Its Energy Interests in Europe."

on which EU states began collaboration, was nuclear energy. “Nuclear policy has been present from the very beginning of the European Union. The six founding nations signed the Treaty on the European Atomic Energy Community (Euratom Treaty) in 1957, which is one of the three founding treaties establishing the EU”.[40] This goes back to the formation of Euratom, the pan-European organization that both promotes and oversees the peaceful use of  nuclear technologies in the bloc. “The treaty pooled core aspects of the nuclear industries of member states, ensured standards for nuclear safety and security, and promoted cooperation in research and development into nuclear energy. R&D was critical: at the time, American players dominated nuclear technology, which they licensed out to European energy providers. Building out European nuclear capacity was, beyond a project to work together toward the peaceful use of nuclear energy, also seen as an instrument for Europe to eventually achieve energy independence”.[41] However, following the Fukushima Daiichi nuclear accident in Japan in 2011, a handful of key European countries began to shut down their nuclear power plants. In this, Germany was the leader. Less than three months after the accident, Berlin decided to phase out nuclear power entirely. Germany, which before Fukushima had gotten a quarter of its electricity from nuclear power, had shut down all its reactors by 2024.[42] Elsewhere in Europe, after the accident in Japan, “Belgium confirmed plans to exit nuclear power by 2025. In Italy, a government-backed plan to bring back nuclear power, shuttered since 1990, fizzled. And countries such as Spain and Switzerland decided not to build new nuclear plants. Between 2011 and 2020, some 48 GWe of nuclear capacity was lost globally as a total of 65 reactors were either shut down or did not have their

[40] Judah et al., “How to Strike a Grand Bargain on EU Nuclear Energy Policy.”
[41] Judah et al., “How to Strike a Grand Bargain on EU Nuclear Energy Policy.”
[42] “Germany.”

operational lifetimes extended".[43] Following Fukushima, there was a fundamental split in approaches to nuclear energy in Europe: France, which gets almost three-quarters of its electricity from nuclear power, the largest share of any other country in the world, became the main European advocate for nuclear energy, and Germany its main opponent.[44] France went on to strongly champion the technology, arguing for its necessity in mitigating climate change, gaining energy independence and powering industry. "France has long been a European leader in nuclear power, pushing for its recognition as a low-carbon energy source."[45] France's pro-nuclear stance ended up being strongly backed by CEE countries;[46] in fact, in 2023 an alliance for the support of nuclear power in Europe was started which is made up mainly of CEE countries, informally led by France. "The group is made up of Bulgaria, Croatia, Finland, Czech Republic, Hungary, the Netherlands, Poland, Romania, Slovakia and Slovenia alongside France"[47]. Germany, on the other hand, has been a strong anti-nuclear voice within the EU,[48] together with Austria and Luxembourg. As of this writing, Germany has now shut down all 33 of its formerly operating nuclear power reactors, living up to its post-Fukushima pledge to fully exit the technology.[49] This move has obviously come with a heavy cost on Germany's large and highly skilled manufacturing industry, as they had to replace nuclear with other power sources, which led to the establishment of a massive supply chain and reliance on Russian gas as well as the re-introduction of coal-fired power plants. "Perhaps the most important country opposing nuclear is Germany—which also happens to be the E.U.'s largest user of Russian energy. Germany's ruling coalition partner Green Party

[43] Paillere, "Nuclear Power 10 Years After Fukushima: The Long Road Back."
[44] Frost, "Europe Is Divided on Nuclear Power: Which Countries Are for and Against It?"
[45] Frost, "Europe Is Divided on Nuclear Power: Which Countries Are for and Against It?"
[46] Davey, "Nuclear Power in the Soviet Bloc."
[47] Frost, "Europe Is Divided on Nuclear Power: Which Countries Are for and Against It?"
[48] Campbell, "As Putin Threatens Nuclear Disaster, Europe Learns to Embrace Nuclear Energy Again."
[49] "Germany."

has its roots as an advocacy group specifically in opposition to nuclear energy, and the country was about to take its nuclear power offline when the war began. As Russian tanks rolled into Ukraine in February, Robert Habeck, German Vice-Chancellor and a Green Party leader, said he wouldn't rule out extending the life of Germany's three remaining nuclear plants on 'ideological' grounds. But he soon backtracked and insisted decommissioning would take place as planned. Instead, Germany has gone cap in hand to Qatar and the UAE to seek alternative sources of liquid natural gas despite climate and human-rights concerns".[50] All in all, following Fukushima and the German move away from nuclear power, France and CEE, on the other hand, have been arguing for the importance of low carbon and dispatchable (energy that runs at all times and is independent of the weather and light – which, for example, solar and wind require) nuclear energy[51] and actively planning to expand its use for a number of reasons, including energy supply security, energy independence and the need to reduce greenhouse gas emissions to meet climate change targets. "Across Europe, there has been a growing acceptance that nuclear energy is a vital plinth of efforts to fight climate change, and Russia's invasion of Ukraine has catalyzed that trend by injecting a national security argument. And as a leader in revolutionary new nuclear technology, the U.S. stands to be the chief geostrategic beneficiary of any revival".[52]

While security concerns have played a role in Europe's bid to reduce its energy dependence on Russia and increase its energy independence, this has been especially true especially in CEE,[53] but not only. "The war in Ukraine has intensified interest

[50] Campbell, "As Putin Threatens Nuclear Disaster, Europe Learns to Embrace Nuclear Energy Again."
[51] Frost, "Europe Is Divided on Nuclear Power: Which Countries Are for and Against It?"
[52] Campbell, "As Putin Threatens Nuclear Disaster, Europe Learns to Embrace Nuclear Energy Again."
[53] Khan et al, "Investigating the Relationship Between Geopolitical Risks and Economic Security: Empirical Evidence From Central and Eastern European Countries."

across Europe in building new nuclear energy plants or extending the lives of old ones to liberate the continent from its heavy reliance on Russian oil and natural gas"[54] and the countries which refuse nuclear (Germany, for example) are experiencing major difficulties. In fact, the breaking away of Germany from Russian supply chains in light of the energy crisis posed a major problem for Germany, as described in a Washington Post article from October 2022:

> "Now, fallout from the war is forcing a further reassessment of modern Germany's foundations. The nation grew prosperous, establishing itself as the economic engine of Europe and the world's fourth-largest economy, by relying on the twin pillars of cheap Russian energy and manufacturing exports. But as the German economy sputters — threatening to drag down Europe with it — the economic model that gave rise to Germany, Inc. has been thrown into doubt … The souring of Western ties with Moscow has had outsize impact here. Before the war, Russia supplied more than half of the natural gas used in Germany — for industrial production, to heat homes and to generate electricity. Now, with the main pipeline from Russia shut off, Germany has had to seek other suppliers, and is paying seven to 10 times last year's prices."[55]

Secondly, environmental concerns have been a growing factor as the scientific community is coming to an increasing consensus: nuclear energy has a key role to play in mitigating climate change as nuclear "power is an important source of low-carbon electricity and heat that can contribute to attaining carbon neutrality and hence help to mitigate climate change"[56]. Furthermore, in "2018, the

[54] Mufson and Parker, "War in Ukraine Generates Interest in Nuclear Energy, Despite Danger."
[55] Anthony Faiola and Vanessa Guinan-Bank, "Germany Got Rich on Exports and Cheap Russian Gas. Now, It's in Trouble."
[56] "Global Climate Objectives Fall Short Without Nuclear Power in the Mix: UNECE."

Intergovernmental Panel on Climate Change (IPCC) published a 400-page special report, 'Global Warming of 1.5°C,' which offered four 'illustrative pathways' to achieving the goal of limiting the increase in the average global temperature and thereby, staving off the worse effects of climate change. All four pathways showed an increase in the use of nuclear power compared to current levels, ranging from 59% to 106% by 2030, and from 98% to 501% by 2050"[57]. Moreover, in comparison to Germany, France has far lower greenhouse gas emissions, mostly due to the use of nuclear energy. "In 2021, France's fossil greenhouse gas (GHG) emissions stood at 302.33 megatonnes, roughly 45 percent of Germany's 665.88 megatonnes (EU Commission)."[58] For these reasons, some European countries are increasingly realizing the importance of nuclear power if they wish to combat climate change. "At a meeting in Stockholm in February 2023, eleven member states agreed to deepen cooperation on nuclear energy. This pro-nuclear alliance, with France at its helm, includes Bulgaria, Croatia, the Czech Republic, Finland, Hungary, the Netherlands, Poland, Romania, Slovakia, and Slovenia, with Belgium and Italy joining as observers. At the core, these member states envision the electricity source as central to the energy transition and want it placed 'on an equal footing' with renewables as a low-carbon source of energy."[59] The growing global consensus on the role of nuclear energy in climate change mitigation was most notably underscored in at the 2023 United Nations Climate Change Conference (COP28), when for the first time ever 198 nations that take part in the conference called for the accelerated deployment of nuclear energy to achieve deep and rapid decarbonization; in addition, 22 countries (12 of them from CEE) at COP28 pledged to triple nuclear power capacity by 2022.[60]

[57] Campbell, "As Putin Threatens Nuclear Disaster, Europe Learns to Embrace Nuclear Energy Again."
[58] "How Germany's and France's Climate Policies and Greenhouse Gas Emissions Compare."
[59] Judah et al., "How to Strike."
[60] "COP28 Recognises the Critical Role of Nuclear Energy for Reducing the Effects of Climate Change."

Thirdly, beyond climate change objectives, affordable and predictable energy prices play a crucial role in the development and functioning of industry, the pillar of the German economy. Germany's move away from nuclear and consequential move towards Russian natural gas and oil supplies became a major problem in light of the 2021 energy crisis. "Germany previously imported around half of its gas from Russia and more than a third of its oil. But Russia cut off the country's gas supply in August, while Germany halted Russian oil imports at the start of the year. In its race to find alternate sources of energy, the country has reopened coal-fired power plants, delayed plans to shut down its three remaining nuclear power plants, and pushed to increase capacity to store natural gas imported from other countries such as Norway and the US."[61] In fact, in light of this, Germany had to swiftly transition to importing American liquified natural gas and built ports in the north of the country, as a Reuturs article from October 25, 2023 describes.

