

Skill action plan to fuel transition from coal to renewable energy in India

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Foreword

Nations across the world are continuously enhancing their efforts to limit climate change. At the 26th UN Climate Change Conference of the Parties, also known as 'COP26', held in Glasgow in November 2021, India displayed its climate leadership with the announcement of its net zero target by 2070 and a strong commitment to turbo charge its economic growth with energy transition. Achievement of this ambitious target requires further leadership by the government, with crucial support from the private sector, civil society and the citizens themselves.

For almost a century, most of the world including India, depended on fossil fuels for economic growth. Today, to limit climate change and to negate the long term impacts of the global pandemic and geopolitical wars, a transition away from these fossil fuels towards renewable energy is imperative to sustain the same economic growth. This energy transition is bound to impact the institutions and the workforce along the value chains of these fossil fuels. The coal mining workers – the frontline community in this context, are one such group that have sustained India's power sector for generations. In light of transition to renewable energy, their interests need to be protected and their skills to be enhanced, to address their economic vulnerabilities and support their future sustenance. It is important to identify and include these institutions and workforce as integral part of this energy transition and support their evolution into an economy driven by renewable energy.

Only then, will this energy transition will be a just transition, and it will affirm India's pole position as the climate and energy leader globally.

Vikas Mehta

Executive Director, SED fund





Foreword

FICCI, in collaboration with EY, is pleased to present the report titled Skill Action Plan to Fuel Transition from Coal to Renewable Energy in India.

In the light of India's commitments to the environment and renewed Nationally Determined Commitments at the Paris Agreement and the more recent CoP 26, with a net-zero target for 2070, it is certain that there will be a transition and increased proportion of renewable sources in India's energy mix. This will impact the workers in coal mines, logistics and transportation, power plants, among others whose livelihood is linked to the coal value chain. These workers are also the most vulnerable group with low levels of education and little-to-no transferable skillset.

The Central and State Governments will have to plan for their transition well in advance to minimize and mitigate the livelihood risk. The solutions will have to be customized to meet the requirement of specific communities through planning for transition, continuous dialogues, mobilizing funds / financial planning and policy-level interventions.

This report has, therefore, been prepared with the objective of developing a framework for ensuring the successful transition with a focus on reskilling the workforce and preparing them for this transition from coal to renewable energy.

For the success of "Just Transition" plans, it is imperative that a holistic approach is adopted which includes planning and actions for skill development, economic development, regional development, and social support.

We believe this report will help in propelling the Governments' and the industry initiatives to address the complex issue of "Just Transition" in India and stimulate the policy direction in this regard.

We thank the contributors from the FICCI Power Committee and others from the industry and the Government for their valuable insights for the report.

Arun Chawla

Director General, FICCI



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Executive summary

With a population of 1.4 billion, India is the third-largest energy-consuming country in the world. It is also the third-largest emitter of greenhouse gases in the world, after China and the US. In 2016, India had ratified the Paris Agreement a year after it pledged its commitment through independently set Nationally Determined Contributions (NDC). India pledged a reduction in the emission intensity of its GDP by 33-35%. The NDCs also targeted to increase the share of the non-fossil fuel-based energy resources to contribute 40% of India's installed electric power capacity by 2030. Additionally, in the light of the recent COP26 conference, India has re-announced its commitment to mitigating climate change impacts and announced 2070 as its net-zero target year. To achieve this target, updated short term targets such as 500 GW renewable energy installed capacity by 2030, non-fossil-based sources contributing 50% of India's energy needs by 2030 and reducing the carbon emissions by 45% by 2030, will collaboratively drive India's efforts towards green economy initiatives.

Currently, India's power sector is one of the most diversified one in the world, with a mix of conventional resources like coal, lignite, natural gas, oil, hydro, and viable non-conventional resources like solar, nuclear, wind and biomass. However, thermal power generation by coal accounts for approximately 62% of the total generation capacity and with increasing energy demands, the dependence on coal is only expected to increase in the coming years. Thus, India must deal with the environmental externalities linked to the production and use of coal– its ecosystem is affected by mining, CO_2 emissions associated with coal use and impact on the environment at different stages of production. However, India has a dual challenge ahead of it–reducing its greenhouse gas emissions and doing while being least discomfiting to the population associated with the thermal sector.

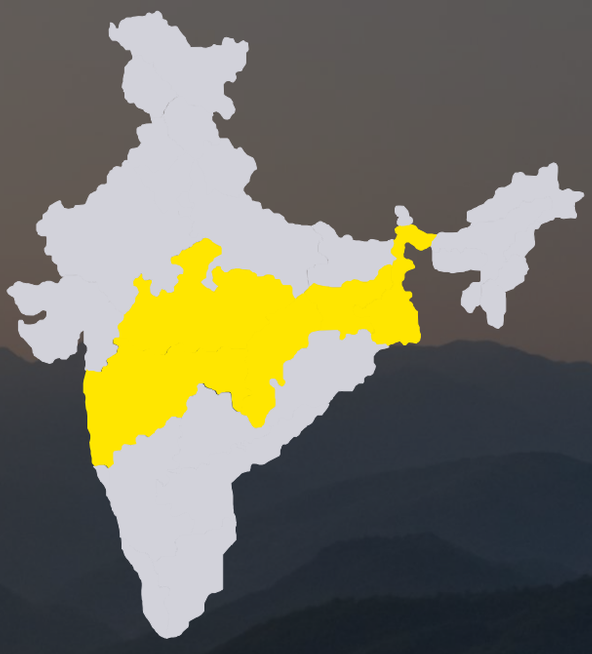
Indian energy policies are propelling a transition from conventional to clean fuel-based energy generation. The Government of India aims to target 500GW of RE capacity by 2030, including a short-term goal of 175 GW of installed RE capacity by 2022. This is one of the most ambitious renewable energy programs anywhere in the world. Interventions by the government like low taxes and subsidies providing cost competitiveness vis-à-vis thermal power generation and stringent environmental policies to reduce greenhouse emissions are further accelerating this transition.

As energy efficiency is receiving more attention, India's traditional thermal power plants and old coal mines are becoming a cause of concern. Coal India Limited, which accounts for the country's 80% coal output, has recently closed a staggering number of loss-making mines: 80 out of 350 mines. These units are mainly concentrated in five states- **West Bengal, Madhya Pradesh, Chhattisgarh, Jharkhand, and Maharashtra.** Further, the retirement of old and non-profitable coal-based units totalling 25,252 MW is expected for the period 2022-30.

The transition of the rapidly rising share of renewable energy and the long shrinking coal industry will bring economic and financial stress to people involved in the coal value chain. Coal mines create over 7.25 lakh direct jobs and many more indirect jobs. With the retirement of old coal plants and shutting down of mines (especially the underground mines), over 1.1 lakh persons are at immediate risk of loss of livelihood in the five key states listed above. Most of them are blue-collar workers with poor levels of education and a low transferable skill set. Apart from direct workers, the entire economy of mining districts revolves around coal-related activities and communities have relied on it for generations.

This introduces the concept of just transition, to address the economic vulnerabilities due to the potential loss of livelihood of the coal mine workers, which necessitates the regions that are undergoing energy transition are also paying enough impetus on facilitating economic diversification and livelihood promotion for the reintegration of the miners in the alternate industries. The just transition to be actualized needs to package interventions and programs that will enable the affected miners to gain new skills and resources to diversify themselves out of the coal mining industry.

The framework of actions for designing these measures and interventions for a just transition is presented in form of state skill action plans. **The skill action plan aims to present a blueprint or a framework of actions to empower the states with all the resources to help design/converge industry relevant skilling and livelihood promotion interventions for the transitioning miners**



The immediate impact of the mine closures is expected **to be reeled on the underground mines.**

Around **1.1 lakh miners expected** to be impacted across the 5 states **with maximum UG mines**

This will create **economic vulnerabilities** that will need to be addressed through need-based programmatic measures

Components of the Skill Action Plan

- Identification of geographical clusters, estimating potential job losses
- Assessment of the **target population**- miners
- Identification of **key industry drivers** and imperatives
- Creating **synergies** across ongoing skill enhancement and livelihood support programs

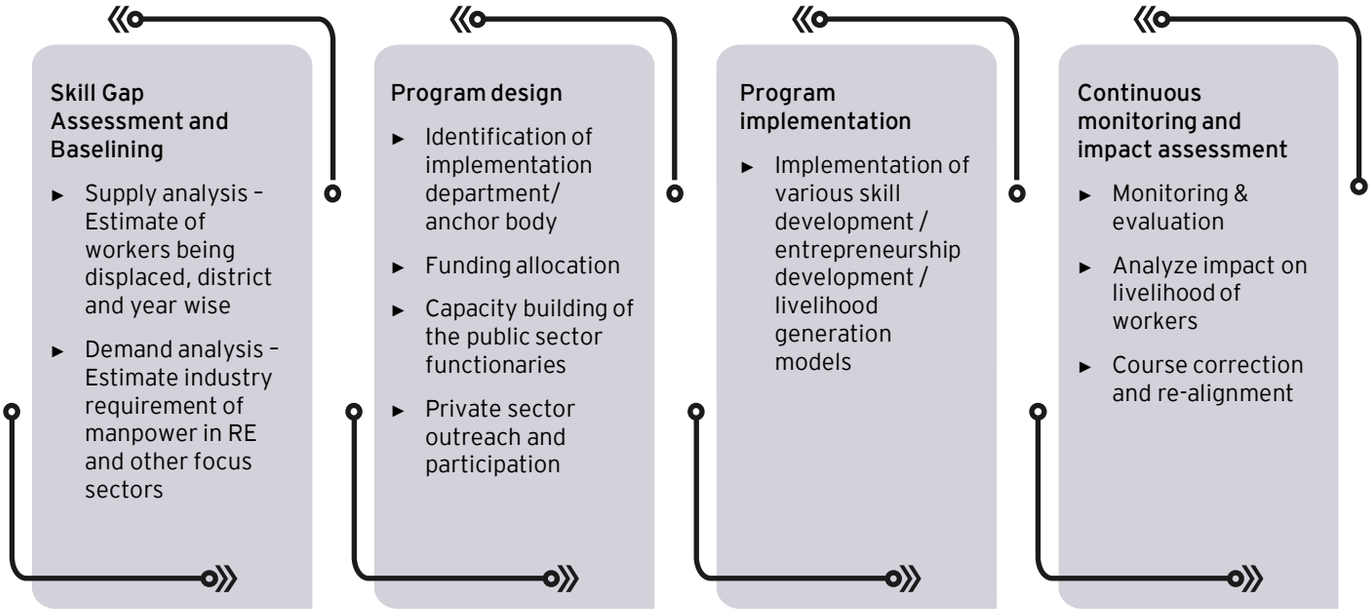
both financial and institutional

Planning and design elements

- **Collaboration and institutional strengthening** for funding and program delivery support
- **Capacity building** of functionaries to actualize the convergent program delivery
- **Monitoring and impact evaluation** to assess the benefits of the programs to the miners
- **Knowledge management** - repository of ready reckoners, global and national best practices etc

Implementation modalities

Roadmap for states for designing and implementing skill based just transition plans



On one hand, the individual state skill action plans will be resultant in assessment of the industry scenario, to estimate the employment opportunities in alternate sectors including renewable energy. And on the other hand, it will include an assessment of the transitioning mine workers and identification and synthesis of the social and development programs that can be packaged and presented to them to capitalize on, to enable them to gain new and marketable skills.

State skill action plans for a just transition to mitigate the human resource impact due to the coal phase-out, aims to provide transformative support to the mining workforce with targeted interventions for skilling/upskilling, employment, income guarantee, etc., to enable them to access employment and livelihood opportunities in other industries. For the policymakers, the state skill action plans envisage presenting a one-stop docket/repository of solutions and ready reckoners that the states can leverage to plan and implement interventions to help the miners acquire new skills.

The miners can be empowered with new skills and competencies through various skilling and entrepreneurship models for promoting livelihoods as:

- Skilling training through - training partner-led model, recruit train and deploy the model and managed Services Operating Partner (MSOP) model
- Entrepreneurship promotion through- Franchisee-based service entrepreneurs, last-mile delivery services led entrepreneurship development model and micro-business facilitation centres for startups

This report specifically focuses on the five states as indicated above, that is estimated to see the maximum number of mine closures in the coming years, i.e., Chhattisgarh, Maharashtra, Madhya Pradesh, Jharkhand, and West Bengal and aims to explain the key contours of a skill action plan that enables the states to harmonize the key program measures in the impacted areas to create synergies for mitigating the impacts of coal phase down

Framework to promote alternate livelihoods for the miners would primary be based on

- Identification of high demand industries and sectors (incl. renewable energy) in the impacted region
- The skill plan will aim to suggest the key programs and schemes that can be leveraged for reskilling and upskilling of the mine workers to enable their economic diversification and prevent livelihood loss
- Identify the key sectors/trades that the youth is currently getting trained, and accordingly provide recommendations to align the training with the industry demanded roles
- It would also aim to identify the aspiring entrepreneurs out of the beneficiary group to provide the enabling support to help them to harness the local potential
- While a few districts offer opportunities in alternate industries, some districts have a mono-economy characteristic, therefore necessitating a tailored approach for both.

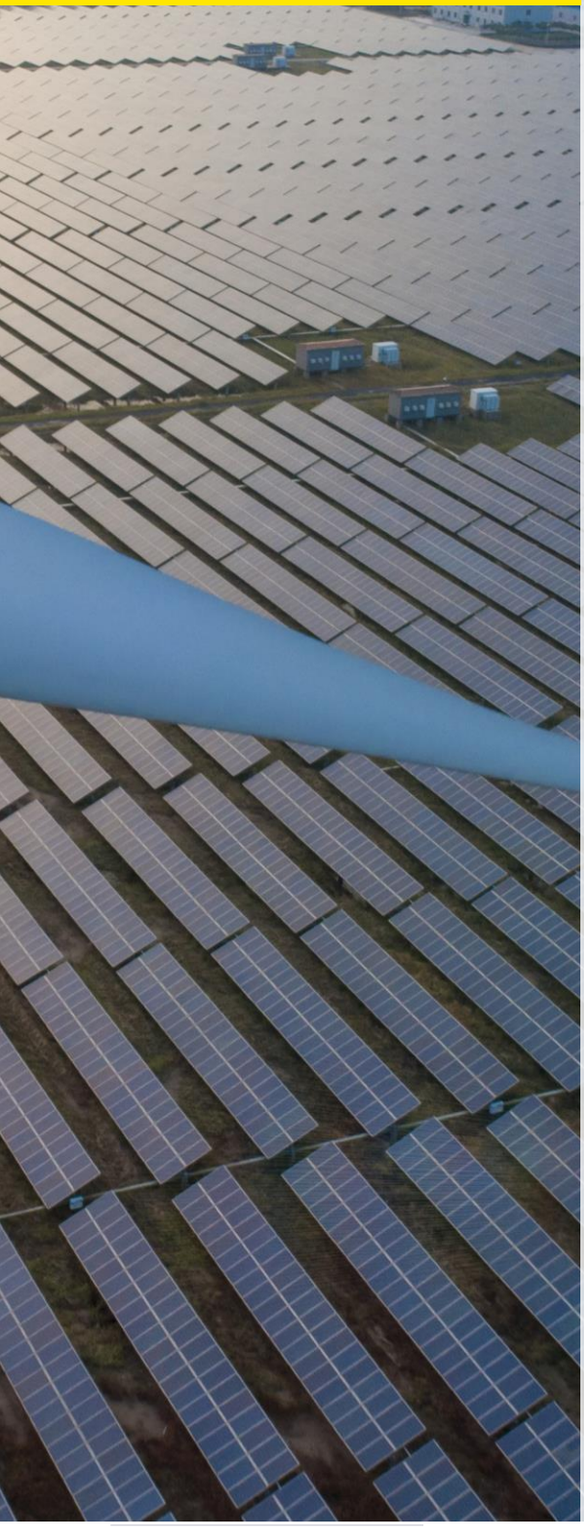
While it is anticipated that the 5 prementioned states will witness a potential loss of livelihood due to the imminent closing of underground mines, a preliminary industry assessment also highlighted some alternate sectors in the states that will create jobs due to private and public investment projects being in the pipeline. The skilling and livelihood generation programs need to necessarily empower the workforce to leverage the jobs to be created in such sectors. A snapshot of such alternate sectors across the states is indicated below:

Key sectors in Chhattisgarh for re-employment/economic diversification of the miners	
Major industries of the state	Metals and Minerals, Power, ESDM, steel, aluminum, food processing and textiles and apparel, forest produce
Upcoming industries	IT-ITES, Defense, New and Renewable Energy, Automotive, Pharmaceutical & Biotechnology, Textile, Plastic
Key sectors in Jharkhand for re-employment/economic diversification of the miners	
Major industries of the state	Agro-based industries, food processing, mining and mineral, heavy and light engineering, chemicals, healthcare and wellbeing, sericulture (tussar silk), handicraft, handloom, steel, tourism, auto components, power/energy
Upcoming industries	Textile and apparels, automobile, and electric vehicles, Electronics System Design and Manufacturing (ESDM)
Key sectors in Madhya Pradesh for re-employment/economic diversification of the miners	
Major industries of the state	Agriculture and food processing, textiles, pharmaceuticals, tourism, chemicals and minerals, engineering and equipment manufacturing, power
Upcoming industries	Automobile and engineering, defense, IT-ITES, ESDM, New and Renewable Energy, plastic, urban development, logistics
Key sectors in Maharashtra for re-employment/economic diversification of the miners	
Major industries of the state	Tourism, auto & auto components, textiles and apparels, IT-ITES, BFSI, food processing and oil and gas
Upcoming industries	Electrical vehicle, aerospace & defense, Industry 4.0, Textiles, biotechnology, medical devices, logistics, ESDM, minerals, green energy
Key sectors in West Bengal for re-employment/economic diversification of the miners	
Major industries of the state	Agriculture and horticulture, logistics, power, textiles, food processing, leather, electronics, healthcare, IT-ITES, gems and jewelry
Upcoming industries	Power (Gas), mines and minerals, logistics



1

Climate change and the need for transition



Climate change is one of the biggest challenges ever faced by mankind

Never in the history of mankind have we been posed with a challenge of this magnitude and significance. Our actions to address this issue will impact the lives of billions along with our continued existence on the planet. Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. And, if it continues to increase at the current rate, global warming is likely to reach 1.5°C between 2030 and 2052[1]. There is also an agreement amongst global scientific communities that an increase in global temperature of 2°C will be catastrophic for the sustainability of life on the planet.

What will happen if we continue the path of global warming? Afterall 2°C does not seem to be a very high difference considering the sustainable temperature range of -50°C to +50°C. There are various climate models which project that even a slight increase in temperature levels will lead to:

- Increase in mean temperature in most land and ocean regions leading to hot extremes in most inhabited regions. This means that number of extremely hot days in a year will continue to increase affecting the food production and livelihood in these regions. The duration and intensity of droughts will increase, and we will not be able to generate enough food to feed our population. A large amount of population will be forced to relocate owing to extreme temperatures and loss of livelihood, especially in agriculture-based economies.
- Increase in precipitation in several regions and drought and precipitation deficits in others. This simply means that the climate will become more and more unpredictable, and the intensity of floods, hurricanes and other natural calamities will increase. This will again make large portions of land unlivable as the unpredictability will allow even less time to prepare for such calamities.
- Rise in global mean sea levels anywhere between 0.26 to 0.77m by 2100 with global warming of 1.5°C and an addition 0.1m at 2°C[2]. Ice sheet instability in Antarctica and Greenland could result in multi-meter rise in sea level over hundreds to thousands of years. The water levels will rise causing large portions of land to submerge underwater. This would mean rehabilitation will be required for population residing in small islands, low-lying coastal areas and deltas.
- Loss of biodiversity and ecosystems leading to species loss and extinction. Many insects, plants and vertebrates will lose their climatically determined geographic range and will not be able to adapt to difference in temperatures leading to mass extinction of species. This will have a domino effect on the food chain leading to an even higher rate of extinction of species and devastation of entire ecosystems which have been sustainable for millions of years. As the temperatures rise, forest fires will also become more and more prominent, wiping out natural habitats of many species.
- Increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels. This will pose high risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans. It is expected that a rise of 2°C will wipe out the coral reefs and cause an irreversible loss to many ecosystems. This will also mean decreased productivity of fisheries and lower food availability and loss of livelihood for societies largely dependent on sea food.

[1] IPCC Global warming of 1.5°C

[2] IPCC Global warming of 1.5°C

The economic impact of climate change is expected to be trillions of dollars which includes the cost of adaptation, loss of infrastructure, etc. Apart from the economic loss, there will be a loss of millions of lives along with priceless ecosystems and species. It is also expected that most of the impact will be faced by the most poor and vulnerable communities who contribute the least towards carbon emissions. Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are disproportionately higher for indigenous peoples, and local communities dependent on agricultural or coastal livelihoods. As the traditional sources of livelihood like agriculture, livestock and fisheries management will become increasingly challenging, the susceptible regions will face large scale migration in the search of alternate livelihood options. Thus, there is an urgent need for governments and policy makers to think about just transition plans for these communities to reduce their susceptibility to poverty.

The transition towards carbon neutrality is one of the most challenging tasks faced by mankind so far	
Almost every human activity release greenhouse gas	Achieving net zero carbon emissions is an extremely uphill task considering every activity that we do emits greenhouse gases – from manufacturing of things, producing energy, agriculture & animal husbandry, transportation, temperature regulation etc.
Achieving carbon neutrality will require collaboration at a global level	Achieving carbon neutrality is going to be immensely hard, because it would require a collective action from all countries across the globe. Global consensus is notoriously hard to achieve especially on something that requires countries to spend valuable resources today for a better climate tomorrow.
Carbon neutrality will require technology, policy, and markets to work in tandem	All three factors are equally important to achieve carbon neutrality. Technology needs to be developed which allows us to conduct our current activities in a more efficient yet sustainable manner and at a cheaper cost. World governments should create a conducive policy environment to promote these technologies / solutions and act as a catalyst. The markets need to be supported to develop and implement these solutions at scale and cost.

Transition can only be successful if it safeguards the interests of communities most vulnerable to change

A transition of this magnitude is bound to create winners and losers. There will be communities where jobs in the coal sector or oil and gas sector will be replaced with jobs in the renewable energy sector. Blue collar workers whose livelihoods rely on coal mining is one such example and the transition will be unfairly hard on them. Coal mining regions usually consist of "mono-industry" towns which are highly dependent on extraction of coal for livelihood. Such regions face multiplying and damaging impacts from such transition. The loss of mining employment substantially reduces the flow of income through these local economies—affecting retail, food services, and other dependent sectors, as well as social services. It is critical that policy makers start thinking about "Just Transition" of these workers and communities to ensure that nobody ends up on the losing end of this transition.

The solutions will vary from place to place and will need to be shaped by local leaders. The central government will also have an important part to play through overall planning, providing funding and technical advice, and by connecting communities around the country that are experiencing similar problems so they can share what's working. The policy makers will have the important task of finding alternate livelihood opportunities for these communities and reinvigorating the economy of these regions. Finally, it's understandable that people worry about how the transition might make it harder for them to make ends meet. Government needs to start acting now and continue in a phased manner to build confidence amongst these communities and to ensure that there is minimal impact on livelihoods of these people. As these are some of the poorest and most vulnerable communities, even a short-term disruption in employment will be devastating for these communities.





2

India's transformation towards a carbon neutral economy

The world has its eyes on India to be the face of this transition

India is the world's third largest emitter of greenhouse gases, after China and the US. However, India has a dual challenge ahead of it – to bring millions of people out of poverty, and to do that while reducing its greenhouse gas emissions. So far, no country has managed to lift itself out of poverty without a concomitant surge in emissions. China's spectacular economic rise, for example, led to an explosive jump in its carbon emissions, making it the world's largest emitter. While the emissions from developed countries such as the US and China have plateaued or declining, India's emissions are expected to rise if it follows China's footsteps towards development. India has a unique opportunity to show the world that development can happen in a sustainable manner and to set an example for rest of the developing countries.

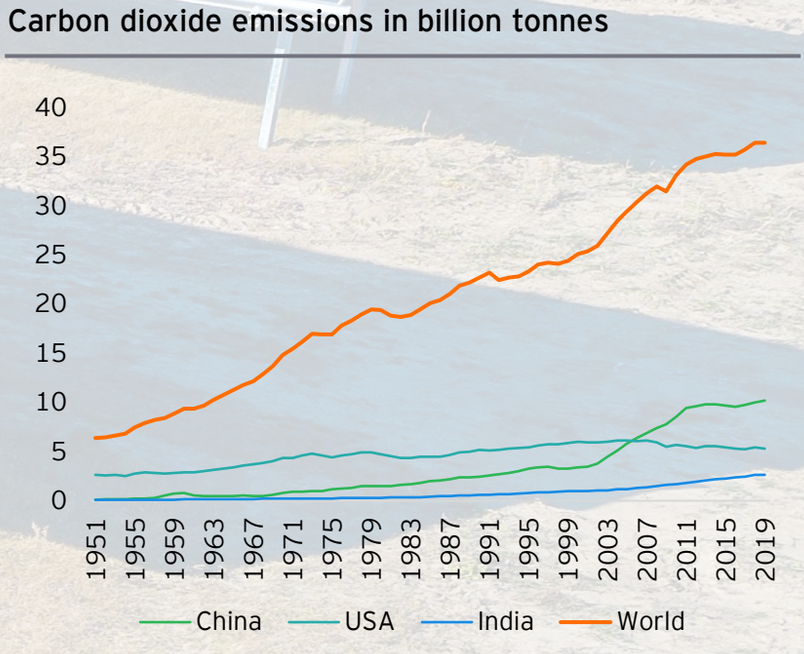


Figure 1
Carbon dioxide emissions in billion tonnes

Source: Hannah Ritchie and Max Roser (2020) - "CO_2 and Greenhouse Gas Emissions". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/CO2-and-other-greenhouse-gas-emissions' [Online Resource]

India's per capita CO_2 emissions stood at around 1.9t in 2019, which is just 12% of the per capita emissions of US and 41% of the world average[3]. India has an unfair burden to curb its greenhouse emissions even though it has been a significantly less contributor to global warming as compared to its developed world counterparts — who have already leveraged the power of fossil fuels to propel their growth. India is also very vulnerable to climate change, notably due to its hot weather, the melting of the Himalayan glaciers and changes to the monsoon season due to global warming.

Per capita carbon dioxide emissions in tonnes

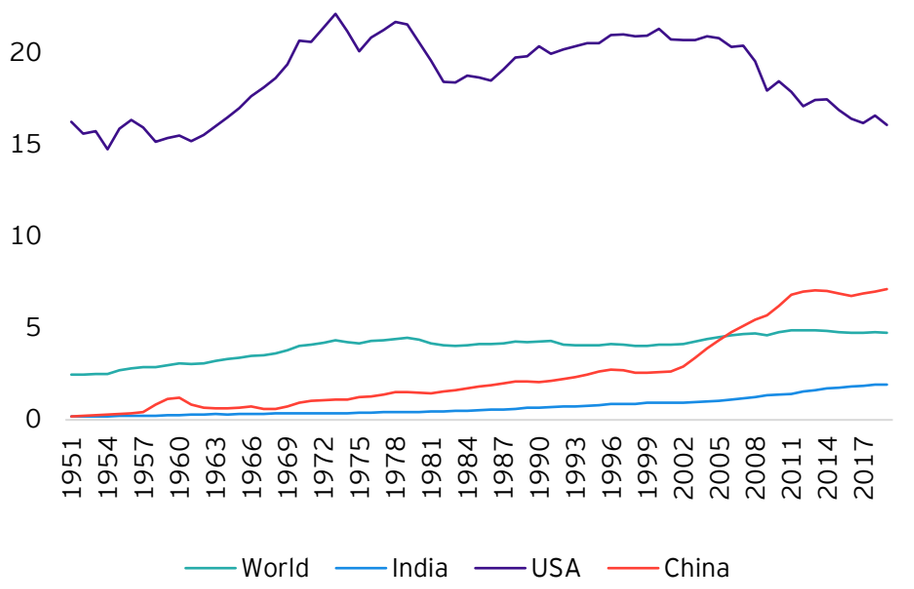


Figure 2

Per capita carbon dioxide emissions in tonnes

Source: Hannah Ritchie and Max Roser (2020) - "CO_2 and Greenhouse Gas Emissions". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/CO2-and-other-greenhouse-gas-emissions' [Online Resource]

India has set forth a target for achieving net-zero by 2070, at the COP26 conference while insisting on a "coal phase down" approach as opposed to a "coal phase-out" approach

During the Paris Agreement conference held in 2016, 196 nations participated and as a long-term climate commitment, it was negotiated that to tackle the greenhouse emissions and rising global temperatures, the nations must tread to achieve a net-zero target by 2050. India in 2016 ratified the Paris Agreement and pledged a 33–35% reduction in the "emissions intensity" of its economy by 2030, compared to 2005 levels as a part of its intended nationally determined contribution, INDC to the United Nations Framework Convention on Climate Change (UNFCCC). It also included an aim to generate 40% of its energy requirements from renewable sources by 2030 (as against a prevailing 23.4%), which would have necessitated 450GW of installed renewable energy capacity by 2030.

[3] CO_2 and Greenhouse Gas Emissions. Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/CO2-and-other-greenhouse-gas-emissions' [Online Resource]

However, in the more recent UN Climate Change Conference, 2021, held in Glasgow, also known as the COP26 conference, India set forth short term, medium-term, and long-term plans to reinstate its enhanced commitment to mitigating the climate challenge. India taking cognizance of its current development and industrial partake, has committed to the world to achieve a net-zero target by 2070. In addition, it also pledged to achieve the following by 2030[4]

- 50% of power to come from renewables
- Reach 500 GW of installed renewable energy capacity
- Reduce carbon intensity by 45%
- Reduce projected total carbon emissions by 1 billion tonnes

For a developing country like India, phasing down coal would mean developing alternate, efficient, and cost-effective resources that will help meet its energy requirements that are only growing with industrial growth and economic development. To eventually meet its coal phase-down plans, India will now have to initiate mission mode projects to increase its RE capacity. The short term 2030 goals intend to lead India to the eventual carbon emission reduction and coal phase down over the next 40 years.

While the earlier phase-out paradigm was focused on the elimination of fossil-based energy sources, the active use of the terminal phase down now stresses the fact that each country, basis its position in the development cycle will be forming its comprehensive plan to promote the use of renewable energy keeping in mind the needs of the people. For a country like India, carbon emission reduction will go beyond just big industries, for example, the population that still lacks power supply or LPG based cooking sources, depend on woodfire for their needs. Therefore, the government to support its emission reduction goals will have to continue to subsidize clean fuel for the masses while investing big time in RE sources. India currently meets about 20% of its electrical energy requirement from renewable energy and the renewed target is 50% (which is 12 percentage points more than what market factors would facilitate). This means rapid electrification of industries, transport, and infrastructure. While India was already working towards 450 GW of non-fossil sources of installed capacity, the new target will require India to more than triple the present non-fossil fuel capacity in less than a decade. Additionally, it will require strengthening the grid infrastructure, enhancing energy storage across the grid, better forecasting, and scheduling, and improving the financial health of power distribution companies.

