Renewable Energy Transition Approach to Sustainable Development: Connecting Triple Bottom Line, Socio-Technical Transition, and Stakeholder Perspectives

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Abstract
Global interest in a Renewable Energy Transition (RET) to achieve sustainable and equitable growth has increased amid the escalating climate catastrophe, rising greenhouse gas emissions, energy insecurity, and socioeconomic disparities. Adoption of renewable energy and sustainability outcomes has been studied independently in the past. However, little research has developed an integrated conceptual framework that explains how RETs contribute concurrently to environmental, social, and economic sustainability. To close this gap, this study proposes a multi-layered conceptual framework grounded in stakeholder theory, socio-technical transition theory, and the triple bottom line. According to the framework, RET is an inclusive change that involves stakeholder engagement, institutional support, technical innovation, and green economic transformation. It is suggested that RET will impact social sustainability through improved energy access, public health, social inclusion, and community resilience; economic sustainability through employment creation, energy security, industrial competitiveness, and innovation; and environmental sustainability through carbon reduction, pollution mitigation, climate resilience, and ecosystem protection. The concept also acknowledges institutional support and technical innovation as important mediating mechanisms, with public awareness, government efficacy, and financial development serving as moderating elements. By integrating multiple sustainability perspectives into an interconnected model, the study advances theory and offers management and policy recommendations for fostering inclusive, sustainable nation-building.

Keywords: Renewable Energy Transition (RET); Sustainable Development (SD); Inclusive Growth; Triple Bottom Line; Socio-Technical Transition; Stakeholder Theory.

Introduction

1.1 Background

Due to growing environmental concerns, resource depletion, climate instability, and rising energy consumption, the modern global economy is undergoing an unprecedented transition in its energy systems. Fossil fuel-based energy systems, especially those based on coal, oil, and natural gas, have been the main drivers of economic growth and industrial expansion since the Industrial Revolution (Smil, 2017). Rapid industrialisation, urbanisation, technical advancement, and advances in living conditions across countries were all made possible by fossil fuels. However, the widespread dependence on fossil fuels has also led to serious socioeconomic and environmental impacts, such as ecological degradation, greenhouse gas emissions, public health issues, and geopolitical energy insecurity (Sovacool, 2016).

The major source of greenhouse gas emissions worldwide is still the energy industry. The Intergovernmental Panel on Climate Change (IPCC, 2023) states that over the past century, transportation, electricity production, industrial production, and unsustainable consumption patterns have contributed to a steady rise in greenhouse gas emissions. The shift to cleaner energy systems is crucial for stabilising the climate, as energy-related carbon dioxide emissions account for around three-quarters of global emissions (IEA, 2023). Discussions about SD and low-carbon economic transformation have intensified in academia and policy circles due to the environmental impacts of fossil fuel dependence.

Renewable energy has become a strategic option that promotes energy security, sustainable economic growth, and climate mitigation. Solar, wind, hydroelectric, biomass, geothermal, and upcoming green hydrogen technologies are examples of renewable energy sources that are naturally replenishable and produce substantially less emissions than traditional fossil fuels. The adoption of renewable energy has expanded globally due to technological advances, economies of scale, declining production costs, and supportive policy initiatives. The International Renewable Energy Agency (IRENA, 2023) reports that over 80% of new electricity generation capacity additions worldwide in 2022 came from renewable energy (Geels, 2002).

However, the RET goes beyond only switching out energy technologies. According to recent research, the energy transition is a comprehensive socio-technical change encompassing institutional transformation, technological advancement, governance adaptation,

stakeholder involvement, industry restructuring, and behavioural change (Geels, 2011; Geels, 2019). As a result, RET is increasingly seen as a crucial path to sustainable and inclusive growth and an environmental imperative.

1.2 Renewable Energy Transition and Sustainable Development

The World Commission on Environment and Development (WCED, 1987) published "Our Common Future," which introduced the concept of SD and defined it as development that meets present needs without jeopardising the capacity of future generations to meet their own. By combining social welfare, economic advancement, and environmental conservation, this term radically changed the conversation about global development. Following this, sustainability evolved into a multilayered framework encompassing social, economic, and environmental dimensions. Elkington's (1997) Triple Bottom Line framework is frequently used to conceptualise sustainability (Bansal, 2005).

The United Nations Sustainable Development Goals (SDGs) were adopted in 2015, further solidifying the world's growing commitment to sustainability. According to the United Nations (2015), the 17 Sustainable Development Goals (SDGs) provide a comprehensive framework for addressing issues such as industrial innovation, responsible consumption, poverty reduction, renewable energy, and climate action. While SDGs 8, 9, 11, and 12 depend indirectly on effective energy transition processes, SDGs 7 (Affordable and Clean Energy) and 13 (Climate Action) clearly emphasise the importance of renewable energy systems. As a result, RET is increasingly recognised as essential to achieving several SDGs simultaneously (Sachs et al., 2022).

There has been significant academic interest in the relationship between SD and renewable energy. Research indicates that renewable energy has a favourable impact on social welfare, economic growth, environmental quality, and energy security (Apergis & Payne, 2010; Bhattacharya et al., 2016). While lowering dependence on imported fossil fuels, investments in renewable energy promote industrial growth, technical advancement, and green jobs. IRENA and ILO (2023) estimate that the renewable energy sector created approximately 13.7 million jobs worldwide in 2022, primarily in solar photovoltaic and wind energy (Jenkins et al., 2016).

From a societal perspective, renewable energy systems promote inclusive development, lessen energy poverty, and increase energy access. Decentralised renewable energy technologies, such as mini-grids and rooftop solar systems, improve access to electricity in underserved and remote areas, helping reduce poverty and enhance access to healthcare, education, and community resilience (Sovacool, 2012; Sachs et al., 2022). Additionally, reducing fossil fuel use enhances public health by reducing air pollution and related respiratory diseases (Lelieveld et al., 2020).

Compared with traditional fossil fuel systems, renewable energy technologies dramatically reduce greenhouse gas emissions and ecological damage (Dogan & Seker, 2016; IRENA, 2023). As a result, RET is increasingly seen as a crucial means of mitigating climate change, reducing carbon emissions, conserving biodiversity, and promoting environmental sustainability (Agarwal et al., 2026).

1.3 RET, Inclusive Growth, and Nation Building

Today's development promotes inclusive growth, whereas SD has traditionally concentrated on balancing economic, social, and environmental goals. The term "inclusive growth" refers to a development process that ensures a fair distribution of economic benefits and opportunities across diverse societal groups. It aims to maintain economic competitiveness while fostering social mobility, job creation, poverty alleviation, and improved quality of life.

The RET provides significant opportunities for further nation-building and inclusive growth. Employment opportunities in manufacturing, installation, operation, maintenance, research, and innovation are generated by investments in renewable energy infrastructure. Additionally, renewable energy systems promote community development, local entrepreneurship, and rural electrification—especially in developing nations, where energy poverty remains a significant barrier to socioeconomic advancement (Goldemberg & Lucon, 2010; Sovacool, 2012).