> "Gas grid company Gascade has obtained approval from mining authorities to complete a link for a pipeline linking Mukran port on the German Baltic Sea island of Ruegen with Lubmin on the mainland so that more liquefied natural gas can flow (LNG). This is the basis for getting the Mukran reception terminal for LNG vessels going, Gascade said in a press release announcing the green light, adding it aimed to complete construction by year-end. Private company Deutsche Regas is pursuing Mukran to complement other terminals. Germany's quest to increase LNG import capacity has intensified as it seeks to end reliance on Russian pipeline gas after Russia invaded Ukraine last year."[62]

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[61] "Germany Says It Is No Longer Reliant on Russian Energy."
[62] "Germany Builds up LNG Import Terminals."

Also, Poland, in light of these problems swiftly moved towards making plans with Westinghouse to build its first nuclear power reactors. This is described in a Reuters article published on October 28, 2022, "U.S. firm Westinghouse Electric Co will build Poland's first nuclear power plant, Prime Minister Mateusz Morawiecki said on Friday, confirming a long-awaited decision aiming to reduce the country's carbon emissions and phase out coal. With Russia waging war in neighboring Ukraine, Poland's choice of a partner from the United States underlines the emphasis Warsaw places on relations with Washington at a time when its security is in the spotlight … 'U.S. partnership on this project is advantageous for us all: we can address the climate crisis, strengthen European energy security, and deepen the U.S.-Poland strategic relationship,' Vice President Kamala Harris said in a tweet"[63]. Also, in light of the increase in energy prices the public consensus changed dramatically with anti-nuclear voices becoming less influential. "The energy crisis sparked by Russia's invasion of Ukraine has seen the proportion of European citizens objecting to nuclear energy fall from 26% in 2021 to 15% in 2022."[64]

All these factors combined with the war and the energy crisis have begun to shift European perspectives on nuclear energy. This was mirrored in EU legislation in July 2022 ruling investments in nuclear power to be climate friendly.[65] This new legislation added nuclear to the "EU 'taxonomy' rulebook" which allows investors to "label and market investments in them as green".[66] Furthermore, following the energy crisis a number of European countries which were on the road to either shutting down reactors, reducing the footprint of their nuclear power programs or pulling out of the technology altogether.[67] This is true for countries such as Germany

[63] Pawlak and Koper, "Poland Picks U.S. Offer for Its First Nuclear Power Plant, Prime Minister Says."
[64] Dalton, "Energy Crisis Sees Major Shift in Support for Nuclear, Research Suggests."
[65] Abnett, "EU Parliament Backs Labelling Gas and Nuclear Investments as Green."
[66] Abnett, "EU Parliament Backs Labelling Gas and Nuclear Investments as Green."
[67] "Energy Crisis Revives Nuclear Power Plans Globally."

(Von Der Burchard and Fiedler), Sweden (Harris), France (Rfi), the UK (Chestney), and Belgium.[68] More specifically, less "than a month after Russia's attack on Ukraine, Belgium delayed by a decade its plan to scrap nuclear energy in 2025".[69] France, meanwhile, extended by 10 years the operation of its Tricastin reactor,[70] and then in 2024, announced a reversal of its previous nuclear reduction policies and the adoption of a new plan instead to build six to twelve large reactors[71].

## 5. Historical Background About Nuclear Energy in CEE and About the Importance and Role of Nuclear Energy in General

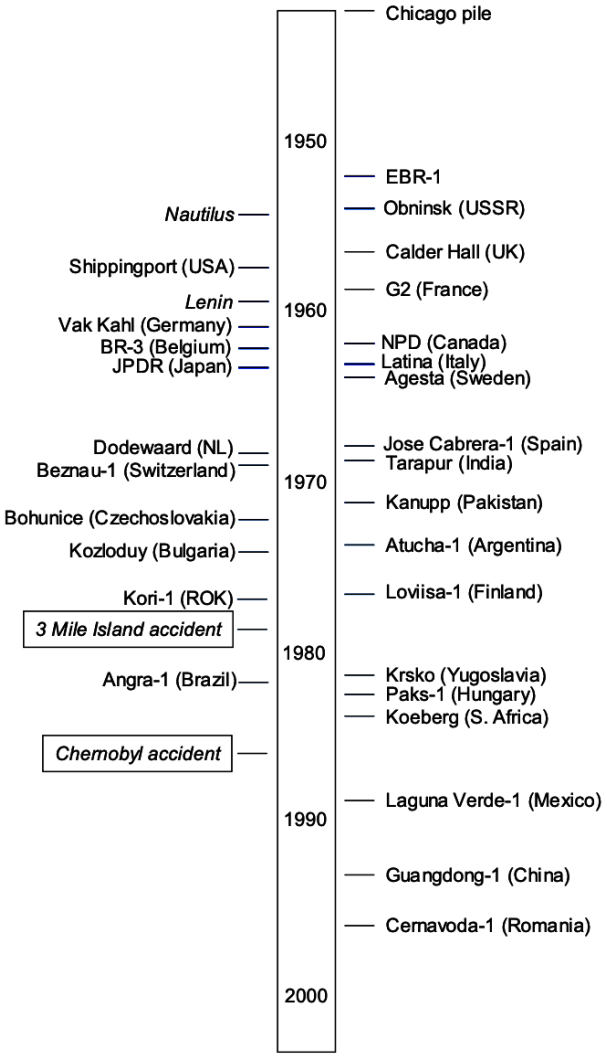
When talking about the history and contextual background in CEE – especially when considering the individual cases of countries such as Romania, Finland, or Czechoslovakia – one must differentiate between one dividing historical factor; that of Eastern Bloc versus Western Bloc countries. Specifically, Finland and Sweden have been independent countries following the Second World War till now[72] – even though Finland was locked into a limiting tight treaty with the Soviet Union, they were not under direct influence or occupation[73]. Whereas, for example, Czechoslovakia or Poland were Eastern Bloc countries that were until 1989 part of the Warsaw Pact, therefore the development as well as the context in which nuclear energy operates is slightly different. That being said, Finland and Sweden also have a rather antagonistic history with Russia[74] and, clearly, considering their security considerations, see Russia as a threat to their national sovereignty and security to

[68] "Energy Crisis Revives Nuclear Power Plans Globally."
[69] "Energy Crisis Pushes Nuclear Comeback Worldwide."
[70] "France Extends Lifespan of 40-year-old Nuclear Reactor to Meet Energy Needs."
[71] "France Drops Renewables Targets, Prioritises Nuclear in New Energy Bill."
[72] Chatterjee, "How Sweden and Finland Went From Neutral to Nato."
[73] Chatterjee, "How Sweden."
[74] Chatterjee, "How Sweden."

this day[75]. Swedish nuclear reactors were first developed in a pre-1989 Western European economy and initially free of Russian or potential Russian influence and collaboration.[76] The Finns built a nuclear reactor in the 1970s and 1980s with Soviet technology.[77] They were, however, operating as a neutral country (which in practice was more part of the Western Bloc) and, in fact, they shortly thereafter built another reactor with a Swedish company. "Another nuclear power plant in Finland, Olkiluoto, is located on the west coast of the country, about 100 km north of Turku. It has two working reactors OL1 and OL2, built at the turn of the 1970s and 1980s. The reactors were built with Swedish technology."[78] On the other hand, nuclear reactors in Eastern Bloc countries such as Bulgaria, Hungary and Czechoslovakia (and the Czech Republic and Slovakia) are Russian designs.[79] There was an exception in Romania, which built a reactor in the 1970s and 1980s with Canadian Candu technology.[80] After the Berlin wall came down, these decades-old nuclear ties between Russia and CEE continued, with the Czech Republic completing new Russian designed reactors at Temelin in 2000 and 2002, and Slovakia last year connecting to the grid a Russian designed reactor, whose construction had started years earlier.[81] The following chart shows a history of nuclear reactors built around the world until the mid-1990s.

History of Nuclear Reactors Built Around the World Until the Mid-1990s:[82]

[75] Binnendijk and Rodihan, "FINNISH AND SWEDISH NONALIGNMENT AND DEFENSE POSTURES."
[76] Kåberger, "SWEDISH NUCLEAR POWER AND ECONOMIC RATIONALITIES," 191–206.
[77] Tm/Mw, "Oldest Nuclear Plant Loviisa Will Run Until 2050: Finland."
[78] Tm/Mw, "Oldest Nuclear Plant Loviisa Will Run Until 2050: Finland."
[79] Mathieson, "Nuclear Power in the Soviet Bloc."
[80] Mathieson, "Nuclear Power."
[81] "PRIS - Home."
[82] "50 Years of Nuclear Energy."




83

As one can see, the USSR built the first nuclear reactor in the Soviet Bloc in the 1970s in Bohunice in Czechoslovakia. Following that in the 1980s Paks-1 was built in Hungary and then the Canadian-designed Cernavoda-1 in Romania was finished in the 1990s which was after the fall of the USSR but it was started in the 1970s and 1980s.[84] Even though Poland has had some research reactors, a nuclear power reactor was never built in Poland during the Soviet period and, despite their recent plans to add nuclear power, the country still does not have a power reactor.[85]

[83] "50 Years of Nuclear Energy."
[84] Mathieson, "Nuclear Power."
[85] Kość, "Poland Gives Details on $20B Nuclear Power Bid."

