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Original Articles – Territorial policies

## The ecological transition in the current geopolitical context

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**Abstract.** The current global focus on ecological transition, driven by challenges such as global warming, pollution, biodiversity loss, and social inequalities, requires a deep change in economic systems and consumption patterns that involves the adoption of new energy sources and critical raw materials, often sourced from countries with differing geopolitical alignments and development levels. This research aims to provide a comprehensive vision of the geopolitical landscape's impact on the ecological transition, offering valuable insights for policymakers as they navigate the complexities of international relations. The study also delves into the political narrative of ecological transition and its impacts on social perception and territorial practices.

**Keywords:** ecological transitions, geopolitical context, climate change, sustainability, hybrid communication.

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### 1. INTRODUCTION

The challenge of ecological transition is becoming increasingly complex in the current geopolitical landscape, not only due to the strong contrasts between the major world powers – namely the United States and Russia, the United States and China, the United States and the EU, and between Russia and China. Even states that were defined as “non-aligned countries” at the Bandung Conference in 1955, today choose to conform to the statements from international summits on combating climate change based on their logic of economic and political convenience. They adopt autonomous positions depending on the circumstances.

As a result, many states prioritize regional interests rather than aligning with those required by the international community or the leading major countries, in a manner that can be described as both conventional and hybrid, through differentiated messages and communications that also impact actions against climate change.

The most recent communication techniques, in fact, expand and deepen the scope of all clashes in cyberspace, including mutual accusations regarding the causes of climate change. The aim, as always, is to domesticate the minds of the masses to the intents of their authors, whatever the topic, conditioning people's thoughts deeply over time. With these methods, communication

about climate change – which, due to its severity, should be precise, transparent, and continuously push all humanity towards more effective resource use – is not universally accurate and does not always receive the necessary emphasis. Yet, it is a well-known issue that concerns everyone, and everyone talks about it, perhaps hoping for miraculous interventions in the immediate term. However, remedies and solutions unfortunately require time, investments, and behaviour on a global level, because the greenhouse effect and pollution know no borders.

This article will attempt to outline the geopolitical context in which the process of ecological transition is situated, with the aim of providing useful reflections for understanding the complex scenario of international relations in which the process of ecological transition is embedded, in pursuit of the goals of economic and social sustainability.

## 2. THE GEOPOLITICAL CONTEXT OF ECOLOGICAL TRANSITION

Given the different economic, social, and political situations, not all states have the same willingness or ability to allocate the substantial investments required for the adoption of climate change mitigation techniques. The costs of economic system conversions are very high and could have negative impacts, particularly in countries that are heavily dependent on fossil fuels. In the European Union, for instance, there are several member states whose energy systems are based on coal, with significant percentages in Poland (about 70-80%), followed by the Czech Republic (50-60%) and Slovakia (30-40%) (Energy Institute 2023; IEA, 2023).

Therefore, it is obvious that there is resistance to pressures for accelerating decarbonization and reducing greenhouse gas emissions that contribute to atmospheric warming and climate change. Other countries that base their economies on oil exports, such as Saudi Arabia, Russia, Venezuela, Iran, Nigeria, and the Gulf countries, obviously oppose the use of alternative energy resources.

Furthermore, although the solutions to reduce at least some of the causes of climate disruptions are known, not all countries have the capabilities and technologies to implement them. If major polluters continue to pollute within the framework of hypocritical international agreements and compromises of all kinds, amidst economic tensions and wars of every kind, the time available to address climate impacts and achieve sustainability goals will keep extending, reaching a point of no return, as highlighted by authoritative international studies. According to the Global Carbon Project, carbon

dioxide emissions in the atmosphere increased by 63% in 2022 compared to 1990 (GCP, 2023). Between 2014 and 2023, observed warming was 1.19°C, predominantly caused by human activities, and emissions from fossil fuels have increased by about 3% per year over the past decade – roughly double the rate of the preceding three decades, a value that exceeds the range of scenarios proposed by the IPCC in 2001. The surge in emissions is attributed to the increase in coal use, which accounts for more than 40% of global CO<sub>2</sub> emissions from fossil fuels (Foster et al., 2024).

In essence, the trend illustrated will lead to a global temperature increase of 3 degrees Celsius by the end of the century, primarily due to the development of coal, oil, and gas extraction, deforestation, the use of chemical fertilizers, intensive livestock farming, and the increase of organic waste in landfills. This trend poses serious consequences for biodiversity as a result of human activities (IPCC, 2021; EEA, 2022).

