REFORM OF COAL MINE CLOSURE GUIDELINES TO SUPPORT A COMPREHENSIVE MINE CLOSURE FRAMEWORK BASED ON JUST TRANSITION PRINCIPLES

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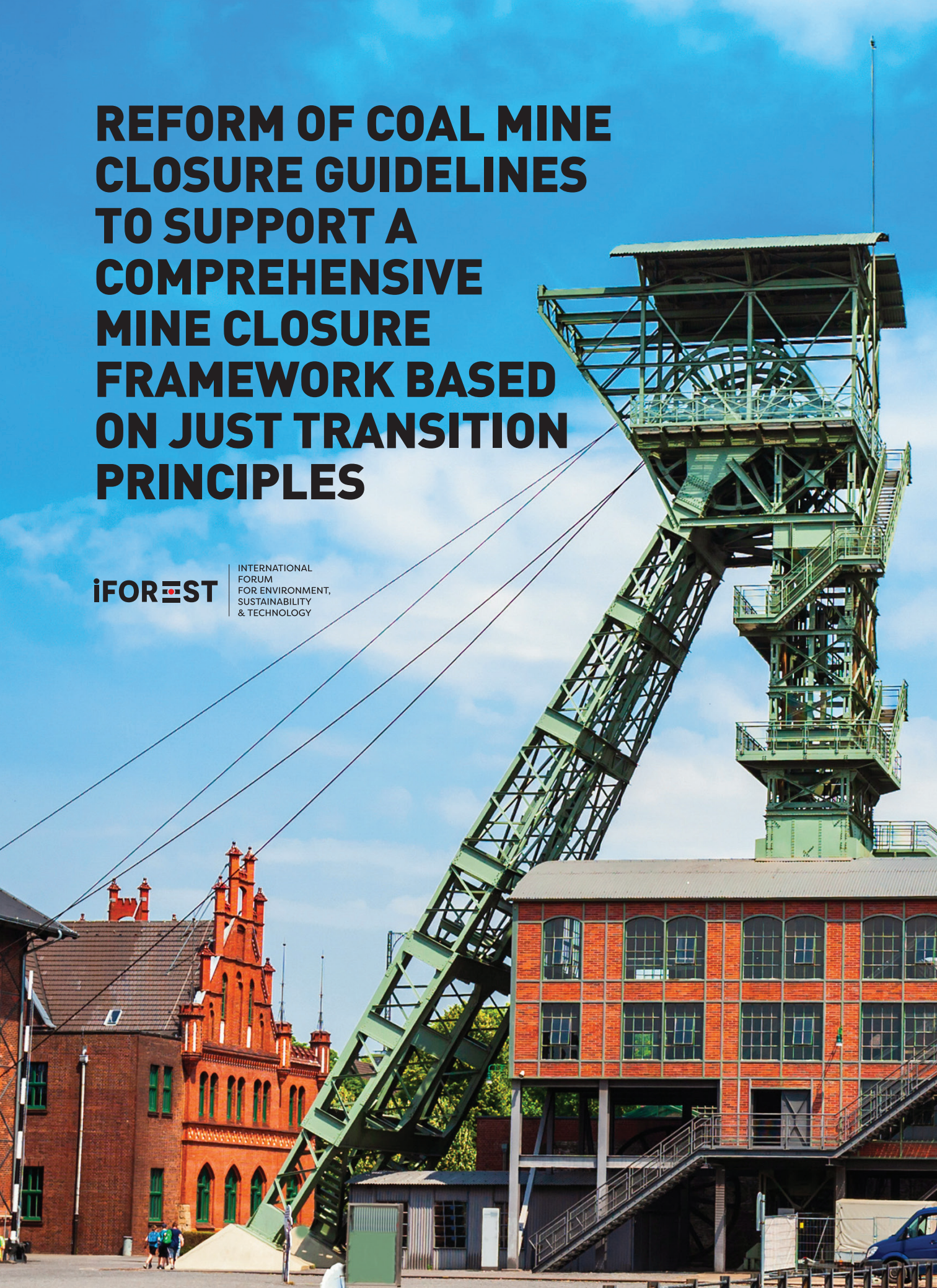

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Contents

List of Tables

List of Figures

List of Abbreviations

CBA Act	Coal Bearing Areas Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIL	Coal India Limited
CMPDI	Central Mine Planning and Design Institute
CMR	Coal Mines Regulations
COT	Consent to Operate
EC	Environmental Clearance
FC	Forest Clearance
FC Act	Forest Conservation Act
FLMPA	Federal Land Policy and Management Act
GoI	Government of India
ICMM	International Council on Mining and Metals
IGF	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
LA Act	Land Acquisition Act
LARR Act	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
MCP	Mine Closure Plan
MoC	Ministry of Coal
MSME	Micro, Small and Medium Enterprises
MT	Million Tonnes
MTPA	Million Tonnes Per Annum
NTPC	National Thermal Power Corporation
OB	Overburden
OSMRE	Office of Surface Mining Reclamation and Enforcement
PSU	Public Sector Undertaking
RCRA	Resource Conservation and Recovery Act
SAIL	Steel Authority of India
SCCL	Singareni Collieries Company Limited
SMCRA	Surface Mining Control and Reclamation Act
SPCB	State Pollution Control Board
WPI	Wholesale Price Index

Summary for Stakeholders

Mine closure is a complex and multifaceted issue that includes environmental, social, economic, and safety concerns. However, the existing coal mine closure guidelines primarily focus on bringing back the mining land as much as possible to pre-mining conditions and undertaking afforestation measures.

Reforming the coal mine closure guideline based on principles of just transition as the Ministry of Coal envisages, is crucial for ensuring sustainable development of regions historically reliant on coal mining. A comprehensive guideline addressing environmental, social, and economic aspects will help to promote environmental sustainability and socio-economic vitality in these regions once the mines are closed.

Key observations

i. The mine closure guidelines primarily focus on afforestation activities in the mined-out area.

The coal mine closure guidelines of 2009 and the subsequent amendments emphasises restoring the mining land to its original form post closure and undertaking afforestation measures in the mined-out area. Since on average about 90% of the pre-mining land use for opencast mines comes under agricultural land, forestland, grazing land, and wasteland, therefore, the focus on 'per-mining conditions' has restricted post-mining land use to primarily raising plantations, besides some measures of horticulture, developing eco-parks, etc. The scope of repurposing the land for gainful economic use to benefit the local community and generate revenue for the government has been undermined.

ii. The guidelines limit the scope of leaving the post-mining land to a feasible standard for other economic activities.

The closure guidelines attempt to minimise the land under external overburden (OB) dumps to abate land degradation as much as possible. For this, an increase of dump height to the maximum extent (considering the safety requirements) has been allowed. The mine closure plans, as designed, also allow significantly high OB dumps to exist outside the pits, as well as internal dumps of considerable height inside the pits.

Such practices mean that the land will not be ready for repurposing once mines are closed. Ideally for repurposing, extreme undulations in the closed mine area need to be minimised to maximise the availability of usable surfaces.

iii. The escrow amount of coal mine closure is grossly inadequate to support land repurposing.

The assessment of closure costs of representative opencast mines in various coalfields of India shows that the current escrow amount is insufficient to ensure repurposing.

The cost of coal mine closure for repurposing ranges from ₹25 per tonne to ₹300 per tonne of remaining extractable reserve depending on the mine reserve and characteristics. However, the escrow amount is only ₹5 per tonne to ₹25 per tonne of remaining extractable reserve. Therefore, the escrow amount is significantly lower considering the unit costs of repurposing. Also, the relationship between the closure cost and the lease area is insubstantial.

iv. Land laws related to mine closure lack clarity on the transfer of land post closure for promoting repurposing.

The land-related laws, such as the Coal Bearing Areas (Acquisition and Development) Act, 1957 (CBA Act) and the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and

Resettlement Act, 2013 (LARR Act), lack clarity on mechanisms of transferring the land to the state government once mines are closed.

There is also a lack of synergy between the provisions of the CBA Act and the coal mine closure guidelines. While the CBA Act remains ambiguous about returning the mining land to the concerned government authorities post closure, and therefore the land remains with the coal companies, the guidelines specify that the land needs to be surrendered to the state government after undertaking all final mine closure activities and obtaining a closure certificate from the Coal Controller.

Recommendations

i. Mine closure guidelines should be developed with the philosophy of maintaining economic continuity in mining areas along with ensuring environmental sustainability.

The basic philosophy of mine closure should change to develop a comprehensive mine closure framework based on just transition principles. Mine closure and post closure measures should be conceptualised and designed to ensure economic continuity in the areas where these mines have been operating, along with environmental sustainability.

The mine closure guidelines need to be revised to remove the chief focus on afforestation or bringing back the land to pre-mining conditions. The guidelines should specify that progressive and final mine closure planning should be undertaken to ensure positive social, economic, and environmental outcomes for the local community and the region post closure. The plans should also be designed in a manner to maximise the land available for repurposing for gainful economic activities.

ii. A social transition plan should be mandated as part of mine closure planning.

Social transition plans recognise the local dependence on a mine and the risks associated with the closure, and consequently create opportunities to encourage the development of sustainable post-closure options to minimise the negative impacts of mine closure on workers and the local community.

The mine closure guidelines should mandate the development of a social transition plan and outline mechanisms for implementation of the same. The social transition plan should be developed when the mining operations are still ongoing. The plan may be developed 10 years before the anticipated closure date (and revised subsequently depending on changing conditions) allowing sufficient time for social transition before the mine is closed.

A social transition team needs to be set up within the sustainability and/or just transition division of the mining company, to coordinate with internal and external stakeholders on social transition planning, determine the costs of transition, and identify necessary resources to implement the plan and monitor implementation measures.

iii. The financial provisions for mine closure for operational mines should be revised based on a well-defined methodology that is site and context-specific and includes social transition costs.

The costs of mine closure should be based on a well-defined and documented cost-estimating methodology that is project and site-specific. The cost estimation should be based on general and site-specific cost assumptions, and site uncertainties, risks, and contingency measures. The methodology should also integrate the costs of social transition.

The closure cost estimates of a mine need to be regularly reviewed to reflect changing circumstances and levels of risk. This will ensure that the accuracy of closure costs is refined and improved with time, and will assist with effective and timely management and mitigation of closure risks.

iv. A methodology should be separately developed for estimating the closure costs of non-operational (closed before 2009) mines.

A specific methodology and formula should be developed for determining the closure costs of 'non-operational mines', including discontinued, abandoned, and closed mines. For mines where only a 'temporary mine closure plan' should be prepared (such as for discontinued mines), a separate method for cost estimation should be developed.

Overall, the Government may consider developing a detailed guideline for the closure of non-operational mines, including outlining mechanisms of preparing mine closure plans for such mines to maximise the scope of repurposing the land for economic use, and estimating closure costs accordingly.

v. The land-related laws need to be amended to maximise the scope of repurposing.

