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COAL CONTROLLER ORGANISATION
सत्यमेव जयते
Ministry of Coal, Government of India

A Green financing framework for Repurposing Decoaled Mine

A.R.T.H.A

Align Rank Target Harness Adapt

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1. Coal Mine Closures: Opportunity for a Just Transition

1.1 Indian Context to Mine Closure

India's coal mining sector stands at an inflection point. While the country's economic growth, rising population, and rapid urbanization continue to drive demand for coal-based power, renewable energy capacity is also expanding at an unprecedented pace. At the same time, a growing number of mines are moving towards closure due to economic, resource, and environmental considerations.

Globally, the understanding of mine closure has shifted. What was once treated as a technical exercise limited to land rehabilitation and regulatory compliance is now increasingly recognized as an opportunity to plan for the future—one built on resilience, livelihoods, and community well-being. This shift reframes mine closure not as the end of extraction, but as a chance to rebuild local economies, restore ecosystems, and strengthen social fabric. With the right approach, closure can become a stepping stone towards renewal.

In India, mine closure is governed by the Mines and Minerals (Development and Regulation) Act, 1957. The Ministry of Coal first issued Mine Closure Guidelines in 2009, later revised in 2013, 2019, and 2020, to integrate closure planning into the mining lifecycle. However, since no closure plans existed for mines discontinued or abandoned before 2009, a structured approach was needed to ensure community benefits, prevent illegal mining, enhance safety, and enable repurposing of mined-out land. To address this, the Ministry issued fresh guidelines on 28.10.2022, providing a comprehensive framework for closing such mines.

As of now, 147 mines have been identified for closure. Of these, 88 pre-2009 mines are marked for temporary or final closure, with approved plans prepared by company boards. For post-2009 mines, Coal India Ltd. and SCCL have identified 59 mines for final closure, in line with approved mine closure plans.

1.2 Implications to Mine Closure

While mining has historically played a crucial role in driving industrial growth and energy security, its activities are accompanied by significant environmental and socio-economic costs. These closures pose profound challenges for regional economies. These regions have long functioned as mono-industries, structured almost entirely around coal extraction and related ancillary activities. It triggers cascading socio-economic disruptions that extend far beyond the loss of direct mining jobs: closures threaten to unravel the interconnected ecosystems of suppliers, services, and livelihoods that have sustained mining communities for decades. Vulnerable groups such as informal workers, tribals, and women are disproportionately affected, often lacking access to social security nets or alternative livelihoods. Out-migration is a common coping strategy, weakening community cohesion and eroding traditional social support systems, while simultaneously adding stress to nearby urban centers already grappling with population pressures. For example, in the coal mines of Barkuhi and Datla (Madhya Pradesh), data indicates that 40–50% of the local population migrated post-closure[1].

Compounding the challenge, decades of intensive coal extraction have left behind degraded land, polluted water resources, and deteriorated air quality, creating a legacy of ecological imbalance. Repurposing these regions for productive and sustainable uses is not straightforward. It demands significant remediation of soil, landforms, and water systems, along with air quality management. Such interventions are essential not only to restore ecological functionality but also to enable alternative land uses, whether for agriculture, renewable energy projects, or community development.

[1] Primary survey with the coal mine affected communities

The key environmental impacts of coal mining are as follows:

- **Impact on Soil and Landform:** Mining significantly alters natural landscapes by stripping away fertile topsoil, often without adequate conservation, resulting in permanent loss of soil fertility and arable land. The use of heavy machinery compacts soil layers, reducing porosity, water infiltration, and root penetration. Exposure of overburden and mine spoils releases heavy metals and sulphur compounds, which leach into soils and diminish productivity. In addition, loose overburden dumps are highly prone to erosion, leading to siltation of surrounding agricultural land and water bodies.
- **Impact on Water Quality:** Rocks from mining when exposed to water, often release acidic runoff into nearby streams and groundwater. This lowers water quality and makes it harmful for aquatic life, while also carrying toxic substances that can contaminate drinking water sources and agricultural land. In addition, coal mining contributes directly to groundwater depletion. Large-scale dewatering when carried out to keep mines dry and workable, lowers the natural groundwater table and leaves surrounding wells and hand pumps dry. Further, the removal of topsoil and compaction of land reduces the soil's capacity to absorb and store rainwater, limiting recharge.

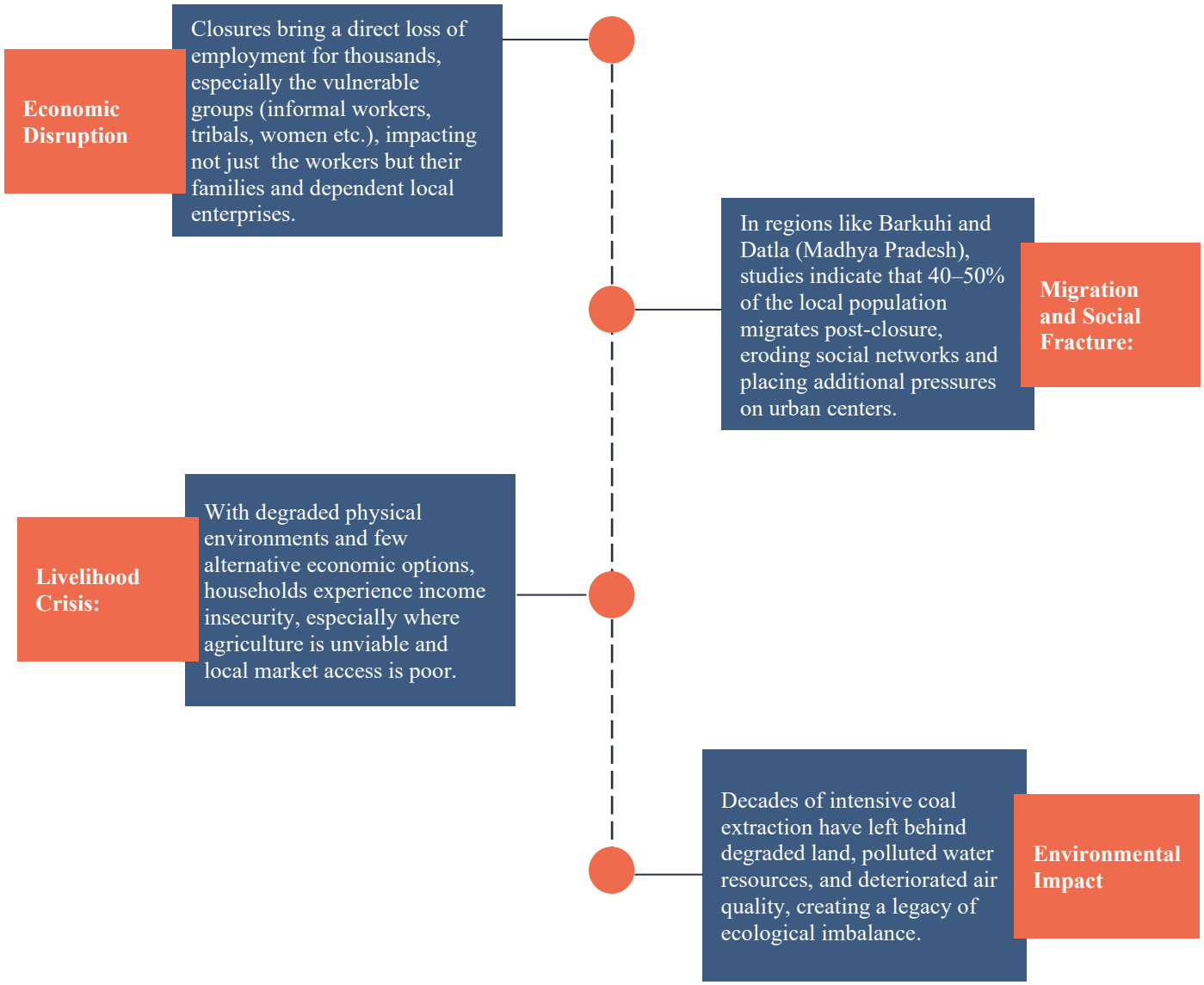


Figure: Implications for local communities, economy and environment

1.3 India's Policy Action and Roadmap

The recent Mine Closure Guidelines of the Ministry of Coal represent a major evolution in India's approach to mine closure. The new framework explicitly integrates community engagement, ecological restoration, health and safety, repurposing of mine assets, and socio-economic transformation, signalling a fundamental shift from closure as a regulatory formality to closure as an opportunity for regional renewal. Importantly, the guidelines earmark at least 25% of the five-yearly escrow amount for community development and livelihood-related activities, and mandate that 10% of the Just Transition allocation be directed towards socioeconomic transition initiatives in consultation with local authorities and stakeholders. This ensures that mining-affected communities are not passive recipients but active participants in shaping a post-mining future.

However, implementation so far has remained fragmented, siloed, and small in scale, limiting overall impact. There is an urgent need for a structured and scalable model that both mitigates the negative impacts of mine closures and builds resilient social and economic pathways for coal-dependent regions. As India pursues decarbonization and a shift to low-carbon growth, safeguarding and diversifying livelihoods for vulnerable communities must remain central.

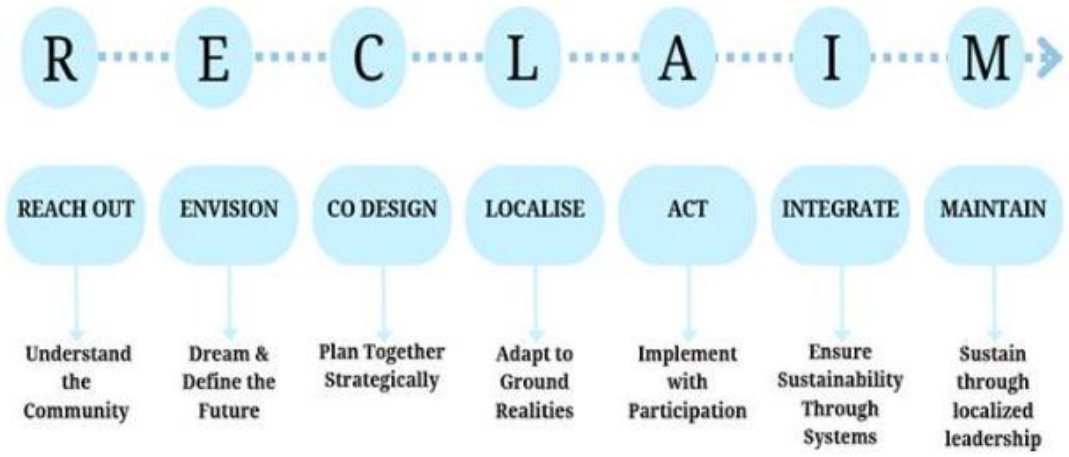
Realizing such a transformation in India will require significant capital investment. Large-scale mine repurposing entails decommissioning, land and water remediation, grid modernization, storage infrastructure, and robust community transition support. While public funding provides the foundation, it is insufficient to meet the full scope of needs. Estimating the scale of India's transition finance requirement is therefore critical to set ambition, shape policy direction, and guide the development of bankable project pipelines that can attract private and blended finance. Innovative financing mechanisms will be essential to de-risk projects, crowd in private capital, and ensure that social equity and environmental integrity remain at the heart of the transition.

