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A Systematic Review of Energy Subsidy Policies and Their Implications for Sustainable Growth

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Abstract

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Energy subsidies have long been used by governments to support energy affordability, economic growth, and social equity, particularly in developing countries. However, this systematic review examines growing concerns about the sustainability of such subsidies, especially those directed toward fossil fuels. Drawing on several peer-reviewed during a five-year observation period, this paper synthesizes the economic, environmental, and social impacts of energy subsidies. The findings reveal that while subsidies can offer short-term socio economic benefits, they often result in inefficient resource allocation, significant fiscal burdens, increased carbon emissions, and regressive distributional outcomes. The review emphasizes that effective reform requires targeted compensation mechanisms, strong institutional capacity, and inclusive policymaking to ensure both public acceptance and social protection. This study concludes that aligning energy subsidy policies with sustainable development necessitates a balanced, context-specific, and evidence-based approach to maximize long-term economic efficiency, environmental responsibility, and social equity.

1. Introduction

Energy subsidies have been a longstanding policy tool used by governments around the world to achieve a variety of socio-economic objectives. These include supporting domestic energy production, protecting consumers from volatile energy prices, ensuring energy affordability, and stimulating industrial growth (Coady et al., 2020). In many developing countries, such subsidies are seen as essential to safeguard low-income households and promote access to modern energy services. However, despite their short-term benefits, energy subsidies especially those directed toward fossil fuels have come under increasing criticism for being economically inefficient, environmentally harmful, and socially regressive (Kalkuhl et al., 2019; International Energy Agency, 2021).

From an economic standpoint, fossil fuel subsidies can distort market mechanisms by artificially lowering energy prices, which leads to overconsumption and misallocation of resources. This in turn creates fiscal burdens for governments, diverting public funds that could otherwise be used for social welfare, education, healthcare, or clean energy development (Kalkuhl et al., 2019; IMF, 2021).

Environmentally, these subsidies tend to incentivize carbon-intensive energy consumption, contributing to air pollution, environmental degradation, and the acceleration of climate change (World Bank, 2022). Socially, rather than benefiting the poorest segments of the population, energy subsidies are often regressive disproportionately favoring wealthier households that consume more energy (Coady et al., 2020).

As the global community pushes forward with the United Nations Sustainable Development Goals and commitments under the Paris Agreement, energy subsidy reform has become a critical policy agenda. According to recent cross-country analyses, reducing inefficient fossil fuel subsidies can support sustainable investments and lower carbon emissions when accompanied by strong institutional frameworks (Kalkuhl et al., 2019; OECD, 2022).

Given the trade-offs involved, policymakers are increasingly interested in understanding the long-term implications of energy subsidies on sustainable development. Numerous empirical and theoretical studies have examined subsidy impacts from economic, environmental, and social dimensions across various country contexts. However, findings in the literature are often fragmented, inconsistent, and context dependent. The diversity of results underscores the need for a structured synthesis of existing knowledge (Xiao & Watson, 2019).

This paper seeks to address that gap by conducting a systematic review of the existing literature on energy subsidy policies and their implications for sustainable growth. Specifically, it aims to map the key themes, identify common patterns and contradictions, and evaluate the conditions under which subsidies either support or hinder sustainability goals. Through this approach, the study aims to provide evidence-based insights that can support more informed and balanced policymaking in the energy sector, particularly in the context of the global transition toward low-carbon economies (Breza, 2021).

2. Literatur Review

Energy subsidies have been widely analyzed in academic discussions due to their dual role in promoting economic development and contributing to environmental challenges. In many developing countries, subsidies are used as tools to make energy affordable and to promote industrial competitiveness. However, growing evidence suggests that untargeted fossil fuel subsidies often result in market distortions and place significant strain on national budgets (Coady et al., 2020). These subsidies tend to lower energy prices artificially, leading to overconsumption and discouraging investment in renewable energy sources.

From an environmental standpoint, energy subsidies especially for fossil fuels have been linked to increased greenhouse gas emissions and environmental degradation. By encouraging carbon intensive consumption, they undermine international climate commitments and slow down the transition toward clean energy systems (Kalkuhl et al., 2019).

Socially, the benefits of energy subsidies are not always equitably distributed. Studies indicate that higher income households tend to capture a larger share of the subsidy benefits, while the poorest segments receive relatively little support. This regressive nature of universal subsidies has raised concerns about their effectiveness in addressing energy poverty (Coady et al., 2020).

Reforming energy subsidies remains a politically complex issue. Efforts to eliminate or reduce subsidies have often been met with strong public resistance due to concerns over rising energy prices and reduced access. Successful reform, therefore, depends on strong institutional capacity, transparent policymaking, and

targeted compensation mechanisms to protect vulnerable groups (OECD, 2022; Breza, 2021).

3. Methods

This study employs a systematic literature review (SLR) approach to comprehensively assess the existing academic literature on energy subsidy policies and their implications for sustainable growth. The SLR method allows for the structured identification, evaluation, and synthesis of relevant research findings across diverse geographical and policy contexts. This method is particularly suitable for consolidating fragmented evidence and identifying common trends, contradictions, and gaps in the literature (Xiao & Watson, 2019).

