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“Zero Footprint Europe: A Chronicle of the Green Transition”

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Abstract:

The European Union's "Green Deal" lays out a roadmap for a fair transition to a more sustainable, climate-friendly future. Its goals span several industries, including building, biodiversity, energy, transportation, and food. The purpose of the study is to look at different difficulties concerning global carbon emissions, as well as the efforts taken by individual nations and their promises to carbon neutrality. According to scientific estimations, reductions in emissions are required to preserve the planet from the catastrophic and irreversible impacts of climate change. There is a risk of carbon leakage as long as many abroad partners are not as ambitious as the EU. According to the study's findings, the EU Green Deal aims to achieve the Sustainable Development Goals and make the EU a low-carbon, resource-efficient region by 2050 with net zero emissions. Other nations must boost their objectives and reduction targets, as well as connect their policies with global environmental agreements. The EU should be more supportive of emerging countries so that their efforts are not in vain and every nation contributes equally to the preservation of the planet.

Keywords: Green Economy; Net-Zero Emissions; Green Innovation; Climate Action; Carbon Neutrality.

Introduction

In December 2019, the European Union (EU) unveiled the European Green Deal, a pioneering initiative aimed at ushering in a more sustainable economic model. This transformative vision, encapsulated in a 24-page document, addresses crucial issues such as climate change and environmental degradation (Press corner, n.d.). The deal sets forth a comprehensive strategy that includes the enactment of the European Climate Law, the formulation of bridge policies spanning various industries, and a commitment to sever the link between prosperity and resource exploitation. Recognizing the urgent global threats posed by climate change, the European Green Deal outlines three primary objectives (European Green deal, n.d.). Firstly, it seeks to achieve ambitious emission reduction targets by 2050. Secondly, it aims to decouple economic growth from the depletion of natural resources. Thirdly, the deal strives to ensure an inclusive green transition that leaves no one behind. A central focus is placed on safeguarding the health and well-being of European citizens from environmental hazards and the adverse impacts of climate change, necessitating the preservation, maintenance, and enhancement of the EU's environmental assets, including land and ecosystems. To realize these climate goals, a substantial investment of up to 2% of Europe's GDP is earmarked for reforesting the economy. This includes initiatives in new construction, government utilities, technology development, and business transformation (Evbox, 2021). Notably, the European Green Deal addresses the major contributors to greenhouse gas emissions in the EU—transportation, industry, energy, buildings, and agriculture. Fossil fuel combustion, particularly in the form of fossil gas, emerges as the largest source of greenhouse gas emissions across these sectors. Acknowledging the diverse challenges posed by different industries, the European Green Deal outlines a timeline for achieving net-zero emissions (Bruegel, 2019). The electricity sector is poised to lead the way and is expected to achieve carbon neutrality by the mid-2040s, thanks to advancements in wind and solar power technologies. The construction industry, though facing significant challenges, is projected to attain net-zero emissions in the late 2040s (Mobilizing Industry for a Clean and Circular Economy, n.d.). The transportation industry, driven by the increasing popularity of electric vehicles, is anticipated to reach carbon neutrality by 2045 (Towards a net zero mobility future - changing transport, n.d.). While acknowledging the economic complexities of decarbonization, the European Green Deal emphasizes the necessity of achieving net-zero emissions across all sectors by 2050. The paper delves into the specific challenges and opportunities presented by each industry, ranging from the relatively faster decarbonization of electricity to the more intricate task of mitigating emissions

in agriculture. Beyond its regional implications, the European Green Deal holds global significance, offering valuable lessons for other countries grappling with similar environmental concerns. As the EU navigates the complexities of implementation, the deal's accomplishments, challenges, and future vision will undoubtedly shape the trajectory of sustainable development in the years to come. This paper explores the various facets of the European Green Deal, including its literature review, elements, initiatives, decarbonizing the future by 2050, importance, achievements, concerns and difficulties, global implications and insights, prospective and conclusion.

