

REDEFINING ENERGY SECURITY: A MULTI-DIMENSIONAL APPROACH IN A CHANGING GLOBE

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The global energy landscape is undergoing a profound transformation, driven by a confluence of challenges and opportunities. The traditional paradigm of energy security, heavily reliant on fossil fuels and prioritizing access over sustainability, is being reshaped by a growing awareness of climate change, geopolitical volatility, and the imperative for a more resilient energy future. This article delves into the shifts taking place in global energy security, highlighting the increasing prominence of renewable energy sources, technological advancements, and the crucial role of sustainability as a defining dimension of this transformation.

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Change, Security, and Sustainability in Energy

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Energy is an indispensable element in both our daily lives and the global economy. Its escalating importance has propelled it to the status of a defining factor in the 21st century. Serving as a fundamental physical foundation, it is crucial for ensuring economic growth and social progress. It fuels industries, powers our homes, enables transportation, and underpins the very fabric of modern society

Beyond its economic significance, energy is also a vital and strategic component that profoundly influences a nation's domestic and international policies. The availability and accessibility of energy resources can impact geopolitical relations, trade agreements, and even national security.

Energy is the lifeblood of sustainable development, a cornerstone of economic and social growth, and a vital driver of technological advancement. A nation's per capita energy consumption serves as a reliable indicator of its developmental stage and the intensity of its economic activities.

However, our globe faces complex energy challenges. The critical role of energy in propelling development across various sectors, particularly economic growth, highlights the urgent need for secure, accessible, affordable, and uninterrupted energy supplies.

The global energy landscape is undergoing a profound transformation, driven by a complex interplay of challenges, including climate change, geopolitical tensions, and the urgent need for secure energy supplies. This landscape is further destabilized by the ongoing Russia-Ukraine war, which has escalated the threat to the global economy, causing ripple effects through food and energy prices, as well as exacerbating casualties and migration problems. This conflict starkly highlights the vulnerabilities of the global economy, placing geopolitical risks at the forefront. Inflation, a burgeoning economic crisis, has been fueled by skyrocketing commodity prices, particularly energy costs, impacting both advanced and emerging economies. This crisis has spurred a critical re-evaluation of the concept of energy security. Traditionally focused on ensuring reliable access to energy sources, primarily fossil fuels, the concept has evolved to embrace a broader, more integrated vision encompassing sustainability and resilience.

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sustainability as a defining dimension of this transformation.

The concept of energy security now encompasses several dimensions: availability of energy resources, affordability, environmental sustainability, and resilience to disruptions. In this context, renewable energy sources, such as solar, wind, hydropower, and geothermal, are becoming increasingly central to the energy security debate. The rise of clean energy technologies and the global transition towards decarbonization are reshaping the energy sector and the geopolitical landscape, with profound implications for how nations secure their energy needs.

According to the International Energy Agency (IEA), due to supportive policies and favorable economics, the world's renewable power capacity is expected to surge over the rest of this decade – with global additions on course to roughly equal the current total power capacity of China, the European Union, India, and the United States combined. Massive growth in renewables by 2030 is set to transform the electricity sector.

In the IHS Markit scenarios, global electric consumption will grow by up to 60 percent by 2040. Wind and solar constitute 24 to 36 percent of total generation by that date. Either is a significant increase in wind and solar from today's 7 percent globally. The reasons for the variance result from what one would expect uncertainties and varying assumptions about technology and innovation, and policies and economics.¹

The rise of renewables is already reducing the need for imports of fossil fuels for some countries, but broad-based reliance on fossil fuels will remain in the coming decades.²

The 1970s oil crisis prompted the rethinking of national energy strategies. France focused on developing nuclear power, while Denmark and Brazil started investing in renewable energy. Over time, as the rapid industrialization of emerging markets intensified competition for oil, natural gas gained strategic importance. Coupled with the growing focus on climate change, the pressure to diversify both fuels and producers intensified. The energy crisis of 2022 marked a turning point in the global energy discourse. In the wake of the COVID-19 pandemic, energy demand surged as governments sought to stimulate economic recovery. At the same time, other challenges emerged, encompassing supply chain disruptions, geopolitical tensions, and changes in energy policy, exacerbated by the lasting effects of the pandemic. The intentional disruption in energy trade between Europe and Russia immediately prior and since the beginning of the war in Ukraine placed immense strain on Europe's energy sector. Compounding this problem, the fluctuating availability of nuclear power in France and severe droughts that reduced hydropower output in Europe, left the

1) Daniel Yergin, *The New Map: Energy, Climate, and the Clash of Nations* (Penguin Group, 2020): 359.

2) IRENA, "Geopolitics of the Energy Transition," April 2024. Available online at <https://www.irena.org/Publications/2024/Apr/Geopolitics-of-the-energy-transition-Energy-security>

European Union with a shortage of approximately 7 percent of its low-cost electricity supplies in 2022.³ Fuel shortages, competition for limited resources, inflation, rising food costs and increased living expenses worldwide have rippled through sectors and geographies, suppressing or even reversing previous advances and widening the gap between haves and have-nots. The fragility of economies reliant on imported fossil fuels was exposed, along with the political and social consequences that energy insecurity brings. In addition to imported fossil fuels two main issues relating to current energy use are scarce resources and climate change. Energy efficiency (a new energy source), alternative energy sources, and carbon sequestration for greenhouse gas reduction are possible methods.

