

Frugal Climate Solutions for a Net Zero India: Integrating ESG, Innovation, and Inclusive Policies

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Abstract

India wants to achieve net zero emissions by the year 2070. This is a major challenge. It is also a great chance to build a better future. Big projects and costly technologies are not the only way to reach this goal. This paper shows another path. It uses frugal innovation, which means doing more with less. It connects Environmental, Social, and Governance (ESG) ideas with local action. It highlights community-led solutions and low-cost technologies. Real examples from Indian villages are shared. These examples include solar power, waste reuse, and local planning. They help reduce pollution. They also create jobs and improve lives. The paper presents a model. It is called the Three-Pillar Frugal Climate Action Framework. It combines ESG principles, frugal solutions, and community participation. This model is simple and easy to follow. Other countries in the Global South can learn from this. They can use this approach to build a greener and fairer future. Climate action must be low-cost, people-centered, and easy to scale.

Keywords: **Frugal Innovation, Net Zero India, ESG Frameworks, Inclusive Climate Policy, Circular Economy, Sustainable Development Goals**

Introduction

India has set a goal to reach net zero carbon emissions by 2070. This goal reflects a major shift in how India sees development and climate responsibility. The path is not easy. India has social and economic differences across regions. Many people still lack access to energy. Climate risks are also rising in many parts of the country.

A single solution will not work for everyone. So far, most plans focus on expensive technology and central control. These plans miss the role of local people, small businesses, and the informal sector. India needs a new approach. This new approach must be inclusive, flexible, and low-cost.

This section presents a different idea. It supports the use of frugal innovation. Frugal innovation means using fewer resources to create useful solutions. These solutions must be

low-cost, simple, and fit local needs. This section links frugal innovation with Environmental, Social, and Governance (ESG) principles. It also includes circular economy and participatory governance ideas. Together, these tools can help build fair and effective climate policies. This model also supports the Sustainable Development Goals (SDGs) like:

- Clean Energy (SDG 7)
- Climate Action (SDG 13)
- Reduced Inequality (SDG 10)

Climate policy must match the real needs of people. It must not copy ideas from other countries without change. Local actors must be given power. These include Panchayati Raj Institutions (PRIs), Self-Help Groups (SHGs), and micro-enterprises.

The government must change its role. It should not only control. It must support, train, and scale up what

is already working at the local level. This section shares a new vision and does three things:

- It reviews current climate policies and their limits.
- It shares frugal innovations from different parts of India.
- It introduces the Three-Pillar Frugal Climate Action Framework.

Through this model, India can lead climate change efforts in the Global South. It can set an example of fair and local-led climate governance.

Literature Review

Frugal innovation uses fewer resources to solve problems. It works well in poor and rural areas. Radjou and Prabhu (2015) showed how frugal tools help with health and energy. George et al. (2012) said these ideas support low-cost change in farming and water. Agarwal and Brem (2020) added that strong policy helps such innovation grow. In India, frugal tools like solar lamps, clean cook stoves, and water filters help poor families live better.

Top-down plans do not fit local needs. People in tribal and coastal areas face climate risks daily.

Ostrom (2010) said shared control works better. Local people know their problems. They must be part of the solution.

A circular economy means reuse, repair, and recycle. It reduces waste and saves money. Geissdoerfer et al. (2017) said this model links green jobs and less pollution. Kalmykova et al. (2018) showed how cities can reuse water and compost waste. In India, Indore and Panaji have done this well. Still, many waste workers lack legal support.

Many studies talk about frugal tools, ESG rules, or local plans. But most of them do not connect all three. This section builds a new model: the Three-Pillar Frugal Climate Action Framework. It links frugal tools, ESG values, and local plans. It offers a way for India and other Global South nations to act on climate without high cost.

The table below summarizes key scholarly and policy insights related to frugal innovation, ESG frameworks, inclusive governance, and circular economy in the context of India's net zero climate goals. Each thematic strand is examined for its core ideas, cited sources, and relevance for policy formulation.