While the industry has an important role to play in land repurposing, outlining mechanisms for returning the land to the state government will be important for maximising the scope of land repurposing. This will require amendments to be introduced in the land laws.

The CBA Act needs to be revised to provide specific directions on the surrendering of land once mines are closed. The revisions in the Act should be synergised with the coal mine closure to allow the surrendering/transfer of the land to the concerned state government. Similarly, amendments need to be introduced in the LARR Act, to allow returning the public land post closure (and after acquiring the closure certificate) to the concerned government, synergising with the provisions of the coal mine closure guidelines.

SECTION 1

INTRODUCTION

1.1. Context

The Ministry of Coal, Government of India, has envisaged developing a "comprehensive mine closure framework on just transition principles", along with appropriate institutional arrangement and funding mechanisms, to allow environmentally and socially responsible mine closure practices in the coming decades. The authorities on various occasions have noted that while the existing coal mine closure guidelines deal with the physical and environmental aspects of closure, the guidelines do not appropriately address the "social aspects of mine closure and repurposing of land and infrastructure assets".[1]

Developing a comprehensive mine closure framework based on just transition principles is a timely and important consideration. A vast amount of valuable land is available with operational and non-operational mines in India that can be used for various economic and social welfare activities once the mines are closed in a scientific manner.

For example, a review of statutory clearances and plans related to coal mines shows that at least 0.35 million hectares (ha) of land is available with the operational mines. Out of this, nearly 89% of the land is available in just seven states. These include Jharkhand, West Bengal, Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha and Telangana.

Besides, these states also have a large amount of land available with abandoned/discontinued mines. While the total land area under all abandoned/discontinued mines is not available, however, the large number of mines falling under these categories, which is at least 287, clearly suggests that potential.

Table 1: Land under operational coal mines

Type of mine	Number of mines	Lease area (ha)	Share of total lease area (%)
Opencast mines	226	2,18,666	62
Underground mines	156	1,13,351	32
Mixed mines	35	18,983	6
Total	**417**	**3,51,000**	

Source: iFOREST analysis; Land area as per latest available environment clearance letters of coal mines

Table 2: State-wise availability of coal mining land

State	Total		Opencast mines		Underground mines		Mixed mines	
	Land (ha)	Proportion (%)	Land (ha)	Proportion (%)	Land (ha)	Proportion (%)	Land (ha)	Proportion (%)
Jharkhand	58,395	17	42,269.5	19	11,696.9	10	4,428.5	23
West Bengal	54,827	16	10,847	5	35,769	32	8,211	43
Chhattisgarh	49,647	14	21,669.8	10	23,594.5	21	4,383	23
Madhya Pradesh	43,897	13	22,938	10	19,730	17	1,229	6
Maharashtra	38,322	11	28,950	13	8,641	8	731	4
Telangana	31,260	9	22,015	10	9,246	8	0	0
Odisha	30,056	9	25381.9	12	4673.6	4	0	0
Gujarat	15,485	4	15,485	7	0	0	0	0
Rajasthan	13,408	4	13,408	6	0	0	0	0
Tamil Nadu	12,835	4	12,835	6	0	0	0	0
Uttar Pradesh	2,692	1	2,692	1	0	0	0	0
Assam	175	0	175	0	0	0	0	0
Total	**3,51,000**		**2,18,666**		**1,13,351**		**18,983**	

Source: iFOREST analysis; Land area as per latest available environment clearance letters of coal mines

Table 3: Abandoned/discontinued coal mines

Company name	Number of abandoned/ discontinued mines	Location (as per the command area)
Eastern Coalfields Limited	84	West Bengal, Jharkhand
Bharat Coking Coal Limited	39	Jharkhand
South Eastern Coalfields Limited	66	Chhattisgarh, Madhya Pradesh
Western Coalfields Limited	56	Maharashtra, Madhya Pradesh
Central Coalfields Limited	21	Jharkhand
Mahanadi Coalfields Limited	2	Odisha
Northern Coalfields Limited	1	Madhya Pradesh
Northeastern Coalfields	6	Assam
Singareni Collieries Company	12	Telangana
Total	**287**	

Source: Ministry of Coal, 2022, Parliamentary response in Rajya Sabha; Information as obtained through RTI from coal PSUs, 2023

Therefore, a scientific and just closure of the coal mines, including repurposing of mining land can yield both environmental and social benefits for the local community. In essence, a comprehensive mine closure framework based on the principles of just transition will not only help in achieving better environmental outcomes and safety in the closed mine areas, but can also help to attract investments, generate employment, and enhance income opportunities.

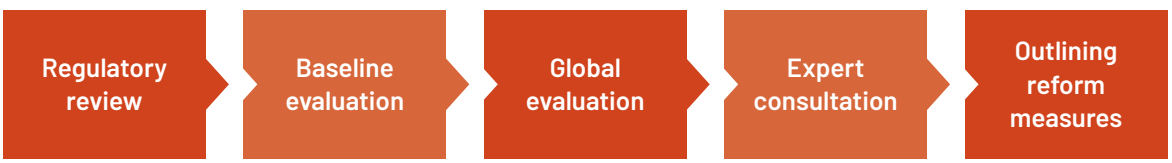
This report reviews the existing coal mine closure guidelines and the associated regulations to understand the reforms that are necessary for developing a comprehensive regulatory framework for coal mine closure. Based on the assessment, the report outlines the key reforms that can be considered for strengthening the closure framework aligning with the principles of just transition. It also highlights some of the key amendments in the land laws that need to be instituted to maximise the scope of repurposing of coal mining land by both public and private sector entities and maximise land utilisation for economic use.

1.2. Study approach

The reform framework for ensuring a sustainable and just closure of coal mines is based on a comprehensive review of the regulatory guidelines concerning coal mine closure in India, the associated regulations, and institutional mechanisms. The observations have been further substantiated by the evaluation of baseline information guiding mine closure practices in India.

Besides national review, a global evaluation of the regulations and guidelines has been undertaken to capture best practices. Based on national and global review and expert consultation, the key reforms required for developing a comprehensive mine closure guideline have been outlined.

Figure 1: Study approach



The reform measures as outlined in the report are intended to inform the government and the industry for developing a comprehensive mine closure framework, that not only ensures the environmental sustainability of the mining areas, but also continuity of economic activities and social vitality of these regions once mines are closed.

SECTION 2

REGULATORY REVIEW

2.1. Background

The regulatory assessment of coal mine closure includes the following components:

i. Review of the regulations/guidelines concerning coal mine closure;

ii. Review of environmental regulations related to coal mine closure; and,

iii. Review of regulations concerning the use and transfer of land when mines are closed to allow repurposing.

The objective of the review is to have a holistic understanding of the mechanisms of mine closure and repurposing potential, as they are closely related to ensuring sustainable and just coal mine closure.

2.2 Coal mine closure guidelines

The concept of systemic mine closure is relatively new to the regulatory landscape governing mining activities in India considering the country's long mining history.[2] The closure guidelines for coal mines were first promulgated in August 2009 by the Ministry of Coal (MoC). The guidelines have been subsequently amended with a key focus on two aspects, viz., the method of developing the mine closure plans (which include components of both progressive and final closure), and the amount that should be deposited (escrow account) towards the mine closure costs.

The following section evaluates the coal mine closure guidelines (of 2009 and subsequent amendments) and associated mechanisms to understand the scope of reforms that are necessary to ensure a sustainable and just closure of coal mines in the coming years.

a. Guidelines of 2009

The coal mine closure guidelines developed in August 2009 primarily intended to ensure a scientific closure of mines and rehabilitation of mining areas by coal mining companies. For this, the development of a progressive and a final mine closure plan (MCP) by the operators has been mandated. The progressive closure plan needs to provide details of various land use activities to be done continuously and sequentially during the entire period of the mining operations. The final mine closure plan should outline activities that would start towards the end of mine life and may continue until the mining area is restored to an acceptable level to create a self-sustained ecosystem. Typically, the final closure plan is required to be developed when a mine has less than five years of life left.[3]

The system of escrow was also introduced for securing the costs of closure in case the mine owner failed to complete the relevant closure activities, holding the mine owner as the ultimate entity responsible for the closure of mining operations. The amount to be escrowed was based on an estimation of typical closure cost for an opencast mine at ₹6 lakhs per hectare and for an underground mine at ₹1 lakh per hectare at the then price levels (August 2009) with escalations as per the Wholesale Price Index (WPI). The guidelines noted that up to 20% of the deposited amount in the escrow account can be released every year starting from fourth year, till the mine closure date.[4]

CONSIDERATIONS OF ECONOMIC REPERCUSSIONS OF COAL MINE CLOSURE AS PART OF MINE CLOSURE PLANNING, MINISTRY OF COAL

While the coal mine closure guidelines (2009) primarily dealt with the environmental aspects of mine reclamation and rehabilitation, the guidelines also recognised that the closure of mines will have an impact on the workers and the local community. Therefore, the guidelines stipulated that the final mine closure plan should include information on manpower retrenchment, compensation to be given, and the socio-economic repercussions and remedial measures consequent to the closure of the mines to be undertaken.

The guidelines outline the specifications that need to be provided. These include:

i. Number of residents employed in the mine, the status of the continuation of the family occupation, and scope of joining the occupation back.
ii. Compensation given or to be given to the employees concerning their sustenance and their family members.
iii. Occupations connected to the mining industry, including the number of persons engaged therein, and continuance of such business after mine closure.
iv. Continued engagement of employees in the rehabilitated status of the mining lease area and any other remnant activities.
v. Envisaged expectation of the society on closure of mines.

Source: Ministry of Coal, Government of India. (2009). Guidelines for preparation of mine closure plan

When the 2009 guidelines were promulgated, there were two types of mines. These included the mines that started operation before August 2009 and were continuing with their operation and mines that were closed/ discontinued/ abandoned either temporarily or permanently before that date.

Mines that started operation before 2009 and were continuing at that time, were placed in the ambit of the guidelines requiring the preparation and formal approval of a MCP. It was specified that the mines should have an approved MCP within a period of one year from the issuance of the guidelines or two years in advance of mine closure, whichever was earlier.[5]

Subsequently, an escrow account for each mine was required to be opened and mines were allowed to operate only with valid escrow accounts. These mines have been following progressive closure (every five years from the date of opening of the escrow account). The revision of mining plans as well as the MCPs are also being carried out depending on the expansion/re-organisation of respective mines as applicable. Subsequently, revision of escrow agreements, etc. are also being carried done.

Mines that were closed/ discontinued/ abandoned either temporarily or permanently before August 2009 were not covered under the 2009 notification, and no formal MCP was required as per the guidelines.

b. Amendments to the 2009 guidelines

Over the past 10 years, the coal mine closure guidelines have been revised three times (2013, 2019, and 2020) to improve mine planning, mine management, and closure measures. Besides notifications have also been issued by the Government to deal with closure, reclamation, and repurposing of discontinued mining land.

