

ENERGY SECURITY, SUSTAINABILITY TRANSITION AND THE CHALLENGES OF CLIMATE ACTION IN INDIA

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ABSTRACT

An intricate and interwoven web of issues in the areas of energy security, sustainable transition, and climate action face India as one of the largest and fastest-growing countries in the world. This study explores the complex environment of India's energy industry, looking at its current energy sources, vulnerabilities to supply disruptions, and existing energy security measures. It examines the nation's continuous transition toward renewable energy sources, in particular, as well as the ramifications of this transformation for the economy and the environment. However, there are several obstacles on the path to sustainability, particularly with regard to addressing climate change. India faces particular challenges in its efforts to meet the energy needs of its expanding population while also committing to reduce greenhouse gas emissions. This essay examines these issues and suggests solutions for reducing climate change's effects while preserving energy security. This research study tries to clarify the crucial connection between energy security, sustainable transition, and climate action in India through case studies and policy recommendations. It underlines the need for a comprehensive strategy that addresses these problems simultaneously and identifies the steps that India should take to move toward an energy future that is more secure, sustainable, and climate resilient.

Keywords: Energy Security, Climate Action, Renewable Energy, Fossil Fuels, Environmental Sustainability.

Introduction

The complex blend of conventional and new energy sources, India's quick economic development, and rising energy consumption all contribute to the country's unique energy landscape. Included in those are: Increase in Energy Consumption of over the past few decades, India has seen substantial economic expansion, which has resulted in an increase in energy consumption. It is anticipated that this trend would persist as the nation's population and industry grow. Energy Sources are likes, Fossil Fuels, Historically, India's energy requirements have been largely satisfied by fossil fuels including coal, oil, and natural gas. The primary fuel for producing energy continues to be coal. Renewable Energy in India has made significant investments in wind and solar energy, in particular. The nation has high goals for increasing its capacity for renewable energy. In Nuclear Energy India has a small number of operating nuclear power facilities and plans to expand its nuclear energy production.

India has made progress, but a sizable section of the population still lacks access to dependable electricity. Government programs like "Saubhagya" are designed to alleviate this problem and expand access to energy. Also have Environmental Issues Because of the strong reliance on coal and other fossil fuels, environmental issues have arisen, such as air pollution and greenhouse gas emissions. To address these challenges, the government is placing more and more emphasis on cleaner energy alternatives. Energy Policy The National Solar Mission and the Ujwal DISCOM Assurance Yojana (UDAY) for power sector reforms are two policies and initiatives that India has launched to support the growth of sustainable energy sources.

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India is a party to pacts like the Paris Accord and is dedicated to cutting carbon emissions and raising the proportion of renewable energy sources in its energy mix. In Opportunities and Challenges India must balance economic growth with environmental considerations in order to guarantee a sustainable and stable energy supply. Energy efficiency improvements and the switch to cleaner energy sources offer potential for both financial and environmental gains.

With a growing emphasis on renewable energy, energy efficiency, and energy availability for all, India's energy landscape is anticipated to substantially change in the years to come.

Modern energy strategy and global development must address both energy security and sustainability. Among the significance are:

Energy Security

Security of the energy supply is crucial for various reasons:

- **Economic Stability:** The growth and stability of the economy depend critically on a stable and reliable energy supply. Economic downturns brought on by energy shortages or disruptions can have an impact on households, businesses, and industries.
- **National Security:** Reliance on foreign energy sources can leave a nation open to supply disruptions and geopolitical warfare. These hazards are mitigated by expanding domestic output and diversified energy sources.
- **Energy Access:** Ensuring that all residents have access to energy falls under the umbrella of energy security. For important services like healthcare, education, and communication, a reliable energy source is required.
- **Energy and Development:** Energy is a driving force behind both social and economic progress. Communities can escape poverty and see an improvement in living conditions by having access to affordable, clean energy sources.

