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DECARBONIZATION AS ONE OF THE WAYS TO SOLVE THE PROBLEMS OF GLOBALIZATION

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Abstract. *Half a century, globalization has been a driving force in the development of world economies. Besides positive effects, globalization has also caused negative consequences: accelerated climate change, degradation of natural resources, and increased emissions. That is why, in the last decade, the importance of climate and decarbonization policies has increasingly appeared on the world agenda. In addition, recent geopolitical events, including COVID-19, the Russian invasion of Ukraine, further emphasize the importance of green solutions for recovery and decarbonization of countries' economies. This article aims to highlight the importance of decarbonization policies and identify the possibility of solving environmental and energy problems caused by globalization. Through an analysis of existing literature and different countries' policies, the article identifies the potential of decarbonization policies to mitigate the negative impacts of globalization on the environment and energy sector. The findings suggest that the adoption of decarbonization policies can lead to a reduction in greenhouse gas emissions, improved energy efficiency, the development of renewable energy sources, and green jobs, ultimately contributing to a more sustainable and resilient global economy.*

Keywords: *Globalization, decarbonisation, renewable energy, climate change, green jobs, energy efficiency.*

I. Introduction

For the last fifty years, globalization has been a key driver of economic growth and development worldwide. However, the rapid expansion of economic activity has also caused significant negative impacts on the environment, including climate change, resource depletion, and increased greenhouse gas emissions. As a result, in recent years, the importance of decarbonization policies has increasingly come to the forefront of global discussions.

Moreover, the recent geopolitical events, such as the COVID-19 pandemic and the Russian invasion of Ukraine, have highlighted the need for sustainable and resilient economies. In response, many countries have increased their focus on decarbonization policies, recognizing the importance of green solutions for recovery and the decarbonization of their economies.

I.1. Globalization impact

The adverse impacts of globalization on the environment have been widely documented by various studies. A study by the United Nations Environmental Programme (UNEP) estimates that global greenhouse gas emissions increased by over 70% between 1970 and 2004, with the majority of the increase being attributed to energy-related activities (Zhang, 2007). The Intergovernmental Panel on Climate Change (IPCC) has also identified the increasing concentration of greenhouse gases

in the atmosphere as a key driver of climate change, leading to a range of environmental impacts such as rising sea levels, more frequent natural disasters, and loss of biodiversity (IPCC, 2022).

I.2. Geopolitical effect

The COVID-19 pandemic has exposed the vulnerabilities of the global economy and highlighted the need for more sustainable and resilient systems. The pandemic has led to disruptions in global supply chains, decreased demand for certain goods and services, and significant economic losses. Governments and businesses have recognized the need to invest in more sustainable and resilient systems that can withstand future shocks.

At the same time, the Russian invasion of Ukraine has led to a renewed emphasis on energy security and the need to reduce dependence on fossil fuels. Many countries in Europe rely heavily on Russian gas imports, and the conflict has highlighted the risks of such dependence. Governments have recognized the need to invest in renewable energy sources and reduce their reliance on fossil fuels to ensure energy security and reduce geopolitical risks.

II. Methodology

The methodology is focusing on a comparative analysis of established regulatory practices regarding the decarbonization of countries' economies, as well as the systematization of research and forecasts of scientists regarding the importance of decarbonization.

In the context of the energy sector and the development of renewable energy sources, the methodology will include an analysis of policy implementation practices that aim to promote the growth of renewable energy technologies and reduce the reliance on fossil fuels. This analysis will include a review of policies such as feed-in tariffs, renewable portfolio standards, tax incentives, and subsidies for renewable energy technologies. Overall, the methodology of the article will involve a comprehensive analysis of policies and practices that aim to promote the growth of renewable energy technologies and reduce the impact of globalization on the environment. By focusing on the energy sector and the implementation of renewable energy policies, the article will provide insights into the ways that decarbonization can be used as a means of addressing the challenges posed by globalization.

III. Results

III.1. Scientific view

Against this backdrop, there has been a growing recognition of the need for decarbonization policies as a means of mitigating the negative environmental impacts of globalization. Decarbonization is the process of reducing or eliminating carbon dioxide and other greenhouse gas emissions from energy systems and other sectors. A report by the International Energy Agency (IEA) highlights the importance of decarbonization in limiting global warming to well below 2 degrees Celsius above pre-industrial levels, as outlined in the Paris Agreement (IEA, 2021).