In January 2013, the first set of amendments was introduced to the guidelines. The guidelines required mine operators to indicate and plan the sequence of mining operations in a phased manner, with

instructions to initiate afforestation or reclamation work in the mined-out areas of the first phase while commencing the operations in the second phase. This amendment suggested that all efforts should be made to keep land requirement at a bare minimum for external overburden (OB) dumping. This may also require increase of dump height to the maximum extent (while ensuring safety).[6]

The reimbursement limits from the escrow account were relaxed and the operators could now claim the amount spent on progressive mine closure or up to 80% of the total deposited amount including the interest accrued whichever is lower. The balance amount would be released to the mine owner at the end of the final closure and in compliance with all provisions of the approved closure Plan.[7]

The guidelines were further amended in December 2019. One of the key inclusions in the amendment was the revision of the mine closure cost. It was specified that as per the 'current' WPI notified by the GoI (based on the base year of April 1, 2019), the closure costs for opencast mines are ₹9 lakhs per hectare, and that for underground mines is ₹1.5 lakhs per hectare. It was noted that the rates will be revised as per the WPI as notified by the GoI from time to time. Details of activities for which financial obligation is considered is outlined in Table 4.

The guidelines also revised the amount that the mine operators could claim for progressive closure activities. From the earlier 80%, this was revised as up to 50% of the total escrow amount or the actual expenditure in the last five years, whichever is lower.[8]

In May 2020 the guidelines were once again modified to provide further specifications on the formulation of a mining plan by a qualified person or an accredited mining plan preparing agency, submission and review processes, and approval of the same.[9]

Table 4: Mine closure activities for which financial obligation is considered

Category	Overall description of activities	Activities under progressive closure	Activities under final closure
Technical reclamation	i. Rehandling or backfilling of external OB dumps, dozing and grading the waste rock 'broken overburden' back into the pit to minimise the left-out void. ii. Construction of toe walls and garland drains around dumps, voids and water bodies. iii. Separate stacking and maintenance of top soil.	i. Reclamation of mined-out land and OB dumps. ii. Filling of void through rehandling of crown dump.	i. Filling of void. ii. OB rehandling for backfilling. iii. Construction of peripheral roads, gates, view point, cemented steps on bank. iv. Construction of toe walls and garland drains around dumps, voids and water bodies.
Biological reclamation	i. Layering the top soil back onto reclaimed land area for plantation. ii. Plantation of suitable species on the reclaimed area, backfilled pit and any remaining external dump. iii. Plantation over designated areas, such as, safety zones, green belts, vacant undisturbed lands earmarked for plantation.	i. Top soil management. ii. Plantation over virgin area including green belt. iii. Plantation on mined out land and OB dumps.	i. Top soil management and landscaping. ii. Plantation activities. iii. Development of agricultural land (where applicable).
Subsidence management (for underground operations)	Remediation of excessive subsidence on surface above caved out/ depillared mining areas.		Subsidence monitoring for five years.

Table 4 continued

Category	Overall description of activities	Activities under progressive closure	Activities under final closure
Safety and security	i. Securing the mining area to avoid any eventualities by barbed wire fencing or construction of concrete or gabion walls. ii. Sealing of inclines, shafts and other portals in case of underground mines.	i. Barbed wire fencing around dump and pit. ii. Construction of toe wall around the dump. iii. Construction of garland drains.	i. Barbed wire fencing around dump and pit. ii. Construction of toe wall around the dump. iii. Construction of concrete wall with masonry pillar around the pit and water body. iv. Construction of garland drains. v. Securing air shaft and installation of borewell pump. vi. Securing incline (underground mines). vii. Stabilising by benching of side walls of the water body.
Demolition and dismantling	i. Reuse of the existing infrastructure developed by the mining operator or demolition of the same. Also includes dismantling of any remaining plants and operational support structures and machinery.		i. Dismantling of workshops, pumps, pipes, and other fixtures. ii. Dismantling of stowing bunker, provisioning of pumps for borewell pumping arrangement (in underground mines). iii. Dismantling of mining equipment as applicable. iv. Dismantling of power lines as applicable. v. Rehabilitation of dismantled facilities.
Environmental monitoring, management and supervision	Monitoring and management of environmental parameters of air, water and noise for a period of three years post closure.	Water quality, air quality and waste management.	i. Post mining air and water quality management for three years. ii. Waste management. iii. Manpower cost of supervision.
Social measures	Entrepreneurship development of affected people, providing retrenchment benefits, and continuation of services such as schools, hospitals etc.		i. Entrepreneurship development (vocational/ skill training for sustainable income of affected people). ii. Golden handshake / retrenchment benefits to 100 employees of opencast mine, and 200 employees of underground mine. iii. One-time financial grant to societies and institutions which is dependent upon the project. Provide jobs in other mines of the company. iv. Continuation of other services like running of schools etc.

Source: Ministry of Coal, Government of India. (2019). Guidelines for preparation of mining plan for the coal and lignite blocks

c. Guidelines for closure of discontinued mines and repurposing of mining land

Apart from dealing with the scientific closure and reclamation of the operational mines, the Government has also issued notifications and guidelines over the past two years regarding the closure of discontinued mines and repurposing of the mining land.

In April 2022, the Union Cabinet chaired by the Prime Minister of India gave a nod to a set of policy guidelines developed by the Ministry of Coal allowing development of certain coal and energy infrastructure and social infrastructure in land acquired under the Coal Bearing Areas. (Acquisition and Development) Act, 1957.[10] The guidelines aim to repurpose the land lying idle with the coal public sector undertakings (PSUs). This includes land where coal mining is not economically viable or the areas that have been de-coaled and reclaimed.

The PSU, which is currently holding the land, can lease it to other central PSUs, state government agencies/PSUs, and other private entities for certain activities for a defined period. The Board of the PSU has been designated as the 'competent authority' to approve all land lease proposals.[11]

Table 5: Infrastructure development activities in discontinued and idle mine land acquired through CBA

Activity type	Lease period
Setting up coal washeries	Maximum 30 years
Setting up conveyor systems	Maximum 30 years
Setting up coal handling plants	Maximum 30 years
Constructing railway sidings	Maximum 30 years
Setting up project offices	Maximum 30 years
Setting up thermal power projects	Maximum 35 years
Setting up renewable projects	Maximum 35 years
Setting up coal gasification and coal to chemical plants	Maximum 35 years
Coalbed methane	Maximum 30 years, or as may be allowed by the government to the coalbed methane concession holder
Rehabilitation and resettlement of project-affected families due to the acquisition of land under the CBA or other land acquisition law	Maximum 99 years
Setting up development-related infrastructure- hospitals	Maximum 99 years
Compensatory afforestation projects	Maximum 99 years
Right of Way- railway lines and highways	Maximum 99 years
Other energy-related infrastructure	Period not specified

Source: Ministry of Coal. Office Memorandum dated April 22, 2022

In October 2022, the Ministry of Coal issued another set of guidelines for scientific closure of mines that had been discontinued/closed/abandoned before 2009, and repurposing of the mined-out land. It was observed that the mine closure guidelines of 2009 and the subsequent amendments have not dealt with such mines. Besides mine closure, the guidelines intend to "provide benefit to the community, prevent illegal mining, and ensure the safety and repurposing of the mined-out land".[12]

Three things have been highlighted for the management and closure of the concerned mines. These include categorising and defining non-operational mines as discontinued, abandoned, and closed mines, specifying requirements of temporary and final mine closure plans, and specifying means of securing financial resources for closure activities. *(See box: Management and closure of mines discontinued/closed/abandoned before 2009)*

MANAGEMENT AND CLOSURE OF MINES DISCONTINUED/CLOSED/ ABANDONED BEFORE 2009

India's long history of coal mining has created a major challenge with the scientific closure and repurposing of the mines that were discontinued/closed/abandoned before the first mine closure guidelines were promulgated in 2009. As recognised by the Ministry of Coal, the 2009 guidelines and the subsequent amendments have been "silent about them". To ensure the scientific closure of these mines and repurposing of the mine-out land, the ministry issued a set of guidelines through an Office Memorandum in October 2022.

The 2022 guidelines outline three specific things concerning the management and closure of such mines. These include:

i. Categorising and defining non-operational mines;
ii. Specifying requirements of temporary and final mine closure plans for such mines; and,
iii. Specifying how financial resources for undertaking the closure activities should be ensured.

i. Categories of non-operational mines

The guidelines have defined the various categories of non-operational mines, i.e., those that are discontinued, abandoned, and closed.

Discontinued mines: Mines where working have been discontinued for any reason and are inaccessible or rendered inaccessible but are likely to be worked again. These mines can be re-opened as per provisions of the Coal Mines Regulations (CMR), 2017, and the Colliery Control Amendment Rule, 2021.

Abandoned mines: Mines that have been abandoned with no intention of working in the future for which the owner of the mine has already submitted a notice to the Chief Inspector of Mines, Regional Inspector, and District Magistrate about abandonment in the prescribed format under CMR, 2017.

Closed mines: Mines for which the owner/agent/manager has submitted a notice of closure in the prescribed format under CMR 2017, to the Chief Inspector of Mines, Regional Inspector, and District Magistrate and has also obtained the mine closure certificate from the Coal Controller.

ii. Development of temporary and final mine closure plans

Mine owners are required to take specific steps based on the category of their non-operational mines. For discontinued/abandoned mines, possibilities of re-operationalisation should be explored, and if not feasible, a temporary mine closure plan should be prepared as per the Mine Closure Guideline of May 2020.

For the closed mines, a final mine closure plan should be prepared per the closure guidelines of May 2020 and followed by the implementation of closure activities. The mine owners will carry out the temporary and final mine closure activities within three years and five years respectively.

Concerning worker support measures, the guidelines mention that "careful consideration is to be given to provide reskilling to the willing workers as per their need for their gainful employment".

iii. Financial resources for closure activities

The costs associated with undertaking temporary and final mine closure activities for abandoned and closed mines should be borne by the respective coal companies. The guidelines stipulate that if the companies cannot meet the costs, CIL may consider levying additional fees on a per tonne basis to be paid by the coal consumers to meet the closure cost.