Sustainability

Energy sustainability is essential for a number of reasons:

- **Environmental Protection:** Unsustainable energy practises, particularly a reliance on fossil fuels, are a major cause of air pollution, climate change, and environmental deterioration. A sustainable planet requires a shift to cleaner energy sources.
- **Conservation of Resources:** Fossil fuels are limited resources. Concerns about resource depletion are diminished by the inevitability or long-term supply outlook of sustainable energy sources like nuclear and renewable energy.
- **Economic Efficiency:** Sustainable energy technology can boost economic efficiency by cutting waste and expenses while increasing energy efficiency. Economic advantages and a decrease in greenhouse gas emissions result from this efficiency.
- **Global Cooperation:** International cooperation is necessary to combat climate change and ensure sustainable energy practises. Sustainable energy policy can encourage international cooperation to address shared problems.
- **Resilience:** Sustainable energy systems are frequently more resistant to disruptions, whether brought on by cyber attacks or natural catastrophes, improving the reliability of energy supply in times of emergency.

India's Energy Security

An outline of the present energy sources' weaknesses is as follows:

- **Fossil Fuels (Oil, Coal, and Natural Gas):** Due to geopolitical unrest, limited reserves that cause price volatility and environmental issues like greenhouse gas emissions and air pollution, these conventional sources are vulnerable to supply disruptions.
- **Nuclear Energy:** Risks of catastrophic accidents, the proliferation of nuclear weapons, expensive building and decommissioning costs, and problems with long-term radioactive waste management are some of the vulnerabilities.
- **Renewable Energy Sources (Solar, Wind, Hydro, and Geothermal):** While clean and sustainable, they have intermittent problems based on climatic factors, geographic constraints, and initial infrastructure expenses.

- **Biomass Energy:** Risks of deforestation if not managed effectively, emissions of particulate matter and pollutants, and resource competition with food production are among the vulnerabilities.
- **Hydroelectric Energy:** Subject to drought-related output swings, environmental effects on ecosystems and water availability, and risks associated with dam failure.
- **Geothermal Energy:** Geothermal energy is restricted to select areas with geothermal resources, has a deteriorating efficiency over time, and may cause induced seismic activity.
- **Solar Energy:** Affects the environment during solar panel production, is dependent on rare elements, and is subject to variations in energy production according to daylight hours and weather conditions.
- **Wind Energy:** This source of energy faces difficulties such as turbine noise and aesthetic impact, dependency on predictable wind patterns, and worries about bird and bat death close to turbines.
- **Natural gas (as a transition fuel):** Natural gas still generates greenhouse emissions and is subject to price changes and infrastructure delays.
- **Hydrogen (as a transition fuel):** Energy-intensive production, complicated storage, and a lack of distribution infrastructure are some of the vulnerabilities associated with hydrogen (as a potential future fuel).

An overview of recent policy actions to improve energy security is as follows:

Energy Source Diversification: Governments can encourage a varied energy mix to lessen reliance on a single source. This entails, among other things, supporting nuclear, natural gas, and renewable energy. Also, **Energy Efficiency Programmes** By putting laws and incentives into place to increase energy efficiency in the commercial, transportation, and residential sectors, the overall demand for energy is decreased, and security is improved. **Support for Renewable Energy Investments** Supporting research and investment in renewable technologies like wind, solar, and geothermal energy helps to reduce reliance on fossil fuels and lessens supply risks. **Strategic Petroleum Reserves** are keeping strategic petroleum reserves on hand acts as a safety net against unpredicted interruptions in the oil supply and price increases.

Resilience of Energy Infrastructure is ensuring the energy infrastructure is resilient to physical threats, cyber attacks, and natural catastrophes are essential for energy security. **International Cooperation of Energy supply and demand agreements** with neighbours help to maintain regional stability and security. **Support for Energy Storage Research and Development** are Supporting the development of cutting-edge energy storage technology aids in the management of intermittent renewable energy sources. **Grid Modernization** is Grid modernization improves dependability and increases the electrical grid's capacity to accommodate a variety of energy sources.

Enacting strong cyber security safeguards for energy infrastructure guards against online dangers that can interrupt the delivery of electricity. **Climate Policies** are By lowering the environmental hazards connected to reliance on fossil fuels, policies to reduce greenhouse gas emissions help to ensure energy security. **Energy Education and Research** are investing in education and research programmes encourages innovation and guarantees that the energy sector has a competent workforce. **Public Awareness and Preparedness** are Increasing the public's resilience to supply disruptions by educating them about energy saving and emergency preparedness.

An outline of the difficulties and dangers to energy security is as follows:

- **Geopolitical instability:** Political unrest, trade wars, or sanctions may impair the flow of energy, especially in areas with large oil and gas deposits.
- **Resource Depletion:** As their supply declines and prices become more unstable, finite fossil fuel supplies offer a long-term risk.
- **Climate Change:** As a result of climate change, extreme weather can wreak havoc on supply chains, destroy energy infrastructure, and reduce energy output.
- **Cyber Security Threats:** As energy infrastructure becomes more digital, it becomes more susceptible to cyber attacks, which can interrupt supplies and jeopardise national security.