Additionally, by lowering dependence on imported fossil fuels and vulnerability to unstable international energy markets, renewable energy improves national energy security. This improves long-term national competitiveness, strategic autonomy, and economic resilience. As a result, the RET has become a key element of sustainable nation-building plans that seek to advance long-term resilience, social inclusiveness, economic prosperity, and environmental stewardship (Meadowcroft, 2009).

1.4 Research Gap

Despite the expanding body of research on SD and renewable energy, significant gaps persist. First, rather than adopting an integrated, multidimensional perspective, existing research primarily focuses on individual sustainability dimensions. While little research integrates economic, social, and environmental sustainability outcomes within a single framework, many studies examine the effects of renewable energy on economic growth, environmental quality, or energy security separately (Apergis & Payne, 2010; Dogan & Seker, 2016). Second, most research on renewable energy is empirical and context-specific, focusing on national-level evidence and econometric analyses. Although these studies offer valuable insights, conceptual theory-building and the development of integrated frameworks that explain the mechanisms by which

RET contributes to SD have received very little attention (Markard et al., 2012). Third, mediating and moderating factors that significantly impact sustainability outcomes—such as technological innovation, institutional quality, governance effectiveness, financial development, stakeholder engagement, and public awareness—are currently underrepresented in the literature (Cherp et al., 2018). As a result, little is known about the intricate relationships between institutional, technological, and socioeconomic issues. Fourth, previous research often overlooks the social, political, governance, and behavioural aspects of the energy transition, favouring an emphasis on technological efficiency. Stakeholder disputes, institutional opposition, consumer behaviour, policy ambiguity, and governance issues are all aspects of sustainability transitions that call for further theoretical research (Geels, 2019). Lastly, a small body of research combines the theories of Triple Bottom Line, Socio-Technical Transition, and Stakeholder to explain RET as a multilayered path toward inclusive and sustainable development (Carter & Rogers, 2008).

1.5 Research Objectives

In light of these gaps, the current study aims to:

1. Examine RET's contribution to inclusive and sustainable growth.
2. Examine how RET affects sustainability in terms of the economy, society, and environment.
3. Combine Stakeholder Theory, Socio-Technical Transition Theory, and Triple Bottom Line Theory into a single conceptual framework.
4. Determine how technological innovation, institutional support, and green economic transformation function as mediators.
5. Examine the moderating effects of government effectiveness, financial development, and public awareness and stakeholder engagement.
6. Create a comprehensive conceptual framework outlining the RET's role in nation-building and SD.

2. Literature Review

2.1 Renewable Energy Transition

The idea of RET is the gradual transition of energy systems from dependence on fossil fuels to renewable and low-carbon energy sources. In the past, energy transitions have been associated with major technological and economic transformations, such as the shift from biomass to coal during the Industrial Revolution and from coal to oil in the twentieth century (Smil, 2017). However, the contemporary RET differs from previous transitions in that it is primarily driven by environmental sustainability, climate change mitigation, energy security concerns, and the SDGs rather than merely by economic efficiency (Cherp, Vinichenko, Jewell, Suzuki, & Antal, 2018). Compared to traditional fossil fuels, renewable energy sources offer numerous advantages, including long-term sustainability, lower environmental impact, and renewability. The global adoption of renewable energy has accelerated due to technological improvements and cost reduction. The International Renewable Energy Agency (IRENA, 2023) reports that renewable energy has emerged as one of the world's fastest-growing economic sectors, accounting for a substantial share of newly installed electricity generation capacity globally (Bridge et al., 2018; Loorbach & Rotmans, 2010).

Researchers are beginning to acknowledge RET as a multilayered socio-technical process that includes market transformation, institutional adaptation, policy reforms, technological innovation, and behavioural change (Geels, 2011; Geels, 2019). Governments, businesses, financial institutions, communities, and consumers must all work together to facilitate the shift. As a result, the RET is more than an energy-related phenomenon; it is a broader social shift that affects governance frameworks, economic structures, and development pathways. According to the literature, stakeholder engagement, financial resources, technological capabilities, and supporting institutional contexts are all necessary for successful RETs (Markard, Raven, & Truffer, 2012). In general, nations that have passed comprehensive renewable energy regulations, invested in research and development, and promoted public involvement have achieved faster transition results. For countries to achieve SD and long-term economic sustainability, the RET is a critical tool.

2.2 Sustainable Development

With the publication of the Brundtland Report by the World Commission on Environment and Development (WCED, 1987), SD became a dominating paradigm in the discourse around global development. According to the paper, SD is a development that meets present needs without jeopardising future generations' capacity to meet their own. According to this definition, sustainability is a multifaceted concept that requires integrating social, economic, and environmental goals. Elkington's (1997) Triple Bottom Line (TBL) method, which emphasises three interconnected dimensions: economic, social, and environmental sustainability, is typically used to operationalise the sustainability framework. Long-term economic viability and resource efficiency are the main goals of economic sustainability. Human well-being, inclusion, social justice, and quality of life are all included in social sustainability. Environmental sustainability focuses on ecological conservation, resource management, and environmental protection.

The international commitment to sustainability was further reinforced in 2015 with the United Nations' approval of the SDGs. According to the United Nations (2015), the Sustainable Development Goals (SDGs) offer an all-inclusive framework that tackles poverty reduction, renewable energy, sustainable industrialisation, climate action, responsible consumption, and inclusive development. SDGs 7 (Affordable and Clean Energy), 8 (Decent Work and Economic Growth), 9 (Industry, Innovation and

Infrastructure), and 13 (Climate Action) all depend heavily on renewable energy. Recent research highlights the increasing interconnection among the economic, social, and environmental aspects of sustainability. SD cannot be attained through discrete policy involvements; instead, integrated strategies are needed to address social inequalities, environmental issues, and the demands of economic growth concurrently (Sachs et al., 2022). The RET is increasingly viewed as an integrated approach capable of generating positive outcomes across all three dimensions of sustainability.

2.3 Inclusive Growth

In light of growing wealth inequality, social exclusion, and unequal development results, inclusive growth has become a crucial counterpoint to SD. Inclusive growth focuses on ensuring that the benefits of economic expansion are fairly distributed across society, whereas traditional economic growth models primarily emphasise gains in GDP (OECD, 2018). Employment creation, poverty reduction, social mobility, access to opportunity, and fair engagement in economic activity are all part of inclusive growth. The World Bank (2022) states that inclusive growth aims to improve overall human well-being, lessen socioeconomic inequality, and generate productive employment opportunities.

Through various avenues, RET can make a substantial contribution to inclusive growth. First, investments in renewable energy generate jobs in manufacturing, construction, installation, operation, maintenance, and research. Second, decentralised renewable energy systems provide rural and underserved areas with access to reliable and affordable energy services. Third, renewable energy initiatives frequently promote local economic growth and community involvement, which strengthens social inclusion and empowerment. According to the literature, renewable energy-based development plans can promote social justice and economic competitiveness simultaneously. As a result, the RET has grown in importance for decision-makers seeking to achieve goals of inclusive, sustainable growth (Porter & van der Linde, 1995; Unruh, 2000).

