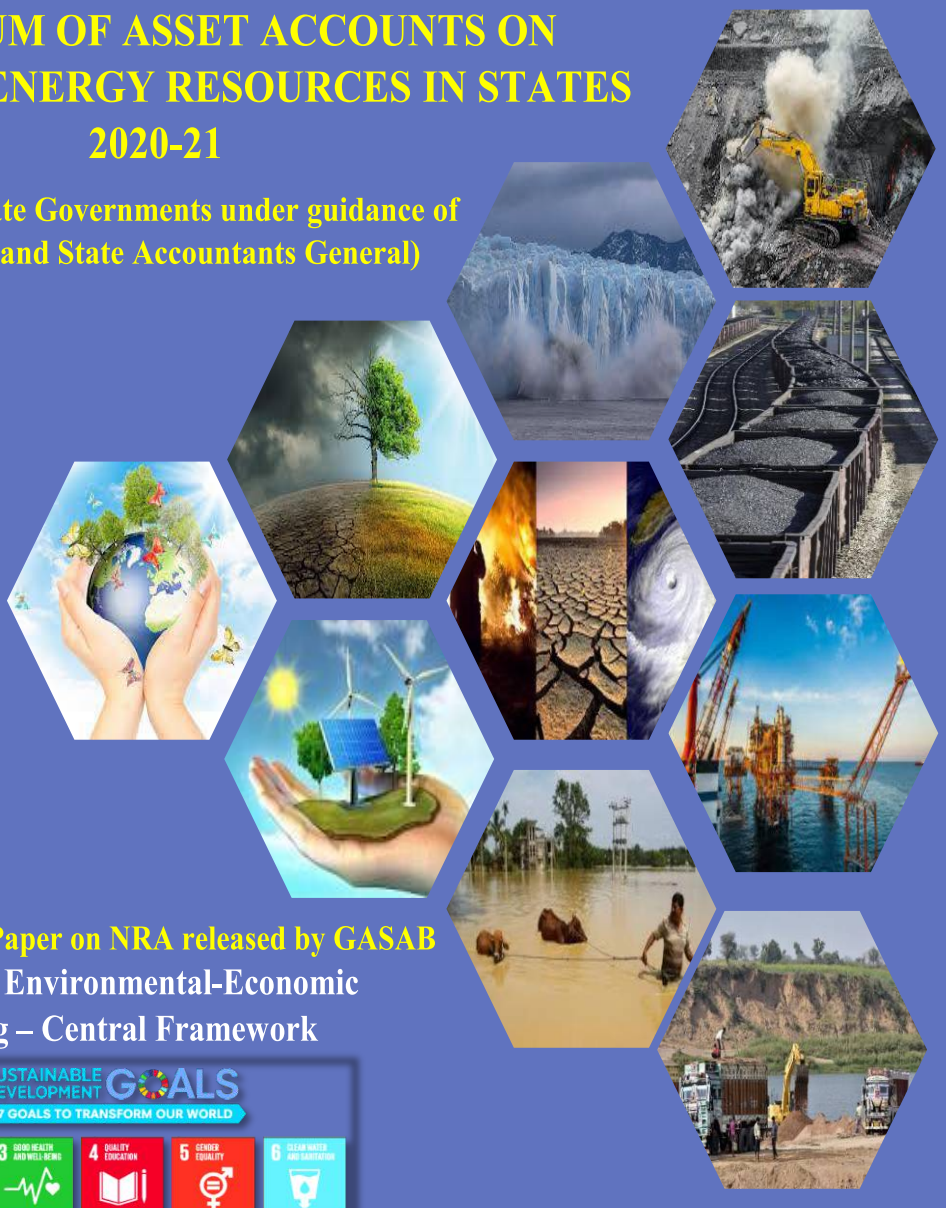
सत्यमेव जयते

आज़ादी का अमृत महोत्सव

लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

COMPENDIUM OF ASSET ACCOUNTS ON MINERAL AND ENERGY RESOURCES IN STATES 2020-21

(Prepared by State Governments under guidance of GASAB and State Accountants General)



OCTOBER 2022

Goal 1 of Concept Paper on NRA released by GASAB

Based on System of Environmental-Economic Accounting – Central Framework

An initiative of

Government Accounting Standards Advisory Board

under the aegis of

Comptroller and Auditor General of India

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Abbreviations

A&E	Accounts and Entitlement
CAG	Comptroller and Auditor General of India
COP	Conference of the Parties
ECOSOC	Economic and Social Council
DMF	District Mineral Foundation
EU	European Union
GASAB	Government Accounting Standards Advisory Board
GDP	Gross Domestic Product
GHG	Green House Gas
GoI	Government of India
GW	Giga Watt
IBM	Indian Bureau of Mines
ICAI	Institute of Chartered Accountants of India
ICWAI	Institute of Cost Accountants of India
IPCC	Inter-Governmental Panel on Climate Change
IPSAS	International Public Sector Accounting Standards
INTOSAI	International Organisation of Supreme Audit Institutions
MMDR Act	Mines and Minerals Development and Regulation Act
MoM	Ministry of Mines
MoEFCC	Ministry of Environment, Forest and Climate Change
MoSPI	Ministry of Statistics and Programme Implementation
MoPNG	Ministry of Petroleum and Natural Gas
MNRE	Ministry of New and Renewable Energy
MSS	Mining Surveillance System
MH	Major head
MU	Million units of energy
MW	Mega Watt
NASA	National Aeronautics and Space Administration
NMI	National Mineral Inventory
NMET	National Mineral Exploration Trust
NRA	Natural Resource Accounting
NRSC	National Remote Sensing Centre
SAI	Supreme Audit Institution
SDG	Sustainable Development Goals
SEEA – CF	System of Environmental-Economic Accounting – Central Framework
SOPs	Standard Operating Procedures
TERI	The Energy and Resources Institute
UN	United Nations
UNSTAT	United Nations Statistical Division
UNFCCC	United Nations Framework Convention on Climate Change
UNSC	United Nations Statistical Commission
UT	Union Territory
WGEA	Working Group on Environmental Auditing of INTOSAI

- Foreword -

Shri Girish Chandra Murmu,
Comptroller and Auditor General of India

Over the years, there has been increasing awareness about global environmental issues and growing concern about the depletion and degradation of natural resources and the environment. The United Nations is leading the endeavor and brought out the System of Economic and Environmental Accounting – Central Framework in 2012, the latest internationally accepted framework for resource accounting. Therefore, the first stage implementation strategy commences with preparing Asset Accounts of natural resources.

Internationally, many countries have attained various environmental accounting stages, prioritising Mineral and Energy Resources accounting.

The Government Accounting Standards Advisory Board (GASAB) of my institution came out with a Concept Paper on Natural Resource Accounting in July 2020, which set out action plans in convergence with the Sustainable Development Goals target of 2030. Preparation of Asset Accounts on Mineral and Energy Resources was prioritised as the first goal as these resources are finite, crucial inputs for economic growth. It will aid in nation-building and also contribute towards climate resilience. In doing so, GASAB has taken technical knowhow and guidance from a Consultative Committee constituted of eminent subject experts and members of stakeholder ministries, regulatory bodies, and academia.

The CAG's institution is mandated to offer advice on forms of accounts. CAG of India is also a member of INTOSAI, an international organisation of all Supreme Audit Institutions which recommended that SAIs should assist their country in preparing NRA. As the CAG of India is also compiling the Accounts of the States, we decided to take this initiative. GASAB, a multi-organisational body functioning under our auspices to offer advice on accounting matters, rose to this challenge.

In respect of selected resources, NRA has to be prepared by the countries who are signatories to SDG declaration 2015. India is a signatory to the SDGs, which makes it important to follow up on the targets for their timely achievement. Our Concept paper targeted the completion of asset accounts by the end of 2022.

I am pleased to share that we have achieved the first goal within the targeted timeline through collaborative efforts and the active involvement of the State Governments. GASAB has successfully led all 28 States and the UT of Jammu & Kashmir to build their first Asset Accounts on Mineral and Energy Resources for 2020-21. Based on these Asset Accounts prepared in the States, GASAB has come out with a Compendium containing the stock and flow of resources across States and their sustainability along with other inter-related issues like revenues vis-à-vis market values and collections of district mineral foundation. The Compendium also discusses areas of focus and possible remedies to improve the overall management of natural resources further and realise revenues due.

I am sure the State Governments would continue preparing the Asset Accounts as per the Guidelines/SOPs developed by GASAB. We will always support this endeavor strengthening the systems and processes and continue to offer our support.

I congratulate the GASAB team on this historic achievement. I also convey my gratitude to the members of the Consultative Committee and the State Governments for their constant support, without which this Compendium would not have been possible.

17 October 2022
New Delhi

(Girish Chandra Murmu)
Comptroller and Auditor General of India

प्रल्हाद जोशी
PRALHAD JOSHI
ಪ್ರಲ್ಹಾದ ಜೋಶಿ

संसदीय कार्य, कोयला एवं खान मंत्री
भारत सरकार
नई दिल्ली
MINISTER OF PARLIAMENTARY AFFAIRS,
COAL AND MINES
GOVERNMENT OF INDIA
NEW DELHI

सत्यमेव जयते

आज़ादी का अमृत महोत्सव

Message

The Hon'ble Prime Minister of India had in his speech during the Accountants General Conclave in 2019 desired that the institution of the CAG of India needs to come forward as catalyst of good governance and turn CAG into CAG plus.

I am elated to know that along with the constitutional functions and efforts to transform to CAG plus and CAG 2.0 as envisaged by the Hon'ble Prime Minister, the CAG's institution has taken the mammoth initiative to spearhead the Natural Resource Accounting across the country.

Meticulous planning coupled with monthly meetings held each month with the States bore fruit as the CAG's institution successfully spearheaded the effort of preparation of first Asset Account on Mineral and Energy Resources by handholding and training the officers and staff of 28 State Governments and I UT, i.e. Jammu & Kashmir.

It gives me immense pleasure to release the Compendium of Asset Accounts on Mineral and Energy Resources in States which is an outcome of rigorous yearlong collaborative exercise but also first such comprehensive document on the subject in the country.

I am sure with this noble endeavour, CAG's institution had taken another leap towards CAG 2.0 ably assisting the nation to make evidence based decision making – a reality. I take this opportunity to dedicate this Compendium to the people of this country on Azadi ka Amrit Mahotsav.

(Pralhad Joshi)

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From the desk of the Deputy CAG & Chairperson, GASAB

The Government Accounting Standards Advisory Board (GASAB) was established in August 2002 by the Comptroller & Auditor General of India with the support of the Government of India. In addition to its endeavour to formulate Government Accounting Standards, GASAB has also been working on natural resource accounting for nearly two years.

The Concept Paper released in 2020 envisaged a three-pronged action plan to prepare Asset Accounts on targeted resources, namely mineral and energy resources, water resources, forestry, and wildlife and land resources. The Paper also outlined the issues and challenges and the suggested ways and means to overcome them. We carried out Pilot Studies in three States of Goa, Meghalaya, and Rajasthan on preparing Asset Accounts on Mineral and Non-Renewable Energy Resources.

GASAB constituted a Consultative Committee of the stakeholder ministries, subject matter experts and academics to guide us in preparing Asset Accounts.

With the encouraging results of the pilot studies and the support and guidance of the Consultative Committee, GASAB finalised the templates for Asset Accounts of Mineral & Non-Renewable Energy Resources and, in October 2021, took up its implementation in States. GASAB also prepared Guidelines/SOPs and handheld the States through the Accountants General in finalising the first draft of Asset Accounts for 2020-21 on a sustained basis. In addition, we developed a Two-stage validation and verification process to ensure that figures included in the Asset Accounts were accurate, viz. a validation of the State Governments and a limited verification/test check by the Field Offices. It resulted in a set of Asset Accounts of the States for the year 2020-21.

GASAB has, after that, prepared this Compendium of State Asset Accounts on Mineral and Energy Resources. The Paper compiles the minerals and energy resources into categories like major and minor minerals and fossil fuels and includes other related matters. In addition, we have included the innovations and good practices observed during the study and suggested improvements for better management of resources.

I would like to recognise the effort put in by the GASAB team, especially Shri R M Johri, Additional Deputy CAG, and Shri Sudipta Narayan Biswas, Senior Administrative Officer. They did not only prepare this document but also guided the States in implementing the project in a short period. I would also like to commend the State Government Departments, the Accountants General, and the staff for their contribution. I thank the eminent members of the Consultative Committee who have constantly guided GASAB with their technical know-how.

I sincerely hope the stakeholders will appreciate the compendium, and we hope it acts as a stimulus for further work on the subject. I request that the States and other authorities in GoI take the opportunity to look into the observations and offer suggestions. I am sure that this document will ultimately aid in optimising revenue realisation and ensuring resource sustainability.

12 October 2022
New Delhi

(Kesavan Srinivasan)
Deputy CAG & Chairperson, GASAB

SUBJECT MATTER EXPERT'S TAKE

Natural Resource Accounting deals with stocks and changes of the stock of natural assets. It is physical accounting different to monetary and environmental accounting. This initiative is timely and will not only help the country in achieving its international obligations but will also add immense value to evidence-based decision-making processes being stressed upon by the Hon'ble Prime Minister of India.

During most of the 20th century, the prices of natural resources such as energy, food, water, and materials such as steel all fell, supporting economic growth in the process. We are now faced with sustained high natural resource prices and increased economic, social, and environmental concerns. Market driven sufficient supply and productivity is now being questioned by the scale and pace of economic and social development. At the global level, up to three billion more middle-class consumers will emerge by 2040 compared with 1.8 billion today, driving up demand for a range of different natural resources. While a large section of the global population lacks access to basic needs, increased resource consumption in cities is leading to environmental problems at global scale. The biggest impact on natural resource use arises from the population shift from villages to cities and into the middle class.

First, instead of adopting a purely market based approach for valuation of natural resources relying on a number of assumptions, as developed countries are doing, the GASAB is using assets, cost and revenue as extraction is regulated and analyzing these trends is an important part of good governance, including identifying 'leakage' of revenue and waste of natural resources.

Second, the shift from looking only at production to considering usage, or consumption, reflects the most stable global trend of urbanization and consumption as the major constituent of GDP. For example, construction material has the largest share of material use worldwide and is growing in India, while its impact on natural resources and on revenue has yet to be widely appreciated.

Third, the joint effort of the CAG and the States in how the country manages natural 'assets' has developed joint-solutions in a cooperative spirit of common understanding. Prompted by this exercise, States are re-looking not just at the current system of collection of statistics but also seeing value in their modification by comparing different sets of statistics.

In addition to managing natural resources better, this exercise has brought together a number of related but distinct initiatives that respond to particular aspects of governance of natural resources.

ABOUT SHRI MUKUL SANWAL

- Appointed to the IAS in 1971.

- First head of the Pollution Control Division in the GoI.

- Represented India at the Earth Summit at Rio-de-Janeiro in 1992 and was a lead negotiator for the Climate Change treaty, Agenda 21 and co-chaired negotiations leading to the Rio Declaration.

- Joined the United Nations in 1993 as policy advisor to the Executive Director of UNEP and later to the Executive Secretary of the Climate Secretariat and was among the group of scientists who contributed to the award of the Nobel Peace Prize for 2007 to the IPCC.

- Associated with drafting of the National Action Plan on Climate Change and is currently co-chair of the Expert Committee on Strategic Knowledge on Climate Change of the Ministry of Science and Technology.

- Visiting professor at the University of Massachusetts, Amherst, USA and Tsinghua University, Beijing, China.

- His Book – The World's Search for Sustainable Development – A Perspective from the global south' was published by Cambridge University Press.

- Hon'ble Member of Consultative Committee on NRA constituted by GASAB under aegis of CAG of India.

For example, the management framework of geo-tagging and uniform reporting formats will establish coherence in the statutory distinction between Major and Minor minerals. It will provide information on access to and use of land with information on 'How' mines operate and not only "What" they produce. It will help in better decision-making with respect to overlapping demands of the local population and industry.

This initiative will also bridge the gap between the traditional regulatory frame and the newly introduced development frame of District Mineral Foundations to generate additional funds for local development, ultimately supporting development of mines to adequately meet rising demand. Technological up-gradation with a digital frame linked with satellite imagery can enable new forms of partnership with mining companies and the use of drones to check illegal mining will pay for itself and be a means to bring in partnership with local communities.

The natural resource accounts should prompt the Indian Bureau of Mines to review the format of the Indian Minerals Yearbook and the Department of Space to also focus on mines and mining and not just the consequences of environmental degradation.

Districts with extensive mining also have the poorest populations and need support in the form of capacity to review the reporting and assessment focusing on the stock and changes in the stock of minerals as the optimum management frame for the transformation of these Districts.

Lastly, the training of All-India and State Service Officers could include exposure to natural resource accounting.

NEW DELHI
DATED: 11-10-2022

(Mukul Sanwal)
IAS 1971 (retd)
Hon'ble Member of Consultative Committee on NRA

MESSAGE

I would like to take this opportunity to thank the Government Accounting Standards Advisory Board (GASAB) under the aegis of Comptroller and Auditor General of India on the initiative taken by them to implement natural resource accounting. It is indeed a matter of great accomplishment that GASAB has engaged in capacity building exercise of States through Accountants General Offices. The very fact that GASAB's efforts have resulted in the compilation of Asset Accounts on Mineral and Energy Resources for 28 States and J&K shows the determination and commitment of the CAG towards sustainable development. TERI is happy to have provided foundation inputs in the process.

Natural resource accounting for energy and minerals is the first key step towards understanding issues around sustainable consumption and production. TERI would also endorse the idea of including asset accounts for energy and mineral resources in economic survey. This could, over a course of time, promote attitude shifts and informed and integrated energy and resources policies at state and national levels.

In the late 1990s when the concept of natural resource accounting was still at formative stages, TERI worked with MOSPI to develop physical and monetary accounts for natural resources and adjust state domestic product to reflect depletion of natural resource and changes in environmental quality. As a next step to asset accounting of energy and mineral resources, monetary accounting may be attempted although these may have their limitations as well.

Monetary valuation has its limitations and may not be able to capture aspects relating to livelihoods and health implications. Also, valuation may have limitations considering the principle of incommensurability, used in ecological economics. The National Environment Policy of 2006 of India talks of "entities with incomparable value" (EIV) that may be applicable to aspects involving biodiversity and rare species. As a next step, another area where GASAB and CAG may like to venture is mapping of EIV entities. This would be a novel idea that could be India's intellectual contribution to the rest of the world. TERI with its multidisciplinary strength would be a willing partner in this endeavour.

I once again congratulate GASAB and CAG for this pathbreaking work which truly has the potential to bring paradigm shifts in policies and perceptions to protect nature and our only planet.

(Vibha Dhawan)
Director General
The Energy and Resources Institute.

PREFACE

Conventional accounting captures data only of the measurable economic activity and does not weigh the environment inputs. Environmental statistics is often developed with a particular objective and does not depict the rate of consumption and its sustainability for future. Natural resource accounting intends to capture the intimate interplay between various components of the natural environment and the economy. This would not only enable the measurement of resources thereby leading to its better management but would also help to quantify the adverse impact of economic development on environment resulting in sustainable development.

The Concept Paper prepared by GASAB was released in July 2020. This laid down the road map for implementation of NRA in India with its unique three-pronged strategies in consonance with the SEEA – CF (latest UN mandated internationally accepted framework) for achieving the targets set under SDGs 2030. The idea is to measure and value the resources used in the economic activities and the amounts incurred on mitigation of environmental damages and reduce them from the economic GDP to arrive at the green GDP.

First goal of the strategy was preparation of Asset Accounts on Mineral and Energy Resources in all the States with the aim of gradually moving to the national level. Requirements of the SEEA-CF framework were translated into specific templates in which data was to be populated to meet the requirements of the framework. Pilot studies were carried out in three states to ensure its operational validity. These templates were then vetted by the members of the Consultative Committee (having representation from all technical and regulatory bodies) constituted by GASAB.

The final templates were released to the State Governments in October 2021 for implementation and preparation of the Asset Accounts on Mineral & Energy Resources of States. A total of five tables were communicated to the States for preparation. Consequent upon the national declaration at the COP 26, we have designed two more tables to capture the inputs on carbon emissions and progress made on generation of renewable energy and added to the existing four tables. The model tables are in the Annexures.

We have constantly monitored the progresses in the States in preparation of Asset Accounts through regular monthly meetings of NRA cells (constituted in each state having representation from State Governments and CAG field offices) of all 29 States/UT involved in this project. This provided a unique platform for regular exchange of ideas, concerns and quick resolution of issues. We have also issued numerous advisories and Guidelines assisting the States in filling up the templates. The State Government Departments prepared the templates with active support of the Office of the Accountants General in States. There were also challenges ranging from non-availability of ready to use data, inputs, and trained personnel in the grass root level of the State Governments. In order to guide the NRA cells and streamline the procedures, Standard Operating procedures (SOPs) were also released. Continuous trainings and workshops along with the monthly meetings with the Officers and staff of not only the State Accountants General but also for the State Government departments including holding state-specific workshops.

We have also actively involved the Consultative Committee in the overall exercise. A virtual meeting was held in September 2021 before finalising and releasing the templates of Asset Accounts. The second meeting of the Committee was held in June 2022 wherein the

implementation process, status of preparation of Asset Accounts in States were presented to the Committee and their guidance sought.

Collaborative efforts bore results as we could complete the preparation of Asset Accounts in all 28 States and UT of Jammu & Kashmir within the targeted timeline of 2022. These accounts have been validated by the State Governments to ensure correctness of the facts and figures and then test checked by our field offices to ensure that the figures included in the Asset Accounts are based on supporting documents available on record of the State Government departments.

As a catalyst for continuity of the effort, we have developed Guidelines/SOPs suggesting the States to implement quarterly reporting framework for collecting and collating data/inputs from the last level, i.e. district mining offices which can then be developed into a database. This will ease the process of preparation of Asset Accounts in future years. We have also suggested for mapping the supply and use for better management of the resources and their sustainability and optimising revenues for the States.

There is need to leverage technology to develop new systems which will enable capture of data at point of origin in a comprehensive and reliable manner on a regular basis. A pan India application has been suggested in the recommendations with dashboard to enable the evidence based decision making by the persons in charge of governance a reality.

I am sure that this novel effort to build the first Asset Accounts of Mineral and Energy Resources in the Country will be taken forward by the Union as well as the State Governments in right earnest till it settles down in a couple of years as envisaged by SEEA framework for new entrants in this arena.

I would like to acknowledge the tremendous efforts put in by the State Government Departments Offices and the offices of Accountants General for making this huge exercise possible. The continued support of the members of the Consultative Committee is gratefully acknowledged. Hope that it will be forthcoming in future years also.

Lastly, I would like to highlight the consistent contribution of Shri Sudipta Narayan Biswas, Sr. Administrative Officer in the entire exercise from preparing the Concept Paper on NRA – action plans & designing the tables, the final templates, Guidelines/SOPs – designing the mapping of supply and use of resources and most importantly drafting this Compendium. He played a key role in the implementation of the project and made all efforts for its successful completion within the targeted timeline. Ms Krishna Chaki, Asst Administrative Officer ably helped us in collating the data of 29 States/UT into the consolidated tables on major/minor minerals and fossil fuels annexed herewith.

14 October 2022
New Delhi

(Ram Mohan Johri)
Additional Deputy CAG, GASAB

OFFICERS ASSOCIATED WITH THE PROJECT

National Compilation on Asset Accounts of Mineral & Energy Resources in States	Shri K Srinivasan, Dy. CAG & Chairperson, GASAB Shri R M Johri, Additional Deputy CAG, GASAB Shri S N Biswas, Sr. Admin Officer, GASAB/NRA Ms Krishna Chaki, Asst Admin Officer, GASAB/NRA
Guidelines and SoPs on continuous data collection and end-to-end mapping of supply and use of resources	Ms Parveen Mehta, Dy. CAG & Chairperson, GASAB Shri R M Johri, Additional Deputy CAG, GASAB Shri S N Biswas, Sr. Admin Officer, GASAB/NRA
The booklet on templates of Asset Accounts on Mineral & Energy Resources	Ms Parveen Mehta, Dy. CAG & Chairperson, GASAB Shri R M Johri, Additional Deputy CAG, GASAB Shri S N Biswas, Sr. Admin Officer, GASAB/NRA
Concept Paper on implementation of NRA in India	Ms Anita Pattanayak, Dy. CAG & Chairperson, GASAB Shri K K Srivastava, Additional Deputy CAG, GASAB Shri Ashok Sinha, Principal Director, GASAB Shri S N Biswas, Sr. Admin Officer, GASAB/NRA

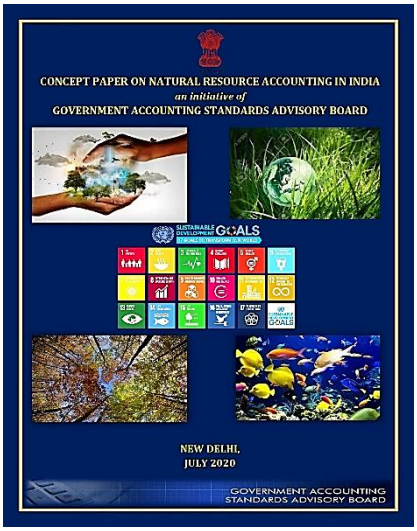
DISCLAIMER

Preparation of Asset Accounts is part of four-stage implementation strategy coined by the System of Environmental-Economic Accounting – Central Framework. This in turn is part of the Sustainable Development Goals to which India is a signatory. Thus, preparation of Asset Accounts on selective resources is an obligation for the country to be able to meet the international commitments.

The Government Accounting Standards Advisory Board under the aegis of institution of Comptroller and Auditor General of India provided technical guidance and support in this endeavour. The Accounts were prepared by the States and then validated by them and test checked by the State Offices of CAG of India. The endeavour of GASAB through its Accountants General Offices in States is only aimed at handholding the States in implementing Natural Resource Accounting commencing with the preparation of the first version of Asset Accounts on Mineral and Energy Resources in a robust manner at par with the requirements of internationally accepted SEEA-CF framework. It is expected that the Asset Accounts would be prepared by the State Governments on regular basis, once the process is stabilised.

The Compendium of Asset Accounts has been prepared solely based on information/data provided by the concerned State Governments concerned and GASAB/CAG of India does not take any responsibility in this regard.

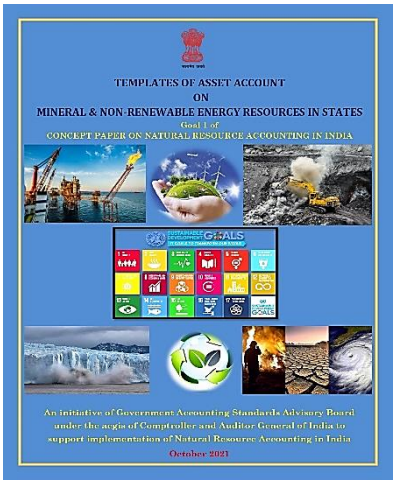
Previous publications on NRA



The Concept Paper on implementation of NRA in India released in July 2020
(http://gasab.gov.in/gasab/pdf/NR-Accounting-final.pdf)

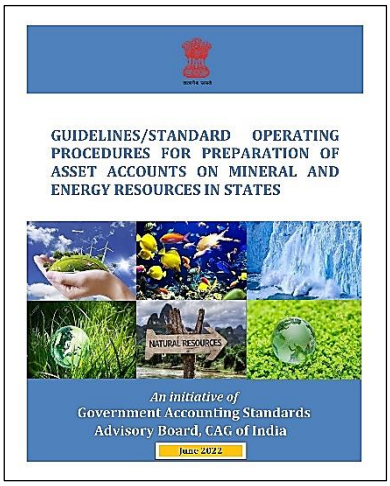
The Paper while discussing the concept, international progresses, requirements of the SEEA – CF, suggested three pronged 10 year action plans in implementing NRA in India converging with the targets of SDGs, i.e. 2030. The Paper also developed the tentative templates for preparation of Asset Accounts on five selected resources namely mineral & energy resources, water resources, forestry & wildlife resources and land resources.

Preparation of Asset Accounts on Mineral and Energy Resources was reckoned as the first short term goal.



The booklet on templates of Asset Accounts on Mineral & Energy Resources released in October 2021
(http://gasab.gov.in/gasab/pdf/TemplateAssetAc.pdf)

Taking cue from the tentative designs of the templates for preparation of Asset Accounts on Mineral & Energy Resources, experience gained through pilot studies, suggestions of the Consultative Committee, this Paper provided the detailed designs of the templates of the Asset Accounts on the selected resources and guidelines on filling up the templates.



Guidelines/SoPs on continuous data collection and end-to-end mapping of supply and use of resources issued in June 2022
(http://gasab.gov.in/gasab/pdf/Guidelines_June2022.pdf)

The book laid down the quarterly reporting framework along with the list of information to be collected and collated from the district level offices to build up the Asset Accounts from time to time. The book also dovetailed the mechanism for 360 degrees profiling and mapping the supply and use of resources for better management and optimising revenues to the State/Union exchequer.

EXECUTIVE SUMMARY

The GASAB Section in CAG's Office had come out with a Concept Paper on NRA in India in July 2020 which, inter-alia, envisaged a three-term plan for implementation of NRA in India in consonance with the strategy enshrined in the SEEA – CF of the UN. The GoI prioritised the resources namely mineral and energy, water, forestry & wildlife and land resources based on the international trends and good practices. Of these, mineral and energy resources were prioritised by GASAB based on their importance towards the economic activities, impacting directly the climate change and need for their sustainability for future generations due to their finite nature. Internationally also they have been considered by all the nations on priority to manage them judiciously to enable their availability for future generations.

Besides the plans, the Concept Paper also suggested the tentative templates for preparation of Asset Accounts on Mineral & Energy Resources. Simultaneous to the release of Concept Paper, pilot studies were initiated (August 2020) and successfully completed (March 2021) in three States namely Goa, Meghalaya and Rajasthan preparing the model Asset Account on Mineral and Non-renewable Energy Resources in the States.

GASAB has also constituted high level Consultative Committee consisting of stakeholder ministries in GoI, regulatory agencies, environmental resource centers, State Governments across the country to support the endeavor with technical knowhow and expertise. The final formats of Asset Accounts on Mineral & Non-Renewable Energy Resources were released in the shape of a booklet in October 2021 for implementation in the States.

In view of the national declaration at the Conference of the Parties (CoP) 26 at Glasgow, efforts were made by GASAB to incorporate templates for collating information on carbon emissions and progress in generation of renewable energy in States. These were intended to help the States and the Union to have a bird's eye view of the progress made towards meeting the targets committed by the country at the CoP 26.

Besides the overall implementation strategy, the SEEA – CF also allows flexibility to generate and design the framework keeping in view country specific needs. Accordingly, in addition to the Asset Accounts, some more information have been embedded into the framework while designing the tables like working out the sustainability of resources, variations between the royalties and market prices, collection of DMF, data on quantum of illegal mining and penalties realisation which are specific to this country and would extensively help the policy makers with evidence based decision making.

In order to help the States in filling up the templates and to ensure continuity of data collection and collation, GASAB prepared and circulated Guidelines/SOPs to the State Governments.

Key elements to be captured by the tables designed are:

Table 1 : Mother table of Asset Accounts - retained the same as prescribed by SEEA - CF will enable international comparisons. Scope of revision embedded - till settles down.

Table 2 : Physical flows and sustainability of resources. Extraction/use in different sectors - Government and Private Sector. Domestic vis-a-vis export data comparisons.

Table 2A/2B : Designed to capture riverine resources which often follow a system of accumulation and depletion - without stock availability.

Table 3 : Two pronged valuation - revenues and average sale/market value - to ascertain revenue streams for future and analyse royalties vis-a-vis market value to optimise resource for State exchequer.

Table 4 : Designed to capture actual extraction - production therefrom and dispatch - to analyse production losses.

Table 5 : Designed to capture District Mineral Foundations/National Mineral Exploration Trust etc recoveries vis-a-vis those recoverable.

Table 6 : Designed to capture sector wise power requirement, energy generated within the state from non-renewable and renewable energy resources with their percentage contribution to monitor achievement of national target of attaining 50 *per cent* of energy generation from renewable energy resources by 2030.

The work on preparation of the Asset Accounts in the States commenced with joint efforts of the Accountants General Offices and the State Governments with formation of State NRA Cells. Presently, State NRA Cells are functional in all States and UTs like Delhi and J&K. GASAB continued to handhold the States through monthly meetings since October 2021 to ensure that all States complete the project within the stipulated timeline. The joint effort bore results as all 28 States and one UT, i.e. J&K completed the preparation of Asset Accounts on Mineral and Energy Resources for 2020-21. Delhi reported nil repository of mineral resources.

The Asset Accounts, once compiled, are designed to aid in evidence based decision-making and good governance by providing the following for the policy makers.

- ***Preparation of NRA in compliance to the requirements of SEEA Framework to meet the commitment made under SDGs and monitor progress on declarations under COP 26.***
- ***Resources at a glance - a one pager document on State-wise resources.***
- ***Compilation of physical and monetary values to enable cross verification of revenues vis-à-vis actual extractions.***
- ***Provide pace of exploitation to bring out sustainability of resources - in years.***
- ***Analysis of revenue vis-à-vis market value/export value will make it easier to assess and review the royalty rates to protect State's revenue interest.***
- ***Enable assessment of revenue streams for the future.***
- ***Mine-wise data on resources – pan India.***
- ***Enabler of identification of alternate resources (economic as well as energy), and***
- ***Close monitoring on illegal mining.***

Salient features brought out in this publication are as follows:

Coverage

40 major minerals, 63 minor minerals and all four fossil fuels covered. The stock and flow of resources have been captured commencing with the opening stock as on 1 April 2020, additions and reductions during the year and the closing stock as on 31 March 2021. Details of stock and flow of significant resources are shown below while detailed physical flows are in **Annexures V to VII:**

Para 4.2, 4.3 and 4.4

Fossil Fuels (all)

Stock and flow	Break-up	Coal	Lignite	Crude Oil/Petroleum	Natural Gas
No of States involved		14	4	7	7
				In million tonnes	***In million cum***
Opening Balance		1,03,017.95	7,951.31	916.26	3,05,539.73
Addition		2,614.34	0	2.50	4,409.96
Extraction	Govt. Sector	479.64	26.79	14.47	6,739.11
	Private Sector	115.65	21.82	0.25	1,622.30
	Illegal/Others	1.48	0	0.015	10.43
	Total	596.77	48.61	14.75	8,371.84
Closing Balance		1,05,035.91	7,902.68	904	3,01,577.85

Major Minerals (significant ones)

Sl. No	Name of Mineral	No of States involved	Stock and Flow of resources				
			Opening Balance	Additions	Extractions		Closing Balance
					Breakup	Total	
					Government		
					Private		
					Others/illegal		
						In million tonnes	
1.	Limestone	23	86,533.38	1,183.26	0.716	326.81	87,388.75
					247.05		
					79.04		
2.	Iron Ore	11	6,659.37	389.58	72.28	213.23	6,835.70
					140.95		
3.	Magnesite	4	314.81	Nil	0.002	0.065	314.74
					0.063		
4.	Bauxite	9	434.92	26.19	11.88	20.83	440.29
					8.95		

5.	Copper ore	3	155.58	0.9	0.99 2.23	3.23	153.25
6.	Manganese	9	100.21	15.17	0.58 2.32	2.90	112.49
7.	Rock Phosphate	2	80.34	Nil	0.80 0.10	0.90	79.47
8.	Silver	1	74.67		 0.0001	0.0001	74.67
9.	Chromite	3	68.88	Nil	1.093 1.695	2.78	66.10
10.	Lead Zinc Ore	1	34.88		 6.14	6.14	28.73
11.	Talc	1	15	Nil		Nil	15
12.	Nickel-Cobalt-Chromium bearing Magnetite	1	13.31	5.38		Nil	18.69
13.	Siliceous earth	1	4.23	Nil	 0.02	0.02	4.21
14.	Silimanite	2	0.84		0.013 0.001	0.014	0.82

Innovations and good practices

A number of innovative approaches and good practices were observed during the course of the study ranging from amendments in the statutes to development of mining surveillance system and efforts to geo-tag and geo-fence the mining areas by MoM, GoI and States. Others included deployment of drone technology in detection of illegal mining, satellite based monitoring methodologies in control and monitoring mining activities, IT enabled monitoring of mining and usage of resources.

Chapter V

Some observations during the course of the Study

The sustainability of resources at present level of consumption as evident from NRAs indicated a number of resources in States are vulnerable as the present level of proven reserves would exhaust in years ranging between less than 10 years, 10 to 20 years and up to 30 years.