Certainly, international bodies, particularly the COP (Conference of the Parties), the decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC), have contributed to maintaining attention and promoting international commitments to address the climate crisis. However, a unanimous sharing of the tools and methods for implementing the principles established in the annual meetings is still lacking, leading to the implementation of climate agreements being hindered from the outset by the divergent attitudes and interests of various countries. For example, the United States, while signing the Kyoto Protocol in 1997, later withdrew partly due to concerns about the impact that reducing emissions would have on their economic system and partly because they highlighted the lack of greenhouse gas reduction obligations for developing countries. A similar incident occurred when the USA exited the COP 21 Paris Agreement, a move subsequently reversed by the Biden administration.

The summits that followed COP 21 up to the one in Dubai, along with related documents and announced initiatives, have consistently highlighted the different interests of States, particularly the divergences between the West and developing countries, compounded by the lack of sanctioning mechanisms. In particular, the implementation of proclaimed initiatives clashes with the political and economic realities of several countries, hindering the overall effectiveness of efforts for ecological transition (UNFCCC, 2023). The consequences of inequalities and poor implementation of agreements by all countries intensify pre-existing critical situations, such as the so-called climate inflation, which exacerbates geopolitical tensions.

### 3. FROM COAL TO RENEWABLE SOURCES: THE INFLUENCE OF GEOPOLITICS

A dangerous effect of climate change with significant geopolitical relevance is climate inflation, which refers to the rising prices of numerous basic food products such as vegetables, olive oil, citrus fruits, coffee, cocoa, and cereals (FAO, 2022; Kotz et al., 2023). Yet, amid droughts and extreme precipitation in many regions of the planet, the impact of climate change on the food market is evident, leading to political upheavals, riots, and revolutions (Hsiang et al., 2011; Mena et al., 2021; Sheryn et al., 2024). In China and India, for instance, drought also reduces hydroelectric power production, significantly affecting food prices.

Warnings about reaching a point of no return in the climate crisis often go unheeded, while climate disturbances continue to exert strong pressure on the food market, provoking speculative pushes with evident repercussions on the major stock exchanges, resulting in ongoing economic pressures and humanitarian crises driven by climate migration (Piguet et al., 2011; Schmidt, 2022).

The increase in activities suitable for meeting the needs of a growing global population results, as is well-known, in the greenhouse effect, which is the cause of global warming. Therefore, there is an urgent need to intervene primarily to reduce emissions of these gases: carbon dioxide, methane, nitrous oxide, fluorinated gases (IEA, 2022). However, this is where the geopolitical aspect comes into play: to transition from fossil fuels to clean renewable energy sources – an essential goal for all – there is a need for rare metals such as lithium, nickel, and cobalt, as well as access to the most modern technologies for their optimal exploitation. These metals are termed rare because their supply is limited and is the result of intense extraction in geographically restricted areas. Their production, which is also significantly polluting, is concentrated mainly in China, the Democratic Republic of the Congo, Australia, and Chile. It is therefore not surprising that these producers have a vested interest in adopting protectionist policies that serve national interests, resulting in severe repercussions regarding the risk of supply chain disruptions and continuous increases in associated costs. The geopolitical management of these metals concentrates, monopolizes, and directs the supply predominantly towards friendly markets, becoming a powerful tool that can hinder ecological transition because it impacts the production of renewable energies and, consequently, the transformation of the economic system according to sustainability principles. The essential nature of these metals for

renewable energy production is evident, for example, in the batteries of electric vehicles and in energy storage systems from sources such as solar and wind.

The increasing international geopolitical tensions and fluctuations in fossil fuel prices do not benefit the stability of their market, which operates within a framework of constant fragility and uncertainty. As a consequence, investments in the renewable energy sector – requiring massive capital and certainty of returns – often do not reach the expected levels called for to reduce global warming. For example, in the development of advanced energy storage technologies, in the most advanced solar panels, and in wind turbines.