2.4 Renewable Energy and Economic Sustainability

Economic sustainability is the ability of an economy to sustain long-term growth, productivity, competitiveness, and resilience while using available resources effectively. The relationship between renewable energy use and economic expansion has been the subject of numerous studies. In several countries, Apergis and Payne (2010) found a favourable long-term correlation between renewable energy use and economic growth. According to Bhattacharya (2016), renewable energy boosts industrial productivity, investment, and innovation, all of which have a major positive impact on economic development.

The manufacture, installation, operation, maintenance, and related supply chain activities in the renewable energy industry create significant job opportunities. In 2022, there were more than 13 million jobs in renewable energy worldwide, according to IRENA and the International Labour Organisation (ILO). Additionally, by reducing reliance on imported fossil fuels and sensitivity to energy price fluctuations, investments in renewable energy help ensure energy security. Infrastructure development for renewable energy also fosters industry competitiveness and technological growth (Dyllick & Hockerts, 2002). Investments in clean energy technology promote the growth of green industries, innovation ecosystems, and research and development. Thus, by encouraging resilient, diversified, and innovation-driven economies, RET promotes economic sustainability (Bansal & Roth, 2000; Hahn et al, 2010).

2.5 Renewable Energy and Social Sustainability

Enhancing human well-being, social equality, community resilience, and quality of life are the main areas of social sustainability. RET supports social sustainability in several ways. Improved energy access is one of the biggest contributions of renewable energy. Energy poverty still affects about 100 million people globally, especially in emerging nations. Poor communities can access affordable, reliable electricity through decentralised renewable energy technologies, including solar household systems, mini-grids, and community-based energy projects (Sovacool, 2012; Mohan et al., 2021).

Access to electricity improves livelihood prospects, communication infrastructure, healthcare services, and educational outcomes. By promoting profitable economic activity and lowering regional disparities, renewable energy systems also support rural development. Additionally, local involvement and community engagement are frequently features of renewable energy projects, strengthening social inclusion and empowerment. By reducing air pollution from burning fossil fuels, renewable energy also improves public health. According to studies, cleaner energy systems reduce the risk of cardiovascular disease, respiratory ailments, and early death from exposure to air pollution (Lelieveld et al., 2020). As a result, the RET delivers significant societal benefits beyond energy supply.

2.6 Renewable Energy and Environmental Sustainability

The RET outcome most often examined remains environmental sustainability. One of the main causes of greenhouse gas emissions, air pollution, and ecological damage is the burning of fossil fuels. Therefore, a critical approach for reducing environmental impacts is to transition from fossil fuels to renewable energy technologies. The adoption of renewable energy often results in reduced carbon emissions and improved environmental quality, according to research (Dogan & Seker, 2016). Compared with traditional energy systems, renewable

energy sources have significantly lower life-cycle emissions and help mitigate climate change.

Renewable energy promotes ecosystem preservation, sustainable resource management, and biodiversity conservation in addition to lowering greenhouse gas emissions. Additionally, renewable energy systems improve resilience to environmental shocks and lessen dependence on limited natural resources. To fulfil international climate responsibilities such as the Paris Agreement and the United Nations SDGs, the environmental advantages of renewable energy are especially crucial. As a result, one of the strongest arguments for accelerating the global adoption of renewable energy is environmental sustainability.

2.7 Triple Bottom Line Theory

Elkington's (1997) Triple Bottom Line (TBL) Theory offers one of the most important frameworks for understanding sustainability. According to this notion, social and environmental outcomes should be taken into account when assessing organisational and societal performance. Because renewable energy simultaneously affects social welfare, economic success, and environmental quality, the TBL concept and the RET are closely aligned. The creation of jobs and industrial growth are examples of economic advantages; energy availability and improvements in public health are examples of social benefits; and carbon reduction and climate mitigation are examples of environmental benefits. As a result, TBL Theory offers a suitable theoretical framework for analysing the multilayered sustainability results of RET.

2.8 Socio-Technical Transition Theory

Large-scale societal systems change results from interactions among institutions, markets, policies, technology, and social actors, according to the socio-technical transition theory (Geels, 2011). The Multi-Level Perspective (MLP) states that interactions among niche inventions, socio-technical rules, and broader landscape pressures initiate transitions. One well-known illustration of socio-technical change is the RET. Technological advancements, including solar photovoltaics, wind turbines, battery storage systems, and smart grids, challenge conventional fossil fuel-based energy regimes. Transition processes are further aided by institutional improvements, policy assistance, and shifting community preferences. The approach highlights that coordinated changes across institutional, social, and technological dimensions are necessary for effective transitions. As a result, Socio-Technical Transition Theory offers insights into how RET influences SD (Geels & Schot, 2007).

2.9 Stakeholder Theory

According to Freeman's (1984) Stakeholder Theory, a variety of stakeholder groups, including governments, corporations, investors, communities, consumers, and civil society organisations, influence organisational and societal outcomes. Extensive cooperation between several stakeholders is necessary for RET (Mitchell et al., 1997). Governments create policy incentives and regulatory frameworks; companies develop and implement technologies; financial institutions provide investment capital; communities participate in project execution; and consumers shape market demand through energy choices (Donaldson & Preston, 1995). Stakeholder participation, collaboration, and alignment are critical to the RET's success. Therefore, by highlighting the importance of group activity in achieving SD outcomes, Stakeholder Theory improves sustainability and socio-technical perspectives (Bryson, 2004). The main conclusions from the literature review on RET and SD for the present investigation are shown in Table 1.

Table 1: Literature analysis on RET and SD

Authors	Focus Area	Key Findings	Limitations Identified
WCED (1987)	SD	Introduced the concept of SD and intergenerational equity.	Did not explicitly address RET mechanisms.
Elkington (1997)	Triple Bottom Line (TBL)	Proposed economic, social, and environmental dimensions of sustainability.	Limited focus on energy transition processes.
Freeman (1984)	Stakeholder Theory	Highlighted the role of multiple stakeholders in organisational and societal outcomes.	Did not specifically examine RETs.
Geels (2011)	Socio-Technical Transition Theory	Explained complete transitions through interactions among technologies, institutions, and actors.	Limited integration with sustainability outcomes.
Geels (2019)	Sustainability Transitions	Emphasised the importance of governance and institutional change in sustainability transitions.	Focused primarily on transition processes rather than development outcomes.

Markard, R. & Truffer (2012)	Sustainability Transition Research	Reviewed transition studies and highlighted technological and institutional dynamics.	Did not provide an integrated sustainability framework.
Sovacool (2012)	Energy Access and Development	Demonstrated the role of renewable energy in poverty alleviation and rural development.	Limited discussion of environmental sustainability outcomes.
Sovacool (2016)	Energy Security and Sustainability	Linked renewable energy with environmental and energy security objectives.	Insufficient attention to inclusive growth dimensions.
Apergis & Payne (2010)	Renewable Energy and Economic Growth	Found positive long-run relationships between renewable energy consumption and economic growth.	Focused primarily on economic outcomes.
Bhattacharya et al. (2016)	Renewable Energy and Development	Renewable energy contributes positively to economic development and sustainability.	Social and institutional dimensions are underexplored.
Dogan & Seker (2016)	Renewable Energy and Environment	Renewable energy reduces carbon emissions and improves environmental quality.	Focused mainly on environmental outcomes.
Cherp et al. (2018)	Energy Transition Governance	Highlighted governance and institutional determinants of energy transitions.	Did not integrate social and economic sustainability outcomes.
Sachs et al. (2022)	SDGs and SD	Emphasised the importance of renewable energy in achieving multiple SDGs.	Limited explanation of transition mechanisms.
IRENA (2023)	Renewable Energy Deployment	Demonstrated rapid global growth of renewable energy and green employment generation.	Primarily descriptive and policy-oriented.
IPCC (2023)	Climate Change Mitigation	Identified renewable energy as a key strategy for reducing greenhouse gas emissions.	Focused on climate outcomes rather than broader development impacts.

