सत्यमेव जयते

Five Year Vision Document
2019-2024
Group III - Resources





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Section I - Executive Summary

1. Executive Summary

This report of the Resources Group comprising the Ministries of Petroleum and Natural Gas, Power, New and Renewable Energy, Coal, Mines, Environment, Forest& Climate Change and External Affairs outlines the vision, strategic imperatives, challenges and action plans to modernize India's resource economy and further the Nation's ambition to be a global economic leader. India is dependent on import of hydrocarbonsto a great extent. However, the country is blessed with abundant coal and renewable energy resources that need to be tapped optimally.This Report outlines an integrated vision for the resources sector and also lays out specific action plans of the various Ministries for realizing the vision.

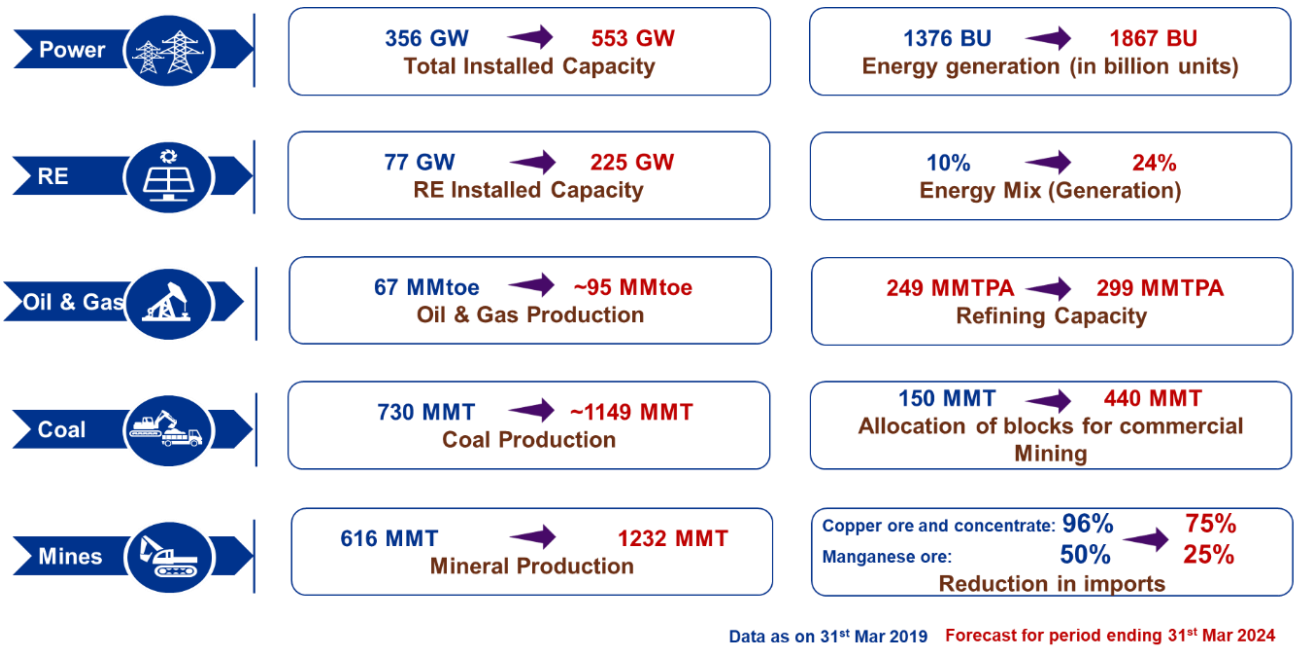
An integrated vision and action plan for the resources sector is a key imperative at a time when the Indian economy is on a growth path. Resources like oil and gas, coal, minerals and power form the foundations of an economy. These resources if available in the right quantum and at the right cost can propel the manufacturing economy which in turn can lead to widespread economic development. The resources sector in itself is capital intensive. Appropriate policy interventions can help modernize the sector building on innovation and efficiency while in turn helping the user sectors to become more competitive.

The Resources Group undertook detailed consultative exercise at the level of the individual ministries and at an overall group level. Six brainstorming workshops/ discussions were held with participation of more than 300 stakeholders.In addition, the individual Ministries consulted a vast number of stakeholders for crafting the sectoral vision and component plans. Assistant Secretaries also actively participated in the internal and SGoS meetings. Guidance was received from the Cabinet Secretary, the Union Ministers and eventually the Hon'ble Prime Minister which have been duly assimilated and reflected inthe vision and the action plans.The sector vision seeks to build:

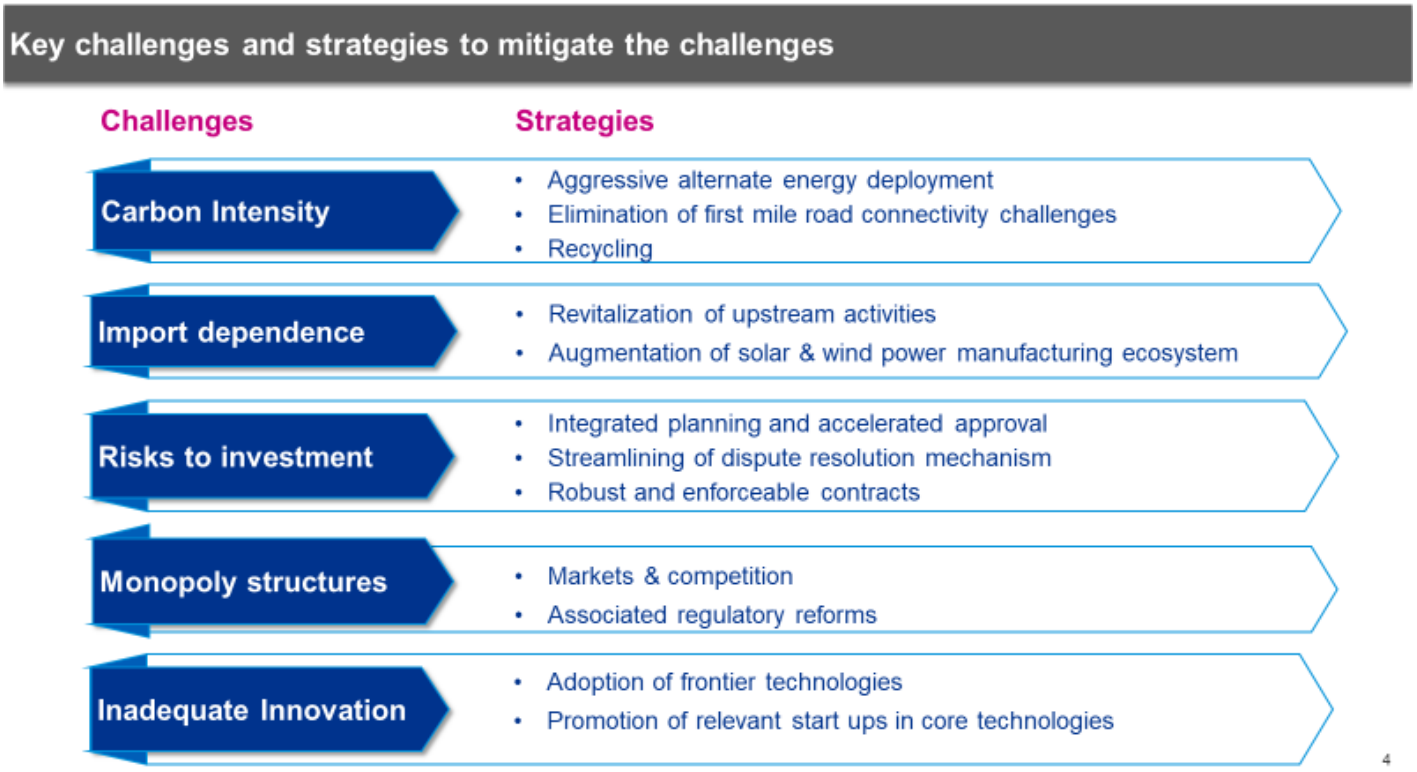
"A sustainable, self-reliant, competitive, efficient and technologically advanced resources economy"

In line with the ambitions of the Nation to become a USD 5 trillion economy, the resources sector has also defined its plans. The position of Resources sector in 2019 as how it will look like in 2024 are presented below:

Resources Economy in 2019 and Projections for 2024



Implementation of this transformative vision will not be bereft of challenges. After extensive consultation, the principal challenges that need to be dealt with have been distilled by the group and are articulated below:



Individual ministries have crafted out specific plans to achieve the ambitions, deal with the challenges and operate within a strong governance framework. An umbrella programme called Sustainable Energy in Every District (SEED) to be jointly owned up by the Ministriesconcerned and managed by the MNRE has also been evolved to ensure that development of the resources sector is broad-based and also improve power supply, specifically keeping in mind sustainability and availability.

The key initiatives and strategies identified by the SGoS,Ministry-wise, are listed below:

Ministry of Petroleum and Natural Gas

- Further push towards gas-based economy
- Universal access to clean fuel
- Increase exploration, oil & gas production

Ministry of Power

- Clean and sustainable generation and Grid integration for RE scale up
- DISCOM revitalization
- Reduce energy intensity

Ministry of New and Renewable Energy

- 30 GW of combined capacity of solar cell and module manufacturing
- Prime Minister's KUSUM scheme for farmers
- Mission Hydrogen

Ministry of Coal

- Expediting production from awarded mines
- Reduction of imports
- Value addition by coal gasification

Ministry of Mines

- Recycling of metal scraps/used metals
- Integrated licenses with pre embedded clearances
- Incentivizing exploration through policy mechanism

Ministry of Environment, Forest and Climate Change

- Combat climate change
- Clean Air and Clean Water
- Expedite EC/FC/CRZ clearances

Ministry of External Affairs

- Support for enhancing global footprint of Indian energy companies
- Diversification of sources for Oil & Gas, coal & strategic minerals
- Encourage diaspora to become investment and technology partners of India

Section II – Sectoral Vision and Roadmap

2. Sectoral Vision and Roadmap

2.1 Process and Stakeholder Consultations

The Resources Group comprising of seven Ministries undertook a detailed consultative exercise at the level of the individual Ministries and group level. The aim was to initially identify the key action areas where a comprehensive resources vision that could make an impact and set the strategic direction for the overall resources sector and the individual Ministries. The broad process adopted was as follows:

(i) Internal deliberations and discussions within the Ministries
(ii) Identification of cross-cutting themes and focus areas
(iii) Consultations within the Resources Group
(iv) External Consultations- expert discussions and workshops
(v) Review at the level of Cabinet Secretary
(vi) Feedback from Union Ministers and Hon'ble Prime Minister

The Resources Group held six brainstorming workshops/ discussions with participation from more than 300 stakeholders. The Sectoral Group of Secretaries met at least 12 times to finalise the Vision Document.The iterative process ensured holistic coverage of all issues and sharpened the ideas to make them crisp and actionable and also allowed for development of an integrated vision for resources.

a) Identification of cross-cutting themes and focus areas

The resources sector provides key inputs for overall economic development.It also has a strong bearing on sustainable development since the component sectors involve extractive industries and energy intensive production processes.The sector requires large investments that often have high gestation periods and are prone to risks in project development and operations. Finally, the sector is also a source for large scale employment including in remote areas.The overall objective of the group was thus to ensure that the resources sector attracts the right investments that leads to holistic development in the areas where the resources sector has a socio-economic impact.Additionally, the key objectives driving the group's thoughts and recommendations included efficiency and transparency to ensure that the sector can

provide inputs to other user sectors – in particular manufacturing – to aid India's aim of becoming a strong manufacturing hub.Crystallizing the above broad thought process, 'Investments', 'Ease of Living' and 'Supporting Infrastructure' were identified as the key focus areas for the resources sector. The areas were then further charted out to identify common themes around which the vision document would be developed. The themes identified were: Sustainability, Make in India, Affordability, Ease of Doing Business, Technology and Efficiency, Socio-economic empowerment, Global Influence and Import Substitution.Initiatives of the individual Ministries have been aligned to these themes.

b) Internal deliberations and discussions within the Ministries

Basing on the above themes,the Ministries worked to identify specific goals, strategies and action plans. The vision and initiatives of the individual Ministries were refined to sharpen and align them to the overall resources sector vision and objectives. During this exercise, all seven Ministries – Ministry of Petroleum and Natural Gas (MoPNG), Ministry of Power (MoP), Ministry of New and Renewable Energy (MNRE), Ministry of Coal (MoC), Ministry of Mines (MoM), Ministry of Environment, Forest and Climate Change (MoEF&CC) and Ministry of External Affairs (MEA) – undertook extensive deliberations with key stakeholders across the resources value chain and also held multiple inter-ministerial consultations.

c) Consultations within the Resources Group

At every milestone of the entire exercise, regular consultations were held within the Resources Group to seek feedback and share inputs amongst one another with a view toensure that each of the seven Ministries move away from their silos and adopt a holistic well-rounded approach. The first meeting of the Group of Secretaries was held on 21st June 2019 and attended by Secretaries, Additional Secretaries and Joint Secretaries of all the sevenMinistries. Views from all officials at different organizational levels were sought, including from young Assistant Secretaries to attract fresh ideas. The initiative received great enthusiasm, and contributed tosignificant value addition to the action plans of the respective Ministries.

d) External Consultations- Expert Discussions and Workshops

Ministry of Power and MNRE organized a Brainstorming Workshop on 1st July 2019, chaired by the Minister of State for Power, New & Renewable Energy (Independent Charge), Secretaries and Additional Secretaries of MoP and MNRE. The session saw participation of more than 150 members including CEOs of companies spread across the power sector value chain and various industry bodies. The session registered active participation and various innovative ideas were discussed.Similarly, Ministry of Petroleum and Natural Gas organised a stakeholder consultation meet, to garner industry inputs on its sectoral Vision and jointly decide the strategic actions to achieve the desired goals for the oil and gas sector.Ministry of Coal undertook extensive deliberations, at its level, with coal PSUs and other stakeholders. More than 5 expert meetings were organized to deliberate on the key constraints, challenges and the potential of the Resources Sector. The expert meetings were attended by the top management of NTPC, CEA, NHPC, Sembcorp, TERI, Soft Bank Group, Yes Bank, FIPI, FICCI, etc.

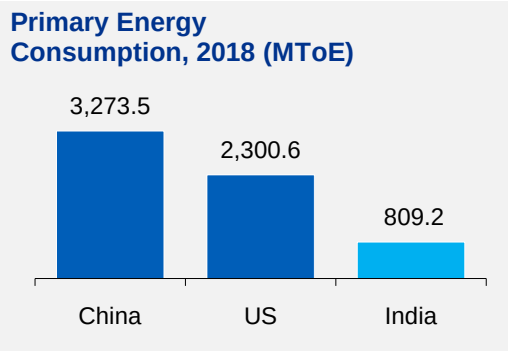
The inputs received from the consultation processes provided diverse stakeholder perspectives which were dovetailed into the vision and the action plans.

e) Review by Cabinet Secretary and feedback from Union Ministers and Hon'ble Prime Minister

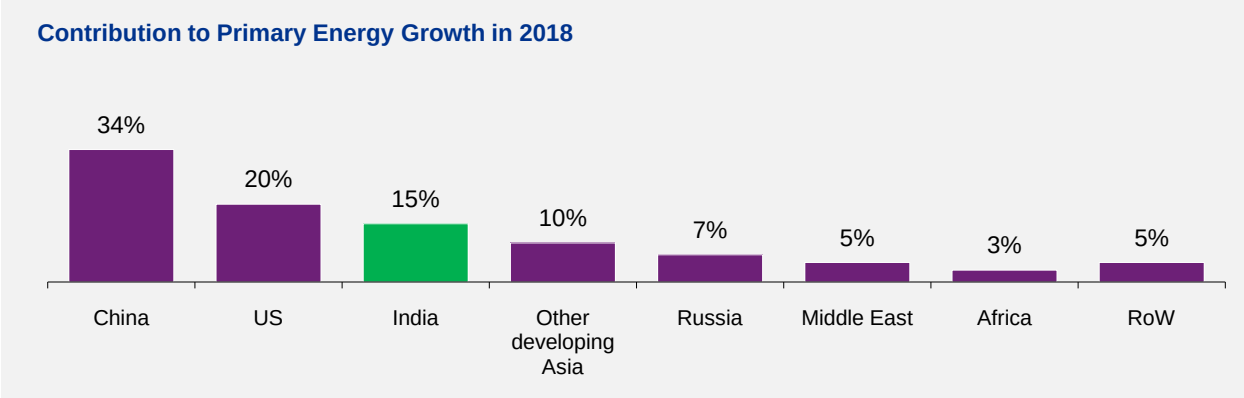
Multiple iterations were undertakento finalize the vision of the resources sector and of the individual Ministries. Action plans for all Ministries were charted out and more than 12 SGOS meetings were held to finalise the action plan. The sectoral vision along with the vision of the respective Ministries were presented to the Cabinet Secretary on various occasions, with latest meeting held on 31st December 2019. Comments were incorporated post discussion with the Secretaries of all the seven ministries and the final vision was presented to Council of Ministers on 4th January 2020. The feedback and inputs from the session were then incorporated to refine the document further so as to come up with a Vision document which is clear, strategic, forward looking and actionable.

2.2 Where we stand (with global benchmark)

Despite 16 percent of global population residing in the country, India consumes less than 6 percent of global energy. Energy is one of the most critical components for socio-economic growth and welfare of nations. The existence and development of adequate energy infrastructure is essential for sustained growth of the Indian economy.India's demand for energy and natural resources will see a concomitant significant rise.During 2018 India's primary energy demand registered a robust increase of 7.9 per cent and is expected to grow at a CAGR of 4.2 per cent during 2017-2040, much faster than any major economy in the world. Further, as per BP Energy Outlook, India is expected to face a massive demand for energy, making the country, the highest contributor to the growth in primary energy demand in the world. As per estimates, a 156 per cent growth in primary energy demand in India is anticipated between 2017 and 2040.



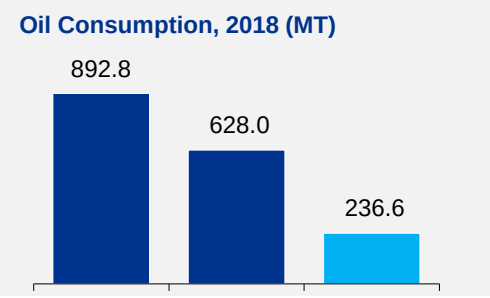
Source: *BP Statistical Review of World Energy 2019*



Source: *BP Statistical Review of World Energy 2019*

Oil and Natural Gas

India is the third largest consumer of crude oil in the world, after the United States and China. In

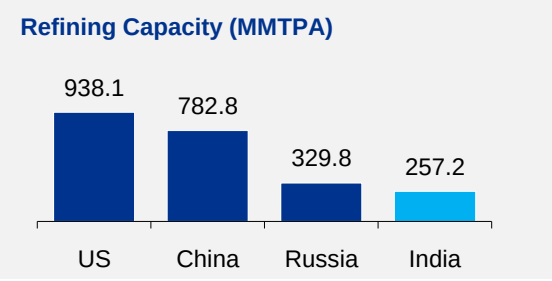


Source: *BP Statistical Review of World Energy 2019*

2018, India's oil consumption grew by 5.3per cent year on year and India's oil demand is to reach 5.05 million barrels per day in 2020. Further, as per BP Energy Outlook, by 2040 India will replace China as the primary source of growth for oil demand[1].

In terms of Natural Gas, India is the 14thlargest gas consumer, fourth largest LNG importer in the world and has the third largest CNG vehicle fleet. However, it is only the 27th largest natural gas producer.Currently, natural gas contributes to about 6.2% of the primary energy consumption in the country, primarily dominated by power and fertilizer sectors. However, given its clean attributes and with India's commitment to reduction in carbon emissions as per COP 21 targets along with a vision of building India's energy future on five pillars - energy security energysustainability, energy access, energy efficiency and energy justice, the country envisions to increase natural gas consumption in India's energy mix. In order to develop the natural gas sector in the country, a series of reforms initiatives have been taken or are underway.

Further, India has established itself as a major global refinery hub by becoming the fourth largest refiner in the world after US, China and Russia. There are 23 refineries in the country, with a total refining capacity of 257.2 MMTPA.



Source: BP Statistical Review of World Energy, 2019

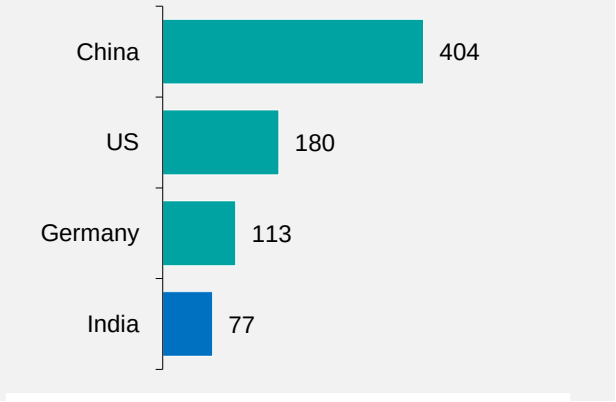
Power and Renewable Energy

India's power sector is one of the most diversified in the world. Sources of power generation range from conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power to non-conventional sources such as wind, solar, and agricultural and domestic waste. Electricity demand in the country has increased rapidly and is expected to rise further in the years to come. In order to meet the increasing demand for electricity in the country, massive addition to the installed generating capacity is required.

[1] As per BP estimates

Additionally, the country has taken large strides in the area of availability of affordable and reliable electricity and is currently the 3rd largest producer of electricity in the world and 4th largest in terms of installed RE capacity. The country is the 3rd largest consumer of electricity in the world with the single largest synchronous grid and is very close to achieving universal electricity access with 100 per cent household electrification. India is also ranked fourth in wind power and 5th in solar power as of 2018.

RE Installed Capacity, 2018 (GW)

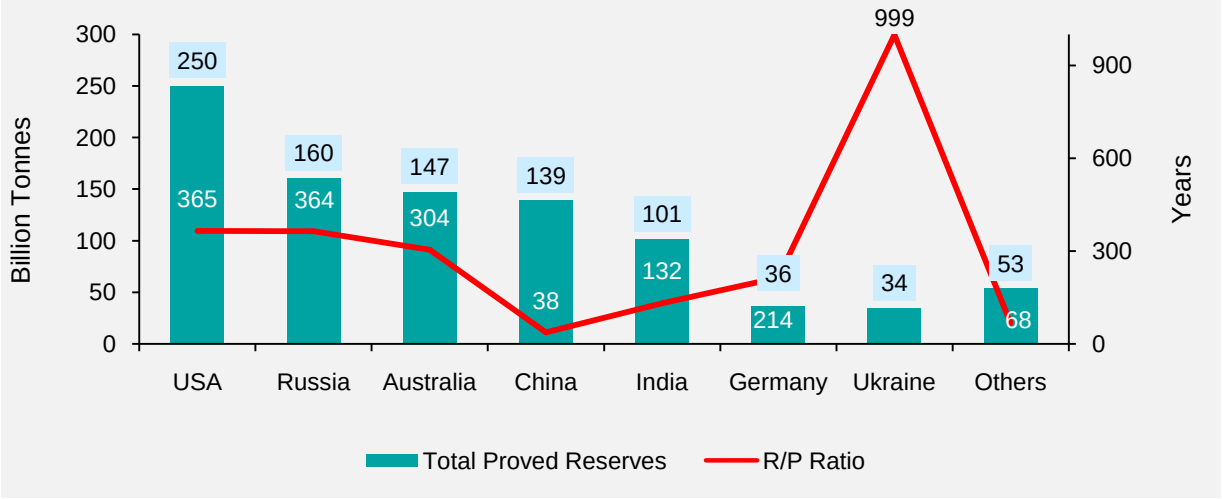


Source: *REN21*

Coal

India possesses one of the largest coal resources in the world. As per the BP Statistical Review of World Energy, 2019, India has the world's fifth largest coal (including lignite) proved reserves with ~10 per cent share (~101 billion tonnes)[2]. The reserve to production ratio (R/P ratio) is more than 100 years at the current production level[3].

World coal reserves, key country wise[4]



Source: *BP Statistical Review of World Energy, 2019*

[2] Source: BP Statistical Review of World Energy, 2019
[3] At the end of 2018
[4] Note: Others include, inter-alia, Indonesia (37 BT), South Africa (10 BT), Canada (7 BT); R/P for Others is weighted average for the constituting countries.

