



Universiteit Utrecht

Master Thesis U.S.E.

**Impact of the outbreak of the Russo-Ukrainian War on
German citizens' attitudes towards the green energy
transition¹**

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Abstract

The Russo-Ukrainian War has dramatically reshaped the global energy landscape, with significant implications for Germany's green energy transition. Amidst rising energy prices and heightened geopolitical tensions, this thesis explores how these events have influenced German public opinion on renewable energy, nuclear power, and the urgency of moving away from fossil fuels. Central to this study is the question: How has the Russo-Ukrainian War altered public perceptions of energy transition policies? Utilizing a difference-in-differences analysis of panel data in an ordered logistic regression, the research reveals that the war has exacerbated negative views on the green energy transition, though these effects are lessened among those who view Russia as a significant threat. The findings highlight a dual impact: the energy crisis has underscored economic concerns, reducing the perceived benefits and urgency for the transition, while also emphasizing the geopolitical benefits of renewable energy for energy independence. Furthermore, the war has accelerated a shift towards a less critical perception of nuclear dangers. These insights underscore the need for policymakers to address public concerns about energy security and enhance communication strategies to support the green energy transition, providing key insights to guide energy policies amidst ongoing geopolitical conflicts.

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Introduction

This research explores the profound effects of the recent outbreak of the Russo-Ukrainian War on public opinion regarding Germany's shift towards renewable energy, known as the *Energiewende*. This is particularly relevant as it sheds light on the interplay between geopolitical crises and public support for energy policies, an area of importance in an increasingly interconnected and volatile world.

The outbreak of the Russo-Ukrainian War in February 2022 has triggered significant disruptions in global energy markets, leading to economic and political issues, especially in Europe. Germany, heavily dependent on Russian natural gas imports, has been compelled to reassess its energy strategies and accelerate its transition to renewable energy sources. Understanding how geopolitical shocks like the Russo-Ukrainian War influence public opinion on the energy transition is crucial for policymakers. For instance, if public support for renewable energy decreases, this could hinder Germany's ability to meet its climate goals and reduce dependency on fossil fuels. Policymakers can use this insight to craft more effective communication strategies and policy interventions that address public concerns and enhance support for renewable energy.

Existing literature has extensively documented the factors shaping public attitudes towards green energy. Studies have shown that environmental awareness, economic considerations, and political orientation play pivotal roles in influencing these attitudes. For instance, Meyer et al. (2022) highlighted a stable trend in environmental attitudes in Germany over nearly three decades, with notable shifts occurring due to major geopolitical events. Furthermore, research has underscored the importance of trust in government and perceived energy security in shaping public opinion on energy policies (Blankenberg & Alhusen, 2019; Boudet, 2019).

Despite these insights, there remains a gap in understanding how severe geopolitical crises, such as the Russo-Ukrainian War, impact public perceptions of energy transition policies. This research seeks to address this gap by investigating the following central question: How has the outbreak of the Russo-Ukrainian War influenced German citizens' attitudes towards the green energy transition?

Addressing this question is essential, as it provides actionable insights for policymakers. In times of geopolitical instability, governments must understand public sentiment to effectively communicate and implement energy transition strategies. By identifying the factors that

mediate public opinion during crises, this research aims to inform the design of resilient policies that garner broad public support.

To explore this overarching question, the research is divided into several sub-questions:

1. How has the outbreak of the war influenced German citizens' perception of the energy transition as harmful?
2. How has the outbreak of the war influenced the sense of urgency of the transition to green energy?
3. How has the outbreak of the war affected the perception that renewable energies make Germany independent from other countries?
4. How has the outbreak of the war influenced the German citizens' perception of the dangers of nuclear energy?

The findings of this study indicate several key trends and shifts in public opinion:

- The Russo-Ukrainian War significantly worsened perceptions of the green energy transition's urgency but viewing Russia as a threat mitigated these negative effects by emphasizing energy security and reducing dependence on fossil fuels.
- There is an increased perception of the geopolitical advantages of renewable energies in terms of energy independence among those who view Russia as a threat.
- Public opinion towards nuclear power has become more favorable, viewing it as a reliable alternative amidst the energy crisis, though concerns about its safety during geopolitical instability persist among those who perceive Russia as a threat.

These results contribute to the academic discussion by providing empirical evidence on the relationship between geopolitical events and public opinion on energy transition, offering insights into the socio-political dimensions of energy policy.

The remainder of this paper is structured as follows: The Literature Review provides a comprehensive overview of existing research on public attitudes towards energy transition and the impact of geopolitical events. The theoretical framework outlines the hypotheses and the conceptual model guiding this research. The empirical strategy details the data sources, variables, and methodological approach. The Results section presents the findings from the data analysis. Finally, the Discussion and Conclusion interpret the results in the context of existing literature and discuss their implications for policymakers and future research.

Literature Review

The outbreak of the Russo-Ukrainian War in February 2022 has reverberated across the global geopolitical landscape in “a kind not seen since the collapse of the USSR in 1991” (Deyermund, 2022; 230), impacting various aspects of international relations, economics, and energy security. Among the countries affected, Germany, which had a significant reliance on Russian natural gas imports, stands out as a key player in the European energy transition.

This literature review examines how these geopolitical tensions and other factors have impacted German citizens' perception about green energy by analyzing scholarly articles and reports to understand the situation and to establish a clear methodology.

A suitable reference point to start with is the research by Meyer et al. (2022) which provides a longitudinal analysis of environmental attitudes, willingness, and behaviors in Germany over nearly three decades. Using data from the International Social Survey Programme Environment Modules², Meyer et al. (2022) finds that environmental attitudes and behaviors have remained relatively stable between 1993 and 2010. However, there is a significant upward trend in attitudes and willingness in 2020, even amid the COVID-19 pandemic.

It is critical to consider the valuable context highlighted by Meyer et al. (2022) that geopolitical events, such as the Russo-Ukrainian war, could influence public opinion on green energy. Moreover, the study’s insights into the heterogeneity of environmental attitudes based on demographic factors such as education, residential region, and political orientation (Table 1) indicate the importance of including these demographic control factors in this research.

Table 1 Previous demographical interactions highlighted by Meyer et al. (2022)

Variable	Effect on Environmental Attitudes	Direction
Education	Positive	Higher education
Region	Positive	West Germany
	Negative	East Germany
Age	Positive	Younger (18-35 years)
	Negative	Older (61-96 years)
Political Orientation	Positive	Left-leaning
	Negative	Right-leaning
Income	Variable	Higher income (occasionally positive)

Source: Own elaboration based on OLSs from Meyer et al. (2022).

² Conducted in 1993, 2000, 2010, and 2020,

Energy transition in Germany: Paradigm shift

Germany's energy transition, known as the "Energiewende," is a comprehensive strategy aimed at decarbonizing the economy and transitioning towards renewable energy sources. Central to this transition is the phase-out of nuclear power and the expansion of renewable energy sources such as wind and solar. It was initiated in the early 2000s and represents the culmination of decades of energy policy discussions in Germany (Hansen, 2019; Federal Ministry for Economic Affairs and Climate Action, 2015).

In this section we analyze the events during the beginning of the conflict that may have affected the attitude of German citizens towards the green energy transition .

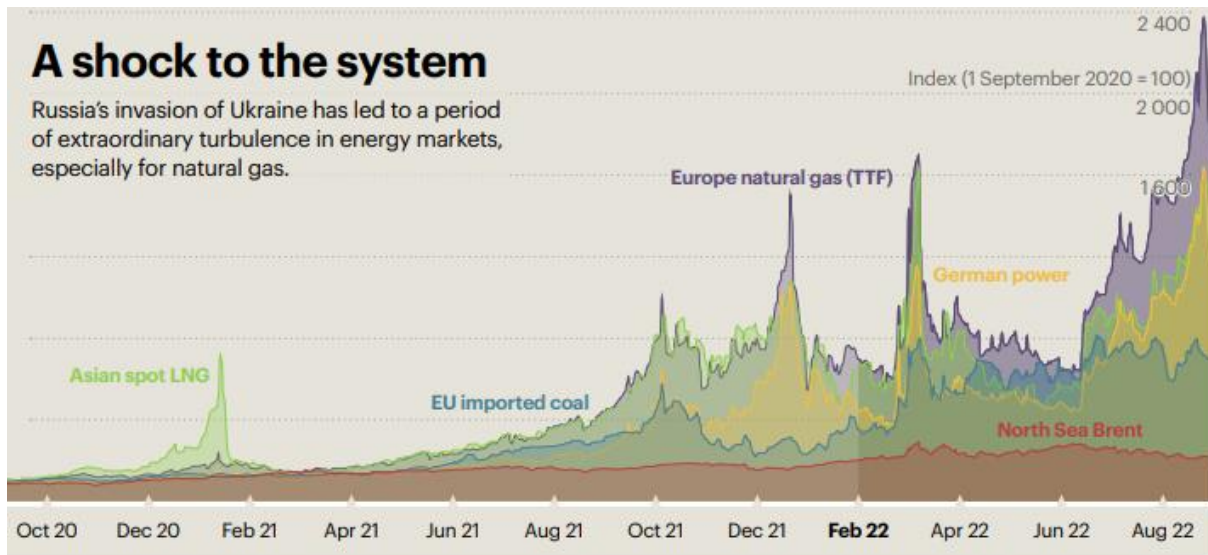
Energy supply chain disruption

Germany's previous dependence on Russian gas was influenced by several key factors. Geographic proximity and infrastructure constraints played a significant role, as Germany lacked sufficient LNG import terminals to significantly diversify its gas supplies before the Russo-Ukrainian war. Consequently, the existing pipeline infrastructure was heavily oriented towards transporting gas from Russia, which was considered a relatively cheap and reliable energy source (Halser & Paraschiv, 2022). Additionally, long-standing economic ties with Russia fostered a sense of energy security. These partnerships were built on the assumption of liberal peacebuilding and persisted despite concerns from the U.S. and other European countries regarding Russia's reliability. Furthermore, the German population had supported energy cooperation with Russia. In 2009, when asked about the interdependence with Russia, 62% of Germans expressed some level of worry about reliance on Russian energy, but 72% supported further extending energy collaboration with Russia (Jensen, 2013).

Germany's energy transition plan was closely linked to its energy imports, particularly natural gas from Russia, making it vulnerable to disruptions in the global energy supply chain (Hansen, 2019). Prior to the war, Germany relied heavily on Russian gas for heating and electricity generation. In 2021, Russia supplied 52% of Germany's gas imports, which decreased to 22% in 2022 due to the war. Just before the conflict, around 1.7 TWh were being delivered daily through Nord Stream 1 until mid-June, when these figures initially dropped by 60%, then by 80%, and ultimately fell to 0 TWh by early September (Bundesnetzagentur, 2023).

Due to these dependencies, the Russo-Ukrainian War has led to a global energy crisis (Figure 1) that “has hurt households, industries and entire economies” and provided a period of “extraordinary turbulence in energy markets” and instability (International Energy Agency, 2022; 87).

Figure 1 Shock Russo-Ukrainian War



Source: International Energy Agency (2022): World energy outlook 2022.