Finland, on the other hand, built its first reactor named Loviisa-1, which is a Russian design, in the late 1970s. After 1989, many countries in the region continued to have their nuclear plants built by Russian companies partly because of their familiarity with the technology, which is one of the most affordable reactor technologies on the market and also benefits from attractive financing backed by the Russian state.[86] Other factors contributed to this include CEE's close proximity to Russia, continuing economic ties to Russia, and Russian general domination of the civilian nuclear market. "Russia, through its mammoth state-owned nuclear power company, Rosatom, dominates the global nuclear supply chain. It was Europe's third-largest supplier of uranium in 2021, accounting for 20 percent of the total. With few ready alternatives, there has been scant support for sanctions against Rosatom — despite urging from the Ukrainian government in Kyiv. For countries with Russian-made reactors, reliance runs deep. "In five European Union countries, every reactor — 18 in total — was built by Russia."[87]

It must be noted that Russia, in the 1990s, was moving in a seemingly democratic direction; however, Russian democratic institutions gradually began to be undermined after former KGB operative Vladimir Putin was handed the presidency from Boris Yeltsin at the end of the millennium. "Following Gorbachev, Boris Yeltsin made decisions that undermined democratic consolidation and to some extent paved the way for future autocratic restoration. The most notable of these was Yeltsin's naming of Vladimir Putin as his successor."[88] In his early years at the Kremlin, Putin enjoyed periods of semi-cordial relations with the West and Washington on certain issues, such as counter-terrorism during the Bush administration. But beginning with his speech to the Munich security conference in

[86] Lecavalier, "Russian nuclear power: Convenience at what cost?"
[87] Cohen, "Why Russia Has Such a Strong Grip on Europe's Nuclear Power."
[88] McFaul, "Road to Autocracy."

2007, Putin began implementing an aggressive policy abroad while continuing to further erode Russia's democratic course at home. His exploits in Russia's near-abroad kicked off in earnest with his 2008 invasion of Georgia, and then escalated with the 2014 annexation of Crimea[89] before the full invasion of Ukraine[90] in 2022. If some CEE countries could perhaps quietly turn a blind eye to Putin's Georgian excursion, and largely maintain the status quo (despite some sanctions) vis-a-via Moscow during the Crimea and Donbass crisis six years later, they could no longer look away after the full-on invasion of 2022. With the exception of Hungary, which we will discuss later, CEE countries broke decisively in their relations with Russia. One way in which this manifested itself was the move away from plans or considerations to build nuclear power reactors with Russian companies. This was fundamentally a security consideration due to the nature of nuclear power: building a nuclear reactor with a country's technology creates ties to that country for up to 100 years, effectively establishing a geopolitical lever and weapon for the constructing country, which must rely on its supplier for key spare parts and components related to plant operations and maintenance as well as, typically, the supply of nuclear fuel[91], which is uniquely fabricated to run in specific reactor technologies (one reason why switching fuel suppliers requires a lengthy process of testing and qualification)[92]. To further expand on this, the Russians, following 1989, with the next-generation evolution of their VVER light water reactor, had developed fairly simple but very efficient, safe and affordable civilian nuclear reactor technology.[93] This, along with a history of using the previous generation of this same technology, seems to have incentivized a lot of CEE countries to build with them following the revolution in

[89] Mackinnon, "The Other Ukraine War: Russia's 2014 Invasion."
[90] Borrell, "The War in Ukraine and Its Implications for the EU."
[91] Sullivan, "The Sources of American Power: A Foreign Policy for a Changed World."
[92] "Analysis of Nuclear Fuel Availability at EU Level from a Security of Supply Perspective."
[93] Karaby and Rosenbaum, "Russia Now World Leader in Nuclear Technology: Experts."

1989. The Americans, following the 3 Mile Island incident and Chernobyl, had largely stopped building nuclear reactors[94] and, as we have seen, the Germans started phasing out nuclear after Fukushima[95]. One significant result of this, despite the continued French presence in the global civilian nuclear market and the recent rise of South Korean nuclear technology[96], was to leave even more space open for Russian state nuclear behemoth Rosatom and its affiliate companies as they had less competition from the West.[97] Moreover, at least for several years post-1991, Russia was seen as a superpower to the east moving in a democratic direction, and mostly not as a threat. "A democratic Russia, though, will not seek to acquire new territory through the exercise of military force."[98] For this reason, economic collaboration with them in CEE was not necessarily seen as strategically dangerous. Also, it is important to note that all this time the Chinese have been consistently producing their own reactors and are now the biggest builder in the world (although their exports have thus far been limited to Pakistan). "As of January 1, of the 59 reactors under construction worldwide, 22 are in China, and 43 use Russian or Chinese technology."[99] This reluctance to produce nuclear reactors by the West, the affordable and effective supply of reactors by Russia, CEE proximity to, existing supply[100] chains and desire to collaborate economically with Russia post-1989, and the general desire in CEE for nuclear reactors as an affordable and sustainable dispatchable power source led to a number of CEE countries announcing plans or the possibility to build with Russian companies into the 2000s. . But this all started to change even before 2014, as Russia was beginning to be seen in CEE as a threat

[94] Plumer, "Why America Abandoned Nuclear Power (and What We Can Learn From South Korea)."
[95] Paddison et al., "'A new era': Germany quits nuclear power, closing its final three plants."
[96] "Seoul wins 40-billion-dollar UAE nuclear power deal."
[97] Cohen, "Why Russia Has Such a Strong Grip on Europe's Nuclear Power,."
[98] McFaul, "Russia's Transition to Democracy and U.S.-Russia Relations: Unfinished Business."
[99] Cessac, "Beijing and Moscow Dominate Global Nuclear Energy Trade."
[100] "Rosatom Enlists More Czech Suppliers."

again and GCP pressures came to mount in countries such as Bulgaria (which we will discuss later). Moreover, while CEE countries still wanted to collaborate with Russia, they became more and more leery of their large eastern neighbor. In fact, to mitigate energy supply risks, some CEE countries began to introduce Westinghouse fuel supply chains into their Russian reactors,[101] including the Czech Republic and Ukraine.

## 5. Multiple Case Study

This thesis will now focus on the details of the individual countries in the region and how each country has a slightly different history and narrative. A case study will be conducted in the form of various tables with statistics of each country and that will be followed by a brief discussion. Firstly, ex-communist countries such as Poland, Czech Republic, Romania, Hungary, and Bulgaria will be covered. Following this, non ex-communist countries such as Finland and Sweden will be discussed. Finally, Ukraine will also be briefly covered as its nuclear policy is central to our discussion.

### 5.1. Statistical Analysis:

The following case study, firstly, looks at the number of nuclear power reactors in each country and their national design origin  before 2014, after 2014 but before 2022, and after 2022. It also includes a table with power reactors in the individual countries that haven't been built yet but have been planned or announced. Specifically, it includes announced plans for power reactors to be built since 2014 and when these plans were announced.

[101] "The Ukraine Way and CEE Energy Security."

Secondly, the study looks into the statistics of nuclear fuel supply and diversification. Moreover, a table is included with announcements of plans by governments since 2014 to diversify their nuclear fuel supply.

Thirdly, a table with the share of nuclear energy in the overall energy mix of each country, is included, in order to better understand and contextualize the statistics.

Number of Operating Reactors in Each Individual Country and Their Design Origin Before 2014:[102]

| Before 2014 | Russian | Western (Western Europe or American Company) | Domestic |
|---|---|---|---|
| Poland[103] | 0 | 0 | 0 |
| Czech Republic[104] | 6 | 0 | 0 |
| Slovakia[105] | 5 | 0 | 0 |
| Romania[106] | 0 | 2 | 0 |
| Bulgaria[107] | 2 | 0 | 0 |
| Hungary[108] | 0 | 0 | 4 |
| Finland[109] | 2 | 2 | 0 |
| Sweden[110] | 0 | 3 | 7 |
| Ukraine[111] | 15 | 0 | 0 |

[102] "World Nuclear Association."
[103] "Nuclear Power in Poland."
[104] "Nuclear Power in Czech Republic."
[105] "Nuclear Power in Slovakia."
[106] "Nuclear Power in Romania."
[107] "Nuclear Power in Bulgaria."
[108] "Nuclear Power in Hungary."
[109] "Nuclear Energy in Finland."
[110] "Nuclear Energy in Sweden."
[111] "Nuclear Power in Ukraine."

Number of Operating Reactors in Each Individual Country and Their Design Origin After 2014 but Before 2022:[112]

| After 2014 Before 2022 | Russia | Western (Western Europe or American Company) | Domestic |
|---|---|---|---|
| Poland[113] | 0 | 0 | 0 |
| Czech Republic[114] | 6 | 0 | 0 |
| Slovakia[115] | 5 | 0 | 0 |
| Romania[116] | 0 | 2 | 0 |
| Bulgaria[117] | 2 | 0 | 0 |
| Hungary[118] | 0 | 0 | 4 |
| Finland[119] | 2 | 2 | 0 |
| Sweden[120] | 0 | 2 | 4 |
| Ukraine[121] | 15 | 0 | 0 |

Number of Operating Reactors in Each Individual Country and Their Design Origin After 2014 Invasion:[122]

| After 2022 Invasion | Russia | Western (Western Europe or American Company) | Domestic |
|---|---|---|---|
| Poland[123] | 0 | 0 | 0 |
| Czech Republic[124] | 6 | 0 | 0 |

[112] "World Nuclear Association."
[113] "Nuclear Power in Poland."
[114] "Nuclear Power in Czech Republic."
[115] "Nuclear Power in Slovakia."
[116] "Nuclear Power in Romania."
[117] "Nuclear Power in Bulgaria."
[118] "Nuclear Power in Hungary."
[119] "Nuclear Energy in Finland."
[120] "Nuclear Energy in Sweden."
[121] "Nuclear Power in Ukraine."
[122] "World Nuclear Association."
[123] "Nuclear Power in Poland."
[124] "Nuclear Power in Czech Republic."

| | | | |
|---|---|---|---|
| Slovakia[125] | 5 | 0 | 0 |
| Romania[126] | 0 | 2 | 0 |
| Bulgaria[127] | 2 | 0 | 0 |
| Hungary[128] | 0 | 0 | 4 |
| Finland[129] | 2 | 3 | 0 |
| Sweden[130] | 0 | 2 | 4 |
| Ukraine[131] | 15 | 0 | 0 |

The highlighted numbers are where there has been a change since the last graph. These tables do not show much of a change and are essentially unaffected by the invasion of Ukraine. This is because building a nuclear power plant takes a lot of time and cannot be done in only a couple years. The following table, which looks at plans to build new reactors since 2014, is much more telling and relevant to this paper's topic.