This report explores a range of green financing mechanisms that can support coal mine repurposing in India and proposes a framework to match the most suitable financing options to specific interventions.

2. Green Projects Pathway for Coal Mines Repurposing

A green project is generally defined as an activity, investment, or initiative that delivers environmental benefits and contributes directly to addressing climate change, resource efficiency, or ecosystem protection. Such projects aim to reduce negative environmental impacts while promoting sustainable development. A just transition is broadly at the core of green projects. Repurposed mines create alternative livelihoods, ensuring communities benefit economically while restoring the degraded land and other natural assets.

There are multiple pathways for repurposing coal mine regions, with meaningful community engagement as a central pillar. To guide this, the Ministry of Coal has recently launched the RECLAIM framework, a structured approach for inclusive community engagement and development across mine closure and post-closure phases. It provides a step-by-step methodology to institutionalize community participation, ensuring that transitions are not only technically sound but also socially just and resilient.



In identifying suitable interventions, alignment with the RECLAIM framework is essential. The framework emphasizes assessment of:

- Regional context and physical attributes of the mine site
- Demand and market opportunities to identify viable economic pathways
- Local needs, skills, and aspirations of affected communities
- Socio-environmental outcomes, particularly livelihood security, equity, and ecological restoration

Some of the potential interventions for coal mine repurposing include the following:

2.1 Climate Resilient Agriculture and Agro-Processing

Agro-based cultivation and processing can be a climate-resilient repurposing pathway for coal mine–affected communities by integrating the One District One Product (ODOP) approach with climate-smart agriculture practices. Once degraded mine lands are remediated, they can be converted into hubs for cultivating region-specific crops, horticulture, or medicinal plants that are drought-tolerant, resource-efficient, and aligned with local agro-climatic conditions. Establishing processing units for value addition ensures greater economic returns while creating local enterprises and jobs. Through SHGs and cooperatives, strong backward linkages can be built for collective access to seeds, credit, technology, and advisory services, while forward market linkages

through ODOP branding, digital platforms, and institutional buyers enhance market access. Capacity building and upskilling in climate-smart practices—such as water-use efficiency, organic farming, crop diversification, and regenerative soil management—can make communities more adaptive to climate risks. This not only ensures sustainable livelihoods for vulnerable workers and women but also enhances the long-term climate resilience of local economies transitioning away from coal.

2.2 Horticulture and Medicinal Plants Plantation and Processing

Horticulture and medicinal plant cultivation can serve as a high-demand, market-driven intervention for repurposing coal mine-affected regions. The growing demand for fruits, vegetables, herbs, and medicinal plants in both domestic and export markets provides a strong economic rationale for transitioning communities toward this sector. Establishing processing units for value addition and linking producers with markets through SHGs, cooperatives, and farmer producer organizations can ensure sustainable incomes and reduce dependence on intermediaries. Focused capacity building and upskilling in climate-resilient cultivation practices, scientific harvesting, and processing techniques can empower local communities, especially women and vulnerable groups, to participate across the value chain. Importantly, such interventions also support climate resilience by restoring degraded mining lands, enhancing soil health, improving water retention, and sequestering carbon, thereby aligning livelihood generation with environmental regeneration.

2.3 Livestock Rearing and Processing Integrated with Sustainable Practices

Livestock rearing and processing present a strong repurposing intervention for coal mine–affected communities, given the steady domestic and export demand for poultry, cattle, buffalo, piggery, and goatery products. Establishing organized value chains, from fodder production to meat, dairy, and egg processing, can generate sustainable livelihoods while addressing local nutritional needs. Backward and forward market linkages through SHGs, cooperatives, and producer companies can reduce transaction costs, ensure fair prices, and improve market access. Targeted upskilling programs in scientific breeding, feed management, animal healthcare, and hygienic processing can enhance productivity and quality standards. In addition, livestock-based livelihoods contribute to climate resilience, as integrated systems combining livestock with agriculture promote resource efficiency, diversify income streams, recycle organic waste, and reduce vulnerability to climate shocks, thereby creating robust and adaptive local economies.

2.4 Green Energy Hubs

Closed mines present unique opportunities to be repurposed as green energy hubs, leveraging their existing land, infrastructure, and grid connectivity. Large tracts of reclaimed land can host solar and wind power projects, while water-filled mine voids offer potential for floating solar plants and pumped hydro storage systems. The existing transmission lines and substation infrastructure of mines can significantly reduce project costs and enable faster integration into the grid. Such repurposing not only supports India's renewable energy targets but also creates new employment avenues and ensures a sustainable economic transition for mining-dependent regions.

2.5 Green Skilling Hub

Mines can be repurposed into Green Skilling Hubs, serving as regional centers for vocational training and capacity building in emerging green sectors. With ready access to land and existing infrastructure, these hubs can be developed to train local communities in areas such as renewable energy installation and maintenance, sustainable agriculture, agro-processing, logistics, waste management, and eco-tourism. By aligning training

programs with evolving market demands, such hubs can equip mining-dependent populations with the skills needed for alternative livelihoods, ensuring that the transition is not only environmentally sustainable but also socially inclusive.

2.6 Green Logistics Hub

Closed mines with strong connectivity can be redeveloped into Green Logistics Hubs, leveraging their strategic location along existing road and rail corridors. These sites can host warehousing facilities, cold chain infrastructure, multi-modal transport terminals, and clean fuel stations such as EV charging and CNG. By integrating renewable energy-powered systems and sustainable transport solutions, these hubs can reduce logistics-related emissions while creating new economic opportunities. Such a transformation not only enhances regional supply chain efficiency but also positions mining regions as anchors in India's transition to low-carbon, future-ready logistics.

2.8 Eco-Parks, Biodiversity Corridors and Climate Resilience Theme Parks

Reclaimed mine land can be converted into biodiversity parks, afforestation zones, or community forests that support ecological restoration, carbon sequestration, and nature-based livelihoods such as honey harvesting and medicinal plant cultivation.

The mine's topography can also be used to demonstrate integrated watershed management techniques. These interactive parks can act as educational spaces for students, farmers, and policy makers while contributing to water security.

2.9 Mine-based Sustainable Tourism Circuits

Closed mines can be repurposed into Mine-based Tourism Circuits, highlighting industrial and geological heritage through geo-trails, museums, and cultural hubs celebrating tribal art and traditions. These can be complemented by agri-tourism opportunities such as corn trails, organic farm visits, and local food festivals, blending ecological restoration with cultural and agricultural tourism. Such integrated models generate diverse livelihoods, preserve heritage, and position former mining regions as unique destinations. To maximize impact, however, these interventions must evolve from pilots to a structured, scalable framework that ensures local participation, attracts diverse financing, and aligns with national priorities and global climate goals. This approach not only mitigates the negative impacts of mine closures but also builds resilient, sustainable pathways for communities in a post-coal future.

3. Green Finance: Its Need and Ecosystem in India

Green financing refers to the mobilisation of financial resources, through loans, bonds, grants, equity, guarantees, or blended structures, towards projects and activities that deliver clear environmental benefits, particularly in climate change mitigation, adaptation, biodiversity conservation, and sustainable resource management.

Unlike traditional financing, which prioritises risk–return profiles without necessarily considering environmental impact, green financing embeds explicit environmental objectives and eligibility criteria, often aligned with recognised taxonomies (e.g., Climate Bonds Initiative, EU Taxonomy) or climate fund requirements. Additionally, green financing usually entails enhanced monitoring and reporting (e.g., greenhouse gas emissions reductions, water savings, biodiversity gains) to demonstrate impact, whereas traditional financing does not require such environmental performance metrics.

3.1 Different Green Finance/ Funding Instruments

Green finance has evolved into a diverse set of instruments catering to both public and private stakeholders:

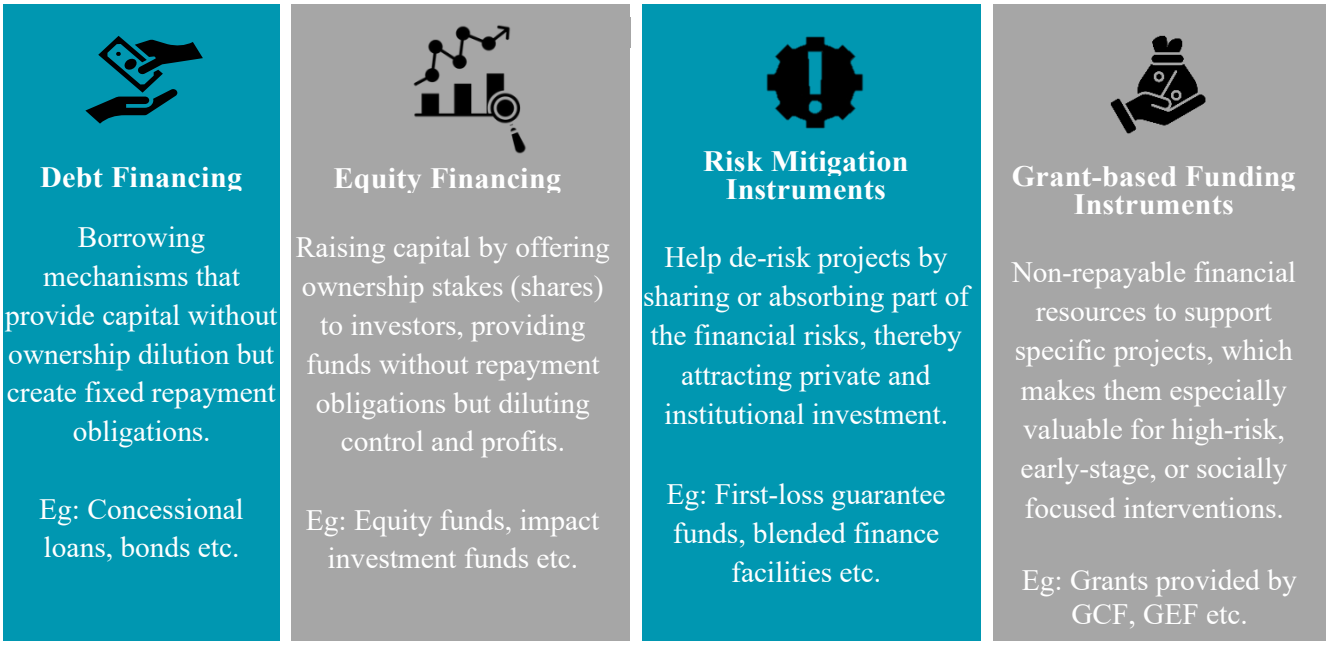


Figure: Green Financing Instruments

- **Debt-based Finance Instruments:** Debt Financing involves raising funds through borrowing, typically in the form of commercial/ concessional loans or bonds. The borrower is required to repay the principal along with interest over a defined period. This mechanism enables organizations to access capital without diluting ownership; however, it creates a fixed financial obligation, with repayments due irrespective of business performance.
- **Equity-based Finance Instruments:** Raising capital by selling shares of ownership in a company. Investors provide funding in exchange for an equity stake, benefiting from future profits or dividends. It doesn't require repayment and can strengthen a company's balance sheet but dilutes ownership and may involve sharing decision-making with new stakeholders.