There are many scientific articles that emphasize the importance of decarbonization policies.

A large number of such articles focus on mitigating climate risks and reduce emissions through decarbonization (Rockström, 2017). The article “A review of the global climate change impacts, adaptation, and sustainable mitigation measures” (Abbass et al., 2022) is a sectorial assessment of climate change mitigation and adaptation approaches worldwide in the aforementioned sectors and the associated economic costs. The authors argue that decarbonization policies are necessary to mitigate the worst impacts of climate change and propose measures for mitigating negative effects in different sectors.

William Nordhaus in his article "The importance of carbon pricing for meeting climate targets" (Nordhaus, 2017) argues that carbon pricing is essential for achieving the necessary emissions reductions to address climate change. The author discusses the economic benefits of carbon pricing and how it can help drive innovation and investment in clean energy technologies.

The article “Emissions Reduction Policies and Their Effects on Economy” examines the relationships between emissions-reducing policies and their effect on the country’s economic growth (GDP) using carbon tax and CO_2 emission as explanatory variables and population and R&D as control variables (Gurtu et al., 2022).

Another analysed block of scientific articles focuses on the economic benefits of decarbonization policies, arguing that they can promote job creation and economic growth. The authors write about pro-environmental economic model that changes the labor market and creates a Green Jobs (Sulich and Sołoducho-Pelc, 2022), analyses connection between the further reduction of emissions and the short-term and long-term growth of employment in the energy sector (Koasidis et al., 2022).

In addition, it was observed that when analyzing decarbonization policies, scientists put a lot of emphasis on the energy sector and related policies. Scientific results show that renewable energy in context of globalization have a significant impact in reducing CO_2 emissions (Ulucak & Yucel, 2021). The scientists came to a conclusion that countries should invest in renewable energy and environmental innovation aligned with the growth (Sahoo et al., 2022), enhance the quality of governance and democracy, attract clean foreign direct investments, promote renewable energy use, and adopt clean economic growth strategies to decarbonize their respective economy (Hamid et al., 2022).

III.2. Policy responses

Moreover, many countries have increased their focus on decarbonization policies. Governments have recognized the importance of investing in green solutions for recovery, such as renewable energy sources, energy efficiency, and sustainable infrastructure.

Analyzing the policies of different countries regarding decarbonization and recovery, it is worth highlighting the most widespread policy solutions of the countries on the reduction of emissions and the negative consequences of globalization processes:

1) Carbon pricing: A carbon price is a fee imposed on fossil fuels' carbon content to incentivize the transition to low-carbon alternatives. A carbon tax or cap-and-trade system reduces greenhouse gas emissions from industries that contribute to globalization, such as shipping, aviation, and manufacturing.
2) Renewable energy incentives: Policies that encourage the development and deployment of renewable energy sources, such as solar, wind, and hydroelectric power, and help reduce the carbon footprint of globalization. This can include feed-in tariffs, tax credits, and subsidies for renewable energy investments.
3) Energy efficiency standards: Regulations that require more efficient energy use in buildings, appliances, and vehicles and focus on reducing energy consumption and greenhouse gas emissions from globalization. This includes energy performance standards, fuel efficiency standards, and building codes.
4) Sustainable transport policies: Policies that encourage sustainable modes of transport, such as public transit, biking, and walking, reduce the environmental impacts of transportation associated with globalization. This includes public transport infrastructure investments, electric vehicle incentives, and congestion pricing.

5) Circular economy initiatives: A circular economy is an economic system in which waste is minimized, and materials are reused, repaired, or recycled. This is used to reduce globalization's environmental impacts by reducing resource consumption, waste generation, and greenhouse gas emissions. Policies encouraging circular economy practices include extended producer responsibility, product labeling, and waste reduction targets.

III.3. Renewable energy incentives

Renewable energy policies are measures designed to promote the development and deployment of renewable energy sources. Renewable energy policies can play an important role in mitigating the negative environmental impacts of globalization, by reducing greenhouse gas emissions from economic activities associated with globalization.