(Paragraph 4.5.3)

Variations between figures of State Government Departments and those reported by the lessees to the IBM were noticed requiring closer co-ordination between the States and the IBM.

(Paragraph 6.1.1)

The States were not capturing the entire gamut of mining activities commencing from extraction, production and dispatch. This denied the States the advantage of monitoring the production loss claimed by the lessees as also the production vis-à-vis extraction of ore.

(Paragraph 6.1.2)

Though royalties are based on the grades of minerals produced, most of the States were not capturing the grades of minerals produced. This made it difficult to monitor the productions grade-wise and commensurate correct calculation and payment of royalties by the lessees.

(Paragraph 6.1.3)

Variations between the royalties and average market prices of produces were captured through the Asset Accounts which requires in-depth study to ensure timely revision of royalties to bring it in line with realisable value.

(Paragraph 6.1.4)

The systems prevalent to deal with illegal mining need to be streamlined as it was noticed that many States were not maintaining datasets on illegal mining and recovery of penalties therefrom. Cases of non-capturing of name of mineral, volume and royalty involved, penalty charged, short charging of penalty below the royalty involved etc. were observed.

(Paragraph 6.1.5)

All States have not yet completed the geo-tagging and geo-fencing of mine areas.

(Paragraph 6.1.7)

There were gaps in realisation of district mineral foundation contributions evidencing lack of monitoring by the States.

(Paragraph 6.1.8)

State specific areas of concerns are at Para 6.2. Major ones are discussed below:

In Chhattisgarh, though an online portal is functional in the State since 2017, all the lessees are yet to be on boarded on the portal till end of March 2021.

In Karnataka, the lessees were feeding data on the online portal and there was no control of the department on the same. Verification revealed large variations between the actual extractions and those uploaded on the online portal.

In Meghalaya, cross verification of records of Mines Department and Customs Department indicated illegal mining of 31,556 tonnes of coal.

In West Bengal,

- Four departments and two heads of accounts are involved in assessment and collection of revenues on coal.
- Though the Public Accounts Committee has recommended in 2004 to streamline the system, it still continues to be the same.
- The lessees issued their own transit passes for transportation of coal from the mine areas which is a violation of the MMDR Act which prescribes transit passes to be only issued by the Departmental authorities on pre-payment of royalties.
- There was no weigh-bridge nor any check-post of the department.

Way Forward

Based on the study for preparation of Asset accounts, the following way forward emerges:

✓ ***There is a need to make concerted efforts to fine-tune the existing systems and processes. Few areas needing attention are discussed in Section A of Chapter VII.***

- Scope of Rule 45 (1) - (5) of Mineral Conservation & Development (Amendment) Rules, 2011 to provide for submission of returns by lessees first to States. After approval of the State authorities, lessees may submit the returns to the IBM - similar to the practice in J&K. States may be advised to put in place similar rules for the minor minerals.
- Mandating the lessees to furnish returns to State Governments in same format as prescribed by IBM would enable capturing data of extraction of run of mines, production till dispatch of processed ores and stock of run of mines and processed ores by State Governments to aid in monitoring production loss. The return format of IBM also captures grade-wise production of ores. Mandating the same return would enable State Governments to capture and monitor production of different grades of minerals and their commensurate royalty payments.
- Forms of reports and monitoring mechanism of average sale prices as applicable for major minerals administered by IBM may be devised by the States for control and monitoring of minor minerals.
- The royalties may be reviewed at specific periodic intervals or when variation with the market price exceeds a predefined level. System prevalent in J&K may also be considered which entails fixation of the market prices based on the royalties while keeping the transportation cost separate and on actuals.
- States to institute more streamlined system of recording the details of illegal mining cases detected to include detail like mineral involved, volume of mineral detected, royalty involved, statute under which penalty levied, quantum of penalty levied and collected.
- A system needs to be installed for assessment of the DMF realisable to ensure that the amounts due is promptly collected and remitted to proper head of account for usage for the desired purposes.
- The Rules governing NMET may be streamlined to ensure easy access to the funds collected under NMET for usage by the Ministry of Mines and the States.

- The Rule 45 (6) provide for the miners and other parties involved in trading, end-usage, exports to report monthly and annually to the IBM and the State Governments about volume of mineral and energy resources dispatched, traded, exported or used during the period reported upon.

- A verifiable mechanism of registration and reporting needs to be put in place.

✓ ***Section B - There is need to leverage technology to develop new systems which will enable capture of data at point of origin in a comprehensive and reliable manner on a regular basis.***

- Efforts may be made to prepare comprehensive geo-enabled mineral map of each State as it would be the first step towards effective management of mineral resources.

- Most States have not initiated the work of geo-tagging and geo-fencing of mines and mining areas and routes. BISAG has already started the process in many states and may be pursued in mission mode.

- The system of monitoring the movement of minerals also needs to be strengthened by using GPS enabled vehicles.

- ***There is need to develop an application which captures the mining activity in the State in its entirety and generates data for the preparation of Asset Accounts. Such application has been***

conceived in the State of Odisha (i3MS). It will standardize the formats in which information is captured, grade-wise. It may commence with the major minerals and fossil fuels and can be extended to minor minerals later on. It shall be designed in a manner that each step acts as a check and balance for the earlier step. This would enable the information collection, collation and its summarization at a State and National level in a near real time manner. When data for several years is available it can be used for trend analysis and interstate comparisons on defined set of parameters.

- ***In order to enable a continuous flow of information from the source, a quarterly reporting framework has been suggested which will collect and collate information/data for preparing the Asset Accounts at the Directorate level till the pan India application becomes a reality. Many States have already agreed on implementing this.***

✓ ***Section C – Mapping the Supply and Use of Resources - A complete mapping of supply and use of resources for 360 degrees profiling of mineral extractions till their end use is suggested for better management of available resources and optimise revenue realisations and ensure sustainability of resources for the future generations.***

- A Centralised data-base of all miners, traders, storage, exporters, end-users need to be created in a mission mode at every State Government level.
- Making it pre-requisite to register all carriage vehicles used in transportation of mineral and energy resources with special FASTags to auto-capture details at mineral check-posts/exit points.
- After the above two steps, States may commence with a mechanism (manual or system based as prevalent) of comparing the reports of the miners, traders, storage, exporters, end users to identify triggers/flags for further investigation. This system would largely help these entities to curb illegal mining by detecting the variations and further investigating into them.

CHAPTER - I
NATURAL RESOURCE ACCOUNTING – THE CONCEPT, RELATION WITH SUSTAINABLE DEVELOPMENT GOALS AND CLIMATE CHANGE

"Earth provides enough to satisfy every man's needs, but not every man's greed"

Mahatma Gandhi

1.1 NRA - THE CONCEPT

Natural resources play a crucial role for economic development of a country and their sustainable exploitation is critical to ensure inter-generational equity.

Economic growth over decades has largely been based on natural resources. In its quest for rapid economic development mankind has over exploited these resources resulting in harmful impact on the environment and this had led to climate change. The impact of climate change can be evidenced by extreme weather conditions. The impact is so severe that it has become a subject of discussions at all global and multilateral forums. There is a consensus among the governments that it cannot continue and hence there is an urgent need to devise mechanisms for economic development which is sustainable.

Measurement of resources leads to its better management

Degradation of earth over years

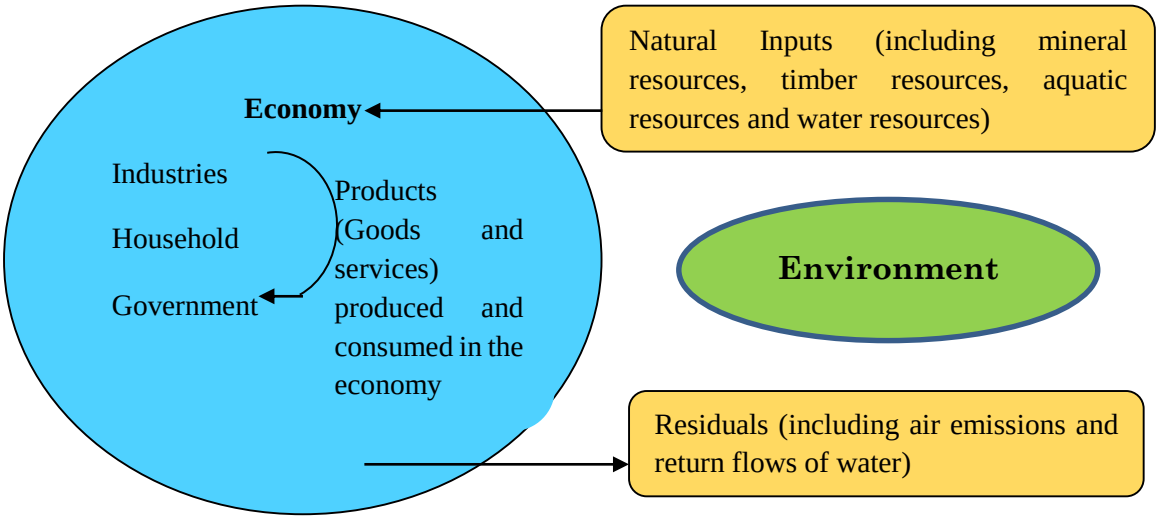
Growth is clearly the major engine to create livelihood options; yet, its increasing reliance on mineral resources leads to many negative externalities. The paradigm of resource-led economic development is not sustainable and hence it has become necessary to strike a balance between use of natural resources vis-à-vis economic growth. Responding to these global concerns and to formulate 'a global agenda for change', the UN had set up (1983) the World Commission on Environment and Development known as the "Brundtland Commission" which, for the first time, coined (1987) the idea of "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" or 'Sustainable Development".

This was followed up in the Earth Summit held at Rio De Janeiro, Brazil in 1992. The historic Agenda 21 agreed upon by the 172 governments in attendance was adopted as a - *a first step towards the integration of sustainability into economic management is the establishment of better measurement of the crucial role of the environment as a source of natural capital and as a sink for by-products generated during the production of man-made capital and other human activities. As sustainable development encompassing social, economic and environmental dimensions, it is also important that national accounting procedures are not restricted to measuring the production of goods and services that are conventionally remunerated - A program to develop national systems of integrated environmental and economic accounting in all countries is proposed.*

Conventional accounting captures data only of the measurable economic activity and does not weigh the environmental inputs. On the other hand, the environmental statistics are often developed with a particular objective and neither caters to the larger picture, nor could be related to other datasets. To overcome this shortcoming and to capture the intimate interplay between the economic indices and the various components of the natural environment, the concept of NRA has emerged. The concept is depicted through the diagram below.

Eco-Environmental Accounting or NRA

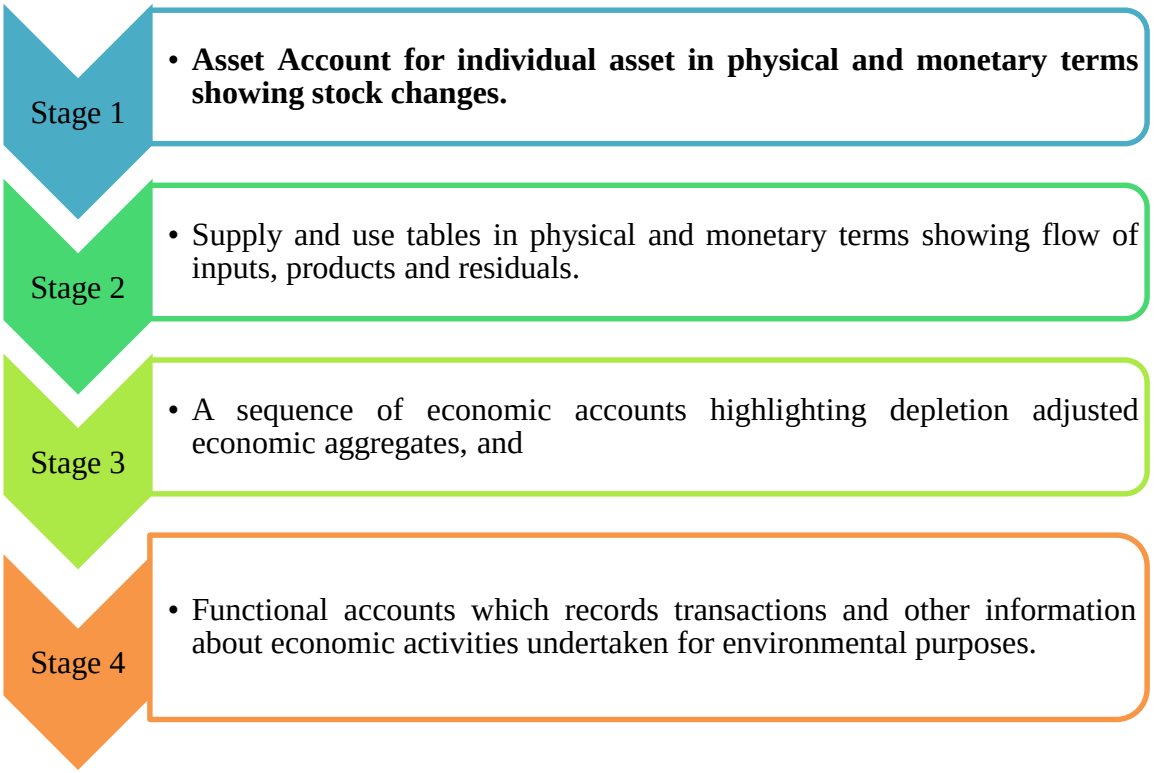
- ✓ Intends to capture the **intimate interplay** between various components of the natural environment and the economy
- ✓ Can connect to other datasets to provide invaluable information on the larger picture **connecting environment with the economy**
- ✓ Able to help **quantify the adverse impact on environment** due to economic development and aid to sustainable growth



The idea is to quantify the enironmental inputs of the economic development and expenditure incurred on mitigating enironmental degrdation due to exploitations and other activities and embed these input and output related costs while arriving at the economic parameters or the GDP to arrive at the Green GDP. While enabling attainment of the larger picture of amalgamation of economic and environmental accounting, it would assist mainly the policy makers in taking policy decisions in respect of matters affecting environment directly and indirectly and bring us in a position to use our

resources on a more sustainable basis and reducing the negative impact on the environment.

The idea emerging from the Earth Summit was followed up in 2002 (Rio+10), 2012 (Rio+20) giving birth to the System of Environmental-Economic Accounting – Central Framework in 2012 which is the latest internationally accepted framework also known as the concept of NRA. The SEEA-CF prescribes a four-stage implementation process by compiling the following accounts as mentioned below:



Note: The first stage is highlighted as India is presently in this stage of creating the Asset Accounts on selected resources.

However, while prescribing the aforesaid milestones for implementation of NRA across the world, the SEEA-CF has also envisaged constraints to be faced by the countries in implementing NRA. SEEA-CF, thus, prescribed for flexibility in designing the accounts based on the specific environmental issues faced by a government. Depending upon the specific environmental issues faced, a country may choose to implement only a selection of the accounts included in the SEEA-CF. The SEEA-CF provides that even if a country does not desire eventually to implement the full system, it may decide to focus its initial efforts on those accounts that are most relevant to current issues.

1.2 SUSTAINABLE DEVELOPMENT GOALS – ITS CONNECT WITH NRA

In the 70th session, the United Nations General Assembly adopted (September 2015) the resolution titled ´Transforming our World: the 2030 Agenda for Sustainable Development' consisting of 17 SDGs and 169 associated targets to help organise and streamline development actions for greater achievement of human wellbeing, while leaving no one behind – by 2030. The details of the SDGs and associated targets are shown in **Annexure - I**. In this Assembly, Government of India affirmed its commitment to the 2030 Agenda and SDGs. SDGs are expected to set up the development agenda and policies to eradicate poverty, protect the planet, foster peace and promoting prosperity for all.

> *We must work closely together to make this year a year of global action, one that will be remembered as the dawn of a new era of sustainable development.*
>
> *(Secretary General, UN)*

The agenda allows each Government to set its own national targets based on national circumstances and decide how global targets would be incorporated into national planning processes, policies and strategies. To assist this process, the United Nations Development Group created a Reference Guide for mainstreaming the 2030 Agenda and SDGs.

Sustainable development – use for present generations without compromising the future

As per the UN Resident Coordinator in India (December 2018), the success of Agenda 2030 globally will depend, in a decisive way, on the progress India makes on the SDGs in the next decade. It is not just the size of India's population or the scale of its interventions that makes it so critical to the SDGs, but its unique convergence of extraordinary economic growth, commitment to sustainability, and social and technological innovations.

Six of the 17 goals are directly or indirectly linked with NRA as mentioned below:

Goal 6	•Ensure availability of sustainable management of water and sanitation for all
Goal 7	•Ensure access to affordable, reliable sustainable and modern energy for all
Goal 12	•Ensure sustainable consumption and production patterns
Goal 13	•Take urgent action to combat climate change and its impact
Goal 14	•Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	•Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt biodiversity loss

Thus, the importance of NRA is evident from the fact that 6 out of 17 goals of SDGs, i.e. more than one third of its activities revolve around NRA and its attainment of various associated targets.

1.3 CLIMATE CHANGE – ITS CONNECT WITH NRA

Climate represents the average weather which exists over a period of time, and may be referred to in terms of local, regional or global geographical confines. Climate change occurs when the climate deviates from the average weather over a long period of time. According to IPCC, global warming, the cause of climate change in most cases, is evidenced by the following:

- Increase in average air and ocean temperature.
- Increase in average global sea level.
- Widespread melting of ice and snow.
- Changes in weather, wind pattern, precipitation, frequency of weather events (floods, storms, tsunami etc.)

The average temperature of the earth has increased by 0.74°C since the late 1800s. It is further expected to rise, according to the UNFCCC by the year 2100, unless prompt rectificatory actions to mitigate the global warming are adopted. According to NASA, *'because of rapid warming trends over the last thirty years, the earth is now reaching and passing through the warmest levels seen in the last 12,000 years'*.

Evidence of climate change – extreme weather conditions

Current projections point to a global increase in temperature of 2° Fahrenheit to 11.5° Fahrenheit (1.1° Celsius to 6.4° Celsius) by 2100, which will result in additional sea level rise that will gradually inundate coastal areas and increase beach erosion and flooding from coastal storms, changes in precipitation patterns, increased risk of floods and drought, threat to biodiversity, and a number of potential challenges to public health.

The principal reason for the mounting global warming is none other than the feverish trend of industrialisation; burning of ever-greater quantities of fossil fuel, the cutting of forests and the practice of certain farming methods.

No challenge poses a greater threat to future generations than Climate Change.

Barrack Obama
Former President, USA

The Kyoto Protocol[1] which is linked to the UNFCCC was the first binding agreement covering 37 industrialised countries and the European Commission, aimed at emission reduction targets. The Protocol targets GHG reduction of five *per cent* against 1990 levels over the five-year period of 2008-2012. Detailed rules for the implementation of the protocol were adopted in the Marrakech accord in 2001, providing for national measures supplemented with market mechanism.

India being a developing nation is not bound by the Kyoto Protocol to reduce the greenhouse gas emissions, which in any case is far below the global average. As per the data published by the World Economic Forum in January 2019, though most of the world's largest economies have high CO_2 emissions per capita – 10 of the top 12 are above the global average of 4.35 metric tons, Brazil and India are the only major economies with below average CO_2 emissions per capita. Moreover, China, Brazil and India are the only nations that are outside the "very high" category of the United Nations Development Programme's Human Development Index. Despite having high total emissions, Brazil's and India's CO_2 emissions per capita are comparatively low due to their large populations and relatively low GDP per capita.

[1] The Kyoto Protocol, adopted in 1997, was an international treaty which extended the 1992 UNFCC that commits state parties to reduce greenhouse gas emission, based on the scientific consensus that global warming is occurring and that human made CO2 emissions are driving it.

At the UN's COP24 summit in Poland in 2018, nearly 200 countries reached a consensus on implementing the 2015 Paris Climate Agreement. But global action on climate change can't come soon enough – the recent uptick in the world's emissions is a stark reminder of the struggle that lies ahead.

The UNFCC Conference of 2021 or the COP 26 was held in Glasgow, Scotland wherein 197 countries including India participated. This was the first time since the Paris Agreement of COP 21 that expected countries to pledge enhanced commitments towards mitigating climate changes. Major decisions and outcomes of the meet are as follows:

- An agreement to re-visit emission reduction plans in 2022 in order to try to keep the 1.5 degrees Centigrade target achievable.
- A commitment to limit (phase down) the use of coal.
- A commitment to climate finance for developing countries.

More than 140 countries (having 90 *per cent* global greenhouse gas emissions) pledged to reach net-zero-emissions; More than 100 countries pledged to reverse deforestation by 2030; More than 40 countries pledged to move away from coal; and governments of 24 developed countries and a group of major car manufacturers committed to work towards all sales of new cars and vans being zero emission globally by 2040.

The latest forecast by researchers from Geological Survey of Denmark and Greenland have alarming revelation that even if the entire world stopped usage of fossil fuel today, zombie ice melting in Greenland will lead to average global sea level rise by at least 27 cm or 10 inches.

1.4 Government of India's commitments (the *Panchamrit*) at COP 26

1. India will take its non-fossil energy capacity to 500 GW by 2030.
2. India will meet 50 *per cent* of its energy requirements from renewable energy by 2030.
3. India will reduce the total projected carbon emissions by one billion tonnes from now till 2030.
4. By 2030, India will reduce the carbon intensity of its economy by more than 45 percent.
5. By the year 2070, India will achieve the target of Net Zero.

Given the complex nature of climate change, the cost to prevent and adapt to its effects, and the controversy surrounding the issue, policy decisions in this area will need to be based on sound data. As the climate change is linked to economic growth, governments must be able to connect economic data to environmental data to develop policies that allow for economic growth while supporting sustainability. Environmental accounts, recognised by the global statistical community as a useful framework for monitoring, measuring and analysing climate change, can play a key role in helping governments make well-founded decisions regarding climate change.

CHAPTER - II
GASAB'S ROLE IN IMPLEMENTING NRA

2.1 ABOUT GASAB

The Government Accounting Standards Advisory Board (GASAB) has been established in August 2002 by the Comptroller & Auditor General of India with the support of the Government of India. GASAB is a representative body of the Central and State Governments with the responsibility of formulating, proposing and improving standards of government accounting and financial reporting. It, *inter-alia*, includes representatives of heads of all accounting services, JS Budget, Government of India, four State Governments in rotation, heads of ICAI, ICWAI among others and headed by Deputy CAG as the Chairperson. Besides, each member can appoint a technical advisor.

At the core, GASAB endeavours to prepare Indian Government Accounting Standards (IGAS) and Indian Government Financial Reporting Standards (IGFRS). IGASs formulated by GASAB are for cash system of accounting and become mandatory from the effective date after their notification by Ministry of Finance, Government of India. On the other hand, GASAB has taken a decision to develop accrual basis accounting standards alongside cash basis standards. The accrual basis standards are issued initially as recommendatory for pilot studies on accrual accounting and will be mandatory with effect from the date of notification by Government of India.

As a stepping-stone towards accrual-based accounting, GASAB is working towards adapting cash based IPSAS in Indian Government financial reporting systems as a precursor to eventual move towards accrual accounting.

2.2 Initiative of GASAB under the aegis of CAG of India in implementing NRA

Constitutional Provisions of CAG of India/ INTOSAI/WGEA

Under the Constitution, CAG has been given a constitutional mandate to advice on the accounting principles, formats standard operating procedures and guidelines for the preparation of accounts.

The CAG's institution is a member of the INTOSAI (International Organisation of Supreme Audit Institutions), which is an autonomous, independent and non-political organisation with special consultative status with the ECOSOC of the UN. This gives an opportunity to have access to the best practices being followed world over in respect of accounting and auditing practices. One group called Working Group on Environmental Auditing(WGEA)[2] in its report – 'Environment Accounting – current status and options for SAIs' has stated (2010) that SAIs can assist in the development of environment accounts by:

- ✓ Identifying challenges to applying environmental accounting in their country;
- ✓ Recommending strategies to overcoming challenges;
- ✓ Identifying goals for developing environmental accounts;
- ✓ Identifying agencies and organisations that compile information useful for NRA, and/or
- ✓ Identifying best practices in NRA.

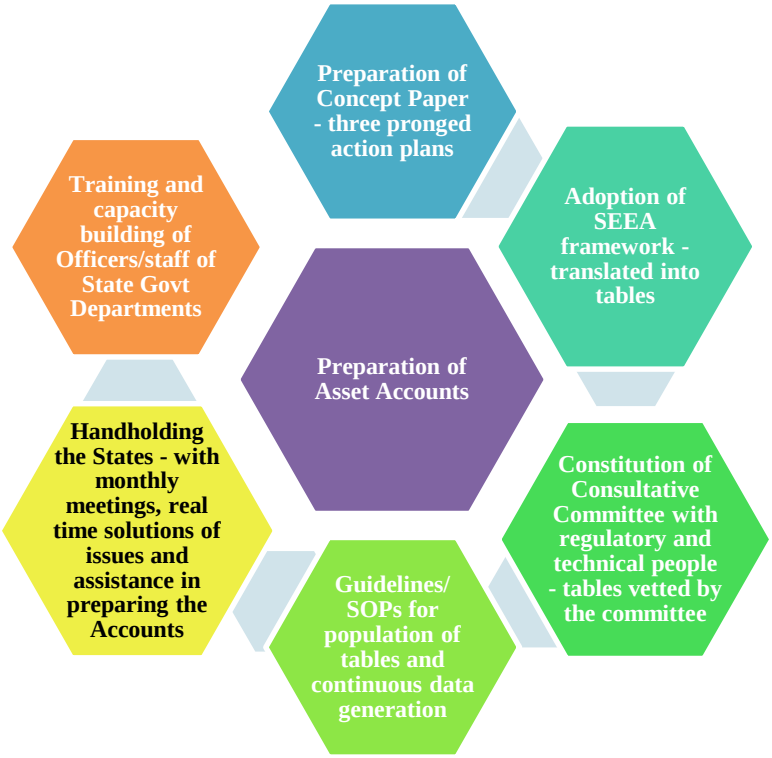
CAG being the supreme auditor for the nation has the responsibility to –

- ✓ Use environmental accounts in program audits to assess the effectiveness of environmental policies and programs, whether or not government programs are complying with national laws;
- ✓ Use environmental accounts to determine the government's compliance with the reporting requirements of international conventions.
- ✓ Natural resource accounts on mineral and energy resources can only be initiated at the State Government level as the production and excavation happens only at the mine level which is necessary to be captured for the preparation of natural resource accounts on minerals and energy resources.

CAG is in a unique position to play a critical role to enable the process of preparation of environmental accounts as it not only has the access to internationally accepted best practices but have constitutional mandate to advise and assist in accounting matters. Moreover, CAG institution has a pan-India presence in every State which can play vital role in training and hand holding the officers/staff involved in generation of data which will become the basis of preparation of natural resource accounts.

The processes involved is depicted through the block diagram below.

[2] Constituted by the INTOSAI – aiming to encourage the use of audit mandates and audit methods in the field of environmental protection and sustainable development by both members of the Working Group and non-member SAIs



These are discussed in the following paragraphs.

2.3 Concept Paper of GASAB on NRA

GASAB has decided in its 34th Board meeting (March 2019) to work on implementation of NRA. A Concept Paper on NRA was prepared and released in July 2020 (http://gasab.gov.in/gasab/pdf/NR-Accounting-final.pdf). The Paper, while complementing the good efforts of the UN in implementing NRA across the world, inter-alia envisioned implementation of NRA in India in phased manner, first in States and then gradually moving towards the national level. The way forward was carefully crafted in alignment with the requirements of the SEEA–CF and also embedding information on country specific needs as per the flexibility enabled by the SEEA framework.

The Paper discussed the concept of NRA, related issues like the SDGs and Climate Change, endeavour of UN in bringing out the latest framework, progresses made around the world including those in India. It also envisaged short, medium and long term goals in consonance with the four stage strategy suggested by the SEEA-CF of the United Nations, as mentioned below.

Short term goals	Mid-term goals	Long term goals
• Preparation of Asset Accounts on Mineral and Non-Renewable Energy Resources in States • Initiation and preparation of disclosure statement on revenues and expenditure	1. Preparation of National Asset Accounts on Mineral and Non-Renewable Energy Resources 2. Preparation of Asset Accounts in respect of other four resources namely water, land	• Preparation of the economic accounts highlighting depletion adjusted economic aggregates; and • Preparation of functional accounts recording transactions and other information about economic

related to natural resources ***(2019-20 to 2021-22)***	and forestry & wildlife resources in the States 3. Preparation of supply and use tables in physical and monetary terms showing flow of natural resource inputs, products and residuals ***(2022-23 to 2024-25)***	activities undertaken for environmental purposes. ***(2025 - 26 onwards)***

GASAB, with its innovative approach has applied the concepts of NRA to visualise the three-pronged goals to implement the whole concept of economic and environmental accounting in India in a span of 10 years to converge with the target date of SDGs, i.e. 2030. Acknowledging the constraints due to the vastness of the country, magnitude of resources and the availability of reliable data coupled with the structure of governance, GASAB has envisioned starting the process with the States.

In addition, the Paper also delved deep into the issues involved, discussed possible challenges and provided comprehensive guidelines for the entities to prepare the Asset Accounts with examples including sample Accounts and source of information for the Asset Accounts on Mineral & Energy Resources.

The action plans– unique features of our framework

Flexibility	• Cut off of Asset A/c year – (enable co-relation and authenticity of stock) • States collaborated to select the minerals – to start with imp minerals – to be expanded to cover all (SEEA allows) • Riverine resources covered separately
Country specific needs	• Sustainability of resources • Comparison between revenues and market prices • Analyse production losses – revenue yields • System driven to plug loopholes , if any
Others	• Map supply and use of resources • Incorporate ancillary data like DMF, NMET etc to make the datasets complete • Data required for monitoring national declaration at COP 26 – carbon emission and generation of renewable energy

2.4 Stakeholder onboarding and consultation process

In order to take the stakeholders, subject experts and academia onboard, GASAB has constituted a broad based Consultative Committee consisting of representatives of stakeholder ministries in Government of India like MoMines, MoEFCC, MoSPI, MoPNG, MNRE, MoJal Shakti, Department of Land Resources, specialist agencies like IBM, ICAI, ICMAI, TERI, NRSC among others and five State Governments and Accountants General in these five States (Gujarat, Karnataka, Meghalaya, Jharkhand and Uttarakhand) and eminent environmentalist and retired bureaucrat Shri Mukul

Sanwal, IAS 1971, to continuously get the works vetted and additional suggestions/ comments to make the process inclusive and robust.

Two meetings of the Committee had been held in September 2021 and June 2022 besides continuous vetting of the documents like the Concept Paper, booklet on templates and Guidelines/ SOPs etc. by the Committee.

Second Consultative Committee meeting was held in CAG's Office in June 2022

In addition to the Consultative Committee of NRA Cell as stated above, GASAB Secretariat has formed NRA Cells in the States consisting of the Audit, A&E Offices of CAG of India in States and State Government Departments like Finance, Geology and Mines etc. to enable co-ordination between the Accountants General Offices in the States with the local State Governments for effective and closer coordination and steering the project at the state level.

State NRA Cells formed

The Chief Secretaries of the States were demi-officially informed (July 2021) about the project by the Deputy CAG & Chairperson, GASAB and presentations were made to all the State Governments regarding the concept, resources to be covered initially, the formats, approach of the work and expectations from the State Governments and their Departments. Seven meetings were held (August – September 2021) in which 28 States and 2 UTs (Delhi and J&K) were covered. The States welcomed the project and agreed to extend all co-operation.

Highest echelons in the States reached out

2.5 Capacity building/trainings/workshops

Parallel to the above efforts, GASAB has been holding workshops under the aegis of Knowledge Center at Regional Training Institute, Prayagraj to update the knowledge base of the Officers in the field Offices, both Audit and A&E Offices of the Department including the Group Officers to handle preparation of the Asset Accounts in coming years.

GASAB has also conducted State specific workshops involving the concerned Departmental Officers/staff besides participation from the State AsG Offices. These workshops were planned to onboard the States which are crucial in implementing the project and to convey the idea of NRA, our expectations from States besides assessing the preparedness and constraints of the States. These handholding exercise has also helped to instill confidence in the State Governments to enable the country become compliant to the SEEA – CF framework. It also provided a platform for effective discussions and obtain clarifications. The State AsG Offices are continuously holding meetings and organising workshops/trainings for the State Government departments.

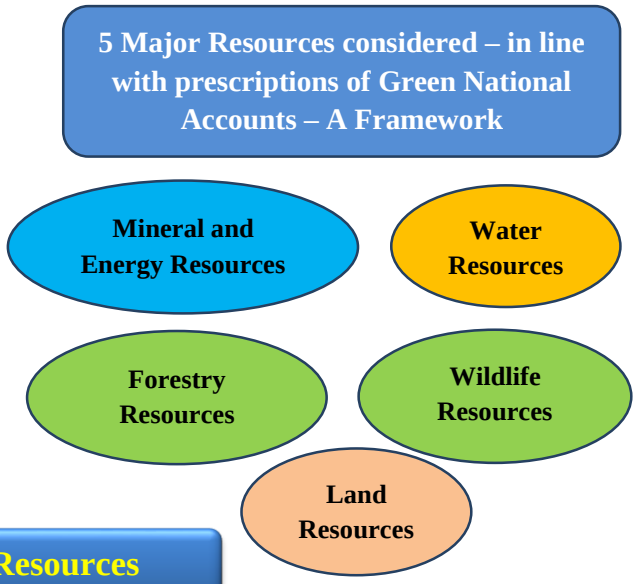
In order to hand hold and guide the States, monthly meetings are being held with the State AsG since October 2021 to monitor the progresses of preparation of Asset Accounts on Mineral and Energy Resources and to clarify/mitigate the queries/challenges. 10 such meetings have been conducted till date. Along with the State AsG Offices, the State Government departments are also participating in these meetings making them more effective and result oriented.

2.6 Shortlisting of resources

The initial stage of implementation strategy of NRA is preparation of the Asset Accounts on individual resources. The SEEA-CF has listed out seven resources of which five major resources namely Mineral & Energy Resources, Water Resources, Forestry & Wildlife Resources and Land Resources have been considered for taking up initially as mentioned in the table and diagrams below:

SEEA – CF prescribes seven resources

- Mineral and Energy Resources
- Land and soil Resources
- Timber Resources
- Aquatic Resources
- Other Biological Resources (except timber and aquatic), and Water Resources



2.7 Why Mineral and Energy Resources

The Asset Accounts on Mineral & Energy Resources have been considered as the most important goal as it consists of non-renewable resources while other major resources fall in the other group and gets renewed naturally.

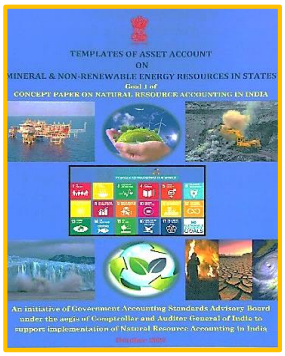
In keeping with the implementation stages as envisaged in the SEEA-CF, the flexibility embedded therein and the importance of non-renewable resources discussed above coupled with the prescription of SEEA that a country may decide to focus its initial efforts on those accounts that are most relevant to current issues, preparation of Asset Accounts on Mineral & Energy resources have been conceptualised as the need of the hour and thus planned as the short term goal No. 1.

Mineral & Energy Resources, being non-renewable resources have been considered as the first goal

The Asset Accounts on Mineral & Energy resources, once generated, will have the capacity to provide valuable information, at a glance, to the policy makers at the State and Central levels regarding the availability, use, resource generation and balance stock along with a forecast about the stream of revenues that the stock of resources will generate for the future generations. The stock of resources could also assist the policy makers in identifying future alternative source of energy and economic resources.

2.8 Finalisation of the templates and roll out to States

The Concept Paper on NRA included tentative templates for preparation of Asset Accounts on Mineral & Energy Resources. In order to test these templates for their implementability, pilot studies were carried out between July 2020 and March 2021. Major challenges included availability of ready to use data and stock of resources which were mitigated through issue of specific guidelines from GASAB. Effective guidance and continuous handholding resulted in successful completion of pilots in three States, namely Goa, Meghalaya and Rajasthan. The pilot studies were conducted in coordination with the State Government Departments of Geology & Mining, Finance and Statistics and the reports were validated by both, the department of Geology & Mines and also verified by the Audit Office.