- **Risk-Mitigation Instruments:** Risk Mitigation Instruments are financial tools designed to reduce exposure to uncertainties such as credit risk, currency fluctuations, commodity price volatility, or political and regulatory risks. These include mechanisms like guarantees and insurance products, which protect against potential financial losses. By lowering the perceived risk of a project or investment, such instruments enhance investor confidence, improve creditworthiness, and make projects more attractive to financiers. In the context of green and transition finance, especially for coal mines repurposing, risk mitigation tools, such as blended finance facilities and first-loss guarantees, play a critical role in mobilizing private capital, particularly for projects in emerging or high-risk sectors. Blended finance structures combine concessional capital from multilateral development banks, climate funds, or public sources with commercial capital, thereby de-risking projects and creating a pathway for scaling investments in sustainable transitions.

  For example, the Evolve EV Risk Sharing Program in India, a collaboration between the World Bank, SIDBI, and NITI Aayog, is designed to de-risk lending for electric 2- and 3-wheeler purchases by mitigating loan default risks. Anchored by a $300 million first-loss risk sharing pool jointly created by the World Bank and SIDBI, the program offers partial credit guarantees (PCG) and concessional loans to participating financial institutions. With NITI Aayog serving as the facilitating agency, banks and NBFCs are able to provide cheaper EV loans to buyers, supported by a first-loss guarantee mechanism that lowers financing costs by 10–12%. By reducing risk exposure for lenders and enhancing loan affordability, the program seeks to accelerate EV adoption while deepening financial sector participation in India's green mobility transition.

- **Grants-based Funding Instruments:** Grants-based finance instruments are non-repayable financial resources provided by governments, international agencies, philanthropic organizations, or development partners to support specific projects, programs, or activities. Unlike loans or equity, grants do not create a repayment obligation for the recipient, which makes them especially valuable for high-risk, early-stage, or socially focused interventions. They are usually targeted toward project preparation and de-risking, social and environmental objectives and capacity building and institutional strengthening.

  In the context of coal mine repurposing, grants-based instruments can finance early groundwork, such as land and water restoration, livelihood diversification, and community engagement, where commercial capital is unlikely to step in. They also help create conditions for attracting concessional and private investment at later stages, thereby acting as a catalyst for larger financial flows.

3.2 Green Finance Facilities/ Options

Green financing mechanisms draw from a mix of public, private, and multilateral sources and are structured to channel investments into projects that deliver both environmental and socio-economic benefits.

Green/ Sustainability-linked Bonds: One of the most widely adopted instruments is the Green Bond, a debt financing tool whose proceeds are earmarked exclusively for climate-aligned projects. Green bonds can be issued by sovereigns, corporations, municipalities, or even specific projects to mobilize capital for renewable energy, clean transportation, afforestation, and resilient infrastructure. In addition, Sustainability-Linked Bonds tie financing costs to the achievement of measurable environmental performance indicators, such as emission reductions or renewable energy deployment. This performance-based approach creates financial incentives for entities to meet sustainability targets, aligning profitability with positive climate outcomes.

Dedicated Climate Funds: At the multilateral level, Dedicated Climate Funds play a pivotal role in channeling grants, guarantees, blended and concessional capital to climate initiatives. Flagship mechanisms such as the Green Climate Fund (GCF), Global Environment Facility (GEF) etc support projects in ecological restoration,

renewable energy, sustainable land use, climate-resilient agriculture, capacity building etc, particularly in developing and emerging economies. These funds are particularly important for de-risking investments, enabling blended finance structures, and ensuring that vulnerable communities benefit from climate transitions.

Many countries have also established national green funds to mobilize domestic resources and co-finance projects with international partners. India has also established dedicated climate funds to channel resources toward low-carbon and climate-resilient development. These include the National Adaptation Fund on Climate Change (NAFCC), which supports adaptation projects in vulnerable states and sectors, and the Green Growth Equity Fund (GGEF), launched under the National Investment and Infrastructure Fund (NIIF) as the country's first climate-focused fund. GGEF invests in renewable energy, energy efficiency, sustainable mobility, and other green infrastructure, playing a catalytic role in mobilizing private capital for India's transition to a low-carbon economy.

Carbon Market-Based Finance Instruments: Carbon market–based finance instruments enable projects that reduce or avoid greenhouse gas (GHG) emissions to generate tradable credits, which can then be sold to buyers seeking to offset their own emissions or meet compliance obligations. These instruments include carbon credits, offsets, and allowances, which place a monetary value on emission reductions. Revenues from the sale of such credits provide a predictable income stream that can help finance climate-positive projects.

For coal mine repurposing, carbon markets are highly significant. Repurposed mines can host renewable energy projects (solar, wind, bioenergy), afforestation, or land restoration initiatives—all of which generate measurable emission reductions or carbon sequestration potential. Even methane capture from abandoned mines can yield carbon credits. By monetizing these environmental benefits, coal-dependent regions can access new sources of finance, reduce reliance on public funds, and create long-term incentives for ecological restoration and sustainable livelihoods. This mechanism effectively transforms the environmental gains of mine repurposing into tangible financial resources for reinvestment in the transition process.

Concessional Loans from Development Finance Institutions: Concessional loans from multilateral development finance institutions such as the World Bank, Asian Development Bank (ADB), and Asian Infrastructure Investment Bank (AIIB) are also another important source of green financing, particularly for emerging economies. These loans are offered at below-market interest rates, with longer repayment periods and more flexible terms, making them suitable for funding climate-resilient infrastructure, renewable energy, and sustainable livelihood projects. By lowering the cost of capital and reducing financial risk, concessional lending helps governments and local institutions implement large-scale green interventions that might otherwise be unviable, while also crowding in private investment for greater impact.

Together, these diverse financing options, ranging from bonds to concessional funds, form the backbone of green and transition finance. By strategically leveraging them, governments and businesses can attract private capital, scale climate solutions, and ensure that the transition toward sustainability is both inclusive and resilient. Some of the key green financing mechanisms have been discussed in the following chapter.

3.3 India's Green Finance Landscape in a Global Context

India has made steady progress in mobilizing green finance through multiple channels. Cumulative sovereign and corporate green bonds have become important instruments, with cumulative issuances crossing USD 46 billion as of 2024[2]. Notably, in FY 2022–23, the Government of India successfully raised ₹16,000 crore through

[2] Climate Bonds Initiative Report

Sovereign Green Bonds (SGrBs), marking a significant step toward mainstreaming green finance[3]. Domestic financial institutions such as IREDA, State Bank of India, Power Finance Corporation Ltd have extended green bonds for renewable energy, energy efficiency, sustainable mobility projects etc.

Concessional loans from multilateral development banks, including the World Bank, ADB, and AIIB, alongside support from global climate funds like the Green Climate Fund (GCF), have further advanced India's low-carbon transition. For example, the GCF has financed about 13 projects in the country, amounting to nearly USD 1 billion[4].

Yet, India's green finance mobilization remains modest when compared globally. India accounts for only about 2% of the total global green bond market, as of 2024. Also, India's access to large-scale international climate finance lags behind many of the global countries, each of which has mobilized multi-billion-dollar Just Energy Transition packages. For example, India has tapped only less than 2% of the fund, considering the population and the scale of requirement. Moreover, structural bottlenecks in project preparation, limited use of blended finance, and challenges in aligning international finance flows with domestic priorities continue to constrain scale.

Global experience offers valuable lessons. South Africa's USD 8.5 billion Just Energy Transition Partnership (JETP) has included mine rehabilitation in its financing pipeline, while Indonesia and Vietnam have adopted similar blended finance models that combine concessional loans, grants, policy guarantees, and technical assistance. In Europe, the EU's transition facilities have integrated blended finance to de-risk projects, while Germany's Ruhr region has successfully transformed closed mines into renewable energy parks, cultural hubs, and industrial heritage sites through a mix of public funding, EU structural funds, and private capital. These cases highlight the potential of innovative financing structures to unlock diverse pools of capital and build investor confidence in transition sectors.

For India, contextualizing and replicating such models could be transformative. Establishing blended finance facilities tailored to coal mine repurposing and other hard-to-abate sectors would help de-risk investments, lower capital costs, and crowd in private participation. At the same time, enhancing institutional capacity to design bankable pipelines, strengthening domestic credit enhancement mechanisms, and aligning national priorities with global climate funds will be critical. Together, these steps can unlock significantly larger volumes of green finance, enabling India to deliver on its climate commitments while ensuring that coal-dependent communities transition toward resilient and inclusive futures. This national green finance framework for mine repurposing seeks to advance exactly this agenda, mobilizing innovative financing at scale to turn mine closures into engines of regional renewal.

[3] Press Information Bureau, GoI
[4] Information sourced from the website of the Global Climate Fund

4. Different Green Finance Facilities/ Options

In this section some of the key green financing mechanisms are discussed in detail.

4.1 Green Climate Fund

The Green Climate Fund (GCF), one of the largest dedicated climate finance mechanism, plays a pivotal role in enabling developing countries to transition toward low-emission, climate-resilient pathways by providing grants, concessional loans, guarantees, and blended finance for climate-aligned initiatives.

Established under the Paris Agreement framework, the GCF works through a country-driven partnership approach, offering flexible financing solutions to help nations achieve their Nationally Determined Contributions (NDCs). With over 300 projects and USD 18 billion committed globally, the Fund seeks a balanced allocation between mitigation and adaptation, with a special focus on vulnerable countries such as Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States. By financing transformative projects with high potential for paradigm shifts, the GCF serves as a key enabler of sustainable climate action worldwide[5].

4.1.1 Investment Guidelines of the GCF

All projects financed through the GCF need to be in alignment with the investment guidelines of the GCF. The criteria identified in the investment guidelines serve as the parameters based on which eligible projects are identified and financed. A summary of the investment guidelines is provided here:

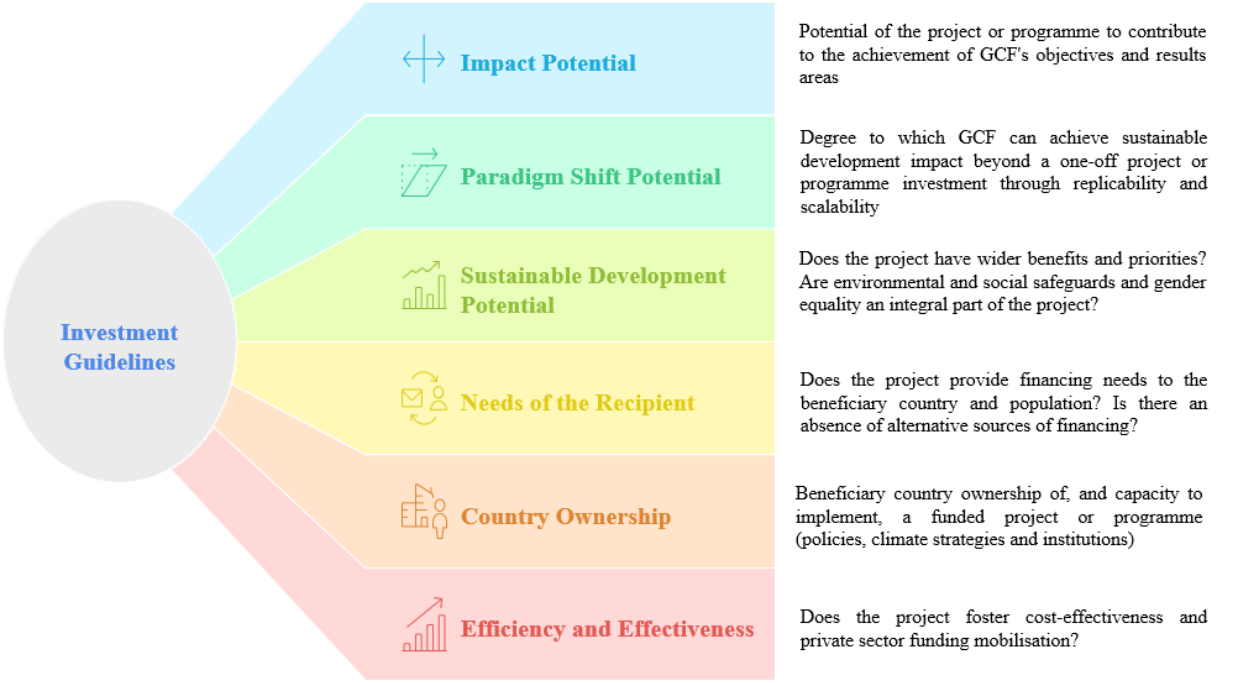


Figure: Investment Guidelines of Green Climate Fund (Source: GCF Website)

[5] All information included has been sourced from the website of the Global Climate Fund on 21st August 2025

4.1.2 Investment Themes and Areas

GCF seeks to have an impact within eight mitigation and adaptation result areas. Apart from aligning with the Investment Guidelines of the GCF, the projects need to also be in the result areas as provided by the GCF. The result areas have been targeted because of their potential to deliver a substantial impact on mitigation and adaptation.