Plans to Build New Nuclear Reactors Since 2014:[132]

| COUNTRY | Year-Number of Reactors Announced to be Built-Company |
|---|---|
| Poland | July 2023-3 Reactors-Westinghouse (USA)[133] |
| Czech Republic | April 2012- Russia tossed out of tender for new reactor on security concerns[134] October 2023-1 Reactor-Bids Submitted by EDF (France), KHNP (South Korea), and Westinghouse (USA)[135] → this was |

[125] "Nuclear Power in Slovakia."
[126] "Nuclear Power in Romania."
[127] "Nuclear Power in Bulgaria."
[128] "Nuclear Power in Hungary."
[129] "Nuclear Energy in Finland."
[130] "Nuclear Energy in Sweden."
[131] "Nuclear Power in Ukraine."
[132] "World Nuclear Association."
[133] "Nuclear Power in Poland."
[134] "Czechs exclude Rosatom from nuclear tender after dispute with Russia."
[135] Janicek, "3 Energy Companies Compete to Build a New Nuclear Reactor in the Czech Republic."

| | |
|---|---|
| | expanded to 4 reactors in January 2024[136], and Westinghouse was dropped from consideration due to inability to guarantee a fixed price[137] |
| Slovakia | - |
| Romania | August 2023-6 Small Modular Reactors (SMRs)-NuScale (USA)[138] |
| Bulgaria | 2023-2 Reactors-Westinghouse (USA)[139] |
| Hungary | January 2014-2 Reactors-Rosatom (Russia)[140] |
| Finland | 2014-1 Reactor-Rosatom (Russia)[141] → CANCELED in May 2022[142] |
| Sweden | November 2023-2 Plans for 2 New Reactors-Company Unspecified[143] |
| Ukraine | September 2021-4 Reactors-Westinghouse (USA)[144]<br>June 2022-4 Reactors-Westinghouse (USA)[145] |

As evident from this table, since 2014, there has been a high demand for building nuclear reactors in CEE and all countries apart from Hungary want to build with non-Russian companies. The biggest spike in demand can be seen after the 2022 invasion in 2022 and 2023.

Plans Announced to Diversify Fuel Supply:[146]

| COUNTRY | Month and Year-Company |
|---|---|
| Poland | - |

[136] "Czech Government Now Seeks to Build up to 4 Nuclear Reactors Instead 1 to Reduce Price."
[137] "Czech Government Now Seeks to Build up to 4 Nuclear Reactors Instead 1 to Reduce Price."
[138] "Romania Sets Out Roadmap for Licensing of NuScale VOYGR."
[139] "Bulgaria to Push Ahead With Two New Units at Kozloduy."
[140] "Nuclear Power in Hungary."
[141] Tisdall, "Finland Gives Go-ahead to Joint Nuclear Venture With Russia's Rosatom."
[142] Kauranen, "Finnish Group Ditches Russian-built Nuclear Plant Plan."
[143] "Nuclear Power in Sweden."
[144] "Nuclear Power in Ukraine."
[145] Nuclear Power in Ukraine."
[146] "World Nuclear Association."

| | |
|---|---|
| Czech Republic | April 2022-With Framatome and Westinghouse (previously supplied by TVEL)[147]<br><br>March 2023-More Reactors with Westinghouse (Previously supplied by TVEL)[148] |
| Slovakia | June 2023-With Framatome[149]<br><br>August 2023-With Westinghouse[150] |
| Romania | - |
| Bulgaria | February 2021-With Westinghouse[151] |
| Hungary | - |
| Finland | November 2022-With Westinghouse[152] |
| Sweden | February 24 2022 – Stops delivery for Russian fuel[153] |
| Ukraine | June 2022-With Westinghouse[154] |

Another significant observable trend is shown by this table where one can see the date of plans announced by countries to diversify their nuclear fuel supply chains away from Russia. The majority of the above countries have announced, since the 2022 invasion, that they are going to diversify their supply chains away from Russian reliance. This is very telling and is a clear indication that countries are steering away from Russian nuclear supply chains.

Table with the Share of Nuclear in Overall Electricity Mix by Country:[155]

| COUNTRY | PERCENTAGE |
|---|---|

[147] "Nuclear Power in Czech Republic."
[148] "Nuclear Power in Czech Republic."
[149] "Nuclear Power in Slovakia."
[150] Zmušková and Mandilara, "Slovakia Stops Relying on Russia for Nuclear Fuel."
[151] "Nuclear Power in Bulgaria."
[152] Mandilara and Vanttinen, "Two Finnish Nuclear Reactors to Receive Fuel From US."
[153] Vattenfall, "Vattenfall Stops Deliveries of Russian Nuclear Fuel."
[154] "Nuclear Power in Ukraine."
[155] "World Nuclear Association."

| | |
|---|---|
| Poland | 0%[156] |
| Czech Republic | 37%[157] |
| Slovakia | 52%[158] |
| Romania | 19%[159] |
| Bulgaria | 35%[160] |
| Hungary | 44%[161] |
| Finland | 35%[162] |
| Sweden | 30%[163] |
| Ukraine | 55%[164] |

This table shows that for all these countries (apart from Poland which doesn't yet have nuclear reactors) nuclear energy plays a significant role in the country's overall energetic mix.

### 5.2. Poland

Poland, which does not have any nuclear power reactors to this day, was already planning on adding the technology to its energy mix before February 2022; however, it announced a series of concrete developments after this date, including choosing the vendors, the main one being Westinghouse.[165] Poland's ambitious plans aim to add up to 9 large power reactors. The country's initial supply agreements were also signed with South Korea's national reactor vendor.

Poland has a troubled history with Russia that casts a long shadow to this day. Polandwas  part of the Eastern Bloc and has  a history of strong dissident activity

[156] "Nuclear Power in Poland."
[157] "Nuclear Power in Czech Republic."
[158] "Nuclear Power in Slovakia."
[159] "Nuclear Power in Romania."
[160] "Nuclear Power in Bulgaria,"
[161] "Nuclear Power in Hungary."
[162] "Nuclear Energy in Finland."
[163] "Nuclear Energy in Sweden."
[164] "Nuclear Power in Ukraine."
[165] Westinghouse Electric Company, "Historic Contract Paves the Way for Site Work on Poland's First Nuclear Power Plant."

carried out by groups such as Solidarity during the USSR period. “Poland’s Solidarity movement, Solidarność, was one of the most impressive social movements in the history of the Soviet Eastern bloc.”[166] This fear of and opposition to Russia carries on to this day and can be clearly seen during the 2022 Russian invasion when Poland expressed significant solidarity with Ukraine. “From the outbreak of the war, Poland and its 38-million population, mobilised to help their neighbours.”[167] Furthermore, Poland passed legislation allowing refugees to work in the labor market, social services, as well as education. Also, the government declared that for three months Poles who housed Ukrainian refugees would be compensated with approximately $9 each day and in November of 2022 around 60% of the, up till then, 1.5 million registered refugees had “have found jobs, joining the 1.5 million Ukrainian workers already in Poland”.[168] Furthermore, they continue to be a strong NATO country clearly expressing their military alliance with NATO and against Russia.[169] In fact, “Stephen Mull, former U.S. ambassador to Poland and now the vice provost for global affairs at the University of Virginia” said in a discussion on March 25, 2022 that Poland has essentially “become the front line of the NATO alliance and the key to security for the entire alliance”.[170]

As mentioned, Poland does not have any standing nuclear reactors but has announced a 20 Billion USD project to build with Westinghouse. Poland is not only looking to do this in order to “reduce its dependence on coal, which still accounts for around 70 percent of the country’s energy mix” but also specifically wants to build the power plant in “an effort to end reliance on Russian coal, oil and gas”.[171] This ties into the trend which was discussed in previous paragraphs of CEE moving towards

[166] Shvangiradze, “The Rise and Fall of Poland’s Solidarity Movement.”
[167] Elisa Perrigueur, “Polish Solidarity With Ukraine Under Pressure.”
[168] Perrigueur, “Polish Solidarity.”
[169] Schiffrin and Sagalyn, “How Poland Has Become ‘the Frontline of the NATO Alliance.’”
[170] Schiffrin and Sagalyn, “How Poland.”
[171] Kość, “Poland Gives.”

nuclear and realizing the importance of nuclear, specifically, in order to break the supply chains with Russian gas and eventually become independent of Russian gas. On a similar note, it is worth noting that Poland in March 2021– specifically the Prime Minister Metausz Morawiecki – along with the prime ministers of the Czech Republic, Slovakia, Hungary, Slovenia, Romania, and France signed an open letter to the European Commission calling for "reassessing for the inclusion of nuclear power in the EU's new taxonomy, a criteria-based transparency tool to help financial investors determine which economic activities are environmentally sustainable".[172] This was as the gas energy crisis was hitting in 2021 which stirred alarm and highlighted the dangers of energy dependence on Russia.[173]

In conclusion, Poland in general has a deeply rooted distrust and fear of Russia as a consequence of their history which can be seen by the solidarity they expressed with Ukraine when they were invaded in 2022.[174] Furthermore, they have been realizing the importance of breaking free of Russian gas energy supply chains and the important role nuclear power can play in this move away from Russia (Wojciech Dąbrowski, president of the management board, Polish Electricity Association (PKEE) and PGE Polska Grupa Energetyczna). In large part because of this, Poland has moved towards building nuclear power plants in Poland with Westinghouse and South Korea.[175] In this situation we can see realist theory in play, as realist concerns over Russia's invasion play a role as Russia is becoming more and more of a threat and Poland is making moves to break away from energy dependence on Russia by, for example, building nuclear power plants with Westinghouse and South Korea.[176] Furthermore, we can also see great power politics in this situation as

[172] "EU Taxonomy: Greenwashing Impacts Global Climate Crisis."
[173] Sabadus, "Europe's Energy Crisis Highlights Dangers of Reliance on Russia."
[174] Sieradzka, "Poland-Ukraine: Solidarity With Refugees, Fear of Russia."
[175] Kość, "Poland Gives."
[176] Kość, "Poland Gives."