In fact, fossil sources still account for about 80% of the global energy mix today. Of course, this does not mean that major leading countries such as the European Union, the United States, and also China and India are not committed to reducing greenhouse gas emissions, even though the latter are particularly major polluters. For instance, Europe, through the Green Deal, aims to reduce such emissions by 55% by 2030. The Inflation Reduction Act in the United States involves an investment of \$437 billion, mainly directed towards combating climate change to reduce greenhouse gas emissions by 40% by 2030, promoting renewable energy production such as solar and wind (United States Department of Energy, 2022). China, in its most recent five-year plan for 2021-2025 (Ministry of Ecology and Environment, 2022), and India with its National Action Plan for Climate Change in 2021 (Ministry of Environment, Forest and Climate Change, 2021; Department of Science & Technologies, 2007) are also committed to reducing greenhouse gas emissions. In particular, India has recently increased its efforts in the development of biofuels.

There is also no shortage of legislation aimed at strengthening environmental sustainability and international funding, especially towards developing countries, through the establishment of the Green Climate Fund (GCF) adopted by 194 countries in 2010 as a financial instrument of the United Nations Framework Convention on Climate Change and the Global Environment Facility (GEF), global partnerships aimed primarily at financing developing countries to address environmental challenges

Theoretically, all of this is very significant but, unfortunately, still insufficient. Although Europe has made significant strides recently. Unfortunately, ongoing wars and political and economic tensions tend to delay the implementation timelines of major international agreements designed to combat climate change, leading to a postponement in the complete transition from fossil fuels.

#### 4. GEOPOLITICAL TENSIONS IN ECOLOGICAL TRANSITION

To illustrate the interconnection between geopolitical tensions and energy issues – and, therefore, the ecological transition – the case of the conflict in Ukraine is particularly telling as it highlights the energy problem. The conflict at Europe’s doorstep does not only concern Moscow and Kyiv but also involves Russia and the United States alongside the entire West (Lizza, 2022; 2024), and it is a proxy war, meaning a war by proxy. In fact, beyond the military confrontation, it encompasses a complexity of various economic, financial, and commercial aspects, especially the issue of geopolitical “sovereignty.”

Moreover, long before the outbreak of war, the energy sector was a significant aspect of the East-West confrontation. Through energy, Russia was strategically moving Europe away from its traditional embrace with its old ally, the United States. With the conflict, Europe has substantially redirected its gas and oil imports elsewhere, allowing for increased supplies from the United States and from countries that previously supplied smaller quantities, such as those in the Caucasus, Africa, and the Gulf.

Another aspect that pertains to the interconnection between geopolitics and the ecological transition is the control and defence against terrorism and military attacks on the thousands of kilometres of pipelines and gas lines, electrical cables, or fibre optic cables that represent the circulatory system of energy and communication. These are all critical vulnerabilities, as evidenced by the 2022 sabotage of the North Stream 1 and 2 gas pipelines that connect Russia to Germany. Such vulnerabilities can only be reduced through an ecological transition towards renewable energy. Sabotaging or militarily attacking a gas or oil pipeline is one matter; however, shutting down thousands of wind, solar, and turbine plants with their corresponding energy storage systems is another entirely. The same applies to the Global Internet cables that rely on satellites in low orbit.

Referring again to the war in Ukraine, amid political tensions, sanctions, and transformations in the transit routes for hydrocarbon trade, nuclear energy continues to represent a particularly contentious area. Given its extremely high risk and potential for escalation into nuclear confrontation, Article 56 of the 1977 protocol, added to the Geneva Convention of 1949, is insufficient, as it effectively leaves the choice of sanctifying a nuclear site to the belligerents.

The World Nuclear Industry Status Report of 2024 (WNISR), which annually outlines the state of nuclear energy production globally, states that this source pro-

vides less than 10% of the world’s electricity. The peak of 449 reactors reached in 2018 has since declined to 411 reactors. Moreover, the narrative regarding a reactor resisting a crashing aircraft can, according to WNISR, at most, apply to just a few plants worldwide, namely only the most modern ones. And yet, none could withstand military attacks with “bunker-busting” missiles or nuclear warheads, not to mention the vulnerability of pools containing spent fuel rods or the failure of a reactor’s cooling system, which could lead to a meltdown and the spread of radioactivity. Thus, one hopes that no one would consider a military attack on a nuclear power plant, as the escalation toward nuclear war would be assured. In a certain sense, and in geopolitical terms, nuclear power plants can act as a deterrent due to the fear of catastrophic consequences.