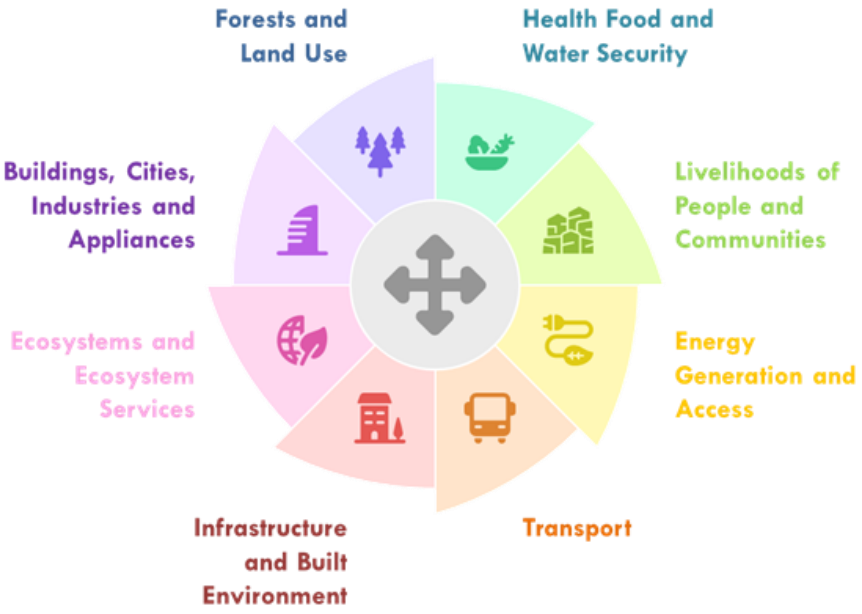


Figure: Investment Themes and Areas of Green Climate Fund (Source: GCF Website)

4.1.3 Investment Access Framework

There are broadly ten stages through which developing countries can mobilize resources from the Green Climate Fund[6].

[6] *This* approach includes the primary approach to access funding from the GCF. There are however other approaches including the Simplified Approval Process, RFP's, Pilot Projects etc.

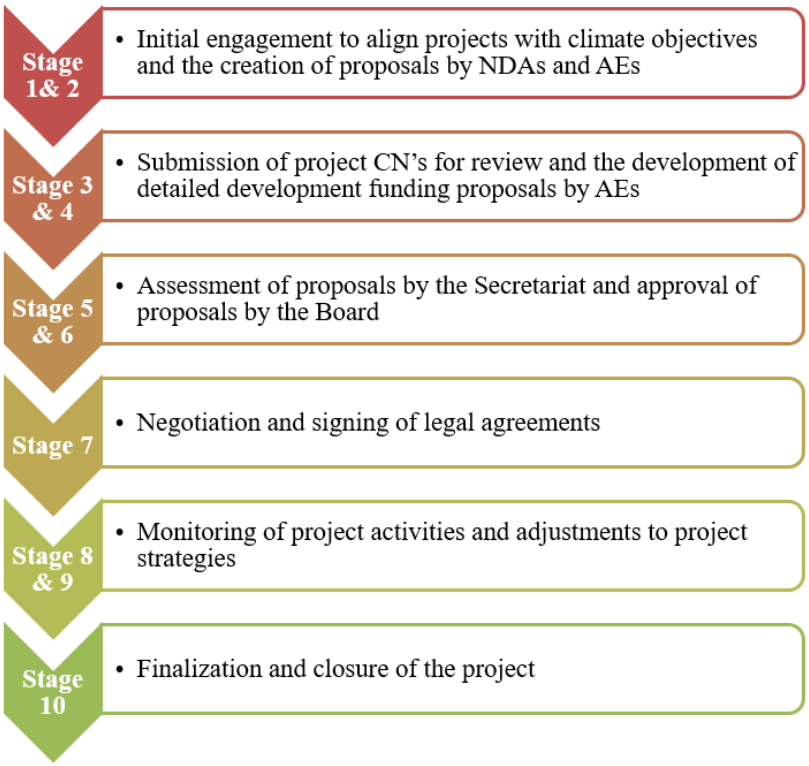


Figure: Investment Access Framework of Green Climate Fund (Source: GCF Website)

- **In the first stage,** a country's government and its National Designated Authority (NDA) set national priorities, assess financial needs, and identify Accredited Entities (AEs) or partners to design and implement funding proposals. The Green Climate Fund (GCF) then engages with the NDA to ensure that projects align with national climate objectives and the Fund's strategic plan. In India, the NDA is the Ministry of Environment, Forest and Climate Change (MoEFCC). A key element of this stage is the Readiness and Preparatory Support Programme, through which GCF helps strengthen institutional capacities, governance mechanisms, and planning frameworks for long-term climate action. During this phase, the GCF Secretariat works closely with the NDA and AEs to shape high-impact project ideas that meet all GCF investment criteria, thereby improving proposal quality and streamlining the approval process. Once this stage is complete, AEs can formally submit initial proposals for funding approval.
- **In the second and third stage**, targeted project proposals are developed by National Designated Authorities (NDAs) and Accredited Entities (AEs). In this stage, two other complementary channels are opened up, through which parties can submit additional funding proposals that meet the criteria of the GCF investment framework. This includes the issuance of targeted RFP's and the generation of bankable project ideas through dedicated platforms. Post this stage, AEs and NDAs are encouraged to submit a detailed Concept Note (CN). CNs present a summary of a proposed project/programme and offer an opportunity for the Secretariat to review and provide feedback on initial project/programme concepts.
- **The fourth stage** is the most important stage in the process, where the Funding Proposals (FPs) are developed in detail by the AEs and are scrutinized by the Fund. FPs submitted to GCF must be accompanied by no-objection letters (NOL) from respective NDAs/focal points. These NOLs ensure that the proposed funding proposal is consistent with country-driven approaches and national climate strategies and plans and signal their support. FPs must also present the implementation arrangements through Executing Entities (EEs). AEs may act as EEs or may carry out the project/programme with one or more EEs. AEs are responsible for determining, selecting, and engaging EEs based on their due diligence and other assessments required. GCF does not enter a direct contractual relationship with EEs.
- **The fifth stage** of the proposal includes the detailed appraisal of the Funding Process by the Secretariat of

the Fund. The Secretariat's appraisal is a formal assessment process that ends when FPs that are aligned with the investment criteria are submitted to the independent technical advisory panel (independent TAP) and the Board for approval. Upon completion of the independent TAP assessment, the Secretariat compiles the FP package, shares it with the Board, and publishes it on the GCF website. The AE must provide confirmation of disclosure of the information included in the FP.

- **The sixth stage** includes the approval of the FP's by the Board of the Fund. Once the FP has been approved by the Board, a formal legal arrangement will need to then come into force between the GCF and the AE. This is done through the Funded Activity Agreement, which is a formal legal document.
- **The seventh stage** defines the Funded Activity Agreement (FAA) negotiation and signing process after FP approval by the GCF Board. An approved FP will have a corresponding FAA between GCF and an AE. FAAs are tailored by the Secretariat to each financial instrument offered by the GCF, such as grant, loan, sub-participation, trust arrangement, and also REDD+ RBPs.
- **The final three stages** of the process deal with the monitoring of the project post devolution of the funds. This includes the Monitoring for performance and compliance, Adaptive management and Evaluation, learning and project closure.

4.1.4 Stakeholders

Board and the Secretariat of the Green Climate Fund: The GCF Secretariat works closely with NDAs and AEs to identify highly impactful project ideas that have the potential to meet all six GCF investment criteria. The final approval and the sanction of the financial proposal for all projects proposed to be financed under the fund are provided by the Board of the Green Climate Fund.

National Designated Authorities (NDAs): In India, the NDA for the GCF is the Ministry of Environment, Forests and Climate Change. All proposals from the country need to be in alignment with the policies and objectives of the NDA. The NDA serves as the focal point of contact for the country. The NDA is also responsible for the identification of the Accredited Entities in the country.

Accredited Entities (AEs): Once they have been identified by the NDA, the Accredited Entities in a country essentially will steer the project through the project's approval process with the GCF. The AEs partner with the GCF for the implementation of all projects. AEs can be private or public, non-governmental, sub-national, national, regional or international organisations.

4.1.5 Examples in India

There are several examples of the use of GCF in different sectors in India, either through grants or risk-mitigation blended facilities:

- **Enhancing Climate Resilience of Coastal Communities:** A grant of USD 43.418 million funded interventions to protect coastal populations in Andhra Pradesh, Maharashtra, and Odisha by restoring ecosystems like mangroves and coral reefs and strengthening livelihoods against climate shocks.

- **Financing Mitigation and Adaptation Projects (FMAP) for MSMEs:** A hybrid package with USD 15.6 million in grants, alongside USD 200 million in concessional loans, supports micro, small, and medium enterprises in adopting climate-resilient and low-emission technologies. This is part of a larger facility managed with SIDBI.

- **Green Climate Fund's India E-mobility Financing Program** is a $1.5 billion initiative designed to accelerate the electrification of India's road transport sector, with a primary focus on e-buses and shared

fleets. By leveraging $200 million in GCF funding alongside $1.3 billion in co-financing from commercial investors, the program establishes a blended finance structure that de-risks private sector participation. The innovative platform structure is India's first-of-its-kind EV-focused leasing and financing company, aimed at mobilizing large-scale investments while reducing risk for lenders and creating affordable financing options for fleet operators.

4.1.6 Advantages and Disadvantages

The main advantage of the GCF is that the finance provided by the fund for projects, will be at concessional rates, which will significantly have an impact on the cost of financing the project. The GCF also promotes and supports blended finance mechanisms and has a wide range of financial instruments through which they fund/finance projects. There is also no minimum co-financing requirement for the GCF to fund projects. The fund also supports and encourages the attraction of co-investors and other financial and developmental institutions, to support the development of a project.