Indian coal sector has seen a significant transformation in the recent times i.e. from being severely coal deficit to having good coal availability over the past 3-5 years. Coal India Limited, the major coal PSU, has seen a CAGR of 6 per cent in the last 5 years and currently accounts for more than 80 per cent of the total supply share. Similarly, the Singareni Collieries Company Limited (SCCL) accounting for 9 per cent of the total supply has seen a CAGR of 5 per cent for same period. Considerable rise in domestic production has helped in sustaining imports at an average of 23 per cent of the overall demand over the last 5 years in spite of growing demand.

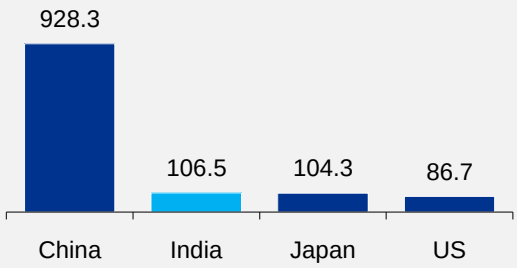
In addition to increased supply, the coal sector has seen various changes in coal allocation mechanisms. For instance, sector specific auctions ensured the competitive availability of coal for key sectors. Similarly, linkage auctions for long term supply of coal to non-regulated sectors has enabled consumers to procure coal from CIL and SCCL in a transparent manner. Further, quantity increase in short-medium term auctions (spot, exclusive, etc.) has ensured availability of coal for all sectors.

Mines

India produces 95 minerals currently– 4 fuel-related minerals, 10 metallic minerals, 23 non-metallic minerals, 3 atomic minerals and 55 minor minerals (including building and other minerals). India has a fair cost advantage in steel and alumina production. Further, its strategic location enables convenient exports to the fast-developing Asian markets.

In terms of iron ore production, India ranks fourth globally. Also, India became the world's second largest crude steel producer in 2018 with output 106.5 million tonnes. Further, as per estimates, India has the 7th largest bauxite reserves – approximately 2,909 million tonnes.

Crude Steel Production, 2018 (MT)



Source: *World Steel Association (worldsteel)*

Forest and Climate Change

As on date, the total forest cover (TFC) of India is 712,249 sq. km i.e. around 21.67 per cent of the total geographical area (TGA) of the country. TFC in India has increased by about 3 per cent as compared to 2011 whereas, globally, between 1990 and 2015, the world's forest areas have decreased from 31.6 per cent of the global land area to 30.6 per cent. Further, India has set a target of bringing 33 per cent of its geographical area under forest cover.

In terms of carbon emissions, India is among the best set of countries in terms of commitment to fight climate change. The country, under its Nationally Determined Contributions (NDC), has committed to reduce greenhouse gas emission intensity of its GDP by 33-35 per cent below 2005 levels by 2030.As per Climate Change Performance Index (CCPI) Results 2020, India for the first time ranks among the top ten in this year’s CCPI at number 9 compared to last year’s rank of 11.

A comparative performance of India with the world / major countries in respect of some of the important parameters covering the Resources sector is given below:

Performance with respect to Key Parameters: India vs World

Sl. No	Indicators	India	World
1	Exploration- finding cost of oil for barrel oil equivalent (boe) (rolling average for FY16, 17, 18)	$3.02(ONGC)	$2.25 ENI, $2.36 Chevron, $4.95 BP, $7.14 ExxonMobil, $8.55 Shell
2	Nelson Complexity Index -Refinery	6.5 to 13.7	7 to 14.1
3	Pipeline Utilization	87.9% (36 pipelines of IOCL)	71% (average of best 28 performers)
4	Per capita consumption of Polymers/Petrochemicals (in kg)	12	36 (USA – 90)
5	Ease of Doing Business – Getting Electricity	22nd position	USA 64th position (among 190 countries)
6	Aggregate technical and commercial losses (2014)	19.3%	8.2% (USA 5.9%)
7	Per Capital Electricity Consumption	1,181 KWH	2,674 KWH
8	Renewable Energy Generation as of 2018 (excluding Hydropower)	4th rank (78 GW)	Japan - 64 GW, USA -180 GW (Total -1,246 GW)
9	Recycling of metals – Aluminium packaged	25%	75% (world), almost 100% (Europe)
10	Forest Area (in 2016)	23.83% (increasing) - 24.6% (Forest & Tree Cover – 2019)	30.72% (decreasing)

2.3 What we aspire (Sector Vision)

The resources sector faces complex challenges, and is beginning to feel the composite impact of a wave of disruptions – rapid technology advances, changing consumer behavior, digital economy, changing energy scenario etc. With the rapid pace of disruption, resources sector requires focus on the following themes:

- **Sustainable:** Sustainability is now a global centerpiece of world's effort to tackle climate change and reduce GHG emissions. Given India's commitment to reduction in carbon emissions as per COP 21 targets, the resources group placed heavy emphasis on increasing natural gas consumption, improving energy efficiency and increasing RE capacity.
- **Make in India:** Make in India is a critical underlying theme, representing the new India with a comprehensive overhaul of processes and policies. Make in India would help in attracting capital and technological investment across the resources sector in India. Furthermore, it would boost the nation's GDP and create millions of jobs in the country.
- **Affordable:** Considering poverty and deprivation in India, access to energy for all at affordable prices is of utmost importance. The aim is to provide access to modern forms of energy including clean cooking fuel and electricity to all within a reasonable price point.
- **Ease of Doing Business (EoDB):** India has been steadily improving its ranking in Ease of Doing Business which signifies a more streamlined and transparent business environment. India's resources sector further needs an overhaul of infrastructure, to provide a much-needed fillip to the industry. Doing so, would require the action plan to be synergized with country's overall EoDB path so that foreign investments are attracted. Thus, ensuring the sector's alignment with a focus on EoDB would help

mobilize the necessary investments, bring in competition, technology etc. and hence would play a crucial role going forward.

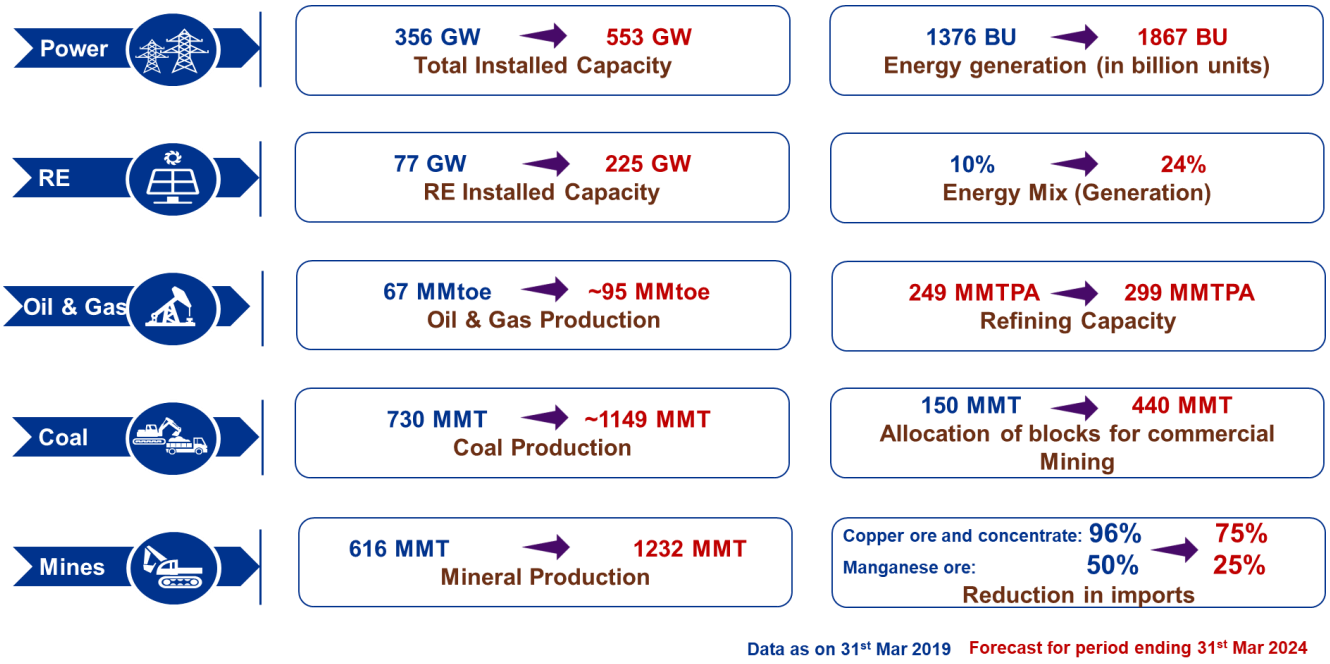
- **Technology and efficiency:** Investing in new technology would put the sector on a growth path by improving operations and resulting in reduced costs, increased safety and improved efficiency.The resources group recognized the need to invest in emerging technologies to reduce risks and increase productivity and efficiency.
- **Socio-economic empowerment:** Being a vast sector in itself, developments in resources sector directly influence the overall socio-economic growth in the economy. For instance, petroleum products have been an important direct contributor to growth in recent years by attracting large investments in refining/distribution, and also fueling economic activity. Therefore, given the criticality of the sector, socio-economic empowerment is a critical theme that the group considered.
- **Global influence:** Several technologies and macroeconomic disruptions are reshaping the resources sector. Therefore, there is an imperative for greater collaboration for energy security, transfer of technology, global benchmarking, adoption of international best practices etc.
- **Import substitution:** Improved energy security and reduced import dependence, is an important goal of the policy. The group recognized the aim of diversification of the sources of imports and increasing domestic production.

These themes led to the formulation of the integrated vision bythe resources groupas below:

“A sustainable, self-reliant, competitive, efficient and technologically advanced resources economy”

The overall vision has driven the thought process behind the plans of the individual ministries. Each Ministry has invested significant time and resources to develop specific strategic initiatives and action plans to work towards achievement of the resources vision. Ministries have also set targets for key parameters to be achieved by 2024, which

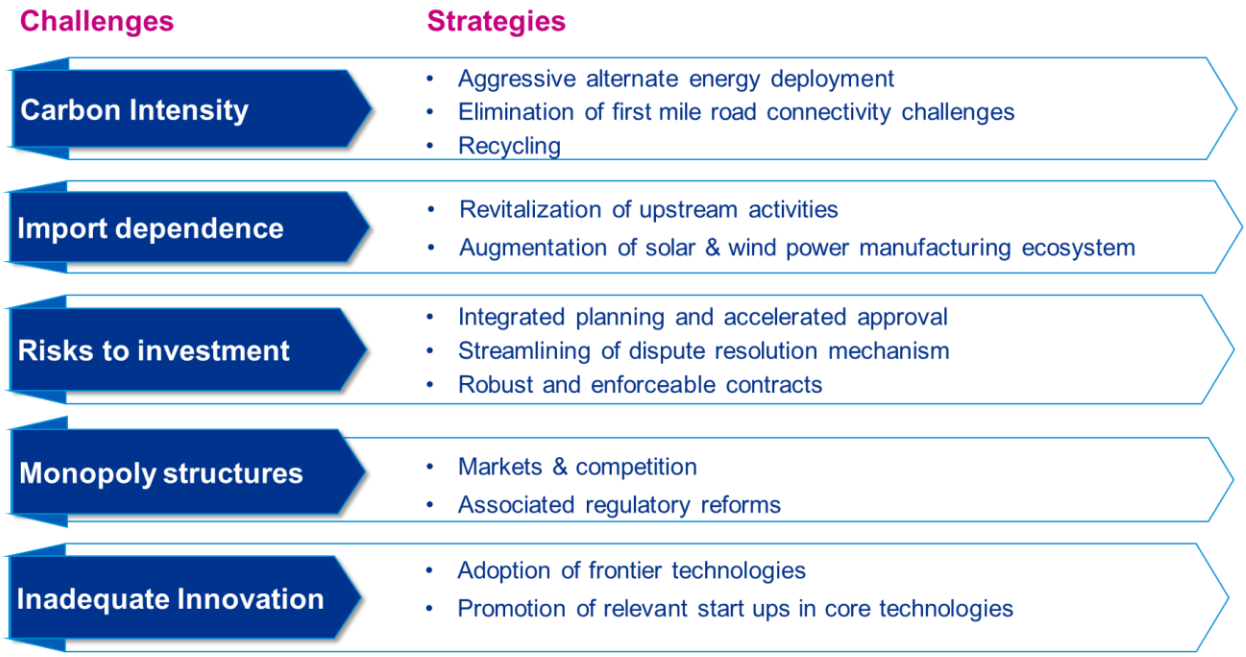
are to be monitored regularly. With joint efforts, and implementation of identified strategies the sector is expected to achieve great heights. The position as on 2019 and projections as on 2024 in respect of some major parameters of the Resources sector are given below:



2.4 Identification and Analysis of Sectoral Challenges

India's resources sector, comprising of oil and gas, power, renewable energy, coal, mines and forestwill have to overcome challenges that are being faced across the resources spectrum. The way forward for mitigating the challenges would require a cohesive approach especially for the cross-cutting issues. For example, issues with availability and RoU/ RoW of land remains a common and constant concern.Issues relating to contract enforcement pose yet another challenge.

Insofar as the specific challenges and strategies to address the challenges within the sector, the group prioritised the following:



1. **Carbon Intensity:** India is facing a dual challenge of driving growth albeit sustainably. The greenhouse gas emissions from resource intensive sectors remains a key concern. India has pledged to reduce its carbon emissions by 35% as part of its INDC's and that will essentially require a rethink of how resources sector is delivering value to the end consumer. Investments in carbon intense activities are becoming increasingly scarce and hence there is a need to address the challenges squarely to reduce carbon intensity in both supply and consumption of energy, and also promote recycling and reuse to ensure minimal waste.

2. **Import dependence:** India's import issues stem not only from the unavailability of adequate resources input in India but is rather a culmination of adequacy combined with management of existing available resources. The biggest hurdle being India's crude oil dependence which requires a rethink of the pathways to meet the growing energy demand through renewables, storage and EVs. The key component being the identification of such areas where the demand can be shifted and exploring sustainable ways to meet it. Import dependence affects development of local manufacturing ecosystem to support the investments, an area which would ultimately also drive the creation of jobs in the country. For example, in the case of renewables, while India develops its future growth path

through RE, attention also needs to be paid on our growing dependence on equipment imports, especially solar. In some cases, despite having the adequate capacity to meet the demand, imports are required which points to an issue of managing the resources economy/sector efficiently. Catering to this common challenge would also help mitigate other issues such as carbon emissions, investor ecosystem and others. While extended protection for domestic industry is not warranted, conditions need to be created to encourage domestic manufacturing provide a level playing field and ensure that such products are competitive.

3. **Risk to Investment:** Investor sentiment, in view of the ongoing changes with regards to policy/price regimes, seriously affect the capacity of the infrastructure sector to attract the required capital. There is a need for a comprehensive plan to ensure that investments made in the sector have reasonable visibility of utilization and longevity. Policy and regulatory risks also need to be reduced. The issues with regards to contract enforcement creates impediments for India's resources sector. Not only are such issues negative for the existing investors, but they also jeopardize the prospective investors who are contemplating investments in India. Such issues also reduce the bankability of resources projects, an outcome that militates the aim of rapid infrastructure creation through resources push in India.

4. **Monopoly structures:** Even as the country has made significant strides in advancing competition in the capital-intensive resources sector there is a prevalence of monopolistic structures. Over time such structures lead to price distortion and market dominance and ultimately affect economic and industrial development. The resource group considers it necessary to progressively unwind such structures and ensure that the input costs of resources for the economy at large is lowered to make end consumption more efficient and competitive.

5. **Inadequate innovation:** Even as India has extremely high-quality talent, innovation needs to be furthered to nurture and realise the immense potential that the country has.It is necessary to encourage the adoption of new and frontier technologies across the resources sector and make this as a means for

modernising the sector while bringing down costs and further new and innovative business applications.

2.5 Directions/observations of PM/Ministers during presentations before Council of Ministers and Action taken thereon

- The Sectoral Groups are to work as organic entities, rather than as assembled Groups.
- The Presentations and Group Reports should have a common narrative with a clear sectoral vision and should not look like aggregation of separate department-wise presentations/ reports.
- SGoS should come up with holistic blueprints for the development of the entire country.
- For every sector, challenges, opportunities and resource/ talent constraints need to be identified and policy prescriptions made accordingly. A time-bound action plan also needs to be incorporated in the presentations.
- Goals and targets should not be mere wish-lists - they must be accompanied with a clear implementing strategy/road map. Challenges, legislative road-blocks, financial constraints etc. need to be identified and strategies to address them formulated.
- Implementation of Vision Documents will span over several years. Additional Secretary/ Joint Secretary level officers may also be attached with the Groups for the sake of continuity.
- Feasibility of "Waste to Wealth" to be explored for every major intervention. "Waste to Wealth" to be made integral to our Planning process.
- Since many critical areas are in the domain of the State Governments, due thought be given to the concerns of the States, and policy prescriptions may be aligned to State policies to the extent possible.
- The Vision document should also address the capacity building and HR issues for achieving the Action Plan.

- Technological interventions, such as artificial intelligence, big data analytics, data mining, machine learning, space technology etc. may be explored to address challenges and roadblocks in innovative manner.
- Benchmarking our aspirations to global standards is critical. Forty global benchmarks identified need to be reviewed by Cabinet Secretary and Ministers.
- For the identified infrastructure projects to be financed from Rs. 100 lakh crore window announced by the FM, DPRs may be prepared expeditiously. It may also be examined as to how all these can be brought under one umbrella.
- Cost escalation and time overruns in project implementation are not acceptable. Acts/ Rules/ Tenders and other legal documents must be detailed and unambiguous leaving little scope for interpretation, and thus minimizing legal disputes/ arbitrations etc.
- Government must lead by example when it comes to "Make in India" Initiative. Government Departments should buy local products so long as they meet the requirements.
- Government Departments, organizations like the Railways, PSUs etc. should fully utilize the GeM portal for making their procurements.
- All Ministries to review Legislations passed during the previous session of Parliament and ensure that necessary action for framing Rules/ Regulations etc. is completed expeditiously.

*(**ATN**: There were several generic cross-cutting remarks made during the presentation to the Council of Ministers. Many of the various suggestions/ views/ comments/ inputs received have been duly taken note of and appropriately incorporated in the Vision Document. Further, there were several suggestions relating to Resource sector and individual Ministries within that sector. These will be duly acted upon by constituent Ministries of the Sectoral Group of Resources. Steps initiated have been reflected in the Vision Document).*

Group III - Resources

- **Observations/ Directions of the Ministers and Hon'ble PM**
  - PPP models (e.g. Infrastructure Investment Trust) for monetization of NHs may also be adopted for projects in other sectors like power transmission lines gas pipelines etc.*(**ATN:** In power transmission sector, Ministry of Power has already initiated asset monetization of around Rs. 7100 crores of transmission assets by identifying the select assets suitable for monetization through the InvIT route under SEBI regulations and are currently in the process of obtaining requisite approvals.)*
  - Gas pipelines may work as carrier for multiple service provider. Any company may use these pipelines by paying a rent to the parent company. (***ATN***: *GAIL gas pipeline capacity is now available for online booking by users for varying periods of the time)*
  - A comprehensive clean cooking movement may be launched nationwide. This need not be gas based necessarily, but also could be based on electricity/solar power technology solutions which need to be identified through a competition. However, such solutions should be in line with traditional cooking habits. (***ATN***: *Nationwide LPG coverage has been increased to 96.9% in December, 2019. Under PMUY, more than 8 crore LPG connections have been given to poor households. MNRE has also taken steps for promoting solar powered cook stoves to begin with Aspirational Districts)*
  - Promoting use of solar pumps may be taken up in mission-mode like the LED bulbs. While the approved financing pattern is 30% grant each by GoI and States, 30% as loan by beneficiaries & 10% as contribution from famers, it was clarified that the famers' contribution (10%) can also be contributed by willing State Governments as grant. Further, savings from efficient use of power would be adequate to finance the beneficiary loan component. Essentially this would have zero or very little impact on the budget of a farmer. (***ATN***: *The PM KUSUM scheme has been launched on August 2019 which will ensure solar pumps to farmers and solarization of grid-connected pumps)*

- Use of solar power for large cold storage may be explored, and private sector may be invited for technological solutions. MNRE to provide a detailed report to PM on the box-type cold storage facilities powered by solar power which have a capacity to store up to 200 Kgs of vegetables.*(**ATN:** National Institute for Solar Energy (NISE), an autonomous institute under this Ministry, has developed technology for setting up small solarised cold storages which can preserve 100 to 150 tonnes of vegetables and fruits for the use of farmers. A project is being developed to solarise large cold storages. NISE has also developed technology for setting up solar chilling plants for preservation of milk up to 1000 litres per day and solar dryers for drying of fruits and vegetables. MNRE has already initiated a programme to introduce these technologies in the country)*
- Installation of Solar Panels along the elevated embankments separating farming plots may be taken up in 20-25 villages in 3 to 4 States initially. The power produced could meet farmers' requirement and any surplus solar power may be bought by the State Government. (***ATN**: Sustainable Energy for Every District (SEED), an integrated resource initiative,suggested by SGoS and anchored by MNRE and MoP will tap solar energy).*
- All land related issues in development of solar power projects to be identified and brought up in PRAGATI. (***ATN**: Appropriate action will be taken by MNRE*)
- Railways to prepare a self-financing model of generating solar power using the vacant land along with the railway tracks *(**ATN:** A series of meetings have been held by MNRE with Chairman, Railway Board and Railway Authorities for identifying land available with railways for setting up of solar projects. Further, Railway Authorities will inform MNRE about their power requirement and availability of land)*
- All requirements for Hydrogen Mission to be identified and sent to PM within two days with copy to DST, and the Mission finalized expeditiously.*(**ATN:** A note has been submitted to Cabinet Secretariat by MNRE)*
- MNRE to make a detailed presentation before PM on the activities taken up by ISA and its impact on cost of solar power. International Solar Alliance (ISA) should take initiative and implement projects in ISA member countries and prove

its usefulness. A review of ISA should be arranged*(**ATN:** A presentation is being arranged by MNRE before the Hon'ble Prime Minister)*

- It should be examined whether crops rotting in cold storages/ godowns could be used for production of ethanol, along with farm residues.*(**ATN**: National Policy on Biofuels 2018 provides for development of new feedstock for biofuel as per the decision of National Biofuel Coordination Committee including surplus food grains, damaged / broken food grains, rotten potatoes, corn etc.)*

- **Other Observations/ Suggestions**
  - It may be considered whether Metal Recycling zones could be set up on barren lands especially in Rajasthan. *(**ATN:** In the proposed draft of Metal Recycling Policy, zones for collection, segregation and treatment facilities have been suggested. The observation has been addressed in the draft policy.)*
  - Use of barren and uncultivable land along the border areas for setting-up of RE parks. *(**ATN:**MNRE has already held meetings with State Governments of Rajasthan, Gujarat and defence authorities including Army, Air Force and Navy for setting up of RE parks in border areas. While Air Force has already given no objection for setting up of RE park in Khavada (Gujarat), clearance from Army authorities is awaited. In Rajasthan, land for setting up of such parks has been identified and necessary clearance from Air Force and Army authorities are being obtained).*
  - District-wise target may be set up for waste to energy generation. Use of locally generated energy may be explored for use in public transportation. (***ATN**: The Sustainable Energy for Every District (SEED), an integrated resource initiative suggested by SGoS, seeks to tap the locally available energy resources including biomass. The Sustainable Alternative towards Affordable Transportation (SATAT)scheme of the MoPNG aims to produce Compressed Biogas (CBG) from biomass)*
  - Best and optimum use of energy mix maybe explored – we should move towards greater use of electricity including for cooking purposes.
  - Possibility of energy generation from traditional materials may be examined, for instance, cow-dung may be used for producing cooking gas.*(**ATN:** MoP has initiated pilot project for using agro-residue including crop stubbles as fuel in*

thermal power plants). The Sustainable Alternative towards Affordable Transportation (SATAT) of the MoPNG aims to produce compressed biogas (CBG) from biomass).