The final templates on Mineral & Energy Resources was released in the form of a booklet in October 2021 and circulated to the Chief Secretaries, State Government Departments, and the AsG (http://gasab.gov.in/gasab/pdf/Template AssetAc.pdf). The idea was to generate the first version of the Asset Accounts on Mineral & Energy Resources in the States for the year 2020-21 by the year 2022 on selected resources in the States, including identification of underlying assumptions.

2.9 Embedding reporting items to measure progress on the *Panchamrits*

Consequent upon the national declaration on *Panchamrits* (five points) at COP-26 at Glasgow as discussed in Chapter 1, the necessity of gathering information/data on monitoring the carbon emissions and generation of renewable energy resources to continuously monitor the progresses towards the international commitment also became a necessity.

GASAB quickly comprehended the need to lay down a system of monitoring at the State level and developed templates for capturing the details of generation/progress in generation of renewable energy resources in States vis-à-vis the total need and how the surplus/shortfall are being managed. MoEFCC is monitoring carbon emissions as per the prescriptions of the UNFCCC.

2.10 The Tables – what do they intend to capture

In view of covering the items required by the SEEA framework, country specific needs embedded into the framework, interrelated issues like District Mineral Foundation/National Mineral Exploration Trust etc. recoverable and the *Panchamrits*, six tables have been designed for implementation in the States. The key elements of each of the tables are discussed as follows:

Table 1 : Mother table of Asset Accounts - retained the same as prescribed by SEEA - CF will enable international comparisons. Scope of revision embedded - till the system settles down.

Table 2 : Physical flows and sustainability of resources. Extraction/use in different sectors - Government and Private Sector. Domestic vis-a-vis export data comparisons

Table 2A/2B : To capture riverine resources which often follow a system of accumulation and depletion - without stock availability

Table 3 : Two pronged monetisation of physical flows - revenues and average sale/market value - to ascertain revenue streams for future and analyse royalties vis-a-vis market value to optimise resource for State exchequer

Table 4 : To capture actual extraction - production therefrom and dispatch - to analyse production losses

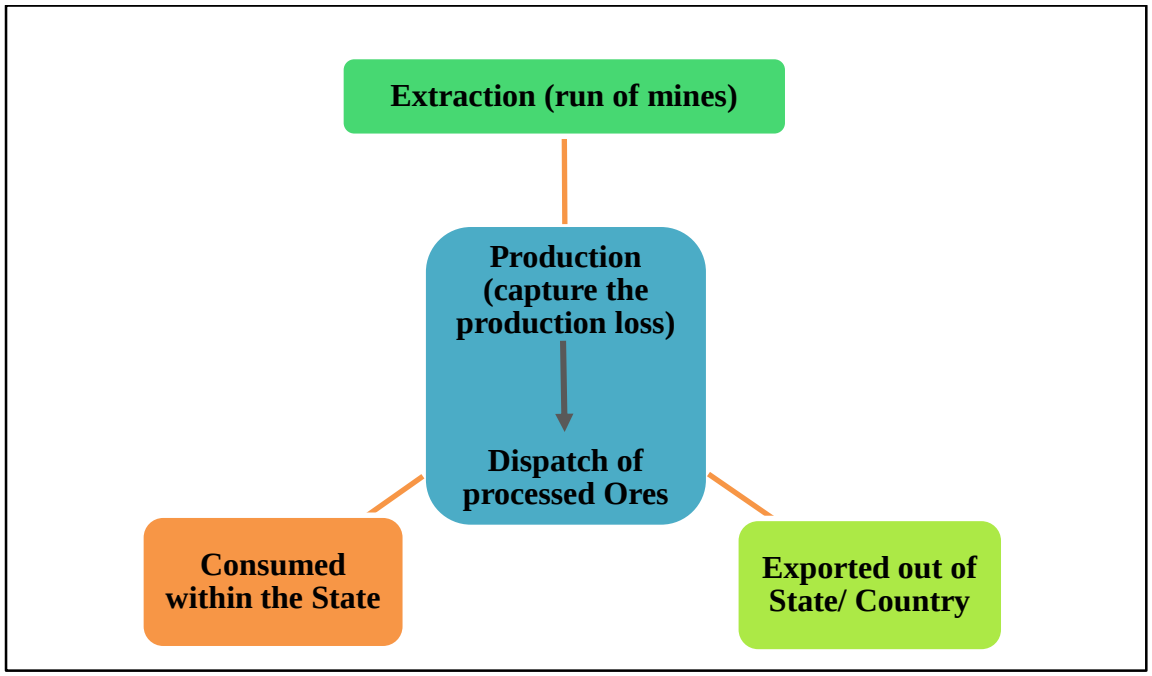
Table 5 : To capture District Mineral Foundations/National Mineral Exploration Trust etc recoveries vis-a-vis those recoverable

Table 6 : To capture sector wise power requirement, energy generated within the state from non-renewable and renewable energy resources with their percentage contribution to monitor achievement of national target of attaining 50 *per cent* of energy generation from renewable energy resources by 2030

The snapshots of input tables are in **Annexure – II**.

2.11 What is being intended – a 360 degrees profiling or end-to-end mapping of supply and usage of resources

The Asset Accounts would enable capturing the supply of resources. However, a 360-degree profiling of the minerals extracted, and their actual consumption/use/sale is not prevalent in the country except in very few States. The framework designed by GASAB intends to capture the entire ecosystem as detailed below:



The idea of this initiative is to map the entire process commencing from extraction of resources – required under SEEA framework, their production at the mine site, production losses – to monitor revenue loss in cases of abysmal production wastage, dispatch with the usage/sale within the State by industries/user agencies and also those exported out of the State/country. This is first such initiative in the country and will go a long way in ensuring sustainable resource management, use and optimising revenue resources for the State exchequer. These are further discussed in Chapter - VII.

System of exploration of resources: Geological Survey of India under MoM, GoI with the help of their agencies and the State Governments carry out exploration of mineral and non-renewable energy resources and categorises them in three distinct categories, namely proved, probable and possible reserves. Reserves which have 90 *per cent* or above likelihood of commercial extraction are categorised as proved reserves. Proved reserves are established using geological and engineering data gathered through seismic testing and exploratory drilling. Reserves having commercial extraction potential less than 90 *per cent* but more than 50 *per cent* are classified as probable reserves while those having odds of commercial extraction less than 50 *per cent* and more than 10 *per cent* are classified as possible resources. These categorisations are presently under review.

Other resources like riverine resources involve scientific and well-defined system of estimation of accumulation during a period based on which mining plans are required to be prepared and extractions are proposed over the plan period for prior approval of the GoI.

The SEEA framework requires stock in Asset Accounts reckon the proved reserves. Thus, States were advised to consider only the proved reserves. In some cases, the States did not readily have the information of only the proved reserves and in such cases, total reserves, or proved plus probable reserves have been considered. These are disclosed in Annexure IV.

2.12 Key takeaways for the States – the final outcome

The Asset Accounts, once compiled, are designed to aid in evidence based decision-making and good governance by providing the following for the policy makers.

- *Preparation of NRA and meet the commitment made to meeting SDGs and SEEA framework.*
- *Resources at a glance - a one pager document on State-wise major and minor minerals.*
- *Compilation of physical and monetary values to enable cross verification of revenues vis-à-vis actual extractions.*
- *Provide pace of exploitation – to bring out sustainability of resources.*
- *Analysis of revenue vis-à-vis market value/export value will make it easier to assess and review the royalty rates – to protect State's revenue interest.*
- *Enable assessment of revenue streams for the future.*
- *Mine-wise data on resources – pan India.*
- *Enabler of identification of alternate resources (economic as well as energy).*
- *Close monitoring on illegal mining, and*
- *Progress on commitment made at COP 26.*

Presently, Asset Accounts on Mineral and Energy Resources for the year 2020-21 in the prescribed six tables have been prepared in 28 States and UT of J&K. Delhi prepared only the table on progress on generation of renewable energy as there is no mineral repository. These are prepared in the form of a Report to be handed over to the State Governments.

Thus, achievement of the short and mid-term goals by 2024-25 would not only help the entities with a consolidated database on availability, usage and sustainability of resources vis-a-vis revenues generated and the costs involved, but also will be a major breakthrough towards attaining the first stage implementation of NRA as envisioned in the SEEA - CF. Also, this will help India to get into the elite list of countries where Asset Accounts on natural resources (importantly non-renewable resources) are being generated.

The final outcome

Besides the inputs to the policy makers, the Asset Accounts will help with an outline of resource bases across the States adding immense value towards the planning for resource exploitation and policy framing for the present as well as sustainability of resources for the future generations.

2.13 Initiation of environmental accounts in other countries

Though the latest framework on NRA was released in 2012, different countries including the United Nations were relentlessly working on this agenda since 1970s. The UN set up the Brundtland Commission in 1983 to formulate 'a global agenda for change' hinged on the concept of sustainable development as an alternative to unfettered economic growth. The Paper, released in 1987, defined sustainable development as development that meets the need of the present without compromising the ability of future generations to meet their own needs. Simultaneous to the efforts of the UN, different developed and some developing nations attempted to draw up their environmental accounts, in which, countries like Australia, Canada, France, Germany, Netherland, Norway, UK are the frontrunners. Some of these are briefly discussed in the following tables.

Australia

Both mineral and energy accounts are compiled – Land, timber and water account also compiled
Physical and monetary accounts compiled
Time series of accounts: 1995 onwards
Produced at national level and annually
Follows SEEA methodology
Figures are added to the national balance sheet

Salient outputs of Asset Accounts:

- The value of Australia's environmental assets increased nearly 150 *per cent* over the years 2002-03 to 2016-17
- Land is the most valuable natural asset while iron ore is the most valuable sub-soil asset
- Environmental assets have made up the largest share of Australia's capital base since 2014-15.

Canada

Mineral, energy and timber asset accounts compiled
Physical and monetary accounts - current prices plus a volume index
Time series of accounts: 1961 onwards

Produced at national and provincial levels and annually

Follows SEEA methodology

Figures are added to the national balance sheet

Salient outputs of Asset Accounts:

- Though the value of the natural assets had increased, yet there is clear indication of steady downward trend in the volume of natural assets.

The Netherlands

Only energy - natural gas and oil accounts are compiled

Physical and monetary accounts

Time series of accounts: 1990 onwards

Produced at national level and annually

Follows SEEA methodology

Salient outputs of Asset Accounts:

- The asset accounts provided information on opening stock, new discoveries, extraction and other changes and closing stock
- One of the components of monetary accounts is Government revenue.

The United Kingdom

Energy - natural gas and oil accounts are compiled, Timber and Fish Accounts are also compiled

Physical and monetary accounts

Time series of accounts: 1989 onwards (physical) and 2011 onwards (monetary)

Produced at national level and annually

Follows SEEA methodology

Salient outputs of Asset Accounts:

- The asset accounts clearly depicted continuous reduction in natural resources like oil and natural gas.

The Philippines

Selected mineral resources (gold, copper, chromium and nickel) and energy resources (coal, oil and natural gas) are compiled

Physical accounts only for energy and both physical and monetary accounts for minerals

Time series of accounts: 2002 onwards for mineral and 2000 for energy resources

Produced at national level and periodically
Follows SEEA methodology

Salient outputs of Asset Accounts:

- Asset Accounts of minerals include sub-classes as well
- Oil and natural gas stock registered a steady declining trend.

Comparison of India with international experience

The above discussions would reveal that the major countries have varied degrees of achievement and objectivity in preparing their environmental accounts. Understandably, the prescriptions of the SEEA-CF which provides for flexibility in designing and preparing the accounts coupled with the provision for countries to decide on their initial focus on those accounts which are most relevant to current issues have been fundamental basis of operationalising NRA in these countries.

Thus, the way forward laid down in the Concept Paper on NRA to initially focus on the preparation of Asset Accounts on Mineral & Energy Resources keeping the country-specific needs in view bridges the efforts in India envisaged by the GASAB under aegis of CAG of India with the internationally accepted principles as discussed above and as prescribed in the SEEA-CF.

2.14 GLOBAL ASSESSMENT BY UN

The United Nations Statistics Division (UNSD) had carried out (2020) a Global Assessment of Environmental-Economic Accounting and Supporting Statistics of national statistical offices of 193 Member States as well as 22 territories, under the auspices of the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) with the aim to assess the progress made in implementation of the System of Environmental-Economic Accounting (SEEA) and in meeting the targets of the SEEA implementation strategy.

At the 47th session of the United Nations Statistical Commission, the UNCEEA recommended the following two SEEA implementation targets:

- *At least 100 countries with ongoing, well-resourced programmes in the SEEA Central Framework by 2020.*
- *At least 50 countries with ongoing, well-resourced programmes in the SEEA Ecosystem Accounting by 2020.*

The aim of the Global Assessment is to assess the progress made in implementation of the System of Environmental-Economic Accounting (SEEA). The number of countries

implementing the SEEA informs Sustainable Development Goal (SDG) target 15.9 on integrating ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts. In particular, the number of countries implementing the SEEA provides data for indicator 15.9.1.

The Assessment indicated that a total of 89 countries implement the SEEA, of which, SEEA – CF was implemented by various degrees as different countries have prioritised different accounts ranging between 30 countries having prepared water accounts while largest number of 47 countries responded to have prepared energy accounts.

The priorities placed on specific SEEA-CF accounts varied between developed and developing countries. The most commonly compiled accounts in developing countries were energy, water and timber accounts. On the other hand, in developed countries, the most commonly compiled accounts included environmental protection and expenditure, environmental taxes and subsidies, and air emission accounts, which together with energy, material flow and environmental goods and services sector accounts, are part of the Eurostat directive on environmental-economic accounting.

In terms of expanding compilation of SEEA-CF accounts in the future, developing countries prioritised water, energy, land, timber, air emission and environmental protection expenditures accounts. On the other hand, developed countries prioritised environmental taxes and subsidies, air emission, environmental goods and services, environmental protection expenditure, material flow and water accounts.

These are shown in the table below:

All countries		*Developed countries*		*Developing countries*	
Account	**No of countries**	**Account**	**No of countries**	**Account**	**No of countries**
Energy	47	EPEA	35	Energy	20
EPEA	43	Environmental taxes and subsidies	35	Water	19
Material flow	41	Air emission	33	Timber	15
Environmental taxes and subsidies	39	Material flow	31	Land	12
Air emission	38	Environmental goods and services	30	Material flow	10
Environmental goods and services	33	Energy	27	EPEA	8
Water	30	Water	11	Air emission	5

EPEA – Environmental protection expenditure accounts.

Source: UN document on Global Assessment of Environment-Economic Accounting and Supporting Statistics 2020

Thus, the main SEEA-CF accounts[3] most commonly compiled by countries with an existing accounting programme in the last five years, disaggregated by economic region. The most commonly compiled accounts differ somewhat between developed and developing countries, as the developing countries tend to prioritise energy and water accounts while on the other hand, developed countries focused mostly on EPEA, environmental taxes and subsidies accounts, and air emission accounts.

Once the national accounts on NRA is prepared for the selected resources of which this compilation is the first major step, India will get enlisted in the elite list of countries where NRA is generated at periodic intervals.

Among neighbours, Bhutan, China, Pakistan and Nepal responded as having implementing SEEA – CF while Bangladesh, Myanmar and Sri Lanka reported they are planning to implement the framework.

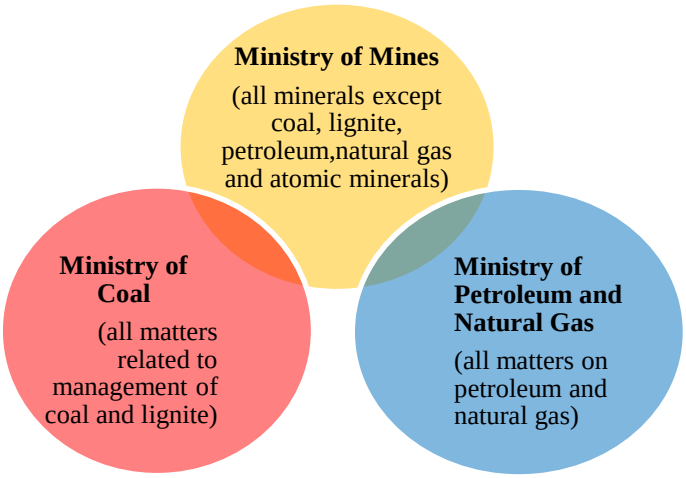
[3] An account is considered to be compiled if it has been compiled at least once within the past five years (2016-2020), irrespective of whether or not it had been published. In addition, an account was considered to be compiled if any part of it was compiled. For example, *'energy accounts'* were considered as being compiled even if countries only compiled physical use tables for energy.

CHAPTER - III
MINING SCENARIO IN THE COUNTRY – MANAGEMENT, PROCESSES, CONSTITUTIONAL PROVISIONS, AND REVENUES

3.1 MINING IN INDIA

Mining sector is one of the core sectors of economy. It provides basic raw material to many important industries. There has been a notable turnaround in this Sector following the Government's initiatives in reforming the Policy. Mining is expected to be a key industry to foster investments, both domestic and foreign, and therefore the prospects for growth and generation of employment is profound.

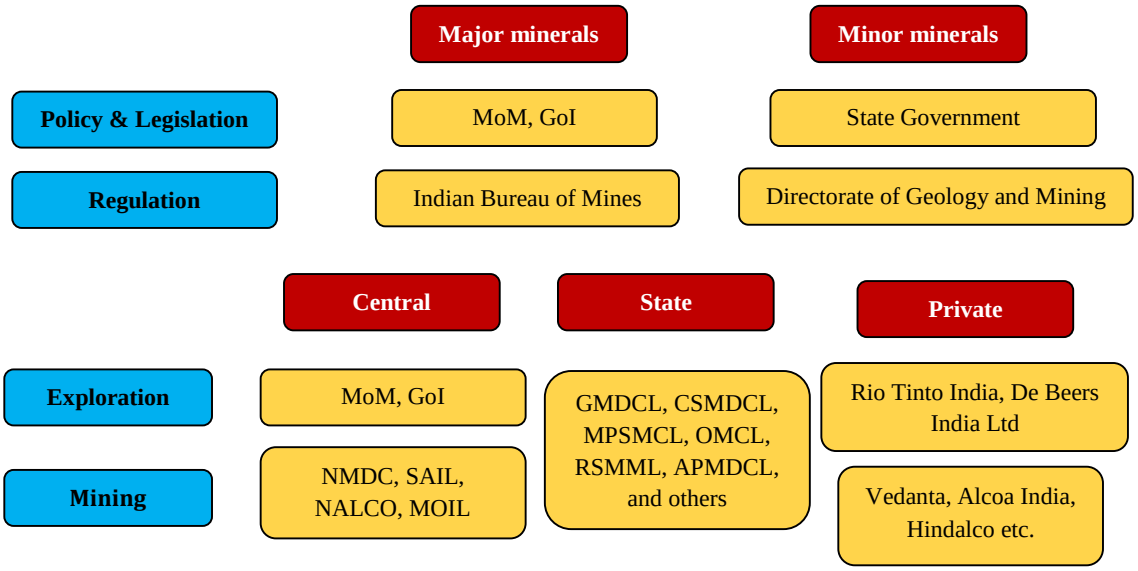
The Ministry of Mines (MoM), Government of India is responsible for the entire minerals and mining sector in the country that includes legislation, administration, policy formulation etc. in respect of all mines and minerals other than coal and lignite, natural gas and petroleum, but including offshore minerals. Coal and lignite are administered by the Ministry of Coal (MoC) while natural gas and petroleum are handled by the Ministry of Petroleum and Natural Gas (MoPNG).



In India, the minerals are classified as minor minerals and major minerals. The power to frame policy and legislation relating to minor minerals is entirely delegated to the State Governments while policy and legislation relating to the major minerals is dealt by the MoM. All the mineral legislations in the country conform to the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act).

MoM through its attached office, Geological Survey of India (GSI) facilitates exploration, geological mapping and mineral resource assessment in the country. Indian Bureau of Mines (IBM), a subordinate office of the MoM is mainly responsible for regulation of mining in the country. Mineral concessions in India are granted to Indian nationals or entities incorporated in India only. Most of the exploration activities in the country are of

conventional type with restricted input from geochemistry, geophysics and remote sensing. The finds so far, are located near the surface (mostly up to a vertical depth of 100 m). Therefore, with fast depletion of easily accessible and shallow or near surface ore bodies and decline in the rate of locating new mineral deposits within shallow depths, the challenge lies in identifying new area for locating near surface deposits and "deep seated" and "concealed/hidden" ore bodies through modern and sophisticated exploration methods/ techniques on the basis of conceptual studies. The management of major and minor minerals in the country is depicted through the following block diagrams.



APMDCL – Andhra Pradesh Mineral Development Corporation Ltd. CSMDCL–Chhattisgarh State Mineral Development Corporation Ltd. GMDCL– Gujarat Mineral Development Corporation Ltd. GoI – Government of India MECL– Mineral Exploration Corporation Ltd. MOIL– MOIL Ltd.	MPSMCL – Madhya Pradesh State Mining Corporation Ltd. NALCO – National Aluminium Company Ltd. NMDC – National Mineral Development Corporation Ltd. OMCL – Odisha Mining Corporation Ltd. RSMML – Rajasthan State Mines & Minerals Ltd. SAIL– Steel Authority of India Ltd.

The MMDR Act, 1957 was amended through the MMDR Amendment Act, 2015. The major features of the amendment that came into force on January 12, 2015 are:

- *Mining Leases will now be granted for a term of 50 years.*
- *The mineral concessions will now be granted through auction process and will not be renewed after the expiry of the concession.*
- *The Central Government will prescribe the terms and conditions for grant of mineral concessions through competitive bidding.*
- *Reconnaissance Permits will henceforth be granted on non-exclusive basis.*
- *The Central Government has the authority to reserve mines for specific end uses at its discretion.*

- *District Mineral Foundation is to be set up in each mineral bearing district for local area development.*
- *National Mineral Exploration Trust is to be set up for regional and detailed exploration in the country.*

3.2 Coal, petroleum and natural gas

The Ministry of Coal has the overall responsibility of determining policies and strategies in respect of exploration and development of coal and lignite reserves, sanctioning of important projects of high value and for deciding all related issues. Under the administrative control of the Ministry, these key functions are exercised through the Public Sector Undertakings, namely, Coal India Ltd. and its subsidiaries and Neyveli Lignite Corporation India Limited (NLCIL). Other than Coal India Ltd. and Neyveli Lignite Corporation India Ltd., the Ministry of Coal also has a joint venture with Government of Telangana called Singareni Collieries Company Limited. Government of Telangana holds 51 *per cent* equity and Government of India holds 49 *per cent* equity.

Coal is the most important and abundant fossil fuel in India. It accounts for 55 *per cent* of the country's energy need. The country's industrial heritage was built upon indigenous coal.

Commercial primary energy consumption in India has grown by about 700 *per cent* in the last four decades. The current per capita commercial primary energy consumption in India is about 350 kg of oil/year which is well below that of developed countries. Driven by the rising population, expanding economy and a quest for improved quality of life, energy usage in India is expected to rise. Considering the limited reserve potentiality of petroleum & natural gas, eco-conservation restriction on hydel project and geo-political perception of nuclear power, coal will continue to occupy centre-stage of India 's energy scenario.

Indian coal offers a unique eco-friendly fuel source to domestic energy market for the next century and beyond. Hard coal deposit spread over 27 major coalfields, are mainly confined to eastern and south-central parts of the country. The lignite reserves stand at a level around 36 billion tonnes, of which 90 *per cent* occur in the southern State of Tamil Nadu.

The Ministry of Petroleum & Natural Gas is concerned with exploration and production of oil and natural gas, refining, distribution and marketing, import, export and conservation of petroleum products. Oil and gas being the important import for our economy, many initiatives have been taken by the Ministry for increasing production and exploitation of all domestic petroleum resources to address the priorities like energy access, energy efficiency, energy sustainability and energy security. The major initiatives of the Ministry include:

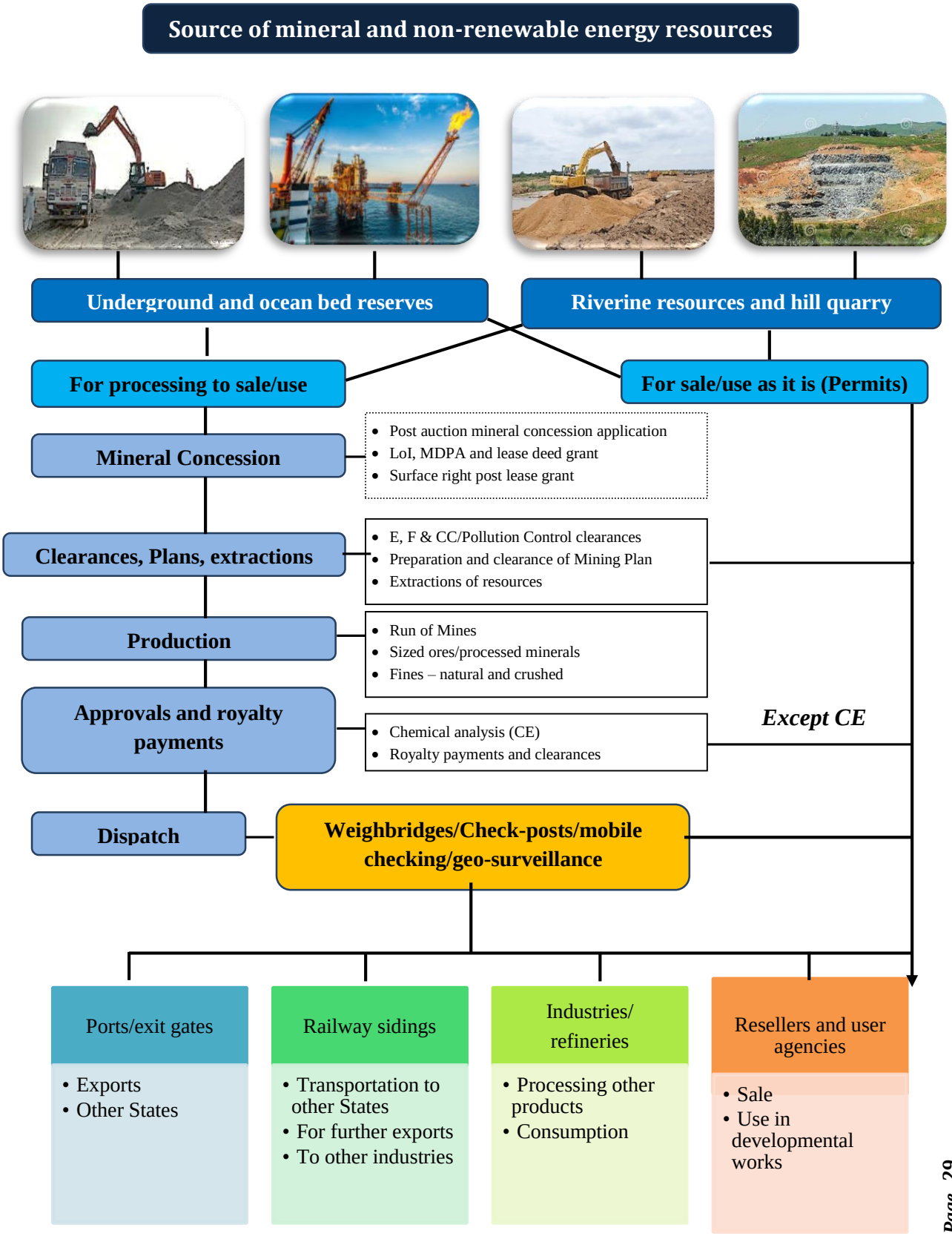
- *Exploration for, and exploitation of petroleum resources, including natural gas and coal bed methane, gas hydrates and shale gas.*
- *Production, supply, distribution, marketing and pricing of petroleum, including natural gas, coal bed methane and petroleum products.*
- *Planning, development and regulation of oilfield services and conservation of petroleum products.*

3.3 Constitutional provisions governing resources

In the federal structure, powers are vested in Union as well as State Governments regarding control and monitoring of mineral and energy resources as shown in the table below.

List I (Union list)	List II (State List)	List III (Concurrent List)
Regulation and Development of oilfields and mineral oil resources, petroleum and petroleum products (53)	Regulation of mines and mineral development subject to provisions of List I (23)	Forests, Protection of wild animals (17A and 17B)
Regulation of mines and mineral development to the extent to which such regulation and development under the control of the Union is declared by Parliament (54)	Taxes on mineral rights subject to such limitations Parliament may impose (50)	Stamp duties other than due duties or fees collected by judicial stamps not including rates of stamp duty (44)
Regulation of labour and safety in mines and oilfields (55)	Fees in respect of any of the matters in this list (except Court fees) (66)	Fees in respect of any of the matters in this List (47)
Fees in respect of any of the matters in this list (except Court fees) (96)		

The operational structure of the mining mostly followed in the country is depicted through the following diagram.



3.4 Containment of illegal mining

Government of India, Ministry of Mines have taken a number of initiatives to prevent illegal mining commencing with amendments in the MMDR Act in 2015 with a number of interventions like –

- *Introducing major deterrents through framing Rules under the MMDR Act – increasing penalty from ₹25,000 to ₹5,00,000 per hectare and imprisonment from 2 years to 5 years.*
- *Provisions for having special courts in States introduced providing speedy trial of the offences.*
- *Clarification on illegal mining further amended in March 2021 to broaden the coverage.*
- *Requests were made to State Governments to set up task forces at the State level and District level to control illegal mining.*
- *Quarterly reporting on illegal mining was introduced for the States along with action taken reports.*

However, the role of GoI in prevention of illegal mining is limited to ensuring sustainable development of mineral resources and ensuring compliance of related provisions of the Acts and Rules. Despite these limitations, GoI has taken various steps as listed above. Besides, GoI has introduced mining surveillance system (MSS) in coordination with the Bhaskaracharya Institute for Space Applications and Geo-informatics, Gujarat and Ministry of Electronics and Information Technology to use space technology for curbing illegal mining activity in the country.

Role of State Governments

As per Section 23 C of MMDR Act, States have the powers to frame rules to curb illegal mining, transportation, and storage of illegally mined minerals. Any orders passed by the State Government cannot be appealed before the Union Government. Accordingly, 21 States[4] have on date framed Rules to curb illegal mining.

22 States[5] have so far set up task forces at State and District level to control illegal mining.

- *As per the existing laws, State Governments are the appropriate authority for prevention of illegal mining because:*
- *Mining leases are entered into by the State Governments with reference to land description in the revenue records and thus, States can only demarcate the lease boundaries and assess any illegal mining activity.*

[4] Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, and West Bengal.

[5] Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

- *State Governments are the owners of mineral rights and control Police, and law and order machinery making it easier to curb illegal mining.*
- *MMDR Act has empowered the State Governments to frame Rules for preventing illegal mining.*

Innovative plan to curb illegal mining through complete mapping of supply and use of resources is discussed in Chapter - VII.

3.5 Importance of mining sector for States

Receipts from mineral and energy resources are collected and retained by the State Governments while those arising out of extraction of petroleum products in ocean beds and those extracted from UTs accrues to the Union Government. State-wise receipts (Finance Accounts[6]) from mineral and energy resources in 10 major mineral rich States during 2020-21 were as under:

Sl. No	State	Petroleum and Mining Receipts and percentage to total non-tax receipts of the State[7]	
		2020-21	
		(₹ in crore)	*Per cent*
1.	Odisha	13,919	71.32
2.	Rajasthan	6,764	49.54
3.	Chhattisgarh	4,976	69.72
4.	Jharkhand	4,896	64.73
5.	Madhya Pradesh	4,284	47.28
6.	Maharashtra	3,950	24.75
7.	Gujarat	2,897	27.61
8.	Karnataka	3,881	49.16
9.	Telangana	3,457	56.67
10.	Assam	1,489	51.35

Thus, the table shows that receipts from mineral and energy resources was more than ₹ 13,000 crore in Odisha. Though some States registered a dip in receipts during 2020-21, it was mainly attributable to the COVID19 restrictions. However, the importance of mineral and energy resources could be clear from the volume of receipts generated by the State Governments from these sources. Statement showing receipts of all 28 States and J&K is at **Annexure - III.**

[6] Major head 0853 Non-ferrous Mining & Metallurgical Industries, 0802 Petroleum, 0803 Coal and Lignite – receipts from royalties, fees, rents etc.

[7] In view of large variations between State Government and Finance Accounts figures in case of MP, figures provided by State Government has been adopted.

CHAPTER - IV
COMPILATION OF ASSET ACCOUNTS OF STATES – MINERAL AND ENERGY RESOURCES

4.1 MINERAL AND ENERGY RESOURCES COVERED ACROSS THE COUNTRY

India is a mineral rich country and has favourable geological milieu which is yet to be fully explored, assessed, and exploited. Its geological setup is similar in many ways to that of resource rich countries like Canada, Australia, Brazil, South Africa, Chile and Mexico etc.

As the State Governments are the owners of mineral and energy resources in their territories, States were requested to prioritise the resources for the first version of Asset Accounts and thereafter onboard the remaining resources gradually in subsequent years. However, this being first such study in the country, there were justifiable challenges for the State Governments to collect and collate such huge set of information on all the resources which were available but scattered in the district level offices. Accordingly, the Asset Accounts in the States were prepared with mineral and energy resources as prioritised by the respective State Governments. Undoubtedly, the mammoth task achieved by the States in collecting and providing information/data on almost all the resources in States is praiseworthy. The remaining resources, very few though, are planned to be onboarded during subsequent years. As foreseen and allowed by the SEEA framework, countries commencing with the study would need a couple of years to settle down. The input tables intend to capture proved reserves as stock and the entire cycle from extraction, production and dispatch. However, this being the first time such account is being prepared, all States could not provide the desired inputs (Details in **Annexure – IV).** The State-wise list of mineral and energy resources covered by this study is depicted through the following table.