- **Natural Disasters:** Hurricanes, earthquakes, and other calamities can harm energy infrastructure and interfere with the distribution of electricity.
- **Energy Transition Challenges:** Challenges associated with infrastructure, energy storage, and labour transformation arises as a result of the move from conventional to renewable energy sources.
- **Price Volatility:** Changes in the price of oil and gas can have an influence on consumer affordability and economic stability.
- **Vulnerabilities in Energy Transportation:** Attacks or interruptions to pipelines, shipping lanes, or transit corridors may cause energy transportation to be disrupted.
- **Energy Dependence:** Relying too heavily on one supplier or energy source makes you more susceptible to supply disruptions.
- **Technological Obsolescence:** As energy infrastructure ages, it may become less dependable and efficient, which could cause supply problems.
- **Resource Access Disputes:** Competition for access to energy resources, such as the oil reserves in the Arctic, can cause disputes and tensions between governments.
- **Energy Poverty:** In many areas, it is still difficult to provide all residents with inexpensive and consistent energy access, which has an impact on both economic growth and security.

Transition to Sustainability

India, a nation with a growing population and increasing energy needs, has made significant progress in recent years in converting to sustainable energy sources. The prevention of climate change, the reduction of reliance on fossil fuels, and the maintenance of energy security all depend on this shift. This succinct summary highlights several important facets of India's work in this area.

- **Expansion of Renewable Energy:** India has considerably boosted its ability to produce renewable energy, especially solar and wind energy. By 2022 and 2030, respectively, the National Solar Mission wants to reach 175 GW and 450 GW of renewable energy capacity. The capability of wind energy has also increased significantly.
- **Solar Energy:** India is becoming one of the world's top producers of solar energy. This expansion has been greatly aided by programs like solar parks, rooftop solar installations, and adoption incentives.
- **Wind Energy:** With wind farms spread out over the nation, wind energy makes a significant contribution to India's renewable energy portfolio. This industry has grown as a result of policies encouraging wind energy investment and technological improvements.
- **Hydropower:** India's energy mix still heavily relies on hydropower. Hydropower plants' contributions to sustainable energy are being increased through initiatives to upgrade current ones and construct new ones.
- **Bio Energy:** To cut carbon emissions and diversify its energy sources, India is looking into the potential of bio fuels and biomass energy sources, such as bio ethanol and biogas.
- **Energy Efficiency:** To increase the energy efficiency of various businesses and appliances and lower total energy consumption, the Perform, Achieve, and Trade (PAT) scheme and the Standards & Labelling program have been put into place.
- **Electric Mobility:** EV promotion and the development of EV charging infrastructure are essential actions to take in order to lower emissions in the transportation industry.
- **International Cooperation:** In order to strengthen its transition to sustainable energy, India has collaborated with a number of other nations and international organizations.
- **Policy Support:** To stimulate investment in renewable energy, the Indian government has implemented a number of regulations, incentives, and subsidies, making it a desirable option for both domestic and foreign investors.

In order to prevent climate change and provide a sustainable energy future for everyone, renewable energy has emerged as a critical alternative. Following are some noteworthy advancements and goals in the field of renewable energy:

- **Global Development:** Renewable energy sources, such as solar, wind, hydropower, and geothermal energy, have shown impressive growth on a global scale. The capability of renewable energy has steadily surpassed that of fossil fuels in recent years.
- **Solar Power:** Solar energy has made significant strides, with photovoltaic panel costs decreasing and efficiency rising. To take use of the sun's plentiful energy, several nations have established lofty goals for the adoption of solar energy.
- **Wind Energy:** As wind energy technology developed, larger and more effective turbines were produced. Onshore and offshore wind farms are being set up to catch strong, reliable winds.
- **Hydropower:** Hydropower continues to be a major source of renewable energy. Some areas are making investments to update their current hydropower facilities and look into small-scale hydropower prospects.
- **Geothermal Energy:** Although less common, geothermal energy is a dependable source of clean energy. EGS, or enhanced geothermal systems, have the potential to increase its application.
- **Biomass and Bio Fuels:** Made from organic resources, biomass and biofuels are used to generate electricity and to replace fossil fuels in transportation.