Changes after the Russo-Ukrainian War

The outbreak of the war brought significant changes in the discourse surrounding the Energiewende in Germany. Wiertz et al. (2023) researched this shift by collecting and analyzing a wide range of textual data, including tweets, newspaper articles, political talk show transcripts, and parliamentary debates. They combined quantitative analysis of tweet hashtags with qualitative coding of texts to identify key themes, focusing on how Germany's energy transition was discussed in the context of the Russo-Ukrainian war, reaching the following conclusions:

- **Acceleration of Renewable Energy Implementation:** The war has led to a notable acceleration in renewable energy implementation, justified by an emphasis on security, freedom, and sovereignty, reflecting a recalibration of energy policies due to evolving geopolitical dynamics (Wiertz et al., 2023).
- **Shift in Paradigm:** The need to reduce dependence on Russian gas has challenged the dominant ecological modernization paradigm, prioritizing geopolitical considerations over environmental concerns. There is a significant debate that weakens the previous broad consensus on the desirability of the energy transition (Wiertz et al., 2023).

- **Reconsideration of Nuclear Power:** Nuclear power and other bridging technologies are gaining traction due to their promise of enhancing supply security amidst geopolitical uncertainties, despite contradicting the goals of the Energiewende (Wiertz et al., 2023).

On the other hand, a study by Ibar-Alonso et al. (2022) utilized sentiment analysis tools to evaluate shifts in public opinion using data from social media platforms, revealing a stark transformation in public sentiment coinciding with the onset of the Russia-Ukraine conflict. The conflict's immediate effect was a noticeable shift in sentiment from predominantly positive to more negative and anxious tones about green energy and energy security, addressing not just the availability of energy but also the geopolitical ramifications of energy dependence on Russia.

Ibar-Alonso et al. (2022) also highlighted the political relevance of the findings, suggesting likely long-term shifts towards more aggressive renewable energy promotion policies in Europe, motivated by the desire to reduce dependence on Russian energy supplies. German citizens, in particular, are experiencing greater concern for energy security, and this is being used to justify an accelerated transition to renewable energy sources.

Building on these findings, the current research assess several dependent variables: the perception of the energy transition as negative (or harmful), the perception of the energy transition's geopolitical advantages, the perception of urgency in the energy transition, and the opinion on nuclear energy. This study will analyze how these variables are influenced by the conflict, highlighting shifts in public attitudes and the broader implications for Germany's energy policies

Impact of geopolitical events on energy transition

The literature on energy transitions underscores the major influence of geopolitical events on the speed, direction, and nature of these changes. Geopolitical disruptions can serve as both catalysts and impediments to energy transitions, reshaping the global energy landscape in profound ways.

Exogenous factors such as military conflicts, major energy accidents, and global crises often influence energy transitions. For instance, the World Wars significantly impacted the French nuclear program, leading to the rapid development of nuclear energy as a means to secure energy independence and mitigate the risks associated with energy import dependence

(Sovacool, 2016). Similarly, the oil shocks of the 1970s, triggered by geopolitical tensions in the Middle East, played a crucial role in altering global energy policies and accelerating the search for alternative energy sources, as evidenced by France's rapid shift to nuclear power (Sovacool, 2016).

Geopolitical events often exacerbate issues of resource scarcity, which in turn drives energy transitions. The concept of "stranded assets" has gained prominence in discussions about future energy transitions, particularly in the context of climate change and the financial risks associated with continued investment in fossil fuels. Nations are increasingly reassessing their energy dependencies and financial strategies to mitigate the risks posed by geopolitical instability and the potential for stranded assets (Sovacool, 2016).

Global energy supply and demand dynamics

Geopolitical events heavily influence the interplay between global energy supply and demand, causing global energy prices to fluctuate. These fluctuations alter strategic decisions by major producers and consumers, significantly affecting the landscape of energy transitions (Sovacool, 2016). Moreover, geopolitical events can significantly disrupt energy systems, often exposing vulnerabilities in energy supply chains, prompting countries to reconsider their energy strategies and accelerate transitions to more secure and sustainable energy sources (Kuzemko et al., 2016).

Understanding the socio-political context of energy transitions is crucial, as public acceptance and support for energy policies are critical for their successful implementation. This is particularly relevant in the context of geopolitical events, which can rapidly shift public opinion and policy priorities. Effective communication and engagement with the public are essential to building support for necessary changes in energy infrastructure and policy (Sovacool, 2016).

To conclude, Cherp et al. (2011) also argue that traditional energy security measures, which focus on the short-term stability of fossil fuel supplies, are increasingly ineffective in the face of geopolitical disruptions. Instead, a shift towards renewable energy sources is necessary to build more resilient energy systems capable of withstanding geopolitical shocks.

The role of public opinion in shaping energy transition policies

Public opinion plays a critical role in the successful implementation of renewable energy policies, particularly in the context of the energy transition. Stokes (2013) provides an in-depth analysis of the political dynamics surrounding renewable energy policies, using Ontario's feed-in tariff policies as a case study.

The study underscores that high-level political support for renewable energy policies does not necessarily translate into widespread public acceptance, particularly at the local level. For instance, in Ontario, this opposition was primarily driven by concerns over the cost of renewable energy projects and their impact on local communities (Stokes, 2013). For this reason, although high-level political support for green energy transition has been noticeable since the beginning of the Russo-Ukrainian War, the case of citizens' attitudes should be studied further.

Stokes (2013) emphasizes that successful energy transition policies must consider not only the economic and technical aspects but also the political dimensions. Engaging the public through transparent communication and addressing public concerns are crucial for gaining and maintaining public support for renewable energy initiatives.

Building on this, Boudet (2019) conducted a comprehensive literature review on public perceptions of energy technologies and concluded that public engagement is essential for the successful restructuring of a nation's energy infrastructure, particularly in democratic societies like Germany. Boudet (2019) notes that surveys are particularly useful for gathering descriptive information about public perceptions at the individual level, which can inform the planning of energy policies. In Germany, these perceptions can be measured using data from the GESIS Panel, which will be described in the sample section.

Other factors affecting green energy transition attitudes

The socio-demographic characteristics that influence environmental attitudes are fundamental to controlling and understanding the main objective of this research, so in this section we will briefly present other factors that influence attitudes towards the transition to green energy and other forms of pro-environmental behavior that in turn affect the perception of this transition. Sociodemographic factors such as gender, age, income, and education significantly shape public perceptions (Blankenberg & Alhusen, 2019; Meyer et al., 2022).

Women and young people are generally more likely to oppose fossil fuel technologies and support renewable energy initiatives. Political ideology also influences attitudes, with progressives typically showing more support for green energy transitions compared to conservatives (Boudet, 2019; Blankenberg & Alhusen, 2019).

High-income individuals tend to have greater awareness and concern for environmental issues in general compared to their low-income counterparts, attributed to higher levels of education and access to information among wealthier individuals (Inglehart, 1995; Gelissen, 2007). The perception of costs and benefits associated with the green energy transition also varies significantly across income classes. Kemmelmeier et al. (2002) also found that high-income individuals are more likely to perceive the benefits, such as reduced pollution and long-term cost savings, outweighing the costs. In contrast, low-income individuals may see immediate costs, like higher utility bills or taxes as barriers to supporting green energy initiative.

Educational attainment, often correlated with income, is another critical factor shaping attitudes towards green energy. Higher educational levels are associated with greater awareness of environmental issues and a better understanding of the long-term benefits of green energy (Franzen & Vogl, 2013). Hartmann and Preisendörfer (2021) found regional differences in environmental awareness between East and West Germany, pointing to historical and socio-economic factors that influence these differences.

Trust in the federal government plays a crucial role in shaping German perceptions of the green energy transition, particularly in the context of the Russo-Ukrainian War. The conflict has underscored Germany's vulnerability due to its reliance on Russian fossil fuels, making governmental support for green energy more prominent (Ibar-Alonso et al., 2022; Wiertz et al., 2023). Citizens' trust is essential for converting this political stance into broad public acceptance (Stokes, 2013). This trust is vital for gaining support for policy shifts towards green energies, as public confidence in the government's competence to handle the geopolitical crisis influences public opinion (Levi & Stoker, 2000; Hakhverdian & Mayne, 2012). Levi and Stoker (2000) and Hakhverdian and Mayne (2012) also argue that political trust significantly affects public attitudes towards government policies, suggesting that higher trust levels lead to greater acceptance and support for initiatives, thereby enhancing the positive perception of the green energy transition.

Theoretical Framework

This section outlines the theoretical foundation for analyzing how the Russo-Ukrainian War has influenced German citizens' attitudes towards green energy transition. The central argument is that the outbreak of the war had an overall negative effect on the perception of the green energy transition due to the energy crisis, but the perception of geopolitical instability due to the threat of Russia has improved the perception of the green energy transition.

To explore these dynamics, we propose several hypotheses that consider the dual influence of economic and geopolitical factors. These hypotheses are grounded in existing literature and will be tested using the differences-in-differences method within an ordered logarithmic regression framework.

While traditional theories on energy transition often focus primarily on economic factors that may not fully capture the complex interplay between geopolitical events and public support, this framework incorporates geopolitical instability as a central variable. By considering the immediate impacts of geopolitical events, it provides a more comprehensive understanding of factors influencing public attitudes towards the green energy transition, which is crucial for developing effective energy policies and communication strategies in an era of global uncertainties and political instability. Despite this theoretical framework's strengths, public perceptions are inherently complex and influenced by numerous factors beyond economic and geopolitical considerations, such as cultural values and media influence, which cannot be fully accounted for in this framework.

Perception of green energy transition as harmful

The extent to which individuals believe the energy transition is harmful is crucial for evaluating their support or opposition to related policies and initiatives (Burke, 2020). This perception offers an overview of whether they are for or against the energy transition.

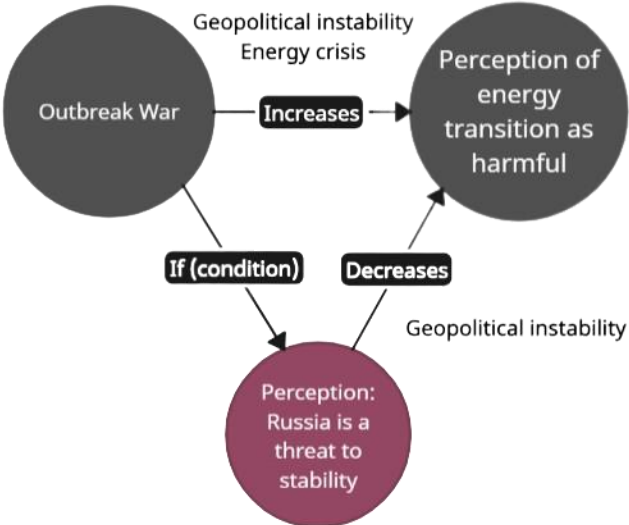
The hypothesis, represented in Figure 1, posits that the outbreak of the Russo-Ukrainian War increases the perception of green energy transition as harmful, but the isolated geopolitical instability perception caused by the Russian threat decreases it.

H1: The outbreak of the war **influences** the perception of energy transition as harmful **positively**.