- Investment needs to be incentivized for exploration of oil/ gas reserve in Assam Arakan Basin. (***ATN***: *A series of transformational policy reforms have been brought in the exploration sector in the last five and a half years. In category II and III basins, exploration regime has been further liberalised by dispensing with production and revenue sharing arrangements.This is expected to promote exploration, bring investment and incentivize production)*
- In the long run, a unified Ministry for energy governance may be considered. (***ATN****: NITI Aayog is looking into the issue*).
- New technologies have opened up possibility of cost-effective coal gasification - adoption of such technologies may be encouraged. (***ATN****: Coal gasification proposal is under implementation in Talcher Fertiliser Plant. A technology neutral coal gasification policy will be finalized by Ministry of Coal within six months*).
- FDI in coal mining has declined in recent years. Policy measures may be taken to reverse this trend as FDI also helps in bringing in new technologies.***(ATN****: several initiatives have been taken by MoC including commercial mining, no end-use restriction, revenue sharing regime etc.).*
- All avenues for diversification of agriculture to be explored - farm residues and crops rotting in godowns may be used in energy production.***(ATN****: National Policy on Biofuels 2018 provides for development of new feedstock for biofuel including surplus food grains, damaged / broken food grains, rotten potatoes, corn etc. The Sustainable Alternative towards Affordable Transportation (SATAT) of the MoPNG aims to produce compressed biogas (CBG) from biomass).*
- Crop diversification from traditional crops to remunerative energy crops may be considered. Possibility of production of hydrogen from biomass also may be examined.***(ATN****: A Hydrogen Mission proposal has been sent by MNRE to Cabinet Secretariat).*

- Competitions may be organized whenever necessary and start-ups may be encouraged to develop technology solutions to generate energy from waste.***(ATN**: Many CPSEs have allocated funds for promoting start-ups.)*
- Food Processing Industries may work with MNRE to utilize industry residues for energy generation.
- Huge tracks of land are used for salt production in coastal areas, part of which may be used for solar power generation.***(ATN**: Necessary action is being taken by MNRE).*
- Installation of solar panels on the banks of rivers and canals and in Government offices /residences should be considered.*(**ATN:**MNRE has already written to all Ministries/Departments of Government of India and State Governments for solarising Government buildings. A Cabinet Note has been circulated for seeking the mandate of the Cabinet for solarisation of all buildings under Government of India by March 2022)*
- The potential forwind-solarhybrid systems forenergy generation may be explored.***(ATN**: Action being taken by MNRE).*
- Assess skill development requirements considering 2024 targets and run programmes for the same. *(**ATN**: Requirements assessed. Plans made for skill development)*
- Ministry should take up necessary steps for catalysing rooftop solar programme. *(**ATN**: MNRE has held dialogue with various State Governments and State DISCOMs for introducing gross metering, allowing maximum capacity for rooftop projects in order to ensure effective implementation of rooftop programme. DISCOMs have been made the nodal agencies for implementing the programme.)*

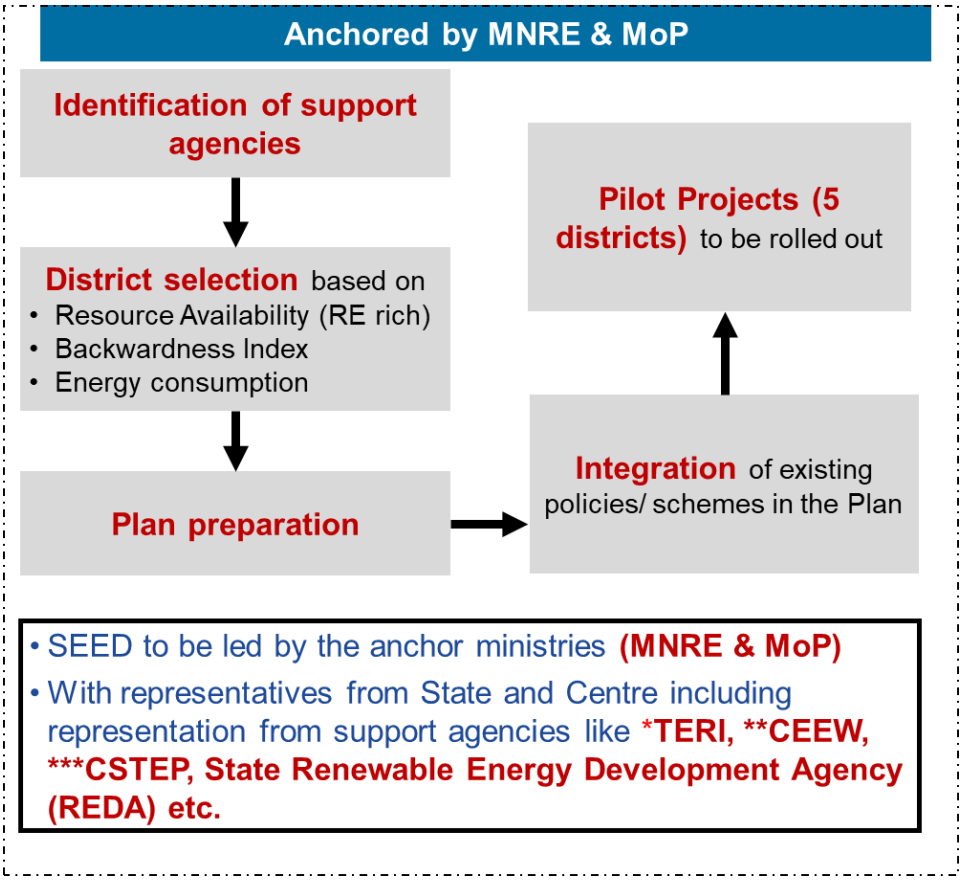
2.6 Roadmap to achieve the Sectoral Vision with timelines and milestones

Within the overall vision and the challenges in realizing the vision, the individual ministries have drawn up specific plans and roadmaps.These are elucidated in the subsequent chapters of this report.Even as those would form the bulwark of the actions emanating from the vision there is also a need to look at the resources sector

as a whole and identify programs that have deep impact and serve common goals of the entire resources sector. The**'*Sustainable Energy for Every District'***or SEED program has been conceived as such a cross-cutting high impact initiative. This programme is designed such that renewable energy resources available in the District are optimally utilized and entrepreneurship is duly encouraged. The programme would be planned in a phase wise manner with the key steps mentioned below:

- Potential mapping of ~50 districts in Phase 1
- Integrated plan for districts to incorporate:
    - Sustainable resource/ energy utilization goals focusing on local resource availability
    - Sustainable energy plan for identified districts based on broad guidelines
    - Assistance to entrepreneurs for technologies suited for the region(Waste to Wealth, Solar, Small Hydro, etc.)
    - Integrated skills development program
    - Finance access based on pre-set approval criteria
    - Pilot projects to validate concept before large scale roll out

The key Ministries to anchor the programme would be MNRE and MoP as demonstratedbelow:



A detailed roadmap for implementation of the SEED program needs to be drawn up by MNRE in consultation with Ministry of Power toarticulate specific goals, specific targets and their phasing, provide implementation timelines and responsibilities, define the success metrics and set up a robust governance/administrative mechanism to take the initiative forward in a time-bound manner.

Section III–Ministry/ Department Specific Vision

3. Ministry/ Department specific

3.1 Ministry of Petroleum and Natural Gas

3.1.1 Vision of the Ministry

The vision of Ministry of Petroleum and Natural Gas (MoPNG) is:

"To provide universal access to affordable, clean and reliable energy, enhance domestic production of crude oil and natural gas, increase efficiency of operation, substantially augment hydrocarbon infrastructure to address India's energy security and sustainability needs"

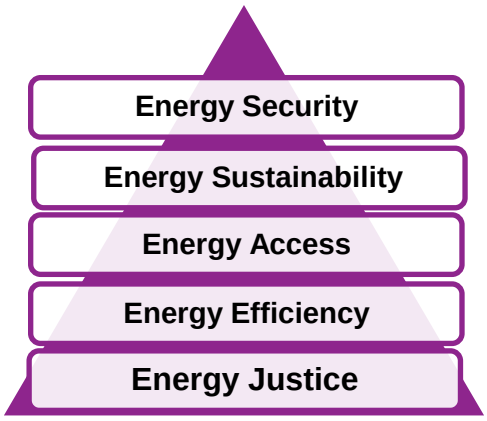
3.1.2 How vision of the Ministry is aligned with the sectoral vision

India is home to one sixth of world population and has experienced a rapid economic growth path in the last decade. There is a direct correlation between GDP and energy consumption of a nation. India's per capita primary energy consumption was still around one third (0.596 tonnes of oil equivalent) as compared to world's average per capita energy consumption (1.810 tonnes of oil equivalent)[5] during 2018. Despite being third largest energy consumer in the world after China and US, it accounts for only about 5.8% of the world's primary energy consumption during 2018[6]. India's primary energy demand registered a robust increase of 7.9% during 2018 and is expected to grow in near future[7]. Therefore, the way energy is harnessed, produced and consumed requires a paradigm shift towards sustainable development.

As per a recent study by Federation of Indian Petroleum Industry (FIPI), oil and gas sector have huge positive impact on the Indian economy. The study indicated that for FY18, every one crore investment in the oil and gas sector led to a total output and household income expansion worth Rs 2.58 crore and Rs 0.45 crores respectively. The study also highlighted that there exist strong inter-linkages between oil and gas sector

[5]BP's Statistical Review 2018 (Unit: 1 toe=42 GJ)
[6]BP's Statistical Review 2018
[7]As per BP estimates

and the economy, highlighting the need for domestic investment which is bound to have positive impact on the overall GDP. Additionally, expenditure on domestic investment vis-à-vis imports positively impacts the GDP growth of the economy and helps in job creation. Therefore, sufficient investments across transportation, processing and storage and distribution of hydrocarbons (crude oil, natural gas and finished petroleum products) is another focus area for the Ministry.



Five Pillars of India's Future Energy

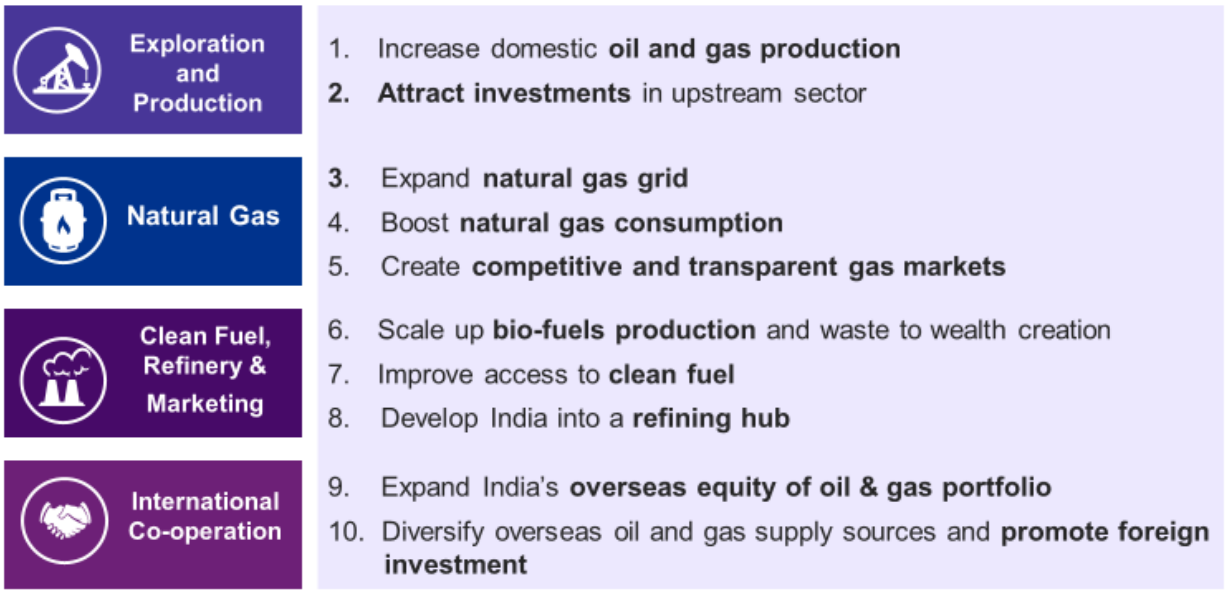
The Indian oil and gas sector present many challenges but also has tremendous opportunities. In the last five years, the Government has undertaken various reforms to address the concerns of Indian oil and gas stakeholders in various aspects of policy, regulation, operation, cost and technology.These reforms have also leaped in delivering energy to the poorest of the poor by adopting the five pillars visualized by Hon'ble Prime Minister i.e.,energy security, energysustainability, energy access, energy efficiency and energy justiceas our guiding principles.

Keeping in mind the above factors, the following overarching goals of the petroleum sector are envisaged:

- **Enhance production of oil and gas and attract investment**
- **Shifting towards gas-based economy**
- **Provide universal access to clean fuel and scale up biofuels production**
- **Strengthening energy security also through International Cooperation**

3.1.3 Recommendations to be implemented by the Ministry, with timelines and milestones

The overarching goals are used as guiding principles and supplemented by additional goals specific to each sub sector to achieve the overall vision for the sector. These sub-sector goals are summarized as follows:



a. Exploration and Production

India's oil import dependence has risen from 80.6 per cent in 2015-16 to 83.7 per cent in 2018-19 mostly due to increase in consumption and stagnation of domestic output. The Government during the last five and a half years has launched several policy initiatives, pricing and regulatory reforms and has invested in acquiring seismic data in frontier areas to facilitate easy selection of blocks for exploration and appraisal (E&A). This has set the stage for garnering greenfield investments that will directly impact the long-term goal of cutting India's import dependence on oil and gas. The growth of exploration and production of hydrocarbons sector is largely hinged upon the efforts of the Government to showcase this sector as a winner in providing value to investors as well as in reducing the investment risk in exploration in India. Along with these efforts, seeking inputs from industry stakeholders in framing policies and amending regulations can bolster the growth of this sector to a large extent.

The prime strategic initiatives to provide a boost to the activities in this sector have been identified that further provide the actionable way forward aligned to these initiatives.

1) **Increase the domestic oil and gas production:** The Government has launched a myriad of policy reforms to increase domestic oil and gas production which includes incentivizing production enhancement, fast track monetization of un-monetized fields, extension of PSCs, etc. The domestic production of oil and gas can be increased by expediting development of discovered fields, by increasing recovery from existing fields, by developing unconventional resources and by establishing a gas-based infrastructure in order to provide options for monetizing gas wells and minimizing flaring of associated gas. However, focusing on nomination blocks that constitute the bulk of production, by providing appropriate incentives for reviving and enhancing production from difficult fields, is imperative.Following are the action items identified in order to increase domestic oil and gas production:

    i. ***Accelerate award of new exploration acreages:*** The Government has launched various policy reforms like OALP and DSF, and has started providing attractive benefits to operators for conducting exploration activities, like conversion of Reconnaissance contract to Petroleum Operations contract, exclusive exploration rights for the whole retained area under Petroleum Operations contract for the entire license period and exploration of all categories of hydrocarbons under a single license. However, exploration drilling has plummeted in the recent years which is also attributable to low crude oil prices. Therefore, activities to attract investment in the exploration of hydrocarbons by presenting a comprehensive picture of available opportunities shall be of foremost priority. The award process of new blocks should be done in a timely manner by allowing a hustle-free approval process for obtaining licenses and clearances as well as through timely launch of bidding rounds. The contractual timelines for achieving exploration work program shall be strictly monitored and operators achieving their exploration work program earlier than required shall be incentivized in monetary terms.

    ii. ***Development of non-monetized discoveries:***Discovered Small Fields (DSF) Policy was launched by the Government in 2015 for early monetization of marginal

fields and un-monetized discoveries of National Oil Companies (NoCs). In order for the bidding rounds to be successful, a high participation shall be ensured by clearly demonstrating the business value to be achieved as an outcome of the project. Flexible exit opportunities may be provided to investors in order to minimize the risk and make such projects more attractive.

2) **Attract investments in upstream sector:** The exploration and production sectorexperience a rigorous due diligence to qualify for investment with significant emphasis placed upon the policy reforms, regulatory environment and technology advancements in the target country. Although India has been consistently improving in the Global Innovation Index (ranking improved from 81st in 2015 to 57th in 2018)and has been among the top 10 improvers in policy reforms[8]**,** it still lags behind on the Enforcing Contracts Index of World Bank standing at 163rd position among 190 countries.

In order to fall within the risk tolerance of potential investors, the challenge of easing the complex regulatory regime needs to be addressed by embedding technological advancement leveraging the **Digital India** initiative. With the advent of digital tools like digital signatures and shared services technology, the timelines for approvals and grant of licenses and clearances should be brought at par with global standards.

MoPNG is drivingmassive hydrocarbon infrastructure creation in the country across upstream, pipelines, CGD LNG terminal, refineries etc. and about USD 130 billion of investments are planned during the five-year period.

b. Natural Gas

Given its clean attribute, natural gas is the next generation fossil fuel which will play a critical role in India's transition towards a low carbon clean fuel-based economy. Hence, Natural gas can not only help India in cherishing its ecological goals and making transitions to clean alternatives but would also play a critical role in mitigating security risk and cost burden. Therefore, the following key strategic initiatives have been identified to support the development of natural gas sector in the country:

1) **Expand the natural gas grid:** Pipeline transportation and retail distribution is critical pre-requisite for development of deeper gas markets. However, gas infrastructure in

[8] World Bank's Doing Business 2019 Report

India has remained limited to select few regions. Despite receiving EOIs and authorizations for new gas pipelines in many states, construction is not taking off as planned.This indicates a need for support from Government to underpin the growth of sector:

i. **Expedite completion of National Gas Grid and CGD projects:** Government of India recently awarded more than 100 Geographical areas across CGD bid round 9 and 10. As per the commitment made by various entities, around 4 crore PNG (domestic) connections and over 7,000 CNG stations are expected to be installed in the next eight years across the country. There has been an expansion of CGD coverage from 34 Geographical Areas (GAs) spread over 66 districts in May, 2014 to 232 GAs spread over 407 districts till January, 2020 with a potential to cover 53% of country's area and 70% of country's population. However, in order to ensure successful implementation of CGD projects, Government will facilitate ease of doing business and provide support in terms of assistance in getting timely clearances/approvals including ROU, Environmental clearance, etc.

ii. **Rationalize pipeline tariffs:** As per the current regulations, the transportation tariffs are determined and recovered from shippers based on a zonal postalized mechanism. Each zone is a length of three hundred kilometres along the route of the natural gas pipeline from the point of origin. Tariffs are recovered from shippers depending on the zones in which they are located. Further, the zones are determined based on the contractual flow of gas. This framework of zonal tariff cause wide disparity in pipeline tariffs particularly for the buyers located at far distant from the point of supply. Considering the pancaking of tariffs that exists due to existing zonal method, there is a need to look at rationalizing the pipeline tariff regime. This will not only ensure efficient delivery of gas but will also ensure fair incentives for setting up new pipelines.

2) **Boost natural gas consumption:** Faster adoption of natural gas would require an enabling ecosystem and a slew of measures to improve the availability and accessibility of natural gas to make it a fuel of choice by wide range of end-users. The following actions would help in accelerating the consumption of natural gas in the country:

i. **Undertake new CGD Bid Rounds to cover additional districts:** Creation of a robust CGD infrastructure would not only play a significant role in achieving the shift towards a gas-based economy, with natural gas as the next-generation, cheaper and environmentally friendly fossil fuel but would also help bring last mile energy access to households, especially women who are currently dependent on fuels such as cow dung, crop residue, twigs and fuelwood for cooking and other household activities. Additionally, expansion of CGD network would also result into job creations for low and mid-level technicians. Therefore, the Government will further aim at expanding the CGD network in additional districts by undertaking new CGD bid rounds.

ii. **Expand access to PNG and CNG:** Easy access to fuel for any industry / commercial establishment / households is essential to conduct their basic operations and daily activities. Furthermore, access to cleaner cooking fuel, PNG, lead to significant improvements in health, especially of women, and hence enhancement of their livelihood. Similarly, expansion of CNG market with people switching to Compressed Natural Gas (CNG) for transportation, would lead to lower carbon emissions. Therefore, the Government shall ensure PNG and CNG access by facilitating Ease of Doing Business by simplifying business practices and making them easier and customer oriented. The Government shall also encourage digital initiatives including real time meter reading and bill generation, online complaint submission and prompt disposal mechanism etc. to endorse ease of access and usage.

3) **Create competitive and transparent gas markets:** As a starting point for the market to develop, it is necessary to build a conducive environment for making natural gas an attractive investment destination for E&P players and a fuel of choice for consumers. The key attributes of such market are adequate network capacity, non-discriminatory open access to infrastructure, data transparency etc.In order to ensure a competitive and transparent gas market in India following action items have been identified:

i. **Set up gas trading hub/exchange:** To expand the share of natural gas in the overall energy basket, there is a need to provide users, service providers and investors with adequate confidence in market access framework. Above all, the

users and suppliers must see lower risks in participating in the market and enjoy greater flexibility. This is not supportedby the current dominant long-termarrangements in the gas market and the back to back nature of every gas transaction that causes the costs and the risks to pile up. Hence, there is a need for freeing up the markets and getting greater competition to play by setting up a gas trading hub/exchange in the country. A gas trading hub would not only encourage competition in supply but will also improve market access and flexibility for end-users and will facilitate fair price discovery and signalling through transparent market mechanisms.

ii. **Establish Independent Transport System Operator (TSO):** Currently in India, the pipeline grid is operated by multiple entities. Further, there are no provision for a unified national pipeline system operator for seamless access. As a consequence, the shippers are required to transact with multiple operators for enabling transportation. Such a system of business operations prohibit seamless transportation of gas to customers and also increases the cost. Therefore, the Government shall look into setting up an independent transport system operator, to begin with as subsidiary and an independent body after about 3 years.

c. Clean fuel, Refining and Marketing

With increasing energy demand, there is a need for Government of India to play a proactive role in improving the efficiency of the refining and marketing sector to ensure energy accessibility to millions of Indian consumers and hence improve ease of living

1) **Scale up bio-fuels production and waste to wealth creation:** Biofuels in India offer great opportunity to integrate with the ambitious targets of increasing farmer's income, import reduction, **employment generation** and **waste monetization**. Moreover, it is also a strategic step towards Government's ambitions towards energy security in the country. Biofuels programme in India has been largely impacted due to the sustained and quantum non-availability of domestic feedstock for biofuel production which needs to be addressed.

   i. **Invest into 2G ethanol capacity:** Bio-fuels seek to provide energy security in an environmentally friendly and sustainable manner by supplementing conventional energy resources, reducing dependence on imported fossil fuels and meeting the

energy needs of India's vast rural population by use of non-food feedstocks. The action plan involves addressing ethanol distillation capacity constraints and ethanol storage constraints at OMC depots. Additionally, reinforcement of ongoing ethanol supplies by increasing domestic production, setting up of 2G bio refineries and developing new technologies for conversion to biofuels are critical initiatives.

2) **Expedite implementation of SATAT initiative:** There is an untapped potential of 62 MMT of compressed bio-gas production that can be generated from the vast amounts of annual Municipal Solid Waste, biomass residue that gets accumulated across the nation. In this backdrop, a new initiative named Sustainable Alternative Towards Affordable Transportation (SATAT) was launched on 1st October 2018. SATAT initiative envisages for establishment of 5,000 CBG plants across the country with an estimated production of 15 MMT CBG per annum by 2023. To expedite the implementation of SATAT, entrepreneurs must be encouraged to setup CBG plants and supply CBG to OMCs. In view of decarbonization it should be ensured that entrepreneurs who will be setting up CBG plants should get hassle-free and timely statutory clearances and approvals as well as access to credit so that the target can be achieved in next 5 years.

3) **Improve access to clean fuel:** In line with reducing carbon emission and assisting in improving ease of living, Government of India is determined to sustain the success of the flagship initiative **Pradhan Mantri Ujjwala Yojana (PMUY)**by promoting 5-kg refills, offering swap facilities, awareness creation, introduction of services through common service centres, setting up large number of distribution agencies especially in rural areas etc.

