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Analytical Study of Climate Change with respect to Energy and Sustainable Development Goals

Ashish Kumar¹, Sujeetsingh Thakur² and Sumeet Gupta³

This research paper particularly talks about two factors, Environment and Sustainability which is a global centric concern. As, India has pledged to achieve Net Zero target emissions by 2070. To achieve such a humongous target, Government of India has introduced various sustainable steps such as launching of Global biofuel alliance that covers majorly renewable sources of energy and ethanol blending.

Objective:

- To analyse present action for climate change with respect to energy sector.
- To suggest an effective framework for climate change

Scope: Indian Energy sector with respect to Oil & Gas sector.

Methodology: Secondary Research

Sustainable development goals are globally applicable that cover both developing and developed countries. SDG covers five pillars which includes People, Prosperity, Planet, Peace and Partnership.

To protect the environment & sustainability three major SDGs will come into consideration SDG-7, SDG-9 and SDG-13.

SDG-7: Affordable & Clean Energy

SDG-9: Industry, Innovation & Infrastructure

SDG-13: Climate Action

The sustainable development goals have comprehensive agenda for global development by 2030, where by NITI Ayog is the nodal institution for achieving sustainable in India.

¹ School of Business, UPES

² School of Business, UPES

³ Prof (Dr) Sumeet Gupta, Professor - School of Business, UPES



Data Analysis (Result and Findings):

To restrict the global temperature to 1.5 degree Celsius, India had introduced International Solar alliance by which there will be more penetration of solar energy which act as clean fuel. India had also introduced One Sun, One World and One Grid concept by which even distribution of solar energy throughout the world.

To protect environment and to support sustainability our Prime Minister Narendra Damodardas Modi has introduced the concept of Panch Amrit, which laid roadmap towards mitigating ill effects of climate change.



- The first agenda is to raise the non-fossil fuel-based energy capacity of the country to 500 GW by 2030.
- Also, by 2030, 50% of the country's energy requirements would be met using renewable energy sources.
- The country will reduce the total projected carbon emission by one billion tonnes by the year 2030.
- The carbon intensity of the economy would be reduced to less than 45% by 2030. The previous goal was 35%.



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- The country would become carbon neutral and achieve net-zero emissions by the year 2070.

Government of India has initiated flagship policies and programmes towards sustainability such as Swachh Bharat Mission, Beti Bachao Beti Padhao, Pradhan Mantri Awas Yojana, Pradhan Mantri Jan-Dhan Yojana and Pradhan Mantri Ujjwala Yojana.

Currently, India is working on 7 key initiatives to achieve sustainability goals:

1. Infrastructure Imperatives
2. Carbon Management
3. Green Energy
4. Circular Economy
5. Environment Conservation
6. Water Conservation
7. Energy Efficiency

Union Minister of Petroleum, Mr. Hardeep Singh Puri has recently announced to achieve 20% Ethanol blending by 2025, and this would save at least Rs.73000 crores in import of crude oil by which it would decarbonize the India's Economy & can generate direct and indirect employment in segment of ethanol blending.

Recently, Reliance India Ltd has announced establishment of 100 Compress Bio-Gas Plant (CBG) as well as Adani has also initiated to develop 5 CBG plants by 2025 in India (Largest democratic Country). This initiative shall ensure reduction in crude oil dependency as well as natural gas. This announcement ensures one such step towards cleaner and greener environment.

Airline Carrier are major consumers of Aviation Turbine Fuel. So it is contributing to energy consumption a lot. It is required to be focussed with reference to energy saving
^{9,10,11}

Integrated Supply Chain in Natural Gas and effective use of wireless communication system will help in recording of energy consumption and conservation^{12,13,14,15}

India has planned to commission about 39,000 MW of offshore wind energy by 2030. This would cater the increase in demand of greener energy as India is an energy hungry nation.



In context of energy transition, India has introduced to generate 5 million tonnes of green hydrogen by 2030 under “National Hydrogen Mission”. This is one of the energy domains where India is leading in the world and set an example to achieve net zero carbon emission by 2070.

Union Minister of Road Transport and Highways, Mr. Nitin Gadkari has made some policies changes in petrol and diesel automotive vehicles by introducing stringent rules and regulations. Therefore, to cut down the sales of petrol and diesel automotive vehicles as well as to curb the carbon emission, Toyota Kirloskar Motor Company has introduced 100% Ethanol blending Innova HyCross. It would give an edge to Toyota company to export such sustainable vehicles to other countries so that it would decrease the consumption of petrol by manifolds.

Recently, Oil and Natural Gas Corporation has announced huge investment of Rs.1 trillion by 2030 to become a low carbon energy company, with investments centred on renewables and green hydrogen.

Indian Oil Corporation Ltd has announced an investment of \$30 billion towards energy transition. It would ensure the companies target to achieve net zero emissions by 2046.

The role of female is very promising for energy conservation in domestic consumption . They are major contributor in SDGs¹

Internet of Things Protocols are commonly used for data integration in Block Chain and Decentralized ledger².