H2: The outbreak of the war **influences** the perception of energy transition as harmful **negatively if** Russia is perceived as a threat to stability.

Based on the previous literature, it is assumed that the outbreak of the war causes both a situation of geopolitical instability and an energy crisis. The reasoning behind this framework is that the energy crisis may increase negative perceptions of green energies due to citizens' changing priorities in the face of rising energy prices (Ibar-Alonso, 2022), but the perception of geopolitical instability may reduce the negative perception of green energy transition.

Figure 2 Hypothesis model perception of green energy transition as harmful



Source: Own elaboration

Sense of urgency in green energy transition, regardless of costs

The urgency to transition away from fossil fuels may be influenced by the immediate economic costs versus long-term environmental benefits (Tang, 2022), heightened by geopolitical instability and the energy crisis. This urgency regardless of costs reflects attitudes towards prioritizing environmental concerns over short-term economic considerations.

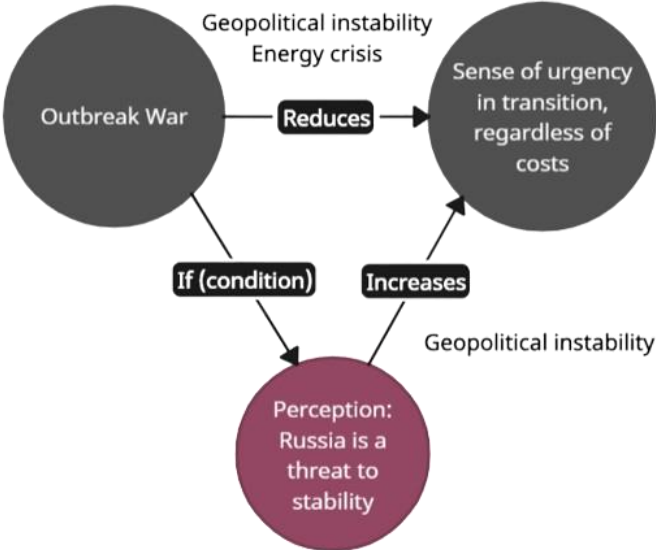
The hypothesis, represented in Figure 2, posits that the outbreak of the Russo-Ukrainian War led to a decrease in the perception of urgency for the green energy transition, but the isolated geopolitical instability perception because of the Russian threat increases it.

H3: The outbreak of the war **influences** the perception of the green energy transition as urgent **negatively**.

H4: The outbreak of the war **influences** the perception of the green energy transition as urgent **positively if** Russia is perceived as a threat to stability.

Based on the previous literature, it is assumed that the outbreak of the war causes both a situation of geopolitical instability and an energy crisis. The reasoning behind this framework is that the energy crisis may increase negative perceptions due to citizens' changing priorities in the face of rising energy prices (Wiertz et al., 2023), but the perception of geopolitical instability may increase it.

Figure 3 Hypothesis model perception green energy transition as urgent



Source: Own elaboration

Renewable energies make Germany independent from other countries

The geopolitical advantages attributed to renewable energy sources in terms of energy independence are of vital importance in this research since they measure the German citizens' perception of renewable energy as a protection against external price fluctuations and geopolitical instability. This conceptual relationship will allow us not only to measure the impact of the conflict itself, but also the success of the political communication of the political spheres that have promoted this solution since the beginning of the war (Wiertz et al., 2023; World Economic Forum, 2022).

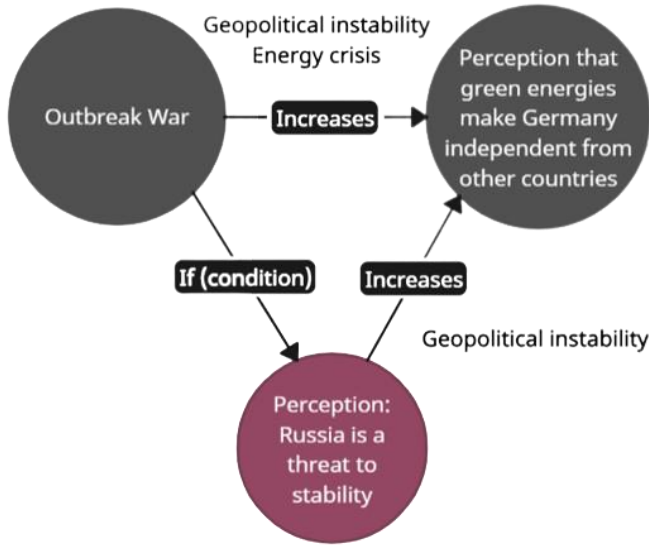
The hypothesis, represented in figure 3, posits that the outbreak of the Russo-Ukrainian War increases the perception that renewable energies make Germany independent from other countries, and the isolated geopolitical instability perception because of the Russian threat increases it as well.

H5: The outbreak of the war **influences** the perception that renewable energies make Germany independent from other countries **positively**.

H6: The outbreak of the war **influences** Perception that renewable energies make Germany independent from other countries **positively if** Russia is perceived as a threat to stability.

Based on the previous literature, it is assumed that the outbreak of the war causes both a situation of geopolitical instability and an energy crisis. The reasoning in this case is that, if the political promotion of green energies has been successful, the energy crisis should have increased the positive perceptions of green energies in this aspect, and the perception of geopolitical instability may reduce the negative perception of green energy transition itself.

Figure 4 Hypothesis model perception that renewable energies make Germany



Source: Own elaboration

Nuclear power plants are dangerous

While the classification of nuclear power in many countries is a controversial issue, in Germany the phasing out of nuclear power is part of its energy transition plan (Energiewende) (Renn, 2016; Federal Ministry for Economic Affairs and Climate Action, 2015). Understanding public perceptions towards nuclear power and its associated risks is essential for assessing support for or opposition to current policies aimed at phasing out nuclear energy.

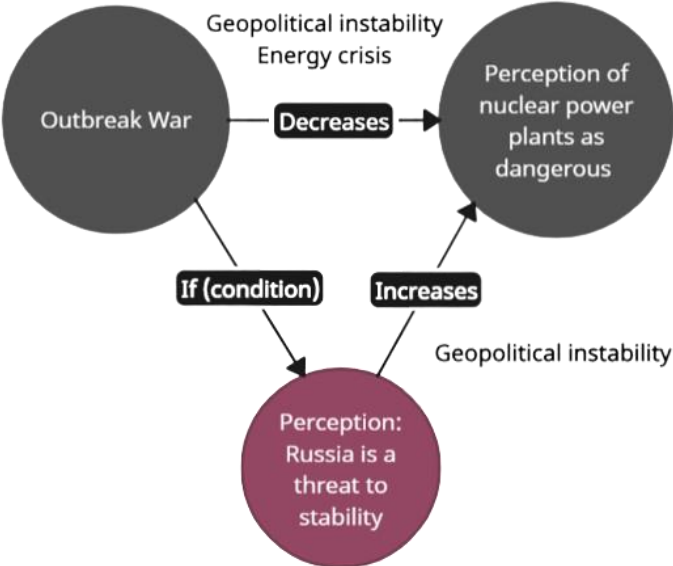
The hypothesis, represented in figure 4, posits that the outbreak of the Russo-Ukrainian War decreases the perception that nuclear power plants are dangerous, but the isolated geopolitical instability perception because of the Russian threat increases it.

H7: The outbreak of the war **influences** the perception that nuclear power plants are dangerous **negatively**.

H8: The outbreak of the war **influences** the perception that nuclear power plants are dangerous **positively if** Russia is perceived as a threat to stability.

Based on the previous literature, it is assumed that the outbreak of the war causes both a situation of geopolitical instability and an energy crisis. The reasoning in this case is that nuclear energy is seen as a reliable and independent source of energy that is cheaper than green energies, which could solve the issue of energy dependency in a situation of geopolitical instability and increase supply security (Wiertz, 2023). However, given the danger they pose in the event of military conflicts that became apparent after an attack on the Zaporizhzhia nuclear site in Ukraine (Reed et al., 2022), those who perceive higher geopolitical instability may consider it more dangerous.

Figure 5 Hypothesis model perception that nuclear energy is a danger



Source: Own elaboration

Empirical Strategy

Sample and data collection

The data utilized in this study are sourced from the GESIS Panel, a robust and comprehensive probability-based mixed-mode panel infrastructure designed to collect high-quality survey data representative of the German population (GESIS, 2024c). Access to the standard edition of the GESIS Panel was granted following a successful peer review of the research proposal.

Established and managed by the GESIS - Leibniz Institute for the Social Sciences, the GESIS Panel is a prominent resource within the academic research community, offering a unique opportunity to analyze longitudinal data on various social topics (Bosnjak et al., 2018). A more detailed description of the GESIS Panel can be found in [Bosnjak et al. \(2018\)](#).

The panel targets the German-speaking population aged 18 to 80³ residing in Germany, ensuring a broad and inclusive demographic coverage with approximately 5400 panelists in total (GESIS, 2024c) recruited through a rigorous multistage sampling process. This recruitment involved drawing a random sample from municipal population registers, conducting computer-aided personal interviews, and subsequently engaging respondents through both online and paper-and-pencil survey modes (Bosnjak et al., 2018).

In this research we use data from the GESIS Panel waves conducted between August 21, 2016, and July 18, 2023, based on the availability of data at the time of this research⁴.

Although there was an annual attrition rate of approximately 7% during the study period, a refreshment sample is recruited every two years to partly compensate for panel attrition (Kern et al., 2019). Moreover, for this research, the selected respondents are those who participated in at least one of the relevant waves between 2022 and 2023. Therefore, the participants for this study include 2,455 respondents who were surveyed six times per year using either a web survey or a paper-and-pencil questionnaire, each lasting approximately 20 minutes.

The GESIS Panel's credibility is further bolstered by its widespread use and recognition within the academic research community. Researchers across various disciplines regularly

³ Initially the limit was 70 years old but in the current version there is people up to 80 years old. In the case of the participants in this research, the youngest are 21 years old.

⁴ For more information about the time frame of the waves please refer to the Annex: Table of waves

rely on the GESIS Panel for empirical studies, underscoring its reputation as a trusted and valuable resource for social science research (Bosnjak et al., 2018).

The GESIS Panel was chosen for this study because its longitudinal design is essential for examining how German citizens' attitudes toward the energy transition and nuclear power evolve over time. This design allows for the analysis of attitudes during distinct phases, including before and after significant geopolitical events like the Russo-Ukrainian War. By offering a comprehensive time perspective, the GESIS Panel enables a more accurate understanding of trends and changes in public opinion.

The GESIS Panel provides an extensive range of variables relevant to this study. These include variables related to attitudes toward the energy transition from various perspectives, perceptions of Russia as a threat to stability in Europe, and several control variables essential for robust analysis. This set of variables allows for an adequate investigation of the research questions and supports the development of well-founded conclusions.

Additionally, the GESIS Panel's mixed-mode data collection approach, incorporating both online and offline methods, enhances the reliability and representativeness of the data. This approach ensures the inclusion of respondents with varying access to technology, mitigating potential biases and ensuring a more accurate reflection of the German population (GESIS, 2024b).