Targets and Commitments

- **Paris Agreement:** To minimize greenhouse gas emissions, nations have established targets for renewable energy. By 2030, many nations have committed to achieving a number of renewable energy targets.
- **National Initiatives:** A number of countries have set aggressive renewable energy targets to move away from fossil fuels, notably Germany, China, and the United States.
- **Corporate Commitments:** Major businesses are pledging to use more renewable energy in their operations, which is boosting demand for clean energy.
- **Research and Innovation:** Financial investments in the study of renewable energy continue to provide ground-breaking results that raise the effectiveness and accessibility of renewable technology.

Challenges

- **Intermittency:** Addressing the sporadic nature of renewable sources like the sun and wind continues to be difficult. To address this problem, energy storage methods are being developed.
- **Grid Integration:** Reliable integration of renewable energy into current systems necessitates substantial modifications and smart grid technology.
- **Policy and finance:** To draw investments and maintain the growth of renewable energy, stable policies and finance frameworks are essential.

There are significant economic and environmental repercussions associated with the switch from fossil fuels to renewable energy sources. Further examples of the major effects of both regions are as follows:

Economic Repercussions

- **Job Creation:** The renewable energy industry has become a significant employer. Numerous jobs in manufacturing, installation, maintenance, and research and development have been created as a result of investments in renewable energy projects.
- **Economic Growth:** By luring investments, promoting innovation, and lowering energy costs for businesses and people, the switch to renewable energy can promote economic growth.
- **Energy Security:** Countries can increase their energy security and lessen their exposure to changes in energy prices on the international markets by diversifying their energy sources and decreasing their dependency on the importation of fossil fuels.
- **Innovation and Technological Advancement:** The switch to renewable energy promotes technological advancement, which results in the creation of more effective and affordable renewable technologies. Other industries are affected by this innovation, which propels broader economic growth.

Environmental Effects

- **Significant Decrease in Greenhouse Gas Emissions:** The biggest environmental advantage of switching to renewable energy is the reduction in greenhouse gas emissions. When producing energy from renewable sources, direct emissions are minimal to non-existent, hence reducing climate change.
- **Improvement in Air Quality:** Moving away from fossil fuels leads to cleaner air and better public health. There are fewer respiratory ailments and associated medical expenses as a result of decreased emissions of hazardous pollutants including sulphur dioxide and particle matter.
- **Preservation of Biodiversity:** When properly planned and implemented, renewable energy projects have less of an adverse effect on ecosystems than conventional energy infrastructure. Local biodiversity can be protected with proper siting and mitigating actions.
- **Water Conservation:** Compared to fossil fuel power plants, which use a large amount of water for cooling, many renewable energy sources, such as wind and solar, require little water for operation.
- **Sustainability of Resources:** Renewable energy sources, such as wind, sunlight, and geothermal heat, are practically endless, providing long-term energy sustainability.

Challenges and Things to Think About

- **Intermittency:** The grid's stability may be threatened by renewable energy sources' variability. To solve this problem, energy storage technology and grid enhancements are required.
- **Resource Availability:** Investments in grid infrastructure and energy storage may be necessary if the location and availability of renewable resources do not match energy demand.
- **Transition Costs:** Making the switch to renewable energy might be expensive at first. These expenses must be weighed against the long-term economic and environmental benefits by policymakers.

Problems with Climatic Action

Through its numerous initiatives, India is an essential player in the fight against climate change. First of all, it has made a strong commitment to reducing emissions despite being one of the biggest global emitters of greenhouse gases. During the Paris Agreement, India committed to reducing its emission intensity by 33–35% from 2005 levels by 2030.

India has also made significant investments in renewable energy sources like wind and solar energy. The International Solar Alliance (ISA) and other initiatives seek to increase the use of solar energy globally. India is committed to using sustainable energy, as seen by its ambitious plans to produce 175 GW by 2022 and 450 GW by 2030.

India also contributes significantly to climate research and development. International organizations and its scientific community work together to research the effects of climate change and possible adaptation measures. The research conducted in India offers the world's climate scientists useful information and insights.

Additionally, India's initiatives at regeneration and afforestation help to sequester carbon. In order to counteract climate change, the Green India Mission, a component of the National Action Plan on Climate Change, emphasizes increasing the amount of forest and tree cover.