Source: Ministry of Coal, Government of India. (October 28, 2022). Guidelines for the Management of Mines Closed/ Discontinued/Abandoned before 2009

d. Overall observation of the existing guidelines and its limitations

The review of the coal mine closure guidelines, as developed and amended from time to time, shows that the guidelines are particularly focused on ensuring mine management and mine closure practices to minimise the negative effects of mining operations on the land and the surrounding environment. The guidelines have not been designed to support two of the key aspects of just transition- the repurposing of land for gainful economic activities, and social transition measures to benefit the local community. The key drawbacks of the guideline are outlined below.

i. The guidelines primarily emphasise afforestation activities on closed mining land

The mine closure guidelines of 2009, and the subsequent amendments have primarily focused on afforestation activities in the mine-out area. Below are the clauses that underscore this:

- Guidelines of December 2009, Para 3.1, specified that "*Mining is to be carried out in a phased manner initiating **afforestation work in the mined-out area** of the first phase while commencing the mining in the second phase i.e., the continuation of mining activities from one phase to other indicating the sequence of operations depending on the geo mining conditions of the mine*".
- The 2013 guidelines also give similar specifications as mentioned above.
- Guidelines of December 2019, Para 2.1, also reiterates that "*Mining is to be carried out in a phased manner along with **reclamation and afforestation work in the mined-out area***".
- Guidelines of May 2020, Para 2, (the one currently in force) specify that "*The mine closure details of the mining plan should be **oriented towards the restoration of land back to its original form** as far as practicable or further improved condition*".

The emphasis on restoration of the mining land to its original form means that reclamation and subsequent repurposing activities will be limited to afforestation/plantation measures, some prepromotion of horticulture, and similar activities. For example, an analysis of pre-mining land use (i.e., the original form of the land) of some of the biggest open cast coal mines operated by various subsidiaries of CIL, shows that on average above 90% of the pre-mining land use comes under agricultural land, forestland, grazing land, and wasteland. Therefore, plantation is the pre-dominant post-mining land use practice as outlined in the approved mining plans and statutory clearances.[13]

ii. The guidelines do not include necessary provisions to ensure the post-mining land is left to a feasible standard for other economic activities

The guidelines primarily attempt to minimise the land under external OB dumps to abate land degradation as much as possible. For this, an increase of dump height to the maximum extent (considering the safety requirements) has been allowed.

The increase of the permissible height while reduces the surface footprint of external OB dumps, the topography changes due to the increased height over the ground level make it extremely difficult to repurpose the land for other economic activities post-mining. Besides, the mine closure plans, as designed, also allow significantly high OB dumps to exist outside the pits, as well as internal dumps of considerable heights inside the pits.

Table 6: Assessment of pre-mining land use of opencast mines

Name of mine	Agricultural land (ha)	Forestland (ha)	Wasteland (ha)	Grazing land (ha)	Surface water bodies (ha)	Others (ha)	Private land (ha)	Township (ha)	Total lease area (ha)	Agriculture land+ Forestland+Waste land+Grazing land (ha)	Share of Agriculture land+ Foresland+ Wast-land +Grazing land of total area (ha)
Lingaraj	828.7	186.3	389.9	0	45	43.3	0	0	1,493.2	1,404.9	94.1
Ananta	359.1	331.5	662.2	0	36.7	30.2	0	0	1,419.8	1,352.8	95.3
Bhubaneswari	445	112.5	0	0	0	80.8	0	0	638.3	557.6	87.3
Balram	1,234.9	250.6	308.5	0	12	701.4	0	0	2,507.4	1794	71.5
Hingula	333.6	435.2	939.7	0	14.4	19.1	0	0	1742	1,708.5	98.1
Jagannath	106.8	82.8	182.5	0	55	151.4	0	0	578.5	372	64.3
Bharatpur	615.2	222.4	469.8	38.8	37.7	14.3	0.0	158.7	1,556.9	1,346.3	86.5
Samaleswari	86.4	580.3	644.9	0	23.3	0	0	0	1,334.9	1,311.6	98.3
Lakhanpur	1183	323.8	930.6	0	0	42.6	0	0	2,480	2,437.4	98.3
Parsa East Kante Besan	701.8	1871.1	0	0	0	110	0	0	2,682.9	2,572.9	95.9
Manikpur	531.9	375.9	111.2	0	0	0	0	0	1,018.9	1,018.9	100
Baroud	567.6	381.3	0	2.3	3.6	156.7	0	0	1,111.4	951.1	85.6
Dipka	1,409.2	409.1	181		0	0	0	0	1,999.3	1,999.3	100
Gevra	2,520.6	1,016.4	571.2	0	7	0	0	69.3	4,184.5	4,108.2	98.2
Konar AKK	24.1	507.3	0	0	0	16	0	0	547.4	531.3	97.1
Rajmahal	1,715.2	107.4	0	0	0	155.4	0	0	1,978	1,822.6	92.1
Sasti	899.5	0	20.2	0	0	0	0	0	919.7	919.7	100
Penganga	597	46	0	0	0	100.8	0	0	743.8	643	86.4
Dudhichua	806.9	1,217.6	0	0	0	366.2	0	0	2,390.7	2,024.5	84.7
Ningahi	1,567.4	1260	0	0	0	191	0	0	3,018.4	2,827.4	93.7
Bina	513	1257	0	0	0	28	0	0	1798	1770	98.4

Source: Environmental clearance letters and mining plans of respective mines

iii. Closure costs based on standard units are inadequate to support land repurposing

The following are the key limitations in the mine closure costs as specified in the guidelines:

- The cost rates for opencast and underground mines are based on a standard/universal unit cost (which is per hectare of land) and are not site-specific.
- No factors are considered for the actual condition of the mines under consideration, such as the lay and disposition of seams, which will have major implications for closure costs.
- The escrow amount also does not reflect the true closure cost if the de-coaled land has to be backfilled and levelled for repurposing. For example, an analysis of all operations mines in four districts (Angul, Korba, Ramgarh, and Bokaro) with various gradients, depth, seams, and stripping ratio show that the costs of actual closure as compared to the escrow amount vary highly. *(See box: Cost of repurposing a coal mine).*

- The cost rates also do not differentiate between new and legacy mines, many of which have been operational for a long time before the mine closure guidelines came into effect in 2009. These mines have significant land area under external OB dumps, poor mine reclamation, poor soil and water management practices, etc. However, the closure plans of these mines, outline a plan for slope reduction and plantation on external OB dumps and prioritisation of backfilling of waste rock generated 2009 onwards.[14] Similarly for underground mines, subsidence management has only become a key aspect post-2009.
- The mine closure plans and associated costs do not account for the social transition investments and associated costs which is crucial for ensuring a just and inclusive transition.

COST OF REPURPOSING A COAL MINE

Repurposing of coal mining land can play a significant role in building a green economy in coal-dependent regions. For repurposing, an optimum closure practice must be followed to maximise the availability of usable surfaces. In other words, the closure practice has to be such that the maximum amount of de-coaled area is filled back, levelled, and stabilised by rehandling internal and external OB dumps.

To estimate the cost of repurposing, a sample of 17 opencast coal mines from four major districts of India – Angul (in Odisha), Korba (in Chhattisgarh), Bokaro and Ramgarh (in Jharkhand)— were studied in detail.

The cost components associated with repurposing the land for alternative economic use include:

- The total cost incurred in filling the void left after mining by rehandling the wastes from external OB dumps and waste above the ground level from internal OB dumps;
- Dozing and levelling on internal OB dumps;
- Topsoil management; and,
- Other costs include demolition and dismantling, safety and security, and miscellaneous costs.

The cost of biological reclamation, social support, and other economic activities have not been included as they will depend on post-mine land use and just transition plan. The unit cost for each of these components has been estimated from a sample of 50 mines across India and applied to the selected mines.

Results

The cost for repurposing varies widely between mines, from about ₹25 per tonne of remaining extractable reserve to more than ₹300 per tonne of remaining extractable reserve. However, there is a similarity in cost within the coalfields.

For instance, the average cost of coal mine closure for repurposing is highest in Bokaro and Ramgarh districts (> ₹200/ tonne of remaining extractable reserve) and lowest for Angul (about ₹50/ tonne of remaining extractable reserve); the costs in Korba falls in between (about ₹115 / tonne of remaining extractable reserve). The cost also significantly varies among older and comparatively less old mining areas. For example, the average cost of repurposing is highest in Bokaro and Ramgarh and is least in Angul. Interestingly, there is no relationship between the closure costs and lease area.

The results show that the current escrow amount is insufficient to ensure repurposing. While the cost of coal mine closure for repurposing ranges from ₹25 per tonne to ₹300 per tonne of remaining extractable reserve, the escrow amount is only ₹5 per tonne to ₹25 per tonne of remaining extractable reserve. Overall, depending on the mine reserve and characteristics, the escrow amount is 6 to 30 times lower than the repurposing costs.

Box continued

Cost of repurposing versus Escrow amount

Name of the mine	Production capacity (MTPA)	Remaining mine life (yr)	Mineable reserve (MT)	Escrow amount (₹/ tonne coal reserve)	Cost of repurposing the land for alternate economic use (₹/tonne coal reserve)	Cost in excess of escrow amount (times)
A. Angul (Part of Mahanadi coalfields)						
Bharatpur	20	29	593.7	2	23.4	11.7
Balaram	15	49	721	3.1	59.6	19.1
Ananta	20	23	320	3.3	73.9	22.2
Lingaraj	20	19	321.5	4.2	26.9	6.4
Kaniha	14	31	625	1	25.3	24.5
Hingula	15	33	513.9	3.3	101.3	30.9
Bhubaneswari	28	23	366	1.6	29	18.5
Average				**2.6**	**48.5**	**18.3**
Maximum				**4.2**	**101.3**	
Minimum				**1**	**23.4**	
B. Korba (Part of Korba coalfields)						
Gevra	40	14	1085.2	3.5	49.5	14.3
Dipka	35	25	948.04	1.9	32.9	17.4
Kusmunda	50	14	779	1.9	59.6	31.1
Manikpur	5.25	12	66.4	13.8	317.1	23
Average				**5.3**	**114.8**	**21.8**
Maximum				**13.8**	**317.1**	
Minimum				**1.9**	**32.9**	
C. Ramgarh and Bokaro (Part of East Bokaro, West Bokaro, North Karanpura coalfields)						
Rajrappa	3	23	75.7	26.9	279.8	10.4
EPR Topa	5.25	32	39.7	13.1	308.7	23.6
Jharkhand	2.7	16	43.2	5.5	105.9	19.4
Pundi	2.5	28	76.8	10	276.7	27.7
Govindpur Phase II	1.2	15	19	13	209.4	16.1
Amlo (AAD)	2.5	11	30	7.4	121.2	16.3
Average				**12.6**	**216.9**	**17.2**
Maximum				**26.9**	**308.7**	
Minimum				**5.5**	**105.9**	

Source: iFOREST analysis

iv. Issues of environmental remediation are not adequately addressed

The adverse impact caused by years of exploitation of land and water resources at the mining location and subsequent measures of remediation are weakly addressed. Monitoring and supervision of environmental parameters for three years post-closure may not be sufficient to completely mitigate these impacts. This may have implications for the health and economic activities of the local community and put them at a disadvantage for the long term, or even permanently.[15]

2.3 Other regulations pertaining to mine closure and land repurposing

Besides, mine closure guidelines, the environmental and land regulations are also important for ensuring scientific mine closure, and optimising land repurposing potential, respectively.