The research follows three main stages of the SLR process: (1) planning the review, (2) conducting the review, and (3) reporting the findings. In the planning stage, the research questions were formulated to guide the selection of studies, focusing on the economic, environmental, and social impacts of energy subsidies. During the conducting stage, a comprehensive search was conducted using academic databases such as Scopus, ScienceDirect, and Google Scholar, using keywords including energy subsidy and sustainable development. Only peer reviewed articles published in English between 2018 and 2022 were considered.

To ensure the quality and relevance of the selected literature, inclusion criteria were applied based on the following: (a) alignment with the themes of subsidy policy and sustainability, (b) clear methodological design (empirical, theoretical, or policy analysis), and (c) publication in reputable academic journals indexed in Scopus or

Google Scholar. Studies that were opinion based, non peer reviewed, or unrelated to the core themes were excluded. In several key articles were selected for full review and analysis (Kalkuhl et al., 2019).

The data extraction process involved coding each study based on the type of subsidy policy examined, the region of study, methodological approach, and identified outcomes categorized under economic, environmental, or social impacts. The data were then synthesized using a thematic analysis framework to identify patterns, recurring insights, and policy implications (International Energy Agency, 2021; World Bank, 2022).

This approach supports the development of a conceptual map of how energy subsidies relate to sustainable development goals across different country contexts (OECD, 2022).

By using this systematic approach, the research aims to provide an evidence-based understanding of the role of energy subsidies in shaping sustainable development outcomes. The findings are expected to guide future policy formulation, particularly in the context of low carbon transitions and global subsidy reform efforts. The methodological rigor of structured synthesis supports clearer policy relevant conclusions and more reliable academic contributions (Xiao & Watson, 2019).

4. Results and Discussion

The findings from this systematic review reveal that energy subsidy policies have complex and multidimensional implications for sustainable growth, depending

on how and under what context the subsidies are implemented. Economically, various studies highlight that fossil fuel subsidies tend to generate market inefficiencies and place considerable strain on national budgets. In many developing countries, subsidies are used to stabilize energy prices and enhance purchasing power, but they also reduce incentives for innovation and investment in renewable energy (Kalkuhl et al., 2019). Continued dependence on subsidies may obstruct structural reforms in the energy sector and create unsustainable fiscal burdens.

From an environmental perspective, there is broad consensus that fossil fuel subsidies contribute directly to higher carbon emissions and hinder the transition toward low-carbon energy systems. These subsidies make carbon intensive energy cheaper, leading to overconsumption and delayed investment in clean alternatives (Kalkuhl et al., 2019; World Bank, 2022). Poorly targeted subsidies intensify the climate crisis, undermining international commitments such as the Paris Agreement. Socially, although energy subsidies are often intended to protect low-income households, the actual distribution of benefits is frequently regressive. Higher-income groups, who consume more energy, tend to capture a disproportionate share of the subsidy, leaving lower-income households with limited benefits (Coady et al., 2020).

Nevertheless, implementing subsidy reform remains politically sensitive and complex. Public resistance, fear of inflation, and concerns over energy access frequently obstruct comprehensive reform efforts. The success of such reforms relies heavily on institutional strength, transparent policy design, and public trust. In

this regard, strategic communication and inclusive policy making are essential to gain broad acceptance and to mitigate potential negative impacts (OECD, 2022).

In summary, the evidence emphasizes the importance of designing energy subsidies with a balanced and context-specific approach. While subsidies can support affordability and access if well targeted, mismanaged or universal subsidies tend to hinder environmental sustainability and fiscal health. Integrating reform into broader sustainable development strategies especially during the global transition to low-carbon economies requires careful trade-offs between economic efficiency, environmental responsibility, and social equity (Kalkuhl et al., 2019; OECD, 2022).

5. Conclusion

This systematic review highlights the complex and often contradictory role of energy subsidy policies in achieving sustainable growth. While energy subsidies, particularly in developing countries, are commonly used to ensure affordability and promote economic development, their long-term impacts can undermine sustainability objectives. Economically, fossil fuel subsidies distort market signals and impose fiscal burdens on governments, while environmentally, they contribute to increased carbon emissions and delay the clean energy transition (Kalkuhl et al., 2019; World Bank, 2022). Socially, the regressive nature of untargeted subsidies often limits their effectiveness in alleviating energy poverty, as wealthier households tend to capture a larger share of the benefits.

The findings suggest that poorly designed and broadly applied subsidies are generally incompatible with the goals of sustainable development. However, reforms

must be carefully planned and implemented, taking into account the political and social contexts in which they occur. Targeted support mechanisms, such as direct cash transfers and social safety nets, are essential to protect vulnerable populations during reform processes. Furthermore, recent cross-country analyses emphasize that institutional quality and transparent governance are decisive factors in successful subsidy reform implementation (OECD, 2022).

Overall, aligning energy subsidy policies with environmental, economic, and social sustainability requires a nuanced and evidence-based approach. As countries strive toward low-carbon economies and sustainable development goals, reforming energy subsidies will be a vital step albeit one that demands careful design, strong institutions, and stakeholder engagement (International Energy Agency, 2021).

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