4) In addition, the government has also launched City Gas distribution (CGD) bidding rounds aggressively to ensure accessibility of clean fuel in the form of Compressed Natural Gas (CNG) and Piped Natural Gas (PNG) across India to realize the vision of making **India a gas-based economy**.Therefore, in view of providing clean fuel, following strategies have been identified:

    i. **Scale up marketing network:** Strengthening of supply chain network is critical to cater to the fuel demand. For this, the Government of India should ensure commissioning of adequate number of LPG distributorship and CNG stations. This will assist in achieving the objective of easy access to clean energy. Further, with

increase in fuel demand and new Retail Outlets commissioning, there will be a need of an efficient logistics network and sufficient number of terminals for supply of petroleum products to the retail outlets. As on April 2019, there are 293 OMC terminal / depots in the country and OMCs are planning to commission 31 new terminals/depots in the next five years which will require effective and efficient project management and timely statutory clearances. Government of India has also recently liberalized policies enabling entry of private entities in retail fuel sector.

ii. **Ensure availability of BS-VI compliant fuel:** In view of reducing carbon emission government decided to leapfrog directly from BS-IV to BS-VI emission norms in the country w.e.f. 1st April, 2020. However, due to increasing pollution level in Delhi, Government has started supply of BS-VI in NCT Delhi w.e.f. 1st April 2018. Large number of districts in National Capital Region are also being currently supplied with BS-VI fuel. Government of India will ensure 100 per cent national coverage of supply of BS-VI complaint fuel w.e.f. 1st April, 2020, which requires increasing the production and ensuring timely commissioning of projects which are under pipeline.

5) Develop India into refining hub: Currently India refines more oil than the domestic requirement and has been a net exporter. Therefore, Government is seeking to develop the country as a refinery hub which will not only generate employmentbut alsoassist the country in earning foreign exchange thereby reducing burden on the economy.

i. **Increase the refinery capacity:** In order to become a global refinery hub and to meet growing demand for petroleum fuels, there is a need to expedite the implementation of capacity addition with effective and efficient project management. Currently there are 13 confirmed brownfield expansions of refinery which are expected to be commissioned in next 5-6 years. Streamlining approvals and providing statutory clearances on time, will ensure infrastructure development of target capacity addition, which will not only cater to the domestic demand but will also increase the export of petroleum products which will ultimately play a significant role in improving GDP growth.

ii. **Boost ethanol procurement for blending:**The Ethanol Blending Programme (EBP) seeks to achieve blending of Ethanol with motor sprit with a view to reduce pollution, improve farmers income, substitute import and conserve foreign exchange and increase value addition in the sugar industry. Further, to make this programme a success, Government has taken key steps to streamline ethanol supply chain, introduced remunerative ex-depot price for ethanol, enabled easier access to credit, added new feedstock for production of ethanol and reduced GST on ethanol being supplied to OMCs.

d. International Co-operation

With the rising energy needs of India, strategic and business partnerships with the International community can play a pivotal role in moving towards energy security. The ramping up of domestic activities in the oil and gas sector needs science and technological developments to go hand-in-hand with operational, transactional and policy implementation. This implies that dedicated R&D partnerships, technology transfer, information exchange with energy mature nations and specialized skill set development for this sector shall be set up aligned with the long-term goals in this sector. Some of the actions that need to be implemented in order to further strengthen the ecosystem for India's international and engagement are as follows:

1) **Expansion of India's overseas equity oil and gas portfolio:** Presently, India's exposure to foreign oil and gas assets is through the National Oil Companies (NoCs) like ONGC (through OVL), OIL, IOCL and BPCL with stakes in exploration assets, producing assets as well as pipeline projects. This includes not only financial exposure but also operational exposure. Prioritization of type of exposure, the category of assets being acquired, and the size of exposure shall be carried out by establishing a well-defined framework for managing operational and financial risks. India's equity oil and gas from overseas assets shall be phased up in order to reduce India's reliance on imported crude oil and natural gas as well as to provide markets for the fast-developing downstream infrastructure in India. In addition to this, top performing assets shall be identified and investments in those shall be phased up based on a pre-defined investment schedule.

2) **Diversification of overseas oil and gas supply sources:** India is considered as a promising market for LNG and crude oil. India, being the third largest consumer of oil in

the world, has significant buyer power that can be leveraged to establish international influence in the global oil and gas procurement markets. In addition, huge opportunities in the infrastructure development for gas transportation and marketing have come up with the successful completion of two rounds of City Gas Distribution within the span of a year.This has given India the prerogative to select the countries for procurement of oil and gas with favourable terms and providing those countries investment opportunities in the fast progressing Indian market.

i. **Addition of new nations to the supplying portfolio:** Reliance on limited sources, like the OPEC countries, may put India at supply risk in case of geopolitical turmoil. India's high hydrocarbon demand presents a promising opportunity to oil and gas rich nations to gain market share in India's imports. This gives India the opportunity to leverage this position and set-up imports with multiple countries to meet India's hydrocarbon demand. Identification of new nations for sourcing crude oil and LNG, setting up of Strategic Energy Partnerships with identified avenues and negotiating terms of these sourcing partnerships towards strengthening the energy future of India will lead a long-way in implementing a full-fledged diversification strategy of oil and gas procurement from overseas.

These goals will be translated into schemes with on-ground results that will be monitored through a key performance indicators (KPI) matrix. The initiatives and action plans that will be undertaken to achieve these strategic goals have been detailed in the table below:

Action Plan

Goals (What)	Actions/ Initiatives (How)	Timeline/Target (When)
I. Increase domestic oil and gas production	1. Increase in production of Oil & Gas	Oil & Gas production to increase from 67.08 to **94.59 MToE** by 2024
	2. Accelerate award of new exploration acreages	Award **2,50,000 SKM** by 2024
	3. Development of non-monetized discoveries	Develop**101** Discoveries by 2024

Goals (What)	Actions/ Initiatives (How)	Timeline/Target (When)
II. Attract investments	1. Driving Hydrocarbon infrastructure – Upstream investments, Pipelines, CGD, LNG terminals, Refining etc.	About USD130 Billion by 2024
III. Scale up bio-fuels production and waste to wealth creation	1. Invest into 2G ethanol capacity	Investment of Rs13,955 crore by 2024
	2. Expedite implementation of SATAT initiative	5,000Letter of Intents for CBG plants
IV. Improve access to clean fuel	1. Scale up marketing network	Additional78,000 ROs already advertised
	2. Ensure availability of BS-VI compliant fuel	100%States w.e.f. 1/1/2020
V. Develop India into a refining hub	1. Increase the refinery capacity	Refining capacity to increase from 249.4 to 299.15 MMTPA by 2024
	2. Boost ethanol procurement for blending	450 crore litre by 2021-22 for 10% blending
VI. Expand natural gas grid	1. Expedite completion of National Gas Grid and CGD projects	Gas pipelines from 16,232 km to 26,924 km
	2. Rationalization of pipeline tariff	Implementation by2020
VII. Boost natural gas consumption	1. Undertake new CGD Bid Round to cover additional districts	2 more rounds by 2022
	2. Expand access to PNG and CNG	• No. of PNG Connections from 50 lakhs to 1.5 crore • No of CNG stations from 1,750 to 5,000
VIII. Create competitive and transparent gas markets	1. Set-up gas trading hub	Implementation by2021
	2. Establish a transport system operator, to begin with as subsidiary and an independent body after about 3 years	Implementation by2021
IX. Expand India's overseas equity oil &	1. Increase CAPEX in overseas assets	Rs. 61,059 crore over 2019-2024

Goals (What)	Actions/ Initiatives (How)	Timeline/Target (When)
gas portfolio	2. Addition to overseas equity oil and gas assets	101.34 MMToEover 2019-2024
X. Diversify overseas oil & gas supply sources	1. Addition of new nations to the supplying portfolio	4 new nations by 2024

3.2 Ministry of Power

3.2.1 Vision of the Ministry

The vision of Ministry of Power is:

"A financially viable and environmentally sustainable power sector furthering energy security and providing reliable 24x7 quality power"

3.2.2 How vision of the Ministry is aligned with the sectoral vision

Availability of reliable electricity is a key enabler for growth. The country has taken large strides in these areas and is currently the 3rdlargest producer of electricity in the world and the 5thlargest in terms of RE capacity. The country is the 3rdlargest consumer of electricity in the world and has the single largest synchronous grid with 100 per cent village electrification.

There is a direct correlation between GDP and electricity consumption of a nation. India's per capita electricity consumptions is still lower at 50 per cent of global average. This picture is evolving with economic advancement of the recent years relative to global trends.Further, India has made massive strides in energy efficiency, which has contained wasteful consumption and has set the stage for greater and sustained gains in this area in the future.However, it is essential that the country expands its resource base in energy provision to meet with the growth aspirations.India's primary energy consumption is set to grow in the coming decades with increase in population and per capita income. In absolute terms, it means that India's share of global primary energy demand would also increase substantially.

Much of this demand will be in the form of electrical energy as society moves rapidly towards electrical power consumption in various applications as a principal means of energy use. Industrial manufacturing, transport and household consumption would account for a bulk of the growth and would require all round action in the areas of sustainable grid scale and distributed generation, network infrastructure, efficiency measures in production and use of energy and robust management of the energy system. Further, India already has the largest synchronously operating power system in

the world. Managing the large and complex energy system of the country would require a move away from the traditional “command and control” structure in favour of a more market-based approach.

The Indian power sector presents many challenges but also tremendous opportunities with the largest integrated grid and one of the largest renewable energy production bases.The new India wants to do it in a sustainable and equitable manner carrying every section of society along. There is new confidence that this can, and indeed must, be done.

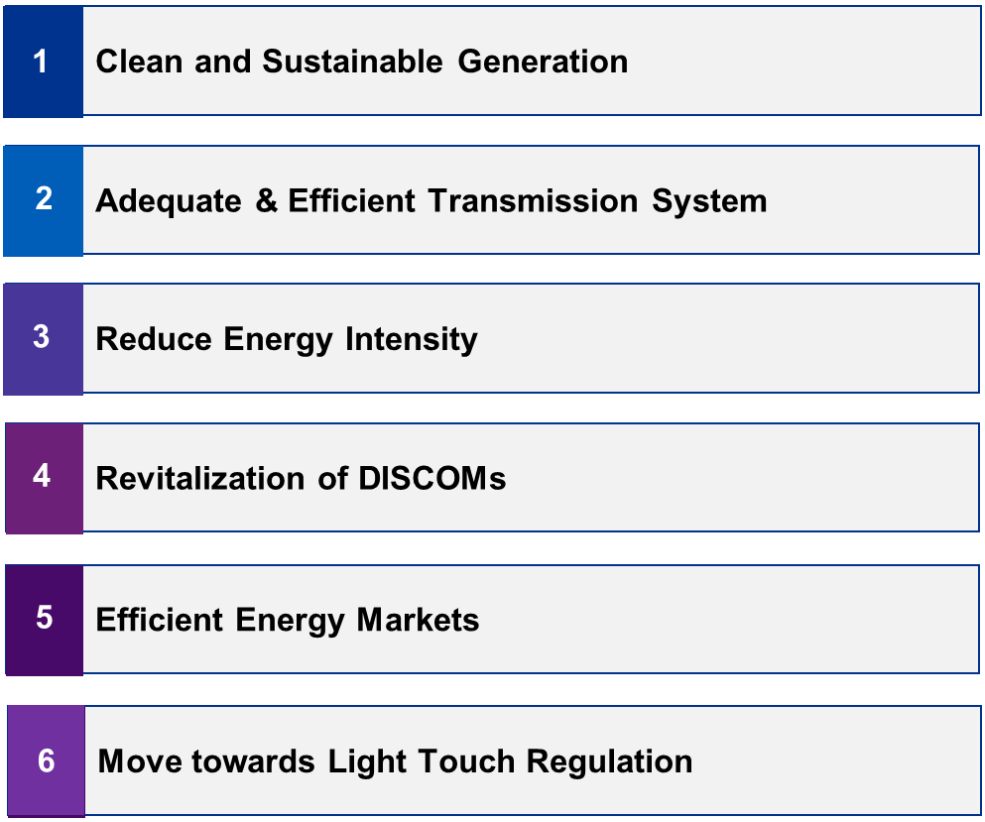
The changes in the operating environment in the power sector presents the opportunity to at once address the problems of the past while leapfrogging into the future.The vision is a key initiative in this direction and translates it into specific goals. It recognizes that change is possible and must address the following imperatives to achieve the overall sectoral vision of the Resources Group.

Keeping in mind the Resources Group Vision, the following overarching goals are envisaged for the sector:

- **Optimal resource mix for Sustainability and Energy Security**
- **Financial Viability across the value chain**
- **Efficient, Transparent and Competitive Mechanisms – Consumer Satisfaction**

3.2.3 Recommendations to be implemented by the Ministry, with timelines and milestones

The overarching goals are used as guiding principles & supplemented by additional goals specific to each sub sector to achieve the overall vision for the sector. These sub-sector goals are summarized as follows:



1) Clean and sustainable generation: The generation capacity in the country has more than doubled in the last decade with 159 GW in FY 2010 to 356 GW as on FY19. Thermal power (coal, lignite, gas) continues to be a mainstay of the energy mix accounting for ~63 per cent of the installed capacity and 80 per cent of the total energy supplied. However, with increasing threats of global warming, it is imperative to encourage the addition of renewables in the power generation capacity which has increased its share from 10 per cent in 2010 to 22 per cent as on FY19. However, with increasing RE capacity, grid integration of RE power becomes an important factor for stable operation which needs to be addressed. Use of flexible power plants like hydro and storage technologies like pumped storage plants will help in grid integration. Also, there is a massive water requirement in the thermal power plants and innovative methods/ technologies are to be deployed to reduce the net water usage to enable sustainable operation. MoP is also trying to devise a solution for the decreasing air quality issues arising from burningagro residues. An effective way to tackle the problem is to use the agro residue as fuel in thermal power plants. A few pilot projects are been carried out to understand the feasibility.

2) Adequate and efficient transmission:India has the largest synchronous grid in the world which lends huge resilience, especially when it comes to managing the increasing variability and unpredictability in the power system. Given the large renewable energy capacity targets set by India, a strong transmission network would be critical to reduce congestion and expedite deployment.

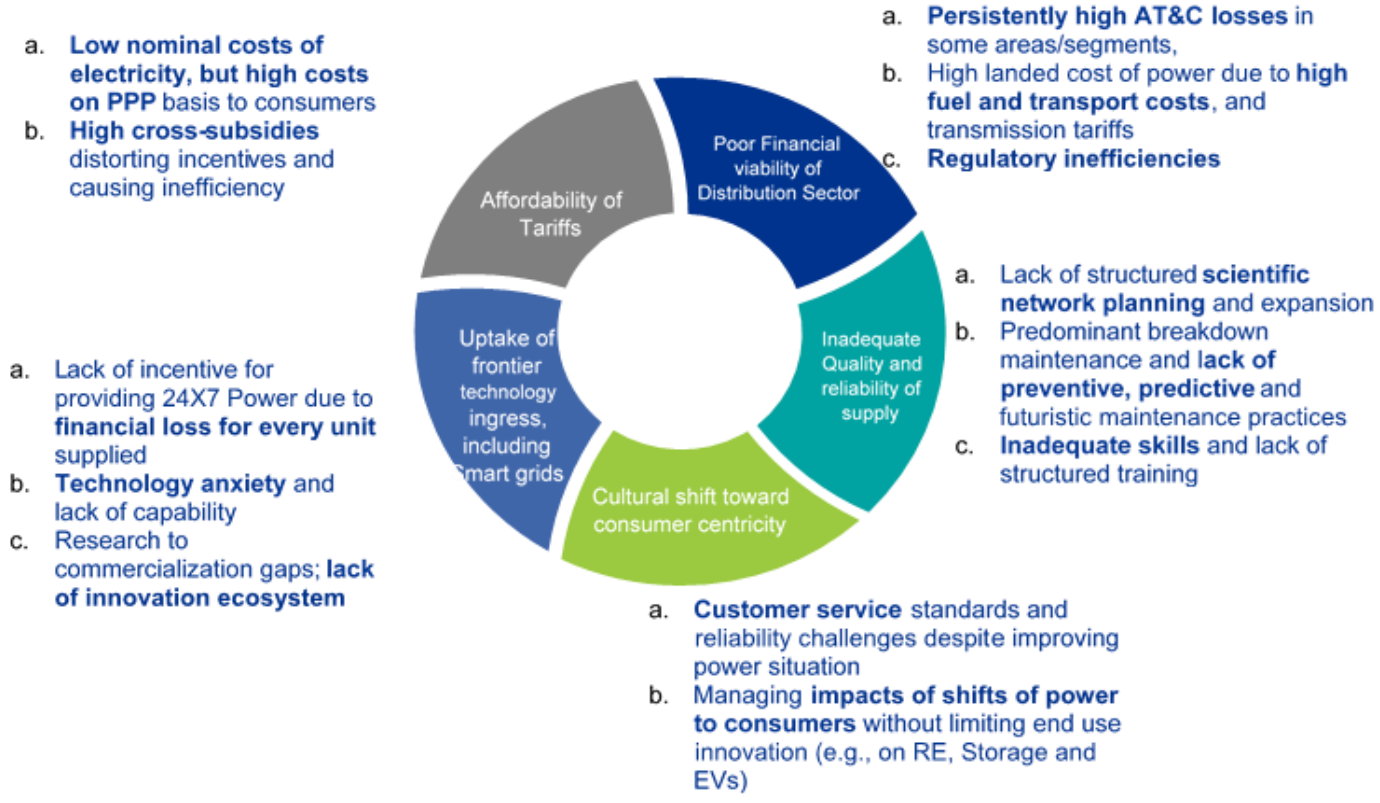
Also, allocation of transmission costs and determination of usage charges would also be an area of improvement. The Point of Connection (PoC) mechanism for charges was developed in line with the National Electricity Policy and Tariff Policy goals of evolving transmission networks/tariffs that are not balkanized and reflect the distance, direction and quantum of flow. It has worked admirably for furthering transmission development and operations and has been the bulwark of development and expansion of the power markets. Specific improvements to make the entire transmission system more transparent would however need to be considered to ensure that the user charges are fair and balanced and reflective of the objectives enshrined in law and policy.

3) Reducing energy intensity:Energy efficiency and conservation in the electricity sector is a remarkable story that has inspired other nations to follow India's lead. Committed towards reducing the emissions, India has been participating as one of the leading parties in the Conference of Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC). The twenty-first session of the COP that took place in 2015 at Paris reached a landmark agreement called the "Paris Agreement" to combat climate change. The aim of the Paris Agreement is to strengthen the global response to the threat of climate change by keeping the global temperature rise well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. The Government of India has submitted its Nationally Determined Contributions (NDCs) to UNFCCC in 2015, endorsing country's ambitious commitment towards the issues related to climate change and ratified it in the year 2016.

While the overall achievements are laudable, the country must make further strides to achieve the goals set out and ensure that energy production and usage in the country is at or better than global standards in terms of efficiency.

4) DISCOM revitalization: The distribution sector is the interface between the consumer and the power sector and is the source of revenue into the power sector. The past 3-4 years have witnessed rapid strides in the sector, especially in the areas of extension of networks to households, and reliability of supply, which are core policy goals. The sector was instrumental in providing energy access reaching all ~5.9 lakhs villages (100%) and electrifying 21.44 Crore (99.9%) households.

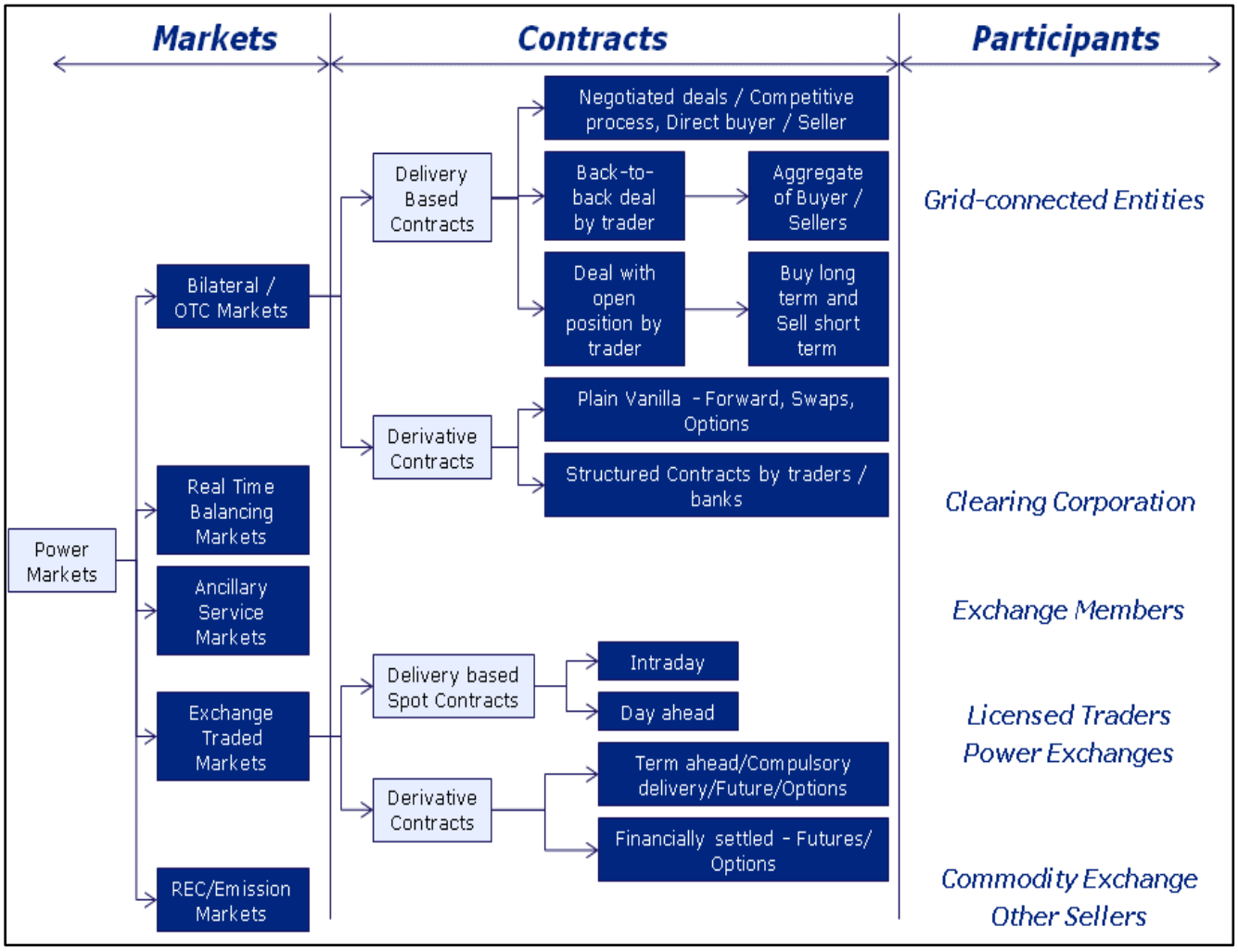
While the achievements are undoubtedly significant, some of the traditional challenges of the distribution system continue to be a cause for concern. In particular, despite the massive Ujjwal Discom Assurance Yojana (UDAY) scheme initiatives, the issues remain complex and intractable and the significant gains achieved through UDAY are proving difficult to sustain.The losses of DISCOM have been consistently at unsustainable levels, and although they have reduced during UDAY, there are again seeing an upward trend. This has had and will continue to exert a cascading effect on the entire power value chain and the banking system, unless addressed. There are complex linkages, including with issues that lie outside the distribution system, which would need a fresh look with an aim to modernize distribution operations rapidly in terms of infrastructure, technology and capabilities. The overall web of challenges in the sector is depicted in the graphic below:



5) Efficient Energy Markets:Over a period of time, competitive power markets have come to be a core part of sector operations, driving efficiency in the wholesale trade of electricity through price signalling to operations of efficient capacity. Studies by POSOCO indicate significant gains from market operations and also evidence of the utilities having learnt to utilize the resources available in the market optimally, within the overall limits of the present market construct.