Review of Literature

Siddi (2020) examined the legal and financial challenges of climate change within the context of Europe's Green Deal. The research underscores the significant potential of the EU Green Deal, emphasizing the need for a well-crafted alignment with the EU's overarching strategic framework, encompassing values such as cooperation, economic development, and rigorous environmental conservation. The success of the green transformation and its financing is contingent upon the willingness of both EU and state entities, as well as EU citizens, to collaborate, share costs, and actively participate in initiatives like the proposed Climate Pact. The European Green Deal is envisioned not only as an environmental initiative but also to foster greater unity in the collective journey toward climate neutrality. Nae and Panie (2021) delved into the intricacies of Green deal in Europe, specifically focusing on its "Rebound Strategy: Addressing Inequalities." Their study aimed to navigate a nuanced exploration of the dynamic relationship between disparities and the Green Deal while also assessing the implementation of the Green Deal within the broader Transformation Program. Moreover, the researchers put forth insightful suggestions for potential reforms. Notably, the study underscored the significance of recognizing the varied impacts of climate change policy on different communities and regions amid the current pandemic scenario, cautioning that the Green Deal might face challenges in meeting its participation goals. A crucial finding emphasized the indispensable role of both governmental and non-governmental investments in fostering a successful transition in European Union (EU) countries. The study highlighted that effective management of green deals hinges on each country's absorption capacity and its ability to craft projects aligned with the criteria for funding through the European Commission. The research underscored the necessity of tailoring approaches to accommodate the diverse needs and capabilities of individual EU member states for the Green Deal to effectively realize its objectives. Usman et al. (2021) undertook a study exploring the

impact of the European Green Deal (EGD) on Africa. The research delves into seven crucial domains—agriculture, biodiversity, energy, crucial raw resources, circular economy, new technologies, and finance—to comprehensively assess the implications of the EGD. The article outlines a roadmap for the socio-economic, ecological, and low-carbon future envisioned for the European Union, with a keen focus on its multifaceted repercussions for African nations. Additionally, the study proposes strategies to better align policy initiatives with Africa's development goals. Siddi (2020) scrutinized the core components of the European Green Deal released in the final month of 2019. To assess its effectiveness in achieving Europe's environmental objectives, the plan is situated within the broader context of international climate policy. The study proposed four key criteria for evaluating the plan, emphasizing the need for continued commitment despite challenges such as the coronavirus pandemic and resulting economic downturn. The analysis also underscored the importance of the legal authority of EU entities in overseeing and managing the execution of the Green Deal. Furthermore, it highlighted the significance of agreements with other stakeholders on issues like emission border adjustments, enhanced competitiveness, and long-term growth, as these factors would influence both the EU's implementation of the Green Deal and the commitment of major emitters to the global challenge of achieving zero net emissions by 2050. Pianta and Lucchese (2020) conducted an analysis of a report titled "Industrial Policy for a Healthy Revolution in Europe," which addresses the necessary reforms for Europe's Green Deals. The report outlines a comprehensive set of initiatives aimed at addressing environmental issues and advocates for an "impartial and transparent" transition. Despite the laudable objectives of the European Green Deal, several shortcomings have been identified. The framework for a post-carbon European economy is deemed insufficient, lacking both the necessary resources and viable options for its implementation. The authors argued that achieving carbon neutrality in Europe's production systems requires a broader array of environmentally friendly industrial policies that consider systemic change, ecological responsibility, and the equitable performance of policies in Europe. Existing studies provide foundational insights into legal, financial, and socio-economic aspects, but gaps in regional variations, global collaborations, and specific policy recommendations persist. The current study, "European Green Deal: A Step Towards Carbon Neutrality," addresses these gaps by offering a holistic analysis. It contributes essential, dynamic perspectives crucial for navigating the evolving landscape of the European Green Deal and ensuring its successful implementation.

