12. Qudratovna, Z. G., & Matyoqubovna, J. M. (2023). O‘ZBEKISTONDA INTERNET MARKETINGNI RIVOJLANISH HOLATI VA UNING IQTISODIY KO‘RSATKICHLARIDAGI O‘ZGARISHLAR. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, *22*(10), 44-48.

13. Qudratovna, Z. G., & Ildarovna, A. G. (2023). THE IMPORTANCE OF SOCIAL NETWORK MARKETING, WHICH IS A PART OF INTERNET MARKETING IN THE ACTIVITIES OF SMALL BUSINESS ENTERPRISES. *Academia Science Repository*, *4*(04), 5-9.

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RENEWABLE ENERGY INTEGRATION IN GERMANY: IMPLICATIONS FOR GLOBAL ENERGY TRANSITION

Introduction. The global imperative to address climate change and achieve sustainable development has propelled the transition towards renewable energy sources, marking a pivotal shift in the global energy landscape. At the forefront of this transition stands Germany, a nation renowned for its ambitious renewable energy integration efforts under the banner of the Energiewende. The Energiewende, initiated in the early 2000s, represents a comprehensive and multifaceted strategy aimed at decarbonizing the energy sector, reducing greenhouse gas emissions, enhancing energy security, and fostering economic prosperity.

Germany's experience with renewable energy integration offers a wealth of insights and lessons that are of immense significance for countries worldwide grappling with similar energy transition challenges. As of 2020, renewable energy sources accounted for over 50% of Germany's electricity consumption, a testament to the success of its policies and initiatives in promoting renewable energy deployment. Key pillars of Germany's renewable energy transition include robust policy frameworks, technological innovation, grid modernization, market mechanisms, and socio-economic considerations.

This paper seeks to explore and analyze the lessons learned from Germany's renewable energy integration journey and their implications for the broader global energy transition agenda. By delving into the intricacies of Germany's policies, technological advancements, grid integration strategies, market mechanisms, and socio-economic impacts, this study aims to distill actionable insights and recommendations for policymakers, researchers, and industry stakeholders worldwide. Through a comprehensive examination of Germany's experience, this paper aims to contribute to the collective understanding of renewable energy integration and accelerate progress towards a sustainable, low-carbon future on a global scale.

Methodology. This study adopts a literature review methodology to analyze and synthesize findings from published scientific papers related to the topic of renewable energy integration in Germany. The methodology involves several key steps:

The first step in the methodology involves identifying and selecting scientific papers that are relevant to the research topic. This includes conducting searches in academic databases such as Google Scholar, Web of Science, and Scopus using keywords such as "renewable energy integration," "Germany," "Energiewende," and related terms.

In the second step, the identified papers are then screened based on their relevance to the research topic and inclusion criteria. This may involve reviewing abstracts, titles, and keywords to determine whether the papers address key aspects of renewable energy integration in Germany.

Then selected papers are thoroughly reviewed, and relevant data and findings are extracted for further analysis. This includes information on policy frameworks, technological innovations, grid integration strategies, market mechanisms, socio-economic impacts, and lessons learned from Germany's experience.

The next step would be to analyze extracted data to identify patterns, trends, and key insights related to renewable energy integration in Germany. This may involve categorizing findings, comparing results across studies, and synthesizing information to draw overarching conclusions.

Furthermore, The analyzed would be synthesized to provide a comprehensive overview of the literature on renewable energy integration in Germany. This involves interpreting the findings in light of the research objectives and identifying implications for the broader global energy transition agenda.

Finally, the methodology culminates in drawing conclusions based on the synthesized findings from the reviewed literature. This includes summarizing key insights, highlighting gaps or limitations in the existing literature, and providing recommendations for future research directions.

Literature Review

Germany's transition towards renewable energy integration, exemplified by the Energiewende, has attracted significant scholarly attention and public interest. This literature review synthesizes key findings from a variety of sources, including academic journals, newspapers, and reports, to provide insights into the lessons learned from Germany's renewable energy integration efforts and their implications for the global energy transition.