The major disadvantage of financing projects through a large multi-lateral fund such as the GCF, is that the transaction costs are high, due to the high level of scrutiny and regulatory requirements.

4.1.7 Conclusion

Coal mine repurposing projects closely align with the GCF's investment guidelines and result areas, particularly in supporting vulnerable communities most affected by climate change. This shared emphasis on resilience, livelihoods, and inclusive development strengthens the case for financing through the Fund. Moreover, the GCF's provision for supporting revenue-generating activities through loans is highly relevant, as many proposed repurposing projects are designed with explicit revenue streams to ensure financial viability and long-term sustainability. This alignment underscores the strong potential for coal mine repurposing initiatives to secure GCF support as part of a just and climate-resilient transition.

4.2 Sovereign Green Bonds

Sovereign Green Bonds (SGrB) are government-issued debt instruments designed to mobilize capital for sustainable development projects, particularly in green infrastructure and low-carbon initiatives. In India, their issuance is governed by the *India: Sovereign Green Bond Framework* of the Department of Economic Affairs, which ensures that proceeds are directed toward eligible green expenditures. Unlike project-level bonds, funds are centrally raised and allocated through the Consolidated Fund of India, with the Public Debt Management Cell monitoring utilization. Importantly, investors do not bear project-specific risks, as repayments are backed by the sovereign. In FY 2022–23, the Government of India successfully raised ₹16,000 crore through SGrBs, marking a significant step in mainstreaming green finance.

4.2.1 Investment Guidelines

The Sovereign Green Bond Framework provides for guidelines based on which projects are categorized as 'green projects'. A project will need to fall into the category of a 'green project', for it to tap into funds from the issuance of green bonds. The projects also need to be in alignment with various environmental laws in India. A 'green project' classification is based on the following principles:

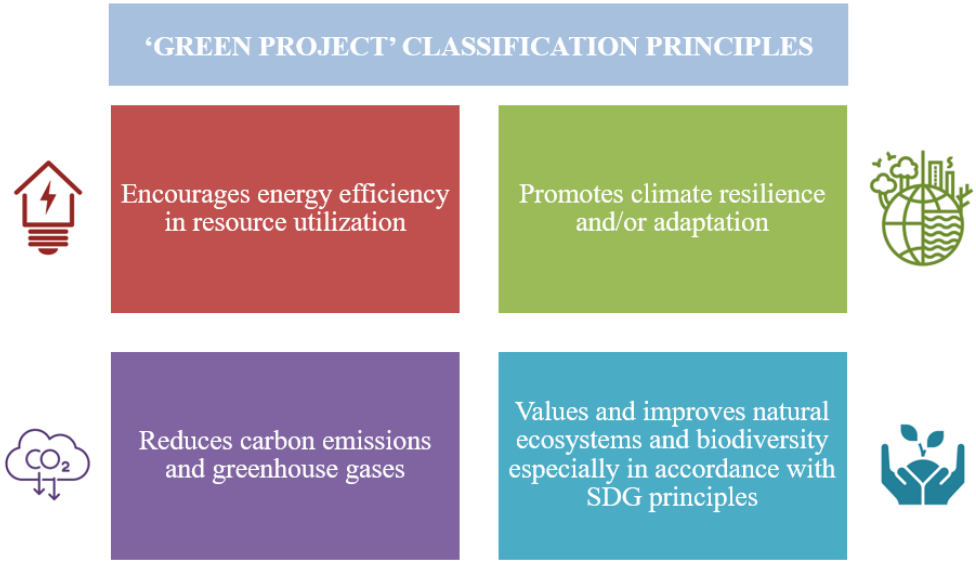


Figure: Investment Guidelines of Sovereign Green Bonds (Source: Sovereign Green Bond Framework)

4.2.2 Investment Themes and Areas

The following table provides a summary of the various categories of projects, which can be funded through green bonds, based on the Sovereign Green Bond Framework:

Green Project Category	Eligibility Criteria
Renewable Energy	• Investments in solar/wind/biomass/hydropower energy projects that integrate energy generation and storage. • Incentivizing adoption of renewable energy
Energy Efficiency	• Design and construction of energy-efficient and energy saving systems and installations. • Supporting public lighting improvements (e.g. replacement with LEDs). • Supporting construction of new low-carbon buildings as well as energy-efficiency retrofits to existing buildings • Projects to reduce electricity grid losses.
Clean Transport	• Promote public transportation including its electrification and transport safety. • Subsidies to adopt clean fuels like electric vehicles including building charging infrastructure.
Climate Change Adaptation	• Projects aimed at making infrastructure more resilient to impacts of climate change, as well as investments in information support systems, such as climate observation and early warning systems
Sustainable Water and Waste Management	• Promoting water efficient irrigation systems. • Installation/upgradation of wastewater infrastructure including transport, treatment and disposal systems. • Water resources conservation. • Flood defense systems.
Pollution Prevention and Control	• Projects targeting reduction of air emissions, greenhouse gas control, soil remediation, waste management, waste prevention, waste recycling, waste reduction and energy/emission-efficient waste-to-energy

Green Project Category	Eligibility Criteria
Green Buildings	• Projects related to buildings that meet regional, national or internationally recognized standards or certifications for environmental performance.
Sustainable Management of Living Natural Resources and Land Use	• Environmentally sustainable management of agriculture, animal husbandry, fishery and aquaculture. • Sustainable forestry management including afforestation / reforestation. • Support to certified organic farming. • Research on living resources and biodiversity protection.
Terrestrial and Aquatic Biodiversity Conservation	• Projects relating to coastal and marine environments. • Projects related to biodiversity preservation, including conservation of endangered species, habitats and ecosystems.

4.2.3 Investment Access Framework for Projects to be funded through Sovereign Green Bonds[7]

There are five major stages in the process through which eligible projects can tap into funding from Sovereign Green Bonds (SGrB). The Ministry of Finance has constituted a 'Green Finance Working Committee' (GFWC) with representation from relevant line ministries and chaired by the Chief Economic Adviser, Government of India. The selection of project is done on an annual basis. The selection of the green projects will be decided and reviewed by this committee. The five stages are briefly outlined below:

1. **Initial Selection of Eligible Projects and Expenditure:** The first stage in the process of tapping into funds under Sovereign Green Bonds is the selection of the eligible project for funding. Relevant Line Ministries will conduct an internal evaluation to come up with a list of eligible projects based on the framework, in addition to their level of preparedness (1= Ready for investment, 2= Under Development, 3= Under Conceptualization).
2. **Assessment and Evaluation of Final set of Eligible Expenditures:** The projects submitted by the various Line Ministries will then be examined and assessed in detail by the GFWC. The projects will need to be in complete alignment with the framework, and also green/sustainable objectives.
3. **Periodic Selection of New Eligible Green Expenditures:** The GFWC will meet periodically to select eligible green projects from various line miniseries. Ministries that are currently not part of GFWC will also be consulted for generating awareness towards sustainability and green projects within their purview, to identify new projects.
4. **Eligible Green Expenditures for Green Bond Issuances:** After the GFWC has selected the eligible projects for funding, the Ministry of Finance will direct the Reserve Bank of India regarding the amount of eligible green expenditures for which proceeds from green bonds can be utilized. The expenditures will be included in the Finance Bill and will need to be passed by the Parliament of India. The Ministry of Finance will also keep track of how proceeds from the issuances are allocated and will inform the RBI about any remaining eligible green expenditures that can be potentially financed in the subsequent year through another issuance. The devolution of funds will be in tranches and shall be dependent upon the achievement of the physical targets as specified in the approved project document.

[7] A more detailed version of the various stages included in the accessing funds through Sovereign Green Bonds is available in the India: Sovereign Green Bond Framework, Department of Economic Affairs, Government of India

4.2.4 Stakeholders Involved

1. **Ministry of Finance, Government of India:** The over-all control and disbursement of funds from the issuance of Sovereign Green Bonds, to individual projects, is done by the Department of Economic Affairs, within the Ministry of Finance. The 'Green Finance Working Committee' (GFWC) is anchored in the Ministry of Finance. The procedural aspects to project financing, including the Finance Bill, also comes under the purview of the Ministry of Finance.
2. **Green Finance Working Committee (GFWC):** The Green Finance Working Committee (GFWC) serves as the nodal agency for the evaluation and approval of various projects eligible for funding. GFWC has been established with clear lines of authority to oversee and validate key decisions on issuance of Sovereign green bonds under the Chairmanship of Chief Economic Adviser, Government of India.

Figure: Green Finance Working Committee Composition

3. **Central Government Line Ministries:** The various Line Ministries are responsible for the conceptualization of eligible projects, and also the preliminary screening/evaluation of projects. It is the main responsibility of the line ministry to consult with experts and other stakeholders, to ensure that the projects meet the eligibility criteria for funding through Sovereign Green Bonds.

4.2.5 Examples in India

The examples of the sovereign green bonds issuances in different sectors in India are as follows:

- In FY 2023–24, the Government of India issued a total of about ₹20,000 crore in sovereign green bonds in four tranches. These funds were deployed toward public sector projects in clean transport, renewable energy, energy efficient electric locomotives and National Mission for Green India.

- In FY 2024–25, India allocated around ₹25,300 crore (RE) from Sovereign Green Bonds (SGrBs) to key green projects. This included ₹12,600 crore for electric locomotive manufacturing, about ₹5,500 crore for metro projects, ₹4,607 crore for renewable energy initiatives such as the National Green Hydrogen Mission, and ₹124 crore for afforestation under the National Mission for a Green India, among others. These investments aim to lower carbon intensity and accelerate progress toward India's climate commitments[8].

[8] Expenditure Profile 2025-26, Ministry of Finance, GoI

4.2.6 Advantages and Disadvantages

The predominant advantage of using funds raised through the issue of Sovereign Green Bonds is that in recent years, there has been an enormous increase in the inflow of funds into Sovereign Green Bonds that have been issued by the Government. The line ministry does not need to focus on the cost of capital or on repayment of the bond. The funds from the bond are devolved to the line ministries for various projects through the Union Budget.

The existence of a robust framework for Sovereign Green Bonds, which has been created in line with international best practices, ensures that the procedure is straightforward and simple. However, the Sovereign Green Bond Framework explicitly mentions that equity financing is not allowed except for metro projects. Eligible projects need to run no risk of 'double-counting' through any other mechanism/financing instrument.

4.2.7 Conclusion

Coal mine repurposing projects can effectively leverage funds raised through Sovereign Green Bonds, as their core objectives align with promoting environmentally sustainable practices and building climate resilience. By supporting vulnerable communities and advancing adaptation measures, these projects fit well within the green expenditure categories outlined under the framework. Initiatives such as sustainable dairy farming, organic horticulture, climate-smart agriculture, and sustainable animal husbandry can be strong candidates for financing. Further, embedding components of energy efficiency and resource optimization into project design will strengthen their eligibility, ensuring compliance with the criteria used to classify projects as 'green.'

4.3 Global Environment Facility

The Global Environment Facility (GEF) is one of the world's largest multilateral fund dedicated to tackling environmental challenges and delivering global environmental benefits. Serving as the financial mechanism for the Rio Conventions (CBD, UNFCCC, UNCCD) and key chemical conventions, the GEF channels donor contributions through its 18 partner agencies to governments, civil society, and the private sector.