The dataset from the GESIS Panel was initially merged, temporally labeled and inspected for missing values, outliers, and the appropriate coding of ordinal categories. Several adjustments have been made to the raw data set to present the results in a consistent way. For more information, please refer to the appendix.

Variables

This section details the variables used in the study, explaining their significance and how they relate to the theoretical framework to check the hypothesis. In the appendix, detailed descriptions and operationalizations of all variables are provided, and the do file contains a comprehensive record of every modification made to improve the variables' clarity.

Dependent variables

All the variables in this section of are part of the GESIS Panel Core Study – Environmental attitudes and behavior, specifically regarding construct “Attitudes: Energiewende”. The

values of these variables correspond to the question “To what extent do you agree or disagree with the following statements?”, resulting in an ordinal variable that measures their attitudes towards the different topics of the green energy transition presented below (GESIS, 2024a; 11860-11866).

1. Perception of the Energy Transition as harmful

- **Statement:** “The so-called 'Energiewende' does more harm than good.”

This variable assesses individuals' perceptions of the overall energy transition (Energiewende) harms and benefits. This measures, as an ordinal variable, the perception of green energy transition as harmful, as mentioned in the theoretical framework.

2. Urgency in the Energy Transition Regardless of Costs

- **Statement:** “We have to move away from fossil fuels as soon as possible, regardless of costs.”

This variable assesses the urgency associated with transitioning away from fossil fuels, irrespective of the economic implications. This measures as an ordinal variable the sense of urgency of the transition to green energy regardless of the costs mentioned in the theoretical framework.

3. Perception of Energy Independence through Renewable Energies

- **Statement:** “Renewable energies make Germany independent from other countries because less energy has to be imported.”

This variable assesses perceptions regarding the role of renewable energies in reducing dependency on external energy sources and enhancing national security. This measures as an ordinal variable the perception that renewable energies make Germany independent from other countries mentioned in the theoretical framework.

4. Perception of Nuclear Power as Dangerous

- **Statement:** “Nuclear power plants are very dangerous for all of us.”

This variable assesses attitudes towards nuclear power and its associated risks. This measures as an ordinal variable the perception of nuclear energy as dangerous in the theoretical framework.

Study variable

- ***Russia as a Threat to Peace in Europe***

This variable serves as a proxy for measuring whether participants see Russia as a threat to stability in Europe. It captures the perceived geopolitical instability in the region due to the Russo-Ukrainian War, reflecting concerns about regional stability and the potential disruption of trade ties and economic relationships in Europe.

The perception of Russia as a threat is crucial for understanding the impact of geopolitical instability on public attitudes towards the green energy transition. This variable has been converted into a dummy variable to test the differences in the impact of the war between those who perceive geopolitical instability in the region and those who do not, as represented in the theoretical framework.

- ***Dummy Variable for Post-War Period***

This variable takes the value of 1 after the outbreak of the Russo-Ukrainian War (post-February 2022) and 0 otherwise and is used to differentiate between the periods before and after the war and test the effect of this event on the Germans' attitudes towards green energy transition, as represented in the theoretical framework.

Control variables

The inclusion of control variables is essential to account for potential confounding factors that may influence the primary relationships, ensuring that the observed effects are attributed to the study variables (Newey & Stouli, 2018). This control variables have been selected based on the previous literature about the changes in attitudes toward green energy transition⁵:

- ***Household Income***: Ordinal variable indicating the income level of the household.
- ***Employment Status***: Categorical variable distinguishing between employed, retirees, students and unemployed
- ***Gender***: Binary variable indicating male or female.
- ***Age and Age Squared***: Age is included in its quadratic form to account for potential non-linear relationships.

⁵ For a more detailed information about these variables, please refer to the appendix.

- ***Highest Level of Education:*** Ordinal categories based on the German education system, as used by the GESIS Panel.
- ***Political Orientation:*** Scale from left to right, based on self-placement.
- ***Trust in Federal Government:*** Ordinal variable indicating the level of trust in the federal government.
- ***Satisfaction with Financial Situation:*** Ordinal variable indicating the level of satisfaction with one's financial situation.

Data analysis

The analysis will be conducted using Stata software, chosen for its robust statistical capabilities and suitability for handling complex survey data.

The primary analytical technique will be ordered logistic regression (ologit), appropriate for the ordinal nature of the dependent variables. These variables measure attitudes towards the green energy transition among German citizens, captured in five ordered categories ranging from "Fully disagree" to "Totally agree" with statements related to energy transition and renewable energy attitudes. The choice of the ologit model is driven by its ability to handle ordinal outcomes and its alignment with the proportional odds assumption. This assumption posits that the odds of being in a higher category of the dependent variable versus a lower category are constant across distinct levels of the independent variables (StataCorp, 2023). This property simplifies the interpretation of the results, making the model suitable for this analysis.

Given the dataset's panel structure, where repeated observations are available for the same individuals, there is a potential for intra-individual correlation. To address this, a clustering strategy will be employed. Specifically, the standard errors in the regression analysis will be clustered by the unique identifier of the respondents. This approach acknowledges that responses from the same individual may exhibit correlated patterns due to unobserved individual-specific characteristics. Clustering by respondent ID allows for adjustment of the standard errors, ensuring that the estimation accounts for potential within-individual correlation and providing more reliable inference (Cameron & Miller, 2015).

To measure the impact of the Russo-Ukrainian War on German citizens' attitudes towards the green energy transition, the analysis employs the Difference-in-Differences (DiD) method. The DiD approach is particularly well-suited for this analysis as it allows for comparing the

changes in attitudes over time between a treatment group (those perceiving a threat from Russia) and a control group (those not perceiving such a threat). By focusing on the differential impact of the geopolitical event, the DiD method helps isolate the causal effect of the war on attitudes towards the green energy transition. The DiD method is justified as it controls for unobserved time-invariant factors and common trends affecting both groups, enhancing the robustness of causal inferences. This methodology is widely used in social sciences to measure the effect of a specific event on two distinct groups of people (Callaway, 2018; Angrist and Pischke, 2008; Ding & Li, 2019).

The significance of the predictors in the ordered logistic model will be evaluated using Wald chi-square tests. These tests assess the contribution of each predictor to the model, allowing for the determination of whether the relationships observed are statistically significant.

Through the use of this methodology, this analysis aims to be an insightful estimation of how German citizens' attitudes towards the green energy transition have been affected by the changing geopolitical environment in relation to the Russo-Ukrainian War. The methodological rigor guarantees results that are reliable and interpretable, hence contributing to valuable knowledge in the field of energy policy studies.

However, one key limitation of the difference-in-differences analysis employed in this study is the parallel trends assumption. This assumption can be questionable and requires that, in the absence of the treatment, the treatment and control groups would have exhibited similar trends over time (Ding & Li, 2019). If this assumption does not hold, the estimated treatment effects may be biased. Although the parallel trend assumption has been checked, the reliability is limited by the availability of the data.

In addition, the access granted to the GESIS Panel for this research does not include a state-level variable, only to a variable indicating whether respondents are from East or West Germany, which was found to be insignificant in all regression models, meaning that we cannot adequately control for regional variations within Germany.

Ordered logistic regression

$$\begin{aligned} \text{logit}(P(Y \leq j)) \\ = \alpha_j - (\beta_1 \text{Post} + \beta_2 \text{RussiaThreat} + \beta_3 \text{Post} \times \text{RussiaThreat} \\ + \beta_4 \text{Control Variables}) \end{aligned}$$

- **Y** represents the dependent variable, which includes:
 - *Perception of the Energy Transition as Harmful.*
 - *Urgency in the Energy Transition Regardless of Costs*
 - *Perception of Energy Independence through Renewable Energies*
 - *Perception of Nuclear Power as Dangerous*
- **j** represents the distinct levels of the ordinal response categories:
 1. Fully disagree.
 2. Do not agree
 3. Neither nor
 4. Agree
 5. I totally agree
- α_j are the threshold parameters specific to each level j of the ordinal response.
- **Post** is a binary indicator variable that equals 1 if the observation is from after the outbreak of the war and 0 otherwise.
- **RussiaThreat** is a binary indicator variable that equals 1 if the respondent perceives Russia as a threat to the stability 0 otherwise.
- **Post** \times **RussiaThreat** is the interaction term between the post-war period indicator and the treatment group indicator, represents the DiD estimator. This coefficient indicates the difference in the change of the dependent variable before and after between those who perceive Russia as a threat to stability in Europe and those who do not.
- **Control Variables:**
 - Household Income
 - Employment Status
 - Gender
 - Age and Age Squared
 - Highest Level of Education
 - Political Orientation (Left-Right Self-placement)
 - Trust in Federal Government
 - Satisfaction with Financial Situation

Results

This section presents the findings from the analysis presented above. The key findings are examined, highlighting significant trends and shifts in public opinion in response to the conflict, based on regression analyses and graphical representations.

Perception of green energy transition as harmful

Effect of geopolitical instability perception and Ukraine Conflict

The coefficient for the dummy variable *perception of Russia as a threat* (1.threat) is significantly negative, with a coefficient of -0.643 ($p < 0.001$). This suggests that this group of citizens who perceive Russia as a threat to Europe were less likely to view the green energy transition as harmful than the control group⁶ even before the outbreak of the war.

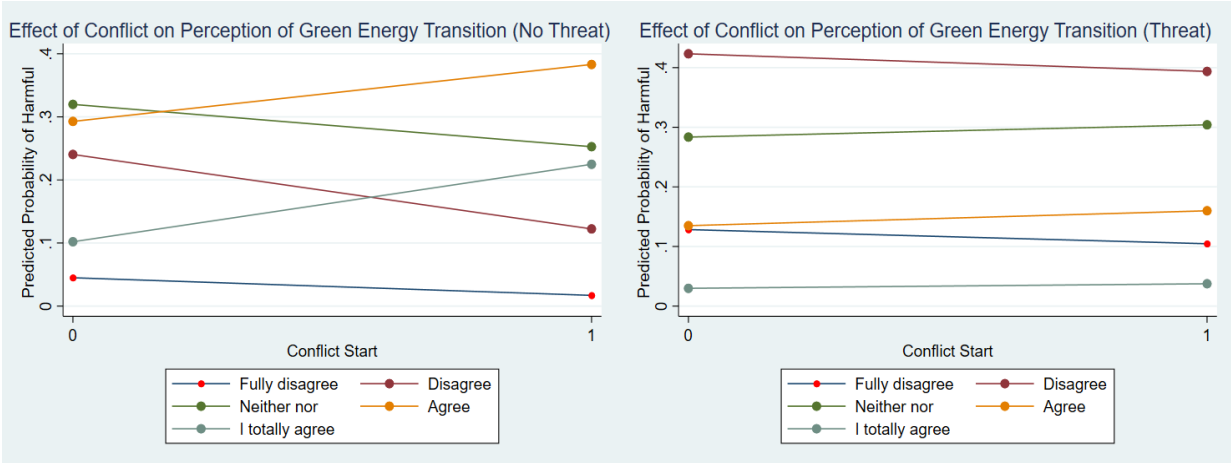
The coefficient for the dummy *conflict* variable (1. conflict) is significantly positive with a coefficient of 1.036 ($p < 0.001$). This indicates that the outbreak of the Russo-Ukrainian war increases the perception of the green energy transition as harmful by those who do not perceive Russia as a threat.