Policy Frameworks:

Germany's Renewable Energy Act (EEG) has been a cornerstone of its renewable energy integration strategy, providing feed-in tariffs and other incentives to promote renewable energy deployment. According to Böhringer and Rosendahl (2018), the EEG has played a crucial role in driving investment in renewable energy technologies, contributing to significant cost reductions over the years. However, some scholars argue that policy uncertainty and regulatory changes have created challenges for investors and hindered progress in renewable energy deployment (Klessmann et al., 2014).

Weigt et. al. provided a European perspective on electricity wholesale market design, including the role of feed-in tariffs in promoting renewable energy deployment. The paper discusses challenges associated with integrating renewable energy into wholesale markets and the need for market reforms to ensure efficient price signals.

Röpke et al. conducted an economic evaluation of renewable energy expansion in Germany, examining the cost-effectiveness of feed-in tariffs and other policy instruments. Their analysis provides insights into the efficiency of feed-in tariffs in promoting renewable energy deployment and achieving climate goals.

Technological Innovations:

Technological advancements have been instrumental in overcoming barriers to renewable energy integration. According to Schmidt et al. (2020), Germany has been a leader in solar photovoltaics (PV) and wind energy innovation, with advancements in efficiency and cost competitiveness. The German experience demonstrates the importance of continuous innovation in driving down costs and improving the performance of renewable energy technologies (Fraunhofer ISE, 2021).

Grid Integration Strategies:

Integrating variable renewable energy sources into the grid requires robust grid infrastructure and innovative grid management techniques. Schmidt et al. (2017) highlighted the importance of grid expansion and grid modernization efforts in accommodating increasing shares of renewable energy. The German experience underscores the need for flexible grid systems, energy storage solutions, and demand-side management strategies to maintain grid stability (DENA, 2020).

Market Mechanisms:

Market mechanisms such as feed-in tariffs and renewable energy auctions have stimulated investment and competition in renewable energy markets. According to Röpke et al. (2019), feed-in tariffs have played a crucial role in incentivizing renewable energy deployment, particularly in the early stages of the Energiewende. However, researchers argue that market design challenges, such as grid congestion and price volatility, require ongoing policy reforms to ensure market efficiency and grid stability (Weigt, 2017).

Socio-Economic Impacts:

The transition to renewable energy has had significant socio-economic implications, including job creation, regional development, and energy affordability. According to Nitsch et al. (2020), renewable energy deployment has led to job growth in the renewable energy sector and related industries, particularly in rural areas. However, challenges such as energy poverty and social acceptance issues require targeted policy interventions and community engagement strategies (Eurostat, 2021).

Results and analysis

The literature review revealed mixed findings regarding the efficiency of feed-in tariffs (FITs) in Germany's renewable energy transition. Several studies highlighted the effectiveness of FITs in promoting renewable energy deployment and driving cost reductions. Böhringer and Rosendahl (2018) found that FITs, as part of a policy mix, have contributed to significant reductions in carbon emissions in Germany's electricity sector. Similarly, Klessmann et al. (2014) emphasized the importance of stable and predictable policy frameworks, including FITs, in driving investment in renewable energy technologies and achieving cost reductions.

The mixed findings regarding the efficiency of FITs in Germany's renewable energy transition reflect the complexity of energy policy and market dynamics. While FITs have played a significant role in

promoting renewable energy deployment and driving cost reductions, they may face challenges in achieving deeper emissions reductions and cost competitiveness in the long term. The effectiveness of FITs depends on various factors, including policy stability, market design, technological advancements, and socio-economic considerations.

The results suggest that a mix of policy instruments, including FITs and competitive auctions, may be needed to achieve ambitious renewable energy targets and address emerging challenges. Policy reforms aimed at enhancing market competitiveness, reducing regulatory barriers, and fostering innovation could complement FITs and unlock further potential for renewable energy deployment. Overall, the analysis underscores the importance of continuous evaluation and adaptation of energy policies to meet evolving sustainability goals and market dynamics.