Table showing mineral and energy resources across States covered in the Asset Accounts 2020-21

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
Andhra Pradesh	Iron Ore, Lime Stone, Manganese Ore, Vermiculite, W. Shale	Ball Clay, Barytes, Black Granite, Building Stone, Calcite, China Clay, C. Granite, Cubes & Kerbs, Dolomite, Feldspar, Fire clay, Gravel/ Earth, Laterite, L. Stone	Crude Oil & Natural Gas

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
		Slabs, Limestone, Limekankar, Mosaic Chips, Marble, Mica, Moulding sand, Murram, Pyrophylite, Quartz, Quartzite, Road Metal, Silica Sand, Steatite, Slate, Yellow Ochre, Ordinary Earth, Rough Stone	
Arunachal Pradesh	Limestone	Dolomite	Coal, Crude Oil & Natural Gas
Assam	Limestone	Granite	Coal, Crude Oil & Natural Gas
Bihar	Limestone	Sand, Stone & Jalwa Quartz	
Chhattisgarh	Bauxite, Iron Ore, Limestone, Tin Ore, Tin- Metal & Graphite	China Clay, Dolomite, Fire clay, Quartz, Quartzite & Soapstone	Coal
Goa	Bauxite, Iron Ore, & Manganese	Basalt & Laterite Stones	
Gujarat	Bauxite, Limestone & Manganese	Bentonite, Calcite, Chalk, China Clay, Dolomite, Fire clay, Granite, Gypsum, Marble, Quartz, Sand stone & Silica Sand	Crude Oil, Lignite, & Natural Gas
Jammu and Kashmir	Bauxite, Limestone, & Magnesite	Dolomite, Granite, Gypsum, Marble, Quartzite, RBM & Sapphire	Coal & Lignite
Haryana		Road Metal & Masonry Stone & Slate	
Himachal Pradesh	Limestone	Boulder, Building Stone, Murram, Rough Stone & Sand	
Jharkhand	Auriferous Quartz, Bauxite, Iron Ore, & Limestone	Pyrophylite, Quartzite & Stone	Coal
Karnataka	Aluminous Laterite, Bauxite, Chromite, Copper Ore, Gold, Iron Ore, Kyanite, Limestone, Manganese, Magnesite, Martilised Magnetic Iron Ore & Titaniferrous Magnetite	Aluminous Clay, Barytes, Black Granite, Brick Earth, China Clay, Clay, Corundum, Cubes, Decorative Building Stone, Dolomite, Dunite, Feldspar, Fuller's Earth, Green Granite, Grey Granite, Import Sand, Kaolinc include ball clay white clay, Laterite, Lime shell, Multi Colour Granite, Murrum, Quartz, Quartzite, Sand stone, Silica Sand & Talc-Steatite-Soapstone	
Kerala	Illemenite, Leucoxene, Limestone, Monazite, Rutile, Sillimanite & Zircon	Building Stone, China Clay Granite, Kaolin include ball clay white clay, Laterite, Limeshell, Ordinary earth, Sand & Silica Sand	
Madhya Pradesh	Bauxite, Copper, Diamond, Iron Ore,		Coal

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
	Limestone, Manganese & Rock Phosphate		
Maharashtra	Bauxite, Fluorite, Iron Ore, Kyanite, Limestone, Manganese, Sand Stowing & Sillimanite	Black Stone, Dolomite, Jambha Chira, Laterite, Murrum, Ordinary Clay, Ordinary Sand, RBM, Silica Sand, Slate & Stone	Coal
Manipur	Chromite & Limestone		
Meghalaya	Iron Ore & Limestone	Boulder Stone, Brick Earth, Granite, Limestone & River sand	Coal
Mizoram		Sand & Stone	
Nagaland	Limestone & Ni-Co-Cr bearing Magnetite	Clay & Decorative Building Stone	Coal, Natural Gas & Petroleum
Odisha	Bauxite, Chromite, Graphite, Iron Ore, Limestone & Manganese ore	Dolomite, Mineral Sand, Pyrophylite, Quartz & Quartzite,	Coal
Punjab		Sand and gravel	
Rajasthan	Copper Ore, Garnet, Iron Ore, Lead-Zinc Ore, Limestone, Manganese ore, Rock Phosphate, Selenite, Siliceous earth, Silver Ore, Vermiculite & Wollastonite	Ball Clay, Barytes, Bentonite, Calcite, China Clay, Dolomite, Feldspar, Fire clay, Fuller's Earth, Granite, Gypsum, Laterite, Marble, Mica, Ochre, Phyllite, Pyrophylite, Quartzite, Silica Sand & Talc-Steatite-Soapstone	Lignite, Natural Gas & Petroleum
Sikkim	Base Metals, Graphite, Limestone & Talc	Boulder, Dolomite, Sand, Stone & Stone Chips	Coal
Tamil Nadu	Beach Sand Minerals, Graphite, Limestone, Marl, Magnesite & Vermiculite	Granite, Quartz, RBM & Rough stone	Lignite, Natural Gas & Petroleum
Telangana	Garnet, Iron Ore, Limestone, Manganese ore & Stowing Sand	Barytes, Black Granite, Colour Granite, Dolomite, Feldspar, Fuller's Earth, Gravel, white clay, Laterite, L. Stone Slabs, Mosaic Chips, Ordinary Sand, Quartz, Road Metal & Shale	Coal
Tripura		Sand	Natural Gas
Uttar Pradesh	Limestone	Diaspore, Granite, Pyrophylite & Silica Sand	Coal
Uttarakhand	Limestone & Magnesite	RBM & Soapstone	

State	Types of resources		
	Major Mineral	Minor Mineral	Fossil Fuel
West Bengal	Stowing Sand	Black Stone, China Clay, Feldspar, Fire Clay, Granite, Quartz, Sand Stone & Silica Sand	Coal

Thus, it can be seen from the table above, a total of 107 mineral and energy resources are covered in this compilation. Break-up is given below.

Fossil fuels	Major minerals	Minor minerals
• 4	• 40	• 63

4.2 ASSET ACCOUNT OF FOSSIL FUELS

During the course of the study, all four fossil fuels have been covered in all 28 States and J&K for the year 2020-21. The overall State-wise position of stock and flow of fossil fuels commencing with the opening stock, additions and extractions during the year, and closing stock at the end of the year 2020-21. This, however, excludes only the fossil fuels (petroleum and natural gas) available in the ocean bed which is available on the website of Ministry of Petroleum and Natural Gas. Also, there is negligible scope of pilferage, illegalities. The following table has the details.

Stock and flow	Break-up	Coal	Lignite	Crude Oil/Petroleum	Natural Gas
No of States involved		14	4	7	7
				In million tonnes	***In million cum***
Opening Balance		1,03,017.95	7,951.31	916.26	3,05,539.73
Addition		2,614.34	0	2.50	4,409.96
Extraction	Govt. Sector	479.64	26.79	14.47	6,739.11
	Private Sector	115.65	21.82	0.25	1,622.30
	Illegal/Others	1.48	0	0.015	10.43
	Total	596.77	48.61	14.75	8,371.84
Closing Balance		1,05,035.91	7,902.68	904	3,01,577.85

Note: The variations in stock and flow is due to variations in stock and flow of resources as reported by the States.

Details are in Annexure - V.

Thus, at the end of March 2021, the stock of fossil fuels in the States stood at 1,05,035.91 million tonnes of coal, 7,902.68 million tonnes of lignite, 904 million tonnes of crude oil and 3,01,577.85 million cum of natural gas.

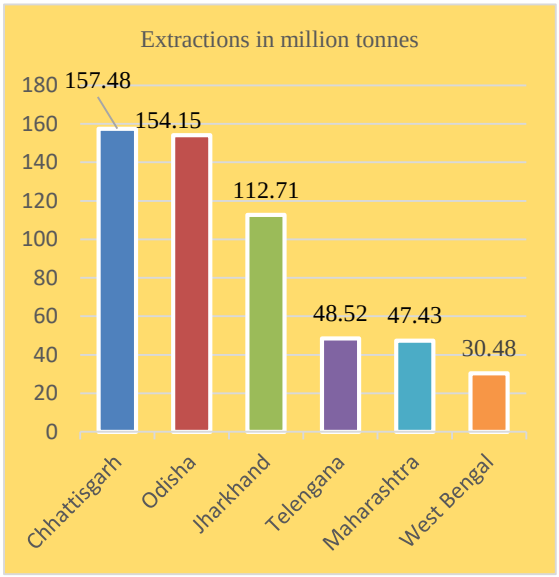
The valuation of the closing stock of the resources is possible using the average sale price of the produces for the month of March 2021 captured by the IBM.

During the year, the flow of reserves involved additions of 2,614.34 million tonnes of coal, 2.50 million tonnes of crude oil and 4,409.96 million cum of natural gas in the States which were new discoveries/newly declared as proved reserves; while at the same time, there was extraction of 596.77 million tonnes of coal, 48.61 million tonnes of lignite, 14.75 million tonnes of crude oil and 8,371.84 million cum of natural gas in the States. State-wise position of major extractors and availability of resources at the end of the year in descending order are given in the following table:

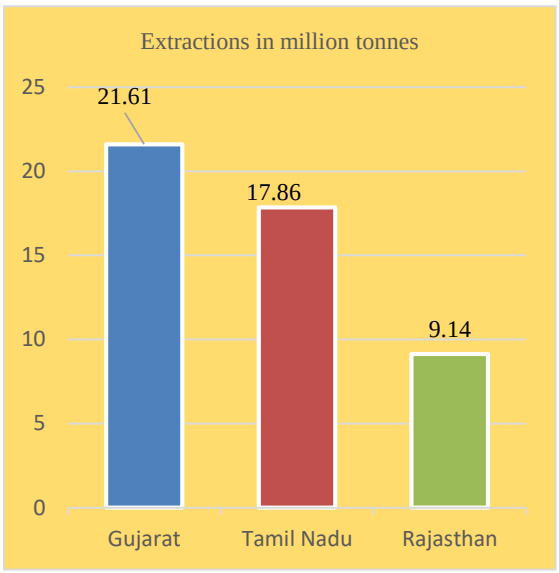
Highest extractions (State/qty)				Closing stock March 2021 (State/qty)			
Coal	Lignite	Crude Oil	Natural gas	Coal	Lignite	Crude Oil	Natural gas
				(All resources in million tonnes/natural gas in million cum)			
Chhattisgarh (157.48)	Gujarat (21.61)	Rajasthan (5.88)	Assam (2,330)	Odisha (43,326)	Gujarat (3,484.18)	Nagaland* (598.98)	Assam (1,64,270)
Odisha (154.15)	Tamil Nadu (17.86)	Gujarat (4.46)	Rajasthan (2,039.76)	Chhattisgarh (17,364.75)	Tamil Nadu (3,295.22)	Assam (151.65)	Gujarat (56,444.53)
Jharkhand (112.71)	Rajasthan (9.14)	Assam (3.80)	Tripura (1,630)	West Bengal (17,045.13)	Rajasthan (1,118.28)	Gujarat (114.13)	Tamil Nadu (37,890)
Telangana (48.52)		Tamil Nadu (0.41)	Tamil Nadu (911)	Jharkhand (10,336.77)	Others (5.00)	Rajasthan (28.70)	Tripura (30,570)
Maharashtra (47.43)		Andhra Pradesh (0.15)	Andhra Pradesh (775.57)	Telangana (9,444.24)		Tamil Nadu (9.08)	Rajasthan (12,327.84)
West Bengal (30.48)			Gujarat (685.47)	Maharashtra (5,658.30)		Arunachal Pradesh (1.45)	Others (75.48)
				Others (1,860.71)		Others (0.01)	

* Including Natural Gas.

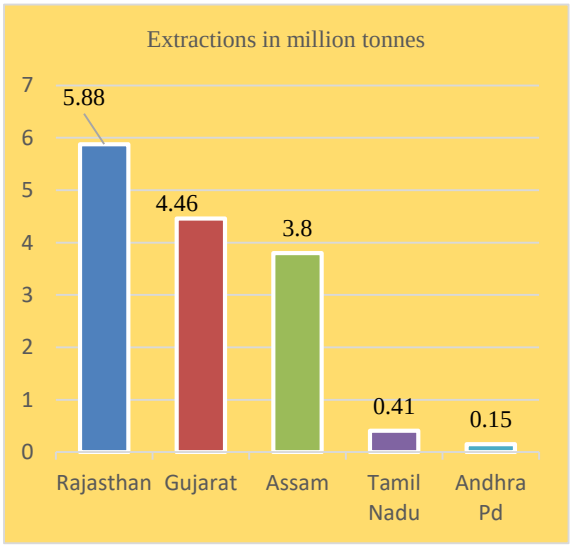
These are further depicted through the charts below.



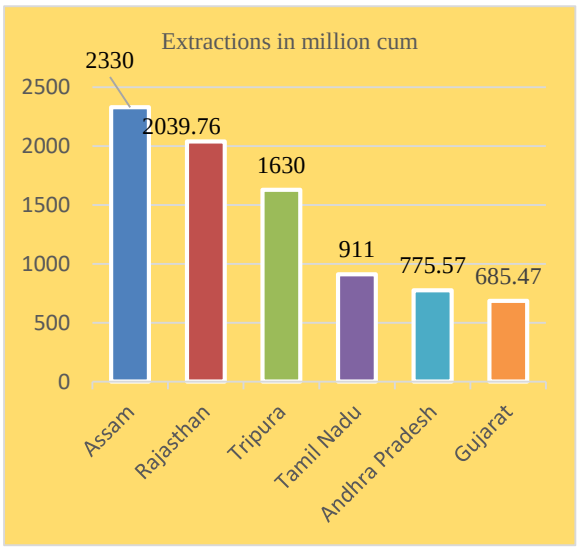
Coal (major extracting States)



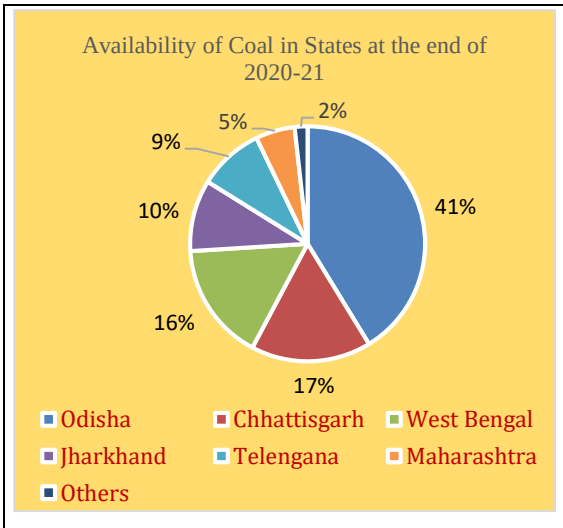
Lignite (major extracting States)

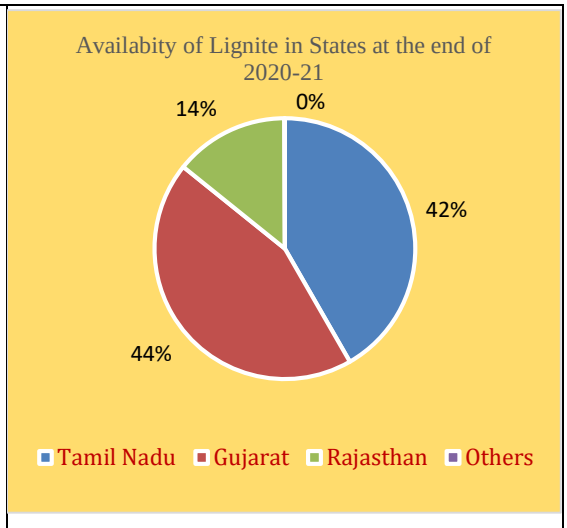


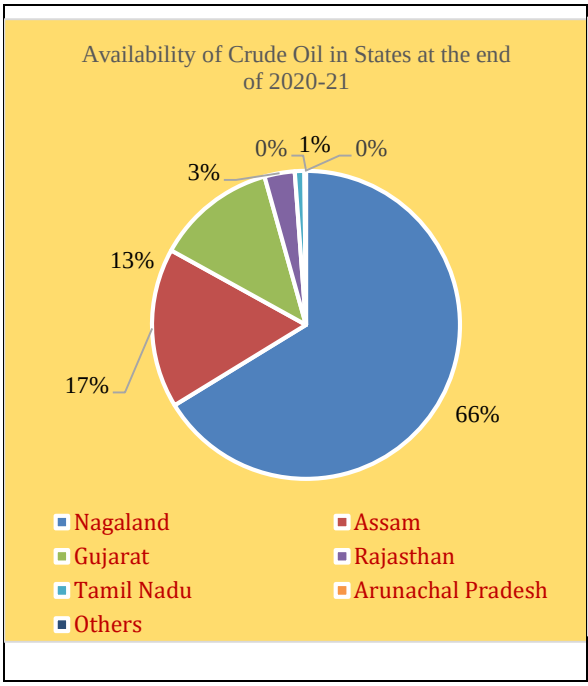
Crude Oil (major extracting States)

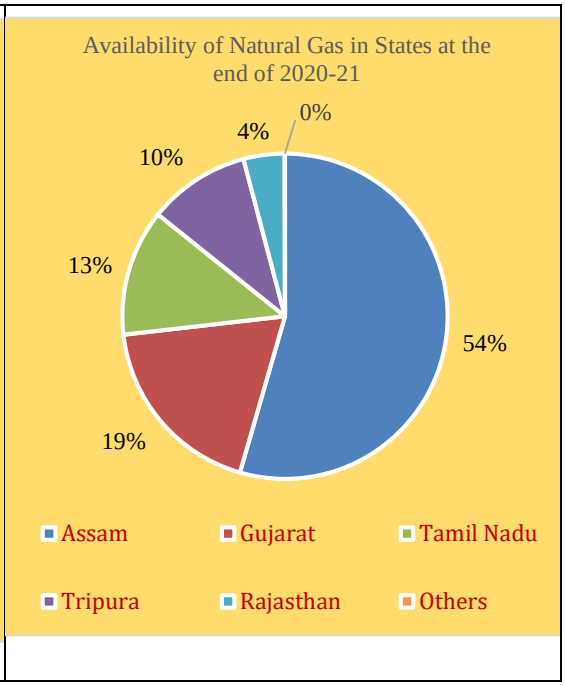


Natural Gas (major extracting States)









As mentioned in Chapter 2, GASAB's endeavour ranged from assisting the country to prepare the basic Asset Accounts table as prescribed by the SEEA – CF and also generate further information which are country specific. It will help the policy makers in evidence based decision making. Thus, inputs like revenues accrued to the State Governments, average sale price of resources and sustainability of resources have also been captured in addition to the stock and flow of resources as prescribed by the SEEA framework. The revenue vis-à-vis average market value and sustainability of resources are in paragraphs 4.5.2 and 4.5.3.

Notes:

- ✓ ***Opening stock of proved reserves wherever made available by the State Governments have been adopted. In certain cases, proved and probable reserves have been clubbed together as the States did not have the break-up. Else, the national mineral inventory of IBM issued in 2015 had been considered and the additions and extractions for the subsequent years 2015 – 16 to 2019-20 has been considered to arrive at the opening balance as of 1 April 2020.***
- ✓ ***Additions are those new discoveries or opening-up of new blocks as proved reserves as reported by the State Governments.***
- ✓ ***Extractions have been further divided into extraction for/by Government sector, Private sector and others which includes illegal mining. Figures as reported by the State Governments have been adopted.***
- ✓ ***The resultant balance has been reckoned as the closing stock of resources.***

4.3 ASSET ACCOUNT OF MAJOR MINERALS

India has significantly large resources of iron ore, bauxite, chromium, manganese ore, barytes, rare earths and mineral salts. In India, minerals are broadly classified into major minerals (non-minor) and minor minerals. During the course of the study, 40 major minerals have been covered in 28 States and J&K for the year 2020-21. In August 2022, the National Mineral Inventory of major minerals as of 1 April 2020 was released. When analysed against the NMI, it is seen that not only all the major minerals against which proved reserves have been enumerated in the NMI have been covered, but the Asset Accounts prepared in States actually cover a number of other major minerals which have not been covered by the NMI. The overall State-wise position of stock and flow of significant major minerals commencing with the opening stock, additions and extractions during the year, and closing stock at the end of the year 2020-21 are depicted through the following table. The overall position of stock and flow of major minerals is in **Annexure - VI**.

Significant Major Minerals

Sl. No	Name of Mineral	No of States involved	Stock and Flow of resources				
			Opening Balance	Additions	Extractions		Closing Balance
					Breakup	Total	
					Government		
					Private		
					Others/illegal		
						In million tonnes	
1.	Limestone	23	86,533.38	1,183.26	0.716	326.81	87,388.75
					247.05		
					79.04		
2.	Iron Ore	11	6,659.37	389.58	72.28	213.23	6,835.70
					140.95		
3.	Magnesite	4	314.81	Nil	0.002	0.065	314.74
					0.063		
4.	Bauxite	9	434.92	26.19	11.88	20.83	440.29
					8.95		
5.	Copper ore	3	155.58	0.9	0.99	3.23	153.25
					2.23		
6.	Manganese	9	100.21	15.17	0.58	2.90	112.49
					2.32		
7.	Rock Phosphate	2	80.34	Nil	0.80	0.90	79.47
					0.10		

8.	Silver	1	74.67			0.0001	74.67
					0.0001		
9.	Chromite	3	68.88	Nil	1.093	2.78	66.10
					1.695		
10.	Lead Zinc Ore	1	34.88			6.14	28.73
					6.14		
11.	Talc	1	15	Nil		Nil	15
12.	Nickel-Cobalt-Chromium bearing Magnetite	1	13.31	5.38		Nil	18.69
13.	Siliceous earth	1	4.23	Nil		0.02	4.21
					0.02		
14.	Silimanite	2	0.84		0.013	0.014	0.82
					0.001		

Note: The variations in stock and flow is due to variations in stock and flow of resources as reported by the States.
Others include exports.

Other major minerals covered are aluminous laterite, auriferous quartz, base metals, beach sand minerals, diamond, fluorite, garnet, gold, graphite, illemenite, leucoxene, lime shell, marl, martilised magnetite iron ore, monazite, rutile, selenite, stowing sand, tin metal, titaniferous magnetite, tin ore, vermiculite, wollastonite, zircon etc. as shown in **Annexure - VI.**

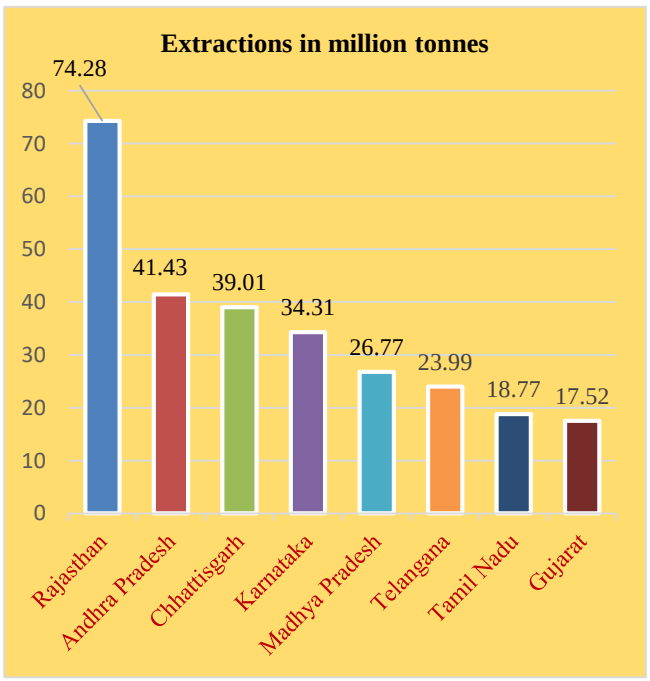
Thus, at the end of March 2021, the stock of 4 major metallic minerals in the States stood at 440.29 million tonnes of bauxite, 66.10 million tonnes of chromite, 6,835.70 million tonnes of iron ore and 112.49 million tonnes of manganese ore. Other major reserves included that of limestone at 87,388.75 million tonnes, magnesite 314.74 million tonnes, and copper ore at 153.25 million tonnes.

The valuation of the closing stock of the resources is possible using the average sale price of the produces for the month of March 2021 captured by the IBM.

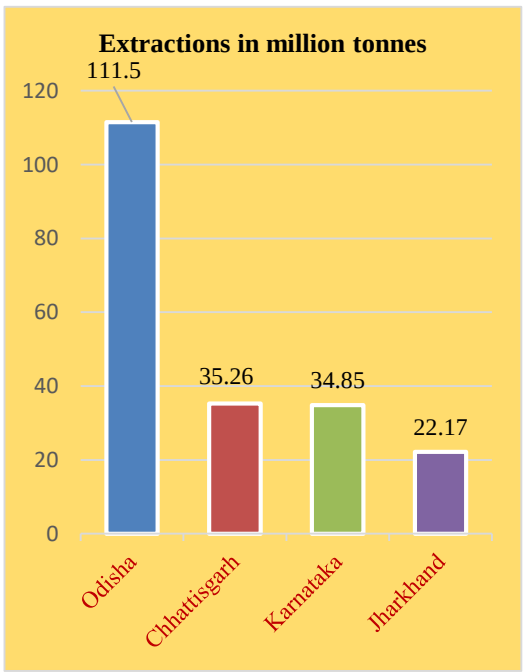
Similarly, in respect of the above significant major minerals, the flow of reserves during the year involved additions of 1,183.26 million tonnes of limestone, 389.58 million tonnes of iron ore, 26.19 million tonnes of bauxite, 15.17 million tonnes of manganese, 5.38 million tonnes of nickel cobalt chromite bearing magnetite in the States which were new discoveries/newly declared as proved reserves; while at the same time, there were extractions of 326.81 million tonnes of limestone, 213.23 million tonnes of iron ore, 20.83 million tonnes of bauxite, 6.14 million tonnes of lead zinc ore, 3.23 million tonnes of copper ore, 2.90 million tonnes of manganese and 2.78 million tonnes of chromite among others. State-wise position of major extractors and availability of resources at the end of the year in descending order are given in the following tables:

Highest extractions (State/qty)						
Limestone	**Iron Ore**	**Bauxite**	**Lead zinc ore**	**Copper ore**	**Chromite**	**Rock Phosphate**
						(In million tonnes)
Rajasthan (74.28)	Odisha (111.50)	Odisha (15.68)	Rajasthan (6.14)	Madhya Pradesh (2.24)	Odisha (2.78)	Rajasthan (0.80)
Andhra Pradesh (41.43)	Chhattisgarh (35.26)	Gujarat (1.65)		Rajasthan (0.99)		Madhya Pradesh (0.10)
Chhattisgarh (39.01)	Karnataka (34.85)	Chhattisgarh (0.75)				
Karnataka (34.31)	Jharkhand (22.17)					
Madhya Pradesh (26.77)						
Telangana (23.99)						
Tamil Nadu (18.77)						
Gujarat (17.52)						

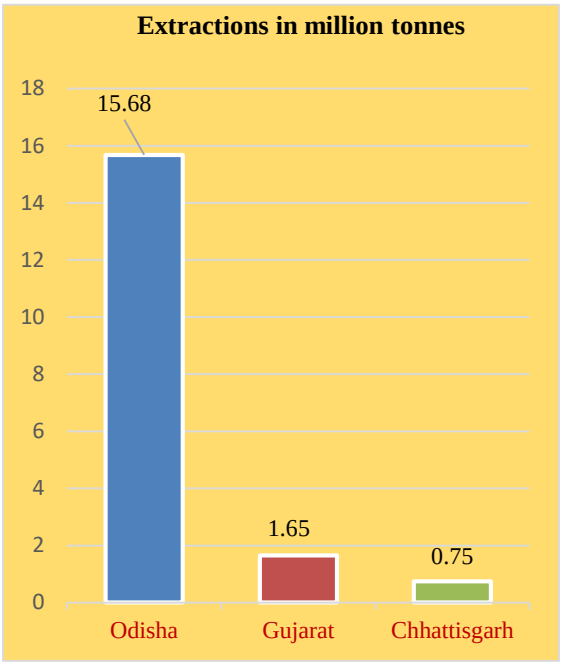
These are further depicted through the charts below.



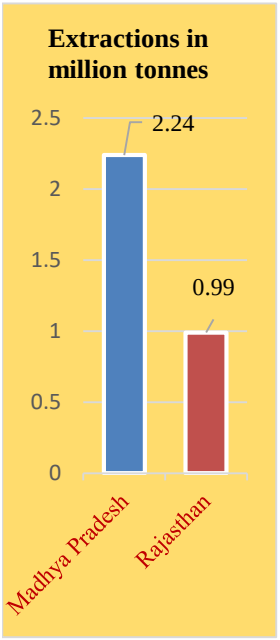
Limestone (major extracting States)



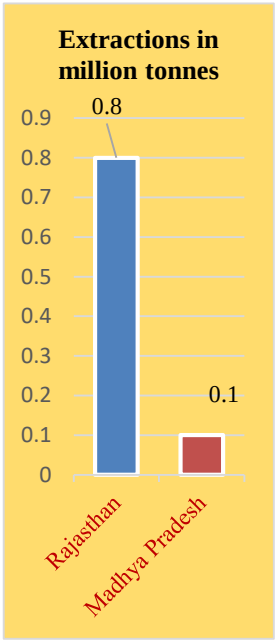
Iron Ore (major extracting States)



Bauxite (major extracting States)



Copper (major extracting States)

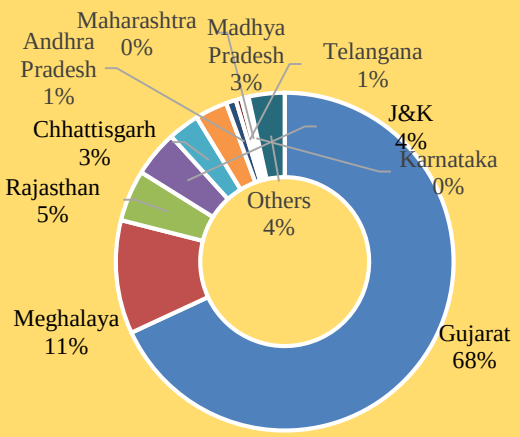


Rock Phosphate (major extracting States)

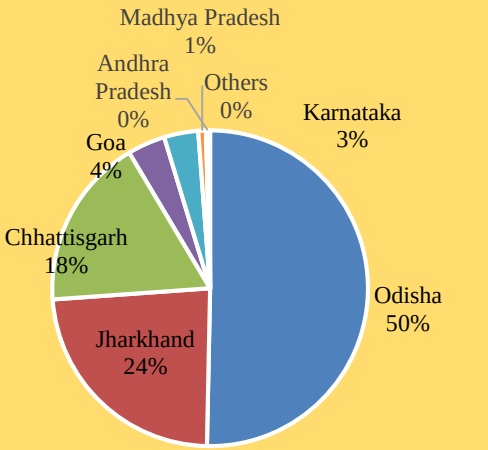
State-wise stock of resources March 2021 (State/qty)						
Limestone	**Iron Ore**	**Bauxite**	**Manganese**	**Chromite**	**Copper ore**	**Magnesite**
						(In million tonnes)
Gujarat (59,506.47)	Odisha (3,439.90)	Odisha (293.25)	Madhya Pradesh (60.27)	Odisha (65.82)	Madhya Pradesh (106.43)	Uttarakhand (231.09)
Meghalaya (9,488.85)	Jharkhand (1,609.60)	Chhattisgarh (38.79)	Odisha (32.16)	Others (0.28)	Rajasthan (46.51)	Tamil Nadu (75.44)
Rajasthan (4,295.28)	Chhattisgarh (1201.29)	Gujarat (28.78)	Karnataka (7.45)		Others (0.31)	J&K (7.00)
J&K (3,855.89)	Goa (263.78)	Jharkhand (26.77)	Others (12.61)			Others (8.79)
Madhya Pradesh (2,699.06)	Karnataka (238.72)	Madhya Pradesh (24.17)				
Chhattisgarh (2,622.11)	Madhya Pradesh (53.83)	Jammu & Kashmir (13.74)				
Andhra Pradesh (831.23)	Andhra Pradesh (22.11)	Goa (11.76)				
Telangana (473.29)	Others (6.47)	Others (0.58)				
Maharashtra (341.51)						
Karnataka (269.66)						
Others (3,005.40)						

The major stock bearing States are depicted through the charts below.

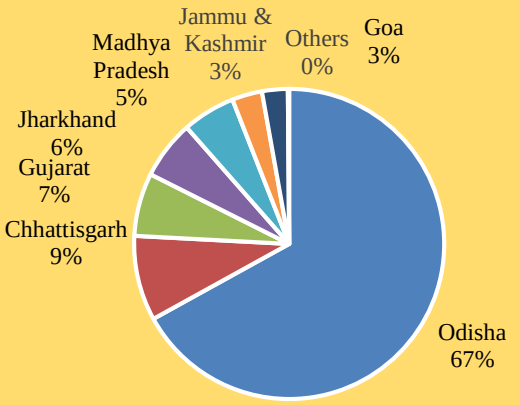
Availability of Limestone at the end of 2020-21



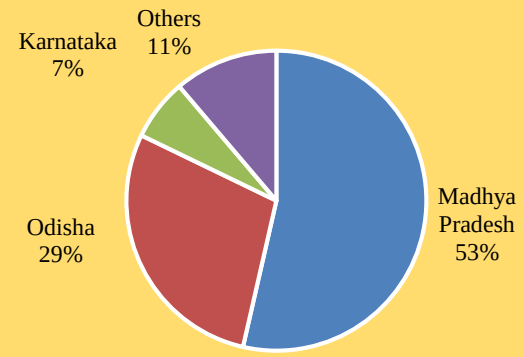
Availability of Iron Ore at the end of 2020-21

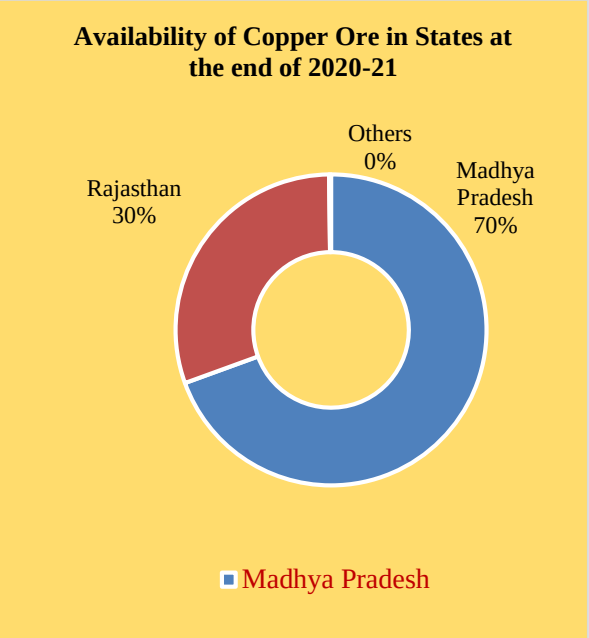


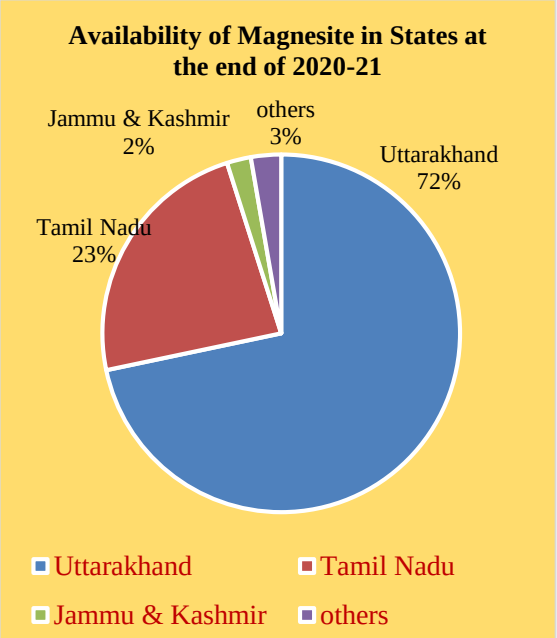
Availability of Bauxite in States at the end of 2020-21



Availability of Manganese in States at the end of 2020-21







Comparison between the revenues vis-à-vis the average sale price and sustainability of resources are discussed in paragraphs 4.5.2 and 4.5.3.

Notes:

- ✓ ***Opening stock of proved reserves wherever made available by the State Governments have been adopted. In certain cases, proved and probable reserves have been clubbed together as the States did not have the break-up. Else, the national mineral inventory of IBM issued in 2015 had been considered and the additions and extractions for the subsequent years 2015 – 16 to 2019-20 has been considered to arrive at the opening balance as of 1 April 2020.***
- ✓ ***Additions are those new discoveries or opening-up of new blocks as proved reserves as reported by the State Governments.***
- ✓ ***Extractions have been further divided into extraction for/by Government sector, Private sector and others which includes illegal mining. Figures as reported by the State Governments have been adopted.***
- ✓ ***The resultant balance has been reckoned as the closing stock of resources.***

4.4 ASSET ACCOUNT OF MINOR MINERALS

Minor minerals are those which are controlled and auctioned/sold otherwise, royalties levied and also collected by the State Governments. GoI has in 2015 notified 31 major minerals

which accounted for more than half of total leases as in 2015 as minor minerals placing them under the purview of the State Governments. These are, agate, ball clay, barytes, calcareous sand, calcite, chalk, china clay, clay (others), corundum, diaspore, dolomite, dunite/pyroxenite, felsite, feldspar, fireclay, fuschite quartzite, gypsum, jasper, kaolin, laterite, lime kankar, mica, ochre, pyrophyllite, quartz, quartzite sand (other), shale, sandstone, silica sand, slate and steatite/talc/soapstone. Also, there are other minor minerals like granite, bentonite, marble, construction material like sand, stone, bajri, aggregates, murrum etc. which were earlier notified as minor minerals.

The Asset Accounting process in the States covered almost all of these important minor minerals. Some States were unable to provide the stock of the riverine minerals. In such cases, the States were advised to consult the mining plans and in case the same is not available therein, only flow of these resources have been captured in the first Asset Accounts for the year 2020-21. The overall State-wise position of stock and flow of significant minor minerals commencing with the opening stock, additions and extractions during the year, and closing stock at the end of the year 2020-21 are depicted through the following table. The detailed statement is at **Annexure - VII**.

Significant Minor Minerals

Sl. No	Name of mineral	No of States involved	Opening balance	Additions	Extractions	Closing balance
						In million tonnes
1.	Marble	4	548.22	27.88	16.80	559.30
2.	Barytes	4	50.69	0.006	1.21	49.47
3.	China clay	6	440.05	4.37	8.83	435.59
4.	Dolomite	11	2,399.23	1.16	8.14	2,393.15
5.	Feldspar	5	159.06	7.48	4.70	161.83
6.	Laterite	6	32.69	Nil	5.82	28.21
7.	Silica Sand	8	1,288.74	9.59	8.88	1,289.40
8.	Quartz	8	91.82	4.57	1.86	94.54
9.	Quartzite	7	63.99	13.90	1.19	76.69

Note: The variations in stock and flow, if any, is due to variations in stock and flow of resources as reported by the States.