Source: The author's compilation based on the literature review.

2.10 Research Gaps and Literature Analysis

The research shows that the RET has a good impact on environmental, social, and economic sustainability. Stakeholder theory emphasises the significance of cooperative governance and stakeholder involvement, the Triple Bottom Line theory explains sustainable outcomes, and the Socio-Technical Transition Theory explains transformation processes. However, present research remains dispersed across several disciplines. Most studies examine specific sustainability outcomes or individual theoretical perspectives rather than developing integrated frameworks. Limited attention has been devoted to understanding how technological innovation, institutional support, governance quality, and stakeholder engagement collectively influence the relationship between RET and SD. To address these gaps, the present study develops an integrated conceptual framework combining sustainability, socio-technical, and stakeholder perspectives. The framework seeks to explain how the RET contributes to sustainable and inclusive growth through economic, social, and environmental pathways while accounting for key mediating and moderating mechanisms. Table 2 explores the Research Gaps and Contributions of the Present Study.

Table 2: Research Gaps and Contributions of the Present Study

Research Gaps in Existing Literature	Contribution of the Present Study
Existing studies mostly examine economic, social, or environmental outcomes independently.	Develops an integrated framework that links RET to all three sustainability dimensions simultaneously.
Most studies focus on empirical relationships between renewable energy and economic growth.	Extends the discussion by incorporating sustainable and inclusive growth outcomes.
Limited integration of sustainability theories with energy transition research.	Integrates Triple Bottom Line Theory, Socio-Technical Transition Theory, and Stakeholder Theory into a unified framework.

Earlier studies have not adequately explained the mechanisms by which RET influences sustainability outcomes.	Identifies technological innovation, institutional support, and green economic transformation as key mediating mechanisms.
Governance and contextual factors are often examined separately.	Incorporates government effectiveness, financial development, and public awareness as moderating variables.
Limited focus on inclusive growth and nation-building outcomes.	Positions RET as a strategic pathway toward sustainable and inclusive nation-building.
Existing frameworks often overlook stakeholder participation and collaborative governance.	Highlights stakeholder engagement as a critical factor influencing transition success.
Most studies are sector-specific or country-specific.	Provides a generalised conceptual framework applicable across different national contexts.
Research tends to focus on the environmental benefits of renewable energy.	Demonstrates how renewable energy simultaneously contributes to economic prosperity, social inclusion, and environmental stewardship.
Lack of theory-building studies linking RET with SD pathways.	Advances theory by proposing an integrated conceptual model and a set of testable propositions (P1–P9).

Source: Developed by the author.

3. Data And Methodology

3.1 Research Design

The present study adopts a conceptual research design to develop an integrated framework explaining the relationship between RET and sustainable and inclusive growth. Conceptual research plays a critical role in advancing theory by synthesising existing knowledge, identifying research gaps, and proposing new theoretical relationships among constructs (Jaakkola, 2020). Unlike empirical studies that test hypotheses using primary or secondary datasets, conceptual studies seek to advance theoretical understanding by integrating diverse bodies of literature and generating new insights.

Because the RET involves technical innovation, institutional reform, environmental sustainability, economic development, and social transformation, its complexity demands a multilayered analytical approach. The majority of current research on renewable energy has developed within disciplinary silos, resulting in a fragmented understanding of how RETs influence SD outcomes. To integrate current information and create a thorough framework that explains these relationships, a conceptual, theory-building approach is necessary. To find, evaluate, and synthesise academic research on RET, SD, inclusive growth, technological innovation, institutional support, and stakeholder involvement, the study employs a systematic literature review and theory-building approach. The developed paradigm serves as a basis for further empirical research and policy analysis.

3.2 Data Sources

The study uses secondary sources from internationally renowned publications and peer-reviewed literature. Because secondary data allow researchers to incorporate findings from multiple contexts and theoretical perspectives, they are especially suitable for conceptual studies. Major academic databases, including Scopus, Web of Science, and Google Scholar, served as the sources for the literature examined in this study. To document current advancements in sustainability and renewable energy, papers and publications from leading international organisations were reviewed, along with scholarly works. The Intergovernmental Panel on Climate Change (IPCC), the United Nations (UN), the United Nations Development Programme (UNDP), the World Bank, the International Labour Organisation (ILO), the International Energy Agency (IEA), and the International Renewable Energy Agency (IRENA) were among these sources. The inclusion of both academic and institutional literature ensured comprehensive coverage of theoretical progresses, policy perspectives, and practical insights related to RET and SD.

3.3 Literature Selection Process

The literature selection approach adhered to a standardised review protocol to ensure scientific rigour and openness. Combinations of the following keywords: energy transition, sustainability, inclusive growth, energy policy, energy security, technological innovation, stakeholder engagement, socio-technical transition, and triple bottom line were used to identify relevant studies. Numerous papers across a range of fields, including energy studies, sustainability science, environmental management, economics, public policy, and business management, were identified during the initial search. There were three steps in the selection process. Database searches and reference tracking were used in Stage 1 (Identification) to find relevant articles. Highly referenced journal publications, review papers, theoretical research, and significant policy reports were prioritised. Publications were examined for their applicability to RET and SD in Stage 2 (Screening). Excluded were studies that

addressed solely technical engineering concerns without considering broader sustainability consequences. Studies that directly advanced knowledge of the connections between RET, sustainability outcomes, governance mechanisms, technical innovation, and stakeholder participation were included in the final selection of literature for Stage 3 (Inclusion and Synthesis). The framework was created based on these investigations.

3.4 Theoretical Foundations

Three complementary theoretical attitudes, Triple Bottom Line Theory, Socio-Technical Transition Theory, and Stakeholder Theory, form the foundation of the conceptual framework created in this study. According to TBL Theory, SD requires taking social, economic, and environmental performance into account simultaneously. The main lens used in this study to conceptualise sustainability outcomes related to RET is the TBL framework. According to the TBL perspective, the RET is expected to promote economic sustainability by creating jobs, fostering innovation, and enhancing energy security. Social sustainability via increased social inclusion, public health, and energy availability. environmental sustainability through ecological preservation and carbon reduction. Large-scale societal systems change results from interactions among institutions, markets, policies, technology, and social actors, according to the socio-technical transition theory (Geels, 2011). RET represents a significant socio-technical shift, transitioning from fossil-fuel to renewable energy systems. This theory provides an explanatory basis for understanding how institutional support and technical innovation serve as crucial mechanisms for promoting transition processes.