For the competitive wholesale markets (upto1 year term) are concerned, various types of contracts and participants in the power market are depicted in the diagram below:

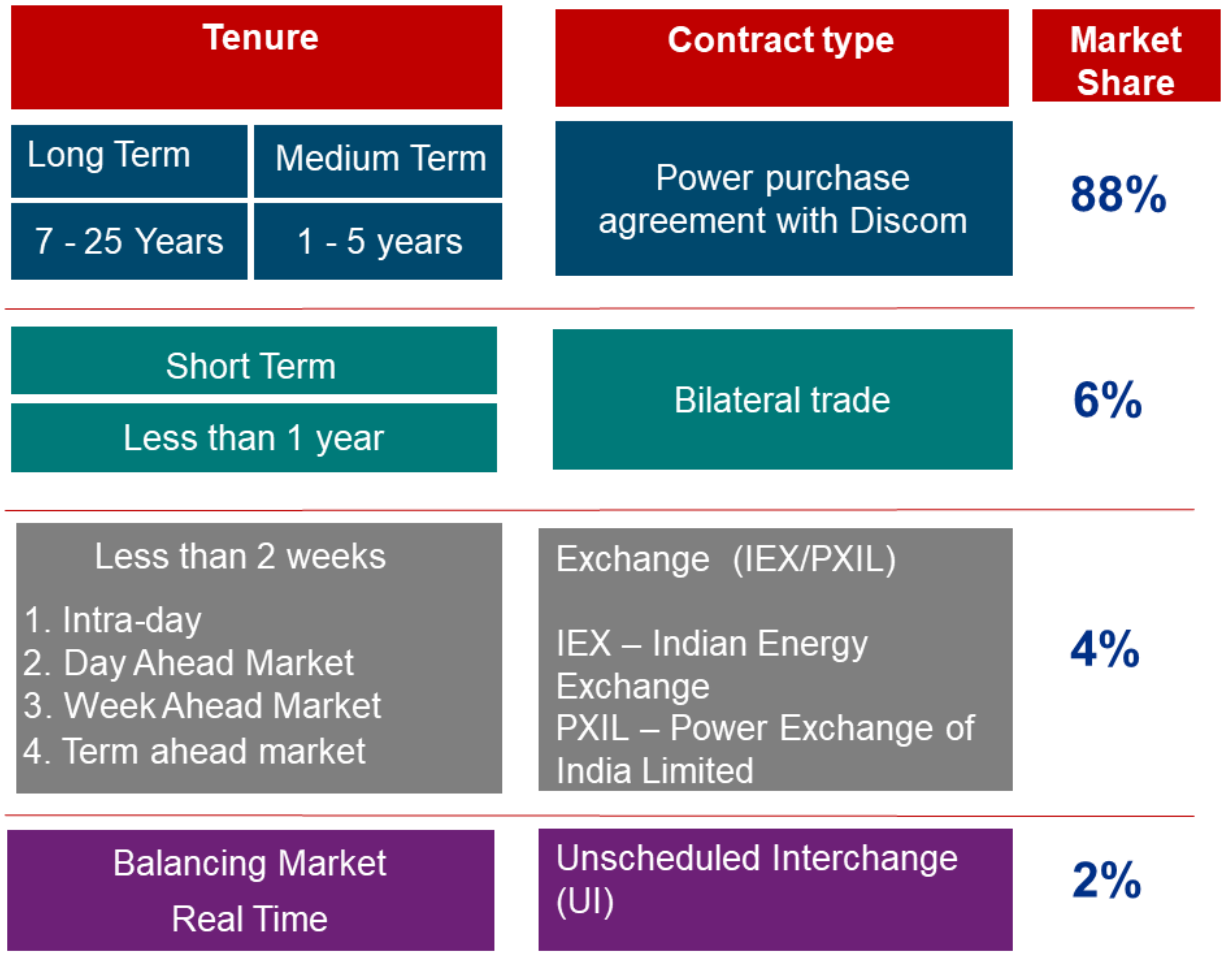
Market Structure



Source: *Statements of Objects & Reasons of Market Power Regulations, CERC*

In India, the day-ahead, intra-day and limited term ahead markets have been in operation for some time now with two exchanges providing the requisite infrastructure to participants within the sector to trade on the spot market and help participants balance

their load profiles. However, due to structural reasons the volumes on the competitive markets, including the power exchanges has been limited in terms of overall share, as depicted below:



Source: *IEX, PXIL*

As mentioned, in the large, complex and growing sector operations in India competitive markets are envisaged as a centerpiece for development and management of the power system, with twin objectives of promoting efficiency and ensuring new capacity. The vision reflects measures in this regard including through deepening of the existing market forms and introducing new platforms and mechanisms including the incorporation of capacity markets/auction mechanisms that help do away with the rigidity of the present long term PPA driven arrangements while catering to the need for reliable capacity. The new markets would also be a key means of managing the variability in the grid caused on account of large-scale ingress of renewables in line with the objective of greening the supply of electricity.

6) Move towards Light Touch Regulation: The Electricity Act, 2003 set out independent regulation as a cornerstone of delivery of sector reforms at the national and state levels. While regulation has evolved in the last 15 years, the outcomes in delivering a financially healthy utility sector have been mixed. Strengthening the regulatory mechanisms for better prudence also remains a critical priority. Better methodologies and processes for examination of capital expenditure assessment, demand forecasting and power purchase planning are much needed by the regulatory institutions in India.

In light of the past history of unaddressed issues in the sector that are in the regulatory domain and the future needs that would require market and regulatory evolution the goals laid out envisage broad regulatory transformation, accountability and institutional capacity building to revitalize the function which is critical for the development of the sector in the evolving context.

These goals will be translated into schemes with on-ground results that will be monitored through a key performance indicators (KPI) matrix. The initiatives and action plans that will be undertaken to achieve these strategic goals have been detailed in the table below:

Action Plan

Goals (What)	Strategies	Actions/ Initiatives(How)	Timeline/Target (When)
I. Clean and sustainable generation	1. Enhance share of RE in total generation mix	a. Facilitate policy for RE capacity additions through RGO targets, with clear incentive mechanisms	RGO policy by December 2020
		b. Bundle RE with conventional power	Implementation byJune 2020
	2. Make generation flexible	a. Encourage Hydropower and Pumped Storage Plants	45 GW to 57 GW (Installed Hydro Capacity)
		b. Improve technical minimum limits to 55% for thermal power plants	60% by FY 2024 (% Fleet of total installed capacity)
	3. Improve water use efficiency	a. Explore technologies to reduce water consumption in thermal power plants	10 by FY 2024 (No. of units using Air Cooled Condensers)
	4. Promote usage of agro-residue	a. Develop policy to increase co-firing with agro-	6 by FY 2024 (No. of plants ready for

Goals (What)	Strategies	Actions/ Initiatives(How)	Timeline/Target (When)
	pellets	residue pellets	co-firing of biomass where agro-residue is available)
II. Adequate and efficient transmission system	1.Robust transmission network to limit congestion	a. Plan and build transmission infrastructure in RE rich areas	32,000 ckm by FY 2024 Length of transmission lines to be added in RE rich areas
	2.Rationalize transmission charges	a. Remove transmission pricing inefficiencies	Policy to be formalized by June 2020
III. Reducing energy intensity	1.Improve energy efficiency in buildings and municipalities	a. Optimize cooling related energy consumption	80 Billion Units Reduction over BAU scenario
		b. Adoption and implementation of Energy Conservation Building Code by ULBs	50 Number of ULBs
	2. Enhance energy efficiency in energy intensive industries	a. Widen and deepen Perform, Achieve and Trade (PAT) scheme	550 No. of Designated Consumers
		b. Facilitate adoption of energy efficient processes through pilot projects for SMEs	30 No. of pilot projects
IV. DISCOM revitalization	1. Introduce consumer choice	a. Separate Carriage and Content (aligned with amendment of Electricity Act)	Implementation by March 2021
	2. Address AT&C loss and cost – revenue gaps in retail tariffs	a. Move towards timely cost reflective tariffs	Implementation by FY 2024
		b. Implement DBT for subsidy disbursal	Implementation by FY 2022
	3. Address metering issues	a. Ensure 100% feeder, transformer and consumer metering	Implementation by FY 2023

Goals (What)	Strategies	Actions/ Initiatives(How)	Timeline/Target (When)
		b. Smart pre-paid metering in three years with machine-based energy audits	Implementation by FY 2023
	4. Strengthen institutional mechanisms and processes	a. Establish model Standards of Performance	Implementation by FY 2020
		b. Link Central Sector Distribution scheme with institutional reforms	Implementation by FY 2020
V. Efficient energy markets	1. Deepen electricity market	a. Introduce suitable market mechanisms	Implementation by December 2020
		b. Deepening of spot markets	From 4% to 25% (% share)
	2. Enhance share of mark traded energy	a. Redesign PPA framework – Merit Order	Implementation by December 2020
		b. Improve liquidity by enabling increased participation of DISCOMs and GENCOs (aligned with tariff policy)	Implementation by March 2021
VI. Move towards Light Touch Regulation	1. Minimize regulatory burden	a. Move from regulation to competition	Implementation by March 2021
		b. Standardized and time bound regulatory processes (aligned with amendment of Electricity Act)	Implementation by March 2021

3.3 Ministry of New and Renewable Energy

3.3.1 Vision of the Ministry

The vision of Ministry of New and Renewable Energy is:

"To enhance the share of renewable energy in the energy mix of the country for ensuring energy security, socio-economic growth and improved quality of life in an equitable, environmentally sustainable and self-reliant manner"

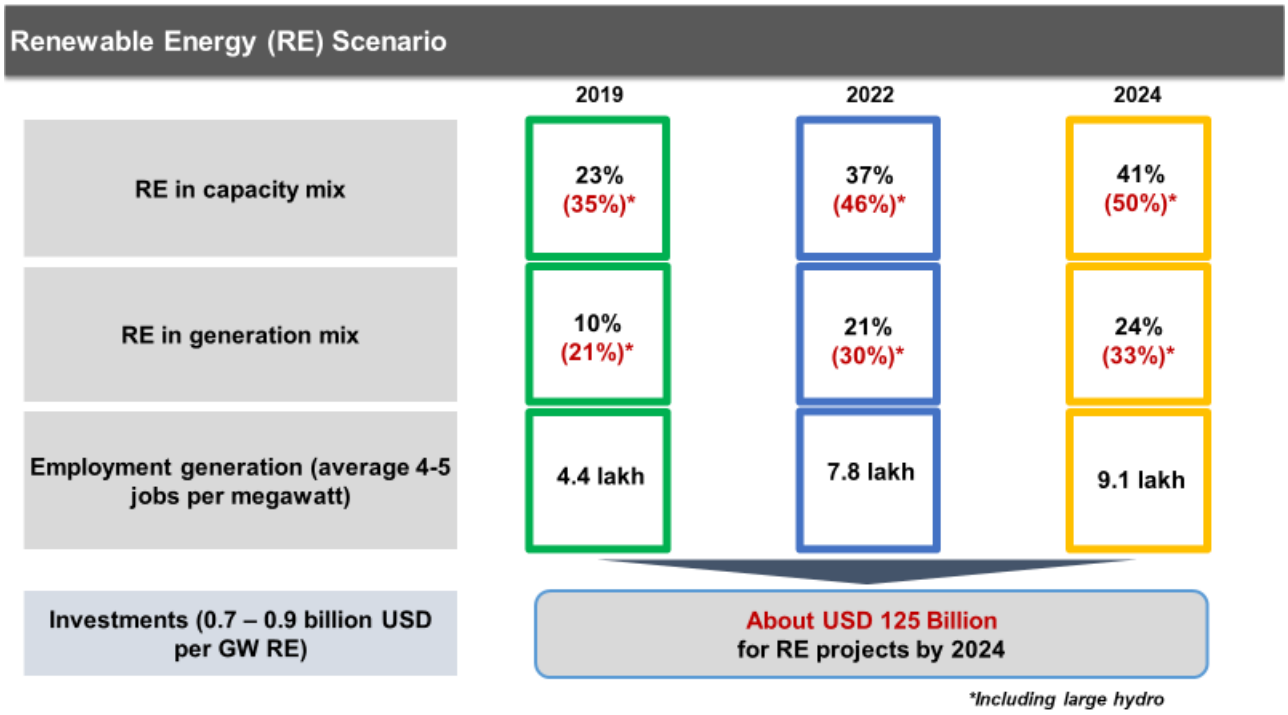
3.3.2 How vision of the Ministry is aligned with the sectoral vision

India has taken a voluntary target to cut the intensity of its carbon emissions by 33-35 per cent considering 2005 level and boost the green energy capacity to at least 40 per cent by 2030. To achieve these targets and make transition towards a cleaner economy, a greater share of renewables in the overall electricity mix is required. Currently, generation from renewable energy sources forms only ~9-10 per cent of the overall generation mix[9] and hence there is huge potential to scale up renewable deployment in the coming years. It is intended that by 2024 renewable energy sources should form 25 per cent of the electricity supply and thereby meet a substantial portion of India's energy needs. Further, in order to facilitate an ecosystem that is conducive to drive future growth of RE, focus of the Ministry is to include new RE sources and new-age technology such as battery storage, pumped hydro storage, hydrogen storage etc.

Going forward, all the new energy technologies will grow concurrently with a significant share contributed by solar and wind energy. The Ministry aims at providing sustainable renewable energy on-demand. Therefore, future development models such as round-the-clock RE will focus on unlocking the value of integration between solar & wind, RE hybrids with biomass & small hydro, RE hybrids with various kinds of storage. Further, electrification of allied sectors such as transport, heating and cooling applications etc., will further contribute to sectoral growth. The Ministry intends to bring in focus towards distributed applications such as solar rooftop, solarization of pumps for farming, solar drying and chilling and solar cookstoves. The Ministry also aims to maximize use of hydrogen as energy carrier for grid balancing, transportation and decarbonizing industries like steel, aviation etc. All put together will lead to a significant adoption of renewable energy including for primary energy use.

[9] For April 2018-March 2019 as per CEA

Renewable energy scenario is given below:



3.3.3 Recommendations to be implemented by the Ministry, with timelines and milestones

The renewable energy sector is growing at a significant pace. In a matter of a decade, it has grown from a fringe sector to a mainstream sector in the overall energy domain. However, to ensure sustained growth and to accelerate capacity additions from the current base, future plans will need to take into consideration some of the challenges that the industry is facing. The Indian grid is among the largest integrated grids in the world and India is fast progressing to become one of the largest renewable energy production bases. In order to further scale-up RE installations across the country, the sector would require focusing on the following strategic goals:

1	Increase RE share in energy mix to 225 GW by 2024
2	Reduce import dependence
3	Enhance quality of life of farmers
4	Promote distributed generation
5	Hydrogen Mission and Increase India's RE influence globally

1. **Increase RE share in energy mix to 225 GW by 2024:**Given India's commitment to reduction in carbon emissions as per COP 21 targets, the Government of India lays heavy emphasis on increasing share of RE in the energy mix and improving energy efficiency. Currently, renewable energy accounts for about 9 per cent of the electricity production in India. With falling costs and increasing technological advancements, renewable energy technologies such as solar and wind has become a de-facto choice for most of the countries across the globe for meeting future electricity demand growth. With increasing interest from global investor community in the Indian renewable energy sector, one of the key imperatives for the Ministry is to increase this contribution of generated units to about 23 per cent and installed capacity to about 47 per cent by 2024.
2. Reduce import dependence:India has fairly scaled-up solar deployment in past 5 years, however it is lagging in terms of development of domestic manufacturing capacity. While China and South East Asia have increased their domestic production capacities significantly over the period of last 4 years (2014-18), India's production capacity increases at a very moderate rate such that India remains a net importer of solar modules. At present 85-90 per cent of PV modules in India are imported. As per Department of Commerce, India imported solar PV cells and modules worth USD 2.1 Bn in FY2018-19 whereas Indian exports stood at USD 0.1 Bn. In case of development of in-house manufacturing capabilities, solar manufacturing has the potential to generate over 1,25,000 additional direct and indirect employments over next 5 years, besides providing equipment supply

security. Further, the deployment of solar projects based on domestic manufacturing can help the country to save substantial forex reserves.

3. Enhance quality of life of farmers: In the case of the rural segment, RE installations improve energy access which in turn leads to socio-economic improvement of the community. Access to clean power through RE helps rural communities with limited/no access to the grid to reduce expenditure on kerosene/diesel. For several rural communities, RE based mini-grid systems would lead to faster improvement in energy access when compared to grid extension.

In agriculture, currently only about 48 per cent of the total cropped area in the country is under irrigation[10] with high dependency on electric and diesel pumps. There are approximately 20.9 million electric and 9 million diesel pumps installed across India and the share of the agriculture sector in total electricity and diesel consumption of the nation is about 22 per cent[11] and about 13 per cent[12], respectively. The power supplied to agricultural consumers is subsidized by the State Governments leading to a high financial burden. Furthermore, the electricity supply in remote areas is often erratic and unreliable. In this backdrop, Solar Powered Irrigation Systems (SPIS) are emerging as an attractive alternative to electric and diesel pumps in meeting irrigation requirements. These pumps provide reliable, quality power supply to farmers while significantly reducing the financial burden on the States. Therefore, it is essential to take-up large programme/initiatives to increase outreach of solar pumps to maximum rural population.

4. **Promote distributed generation:**Distributed generation systems such as solar rooftop (SRT) offers several advantages, primary being reducing T&D losses by generating near the site of consumption and enabling efficient utilization of land available at the consumer end. Currently, majority of the SRT installations are driven by the commercial, industrial segments followed by public sector establishments. Solar rooftop systems have already achieved grid parity for Commercial & Industrial (C&I) customers and is attractive for large portion of residential customers in most solar rich states. The incentives from the central government has led to the growth of the segment with increasing awareness level in

[10] https://data.gov.in/resources/stateut-wise-details-agricultural-land-net-area-sown-and-net-irrigated-area-during-2014
[11] http://pib.nic.in/newsite/PrintRelease.aspx?relid=128572
[12] http://pib.nic.in/newsite/PrintRelease.aspx?relid=102799

the C&I consumer segments. However, the residential sector, which offers significant growth potential is yet to be fully tapped. Further, with challenges to capture large tracks of contiguous land, it is essential to tap the excess land available with airport, ports, railways etc., for increasing RE generation.

5. **Hydrogen Mission and increase India's RE influence globally:** Macroeconomic disruptions like EV adoption, advancements in energy storage options, smart metering are reshaping the overall transition of power sector. In recent times, focus has shifted to development of green hydrogen technologies where hydrogen produced from renewable energy sources can be used in allied sectors such as transportation, steel, aviation, refining, fertilizers etc. With hydrogen gaining prominence, it will be important for India to prepare for this change and identify opportunities to remain ahead of the curve in hydrogen production and usage. Further, hydrogen adoption across various sector provides an opportunity for India to cut on import of fossil fuels.

   Successful transition towards renewable energy calls for greater international and regional cooperation to enhance energy security. Optimal utilization of RE sources through cross-border trade of power and taking advantage of geographical dispersion will remain a critical success factor for expanding India's global footprints in the RE sector. India already has interconnections with SAARC countries of Nepal, Bhutan and Bangladesh. An important precursor to this will involve achieving significant coordination and collaboration through existing and emerging international renewable energy platforms facilitating larger bi-lateral dialogues. International Solar Alliance (ISA) is one such great example which encompasses a common platform for cooperation among solar-rich countries. Similar platforms will help in attracting foreign investors, rally investments and in facilitating collaborations thus putting India at the center of the global energy transitions.

In order to monitor and achieve the above-mentioned goals, a defined results-based framework in form of key performance indicator (KPI) matrix has been planned. The initiatives and action plans that will be undertaken to achieve these strategic goals have been detailed in the following section.

Action Plan

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
I. Increase RE share in energy mix to 225 GW by 2024	1. Tying up land and transmission	a. Develop 30 GW Ultra-Mega RE Power Parks including Parks in Border Areas with dedicated transmission(through SPVs between Central PSUs and State Government entities, SPVs to acquire land)	By December 2022
	2. Exploit new RE sources for power generation	a. Tender for 3-5 GW of off-shore wind	• 1 GW each in 2020, 2021 • 3 GW in 2022-24
	3. Provide easy finance for RE project	a. RE to be separate category from power for lending purpose (taken up with RBI and D/o Financial Services)	March 2020
		b. Expand capital base of IREDA (enhance equity by about Rs 450 crore)	July 2020
		c. Expand capital base of SECI for development of new projects	March 2022
	4. Generate employment in the RE sector	a. Generate employment in the sector at average of 4-5 jobs per megawatt	3.4 lakh jobs by 2022 1.3 lakh jobs from 2022 to 2024
	5. Increase investment in the RE sector	a. Investment of about USD 125 billion (i.e. USD 0.7-0.9 billion per GW) for driving new RE projects	By 2024
II. Reduce import dependence	1. Creation of additional solar manufacturing ecosystem	a. 10 GW of Solar Cell Manufacturing (manufacturing linked tender, conducive tariff and	By 2024

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
		non-tariff barriers)	
		b. 20 GW Solar Module manufacturing (manufacturing linked tender, conducive tariff and non-tariff barriers)	By 2024
		c. Promoting domestic production by mandating domestic products in specific schemes (like KUSUM, Solar rooftop projects etc.)	Order issued
III. Enhance quality of life of farmers	1. Enhance energy independence & income of farmers	a. Provide about 23 lakh solar pumps to farmers (30% grant each by GoI and States, 30% loan, 10% farmer contribution)	2019-20 to 2023-24
		b. Solarize 15 lakh grid-connected pumps for additional income generation	2019-20 to 2023-24
		c. Small size solar power plants of total 15,000 MW on barren land (100% funding by farmers, sell power to DISCOMs)	2019-20 to 2023-24
	2. Introduce new RE products &technologies for benefit of farmers	a. Technology transfer for solar drying, cooling, chilling and heating (technology developed by National Institute of Solar Energy (NISE), seminar / workshop with stakeholders)	March 2020

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
		b. Promote solar powered cook stoves (to begin with Aspirational Districts)	From March 2020
IV. Promote distributed generation	1. Promote distributed generation/ Rooftop Solar	a. Making Rooftop on central government / central government institution buildings mandatory	By March 2022
		b. Use of excess lands at railway stations, ports, airports, warehouses and stadiums etc. for solar projects (under RESCO model, service provider to bring capital, consultation with stakeholder Ministries) for solar	By March 2023
V. Hydrogen Mission and Increase India's RE influence globally	1. Hydrogen Mission	a. Research in materials and processes for production, storage and use of hydrogen as a fuel	Start in 2020
		b. Demonstration of applications of hydrogen for power generation and transport sector	By 2021
	2. Information Exchange Portal	a. Launch IRIX- Integrated portal for international idea exchange	Launched in October, 2019
	3. One Sun-One Grid connectivity with Middle East and South East Asia	a. Start feasibility studies	By December 2020
		b. Enter into cooperation agreements	By December 2021
	4. Enhance influence of ISA	a. Review working of ISA	By December 2022
		b. Increase membership to 150 countries	By December 2022

3.4 Ministry of Coal

3.4.1 Vision of the Ministry

The vision of Ministry of Coal is:

"Modern, sustainable and competitive coal sector enabling accelerated coal production for energy security and economic growth"

3.4.2 How vision of the Ministry is aligned with the sectoral vision

Global energy markets are on the verge of significant disruption owing to continuously changing global energy mix. While accelerating economic growth and urbanization in developing countries may push up demand of energy, technological breakthrough, rising environmental concerns & changing economic and business realities may alter the energy mix significantly. This impact is most evident in the case of conventional sources of energy i.e. coal and petroleum. The expected shift away from conventional energy has already started and is already apparent in many countries, though the complete obliteration of conventional energy sources (if ever) is not visible.

Globally, economies are grappling with the fine balance between capital invested and future supply deficit/ stranded assets. However, in case of India, the issue is even more complex since a significant proportion of population is still without access to reliable and assured supply of energy. Therefore, the choices made today, in terms of technology(s) adaptation, capital investment, policy & regulatory support, market enablement etc. will decide, inter-alia,

- Access to reliable and assured energy,
- Affordable cost of energy, and
- Reduction in carbon footprint

So far, Indian coal sector has played a significant role in the energy mix. Transition from coal to renewables (or in general to cleaner fuels including cleaner coal) seems a reality though the extent and path are up for debate. This transition will have to be

planned meticulously to achieve the overall sectoral vision envisaged and the key goals of MoC has been drafted accordingly.