US influence in Poland has only gotten stronger as a result of a war that effectively has removed Russia from any consideration of being in competition in Poland's nuclear energy market.[177]

### 5.3. Czech Republic

Poland's southern neighbor, the Czech Republic, has been operating nuclear reactors since 1978 when the first reactor in Czechoslovakia in Jaslovské Bohunice was activated during the Soviet era.[178] It is important to mention, however, that this reactor was built in today's Slovakia, which back then was part of the country, but split off in 1992.[179] Following this, the Dukovany nuclear reactor in the Czech Republic began operating in 1985.[180] Temelín began construction in 1987 and began operating in 2002 and 2003.[181] To this date, four reactors at the Dukovany plant and two reactors at the Temelín plant are operational.[182] These two power plants produce 36.7% of the Czech Republic's electricity.[183] One could say that the Czech collective narrative of Russia is similar to that in Poland, but not the same; while some people do not fear Russia as a threat, a large portion of the population does see Russia as a threat. "Most Czechs perceive Russia as a security threat to the country … On a scale of 1 to 10 - where one means zero and ten means a huge threat - they rated the risk at 6.5. Over 40 percent of those asked perceive Russia as a serious threat and nearly a fifth as a huge threat," according to a survey conducted in April of 2021 by the Median agency for Czech Radio.[184] This is likely to be connected to the dark Soviet past, including the brutal suppression of the Czech people and their national

[177] Waste, "Is Poland America'S Most Important Partner in Europe?"
[178] "Czech Nuclear Know-how | Skupina ČEZ."
[179] "Czech Nuclear Know-how."
[180] "Czech Nuclear Know-how."
[181] "Czech Nuclear Know-how."
[182] "Czech Republic."
[183] "Czech Republic."
[184] Fraňková and Trachtová, "Survey: Most Czechs Perceive Russia as Security Threat."

autonomy when Warsaw Pact troops invaded Czechoslovakia in 1968 and brutally put down peaceful demonstrations and the liberalizing "Prague Spring"[185] movement. "The negative perception may be connected to the fact that many of them experienced first-hand the occupation of Czechoslovakia."[186] Perhaps due to this public perception and national collective memory fueled by the country's past, paired with realist concerns of Russia becoming more of a liability to the Czech Republic's security, the Czech Republic realized its need to diversify its energy supply chains even before the energy crisis in 2021. More specifically, the Czech Republic had already began diversifying its nuclear fuel supply by starting to test a switch from Russian nuclear fuel to buying nuclear fuel from US (Westinghouse) and French (Framatom) companies for their nuclear reactors[187]. This move to fuel diversification started in 2014 when an explosion at an arms wearhouse in Moravia happened and was tied to Russia by Czech security services. "The Czech Republic's dramatic accusation that Russian intelligence agents were responsible for a deadly 2014 warehouse blast is threatening to destabilize relations between the two countries."[188] Following this, in 2016, "ČEZ selected Westinghouse in February 2016 to supply six Lead Test Assemblies (LTA) for the Temelín plant. At that time, Westinghouse's then Senior Vice President, Nuclear Fuel and Components Manufacturing José Emeterio Gutiérrez said, 'The decision by ČEZ to launch an LTA programme for its Temelín nuclear power station is significant. It demonstrates that ČEZ is serious about taking measures to improve its security of supply through a diversification of its nuclear fuel sources'".[189] Furthermore, in September 2021 a new law was passed in the Czech Republic fully outlawing the involvement of both Russia and China in the

[185] Kramer, "The August 1968 Red Square Protest and Its Legacy."
[186] Fraňková and Trachtová, "Survey: Most Czechs Perceive."
[187] "ČEZ Says Westinghouse and Framatome Deal Boosts Czech Energy Security."
[188] Mortkowitz, "Czechs Pull Back From Russia After Bombing Allegations."
[189] "ČEZ Says Westinghouse and Framatome Deal Boosts Czech Energy Security."

construction of any future nuclear reactors in the country,[190] on national security grounds. And then in 2021 the Czech prime minister along with the prime ministers of Poland, Slovakia, Hungary, Slovenia, Romania, and France signed an open letter to the European Commission calling for a "role of nuclear power in the EU climate and energy policy".[191] Czechs now have plans to build new reactors with non-Russian companies. Moreover, two companies – KHNP (Korea) and EdF (France) – will participate in the construction of the Czech Republic's next nuclear reactor, which will be located at the Dukovany station. In addition, in February 2024, the Czech government announced a change in its plans; instead of building one new large reactor, the country would now seek to build four of them, as that would help ensure energy security and reduce the overall price per electricity unit produced.[192] The Czech nuclear power expansion is part of an effort towards more energy independence and a gradual move away from fossil fuels.[193] In March of 2022, ČEZ also announced that they also plan on building the first small modular reactor at the Temelin power plant site.[194] Following this, in February of 2023 ČEZ said it had chosen the location, for another two small modular reactors, to be the coal burning plants at Dětmrovice and Tušimice with projected plans to have these plants up and running between 2035 and 2040.[195] Similarly to the Polish case, realist concerns of Russian danger play a role. Moreover, Russia is becoming more of a threat as seen by, for example, the warehouse explosion in 2014 and its implications, or by the 2022 invasion of Ukraine. The Czech Republic is therefore making moves to break away from energy dependence on Russia by, for example, switching to Westinghouse for

[190] "Nuclear Energy From US and France Will Cut Czechia's Dependency on Russia."
[191] "The Visegrad Group: The Czech Republic, Hungary, Poland and Slovakia | Joint Letter by Seven State Leaders to EU Commission on the Role of the Nuclear Power in the EU Climate and Energy Policy."
[192] Shaw, "Czech Government Goes With EDF and KHNP for Expanded Nuclear Tenders."
[193] "3 Energy Companies Vying to Build New Czech Nuke Reactor."
[194] "Czech PM Suggests Four New Nuclear Units Needed."
[195] "Czech PM Suggests Four New Nuclear Units Needed."

nuclear fuel (although this effort is still under development and will require some time before full implementation) and outlawing the building of any future nuclear power plants in the country by the Russians (and Chinese).

### 5.4. Slovakia

Slovakia is another CEE country which relies highly on nuclear energy. In fact, Slovakia generates around 60% of its electricity with nuclear power.[196] Construction on the first reactor in Slovakia started in 1958 at Bohunice and this Russian designed reactor was completed in 1972.[197] Following this starting in 1972 two more reactors were built at this site and began operating in 1984 and 1985 but are now in the process of being decommissioned.[198] In the meantime the first unit was closed in 1977 because of an accident and, following this, in the 1980s and 1990s two units at Mochovice were constructed.[199] In 2023 a third Russian designed unit was commissioned at Mochovice and began operating.[200] This was a unit which began construction in 1987 and the construction was then suspended in 1992 but then was restarted in 2009.[201] All the current units have always almost only used Russian fuel, but this is changing as Slovakia signed an agreement in 2023 to diversify its nuclear fuel, with France's Framatome[202] and also with Westinghouse[203]. Subsequently, another deal with Westinghouse was signed in July of 2023 on the "potential deployment" of Westinghouse small modular reactors.[204] Furthermore, also in 2023, Slovenské Elektrárne – the operator of the Slovakia's two nuclear power plants –

[196] Zmušková et al., "Slovakia's Likely Future Coalition Wants to Build a New Nuclear Reactor."
[197] "Nuclear Power in Slovakia."
[198] "Nuclear Power in Slovakia."
[199] "Nuclear Power in Slovakia."
[200] "Nuclear Power in Slovakia."
[201] "Nuclear Power in Slovakia."
[202] "Nuclear Power in Slovakia."
[203] Zmušková and Mandilara, "Slovakia Stops Relying on Russia for Nuclear Fuel."
[204] "Nuclear Power in Slovakia."

signed a "memorandum of understanding for the development of a global strategic relationship, the companies announced last week" with the French's Framoatome.[205]

> "The MOU sets up the basis for future strategy and an agreement for further discussions regarding the extension of the companies' long-term commercial relationship in the field of nuclear energy, according to the announcement. Cooperation on a long-term solution for fuel diversification at Bohunice's and Mochovce's four VVER-440 units is one of the key elements of the MOU, the companies said, along with nuclear operations and maintenance, safety, instrumentation and control, cybersecurity, and the feasibility of nuclear medicine and radioisotope production in Slovakia."[206]

All in all, Slovakia is following the trend of the majority of countries in CEE, namely, it is slowly moving away from cooperation and trade with Russia in nuclear energy. Specifically, Slovakia is moving towards ending its decades long reliance on Russian nuclear fuel by diversifying its nuclear fuel supply chains. Slovakia has also signed a memorandum of understanding with France's Framatom. And finally, Slovakia has potential plans to build small modular reactors with Westinghouse. Whether this approach changes under the new government of Prime Minister Robert Fico, which has signaled a more Russian-friendly approach, remains to be seen.

### 5.5. Romania

Romania, even though an Eastern Bloc country, started building its first reactor in Cernavoda in 1980 (completed in 1996) using Canadian technology. Two reactors are currently active at Cernavoda and they produce about 20% of the

[205] "Framatome Extends Partnership With Slovakia's Nuclear Operator."
[206] "Framatome Extends Partnership With Slovakia's Nuclear Operator."

country's electricity production.[207] Romania used the CANDU (Canadian) reactor technology to build its Cernavoda reactor.[208] After the fall of the USSR Romania began to slowly re-orientate itself westward and joined NATO in 2004.[209] However, in 2015 Romania signed plans with China General Nuclear Power Group regarding the building of the third and fourth reactor at Cernavoda.[210] That all came to a halt in May of 2020 when it was announced that Romania would no longer build these reactors with the Chinese company, in a move that the media attributed to GPC in the country–specifically, pressure from NATO ally Washington on Budapest to drop the deal with China.[211] "Romania's economy ministry has asked state-owned power producer Nuclearelectrica to end negotiations with China General Nuclear (CGN) about the construction of two reactors at its plant on the river Danube, the company said."[212] Following this, in November of the same year, Romania announced that they would instead build these two reactors – that were meant to be built by the Chinese – as well as refurbish the first unit, with the USA. Romania announced in 2022 on November 9th that the US will fund $3 billion for reactors to l be built by the US company NuScale.[213] România Prime Minister Nicolae Ciucă stated that, by doing this, "Romania is taking important steps towards energy independence"[214] and he "emphasized that the nuclear project is based on 25 strategic partnerships between Romania and the US"[215] alluding to strategic, security, and geopolitical motivations. Furthermore, through this partnership with the United States, Romania wishes to also introduce SMRs . In fact, after 2022 Romania, while keeping it more quiet then

[207] "Nuclear Power in Romania."
[208] Dalton, "Canada's Candu Energy Wins $65 Million Cernavodă-1 Refurbishment Contract."
[209] "NATO Member Countries."
[210] Chiriac, "Romania to Build Reactors With Chinese Money."
[211] "US Ousts China From Romania Nuclear Project."
[212] Ilie, "Romania's Nuclearelectrica to end reactor talks with China's CGN."
[213] Gotev, "Romania Secures $3 Billion US Funding for Two Nuclear Reactors."
[214] Necsutu, "Romania to Build Two New Nuclear Reactors With US Technology."
[215] Necsutu, "Romania to Build."