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 viable non-conventional sources such as wind, solar and biomass. India's generation is primarily dominated by thermal generation contributing approximately 62% of the total generation capacity.

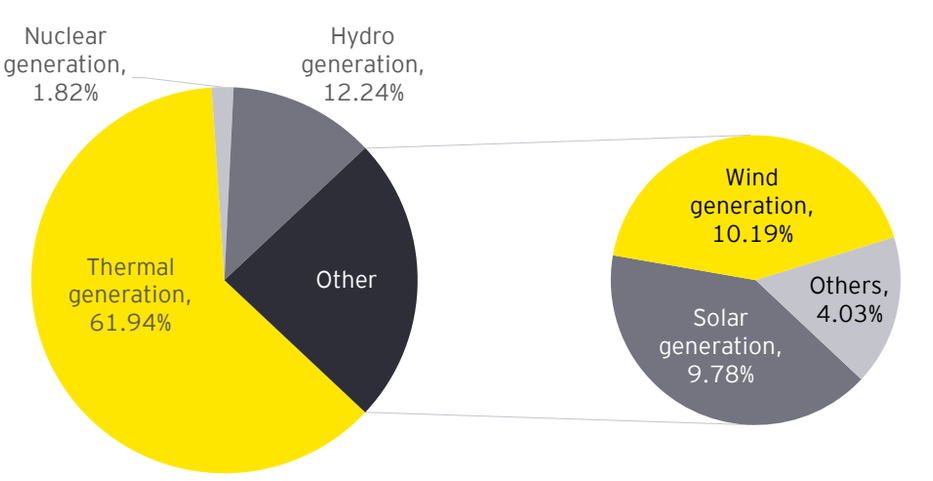


Figure 3
India's energy generation mix

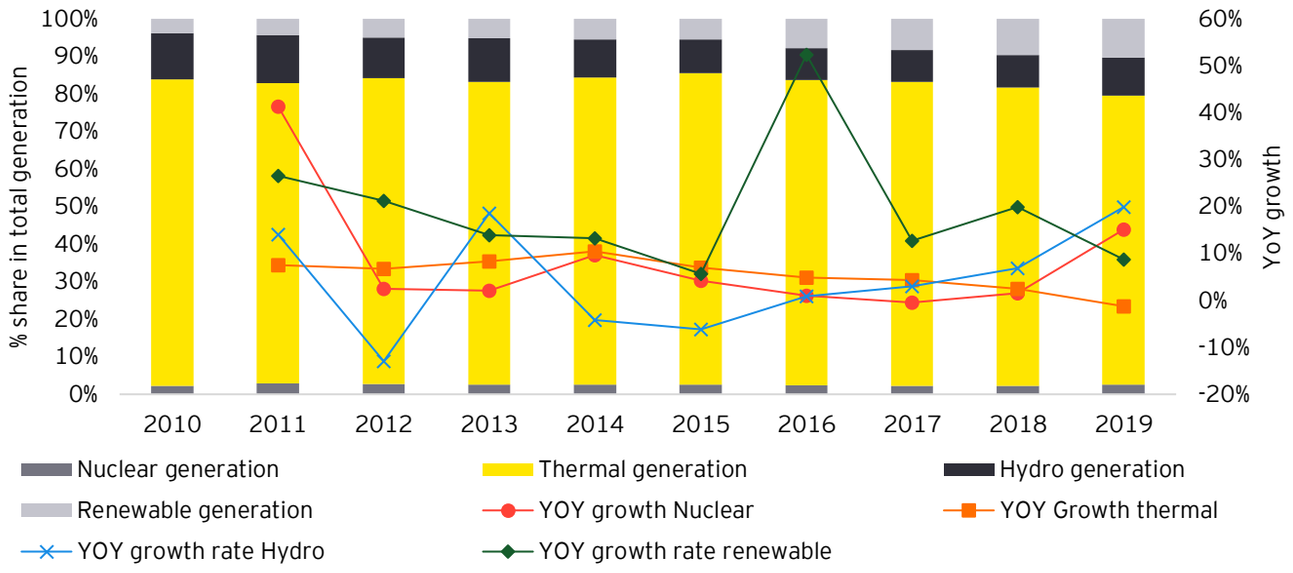
Source: India's generation mix (October 2020)

[4] WRI India (2021), COP26: Unpacking India's Major New Climate Targets

While, thermal energy (coal) remains the dominated source of power generation, the country's generation mix is witnessing a transition from conventional generation to the clean fuel-based energy generation. In 2019, the total energy generation stood at 1,579+ Billion Units[5]. Since 2014, the energy generated from fossil fuel based has grown with a five-year CAGR of 3.45%, while the renewable energy-based energy generation has increased at a five-year CAGR of 18.77%. The share of fossil fuel-based generation has also reduced from 81.7% (in 2014) to 77% in 2019.[6]

Figure 4
Energy generation growth statistics

Source: Energy statistics India 2021, MOSPI



India was already on track towards its target of achieving 40% of its total power capacity from renewable energy (RE) sources by 2030, which now will have to be enhanced to meet 50% of its power capacity from renewable sources. India has a great potential for harnessing the power from renewable energy sources. One of India's major advantages today and going forward is that its RE potential is vast and largely untapped. Recent estimates indicate that India's solar potential is greater than 750 GW, wind potential of 302 GW and small hydro potential of 21 GW[8].

While the coal production has been steadily growing but its growth is likely to decline in the next decade. The reasons attributable to its stagnant or negative growth are:

A. Policy enablement by GoI towards green energy

The overarching objectives of Indian energy policy are to provide access and affordability. However, in recent years, environmental concerns have risen the ranks of policy priorities. This has been due to the worsening of environmental challenges such as local air pollution and water scarcity, as well as increasing cognizance of the threats posed by global climate change to Indian sustainable development. It has also been driven by the increasing economic competitiveness of alternatives to fossils, notably in the power sector.

The following policy objectives summarize the high-level thrust of Indian energy policy as it relates to the issue of coal sector transition:

[5] Source: www.eia.gov

[6] Energy Statistics Report, MOSPI

[7] Source: Ministry of New and Renewable Energy, Press release. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1737805

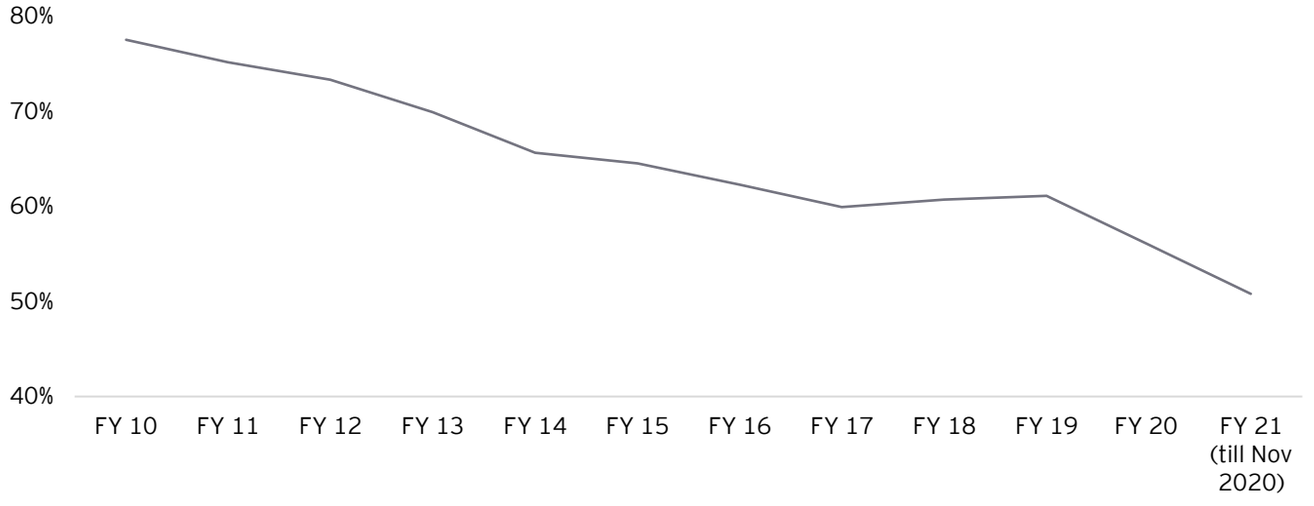
[8] Annual Report 2020, Ministry of New & Renewable Energy; https://mnre.gov.in/img/documents/uploads/file_f-1597797108502.pdf

- The Government of India aims to achieve 175 GW of renewable energy generation capacity by 2022, which would drive up the share of RE in electricity generation (excluding large hydro) from the current level of 7% to about 20% within the space of a few years[9]. In addition, now there will be renewed focus on the driving up these initiatives to reach a 50% energy generation from RE and 500 GW RE capacity installation by 2030.
- The National Electricity Plan prepared by the Central Electricity Authority under the Ministry of Power targets 275 GW of renewable capacity by FY2026–27 and a total share of non-fossil fuel capacity of 57.2%.[10]
- According to the National Electricity Plan, a net increase in coal fired power generation capacity of 21% by 2027 should occur, taking the installed capacity from 197 GW today to around 238 GW. According to the document, this is required to meet rising demand, but more particularly to provide peaking and load-following power to compensate for variable renewables. This growth rate of installed coal capacity would represent a significant slowdown compared to the pace seen over the last 10 years.
- The government had set the target of achieving 1000 Mt of domestic coal production by 2024, to meet demand and reduce imports.[11]
- The Ministry of Environment and Forests released new, stringent norms for emissions of local air pollutants (NOx, SOx, and particulate matter) from coal fired power plants, and had targeted 2017 for their implementation. However, in the face of widespread non-compliance and requests from the Ministry of Power, the implementation of these norms has been pushed back to 2022. The implementation of these norms is expected to raise the cost of coal-fired electricity by some 0.2–0.3 R/kWh.

These policies aim to accelerate the transition from coal-based energy to renewable energy while balancing the objective of meeting demand growth and affordability.

B. Limited capacity addition in coal-based power generation in next decade

Figure 5
Plant load factor of coal based plants



More than 80% of the coal produced in the country is being used for coal-based power generation. In the next decade, country plans to add to merely 60 GW. This is further coupled with declining plant load factor (PLFs) of coal-based plants which has reached to a level of 50.8% in FY 21 (cumulative till November 2020)[12]. The objective of having thermal capacity would be not to meet rising demand, but more particularly to provide peaking and load-following power to compensate for variable renewables. This growth rate of installed coal capacity would represent a significant slowdown compared to the pace seen over the last 10 years.

[9] Source: Mnre.gov.in

[10] National Electricity Plan, Ministry of Power

[11] Source: Ministry of Coal, Press release https://pib.gov.in/Pressreleaseshare.aspx?PRID=1590009

[12] Source: https://powermin.nic.in/en/content/power-sector-glance-all-india

C. Cost competitiveness of renewable

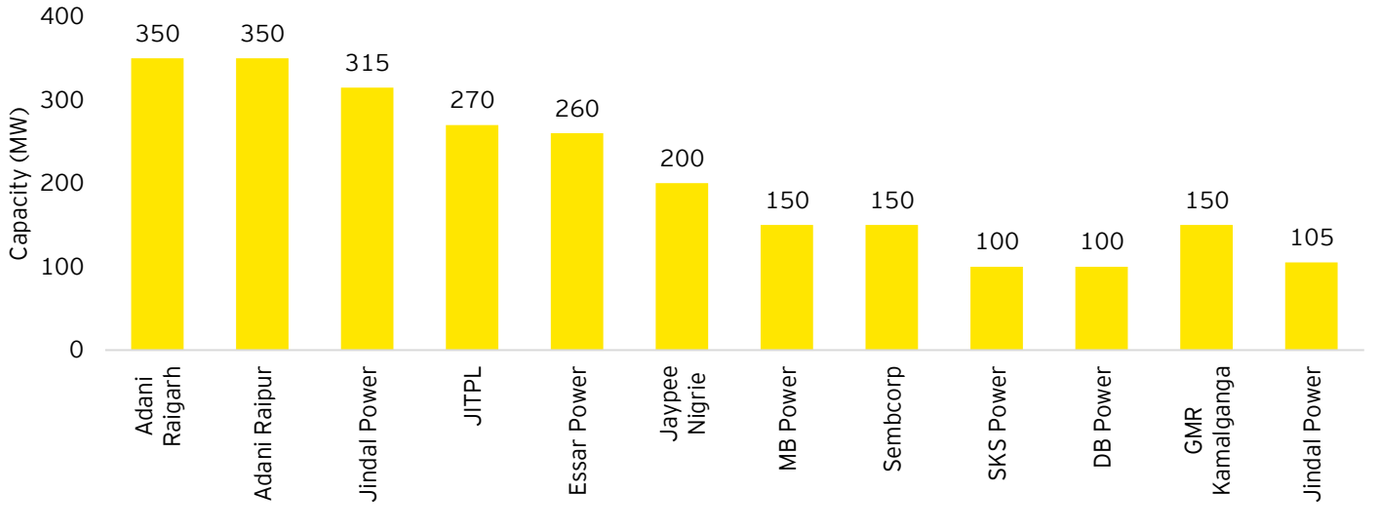
In India, renewable energy tariffs have become more competitive and are significantly lower than thermal generation sources. With the increasing competitiveness in renewable energy tariffs, the utilities and electricity sector authorities are becoming reluctant to sign long term power purchase agreements (PPA) with thermal sources-based power generation plants.

Recently, Uttar Pradesh Electricity Regulatory Authority (UPERC) has prohibited state power utilities from signing any long-term power purchase agreements (PPA) till December 2022 stating that state power utilities had already contracted for "sufficient" thermal power with coal-fired power plants to meet projected demand till 2026–27.

The recent PPA (25 years) signed in May 2020 between Madhya Pradesh Power Management Company Limited with Adani Power for 1320 MW of thermal power at a tariff of INR 4.79/unit (INR 2.90/unit as fixed charge and INR 1.89/unit variable charge) is witnessed after five years by the industry.[13] After the last long-term PPA was concluded in Kerala in 2015, several such bids were postponed or cancelled.

Earlier in 2020, multiple private power generation companies like Adani Power, Jindal Power, GMR Energy and Essar Power have quoted INR 3.26 per unit tariff for power supply to states. The lowest ever tariff for medium-term power contacts, was a desperate move by the stressed thermal power sector, which is facing intense competition from solar and wind power plants, the lowest bid from coal-based power projects in years.

Figure 6
Thermal capacity allocated under PFC's 2500 MW



On the contrary, the renewable energy tariffs are hitting a new low with every auction conducted by Solar Energy Corporation of India (Central Government entity responsible for renewable energy procurement). The graphs in Figure 6 present the journey of renewable energy tariff in last couple of years in India, which is significantly competitive as compared to thermal power tariffs.