3.4.3 Recommendations to be implemented by the Ministry, with timelines and milestones

The following overarching goals are used as guiding principles to achieve the overall vision for the sector:

1. Reducing demand supply imbalance: The key strategic initiatives that need to be taken to provide a boost to the coal supply in this sector have been identified as below. The target of 1BT production by 2023-24 would be enabled by a slew of measures listed below:

- Allocation of 200+ coal blocks

During five (5) year period, Ministry of Coal intends to offer more than 200 coal blocks for allocation to augment future coal supplies. Ministry also intends to make changes to the allocation methodology to make the coal blocks more attractive to the investors and thereby increase participation. Some of the specific initiatives have been discussed herein below.

- Coal blocks allocation mainly for 'Sale of Coal'

The Government has already notified a policy with regard to allocation of coal resources for ‘sale of coal’. In line with the policy, Ministry of Coal has decided to progressively allocate coal blocks to public and private sector entities for ‘Sale of Coal’. This policy change will ensure creation of a functioning domestic coal market thus improving competitiveness. The Ministry aims to issue the RFP for ‘sale of coal’ by March 2020.

- Auction of partially explored blocks by devising suitable methodology

To widen the pool of blocks for allocation, Ministry has formulated a policy aimed at allocation of partially explored coal blocks. Selection of such coal blocks will be based on risk of development, estimated cost of mining and block geology etc. as this will be critical for the growth of coal supply in India.

- Early operationalization of allocated coal blocks

Efforts will be made to facilitate early operationalization of the already allocated coal blocks. Ministry of Coal will also act as an interface between mine owners and relevant government agencies and will oversee the timely approval of all required applications.

- Enhanced coal production by Coal PSUs

Land acquisition for coal mines in India is governed by two primary legislative acts, namely, The Coal Bearing Areas (Acquisition and Development) Act, 1957 (the CBA Act, 1957); and The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (the Land Acquisition Act, 2013). However, the application of these acts imposes stringent limitations on land acquisition, thus extending the timelines. Efforts will therefore be made to acquire the land under CBA Act at one go for all feasible cases by issuing relevant guidelines for possession of land. This will alleviate the procedural complexities involved in land acquisition, instances of cost escalations & other complications and initiate the timely development of coal mines in India.

In addition to this, efforts will also be made to engage mine operators with state-of-the-art-technology through global open tender, for identified large scale CIL mines. This will ensure timely development of mines in an efficient and responsible manner to meet the rising demands of end-use sector.

2. Accelerate Exploration: To provide an impetus to the addition of proven, probable and possible reserves, specialized exploration activities on a large scale is required.

    - Increased exploration activities

Currently, a considerable proportion of prognosticated potential coal bearing areas are available for 'Detailed and Regional Exploration'. However, the rate of exploration has been affected due to significant local resistance. Ministry of Coal will coordinate with relevant state/ local governments to ensure that such issues are resolved quickly thus ensuring early completion of exploratory drilling.

Furthermore, efforts will also be made to ensure timely availability of fund from the Ministry for exploratory drilling in both promotional & detailed exploration areas in Non-CIL blocks and from CIL/coal companies for drilling in their respective blocks.

The aim is to increase the resource area, wherein resource addition to G2/G3 category through regional exploration by notified PSEs is targeted as 785 sq. km. and resource addition to G1 category through notified PSEs is targeted at 1265 sq. km. by FY24. This will ensure continued exploration to meet the future demand of the country.

    - Capacity building for exploration

Currently, exploration in the coal sector, is carried out mainly by CMPDIL. To enable competition and to further build capacity for detailed exploration, Ministry of Coal will undertake an initiative to accredit new agencies by defining process of empanelment, introducing a comprehensive system of accreditation and deciding its norms and standards in conjunction with accreditation agencies like Quality Council of India (QCI) and/or National Accreditation Board for Education and Training (NABET).

3. Promote Ease of Doing Business: Indian coal sector has seen significant changes in the policy and regulatory framework in the recent times. This has been directed towards resource allocation, linkage policy for coal PSUs and pricing mechanism. However, efforts are required to reduce the development risk and create vibrant and competitive coal market in India. The suggested activities are as below:

    - Simplifying developmental activities

a. To facilitate early operationalization of mines, efforts will be made to dispense the coal blocks to be allocated by Central Government with “Previous Approval”. For this, suitable amendment has been made in the MMDR Act, 1957.

b. Efforts will also be made to revise the guidelines with a view to simplify, economize and fast track mining plan approvals.

c. To cut down the lead time for award of major approvals/ clearances/ licenses, Ministry of Coal will propose the concept of ‘single-window clearance’ at state level for allocated mines with an aim to rationalize and standardize the process across all coal bearing states; and to ensure greater coordination between various levels of central & state government for faster decision making.

- Reducing repetitive EC expansion proposals for a project

Currently, project proponent is required to approach MoEF&CC for capacity enhancement each time its rated capacity is revised upwards during the life cycle of the project, which turns out to be a repetitive process. To address the same, Ministry of Coal will work in conjunction with MoEF&CC to make it one-time affair.

At present, there is a relaxation for applying for EC expansion of 40 per cent without conducting Public Hearing (PH). However, substantial time is consumed in doing EIA and preparing EMP. Accordingly, it is being proposed to conduct EIA and prepare EMP considering peak capacity of the project and also capacity with 40 per cent expansion, on which MoEF&CC may grant EC separately (for both cases) with separate mitigation parameters. Thus, in case, project proponent crosses the EC capacity, the higher EC will be activated, and the proponent will be bound to follow the stipulations as prescribed for 40 per cent higher capacity and need not take an EC clearance once again.This would reduce the time for mine operationalization in case of expansion.

- Non-levying of NPV for exploration of coal/ lignite in forest area

As per ISP (Indian Standard Procedure) modified in 2017, minimum 7-8 boreholes per sq. km are required to be drilled to assess the coal resources in proved/ measured category. Any smaller number of boreholes drilled will result in indicated/ inferred category which may not be geo-economically viable for planning coal projects for augmenting coal production.

However, vide circular dated 24th December 2018, MoEF&CC has recommended the following with regard to grant of Forest Clearance for exploratory drilling,

i. No. of boreholes to be drilled in forest area has been restricted to 25 nos. (maximum 4" diameter) per 10 sq.km for exploration of coal & lignite, which will not attract the provision of Act.

ii. For exploration with borehole density in excess of (i), the application for forest clearance for coal & lignite exploration activities in forest area will be considered in line with forest diversion case required while applying for mining lease in forest area.

iii. Imposition of NPV (Net Present Value) - amount ranging from 2% (vegetation density between 0.1 and 0.4) & 5% (vegetation density between 0.4 and 0.7) for the total lease area proposed for prospecting.

In view of the requirement for addition of coal resources, deliberations will be held with MoEF&CC to exempt Reconnaissance Permit (RP) and Prospecting Licence (PL) stage activities from requirement of EC & FC. If exemption is not feasible, then Ministry of Coal will ensure to actively pursue non-levying of NPV for exploration of coal/ lignite in forest area with MoEF&CC.

- Consideration of restored and reclaimed land for Compensatory Afforestation (CA)

Ministry of Coal has deliberated with the MoEF&CC who have agreed to consider the coal mine areas restored and reclaimed (through plantation) by the coal companies as afforested CA land for its management without insisting for transfer of land ownership.

- Seamless transfer of FC in case of change of project proponent

As per the existing practice, in cases of transfer of ownership of the mines, the new project proponent (PP) has to start the process of grant of FC de novo. For facilitating, ease of doing business and ensuring uninterrupted continuance of mining operations, efforts will be made to develop provision for automatic transfer of FC to the new PP in such cases of transfer of mine ownership.

- Ecosystem for 'sale of coal' through e-trading platform & coal index

One of the key policy goals of Ministry of Coal is the enablement of competitive and transparent coal markets in India. The Ministry of Coal will facilitate the establishment of an online platform for coal trading/ transactions in India; and subsequently will formulate a domestic coal price index.

The platform is likely to reduce the information asymmetry between coal consumers and suppliers, and between suppliers, ensuring increased competition. The platform may include spot/ forward auction of CIL and sale of coal by mining companies. Various products like long term contracts, spot contracts, forward contracts etc. shall be available for transaction on these platforms.

In addition to this, there is also a need for domestic coal price index which can form the basis of pricing & marketing of coal, royalty determination and revenue sharing in case of captive and 'sale of coal' blocks (as and when implemented). At a strategic level, such coal index may also help companies decide on capex plans thereby fine-tuning capacity addition including greenfield expansion. Creation of the coal trading platform and transactions through the portal will be one of the precursors to the index. With greater volumes of trades being routed through the platform, there will be greater information availability on the market prices of coal which will enable a robust domestic coal index.

4. Technology Upgradation & Modernization:One of the key elements of future coal sector will be greater adoption of technology and focus on innovation and R&D. Some of the potential actions are:

    - Exploration & production modernization

        a. The present exploration practice at most coal mines of CIL and many others including that in the private sector largely involves core drilling with limited open-hole drilling and geophysical logging. Hence, efforts will be made through CMPDIL to test and employ various exploration technologies such as seismic survey and non-coring drilling etc. Further, for large scale adoption of such technologies, Indian Standard Procedures will be revised in conjunction with Geological Survey of India and Ministry of Mines. Adoption of such technologies will accelerate exploration & resource estimation and reduce costs by about 40 per cent.

b. Currently, a large proportion of ROM production from opencast/ underground mines is through drilling and blasting which comes with its own set of challenges including pollution, limited mechanization, high manpower, production efficiency and increased costs. However, going forward, environmental considerations may make a greater proportion of OC/ UG mining a necessity instead of a business decision. It is important that such mining capabilities are sustained and improved in India. With this aim, Ministry of Coal will encourage coal PSUs for large scale adoption of blast free coal mining technology including that of Surface Miners in opencast mines and Continuous Miners, Power Support Long-wall and High-wall Miners in underground mines.

c. Ministry of Coal will encourage coal mining companies, particularly coal PSUs, to identify critical mines and leverage large and/ or small-scale robotics fleets such as 'drones' for improved mine mapping & monitoring including land reclamation, fire mapping, and mine closure monitoring. Further, Ministry will also urge coal PSUs to use 3D terrestrial laser scanner in all mines for greater accuracy in OB measurement

- Improved governance

a. To enable an IT platform for rationalization and standardization of processes, Ministry of Coal will ensure complete adoption of e-office for all sub-ordinate/ autonomous offices (like DGMS, CIMFR and coal regulator/ CCO) and coal PSUs of the Ministry in accordance with e-governance initiative of the government.

b. Ministry will also ensure development of common digital platform for CIL & its subsidiaries to ensure seamless visibility of operational data to minimize human intervention in different processes.

c. Efforts will also be made to create a digital platform for ensuring end-to-end visibility and management of coal linkages by various stakeholders. This will lead to an introduction of quick and transparent mechanism providing information regarding long term supply of coal thus, enabling consumers to procure and manage coal from CIL & SCCL.

5. Social & EnvironmentalResponsibility: While coal companies are themselves addressing the social & environment issues through their Rehabilitation & Resettlement (R&R) plan, Ministry will also facilitate improvement in the social & environment scenario of coal mining areas through various forums/ mechanisms. Efforts will also be made to invest in green and clean technologies through the following initiatives:

   - Enhancing environmental responsibility

     a. With the aim to further step up its environmental responsibility, Ministry of Coal through its coal PSUs will work towards 'Ease of Living'. Efforts will therefore be made to encourage coal PSUs to leverage mine-water, treat it and thereafter supplement potable water supply to about 45 lakh people (i.e. approximately about 15 lpcd)living in the coal bearing areas and create irrigation potential for over 3 lakh acres within those and/ or nearby areas.

     b. In addition to the compensatory afforestation, the Ministry will also encourage coal PSUs to undertake massive afforestation program in the respective command areas of coal companies.

     c. As the mining industry grows, more land will be broken to get the increased supply of coal. Hence, coal companies would be encouraged to reclaim as much broken land as possible in the next 5 years.

   - Enhancing social responsibility

     a. For long, the quality of talent in the coal sector has been impacted by the job-for-land policy followed over the last several years. However, now, with the aim ofrecognizing the various trends in the workplace and model the skill and people's vision for the sector in such a way that it prepares the sector to meet the needs of the working-age population, the Ministry in conjunction with coal PSUs will work to increase the employability of local youth (i.e. youths in the command areas of coal PSUs). For this, efforts will be made to identify relevant trades in government ITIs in command area (such as surveyors, drill operators, dumper operators/ heavy vehicle drivers, blasting operators, excavator operators, fitters, electrical operators, blacksmith, instrumentation

specialists, mechanics, machinists, telecom operators, data entry operators etc.). Following this, capacities will be created in the identified areas by defining the curriculum, sponsoring the infrastructure and funding teacher's salaries and candidates' fees. Accordingly, apprenticeship training will be imparted to qualified candidates.

b. Efforts will also be made to provide employable skills to youths living in the rehabilitated areas of the coal PSUs. For this, Ministry will encourage its PSUs to conduct large-scale surveys to identify relevant skills and to tie-up with relevant training agencies for imparting identified skills by creating suitable infrastructure.

- Going Green

Government has set the target for renewable sources to reach 260 GW by FY2024. To achieve this target of power generation through green and clean sources, Ministry will encourage its PSUs to identify suitable areas and set up solar power generation capacities which may either be used internally or may be sold across to the grid.

- CBM exploitation

A strategy will be worked out in conjunction with coal PSUs to operationalize the identified CBM blocks on standalone basis. Efforts will also be made in coordination with Ministry of Petroleum & Natural Gas (MoPNG) to suitably identify MMDR coal blocks with CBM overlap and facilitate sequential extraction of both, CBM and coal.

- Enablers already in place
  - Mining Plan re-engineered- Simplification of Structure & process-Guidelines issued by the Ministry in December 2019.
  - Composite EC –to have in-built provision for 40% expansion with respect to quantity - Clarification issued by MoEF&CC in September 2019
  - Restored/ reclaimed land of CIL to be accepted for Compensatory Afforestation- Circular issued by MoEF&CC in October 2019

These goals will be translated into schemes with on-ground results that will be monitored through a key performance indicators (KPI) matrix. The initiatives and action plans that will be undertaken to achieve these strategic goals have been detailed in the table below:

Action Plan

Goals (What)	Actions/ Initiatives (How)	Timeline/Target (When)
I. Reduce Demand Supply Imbalance	1. Attract investment in Coal production – (promote commercial mining, no end-use restriction, bid documents for revenue sharing regime ready)	RFP by Feb 2020 (37 blocks to begin with, total 200+ blocks)
	2. Expedite production from allocated blocks (handholding and monitoring by PMU, bid for PMU already floated)	Production increase from 58 to 184 MMT by private sector
II. Accelerate Exploration	1. Offer partially explored blocks through Prospecting License cum Mining Leaseregime instead of bidding out only fully explored blocks (bid documents ready)	By January 2020 (1,000 sq. km/year against current 250 sq. km/year)
	2. Expedite Regional exploration-Central Mine Planning and Design Institute Ltdto take up a large programme (huge hike proposed in budget for upgrading coal-bearing areas, large area for exploration)	2525 sq. km (by 2024) (about 500 sq. km/year instead of current 125 sq. km/year)
III. Promote Ease of Doing Business	1. Re-engineer Mining Plan-Simplify Structure & process	Guidelines issued in Dec. 2019
	2. Multiple Amendments in the MMDR* / CMSP** Acts – (allow FDI and non-coal mining companies, removing redundant/repetitive clauses, etc.)	Cabinet note under preparation

Goals (What)	Actions/ Initiatives (How)	Timeline/Target (When)
	3. Composite EC –to have in-built provision for 40% expansion with respect to quantity	Clarification issued by MoEF&CC in September 2019
	4. Restored/ reclaimed land of CIL to be accepted for Compensatory Afforestation	Circular issued by MoEF&CC in October 2019
	5. Introduce Online application & approval for Mining Plan – Integrate with environmental clearance (integrate with PARIVESH portal of MoEF&CC)	By March 2020
IV. Technology Upgradation & Modernization	1. Value addition of coal / award of coal blocks for coal gasification • Extraction of CBM through competitively selected partners • Underground Coal Gasification Pilot study at NLCIL* • Surface Coal Gasification project at Dankuni under BOO model • Policy formulation for technology neutral coal gasification	• Invite bids in January 2020 • Tender opening in January/February 2020 • Tender by March 2020 • July2020
	2. Mechanize coal transportation within large mines (build state of art evacuation infrastructure at a cost of about Rs 18,500 crore)	• Implementation – March 2024 • Increase from present 33% share to 93%
V. Social & Environmental Responsibility	1. Utilise mine-water in meeting water demand of nearby habitations and create irrigation potential (creation of infrastructure for pumping out, setting up distribution channels)	• Potable water supply to ~45 lakh people (~15 lpcd) • 3+ lakh acres irrigable land
	2. Improve public perception of coal mining via Coal Mine Tourism and Bio recovery of Mined-out	• Promote 10 mines (Open cast and UG mines)

Goals (What)	Actions/ Initiatives (How)	Timeline/Target (When)
	areas	• 23,500 Ha to 31,500 Ha & 2 crore trees by 2024

3.5 Ministry of Mines

3.5.1 Vision of the Ministry

The vision of Ministry of Mines is:

"To double the production minerals in next 5 years with resultant reduction in import dependency, by allocating and regulating minerals in transparent and sustainable manner and intensify exploration to find deep seated minerals and effectively implement vision stated in the National Mineral Policy, 2019.Thereby, country will progress towards attaining self-sufficiency in major mineral production."

3.5.2 How visionof the Ministry is aligned with the sectoral vision

India is blessed with a bounty of resources, specially the minerals.From the economic perspective, India is ideally positioned to consolidate its climb up to be a five trillion-dollareconomy, having raw materials to support industrialisation for enhanced push for infrastructure development and sustained growth. During last five years, the Government has introduced important reforms to open up the mineral sector to ensure its contribution in achieving the national policy goals. Major reforms included enactment of the Mines and Mineral (Development & Regulations) (MMDR) (Amendment) Act 2015 which made the process of allocation of mineral concession completely open and transparent by introducing mineral auctions with active participation of the State Governments. In the federal set up, States are owners of mineral wealth in their respective territories. Forrealising the benefits of mineral wealth, States have primary and significant role to come up with mineral auctionable blocks that have clearance to start production.

Keeping in mind the Resources Group Vision, the following overarching goals are envisaged for the sector:

1	Incentivizing exploration also through private sector participation
2	Recycling of metal scraps viz. Aluminum, Copper etc.
3	Integrated licenses with pre embedded clearances
4	To double the production of major minerals in the country

3.5.3 Recommendations to be implemented by the Ministry, with timelines and milestones

1. Incentivising exploration of mineral blocks: In pursuance of the National Mineral Policy (NMP), 2019 and the recommendations of the High-Level Committee of NITI Aayog, Section 10C (2) of MMDR Act, 1957 has been amended through the Mineral Laws (Amendment) Ordinance, 2020, to provide for incentives to NonExclusive Reconnaissance Permit (NERP) holders. This will pave the way for exploration of deep-seated and other notified minerals and their auction. Till now, the grant of NERP implemented since 2015, has been a virtual non-starter as private sector has not shown much interest in the new policy. There have been no takers for this concession, as it does not entail any benefit for the NERP holder. The new amended provision which provides for linkage between exploration of the mineral and its eventual auction will make NERP attractive for domestic and as well as international exploration and mining agencies.

The Ministry would consider how NERP holder will do exploration upto a prescribed level and then can propose auction of the explored mineral block for composite license of Prospecting License (PL) cum Mining License (ML). The selection criteria for auction of composite license may be about 70 per cent weightage for committed exploration and production programme and 30 per cent weightage for revenue sharing. There will be an overall weightage in favour of the NERP holder as originator advantage. The NERP holder may at any stage of reconnaissance operations can transfer the reconnaissance permit to another junior company, who will be entitled to the originator's advantage in the auction process. By bringing in the concept of 'junior', this new dispensation will attract state of the art exploration and mining technology as well as global best practices into the Indian mineral sector.

2. Recycling of Metal Scraps in Scientific Manner: Recycling of metal does not entail loss of property, and thus metal scraps are akin to minerals resources. Therefore, scrap of metals produced today is metals for tomorrow. Recycling of metal is energy efficient and environment friendly, as energy used and carbon footprint generated in recycling of metals scraps is a fraction of those generated in producing primary metals. Low level of recycling scrap generated in India (e.g. 25 per cent in Aluminium against more than 90 per cent in Europe) results in high import of scrap and import dependency. India imported scraps of Aluminium and Copper to the extent of USD 2469 millionand USD 347 million respectively in 2018-19. Thus, there is need to have metal scrap recycling policy that addresses these challenges.

Objectives of proposed Recycling Policy are as under:

i. Promote resource efficiency and circular economy.

ii. Processing and recycling of products in an organized, safe and environment friendly manner.

iii. Formal process of scientific collection, dismantling and processing activities

iv. Promote 6Rs principles of Reduce, Reuse, Recycle, Recover, Redesign and Remanufacture through scientific handling, processing and disposal

v. Create a mechanism for treating waste streams and residues produced

vi. Achieve a target of 50 per cent recycling rate by the year 2025

vii. Mission Oriented and Directed R & D for Technology Development.

viii. Promote start-ups in Recycling eco-system

ix. Formation of Recycling Mission / Agency that would cover aforementioned implementation strategy.

The proposed Recycling policy would, inter-alia, cover following aspects:

i. Stages of recycling: Collection, sorting, recovery, refining and re-melting and unorganized character of recycling industry.

ii. Develop zones for collection, segregation and treatment facilities.

iii. Develop zones for refining and re-melting

iv. Guidelines for quality of scrap to be used in furnace

v. Designate authorities/ agencies to certify the quality of products made from recycled metals.

vi. Suggest an appropriate legislative, administrative and institutional framework for recycling

Policy would be issued by September 2020.

3. Auction of mineral blocks with pre-embedded statutory clearances: The successful bidder in auction has to get Environmental Clearance (EC), Forest Clearance (FC), land rights and other clearances for starting the mining operations. It takes more than 3 years or more usually to obtain all the requisite clearances. This acts as a disincentive for prospective bidders, especially the foreign investors. If these clearances are in place at the time of auction, it will give a fillip to the auction process and would eventually lead to greater participation and higher competition in the bidding process.

The concept of pre-embedded clearances forms a part of the National Mineral Policy, 2019 To make a beginning in this regard, 3 State Governments, namely, Odisha, Karnataka and Madhya Pradesh have been requested to arrange for auction of selected mineral blocks with pre-embedded clearances on a pilot basis. Here, the State Government would, in advance, obtain the requisite clearances/rights/approvals in respect of specific mineral blocks to be put on auction. These clearances/rights/approvals will be transferred to the successful bidder. In fact, for non-captive working mining leases, which are expiring after March 2020, some sort of pre-embedded clearances is being operationalised on the basis of amendments. Based on the experience of these pilot projects, the system of pre-embedded clearances will be upscaled for general implementation as a general policy in the mineral sector. Ministry would implement this intervention by August 2020 in active participation with State governments and MoEF&CC.

4. To double the production of major minerals in the country:Currently, mining sector is growing at CAGR of 6 per cent. Ministry of Mines envisions to double the production

of major minerals in the country, to achieve this, production needs to grow at CAGR of 15 per cent.

5. Ministry will take steps to claim rights over minerals resources in outer space in conformity with international laws.