Poland, has helped Ukraine in its defense against Russia potentially as much as Poland as "it is one of the leading countries in transporting US lend-lease cargoes to Ukraine and the third largest transit country for the delivery of weapons and equipment".[216] For this reason, it is reasonable to conclude that the Romanian government still expresses realistic concerns about the current danger of Russia for their country and, specifically the dangers of Russia using its "energy exports as a weapon".[217] Thus, Romania acts accordingly by strengthening Romania's ties to the West, to the United States (by building nuclear reactors with them), and by supporting Ukraine greatly in its efforts in defending itself from Russian aggression.

### 5.6. Bulgaria

Bulgaria was part of the Eastern Bloc and its current operating nuclear power plant, Kozloduy, is a Russian design and sits in the north of the country near the Romanian border. Bulgaria's operating nuclear power plant as of 2022 produced 32.5% of the country's electricity supply.

The story of Bulgaria's plans to build a second nuclear power plant at Belene provides important context for this thesis. Bulgaria originally planned this construction with a Russian company, but in 2012, after 15 years of negotiations and with work already started on the plant, Bulgaria pulled out, a move hailed by Washington as improving the country's security.[218] Bulgaria, which said it was already "too energy dependent on Russia", ended up settling a dispute with Russia over the Belene contract that cost the country 600 million euros.[219]

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[216] "Romania's Support for Ukraine Deserves Greater Recognition."
[217] Rabson, "Canada Signs $3B Nuclear Deal With Romania, as Europe Aims to Wean off Russian Energy."
[218] Reznichenko, "Russia and Bulgaria fall out over Belene nuclear plant."
[219] Vujasin, "Bulgaria Abandons Belene, Announces New Reactors at Kozloduy."

Steps since then have only taken Bulgaria further away from Russia's nuclear energy orbit. In 2022 Bulgaria began to diversify its fuel supply with Westinghouse. In December 2022, as its first step towards diversification away from Russian supply, it signed with Westinghouse to establish a supply chain for nuclear fuel for its Russian built 1000 megawatt Unit 5.[220] Following this, on the 30th of December 2022, well into the Ukraine war, Bulgaria announced an agreement with Framatome for supplying fuel as well as fuel assemblies for one of its two nuclear power reactors, "agreement with France's Framatome follows a deal with US firm Westinghouse and is part of the Bulgarian nuclear power plant's diversification of nuclear fuel supply".[221] Much like Romania, Bulgaria, Bulgarian politicians, and the Bulgarian public have a much more favorable view of Russia than, say, Czech Republic or Poland. "Bulgaria shares historically strong ties with Russia, and at least a third, if not half, of Bulgarians harbor deeply rooted pro-Russian sentiments."[222] Moreover, Bulgaria is realizing the strategic importance of being more independent of Russian energy[223] and, therefore, it has been pulling out of nuclear deals – despite having to pay fines and it being economically disadvantageous in the short run – as well a diversifying its fuel supply with both American and French companies, passing sanctions against Russia[224] (following the 2022 invasion), sending "humanitarian and military aid to Kyiv"[225], and accepting refugees[226]. Finally, in a major energy shift, Bulgaria in 2023 announced plans to build two new reactors with Westinghouse at the Kozloduy site[227]. All in all, amid a backdrop of GPC that has

[220] Tsolova, "Bulgaria Signs Nuclear Fuel Deal With Westinghouse."
[221] "Kozloduy and Framatome Sign Nuclear Fuel Agreement."
[222] Zankina, "Pro-Russia or anti-Russia: Political dilemmas and dynamics in Bulgaria in the context of the war in Ukraine."
[223] Tsolova, "Bulgaria Signs."
[224] Zankina, "Pro-Russia."
[225] Zankina, "Pro-Russia."
[226] Zankina, "Pro-Russia."
[227] "Bulgaria to Push Ahead With Two New Units at Kozloduy."

tilted decisively in Washington's favor in the wake of Russia's full invasion of Ukraine, Bulgaria is moving away from dependence and alliance with Russia and is increasingly orientating itself to the west as it moves towards working with Westinghouse and other western nuclear power companies.[228]

### 5.7. Hungary

As of this writing, Hungary is the great exception in the CEE when it comes to nuclear energy policy. Under Prime Minister Viktor Orban, who some analysts see as following his own vision of realism and purported balancing of great power interests,[229] Hungary has steadfastly stuck by its plans to build new Russian designed power reactors, while also opposing the EU/NATO mainstream on policy towards Russia and the war in bordering Ukraine.[230]

As part of the Eastern Bloc, Hungary built its only nuclear power plant (Paks) – which consists of four Russian designed nuclear reactors – in the 1970s and 1980s with the Hungarian Paks Nuclear Power Plant Company (PAV). It produces about half of the country's electricity.[231] This makes Hungary very reliant on nuclear power and, in fact, the country announced plans in December 2023 to extend the lifetime of its four current reactors at the Paks power plant by 20 years.[232] In addition, the country has plans to build two new reactors – Paks II – next to the existing Paks site with Rosatom supported with a loan by the Russian government.[233] This makes Hungary the only country in CEE that still has plans to continue building nuclear power plants with Russian companies, making it an outlier in the region as, unlike all the other countries in the region, it has not moved away from building reactors with

[228] Gavin, "In Historic Shift, Bulgaria Seeks US Help to Escape Russia's Nuclear Grasp."
[229] Gyulai, "'Reality Free of Ideology' – Viktor Orban's Realism and Illiberalism."
[230] Dreher, "Viktor Orban, Keeping It Realist."
[231] "Nuclear Power in Hungary."
[232] "Hungary Aims to Extend Life of Paks Nuclear Plant by 20 Years."
[233] "Hungary Aims to Extend Life of Paks Nuclear Plant by 20 Years."

Russia. Furthermore, Hungary has slowed down the shift away from Russian nuclear power reliance in Europe, not only by continuing to build with Rosatom, but also by vetoing EU sanctions against Rosatom.[234] These sanctions were proposed in response to not only the war but also to an explicit demand by Ukrainian president Volodymyr Zelenskyy.[235] (However, no sanctions on nuclear energy exports have yet to be passed on Russia, a testament, perhaps, to the fact that fuel exports are needed not only in Eastern Europe but also North America where Russian uranium makes up 14% of the American market.)[236]

### 5.8. Finland

Finland, while not being historically part of the Eastern Bloc, also has an antagonistic history with Russia. In fact, in 1939 the Soviet Union launched an attack on Finland attempting to seize a portion of its land. "At 8.30 a.m. on 30 November 1939 after a half-hour artillery bombardment the Red Army crossed the frontier on the Karelian isthmus in force."[237] Finland fought off this attack (which is referred to as the Winter War) on its own but then a couple years later towards the end of World War 2 Finland lost "around 10% of its territory to the Soviet Union in the Moscow Armistice in September 1944. It had to relocate 400,000 inhabitants, or 11% of its population, from lost territories and pay war indemnities worth $300 million, equalling some 4.9 billion euros ($5.3 billion) in current exchange rate".[238] Then, following the Second World War, Finland was forced to declare neutrality. "Finland had to also sign the Agreement of Friendship, Cooperation, and Mutual Assistance with Russia in 1948, cementing a degree of economic and political dependency and

[234] Liboreiro, "Kyiv Wants Sanctions on Russia's Nuclear Sector. But for the EU, the Stakes Are Too High."
[235] Liboreiro, "Kyiv Wants Sanctions."
[236] Sebastian, "The West hasn't gone after Russia's nuclear energy. Here's why."
[237] Spring, "The Soviet Decision for War against Finland, 30 November 1939."
[238] Kauranen and Ahlander, "A Brief History of Finland's and Sweden's Strained Ties With Russia."

isolating it militarily from western Europe."[239] But this is not the only war the Finns had with the Russians. Finnish fear of Russia and antagonism with Russia dates back hundreds of years. "Finland's difficult past with Russia goes back to the 17th and 18th centuries when tsars of the Russian Empire repeatedly tried to conquer Finland, then a hinterland of the Swedish kingdom."[240]

Finland currently "has five nuclear reactors in two power plants located on the shores of the Baltic Sea. Combined, they cover more than 40% of the nation's electricity demand".[241] Finland had been planning to build a sixth nuclear reactor with the Russian company Rosatom up till 2022 when "Fennovoima said it had terminated the contract due to RAOS Project's 'significant delays and inability to deliver the project,' referring to Rosatom's Finnish subsidiary. 'The war in Ukraine has worsened the risks for the project. RAOS has been unable to mitigate any of the risks,' it added, without going into further detail. Rosatom said it was 'extremely disappointed' by the decision which it said had been taken without any detailed consultation with the project's shareholders - including another of its subsidiaries".[242] So in Finland's case, realist concerns play a large role as Finland was still willing up to 2022 to build with the Russians. But when Russia invaded Ukraine building with them became more of a liability and therefore unbeneficial to Finland's domestic and strategic interests as the "Finnish-led consortium Fennovoima" cited "increased risks due to the war in Ukraine" and the Finnish "minister of economic affairs, Mika Lintila, repeatedly said it would be 'absolutely impossible' for the government to grant a construction permit".[243]

[239] Kauranen and Ahlander, "A Brief History of Finland's and Sweden's Strained Ties With Russia."
[240] Kauranen and Ahlander, "A Brief History of Finland's and Sweden's Strained Ties With Russia."
[241] Tanner, "Europe's Most Powerful Nuclear Reactor Kicks off in Finland."
[242] Kauranen, "Finnish Group Ditches Russian-built Nuclear Plant Plan."
[243] Kauranen, "Finnish Group Ditches Russian-built Nuclear Plant Plan."