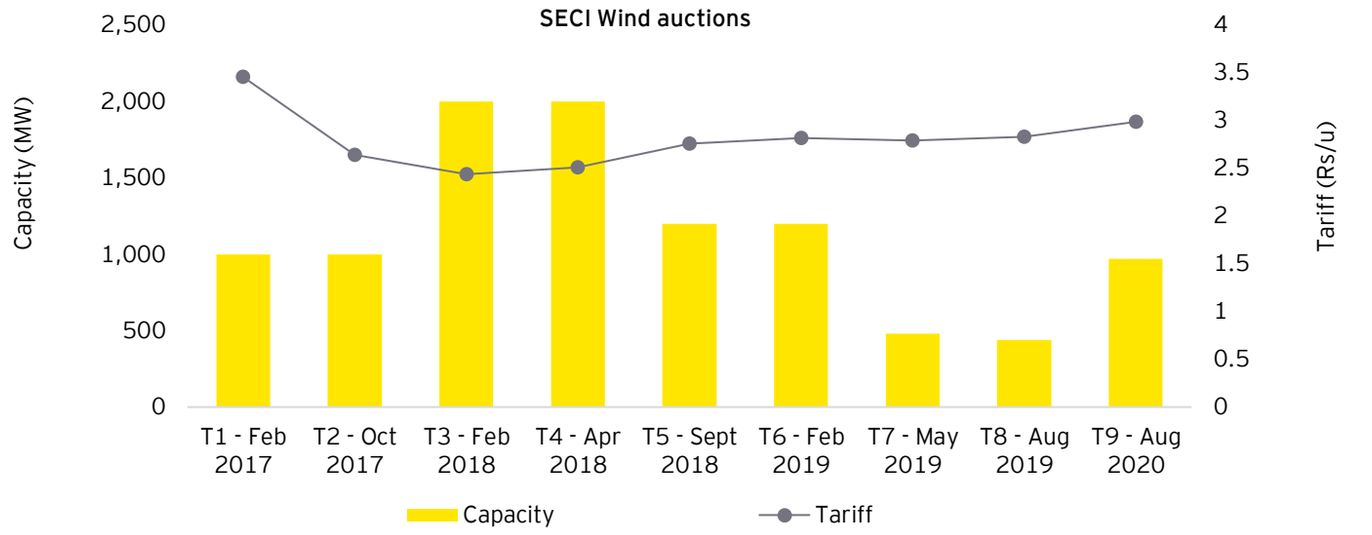
While the SECI solar procurements has witnessed a tariff of INR 2/unit, the country has already witnessed solar tariff of INR 1.99/unit under the procurement management by Gujarat Urja Vikas Nigam Limited (State power sector entity) for 500 MW of capacity.[14] The solar tariff discovered in recent auctions are less than 50% of thermal tariffs being signed by Madhya Pradesh State Utilities.

[13] Source: Financial Express, https://www.financialexpress.com/industry/new-ppa-after-5-years-madhya-pradesh-approves-pact-with-adani-power/1975419/

[14] Source: Mint, https://www.livemint.com/industry/energy/solar-power-tariff-dips-to-all-time-low-of-1-99-unit-11608549136039.html

Figure 7

Renewable energy tariff trends in India - Wind



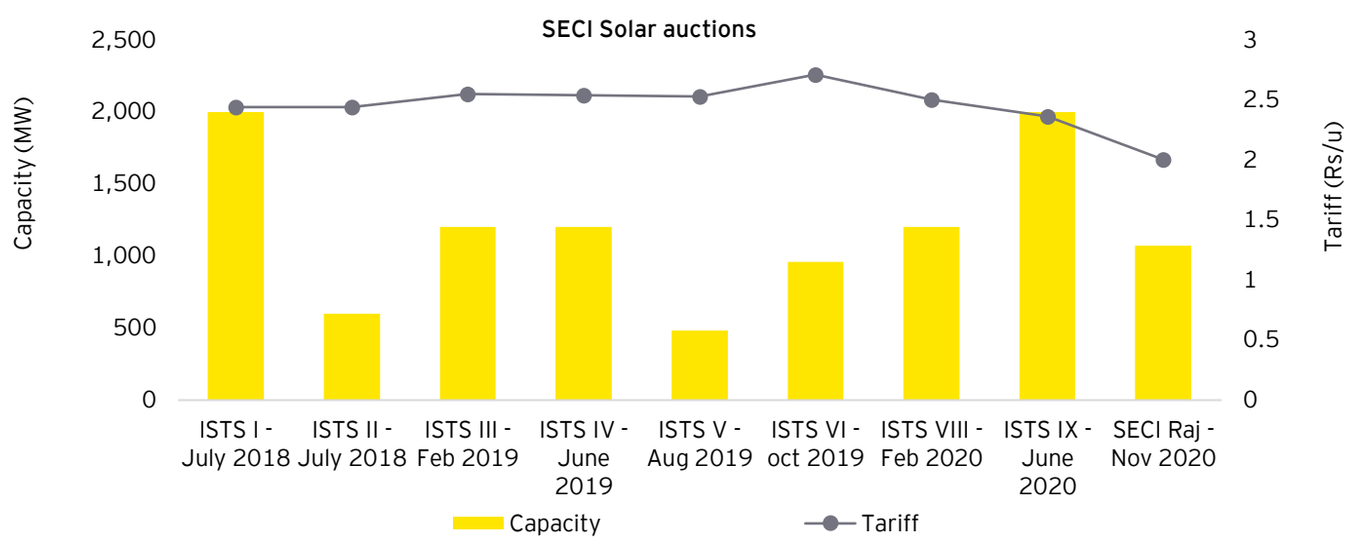


Figure 8

Renewable energy tariff trends in India - Solar

With the help of the national policies, cost competitiveness of renewables and increasing focus on environmental issues, India was hopeful to achieve its previous Nationally Determined Contribution (NDC), which can be expected to be renewed given the COP26 context. However, Climate Action Tracker rates India's NDC target as "2°C compatible" indicating that India's climate commitment in 2030 is a fair share of global effort based on its responsibility and capability. The 2°C compatible category refers to the 2°C goal adopted by the Copenhagen Agreement in 2009, which was replaced by the 1.5°C limit in the Paris Agreement, providing a historical reference point and bridge to the Paris Agreement compatible category rating. While India's 2°C is not consistent with the Paris Agreement and domestic emissions need to peak and start reducing, including with international support. There is potential for India to become a world leader with enhanced 1.5°C compatible targets and a just and swift transition away from coal and accelerate the transition to renewable energy exists, which would bring large benefits for sustainable development including health and employment.

While no new coal-fired power station has been built in the first half of 2020, India keeps planning for more coal capacity, despite utilization rates of coal power plants falling and their profitability already at risk. Based on current coal expansion plans, capacity would increase from currently more than 200 GW to almost 300 GW over the coming years. Coal production is increasing and is on track to reach a billion tons by 2024.



3

Estimating the impact of transition on India by 2030



Despite the ambitious NDC target, India's dependence on coal is only going to increase in the coming decade owing to increase in the demand for energy

India is second on the list of the world's largest coal-producing countries, producing around 715.95 MT (730.87 in 2019–20) in 2020–21 – just under 10% of the global share[15]. State-owned Coal India, the world's largest coal-mining company, accounts for around 80% of the country's output and has more than 350 mines in operation. The dependence on coal is only expected to increase in the coming years.

In addition, India also imports 196.34 MT (248.54 MT in 2019–20) of coal in 2020–21. Coking Coal is being imported by Steel Authority of India Limited (SAIL) and other steel manufacturing units mainly to bridge the gap between the requirement and indigenous availability and to improve the quality[16]. Coal based power plants, cement plants, captive power plants, sponge iron plants, industrial consumers and coal traders are importing non-coking coal. Coke is imported mainly by pig-iron manufacturers and iron and steel sector consumers using a mini-blast furnace.

Although the Covid-19 pandemic had marginally reduced the demand of coal in the last year, the demand is only expected to rise in the coming decade – before it eventually peaks and starts declining. The increase in demand till 2030 will be driven by increase in the demand for coal in power generation and manufacturing processes.

[15] Source: Ministry of Coal, Press release https://pib.gov.in/Pressreleaseshare.aspx?PRID=1685058

[16] Source: Annual Report, Ministry of Coal http://coal.nic.in/sites/default/files/2021-03/chap8AnnualReport2021en.pdf

Sector		2015-16	2016-17	2017-18	2018-19	2019-20
I.	**Coking coal (MT)**					
1	Steel/ Coke oven & cookeries (indigenous)	12.522	10.336	11.447	12.813	17.141
2	Steel (import)	44.561	41.644	47.003	51.838	51.833
	Total Coking coal	**57.083**	**51.980**	**58.450**	**64.651**	**68.974**
I.	**Non - Coking coal (MT)**					
3	Power (utilities)	435.438	483.124	490.987	533.400	534.256
4	Power (captive)	62.263	34.645	44.057	77.153	77.153
5	Cement	11.357	8.985	6.356	8.597	8.597
6	Sponge iron	17.766	7.763	5.557	10.443	10.443
7	BRK & others including fertilizer	64.426	85.403	88.685	90.388	59.180
	Total Non-Coking coal	**591.250**	**619.920**	**635.642**	**719.981**	**689.629**
8	Non-Coking coal (import)	159.388	149.309	161.245	183.510	196.704
	Total supply (I. + II.)	**807.721**	**821.209**	**855.338**	**968.142**	**955.307**

Table 1
Coal Supply in India

Source: http://coal.nic.in/sites/default/files/2021-03/chap8AnnualReport2021en.pdf

As evident from the table above, the two major areas where coal is required are for power generation and industrial processes. We will project the country's coal requirement for both and try to estimate the country's total coal demand by 2030.

Power generation

The demand for energy in India was estimated to be 1291.01 BU in 2019–20[17]. Although the demand for energy was increasing at a CAGR of 4.9% from 2014–2019, it only grew by 1% in the year 2019–20. This can be attributed to the Covid-19 pandemic, which is likely to impact the demand for energy in FY 21 as well.

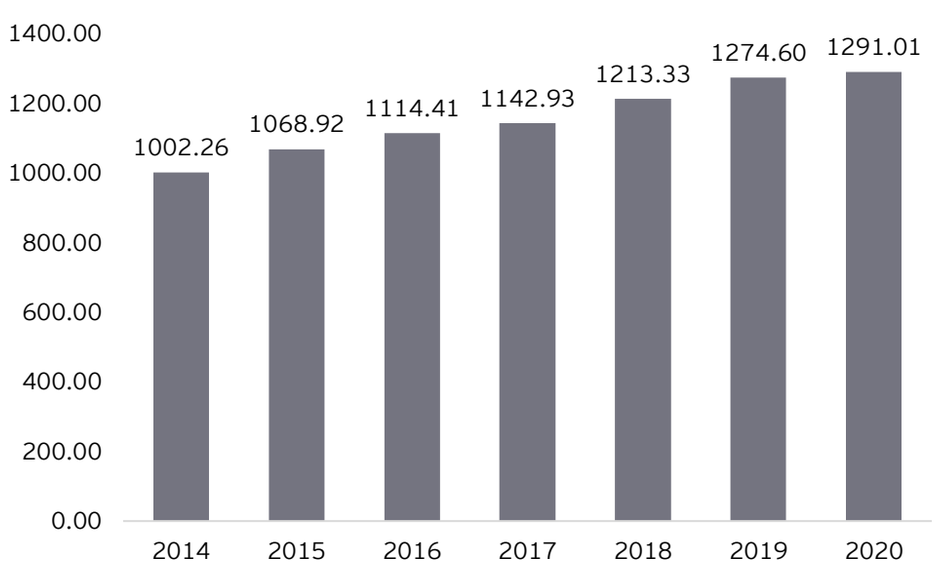


Figure 9
Energy Demand India (BU)

Source - Ministry of power, CEA

[17] Ministry of Power, CEA

The Central Electricity Authority (CEA), Ministry of Power projects gross electricity generation (BU) during the year 2029–30 likely to be 2,518 BU comprising of 1,393 BU from Thermal (Coal, Gas and Lignite), 801 BU from RE Sources, 207 BU from Hydro, 4.4 BU from PSS and 113 BU from Nuclear. The technology wise capacity and generation estimates in 2029–30 are shown below .

Generation estimates 2030 (BU)

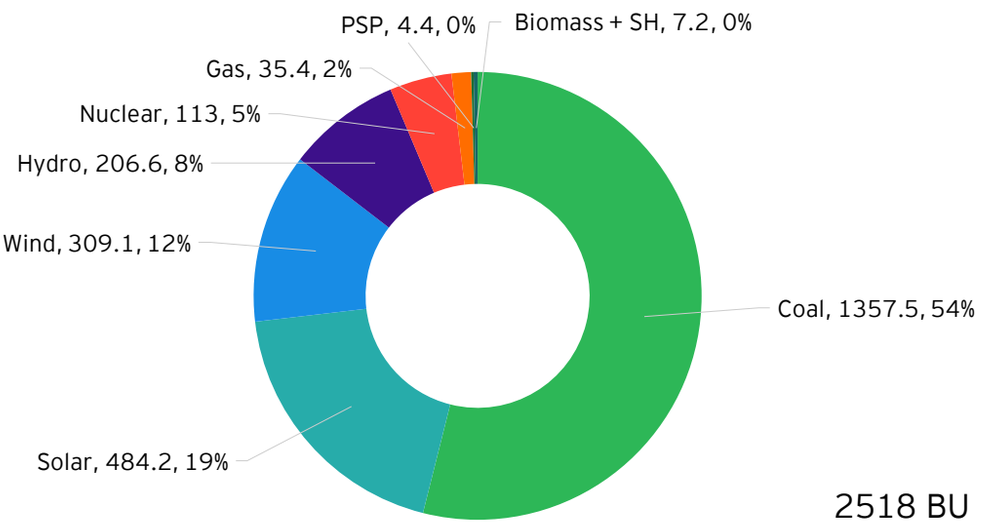


Figure 10
Generation estimates for 2030

Source: Report on optimal generation capacity mix for 2029-30, CEA, Ministry of Power

Capacity (MW)

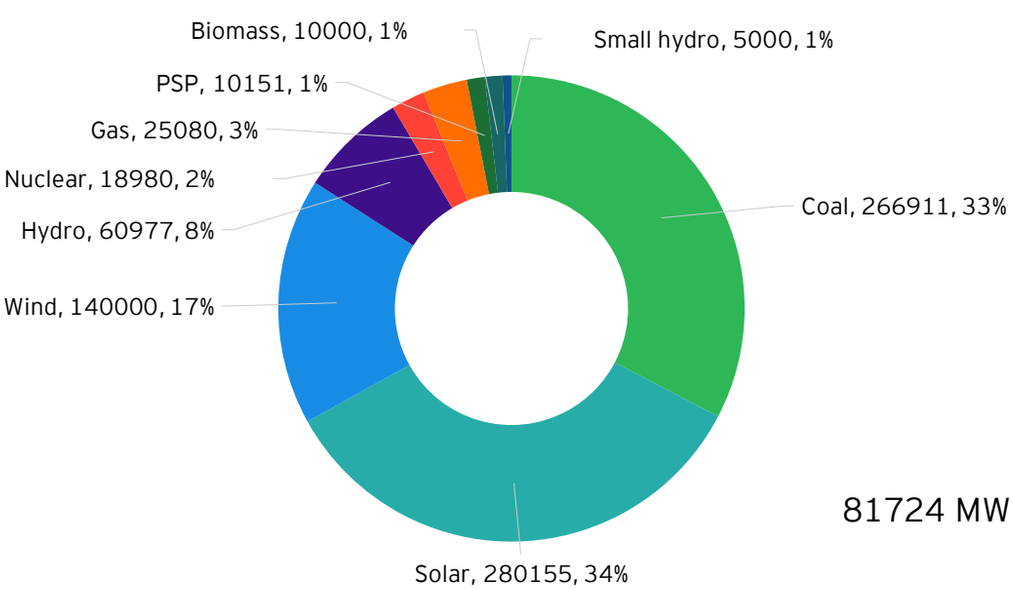


Figure 11
Capacity estimates for 2030

Source: Report on optimal generation capacity mix for 2029-30, CEA, Ministry of Power

[18] Report on optimal generation capacity mix for 2029-30, CEA, Ministry of Power

This indicates that coal will have a major role to play in India's power generation mix even in 2030 with almost 54% (1358 BU) of energy being generated by coal, even though its capacity is expected to be reduced to one-third of the total mix.