Unlike many other funds, GEF financing is primarily disbursed as predictable, non-reimbursable grants, making it a critical enabler of country-driven climate and environmental action[9]. In its current replenishment cycle (GEF-8, 2022–2026), the Facility has allocated USD 5.33 billion globally, with India eligible for over USD 37 million to support projects in areas such as climate change, biodiversity, land restoration, and sustainable forest management.

4.3.1 Investment Guidelines

The GEF primarily aims at tackling issues related to environmental degradation. At the core of the GEF-8 Architecture is the 'Healthy Planet and Healthy People' framework[10] . The GEF places a high level of emphasis on an 'integrated approach' to environmental issues. It is also necessary that projects involve the community and the public in the design and implementation process. The projects are also required to be driven by the countries themselves and need to be in line with national level priorities and policies for sustainable development.

[9] This information has been sourced from the official website of the GEF, as of August 21st 2025
[10] GEF-8 Programming Directions

4.3.2 Investment Themes and Areas

Projects financed under the GEF are required to fall into one of the following 'focal areas' - Biodiversity, Climate Change, Land Degradation, International Waters, and Chemicals and Waste. The goals/objectives of the various focal areas under the GEF-8 are summarized below:

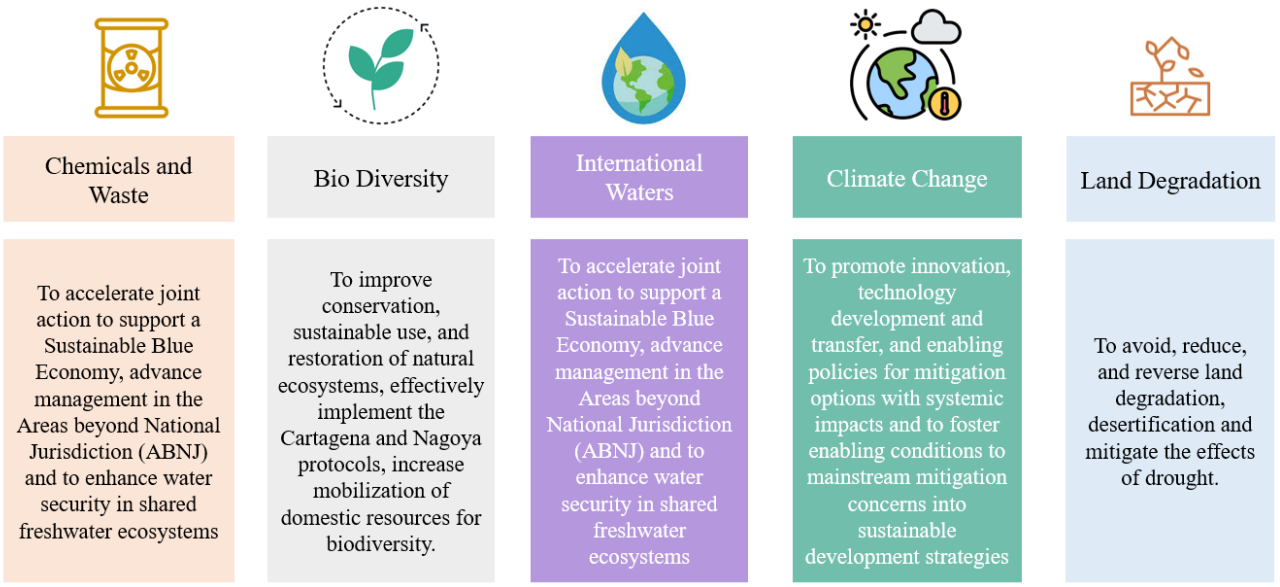


Figure: Investment Theses and Areas of GEF (Source: GEF Official Website)

4.3.3 Investment Access Framework for the GEF-8

Countries are eligible for financing projects through the GEF only if:

a) The country has ratified the conventions the GEF serves and conforms with the eligibility criteria decided by the Conference of the Parties of each convention; or

b) The country is eligible to receive World Bank (IBRD and/or IDA) financing or if it is an eligible recipient of UNDP technical assistance through its target for resource assignments from the core (specifically TRAC-1 and/or TRAC-2).

It may be noted here that India is eligible under both of the criterion provided.

The projects are proposed to the GEF for financing and support, through the Operational and Political Focal Points, that are designated authorities. In India, the Focal Points include senior officials in the Department of Economic Affairs (Ministry of Finance) and Ministry of Environment, Forest, and Climate Change. There are primarily four different types of projects that are eligible for financing by the GEF, these include:

- Full-sized Project (FSP): GEF project financing of more than five million US dollars.
- Medium-sized Project (MSP): GEF project financing up to five million US dollars.
- Enabling Activity (EA): A project for the preparation of a plan, strategy, or report to fulfill commitments under a convention.
- Program: A longer-term and strategic arrangement of individual yet interlinked projects that aim at achieving large-scale impacts on the global environment.

Although the exact procedures for project proposal approval for each of the four types of projects are different,

they broadly include the submission of a Project Identification Form (PIF) or a similar document, based on which the proposals are evaluated by the Secretariat or the CEO, and then may be also placed before the Council for final approval. For medium sized projects, in some cases a PIF would not be required, instead of which a MSP Approval Request is submitted to the Secretariat for approval. In the case of Enabling Activities, a EA Approval Request is submitted to the Secretariat. Larger programs, which include several interlinked projects, would require the development of a Program Framework Document, along with PIFs for the individual projects under the program. However, in all four cases, the project must seek GEF financing only for the agreed incremental costs on measures to achieve global environmental benefits. There are specific templates and guidelines that are available for each type of project/program under the GEF[11].

4.3.4 Stakeholders Involved

1. **Operational Focal Point for India:** The Operational Focal Point for India under the GEF is the Ministry of Environment, Forest and Climate Change. The Operational Focal Point coordinates all GEF-related activities within a country. The OFP reviews project ideas, checks against eligibility criteria, and ensures that new project ideas will not duplicate an existing project. Any project to be submitted for approval requires a Letter of Endorsement signed by the GEF OFP.
2. **Execution Agency:** The agency will develop and implement the entire project or program, in alignment with the national government's policies and objectives. The OFP decides on the best suited agency for the execution of the project or programme. The GEF however has 18 partner execution agencies.
3. **Secretariat and Council of the GEF:** The Secretariat and Council of the GEF have a large role in the appraisal and approval of grants for various projects and programmes. They also play an important role in monitoring the projects that have received funds.

4.3.5 Examples in India

India MSME Energy Efficiency Project: Implemented via SIDBI and BEE in partnership with the World Bank, this initiative received a GEF grant of USD 9.05 million, along with USD 2.25 million in support to BEE for energy efficiency in MSME clusters (e.g., foundry, forging, chemical, and kiln units). The project supported energy audits, DPR preparation, and financing mobilization while building capacity in industrial zones.

Green–Ag: Transforming Indian Agriculture: Under a global agro-ecosystem portfolio, this project received USD 21.38 million in GEF grant funding, complemented by USD 33.86 million in co-financing, out of a total project cost of around USD 528 million. It aims to boost biodiversity conservation within agricultural landscapes and integrate climate-resilient and biodiversity-positive practices at scale.

GEF Small Grants Programme (SGP India): Operating since 2000, SGP India is a localized GEF initiative supporting over 443 community-based action projects across themes such as biodiversity conservation, climate change, and sustainable livelihoods. These people-led, small-scale interventions have benefited over 600,000 individuals across India.

Creating & Sustaining Markets for Energy Efficiency (EESL): In its GEF-6 cycle, GEF awarded USD 18.85 million in grant funding, which was matched by USD 434.2 million in co-financing from partners like ADB, UNEP, KfW, and EESL. The program supported the creation of an Energy Efficiency Revolving Fund, scale-up of efficient technologies, and institutional innovation through ESCO models.

[11] A more detailed version of the submission guidelines and procedures can be found in the GEF Project and Program Cycle Policy, updated on June 9th 2025.

4.3.6 Advantages and Disadvantages

The major advantage of the GEF, is that a lot of funding under the facility is provided in the form of grants and blended finance mechanisms. The GEF also explicitly supports integrated programs, and not just individual projects. This ensures that a collection of smaller projects can be funded through the GEF, which all are all interlinked to each other, creating an enabling environment for scaling up and long term impact. The GEF also has a non-grant pilot program, through which the GEF supports innovative financial mechanisms.

A disadvantage in trying to get grants from global multilateral facilities such as the GEF is that there is substantive process which may be involved, this could also include substantial transaction costs. However, in order to support the development of project proposals, the GEF has the provision of a Project Development Grant.

4.3.7 Conclusion

Coal mine repurposing projects fit well within the GEF's financing mandate, particularly as they contribute to just transition objectives and directly address land degradation, a core focus area of the Facility. Moreover, the GEF's emphasis on integrated programs, comprising interlinked projects with systemic benefits, aligns closely with the proposed coal region interventions, which aim to bundle multiple initiatives for ecological restoration, livelihood diversification, and community resilience. This makes GEF a natural partner for financing holistic and transformative mine repurposing efforts.

4.4 Carbon Market–Based Finance Mechanism

Carbon market–based finance instruments allow projects to monetize verified emission reductions or removals as tradable carbon credits. Article 6 of the Paris Agreement provides the framework for international cooperation on such markets. Under Article 6.2, countries may trade mitigation outcomes, known as Internationally Transferred Mitigation Outcomes (ITMOs), to achieve their climate targets under Nationally Determined Contributions (NDCs). Article 6.4 establishes a UN-supervised mechanism for registering projects and issuing credits with high transparency and environmental integrity.

Coal mine repurposing projects could be registered under these mechanisms. Once verified, the credits generated can be traded internationally as ITMOs or sold in voluntary markets, creating a performance-linked financing stream for transition projects.

Domestically, India has launched the Carbon Credit Trading Scheme (CCTS) as a market mechanism to reduce greenhouse gas (GHG) emissions through carbon pricing. The CCTS consists of two elements: a compliance mechanism for obligated industrial entities, and an offset mechanism for voluntary participation. By incentivizing emission reductions, it lays the foundation for a robust Indian Carbon Market (ICM).

In July 2024, the government announced emission-intensity targets for entities in eight heavy industrial sectors, aluminium, cement, paper and pulp, chlor-alkali, iron and steel, textiles, petrochemicals, and petroleum refineries. Entities that outperform these targets earn Carbon Credit Certificates (CCCs), while underperformers must purchase credits. The CCTS builds upon the earlier Perform, Achieve, and Trade (PAT) scheme, with a full market launch targeted for 2026.

4.4.1 Institutional Mechanism

To operationalize participation in global markets, the Ministry of Environment, Forest and Climate Change (MoEFCC) has finalized the National Designated Authority for the Implementation of Article 6 of the Paris Agreement (NDAIAPA). The NDA is responsible for approving eligible projects, ensuring alignment with India's NDCs, facilitating credit generation and transfer, and engaging with private investors, multilateral funds, and international buyers to mobilize carbon finance.

Oversight of the domestic carbon market is provided by the Bureau of Energy Efficiency (BEE) and the National Steering Committee for the Indian Carbon Market (NSCICM), which are tasked with ensuring market integrity, transparency, and effective functioning.