Other minor minerals covered are granite, pyrophylite, white clay, bajri, sandstone etc. as detailed in the **Annexure - VII.**

Thus, at the end of March 2021, the stock of significant minor minerals in the States stood at 2,393.15 million tonnes of dolomite, 1,289.40 million tonnes of silica sand, 559.30 million tonnes of marble, 435.59 million tonnes of china clay, 76.69 million tonnes of quartzite, 49.47 million tonnes of barytes, 28.21 million tonnes of laterite and others.

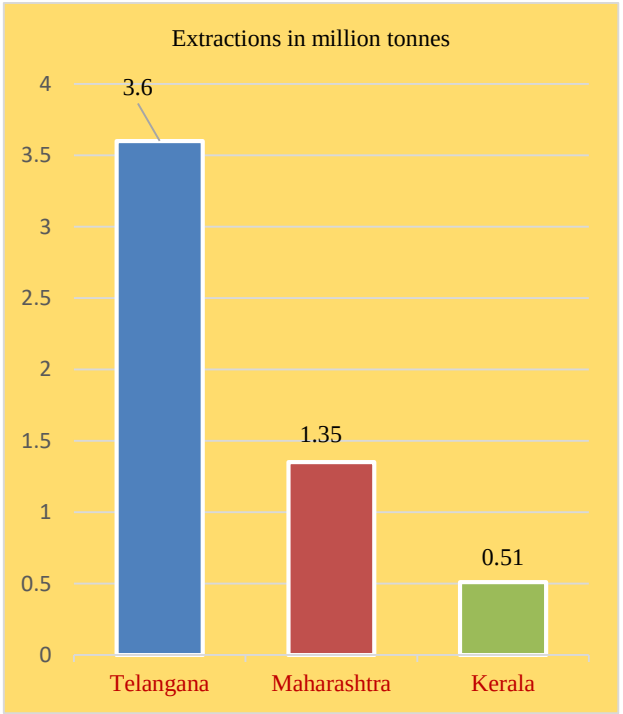
The valuation of the closing stock of these resources is possible using the average sale price of the produces for the month of March 2021 captured by the IBM/States.

Similarly, in respect of the above significant minor minerals during the year, the flow of reserves involved additions of 27.88 million tonnes of marble, 13.90 million tonnes of

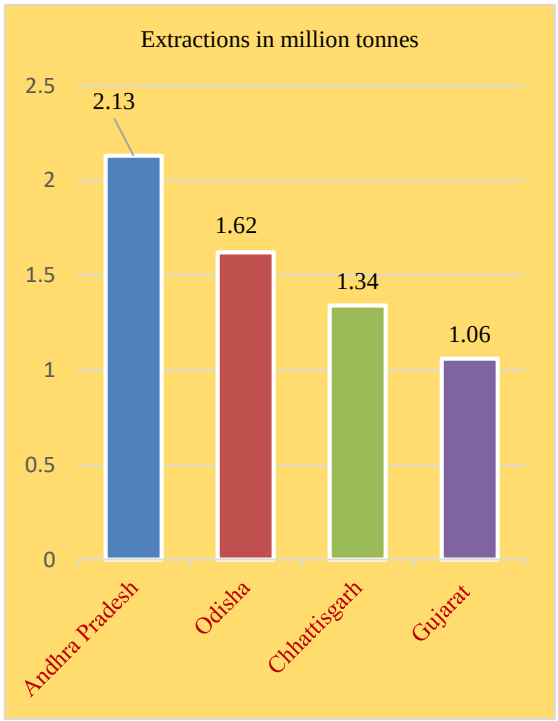
quartzite, 9.59 million tonnes of silica sand, 4.57 million tonnes of quartz, and 1.16 million tonnes of dolomite in the States which were new discoveries/newly declared as proved reserves; while at the same time there were extractions of 16.80 million tonnes of marble, 8.88 million tonnes of silica sand, 8.83 million tonnes of china clay, 8.14 million tonnes of dolomite, 5.82 million tonnes of laterite, 1.86 million tonnes of quartz. Other major extractions were in building stones, river bed materials, sand, stone, murrum as apparent from the details in **Annexure - VII**. State-wise position of major-extractors and availability of resources at the end of the year in descending order are given in the following tables:

Highest extractions (State/Qty)					
Marble	**Laterite**	**China clay**	**Dolomite**	**Silica sand**	**Quartz**
			In million tonnes/In million cum (in red)		
Rajasthan (16.15)	Telangana (3.60)	Gujarat (4.89)	Andhra Pradesh (2.13)	Gujarat (1.59)	Telangana (0.91)
Gujarat (0.65)	Maharashtra (1.35)	Kerala (0.18)	Odisha (1.62)	Andhra Pradesh (1.4)	Andhra Pradesh (0.55)
	Kerala (0.51)	Andhra Pradesh (0.07)	Chhattisgarh (1.34)	Uttar Pradesh (0.38)	Gujarat (0.26)
			Gujarat (1.06)		

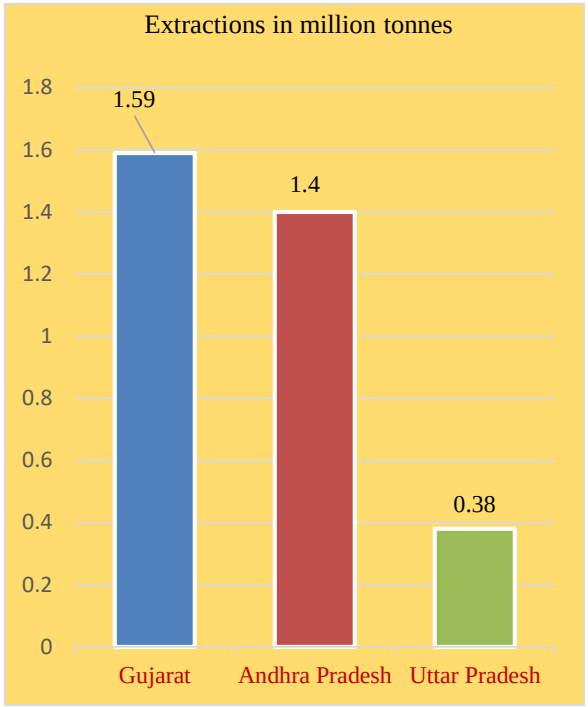
These are further depicted through the charts below.



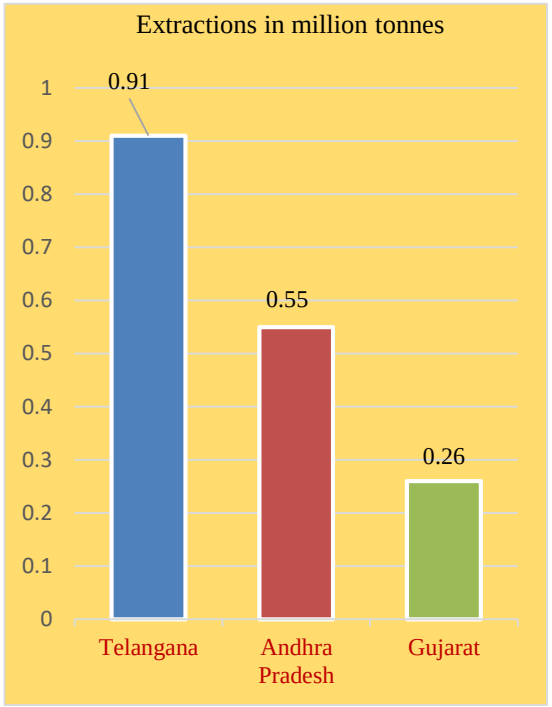
Laterite (major extracting States)



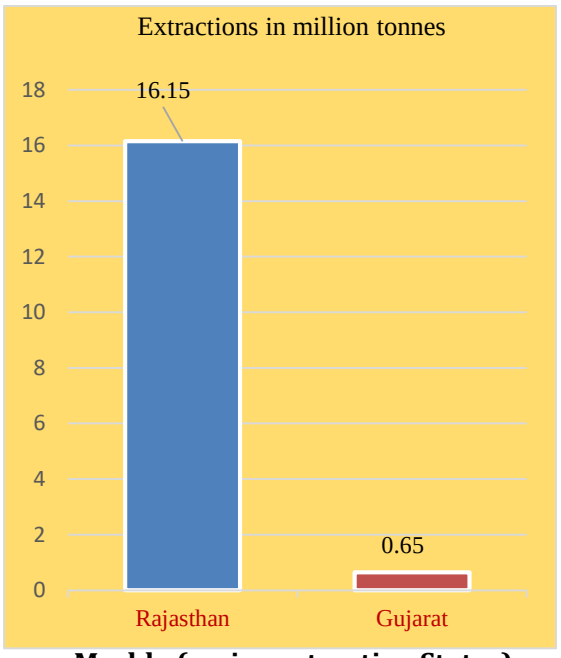
Dolomite (major extracting States)



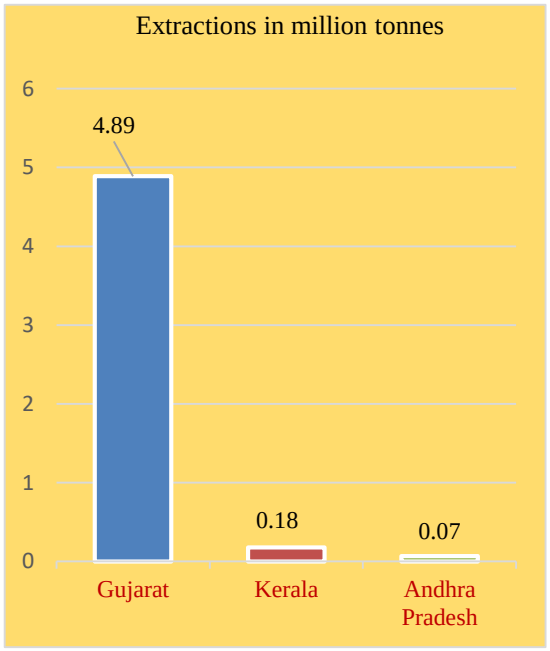
Silica Sand (major extracting States)



Quartz (major extracting States)



Marble (major extracting States)

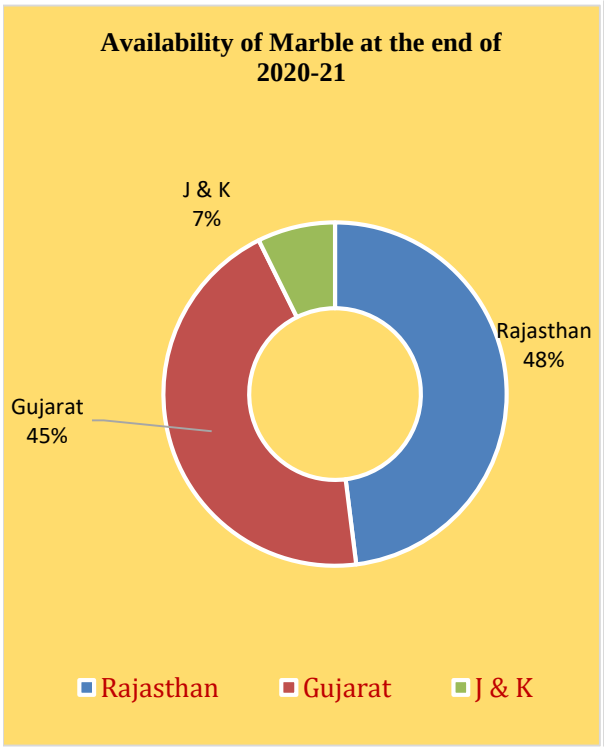


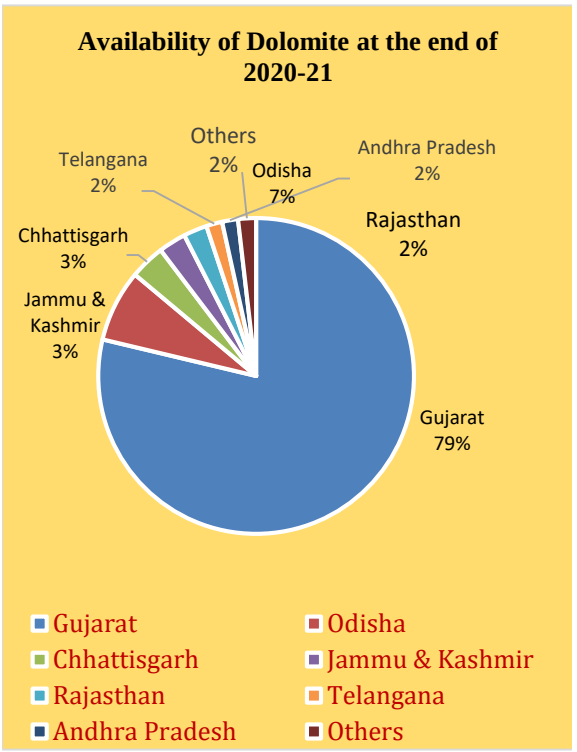
China Clay (major extracting States)

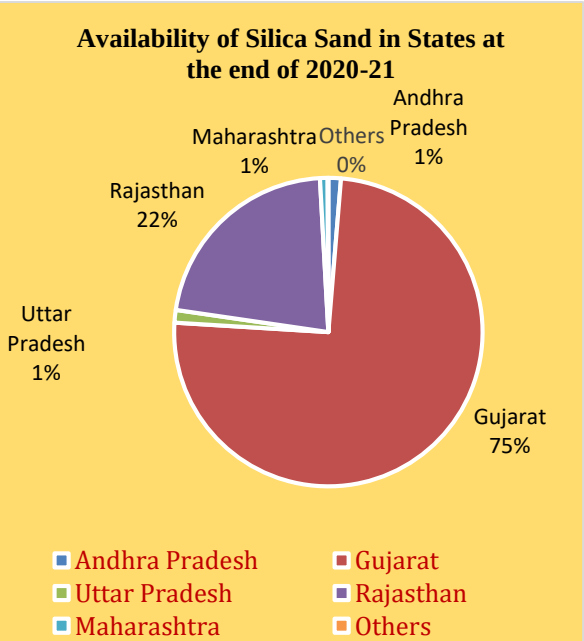
Closing stock of resources March 2021 (State/qty)					
Quartz	**Dolomite**	**Silica Sand**	**China Clay**	**Barytes**	**Marble**
					In million tonnes
Andhra Pradesh (35.12)	Gujarat (1,883.86)	Gujarat (962.76)	Gujarat (265.15)	Andhra Pradesh (42.60)	Rajasthan (266.90)

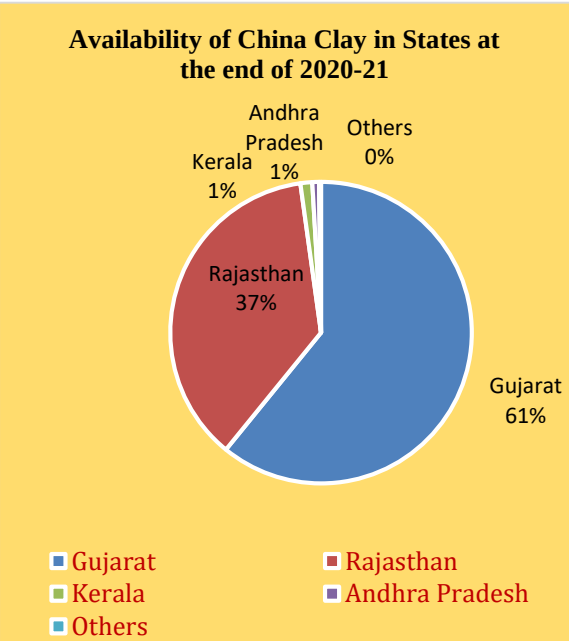
Tamil Nadu (25.02)	Odisha (176.27)	Rajasthan (281.41)	Rajasthan (160.88)	Rajasthan (5.50)	Gujarat (248.09)
Telangana (14.38)	Chhattisgarh (85.85)	Andhra Pradesh (16.93)	Kerala (5.51)	Telangana (1.29)	Jammu and Kashmir (40.72)
Gujarat (13.19)	Jammu & Kashmir (67.37)	Uttar Pradesh (17.05)	Andhra Pradesh (3.12)	Others (0.08)	
West Bengal (2.27)	Rajasthan (57.91)	Maharashtra (10.29)	Others (0.93)		
Others (4.56)	Telangana (39.07)	Others (0.96)			
	Andhra Pradesh (38.96)				
	Others (43.86)				

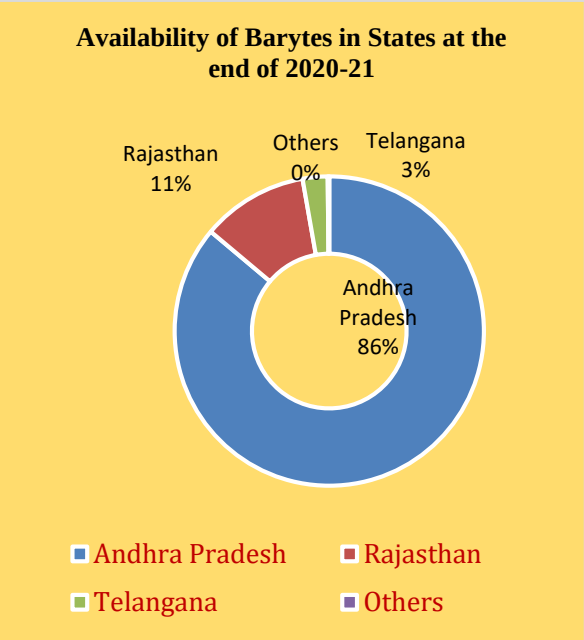
The major stock bearing States are depicted through the charts below.

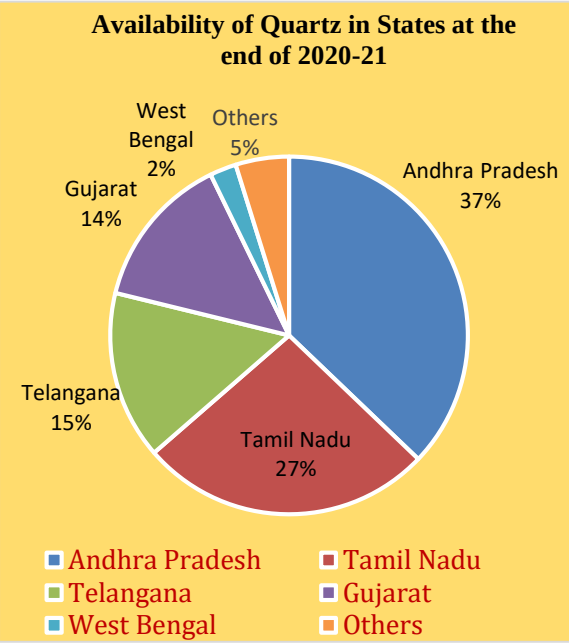












4.5 ADDITIONALITIES – COUNTRY SPECIFIC INPUTS

The framework designed by GASAB not only addresses the requirements of the SEEA – CF but also embeds information which are country specific and will help the policy makers in evidence based decision making. Some of the additional inputs which the formats of Asset Accounts would enable are briefly as follows:

4.5.1 Extraction vis-a-vis production – ascertaining the production loss

The present system requires the lessees to furnish periodic reports on production to the IBM. The templates designed by GASAB require collection of information on extraction of run of mines and production therefrom showing separately the production loss.

However, at present, most of the State Governments did not possess the information. These information as per the templates had to be called for from the lessees. In majority of the States, this information was not finally available and included in the Asset Accounts for the year 2020-21.

Since the royalties are collected on the mineral produced, it is imperative that an effective mechanism exists at the State Government level to monitor production vis-à-vis the extractions and proper reporting of extraction, processing, production loss/wastage and ores produced on which royalty is paid.

The Guidelines/SOPs require collection of such information from the lessees to be collected and collated by the district mining/petroleum/forest officers while compiling the quarterly reports. This will enable the State Governments to ensure effective watch over the production of minerals from run of mines and production losses claimed by the lessees.

4.5.2 Variation between revenues and average sales prices

The formats were designed to capture the royalty vis-à-vis the average market value of each of the minerals to aid the policy makers. For major minerals, the IBM has a system of monitoring the average market prices which are brought out monthly, mineral-wise. Majority of States could not provide the average market prices of minor minerals.

Good practice: In J&K, to prevent profiteering, sale price of minor and processed minerals are notified district-wise excluding transportation charges. This ensures supply of materials to the common public and industries at reasonable prices.

Results of analysis of royalties and the average market values in respect of some resources are depicted in the following table.

State	Mineral	Royalty	Average market value	Variation
		In ₹/MT, cum, kg as it may be		in *per cent*
Goa	Iron ore lump	500	3,332	566
	Iron ore fines	399	2,661	567
	Iron ore concentrates	444	2,962	567
	Manganese 25 % to below 35 %	293	5,852	1,897
	Basalt	62	900	1,352
	Laterite	66	1,729	2,520
Gujarat	Bentonite	110	440	300
	Calcite	60	600	900
	Chalk	95	665	600
	China clay	45	405	800
	Dolomite	75	448	497

	Granite	210	1,260	500
	Gypsum	45	270	500
	Marble	230	3,450	1,400
	Quartz	60	300	400
	Sandstone	50	500	900
Jammu & Kashmir	Lime stone	80	409	411.25
	Magnesite	147.3	4,910	3,233
	Bauxite	158.75	635	300
	Gypsum	90	900	900
	Dolomite	75	750	900
	Quartzite	25	250	900
	Granite	230	2,300	900
	Marble	70	700	900
Jharkhand	Coal	248	2,073	736
	Bauxite	124	982	692
	Iron ore	558	2,893	418
	Auriferous quartz	735	3,307	350
	Quartzite	70.78	442.30	525
Kerala	Ilmenite	271	13,550	4,900
	Zircon	2,142	1,07,100	4,900
	Granite building stone	24	600	2,400
	Granite dimension stone	6,000	24,000	300
	China clay	50	800	1,500
	Silica sand	250	3,300	1,220
	Laterite building	24	500	1,983
	Laterite cement	95	1,050	1,005
Meghalaya	Limestone (major)	80	347	333
	Limestone (minor)	100	750	650
	Coal	675	4,850	619
	Brick earth	100	1,635	1,535
	Boulder stone	240	823	243
Rajasthan	Lignite	50	1,915	3,730
	Lead Zinc Ore	1,716	15,328	793
	Manganese ore	150	3,000	1,900
	Rock Phosphate	512	4,098	700
	Copper ore	353	6,997	1,882
	Wollastonite	139	927	567
	Barytes	80	1,308	1,535

	China clay	65	438	573
	Granite dimension stone	178	5,811	3,165
	Ball clay	75	700	833
Tamil Nadu	Magnesite	137	4,552	3,222
	Vermiculate	166	3,310	1,894
	Garnet	335	8,375	2,400
	Monazite	125	3,,000	2,300
	Ilemenite	328	16,387	4,896
Telangana	Coal	343	2,450	614
	Manganese ore	306	6,125	1,902
	Stowing sand	3	139	4,533
	Barytes	600	4,991	732
	Dolomite	100	605	505
	Feldspar	75	478	537
	Quartz	60	419	598
	White clay	24	303	1,162
	Road metal	50	1,145	2,190
	Gravel/earth	20	460	2,200
	Black granite	1,200	21,780	1,715
	Colour granite	1,000	25,410	2,441
	Limestone slabs	8	315	3,837
	Fullers earth	150	1,254	736
	Mosaic chips	45	919	1,942
	Ordinary sand	40	600	1,400

Thus, the average market prices were abysmally higher by upto 49 times of the royalty which needs to be looked into in the interest of revenues.

4.5.3 Sustainability of resources in States – vulnerable minerals

An attempt to extend the SEEA prescribed framework was to enable inputs for the policy makers for evidence based decision making to capture mineral wise sustainability so as to identify vulnerable resources. This will help ensure more focus on their sustainable use and identify alternatives for the future. As this was the first such exercise, the closing stock of proved reserves as on 31 March 2021 vis-à-vis stock extracted during 2020-21 has been taken into consideration for working out the sustainability of resources. The extraction could be averaged out after this system continues for couple of years thus, providing inputs on pace of extraction and rough sustainability of the resources vis-à-vis the stock.

The following table shows the minerals which will exhaust in period ranging upto 10 years, between 10 – 20 years and 20 – 30 years from now if the extractions continued at the same pace as was done during 2020-21 and there are no catastrophic or other losses of

the stock as on 31 March 2021 which has been reckoned as the base. Further exploration or opening-up of new blocks, deep-seated deposits would change the sustainability.

State	Mineral	< 10 years	>10 years < 20 years	>20 years < 30 years
Andhra Pradesh	Limestone		20 years	
	Manganese ore	10 years		
	Dolomite		18 years	
	Feldspar		11 years	
	Pyrophyllite		13 years	
	Silica sand		12 years	
	Slate			26 years
Bihar	Limestone		11 years	
Goa	Basalt		14.5 years	
Gujarat	Bauxite			23 years
	Manganese Ore			24 years
	Bentonite			24 years
	Crude Oil			26 years
Jharkhand	Auriferous quartz	4 years		
	Quartzite			25 years
	Bauxite		18 years	
Karnataka	Limestone	8 years		
	Manganese			26 years
	China clay	10 years		
	Quartz	10 years		
Madhya Pradesh	Iron ore		15 years	
	Bauxite			30 years
	Coal			23 years
Meghalaya	Limestone		17 years	
Rajasthan	Natural Gas	6 years		
	Petroleum	5 years		
	Lead Zinc ore	5 years		
	Wollastonite		13 years	
	Bentonite	8 years		
	Ochre		13 years	
	Ball clay	8 years		
	Marble		17 years	
	Phylite	4 years		
Tamil Nadu	Limestone		11 years	
Telangana	Limestone		20 years	
	Manganese Ore	8 years		
	Feldspar	6 years		

	Laterite	4 years	
	Quartz		16 years
	White clay	7 years	
Tripura	Natural gas		19 years
West Bengal	Silica sand	9 years	

4.5.4 Collection of District Mineral Foundation and other such levies

In order to fund the welfare measures towards the people living in mining and nearby areas affected by mining activities, the GoI had enacted District Mineral Foundation in January 2015 at 10 *per cent* and 30 *per cent* of royalties to be paid by the lessees in cases of leases granted after and before 2018 respectively. Similarly, the GoI also enacted National Mineral Exploration Trust at 2 *per cent* of the royalty amount for boosting the exploration activities. The funds are to be kept separate and spent as per the guidance of the GoI.

The formats of Asset Accounts require collection of information on DMF and NMET realisable and those realised. This will provide specific information to the State Governments on amounts remaining to be collected. All information were not readily available with the States. Information provided by the State Governments on DMF collectible and collected during 2020-21 indicated variations as shown in the following table:

Sl. No.	State	Total DMF realizable (₹ in Crore)	Total DMF realized (₹ in Crore)	Variations (-) Surplus	
				₹ in Crore	Percentage
1.	Andhra Pradesh	235.35	233.07	2.28	0.97
2.	Arunachal Pradesh	4.47	3.31	1.16	25.95
3.	Assam	7.51	7.51	--	--
4.	Bihar	19.85	15.45	4.40	22.18
5.	Chhattisgarh	1,589.42	1,354.39	235.03	14.79
6.	Goa	22.03	22.09	(-) 0.06	(-) 0.27
7.	Gujarat	177.71	192.00	(-) 14.29	(-) 8.04
8.	Haryana	--	39.10	--	--
9.	Himachal Pradesh	40.06	33.53	6.53	16.30
10.	J&K	3.85	0.68	3.17	82.34
11.	Jharkhand	1,345.05	1,320.37	24.68	1.83
12.	Karnataka	525.97	525.97		
13.	Madhya Pradesh	NA	181.70		
14.	Maharashtra	2,454.4	2,454.4		
15.	Meghalaya	34.70	17.25	17.45	50.29
16.	Odisha	--	2,187.16		
17.	Punjab	70.04	41.43	28.61	40.84
18.	Rajasthan	1,116.81	1,073.94	42.87	3.84
19.	Tamil Nadu	122.47	122.54	(-) 0.07	(-) 0.06

20.	Telangana	8.43	7.44	0.99	11.74
21.	Uttar Pradesh	200.75	156.55	44.20	22.02
22.	Uttarakhand	43.04	58.97	(-) 15.93	37
23.	West Bengal[8]	4.55	4.72	(-) 0.18	(-) 3.96

Thus, there had been shortfall in collection of ₹ 411.37 crore in 12 States while there have been instances of overpayments of ₹ 30.53 crore in five States. In some States, only the amounts realised have been captured.

The reasons for over payment is attributable to lumpsum payments made by the lessees against which the payables are adjusted from time to time. Information from remaining States were awaited.

Observations related to the collections and management of DMF and other funds are in Chapter VI.

4.5.5 Generation of power from non-renewable and renewable energy resources

The national declaration on *panchamrit* set a target of taking the non-fossil energy capacity to 500 GW and generating 50 *per cent* energy needs to be sourced from renewable energy sources by 2030.

Input tables were designed and included for collection of information by State Governments on sector-wise requirement of power in the State vis-à-vis production from renewable and non-renewable sources and the percentage of generation of power vis-à-vis the total requirement. It also required to capture information on power procured from out of the State by the energy deficit States. These inputs will enable States and the Union Government to monitor achievement of the national target of 50 *per cent* power generation from renewable energy resources by 2030. Information provided by the States for the year 2020-21 indicated the following:

State	Total energy required	Non-renewable energy generated within the state	Renewable energy generated within the State	Percentage of renewable energy generation vis-à-vis total energy required
			In MW/MU	
Andhra Pradesh (MU)	60,199.3	47,097.38	12,817.58	21.29
Arunachal Pradesh	160	Nil	9.09	5.68
Assam	1,10,04,000	13,58,340	50,867.16	0.46
Bihar (MU)	24,342	29,343.11	4,861.42	19.97
Chhattisgarh	3,37,84,130.62	10,95,53,840	19,39,900	5.74
Delhi	3,008	587.21	62.20	2.07
Goa	3,57,55,650	1,49,530	13,280	0.03
Gujarat	11,66,09,907	10,14,59,252	1,51,50,659	13

[8] Including NMET.

Himachal Pradesh	8,635.31	1,308.27	9,896.22	114.6
J&K	2,54,36,858.37	Nil	1,75,42,955.48	68.97
Jharkhand	2601	809	68	2.61
Kerala (MU)	22,151.6	7.845	1,159.48	5.23
Madhya Pradesh	83,645	67,131	10,737	12.84
Maharashtra (MU)	1,09,513.42	1,17,566.99	14,918.1	13.62
Manipur (MU)	748.19	Nil	611.99	81.80
Meghalaya	13,26,460	Nil	12,37,790	93.32
Mizoram	723.96	Nil	30.6	4.23
Nagaland	854.54	Nil	5.76	0.67
Odisha	24,626.77	15,317.34	9,309.42	37.8
Punjab (MU)	58,524.61	45,408.99	4,156.65	7.10
Rajasthan	64,593	98,633.39	17,324	26.82
Sikkim	4,03,540	5,39,320	6,36,880	157.82
Tamil Nadu	1,07,064 (MU)	16,219.47 (MW)	16,375.59 (MW)	--
Telangana	14,990.96	12,791	3,565.45	23.78
Tripura	510	1,077.6	10.84	2.13

MW – Mega Watt. MU – million units of energy. 500 MW running for 24 hours gives 12 MUs of energy. For compilation purposes, requirements under heads like industries, domestic, agriculture, commercial, traction and railways. Captive consumption has been consolidated and detailed break-up is available in State-wise reports. States where total requirements could not be provided have not been included.

4.5.6 Information on illegal mining

Sustainability of mineral resources cannot be ensured if their unscientific and illegal mining continues unabated. The GoI had taken a number of initiatives towards this.

In view of its cascading effect on the environment and the State and Union exchequer, the Asset Accounts require specific information to be collected on illegal mining detected by the State Governments and penalties collected on the same. Information provided by the States for the year 2020-21 indicated the following.

Name of the State	No of cases detected during the year 2020-21	Detection of illegal mining by the departmental authorities on which challans issued and offence report registered			
		Name of minerals	Physical quantity/ volume (tonnes)	Revenue involved	Amount recovered as penalty
				(₹ in crore)	
Chhattisgarh	152	Coal, dolomite, iron ore, limestone, quartz etc	3,567.714	0.04	1.08
Goa	10	Iron ore	559.30	4.28	*Under Process*

		Sand and laterite	36,291 cum		
Gujarat	7,149	Major and minor minerals	20,27,551.06	--	102.60
Himachal Pradesh	6,506	--	--	--	2.89
J&K	5,370	Stone, ordinary sand etc.		0.32	9
Jharkhand	256	Major minerals	27,750.62		0.06
	3,893	Minor minerals	75,767.93	0.70	6.93
Karnataka	1,133	Sand	65,121	0.23	7.30
	--	Grey granite, boulder stone etc.	1,92,774.7	1.18	5.91[9]
Madhya Pradesh	610	Sand, murrum, coal, boulder, bauxite etc		69.45	64.12
Maharashtra	10,845	NA	NA	NA	101.20
Meghalaya	6	Limestone, boulders	1,461.68	0.01	0.03
Mizoram	9,383	Sand, stone	NA	0.29	0.68
Punjab	878	Sand, gravel and ordinary earth	NA	NA	NA
Rajasthan	8,699	Bajri, masonry stone, gypsum, quartz, marble, bentonite, limestone etc.	15,11,175	115	78.59
Tamil Nadu	75	Major and minor minerals	3,89,157.03	0.47	7.06
Telangana	5,620	NA	NA	NA	8.20
Uttar Pradesh	NA	Murrum, granite Gitti	67,678.60 (cum)	8.22	5.20

NA – denotes either details not available with the Department or not provided.

Thus, there were collection of ₹ 400.85 crore as penalty against illegal mining in 14 States. Information from other States were awaited.

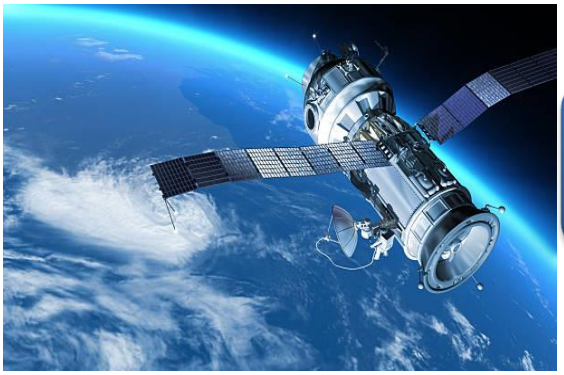
While most of the States charged penalty over and above the amount of royalty involved in the illegally mined minerals, in case of Rajasthan an amount of ₹ 78.59 crore was charged as penalty against the royalty involvement of ₹ 115 crore. Similarly, in Madhya Pradesh, ₹ 64.12 crore was charged as penalty against the royalty involvement of ₹ 69.45 crore while in Uttar Pradesh, ₹ 5.20 crore was charged against royalty involvement of ₹

[9] Penalty levied for extraction of minerals from outside the mining areas but not collected from the leaseholders.

8.22 crore which is against the essence of relevant provisions of the Acts and Rules which calls for penalty to be in multiples of royalty to serve as a deterrent. Punjab could not provide the volume of minerals illegally removed, amount of royalty involved as well as penalty charged, if any, in the 878 cases.

In these three instances, there was loss to the State exchequers of atleast ₹ 36.41 crore (Rajasthan), ₹ 5.33 crore (Madhya Pradesh) and ₹ 3.02 crore (Uttar Pradesh).

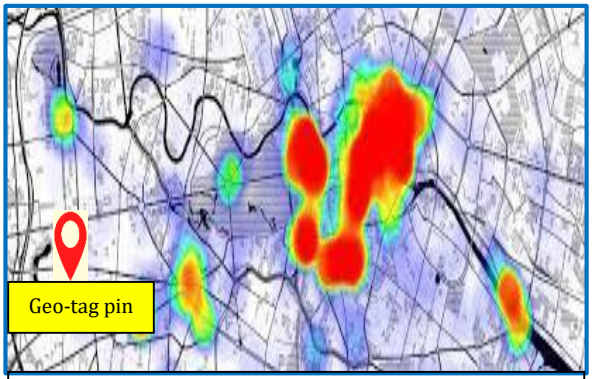
CHAPTER - V
GOOD PRACTICES AND INNOVATIONS



5.1 TECHNIQUES AND TOOLS FOR BETTER MANAGEMENT OF MINING ACTIVITIES

5.1.1 Importance of Geo-tagging and Geo-fencing

Geo-tagging of mineral bearing areas refers to attaching of geographic coordinate information recorded by GPS enabled electronic devices. Geo-tagged mineral bearing areas would thus, contain the coordinates of the entire mine area with geospatial metadata such as latitude and longitude coordinates, altitude, bearing and more. In google maps and similar GPS services, geo-tagging may also be referred to as dropping a pin. Pins can be tagged with contextual information to share information about the specific physical location. While geo-tagging of the mines area, similar geotag pins are generated around the mineral bearing areas which are then connected to each other to create geo-fencing of the mine area. Mining activities carried out outside the geo-tagged area could be picked up by satellite interventions and reported.