Interaction Effect: Differences-in-Differences Estimator

The interaction term between threat and conflict (*threat#conflict*) is significantly negative with a coefficient of -0.791 ($p < 0.001$). This coefficient represents the additional effect of the conflict on the perception of the green energy transition as harmful for those who also perceive a geopolitical threat. The negative sign indicates that the increase in negative perception due to the conflict is less pronounced for those who perceive a high threat from Russia.

⁶ Those who do not perceive Russia as a threat to Europe.

Graph 1 Effect of conflict start on perception of energy transition as harmful



Source: Own elaboration

As we can see in Graph 1, the probability of people agreeing with the energy transition being harmful increases a lot for those who do not perceive Russia as a threat, with an increase of around 20% (Totally agree and agree together) but for those who do not perceive Russia as a threat, the probability increases in a much softer way. We can also see this difference in the regression if we subtract the interaction and conflict coefficients ($1.036 - 0.791 = 0.245$). In other words, the perceived geopolitical threat moderates the impact of the conflict, reducing the additional perception of the green energy transition as harmful. Therefore:

- **H1 (Accepted):** The outbreak of the war increases the perception of the energy transition as harmful.
- **H2 (Accepted):** The negative perception of the energy transition (as harmful) due to the outbreak of the war is moderated (reduced) if Russia is perceived as a threat to stability.

All the significant control variables confirm the expectations of the literature, but gender and age are not significant in this context, indicating that perceptions of the green energy transition are less influenced by these factors.

Table 2 Ordered Logistic Regression results perception of green energy transition as harmful⁷

	(1) Simple harmful	(2) Controlled harmful
Pseudo R ²	0.0179	0.0836
Prob > chi2	0.0000	0.0000
1. threat	-1.074*** (-9.49)	-0.643*** (-5.59)
1.conflict	1.176*** (10.78)	1.036*** (8.43)
Threat##conflict	-0.966*** (-8.55)	-0.791*** (-6.26)
Income		-0.0788*** (-5.31)
Education		-0.158*** (-7.38)
Gender		-0.0946 (-1.62)
Age2		0.0000126 (0.58)
Political Orientation		0.247*** (15.32)
Trust in Federal Govt.		-0.362*** (-18.98)
Financial Satisfaction		-0.0413* (-2.09)
/		
cut1	-3.048*** (-25.50)	-4.870*** (-20.11)
cut2	-0.922*** (-8.40)	-2.501*** (-10.76)
cut3	0.517*** (4.77)	-0.895*** (-3.92)
cut4	2.386*** (19.63)	1.085*** (4.72)
N	18408	15670

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Own elaboration

⁷ Tested for multicollinearity, heteroscedasticity and robustness, controlled for autocorrelation. There is no relevant variation using fixed/random effects.

Move away from fossil fuels as soon as possible, regardless of costs

Effect of geopolitical instability perception and Ukraine Conflict

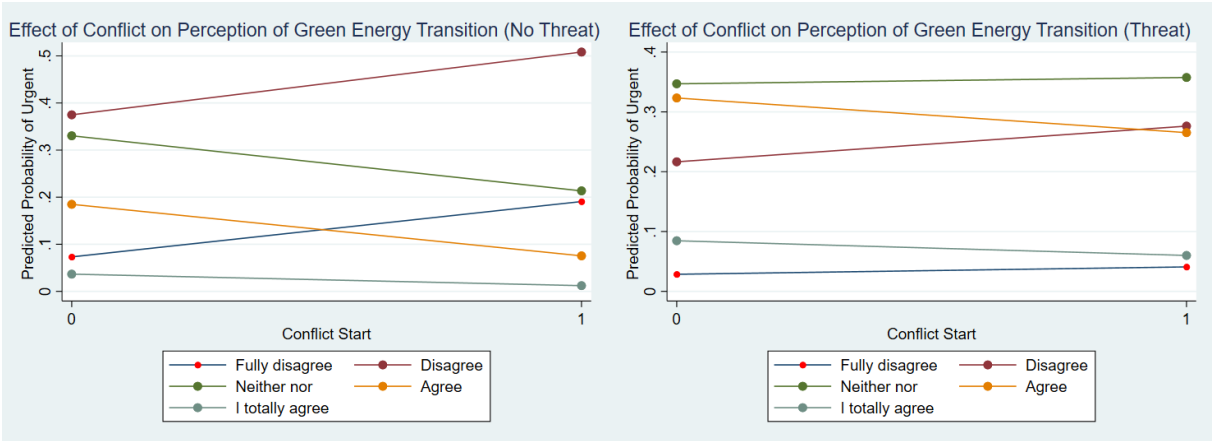
The coefficient for the dummy variable *perception of Russia as a threat* is significantly positive with a coefficient of 0.628 ($p < 0.001$) (Table 3). This suggests that this group of citizens who perceive Russia as a threat to Europe were more likely to view the energy transition as urgent than the control group⁸ even before the outbreak of the war.

The coefficient for the dummy *conflict* variable (1. conflict) is significantly negative with a coefficient of -1.136 ($p < 0.001$) (Table 4). This indicates that the outbreak of the Russo-Ukrainian war decreases the perception of urgency in the green energy transition among those who do not perceive Russia as a threat.

Interaction Effect: Differences-in-Differences Estimator

The interaction term between threat and conflict (*threat#conflict*) is significantly positive with a coefficient of 0.761 ($p < 0.001$) (Table 5). This coefficient represents the additional effect of the conflict on the perception of the green energy transition as urgent for those who also perceive a geopolitical threat. The positive sign indicates that the decrease in the perception of urgency due to the conflict is less pronounced for those who perceive a high threat from Russia.

Graph 2 Effect of Conflict Start on Perception of Energy Transition as Urgent



Source: Own elaboration

⁸ Those who do not perceive Russia as a threat to Europe.

As we can see in Graph 2, the probability of people agreeing that the energy transition is urgent decreases significantly for those who do not perceive Russia as a threat, with a decrease of more around 20% (Fully disagree and disagree together) and a decrease of the neutral answer in favor of the disagreement of around 10%. However, for those who perceive Russia as a threat, the probability decreases in a much softer way. We can also see this difference in the regression if we subtract the interaction and conflict coefficients ($-1.136 + 0.761 = -0.375$). In other words, the perceived geopolitical threat moderates the conflict's impact, reducing the additional perception of urgency in the energy transition. Therefore:

- **H3 (Accepted):** The outbreak of the war decreases the perception of urgency in the energy transition.
- **H4 (Accepted):** The reduced perception of urgency in the energy transition due to the outbreak of the war is moderated (lessened) if Russia is perceived as a threat to stability.

All the significant control variables confirm the expectations of the literature. However, Gender, Age, Satisfaction with Financial Situation and Income⁹ are not significant in this context, indicating that perceptions of the urgency in the energy transition are less influenced by these factors.

⁹ Despite having a p-value of 0.05, it has been confirmed not to be robust.

Table 3 Ordered Logistic Regression results perception of urgency in energy transition, regardless of costs¹⁰.

	(1) Simple Urgent	(2) Controlled Urgent
Pseudo R ²	0.0139	0.0404
Prob > chi2	0.0000	0.0000
1. threat	0.860*** (8.51)	0.628*** (5.81)
1.conflict	-1.151*** (-10.67)	-1.136*** (-10.05)
Threat##conflict	0.796*** (7.12)	0.761*** (6.50)
Income		-0.0404** (-2.82)
Education		0.105*** (5.13)
Gender		-0.104 (-1.80)
Age2		0.0000170 (0.78)
Political Orientation		-0.216*** (-13.82)
Trust in Federal Govt.		0.136*** (7.52)
Financial Satisfaction		0.0498** (2.59)
/		
cut1	-2.630*** (-24.33)	-2.693*** (-12.21)
cut2	-0.266** (-2.77)	-0.232 (-1.08)
cut3	1.269*** (12.81)	1.347*** (6.25)
cut4	3.304*** (29.99)	3.431*** (15.39)
N	18401	15670

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Own elaboration

¹⁰ Tested for multicollinearity, heteroscedasticity and robustness, controlled for autocorrelation. There is no relevant variation using fixed/random effects.

Renewable energies make Germany independent from other countries

Effect of geopolitical instability perception and Ukraine Conflict

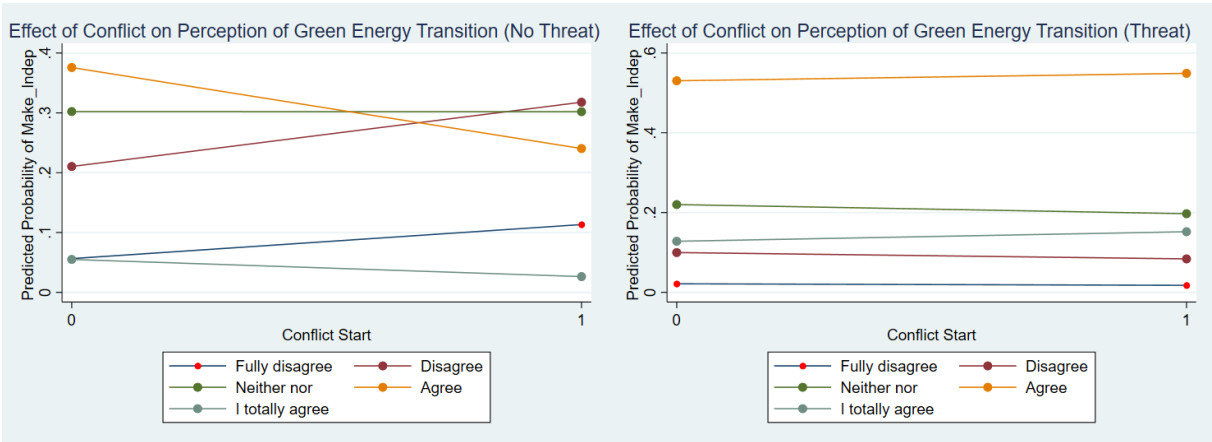
The coefficient for the dummy variable *perception of Russia as a threat* is significantly positive with a coefficient of 0.666 ($p < 0.001$) (Table 4). This suggests that this group of citizens who perceive Russia as a threat to Europe were more likely to believe that renewable energies make Germany independent from other countries than the control group¹¹ even before the outbreak of the war.

The coefficient for the dummy *conflict* variable (1. conflict) is significantly negative with a coefficient of -0.775 ($p < 0.001$) (Table 4). This indicates that the outbreak of the Russo-Ukrainian war decreases the perception that renewable energies make Germany independent from other countries among those who do not perceive Russia as a threat.

Interaction Effect: Differences-in-Differences Estimator

The interaction term between threat and conflict (*threat#conflict*) is significantly positive which a coefficient of 0.978 ($p < 0.001$) (Table 4). This coefficient represents the additional effect of the conflict on the perception of the green energy transition as urgent for those who also perceive a geopolitical threat. The positive sign indicates that the perception of urgency increased for those who perceive a high threat from Russia when the conflict is ongoing.