A major worldwide problem is reducing greenhouse gas (GHG) emissions; however there are several barriers in the way of success.

- **Economic Interests:** Fossil fuels play a significant role in a number of businesses and economies. Economically speaking, moving away from them can be difficult because it frequently calls for substantial expenditures in new infrastructure and technology.
- **Political Obstacles:** Political differences can make it difficult to enact sensible rules, making climate policy problematic. Reaching consensus and upholding international agreements like the Paris Agreement can be difficult tasks.
- **Technological Gaps:** There are some industries that lack established, efficient low-carbon technologies. These technologies must be developed and scaled up, but this process might take time and resources.

- **Behavioural Change:** Achieving emissions reductions frequently requires society and individual behavioural changes. It may be challenging to inspire and maintain this; it calls for public awareness, education, and incentives.
- **Energy Transition:** Making the switch to renewable energy sources presents difficulties due to its erratic nature (such as solar and wind energy). During this shift, balancing energy supply and demand is a challenging task.
- **International Cooperation:** Because climate change is a worldwide issue, international cooperation is crucial. International collaboration may be hampered by variations in emissions, historical liabilities, and economic inequities.
- **Social Equity:** The disparate effects of climate policies on various areas might raise questions about social justice and fairness. It is difficult to balance the advantages and disadvantages of emissions reductions.
- **A Lack of Data and Monitoring:** Tracking success requires accurate measurement and verification of emissions reductions. Ineffective monitoring and data systems can thwart climate action.
- **Adaptation Needs:** There is an increasing need for adaptation to climate change impacts in addition to mitigation activities. A difficult choice must be made when dividing resources between mitigation and adaptation.
- **Global Supply Chains:** Complex global supply chains can make it challenging to identify and cut emissions related to the manufacture and delivery of goods.

To ensure that communities, ecosystems, and economies are resilient to the effects of climate change, adaptation measures are crucial. Among the most important adaptation techniques are the following:

- **Improving Infrastructure Resilience:** Renovate and construct infrastructure (such as homes, roads, and bridges) to resist severe weather conditions and increasing sea levels. Plan your infrastructure while taking climate estimates into account.
- **Promoting Sustainable Agriculture:** To secure food security in the face of changing climatic circumstances, employ climate-smart agricultural techniques such crop diversification, effective water management, and the use of drought-resistant crops.
- **Ecosystem Restoration:** Preserve and rebuild ecosystems including coral reefs, wetlands, and forests that act as natural barriers against climate impacts like storm surges, erosion, and floods.
- **Water Resource Management:** Create flexible water management plans that take into account shifting precipitation patterns and water scarcity. These plans should include water conservation, effective irrigation, and the building of durable water infrastructure.
- **Urban Planning and Design:** Encourage resilient cities with green areas, effective public transportation, and climate-resistant structures. To cut down on carbon emissions, promote dense, pedestrian-friendly urban construction
- **Early Warning Systems:** Invest in cutting-edge meteorological and early warning systems to deliver prompt notifications for extreme weather occurrences, assisting communities in getting ready and evacuating as needed.
- **Health Systems that are Climate-Resilient:** Adapt the healthcare system to climate-related health hazards such heatwaves, vector-borne infections, and waterborne illnesses.
- **Community Engagement and Education:** Increase community understanding of the effects of climate change and available adaptation options. Encourage local involvement in planning and decision-making for adaptation.
- **Diversifying Energy Sources:** Move away from fossil fuels, which fuel climate change, and toward renewable energy sources. Energy resilience may be improved by distributed renewable energy systems.
- **Financial Mechanisms:** Create climate funds and insurance mechanisms to give vulnerable communities and nations financial support for coping with climate consequences.

- **Biodiversity Conservation:** Maintain and maintain biodiversity to increase ecosystem resiliency and aid in species adaptability to environmental change.
- **Cross-Border Cooperation:** Work together on a regional and global scale to address shared climate threats, such as the displacement of climate refugees and transboundary water resources.