Stakeholder theory emphasises the significance of various stakeholder groups in achieving corporate and societal goals. Governments, corporations, investors, communities, consumers, and civil society organisations must all actively contribute to RET. Thus, collaborative governance and stakeholder involvement are key components of good sustainability results, as explained by Stakeholder Theory. The integration of these three theories provides a comprehensive understanding of the RET as a multifaceted process that promotes equitable and sustainable growth.

3.5 Conceptual Framework Development

A theory-integration procedure comprising four consecutive steps was used to develop the conceptual framework. The literature review identified RET as the primary explanatory construct in Stage 1 (Identification of Core Constructs). Economic, social, and environmental sustainability characteristics were used to operationalise sustainable and inclusive growth, which was identified as the main outcome variable. The literature constantly emphasises technological innovation, institutional support, and green economic transformation as crucial mechanisms via which the RET produces sustainability outcomes in Stage 2 (Identification of Mediating Mechanisms). These factors were therefore included as mediating constructs in the suggested framework. Previous research in Stage 3 (Identification of Moderating Factors) shows that contextual factors, including public awareness, institutional efficacy, financial development, and governance quality, affect the effectiveness of the RET. As a result, the framework included public awareness, financial development, and government effectiveness as moderating factors that affect the strength of partnerships. To create a thorough conceptual model, the last step in Stage 4 (Integration and Proposition Development) involved combining ideas from the literature review and the theoretical foundations. Several theoretical claims were developed to link RET to inclusive and sustainable growth objectives based on the suggested linkages. The resulting framework views RET as a multilayered transformation process that uses institutional, technical, and stakeholder-driven paths to promote economic, social, and environmental sustainability.

3.6 Analytical Approach

The study uses theory-building analysis and thematic synthesis to examine connections among the identified constructs. The integration of findings from multiple investigations is facilitated by thematic synthesis, whereas theory-building analysis facilitates the creation of new conceptual connections and hypotheses. This strategy provides a solid basis for further empirical validation of the proposed framework and aligns with present conceptual research methods. As a result, the integrated conceptual framework and the theoretical connections among RET, mediating processes, moderating factors, and sustainable outcomes are presented in the following section.

4. Results And Discussion

4.1 Proposed Conceptual Framework

This study proposes an integrated conceptual framework that connects the RET to inclusive and sustainable growth, based on a synthesis of the literature on renewable energy, sustainability, socio-technical change, and stakeholders. According to the model, RET is a multilayered transformation process that affects sustainability outcomes through social, institutional, technological, and economic factors. RET is the primary explanatory construct within the framework. The term "RET" refers to the systematic transition from fossil-fuel-based energy systems to low-carbon, renewable energy sources, such as geothermal, hydroelectric, solar, wind, biomass, and other clean energy technologies.

According to the model, RET promotes equitable and sustainable growth via three mediating mechanisms: institutional support, green economic transformation, and technological innovation. The model also implies that contextual factors, such as government

effectiveness, financial development, public awareness, and stakeholder engagement, affect the effectiveness of these connections. The economic, social, and environmental aspects of sustainability represent the final results of the shift. Consequently, the cumulative result of transformation powered by renewable energy is inclusive and sustainable growth. The model combines ideas from Stakeholder Theory, Socio-Technical Transition Theory, and Triple Bottom Line Theory to offer a comprehensive explanation of sustainability transitions fuelled by renewable energy. The proposed conceptual framework for the current investigation is shown in Figure 1.

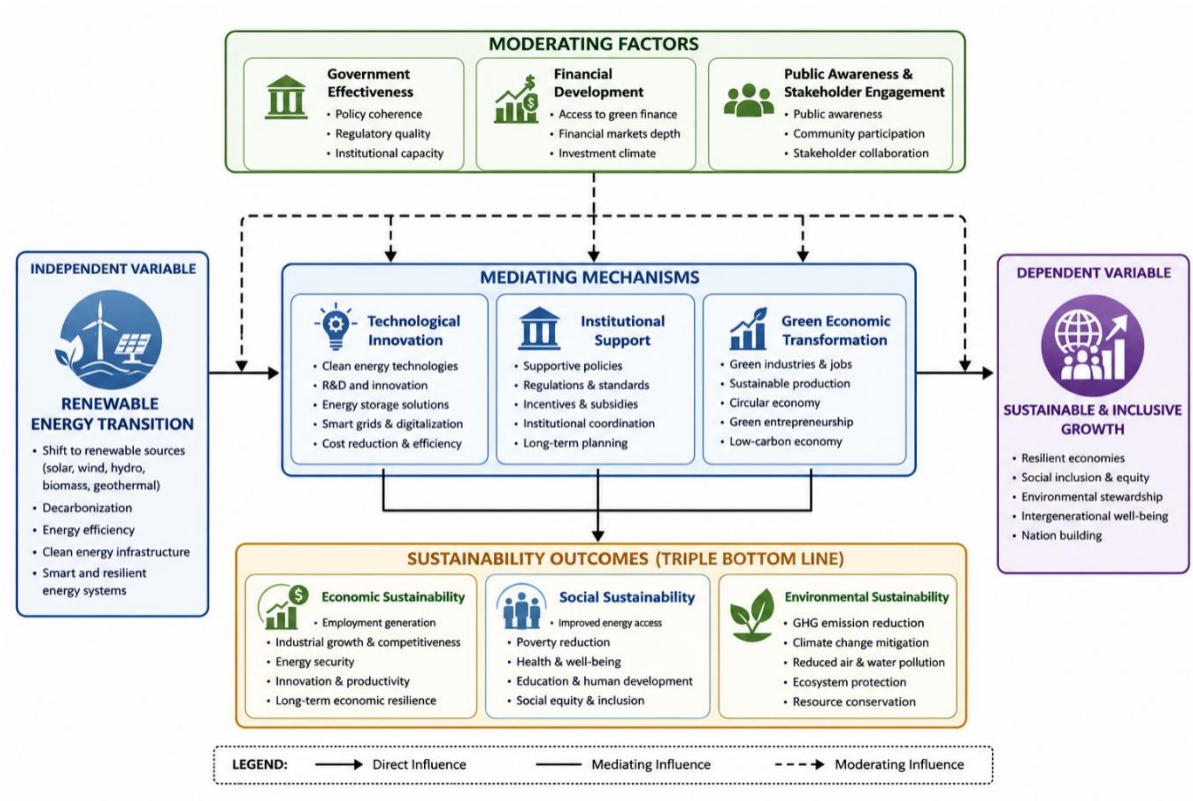


Figure 1. Proposed Conceptual Framework

4.2 Renewable Energy Transition and Economic Sustainability

Economic sustainability is the ability of an economy to withstand long-term growth, productivity, competitiveness, and resilience while using resources effectively. The available material consistently shows that renewable energy promotes economic development in several ways. First, investments in renewable energy promote infrastructural development and industrial activity. Large-scale renewable energy projects create economic opportunities across value chains by requiring significant expenditures in manufacturing, engineering, construction, and maintenance services (Bhattacharya et al., 2016). Second, there are many job opportunities in the renewable energy sector. IRENA (2023) states that the renewable energy industry has emerged as a key global provider of green jobs. Beyond energy production, research and development, equipment manufacturing, installation services, project management, and maintenance all contribute to job creation. Third, by reducing dependence on imported fossil fuels and increasing sensitivity to global energy price changes, renewable energy enhances energy security. Increased energy security supports both national competitiveness and economic stability. Fourth, investments in renewable energy encourage entrepreneurship and innovation. Opportunities for technological growth and industrial diversification are created by emerging technologies such as battery storage systems, smart grids, hydrogen energy systems, and digital energy management platforms. As a result, the RET helps build robust, innovative economies that can maintain long-term growth.