Graph 3 Effect of Conflict Start on Perception of Renewable Energies Making Germany Independent



¹¹ Those who do not perceive Russia as a threat to Europe.

Note: The graph at the right has a different scale to capture the high probability of agreement in the group (>50%)

Source: Own elaboration

As we can see in Graph 3, the probability of people agreeing with renewable energies making Germany independent decreases for those who do not perceive Russia as a threat, with a decrease of around 15% (Totally agree and agree together) but for those who do not perceive Russia as a threat, the effect is the opposite, the probability of agreeing slightly increases, while the neutral answer and disagreement decreases and the fully disagreement stays close to 0. We can also see this difference in the regression if we subtract the interaction and conflict coefficients ($1.036 - 0.791 = 0.245$).

As the general aggregate effect of the outbreak of the war is not clear in this regression, it has been checked by an additional regression without the use of the DiD estimator (Table A4) with a significant positive coefficient of 0.105 ($p < 0.01$), indicating that the overall change has been positive in the German population.

In other words, in this case, there is a dual effect of the impact of the conflict, which is positive for those who perceive Russia as a threat and negative for those who do not. Despite this, the overall effect on the German citizens is positive (as more people perceive this threat than do not). Therefore:

- **H5 (Accepted):** The outbreak of the war increases the perception that renewable energies make Germany independent from other countries.
- **H6 (Accepted):** The perception that renewable energies make Germany independent from other countries after the outbreak of the war increases if Russia is perceived as a threat to stability.

All the significant control variables confirm the expectations of the literature. However, gender, age, income and satisfaction with financial situation are not significant in this context, indicating that perceptions of the independence provided by renewable energies are less influenced by these factors.

Table 4 Ordered Logistic Regression results perception of renewable energy makes Germany independent¹²

	(1) Simple Independent	(2) Controlled Independent
Pseudo R ²	0.0138	0.0339
Prob > chi2	0.0000	0.0000
1. threat	0.873*** (8.71)	0.666*** (6.26)
1.conflict	-0.856*** (-7.71)	-0.775*** (-6.93)
Threat##conflict	1.061*** (9.14)	0.978*** (8.34)
Income		-0.00110 (-0.08)
Education		0.0528** (2.64)
Gender		0.128* (2.25)
Age2		-0.0000268 (-1.30)
Political Orientation		-0.153*** (-10.33)
Trust in Federal Govt.		0.186*** (10.35)
Financial Satisfaction		0.0325 (1.72)
/		
cut1	-2.893*** (-23.93)	-2.707*** (-11.90)
cut2	-1.108*** (-11.45)	-0.848*** (-4.00)
cut3	0.255** (2.65)	0.516* (2.40)
cut4	2.827*** (27.02)	3.179*** (14.30)
N	18419	15673

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Own elaboration

¹² Tested for multicollinearity, heteroscedasticity and robustness, controlled for autocorrelation. There is no relevant variation using fixed/random effects.

Nuclear power plants are dangerous

Effect of geopolitical instability perception and Ukraine Conflict

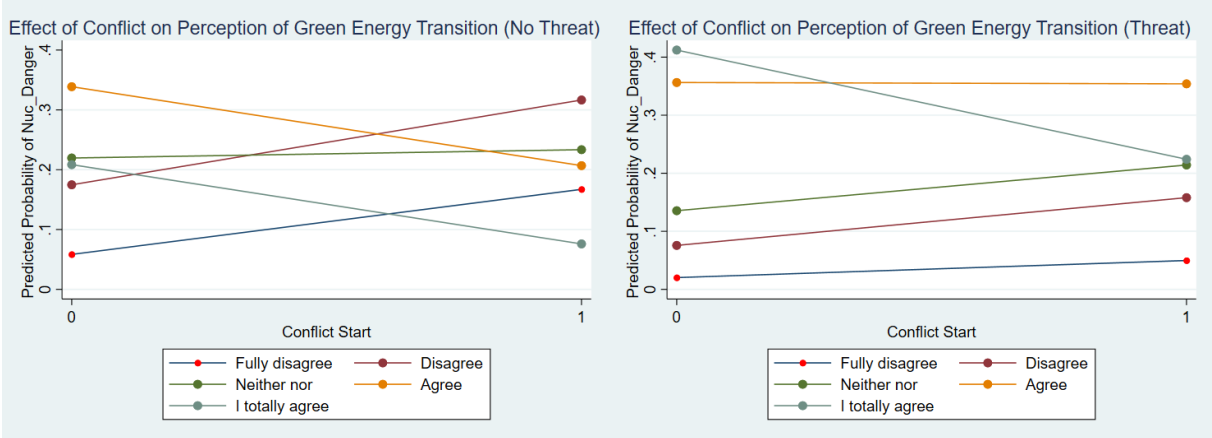
The coefficient for the dummy variable *perception of Russia as a threat* is significantly positive with a coefficient of 0.777 ($p < 0.001$) (Table 5). This suggests that this group of citizens who perceive Russia as a threat to Europe were more likely to view nuclear power plants as dangerous than the control group¹³ even before the outbreak of the war.

The coefficient for the dummy *conflict* variable (1. conflict) is significantly negative with a coefficient of -1.220 ($p < 0.001$) (Table 5). This indicates that the outbreak of the Russo-Ukrainian war decreases the perception that nuclear power plants are dangerous.

Interaction Effect: Differences-in-Differences Estimator

The interaction term between threat and conflict (*threat#conflict*) is significantly positive with a coefficient of 0.282 ($p < 0.001$) (Table 5). This coefficient represents the additional effect of the conflict on the perception of nuclear power plants as dangerous for those who also perceive a geopolitical threat. The positive sign indicates that the decrease in the perception of danger due to the conflict is less pronounced for those who perceive a high threat from Russia.

Graph 4 Effect of Conflict Start on Perception of Nuclear Power Plants as Dangerous



Source: Own elaboration

As we can see in Graph 4, the probability of people agreeing that nuclear power plants are dangerous decreases significantly for those who do not perceive Russia as a threat, with a

¹³ Those who do not perceive Russia as a threat to Europe.

decrease of more than 20% (Totally agree and agree together). However, for those who perceive Russia as a threat, the change occurs differently. While the probability of agree remains constant, the probability of fully agree decreases drastically, being compensated by an increase in "Neither nor" and "Disagree" and a marginal increase in "Fully disagree". This indicates that although the probability of thinking that nuclear energy is not dangerous increases by only 10% and the probability of a neutral position increases by the other 10%. In the regression if we subtract the interaction and conflict coefficients we obtain a strong negative value ($-1.220 + 0.282 = -0.938$) however this should be interpreted in conjunction with the graph, concluding that in reality the change has been towards a more moderate position than the control group¹⁴, given the increase in the neutral response.

In other words, the perceived geopolitical threat moderates the impact of the conflict, reducing the decrease in the perception that nuclear power plants are dangerous. Therefore:

- **H7 (Accepted):** The outbreak of the war decreases the perception that nuclear power plants are dangerous.
- **H8 (Accepted):** The reduced perception that nuclear power plants are dangerous due to the outbreak of the war is moderated (lessened) if Russia is perceived as a threat to stability.

The control variables show that income, financial satisfaction, and age are not significant in this context, indicating that perceptions of nuclear plant as dangerous are less influenced by these factors.

¹⁴ Those who do not perceive Russia as a threat to Europe.

Table 5 Ordered Logistic Regression results perception that nuclear plants are dangerous¹⁵

	(1) Simple Nuclear danger	(2) Controlled Nuclear danger
Pseudo R ²	0.0255	0.0275
Prob > chi2	0.0000	0.0000
1. threat	0.981*** (8.48)	0.777*** (6.42)
1.conflict	-1.161*** (-13.56)	-1.220*** (-12.49)
Threat##conflict	0.301*** (3.37)	0.282** (2.78)
Income		-0.0296 (-1.91)
Education		0.0773*** (3.46)
Gender		-0.246*** (-3.91)
Age2		0.00000123 (0.05)
Political Orientation		-0.253*** (-15.19)
Trust in Federal Govt.		0.0963*** (5.02)
Financial Satisfaction		0.0105 (0.52)
/		
cut1	-2.846*** (-21.98)	-3.724*** (-15.25)
cut2	-1.246*** (-11.09)	-2.063*** (-8.84)
cut3	-0.217* (-1.97)	-0.979*** (-4.16)
cut4	1.357*** (11.97)	0.675** (2.84)
N	18399	15659

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Own elaboration

¹⁵ Tested for multicollinearity, heteroscedasticity and robustness, controlled for autocorrelation. There is no relevant variation using fixed/random effects.

Discussion and Conclusion

The findings of this thesis provide significant insights into the perception of the green energy transition, the urgency of the energy transition, and the danger posed by nuclear energy in the context of the geopolitical and energy crises after the outbreak of the Russo-Ukrainian War. These findings have been analyzed and interpreted in light of existing literature to determine the contribution of this research to the academic field.

Previous studies have shown that geopolitical conflicts can influence public opinion on energy security and transition policies (Cherp et al., 2012; Kuzemko et al., 2017). This thesis adds to this body of knowledge by providing empirical evidence from a Differences-in-Differences (DiD) analysis, highlighting the nuanced effects of the Russo-Ukrainian War and perceived threats from Russia on the German citizens' perception of green energy transition, urgency in energy transition, and the safety of nuclear power plants.

In the case of the perception of the green energy transition and its urgency, the outbreak of the Russo-Ukrainian War worsened these attitudes significantly, however, the perception of Russia as a threat moderated these negative effects in a positive way. This distinction indicates the dual impact that the war has had on attitudes towards the green energy transition: on the one hand, the energy crisis has highlighted the economic importance of the energy sector and increased the German population's awareness of the effect of rising prices, resulting in a reduced sense of urgency in the energy transition (regardless of costs) in favor of a smoother transition, and the increased perceived risk of an energy transition to renewables considered more expensive in a period when energy prices are already much higher than they used to be; on the other hand, for those who perceive a risk to stability in Europe, the benefits of green energy in terms of energy security and the protection it provides against dependence on fossil fuels from third countries partly (but not completely) offsets the negative effects of the energy crisis. This argument is reinforced by the following finding.

Supporting the theoretical framework, the perception of the geopolitical advantages of renewable energies in terms of energy independence (considering that they make Germany independent from other countries) has increased after the outbreak of the Russian-Ukrainian war for those who perceive Russia as a threat to stability, while it has decreased significantly for those who do not. This change in attitude is explained by the change in the political discourse of accelerating energy transition as a solution to Russia's energy dependence both in

Germany and at the European level (Wiertz et al., 2023; World Economic Forum, 2022). However, a greater effect is observed in the short term (shortly after the start of the war in 2022) than in the medium term, as the first considerable increase in those who consider the threat to stability practically returned to normal in 2023 (Graph A1), indicating that the rhetoric used to defend green energy as a protective measure against other countries has lost its force in the medium term.