Geo-tagged mine area

5.1.2 Initiatives of MoM, GoI to geo-fence the mine areas

The MoM, GoI through the IBM has developed the Mining Surveillance System (MSS), in coordination with Bhaskaracharya Institute for Space Applications and Geo-Informatics and Information Technology (BISAG) to use space technology for curbing illegal mining activity in the country which was launched in October 2016.

MSS is a satellite based monitoring system which aims to establish a regime of responsive mineral administration, through public participation, by curbing instances of illegal mining activity. The system checks a region of 500 meters around the existing mining lease boundary (geo-tagged mine area) to search for any unusual activity which is likely to be illegal mining. Any discrepancy, if found, is flagged-off as a trigger.

While GoI uses the above MSS for identifying illegal mining of major minerals, they have advised the States to introduce MSS for monitoring the minor minerals.

As discussed in Chapter VI, no verifiable progress had been made in most of the States on developing MSS to curb illegal mining of minor minerals except for a small number of States as discussed in some of the succeeding sections on State-wise innovations/good practices. States neither have a robust system of mapping the supply and use of resources to detect illegal extraction and supply of resources by unscrupulous miners/entities. Moreover, the system of detection and imposition of penal measures is also deficient in States as evident from the fact of instances of non-recording of name and volume of minerals detected, royalty amounts involved etc. were not found recorded in most of the States.

During the course of the study, a number of good practices and innovations have been observed in States, which are discussed in the following paragraphs.

5.2 Good practices and innovations observed in States

5.2.1 Andhra Pradesh

The Department of Mines and Geology has e-permit system which was launched in September 2014 for both major and minor minerals. At the instance of the Accountants General Office, for capturing the data for preparation of Asset Accounts on NRA, the Department has developed a new screen in the e-permit system. All the districts have been directed to upload data in the e-permit system easing the compilation of the Asset Accounts.

E-permit screen of Andhra Pradesh

The Department has developed an online vehicle tracking system and monitoring mineral transportation across the State with state-of-the-art technology for curbing illegal mining and carriage.

Department has also developed an online system for regulating buying, storing and transportation of minerals (online system for mineral audit) to enable filing of applications, generation of transit passes and facilitating transfer of the stock from the leaseholder to dealer, dealer to dealer in line with the physical stock transportation and enables the departmental staff to monitor real time stock movement and keep constant vigil.

The Department was conferred with the prestigious SKOCH silver award under digital India and e-Governance category and the SKOCH order of merit awards for the online

system for mineral audit involving regulation of buying, storing and transportation of minerals in 2020.

5.2.2 Bihar

The State Pollution Control Board of Bihar was the only one to provide State-specific information on carbon emission.

5.2.3 Goa

The Directorate of Geology & Mining has taken up development of Bhumija Ore management system a web-based automation solution for processes involved in mining activity and capturing the data of related compliances by the lessees, transporters, etc. It envisages provision of online registration of stakeholders, permits, e-wallets, trip sheets, vehicle tracking system in respect of all minerals.

5.2.4 Gujarat

The Commissionerate of Geology and Mining, Gujarat has introduced 'Drone Project' (Trinetra)' which is first of its kind used for surveillance of Mining areas in India. The Drone can record video in Full High Definition and can be controlled from a distance 4–5 kilometre (at a radius of 2 to 2.5 km) and covers approximately 10 kms. Further, the Drone can capture the mining activities and vehicle number from height of 30 to 35 meters during daytime and can record mining activities from the height of 70 to 75 meters with night vision facility.

Digital picturisation of Trinetra project

The State Government has also implemented GPS based vehicle tracking monitoring system to curb royalty theft and illegal transportation of minerals. The system tracks navigation route of vehicles transporting minerals using GPS technology and alerts deviations in the pre-determined routes. It also assists the mining officers to monitor driving patterns to prevent loss of minerals due to rash/negligent driving.

All mines in Gujarat are geo-tagged with the help of BISAG with information such as name of lease holder, mine area, environmental clearance status along with geographical boundary of mine etc. (picture of screen along side).

5.2.5 Himachal Pradesh

The Directorate of Mines, Himachal Pradesh has installed a system of mapping the supply and use of major minerals found in the State, i.e. limestone. There is a system of obtaining the details of periodic reports on usage of limestone by the industries and mapping with the supply data in line with the amended Rule 45 (6) of Mineral Conservation &

Development (Amendment) Rules 2011. This has largely helped in preventing illegal mining of limestone and its unauthorised usage.

5.2.6 Jammu & Kashmir

The Geology and Mining Department of J&K administration has successfully switched over from open auction and conducted e-auction of minor mineral blocks across the UT in 2020 for the first time and more than 175 mining leases have so far been granted. This move has generated substantial direct and indirect employment besides ensuring mining on scientific lines.

For improving ease of doing business, a district level single window clearance committee has been constituted for facilitating the execution of mining leases of e-auctions.

To ensure assured supply of raw materials to the government agencies for the development of various prestigious projects in the UT, 10 minor mineral blocks were reserved for PSUs, five each for J&K Minerals Limited and J&K Project Construction Corporation.

Keeping minor minerals reserved for nationally important projects, Department has instituted system of granting short term permits to the executing agencies by bringing in necessary changes in the Rules.

Control and monitoring measures:

- *For control and monitoring of movement of minor minerals, State has created 11 mineral check posts and 100 more such posts are under consideration.*
- *All the leased areas are geo-tagged.*
- *A multi-departmental district level task force is constituted to check illegal mining.*
- *Transportation of minerals is allowed with colour coded security featured challans only.*
- *To prevent black marketing/profiteering, the Department has notified the sale price of minor minerals and processed minerals excluding transportation charges in the respective districts. This ensures supply of materials to industries and the public at reasonable rates.*

5.2.7 Karnataka

The Department of Mines and Geology, Karnataka has taken the following initiatives:

- *Drone surveys of quarry leases with the assistance of Karnataka State Remote Sensing Application Center for assessing the total pit volume of all the building stone leases for plugging the scope of loss of revenue.*
- *New Sand Policy 2020 has been implemented to ensure availability of sand to the common people at an affordable cost.*
- *Vehicle tracking system is being developed to monitor the movement of unauthorised sand transportation vehicles.*

- *A comprehensive application integrated lease management system (ILMS) has been developed which provide real time and seamless services to the lease holders and other stake holders with information like lease holding, payments, transactions, updated mineral rates, e-permits, demand registration information, production of individual mines (major minerals) etc.*
- *This system has been integrated with the Karnataka Forest Department's application to provide single platform for generation of mineral dispatch permits.*

5.2.8 Maharashtra

The State Government has undertaken enhanced surveillance through adoption of IT/digital technologies like Mineral Management System (MMS) with the following objectives:

- *Generation of geospatial digital database of geology, mineral location and major mineral mining leases using geo-referenced satellite imagery of the entire mining lease areas in the State.*
- *Creation of land use/land cover layer of each mining lease area and statistics, making it easy to study change detection in the mining areas in future.*
- *Uploading of remote sensing and geographic information system based database in the web portal.*
- *Establishment of a well- equipped lab in the headquarters for monitoring mining activities to help in identifying excavations outside the granted lease area with the help of recent satellite imageries.*
- *Besides, the State Government follows up the triggers generated through the MSS of GoI for inspections and action as per rule.*
- *The project MAHAGEOMIN was awarded the gold category for 'innovative use of GIS for e-Governance'.*

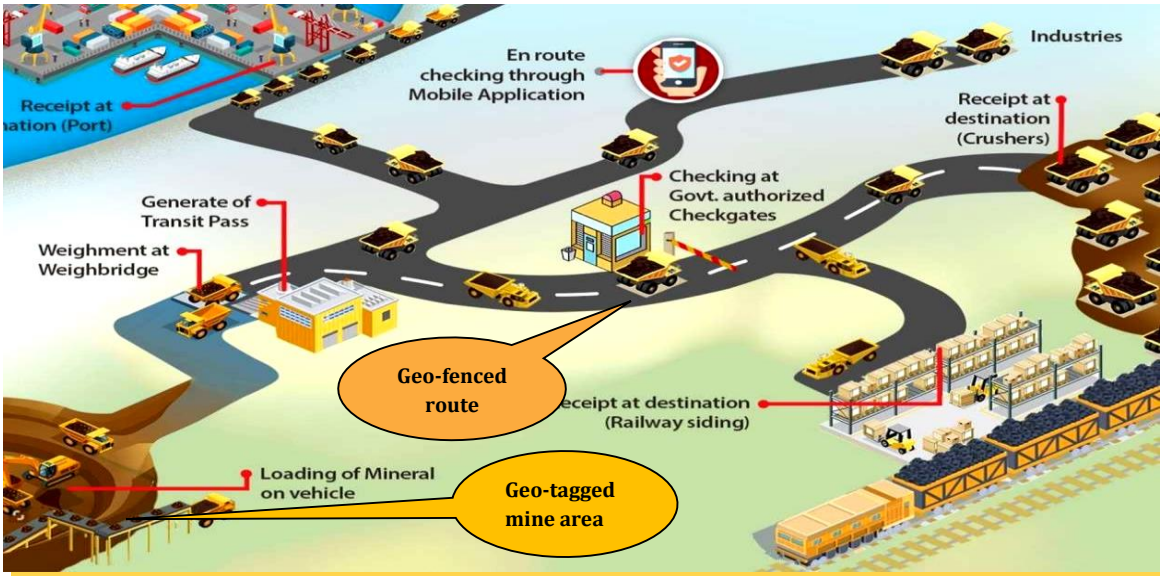
Besides the above, flying squads are also formed at the Directorate, regional and district levels to effectively curb illegal mining.

5.2.9 Punjab

Punjab Government has taken initiative on automation of mining related activities through a centralised management and monitoring system. A web portal is also put in place which monitors centrally all aspects of mining in the State, periodic reports on extractions and available resources in each mine. In case of any violation, the system can stop generation of weighment slips.

5.2.10 Odisha

The State Government of Odisha had developed innovative end-to-end IT solution namely i3MS which is an Ore Accounting and Mines Lifecycle Management system of Odisha. Through i3MS the minerals are tracked from production, transportation to receipt by industries. A part of the mineral transactions is on public domain as a part of mineral transparency initiative. The Stage wise information captured in i3MS is as shown in the picture and diagram.



A model mining management system with geo-tagging of mineral bearing areas and geo-fenced transit route for effective management of resource extraction and their transport

STAGES OF MINING OPERATIONS

Mineral Concession
- Post auction mineral concession application
- LoI, MDPA and lease deed grant
- Surface Right (NOC) post lease grant

Clearances
- Environment and SPCB clearance
- Forest clearance
- Mining Plan

Production
- Run of mines
- Sized ores
- Fines (natural and crushed)

Approval
- Chemical analysis
- Due clearances
- Royalty payments

Dispatch
- Road and rail
- Conveyor and NGT

Verification
- Check Gate
- En-route/Surveillance

Receipt
- Industries/Ports
- Stockists/storage

After the auction, the IT systems manage all aspects of business, mineral regulation and administration online

Stages of mining activities and those captured by i3MS in Odisha

After launch of the system in 2012, about ₹ 325.06 crore of user fees and ₹ 11.66 crore of application fees collected till date. More than 9,03,652 e-permits and 74,173,532 e-passes issued till date since inception. Also, 964 electronic weigh bridges are integrated with i3MS for online mineral weighments.

The State has also developed a dedicated GIS cell with well-trained remote sensing and GIS personnel having manifold potential in rendering services for promotion of geological exploration and geo-environmental activities. It is equipped with 29,400 aerial photographs and 228 IRS 1A/B imagery covering the hilly/mountainous tract of the state, which are used for interpretation of geology, land use/land cover, geo-environment etc. The cell is actively engaged in providing the interpreted litho-structural/geomorphological/land use/land cover maps to different investigation units operating in the state. Besides, the cell has taken up a project based on remote sensing studies for analysis of coastal geomorphic features of Odisha coast under the sponsorship of MoEFCC. The cell has the capacity to carry out any work relating to geology, soil, ground water, geo-morphology, geo-environment studies etc. on the basis of remote sensing.

5.2.11 Rajasthan

The Department of Mines and Geology has instituted a comprehensive website containing all information for control and monitoring of mining activities in the State. This largely facilitated quick collation and consolidation of data for preparation of Asset Accounts in the State. The following good practices and initiatives have also been taken by the state Government.

- *Issuance of transit pass for major/minor minerals on online systems namely 'e-rawana' with mobile application.*
- *Usage of drones for surveillance of illegal mining in Udaipur area.*
- *3,480 weighing scales have been empanelled online for weighing extracted minerals with facilities of two cameras, each weighing scale.*
- *Amount payable and payments of DMF is also online w.e.f. 1 January 2020.*
- *The monthly/annual returns of the lessees are also submitted online.*

5.2.12 Tamil Nadu

The Office of the Accountant General in consultation with the Directorate of Geology and Mining had developed excel sheets as input forms for quarterly reporting framework for capturing the data from quarter ending June 2022 as prescribed in the Guidelines/SOPs circulated by GASAB. The inputs forms can be consolidated into master tables to generate the Asset Accounts.

5.2.13 Telangana

The State Government is leveraging information technology in order to monitor and regulate mining activities with implementation of Online Mineral e-payments and e-permit System which facilitates lease holders to make only payments of statutory charges, monitors the transit passes from filing of application to transportation of finished minerals and monitoring system for temporary permits for minor minerals.

The State has initiated preparation of geo-referenced cadastral maps – differential global positioning system – with the support of specialised agencies including Telangana State Remote Sensing Application Center for geo-fencing of the leased mining/quarrying areas. After completion, the geo-referenced maps will be used to identify the unauthorised quarrying/mining. The survey work is currently underway.

5.2.14 Uttarakhand

The State Government in collaboration with the IT Development Agency is working on establishing a system for development and maintenance of mining digital transformation and Surveillance System for monitoring illegal mining and transportation, survey of all sanctioned new mining areas, stone crusher and surveillance at exit gates with electronic weigh-bridges to monitor and regulate mining activities in the State.

5.2.15 Uttar Pradesh

The State Government has developed an end-to-end solution for mineral management called Mine Mitra, an innovative and ambitious initiative of the Directorate of Geology and Mining in the area of e-governance. The system encompasses all online mining services, integrated mining surveillance system, e-Commerce platform for minerals to encourage transparent mining practices and curb illegal mining and transportation through real time data monitoring.

The State Government has also framed UP Minerals (Prevention of illegal mining, transportation and storage) Rules 2018 for control and monitoring of illegal mining, storage and transportation.

CHAPTER - VI
OBSERVATIONS EMERGING FROM THE STUDY

6.1 GENERAL OBSERVATIONS – APPLICABLE TO ALL STATES

GASAB's handholding of the State Governments through the NRA cells formed in each state having representation from AsG in States and the employees of the State Government resulted in successful preparation of the Asset Accounts of selective resources in the States. This exercise also pointed towards areas needing more attention and focus of the State Government Departments and the Ministries in GoI to ensure compliance of existing rules and regulations, improvement of systems and processes for effective control, monitoring on the mining activities and effective management of mineral and energy resources in the country. Some instances of deficiencies pointed out through various Audit Reports of CAG of India, which have been laid in the State Legislatures, are also incorporated.

6.1.1 Coordination between the State Governments and the IBM

Rule 45 (1) - (5) of Mineral Conservation and Development Amendment Rules 2011 prescribes submission of a report by the lessees to the IBM periodically. However, the Rule do not prescribe submission of reports by lessees to the State Governments, though the form has provisions for submission of a copy of the return to the State Governments. This has resulted in a situation where the lessees have been using discretion about submitting copies of the reports to the State Governments along with the IBM. Consequently, there were huge variations between the figures of stock and flow as reported by the State Governments and those captured by the IBM through periodic reports of the lessees.

Good practice: In J&K, the State Government has introduced a system of verification of reports of lessees prior to their submission to the IBM. Consequently, the data of State administration and IBM had minimal variations.

During the course of preparation of Asset Accounts on Mineral and Energy Resources in States for 2020-21, variations observed between the data provided by the State Governments and the IBM are depicted through the table below:

State	Mineral	Figure as per State Govt.	Figure as per IBM	Variation (-) More in IBM
				(in tonnes)
Chhattisgarh (Production)	Coal	15,74,79,449.20	15,84,10,000	(-) 9,30,550.80
	Bauxite	7,20,381.22	7,15,296	5,085.22
	Iron ore	3,52,74,170.42	3,69,89,083.08	(-) 17,14,912.66
	Limestone	3,90,12,298.21	4,03,78,325.26	(-) 13,66,027.05
Gujarat (Production) 2019-20	Bauxite	17,29,460.44	20,76,329	(-) 3,46,868.56
	Limestone	2,16,61,831.05	2,28,68,000	(-) 12,06,168.95
	Manganese ore	68,750.69	0	68,750
Gujarat (Stock)	Bauxite	2,49,15,931	13,08,26,017	(-) 10,59,10,086
	Limestone	9,69,02,21,608	62,36,77,000	9,06,65,44,608
	Manganese	14,40,780	6,00,428	8,40,352
Jharkhand (Production)	Coal	11,27,07,000	11,93,65,000	(-) 66,58,000
	Bauxite	14,95,291	14,97,473	(-) 2182
	Iron ore	2,21,70,000	2,09,40,000	12,30,000
	Limestone	0	3,25,000	(-) 3,25,000
Manipur (Proved Reserve)	Chromite	5,563.60	0	--
	Limestone	6,27,000	0	--
Meghalaya (stock)	Coal	13,29,30,000	8,90,40,000	4,38,90,000
	Limestone	9,49,96,20,000	10,58,60,000	9,39,37,60,000
Telangana (Production)	Coal	4,85,17,000	5,26,03,000	(-) 40,86,000
	Manganese ore	11,735	11,097	638
	Limestone	2,39,93,000	2,44,98,000	(-) 5,05,000
West Bengal (Production)	Coal	3,04,80,000	3,10,38,682	(-) 5,58,682

Andhra Pradesh, Himachal Pradesh, J&K, Kerala, Madhya Pradesh, and Sikkim also reported variation between departmental and IBM figures.

In view of the variations, further detailed verification was carried out in some States. In Gujarat variation was observed between the Departmental figures and the IBM figures in respect of Manganese ores during 2018-19 and 2019-20 which was taken up for detailed scrutiny. It was observed that the lessees extracted manganese ore of 48,713.68 MT and 68,750.69 MT during 2018-19 and 2019-20 which was verifiable through the royalty passes and other documents. However, as per the IBM database, production of manganese ore during 2018-19 and 2019-20 was shown as nil.

A system of close co-ordination would help in preventing such variations in both the sets of data.

The non-submission of regular returns by the lessees to the State Governments through the district mining officers also resulted in non-collation of State-wise data on mining activities at the Directorate level. During the study it was observed that in most of the

States, the State governments sourced the data either from the lessees or the DMOs and there was no State wise database existing at the Directorate level.

6.1.2 Need for a system to capture the entire ecology of mining

The process of mining involves extraction of run of mines, processing at the mine head to produce the ores before these are dispatched from the mine head. The Asset Account mechanism has been designed to capture the entire ecology of mining activity as depicted in the block diagram at para 2.11 of Chapter 2.

During the course of the study, it was observed that none of the States (except Chhattisgarh and Odisha to some extent) have instituted a system of capturing the entire system of mining operations commencing from the extraction of run of mines till dispatch of resources.

Moreover, States like Gujarat, Kerala, Meghalaya, Rajasthan, TN, Uttar Pradesh, and West Bengal could not provide the extraction figures of major minerals and their accounts had to be based on production figures only. Further, the State of Madhya Pradesh did not have the extraction as well production figures and accordingly their Asset Accounts were based on dispatch figures only. Consequently, these States remained unaware about the production loss depicted and claimed by the lessees.

This bears significance as the royalty is collected on the minerals produced and dispatched and therefore, more the production loss, more is the revenue leakage. Moreover, cases of irregular claims of production loss also remained undetected due to such system lacunae.

Only the State of Chhattisgarh could provide the detailed position of extraction, production and dispatch of resources along with production loss which was limited within five *per cent*.

6.1.3 Need for capturing the grades of mineral production

Royalty rates of coal, iron ore, limestone etc. varies based on the grades of minerals produced. However, the study indicated that most of the State Governments were unaware about the grades of minerals produced by the lessees as evident from the fact that they could not provide the grade-wise minerals produced in the States. More effective control on the mining activities on the part of the State Governments would enable them to obtain more precise datasets and assurance on proper realisation of revenues as per the grades of minerals produced.

6.1.4 Variations between revenues and market prices

Ideally, royalties should have direct correlation with the market prices to ensure that receipt on account of royalties is in tune with the realisable value and no undue benefits accrue to the lessees/users/sellers/consuming industries/exporters. IBM has a system of capturing the average sales prices of major minerals, monthly and the same compilation is brought out on their website. The State Government departments of statistics, mines and geology have their own systems of capturing the market values of minor minerals. As per the MMDR Act, royalties are to be reviewed every three years.

The analysis of revenues and average sales prices as captured in the Asset Accounts of States indicated variations of upto 49 times. Para 4.5.2 at Chapter 4 has the details.

6.1.5 Monitoring illegal mining of resources

Controlling the illegal mining is priority of the MoM, GoI and the Ministry has taken a number of measures like amendment of the MMDR Act to provide for stringent penal measures, enable special courts in States, periodic reports on illegal mining from States and mining surveillance system (MSS) for detection of illegal mining of major minerals. The State Governments have been suggested to install similar MSS mechanism for controlling illegal mining of minor minerals.

During the course of the study, certain areas of policy interventions which will assist in control and monitoring of illegal mining were noticed.

- *The States did not install a system of proper recording of details of illegal mining as evident from the fact that vital details like names of mineral detected, volume of mineral illegally mined and detected, amount of royalty involved, quantum of penalty levied were not captured in the offence reports. Consequently, some instances of levy of penalty at rates lower than the royalty involved remained undetected as pointed out in para 4.5.6 of Chapter IV.*
- *None of the States installed a separate MSS for detection of illegal mining of minor minerals as suggested by the GoI except for some States opting for drone technologies for monitoring illegalities on case to case basis.*
- *A number of States could not provide any data relating to illegal mining.*

6.1.6 Compilation of stock, flow and average sale price of minor minerals

The IBM collects and compiles the data on stock, flow and average sale price of major minerals. During the study, it was observed that most of the States did not institute a system of ascertaining the stock of minor minerals including riverine resources. Similarly, the average sales price of these minor minerals and riverine resources were not being monitored by the States. Except a very few States and a selective number of resources, this information was not available.

6.1.7 Geo-tagging and geo-fencing of mine areas and routes

Geo-tagging is the process of adding metadata that contains geographical information (exact coordinates) and area of the mines. The data usually consists of latitude and longitude coordinates but may also include a timestamp as well as links to additional information. Geo-tagging of mine areas would allow the State Governments to develop a mineral map of State which contains the geographical and other related information/data of mining sites and routes and may serve as a major deterrent against illegal mining and pilferage of mined minerals.

Geo-fencing is a technological solution for tracking the material which moves out of the earmarked area. This can enable the State Governments to monitor the quantum of actual extraction taking place in mines.

The MoM, GoI has initiated the process of geo-tagging the major minerals through Bhaskaracharya National Institute for Space Applications and Geo-informatics (BISAG).

During the course of the study, the following were observed:

- *Most of the states have not prepared a comprehensive minerals map of the State. States may be encouraged to prepare the mineral maps as it would be the first step towards effective management of mineral resources. Moreover, there are funds earmarked for this purpose under NMET for carrying out the surveys.*
- *Most of the States have not initiated the work of geo-tagging and geo-fencing of mines and mining areas and routes. It was also noticed that Gujarat, J&K and Odisha have geo-tagged and geo-fenced all its mines which implies that it is a feasible preposition and states can do it if it is made mandatory and there is requirement to do it in the prescribed time period.*
- *Odisha has also geo-fenced the routes for transportation of minerals till the end point, i.e. industries, check-posts and ports etc.*
- *Though BISAG had been carrying out geo-tagging of the mine areas in States, this information was not forthcoming from the State Government departments.*

6.1.8 Levy of District Mineral Foundation and National Mineral Exploration Trust

The GoI had introduced district mineral foundation as a fund to support the welfare measures of people affected in mining areas. The Rules provide scope for the State Governments to levy DMF on minor minerals.

During the course of the study, the following were observed:

- *States did not have a readily available database on DMF. Some States could not provide district wise DMF data even till the finalisation of the State Reports, i.e. even after period of more than six months.*
- *A number of major mineral bearing States like Karnataka, Maharashtra, Telangana did not have the figures of DMF realizable for the year 2020-21. These States provided only the data of DMF realised and realisable as same. This indicated that the States were not monitoring the DMF collections against those collectible.*
- *Even in cases where the State Governments provided DMF realizable, there were gaps in DMF realised leading to short/non-realisation of DMF like Chhattisgarh, Jharkhand, Meghalaya, Punjab and Rajasthan. Para 4.5.4 in Chapter 4 has the details.*
- *In a number of States, the State Governments have levied DMF on riverine resources and also on the dead rent[10]. This needed to be re-examined with the spirit of the Rules which was promulgated with the objective of collecting a fund for welfare of the affected people near the mining areas.*

[10] Levied on the surface area where no mining activity is carried out.

6.2 STATE SPECIFIC OBSERVATIONS

In addition to the above which are applicable to all States, the study also pointed towards some areas needing focus and attention in respective States. Some major State specific observations are as follows:

6.2.1 Andhra Pradesh

6.2.1.1 There was misclassification of revenues realised on fuel minerals to MH 0853 instead of 0802.

6.2.1.2 Monthly production data of iron ore furnished by the State Government department showed 47 *per cent* variation when compared with production data of IBM.

6.2.2 Chhattisgarh

6.2.2.1 An online system khanijaonline.cgstate.gov.in is functioning in the State for generation of permits and transit pass, payment of all statutory fees/royalties, verification at the check posts etc. had been made mandatory from January 2017. However, all the lessees could not be on boarded owing to poor connectivity resulting in manual system of issuance of permit/transit pass/payment being operated parallel with the online system. This defeated the purpose of the online mechanism.

6.2.2.2 There is absence of methodology for assessment of minor mineral resources of the State due to which all the minor minerals could not be included in the Asset Accounts for 2020-21. Opening balance of minor minerals except for those reclassified from major minerals after February 2015 is required to be determined for their inclusion in the Asset Accounts of future years in phased manner.

6.2.3 Karnataka

6.2.3.1 In respect of six major minerals and 16 minor minerals, the State Government did not have the opening stock position, yet, extractions are being carried out yearly. In respect of minor minerals, closing stock provided by the State Government varied largely with the quarry/mining plans. The concerned department did not possess the quarry/mining plans of the expired leases and dormant mines. From the DCBs of the districts, it was seen that the departmental authorities had noted extractions of 2,79,41,714 tonnes of various minerals like granite, building stones, sand etc. from outside the lease areas during the years 2018-19 to 2020-21 whereas 5,28,85,063 tonnes[11] of minerals were dispatched without valid permits during the same period. However, no further action was taken to recover the revenues and penalties on these minerals removed. Evidently, State has lost revenues on the said volume of minerals which could not be quantified.

6.2.3.2 Further, though the Department has created an electronic portal named integrated lease management system (ILMS), data inputs are being handled by the lessees and there were no control and monitoring of the State Government departments on the same. Sample check in eight district revealed huge variations between actual extractions vis-à-vis those uploaded in the ILMS database.

[11] Including minerals extracted from outside the lease areas in earlier years.

6.2.3.3 There were variations between the figures maintained by the district mining offices and those at the Directorates.

6.2.4 Meghalaya

6.2.4.1 Cross verification of records of Directorate of Mineral Resources with those of the Customs Department carried out by NRA Cell during the course of the study indicated 31,556 tonnes of coal exported to Bangladesh during 2020-21 without approval of the Mining Department and transit passes on pre-payment of royalty resulting in loss of revenue of ₹ 2.13 crore (@ ₹ 675 per MT).

6.2.5 Nagaland

6.2.5.1 During the period from 2016-17 to 2020-21, State Government collected royalty of ₹ 5.41 crore and ₹ 0.57 crore on coal and minor minerals respectively. However, neither the database of IBM nor the State Government provides any data on extraction/production of these minerals.

6.2.6 Punjab

6.2.6.1 Information provided by the State Government showed that an amount of ₹ 18.07 crore on account of royalty and DMF pertaining to the year 2020-21 were yet to be recovered. Also, interest of ₹ 33.97 crore on delayed payments/non-payments was to be levied but not levied by the State.

6.2.7 Rajasthan

6.2.7.1 The State Government has registered 682 illegal mining cases against which penalty of ₹ 78.59 crore had been recovered.

6.2.8 Sikkim

6.2.8.1 The Forest Department was not having the data on extraction of resources and royalty realised thereon. The departments were getting information on mineral extraction from the check posts only and there was no system of collection of information from the lessees. The departments confirmed that there was no mechanism for detection of illegal mining.

6.2.9 Tamil Nadu

6.2.9.1 During the study, discrepancies between the permit registers and annual returns furnished to the Commissionerate of Geology and Mining was noticed in respect of a district.

6.2.9.2 Discrepancy between the DMF figures provided by a district vis-à-vis that provided by the Commissionerate of Geology and Mining was also observed.

6.2.9.3 During the performance audit of mineral wealth[12], excess mining cases were detected through use of unmanned aerial vehicles. The State Government had accepted the audit observation and made budget estimates for similar checks.

[12] Para No. 5.4 of Audit Report on Revenue Sector for the year 2017-18, Government of Tamil Nadu

6.2.10 Telangana

6.2.10.1 Even though there were extractions of nine minor minerals during 2020-21, the State Government did not have the stock position of these resources and consequently these were shown as zero.

6.2.10.2 There were cases of variation of figures between those maintained by the district mining offices and the Directorates.

6.2.11 West Bengal

6.2.11.1 The system of assessment and collection of revenue on coal in West Bengal is complex as it involves four departments and two heads of accounts. The royalty and dead rent are assessed by the Chief Mining Officer while these are collected by concerned Land and Land Reforms Officer and deposited under head 0029 (as tax revenue head under land revenue) instead of head 0853 (a non-tax revenue head meant for mineral concession fees, rent, and royalties). The State Government levies few more cess on primary education cess and rural education cess which are assessed by the Joint Commissioner of Revenue whereas public works cess and road cess are assessed and collected by the district land and land reforms officers under Land and Land Reforms Department and credited under head 0029 (as tax revenue of land revenue).

On the basis of the above observation included in Audit Report, the Public Accounts Committee of West Bengal has recommended (2004) to formulate a concrete system to bring the entire matter of mines and minerals under one umbrella[13].

During the course of the study, it was observed that the same system still continues in West Bengal even after 16 years of specific PAC recommendation. Consequently, the following observations were made during the study which were indicative of lack of co-ordination between the assessing and collecting Offices belonging to different administrative departments:

- *There was non-assessment and non-collection of surface rent and cess thereon amounting to ₹4.87 crore for the years 2020-21 and 2021-22.*
- *Short disclosure of production of coal resulted in non-realisation of RE and PE cess by ₹1.71 crore during 2021-22.*
- *District authorities did not assess the demand in cases coal lessees[14] which did not submit returns leading to non-raising of demand and consequent non-realisation of ₹62.49 lakh.*
- *There was non-raising of demand on cess on dead rent resulting in non-realistion of ₹24.82 lakh.*
- *Non-raising of demand on delayed payment resulted in non-levy of interest and consequent non-collection of revenue of ₹20.53 lakh.*

[13] Para 7.5 of Report No. 2 of the year 2013 of the CAG of India, Government of West Bengal.
[14] M/s Bharat Coking Coal Limited, SAIL and Integrated Coal Mining Limited.

6.2.11.2 There is no system of issuance of permits/transit passes for coal on advance payment of royalty which is a pre-requisite as enshrined in the MMDR Act, 1957 (though this system is prevalent in case of transportation of minor minerals).

It was observed that there is no control and monitoring of the mining officers on production and dispatch of coal from the mine head. The lessees have their own system of issuing permits/passes and weigh-bridges for measurement which do not have Mines Department personnel. The Department also do not have any weigh-bridges or check-gates to monitor actual dispatch of coal. Assessment of revenue is done solely on the basis of returns furnished by the lessees.

This system is highly susceptible to illegal mining, pilferage of minerals leading to windfall gains to the lessees and connected parties and commensurate loss to the State exchequer.

The State Government may take suitable action to establish control and monitoring system as prescribed in Section 23C (2) of the MMDR Act and may also look into any case of pilferage of resources leading to revenue loss to the State exchequer.

CHAPTER – VII WAY FORWARD – TO BETTER MANAGEMENT OF RESOURCES

7.1 Three pronged action plan

The compendium had brought out the compilation of the Asset Accounts of all the States on fossil fuels, major and minor minerals, good practices and innovations in States and observations during the course of the study. Based on good practices and the observations noticed during the study, the way forward chapter is divided into three sections.

- **Section A** discusses about the possible initiatives that could improve the systems and procedures already in place in management of mineral and energy resources in the ministries and the states.

- **Section B** includes application to capture end-to-end data capture of all facets of the mining operations and operationalisation of a quarterly reporting framework to systemize uniform periodic reporting mechanism from the district level offices till the Directorates for effective monitoring and also compilation of the Asset Accounts for the future.

- **Section C** brings out an ambitious plan to map the supply and usage/sale/export of resources for better management of resources by ensuring best possible control and monitoring processes to minimise the scope for illegal/unscientific mining to help in optimisation of the revenue streams for the State exchequers and sustainability of resources for the future generations. These are discussed in the succeeding sections.

SECTION A
FINE-TUNING THE EXISTING SYSTEMS AND PROCESSES

With reference to the observations included in Chapter VI, the following are the suggestive ways forward:

Co-ordination between State Governments and IBM

(i) Rule 45 (1) - (5) of Mineral Conservation & Development (Amendment) Rules, 2011 be modified to provide for submission of returns by lessees first to States. After approval of the State authorities, lessees may submit the returns to the IBM - similar to the practice in J&K. **(ii)** All cases of reporting of production of minerals to IBM (Para 6.1.1) more than that reported to State Governments need to be further looked into in the revenue interests of the States.

System of capturing the entire mining activity from extraction to dispatch

Mandating the lessees to furnish returns to State Governments in same format as prescribed by IBM would enable capturing data of extraction of run of mines, production till dispatch of processed ores and stock of run of mines and processed ores by State Governments to aid in monitoring production loss.

Grades of mineral production and royalty payments

The return format of IBM captures grade-wise production of ores. Mandating the same return would enable State Governments to capture and monitor production of different grades of minerals and their commensurate royalty payments.

Variations between royalties and the market prices

The royalties may be reviewed at specific periodic intervals or when variation exceeds a predecided level. System prevalent in J&K may also be opted for to fix the market prices based on the royalties while keeping the transportation cost separate and on actuals.

Closer monitoring on illegal mining-making geo-tagging, fencing and mapping the supply and use of resourced- imperative

States to institute more streamlined system of recording the details of illegal mining cases detected to include mineral involved, volume of mineral detected, royalty involved, statute under which penalty levied, quantum of penalty levied and collected.

Geo-mapping and geo-fencing of mines and routes may be prioritised and completed within a fixed timeframe. The mapping of supply and use as suggested in Section C needs to be considered for implementation.

Capturing the information on minor minerals

Similar forms of reports and monitoring mechanism of average sale prices as applicable for major minerals administered by IBM may be devised by the States for control and monitoring of minor minerals.