However, Ukraine continues to rely on atomic energy, despite the Zaporizhzhia plant, Europe’s largest with six reactors, being constantly at risk of accidents. In fact, Kyiv has recently laid the foundation stone for the construction of two new nuclear reactors at the Khmelnytskyi plant, where two Soviet-manufactured reactors are already operational. Notably, these new reactors will be built by Westinghouse, a U.S. company that has long collaborated with Kyiv to supplant Russian technology with its own. This scenario exemplifies a situation where the belligerents compete only in the technical and economic arenas, effectively excluding direct military interventions.

Indeed, despite the war, nuclear giants like the American Westinghouse and the Russian Rosatom continue to compete not only in Ukraine but throughout Eastern Europe. For instance, in Poland, Westinghouse will construct the first nuclear plant in Lubiatowo-Kopalino, and in the Czech Republic, expansion plans are underway for the Dukovany and Temelín plants. However, the technical-economic conflict, even though many other Soviet-manufactured plants in Hungary, Slovakia, and Bulgaria are still operational, goes even further. The supply of raw materials, namely uranium, also comes into play here. This is where geopolitical issues directly intersect with climate change. While atomic energy is seen as an essential piece in finally reaching the objectives of transitioning to clean energy, it is just as evident that this cannot be achieved without uranium. However, this raw material is predominantly located in Russia and, notably, within the borders of its traditional allies, Uzbekistan and Kazakhstan. The latter is the world’s leading producer, and together they account for roughly half of the world’s production (World Nuclear Association, 2024). In contrast, the Western world primarily features Australia and Canada, which have significantly lower volumes (World Nuclear Association, 2024).

Rosatom is the Russian nuclear giant, a global holding company involved in diverse fields that governs a collective of over 300 companies operating around the world wherever Kremlin politics extend their influence. Moreover, nuclear energy is not subject to sanctions from the European Union, and the United States only stopped importing Russian uranium in May 2024. Thus, European nuclear plants, which import 99.5% of their raw uranium, cannot simply remove Rosatom from their list of suppliers, despite the war in Ukraine and ongoing international political tensions, as well as Westinghouse's efforts to replace Rosatom in Europe and eliminate Russian technology.

In summary, while the conflict over hydrocarbons knows no bounds, the nuclear energy sector remains confined within the technological and economic market variables. This suggests that it is hoped that companies and production supply chains operating in nuclear energy will continue to advance, despite ongoing political and military conflicts, alongside the development of renewable energies to effectively combat the impacts of climate change.

#### 5. GEOPOLITICAL DYNAMICS IN THE CONTEXT OF ECOLOGICAL TRANSITION

In the context of ecological transition, certain geopolitical dynamics play a crucial role, which will be examined in this section. With the end of the Cold War, the world order transitioned from a bipolar system dominated by the United States and the Soviet Union to a unipolar structure led by the United States, followed by fragmentation due to the emergence of powers such as China, Russia, and India. This evolution has radically changed the distribution of international sovereignty, leading to a re-evaluation of global agreements and the sharing of planetary resources. Today, issues related to access to the Arctic and Antarctic, ocean management, fishing, water, and even space are no longer simple territorial disputes; they are linked to new economic and political confrontation dynamics. In response to China's Belt and Road Strategy, aimed at strengthening its influence through trade flows and infrastructure, the United States and its allies are proposing alternative trade projects that connect India, traverse the Middle East, and reach Europe. These developments encompass not only trade aspects but also reflect broader geopolitical ambitions, manifested through infrastructures such as pipelines, railways, and communication networks, all of which must be considered globally in the ecological transition process.

Following the conclusion of the conflict in Ukraine, the world is likely to face further division between the West and the non-West. The alliances formed during this war, particularly between Russia and China, will contribute to consolidating rivalries between these opposing fronts. The sanctions imposed on Russia, along with new emerging political dynamics in Africa and conflicts in the Middle East, have already initiated the creation of alternative economic and military relations to those previously established with the West. Additionally, NATO's expansion, highlighted by the entry of Finland and Sweden, could further fuel disagreements among global powers and hinder or slow down the ecological transition.

The increasing multipolar configuration of the world is further accentuated by the enlargement of the group of emerging countries, the so-called BRICS, which now also includes Saudi Arabia, the United Arab Emirates, Iran, Egypt, and Ethiopia. This expansion represents an effort to build multipolar relationships in opposition to the Western world, making it even more challenging to reach agreements for resolving global issues. Additional tensions and conflicts between the North and South could direct substantial resources towards the defence sector, reducing the financial resources needed for combating climate change. Moreover, the rift between Russia and the West will be difficult to resolve, even after the war, as noted by Alexander Gabuev (2024), because the shared anti-Western interest of the two autocratic powers, Moscow and Beijing, is likely to endure, while ecological transition requires a global commitment that transcends current geopolitical divisions. In this context, Western policymakers are called upon to make greater efforts to carefully consider the Sino-Russian axis for coordinated and significant action to steer political, economic, and technological changes toward sustainability.