The literature review on renewable energy integration in Germany revealed a multifaceted picture of the country's transition towards a sustainable energy system. Academic journals highlighted the role of policy frameworks, technological innovations, grid integration strategies, market mechanisms, and socio-economic impacts in driving renewable energy deployment.

Policy frameworks, such as the Renewable Energy Act (EEG), were found to be instrumental in promoting renewable energy deployment through feed-in tariffs and other incentives (Böhringer & Rosendahl, 2018). Technological innovations, particularly in solar photovoltaics and wind energy, have contributed to significant cost reductions and efficiency improvements (Schmidt et al., 2020).

Grid integration strategies, including grid expansion and grid modernization efforts, are crucial for accommodating increasing shares of renewable energy and maintaining grid stability (Schmidt et al., 2017). Market mechanisms, such as feed-in tariffs and renewable energy auctions, have stimulated investment and competition in renewable energy markets (Röpke et al., 2019).

Socio-economic impacts of renewable energy deployment include job creation, regional development, and energy affordability (Nitsch et al., 2020). However, challenges such as energy poverty and social acceptance issues require targeted policy interventions and community engagement strategies (Eurostat, 2021).

The results of the literature review underscore the multifaceted nature of renewable energy integration in Germany and the importance of holistic approaches to energy policy and planning. Policy frameworks, technological innovations, grid integration strategies, market mechanisms, and socio-economic considerations are all interconnected and must be carefully coordinated to achieve sustainable energy transition goals.

The analysis highlights the need for stable and predictable policy frameworks to provide certainty for investors and drive long-term investments in renewable energy technologies. Technological innovation plays a crucial role in driving down costs and improving the performance of renewable energy technologies, making them increasingly competitive in the energy market.

Grid integration strategies are essential for ensuring the reliable and efficient operation of the electricity grid as renewable energy penetration increases. Market mechanisms such as feed-in tariffs and renewable energy auctions can help stimulate investment and competition in renewable energy markets, but they must be carefully designed to ensure efficiency and effectiveness.

Socio-economic impacts of renewable energy deployment present both opportunities and challenges for policymakers. Job creation and regional development can contribute to economic growth and social well-being, but targeted interventions may be needed to address energy poverty and ensure equitable access to clean energy resources.

Conclusion:

The findings from the literature review provide valuable insights into the efficiency of feed-in tariffs (FITs) in Germany's renewable energy transition and the broader context of renewable energy integration in the country. Despite the mixed findings regarding the effectiveness of FITs, several key themes emerge that have implications for energy policy, market dynamics, and the global energy transition agenda.

Firstly, the literature highlights the importance of policy stability and predictability in driving renewable energy deployment. While FITs have played a significant role in promoting renewable energy in Germany, there is a need for complementary policy instruments and market reforms to address emerging challenges and achieve ambitious sustainability goals. Competitive auctions, technological innovation, and grid integration strategies are among the key areas where policy interventions can unlock further potential for renewable energy deployment and cost reductions.

Secondly, the literature underscores the interconnected nature of renewable energy integration, spanning policy frameworks, technological innovations, grid infrastructure, market mechanisms, and socio-economic

considerations. Holistic approaches to energy policy and planning are essential to ensure the reliable, efficient, and equitable transition to a sustainable energy system.

Thirdly, the findings from the literature review have implications for the broader global energy transition agenda. Germany's experience with renewable energy integration offers valuable lessons and insights that can inform and guide other countries' energy transition efforts. By learning from Germany's successes and challenges, policymakers, researchers, and industry stakeholders worldwide can accelerate progress toward a sustainable, low-carbon future.

In conclusion, while the efficiency of instruments in Germany's renewable energy transition may vary depending on specific contexts and evolving market dynamics, the overarching message is clear: a coordinated and integrated approach to energy policy and planning is essential to achieve sustainable energy transition goals. By addressing policy barriers, fostering technological innovation, enhancing grid infrastructure, and promoting socio-economic development, countries can overcome challenges and seize opportunities for a clean energy future.