### 5.9. Sweden

Sweden has three operational nuclear power plants. Sweden introduced its first reactors in the 1960s and 1870s and, as of now, has six operating reactors which are located at three different sites that provide for about one third of Sweden's electricity.[244] Sweden also, much like Finland, has an antagonistic relationship with Russia dating back to the 17th century.[245] In 1939 "Sweden lent some military aircraft to Finland when it was attacked by Russia during the Winter War in 1939, but it remained neutral throughout the World War Two and the Cold War … Sweden's official role as neutral allowed it to be a vocal critic of both the Soviet Union and the United States but had a secret deal that the U.S. would come to Sweden's defense in case of a Soviet attack from the 1960s and forward".[246] So following the Second World War, it remained neutral, but in recent years, as a consequence of Russia's actions, it has been strengthening its ties with NATO, and is now joining NATO.[247] This began already with the 2014 annexation of Crimea as Sweden made its first move to strengthen its relationship with NATO by signing an agreement "allowing assistance from Nato troops in emergency situations".[248] Then, in 2022, following the Russian full-scale invasion of Ukraine, Sweden moved even closer to NATO, and eventually joined the alliance, after overcoming stalling from Hungary and Turkey[249] (where Russia is also building a major nuclear power plant) . Furthermore, Sweden, before February 2022, began to attempt to diversify its fuel supply by buying Russian fuel, but following the 2022 Russian invasion they pulled it out of those plans. "Early in the Ukraine conflict, Sweden refused to purchase Russian nuclear fuel."[250] All in

[244] Dahl, "Sweden's Plan to Expand Nuclear Power in Focus During First Visit by Director General Grossi."
[245] Kauranen and Ahlander, "A Brief History."
[246] Kauranen and Ahlander, "A Brief History."
[247] Gozzi, "Sweden formally joins Nato military alliance."
[248] "Finland and Sweden to Strengthen Ties With Nato."
[249] Edwards et al., "Sweden officially joins NATO, becoming alliance's 32nd member."
[250] "Putin Profits off US, European Reliance on Russian Nuclear Fuel."

all, despite a history of antagonism with Russia, Sweden had been still open to trade with Russia (on the fuel front) as they believed it improved their energy security through fuel supply diversification. But after Russia invaded Ukraine, Sweden quickly adopted a hard realist view and moved to limit nuclear trade ties with Russia.[251]

### 5.10. Ukraine

Nuclear energy policy in Ukraine is central to the geopolitical tensions in CEE which are discussed and analyzed in this paper. Ukraine has four nuclear power plants on which 15 nuclear reactors are operating to this day[252] that account for about "half of its electricity"[253]. All the power plants in Ukraine were built by Soviet or Russian companies.[254] However, in a sign of both realism and GPC on its territory,already in 2008 Ukraine began to take steps to diversify its nuclear fuel supply, becoming the first country in Europe to do so. In 2008, Ukraine began to introduce Westinghouse as an additional supplier of their nuclear fuel, becoming the first country in Europe to do so. "Westinghouse originally signed a fuel supply contract with Energoatom in 2008. Through that contract, Westinghouse supplied a total of 630 nuclear fuel assemblies to the three VVER-1000 pressurized water reactors at the South Ukraine nuclear power plant."[255] This increased even more following the Russian invasion of Crimea in 2014 when this contract was "amended, extending Westinghouse deliveries of fuel through to 2020".[256] In fact, by 2016 Westinghouse was supplying over 30% of Ukraine's nuclear fuel and in 2018 Westinghouse announced it "signed a contract with Energoatom that extends its

[251] Skidelsky, "The Case for Nordic and NATO Realism."
[252] "Ukraine: Current Status of Nuclear Power Installations."
[253] "Nuclear Power in Ukraine."
[254] "Nuclear Power in Ukraine."
[255] "More Westinghouse."
[256] "More Westinghouse."

supply of nuclear fuel to VVER nuclear power plants in Ukraine from 2020 to 2025".[257] This all ultimately culminated in 2020/21 when it was announced that Westinghouse signed an expanded nuclear fuel deal to supply Ukraine's reactors. "The new contract, signed with the National Nuclear Energy Generating Company Energoatom, adds two VVER-440 reactors at the Rivne nuclear power plant. The parties also signed a letter of intent regarding exploring localising fuel assembly component production. 'With this major agreement, we extend further our commitment to Ukraine's energy security and focus on further improving the operational excellence of its nuclear fleet,' Westinghouse CEO Patrick Fragman said".[258] Then, in 2024 Ukraine announced that it plans to build four new reactors at the Khmelnytskyi Nuclear Power Plant in order to "compensate for the lost capacity of the Russian-occupied Zaporizhzhia Nuclear Power Plant".[259] Two of these reactors will be using Russian-made equipment which Ukraine plans to import from Bulgaria and the other two will be Westinghouse reactors.[260]

## 6. Implications and Contextualization

As is evident, the majority of countries in CEE are shifting their nuclear power business away from Russia as the war in Ukraine has made it virtually impossible to do business with Moscow in such a strategically important sector. To be sure, amid growing security concerns over Russia, as well as pressure from Washington amid GPC with Moscow, some countries in the region were already shifting their nuclear energy policy away from Russia well before the February 2022 invasion of Ukraine. For example, in 2022, Bulgaria canceled a contract with Rosatom to build reactors at

[257] "Westinghouse Extends Ukrainian Fuel Supply to 2025."
[258] Zinets, "Westinghouse signs expanded Ukraine nuclear fuel deal."
[259] Kudryk, "Minister: Ukraine to Start Building 4 Nuclear Reactors in 2024."
[260] Kudryk, "Minister: Ukraine to Start Building 4 Nuclear Reactors in 2024."

Belene, and the Czech Republic kicked both China and then Russia out of the new tender to build a new reactor at Dukovany on national security grounds. Since the Ukrainian invasion in 2022, this shift in CEE has greatly accelerated as part of a general European move away from Russian energy supply chains including oil and natural gas, in an attempt to gain energy independence from Russia. Whereas some countries in the region had previously sought to balance great power interests in their countries, including by working with or remaining open to doing so with the Russian nuclear sector, that approach has mostly been dropped. With the exception of Hungary, CEE countries including Bulgaria, Czech Republic, Romania, Slovakia Poland and Estonia have all announced either new plans to build new reactors or buy nuclear fuel with Western or non-Russian nuclear companies. Realist concerns based on national security seem to be driving these new policies, even as Orban's Hungary has taken the opposite approach and is seen by some scholars as pursuing an alternative vision of realism. Beyond Hungary, CEE has clearly signaled that being allied with the West, the EU, and NATO is more important now than ever before, and that this geopolitical and security orientation carries over into nuclear energy policy. In line with the general trend across Europe, CEE countries are taking concrete steps to become energy independent from Russia and this includes nuclear energy. In the process, U.S. energy supplies, including not only reactors and nuclear fuel but also LNG, are now on the ascendance in CEE and Europe as a whole.

The strategic nature of nuclear energy is at the heart of these policy changes. Building a reactor with a country creates ties and material and knowledge dependencies to the supplier country that last for up to "100 years".[261] Furthermore, buying nuclear fuel from a country makes the buyer's country's electrical power grid reliant – to whatever degree that nuclear is being used for electricity – on the

[261] Sullivan, "The Sources."

supplier country. This creates a degree of dependency and thus strategic leverage, that can be used against the buyer. For this reason, and keeping in mind Russia's use of natural gas as a political weapon in Europe over the past 20 years, it is reasonable that in the wake of the Ukraine war, the consequential increasing Russian threat for the region, and in the aftermath of the energy crisis following the Russian invasion (that woke Europeans up to their energy dependence on Russia), CEE countries are moving away from buying reactors and fuel from Russian companies. All this is gradually weakening Russia's position in the region and, further, isolating Russia, while boosting the position of its GPC rival, the United States.[262] Russia, meanwhile, is turning its energy trade towards countries such as India and China. "In the wake of multiple sanctions levied against Russia in response to the ongoing conflict with Ukraine, the Russian Federation is actively exploring alternative avenues to mitigate the impact. One such approach involves forging closer ties with two major global powers, namely India and China".[263] And despite its loss of new nuclear reactor markets in CEE, Russia continues to provide nuclear fuel to CEE and the larger West, as this sector remains unsanctioned, and continues to be the world's leading exporter of nuclear power technology, with construction projects currently underway in Belarus, Bangladesh, Turkey, Egypt and soon, probably Hungary.[264] (By contrast, Westinghouse, a private company that does not enjoy the sovereign political and financial backing that state owned Rosatom enjoys in the Kremlin, is not yet building any reactors abroad, despite all the newly announced plans to do so.)