2.3.1 Environment-related laws

Besides the coal mine closure guidelines, environmental management and compliance obligations of a mining company are also built in as a component of their ongoing mining practices. The conditions for environmental management are largely stipulated in the environmental clearance (EC) and forest clearance (FC) letters related to a mine, which are issued under the Environmental Protection Act, 1986, and the Forest Conservation Act,1980 respectively.

a. Conditions in environmental clearance

The environmental conditions to be complied with as part of mine closure are specified under the 'Specific Conditions' in the EC letters. These, include conditions for OB handling, filling up of mine void with OB, topsoil management, etc.[16] As per information of officials of the Coal Controllers Organization, the periodic environmental monitoring and compliance reports of mining activities, as verified by the concerned authorities, constitute the basis of assessing compliance. There is no separate report that is to be prepared for closure purposes on this account.

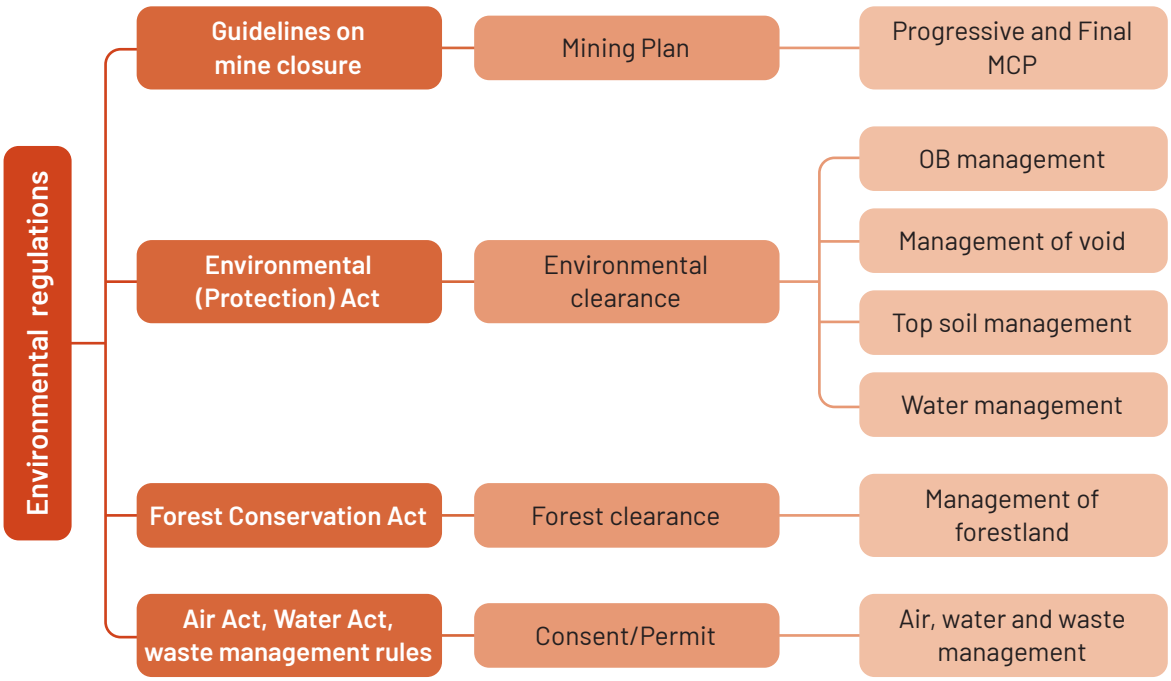
b. Conditions in forest clearance

The FC letters of coal projects specify the management of forestland, that is considered for diversion for undertaking mining activities. The conditions specify that the 'legal status of the forest land shall remain unchanged'. The Government has further specified that the period of diversion of the forestland shall be co-terminus with the mine lease period.[17] Both these conditions considered together underscore the fact that the forest land shall be handed over to the forest department once mines are closed.

c. Consent orders

Besides, ECs and FCs, conditions of mine management are also stipulated in the consent orders, particularly Consent to Operate (COT), issued by the State Pollution Control Boards (SPCBs) in compliance with the Air (Prevention and Control of Pollution) Act, 1981 (Air Act) and the The Water (Prevention and Control) Act, 1974 (Water Act). While there is no specification of conditions related to mine closure in the consent orders, the environmental compliance reports prepared by the mining companies on basis of the consents, provide an understanding of the environmental condition of a mining area at the time of closure.

Figure 2: Environmental regulations related to coal mine closure



Source: iFOREST analysis

d. Overall observations on environment-related laws

The compliance conditions stipulated in the EC and FC aim to ensure that during the operational life the mines are managed well to minimise liability at the time of closure. However, as per state environmental authorities, the specific conditions related to final mine closure (as stipulated in the ECs) are difficult to monitor for compliance given the long duration of the mining projects, and the capacity of authorities. The compliance of these activities is monitored through the half-yearly compliance reports which are prepared by the project proponents.[18]

There is also vagueness on the role of SPCBs in post-closure monitoring of air and water quality management. While the closure guidelines mention the requirement to monitor air and water quality for three years after mines are closed, it is.

2.3.2 Land-related regulations

Besides scientific closure and reclamation of coal mines, a key aspect related to just closure is the repurposing of the coal mining land for gainful economic use that can benefit the local community and support the economy. For repurposing, a determining factor is the ownership status of land once mines are closed.

a. Land ownership of coal companies

Since coal is considered a national asset and a resource for 'public purpose', regulations of acquiring and using land for coal mining is distinguished from many other industrial land use. The most important one is the Coal Bearing Areas (Acquisition and Development) Act, 1957 (CBA). The law has allowed public sector companies, the CIL, and its subsidiaries, to acquire substantial stretches of land for prospecting and mining purposes.[19]

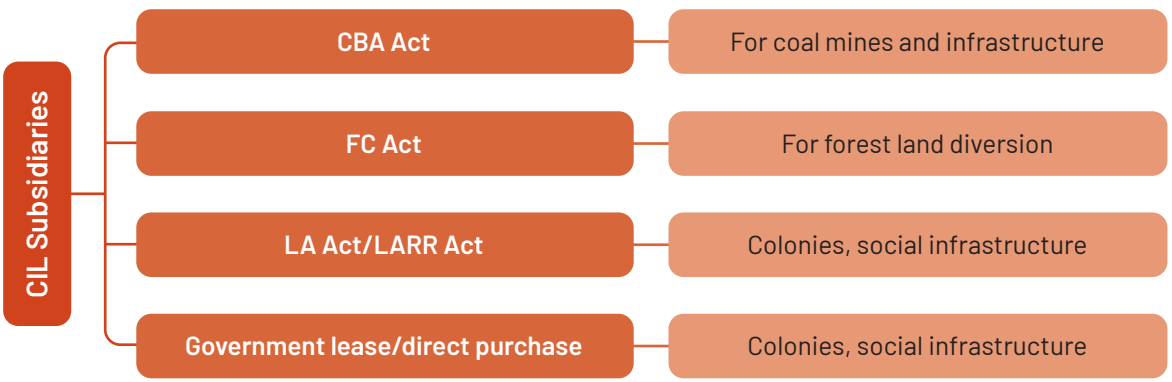
Besides, the Land Acquisition Act, 1984 (which in 2013 was replaced by the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 or the LARR Act), has been used for acquiring land for other purposes, such as for developing infrastructure, townships, etc.

Besides CIL and its subsidiaries, land for coal mining and the development of related infrastructure is also acquired by other coal companies. This includes the Singareni Collieries Company Limited (SCCL), under the ownership of the Government of Telangana, the Central PSUs such as the National Thermal Power Corporation (NTPC) or the Steel Authority of India (SAIL) and the state power generation companies.

The SCCL has been acquiring land for coal mining under the LA Act/LARR Act that is privately owned. For government land, the land has been transferred by the concerned state government to the company. The company acquires land under the CBA Act only for its operations in other states, such as the upcoming projects in Odisha.[20]

For NTPC, the Ministry of Coal specifically notified the procedure for land acquisition under the CBA Act.[21] Feedback from the officials of the PSUs and the Ministry suggests that while the CBA Act applies to all PSUs[22] , the non-CIL PSUs acquire land through both the CBA Act and the LA Act/LARR Act on a case-to-case basis.[23] In all cases, land meant for colonies and other employee-related infrastructure is acquired under the LA Act/LARR Act leased from the government or directly purchased from the owners.

Figure 3: Laws under which CIL subsidiaries acquire land



Source: iFOREST analysis

With respect to private companies, land is acquired only through the LA Act/LARR Act. Land required for colony or employee-related infrastructure developed is directly purchased for individuals or leased from the concerned government.

b. Scope of land transfer for repurposing

The review of the CBA Act, the LARR Act, and the FC Act show that there is limited scope of transferring the land to other entities once mines are closed.

Land transfer issues under the CBA Act

The CBA Act (as amended till December 1976) remains ambiguous about what happens to the coal mining land once mines are closed. Such ambiguity arises from two factors, viz., the duration of the mine-lease period, and the ownership status of the land once mines are closed.

Section 11 of the CBA Act outlines the 'Power of Central Government to direct vesting of land or rights in a Government company'. Section 11(2) specifies that "*Where the rights under any mining lease acquired under this Act vest in a Government company under sub-section (1), the Government company shall, on and from the date of such vesting, be deemed to have become the lessee of the State Government as if a mining*

lease under the Mineral Concession Rules had been granted by the State Government to the Government company, the period thereof being the entire period for which such a lease could have been granted by the State Government under those rules; and all the rights and liabilities of the Central Government in relation to the lease or the land covered by it shall, on and from the date of such vesting, be deemed to have become the rights and liabilities of the Government company".

The reading of Section 11 has led to the interpretation that coal mining leases are granted to PSUs in 'perpetuity' for the lifetime of the mine.

Concerning the ownership status of the land once the mines are closed, Section 12 of the CBA Act specifies that "*The competent authority may, by notice in writing, require any person in possession of any land acquired under this Act to surrender or deliver possession of the land within such period as may be specified in the notice, and if a person refuses or fails to comply with any such notice, the competent authority may enter upon and take possession of the land*".

While the provision mentions surrendering the mining land or delivering possession, no clear guidelines have been developed on how the land should be surrendered. In the absence of it, after mining is over, the land has been staying with the coal companies and no land has been 'surrendered' or handed over to the government so far.[24]

However, the coal mine closure guidelines stipulate that the land needs to be surrendered to the state government after final closure activities. As mentioned, the mine owner is required to obtain a final mine closure certificate from the Coal Controller after undertaking reclamation and rehabilitation work, and all final mine closure activities, "for surrendering the reclaimed land to the state government." (Para 2.17).[25]

Land transfer issues under the LARR Act

The LARR Act, 2013, specifies provisions for the return of land to the government and reuse of the same for other purposes for which it has been originally acquired during 'unforeseen' circumstances.