Vitality Initiatives of the Deal

The European Green Deal: A Step Towards Carbon Neutrality holds paramount significance in the context of addressing the global climate crisis. As the EU stands as the third-largest emitter of carbon pollution, its resolute commitment to achieving climate neutrality by 2050 represents a monumental stride in the international fight against climate change (Zero pollution targets. Environment, n.d.). While acknowledging the substantial responsibility of major emitters like China and the United States, the EU's declaration establishes a clear and proactive objective, symbolizing a dedicated effort toward environmental stewardship. Recognized as a commendable initiative, the Green Deal serves as a catalyst, inspiring other nations to intensify their contributions and fostering a collective, meaningful impact globally. The reaffirmation of this commitment by European leaders in December 2019 demonstrates a steadfast dedication to transformative change in the forthcoming years. The transparent dissemination of Commission proposals and activities to both the European Parliament and the Council underscores a commitment to inclusive decision-making, ensuring thorough evaluation and collective determination of the Green Deal's implications. Regular engagements in various forms of the EU Council further highlight the dynamic and iterative nature of legislative and non-legislative initiatives, showcasing an adaptable approach toward achieving carbon neutrality. In essence, the European Green Deal not only signifies a pivotal commitment by the EU to combat climate change but also sets a noteworthy precedent for global leadership, encouraging other nations to join in the collaborative effort towards a sustainable and carbon-neutral future (Towards a net zero mobility future - changing transport, n.d.).

Sustainable Pillars of Green Deal Ensuring Reliable, Cost-Efficient, and Clean Energy

Access: An integrated approach within the European Green Deal aims to decrease carbon emissions and enhance societal well-being through several key strategies. This includes ensuring a reliable and cost-effective energy supply for the EU, establishing a fully digitalized, integrated, and interconnected energy market, prioritizing energy efficiency, enhancing the energy efficiency of buildings, and transitioning the power sector to predominantly rely on renewable energy sources (Delivering the European Green Deal, n.d.).

- **Achieving a Pollution-Free Environment through Zero Contamination:** The "Zero Pollution Vision" aspires to achieve a toxic-free environment by 2050, focusing on reducing contamination of land, rivers, and the atmosphere without causing harm to

the forest environment or public health. The 2030 goals include a 55% improvement in air quality, a 50% reduction in sea pollution, and a 30% decrease in microplastics to prevent premature deaths from air pollution. The plan also aims to minimize pollution threats to biodiversity in EU ecosystems by 25%, decrease chronic disruptions from traffic noise by 50%, and improve soil quality by cutting the use of chemical pesticides and nutrient losses by 50%. This action plan not only seeks to enhance the EU's economic, digital, and green leadership but also envisions a healthier, more equitable world. It serves as a guide for integrating pollution prevention into all relevant EU programs, accelerating the implementation of pertinent legislation, and identifying any existing gaps (Zero Pollution Targets, n.d.).

- **Sustainable Food Systems: From Field to Table Strategy:** At the core of the Green Deal lies the fundamental principle of the "farm-to-fork" approach. Adapting agricultural networks presents a challenge, emphasizing the interconnectedness of a thriving population, a robust society, and an environmentally friendly ecosystem (Farm to Fork Strategy, n.d.). The comprehensive "Farm to Fork Strategy" has been formulated to ensure that the food value chain aligns with the goal of achieving a climate-neutral union by 2050. Recognizing that food systems are significant contributors to climate change, environmental degradation, and biodiversity loss, the strategy aims to address these issues and empower consumers to make sustainable food choices, ultimately benefiting both health and overall well-being while reducing societal healthcare costs (Farm to fork strategy adopted – for a fair, healthy, and environmentally, n.d.).
- **EU Climate Targets for 2030 and 2050:** The EU's commitments for 2030 entail a minimum 55% reduction in environmental emissions, as recommended by the Commission. Looking ahead to 2050, the EU aspires to achieve climate neutrality in an aggressive yet economically viable manner, fostering green job growth and maintaining a track record of greenhouse gas reduction alongside economic expansion (Evbox, 2021). The overarching goal is to inspire global partners to keep global temperature increases below 1.5°C and mitigate the severe consequences of environmental issues (2030 climate target plan, 2022).
- **Sustainable Building and Renovation Practices:** The imperative to construct new buildings and retrofit existing structures for environmental sustainability is paramount, considering their long-term impact. The plan highlights the critical role of both government and private infrastructure remodelling in advancing industry energy efficiency and meeting established goals (Renovation Wave, n.d.). By doubling refurbishment rates by 2030, coupled with enhanced resource and energy efficiency,

the initiative envisions the renovation of up to 35 million buildings, fostering the creation of approximately 160,000 new green jobs within the construction industry (Priority Topics, n.d.).