These goals will be translated into schemes with on-ground results that will be monitored through a key performance indicators (KPI) matrix. The initiatives and action plans that will be undertaken to achieve these strategic goals have been detailed in the table below:

Action Plan

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
I. Incentivising exploration of mineral blocks	1. Exploration reports	a. Increase the number of auctionable reports to enhance auction of mineral blocks	Increase number of auctionable reports from 34 to 115
	2. NMET expenditure	a. Increase National Mineral Exploration Trust (NMET) expenditure on baseline data acquisition, green field exploration etc.	Increase NMET Expenditure from Rs. 80 crore to Rs. 300 crore
	3. Facilitation of private participation in exploration	a. Revise schedule of charges of NMET to increase private sector participation (Technical Committee constituted; Report received in Ministry of Mines)	Implementation byDecember2020
II. Recycling of Metal Scraps in Scientific Manner	1. Formulate National Non-ferrous Metal Recycling Policy	a. Put Draft Policy for public consultation	By March 2020
		b. Submission of Cabinet Note	By July 2020
		c. Issue of Policy	By September 2020

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
III. Auction of mineral blocks with pre-embedded statutory clearances	1. Auction of greenfield areas for Reconnaissance Permit cum Prospecting License cum Mining Lease on revenue share basis for base metal and deep- seated minerals	a. Pre-embedded in-principle statutory clearances for grant of mining lease (State Govt to get prior clearances before auction and transfer EC & FC clearances to successful bidders)	Implementation by December 2020
		b. Align the Acts/Rules with National Mineral Policy. Decision onrecommendations of the Committee under NITI Aayog for reforms in mining (examination in Ministry, Cabinet approval)	Implementation by August 2020
	2. Ensuring sustaining of production of mines whose leases expiring in March 2020	a. Fresh auction of 46 mines – mines auctioned - 6, Ongoing NIT – 22, Under exploration– 18	March 2020
		b. Coordinate with States and Central Govt departments to facilitate expeditious transfer of EC and FC and other clearances to the successful bidders to commence early production	March 2020
		c. Finalise contingency plan to meet the shortfall during transition. Consultation with M/o Steel, State Govts and Private sector	Jan 2020 (plan finalised)

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
		d. Ordinance route under process to legally support seamless transfer to new lessees	Jan 2020 (ordinance issued on 10th January 2020)

3.6 Ministry of Environment, Forest and Climate Change

3.6.1 Vision of the Ministry

The vision of Ministry of Environment, Forest and Climate Change is:

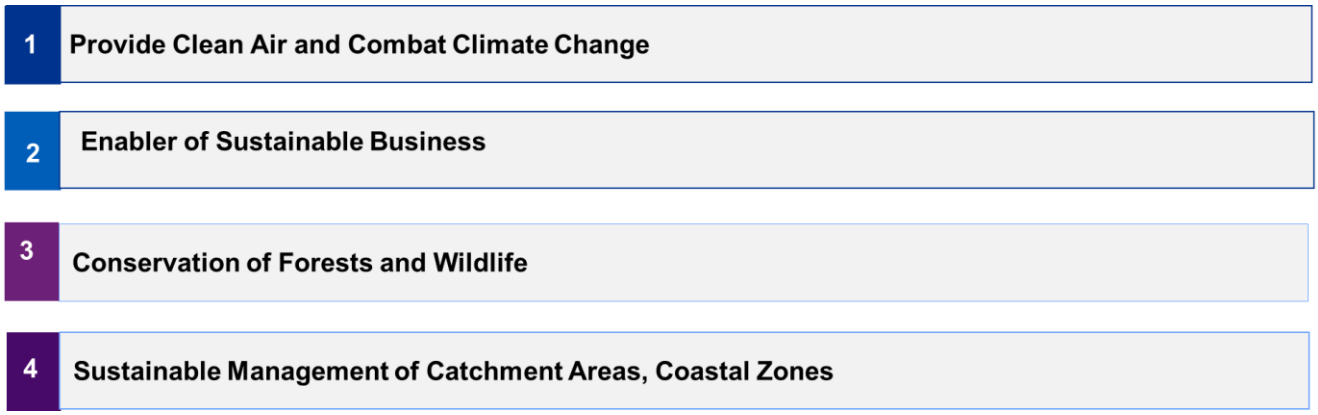
"To transform into development partner for achievement of sustainable and responsible growth"

3.6.2 How visionof the Ministry is aligned with the sectoral vision

Under the Paris Agreement, India submitted its Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) on 2nd October 2015, which outlines the climate actions intended to be taken in the period 2021-2030. However, the growth in the resources sector across the value chain including exploration of minerals, oil and gas and coal to production and consumption of energy creates a massive impact on the environment. MoEF&CC, as the nodal agency for planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes, aims to facilitate policies and initiatives enabling growth along with sustainability across ministries and departments. The key goal of MoEF&CC is to create carbon sink by increasing green cover so as to control and abate air pollution, reduce emission intensity of GDP and combat climate change. The ministry also aims to be a development partner and an enabler for sustainable businesses by expediting environment and forest clearances to ensure timely completion of projects.

3.6.3 Recommendations to be implemented by the Ministry, with timelines and milestones

The following overarching goals are used as guiding principles to achieve the overall vision for the sector:



1. **Provide clean air and combat climate change:**With increase in air pollution levels, MoEF&CC has launched National Clean Air Programme (NCAP). The NCAP is aimed at the formulation of effective air pollution reduction plan on the basis of scientific studies for 102 non-attainment cities. City specific clean air action plans with special focus on large cities with high pollution levels have been devised.
2. **Enabler of sustainable business:**MoEF&CC has an important role to play in handing out environment and forest clearances to different resource ministries for execution of the projects. In order to avoid the clearances to be a bottleneck for timely execution of the projects, action plan have been charted out with an objective to reduce the time taken for granting of environmental and forest clearances to two digit number with the help of an automated portal named ‘PARIVESH’.
3. **Conservation of forests and wildlife:** MoEF&CC, with an aim to conserve forests and wildlife to maintain the ecological balance of the area has devised plans to increase forest cover, conserve and protect endangered species and catalyse ecotourism.
4. **Sustainable management of catchment areas, coastal zones:** With the aim ofreducing vulnerability of soil erosion, increasing retention of moisture in the catchment for a longer duration, which in turn will significantly augment natural regeneration of forests, improving the productivity of natural forests and also augment carbon content in biomass and soil, this goal was conceived.

These goals will be translated into schemes with on-ground results that will be monitored through a key performance indicators (KPI) matrix. The initiatives and action plans that will be undertaken to achieve these strategic goals have been detailed in the table below:

Action Plan

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
I. Provide Clean Air and Combat Climate Change	1. Prevent, control & abate air pollution	a. Reduce Particulate Matter-PM2.5 and PM10 (implement National Clean Air Programme for 102 cities – measures to prevent, control and abatement of air pollution)	Reduce PM2.5 & PM10 levels by 30% by 2024
		b. Expansion of air quality monitoring network	From 779 to 1500 manual stations and 167 to 400 Continuous Ambient Air Quality Monitoring Station(CAAQMS)
		c. Prepare and implement Action Plan to contain stubble burning to minimize air pollution	6 month – M/o EF&CC and M/o A&FW
	2. Reduce GHG emission intensity of GDP	a. Implement Missions under National Action Plan on Climate Change to fulfil NDC commitments under Paris Agreement Ensure 40% share of power generation mix from non-fossil sources (Enhance share of solar / wind / renewable energy)	Reduce emission intensity of GDP by 29% by 2024 from 2005 levels

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
	3. Create additional carbon sink	a. Increase tree cover outside forest (plantation in private land, formulate new policy for plantation outside forest area)	Addition of 1 Billion tonne of CO_2 equivalent by 2024 from 2015 level
II. Enabler of Sustainable Business	1. Expeditious grant of forest andenvironmental clearances	• Clearance process to be paperless (States onboarded in PARIVESH portal) • EC / FC and CRZ clearances to be brought on the same portal • Coastal Zone Management Plan of all coastal States / UTs approved under 2011 CRZ Notification • New streamlined and simplified CRZ Regulations notified to speed-up coastal development and tourism • Several Notifications issued simplifying FC • Central Government fixed 60 days-time for granting FC • Timely FC is a big challenge also in view of delays at State level • Strong need to further simplify / streamline FC process in consultation with States to reduce time taken for FC	Implementation has already begun

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
		Reduce time taken for EC to double-digit level (also fix time limits for States, further delegation of powers to States, central monitoring by MoEF&CC)	From 115 days to 90 days by 2022-23
III. Conservation of Forests and Wildlife	1. National Forest Policy	a. Finalise National Forest Policy (draft policy prepared, consultation with State Governments and other stake holders done, placed before Cabinet for consideration)	By March 2020
	2. Conserve/protect endangered species of wild animals	a. Launch projects on selected endangered species for development wildlife habitats (special projects to be launched on the lines of Project Tiger)	Identify 21 species March, 2020
		b. Establish a new world class Natural History Museum in Delhi (land available, design finalized, Cabinet note circulated)	By 2023
		c. Upgrade Central Zoo to international standards (transformation and management of Delhi Zoo, project is being prepared)	By 2022
	3. Catalyse Ecotourism	a. Launch and implement Ecotourism Policy in the forests and wildlife areas of the country (Draft policy prepared / circulated, consultation with State Governments)	Policy byFebruary, 2020

Goals (What)	Strategies	Actions/ Initiatives (How)	Timeline/Target (When)
IV. Sustainable Management of Catchment Areas, Coastal Zones	1. Introduce treatment of Catchment Area	a. Catchment Area Treatment (CAT) of 13 major river systems (DPRs being prepared for 13 rivers, plantation-cum-watershed policy to be followed)	CAT Plan by 31st March 2020 Implementation over a 10-year period and 5 by 31/3/2024
	2. Sustainable management of Coastal areas	a. Implementation of Integrated Coastal Zone Management Projects (World Bank assisted project Rs 2,500 crore. Activities installation of STPs, mangrove plantation, coastal erosion protection measures, improving drainage system, formation of self-help groups etc., to conserve Ecosystems, and enhance livelihood security of coastal communities)	Roll out in April 2021

3.7 Ministry of External of Affairs

3.7.1 Vision of the Ministry

The vision of Ministry of External Affairs in the context of Resource Groupis:

"Contributing to national development goals and India's energy security by identifying opportunities for our business, industry, institutions & organisations and also facilitate their access to resources and knowledge including new and emerging technologies"

3.7.2 How vision of the Ministry is aligned with the sectoral vision

As the resources sector aim to expand its base into international geographies, MEA would act as an enabler and a facilitator to help Indian companies to expand. Also, as India seeks diversification of resources for oil and gas, coal and strategic minerals, MEA would pro-actively look for options and opportunities. MEA would also proactively

undertake technology diplomacy for identifying source countries for new and emerging technologies.

3.7.3 Recommendations to be implemented by the Ministry, with timelines and milestones

i. Global mapping of strategic resources and developing a website for this purpose to be launched by May 2020.

ii. Enhancing India's international presence in new and renewable energy including through initiatives like International Solar Alliance and executing solar energy projects in other countries under the LoC's of USD 1.6 billion.

iii. Work on completion of energy projects in our region – Nepal, Bhutan andBangladesh.

iv. New, Emerging and Strategic Technologies (NEST) Division has been set-up in MEA for technology development in the country and to deal with the foreign policy as well as the international legal aspects of new & emerging technologies and engage in technology diplomacy.

v. For purposes of economic diplomacy, MEA has a separate division called Economic Relations Division.

Section IV – Recommendations and Roadmaps

4 Recommendations and Roadmap

4.1 Actionable recommendation

4.1.1 Ministry of Petroleum and Natural Gas

MoPNG has identified the following actionable goals and initiatives to be achieved during next five years:

Increase domestic oil and gas production
• Increase in production of Oil & Gas • Accelerate award of new exploration acreages • Development of non-monetized discoveries
Attract investments
• Driving Hydrocarbon infrastructure – Upstream investments, Pipelines, CGD, LNG terminals, Refining etc.
Scale up bio-fuels production and waste to wealth creation
• Invest into 2G ethanol capacity • Expedite implementation of SATAT initiative
Improve access to clean fuel
• Scale up marketing network • Ensure availability of BS-VI compliant fuel
Develop India into a refining hub
• Increase the refinery capacity • Boost ethanol procurement for blending
Expand natural gas grid
• Expedite completion of National Gas Grid and CGD projects • Rationalization of pipeline tariff
Boost natural gas consumption
• Undertake new CGD Bid Round to cover additional districts • Expand access to PNG and CNG

Create competitive and transparent gas markets
• Set-up gas trading hub • Establish a transport system operator, to begin with as subsidiary and an independent body after about 3 years
Expand India's overseas equity oil & gas portfolio
• Increase CAPEX in overseas assets • Addition to overseas equity oil and gas assets
Diversify overseas oil & gas supply sources
• Addition of new nations to the supplying portfolio

These recommendations provided by Ministry of Petroleum and Natural Gas will be monitored through a KPI based matrix. The KPIs have been identified alignedwith the overall vision of the Ministry and Resources Economy. The key objective is to increase domestic production of oil and natural gas, aimed at reducing imports and moving towards a gas-based economy. to reduce imports. The KPIs and targets for monitoring of KPIs are given below:

S. No	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
1.	Crude oil production	MMT	35.04	35.79	38.23	38.61	**38.91**
2.	Natural gas production	BCM	34.55	39.32	46.92	54.53	**55.68**
3.	Revival of sick/ un-flowing wells	Nos	1,875	1,873	1,868	1,866	**1,864**
4.	Discoveries monetized	No. of discoveries	22	26	17	26	**11**

S. No	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
5.	Award of new exploration acreages under OALP Rounds	SKM	50,000	50,000	50,000	50,000	**50,000**
6.	Accelerating 2D & 3D seismic surveys	2D - LKM	2,410	7,188	7,208	7,298	**4,950**
7.	Addition in refining capacity	MMTPA	0	0	14	11	**25**
8.	Investment into 2G Ethanol Capacity	Rs.crore	777	3,066	4,332	3,695	**2,085**
9.	Ethanol procurement for blending	KL	26,00,000	33,50,000	42,00,000	45,00,000	**50,00,000**
10.	Biodiesel procurement for blending	KL	1,55,000	1,80,000	2,30,000	2,60,000	**3,00,000**
11.	Letter of Intent (LoIs) for CBG plants under SATAT	Numbers(Cumulative)	800	1,500	2,500	3,500	**5,000**
12.	Energy efficiency in refineries	MBN	72.4	67.6	65.6	64.6	**63.2**
13.	LPG Coverage for BPL	%	96	98	100	-	**-**
14.	Addition in LPG Distributorship	No. of Distributors	800	600	400	100	**100**
15.	New LPG bottling plants/Capacity Augmentation of Bottling plants	TMTPA	1,800	1,410	690	810	**300**

S. No	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
16.	Marketing/ Depots	Nos	5	3	6	5	**12**
17.	New fuel retail outlets	Nos	2,550	2,850	2,800	2,750	**3,050**
18.	Solarisation of retail outlets	Nos	3,450	3,950	4,050	4,050	**3,000**
19.	Mobile fuel dispensers	Nos	180	210	210	210	**210**
20.	Boost natural gas consumption	MMSCMD (Total)	156	165	175	181	**186**
21.	New CNG stations to be added (by CPSE's)	No. of Station	550	600	650	700	**750**
22.	New domestic PNG connections to be added (by CPSE's)	No. of Connections (in Lakhs)	18.5	19	20	21	**21.5**
23.	Additional gas pipelines laid	Kms	941	2,312	2,483	1,800	**3,156**
24.	New LNG re-gasification capacity added	MMTPA	38.8	38.8	38.8	42.5	**42.5**

S. No	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
25.	New CGD Bid Rounds	No. of Rounds	1	-	1	-	**-**
26.	CAPEX (Overseas Assets)	Rs. crore	11,502	12,353	13,264	12,601	**11,339**
27.	Addition to equity oil and gas assets from overseas assets	MMTOE	20.28	19.88	19.91	20.75	**20.52**
28.	Export of Petroleum Products	MMT	15	16	17	18	**19**
29.	Total CAPEX across hydrocarbon sector	Rs. crore	93,639.30	1,32,470	1,56,356	1,61,630	**132,195**
30.	R&D expenditure by major O&G PSUs	Rs.crore	1,754	1,995	2,671	2,799	**2,370**

4.1.2 Ministry of Power

MoP has identified the following actionable goals and initiatives to be achieved during next five years:

Clean and sustainable generation
• Enhance share of RE in total generation mix • Make generation flexible • Improve water use efficiency • Promote usage of agro-residue pellets
Adequate and efficient transmission system
• Robust transmission network to limit congestion • Rationalize transmission charges
Reducing energy intensity
• Improve energy efficiency in buildings and municipalities • Enhance energy efficiency in energy intensive industries
DISCOM revitalization
• Introduce consumer choice • Address AT&C loss and cost – revenue gaps in retail tariffs • Address metering issues • Strengthen institutional mechanisms and processes
Efficient energy markets
• Deepen electricity market • Enhance share of mark traded energy
Move towards Light Touch Regulation
• Minimize regulatory burden

These recommendations provided by Ministry of Power will be monitored through a KPI based matrix. The KPIs have been identified inline overall vision of the Ministry and Resources Economy. The key objective is to promote a financially viable and environmentally sustainable power sector. Some of the key parameters and targets for monitoring of KPIs are given below:

S. No	Parameter	Unit	Target Value (cumulative)				
			2019-20	2020-21	2021-22	2022-23	2023-24
1.	Capacity Addition for Hydro Electric Plants (including Pumped Storage Plants)	**GW**	46.6	47.4	50.2	52.2	**57.3**
2.	Improve technical minimum limits to 55% (for thermal plants)	**% of fleet capacity**	20%	30%	40%	50%	**60%**
3.	Use of Air-Cooled Condensers in water scarce regions in power units	**No.**	2	4	6	8	**10**
4.	Length of transmission line to be added in RE rich areas	**circuit km**	2,000	5,000	16,000	24,000	**32,000**
5.	%age of consumers metered	**%**	90%	100%	100%	100%	**100%**
6.	Deepening of spot markets	**% share in power market**	4%	8%	10%	15%	**25%**
7.	Widening and deepening of PAT scheme	**No. of Designated Consumers**	110	220	330	440	**550**
8.	Incorporation of Energy Conservation Building Code (ECBC) in bye-laws of Urban Local bodies	**No. of ULBs**	5	10	20	35	**50**
9.	Facilitate adoption of energy efficient technologies through pilot/ demonstration projects in SMEs	**No. of pilot projects**	0	5	10	20	**30**

4.1.3 Ministry of New and Renewable Energy

MNRE has identified the following actionable goals and initiatives to be achieved during next five years:

Increase RE share in electricity generation mix to 225 GW by 2024
• Tying up land and transmission • Exploit New RE sources for power generation • Provide easy finance for RE project • Generate employment in the RE sector • Increase investment in the RE sector
Reduce import dependence
• Creation of additional solar manufacturing ecosystem
Enhance quality of life of farmers
• Enhance energy independence & income of farmers • Introduce new RE Products & Technologies for benefit of farmers
Promote distributed generation
• Promote distributed generation/ Rooftop Solar
Hydrogen Mission and Increase India's RE influence globally
• Hydrogen Mission • Information Exchange Portal • One Sun-One Grid connectivity with Middle East and South East Asia • Enhance influence of ISA

MNRE has carefully considered and finalized the KPIs based on the Government's mission of 225 GW of RE capacity by 2024. This include both traditional RE sources such as solar and onshore wind as well as emerging areas such as offshore wind. Emphasis has also been placed on improving access to energy to farmers through decentralized generation using solar pumps. For supporting this transition, targets have also been fixed for rapidly scaling up

manufacturing capacity so as to reduce import dependency. In addition, innovative concepts such as RE parks are also part of the five-year targets.

The key parameters and targets for monitoring of KPIs are given below:

S.No.	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
1.	Bids to be called	**MW**	30,000	25,000	25,000	25,000	**--**
2.	Off-shore Wind Bids	**MW**	1,000	1,000	1,000	1,000	**1,000**
3.	Cell manufacturing capacity	**MW**	2,500	-	2,500	--	--
4.	Module manufacturing capacity	**MW**	2,500	2,500	2,500	2,500	**--**
5.	Off grid solar pumps	**lakhs**	1.75	5.25	5.25	5.25	6.00
6.	Solarization of grid pumps	**lakhs**	1	3	3	4	**4**
7.	Small power plants on fallow land	**MW**	1,000	3,000	3,000	3,000	**5,000**
8.	Ultra-Mega RE Power Park projects	**MW**	2,000	10,000	10,000	8,000	**--**

4.1.4 Ministry of Coal

MoC has identified the following actionable goals and initiatives to be achieved during next five years:

Reduce demand supply imbalance
• Attract investment in Coal production • Expedite production from allocated blocks
Accelerate exploration
• Offer partially explored blocks through Prospecting License cum Mining Lease regime instead of bidding out only fully explored blocks • Expedite regional exploration
Promote ease of doing business
• Re-engineer Mining Plan- Simplify Structure & process • Multiple Amendments in the MMDR* / CMSP** Acts to allow FDI and non-coal mining companies, removing redundant/repetitive clauses, etc • Composite EC –to have in-built provision for 40% expansion with respect to quantity • Restored/ reclaimed land of CIL to be accepted for Compensatory Afforestation • Introduce Online application & approval for Mining Plan –Integrate with environmental clearance (integrate with PARIVESH portal of MoEF&CC)
Technology upgradation & modernization
• Value addition of coal / award of coal blocks for coal gasification • Mechanize coal transportation within large mines
Social & environmentalresponsibility
• Utilise mine-water in meeting water demand of nearby habitations and create irrigation potential Information Exchange Portal • Improve public perception of coal mining via Coal Mine Tourism • and Bio recovery of Mined-out areas

These recommendations provided by Ministry of Coal will be monitored through a KPI based matrix. The KPIs have been identified aligned with the overall vision of the Ministry and Resources Economy.The key milestone for monitoring of KPIs for the above listed recommendations are provided below.

S.No.	Parameter	Unit	Target Value (per year)				
			2019-20	2020-21	2021-22	2022-23	2023-24
1.	Coal Production	Million Tonnes	810	875	964	1050	**1,149**
2	Allocation of fully and partially explored coal blocks	No. of blocks	64	53	36	43	**39**
3.	Expediting regional exploration	Area in sq. km	125	400	800	800	**400**
4.	Expediting detailed exploration	Area in sq. km	230	1200	1400	1400	**700**
5.	Mine water for community use	Lakh kilo Litres	2,400	2,900	3,500	4,000	**4,300**
6.	Area irrigable by utilizing mine water	Acres	180,000	220,000	260,000	300,000	**3,20,000**

4.1.5 Ministry of Mines

Ministry of Mines has identified the following actionable goals and initiatives to be achieved during next five years:

Incentivising exploration of mineral blocks
• Increase the number of auctionable reports to enhance auction of mineral blocks • Increase National Mineral Exploration Trust (NMET) expenditure on baseline data acquisition, green field exploration etc. • Facilitation of private participation in exploration
Recycling of metal scraps in scientific manner
• Formulate National Non-ferrous Metal Recycling Policy
Auction of mineral blocks with pre-embedded statutory clearances
• Auction of virgin areas for Reconnaissance Permit cum Prospecting License cum Mining Lease on revenue share basis for base metal and deep- seated minerals • Ensuring sustaining of production of mines whose leases expiring in March 2020

The above recommendations provided by Ministry of Mines will be monitored through a KPI based matrix. The KPIs have been identified aligned with the overall vision of the Ministry and Resources Economy. The targets for production of major minerals for the five-year period are provided below.

S. No	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
1.	Iron Ore	**MT**	227	229	264	303	**349**
2.	Limestone	**MT**	435	501	576	662	**761**
3.	Chromite	**MT**	4.6	5.3	6.0	6.9	**8.0**
4.	Manganese Ore	**MT**	3.2	3.7	4.3	4.9	**5.7**
5.	Lead & Zinc	**MT**	1.02	1.20	1.40	1.60	**1.80**
6.	Bauxite	**MT**	27.2	31.2	35.9	41.3	**47.5**
7.	Copper Ore	**MT**	4.7	5.4	6.2	7.2	**8.3**

4.1.6 Ministry of Environment, Forest and Climate Change

MoEF&CC has identified the following actionable goals and initiatives to be achieved during next five years:

Provide clean air and combat climate change
• Prevent, control & abate air pollution • Reduce GHG emission intensity of GDP • Create additional carbon sink
Enabler of sustainable business
• Expeditious grant of forest and environmental clearances
Conservation of forests and wildlife
• Finalise National Forest Policy • Conserve/protect endangered species of wild animals • Catalyse ecotourism
Sustainable management of catchment areas, coastal zones
• Introduce treatment of catchment areaof 13 major river systems • Sustainable management of coastal areas- implementation of Integrated Coastal Zone Management Projects

The above recommendations provided by Ministry of Environment, Forest and Climate Changewill be monitored through a KPI based matrix. The KPIs have been identified aligned with the overall vision of the Ministry and Resources Economy. The key milestone for monitoring of KPIs for the above listed recommendations are provided below.