In that sense, we can easily state that climate change became a primary international concern in the last quarter of the 20th century and will likely be the defining issue of the 21st century: increase in average temperature, increase in extreme weather events, melting glaciers and rising sea level, combined with the pressure on environmental resources by increasing population. Our present production and consumption of energy are unsustainable.

This alarm about climate is the great motivator for the energy transition. Energy transitions are not new. They have been going on for a long time and unfold over time. Technology, economics, environmental considerations, and convenience and ease have primarily driven previous energy transitions. The current energy transition has a more pronounced mix of politics, policy, and activism.⁴

Energy transition means different things to different nations, especially in the developing world. A billion people lack access to electricity; three billion do not have access to clean cooking fuels. Instead, they burn wood, charcoal, crop waste, or cow dung indoors, impairing their health. This leads to a different perspective.⁵

The first energy transition began in Britain in the thirteenth century with the shift from wood to coal. Rising populations and destruction of forests made wood scarce and expensive, and coal came to be used for heating in London.⁶

If environmental sustainability, defined as meeting the needs of the present generation without compromising the needs of future generations, is to be achieved, and energy security for future generations is to be assured, then a fundamental shift in our energy use is necessary one that embraces sustainability.

3) Georg Zachman, "The Great 2022 European Energy Crisis – What Actually Happened and How Did Europe Cope?" BRUEGEL, 16 January 2023. Available online at <https://www.bruegel.org/newsletter/great-2022-european-energy-crisis-what-actually-happened-and-how-did-europe-cope-0>

4) Daniel Yergin, (2020): 339-341.

5) Daniel Yergin, (2020): 365.

6) Daniel Yergin, (2020): 340-341.

We can see this transformation even in the most successful and long-standing military and political institution, NATO. With the power of change and adaptation, it has adapted itself to current threats. For this purpose, the Strategic Concept sets the Alliance's strategy. It outlines NATO's enduring purpose and nature, its fundamental security tasks, and the challenges and opportunities it faces in a changing security environment. It also specifies the elements of the Alliance's approach to security and provides guidelines for its political and military adaptation.⁷ The NATO 2022 Strategic Concept sets out NATO's priorities, core tasks, and approaches for the next decade.⁸

“Become the leading international organization when it comes to understanding and adapting to the impact of climate change on security. NATO will lead efforts to assess the impact of climate change on defense and security and address those challenges. Combatting climate change by reducing greenhouse gas emissions, improving energy efficiency, investing in the transition to clean energy sources and leveraging green technologies, while ensuring military effectiveness and a credible deterrence and defense posture.”⁹

NATO endorsed an ambitious new NATO Action Plan: NATO 2030¹⁰ which indicates 9 proposals, and proposal 7 is on Combat and Adapt to Climate Change, intending to make NATO the leading international organization when it comes to understanding and adapting to the impact of climate change on security. To significantly reduce greenhouse gas emissions from military activities and installations, reduction of greenhouse gas emissions by the NATO political and military structures and facilities, to assess the feasibility of reaching net zero emissions by 2050.

NATO will increase awareness by monitoring and tracking climate change much more closely, and invest in better research, data sharing and analysis. It will accelerate its adaptation to continue to operate in all conditions, including extreme heat and cold, rising sea levels, and natural disasters.

NATO will play its part in reducing military emissions. Greening militaries offers real win-wins to improve operational effectiveness by decreasing dependence on fossil fuel supplies. Recognizing that it needs to connect with other international stakeholders in its efforts to address the security implications of climate change, NATO will also begin to hold a global climate change and security dialogue, starting in 2022.

In fact, the concept of energy security has surpassed above and beyond of all dimensions in order to be able to respond to newly emerging issues and questions.

7) See NATO, at www.nato.int

8) NATO, “NATO 2022 Strategic Concept,” June 2022. Available online at https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/290622-strategic-concept.pdf

9) NATO, “NATO 2022 Strategic Concept,” June 2022.

10) NATO, “NATO 2030, Factsheet,” June 2021. Available online at https://www.nato.int/nato_static_fl2014/assets/pdf/2021/6/pdf/2106-factsheet-nato2030-en.pdf

In that context I came to a definition that I call Multi-Dimensional Energy Security, which includes diversification of energy sources and countries of origin considering the political and economic dynamics, development of continual and affordable pricing mechanisms within a sustainable systematic and the continuation of production, transmission and distribution activities while ensuring a safe, secure, controlled and sustained energy infrastructure security. So that sustainability became an indispensable part of energy security discussions.

As a result, while the concept of energy security has expanded to include many disciplines over the years, it has undergone and continues to experience changes with the crises, transformations, and new initiatives and remains as an ever-crucial topic. As can be seen when examining the historical literature of the concept of energy security, after the golden period of oil and the subsequent oil crises suffered, natural gas and nuclear energy were included in the agenda, and following the recent energy transformation, especially with the renewable resources throwing its weight on the energy markets with revolutionary developments, the concept of energy security and the dimensions it involves began to mutate. For this very reason, it is evident that the need to elaborate and analyze these new dimensions to emerge will continue...