Table 1 Summary of Key Themes in Literature on Frugal Climate Innovation and Governance in India

Theme	Key Insights	Scholars / Reports (Source)	Policy Relevance
Frugal Innovation	Focuses on low-cost, resource-conscious solutions emerging from grassroots communities. Solutions like solar lanterns and biogas systems are scalable.	Radjou and Prabhu (2015); Pansera and Sarkar (2016); Agarwal and Brem (2020)	Enables decentralized climate action, particularly in energy access, water, and rural resilience.
ESG Frameworks	ESG reporting is expanding but remains urban- and corporate-centric. MSMEs and informal sectors are underrepresented in impact metrics.	Eccles & Klimenko (2019)	Localized ESG integration needed to influence sectoral decarbonization and investment accountability.
Inclusive Governance	Centralized policies overlook community innovation and adaptation practices. Polycentric governance is more effective in climate resilience.	Ostrom (2010)	Suggests empowering PRIs and SHGs via climate finance and capacity building for local adaptation.
Circular Economy	Promotes resource efficiency, waste valorization, and emissions reduction. Informal sector plays a crucial but neglected role in CE implementation.	Geissdoerfer et al. (2017); Kalmykova et al. (2018)	Circular solutions support India's net zero goals through frugal waste-to-resource practices.

Identified Gap	Fragmentation in literature; lack of integrative frameworks combining frugal innovation, ESG, and inclusive governance for climate action.	This Study	Justifies the proposed Three-Pillar Frugal Climate Action Framework for scalable and just transition.
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Source: Compiled by the author based on cited academic and policy literature (2015–2023).

Conceptual Framework: The Three-Pillar Frugal Climate Action Model

India cannot reach its net zero goals using only expensive, imported solutions. The country must create local, low-cost, and inclusive methods that match its diverse needs.

This section presents a model called the Three-Pillar Frugal Climate Action Framework (FCAF). It brings together three ideas:

- ESG Localization
- Frugal Innovation
- Participatory Governance

These pillars work together to guide India's climate action in a practical and affordable way.

Pillar 1: ESG Localization and Integration

This pillar makes Environmental, Social, and Governance (ESG) ideas work for rural areas and informal sectors.

Focus

Use custom ESG metrics for small businesses, farms, and village services.

Application

Add ESG steps into rural electrification, green public buying, and state-level planning.

Result

Better tracking and action that match local capacity.

Pillar 2: Frugal Innovation Deployment

This pillar supports simple, low-cost tools that solve climate problems.

Focus

Use solar pumps, clean cookstoves, and local transport fixes.

Application

Ask CSR funds and innovation missions to support grassroots ideas.

Result

People gain jobs, better health, and lower carbon use.

Pillar 3: Participatory Governance and Capacity Building

This pillar brings local people into planning and action.

Focus

Train Panchayats, Self-Help Groups (SHGs), and cooperatives in climate tools and data.

Application

Include climate needs in village budgets and use public institutions for training.

Result

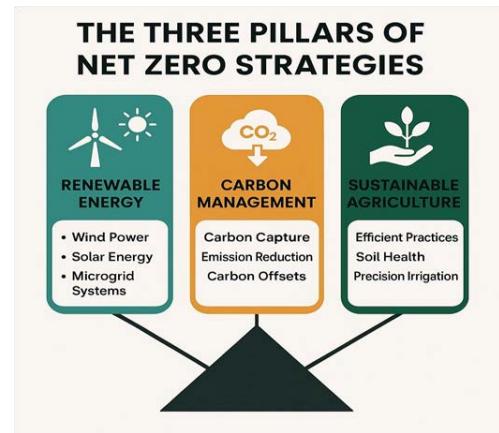
People gain ownership and make plans that last.

How the Three Pillars Work Together

These pillars are connected, not separate. ESG metrics help track frugal innovation success. Frugal tools make ESG steps easier for small groups. Participation ensures that changes match local needs. Together, they form a climate strategy that fits India's goals, SDGs, and local development.