S. No.	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
1.	National Clean Air Programme (2017 as the	**PM2.5& PM10 (µg/m3)**	0-5%	5-10%	11-15%	16-22%	**23-30%**

S. No.	Parameter	Unit	Target Value				
			2019-20	2020-21	2021-22	2022-23	2023-24
	base year)						
2.	Implementation of catchment area treatment plan	**%age of area of CATP**	10%	10%	15%	15%	**10%**
3.	Reduce average number of days for issue of EC to double digit by 2022	**days**	Amendment of EIA Notification	100	95	90	**90**
4.	Target of Recycling/ processing of plastic waste	**Million MT**	5.62	6.77	8.00	9.45	**11.00**
5.	Utilisation of fly ash	**%**	85%	100%	100%	100%	**100%**
6.	Recycling and processing of substantial quantum of e-waste generated in an environmentally sound manner in the country by 2024 (as indicated in the EPR Plan)	**% quantity of waste**	30%	40%	50%	60%	**70%**
7.	Blue Flag Beach certification	**No. of beaches per year**	10	20	20	25	**25**
8.	Restoration & rejuvenation of Wetlands/Lakes	**ha**	1.5 lakh	2.0 lakh	2.5 lakh	3.0 lakh	**3.5 lakh**

4.2 100 days agenda – Status Report

4.2.1 Ministry of Petroleum and Natural Gas

Ministry of Petroleum and Natural Gas had undertaken various strategic actions as part of their 100-day action plan. The status of the 100 days agenda for MoPNG is as follows:

a. **Monitoring of implementation of CCEA decisions regarding recommendations of the committee headed by VC, NITI Aayog:** MoPNG is regularly monitoring all actions. Out of 17 major recommendations, 16 recommendations have already been implemented.

b. **Award of New Exploration Blocks:** Under OALP Bid Round II and III, bids were received for 32 blocks against 37 blocks offered. Government has already awarded the 32 blocks and the contracts have been already executed with successful bidders. Under OALP, till December, 2019, 94 blocks have been awarded in four bidding rounds having a total area of 1,36,790 sq km.

c. **Enhancing oil and gas recovery from existing nomination fields:**With an objective of enhancing oil and gas recovery from existing nomination fields, ONGC and OIL have issued Notice Inviting Offer (NIO) for bidding out 66 small and marginal fields. Online submission of bids by prospective bidders are expected by Early 2020.

d. **Popularisation of 5 kg LPG cylinders:** As on 06.02.2020, the total sale of 5 kg refills is 36.97 lakhs. In 100 days, 14.72 lakhs 5 kg refills were sold.

e. **Monitoring of capacity addition for ethanol production for ethanol blending programme:** MoPNG and DFPD are regularly monitoring capacity addition for ethanol production under Ethanol Blending Programme. A few developments are highlighted below:

- Under Interest Subvention Scheme, 426 applications have been received, out of which 328 proposals have been approved by DFPD in principle, with potential to produce more than 530 crore litres of Ethanol
- Policy for fixation of price including from sugar and sugar syrup for Ethanol Supply Year 2018-19 has been approved by the CCEA

- Long term procurement policy has been notified

f. **Monitoring of work on City Gas Distribution (CGD) Network:** Work of 10thCGD Bidding round launched on 26.8.2019 has already commenced. Further, online monitoring portal has been developed and PNGRB is monitoring the progress of CGD work regularly.

g. **Eight crore connections under Ujjwala:** LPG connections under PMUY has reached the target of 8 crore on 07th Sep 2019, about 8 months ahead of target.

4.2.2 Ministry of Power

Ministry of Power had undertaken three major strategic actions as part of their 100-day action plan. The status of the 100 days agenda for MoP is as follows:

a. **Revision of Tariff Policy:** Draft Tariff Policy 2019 has been submitted for Cabinet approval

b. Payment Security mechanism for power transactions: Order issued on 28thJune 2019 on opening and maintaining of adequate LC for payment security under PPA by Distribution Licensees. Implemented from 1st August 2019

c. Comprehensive Distribution Sector Scheme: The Committee to formulate the scheme has already been constituted. Further, preliminary deliberations have been made on the contours of the scheme and the scheme is under formulation

4.2.3 Ministry of New and Renewable Energy

The Ministry of New and Renewable Energy have undertaken some of the most important initiatives under the 100 days programme which includes the following –

a. **Launching of PM-KUSUM:** The new scheme aims at increasing farmer's income and energy independence and de-dieselization of the farm economy. The Ministry launched the PM-KUSUM scheme on 22nd July 2019 with the issuance of guidelines. Under this scheme, 17.5 lakh standalone solar pumps will be supplied to the farmers. Further, under the scheme 10 lakh agricultural pumps will also be solarised and 10,000 MW of small solar projects of capacity up to 2 MW will be set-up on barren and uncultivable land by 2022.

b. **Launch of Solar rooftop Phase-II (SHRISHTI):**Under this programme, a movement is being initiated for popularizing distributed generation of electricity with the consumers becoming producers by putting their own rooftop solar plants. This would help low-income households in availing benefits of solar power. This is planned to be accomplished with launching of single window portals of States which will make it easy for prospective consumers to get rooftop solar plants installed seamlessly without approaching multiple authorities. The Ministry has launched the programme on 21st Aug 2019 with the issuance of guidelines.

c. **Finalization of first RE Park:** To address the challenges of land and transmission, the Ministry has revised the solar parks policy and brought in the concept of Ultra-Mega Renewable Energy (RE) Power Parks (UMREPPs) to be implemented through CPSUs and State Governments entities. This will lead to affordable wind and solar power by reducing the industry risks associated with land and evacuation. The first RE park of 4,000 MW in Dholera, Gujarat has been announced.

a. **Bidding of large renewable energy projects:** A total capacity of 10,000 MW of solar and 2,400 MW of wind capacity was planned to be bid out over the period of 100-days. The Ministry released tender for 10.45 GW of solar and 3 GW of wind capacity during this period. These bids aimed at achieving the target of installing 175 GW of RE capacity by 2022. It would be the endeavour of the Ministry to bring more standalone-solar, standalone-wind and specialised bids such as solar power

with solar manufacturing, hybrid solar and wind with storage, floating solar at regular time intervals to ensure that steady pipeline for building RE plants is maintained and India is able to harness advantage of latest technological advancements in the RE sector.

d. **Ranking of states on rooftop attractiveness:** To instil competitive spirit among various States/UTs for facilitating the implementation of rooftop projects, it was planned to create an index (SARAL - State Rooftop Solar Attractiveness Index) and release their ranking based the index parameters. **The Ministry released SARAL on 21st August 2019.**

e. **Scheme for solar induction cooking:**In order to extend the benefits of renewables to the rural segment and reduce firewood and fossil fuel dependence, the Ministry has planned a scheme for solar induction cooking. The Ministry has received an in-principle approval from Department of Expenditure for the same. The scheme will also contribute to better health of rural women. The solar induction cooking scheme in long run can replace LPG usage and become an instrument for reducing imports & saving foreign exchange.

4.2.4 Ministry of Coal

The status of the 100 days agenda for MoC is as follows:

a. **Enhance coal handling efficiency through alternate transport methods:** As on date, MoC has secured approval for projects (with CAPEX of Rs 18,000 crore) from company Boards. Further, construction has started in 8 projects.

b. **Expediting & Operationalizing Coal Washeries:** 3 out of 6 Coking coal projects will be completed by March 2020, remaining 3 shall be completed by 2022. In case of Non coking coal, all 4 to be completed by 2021.

c. **Completion of Coal Handling Plants (CHPs):** 2 Coal Handling Plants (CHPs) are functional (Gevra, Kusmunda), balance 2 (Madhuban, Maheshpur) to be functional by Mar 2021.

d. Award of mines as per commercial mining policy: MoC is in readiness to auction 74 mines with Peak Capacity of ~300 MTPA. The bid process is expected to be launched in January/February 2020.

e. **Implementation of 'sale of excess coal' policy:** MoC has allocated 13 mines - 5 through auction and 8 through allotment

4.2.5 **Ministry of Environment, Forest and Climate Change.** The status of 100-days agenda is as follows:

a. **Initiate action in 27 cities out of 102 under National Clean Air Programme:**

- The Ministry of Environment, Forest and Climate Change, has finalized and on 10th January 2019 launched a National Clean Air Programme (NCAP) as a national-level strategy outlining the actions for reducing the levels of air pollution at city and regional scales in India.
- The NCAP aimed at the formulation of effective air pollution reduction plan on the basis of scientific studies for 102 non-attainment cities of the country
- A special focus is being laid initially on the large cities (with population greater than 1 million) and high pollution levels (PM10 > 90ug/m3) and their air action plans were reviewed in the ministry and possible areas of funding support was identified in 28 such cities.
- City specific Clean Air Action Plans for 102 cities were prepared by the states and approved by CPCB.
- 28 priority cities with million plus population and PM10 greater than 90ug/m3 were allocated with budget of Rs 10 crore per city
- 20 cities with less than 5 lakhs population is allocated a budget of Rs10 lakh per city
- 44 cities with 5 to 10 lakhs population is allocated a budget of Rs 20 lakhs per city
- Funds were disbursed to 84 cities of 17 States by CPCB.
- To help the States finalise and implement the city action plans, the Ministry formed a National Knowledge Network under NCAP with SPCBs and leading academic institutions in the States. The Ministry has designated IIT Kanpur as the nodal academic institution to coordinate the activities of National Knowledge Network and also to ensure collaboration between these institutions & their respective SPCBs.

b. Jal Abhayaranya Programme for Rejuvenation of Himalayan Springs:

i. Baseline data/ information on water supply schemes (source-wise) for all 12 Himalayan States

- Source wise water data has been compiled for all 11 states, i.e., Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Assam, Nagaland, Tripura and West Bengal, excluding J&K.
- Water resources of entire 11 states of IHR have been identified at block level and dominant water resources have been distinguished.

ii. Delineating and mapping of water scarce blocks/taluks in all 12 Himalayan States

- Final water scarcity mapping at block level for 11 States of IHR has been accomplished using GIS modeling.
- Out of total 594 blocks mapped, 285 blocks have been identified to be water scarce (For Arunachal Pradesh: 31; Assam: 15; Himachal Pradesh: 54; Manipur: 18; Meghalaya: 3; Mizoram: 2; Nagaland: 39; Sikkim: 20; Tripura: 19; Uttarakhand: 78; West Bengal: 6)

iii. Inventorisation of springs in one water scarce district in each of the 12 IHR States

- Spring inventory preparation started in all 11 States excluding J&K.
- Work completed in selected districts of 4 states (Uttarakhand, Arunachal Pradesh, Sikkim and Himachal Pradesh) and 2550 springs have been mapped. Spring mapping work is in progress in other 7 states

iv. Organizing mass awareness campaign on Jal Abhayaranya among different stakeholders

- A promotional flier for Jal Abhayaranya Abhiyan has been developed.
- Jal Abhayaranya programmes have been launched in all 11 IHR States excluding J&K.

v. **Launch of Pilot programs at 12 identifies sites**

- Total 11 water scarce villages in 11 IHR States excluding J&K (Sikkim, Manipur, Arunachal Pradesh, Mizoram, Nagaland, HP, West Bengal, Tripura, Assam, Meghalaya and Uttarakhand) have been selected for developing pilot models of water sanctuary.
- Field level interventions have been started in 10 sites with baseline mapping of spring shed area. Full scale spring shed treatment work will be started in the next 15 days.

c. **Action plan for 100 beaches of India for Blue Flag Beach Certification:**

i. **10 beaches to be taken up for certification during 2019-20 after completion of associated works and services at the nominated beaches.**

- Infrastructure and services have been put in place in 2 beaches i.e., Shivrajpur (Gujarat) and Ghogla (Diu).
- Works/services contracts have been awarded and activities are progressing at eight beaches i.e., Padubidri and Kasarkod (Karnataka), Kozhikode (Kerala) Rushikonda (Andhra Pradesh), Golden Beach (Odisha), Eden Beach (Puducherry), Radhanagar Beach (Andaman & Nicobar Island) and Kovalam Beach (Tamil Nadu).

ii. **20 beaches are planned for certification during 2020-21, for which identification of beaches and necessary preparatory work would be carried out in 2019-20**

- Process for identifying beaches for certification during 2020-21 is also underway and 3 beach sites Miramar (Goa), Bhogave (Maharashtra) and Bangaram (Lakshadweep) have been finalised.
- Data Base for potential beaches is being prepared in consultation with States/UTs. A suggestive 52 potential beaches across the country have been identified for which feasibility studies shall be carried out.

d. **Reduce time taken for grant of EC to two digits:** Time taken for grant of EC will be brought down to 95 days by 2021-22

e. Streamlining of various clearances: States have been on boarded in PARIVESH portal. The portal reflects updated status and allows for paperless processing of all clearance proposals.

The status of points (d) and (e) is as follows:

- Phase II of PARIVESH, was rolled out at the State level from 16th August 2019.
- To streamline implementation of PARIVESH, Staff of 21 SEIAAs in States and UTs were trained in PARIVESH phase II.
- The implementation of PARIVESH, states have started taking up the environmental clearances in PARIVESH module and a total of 1702 terms of references (ToR) and environmental clearances have been issues entirely through PARIVESH.
- The Ministry is in the process of deputing additional Master Trainers for handholding of PARIVESH module in all the States, with special focus on the North Eastern States.

Restoration and rejuvenation of at least 100 major lakes across the country:

- Wetland health card and management plans for 100 lakes/ wetlands has been prepared. Further, concept of wetland 'mitras' has been introduced in 50 wetlands
- Knowledge partners were on-boarded and each region has been allotted a separate knowledge partner
- State Governments on boarded and meeting of State Wetland Authorities was held on 26.08.2019
- Guidelines to implement Wetland Rules 2017 finalized
- Review meeting with all the knowledge partners was held on 30.09.2019.

- At the end of the 100 days, Brief documents and Wetland Health Cards have been made for all the 100 identified wetlands. The work of enlisting Wetland Mitras is in progress and report in the format provided is being collated.
- As per the yearly KPIs indicated, in the current year, 1.5 lakh hectares of wetlands are proposed to be rejuvenated and health cards and wetland Mitras have to be created for all wetlands >1000 ha. Wetland Health Cards have infact been created for all the identified 100 wetlands.

f. **Launch Programme to double the number of trees planted through active public participation including school nurseries school plantation peri-urban forestry and involving all governmental and non-governmental organizations:** By 2024, MoEF&CC will increase the annual plantation of saplings to 253 crore with per annum increase of 50 crores.

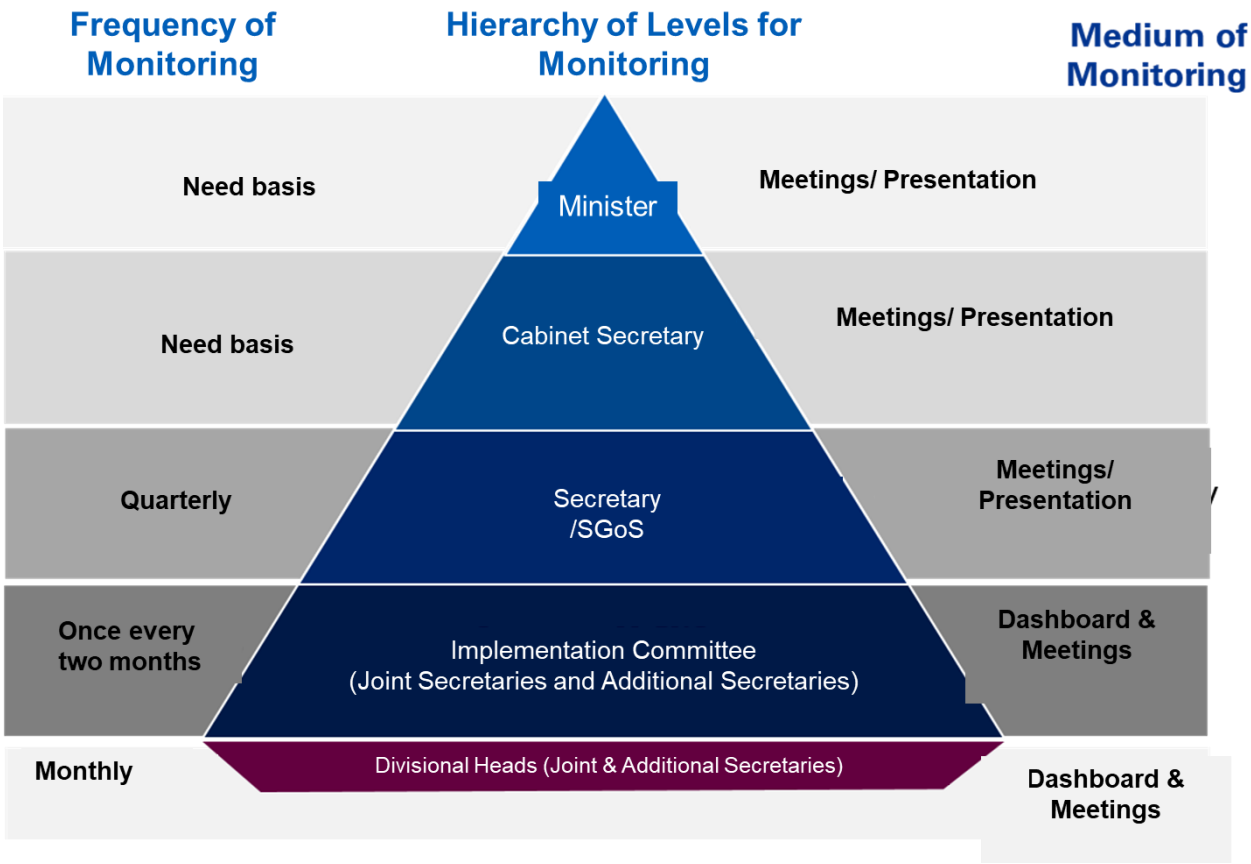
- In pursuance of this objective MoEF&CC has issued directions to all the states to take up large scale plantation especially in drought affected areas, preferably in the micro catchments and vacant lands and ensure plantations of local indigenous plants suitable for conservations and percolation of water. MoEF&CC has coordinated the intensive afforestation in all the States, and the States were advised to involve communities, educational institutions, local body and other government department in afforestation activities.
- Earlier states were given a target of planting 121 crores and 37 lakhs saplings under 20 point Programme for the year 2019-20. Till 15thOctober 2019, as reported by States in total 205 crores and 92 lakhs saplings have been planted under ‘Intensive Afforestation’ intervention.

4.3 Monitoring Mechanism

In order to achieve proper implementation of India's multi-pronged strategy for the development of the resources sector, a robust mechanism for monitoring the developments in the sector is visualized. This monitoring should be done dynamically through automated dashboards facilitating updation of data in real-time.

The frequency and mode of monitoring at various levels has been suitably defined. The following mechanism would be followed for monitoring as per the hierarchy level:

1) The KPIs for the individual action plan would be reviewed by the Divisional Heads (Joint Secretaries / Additional Secretaries of the respective ministries) on a monthly basis.
2) Monitoring at the level of the Implementation Committee, constituting of Joint Secretaries and Additional Secretaries would be done once every two months.
3) Monitoring at the level of Secretary of respective Ministries and SGoS would be done through meetings/ presentationon a quarterly basis.
4) Monitoring at the level of Cabinet Secretary would be done on a need basis.
5) Monitoring at the level of Hon'ble Ministers of the respective ministries would be done on a need basis.


Frequency of Monitoring
Hierarchy of Levels for Monitoring
Medium of Monitoring
Need basis
Minister
Meetings/ Presentation
Need basis
Cabinet Secretary
Meetings/ Presentation
Quarterly
Secretary /SGoS
Meetings/ Presentation
Once every two months
Implementation Committee (Joint Secretaries and Additional Secretaries)
Dashboard & Meetings
Monthly
Divisional Heads (Joint & Additional Secretaries)
Dashboard & Meetings

4.4 Abbreviations

Abbreviation	Full Form
AT&C	Aggregate Transmission and Commercial
BAU	Business as Usual
BPL	Below Poverty Line
BU	Billion Units
CAGR	Compound Annual Growth Rate
CAAQMS	Continuous Ambient Air Quality Monitoring Stations
CAT	Catchment Area Treatment
CBG	Compressed Bio-Gas
CEA	Central Electricity Authority
CEEW	Council on Energy, Environment and Water
CFA	Central Financial Assistance
CGD	City Gas Distribution
CHPs	Coal Handling Plants
CIL	Coal India Limited
CMPDIL	Central Mine Planning and Design Institute
CNG	Compressed Natural Gas
COP	Conference of Parties
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
CSTEP	Centre for Study of Science, Technology and Policy
DFPD	Department of Food and Public Distribution
DISCOM	Distribution Companies
DPRs	Detailed Project Reports
DST	Department of Science & Technology
E&A	Exploration and Appraisal
EBP	Ethanol Blending Programme
EC	Environment Clearance
EIA	Environment Impact Assessment
EMP	Environment Management Plan
EoDB	Ease of Doing Business
EVs	Electric Vehicles
FAQs	Frequently Asked Questions
FC	Forest Clearance
FDI	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce & Industry
FIPI	Federation of Indian Petroleum Industry

Abbreviation	Full Form
FM	Finance Minister
FY	Financial Year
GDP	Gross Domestic Product
GeM	Government e Marketplace
GHG	Green House Gases
GoI	Government of India
GW	Gigawatt
IEA	International Energy Agency
IEX	Indian Energy Exchange
IHR	Indian Himalayan Region
IOCL	Indian Oil Corporation Ltd
ISA	International Solar Alliance
IT	Information Technology
KPI	Key Performance Indicators
LED	Light-emitting diode
LNG	Liquefied Natural Gas
LPG	Liquefied petroleum gas
MEA	Ministry of External Affairs
MMDR	Mines and Minerals (Development and Regulation)
MMT	Million Metric Tonne
MMTPA	Million Metric Tonne Per Annum
MNRE	Ministry of New and Renewable Energy
MoC	Ministry of Coal
MoEF&CC	Ministry of Environment, Forests and Climate Change
MoM	Ministry of Mines
MoP	Ministry of Power
MoPNG	Ministry of Petroleum and Natural Gas
MToE	Million tonnes of oil equivalent
MW	Megawatt
NABET	National Accreditation Board for Education and Training
NCAP	National Clean Air Program
NDCs	Nationally Determined Contributions
NEP	National Electricity Policy
NERP	National Emissions Reduction Plan
NEST	New, Emerging and Strategic Technologies
NHs	National Highways
NIO	Notice Inviting Offer
NISE	National Institute of Solar Energy
NIWE	National Institute of Wind Energy
NLCIL	NLC India Limited

Abbreviation	Full Form
NOCs	National Oil Companies
OIL	Oil India Limited
ONGC	Oil and Natural Gas Corporation
OVL	ONGC Videsh Limited
PARIVESH	Pro Active and Responsive facilitation by Interactive and Virtuous Environmental Single window Hub
PAT	Perform, Achieve and Trade
PL	Prospecting License
PM	Prime Minister
PM	Particulate Matter
PM-KUSUM	Pradhan Mantri Kisan Urja Suraksha evamUtthaanMahabhiyan
PMUY	Pradhan Mantri Ujjwala Yojana
PNG	Piped Natural Gas
PoC	Point of Connection
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PRAGATI	Pro-Active Governance and Timely Implementation
PSC	Production Sharing Contract
PSE	Public Sector Enterprises
PSUs	Public Sector Undertakings
PXIL	Power Exchange India Limited
QCI	Quality Council of India
R&D	Research and Development
R&R	Rehabilitation & Resettlement
RE	Renewable Energy
RESCO	Renewable Energy Service Company
RFP	Request for Proposal
RGO	Renewable Generation Obligation
ROs	Retail Outlets
RP	Reconnaissance Permit
RTIs	Right to Information
SCCL	Singareni Collieries Company Limited
SEED	Sustainable Energy in Every District
SEIAA	State Environment Impact Assessment Authority
SGoS	Sectoral Group of Secretaries
SHRISHTI	Sustainable Rooftop Implementation for Solar Transfiguration of India
SHP	Small Hydro Power
SMEs	Small and Medium-sized Enterprises
TERI	The Energy and Resources Institute

Abbreviation	Full Form
TWh	Terawatt Hour
UDAY	Ujjwal Discom Assurance Yojana
UI	Unscheduled Interchange
ULBs	Urban Local Bodies
UMREPPs	Ultra-Mega Renewable Energy Power Parks
UNFCCC	United Nations Framework Convention on Climate Change

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