Proposition 1 (P1): RET positively influences economic sustainability by generating employment, enhancing energy security, driving industrial development, and fostering technological innovation.

4.3 Renewable Energy Transition and Social Sustainability

Enhancing human development, social justice, quality of life, and community well-being are the main goals of social sustainability. RET makes a substantial contribution to social sustainability in several areas. Improved energy access is one of the most significant contributions of renewable energy. Millions of people around the world still lack appropriate access to

dependable electrical services. Decentralised renewable energy technologies empower rural electrification and increase energy availability in isolated and underserved areas. By enabling digital learning, illumination, and communication technology, increased availability to power promotes educational progress. Reliable energy supplies also help healthcare services by enabling better operation of medical equipment, improved vaccination storage, and enhanced emergency response capabilities. By promoting local economic growth and creating job opportunities, renewable energy initiatives also advance social inclusion. Stakeholder participation is frequently encouraged by community-based renewable energy projects, which promotes social cohesion and empowerment. Additionally, reducing air pollution and decreasing reliance on fossil fuels improve public health outcomes. Cleaner energy systems reduce cardiovascular disease, respiratory ailments, and other health issues associated with burning fossil fuels (Pham et al, 2026).

Proposition 2 (P2): RET positively influences social sustainability by enhancing energy access, fostering social inclusion, promoting community development, and improving public health outcomes.

4.4 Renewable Energy Transition and Environmental Sustainability

One of the main drivers of the RET is environmental sustainability. Air pollution, climate change, greenhouse gas emissions, and ecological degradation are all significantly impacted by fossil fuel-based energy systems. Compared with conventional energy systems, renewable energy solutions produce much lower life-cycle emissions. As a result, expanding the use of renewable energy reduces carbon emissions and supports efforts to mitigate climate change. Renewable energy offers environmental benefits beyond reducing emissions. Renewable energy systems enhance air quality, promote biodiversity conservation, ease the strain on limited natural resources, and strengthen ecological resilience. Therefore, the shift to renewable energy aligns with international climate obligations, including the Paris Agreement and the United Nations SDGs.

Proposition 3 (P3): RET positively influences environmental sustainability by reducing carbon emissions, mitigating climate change, improving air quality, and protecting ecosystems.

4.5 Mediating Role of Technological Innovation

One of the most significant ways that the RET produces sustainable results is through technological innovation. According to Socio-Technical Transition Theory, technological developments promote complete change by increasing productivity, reducing costs, and facilitating widespread adoption. Recent advancements have significantly improved the efficiency and cost-effectiveness of renewable energy in solar photovoltaic systems, wind turbine technologies, battery storage systems, smart grids, artificial intelligence, and energy management platforms. By increasing the efficiency of renewable energy sources, lowering production and deployment costs, boosting energy storage capacity, facilitating grid integration, and enabling the digitalisation of energy systems, technological innovation affects sustainability outcomes. These enhancements improve sustainability outcomes and accelerate the adoption of renewable energy (de Oliveira et al, 2022).

Proposition 4 (P4): Technological innovation mediates the relationship between RET and sustainable and inclusive growth.

4.6 Mediating Role of Institutional Support

Another important mechanism that makes the RET possible is institutional backing. Institutions create the financial, governance, and regulatory frameworks required to implement renewable energy. Government policies, including carbon pricing mechanisms, feed-in tariffs, tax incentives, subsidies, renewable portfolio standards, and renewable energy objectives, heavily influence investments in renewable energy. Long-term infrastructure development is facilitated by institutional assistance, which also reduces uncertainty and increases investor confidence. Additionally, strong institutions ensure the successful execution of renewable energy projects and encourage collaboration among stakeholders (Osei, 2024).

Proposition 5 (P5): Institutional support mediates the relationship between RET and sustainable and inclusive growth.

4.7 Mediating Role of Green Economic Transformation

The RET helps bring about more significant structural changes in the economy. Industrial diversification, green entrepreneurship, sustainable production methods, and circular-economy principles are among these shifts. The process by which economies move toward environmentally sustainable production and consumption patterns is known as "green economic transformation." An essential element of this change is renewable energy. Green economic transformation lowers environmental externalities, increases economic resilience, and fosters sustainable innovation.

Proposition 6 (P6): Green economic transformation mediates the relationship between RET and sustainability outcomes.

4.8 Moderating Role of Government Effectiveness

The government's effectiveness significantly impacts RET results. Effective governments have the institutional stability, administrative capacity, policy consistency, and high-quality regulations required to

achieve sustainability objectives. Because they offer clear policy signals, regulatory stability, and an encouraging institutional context, nations with strong governance systems typically have more successful RETs.

Proposition 7 (P7): Government effectiveness positively moderates the relationship between RET and sustainable and inclusive growth.

4.9 Moderating Role of Financial Development

Projects using renewable energy are capital-intensive and require substantial capital. Financial development promotes the adoption of green finance tools, lowers financing costs, and increases credit availability, thereby supporting investments in renewable energy. Green bonds, climate finance mechanisms, venture capital investments, and sustainable banking efforts are among the ways well-developed financial systems facilitate the deployment of renewable energy.

Proposition 8 (P8): Financial development strengthens the positive relationship between RET and sustainability outcomes.

4.10 Moderating Role of Public Awareness and Stakeholder Engagement

According to stakeholder theory, governments, corporations, communities, investors, and consumers must all be involved for sustainability transitions to be effective. Public awareness promotes sustainable consumption practices and promotes social acceptability of renewable energy technologies. Involving stakeholders improves project legitimacy, lessens implementation disputes, and fosters cooperative governance. Long-term sustainability objectives are more likely to be supported by communities that actively engage in renewable energy projects (Amin et al, 2026).

Proposition 9 (P9): Public awareness and Stakeholder engagement positively moderate the relationship between RET and sustainable and inclusive growth.

According to the suggested framework, the RET serves as a strategic tool for nation-building and environmental protection. Renewable energy promotes long-term economic growth, social inclusion, and environmental stewardship through technology innovation, institutional strengthening, and green economic transformation. Innovation, energy security, and green employment all contribute to economic sustainability, which boosts resilience and national competitiveness. Social fairness and human development are enhanced by social sustainability, achieved through greater energy availability, improved public health, and community involvement. Long-term ecological stability and climate resilience are guaranteed by environmental sustainability. The integrated character of these results embodies the ideas of inclusive and sustainable growth. As a result, RET should be seen as a comprehensive development strategy that can support national development goals and advance the SDGs, rather than merely an energy policy target. Therefore, the framework provides a thorough explanation of how RET supports sustainable nation-building through interrelated institutional, technological, social, environmental, and economic pathways.