4.4.2 Mechanism and Project Cycle

Carbon market finance follows a results-based approach. Projects must be designed, validated, and registered under an accredited standard such as Verra's Verified Carbon Standard (VCS), Gold Standard, or a national scheme. Each project must prove additionality, establish a conservative baseline, and put in place robust monitoring and reporting systems. Independent third-party auditors then verify the emission reductions or removals, after which verified credits are issued on a recognized registry.

Credits can be sold to buyers through direct contracts, forward agreements (Emission Reduction Purchase Agreements – ERPAs), or market platforms. This creates predictable, performance-linked revenue streams that strengthen project bankability.

4.4.3 Guidelines and Safeguards

To maintain credibility and integrity, repurposing projects seeking carbon finance must comply with strict safeguards:

- **Additionality and Baseline**: Demonstrating that projects would not occur without carbon finance and defining a conservative reference scenario.
- **Monitoring, Reporting, and Verification (MRV)**: Ensuring transparent data collection and third-party validation.
- **Environmental and Social Safeguards**: Protecting community rights, ensuring Free Prior Informed Consent (FPIC), promoting gender inclusion, and enabling equitable benefit-sharing.
- **Accounting Integrity**: Avoiding double counting with national NDCs and ensuring permanence of carbon outcomes, especially for land-use projects.

4.4.4 Stakeholders Involved

A range of actors are engaged in this process:

- **Project proponents** such as coal companies, state agencies, and private developers.
- **Communities and cooperatives** who benefit from land restoration and revenue-sharing.
- **Carbon standards and registries** such as Verra and Gold Standard that issue credits.
- **Independent verifiers** who validate and certify emission reductions.
- **Buyers** in both voluntary and compliance markets, including corporations and utilities.
- **Governments and multilateral development banks (MDBs)** that provide enabling frameworks and blended finance.

4.4.1 Mechanism and Project Cycle

The mechanism follows a results-based financing model. A project is designed, validated, and registered under a recognized carbon standard such as Verra (VCS), Gold Standard, or a national scheme. The project must demonstrate additionality, establish a credible baseline, and put in place robust monitoring and reporting systems. After implementation, independent third-party auditors verify the achieved emission reductions or removals. Verified credits are issued on a registry and can then be sold to buyers. The revenue flow typically involves direct sales, forward contracts (Emission Reduction Purchase Agreements – ERPAs), or participation in auctions/markets.

4.4.2 Guidelines and Safeguards

To ensure credibility, projects must comply with strict guidelines:

- **Additionality and Baseline:** Proving the project would not happen without carbon finance and defining a conservative reference scenario.
- **Monitoring, Reporting, and Verification (MRV):** Transparent systems for data collection, reporting, and third-party audits.
- **Environmental and Social Safeguards:** Ensuring projects do no harm, uphold community rights (FPIC), promote gender inclusion, and share benefits fairly.
- **Accounting Integrity:** Preventing double counting with national climate commitments (NDCs) and ensuring permanence of carbon outcomes, particularly for land-use projects.

4.4.3 Stakeholders Involved

Key stakeholders include:

- **Project proponents:** Coal companies, state agencies, private developers etc.
- **Communities and cooperatives** who benefit from land restoration and revenue-sharing.
- **Carbon standards and registries**: E.g., Verra, Gold Standard that issue credits.
- **Third-party verifiers** who validate and certify emission reductions.
- **Buyers**: Corporates in voluntary markets, utilities in compliance markets etc.
- **Governments and MDBs** who provide enabling frameworks and blended finance.

4.4.4 Advantages

Carbon markets offer multiple benefits for coal mine repurposing. They provide a predictable and performance-linked revenue stream, improving bankability and attracting private capital alongside grants and concessional loans. They also reward projects with co-benefits, such as ecosystem restoration, livelihood creation, and improved water security. By tying revenue to verified outcomes, carbon markets encourage long-term sustainability and accountability.

4.4.5 Disadvantages and Risks

At the same time, risks remain. Carbon markets are vulnerable to price volatility and regulatory uncertainty, which may affect revenue predictability. High transaction costs make participation difficult for smaller projects, often necessitating aggregation. Land-use projects face permanence risks from fires, droughts, or social conflict. Methodological gaps exist, with some innovative repurposing solutions not yet covered by approved standards. Social acceptance issues, particularly around land rights and equitable benefit-sharing, also need to be

addressed.

4.4.6 Conclusion

Carbon markets represent a powerful opportunity to channel private and international finance into coal mine repurposing. With strong MRV systems, social safeguards, and fair benefit-sharing models, these instruments can enhance the financial viability of closure plans while strengthening resilience in coal-dependent communities. A blended approach, combining carbon revenues with grants, concessional capital, and risk guarantees, will be essential to ensure that interventions are scalable, credible, and impactful in driving a just transition.

5. Artha- Green Finance Framework for Coal Mines Closure and Repurposing

Repurposing the decoaled mines require not only identifying suitable repurposing interventions but also aligning them with the right financing instruments. Given the diversity of potential projects, it is essential to adopt a structured and systematic approach to financing. The proposed ARTHA Framework (Assess, Rank, Tag, Harmonize, Align) provides a stepwise methodology to guide the different stakeholders involved in evaluating repurposing interventions, categorizing them on technical and financial parameters, and mapping them with the most appropriate green financing mechanisms. This ensures that projects are both impactful and bankable, while also compliant with fund requirements, thereby maximizing the chances of mobilizing sustainable finance at scale.

5.1 Guiding Principles

Green financing for coal mine repurposing is guided by a set of principles that ensure financial resources are deployed in ways that create climate-positive, socially just, and economically viable transitions. These principles provide the foundation for aligning projects with the broader goals of sustainable development, just transition, and low-carbon growth.

Alignment with Climate and Transition Goals

Green Financing directly support India's commitments under the Paris Agreement, net-zero targets, and national/state climate policies. Repurposed projects should contribute to decarbonization, resilience, and long-term sustainability rather than locking in new carbon-intensive pathways.

Just Transition and Social Equity

The framework prioritizes projects that foster inclusive economic opportunities, safeguard livelihoods, and reduce adverse impacts on coal-dependent communities. Equity considerations, particularly gender inclusion, skills development, and protection of vulnerable groups, are integral to the design and structuring of project financing.

Environmental Integrity

Through the framework, potential projects identified for financing would be designed to deliver tangible environmental co-benefits, including ecological restoration, land reclamation, sustainable water management, and enhanced climate mitigation and adaptation outcomes.

Financial Additionality and Innovation

Green financing extends beyond traditional capital flows by mobilizing additional and innovative instruments such as blended finance, green bonds, and risk guarantees. Repurposing projects will be structured to attract private sector participation while strategically leveraging concessional capital where needed.

Transparency and Accountability

Funds would be deployed under clear and transparent governance frameworks, with robust Monitoring, Reporting, and Verification (MRV) systems. Accountability to stakeholders, including affected communities, will be embedded through open reporting, grievance redressal, and participatory oversight.

Risk Management and Resilience

The framework incorporates mechanisms for risk absorption and resilience-building, recognizing that repurposing projects may face uncertainties related to technology, regulatory frameworks, or community acceptance. Instruments such as guarantees, first-loss capital, and insurance mechanisms should be encouraged.

Scalability and Replicability

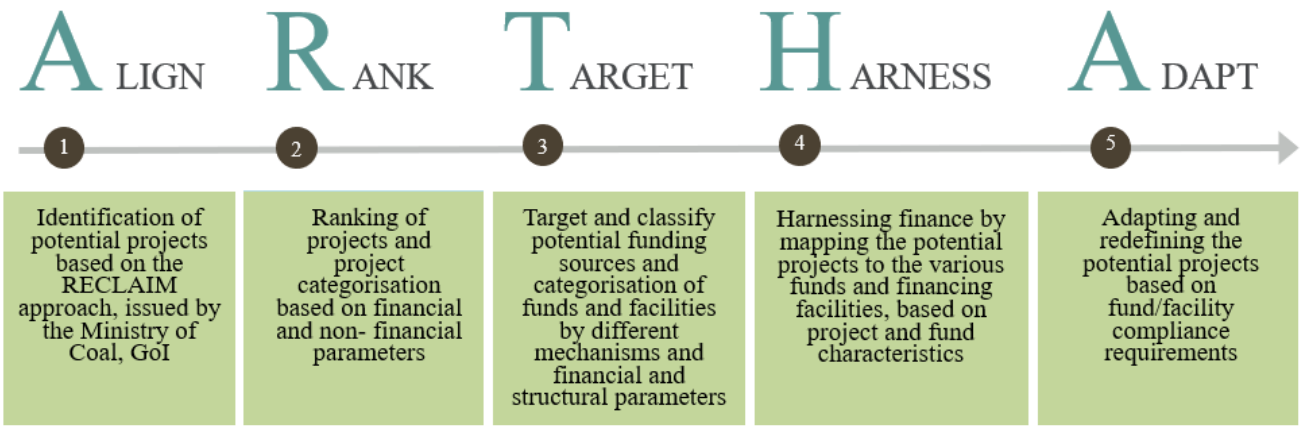
Financing structures would be designed to support scaling up and replicating successful models, ensuring that mine repurposing initiatives can move from pilots to large-scale transformation programs across coal regions.

Policy Coherence and Convergence

The framework is set to align with and leverage national and state-level policies, missions, and sectoral programs (renewables, land use, livelihoods, circular economy). This ensures convergence and avoids duplication of efforts, while maximizing synergies across government and private initiatives.

5.2 Artha- Green Finance Framework

The ARTHA Framework, which is the proposed green financing framework for coal mine repurposing is shown below:



The name "Artha" has been chosen for the framework as it embodies both purpose and prosperity. In Sanskrit, *Artha* signifies meaning, livelihood, and wealth, apt for a framework that seeks to repurpose coal mines into engines of sustainable economic and social value. It also draws from the concept where it represents the pursuit of prosperity and well-being, aligning with the framework's focus on creating resilient livelihoods, mobilizing green finance, and ensuring equitable growth for coal-dependent communities.

Stage 1– Align (Project Selection)

This stage involves identifying projects aligned with the RECLAIM approach of the Ministry of Coal (as discussed in chapter 2).

The different criteria for project selection may include:

- Regional context and physical attributes of the mine site.
- Demand and market assessment to identify viable and scalable opportunities.
- Local needs and potential of affected communities.
- Socio-environmental outcomes, particularly on community impact (livelihoods, equity, gender inclusion), environmental safeguards (ecological restoration, climate resilience including adaptation and mitigation benefits).

At this stage, a set of project concepts is identified based on mine repurposing opportunities that are environmentally sustainable, socially inclusive, and economically viable. The shortlist ensures that only interventions aligned with just transition principles, local community needs, and climate-resilient development pathways move forward for further financial and technical assessment.

Stage 2– Rank (Project Categorisation by Parameters)

Once a pipeline of eligible project concepts has been shortlisted, the next step is to categorise and rank them systematically using both financial and non-financial parameters. This stage ensures that each project is assessed not just on its economic viability, but also on its ability to deliver social equity and environmental resilience in the context of coal mine repurposing. The dual focus on financial and non-financial aspects helps identify whether projects should be positioned as commercially bankable, socially driven, or as hybrid models requiring blended approaches.