Levy of DMF

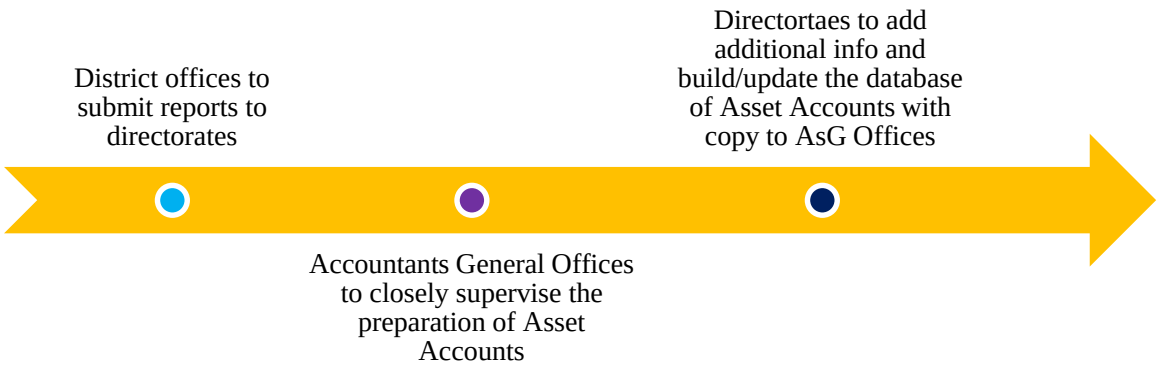
More closer monitoring is needed for DMF to prevent cases of short/non-realisation of DMF. A system needs to be installed for assessment of the DMF realisable to ensure that the amounts due is promptly collected and remitted to proper head of account for usage for the desired purposes.

Exploration of minerals availability across the country and use of NMET

The Rules governing NMET may be streamlined to ensure easy access to the funds collected under NMET for usage by the Ministry of Mines and the States. Also, target oriented approach may be taken for exploration of all minerals available in the country including those in forest areas through satellite imagery. The experiences of internationally accepted good practices may be followed (as done in Australia).

SECTION B - QUARTERLY REPORTING FRAMEWORK – EASE OF DATA COLLECTION

A sound control and monitoring system hinges upon a robust MIS mechanism. However, the studies in the States indicated deficiencies in reporting mechanism as pointed out in the preceding chapters. The Guidelines/SOPs released by GASAB in June 2022 suggested for instituting systems of quarterly reporting framework for collation and collection of information from the last layer of the hierarchy, i.e. the district mining/petroleum/forest offices to the Directorates to ensure that the State Governments have more effective control on the mining activities, revenues therefrom, market prices of the produces, optimization of revenues and sustainability of resources for the future generations. The reporting framework is shown through the block diagram below:



As the district mining/petroleum/forest Officers are the most important layers of control and monitoring on resource extractions, data compilers and generators, the following

information, resource-wise and mine-wise, may be compiled by the district offices keeping semblance with the reporting formats of IBM and channelised quarterly to the directorates, preferably within 30 days after closure of each quarter:

- Name of resource/mine – showing separately major minerals, fossil fuels, minor minerals and other resources (as the case may be) including their grades wherever available.
- GPS co-ordinates of the mine area.
- Whether the mine area is geo-fenced. If not, target for completion of geo-fencing.
- Proved reserve as on 1-4-2022.
- Name of lease holder, their Aadhaar and PAN numbers.
- Periodicity of lease.
- Quantity allowed for extraction (gross).
- Quantity extracted till previous quarter (with detailed grades of minerals, subject to availability).
- OB of extracted resources/finished products for the current quarter (with detailed grades of minerals, subject to availability).
- Quantity extracted during the quarter (with detailed grades of minerals, if available)
- Grade-wise quantity dispatched during the quarter – showing separately Government sector, Private sector, others usage, exports.

✓ ***For this, suitable mechanism needs to be evolved at the district level for monitoring dispatch/usage of resources for various sectors like Government, Private, Export etc. need to be installed, if not in place.***

- Revenue remitted on account of resource extraction/dispatch – to be verified/reconciled with the treasury figures supported with schedule of receipts
- Variations/percentage variations.
- Closing stock of extracted run of mines/processed ores (with detailed grades of minerals, wherever available).
- Amounts collected under district mineral foundations and other such trusts and their utilisation (if available).
- Comments (if any) including detailed information on detection of illegal mining in the area.
- **Certification**

✓ That all resources/mining areas including dormant mines are covered in the report.
✓ Data has been verified with the records of the district office.
✓ Data is reconciled with that of the lease holder's records.
✓ Resources have been extracted/dispatched after prior payment of requisite royalties and other Government dues.
✓ The receipts mentioned in this report tallies with that reported through the quarterly accounts and verified/reconciled with the schedule of receipts.

States which have electronic system of data processing were suggested to make suitable changes in the e-permit system for embedding the above processes into the systems. States which have manual system of data processing can introduce suitable manual reports/returns on the above data flow. These data may be compiled by the month after every quarter and submitted by the district Offices to the directorates and the directorates may submit the same to the AsG Offices.

States like Andhra Pradesh, Goa and Odisha had agreed to modify their e-permit/respective software like i3MS and *Bohemia* to provide for the quarterly reporting framework suggested by GASAB.

Other States like Karnataka, Mizoram, Punjab, Rajasthan, Sikkim and Telangana have agreed to implement the quarterly reporting framework.

Additional inputs from the directorates

Upon receipt of the information from the districts, the directorates may add information like additions, new discoveries, upward and downward reappraisals, reclassifications (if any), information on illegal mining which are available with these authorities. The directorates may consolidate the information, district-wise, into a State-wise data base and share with the Accountants General Offices, quarterly. The NRA Cell can work on these datasets, carry out necessary validations, cross-verifications etc. for finalising the Asset Accounts for the year.

Authentication of data flow

As the datasets submitted from the district offices and the directorates would form the basic Asset Accounts, it is imperative that the data would have to be authentic. Besides the certifications that are mandated above, the following may also form part of the datasets:

- Copies of the monthly accounts showing total receipts during the three months
- Supporting proof of information/figures as provided in the quarterly report/returns
- Copies of schedule of receipts (monthly – for three months)
- Copies of reports submitted to the IBM (in case of major minerals)

Provided that for certain basic information like name of mine/resources, name of lease holder, proved reserves etc., supporting document may be furnished only once during the first quarterly report, for each year.

For further details, please refer to the Guidelines/SOPs issued by GASAB in June 2022 available on GASAB website.

Development of Pan-India Application

In order to create a reliable system of capture of data at origination, it is desirable to develop a Pan India Application/System with login facilities for each state and customised to suit its functional requirements for capturing, collation and summarisation of data at different levels on the lines of i3MS system in Odisha. This system shall be designed to

capture all facets (end to end) of the mining process. It will standardise the formats in which information is captured and would also assist in implementation of UNFC codification of minerals. It may be done originally for the Major minerals and fossil fuels and can be extended to minor minerals later on. When necessary infrastructure (connectivity, equipment, trained personnel) is available at the mine level, the whole system can be automated and it can provide information in near real time for the decision makers. This will also feed the data to the All India Dash-board of minerals being conceived which will facilitate in taking policy decisions by the authorities concerned.

Need for uniform depiction of grades of resources

There are different grades of resources, mainly the major minerals some of which attract different rates of royalties and hence directly affects the revenue streams of the State Governments. The study on preparation of Asset Accounts in the States had indicated deficiencies in recording the grades of mineral resources in absence of which the States could not exercise proper control over collection of the appropriate royalties against the minerals processed and dispatched. Thus, there is a need to reckon and include all such major grades of resources in the Asset Accounts. One such mechanism is to mandate submission of same reports as submitted to IBM to the State Governments and also to mandate similar reporting forms for minor minerals as suggested in Section A above. Besides depiction of the resources with their grades enabling detailed calculation of royalty and market values, this would lead to information on availability of various types and sub-types of resources across the country. Some instances of major minerals and their grades are as mentioned below:

Iron Ore	Limestone	Manganese Ore	Marble
Below 55 % FE	Cement	Below 25 % Mn	White colour
55% to below 58% FE	LD, SMS and BF	25% to below 35% Mn	Off colour
58% to below 60% FE	Chemical	35% to below 46% Mn	
60% to below 62% FE		46% Mn and above	
62 & to below 65% FE			
Above 65% FE			

Note: some instances of grades of resources as per the IBM

States may adopt these broad grades of minerals in addition to any other resources for which grades of minerals may be required to be included in consultation with the Union Government. However, the grades of minerals may be classified in the lines as listed by the IBM some of which are illustrated above.

SECTION C
MAPPING THE SUPPLY AND USE OF RESOURCES

Revenue yields from exploitation of minerals and energy resources consist substantial part of State's receipt and largely help the entities to fund the welfare and other planned

activities of the States. Hence, it is imperative that a robust framework is put in place to ensure zero tolerance on resource and revenue pilferages.

As per Rule 45 (1) - (5) of the Mineral Conservation and Development (Amendment) Rules, 2011, the owner, agent, mining engineer or manager of every mine, or any person or company engaged in trading or storage or end-use or export of minerals mined in the country, shall register with the IBM and get a registration number allotted to be used for all purposes of reporting and correspondence connected therewith. These registrations were required to be completed within one month from the date of the above amended Rules coming into force on 9 February 2011.

The Rule 45 (6) provide for the miners and other parties involved in trading, end-usage, exports to report monthly and annually to the IBM and the State Governments about volume of mineral and energy resources dispatched, traded, exported or used during the period reported upon. The Rules prescribed penal measures like cancellation of licences for falsification in reports submitted by the above parties.

The State NRA reports indicate that these Rules are not being followed in its entirety in the country.

MoM, GoI has taken initiative to curb illegal mining through amendment of the Mines and Minerals (Development and Regulation) Act in 2015 which *inter-alia* enhanced the penalties under section 21(1) & (2) from twenty five thousand rupees to five lakh rupees per hectare and the term of imprisonment increased to five years. Provisions for establishing special courts in respective States have been introduced under section 30 (B) and (C) for providing speedy trial of the offences. However, as per information on setting up of special courts in exercise of powers conferred by the amended Act, no special court has been set up in any State[15].

As per the amended Act, 21 States have framed Rules under Section 23C of the MMDR Act to curb illegal mining. Also, 22 States have set up task forces at State and District level to control illegal mining. Further, States are required to submit quarterly reports on illegal mining to the IBM.

Other initiatives of MoM, GoI and also some of the State Governments have been discussed in some of the preceding paragraphs.

Suggestions, based on the amended Rules and best practices observed in various States are placed below for consideration:

[15] Note on illegal mining – Ministry of Mines website (as on 9 June 2022)

A centralised database of all mine lessees, traders, storage, exporters, end-users

A Centralised data-base of all miners, traders, storage, exporters, end-users need to be created in a mission mode at every State Government level.

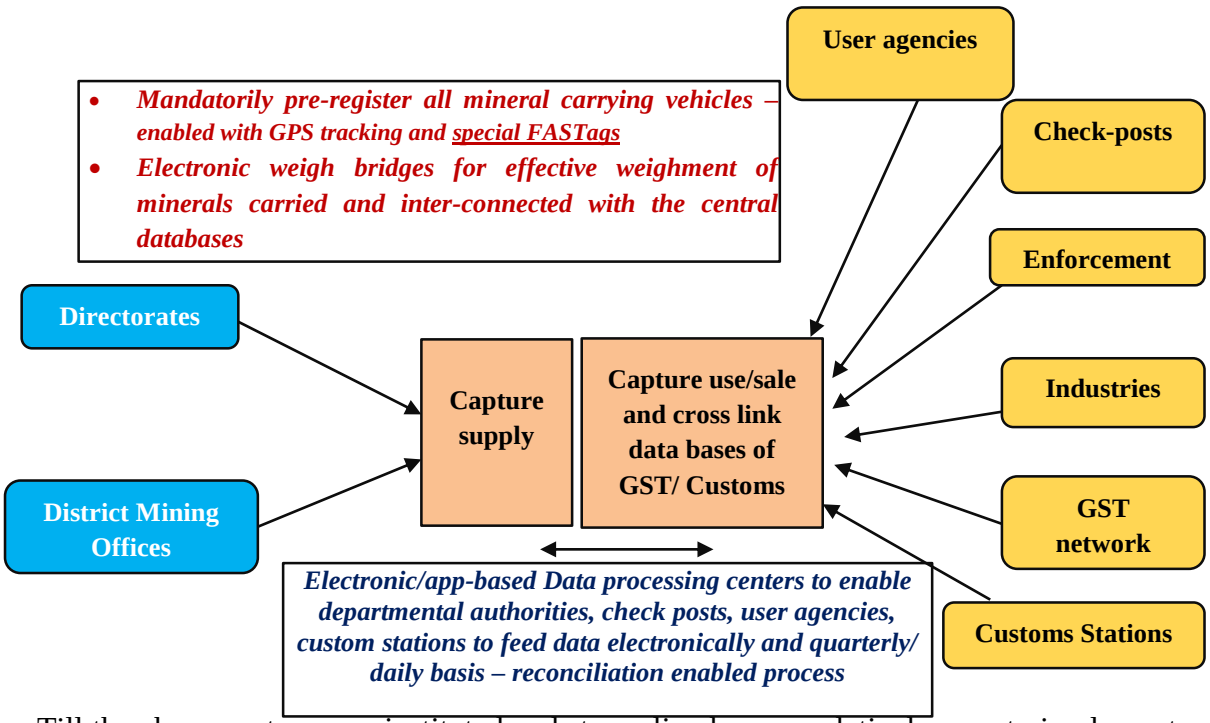
Mandatory registration of carriage vehicles/system of special fastags

Making it pre-requisite to register all carriage vehicles used in transportation of mineral and energy resources with special fastag to auto-capture details at mineral check-posts/exit points.

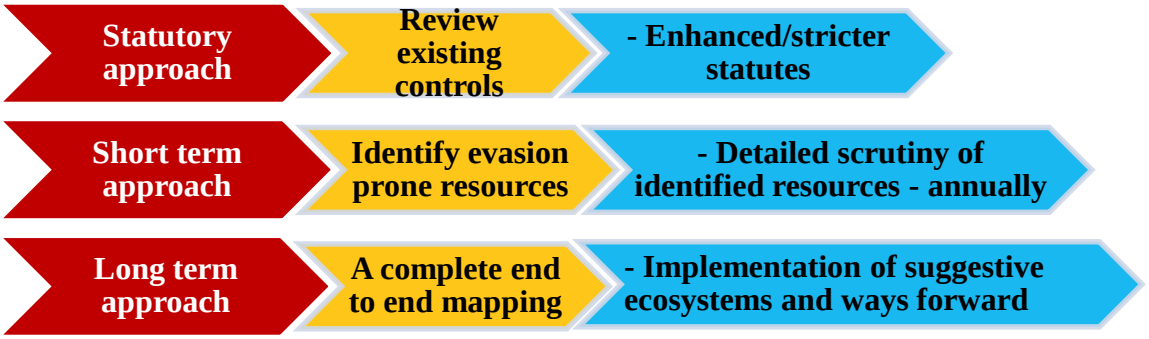
A system of matching the reports of suppliers and users/sellers/exporters

After the above two steps, States may commence with a mechanism (manual or system based as prevelent) of comparing the reports of the miners, traders, storage, exporters, end users to identify triggers/flags for futher investigation. This system would largely help these entities to curb illegal mining by detecting the variations and further investigating into them.

It may then be cross linked with other databases of taxation authorities to make it more robust.



Till the above systems are instituted and streamlined, some relatively easy to implement approaches for better management of resources divided into three categories, i.e. statutory, short term and long-term approaches are discussed below.



Statutory approach

- Initiate and ensure geo-tagging and end-to-end geo-fencing of all mining areas and transport routes for effective monitoring of mining activities and movement of mineral and energy resources.
- Automate the e-permit system, with
  - bar-coding of permits,
  - real time information sharing on permits issued,
  - pre-registration, GPS tagging of carriage vehicles with unladen weight and **special FASTags** for easy monitoring of minerals carried at the weigh bridges,
  - Establishment of more electronic weigh bridges and their interlinking with the central databases.
- Making it mandatory for the check posts (both intra and inter-State/customs check posts at international borders)/receiving points at industries to e-verify the permits – making them invalid for re-use. Else, movement/receipt should be allowed only upon full payment of royalty, fees, fines etc.

Short term approach

While the State Government Departments may take some time to process the statutory changes and 360 degrees profiling of extraction and sale/use of minerals, the following could be the short-term measures implemented with immediate effect.

- Identify and list evasion prone minerals/resources.
- Select one or more such commodities each year.
- Identify all probable contact points to gather information like exit check posts, export points, enforcement wings of departments including Police Department, consuming industries, bulk selling/wholesale points, user agencies, red flags in IBM website, assistance of National Remote Sensing Center etc. (illustrative and not exhaustive).
- Gather information from the sources and cross verify with the permitted quantity and other data of lease holders.
- Prepare case studies on cross verification of selected commodities along with the Asset Accounts – each year – so as to cover all evasion prone minerals in a span of 3 – 4 years. Resource pilferage and loss to State exchequer could be pointed out in these reports.

Long term approach

The goal should be complete 360 degrees profiling of minerals with end-to-end mapping of supply and use with zero pilferage of resources and revenues. For this, effective and timebound implementation of the suggestive ways forward as discussed under Sections A to C in this Chapter would be required for the Union and the States in the interest of better management and sustainability of resources.

Annexure - I

Sustainable Development Goals and associated targets
(Reference: Para 1.2)

Goals	About the Goals	Associated targets
GOAL - 1 No Poverty	End poverty in all its forms everywhere	7
GOAL - 2 Zero Hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	8
GOAL - 3 Good health and well being	Ensure healthy lives and promote wellbeing for all at all ages	13
GOAL - 4 Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	10
GOAL - 5 Gender equality	Achieve gender equality and empower all women and girls	9
GOAL - 6 Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all	8
GOAL - 7 Affordable and clean energy	Ensure access to affordable, reliable sustainable and modern energy for all	5
GOAL - 8 Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	12
GOAL - 9 Industry, innovation and infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation	8
GOAL - 10 Reduced inequality	Reduce inequality within and among countries	10
GOAL - 11 Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable	10
GOAL - 12	Ensure sustainable consumption and production patterns	11

Goals	About the Goals	Associated targets
Responsible consumption and production		
GOAL - 13 Climate action	Take urgent action to combat climate change and its impacts	5
GOAL - 14 Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	10
GOAL - 15 Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt biodiversity loss	12
GOAL - 16 Peace and justice strong institution	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	12
GOAL - 17 Partnership to achieve goal	Strengthen the means of implementation and revitalise the global partnership for sustainable development	19

Annexure - II

Tentative input tables included in Templates booklet and Guidelines/SOPs (Reference: Para 2.10)

Table 1 (mother table as prescribed by SEEA)

Particulars	Names of resource(s)
Opening stock of environmental asset	
Growth in stock	
Discoveries of new stock	
Upward reappraisals	
Reclassifications	
Total addition of stock	
Reduction of stock	
Extractions	
Normal loss of stock	
Catastrophic losses	
Downward reappraisals	
Reclassification	
Total reduction in stock	
Valuation/Revaluation of the stock* (revenue receivable/actual market price) – as in table 3	
Closing stock of environmental assets	

Table 2 (physical stock and flow, sustainability)

Classification	Grade-wise sub-classification (may vary from State to State)	Opening stock of proved reserves	Addition to stock	Reduction in stock				Closing stock of proved reserves	Sustainability of resources in years
				Extracted by/for		Other extractions /exports	Total extraction		
				Govt Sector	Private Sector				
		(in tonnes/cum - as the case may be)							
Major, minor and fossil fuels									

Table 3 (Valuation of resources)

Particulars	Grade- wise sub-classification (may vary from State to State)	Physical unit (in tonnes/ cum) extracted showing Govt, Private and other sector	Valuation of resources		
			Revenue receivable showing Govt, Private and other sector	Total revenue receivable	Average Market value (as ascertained from the IBM/ State Statistical Department)
			(₹ in crore)		

Table 4 (Capturing entire cycle from extraction, production and dispatch)

Name of resource (s) with detailed grades	Opening stock at the beginning of the year		Extraction during the year	Production during the year	Production loss/variations between extraction and production		Dispatch during the year	Closing stock at the end of the year	
	Raw ores	Processed ores			In volume	In *per cent*		Raw ores	Processed ores
	Physical units							Physical units	

Table 5 (Capturing DMF etc.)

Name of Mine/Mineral/ District	Volume of minerals on which DMF was realisable	Rate at which DMF realisable	Total DMF realisable	Total DMF realised	Variations, if any	
					In ₹	Percentage

Table 6 (Generation of renewable energy resources)

Sector	Energy requirement by sector during the year (in MWH/ GWH)	Total energy requirement in the State (in MWH/ GWH)	Generation/additional generation of energy during the year (in MWH/GWH)		Percentage share of non-renewable and renewable energy resources vis-à-vis total requirement
			Non-renewable (N/R) energy/Fossil fuel sources (MWH/ GWH)	Renewable energy	
				Solar/Wind/Hydel/Others incl Bio Mass, Waste to energy, Geothermal etc.	N/R vis-à-vis Renewable energy
Industries					
Domestic					
Agriculture					
Commercial					
Traction and Railways					
Others					

Annexure - III
Statement showing royalty, fees etc. of States during 2020-21
(Reference: Para 3.5)

Sl. No.	Name of the State	Major Head	2020-21 Amount (₹ in lakh)
1.	Andhra Pradesh	0853 Non-ferrous Mining & Metallurgical Industries	22,54,92.34
2.	Arunachal Pradesh	0853 Non-ferrous Mining and Metallurgical Industries	NA
3.	Assam	0802 Petroleum	14,67,44.13
		0803-Coal and Lignite	16,03.82
		0853-Non-ferrous Mining and Metallurgical industries	5,44.14
4.	Bihar	0853-Non-ferrous Mining and Metallurgical industries	1,70,911.55
5.	Chhattisgarh	0853-Non-ferrous Mining and Metallurgical industries	49,76,35.58
6.	Goa	0853 - Non-ferrous Mining and Metallurgical industries	1,68,10.00
7.	Gujarat	0853- Non-ferrous Mining and Metallurgical Industries	28,96,72.48
8.	Haryana	0853 Non-Ferrous Mining and Metallurgical Industries	10,00,41.01
9.	Himachal Pradesh	0853 Non-ferrous Mining and Metallurgical Industries	2,01,14.03
10.	Jammu & Kashmir	0853- Non-Ferrous Mining and Metallurgical Industries	68,92.48
11.	Jharkhand	0853- Non-ferrous Mining and Metallurgical Industries	48,96,16.74
12.	Karnataka	0853 Non -ferrous Mining and Metallurgical Industries	38,80,82.04
13.	Kerala	0853-Non-ferrous Mining and Metallurgical Industries	2,01,90.26

Sl. No.	Name of the State	Major Head	2020-21 Amount (₹ in lakh)
14.	Madhya Pradesh	0853 - Non-Ferrous Mining and Metallurgical Industries	28,34,70.41
15.	Maharashtra	0853 - Non-Ferrous Mining and Metallurgical Industries	39,49,90.24
16.	Manipur	0853 Non-ferrous Mining and Metallurgical industries	0.43
17.	Meghalaya	0853 Non-ferrous Mining and Metallurgical Industries	2,46,43.58
18.	Mizoram	0853 Non-ferrous Mining and Metallurgical Industries	5,02.84
19.	Nagaland		49.14
20.	Odisha	0803- Coal and Lignite	1,26,87.79
		0853- Non-ferrous Mining and Metallurgical Industries	1,37,91,72.09
21.	Punjab	0853 Non - Ferrous Mining and Metallurgical Industries	1,20,01.33
22.	Rajasthan	0802. Petroleum	19,04,80.82
		0853. Non-ferrous Mining and Metallurgical Industries	48,59,36.60
23.	Sikkim		15.98
24.	Tamil Nadu	0853. Non-ferrous Mining and Metallurgical Industries	8,64,06.75
25.	Telangana	0853-Non-ferrous Mining and Metallurgical Industries	34,57,49.04
26.	Tripura	Receipts from natural gas and sand	91,39.00
27.	Uttar Pradesh	0853-Non-Ferrous Mining and Metallurgical Industries-	2,70,165.87
28.	Uttarakhand	0853-Non-Ferrous Mining and Metallurgical Industries	4,98,05.81
29.	West Bengal	0853-Non-ferrous Mining and Metallurgical Industries	1,65,69.17

Note: Finance Accounts of Arunachal Pradesh for 2020-21 is not yet public

Annexure - IV
Statement showing basis of stock* and flow of resources in different States
(Reference: Para 4.1)

Sl. No.	State	Reserves based on	Reduction based on
1.	Andhra Pradesh	Proved reserves	Extraction
2.	Arunachal Pradesh	Proved reserves	Extraction
3.	Assam	Proved reserves	Extraction
4.	Bihar	Proved reserves	Extraction
5.	Chhattisgarh	Proved and probable reserves	Extraction
6.	Goa	Proved reserves	Extraction
7.	Gujarat	Proved and probable reserves	Production
8.	Haryana	Mineable[16] reserve	Extraction
9.	Himachal Pradesh	Proved reserves	Extraction
10.	Jammu & Kashmir	Proved and probable reserves	Extraction
11.	Jharkhand	Proved reserves	Extraction
12.	Karnataka	Proved reserves	Extraction
13.	Kerala	Proved reserves	Production
14.	Madhya Pradesh	Total reserves	Dispatch
15.	Maharashtra	Proved reserves	Extraction
16.	Manipur	Proved reserves	--
17.	Meghalaya	Proved reserves	Production
18.	Mizoram	--	Production
19.	Nagaland	--	--
20.	Odisha	Proved reserves	Extraction
21.	Punjab	Proved and probable reserves	Extraction
22.	Rajasthan	Proved reserves	Production
23.	Sikkim	Proved and probable reserves	Extraction
24.	Tamil Nadu	Proved reserves	Production
25.	Telangana	Proved reserves	Extraction
26.	Tripura	Proved reserves	Extraction
27.	Uttar Pradesh	Proved and Mineable reserves	Production
28.	Uttarakhand	Total reserves	Extraction
29.	West Bengal	Proved reserves	Production

* Except sand stowing, some of the minor minerals and other riverine resources.

No extraction of minerals reported in Manipur and Nagaland during 2020-21.

[16] Mineable reserve is economically extractable reserve and is on higher side of Proved Reserve.

Annexure – V

Position of stock and flow of Fossil fuels in States during 2020-21 (Reference Para 4.2)

Sl. No.	State	Coal				Petroleum/Crude Oil				Lignite				Natural Gas			
		In Million tons												In Million cum			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Andhra Pradesh					0.01	0.15	0.15	0.01					34.18	814.34	775.57	72.95
2.	Arunachal Pradesh	31.23	0.00	0.00	31.23	1.47	0.03	0.05	1.45					2.10	0.47	0.04	2.53
3.	Assam	460.47	0.00	0.26	460.21	155.45	0.00	3.80	151.65					166600	0.00	2330	164270
4.	Bihar																
5.	Chhattisgarh	17522.23	0.00	157.48	17364.75												
6.	Goa																
7.	Gujarat					118.60	0.00	4.46	114.13	3505.79	0.00	21.61	3484.18	57130	0.00	685.47	56444.53
8.	Haryana																
9.	Himachal Pradesh																
10.	Jharkhand	10449.09	0.00	112.71	10336.77												
11.	Karnataka																
12.	Kerala																
13.	Madhya Pradesh	661.43	1.29	28.52	634.20												
14.	Maharashtra	5705.73	0.00	47.43	5658.30												
15.	Manipur																
16.	Meghalaya	132.93	0.00	0.19	132.74												
17.	Mizoram																
18.	Nagaland	492.68	0.00	0.00	492.68	598.98	0.00	0.00	598.98								
19.	Odisha	40872	2608.15	154.15	43326												
20.	Punjab																

Sl. No	State	Coal				Petroleum				Lignite				Natural Gas			
													In million tons				In million cum
		OS	Add	Red	CS	OS	Add	Red	CS	OS	Add	Red	CS	OS	Add	Red	CS
21.	Rajasthan					32.72	1.86	5.88	28.70	1127.43	0.00	9.14	1118.28	13843.45	524.15	2039.76	12327.84
22.	Sikkim	0.72	0.00	0.00	0.72												
23.	Tamil Nadu					9.03	0.46	0.41	9.08	3313.09	0.00	17.86	3295.22	37090	1711	911	37890
24.	Telangana	9492.76	0	48.52	9444.24												
25.	Tripura													30840	1360	1630	30570
26.	Uttar Pradesh	121.07	4.89	17.02	108.94												
27.	Uttarakhand																
28.	West Bengal	17075.61	0.00	30.48	17045.13												
29.	Jammu and Kashmir	0.00	0.01	0.01	0.00					5.00	0.00	0.00	5.00				
Total		**103017.95**	**2614.34**	**596.77**	**105035.91**	**916.26**	**2.50**	**14.75**	**904**	**7951.31**	**0.00**	**48.61**	**7902.68**	**305539.73**	**4409.96**	**8371.84**	**301577.85**

OS – Opening stock, Add – addition, Red – Extraction, and CS – closing stock

Note: Government/Private bifurcation wherever not available had been listed under Private extraction.

In case of Nagaland, the figure of petroleum includes natural gas. This has been referred back to the State Government for bifurcation of figures. Replies awaited.

The variations, if any, in closing stock is due to rounding off of fractions into million tons.

Annexure - VI

Position of stock and flow of Major Minerals in States during 2020-21 (Reference Para 4.3)

Sl. No.	Name of mineral	Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone	722.53	150.13	41.43	831.23	67.89	0	0	67.89	171.06	0	1.56	169.50	11.8	0	0.99	10.8
2.	Magnesite																
3.	Bauxite																
4.	Chromite																
5.	Copper Ore																
6.	Iron Ore	21.85	0.64	0.38	22.11												
7.	Manganese	2.47	0.18	0.24	2.41												
8.	Gold																
9.	Silver																
10.	Lead-Zinc Ore																
11.	Garnet																
12.	Marl																
13.	Vermiculite	0.001	0	0.0008	0.0008												
14.	Graphite																
15.	Beach Sand Minerals																
16.	Base Metals																
17.	Talc																
18.	Rock Phosphate																
19.	Wollastonite																
20.	Selenite																
21.	Siliceous earth																

Sl. No.	Name of mineral	Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite																
23.	Kyanite																
24.	Lime shell																
25.	Martilised Magnetitic Iron Ore																
26.	Titaniferrous Magnetite																
27.	Tin Ore																
28.	Tin Metal																
29.	Auriferous Quartz																
30.	W. Shale	1.06	0.03	0.03	1.06												
31.	Fluorite																
32.	Sand Stowing																
33.	Sillimanite																
34.	Illemenite																
35.	Leucoxene																
36.	Rutile																
37.	Zircon																
38.	Monazite																
39.	Nickel Cobalt Chromium bearing Magnetite																
40.	Diamond **(Carat)**																

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Chhattisgarh				Goa				Gujarat				Haryana			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone	2,535.85	125.27	39.01	2,622.11					59,523.99	0	17.52	59,506.47				
2.	Magnesite																
3.	Bauxite	28.82	10.72	0.75	38.79	11.76	0	0	11.76	24.9	5.53	1.65	28.78				
4.	Chromite																
5.	Copper Ore																
6.	Iron Ore	1,236.56	0	35.26	1,201.29	263.78	0	0	263.78								
7.	Manganese					1.19	0	0	1.19	1.41	0	0.05	1.36				
8.	Gold																
9.	Silver																
10.	Lead-Zinc Ore																
11.	Garnet																
12.	Marl																
13.	Vermiculite																
14.	Graphite	0.006	0	0	0.006												
15.	Beach Sand Minerals																
16.	Base Metals																
17.	Talc																
18.	Rock Phosphate																
19.	Wollastonite																
20.	Selenite																
21.	Siliceous earth																

Sl. No.	Name of mineral	Chhattisgarh				Goa				Gujarat				Haryana			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite																
23.	Kyanite																
24.	Lime shell																
25.	Martilised Magnetitic Iron Ore																
26.	Titaniferrous Magnetite																
27.	Tin Ore	0.004	0	0.000003	0.004												
28.	Tin Metal	0.0001	0	0	0.0001												
29.	Auriferous Quartz																
30.	W. Shale																
31.	Fluorite																
32.	Sand Stowing																
33.	Sillimanite																
34.	Illemenite																
35.	Leucoxene																
36.	Rutile																
37.	Zircon																
38.	Monazite																
39.	Ni-Co-Cr bearing Magnetite																
40.	Diamond **(Carat)**																

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Himachal Pradesh				Jharkhand				Karnataka				Kerala			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone	200.87	0	12.43	188.44	2.3	0	0	2.3	303.97	0	34.31	269.66	8.95	0	0.31	8.63
2.	Magnesite									1.21	0	0.005	1.21				
3.	Bauxite					28.26	0	1.5	26.77	0.11	0	0	0.11				
4.	Chromite									0.27	0	0	0.27				
5.	Copper Ore									0.31	0	0	0.31				
6.	Iron Ore					1,631.77	0	22.17	1,609.6	273.58	0	34.85	238.72				
7.	Manganese									7.82	0	0.37	7.45				
8.	Gold									0	0	0.001	0				
9.	Silver																
10.	Lead-Zinc Ore																
11.	Garnet																
12.	Marl																
13.	Vermiculite																
14.	Graphite																
15.	Beach Sand Minerals																
16.	Base Metals																
17.	Talc																
18.	Rock Phosphate																
19.	Wollastonite																
20.	Selenite																
21.	Siliceous earth																

Sl. No.	Name of mineral	Himachal Pradesh				Jharkhand				Karnataka				Kerala			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite									0	0	0.15	0				
23.	Kyanite									0	0	0.002	0				
24.	Lime shell													0	0	0.0004	0
25.	Martilised Magnetitic Iron Ore									0	0	0.126	0				
26.	Titaniferrous Magnetite									0	0	0.001	0				
27.	Tin Ore																
28.	Tin Metal																
29.	Auriferous Quartz					0.01	0	0.002	0.01								
30.	W. Shale																
31.	Fluorite																
32.	Sand Stowing																
33.	Sillimanite													0.71	0	0.013	0.69
34.	Illemenite													3.83	0	0.11	3.72
35.	Leucoxene													0.013	0	0.00004	0.013
36.	Rutile													0.2	0	0.002	0.2
37.	Zircon													0.48	0	0.006	0.48
38.	Monazite													0.01	0	0	0.01
39.	Ni-Co-Cr bearing Magnetite																
40	Diamond **(Carat)**																

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone	2,135.38	590.45	26.77	2,699.06	355.13	0	13.61	341.51	0.627	0	0	0.627	9,499.62	0	10.77	9,488.85
2.	Magnesite																
3.	Bauxite	20.12	4.85	0.80	24.17	3.38	0	0.45	2.92								
4.	Chromite									0.005	0	0	0.005				
5.	Copper Ore	107.77	0.9	2.24	106.43												
6.	Iron Ore	56.19	1.25	3.61	53.83	5.02	0	1.23	3.78					3.6	0	0	3.6
7.	Manganese	59.22	1.73	0.68	60.27	7.59	0	1.04	6.55								
8.	Gold																
9.	Silver																
10.	Lead-Zinc Ore																
11.	Garnet																
12.	Marl																
13.	Vermiculite																
14.	Graphite																
15.	Beach Sand Minerals																
16.	Base Metals																
17.	Talc																
18.	Rock Phosphate	14.04	0	0.10	13.94												
19.	Wollastonite																
20.	Selenite																
21.	Siliceous earth																

Sl. No.	Name of mineral	Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite																
23.	Kyanite					0.19	0	0.001	0.19								
24.	Lime shell																
25.	Martilised Magnetitic Iron Ore																
26.	Titaniferrous Magnetite																
27.	Tin Ore																
28.	Tin Metal																
29.	Auriferous Quartz																
30.	W. Shale																
31.	Fluorite					0.21	0	0.001	0.21								
32.	Sand Stowing					0	0	0.32	0								
33.	Sillimanite					0.13	0	0.001	0.13								
34.	Illemenite																
35.	Leucoxene																
36.	Rutile																
37.	Zircon																
38.	Monazite																
39.	Ni-Co-Cr bearing Magnetite																
40.	Diamond **(Carat)**	7,82,295.87	0	13,673.41	7,68,622.46												

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Mizoram				Nagaland				Odisha				Punjab			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone					423.8	7.59	0	431.39	338.67	0	7.16	331.50				
2.	Magnesite																
3.	Bauxite									303.83	5.09	15.68	293.25				
4.	Chromite									68.60	0	2.78	65.82				
5.	Copper Ore																
6.	Iron Ore									3,163.71	387.69	111.5	3,439.90				
7.	Manganese									19.4	13.26	0.50	32.16				
8.	Gold																
9.	Silver																
10.	Lead-Zinc Ore																
11.	Garnet																
12.	Marl																
13.	Vermiculite																
14.	Graphite									1.28	1.51	0.023	2.76				
15.	Beach Sand Minerals																
16.	Base Metals																
17.	Talc																
18.	Rock Phosphate																
19.	Wollastonite																
20.	Selenite																
21.	Siliceous earth																

Sl. No.	Name of mineral	Mizoram				Nagaland				Odisha				Punjab			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite																
23.	Kyanite																
24.	Lime shell																
25.	Martilised Magnetitic Iron Ore																
26.	Titaniferrous Magnetite																
27.	Tin Ore																
28.	Tin Metal																
29.	Auriferous Quartz																
30.	W. Shale																
31.	Fluorite																
32.	Sand Stowing																
33.	Sillimanite																
34.	Illemenite																
35.	Leucoxene																
36.	Rutile																
37.	Zircon																
38.	Monazite																
39.	Ni-Co-Cr bearing Magnetite					13.31	5.38	0	18.69								
40.	Diamond **(Carat)**																

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Rajasthan				Sikkim				Tamil Nadu				Telangana			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone	4,059.75	309.83	74.28	4,295.28	1.07	0	0	1.07	235.06	0	18.77	215.76	497.28	0	23.99	473.29
2.	Magnesite									75.49	0	0.04	75.44				
3.	Bauxite																
4.	Chromite																
5.	Copper Ore	47.5	0	0.99	46.51												
6.	Iron Ore	2.82	0	4.24	-1.41									0.49	0	0	0.49
7.	Manganese	1.01	0	0.006	1.011									0.10	0	0.01	0.09
8.	Gold																
9.	Silver	74.67	0	0.0001	74.67												
10.	Lead-Zinc Ore	34.88	0	6.14	28.73												
11.	Garnet	0.02	0	0.0003	0.02									0.01	0	0	0.01
12.	Marl									0	0	0	0				
13.	Vermiculite	0.04	0	0	0.04					1.51	0	0	1.51				
14.	Graphite					0.0006	0	0	0.0006	2.39	0	0.015	2.37				
15.	Beach Sand Minerals									188.24	0	0.04	188.2				
16.	Base Metals					1.9	0	0	1.9								
17.	Talc					15	0	0	15								
18.	Rock Phosphate	66.34	0	0.8	65.53												
19.	Wollastonite	1.23	0	0.08	1.14												
20.	Selenite	0.91	0	0.0004	0.91												
21.	Siliceous earth	4.23	0	0.02	4.21												

Sl. No.	Name of mineral	Rajasthan				Sikkim				Tamil Nadu				Telangana			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite																
23.	Kyanite																
24.	Lime shell																
25.	Martilised Magnetitic Iron Ore																
26.	Titaniferrous Magnetite																
27.	Tin Ore																
28.	Tin Metal																
29.	Auriferous Quartz																
30.	W. Shale																
31.	Fluorite																
32.	Sand Stowing													0	0	0.84	0
33.	Sillimanite																
34.	Illemenite																
35.	Leucoxene																
36.	Rutile																
37.	Zircon																
38.	Monazite																
39.	Ni-Co-Cr bearing Magnetite																
40.	Diamond **(Carat)**																

In Rajasthan, the extraction of iron ore was more than the proved reserves, hence the balance is negative.