Finally, the decrease in the perception of nuclear energy as dangerous, which had already been on a negative trend since 2016 (Graph A1), has been significantly accelerated after the outbreak of the Russian-Ukrainian war, as it is a cheaper and more reliable source of energy than renewables and less dependent on countries such as Russia. This increase in the positive perception of nuclear energy as a solution (or mitigation) to the energy crisis (Wiertz, 2023) must have led to a reconsideration of the risks involved, shifting to a less critical view. However, the perception of Russia as a threat attenuated these effects so that those who perceived a threat experienced a softer decrease, with half of those who no longer agreed with the statement that they are dangerous shifting to a neutral rather than a negative position. This is justified by the danger they pose in the event of military conflicts observed after an attack on the Zaporizhzhia nuclear site in Ukraine (Reed et al., 2022), however, given that there were no incidents and perceptions of danger continued to decline in 2023, it is likely that this event will soon be forgotten and have no effect in the medium to long term.

The findings provide actionable insights for policymakers to address public concerns and enhance support for energy transitions amidst geopolitical tensions. However, it is important to note that this research focuses exclusively on Germany. Extrapolating the results to other countries may be challenging due to Germany's unique dependency on Russian energy, its specific political context, and its distinct approach to energy transition.

Moreover, this study has several limitations. Firstly, the reliance on survey data introduces the potential for response biases and bases the research conclusions on the representativeness of German citizens. Secondly, while the Differences-in-Differences approach mitigates some confounding effects, this method depends on some assumptions, and unobserved variables may still influence the results due to the complexity of the study topic. Finally, panel attrition has the potential to change the sample's representativeness over time. Future research should consider these limitations and strive to incorporate more robust methodologies and further observations collected after the outbreak of the Russo-Ukrainian War.

Future research should build on these findings by exploring the specific impacts of the Russo-Ukrainian War on public perceptions of energy policies. Longitudinal studies could provide deeper insights into how these perceptions evolve over time, especially in response to ongoing geopolitical threats and energy supply disruptions. Additionally, comparative studies across different countries or geopolitical contexts could help generalize the findings and understand the broader implications of instability for energy policies.

For policymakers, the findings underscore the importance of addressing public concerns about the energy security and reliability of green energies in the context of geopolitical conflicts. Enhancing communication strategies to emphasize the stability and benefits of the green energy transition amidst conflicts could help mitigate negative perceptions and even use this idea to further incentivize investment in renewables to offset higher energy costs with new and more efficient technology.

Additionally, this study highlights the necessity of further research into the changing perceptions of nuclear energy. Understanding how public attitudes towards nuclear power are changing, especially in light of recent geopolitical events, is critical for policy analysts to monitor support for the nuclear phase-out.

Understanding the impact of demographic variables on attitudes toward the green energy transition is also crucial for designing effective policies. The results highlight once more that energy policies must consider the economic constraints and priorities of different income classes. For instance, providing subsidies or financial incentives for low-income households to adopt green technologies can help mitigate perceived cost barriers (Carley & Konisky, 2020) which have been reinforced by the energy crisis resulting from the Russo-Ukrainian war. Trust in government has also been shown to play a key role in mediating these perceptions, with higher trust correlating with more positive attitudes towards the energy transition, so transparent and consistent communication about the benefits and progress of the green energy transition is fundamental to building this trust.

In conclusion, this research highlights the critical role of geopolitical threats in shaping public perceptions of energy policies. By addressing these concerns and fostering trust, policymakers can better navigate the complexities of energy transitions in an increasingly interconnected and volatile world.

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Appendix

Variable's details

The data was adapted to the research by creating inverted variables for certain survey responses to ensure ordinal variables were uniformly scaled from less agreement to more agreement. This was done using the formula:

$$\text{New_variable} = 6 - \text{Original_variable}$$

This inversion was applied to the variables *harmful*, *urgent*, *independent*, and *nucleardanger*, transforming their scales to range from 1 (strongly disagree) to 5 (strongly agree).

Specific coded values that indicated missing data (Figure A1) have been replaced with Stata's missing value symbol (.). For variables with potential time-specific missing values, missing data was filled in using the value from the previous or next year, when appropriate and there is low short-term variability. For example, the highest degree of education, when missing, has been replaced by the one of the previous years. For more details, refer to the .do file.

Figure A1 Missing value scheme

Missing value scheme

The complexity of the GESIS Panel requires a comprehensive missing value scheme as shown in table below.

Value	Value label	Remark
-11	Not invited	only in recruitment waves as long as the respective profile survey is not yet finished
-22	Not in panel	not willing to join the panel after recruitment interview or actively signing off the panel
-33	Unit nonresponse	invited but not participating in corresponding wave
-44	Missing by m.o.p.	mode of participation (m.o.p.): online or offline
-55	Missing by technical error	e.g. questionnaire programming error
-66	Missing by design	experimental variation
-77	Not reached	only in online mode: panelist has not seen the item , indicates break-off
-88	Missing by filter	filtered item
-99	Item nonresponse	due to nonresponse by the respondent
-111	Ambiguous answer	ambiguous answers in questionnaire

Source: GESIS, 2024b

The present study uses and adapts the codebook developed by the GESIS Panel (2024a)¹⁶:

¹⁶ All the variables and text from the list are a from GESIS (2024a) codebook.

- “Energy transition: Energy transition does more harm than good
 - Variables: dczd021a eczd021a fczd021a gczd021a hczd020a ibzd020a jbz020a kbzd020a
 - Question text: To what extent do you agree with the following statements?”
 - Value labels¹⁷: 5 I totally agree, 4 Agree, 3 Neither nor, 2 Do not agree, 1 Fully disagree.

- “Energy transition: Move away from fossil fuels as soon as possible, regardless of costs
 - Variables: dczd022a eczd022a fczd022a gczd022a hczd021a ibzd021a jbz021a kbzd021a
 - Question text: To what extent do you agree with the following statements?”
 - Value labels¹⁸: 5 I totally agree, 4 Agree, 3 Neither nor, 2 Do not agree, 1 Fully disagree.

- “Energy transition: Renewable energies make Germany independent of other countries
 - Variables: dczd023a eczd023a fczd023a gczd023a hczd022a ibzd022a jbz022a kbzd022a
 - Question text: To what extent do you agree with the following statements?”
 - Value labels¹⁹: 5 I totally agree, 4 Agree, 3 Neither nor, 2 Do not agree, 1 Fully disagree.

- “Energy Transition: Nuclear power plants are danger
 - Variables: dczd027a eczd027a fczd027a gczd027a hczd026a ibzd026a jbz026a kbzd026a
 - Question text: To what extent do you agree with the following statements?”
 - Value labels²⁰: 5 I totally agree, 4 Agree, 3 Neither nor, 2 Do not agree, 1 Fully disagree.

- “Russia is threat to peace in Europe.
 - Variables: jbdu074a and jcdu082a
 - Question type: Matrix Question

¹⁷ Numerical value inverted to facilitate the comprehension of the regression.

¹⁸ Numerical value inverted to facilitate the comprehension of the regression.

¹⁹ Numerical value inverted to facilitate the comprehension of the regression.

²⁰ Numerical value inverted to facilitate the comprehension of the regression.

- Question text: To what extent do you agree with the following statements? Russia currently poses a threat to peace in the EU.”
 - Value labels: 1 I totally/rather agree, 0 Fully/rather disagree²¹.
- “Household income
 - Variables: dfzh056c efzh050c ffzh048c gfzh048c hfzh072c idzh052c jdzh072c
 - Question type: Single Choice
 - Question Text: And how high is the average net income of your household, meaning the sum of all net incomes and social security/welfare benefits of people living inside your household?
 - Value labels: 1 Under 900 €, 2 from 900 to less than 1300 €, 3 from 1300 to less than 1700 €, 4 from 1700 to less than 2300 €, 5 from 2300 to less than 3200 €, 6 from 3200 to less than 4000 €, 7 from 4000 to less than 5000 €, from 5000 to less than 6000 €, 9 6000 € and more.”
- “Employment status
 - Variables: dezh087a eezh087a fezh087a gezh089a hezh070a iczh072a jczh072a
 - Question type: Single Choice
 - Question Text: What applies to you?”
 - Value labels: 0 Unemployed, 1 Student, 2 Pensioner, 3 Employed²²
- “Gender
 - Variables: idzh023
 - Question type: Single Choice
 - Question Text: What gender are you?”
 - Value labels: 0 Female 1 Male²³
- “Year of birth²⁴
 - Variables: dfzh038c efzh032c ffzh032c gfzh032c hfzh024c idzh024c jdzh024c
 - Question type: Open Question

²¹ Converted to a dummy variable to use in the Difference-in-Differences analysis, the procedure is recorded in the do file.

²² Re-ordered values to facilitate understanding of the regression

²³ Transformed into a dummy variable to facilitate the comprehension of the regression.

²⁴ This variable is modified to age during the analysis in order to use the log age as variable.

- Question text: When were you born?"

- "Highest level of education
 - Variables: dfzh044a efzh038a ffzh038a gfzh038a hfzh030a i12d093a idzh030a jdzh030a
 - Question type: Single Choice
 - Question Text: What is your highest general degree of education?
 - Value labels: 1 Schüler/-in Student, 2 Von der Schule abgegangen ohne Abschluss Left school without degree, 3 Abschluss nach höchstens 7 Jahren Schulbesuch (im Ausland) Degree after 7 years of school attendance at most (abroad), 4 Polytechnische Oberschule DDR, Abschluss 8. oder 9. Klasse Polytechnic secondary school GDR, Degree 8th or 9th grade, 5 Polytechnische Oberschule DDR, Abschluss 10. Klasse Polytechnic secondary school GDR, Degree 10th grade, 6 Hauptschulabschluss, Volksschulabschluss Lower secondary school, 7 Realschulabschluss, Mittlere Reife Secondary school, 8 Fachhochschulreife Advanced technical college certificate, 9 Abitur, allgemeine oder fachgebundene Hochschulreife General qualification for university entrance."

- "Left-Right-Selfplacement
 - Variables: dbzc061a ebzc061a fbzc064a gbzc064a hbzc043a iazc068a jazc068a kazc068a
 - Question type: Single Choice
 - Question text: In politics people sometimes talk of "left" and "right". Where would you place yourself on this scale, where 0 means "left" and 10 means "right"?
 - Value labels: 0 Left [...] 10 Right."

- "Trust in Federal Government
 - Variables: dbzc050a ebzc050a fbzc054a gbzc054a hbzc033a iazc058a jazc058a kazc058a
 - Question type: Matrix Question
 - Question text: How much do you personally trust the following public institutions or groups?
 - Item text: Bundesregierung (Federal government)

- Value labels: 1 Vertraue überhaupt nicht (Don't trust at al) [...] 7 Vertraue voll und ganz (Entirely trust)“.
- “Satisfaction: Financial Situation
 - Variables: dazb019a eazb019a fazb019a gazb019a hbzb064a iazb018a jazb018a kazb018a
 - Question type: Matrix Question
 - Question text: How satisfied are you with these areas of life?
 - Item text: Finanzielle Situation (Financial situation)
 - Value labels: 1 Very dissatisfied [...] 7 Very satisfied.”