Moreover the attack of the Russian Federation on Ukraine acted as a powerful catalyst for decarbonization processes, forcing the countries of the world community to rethink their perception of the Russian Federation's fossil fuels as a source of funding for its military aggression (Kudirko et al., 2022).

In recent years, countries around the world have actively implemented renewable energy policies to promote the development and deployment of renewable energy sources, as a means of mitigating the negative environmental impacts of globalization and become more energy independent. These policies include feed-in tariffs, tax incentives, renewable energy standards, and carbon pricing, among others. The European Union proposed the European Green Deal a centerpiece of its recovery plan, investing in renewable energy, sustainable transport, and circular economy practices.

The European Union's Green Deal is a comprehensive plan aimed at achieving climate neutrality by 2050, with a target of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. The plan includes significant investments in renewable energy, sustainable transport, and circular economy practices, among other initiatives. The European Union's investment in renewable energy is particularly noteworthy, as the bloc has set a target of sourcing 32% of its energy from renewable sources by 2030.

One of the key components of the European Union's Green Deal is the EU Renewable Energy Directive, which aims to increase the share of renewable energy in the EU's final energy consumption to at least 32% by 2030. The directive sets binding targets for each EU member state, taking into account their starting points and national circumstances. This policy has already had a significant impact on the decarbonization process in Europe, with renewable energy sources accounting for 34.6% of the EU's electricity generation in 2020, up from 31.6% in 2019. This progress is expected to continue in the coming years, as the EU continues to invest in renewable energy infrastructure and technologies.

The United States has also committed to significant investments in renewable energy and infrastructure as part of its Build Back Better plan. The plan includes a proposed 2 trillion USD investment in clean energy over the next decade, with a focus on achieving 100% clean electricity by 2035. This investment is expected to create millions of new jobs in the renewable energy sector, while also reducing greenhouse gas emissions and increasing energy security. The plan also includes significant investments in electric vehicles, energy efficiency, and sustainable buildings.

The United States has implemented a range of federal and state-level policies to promote renewable energy, including tax credits, loan guarantees, and renewable energy standards. Many states have also implemented net metering policies, which allow households and businesses to sell excess renewable energy back to the grid.

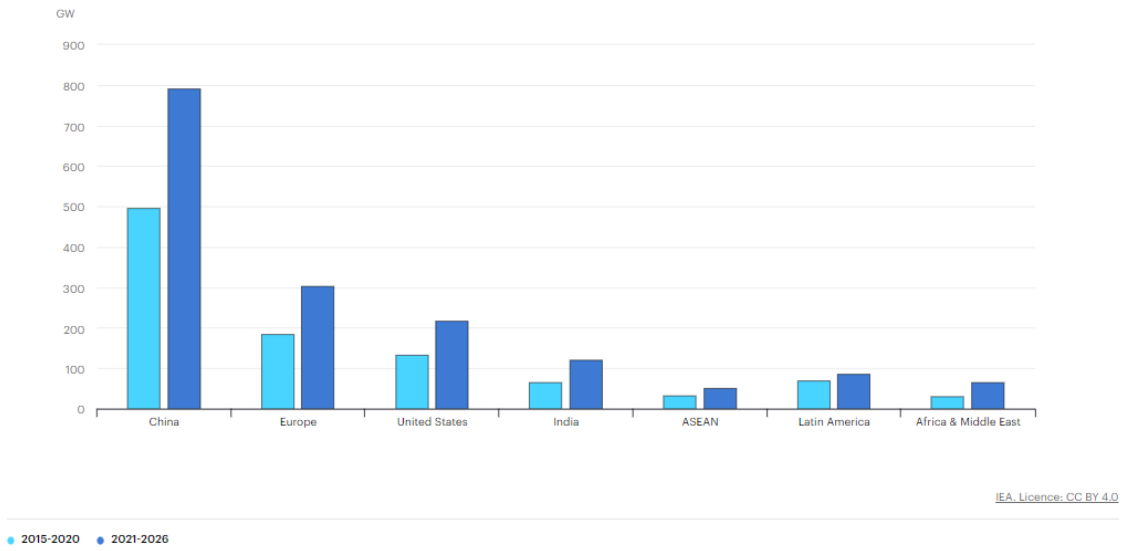
Other renewable energy policies in different countries around the world:

1. Germany: Germany is a world leader in renewable energy, with a goal to generate 65% of its electricity from renewable sources by 2030. The country has implemented a feed-in tariff system, which guarantees a fixed payment for renewable energy generated by households, businesses, and utilities.
2. China: China is the world's largest producer of solar and wind energy, and has set a target to achieve 20% of its energy mix from non-fossil fuel sources by 2030. The country has implemented a range of policies to support renewable energy, including subsidies, tax incentives, and feed-in tariffs.
3. Japan: Japan has set a goal to achieve a 22-24% renewable energy share by 2030, and has implemented a feed-in tariff system to support the development of renewable energy. The country has also implemented energy efficiency standards and a carbon pricing system.
4. India: India has set a target to achieve 40% of its electricity generation from non-fossil fuel sources by 2030, and has implemented a range of policies to support renewable energy, including feed-in tariffs, tax incentives, and renewable energy certificates.
5. Brazil: Brazil has implemented a range of policies to promote renewable energy, including tax incentives, feed-in tariffs, and a renewable energy auction system. The country has also implemented biofuels mandates, which require a certain percentage of transportation fuel to come from renewable sources.

IV. Statistical Analysis

The transition to renewable energy sources such as solar, wind, and hydropower has been identified as a critical step in achieving decarbonization goals. A study by the European Union's Joint Research Centre (JRC) highlights the potential of renewable energy sources to contribute to decarbonization efforts, with the authors noting that renewable energy technologies have become increasingly competitive with fossil fuels in terms of cost (Tsiropoulos et al., 2020).

Figure 1. Renewable electricity capacity growth by region/country, main case 2015-2020 and 2021-2026



Source: International Energy Agency (International Energy Agency [IEA], 2021)

Scientists and experts have emphasized the importance of decarbonization policies in addressing the challenges of climate change and environmental degradation caused by globalization. A study by the National Renewable Energy Laboratory (NREL) in the United States found that in all modeled scenarios that the health and climate benefits associated with fewer emissions exceed the power system costs to get to 100% clean electricity (Denholm et al., 2022). In addition, the report notes that such a green transition is quite real and not only in United States.

The International Energy Agency is forecasting the growth of renewable capacity to accelerate in the next five years, accounting for almost 95% of the increase in global power capacity through 2026 (International Energy Agency [IEA], 2021).

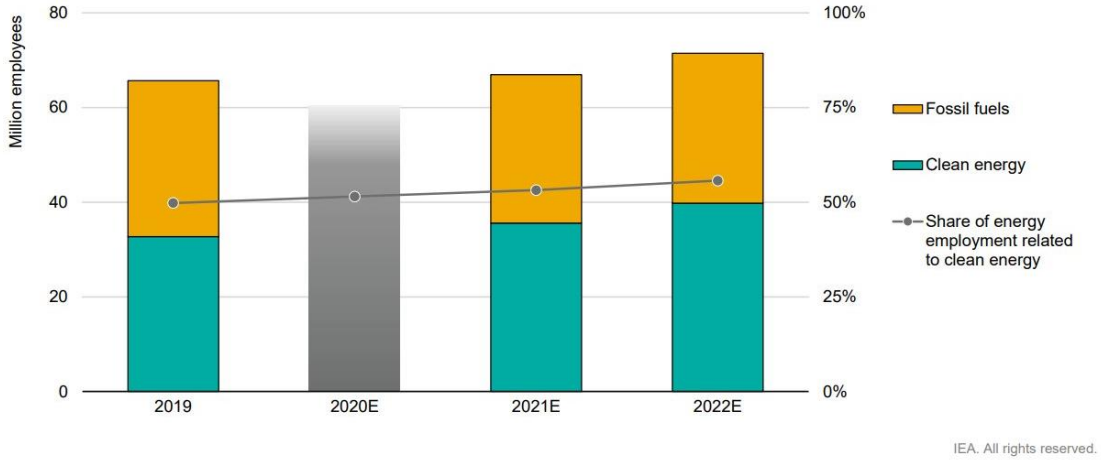
Moreover, according to the IEA, the forecast increase in renewables is now 30% higher than the growth volumes anticipated before the Russian full-scale invasion into Ukraine. Global renewable energy capacity is set to almost double, increasing by 2,400 gigawatts to reach 5,650 gigawatts by 2027 (International Energy Agency [IEA], 2022).