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Limestone					37.81	0	2.57	35.24	1,542.76	0	0	1542.76				
2.	Magnesite									231.11	0	0.02	231.09				
3.	Bauxite																
4.	Chromite																
5.	Copper Ore																
6.	Iron Ore																
7.	Manganese																
8.	Gold																
9.	Silver																
10.	Lead-Zinc Ore																
11.	Garnet																
12.	Marl																
13.	Vermiculite																
14.	Graphite																
15.	Beach Sand Minerals																
16.	Base Metals																
17.	Talc																
18.	Rock Phosphate																
19.	Wollastonite																
20.	Selenite																
21.	Siliceous earth																

Sl. No.	Name of mineral	Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
22.	Aluminous Laterite																
23.	Kyanite																
24.	Lime shell																
25.	Martilised Magnetitic Iron Ore																
26.	Titaniferrous Magnetite																
27.	Tin Ore																
28.	Tin Metal																
29.	Auriferous Quartz																
30.	W. Shale																
31.	Fluorite																
32.	Sand Stowing													0	0	3.4	0
33.	Sillimanite																
34.	Illemenite																
35.	Leucoxene																
36.	Rutile																
37.	Zircon																
38.	Monazite																
39.	Ni-Co-Cr bearing Magnetite																
40.	Diamond **(Carat)**																

Position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Jammu & Kashmir			
		In Million tons			
		O.S	Add	Red	C.S
1.	Limestone	3,857.21	0	1.32	3,855.89
2.	Magnesite	7	0	0	7
3.	Bauxite	13.74	0	0	13.74
4.	Chromite				
5.	Copper Ore				
6.	Iron Ore				
7.	Manganese				
8.	Gold				
9.	Silver				
10.	Lead-Zinc Ore				
11.	Garnet				
12.	Marl				
13.	Vermiculite				
14.	Graphite				
15.	Beach Sand Minerals				
16.	Base Metals				
17.	Talc				
18.	Rock Phosphate				
19.	Wollastonite				
20.	Selenite				
21.	Siliceous earth				
22.	Aluminous Laterite				

Sl. No.	Name of mineral	Jammu & Kashmir			
		In Million tons			
		O.S	Add	Red	C.S
23.	Kyanite				
24.	Lime shell				
25.	Martilised Magnetitic Iron Ore				
26.	Titaniferrous Magnetite				
27.	Tin Ore				
28.	Tin Metal				
29.	Auriferous Quartz				
30.	W. Shale				
31.	Fluorite				
32.	Sand Stowing				
33.	Sillimanite				
34.	Illemenite				
35.	Leucoxene				
36.	Rutile				
37.	Zircon				
38.	Monazite				
39.	Ni-Co-Cr bearing Magnetite				
40.	Diamond **(Carat)**				

OS – Opening stock, Add – addition, Red – Extraction, and CS – closing stock

Consolidated position of stock and flow of Major Minerals in States during 2020-21

Sl. No.	Name of mineral	Grand Total in all States/UT			
					In Million tons
		O.S	Add	Red	C.S
1.	Limestone	86,533.38	1,183.26	326.81	87,388.75
2.	Magnesite	314.81	0	0.065	314.74
3.	Bauxite	434.92	26.19	20.83	440.29
4.	Chromite	68.88	0	2.78	66.10
5.	Copper Ore	155.58	0.9	3.23	153.25
6.	Iron Ore	6,659.37	389.58	213.23	6,835.70
7.	Manganese	100.21	15.17	2.90	112.49
8.	Gold	0	0	0.001	0
9.	Silver	74.67	0	0.0001	74.67
10.	Lead-Zinc Ore	34.88	0	6.14	28.73
11.	Garnet	0.03	0	0.0003	0.03
12.	Marl	0	0	0.52	0
13.	Vermiculite	1.55	0	0.0008	1.55
14.	Graphite	3.67	1.51	0.038	5.14
15.	Beach Sand Minerals	188.24	0	0.04	188.20
16.	Base Metals	1.90	0	0	1.90
17.	Talc	15	0	0	15
18.	Rock Phosphate	80.38	0	0.90	79.47
19.	Wollastonite	1.23	0	0.08	1.14
20.	Selenite	0.91	0	0.0004	0.91
21.	Siliceous earth	4.23	0	0.02	4.21

22.	Aluminous Laterite	0	0	0.15	0
23.	Kyanite	0.19	0	0.003	0.19
24.	Lime shell	0	0	0.0004	0
25.	Martilised Magnetitic Iron Ore	0	0	0.13	0
26.	Titaniferrous Magnetite	0	0	0.001	0
27.	Tin Ore	0.004	0	0.000003	0.004
28.	Tin Metal	0.0001	0	0	0.0001
29.	Auriferous Quartz	0.01	0	0.002	0.01
30.	W. Shale	1.06	0.03	0.03	1.06
31.	Fluorite	0.21	0	0.001	0.21
32.	Sand Stowing	0	0	4.56	0
33.	Sillimanite	0.84	0	0.014	0.82
34.	Illemenite	3.83	0	0.11	3.72
35.	Leucoxene	0.013	0	0.00004	0.013
36.	Rutile	0.2	0	0.002	0.2
37.	Zircon	0.48	0	0.006	0.48
38.	Monazite	0.01	0	0	0.01
39.	Ni-Co-Cr bearing Magnetite	13.31	5.38	0	18.69
40.	Diamond **(Carat)**	7,82,295.90	0	13,673.41	7,68,622.50

Note: The variations in stock and flow, if any, is due to variations in stock and flow of resources as reported by the States.

Annexure - VII

Position of stock and flow of Minor Minerals in States during 2020-21 (Reference Para 4.4)

Sl. No.	Name of mineral	Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum																
2.	Dolomite	39.92	1.16	2.13	38.96	37.09	0.00	0.00	37.09								
3.	Quartzite	18.92	13.90	0.85	31.97												
4.	Marble	3.33	0.27	0.0003	3.59												
5.	Barytes	43.81	0.01	1.21	42.60												
6.	China Clay	3.19	0.00	0.07	3.12												
7.	Decorative Building Stone																
8.	Mineral Sand																
9.	Pyrophylite	0.16	0.05	0.01	0.20												
10.	RBM																
11.	Aluminous Clay																
12.	Kaolinc include ball clay/white clay																
13.	Clay	0.33	0.36	0.05	0.64												
14.	Corundum																
15.	Dunite																
16.	Feldspar	2.11	0.59	0.22	2.48												
17.	Fire clay	0.03	0.04	0.03	0.05												
18.	Import sand																
19.	Fuller's Earth																

Sl. No.	Name of mineral	Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
20.	Sandstone																
21.	Lime shell																
22.	Bentonite																
23.	Calcite	0.09	0.06	0.001	0.15												
24.	Mica	0.38	0.13	0.02	0.50												
25.	Ochre	6.55	0	0.05	6.50												
26.	Quartz	31.13	4.54	0.55	35.12												
27.	Silica Sand	10.06	8.27	1.40	16.93												
28.	Talc-Steatite-Soapstone	4.76	0	0.10	4.66												
29.	Ball Clay	9.06	10.48	0.14	19.4												
30.	Phyllite																
31.	Laterite	5.50	0	0.07	5.43												
32.	Lime kankar	0.010	0	0	0.010												
33.	Chalk																
34.	Cubes & Kerbs	4.53	0.002	0.14	4.39												
35.	Mosaic Chips	1.79	0.32	0.13	1.98												
36.	Slate	0.21	0.02	0.009	0.22												
37.	Moulding Sand	0.001	0	0.0009	0.00004												
38.	Black Stone																
39.	Jambha Chira																
40.	Gravel	2.17	5.23	2.75	4.65												

Sl. No.	Name of mineral	Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
41.	River Sand																
42.	Clay Major																
43.	Shale																
44.	Diaspore																
45.	Jalwa Quartz													2.89	0	0	2.89
46.	Granite									331.50	0.00	0.00	331.50				
47.	Brick Earth																
48.	Road Metal	161.92	29.83	10.31	181.44												
49.	Black Granite	41.57	4.99	0.79	45.77												
50.	Sand													211.51	0	28.13	183.37
51.	Stone													195.57	0	14.05	181.52
52.	C. Granite	209.76	3.79	0.75	212.80												
53.	L. Stone Slabs	8.91	0.19	1.95	7.15												
54.	Roughstone	0	0	0.18	0												
55.	Murrum/ Bajri	0	0	0.05	0												
56.	Building Stone	0	0	0.03	0												
57.	Ordinary Earth	0	0	2.81	0												
58.	Green Granite																
59.	Grey Granite																
60.	Multi-Colour Granite																

Sl. No.	Name of mineral	Andhra Pradesh				Arunachal Pradesh				Assam				Bihar			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
61.	Basalt																
62.	Sapphire																
63	Limestone (as per use)	77.11	0.82	0.41	77.52												
	Boulder (include with RBM in Sl. No. 10)																
	Stone Chips (include with RBM in Sl. No. 10)																
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter. Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21

Sl. No.	Name of mineral	Chhattisgarh				Goa				Gujarat				Haryana			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum									3.33	0	0	3.33				
2.	Dolomite	87.20	0	1.34	85.85					1,884.92	0	1.06	1,883.86				
3.	Quartzite	3.69	0	0	3.69												
4.	Marble									248.75	0	0.65	248.09				
5.	Barytes																
6.	China Clay	0.13	0	0.0002	0.13					267.01	3.04	4.89	265.15				
7.	Decorative Building Stone																
8.	Mineral Sand																
9.	Pyrophylite																
10.	RBM																
11.	Aluminous Clay																
12.	Kaolin include ball clay/white clay																
13.	Clay																
14.	Corundum																
15.	Dunite																
16.	Feldspar																
17.	Fire clay	0.36	0	0.00004	0.36					148.46	0	0.61	147.84				
18.	Import sand																
19.	Fuller's Earth																
20.	Sandstone									1,359.42	0	1.12	1358.29				
21.	Lime shell																
22.	Bentonite									76.06	0	3.04	73.02				

Sl. No.	Name of mineral	Chhattisgarh				Goa				Gujarat				Haryana			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
23.	Calcite									0.05	0	0	0.05				
24.	Mica																
25.	Ochre																
26.	Quartz	1.78	0	0	1.78					13.46	0	0.26	13.19				
27.	Silica Sand									964.36	0	1.59	962.76				
28.	Talc-Steatite-Soapstone	0.03	0	0	0.03												
29.	Ball Clay																
30.	Phyllite																
31.	Laterite																
32.	Lime kankar																
33.	Chalk									152.81	0	0.14	152.67				
34.	Cubes & Kerbs																
35.	Mosaic Chips																
36.	Slate													8.29	0	0.013	8.28
37.	Moulding Sand																
38.	Black Stone																
39.	Jambha Chira																
40.	Gravel																
41.	River Sand																
42.	Clay Major																
43.	Shale																
44.	Diaspore																
45.	Jalwa Quartz																
46.	Granite									18,967.20	0	0.37	18,966.83				

Sl. No.	Name of mineral	Chhattisgarh				Goa				Gujarat				Haryana			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
47.	Brick Earth																
48.	Road Metal													868.38	0	68.7	799.67
49.	Black Granite																
50.	Sand																
51.	Stone																
52.	C. Granite																
53.	L. Stone Slabs					0.22	0	0	0.22								
54.	Roughstone																
55.	Murrum/Bajri																
56.	Building Stone																
57.	Ordinary Earth																
58.	Green Granite																
59.	Grey Granite																
60.	Multi-Colour Granite																
61.	Basalt					4.20	0.47	0.29	4.37								
62.	Sapphire																
63.	Limestone (as per use)																
	Boulder (include with RBM in Sl. No. 10)																
	Stone Chips (include with RBM in Sl. No. 10)																

Sl. No.	Name of mineral	Chhattisgarh				Goa				Gujarat				Haryana			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter.

Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21

Sl. No.	Name of mineral	Himachal Pradesh				Jharkhand				Karnataka				Kerala			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum																
2.	Dolomite									0	0	0.92	0				
3.	Quartzite					3.34	0	0.13	3.21	0.32	0	0	0.32				
4.	Marble																
5.	Barytes									0.08	0	0.001	0.08				
6.	China Clay									0.09	0	0.002	0.09	5.69	0	0.18	5.51
7.	Decorative Building Stone																
8.	Mineral Sand																
9.	Pyrophylite					0.12	0	0	0.12								
10.	RBM																
11.	Aluminous Clay									0.03	0	0	0.03				
12.	Kaolin include ball clay/white clay									0.19	0	0	0.19	0	0	0.13	0
13.	Clay									0.13	0	0.39	0				
14.	Corundum									0	0	0.00001	-0.00001				
15.	Dunite									3.71	0	0.08	3.62				
16.	Feldspar									0.18	0	0	0.18				
17.	Fire clay																
18.	Import sand									0	0	0.001	0				
19.	Fuller's Earth									0	0	0.03	0				
20.	Sandstone									0.05	0	0.0005	0.05				

Sl. No.	Name of mineral	Himachal Pradesh				Jharkhand				Karnataka				Kerala			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
21.	Lime shell									21.5	0	0	21.5	0	0	0.0007	0
22.	Bentonite																
23.	Calcite																
24.	Mica																
25.	Ochre																
26.	Quartz									1.51	0	0.07	1.44				
27.	Silica Sand									0.21	0	0.05	0.15	0.35	0	0.01	0.34
28.	Talc-Steatite-Soapstone									0.38	0	0.0007	0.38				
29.	Ball Clay																
30.	Phyllite																
31.	Laterite									2.06	0	0.29	1.76	1.29	0	0.51	0.78
32.	Lime kankar																
33.	Chalk																
34.	Cubes & Kerbs																
35.	Mosaic Chips																
36.	Slate																
37.	Moulding Sand																
38.	Black Stone																
39.	Jambha Chira																
40.	Gravel																
41.	River Sand																
42.	Clay Major									0.03	0	0.02	0.009				

Sl. No.	Name of mineral	Himachal Pradesh				Jharkhand				Karnataka				Kerala			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
43.	Shale									0	0	0.03	0				
44.	Diaspore																
45.	Jalwa Quartz																
46.	Granite													0.11	0	0.001	0.11
47.	Brick Earth									0	0	0.035	0				
48.	Road Metal																
49.	Black Granite									2.56	0	0.20	2.36				
50.	Sand	24.25	0.13	2.34	22.05									0	0	0.21	0
51.	Stone					873.59	0	27.78	846.30								
52.	C. Granite																
53.	L. Stone Slabs																
54.	Roughstone	7.65	0.35	0.84	7.17												
55.	Murrum/ Bajri	30.36	0.16	2.19	28.33					2.02	0	2.34	0				
56.	Building Stone	0.53	0	0.023	0.50					299.03	0	244.51	54.52	556	0	36.32	519.67
57.	Ordinary Earth													0	0	6.97	0
58.	Green Granite									2.40	0	0.04	2.36				
59.	Grey Granite									43.19	0	0.36	42.83				
60.	Multi-Colour Granite									1.55	0	0.10	1.45				
61.	Basalt																
62.	Sapphire																

Sl. No.	Name of mineral	Himachal Pradesh				Jharkhand				Karnataka				Kerala			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
63.	Limestone (as per use)																
	Boulder (include with RBM in Sl. No. 10)	47.24	1.01	2.38	45.86												
	Stone Chips (include with RBM in Sl. No. 10)																
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter.

Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21

Sl. No.	Name of mineral	Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum																
2.	Dolomite					6.38	0	0.6	5.77								
3.	Quartzite																
4.	Marble																
5.	Barytes																
6.	China Clay																
7.	Decorative Building Stone																
8.	Mineral Sand																
9.	Pyrophylite																
10.	RBM					0	0	94.38	0								
11.	Aluminous Clay																
12.	Kaolinc include ball clay/white clay																
13.	Clay					0	0	14.64	0								
14.	Corundum																
15.	Dunite																
16.	Feldspar																
17.	Fire clay																
18.	Import Sand																
19.	Fuller's Earth																

Sl. No.	Name of mineral	Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
20.	Sandstone																
21.	Lime shell																
22.	Bentonite																
23.	Calcite																
24.	Mica																
25.	Ochre																
26.	Quartz																
27.	Silica Sand					11.34	0	1.04	10.29								
28.	Talc-Steatite-Soapstone																
29.	Ball Clay																
30.	Phyllite																
31.	Laterite					0	0	1.35	0								
32.	Lime kankar																
33.	Chalk																
34.	Cubes & Kerbs																
35.	Mosaic Chips																
36.	Slate					0	0	1.44	0								
37.	Moulding Sand																
38.	Black Stone					0	0	0.7	0								
39.	Jambha Chira					0	0	2.01	0								
40.	Gravel																

Sl. No.	Name of mineral	Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
41.	River Sand													6.16	0	0.09	6.07
42.	Clay Major																
43.	Shale																
44.	Diaspore																
45.	Jalwa Quartz																
46.	Granite													0.00002	0	0	0.00002
47.	Brick Earth													1.86	0	0.017	1.84
48.	Road Metal																
49.	Black Granite																
50.	Sand					0	0	7.14	0								
51.	Stone					0	0	11.24	0								
52.	C. Granite																
53.	L. Stone Slabs																
54.	Roughstone																
55.	Murrum/ Bajri					0	0	63.82	0								
56.	Building Stone																
57.	Ordinary Earth																
58.	Green Granite																
59.	Grey Granite																
60.	Multi-Colour Granite																
61.	Basalt																
62.	Sapphire																

Sl. No.	Name of mineral	Madhya Pradesh				Maharashtra				Manipur				Meghalaya			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
63.	Limestone (as per use)													23.97	20.54	2.50	42.01
	Boulder (include with RBM in Sl. No. 10)													7.63	1.77	0.75	8.65
	Stone Chips (include with RBM in Sl. No. 10)																
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter.

Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21.

Sl. No.	Name of mineral	Mizoram				Nagaland				Odisha				Punjab			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum																
2.	Dolomite									177.89	0	1.62	176.27				
3.	Quartzite									21.16	0	0.09	21.06				
4.	Marble																
5.	Barytes																
6.	China Clay																
7.	Decorative Building Stone					317	0	0	317								
8.	Mineral Sand									122.67	40.98	0.36	163.30				
9.	Pyrophylite									2.77	0	0.003	2.76				
10.	RBM																
11.	Aluminous Clay																
12.	Kaolinc include ball clay/white clay																
13.	Clay					20	0	0	20								
14.	Corundum																
15.	Dunite																
16.	Feldspar																
17.	Fire clay																
18.	Import Sand																
19.	Fuller's Earth																
20.	Sandstone																

Sl. No.	Name of mineral	Mizoram				Nagaland				Odisha				Punjab			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
21.	Lime shell																
22.	Bentonite																
23.	Calcite																
24.	Mica																
25.	Ochre																
26.	Quartz									1.30	0.03	0.003	1.34				
27.	Silica Sand																
28.	Talc-Steatite-Soapstone																
29.	Ball Clay																
30.	Phyllite																
31.	Laterite																
32.	Lime kankar																
33.	Chalk																
34.	Cubes & Kerbs																
35.	Mosaic Chips																
36.	Slate																
37.	Moulding Sand																
38.	Black Stone																
39.	Jambha Chira																
40.	Gravel																
41.	River Sand																
42.	Clay Major																
43.	Shale																

Sl. No.	Name of mineral	Mizoram				Nagaland				Odisha				Punjab			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
44.	Diaspore																
45.	Jalwa Quartz																
46.	Granite																
47.	Brick Earth																
48.	Road Metal																
49.	Black Granite																
50.	Sand	0	0	0.10	0									651.07	0	11.45	639.62
51.	Stone	0	0	0.43	0												
52.	C. Granite																
53.	L. Stone Slabs																
54.	Roughstone																
55.	Murrum/Bajri																
56.	Building Stone																
57.	Ordinary Earth																
58.	Green Granite																
59.	Grey Granite																
60.	Multi-Colour Granite																
61.	Basalt																
62.	Sapphire																
63.	Limestone (as per use)																
	Boulder (include with RBM in Sl. No. 10)																

Sl. No.	Name of mineral	Mizoram				Nagaland				Odisha				Punjab			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
	Stone Chips (include with RBM in Sl. No. 10)																
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter.

Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21

Sl. No.	Name of mineral	Rajasthan				Sikkim				Tamil Nadu				Telangana			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum	12.03	0	6.78	5.24												
2.	Dolomite	58.03	0	0.11	57.91	1	0	0	1					39.43	0	0.36	39.07
3.	Quartzite	10.78	0	0.12	10.66												
4.	Marble	255.43	27.62	16.15	266.90												
5.	Barytes	5.51	0	0.003	5.50									1.29	0	0.0005	1.29
6.	China Clay	163.15	1.33	3.60	160.88												
7.	Decorative Building Stone																
8.	Mineral Sand																
9.	Pyrophylite	0.64	0	0.01	0.62												
10.	RBM																
11.	Aluminous Clay																
12.	Kaolin include ball clay/white clay													0.31	0	0.04	0.27
13.	Clay																
14.	Corundum																
15.	Dunite																
16.	Feldspar	152.23	6.89	3.81	155.30									4.39	0	0.67	3.72
17.	Fire clay	6.56	0	0	6.56												
18.	Import Sand																
19.	Fuller's Earth	3.80	0.10	0.02	3.88									0	0	0.38	0
20.	Sandstone																

Sl. No.	Name of mineral	Rajasthan				Sikkim				Tamil Nadu				Telangana			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
21.	Lime shell																
22.	Bentonite	3,.64	0.25	0.44	3.45												
23.	Calcite	0.60	0	0.01	0.59												
24.	Mica	-0.02	0	0.01	-0.04												
25.	Ochre	26.86	13.79	2.80	37.84												
26.	Quartz									25.03	0	0.01	25.02	15.28	0	0.90	14.38
27.	Silica Sand	285.76	0	4.34	281.41												
28.	Talc-Steatite-Soapstone	46.18	0.35	1.59	44.94												
29.	Ball Clay	35.02	0	4.09	30.93												
30.	Phyllite	11.11	0	2.41	8.69												
31.	Laterite	4.30	0	0	4.30									19.54	0	3.60	15.94
32.	Lime kankar																
33.	Chalk																
34.	Cubes & Kerbs																
35.	Mosaic Chips													0	0	0.16	0
36.	Slate																
37.	Moulding Sand																
38.	Black Stone																
39.	Jambha Chira																
40.	Gravel									30.91	0	4.85	26.04	0	0	80.11	0
41.	River Sand																
42.	Clay Major																

Sl. No.	Name of mineral	Rajasthan				Sikkim				Tamil Nadu				Telangana			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
43.	Shale													13.62	0	0.02	13.6
44.	Diaspore																
45.	Jalwa Quartz																
46.	Granite	136.21	77.48	2.43	211.27					558.15	0	0.11	558.04				
	Granite (in MT)									0.41	0	0.009	0.41				
47.	Brick Earth																
48.	Road Metal													0	0	83.59	0
49.	Black Granite													0	0	0.36	0
50.	Sand					0	0	0.28	0					0	0	12.16	0
51.	Stone					0	0	0.19	0								
52.	C. Granite													0	0	0.84	0
53.	L. Stone Slabs													0	0	0.22	0
54.	Roughstone									677.25	0	25.56	651.69				
55.	Murrum/ Bajri																
56.	Building Stone																
57.	Ordinary Earth																
58.	Green Granite																
59.	Grey Granite																
60.	Multi-Colour Granite																
61.	Basalt																
62.	Sapphire																

Sl. No.	Name of mineral	Rajasthan				Sikkim				Tamil Nadu				Telangana			
		In Million tons															
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
63.	Limestone (as per use)																
	Boulder (include with RBM in Sl. No. 10)					0	0	0.10	0								
	Stone Chips (include with RBM in Sl. No. 10)					0	0	0.21	0								
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter.

Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21.

Sl. No.	Name of mineral	Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
1.	Gypsum																
2.	Dolomite																
3.	Quartzite																
4.	Marble																
5.	Barytes																
6.	China Clay													0.79	0	0.08	0.71
7.	Decorative Building Stone																
8.	Mineral Sand																
9.	Pyrophylite					0.42	0	0.01	0.41								
10.	RBM									41.6	0	21.7	19.9				
11.	Aluminous Clay																
12.	Kaolinc include ball clay/white clay																
13.	Clay																
14.	Corundum																
15.	Dunite																
16.	Feldspar													0.15	0	0.003	0.15
17.	Fire clay													2.86	0	0.06	2.8
18.	Import Sand																
19.	Fuller's Earth																
20.	Sandstone													0	0	19.14	0
21.	Lime shell																
22.	Bentonite																

Sl. No.	Name of mineral	Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
														In Million tons			
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
23.	Calcite																
24.	Mica																
25.	Ochre																
26.	Quartz													2.33	0	0.06	2.27
27.	Silica Sand					16.11	1.32	0.38	17.05					0.55	0	0.07	0.47
28.	Talc-Steatite-Soapstone									76.41	0	0.35	76.05				
29.	Ball Clay																
30.	Phyllite																
31.	Laterite																
32.	Lime kankar																
33.	Chalk																
34.	Cubes & Kerbs																
35.	Mosaic Chips																
36.	Slate																
37.	Moulding Sand																
38.	Black Stone													19.18	0	0.15	19.03
39.	Jambha Chira																
40.	Gravel																
41.	River Sand																
42.	Clay Major																
43.	Shale																
44.	Diaspore					0.47	0	0.005	0.46								
45.	Jalwa Quartz																
46.	Granite					2.14	0	0.015	2.13					18.74	0	0.003	18.74

Sl. No.	Name of mineral	Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
47.	Brick Earth																
48.	Road Metal																
49.	Black Granite																
50.	Sand	0.54	0	0.21	0.33												
51.	Stone																
52.	C. Granite																
53.	L. Stone Slabs																
54.	Roughstone																
55.	Murrum/Bajri																
56.	Building Stone																
57.	Ordinary Earth																
58.	Green Granite																
59.	Grey Granite																
60.	Multi-Colour Granite																
61.	Basalt																
62.	Sapphire																
63.	Limestone (as per use)																
	Boulder (include with RBM in Sl. No. 10)																
	Stone Chips (include with RBM in Sl. No. 10)																

Sl. No.	Name of mineral	Tripura				Uttar Pradesh				Uttarakhand				West Bengal			
																	In Million tons
		O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S	O.S	Add	Red	C.S
	Kankar (include with RBM in Sl. No. 10)																
	Pebbles (include with RBM in Sl. No. 10)																

Red colour – in million cubic meter.
Green colour in kg.
In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Position of stock and flow of Minor Minerals in States during 2020-21

Sl. No.	Name of mineral	Jammu and Kashmir			
		(In million tonnes)			
		O.S	**Add**	**Red**	**C.S**
1.	Gypsum	43.53	0	0.66	42.87
2.	Dolomite	67.37	0	0	67.37
3.	Quartzite	5.78	0	0	5.78
4.	Marble	40.72	0	0	40.72
5.	Barytes				
6.	China Clay				
7.	Decorative Building Stone				
8.	Mineral Sand				
9.	Pyrophylite				
10.	RBM	171.66	0	1.24	170.42
11.	Aluminous Clay				
12.	Kaolin include ball clay/white clay				
13.	Clay				
14.	Corundum				
15.	Dunite				
16.	Feldspar				
17.	Fire clay				
18.	Import Sand				
19.	Fuller’s Earth				
20.	Sandstone				
21.	Lime shell				
22.	Bentonite				
23.	Calcite				

Sl. No.	Name of mineral	Jammu and Kashmir			
		(In million tonnes)			
		O.S	Add	Red	C.S
24.	Mica				
25.	Ochre				
26.	Quartz				
27.	Silica Sand				
28.	Talc-Steatite-Soapstone				
29.	Ball Clay				
30.	Phyllite				
31.	Laterite				
32.	Lime kankar				
33.	Chalk				
34.	Cubes & Kerbs				
35.	Mosaic Chips				
36.	Slate				
37.	Moulding Sand				
38.	Black Stone				
39.	Jambha Chira				
40.	Gravel				
41.	River Sand				
42.	Clay Major				
43.	Shale				
44.	Diaspore				
45.	Jalwa Quartz				
46.	Granite	0.002	0	0	0.002
47.	Brick Earth				

Sl. No.	Name of mineral	Jammu and Kashmir			
		(In million tonnes)			
		O.S	Add	Red	C.S
48.	Road Metal				
49.	Black Granite				
50.	Sand				
51.	Stone				
52.	C. Granite				
53.	L. Stone Slabs				
54.	Roughstone				
55.	Murrum/Bajri				
56.	Building Stone				
57.	Ordinary Earth				
58.	Green Granite				
59.	Grey Granite				
60.	Multi-Colour Granite				
61.	Basalt				
62.	Sapphire	0	3.2	3.2	0
63.	Limestone (as per use)				
	Boulder (include with RBM in Sl. No. 10)				
	Stone Chips (include with RBM in Sl. No. 10)				
	Kankar (include with RBM in Sl. No. 10)				
	Pebbles (include with RBM in Sl. No. 10)				

Note: 1. OS – Opening stock, Add – addition, Red – Extraction, and CS – closing stock.

Red colour – in million cubic meter. Green colour in kg.

In cases where the resources are riverine in nature or in cases where stock was not readily available, only flow has been captured.

Consolidated position of stock and flow of Minor Minerals in States during 2020-21

Sl. No.	Name of mineral	Grand total in all States			
		O.S	Add	Red	C.S
					(In million tonnes)
1.	Gypsum	58.89	0	7.44	51.44
2.	Dolomite	2,399.23	1.16	8.14	2,393.15
3.	Quartzite	63.99	13.90	1.19	76.69
4.	Marble	548.23	27.89	16.80	559.30
5.	Barytes	50.69	0.006	1.21	49.47
6.	China Clay	440.05	4.37	8.83	435.59
7.	Decorative Building Stone	317	0	0	317
8.	Mineral Sand	122.67	40.98	0.36	163.30
9.	Pyrophylite	4.11	0.05	0.04	4.11
10.	RBM	213.26	0	117.32	190.32
11.	Aluminous Clay	0.03	0	0	0.03
12.	Kaolin include ball clay/white clay	0.5	0	0.17	0.46
13.	Clay	20.46	0.36	15.08	20.64
14.	Corundum	0	0	0.00001	-0.00001
15.	Dunite	3.71	0	0.08	3.62
16.	Feldspar	159.06	7.48	4.70	161.83
17.	Fire clay	158.27	0.04	0.70	157.61
18.	Import Sand	0	0	0.001	0
19.	Fuller's Earth	3.80	0.10	0.43	3.88
20.	Sandstone	1,359.47	0	20.26	1,358.34
21.	Lime shell	21.50	0	0.0007	21.50
22.	Bentonite	79.70	0.25	3.48	76.48
23.	Calcite	0.74	0.06	0.01	0.79
24.	Mica	0.36	0.13	0.03	0.46

25.	Ochre	33.41	13.79	2.85	44.34
26.	Quartz	91.82	4.57	1.86	94.54
27.	Silica Sand	1,288.74	9.59	8.88	1,289.40
28.	Talc-Steatite-Soapstone	127.76	0.35	2.04	126.06
29.	Ball Clay	44.08	10.48	4.23	50.33
30.	Phyllite	11.11	0	2.41	8.69
31.	Laterite	32.69	0	5.82	28.21
32.	Lime kankar	0.01	0	0	0.01
33.	Chalk	152.81	0	0.14	152.67
34.	Cubes & Kerbs	4.53	0.002	0.14	4.39
35.	Mosaic Chips	1.79	0.32	0.29	1.98
36.	Slate	8.50	0.02	1.46	8.50
37.	Moulding Sand	0.001	0	0.0009	0.00004
38.	Black Stone	31.89	0	0.87	31.72
39.	Jambha Chira	0	0	2.01	0
40.	Gravel	33.07	5.23	87.71	30.69
41.	River Sand	6.16	0	0.09	6.07
42.	Clay Major	0.03	0	0.02	0.009
43.	Shale	13.62	0	0.05	13.60
44.	Diaspore	0.47	0	0.005	0.46
45.	Jalwa Quartz	2.89	0	0	2.89
46.	Granite (in million cum)	1,046.85	77.48	2.56	1,121.79
	Granite (in million tonnes)	18,967.62	0	0.37	18,967.24
47.	Brick Earth	1.86	0	0.05	1.84
48.	Road Metal	1,030.30	29.83	162.60	981.11
49.	Black Granite	44.13	4.99	1.35	48.13
50.	Sand	887.37	0.13	62.02	845.37

51.	Stone	1,069.16	0	53.69	1,027.82
52.	C. Granite	209.76	3.79	1.59	212.80
53.	L. Stone Slabs	9.12	0.19	2.17	7.37
54.	Roughstone	684.90	0.35	26.58	658.86
55.	Murrum/Bajri	32.38	0.16	68.40	28.33
56.	Building Stone	855.56	0	280.88	574.69
57.	Ordinary Earth	0	0	9.78	0
58.	Green Granite	2.40	0	0.04	2.36
59.	Grey Granite	43.19	0	0.35	42.83
60.	Multi-Colour Granite	1.55	0	0.09	1.45
61.	Basalt	4.20	0.47	0.29	4.37
62.	Sapphire	0	3.20	3.20	0
63.	Limestone (Andhra Pradesh & Meghalaya)	101.07	21.36	2.91	119.53
	Boulder (include with RBM in Sl. No. 10)	54.87	2.78	3.23	54.41
	Stone Chips (include with RBM in Sl. No. 10)	0	0	0.21	0
	Kankar (include with RBM in Sl. No. 10)				
	Pebbles (include with RBM in Sl. No. 10)				

Red colour – in million cubic meter.

Green colour in kg.

Note: The variations in stock and flow, if any, is due to variations in stock and flow of resources as reported by the States.

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