The coal requirement for the year 2029-30 has been worked out to be about 892 MT considering specific coal consumption of 0.65kg/kWh + 1% transportation loss[19]. Currently about 10% of the coal required for power generation is imported, primarily for coal power plants which are designed to run only on imported coal. The share of imported coal in power generation increased from 9.4% in 9MFY19 to 11.2% in 9MFY20. However, India plans to stop all coal imports by power plants by FY 2024, as announced by Union Coal Minister in February 2020. Therefore, is it safe to assume that India will have to domestically produce 892 MT of coal by 2030 just for power generation purposes.

Industrial processes

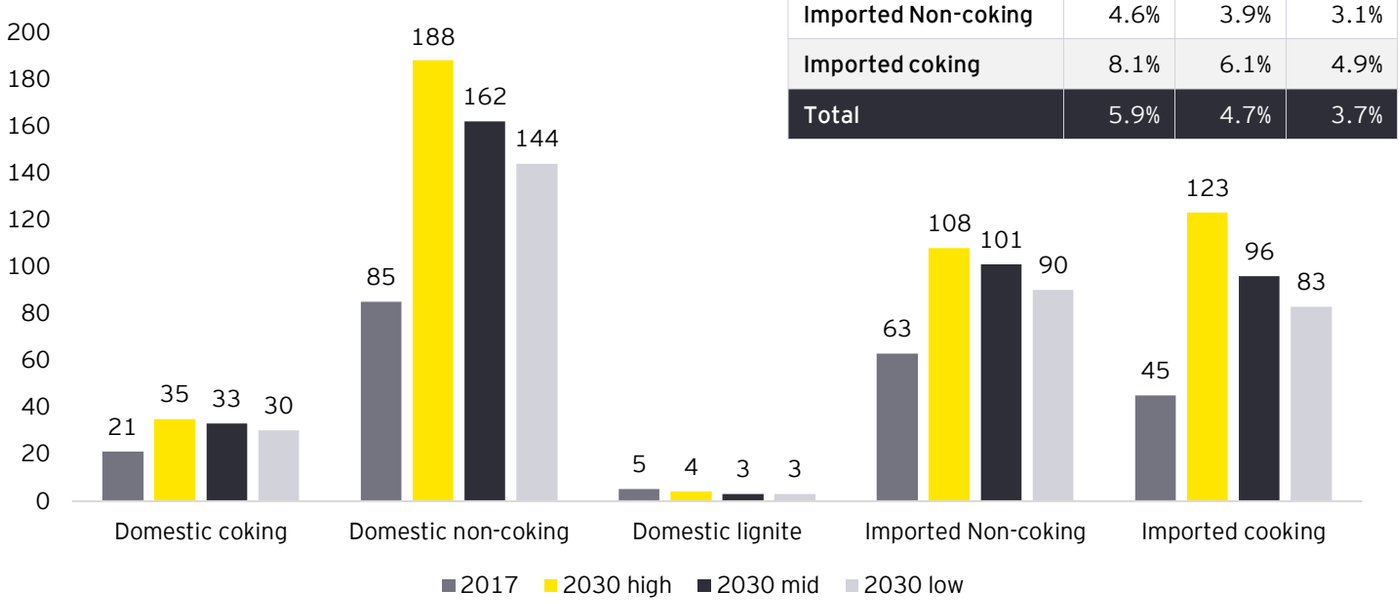
Industrial processes like production of steel, cement, iron, fertilizers, etc. also require coal primarily for thermal purposes. Industrial coal demand is expected to grow to 350–458 MT by 2030 (3.7–5.9 percent CAGR) based on the range of outcomes in manufacturing growth and energy efficiency, with a mid-value of nearly 400 MT (4.7 % CAGR)[20].

Figure 12

Industry thermal demand by type of coal

Source: Report on optimal generation capacity mix for 2029-30, CEA, Ministry of Power

CAGRs	High	Mid	Low
Domestic coking	3.9%	3.4%	2.7%
Domestic non-coking	6.1%	5.0%	4.0%
Domestic lignite	-1.2%	-2.7%	3.3%
Imported Non-coking	4.6%	3.9%	3.1%
Imported coking	8.1%	6.1%	4.9%
Total	5.9%	4.7%	3.7%



The growth of domestic non-coking and imported coking coal will be the dominant drivers of industrial coal demand. It is also assumed that about 50% of the coal used for industrial processes is expected to be imported by 2030 due to non-availability of high-quality coal domestically, which is consistent with the current trends.

Estimates suggest that coal demand will grow till 2030 and peak sometime beyond that

Based on the above estimates, we can say that the domestic coal production requirement is only expected to grow in the coming years from around 716MT in 2020-21 to 1067-1121 MT in 2030.

[19] Report on optimal generation capacity mix for 2029-30, CEA, Ministry of Power

[20] Rahul Tongia, Anurag Sehgal, Puneet Kamboj. Future of Coal in India: Smooth Transition or Bumpy Road Ahead?

India coal requirement estimates (2030)

	Power	Industry
Coal demand (MT)	2030	2030
Domestic	892	175-229
Imported	0	175-229
Total	892	350-458
Domestic %	100%	50%

Table 2

India's coal requirement estimated

Source: EY Research and Analysis

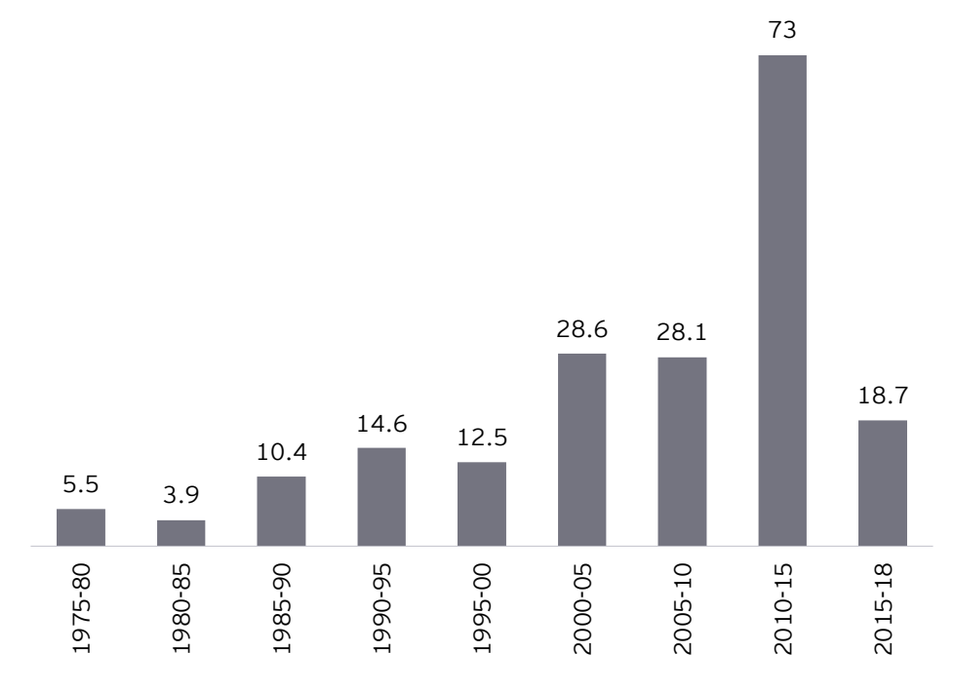
We would also like to refer to estimates from other sources. According to Coal Vision 2030, produced by CIL in 2017, total coal demand in India in 2020 was expected to be at 900–1,000 MTPA (Million Tons Per Annum) and 1,300–1,900 MTPA by 2030. Although their 2020 prediction is highly accurate, the 2030 prediction seems on the higher side. This can be justified considering that the report does not factor in the slowdown due to Covid-19. There also has been an increased focus on renewable energy in the past few years due to factors discussed earlier in the report.

Another factor which deeply impacts the transitions to renewable energy is the total life of thermal power plants. Construction of thermal power plants require huge upfront capital expenditure, which is why they operate for 25–30 years to be financially viable. Any thermal power plant established in 2020 will probably still be operational in 2050, which is why the Government of India has stopped the commissioning of any new thermal power plants. However, most of our existing power plants are relatively new and within their first decade of operation. These plants will require coal was years to come to sustain their operations.

Figure 13

Coal power plants by construction year and total capacity (GW)

Data source: WRI database



Operating coal power (MW) by plant age

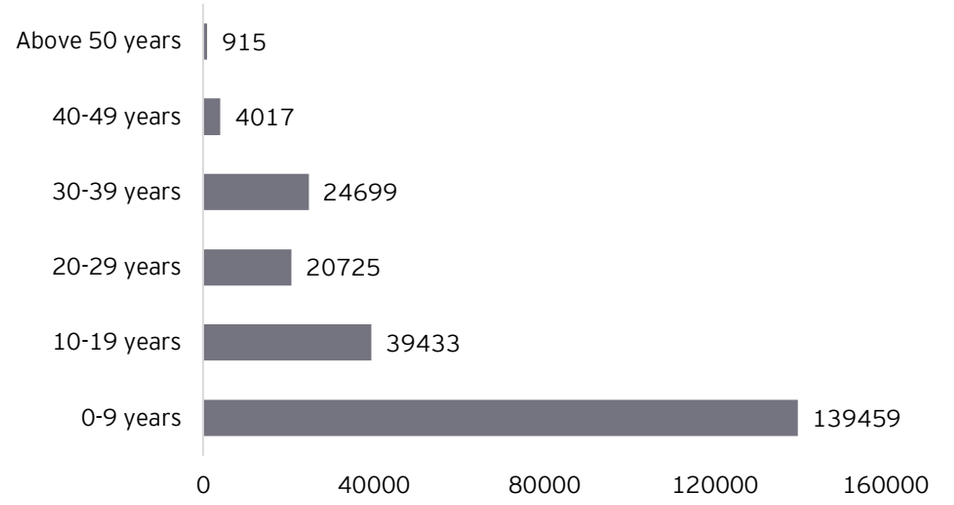


Figure 14
Operating coal power (MW) by plant age

Source: https://globalenergymonitor.org/projects/global-coal-plant-tracker/dashboard/

India has a thermal power installed capacity of 231.45GW as of July 2020[21]. Retirement of old coal-based units totalling to 25,252 MW is expected for the period 2022 –30[22]. In addition, as much as 59,810 MW of thermal power generation capacity is under construction in the country which includes 23,730 MW to be developed by private players.

India is also gearing up to enhance their coal production capacity in line with the projected demand. The government has set a target for CIL for production of a billion tonne of coal by 2023–24. To achieve the target, CIL is planning to add 55 new mines adding 92MT of coal annually[23]. It is also planning to expand 193 of its existing mines. As per the Coal Vision 2030 report, the total capacity of mines allocated/ auctioned (including Coal India Limited, Singareni Collieries Company Limited and Neyveli Lignite Corporation) as on 2017 was about 1,500 MTPA at the current rated capacity.

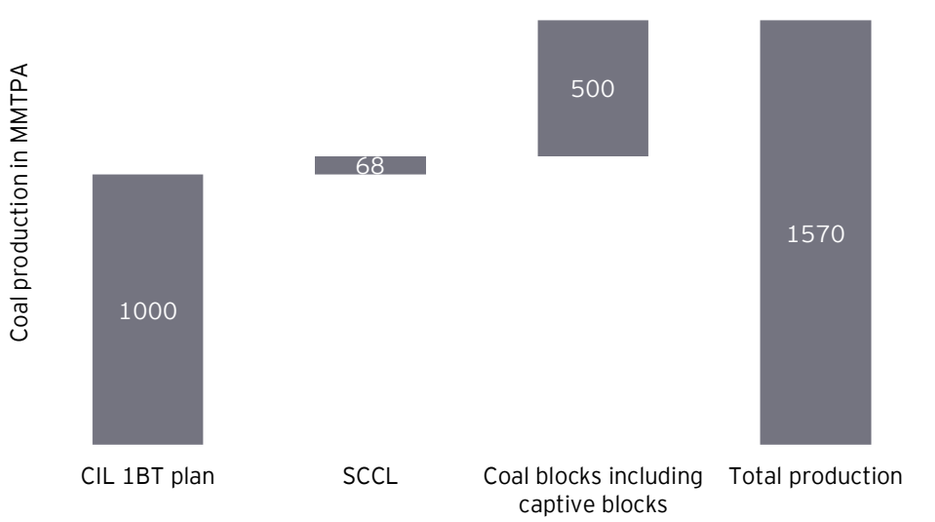


Figure 15
Coal Production

Source: http://coal.nic.in/sites/default/files/2021-03/chap8AnnualReport2021en.pdf

[21] The Evolution of Power Sector in India

[22] CEA Report

[23] Economic Times, https://energy.economictimes.indiatimes.com/news/coal/cil-to-develop-55-new-coal-mines-in-next-5-yrs-coal-minister/72143589

Figure 16

Has coal-fired generation peaked in India?

Source: https://ember-climate.org/project/peak-coal-india/

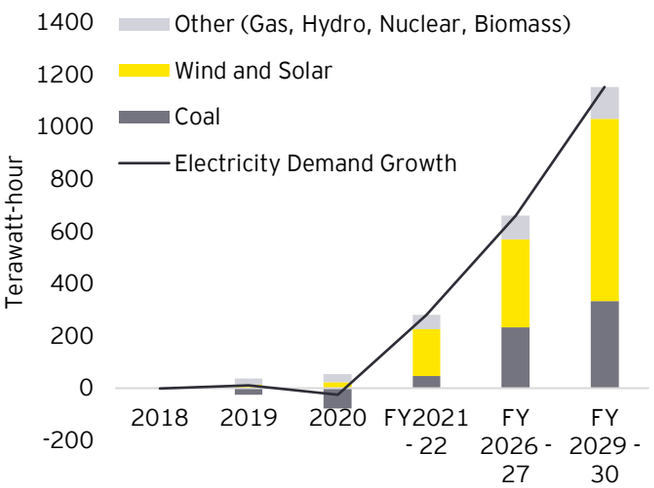
Therefore, India is not expected to reach its peak coal capacity by 2030 and will only be enhancing its capacity for years to come. However different reports have different projections about India's coal requirement going forward based on varied assumptions. Most of India's electricity sector targets today are informed by two key government reports published by Central Electricity Authority of India (CEA): 'Optimal Generation Capacity Mix for 2029–30' (OGCM) and '13th National Electricity Plan' (NEP13). Outside the CEA projections, the IEA's Sustainable Development Scenario (SDS) and India Vision Case (IVC) forecasts by India Energy Outlook 2021 report have also provided projections. IEA IVC assumes an optimistic stance on India's speed of economic recovery, long-term growth, and the prospects for a fuller implementation of stated energy policy ambitions. IEA SDS works backwards from specific international climate, clean air and energy access goals and assumes a combination of actions necessary to achieve them. The Stated Policies Scenario (STEPS) provides a balanced assessment of the direction in which India's energy system is heading, based on today's policy settings and constraints and an assumption that the spread of Covid-19 is largely brought under control in 2021.

A comparative analysis of the projections by various agencies is shown below. While scenarios developed by OGCM and NEP 13 suggest rise in coal requirement by 2030, IEA has provided multiple scenarios depending upon how aggressively India takes on the transition.

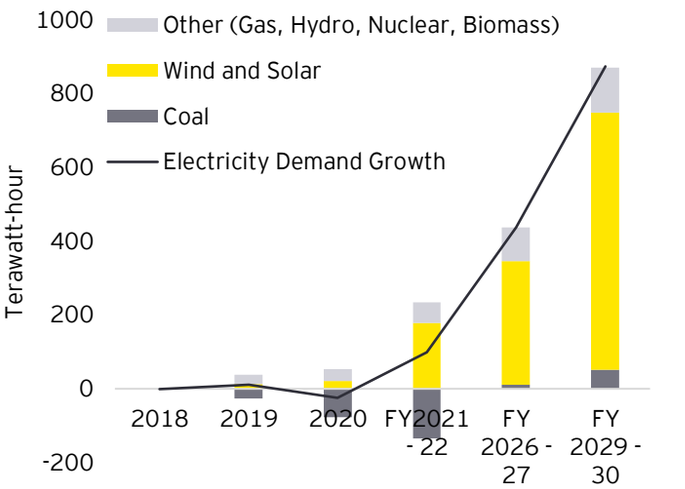
Will coal fired generation in India rise, stagnate or fall in 2020s?