While Europe in general seeks to shift away from energy reliance and supply chains with Russia, out of realist concerns over its energy and national security, CEE

[262] Simon, "The World Is Isolating Putin. Here's What That Could Mean for the War."
[263] Kypriotaki, "Russia Turns to India and China to Establish Trade Corridors."
[264] Kobayashi, "Challenging Russia's Dominance in Nuclear Power Market: Efforts by Japan, U.S., and Europe."

countries (with the exception of Hungary) face the challenge of replacing potential Russian nuclear energy supplies with U.S. or Korean suppliers. This will not be easy. As this thesis has stated, Russian nuclear power technology is world-leading; backed by Kremlin financing, and strong supply chains, Rosatom is the world's leading reactor exporter and countries in CEE could have expected to get a competitive financial deal and timely delivery of the technology from the Russian company, if they had pursued their pre-Ukraine invasion deals or intentions with Moscow on nuclear energy. Whether American or Korean or French nuclear companies (which have been beset by cost overruns in places like Finland and the UK) can easily step into this breach, remains a big question. Nonetheless, with the exception of Hungary as sanctions against Rosatom have been vetoed by Hungary,[265] the region is striving to away from Russian nuclear energy dependence – as exemplified by countries such as Czech Republic, Slovakia, Finland, or Bulgaria who have terminated future deals to build reactors with Rosatom and/or diversified their previously Russian dependent nuclear fuel supply with western companies[266]. Russia, on the other hand, is creating more economic interdependence with India and China, while continuing to build reactors in several other countries outside Europe as well as, probably, Hungary.[267]

All of these developments are deeply informed by IR theory and considerations about GPC; ultimately, these developments show that the Ukraine crisis, which has unfolded over several years in different stages before the full invasion of 2022, has taken place amid a clear backdrop of rivalry and competition between Moscow and Washington, a competition that has played out in the contest

[265] Liboreiro, "Kyiv Wants Sanctions."
[266] Diaz-Maurin, "Cutting Power: How Creative Measures Can End the EU's Dependence on Russian Nuclear Fuel - Bulletin of the Atomic Scientists."
[267] Diaz-Maurin, "Cutting Power."

to build new nuclear reactors (and thereby retain influence for decades) in countries across the CEE region. Indeed, Russia's drive to sell reactor technology in CEE was not just financial. Russia was "increasingly seeking to carve out spheres of dominant influence within their respective 'near abroads,' to undermine U.S. alliances and partnerships in these areas, and to develop military capabilities needed to achieve regional primacy and project power even further abroad"[268]. Well before February 2022, some countries in the region (Bulgaria and Czech Republic, for example), at times prodded by Washington, took concrete decisions based on security concerns to either cancel nuclear reactor deals with Moscow (Bulgaria) or exclude Russia for any future reactor construction tender (Czech Republic). These moves served to foreshadow the larger shift away from Russian nuclear power technology and fuel that occurred after February 2022, and which were also clearly prompted by concerns over national security, energy independence and Russia's potential future negative actions in the region. In this sense, the strategic and economic reaction to pull away from Moscow on nuclear energy, which began in CEE more than 10 years ago but has dominated policy since February 2022, is a clear vindication of IR realist theory[269].

## 7. Conclusion

The Russian war of aggression in Ukraine has prompted an abrupt and extensive rethinking of the energy policy across Europe to seek to reduce or eliminate reliance on Russian energy supply chains. In CEE countries, which have old ties to Moscow both in terms of politics but also nuclear technology, we see this reaction playing out in particular in national nuclear policies and the commercial market for

[268] Brands, "Six Propositions," 2.
[269] "Russia's War."

nuclear power reactors and fuel. Every country in this study except Hungary, citing realist national security and energy security concerns, has taken decisive steps to shift away from the buying of nuclear reactors from Russian companies and to break away from Russian nuclear fuel supply chains. At the same time, several of these countries, as witnessed in the French-led nuclear alliance, and in light of the perceived shortcomings of the German energy transition, increasingly see nuclear energy as a pillar of a future energy system that can ensure their best chance for achieving climate change goals as well as energy system reliability and price predictability. To this extent, one could argue that CEE countries, together with France, have had an outsize influence in helping to change EU policies on nuclear energy, making these policies more accepting of the technology. The same could be said on the global level as well, given CEE's outsize representation in the Dubai COP28 pledge to triple nuclear power capacity globally.

This changing nuclear energy picture in CEE also highlights a backdrop of a larger realignment of the great power equilibrium in the region. CEE has been, since the end of the Cold War, trading, especially in regards to energy, with both Russia and the USA. Specifically, they had been very open to collaborating and trading with Russia with nuclear energy, in fact, all countries in CEE had traded with and been reliant on Russia when it came to energy and nuclear energy.[270] However, Bulgaria's cancellation of the Belene reactor deal with Russia in 2012 followed by the 2014 invasion of Crimea marked the beginning of a gradual move away from nuclear energy collaboration with Russia and a move towards building nuclear plants and nuclear fuel supply chains with Western or Korean companies. This shift can be seen in the analysis of the CEE countries' policy moves over the last 12 years, but especially since February 2022. The only CEE country still pursuing a reactor

[270] Jack and Cooper, "Russian Nuclear."

construction deal with Russia is Hungary. Moreover, this answers all the research questions asked at the outset of this thesis:

1. What concrete steps have CEE countries taken to change their nuclear energy policy, including shifting away from Russian nuclear supply chains, due to national security concerns in the wake of Russia's war in Ukraine?

As is evident from the research presented here, with the exception of Hungary, all CEE countries involved in nuclear energy (as well as Finland, Sweden and Ukraine) are shifting away from buying nuclear reactors with Russia. Some have announced new plans to build new reactors with non-Russian companies, and all of them currently operating reactors have announced plans to either begin or expand their diversification away from Russian nuclear fuel in an attempt to end their reliance on Russian nuclear fuel. In almost all cases, the apparent commercial beneficiary for the moment is largely Westinghouse, although French and Korean companies remain in the contest for supplying fuel in all of these countries and in some of them for building new reactors, such as the Czech Republic and Poland. That being said, for technological reasons related to reactors and nuclear fuel, there is still a large degree of reliance on Russian nuclear fuel[271] – as well as a a short term increase in purchase of Russian nuclear fuel as many countries are stocking up on nuclear fuel to ensure a secure transition away from Russian fuel and avoid shortages during the transition period[272]. Moreover, Hungary, out of what some analysts say is that country's own perceived realist concerns about balancing GPC on its territory (as well as realist recognition about affordability, financing and delivery time of the reactors, where Russia has a proven upper hand at the moment), is still planning on building nuclear reactors with Russia. Thus, the supply chain with Russia is by no

[271] Digges, "Europe Doubled Its Import of Russian Nuclear Fuel for 2023, Data Say."
[272] Digges, "Europe Doubled Its Import of Russian Nuclear Fuel for 2023, Data Say."

means completely broken but, generally, as demonstrated by this thesis's multiple case study, there is a clearly observable and significant shift away from and an attempt to break the reliance on Russian nuclear power reactors and fuel in CEE.

2. What other factors (such as climate change and energy system reliability and affordability) have contributed to the changing nuclear energy policies in CEE, beyond concerns about reducing energy reliance on Russia?

Environmental concerns have been a growing factor in the development of nuclear energy in the EU as the global scientific community has come to an increasing consensus that nuclear energy has a crucial role to play in reversing climate change because nuclear "power is an important source of low-carbon electricity and heat that can contribute to attaining carbon neutrality and hence help to mitigate climate change"[273]. This can be seen in the (previously mentioned) 2018 IPCC report which offered "four 'illustrative pathways' to achieving the goal of limiting the increase in the average global temperature and thereby, staving off the worse effects of climate change. All four pathways showed an increase in the use of nuclear power compared to current levels, ranging from 59% to 106% by 2030, and from 98% to 501% by 2050"[274]. Furthermore, at a 2023 meeting in Stockholm a pro-nuclear alliance formed led by France and including Croatia, the Czech Republic, Bulgaria, Finland, the Netherlands, Poland, Romania, Slovakia, Hungary, Finland, and Slovenia and the member states in this alliance believe that nuclear energy is "central to the energy transition and want it placed 'on an equal footing' with renewables as a low-carbon source of energy".[275] Apart from climate change, another factor is energy reliability and this especially within the context of energy reliability for countries with a large industry. This can be seen, for example, in the

[273] "Global Climate Objectives Fall Short Without Nuclear Power in the Mix: UNECE."
[274] Campbell, "As Putin."
[275] Judah et al., "How to Strike."

complications Germany went through during the energy crisis in 2021, in large part, because Germany has a large industry but doesn't have nuclear power.[276] Finally, as previously stated, the need for more nuclear energy has now been recognized as part of the UNFCCC COP process,[277] Dubai last year. And CEE countries played a key role in the tripling pledge at that summit.

3. In what ways does IR theory help to illuminate the nuclear policy changes underway in the CEE region, and what role has great power competition played in these developments?

When analyzing this issue, IR realist theory is seemingly the most useful in this context. In fact, the whole Ukraine crisis, and its geopolitical effect on CEE, can be seen, and is seen by many experts, as a vindication of IR realist theory.[278] Moreover, it has woken Europe up to the fact that states act in their strategic self-interest (as realist theory argues), that international cooperation can only go so far, and that military security is, in fact, vital.[279] Apart from that, the fact of the threat of an aggressor in the east, has made Europeans rethink their trade and supply chains with Russia. This has been especially pronounced when talking about energy supply chains in which nuclear power plays a role. In fact, on the nuclear energy front, CEE governments have generally been adopting what can easily be interpreted as a realist approach to the situation. This approach involves breaking the Russian nuclear fuel supply chains and canceling future projects of building power plants with Russian companies in an attempt to break away from energy dependence with Russian companies. This is happening because Russia is becoming more of a threat to these countries' security as a consequence of its actions in Ukraine. Furthermore,

[276] "Germany Says It Is No Longer Reliant on Russian Energy."
[277] "Global Stocktake."
[278] Walt, "An International."
[279] Walt, "An International."

Great-Power Competition  theory is also useful to illuminate the background to the larger conflict with Russia unfolding in the region. NATO has gradually been expanding eastward since the end of the Cold War even as Russia has sought to expand its own influence in the region and in particular, control over Ukraine. Thus, CEE as well as Ukraine are in many ways the theater stage on which  great power competition  over influence in the region between the USA and Russia has been unfolding for several years.[280] CEE gradually shifting to trading with US nuclear suppliers, and then abruptly moving to do so after 2022, is just a small part of a larger shift in the US gaining more influence over the region and Russia losing influence over the region.  In conclusion, there is a strategic European move away from energy dependence and trade with Russia as a consequence of the Ukraine crisis. One of the ways in which this is being articulated is in CEE nuclear power policy. Except for Hungary, all CEE countries that had plans or entertained plans to build reactors with Russia have repealed these plans, and all CEE countries are seeking to reduce if not eliminate their reliance on nuclear fuel supply chains with Russia. Consequently, they are establishing new nuclear fuel from Russia. Instead, all CEE countries except Hungary have announced new plans or intentions to pursue nuclear reactor newbuilds and or nuclear fuel supplies with American, European, and other non-Russian companies (South Korean for example) instead of Russia. These nuclear policy changes are a significant marker in the larger  ones shift occurring in the great power balance in the region as CEE (with the exception of Hungary) abandons a previous attempt to sustain more balance between Russia and the West, and moves more decisively closer to the West and away from Russia.

[280] Brands, “Six Propositions.”

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