- **Promoting Green and Circular Economies: Galvanizing Industries:** The roadmap for a green economy underscores the promotion of "sustainable products" as a catalyst for the circular design of all products through standardized approaches. Prioritizing recycling, reduction, and reuse of waste, the action plan encourages new business models and sets minimal standards to prevent environmentally harmful products from entering the EU market (Renovation Wave, n.d.). While the circular economy action plan addresses all sectors, particular attention is given to resource-intensive industries such as plastics, electronics, construction, and textiles. Additional measures aim to incentivize companies to provide reusable, durable, and repairable products, empowering consumers to make environmentally conscious choices (Mobilizing Industry for a Clean and Circular Economy, n.d.).
- **Sustainable and Smart Transformation in Mobility:** Embedded within the EU Green Deal is the Smart and Mobility Strategy, with a goal to slash transportation emissions by 90% by 2050 (Towards a net zero mobility future - changing transport, n.d.). The strategy outlines five key initiatives focused on minimal carbon and alternative energy utilization, achieving zero-emission vehicles, ships, and airplanes by 2030, developing zero-emission ports and airports, promoting sustainable urban and intercity mobility, supporting eco-friendly freight transportation, and implementing user incentives and carbon pricing (Mobilising Industry for a clean and circular economy, n.d.). In the "smart area" of innovation and digitalization, efforts are directed towards establishing a more automated and interconnected multimodal mobility system, leveraging data and artificial intelligence for innovation. (Pamela, 2020) stated that the European Commission remains committed to fortifying the single market, ensuring equitable mobility, and enhancing safety and security across all transportation modes for a resilient transportation system.
- **Safeguarding and Revitalization of Natural Systems and Biological Diversity:** A crucial step in addressing the adverse effects of global warming and species extinction, the concept of a wilderness rejuvenation policy is introduced to prevent ecosystem collapse. This involves restoring rivers, canals, trees, meadows, ocean life, urban settings, and the fauna they support—a vital and cost-effective investment for agricultural production, climate change resilience, and overall well-being (Press Corner, n.d.). Europe's biodiversity strategy aims to recover biodiversity by 2030, safeguarding wildlife, combating climate change impacts, forest fires, food instability,

and disease outbreaks. As a cornerstone of the European Green Deal, the Biodiversity Strategy is poised to contribute to a green recovery post-COVID-19 (EU Biodiversity Strategy for 2030 — European Environment Agency, n.d.). The strategy envisions resilient, restored, and adequately protected ecosystems worldwide by 2050, significant enhancements to National Biodiversity Strategies and Action Plans by the end of 2021, and the active participation of local communities and indigenous peoples ensured through the principle of equality.

Initiatives Outlined Within the Framework of the Green Deal

The European Green Deal underscores the need for a comprehensive approach to achieve its goals, utilizing European declarations and laws. The Commission's message focuses on key policy areas such as climate, ecosystems, energy, mobility, agribusiness, and green finance, recognizing their intricate connections. The Green Deal commits to a thorough review of policies related to climate neutrality, with potential revisions as needed, ensuring a cohesive and effective strategy.