Change in electricity generation, compared to 2018

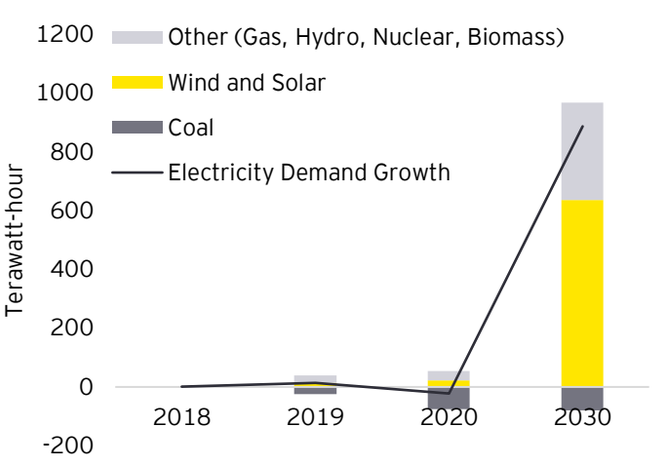
Government is currently forecasting coal will **rise**



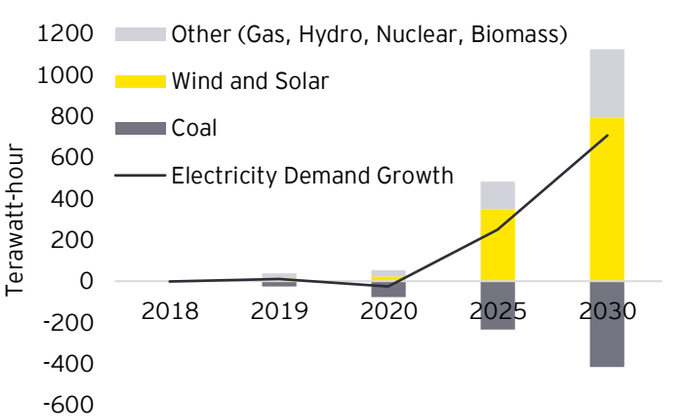
COVID 19 demand shock meant, coal stagnation



IEA India Vision Case scenario reveals coal may **stagnate**



IEA Sustainable Development Scenario shows its possible for coal to fall drastically



IEC also projects an increase in India's coal demand by 2030 in STEPS and IVC scenarios and a decrease in the demand in the optimistic SDS scenario.

Coal demand in India as per IEC analysis (Mtce)

			STEPS		SDS		IVC	
	2000	2019	2030	2040	2030	2040	2030	2040
Power generation	147	397	454	444	232	60	371	362
Industry	37	141	198	255	169	185	193	240
Coal demand	208	590	712	772	454	298	660	712

It may appear that the transition to renewable energy will have no short-term impact on the livelihood of employees working in coal mines and other aspects of the coal value chain. However, this assumption is incorrect, and we will discuss about this in detail in the coming section.

Table 3

Coal demand in India as per IEC analysis (Mtce)

Source: https://www.iea.org/reports/coal-2020/demand

Almost 50% of the mines in India are hugely unprofitable and may soon face shutdown

Coal India Limited, the world's largest coal-mining company, accounts for around 80% of the country's output and has more than 350 mines in operation. CIL functions through its subsidiaries in 80+ mining areas spread over seven states of India. Out of these, 174 mines are open cast, 156 are under ground and 20 are mixed mines. These mines create over 7.25 lakh direct jobs and many more indirect jobs[24]. Direct jobs here refer to those jobs that are directly connected with the coal mining industry. These include workers working in the mines and washeries, executives working in coal company offices and support staff. There are many more indirect (e.g., trucking) and induced jobs (e.g., restaurant workers serving coal workers) in the mining regions which cannot be quantified. The dataset also excludes unauthorized coal workers (also known as informal workers) who scavenge coal for a living. The Indian coal mining sector also generates a large employment multiplier. According to interviews with academic experts and executives in Coal India Limited and Central Coalfield Limited, every formal coal job generates anywhere between 3–10 additional jobs in the coal mining districts (Urpelainen, 2020).

Table 4

Coal mines in India

Source: Pai, S; Zerriffi, H; Kaluarachchi, S, 2021, "Indian coal mine location and production - December 2020", https://doi.org/10.7910/DVN/TDEK8O, Harvard Dataverse, V1

State	Opencast	Under ground	Mixed	Grand Total
Chhattisgarh	18	28		46
Jharkhand	66	27	10	103
Madhya Pradesh	16	35	2	53
Maharashtra	39	13		52
Orissa	17	8		25
Uttar Pradesh	5			5
West Bengal	13	45	8	66
Grand Total	**174**	**156**	**20**	**350**

[24] Source: A novel dataset for analysing sub-national socioeconomic developments in the Indian coal industry https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb

The challenge is that a majority of CIL's 350 mines either make losses, are on artificial support or make very low profits. Underground mines are very labor intensive and have a high human resource deployed to coal production ratio, making them unprofitable to operate. Over 45% of the underground mines produce less than 5% of the total coal and drag down the profitability of CIL. These underground mines alone employ more than 1.1 lakh direct workers who are at an immediate risk of losing their jobs due to mine closure[25].

Among districts, there is a large variation in coal production and the number of mines producing coal. Korba district in Chhattisgarh is the largest coal producing district—just 15 mines produce 120 MT. There are also others such as Singrauli (Madhya Pradesh) and Angul (Odisha) with 7 and 13 mines respectively producing just over 80 MT. The mines in these districts are operated by CIL's newer subsidiaries South Eastern Coalfields Limited (SECL), Northern Coalfields Limited (NCL) and Mahanadi Coalfields Limited (MCL), which are more efficient and operate large OC mines.

On the other hand, Paschim Bardhaman (West Bengal) and Dhanbad (Jharkhand) districts are home to 65 and 51 mines respectively but only produce about 31 MT each. All in all, 22 districts produce over 10 MT of coal, 17 districts produce between 1 and 10 MT and 12 districts produce less than 1 MT of coal. The districts that have predominantly large OC mines have a lesser number of jobs compared to those with more UG mines. For example, Korba district, which is the highest coal producing district (over 120 MT) has nearly 30,000 less coal jobs compared to Dhanbad district which produces 30 MT[26].

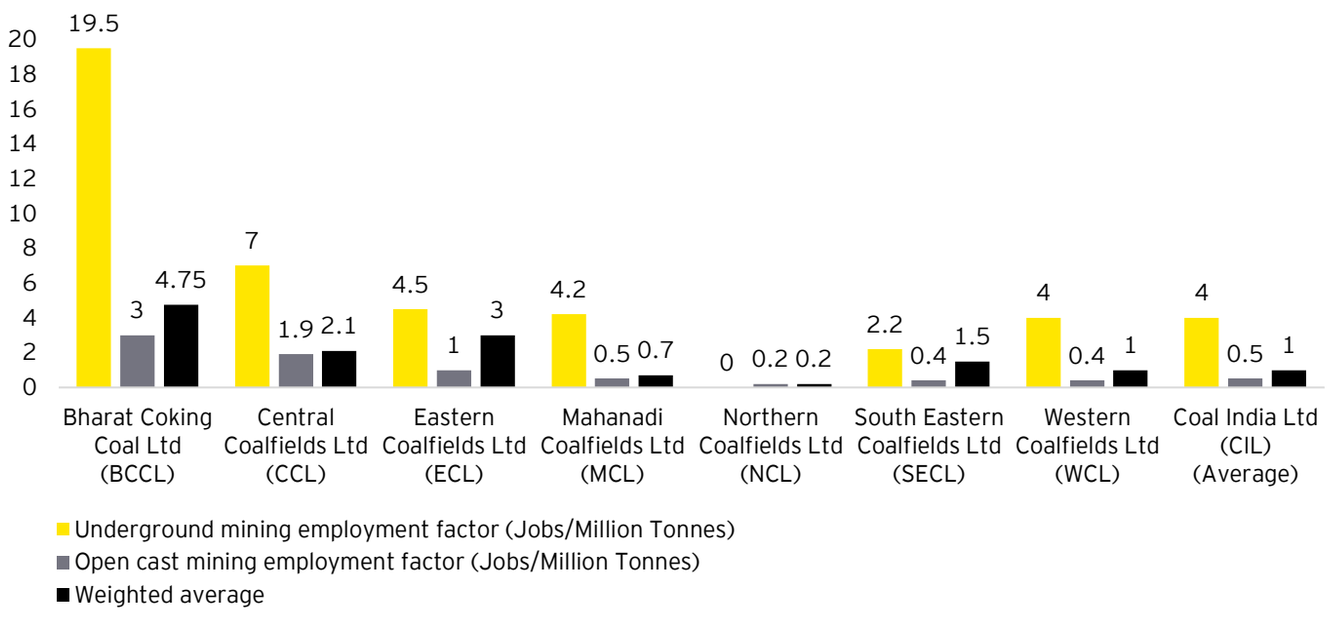


Figure 17

Employment factor for CIL and its subsidiaries

Source: Ministry of Coal 2020 Joint Bi-partite Committee of Coal Industry Report

The Centre's push to convert all Coal India Ltd (CIL) mines as profit-making mines has resulted in the closure of underground mines across subsidiaries since underground operations are not cost-effective. CIL has closed 80+ lossmaking mines in the last four years.[27] Underground mines typically employ many more workers than open-cast mines, but with much lower productivity. Most of these underground mines are in five states — West Bengal, Madhya Pradesh, Chhattisgarh, Jharkhand, and Maharashtra.

[25] Source: A novel dataset for analysing sub-national socioeconomic developments in the Indian coal industry https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb

[26] Source: A novel dataset for analysing sub-national socioeconomic developments in the Indian coal industry https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb

[27] Source: Financial Times, https://www.financialexpress.com/market/cil-shuts-underground-mining-with-centre-push-to-convert-all-mines-profitable/1559373/



4



Just transition plan for workers and communities dependent on coal

The government needs to develop a "Just Transition" plan for workers facing a loss of livelihood due to transition

As India transitions towards a carbon neutral economy and the dependence on coal reduces, coal mines will shut down and thermal power plants will become a thing of the past. This will disrupt an entire sector which employs workers in coal mines, logistic and transportation, power plants and indirect workers whose livelihood is linked to the coal value chain. These workers are also the most vulnerable group as most of them are blue collar workers with low levels of education and little to no transferable skillset.

Coal mines are often concentrated in regions far away from economic hubs and have very little other employment opportunities. The entire economy of these districts revolves around coal related activities and shutting down of coal mines can have a ripple effect leading to collapse of entire economy. This leads to development of mono-industry towns, where loss of mining employment substantially reduces the flow of income in these towns and deeply impacts other businesses and services as well. Therefore, mine closure is not just about coal anymore, it is about mitigating the impact of mine closure on workers and communities dependent on coal for their livelihood.

An obvious solution to loss of employment due to mine closure is to deploy the mine workers to another mine. This might seem like a win-win solution for the workers as well as the employer, but it has many implications. Firstly, this will only work till the time the coal sector is expanding and more mines are opening than being shut down. However, as we have established in the previous sections, this will not always be the case. Secondly, this requires workers and communities to uproot their lives and migrate to a different region, which has challenges of its own. While migration is easier for young workers, people with families and responsibilities are much less likely to migrate. Lastly, this approach only provides solution to families of workers directly employed by the coal mines. As entire communities are dependent on income from coal in one way of the other, indirect workers and local businesses are the ones who are left behind in a failing economy without other sources of income.

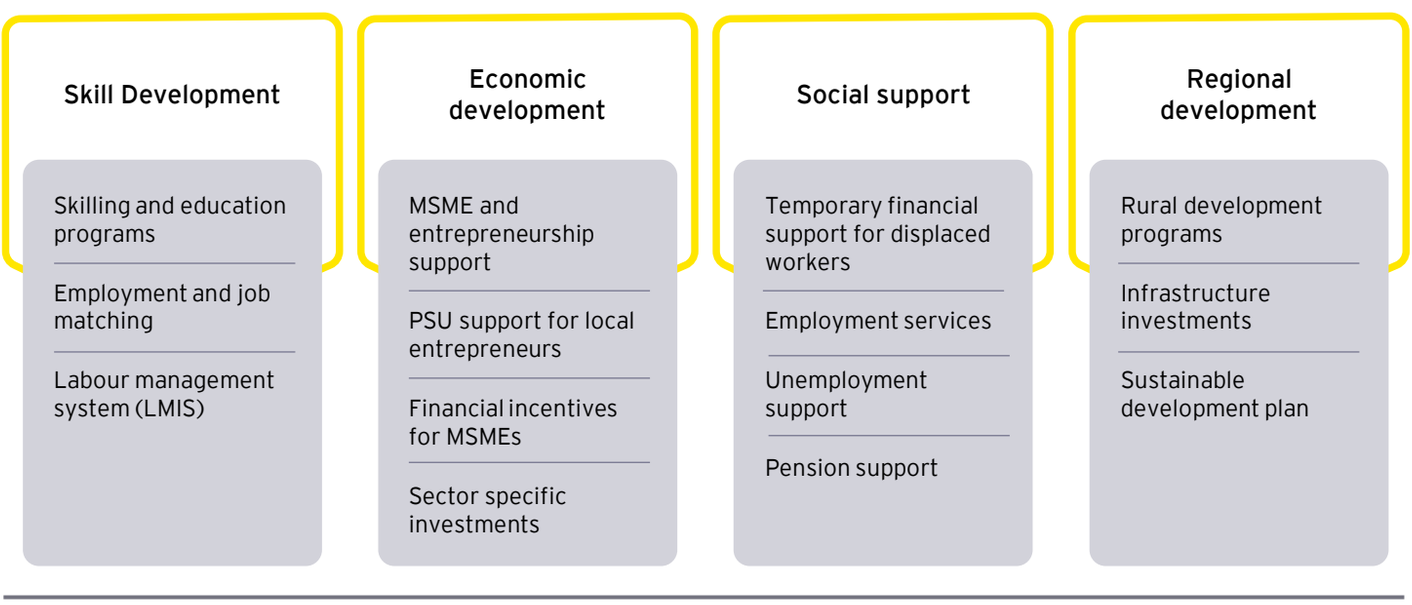
The central and local Governments will have to plan for the transition well in advance to minimize and mitigate the livelihood risk. The solutions will have to be customized to meet the requirement of specific communities through planning for transition, continuous dialogue with the communities, mobilizing funds / financial planning and policy level interventions.

A "Just Transition" requires planning at various levels including skill, economic and regional

For the success of "just transition" plans, it is imperative that a holistic approach is adopted which includes planning and actions for skill development, economic development, regional development, and social support.

1. Skill development: Training and education support to displaced workers to upskill / reskill them through employment linked and demand-based training programs
2. Economic development: Enabling creation of MSMEs and new economic avenues to replace traditional opportunities impacted by the transition
3. Social support: Providing financial support to displaced workers to ensure their sustenance during periods of non-availability of livelihood created by the transition
4. Regional development: Ensuring the impacted regions have adequate infrastructure and facilities to successfully rejuvenate the economy

Figure 18
Just Transition Plan



The framework proposes key actions under each of the discussed verticals. Each of the identified areas and their respective actions are equally important to ensure minimal disruption in the livelihood of the workers and the society.