Financial Parameters:

- **Capital Intensity (low vs. high):** Projects need to be categorized as being high or low in capital costs. While most projects will involve substantive investments in hard infrastructure, certain projects may have disproportionately higher capital requirements due to land development, enabling infrastructure, or technology-intensive solutions.
- **Revenue Model (commercially viable vs. public good):** This step assesses whether the project generates sustainable cash flows for commercial viability or primarily delivers public goods (such as ecological restoration or community health), in which case concessional finance, grants, or blended structures may be necessary.
- **Risk Profile (low vs. high):** A preliminary assessment of the project's risk profile considers regulatory uncertainty, financial volatility, operational challenges, and social/environmental sensitivities. While certain risks cannot be precisely quantified, projects should be categorized based on whether they face low, moderate, or high levels of exposure.
- **Time Horizon:** Projects are categorised on the basis of implementation and gestation period, as well as overall life cycle. Administrative and regulatory procedures, which may significantly influence timelines, should also be considered. Projects may therefore be classified as short-term, medium-term, or long-term.

Non-Financial Parameters:

- **Social Impact:** Projects are assessed for their potential to generate sustainable livelihoods, support reskilling of workers displaced from coal-based employment and foster inclusive growth for vulnerable communities. A strong social impact ensures that repurposing efforts contribute meaningfully to a just transition.
- **Environmental Benefits:** Beyond direct project outcomes, the environmental value-adds, such as

biodiversity regeneration, water resource management, soil remediation, or contribution to mitigation targets (through carbon sequestration or emission reductions), are critical to long-term sustainability. Projects with multiple co-benefits should be prioritized.

- **Policy alignment (national/state climate and energy strategies):** Alignment with India's Nationally Determined Contributions (NDCs), state-level just transition strategies, and broader green growth missions is an essential criterion. Projects that demonstrate strong policy coherence are more likely to access government support and international financing.

It is therefore important that expected outcomes under both financial and non-financial categories are clearly analysed and determined at the project design stage. This ensures that mine repurposing projects contribute not only to local development but also to India's larger climate change and energy transition priorities.

Stage 3– Target (Fund Classification)

Once projects have been ranked and categorised, the next step is to target and classify potential funding sources. This stage builds a structured fund landscape matrix that links project needs with the most appropriate financing mechanisms and funding parameters. By doing so, it ensures that coal mine repurposing projects are not only technically viable but also financially matchable with the right instruments.

Classify Funds by Mechanism

- **Grant-based funding instruments:** Valuable for high-risk, early-stage, or socially focused interventions. They are usually targeted toward project preparation and de-risking, social and environmental objectives and capacity building and institutional strengthening.
- **Debt instruments (Green Bonds, Sustainability-Linked Loans):** Debt financing tools enable projects to raise upfront capital for infrastructure and operational costs. Instruments like green bonds or sustainability-linked loans offer lower borrowing costs tied to sustainability performance, making them suitable for commercially viable projects with predictable cash flows.
- **Equity mechanisms:** Equity-based funding provides risk capital for projects that are innovative or growth-oriented. Investors, such as climate-focused private equity/venture capital funds or impact investors, are more likely to support projects with long-term profitability and scalability potential.
- **Risk Mitigation instruments (guarantees, blended finance, first-loss capital):** These mechanisms are designed to de-risk projects that may face regulatory or operational uncertainties. By providing partial guarantees or absorbing first-loss positions, such instruments help crowd in private sector investment for projects that would otherwise be considered too risky.
- **Concessional / Multi-lateral Development Banks Financing:** Multilateral development banks and global facilities often extend concessional loans at below-market interest rates with longer repayment tenors. These instruments are especially useful for socially driven projects, where commercial viability is limited but broader social or environmental impact is significant.
- **Dedicated climate funds (GCF, GEF, Adaptation Fund, NAFCC):** Dedicated funds provide targeted financing for projects aligned with global climate priorities such as mitigation, adaptation, and resilience. These facilities often prioritize transformative, large-scale projects with high social and ecological benefits, and typically come with extensive eligibility and compliance requirements.

Classify Funds by Funding Parameters

- **Cost of Capital:** Funds should be evaluated based on whether they provide grants, concessional loans, or market-linked instruments. Concessional terms reduce the financial burden on projects, especially those delivering strong social and ecological outcomes but limited revenue streams.
- **Tenor/ Repayment Flexibility:** Long-tenor loans or flexible repayment conditions allow projects with extended gestation periods—such as ecological restoration or livelihood regeneration—to succeed without short-term repayment pressures.
- **Risk Absorption:** Effective climate finance must provide buffers against policy, financial, and operational risks. Funds offering co-financing, guarantees, or even non-financial support (capacity building, technical handholding, continuous engagement) enhance the bankability of high-impact but riskier projects.
- **Scale Suitability:** Certain funds are designed for large integrated programs rather than standalone initiatives. Assessing scale suitability ensures that projects capable of delivering system-level impacts are matched with financing that supports scaling up rather than piecemeal funding.
- **Co-Financing Potential:** Many green projects succeed only through blended structures combining concessional finance, commercial capital, and public grants. Funds that actively enable co-financing or crowd in private sector participation should be prioritised for larger, high-impact projects.
- **Transaction Complexity:** While some facilities have streamlined access procedures, others involve complex approval cycles, technical prerequisites, and significant administrative burden. Evaluating transaction complexity helps balance the urgency of implementation with the feasibility of securing financing.
- **Alignment with Objectives (Green, Social, Transition-related Financing Conditions):** Each fund has specific eligibility criteria, often linked to decarbonisation, resilience, or social impact. Ensuring precise alignment between project objectives and fund priorities increases the chances of successful financing.

In this stage, it would also entail leveraging national and state-level policies, missions, and sectoral programs. This ensures convergence and avoids duplication of efforts, while maximizing synergies across government and private initiatives.

Stage 4– Harness (Project-to-Fund Mapping)

Having identified the characteristics of both projects (Stage 2) and funding sources (Stage 3), the next step is to strategically map projects to the most suitable financing mechanisms. This stage operationalises the framework by aligning project requirements with the characteristics of funds and facilities in the financing landscape. The objective is to ensure that every project in the portfolio is paired with financing instruments that maximise feasibility, scalability, and impact.

Mapping Method

1. **Match project categories with suitable funds:** Projects should be mapped to financing sources that best address their financial and non-financial profiles. For example:
    - Renewable energy parks or storage hubs may be suited to MDB concessional loans (for long-tenor, lower-cost capital) complemented by green bonds to crowd in private capital.
    - Afforestation and ecological restoration projects, which deliver strong adaptation and mitigation co-benefits but limited commercial returns, may align best with dedicated climate funds (GCF, Adaptation Fund, NAFCC) or concessional windows from MDBs.
    - Skill development and livelihood transition programs could be matched with social impact funds, risk

mitigation facilities, or grant-based programs, since their outcomes are primarily social rather than revenue-generating.

2. **Identify blended pathways for multi-layered finance:** Many coal mine repurposing projects will require hybrid financing approaches, combining concessional and commercial sources. For instance, an EV manufacturing hub may require a blended pathway of equity from climate-focused PE/VC, backed by risk mitigation instruments (first-loss capital or guarantees), and supplemented with policy-driven incentives. Similarly, community infrastructure projects could leverage a mix of public grants, guarantees, and low-interest loans to reduce upfront risk while enabling long-term sustainability.

The result of this stage is a Project–Fund Match Matrix, which explicitly links each project category within the RECLAIM portfolio to 2–3 potential financing sources. This mapping not only helps identify immediate funding options but also highlights blended pathways that can bring together multiple actors, government, MDBs, private investors, and dedicated climate funds, to support large-scale and high-impact transitions. By building directly on the fund classification exercise of Stage 3, this stage ensures that project ambitions are translated into financing strategies that are both realistic and aligned with broader climate, social, and economic priorities.

Stage 5– Adapt (Redefining Projects for Fund Fit)

Once projects have been mapped to suitable funds, the next step is to refine and adapt project designs to meet the eligibility, compliance, and operational requirements of those financing sources. While initial project concepts may be aligned in principle with a fund's objectives, accessing actual financing requires tailoring proposals to meet specific technical, financial, environmental, and governance criteria. This stage is therefore critical in converting shortlisted project–fund matches into bankable, fund-compliant proposals ready for submission.

Stage Activities

- **Adjust scale, phasing, or co-financing:** Where required, projects may need to be restructured to fit within fund parameters. This could involve scaling down into pilot phases for proof-of-concept, integrating co-financing arrangements (government, private sector, or MDB participation), or phasing investments to align with fund disbursement schedules. Such flexibility ensures project bankability while retaining long-term transformative potential.
- **Strengthen governance and fiduciary structures:** Many funds, especially multilateral and global climate facilities, require clear fiduciary standards and governance arrangements to ensure accountability. Projects should define institutional roles, decision-making processes, financial management systems, and safeguard mechanisms to comply with these requirements.
- **Embed MRV (Monitoring, Reporting, Verification) systems:** Projects need to incorporate robust MRV frameworks that align with fund requirements. These include quantifiable indicators for climate impact (emissions reduction, resilience benefits), social outcomes (jobs created, livelihoods supported), and governance performance. Strong MRV systems enhance transparency and increase funders' confidence in long-term outcomes.

The output of this stage is a set of refined, fund-ready project proposals, tailored to the technical and operational requirements of each financing source. By building on the project–fund matches identified in Stage 4, this step ensures that promising project concepts are translated into compliant proposals that maximize their chances of approval. In effect, this stage closes the loop between project ambition and funder expectations, making coal mine repurposing initiatives both practically viable and financially executable.

6. The Road Ahead: From Policy to Practice

To move the ARTHA Framework from intent to practice, a dedicated institutional mechanism is required to bridge policy objectives with financing and on-ground action. Establishing a dedicated unit will be central to operationalizing ARTHA and ensuring that coal mine repurposing projects are designed, financed, and implemented effectively. The unit would be set up under the Ministry of Coal (with inter-ministerial coordination mechanism.). The unit would be equipped to access the support of transaction advisors/consultants specializing in project finance, environmental safeguards, MRV, and just transition issues.

The core functions would entail project pipeline development, fund mapping, transaction structuring, compliance support, and monitoring of financed projects.

- **Financing Facilitation:** The unit would be responsible for accessing blended finance, climate funds, and concessional capital, in collaboration with other relevant stakeholders.
- **Procurement:** The unit would develop transparent procurement systems for selecting consultants, developers, and implementing partners, ensuring alignment with ARTHA stages.
- **Contract Implementation:** Standardized contracts, incorporating ESG safeguards, MRV protocols, and risk-sharing arrangements, would be developed to ensure funder confidence and project accountability.
- **Programme Monitoring and Evaluation:** A robust MRV framework will track financial flows, project performance, and community outcomes, feeding back into policy refinement and international climate reporting obligations.
- **Capacity Building:** Train state agencies and project proponents on financial structuring, compliance requirements, and funder engagement.

In essence, the establishment of a Green Financing Management Unit, supported by transaction advisors and operationalized through structured procurement, contracting, and monitoring, will provide the institutional anchor required to translate ARTHA from a guiding framework into a practice-ready mechanism. This will ensure that coal mine repurposing projects are not only financially viable and fund-compliant but also socially inclusive and environmentally sustainable.

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