- **Renovation Surge:** The construction industry, accounting for one-third of Europe's carbon dioxide emissions and standing as a major energy consumer, is targeted by the renovation wave strategy (Renovation Wave, n.d.). This strategy aims to intensify renovation activities across the EU, enabling the building sector to actively contribute to the EU's 2050 climate neutrality objective while fostering an equitable transition to sustainability (Buildings should be at the heart of the European Green Deal, n.d.). EU Ministers endorsed the renovation wave strategy in June 2021, emphasizing considerations for social inclusion, economic recovery, and the shift to a green economy. The strategy's approved goal is to double energy-related renovation rates in the EU by 2030, a crucial step in decarbonizing the building sector, revitalizing the economy, and addressing energy poverty through robust renovation efforts (Green Buildings, n.d.).
- **Strategies for Forest Ecosystem Management:** The Commission's July 2021 publication of the European woodland initiative until 2030 plays a pivotal role in Europe's overarching plan. A linchpin in achieving the EU's commitment to approximately a 55% reduction in environmental emissions by 2030, the forest strategy received commendation from the Council in its November 2021 conclusions. Forests play a vital role in individual well-being and are integral to Europe's transition to a regenerative and environmentally friendly economy (Brussels, 2021). Emphasizing the need for a balanced approach to sustainable land management, the Forum highlighted the ecological, sociological, and economic aspects while acknowledging and safeguarding the diverse natural vegetation management

approaches found in different cities and territories. Proposed measures include promoting nature conservation, providing economic incentives for woodland licensees adhering to green initiatives, enhancing vegetation growth and species richness, aiming for the installation of 3 billion young plants by 2030, and encouraging the use of financial support under the common agricultural policy to promote alternative forest sectors such as outdoor recreation.

- **2030 European Union Biodiversity Roadmap: Nurturing Nature's Diversity:** In May 2020, the Council introduced its biodiversity policy proposal for 2030, aiming to restore Europe's biodiversity by the end of the decade, impacting humanity, nature, and the global environment. The proposal advocates for strengthening nature reserves through organic farming, reduced pesticide usage, and greening initiatives (European Green deal, n.d.). The Environment Board, in October 2020, endorsed Europe's 2030 ecological plan, incorporating wildlife preservation recommendations. Recognizing the need to address direct and indirect drivers of biodiversity loss and environmental degradation, states underscored the necessity for intensified efforts. Furthermore, they called for the seamless integration of biodiversity objectives into EU measures in agriculture, fisheries, and forestry, ensuring a coherent approach.
- **Attainable, Cost-Effective, and Dependable Energy:** Advancing the EU towards climate neutrality involves a pivotal step—decarbonizing the power sector, responsible for 75% of European greenhouse gas emissions from electricity usage and manufacturing (European Green deal, n.d.). The discourse primarily centered on the EU's energy system integration strategy, enhancing energy efficiency, and mitigating heat losses across Europe. In December 2020, EU energy ministers reached consensus on offshore renewable energy and hydrogen following the presentation of the Commission's sustainable energy policies.
- **EU's Approaches to Sustainable Chemicals:** Approved by the Council in March 2021, the EU chemicals sustainability plan, proposed by the Commission, addresses the dual nature of chemical substances—essential for modern living and economic progress, yet potentially harmful to people and the environment. This strategy forms a critical part of Europe's plan for zero pollution, outlining a long-term vision to safeguard human health, bolster industry competitiveness, and foster toxic-free environments at both EU and member state levels.
- **Sustainable and Intelligent Mobility Framework:** In response to the imperative for net-zero pollution communities, the mobility sector is urged to enhance efficiency and sustainability. Achieving environmental equality in Europe by 2050 requires a substantial 90% reduction in the sector's emissions (European Green deal, n.d.).

Recent legislative and non-legislative initiatives by governing bodies include kickstarting the European Rail Year in 2021, revising road pricing for heavy-duty vehicles, financing through the Connecting Europe Facility, and supporting the broader decarbonization of transportation—integral to the European Green Deal objectives (Towards a net zero mobility future - changing transport, n.d.).

- **European Climate Law:** In alignment with the proposed European climate law, every sector of society and the economy is mandated to contribute to achieving zero emissions by 2050. The legislation introduces an assessment framework to monitor progress toward this ambitious goal. Additionally, a revised target aims for a 55% net reduction in EU emissions by 2030 compared to 1990 levels. EU leaders have expressed support for the forthcoming emissions reduction target, emphasizing a prompt adoption of the climate mandate, as outlined by the Commission in December 2020. A series of proposals aimed at revising and updating climate and energy-related regulations will follow the climate law to ensure alignment with the overarching 2030 goal set by the Commission (2030 climate target plan, 2022).