The transition needs to be aligned to the needs and preferences of different groups of workers

There are varied categories of workers at different stages of their life and profession. There are young workers who are at early stages of their career, some are mature workers who are in the middle of their working lives and then there are elderly workers who are close to their retirement age. A one size fits all solution cannot work here as each category of workers might have different preferences.

	Preferences	Recommendation
Young workers (15-35 years)	► Youngs workers usually have low preferences and also are more willing to migrate to nearby districts/states for alternate employment owing to lower personal and family responsibilities.	► Reskilling in RE sector
Mature workers (35-50 years)	► Mature workers have high family responsibility, immovable assets, deeply engrained relationship with community etc. which makes them less susceptible to relocation.	► Entrepreneurship- Setting up of MSME ► Agriculture sector
Elderly workers (50+ years)	► Elderly workers are close to retirement and prefer to leave the workforce with severance packages.	► Severance package ► Social benefits

Figure 19
Categorization of workers at different stages in life and profession

The planning for mine closure should include the collection of relevant data, understanding the preferences of workers and the gradual phasing out of workers from their current jobs into new opportunities. The lack of relevant data often inhibits the planning process. CIL being the largest employer of coal mine workers should undertake the activity of data collection and work closely with the local administration in the development of transition plans. It is also recommended that a local body maybe established to oversee the efforts towards economic growth and diversification of transition affected regions.

Enough jobs are being created in the RE sector in these five states to provide employment to displaced workers

In the previous sections we have estimated that almost 1.1 lakh jobs are at immediate risk due to the closure of unprofitable coal mines in the states of West Bengal, Madhya Pradesh, Chhattisgarh, Jharkhand, and Maharashtra. Skill development of displaced workers, especially the ones in early stages of their work life, is an important aspect of just transition plans. This allows workers to attain skillset in an emerging technology / sector, which will enable them to sustain their livelihood for years to come.

Fortunately, the states which are likely to be most impacted by the transition in the short-term have huge potential for renewable energy which can be leveraged to create job opportunities for workers after re-skilling. Our study specifically focuses on blue collar jobs, which require minimum educational qualification and can be taken up by coal value chain workers by undergoing short term skill development training.

Table 5
State-wise estimated potential of renewable energy (MW)

Source: Energy Statistics 2021 http://www.mospi.nic.in/sites/default/files/reports_and_publication/ES/Energy%20Statistics%20India%202021.pdf

States in focus	State-wise estimated potential of renewable energy (MW)		
	Solar (ground+ rooftop)	Small hydro power	Wind
Jharkhand	18,180	228	
West Bengal	6,260	392	2
Madhya Pradesh	61,660	820	10,484
Maharashtra	64,320	786	45,394
Chhattisgarh	18,270	1,098	77

The Ministry of Renewable Energy has already allocated targets to states till 2022, which have been achieved with varying degree of success. Although the states are yet to be allocated their 2030 targets, we have attempted to estimate the additional capacity development till 2030 based on the state's RE potential, achievement of existing target and allocation of additional target in the same ratio as the 2022 target has been allocated amongst the states.

Table 6

Estimated state-wise RE targets

Source: EY Research and analysis

State	State-wise RE target to be achieved 2022 (MW)				Installed capacity of RE as on Feb 2021 (MW)			
	Solar ground mounted	Solar roof top	Solar total	Wind	Solar ground mounted	Solar roof top	Solar total	Wind
Jharkhand	1,195	800	1,995		19	30	49	
West Bengal	3,236	2,100	5,336		100	50	150	
Madhya Pradesh	3,476	2,200	5,676	6,200	2,386	77	2,463	2,520
Maharashtra	7,226	4,700	11,926	7,600	1,642	648	2,290	5,000
Chhattisgarh	1,083	700	1,783		223	30	252	

In addition to the achievement of remaining 2022 target, the states will also be allocated target till 2030 from the remaining national quota of 275 GW. As these targets are yet to be allocated, we have assumed here that the targets will be allocated in the same proportion amongst states and technologies as the 2022 targets. We have also capped the capacity development to 80% of the state's potential in our assumptions to ensure realistic estimates.

State	Remaining target (from 2022 allocation) MW				Additional (estimated) capacity to be installed by 2030 to meet the 2030 target (MW)				Total (estimated) RE capacity to be installed by 2030			
	Solar Ground Mounted	Solar Roof Top	Solar total	Wind	Solar Ground Mounted	Solar rooftop	Solar total	Wind	Solar Ground Mounted	Solar rooftop	Solar total	Wind
Jharkhand	1,176	770	1,946		1,878	1,257	3,135		3,054	2,028	5,081	
West Bengal	3,136	2,050	5,186		-	-	-		3,136	2,050	5,186	
Madhya Pradesh	1,090	2,123	3,213	3,680	5,462	3,457	8,919	2,064	6,552	5,580	12,132	5,900
Maharashtra	5,584	4,052	9,636	2,600	11,355	7,386	18,741	11,943	16,939	11,438	28,377	14,543
Chhattisgarh	860	670	1,531		1,702	1,100	2,802		2,562	1,770	4,332	

Table 7

Estimated state-wise RE targets

Source: EY Research and analysis

To estimate the total human resource requirement for achieving the desired capacity, we need to understand the development cycle of solar and wind projects. We have split the cycle into two broad phases — Engineering & Construction and Operations & Maintenance.

- The first phase, i.e., engineering & construction creates one-time jobs. For example, once the project is designed or constructed, the employment generated from those functions is terminated and the workforce employed for those functions moves on to the next project.
- For the second phase of the project, i.e., operations & maintenance, the employment generated lasts for the lifetime of the project.

It is estimated that nearly 1.18 lakh workers will be required to implement the state RE plans in the five states[28]. Therefore, young workers in the coal sector that may potentially lose their jobs may be trained for roles in RE sector, to address the state human resource requirement and capitalize on the employment opportunities in the RE sector of the state as well.[29]

Phase of renewable energy project	Human resource requirement				
	Jharkhand	West Bengal	Madhya Pradesh	Maharashtra	Chhattisgarh
Engineering & construction - Solar ground mounted	3,043	3,125	6,529	16,879	2,553
Engineering & construction - Solar Rooftop	552	558	1519	3114	482
Engineering & construction – Wind			2,409	5,938	
Operation and maintenance - Solar ground mounted	5,008	5,143	10,745	27,780	4,202
Operation and maintenance - Solar rooftop	1,014	1,025	2,790	5,719	885
Operation and maintenance - Wind			2,183	5,381	

Table 8
Employment potential across states in renewable energy sectors

Entrepreneurship development and promoting MSMEs will be key factors in reviving and diversifying the economy of coal depend mono-industry towns

There are two broad ways to revive an economy – through increasing demand and through investment in infrastructure. The demand can be increased by putting money into the hands of people through providing employment and entrepreneurship opportunities. Investment in infrastructure has a booming effect on the local economy as it not only creates jobs and thereby increases demand, but it also improves the economy through increased connectivity, facilities, etc. There needs to be focus on to ensure that the economies of these mono-industry towns are rejuvenated after the transition.

MSMEs are the backbone of the economy and key mechanism for job creation. However, in these coal dependent regions, coal extraction and production become the primary source of livelihood, which forces other businesses and opportunities to take a back seat. Ministry of MSME along with the local administration should promote development of MSMEs in the regions impacted by the transition as they are the most effective way of job creation in the short term. The key areas of intervention include skill training programs, easy access to finance and development of market linkages.

[28] EY Research and Analysis

[29] Annexure 1 for Detailed job role wise employment creation potentials

The state governments will have to plan for the transition away from coal well in the advance. Coal is a major source of revenue for these states, but it is not going to be the case for long. The governments will have to explore other avenues of revenue generation and bolstering the economy. This will only happen if concrete measures are taken to promote entrepreneurship, job creation and increased spending on infrastructure. There are various national and state level initiatives which can fund, implement, and monitor the entrepreneurship development and job creation agenda. Their access and outreach can be enhanced for these regions to enable the local population to benefit from these initiatives.

CIL, NTPC and other public sector entities should focus on job creation in these regions

As there is limited private sector penetration in the coal dependent towns, public sector will have to take the lead in job creation activities. CIL and its subsidiaries should take up a strategic role in easing the transition and development of economy of these regions. Since they already have strong presence and understand the socio-economic aspects coal mining areas, they are best suited to come up with customized transition plans. As these companies are themselves in the process of transition to more sustainable business lines, they also need to ensure that the communities who have been deeply associated with them for so long are not left behind.

CIL will generate close to 3,000 MW of solar power by 2024 at an estimated investment of around INR 13,500 crore. Coal India Ltd, which is betting big on solar power generation with a view to diversifying its portfolio, is looking to set up a Special Purpose Vehicle (SPV) for the same. NTPC is also taking various steps to make its energy portfolio greener by adding significant capacities of renewable energy Sources. By 2032, the company plans to have a minimum of 32,000 MW capacity through RE sources constituting nearly 25% of its overall power generation capacity. CIL and NTPC should explore the renewable energy potential of these coal regions and prioritize projects there.

The PSUs can also support these regions through prioritizing the MSMEs in their procurement processes. They can development community building programs and support in skill development, access to finance, development of self-help groups and procurement of products / services. This form of backward integration will not only enable the PSUs to have better control on their raw material but also have huge social benefits for these communities.

Environmental restoration through jobs under MNREGA and other govt. employment programs can provide immediate jobs after mine shutdown

Years of coal mining has a detrimental impact on the environment of the region. It is also important that these regions are developed on a sustainable growth model. As India moves towards carbon neutrality, these regions can become model towns for low emission growth. This includes restoration of the environment damaged by coal mining as well as planning for sustainable growth.

Coal mining, processing, and burning creates pollution leading to contamination of land, air and water. Environment clean-up activities can create job opportunities for displaced coal industry workers and lasting protection for human health and safety and stimulate the local economy. Coal plant cleanup has been shown to create jobs regardless of region; for example, Duke Energy's coal ash cleanup efforts in North Carolina created over 3,700 jobs between 2013 and 2019[30]. This may include activities such as restoration of mined land, afforestation, water body rejuvenation and creating social infrastructure for rainwater harvesting, skill development, clean energy generation etc.

The government has various programs for ecological restoration and development of social infrastructure such as MNREGA which can be leveraged for employment generation. Other funding sources like District mineral fund and funding for mine closure plan may also be explored.

[30] Source: https://www.eesi.org/papers/view/issue-brief-how-coal-country-can-adapt-to-the-energy-transition

The just transition plans do not need to wait – funding from existing Govt. initiatives can be leveraged to initiate the implementation

While the larger energy transition in India may still take a few years to actualize, the immediate impact of mine closures due various other commercial factors poses a looming challenge and miners across these mines need empowerment through skills and resources to help them harness opportunities in other sectors. To enable this action efficiently, existing programs and schemes can be leveraged by mobilization of the affected communities towards these programs. While a few key programs have been listed below, Chapter 6, further provides a deeper lens into this by providing state wise recommendations to provide the enabling support to the workers.

Scheme name: Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY)

Description

Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) is a scheme for transforming the living standards / social upliftment of people and development of areas affected by the Mining related operations with the following objectives:

- Implement various developmental and welfare projects/programs in mining affected areas
- Minimize/mitigate the adverse impacts, during and after mining, on the environment, health, and socioeconomics of people in mining districts
- Ensure long-term sustainable livelihood

Administration and financing

- Implemented by District Mineral Foundation (DMF)
- Funding is provided by entities with mining lease
- INR 23,606 cr available across 557 districts in 21 mineral rich states

Thematic areas

- For priority areas - rehabilitation/ecosystem support
- Drinking water supply, environment preservation and pollution control measures-, healthcare and sanitation, education, women and child welfare, elderly/PwD support, skill development
- Other priority areas
- Physical infrastructure, irrigation, energy, and watershed development

Scheme name: Pradhan Mantri MUDRA Yojana (PMMY)

Description

PMMY is a scheme launched by the Hon'ble Prime Minister on 8 April 2015 for providing loans up to INR 10 lakh to the non-corporate, non-farm small/micro enterprises. MUDRA Loans are so designed, to meet requirements of different sectors / business activities as well as business / entrepreneur segments

Administration and financing

- Micro Units Development & Refinance Agency Ltd (MUDRA) was set up by the Government of India (GoI)
- Wholly owned subsidiary of Small Industries Development bank of India (SIDBI) with 100% capital being contributed by it
- Presently, the authorized capital of MUDRA is 1000 crores

Thematic areas

- Entrepreneurial support through loan funding
- Shishu: loans up to INR 50,000/-
- Kishor: loans between INR 50,000 and INR 5 lakh
- Tarun: loans between INR 5 lakh and INR
- 10 lakhs

This funding support maybe explored for families impacted by coal mine closure to start their venture for ensuring livelihoods

Scheme name: Suryamitra Skill Development Program

Description

MNRE launched Surya Mitra Scheme for creating 50,000 trained personnel within a period of five years (2015–16 to 2019–20) in collaboration with State Nodal Agencies, at various locations across the country. The Suryamitra Programme is also designed to prepare the candidates to become new entrepreneurs in solar energy sector.

Administration and financing

- The Suryamitra Skill Development Programmes are sponsored by Ministry of New & Renewable Energy, Government of India
- For skilling a batch of 30 suryamitras MNRE provides a funding support of INR 13 lakhs
- Administration and implementation support by NISE and state nodal agencies of MNRE

Thematic areas

- Skill training under the SCG/Q101 by Sector Skill Council for Green Jobs under NSQF

Scheme name: Pradhan Mantri Kaushal Vikas Yojana (PMKVY)

Description

India's flagship skill development scheme by the Ministry of Skill Development and Entrepreneurship, Govt of India to provide market linked and industry certified skill training to the youth of the country under two key modes – fresh training of unskilled youth and certification of informally trained youth with prior experience.

The scheme offers livelihood support to the youth that are certified under the program, either through wage employment or self-employment /entrepreneurship.

Administration and financing

There are two components of the scheme

- Central component - centrally sponsored centrally managed
- State component - centrally sponsored state managed

Thematic areas

- Skill development/skill certification
- Livelihood support - wage employment, self-employment (capital funding, market linkages, etc.)

**

- Under the state component – states could be encouraged to plan training programs for the potential workers that may lose their jobs due to mine shut down
- Special projects again could be explored to design tailored programs for helping these workers to gain skills for continued employment beyond mining
- Youth are already being trained under PMKVY for Solar PV installer role, which also may be used to train youth losing jobs in the coal sector

Scheme name: Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY)

Description

Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) is the skilling and placement initiative of the Ministry of Rural Development (MoRD), to help the rural poor get trained with employable skills have access to employment opportunities.

Administration and financing

- Ministry of Rural Development
- States design the annual plans (Annual Action Plans (AAP) and implement the scheme through project implementation agencies

Thematic areas

- Skill development
- Livelihood support

Mine closure plans

- The coal mining entities are mandated by - Guidelines for preparation of Mine Closure Plan under amendments of Mineral Concession Rules, 1960 and Mineral Conservation and Development Rules, 1988
- As per these amendments all the existing mining lessees are required to submit the "Progressive Mine Closure Plan"
- Further, the mining lessee is required to submit "Final Mines Closure Plan" one year prior to the proposed closure of the mine
- These guidelines also entail some specific guidelines with respect to the associated human resources in the mines, wherein collaborative conversations if organized with the entities can help identify some efforts led by them to encourage just transitions

The entities must design a framework for the remedial measures consequent to mine closures which maybe manifested in human resource retrenchment and compensatory measures, such as:

- Compensation given to the employees to support sustenance of themself and their family members
- Identify satellite occupations connected to the mining industry - number of persons engaged therein – exploring the continuance of such business after mine closes and ensuring how maximum people could be engaged in these roles
- Plan, continued engagement of employees in the rehabilitated status of mining lease area and any other remnant activities
- In addition to the resettlement and rehabilitation measures that they undertake, the CSR wing of these organizations may also be leveraged to support the communities at the risk of loss of livelihoods due to mine closure

Scheme name: Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)

Description

MNREGA is an Indian labor law and social security measure that aims to guarantee the right to work to the members of rural households who volunteer to do unskilled manual work

- The program aims to engage workforce from rural areas of the country to provide social protection through employment opportunities
- Opportunities for livelihood generation under the program is created through employing the workers under various public infrastructure development projects

Such opportunities are empowering the rural families to invest their income earned through MNREGA towards better health, education and livelihood opportunities

Administration and financing

- Implemented by Ministry of Rural Development through Gram Panchayats
- Annual financial outlays during 2020-21 was INR 63,000 cr, with a 97% utilization

Permissible areas of work under the MNREGA projects

- Strengthening of agriculture and allied works
- Projects that support ecological balance
- Projects to improve health and sanitation situations





The previous sections aimed at contextualizing the current environmental opportunity to adopt greener and sustainable alternatives to meet the country's power and energy needs and understanding the imperatives of an imminent coal phase down.