The Act stipulates that "*No change from the purpose or related purposes for which the land is originally sought to be acquired shall be allowed, provided that if the land acquired is rendered unusable for the purpose for which it was acquired due to a fundamental change because of any unforeseen circumstances*". In such cases, the appropriate Government may use such land for any other 'public purpose'.[26] Besides, the law also specifies that no change of ownership without specific permission from the appropriate government shall be allowed.

Overall, like the CBA Act, there is no provision specified in the LARR Act for return of the coal mining land to the state government following closure.

Land transfer issues under the FC Act

There is also concern about the reuse of the forestland that is part of the mine lease area. The status of such land is governed by the FC Act, of 1980 and the Rules developed under it.

As per the FC Act, read along with the FC Rules, 2003,[27] "*The Regional Office of the MoEF&CC shall regularly monitor the status of compliance to conditions stipulated in approvals accorded under the FC Act for diversion of forest land falling in mining leases to ensure that the user agencies comply with all the conditions before the land falling in such leases is surrendered to the concerned State Government/Union Territories on expiry of the mining lease*".

As per the provision, if a coal mining activity involves forest land, the land will be surrendered to the concerned authorities of the state government (or the Union Territory) on the expiry of the mining lease. However, this limits the scope of repurposing of such land post closure. Once forest land is returned to the forest authorities, a fresh set of clearance will be required for undertaking any repurposing activity in such land. This can create potential deterrence for repurposing. It is also desirable to repurpose the

forestland that has already been diverted for mining and related activities, instead of diverting new forestland for economic purposes.

c. Overall observations on land transfer for repurposing

Overall, a review of the CBA Act, the LARR Act, the FC Act, and the forest rules, makes clear that there exists a lack of clarity for returning/transferring the mining land to the state government post closure. There is also a lack of synergy between the provisions of the CBA Act and the coal mine closure guidelines. These collectively undermine the scope of land repurposing. Therefore, a reform in various land-related laws will be required to ensure synergy between the coal mine closure guidelines and these laws.

SECTION 3

GLOBAL REVIEW

3.1. Background

Mine closures, until recent years, have been perceived as an environmental issue by most countries and the industry at large. Therefore, the regulatory provisions concerning mine closures are largely related to the environmental and mining laws. Most of these regulations and guidelines require that mined-out land be returned to a condition as close as possible to the pre-mining situation.[28]

A comprehensive framework for mine closure, covering various aspects that are intricately related to a just closure process, such as environment responsiveness, land rehabilitation and repurposing, labour issues, and other socio-economic aspects, has not been developed in most countries. A study conducted by the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) of 30 countries across North America, South America, Europe, Asia, Africa, and Oceania (2021) showed that 76% of the countries required preparation of a mine closure plan as part of mine development, however, the comprehensiveness of these plans considering all aspects of mine closure — technical issues, environmental/ecological aspects, and socio-economic aspects, etc.— is extremely limited.[29]

There is also a huge problem with the financial assurance that is mandated. The assessment showed that the full amount of the estimated closure cost is secured through financial assurance only in a few countries. Also, often, the real costs of closure are underestimated. This puts many countries and coal regions at 'financial, environmental, and social risk' in case mining companies fail to implement mine closure measures.[30] At the same time, it is a business risk for the companies if they have to pay for the costs later.

In recent years, it has been recognised that mine closures must also deal with socio-economic aspects through a comprehensive set of regulatory provisions. Various governments are also recognising the significance of post-mining transition, besides mine closure. However, regulations and policies to effectively execute this are extremely limited.[31]

3.2 Global experiences

The following section discusses some of the global regulations and guidelines that are aimed at supporting mine closure practices that are environmentally and socially responsible. The review includes both country-specific regulations and guidelines developed by international agencies.

a. Australia: Guidelines for comprehensive mine closure planning

There is a long history and awareness of the benefits of effective mine closure planning in Australia. All the states have jurisdiction-specific mine closure laws. In general, the federal mineral acts provide statutory requirements enforcing the management and rehabilitation of the affected environment of mining. Detailed guidelines for mine rehabilitation and closure are also available for the various regions.[32]

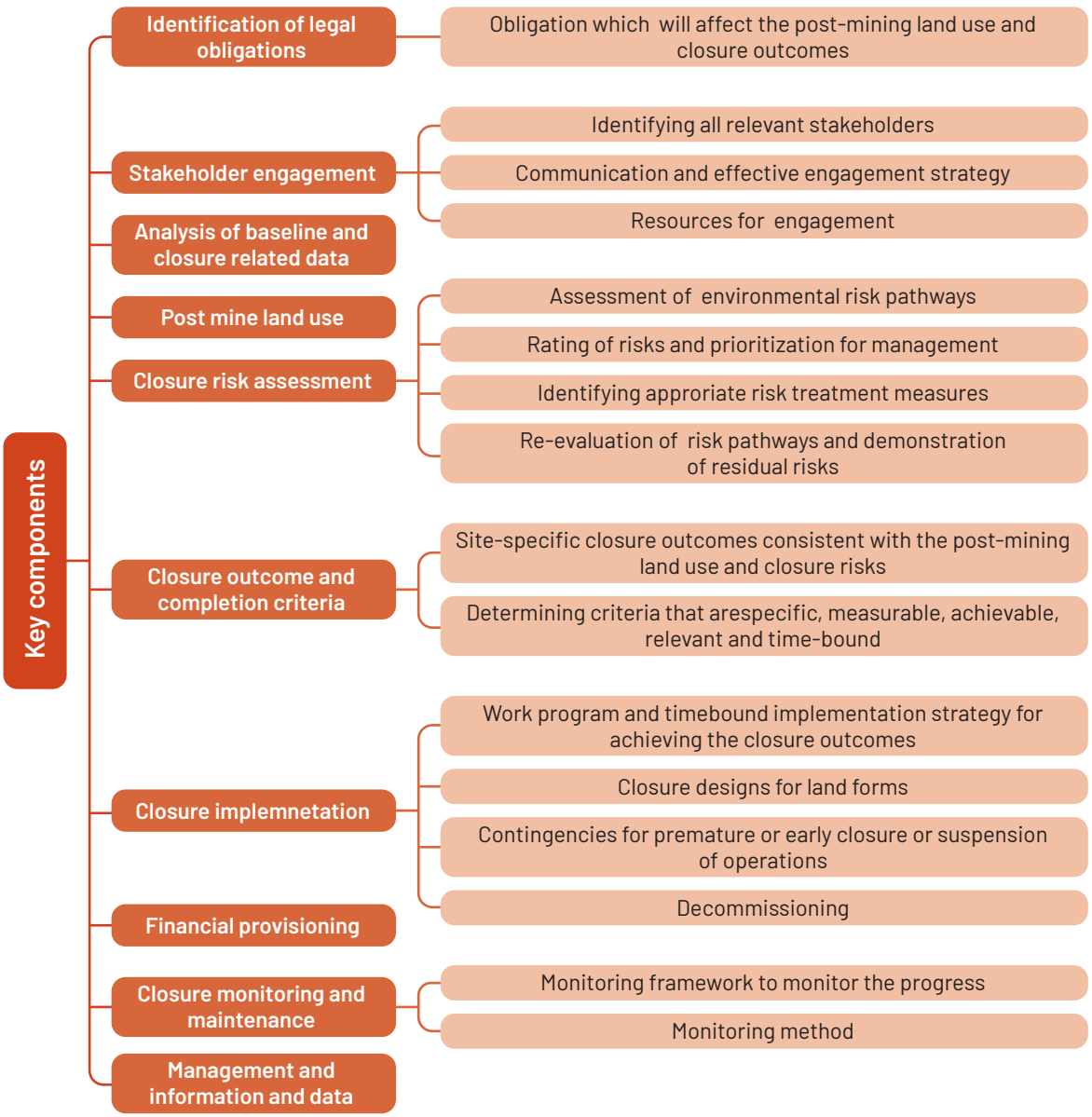
In recent years, some jurisdictions in Australia have started considering reforming their mine closure frameworks to ensure comprehensive closure practices that are both environmentally and socially responsible. The overall objective is to prevent or minimise adverse long-term environmental, physical, social, and economic impacts, of mining activities in the regions, and create a 'stable landform' suitable for post-closure land use, that is agreeable to the local community.[33]

One of the most comprehensive sets of guidelines has been developed by the Government of Western Australia. The guidelines have been developed under the country's Mining Act (1978).[34] The guidelines cover several environmental, social, and economic components as part of mine closure.[35] The key components of mine closure planning include determining the legal obligations, stakeholder engagement, analysis of baseline information, determining post-mine land use, undertaking a closure risk assessment, determining closure outcomes and completion criteria, implementation of closure measures, financial provisioning, monitoring, and enforcement, and management of information and data.

Concerning financial provisioning for closure, the guidelines emphasise a site-specific approach with the scope of periodic review and revision. Following are some of the key financial provisioning issues that the guidelines insist upon[36]:

- While it is important to estimate closure costs early on, providing verifiable closure cost estimates is difficult at the early stages of a mine's life and is dependent on assumptions and unforeseen events. Therefore, the cost estimates need to summarise the assumptions and uncertainties in a site-specific manner and the expected cost variation (±). The percent variation needs to be refined during operations and decommissioning.
- The mine closure plan must contain a summary of the mine closure costing methodology, assumptions and uncertainties, and financial processes aligned with the closure outcomes.
- The closure cost estimates need to be regularly reviewed to reflect changing circumstances and levels of risk.

Figure 4: Components of mine closure plan of the Government of Western Australia



Source: iFOREST analysis based on Mine Closure Plan Guideline of the Government of Western Australia, 2023

b. Germany: Aligning post-mining land use with spatial planning

The use of post-mining land is an important consideration for mine closure planning. While various mine closure-related regulations require such land use to be identified, the focus is primarily site-specific.

However, integrating mine closure planning with local land use planning can improve the scope of utilising post-mining land in a manner that is aligned with the local socio-economic context. A point in the case is Germany's approach to developing mining land use plans.