5. Conclusions

One of the major socioeconomic and environmental changes of the twenty-first century has been the global shift to renewable energy. The search for cleaner, more resilient energy systems has intensified amid growing concerns about environmental degradation, climate change, energy security, and SD. Solar, wind, hydroelectric, biomass, geothermal, and other renewable energy technologies are becoming increasingly important portions of national and global sustainability plans. Renewable energy systems are widely accepted as vital drivers of social progress, economic expansion, technological advancement, and institutional change, as well as of environmental benefits.

The objective of the present study was to develop a comprehensive conceptual framework explaining how the RET supports equitable and sustainable growth. The study conceptualised RET as a multilayered transformation process that can simultaneously produce economic, social, and environmental sustainability outcomes, drawing on Triple Bottom Line Theory, Socio-Technical Transition Theory, and Stakeholder Theory. The study highlighted technical innovation, institutional support, and green economic transformation as important mediating processes through which RET promotes sustainability outcomes, based on a thorough assessment and synthesis of current knowledge. Stakeholder participation, financial development, public awareness, and government effectiveness were also found to be important contextual factors that affect how well transition processes function.

The suggested strategy highlights how the RET fosters economic sustainability by enhancing energy security, boosting industrial competitiveness, fostering innovation, and generating jobs. Renewable energy concurrently advances social sustainability by increasing energy availability, reducing energy poverty, improving public health, and fostering social inclusion. Environmental sustainability can be achieved by reducing greenhouse gas emissions, mitigating climate change, managing pollutants, and protecting ecosystems. When considered collectively, these findings support inclusive and sustainable growth and strengthen the foundation of long-term nation-building.

Numerous significant theoretical advances have been made in the study. First, it creates a cohesive analytical framework by combining three significant theoretical stances. Second, by concurrently

considering the economic, social, and environmental characteristics of the RET, it builds on the existing sustainability literature. Third, it emphasises the crucial role of institutional, technological, financial, and stakeholder-related factors in determining sustainability outcomes. Compared to many other models, the framework provides a more thorough explanation of the change caused by renewable energy by including mediating and moderating mechanisms.

Practically, the analysis emphasises the strategic significance of RET as a development policy rather than merely an environmental project. Recognising renewable energy as a driver of social development, economic modernisation, and environmental resilience is essential for governments targeting to achieve equitable and sustainable progress. Businesses, investors, development organisations, and legislators can all benefit from the framework's guidance on the essential elements of a successful sustainability transition.

The study has limitations despite its contributions. The suggested framework has not been empirically tested. Future studies should use quantitative, qualitative, or mixed-methods methods across various institutional and geographic contexts to validate the proposed links. Further information about contextual variations in RET pathways may be obtained through comparative studies of rich and emerging economies. Future research may also examine how cutting-edge technologies such as smart grids, energy storage devices, green hydrogen, and artificial intelligence can improve sustainability outcomes.

To sum up, the RET is much more than just a change in energy generation technology. It is an all-encompassing socio-technical change that simultaneously promotes social justice, economic success, and environmental sustainability. The suggested paradigm provides a solid basis for understanding how the RET may support inclusive and sustainable nation-building by integrating sustainability, innovation, governance, and stakeholder perspectives. Renewable energy will remain an important tool for achieving long-term sustainability and resilience as nations pursue low-carbon growth.

6. Policy, Managerial, and Social Implications

6.1 Policy Implications

For governments seeking to accelerate RET and achieve SD goals, the study's conclusions offer several important policy suggestions. Implementing comprehensive policy frameworks that acknowledge the multilayered advantages of renewable energy beyond environmental preservation is the first step for policymakers. Policies about renewable energy should not only reduce carbon emissions but also promote social inclusion, economic growth, job creation, and technological advancement.

Second, to promote continuous investment in renewable energy infrastructure, governments should provide transparent, reliable regulatory frameworks. Renewable portfolio standards, feed-in tariffs, tax breaks, carbon pricing schemes, and green subsidies are policy tools that can boost investor confidence and accelerate the adoption of renewable energy.

Third, for renewable energy policies to be implemented successfully, institutional capacity must be strengthened. Stakeholder participation, project monitoring, policy coordination, and regulatory enforcement are all made easier by strong institutions. Successful energy transitions are typically more likely to occur in nations with strong governance frameworks.

Fourth, governments should give renewable energy research and development top priority. The energy transition and sustainability results continue to be significantly influenced by technological innovation. National competitiveness in developing renewable energy industries can be improved by public investment in research institutes, innovation hubs, clean technology incubators, and academia-industry partnerships.

Lastly, inclusive energy transition solutions that ensure representatives support fair benefit-sharing. To ensure that renewable energy growth contributes to social inclusion and poverty mitigation, special consideration should be given to underserved areas, low-income populations, and rural communities.

6.2 Managerial Implications

For corporate executives and organisational decision-makers working in markets increasingly focused on sustainability, the study offers significant management implications. For businesses across sectors, RET offerings both pose competitive challenges and offer strategic opportunities.

Managers should view the adoption of renewable energy as a strategic investment rather than simply a matter of compliance. Businesses that make proactive investments in renewable energy technologies stand to gain from lower operating costs, greater energy security, a stronger corporate reputation, and enhanced environmental performance.

Second, companies must incorporate renewable energy projects into more comprehensive Environmental, Social, and Governance (ESG) plans. Customers, regulators, investors, and other stakeholders are increasingly evaluating businesses on their sustainability performance. Therefore, long-term value creation and stakeholder trust can be significantly enhanced through investments in renewable energy.

Third, to take advantage of new opportunities in clean energy technologies, organisations should improve their innovation capacity. Investments in digital technology, energy-efficiency plans, sustainable product development, and renewable-energy research can boost competitiveness and drive corporate change.

Fourth, managers should use cooperative strategies with a variety of stakeholders. Governments, commercial companies, financial institutions,

communities, and civil society groups often need to collaborate to ensure renewable energy projects succeed. Effective stakeholder engagement can increase project adoption, reduce implementation risks, and improve sustainability outcomes.

Fifth, green financing methods such as green bonds, sustainability-linked loans, climate funds, and renewable energy investment portfolios should receive greater support from investors and financial institutions. One of the significant factors influencing the use of renewable energy is still the availability of reasonably priced financing.

6.3 Social Implications

The RET has significant effects on human development and society. Improved access to present-day energy services is one of the biggest societal advantages of renewable energy. Especially in rural and marginalised areas, dependable, reasonably priced electricity promotes economic opportunities, healthcare delivery, education, and communication infrastructure. Additionally, workforce development and job creation are supported by renewable energy. The need for qualified workers, technicians, engineers, researchers, and entrepreneurs has increased due to the growth of the renewable energy sectors. As a result, investments in renewable energy can boost human capital development and create jobs.