Figure 1 shows the Three-Pillar Frugal Climate Action Framework. It joins ESG practices, frugal innovation, and local governance into one simple model. Together, they guide inclusive and low-cost climate action.

Figure 1 Three-Pillar Frugal Climate Action Framework



Source: Created by the author.

This diagram shows how three key ideas support India's Net Zero journey:

- ESG Localization
- Frugal Innovation
- Participatory Governance

They work together to build a low-cost, community-based, and scalable system for climate action.

Case Illustrations and Policy Implications

This section brings stories from the ground. These are not big-budget plans or tech-heavy projects. They are local efforts, run by real people, using simple ideas. Each case shows that when action starts at the bottom, change becomes possible.

Bihar's Solar Villages

Power cuts were a daily problem in some parts of Bihar. There were places where people lived without electricity for years. Then a local firm, Husk Power, stepped in. They didn't bring large grids. Instead, they set up small solar stations. These mini-grids lit up homes, shops, and schools.

Villagers worked in the project. They learned how to maintain the systems. No one had to depend on outside help. They paid using prepaid meters simple and fair. It reduced diesel use and gave youth a new skill. This model spread quickly across the region.

Indore's Clean Streets

Indore once struggled with waste. Trash piled up in corners. Then the city changed its approach. It didn't buy expensive machines. Instead, it trusted its people. Citizens sorted waste at home. Workers collected it. The city set up small plants to convert it into biogas and compost.

The whole system worked like a loop. Nothing went to waste. Everyone had a part to play. Indore became one of the cleanest cities, not by spending more, but by doing things differently.

Kerala's Quiet Revolution

Kerala is no stranger to floods. Year after year, some villages went underwater. Instead of waiting for outside help, they took charge. Local bodies planned tiny but powerful projects. They built

rainwater tanks, repaired roads, and even installed green energy pumps.

All of this happened with the help of MGNREGA funds. People made the decisions. They picked what mattered to them. This local planning turned fear into action.

Table 2 What India Teaches Us

Challenge	What Worked
No electricity	Build mini-grids, train locals, use prepaid meters
Waste management	Trust citizens, set up small recycling units, reward results
Climate resilience	Let local councils plan, use public job schemes, go small-scale
ESG tracking	Capture informal work, value low-cost efforts

Source: Author's synthesis of lived practices across Indian states.

Takeaway

You don't always need big money to fight climate change. What you need is trust in local ideas and the willingness to act small and early. India has many of these stories. They need to be heard, studied, and shared.

Conclusion and Future Research Directions

India wants to cut its carbon emissions by 2070. That is a long-term goal. But climate change is already here. People are facing heat, floods, and crop failures. The solutions must come quickly. They must also be fair and low-cost.

This study looked at simple ways to fight climate change. It showed that action does not need to be expensive. In fact, small local ideas can do more than big national plans.

We called this model the Three-Pillar Frugal Climate Action Framework. It brings together three things:

- Grassroots innovation
- Local governance
- ESG practices

This model works because it listens to people. It uses tools that already exist. It respects culture and local skills. It does not wait for foreign help. It builds from the bottom up.

We saw this in Bihar. There, small solar plants now power homes. We saw this in Indore. The city became clean by trusting its citizens. We saw it in Kerala. Local funds helped reduce flood risks. These examples are real. They are working now.

India has a chance. It can lead climate action for the Global South. But it must do so in a way that includes everyone. The poor, the rural, the informal sector, they must not be left behind.

What Researchers Can Explore Next

There is more to learn. Future research can:

- Build a scorecard to measure frugal and fair climate actions.
- Compare how different states use climate funds.
- Study how AI tools can track small climate wins.
- Look at how local models can spread to other countries in Asia and Africa.

Final Thought

Big change does not always need big money. It needs trust, ideas, and the will to act. India has all three. The world is watching. It is time to act smart, act local, and act now.

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