Such predictable growth contributes not only to the reduction of pollution and emissions, but also to the growth of other economic indicators, in particular the number of jobs, green jobs.

Clean energy employment is “rapidly growing” and now accounts for more than half of all energy sector jobs, according to a new report.

The first World Energy Employment Report from the IEA finds that hiring in clean energy has pushed energy sector employment globally above pre-pandemic levels – despite the oil and gas sector still struggling to recover from big layoffs in the initial stages of COVID-19 (International Energy Agency [IEA], 2022). Russia’s invasion of Ukraine and the energy crisis that followed have seen countries looking to “accelerate the growth of homegrown clean energy industries,” said IEA Executive Director Fatih Birol.

Figure 2. Energy employment in fossil fuel and clean energy sectors, 2019-2022

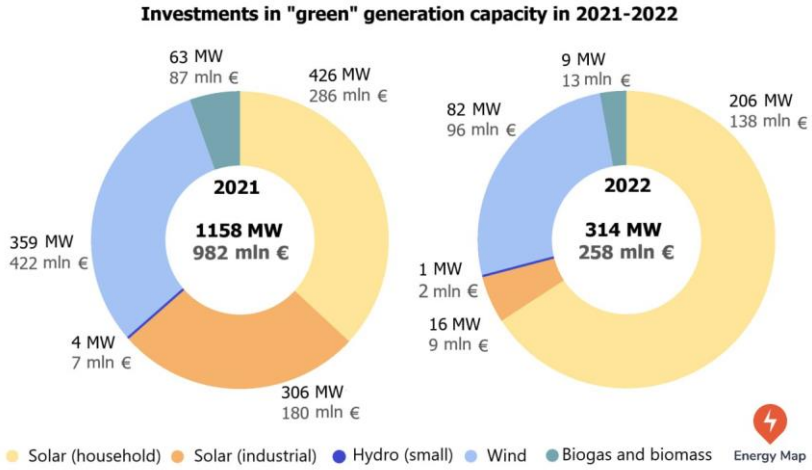


Source: International Energy Agency (International Energy Agency [IEA], 2022)

Thus, Russia's war against Ukraine became a catalyst for the introduction of renewable energy technologies. And it is worth noting, not only in the world, but also in Ukraine, even despite the constant shelling of the energy infrastructure.

With the beginning of the full-scale invasion, especially during the difficult winter period, Ukrainians began actively install home installations in order to provide themselves with energy and be energy independent. In 2022, the share of investments in household solar power accounted for more than 60% of total investments in green genetation capacities.

Figure 3. Investments in "green" generation capacity in 2021-2022



Source: Energy Map

V. Conclusions

The article highlights the significance of decarbonization policies in promoting economic growth and job creation, while reducing the carbon footprint of economic activities. This is in line with previous research findings which have demonstrated that the transition to a low-carbon economy can lead to significant economic benefits, including job creation, increased energy security and reduced costs of energy production. For instance, a study by the International Energy Agency found that the renewable energy sector has the potential to create up to 42 million jobs by 2050 (International Energy Agency [IEA], 2022). This underscores the economic potential of decarbonization policies in promoting sustainable economic growth and reducing the risks of future shocks.

Moreover, the article highlights the importance of sustainable and resilient systems in reducing the risks of future shocks and providing solutions for energy independence. This is in line with previous research which has emphasized the need for resilient infrastructure and systems to mitigate the impacts of climate change and other shocks. For instance, a study by the Global Commission on Adaptation (GCA) found that investing in climate adaptation measures can yield significant economic benefits, including $7.1 trillion in net benefits by 2030 (Verkooijen, 2019). This highlights the importance of adopting a holistic approach to decarbonization, which not only focuses on reducing emissions, but also on building resilient systems that can withstand future shocks and provide long-term solutions for energy independence.

In conclusion, the article provides a compelling argument for the importance of decarbonization policies in promoting sustainable economic growth and reducing the risks of future shocks. The research has demonstrated the economic potential of decarbonization policies, as well as the need for resilient systems to mitigate the impacts of climate change and other shocks. As such, policymakers should prioritize the development and implementation of ambitious decarbonization policies at the national and international levels, in order to promote sustainable economic growth, create new opportunities for job creation and reduce the risks of future shocks.

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