Public health outcomes also improve with the shift to cleaner energy systems. Decreased dependence on fossil fuels reduces air pollution, which in turn reduces cardiovascular disease, respiratory ailments, and other health hazards linked to environmental degradation. The RET promotes energy equity and participation from a social justice standpoint. For marginalised groups and isolated areas that have traditionally been excluded from centralised energy infrastructure, decentralised renewable energy systems can offer affordable access to electricity. These results are in line with more general objectives of social development and inclusive growth. Additionally, by protecting natural resources and reducing climate-change risks, renewable energy promotes environmental stewardship and intergenerational equity. Future generations stand to benefit from cleaner environments, more resilient ecosystems, and sustainable economic systems.

6.4 Implications for Sustainable and Inclusive Nation Building

This study's larger conclusion is that the RET should be viewed as a nation-building strategy rather than simply an energy policy endeavour. Building a sustainable nation requires balancing social welfare, economic development, and environmental sustainability. All three goals are directly impacted by renewable energy. Renewable energy boosts energy security, innovation potential, and industrial competitiveness. Socially, it promotes communal development, public welfare, and inclusivity. In terms of the environment, it promotes ecological sustainability, resource conservation, and climatic resilience. These results collectively serve as the basis of inclusive and sustainable growth.

Governments, corporations, civil society organisations, and international organisations must thus work together to expedite the RET and optimise its contribution to national development objectives. Renewable energy can be an effective catalyst for long-term nation-building through a coordinated strategy that integrates institutional success, technological innovation, stakeholder engagement, and sustainable investment. The ability of societies to effectively manage the shift to low-carbon, renewable energy systems will become increasingly important for the future of SD. As a result, RET is both an environmental necessity and a calculated step toward creating resilient, inclusive, and sustainable nations.

References

1. Agarwal, K. M., Patil, A., Aggarwal, S., & Sharma, N. (2026). Renewable energy transition for sustainable development: A comprehensive bibliometric analysis for business, management, and policy research trends. *EPH-International Journal of Business & Management Science, 12*(5s), 41–71. https://doi.org/10.69980/bh82yf48
2. Amin, A., Mohamed Yusof, N. Y., Kamran, H. W., Işık, C., & Ali, M. S. E. (2026). Transforming mobility: Pioneering sustainable transportation through energy transition and technological innovation. International Journal of Energy Sector Management. Advance online publication. https://doi.org/10.1108/IJESM-12-2024-0049
3. Apergis, N., & Payne, J. E. (2010). Renewable energy consumption and economic growth. Energy Policy, 38(1), 656–660.
4. Bansal, P. (2005). Evolving sustainably. Strategic Management Journal, 26(3), 197–218.
5. Bansal, P., & Roth, K. (2000). Why companies go green. Academy of Management Journal, 43(4), 717–736.
6. Bhattacharya, M., Churchill, S., & Paramati, S. (2017). The dynamic impact of renewable energy and institutions on economic output and CO_2 emissions across regions. Renewable Energy, 111, 157–167.
7. Bridge, G., Bouzarovski, S., Bradshaw, M., & Eyre, N. (2018). Geographies of energy transition. Energy Research & Social Science, 13, 1–6.
8. Bryson, J. M. (2004). What to do when stakeholders matter. Public Management Review, 6(1), 21–53.
9. Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management. International Journal of Physical Distribution & Logistics Management, 38(5), 360–387.
10. de Oliveira, M., de Moraes, J., et col. (2022). The relationship between socioeconomic development, renewable energies and the innovative process. International Journal of Energy Sector Management, 16(6), 1037–1063.

https://doi.org/10.1108/IJESM-05-2021-0020
11. Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation. Academy of Management Review, 20(1), 65–91.
12. Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. Business Strategy and the Environment, 11(2), 130–141.
13. Elkington, J. (1997). Cannibals with Forks: The Triple Bottom Line of 21st Century Business. Capstone.
14. Freeman, R. E. (1984). Strategic Management: A Stakeholder Approach. Pitman.
15. Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes. Research Policy, 31(8–9), 1257–1274.
16. Geels, F. W. (2011). The multi-level perspective on sustainability transitions. Environmental Innovation and Societal Transitions, 1(1), 24–40.
17. Geels, F. W. (2019). Socio-technical transitions to sustainability. Annual Review of Environment and Resources, 43, 1–32.
18. Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. Research Policy, 36(3), 399–417.
19. Goldthau, A., & Sovacool, B. K. (2012). The uniqueness of the energy security, justice, and governance problem. Energy Policy, 41, 232–240. https://doi.org/10.1016/j.enpol.2011.10.042
20. Hahn, T., Figge, F., Pinkse, J., & Preuss, L. (2010). Trade-offs in corporate sustainability. Organization & Environment, 23(2), 217–237.
21. International Energy Agency. (2023). World energy outlook 2023. International Energy Agency. https://www.iea.org/reports/world-energy-outlook-2023
22. International Renewable Energy Agency. (2023). Renewable capacity statistics 2022. International Renewable Energy Agency. https://www.irena.org/publications
23. Jenkins, K., McCauley, D., Heffron, R., Stephan, H., & Rehner, R. (2016). Energy justice. Energy Research & Social Science, 11, 174–182.
24. Lelieveld, J., et al. (2020). Loss of life expectancy from air pollution. Cardiovascular Research, 116(11), 1910–1917.
25. Loorbach, D., & Rotmans, J. (2010). The practice of transition management. Futures, 42(3), 237–246.
26. Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions. Research Policy, 41(6), 955–967.
27. Meadowcroft, J. (2009). What about the politics? Policy Sciences, 42(4), 323–340.
28. Mohan, U., Singh, P., Agarwal, K. M., Sharma, S. K., Yadav, A., & Sharma, C. (2021). Solar power generation, utilization and management for facilitating sustainable development in India: Review. *IOP Conference Series: Materials Science and Engineering, 1168*, 012004. https://doi.org/10.1088/1757-899X/1168/1/012004
29. Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification. Academy of Management Review, 22(4), 853–886.
30. OECD. (2021). Policy coherence for sustainable development. OECD Publishing.
31. Osei, B. (2024). Sustainability of renewable energy production: Empirical evidence from developing and middle-income countries. International Journal of Energy Sector Management, 18(4), 749–766. https://doi.org/10.1108/IJESM-04-2023-0012
32. Pham, N. T., Ngo, Q. D., & Nguyen, Q. H. (2026). Understanding the employment effects of renewable energy transition: A multi-dimensional analysis of Vietnam's energy sector. International Journal of Energy Sector Management. Advance online publication. https://doi.org/10.1108/IJESM-03-2025-0067
33. Porter, M. E., & van der Linde, C. (1995). Green and competitive. Harvard Business Review, 73(5), 120–134.
34. Sovacool, B. K. (2016). How long will it take? Energy Research & Social Science, 13, 202–215.
35. United Nations. (1987). Our Common Future (Brundtland Report). Oxford University Press.
36. United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. New York, NY: United Nations.
37. Unruh, G. C. (2000). Understanding carbon lock-in. Energy Policy, 28(12), 817–830.
38. World Bank. (2024). World Development Report. World Bank