Ultimately, as geopolitical blocs consolidate and rivalries increase, the ecological transition must be viewed as an opportunity to find common ground. Ecological crises do not recognize borders and require joint efforts to mitigate their devastating effects. Investing in clean technologies and promoting sustainable policies offers chances for dialogue and cooperation, even among historical adversaries. Only by working together can nations hope to successfully address climate threats and ensure a secure and sustainable future for generations to come.

#### 6. THE ROLE OF INFORMATION IN THE GEOPOLITICAL CONNECTION AND ECOLOGICAL TRANSITION

At the beginning of this work, we referenced the importance of new communication techniques in shap-

ing and influencing the choices of contemporary society. This section will examine in more detail whether these techniques can help curb climate change and improve the health of our planet and humanity, threatened by extreme events. The answer is positive if these techniques are used correctly. Again, the connection between geopolitics and ecological transition comes into play regarding the effects that communication can produce in collective perception, as exemplified by the manipulation by Cambridge Analytica, which influenced voters' decisions in the 2016 U.S. elections, highlighting how modern geopolitics is based not only on state or military interactions but also on new forms of influence that exploit technology and big data to change voter behaviour and, consequently, political decisions.

The manipulation of information is a crucial tool as it can direct and influence public opinion on issues such as climate change and the transition to sustainable energy sources in an increasingly unstable geopolitical context. If citizens are not adequately informed or sensitized, political decisions may delay significant progress in sustainability. The availability of accurate and transparent information plays a fundamental role in promoting effective environmental policies. However, political choices that incorporate genuine ecological responsibility may be more vulnerable to external pressures, such as those from energy corporations and industrial lobbies that can influence local and national leaders. This creates a dichotomy: while democracies are more open, the saturation of content and the speed of public debate can lead to confusion and disinterest in vital environmental issues.

In the geopolitical context, economic decisions related to the energy transition may also be influenced by international rivalries. Countries with renewable energy resources, like those in Europe, must balance their energy security with the urgent need to reduce emissions. Here, global competition for access to new green technologies and environmental standards can generate new alliances or conflicts.

From Noam Chomsky's well-known tenets on mind manipulation, it emerges that deeply understanding the society in which one wishes to intervene is essential. This involves analyzing sociocultural aspects and dynamics, history, geographical context, economic conditions, and political inclinations. Such knowledge not only helps to outline more effective strategies for influencing behaviour and perceptions but is also crucial for communicating in a relevant and meaningful way.

Communication techniques have the capacity and power to condition and influence the masses through profiling methods that allow for predicting and direct-

ing people's behaviour. While this can lead to a distortion of public discourse, it can also be used positively to promote collective awareness regarding environmental issues. Particularly in the contentious realm of climate change debate, it is essential to utilize these communicative techniques to foster collective action, even in conflict contexts. Despite existing divisions, there is a common interest in ecological transition that requires coordinated commitment, making it imperative to unite efforts at a global level. In this way, the dissemination of information and the strategic use of persuasive technologies can contribute to a collective mind shift necessary for addressing the climate crisis and pursuing a more sustainable future for all.

## 7. CONCLUSION

Ultimately, the transition to a low-carbon economy necessitates a thorough analysis of the links between energy, economy, and global politics. Ecological transition cannot occur in isolation from geopolitical considerations: solutions must be explored not only for ensuring access to essential energy resources but also for strategies to mitigate the risks associated with environmental and geopolitical conflicts.

Transitioning to clean energy use entails the need for advanced technologies and, above all, the global sharing of innovation. Currently, more than collaboration, there is a prevailing scenario of competition and conflict among major powers. As evidenced by the 2024 Australian Strategic Policy report, which highlights China's surpassing of the United States, the latter now holds over 80% of so-called "critical" technologies – those at high risk of manipulation.

All of this does not contribute to peace and cooperation among peoples for the protection of the environment and ecological transition if the ongoing military conflicts are compounded by tensions over exclusive control of technological innovations. Limiting access to innovations that could solve global problems, such as environmental issues, could result in severe delays in achieving the common good.

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