Carbon-Free: A Blueprint for the Future

The European Green Deal's goal to reach carbon neutrality by 2050 reflects not simply an aim for the European Union but also an intense dedication to the planet's longevity (European Union, 2020). Acknowledging the intertwined nature of Europe's future with environmental sustainability, the EU has expressed a vision that extends beyond mere carbon emission reduction. This dedication requires a thorough and equitable transformation of Europe's society and economy, ensuring that the path to carbon neutrality is both economically viable and socially fair. The European Commission, through its Green Deal message, has outlined a strategic framework, emphasizing policy actions directed at realizing this ambitious objective. This vision is not merely a policy statement; it serves as a stimulus for legislative examination and collective action. The EU, through its Board Assembly and the EGD debate, has not just approved but championed its role in global emissions reduction, underscoring the immediacy of climate action. The commitment to an enforceable treaty mandating "net-zero emissions" by 2050 reflects a dedication that transcends mere rhetoric, transforming the democratic pledge into a legal commitment (European Green deal, n.d.). By embracing the 2050 climate neutrality goal of the Paris Agreement, the European Union emerges as a trailblazer, establishing a precedent for others to emulate. The envisioned environmental equilibrium goes beyond simple emission reductions, encompassing the establishment of carbon sinks like forests and the application of innovative technologies such as carbon capture and storage (Zero pollution targets, n.d.). Essentially, the goals of achieving carbon

neutrality encapsulate a comprehensive and forward-thinking approach, positioning Europe as a frontrunner in the global pursuit of a sustainable and carbon-neutral future.

Prospective Course

European Green Deal signals an unprecedented era of dedication and innovation as the European Union charts its path toward a sustainable and climate-neutral future. Presented as an ambitious and transformative roadmap, this vision surpasses the mere attainment of carbon neutrality by 2050; it champions a profound paradigm shift, with leading-edge research and technology at the forefront (European Green deal, n.d.). Anchoring this evolution is a resolute focus on fostering a circular economy, advocating for resource efficiency, and ensuring an impartial transition for all, weaving together environmental resilience with social justice. As a symbol of global leadership, the Green Deal aims to inspire nations worldwide, underscoring the urgency of collaborative action in confronting climate change. Guided by inclusivity as a fundamental principle, it endeavors to guarantee that the journey toward sustainability leaves no individual marginalized. Through the seamless integration of biodiversity preservation, resilience enhancement, and nature-based solutions, the prospective direction of the European Green Deal emerges as a dynamic, comprehensive, and captivating blueprint for a greener and more sustainable future.

Climax of the Deal

The European Green Deal stands as a transformative and ambitious initiative, mapping a trajectory towards a sustainable and climate-neutral future for the European Union. Unveiled in December 2019, this visionary roadmap not only envisions achieving carbon neutrality by 2050 but also endeavors to instigate a profound paradigm shift, placing innovation, circular economies, and social justice at its core. Spanning critical sectors from energy and mobility to agriculture and biodiversity, the Green Deal embodies a holistic approach to environmental resilience, reflecting its far-reaching significance beyond European borders. Serving as a catalyst for global climate action, the research paper delves comprehensively into the Green Deal's various dimensions, including a literature review, component analysis, scheduled projects, and the overarching goal of achieving carbon neutrality. While recognizing accomplishments in emissions reduction, the paper also underscores challenges, emphasizing the imperative for broader global collaboration. As the European Green Deal unfolds, it not only serves as an inspirational beacon but also highlights the collective and inclusive efforts needed to safeguard our planet's future. The trajectory of the Green Deal signifies a dedication to innovation and a collective commitment to constructing a sustainable and resilient world. By aiming to transform the union into a territory with net zero pollutants by 2050, the plan seeks to

contribute significantly to the Sustainable Development Goals, fostering growth and collaboration on a global scale. The renewed thinking embedded in this strategy holds the promise of better climate goals, enhanced social inclusion, and strengthened international cooperation for a more sustainable future.

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