In Germany, mine (lignite) planning and post-mining land uses are regulated (addressed) by spatial development and land planning policies. This involves agencies at both the federal and state levels.[37] In accordance with the country's Spatial Planning Act (initially enacted in 1965), mining land use plans are jointly developed as part of municipal and regional spatial plans to ensure an integrated regional land use framework.[38]

The mechanism of integrating post-mining land use planning with spatial planning can be understood from the evaluation of the Lusatian mining region of Germany. The Lusatian mining region covers an area of 80 kilometers stretching over two states, Brandenburg and Saxony. Therefore, planning for mining land use requires coordination between the competent authorities from both states and the lignite committees.[39]

In Brandenburg, the responsible authority for spatial planning and development is the Joint Planning Department Berlin-Brandenburg (this is as per an agreement signed between Berlin and Brandenburg in 1996, forming the German capital region). The spatial structure plans of the region, including brown coal and rehabilitation plans are prepared by the Joint Planning Department, in collaboration with relevant authorities and entities. The main instruments guiding spatial planning are the state development programme and state development plan.[40]

The state's (lignite) rehabilitation plans determine at an early stage (before the issuing of permit) the most appropriate and desirable post-mining land uses for coal mining land as per the federal and state spatial planning priorities and the regional land use plans in place. For Brandenburg, the most common post-mining land uses include agriculture, forestry, recreation, conservation, and lakes.[41]

c. United States: Reclamation of abandoned mines

Coal mine management and closure issues in the United States of America (USA) have been largely guided by the regulatory provisions provided under various environmental, mining, and land laws that are promulgated by the federal and state governments.[42]

A key one in this regard is the Surface Mining Control and Reclamation Act (SMCRA) which was enacted in 1977 (as amended in 2021). The law specifically deals with environmental and land reclamation issues of coal mining, including the reclamation of abandoned mine areas in the US.[43] Following the enactment of the SMCRA, the Office of Surface Mining Reclamation and Enforcement (OSMRE), under the aegis of the US Department of the Interior was created to deal with its implementation.[44]

The implementation of the SCMRA has two major focuses — first to ensure that the coal mines operate in a manner that protects citizens and the environment during mining operations, and to restore the land to beneficial use following mining., and second, to implement an 'Abandoned Mine Land' programme to ensure closure and reclamation of such mine sites, and "address the hazards and environmental degradation resulting from two centuries of coal mining activities" before the enactment of the SMCRA.[45] The Act provides a long list of performance standards, which include restoration of land to a condition capable of supporting pre-mining uses, or acceptable higher or better uses.

The reclamation of abandoned mines and the implementation of the SMCRA has further been bolstered by the 'Infrastructure Investment and Jobs Act, which was enacted in November 2021.[46] The law provided substantial annual grants for abandoned mine land and water reclamation projects under the provisions of the SMCRA. It has earmarked $11,293,000,000 in federal funds for depositing in the existing 'Abandoned

Mine Reclamation Fund' under the SCMRA which is to remain available until expended. The key purpose of the use of the fund is to restore land and water resources, and environmental conditions that have been degraded by the adverse effects of coal mining practices and ensure the protection of public health and safety from the adverse impacts of coal mining. The law also requires the preparation of an inventory with respect to the closure, reclamation, and decommissioning activities of mines.[47]

Various environmental laws that are related to mine closure include the National Environmental Policy Act (1970), the Clean Air Act (1970), the Clean Water Act (1972), the Resource Conservation and Recovery Act (RCRA, 1976), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 1980).[48]

Apart from these, the Federal Land Policy and Management Act (FLMPA, 1976), and its subsequent amendments, regulate mining activities and mine closures on public lands. The Bureau of Land Management entrusted with the implementation of the Act, required a mine operator to submit a plan of operations and reclamation for proposed mining activities.[49]

d. ICMM: Integrated closure framework proposed by international agencies

International agencies such as the International Council on Mining and Metals (ICMM), have also outlined integrated closure frameworks. The 'Integrated Mine Closure: Good Practice Guide' (2019), outlines a plan for closing legacy mine sites, existing mines, as well as new mines. *(See box: Integrated mine closure plan).*

As per the guideline, closure and post-closure activities of a mine need to be realised through a comprehensive process of planning, designing, and implementing measures, in consultation with relevant authorities and stakeholders. The financial provisions for closure should consider both environmental and social aspects of closure. Overall, the guidelines outline an integrated mine closure planning approach emphasising certain key issues for ensuring positive environmental and socio-economic outcomes. The various elements of the integrated closure planning approach are outlined in Figure 5.

The guidelines specifically highlight some of the key aspects for ensuring a socially responsible mine closure besides environmental considerations. These include:

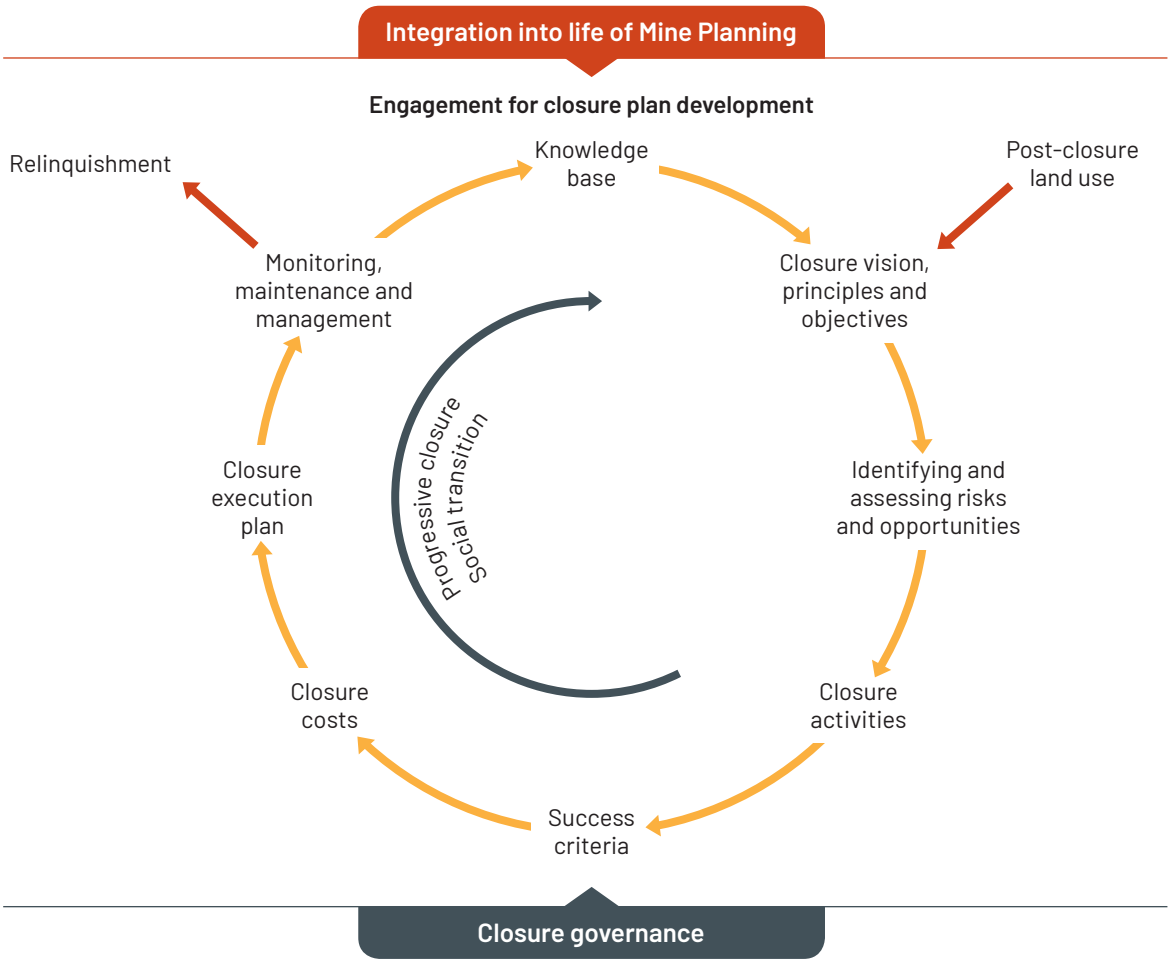
- Integrating closure throughout mine planning;
- Determining closure vision, principles, and objectives;
- Engagement of stakeholders including the local community in closure plan development through multiple mechanisms;
- Identifying and planning post-closure land use; and,
- Adopting social transition measures.

For example, for a fair social transition, the vision, principles and objectives of closure should be defined early in the closure planning process and refined throughout the life of the mine with inputs from stakeholders and as per the knowledge base. Inputs for closure objectives may also include company policies and guidelines, resources and timing; site constraints/achievability (including physical, technical, environmental, and workforce-related issues), socio-economic context, impacts and risks, and stakeholder inputs and community vision.

Similarly, post-closure land use needs to be determined considering aspects of both environmental sustainability and social transition. Potential land use activities may be identified by using the knowledge base (information related to physical, environmental, socio-economic, and regulatory landscape), considering land capability and mapping the potential land use options, involving stakeholders, identifying beneficial uses, considering the applicable regulatory framework, and addressing failure mechanisms. The identified usage may be modified during the lifecycle of the mine as per the changing local circumstances.

In most aspects of closure planning and implementation, engagement with stakeholders is crucial. Capturing the views of stakeholders is important for ensuring closure outcomes that benefit the community. Stakeholders may include, mine workers, the local community, government agencies and regulators, industry, members of the civil society, academia, etc.

Figure 5: Elements of closure planning by ICMM



Source: Adopted from the Integrated Mine Closure Good Practice Guide, 2019

SOCIAL TRANSITION

Social transition for mine closure recognises risks associated with local dependence on the mine and consequently creates opportunities to encourage the development of sustainable post-closure options.

The social transition planning and implementation process needs to begin while the mine/mine cluster is still in operation. Most of the expenditure towards social transition activities should happen during such an operational phase, especially for projects that aim to support a sustainable local economy post-closure. Ideally, at the time of closure, the local community should already be well-capacitated and secured, with a limited need for ongoing support from mining companies.

Overall, there are three key steps in social transition. These include planning, determining social investments, and determining the costs.

Box continued

Planning process: Social transition planning should be an integrated and iterative process involving multiple mine departments and stakeholders. The planning process needs to consider the following elements:

- The zone of influence and the mine's social and environmental setting.
- Implications of local procurement policies during operations and subsequent impacts on suppliers post-closure.
- Workforce recruitment and retrenchment needs.
- Interest, availability, and capacity of the local community in participating in the social transition planning process and the type of future leadership roles they can take on.
- The impact of generational changes, and the resulting evolution of needs and desires in the community.
- Communication of closure internally (employees) and externally (local communities, government, etc.).

Social investment: Social investment for closure includes those aspects that focus on generating post-closure economic and social returns in local communities and on building community resilience to the impacts of mine closure. The investments should be planned around a shared vision of a post-mining future. The company(ies) should develop a strategic, planned, and resourced approach to social investment for closure, including partnering with others to identify and prepare alternative long-term economic opportunities.

Social transition costs: Unlike other elements of closure cost estimation, social transition costs do not typically have readily available, experience-based unit costs or easily measurable quantities. There is considerable variability among sites with respect to socioeconomic, environmental and political settings, stakeholder expectations, community capacity, etc.

There are particularly three types of costs associated with social transition. The various cost components are outlined below.

Cost components of social transition	Subcomponents
Updating the knowledge base	i. Assessment of social impacts. ii. Assessment of health impacts. iii. Community sensitivity analysis. iv. Economic diversification studies.
Operational or corporate aspects of the mine closure	i. Employee training or reskilling programmes. ii. Staff and contractor redundancy costs. iii. Partnership costs (advisory boards, fund management, etc.). iv. Communication and media planning and implementation.
Implementation of social transition measures	i. Engagement of stakeholders. ii. Grievance management. iii. Social investment implementation. iv. Relocation costs, including planning and implementation. v. Final land use and infrastructure costs to meet community or government vision and their requirements. vi. Post-closure monitoring, measurement and reporting.