References:

1. Böhringer, C., & Rosendahl, K. E. (2018). Greening electricity more than needed: On the policy mix to reduce carbon emissions. Resource and Energy Economics, 51, 1-21.
2. DENA. (2020). Grid Development Plan 2020. Deutsche Energie-Agentur (DENA).
3. Eurostat. (2021). Energy poverty statistics. European Commission.
4. Fraunhofer ISE. (2021). Photovoltaics report. Fraunhofer Institute for Solar Energy Systems ISE.
5. Klessmann, C., Held, A., & Rathmann, M. (2014). The impact of policy assumptions in modeling the future costs of renewable energy: A critical assessment. Energy Policy, 73, 702-716.
6. Nitsch, J., Oei, P. Y., & Fichtner, W. (2020). Local added value and employment effects of renewable energy deployment in Germany. Energy Policy, 139, 111321.
7. Röpke, L., Heinemann, F., & Madlener, R. (2019). Economic evaluation of renewable energy expansion in Germany. Energies, 12(22), 4358.
8. Schmidt, T. S., Schneider, M., Hoffmann, V. H., & Hoffmann, F. (2017). Decentralization and democratization of energy production: The transformative potential of renewable energy in the global south. World Development, 96, 418-434.
9. Schmidt, T. S., Sewerin, S., & Huenteler, J. (2020). The global rise of renewable energy. Nature Energy, 5(1), 74-84.
10. Weigt, H. (2017). Electricity wholesale market design: A European perspective. International Economics and Economic Policy, 14(4), 563-575.

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QUYOSH SUV ISITGICHLARINING AVTOMATIK MASOFADAN BOSHQARUV QUILMASINI LOYIHALASH

Taklif etilayotgan ixtiroga o'xshash moslama sifatida Xitoy xalq respublikasidan import qilinib quyosh kollektrolar(quyosh suv isitgichlari)ini olib sotadigan korxonalarda ishlatiladi. Bu quyosh kollektorlarning kontrollerlari asosan suv sathni, suv xaroratini, vaqtni ko'rsatishi hamda suv sathi kamayganda avtomatik quyosh kollektrolarini bakini to'ldirishdan iborat. Ularning asosiy kamchiligi ishdan chiqsa yoki kuysa qayta sozlab bo'lmasligi, masofadan turib kuzatib bo'lmasligi hamda maxsulat tannarxini qimmatlashishga olib kelishidadur [2].

Ushbu taklif qilingan qurilmaning asosiy mohiyati shundan iboratki, quyosh kollektorini boshqaruv qurilmasi(kontroller) jahon bozoridagi narxi 1 200 000 so'm atrofida bo'lsa biz loyihalagan yangi kontroller 650 ming so'm atrofida bu esa o'z navbatida tannarxini arzonlashtrishga va ichki bozorni biz loyihalagan maxsulat bilan taminlashga imkon beradi.

Innovatsion yangi kontrollerda laboratoriya sharoitida ham, sanoat va qishloq xo'jalik sohalarida bemolol foydalansa bo'ladi, flesh karta avtomatik xotiraga saqlab qolish , masofadan turib kuzatish imkoniyatlati mavjud.

Asosan quyosh kollektrolari bino va xonadonlarga issiq suv berishga xizmat qiladi. Quyosh suv isitgichilarining kontrollerni o'rnatish jarayoni qurilma uy qismning xonalardan biriga o'rnatiladi va boshqaruv qurilmasi(kontroller)dan suvning sathini hamda xaroratini o'lchab beradigan datchiklar kabellar orqali kollektor bakiga joylashtirilib serkulyatsion nasos orqali issiq suv kelishi taminlanadi. Bu jaroyani bevosita masofadan turib mabil qurilma orqali kuzatib turishim hamda kunlik xarorat sath