Case Studies

Several illustrations of effective sustainability programs include:

- **Google's Commitment to Carbon Neutrality:** In 2007, Google declared its intention to run as a carbon-neutral business. They did this by utilizing energy-efficient technologies, investing in renewable energy sources, and compensating for emissions. This project exemplifies how a digital titan can take the lead in sustainability.
- **IKEA's Circular Economy Model:** IKEA actively promotes a circular economy by using recyclable materials when creating items and by enticing customers to recycle used furniture. This program shows how a significant store may cut waste and encourage sustainable consumption.
- **Tesla's Electric Vehicles:** Tesla's electric vehicles (EVs) transformed the automobile sector. Tesla has made a huge contribution to lowering greenhouse gas emissions and promoting sustainable mobility by popularizing EVs.
- **UNESCO'S World Heritage Conservation:** The World Heritage program of UNESCO has successfully safeguarded natural and cultural monuments all over the world. The program's emphasis on conservation and sustainable tourism has helped to safeguard priceless ecosystems and cultural treasures.
- **The Paris Agreement:** The Paris Agreement is a significant worldwide effort to tackle climate change. In order to slow down global warming and make the transition to a more sustainable future, it emphasizes worldwide cooperation.
- **Costa Rica's Renewable Energy Pledge:** Costa Rica pledged to use renewable energy sources to generate electricity in an effort to reach carbon neutrality by 2021. This tiny nation serves as an example of how innovation and legislation may help achieve lofty environmental goals.
- **Patagonia's Worn Wear Program:** Patagonia's Worn Wear program encourages the repair and reuse of items, minimizing the environmental impact of the fashion industry. It serves as a model for ethical fashion industry practices.
- **Loop's Circular Packaging:** Loop is a platform for waste-free shopping that sells goods in reusable containers. Major brands and retailers have taken notice, highlighting the potential of circular packaging systems.

These are the crucial factors to bolster India's stance in global climate negotiations:

- **Ambitious Emission Reduction Objectives:** By establishing more ambitious emissions reduction objectives that are in line with global climate goals, India can demonstrate its commitment to mitigating climate change and increase its credibility.
- **Continued Investment in Renewable Energy:** This will show that India is making the transition to cleaner energy and is committed to lowering greenhouse gas emissions. Examples of renewable energy sources include solar and wind power.
- **Measures for Adaptation and Resilience:** Emphasize India's efforts to address the effects of climate change through measures for Adaptation and Resilience, such as infrastructure upgrades, water resource management, and climate-resilient agriculture.
- **Climate Finance:** Advocate for additional funding and assistance from industrialized nations in the area of climate change in order to help India achieve sustainable development while reducing emissions and adapting to the changing climate.
- **Technology Transfer:** Stress the significance of technology transfer to India from wealthy nations, allowing for the adoption of green technologies that lower emissions.

- **Cooperation with Developing Nations:** Work together to present a unified front in climate discussions so that the voices and concerns of these nations are heard and taken into account.
- **Transparent Reporting:** Continue to provide accurate and transparent reporting on emissions data and the status of efforts to reduce greenhouse gas emissions, promoting confidence and cooperation in global climate negotiations.
- **Capacity Building:** Put an emphasis on giving Indian diplomats and negotiators who are taking part in climate negotiations the tools they need to successfully represent India's interests and concerns.
- **Coalition Building:** Create alliances and coalitions with nations that share your views in order to jointly promote just climate policy and exchange negotiation best practices.
- **Public Engagement:** To build a strong domestic constituency for climate action, involve the Indian public, civil society, and non-governmental organizations in climate discussions.

Conclusion

For a more secure and sustainable future, energy security and sustainability are two critical facets of our global energy landscape that must be tackled together.

To meet the needs of society, business, and governments, energy security entails guaranteeing a consistent and stable energy supply. Many countries are vulnerable to supply disruptions and price changes because of their reliance on centralized energy sources and scarce fossil resources. Diversifying energy supplies and advancing renewable energy technologies are essential for improving energy security. Wind, solar, and hydroelectric power are examples of renewable energy sources that can help to build a more robust energy infrastructure while reducing dependency on scarce resources.

Fossil fuels pose long-term risks to the health of our world by contributing to greenhouse gas emissions and climate change. The move to cleaner, greener energy sources that lower carbon emissions and limit environmental deterioration is necessary to address sustainability. This adjustment is in line with international initiatives to fight climate change and lessen our ecological imprint.

Sustainability and energy security are inextricably linked. Sustainable energy sources lessen risks associated with resource scarcity and reduce environmental harm while also improving energy security by lowering reliance on geopolitically unstable countries. Furthermore, sustainability can spur economic expansion and innovation, creating chances for the development of new technologies and jobs.

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