Source: International Council on Mining and Metals. (2019). Integrated Mine Closure. Good Practice Guide, 2nd Edition

3.3. Overall observations

Mine closure related regulations and guidelines primarily focus on the physical and environmental aspects related to the reclamation and rehabilitation of mining land, as noted by scholarly studies and observed from regulatory reviews. The consideration of the socio-economic impacts of closure, and a comprehensive regulatory framework to address it is largely absent.

However, there are some emerging global practices and international guidelines that emphasise certain aspects that are relevant for developing a comprehensive mine closure framework taking into consideration the aspects of just transition and local development. These particularly include social transition investments, stakeholder engagement, spatial planning, etc., which are considered an integral part of mine closure planning and determining post-mining land use and repurposing potential.

Overall, the global best practices for mine closure focus on the following key aspects:

i. Closure planning should start as early as the design stage for a new mining project.
ii. Mining companies should plan for the closure integrating aspects of social transition when the mines are still in operation.
iii. Mine closure planning and land repurposing can be aligned with state/regional developmental plans and programmes to enhance socio-economic benefits for the local community.
iv. Closure planning should engage both external and internal stakeholders.
v. The closure costs should be estimated considering all costs associated with the closure of a mine, including the various elements of social transition.
vi. Mining companies should monitor the outcomes of the implementation of the closure plan, including environmental conditions and local socio-economic development.
vii. The closure plan should be updated whenever there are substantial changes to the mining project or conditions in the surrounding area.

All of the above need to be suitably integrated into a comprehensive framework of mine closure to ensure environmentally and socially responsible closure practices and outcomes.

SECTION 4

RECOMMENDATIONS ON A COMPREHENSIVE MINE CLOSURE FRAMEWORK ALIGNING WITH JUST TRANSITION PRINCIPLES

4.1. Philosophy of a comprehensive mine closure framework

The philosophy of coal mine closure is a complex and multifaceted issue that involves various considerations, including environmental, social, economic, and safety concerns. However, until now, the basic philosophy that has underpinned mine closure regulations and practices is bringing back the mining land, as much as possible to pre-mining conditions. Since the pre-mining land use types predominantly include forest, agriculture, grazing and wasteland, therefore, the mine closure planning and post mining land use is focused on raising plantations, along with other activities, such as development of eco-parks and recreational areas, etc.

For developing a comprehensive mine closure framework based on just transition principles, the basic philosophy of mine closure should change. Mine closure and post closure measures should be conceptualised and designed to ensure economic continuity in the areas where these mines have been operating, along with environmental sustainability.

JUST TRANSITION PRINCIPLES FOR INDIA AND OBJECTIVE OF MINE CLOSURE

Just transition in India is envisioned as an equitable and inclusive socio-economic development process aligned with the goals of achieving net zero emissions, building a green economy, ensuring energy security and access, securing livelihoods and decent incomes, eradicating poverty and deprivation, building resilient communities, and ensuring social equity. The key principles of just transition, therefore, are as follows:

i. Support restructuring of the economy and industries, including transforming the energy sector.
ii. Support reskilling of the workforce and revitalisation of communities to be impacted by the transition.
iii. Support repurposing of land and infrastructure to maximise the potential of these post closure.
iv. Support responsible social and environmental practices to foster transformative change.
v. Support in investments to build resilient communities.
vi. Support substitution of public revenue.
vii. Support social dialogue and inclusive decision-making.

Considering this, the objective of the comprehensive coal mine closure framework should be to promote environmentally and socially responsible mine management, closure, and reclamation practices and maximise the potential of repurposing mine land and infrastructure post closure to ensure positive environmental and socio-economic outcomes for the local community.

4.2. Reforms in mine closure guidelines for developing a comprehensive framework

An emphasis on afforestation and bringing back the mine land to pre-mining conditions limits the scope of repurposing for diverse economic use. Such as focus also creates additional regulatory hurdles for future land use. This is because once trees are planted on the closed mine land or OBs, to reuse this land for any other activities, a new set of clearances for tree cutting will need to be obtained from the concerned authorities, i.e., forest departments.

To achieve a more balanced and inclusive approach to mine closure, the closure guidelines should promote a diversity of land uses that align with the economic and social needs of the affected communities. This might include opportunities for new industries, renewable energy projects, agricultural and horticultural projects, development of green micro, small and medium enterprises (MSME), or welfare activities, depending on the local context and community input. Besides, a seamless opportunity for the reuse of the mine land should be ensured to maximise the scope of repurposing and also prevent the use of additional virgin lands or forest areas.

Following are some of the key revisions that should be considered for strengthening the coal mine closure guidelines.

a. Reforms in the development of progressive and final mine closure plan

i. The mine closure guidelines need to be revised to remove the specific focus on afforestation or bringing back the land to pre-mining conditions.

ii. The guidelines should specify that progressive and final mine closure planning should be undertaken to ensure positive social, economic, and environmental outcomes for the local community and the region post closure.

iii. The progressive and final mine closure plans should be developed in alignment with the economic and social development objectives of the region to ensure social, and economic benefit from mining assets.

iv. The technical closure of the mine should be planned with the purpose of levelling the excavated void to ground level at final closure for the intended land repurposing,

v. The closure plans (and associated costs) for each mine should take into consideration the total amount of OB – both external and internal— to be rehandled for making the de-coaled area filled up to the ground level, the topsoil to be spread and levelled, alongside other measures considered as part of technical closure.

vi. The post-mining land use plan (as included as part of the approved mining plan) should be developed considering potential repurposing measures that can create jobs for the local community and support sustainable and green growth.

vii. The post-mining land use plan should be revised periodically as per the changing socio-economic dynamics of the region, and accordingly respond to the needs of the local community.

b. Development and implementation of a social transition plan

i. A separate social transition plan for the mine should be developed by the concerned mining companies in consultation with external stakeholders.

ii. The social transition plan should be developed when the mining operations are still ongoing. The plan may be developed 10 years before the anticipated closure date allowing sufficient time for social transition before the mine is closed. The plan shall be reviewed and updated after five years based on experiences so far, and the revised plan should be part of the final mine closure plan.

iii. Development of the plan should involve six key steps:
   a. Ensure an effective and inclusive planning process. The planning process should consider both the impacted workforce and the 'zone of influence' of the mines.
   b. Develop a social impact evaluation report, based on baseline data and participatory appraisal.
   c. Develop a social transition plan by engaging with relevant internal and external stakeholders.
   d. Identify required social transition investments that can guarantee economic and social returns to the local communities and build community resilience.
   e. Estimate the costs of social transition considering the workforce distribution and the socio-economic context of the zone of influence.
   f. Identify internal and external financial resources for implementing the social transition plan.

iv. A social transition team needs to be set up within the sustainability and/or just transition division of the mining company, to undertake the following (not limited to) tasks:
   a. Coordinate engagement of internal and external stakeholders on identifying required social transition investments and measures.
   b. Develop the social transition plan following a participatory process involving concerned stakeholders including employees/workers and the local community members from the zone of influence.
   c. Determine the costs of social transition and identify necessary resources to implement the plan.
   d. Oversee implementation of the social transition plan.
   e. Develop yearly action taken/progress reports on measures undertaken for social transition and the outcome of such measures.
   f. Develop a comprehensive social transition impact evaluation report during the fifth year to make necessary revisions in the strategy, investments, and any other associated measures.
   g. Make necessary revisions in the social transition plan based on the impact evaluation report, to integrate the revised plan into the final mine closure plan.

c. Inclusion of additional sections in the mine closure plan and submission of associated documents

The Appendix of the coal mine closure guidelines (May 2020) that provides specifications on the details to be furnished in the mining plan should include the following requirements:

i. A chapter on post-closure land use and potential repurposing, considering just transition principles.

ii. A chapter on measures of social transition.

iii. Correspondingly, a detailed social transition plan needs to be submitted, which should be revised periodically.

d. Reforms in financial provisions for mine closure for operational mines

i. The costs of mine closure should be based on a well-defined and documented cost-estimating methodology that is project and site-specific. The cost estimation should be based on a project-specific work breakdown, general and site-specific cost assumptions, and site uncertainties, risks, and contingency measures.

ii. The closure costs should consider the costs of social transition as per specifications of international guidelines (ICMM, as discussed earlier), and adding/substituting necessary cost components as per the local context.

iii. The closure cost estimates need to be regularly reviewed to reflect changing circumstances and levels of risk. This will ensure that the accuracy of closure costs is refined and improved with time, and will assist with management and mitigation of high-risk issues.

e. Developing a methodology for estimating the costs of closure for non-operational (closed before 2009) mine

i. A separate methodology should be developed for determining the costs of 'non-operational mines', including discontinued, abandoned, and closed mines.

ii. For mines where only a 'temporary mine closure plan' should be prepared, the method for cost estimation should clearly outlined.

iii. Overall, a separate guideline should be developed for the non-operational mines outlining in detail the mechanisms of preparing mine closure plans, repurposing aspects, and financial provisions.

4.3 Reforms in land-related regulations to maximise the scope of repurposing

The CBA Act (1957) needs to be revised to provide specific directions on the surrendering of land once mines are closed. The revisions in the Act should be synergised with the coal mine closure guidelines, which specifies that the mine owner is required to obtain a final mine closure certificate from the Coal Controller after undertaking reclamation and rehabilitation work, and all final mine closure activities, for surrendering the reclaimed land to the state government.[50]

Similarly, amendments need to be introduced in the LARR Act (2013), to allow returning the public land post closure (and after acquiring the closure certificate) to the concerned government, synergising with the provisions of the coal mine closure guidelines.

4.4 Reforms in institutional mechanisms

To develop and implement a coal mine closure framework that is based on just transition principles, certain institutional reforms will be necessary. These include the following:

i. Every coal mining company, the PSUs or the private companies, should develop a dedicated department/cell for planning, implementing, and coordinating just transition of coal mines at the end of the mine life/or when resources cannot be further extracted in a economically viable manner.

ii. A social transition team needs to be set up in the just transition cell or sustainability division of the mining companies to develop an integrated and comprehensive mine closure plan.

iii. The comprehensive mine closure plans need to be developed through the engagement of technical experts (of mine closure planning), social scientists, economists, and any other of similar background and expertise to appropriately address issues of technical closure, biological reclamation, and social transition.

iv. The role of various authorities, such as the Coal Controller's Office, the CMPDI, and the SPCB, needs to be clearly articulated to avoid duplicity and to streamline processes of compliance monitoring of environmental conditions to reduce future risks.

Overall, a successful mine closure process considering the imperatives of a just transition, should be a dynamic, iterative, and participatory process that takes into account environmental, social, and economic considerations, from the early stage of mine management till the time of final closure.

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Notes