Role of Blockchain Technology is very prominent in data security for energy conservation . It is helpful in the attainment of Sustainable Development Goals^{3, 28,29,30}

IOT and Cyber Models can be used in tap of energy consumption , demand and supply and data can be used for energy conservation^{4, 22,23,24}

Cyber Security , IOT Protocols , AI and Chatbot can be used effectively in energy security, conservation and attainment of sustainable goals.^{5,6,7,8, 21}

Toxic gas levels, Investment and pricing in Oil and Gas are crucial for successful implementation of optimized energy conservation framework^{20,25,27}

Suggestions:

Environment and sustainability are critical global issues that require concerted efforts from individuals, communities, businesses, and governments. The oil and gas sector plays a significant role in global energy production and is a major contributor to environmental challenges, including greenhouse gas emissions and habitat disruption.



Here are some suggestions on how individuals and organizations can contribute to environmental sustainability:

1. **Reduce, Reuse, Recycle, Refurbish and Redevelopment:** Practice the "Five Rs" to minimize waste. Reduce consumption, reuse items when possible, and recycle materials like paper, glass, and plastics.
2. **Conserve Energy:** Use energy-efficient appliances and lighting, turn off lights and electronics when not in use, and consider renewable energy sources like solar panels.
3. **Use Sustainable Transportation:** Walk, bike, carpool, or use public transportation to reduce carbon emissions from personal vehicles. Consider electric or hybrid vehicles if feasible.
4. **Reduce Single-Use Plastic:** Use reusable bags, bottles, and containers to reduce plastic waste. Avoid single-use plastics like straws and utensils.
5. **Advocate for Environmental Policies:** Stay informed about environmental issues and advocate for policies that promote sustainability at the local, national, and global levels.

For Oil & Gas Sector:

1. **Transition to Cleaner Energy Sources:** Invest in renewable energy technologies such as wind, solar, and geothermal energy to diversify the energy portfolio and reduce reliance on fossil fuels. Explore the development of green hydrogen and other low-carbon fuels.
2. **Improve Energy Efficiency:** Implement advanced technologies and practices to reduce energy consumption during oil and gas extraction, refining, and distribution processes. Conduct energy audits and invest in energy-efficient equipment and processes.
3. **Reduce Methane Emissions:** Implement methane detection and mitigation programs to minimize methane leaks during production and distribution. Embrace leak detection and repair (LDAR) programs to identify and fix leaks promptly.
4. **Carbon Capture and Storage (CCS):** Invest in CCS technologies to capture and store carbon emissions from industrial processes, preventing them from entering the atmosphere.
5. **Sustainable Drilling Practices:** Use directional drilling and multi-well pad drilling to reduce the environmental footprint of drilling operations. Employ



"green completions" to minimize the release of volatile organic compounds during well completion.

6. **Reduce Water Usage and Pollution:** Implement water recycling and treatment systems to reduce the freshwater consumption and minimize the discharge of polluted water. Use environmentally friendly drilling fluids and chemicals.
7. **Biodiversity Conservation:** Develop and implement biodiversity management plans to minimize habitat disruption in ecologically sensitive areas. Support habitat restoration and conservation initiatives in regions affected by oil and gas operations.
8. **Stakeholder Engagement and Transparency:** Engage with local communities and stakeholders to address concerns and ensure transparency in environmental impact assessments and operations. Provide regular updates on sustainability efforts and environmental performance.
9. **Regulatory Compliance and Best Practices:** Adhere to strict environmental regulations and industry best practices to minimize environmental impacts. Invest in research and development to continuously improve environmental technologies.
10. **Invest in Alternative Transportation Fuels:** Explore and invest in alternative fuels such as biofuels and synthetic fuels to reduce the carbon footprint of transportation.
11. **Diversify the Business Model:** Consider diversifying into cleaner and more sustainable energy businesses, such as electric vehicle charging infrastructure or renewable energy projects.
12. **Long-Term Transition Planning:** Develop long-term sustainability and transition plans that outline specific goals, timelines, and actions to reduce the sector's environmental impact.

Conclusion:

India is an opportunistic country where lot of development has been happened in the field of renewable energy as well as in adoption of Carbon capture storage & utilization (CCUS). Most of the NOCs of India has recently announced huge investments in the field of non-fossil fuel, Renewable energy and green hydrogen so as to migrate from fossil-based economy to renewable based economy. Further, it will reduce the carbon



footprint as well as open more doors for the employment in the field of energy transition and sustainability.

Energy transition shall ensure to cater a huge demand of energy in country like India where 140 billion of population are dependent on it. To fulfil the energy transition and to ensure the protection of environment, regulation has to be proposed & implemented by both Central & State governments.

To achieve energy sustainability, India needs expertise, technology and skilled labour workforce so as to complete the task in a stipulated time framework. As, India is a signatory of Paris Climate Agreement 2015, proactive steps had been taken by government of India & set an example to rest of the world. To abide by the Paris Climate Agreement, recently had taken a proactive step to introduce a “Global Biofuel Alliance” at G20 platform which had taken place in New Delhi.

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