Table A1 Descriptive analysis of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
ID	19640	543000000	263000000	100000000	1000000000
Wave	19640	2019.5	2.291	2016	2023
Satisfaction with financial situation	18502	5.0719	1.3715	1	7
Trust In Federal Government	18515	3.775	1.5293	1	7
Trust In United Nations	18487	3.6222	1.485	1	7
Political Orientation (Left-Right)	18154	4.7973	1.8729	0	10
Year Of Birth	19608	1965.053	13.453	1943	1995
Education	19522	7.3606	1.5457	1	9
Household Income Category	14268	5.6149	2.0081	1	9
Gender	19268	0.4891	0.4999	0	1
Dummy Conflict	19640	0.25	0.4330	0	1
Employment Status	16153	2.5449	0.7666	0	3
Age	19608	54.4466	13.653	21	80
Age Squared	19608	3150.821	1431.921	441	6400
Perception Of Green Energy Transition as Harmful	18408	2.6309	1.0069	1	5
Perception of green energy transition as urgent	18401	3.1120	0.9789	1	5
Perception of green energies making Germany more independent	18419	3.5993	0.9233	1	5
Perception of nuclear energy being dangerous	18399	3.8785	1.0987	1	5
Perception of Russia as a threat to stability	19004	0.7797	1.4989	0	4

Source: Own elaboration

Table A2 Waves and its time frames

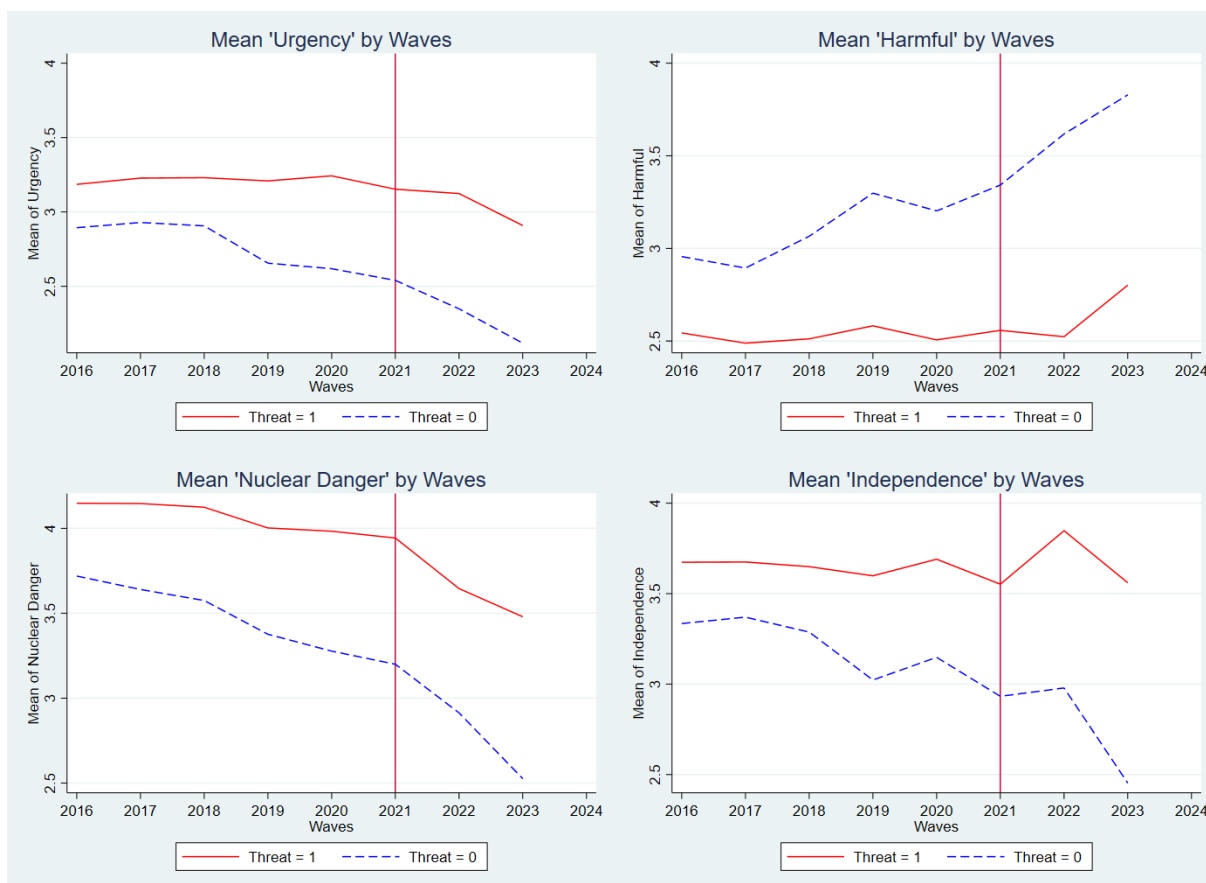
Time frame	Wave
17.02.2016 - 19.04.2016	wave da
20.04.2016 - 14.06.2016	wave db
15.06.2016 - 16.08.2016	wave dc
17.08.2016 - 18.10.2016	wave dd
19.10.2016 - 13.12.2016	wave de
14.12.2016 - 14.02.2017	wave df
15.02.2017 - 18.04.2017	wave ea
19.04.2017 - 13.06.2017	wave eb
14.06.2017 - 15.08.2017	wave ec
12.09.2017 - 23.09.2017	wave ed
18.10.2017 - 12.12.2017	wave ee
13.12.2017 - 13.02.2018	wave ef
14.02.2018 - 17.04.2018	wave fa
18.04.2018 - 12.06.2018	wave fb
13.06.2018 - 14.08.2018	wave fc
15.08.2018 - 16.10.2018	wave fd
05.10.2018 - 11.12.2018	wave fe
12.12.2018 - 12.02.2019	wave ff
13.02.2019 - 16.04.2019	wave ga
17.04.2019 - 11.06.2019	wave gb
12.06.2019 - 13.08.2019	wave gc
14.08.2019 - 15.10.2019	wave gd
16.10.2019 - 10.12.2019	wave ge
11.12.2019 - 11.02.2020	wave gf
17.03.2020 - 29.03.2020	wave hz
20.05.2020 - 07.07.2020	wave hb
08.07.2020 - 23.08.2020	wave hc
26.08.2020 - 13.10.2020	wave hd
14.10.2020 - 08.12.2020	wave he
09.12.2020 - 09.02.2021	wave hf
24.02.2021 - 20.04.2021	wave ia
26.05.2021 - 20.07.2021	wave ib
25.08.2021 - 19.10.2021	wave ic

24.11.2021 - 18.01.2022	wave id
23.02.2022 - 19.04.2022	wave ja
25.05.2022 - 19.07.2022	wave jb
24.08.2022 - 08.10.2022	wave jc
23.11.2022 - 17.01.2023	wave jd
22.02.2023 - 18.04.2023	wave ka
24.05.2023 - 18.07.2023	wave kb

Source: GESIS (2024b)

Additional content

Graph A1 Dependent Variables Trends



Source: Own elaboration

Table A3 DiD Analysis worsening in Finance Satisfaction after the conflict

	(1) Harmful	(2) Urgent	(3) Nuclear_danger	(4) Make_independent
1.worsefinance	0.0833 (1.30)	0.0117 (0.18)	-0.0616 (-0.87)	0.0152 (0.25)
1.conflict	0.335*** (8.12)	-0.408*** (-10.42)	-0.971*** (-24.59)	0.134** (3.12)
Threat##conflict	-0.0574 (-0.81)	-0.0894 (-1.32)	0.0439 (0.67)	-0.0915 (-1.23)
Income	-0.0815*** (-5.47)	-0.0361* (-2.50)	-0.0250 (-1.62)	0.00232 (0.17)
Education	-0.171*** (-8.00)	0.117*** (5.66)	0.0909*** (4.09)	0.0676*** (3.38)
Gender	-0.0613 (-1.05)	-0.135* (-2.32)	-0.284*** (-4.53)	0.0875 (1.54)
Age2	-0.00000656 (-0.03)	0.0000265 (1.20)	0.0000157 (0.66)	-0.0000138 (-0.66)
Political Orientation	0.253*** (15.60)	-0.222*** (-13.96)	-0.259*** (-15.35)	-0.159*** (-10.47)
Trust in Federal Govt.	-0.392*** (-20.27)	0.168*** (9.25)	0.131*** (6.71)	0.223*** (12.19)
Financial Satisfaction	-0.0427* (-2.14)	0.0479* (2.45)	0.0107 (0.52)	0.0311 (1.62)
/				
cut1	-4.480*** (-19.51)	-2.980*** (-14.03)	-4.135*** (-17.48)	-2.976*** (-13.54)
cut2	-2.114*** (-9.58)	-0.575** (-2.82)	-2.500*** (-11.14)	-1.159*** (-5.72)
cut3	-0.531* (-2.45)	0.990*** (4.85)	-1.435*** (-6.36)	0.175 (0.86)
cut4	1.389*** (6.32)	3.070*** (14.50)	0.201 (0.89)	2.817*** (13.37)
<i>N</i>	15670	15670	15659	15673

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Own elaboration

Table A4 VIF Analysis regressions

Variable	VIF ²⁵	1/VIF (Harmful)	1/VIF (Urgent)	1/VIF (Make_independent)	1/VIF (Nuclear_danger)
Income	1.33	0.751882	0.752433	0.751949	0.751419
Education	1.27	0.790344	0.790962	0.790960	0.790380
Age2	1.20	0.834806	0.835027	0.835464	0.834552
Financial Satisfaction	1.20	0.835517	0.835161	0.835128	0.834410
Trust in Federal Govt.	1.14	0.877579	0.877929	0.877930	0.878285
Dummy threat	1.08	0.927301	0.927689	0.927322	0.927965
Gender	1.04	0.960767	0.960539	0.960413	0.960148
Dummy conflict	1.04	0.963058	0.962997	0.963192	0.963046
Political Orientation	1.03	0.967135	0.967293	0.967276	0.967195
Mean VIF	1.15				

Source: Own elaboration

²⁵ The same values are applicable to the four dependent variables.

Table A4 Ordered Logistic Regression Renewable energies make Germany independent from other countries (Both groups together)

	(1) Simple independent	(1) Controlled independent
Conflict	0.100** (3.17)	0.105** (2.93)
Income		0.00204 (0.15)
Education		0.0675*** (3.38)
Gender		0.0880 (1.55)
Age2		-0.0000143 (-0.68)
Political Orientation		-0.159*** (-10.47)
Trust in Federal Govt.		0.222*** (12.22)
Financial Satisfaction		0.0332 (1.75)
/		
cut1	-3.603*** (-47.08)	-2.974*** (-13.68)
cut2	-1.859*** (-51.03)	-1.157*** (-5.78)
cut3	-0.535*** (-19.17)	0.177 (0.88)
cut4	1.998*** (49.03)	2.819*** (13.53)
<i>N</i>	18419	15673

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The STATA .do file with the processing of the raw data to the used data can be found in the following folder: [Online Supplementary Material](#).

For privacy reasons, the raw data needs to be requested directly to [GESIS Panel](#)