To benefit from this opportunity, it is imperative that the states strategize, plan and implement support interventions for the frontline workers employed across the coal mines. The interventions thus planned should aim to help them grapple with transition through a network of skills and opportunities and enable them to economically diversity themselves. The subsequent parts of the report will aim to present a blueprint for the framework of actions for the states to achieve the same and provide a geography targeted approach as well in this regard.



5



Framework for designing state skill action plan

State skill action plan for livelihood creation and just transition of impacted coal mine workers through convergent action and integrated approach

The discourse of decarbonization is incomplete without a dialogue on addressing the economic vulnerabilities due to the loss of livelihood of the coal mine workers. This puts focus on devising shock responsive plans of action to provide transformative support to the mining workforce with targeted interventions for skilling/upskilling, employment, income guarantee, etc. to enable them to access employment and livelihood opportunities in other industries.

Objective for State Skill Action plan

The skill action plan aims to present a blueprint or a framework of actions to empower states with all the resources to help design/converge industry relevant skilling and livelihood promotion interventions for the transitioning miners

This report aims to explain the key contours of skill action plans and enable the states to harmonise the key program measures in the impacted areas to create synergies for mitigating the impacts of the coal phase-out

1. Identification of focus geographical clusters for interventions



- The immediate impact of the mine closures is expected to be reeled on the underground mines.
- 5 key states with maximum number of underground mines have been chosen to kick start the efforts for worker transition through skill development and livelihood promotion support
- Around 1.1 lakh miners expected to be impacted across the 5 states with maximum UG mines

Number of jobs that are potentially at risk and need attention under the purview of just transition	
State	Manpower engaged in underground mines
Chhattisgarh	17,050
Jharkhand	23,002
Madhya Pradesh	23,246
Maharashtra	5,400
West Bengal	40,550

State	District
Chhattisgarh	Balrampur
	Korba
	Korea
	Raigarh
	Surajpur
	Surguja
Jharkhand	Bokaro
	Chatra
	Deoghar
	Dhanbad
	Giridih
	Godda
	Hazaribagh
	Latehar
	Pakur
	Palamu
	Ramgarh
	Ranchi
Madhya Pradesh	Anuppur
	Betul
	Chhindwara
	Shahdol
	Singrauli
	Umaria
Maharashtra	Chandrapur
	Nagpur
	Yavatmal
West Bengal	Bankura
	Birbhum
	Paschim Bardhaman
	Purulia

Districts with Underground Mines

Figure 20

Key focus areas of the state skill action plan

2. Industry diagnostic for demand estimation in priority sectors with focus on renewable energy

- Identification of sunrise sectors with high investment potential
- Highlight the presence of alternate sectors in the mining regions
- Identify avenues for wage employment /entrepreneurial opportunities for the miners
- Identification of local produce/arts/crafts that can be commercialised as an alternate income generation option

3. Convergence mode implementation of skills and livelihood programs in the state to support the miners

Based on **Industry imperatives** and **Supply side need analysis** → Identify schemes and programs that can be aimed to be implemented through convergence model for the miners

4. Development of skill development and entrepreneurship program implementation models for focus interventions

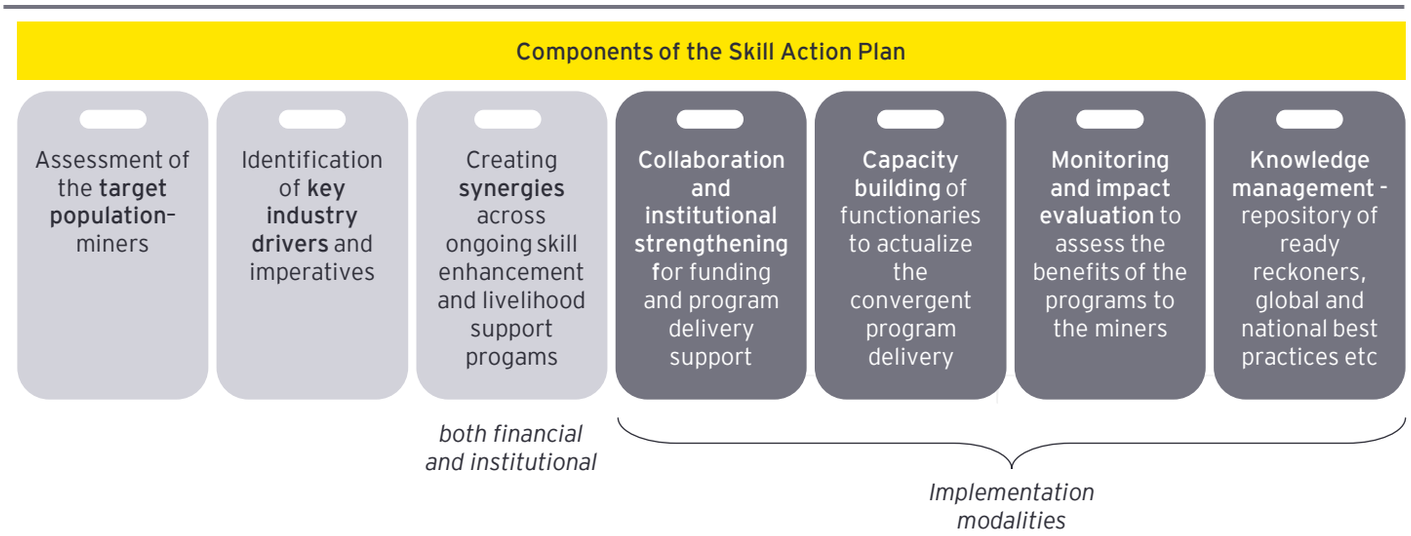
Skill development models	Entrepreneurship models
TP led model for skill development	Franchisee based service entrepreneurs
Recruit – train – deploy	Last Mile Government Service Delivery
Managed Services Operating Partner (MSOP)	Promoting Start-ups thriug Micro Business

Based on industry inputs, it has been estimated that around 1.1 lakh jobs are at threat of being displaced due to closures of the underground mines, while the renewable sector itself across the 5 key states is expected to add around 1.18 lakh jobs over the next few years. However, the pace of the development of the renewable energy sector is also dependent on various other factors and may take a few years to reach its full potential. Therefore, to increase the pool of jobs that the mineworkers can access, it is essential that the potential of the other sectors in a state is also assessed, for which the workers can be skilled to leverage the employment opportunities. In this context, a robust skilling and livelihoods promotion plan helps the states to concert their efforts for mitigating the economic vulnerabilities of the miners that may lose their jobs due to mine closures

Key components of a state skill action plan

The skill action plan lays the groundwork for making skill training and livelihood programs accessible to the workforce, which faces a potential risk of loss of livelihood due to the transition to net-zero and closure of mines due to other factors. The skill action plan empowers the states to lead with a strategy for addressing the transition needs of the coal miners

Figure 21
Fundamental elements a skill action plan framework for the states



Assessment and categorization of the target population

The broad goals and objectives of the just transition plan are to ensure the mobilization of the displaced mine workers to alternate income generation avenues. This can be better designed and implemented when the social and economic characteristics of the target population are well known. The states intending to support the displaced mine workers will need to identify the relevant intervention programs based on the results of a target group assessment, to yield the maximum results and outcomes.

Some key categories to consider during the supply-side assessment (target group- mine workers in this case)	
Total number of impacted workers	To evaluate the scale of the intended programs
Age groups of the impacted workers	Different age groups would have specific livelihood requirements, such as reskilling/upskilling for younger age groups, income support for older groups etc.
Sex categories	Identify the number of the females in the group and evaluate their willingness towards alternate sources of income and livelihood opportunities, preferred occupations, mode of income generation (wage/self-employment/entrepreneurial)
Aspirations of the workers	Aspiration is a key input to identify the inclination of the workers towards certain sectors and occupational roles and their gravitation towards wage employment or entrepreneurial opportunities.
Migration preferences	Given the mono economic trajectory of the coal mining regions it becomes equally important to assess the willingness of the mine workers to relocate to other geographical regions for their economic reintegration

Additionally, owing to a high tribal population among the transitioning miners, some worker groups may also possess certain local skills, community strengths etc. which becomes essential to capture, to ensure that the support measures are also inclusive in nature

Identification of key industry drivers and imperatives

To identify the alternate sectors and occupations for displaced workers, a state-level industrial diagnostic study will throw light on the key market segments with growth impetus and substantial demand for human resource requirements. Based on this demand assessment, the skill action plan will highlight the employment opportunities in the state/district and neighbouring areas and subsequently aid in planning for the transition of the workers across industries and sectors through facilitation of skill up-gradation, reskilling, certification programs as needed.

The industry demand analysis would yield the following inputs (indicative) which would be significant while designing a just transition plan for the state to mobilize the mining workforce
Key industries local products / services of the state/district
Assessment of renewable energy potential in the state, and in the affected districts particularly, as avenue for placement of transitioning workers
Key skills and competencies in demand by industries in the state
Key geographical clusters in focus for industrial development and investment
New industries and sectors in focus for the state / districts identified through assessment of planned investment pattern and government led initiatives for industrial growth for the state (planned industrial parks, economic zones, clusters with large scale infrastructural development plans, growth potential of MSMEs)

Creating synergies across ongoing skill enhancement and livelihood support programs

To minimize economic vulnerabilities and livelihood loss, the affected workers need to be equipped with the new/additional skills and competencies to explore alternate occupations. This may be initiated by empowering them with awareness and information about the various programs for skilling and training and their offerings. To design the skills and livelihood promotion programs for the mineworkers, it is proposed that synergies are built to converge the existing schemes and programs in affected regions, to leverage their financial support and institutional network.

In this regard, the skill action plan aims to map the last mile provisions available through these programs to the requirements of the target population.

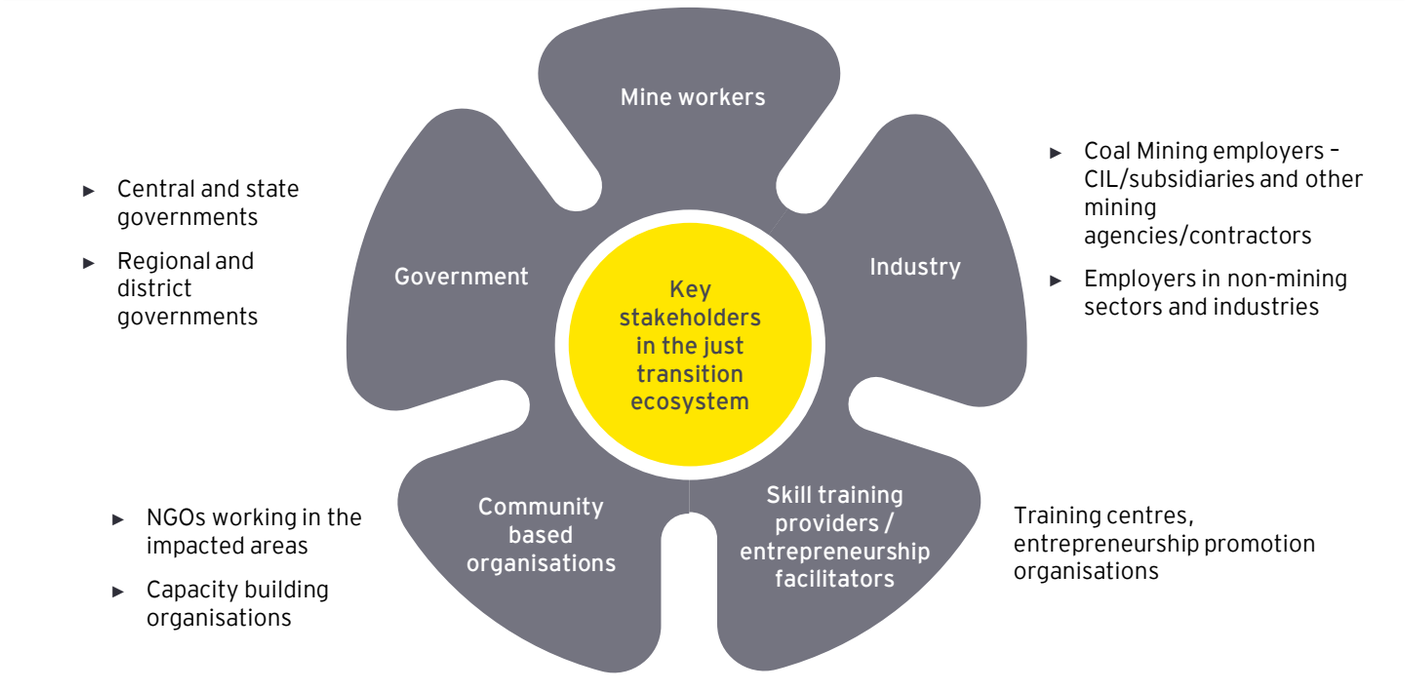
This necessitates for mission mode convergence model to facilitate strategic use of existing funding channels and build a strong collective delivery model for programs. It may be done through the following:

- Target group need identification and thematizing thereof (namely skill acquisition, certification/ bridge courses, income guarantee support, entrepreneurial support - market and capital linkage)
- This also entails encouraging the impacted communities to identify group strengths and local resources to drive their economic transitions and with program support for market and credit linkages
- Classification of the existing schemes and programs (state, central, district level) in the region and mapping the same with the intervention themes. Highlight the policy imperatives, key actors and outcomes of each program and align the same with the just transition skilling action plan
- Define the modalities of convergence such as identification of the stakeholders, collaboration across institutional network channels and estimating funding avenues available through the existing schemes
- Map the last mile delivery value chain of the intervention, onboard last-mile delivery champions or programs partners such as NGOs and CBOs to work closely with the communities and mobilize the beneficiaries to access and realize the program entitlements

Examples of existing programs for skilling, livelihood support and incoming generation that may be leveraged for convergence under the just transition plan - Pradhan Mantri Khanij Kshetra Kalyan Yojana/DMF fund utilization, Pradhan Mantri MUDRA Yojana, Pradhan Mantri Kaushal Vikas Yojana, Deen Dayal Upadhyaya Grameen Kaushalya Yojana, Mahatma Gandhi National Rural Employment Guarantee Act, CSR and funds/programs run by the private sector in the region etc.

Collaboration and institutional strengthening for funding and program delivery support

To deliver the best value from funding channels (public/private) and institutional networks of the existing programs and schemes, it becomes imperative to undertake social dialogue and partnerships with key functionaries in the government and industry task force. Such communication and information dissemination help to make the process more inclusive by encouraging the pooling of ideas and recommendations and secure buy-in from different actors towards the skill development and livelihood promotion interventions for the mineworkers.



The key imperatives of advocacy and outreach efforts should be aimed at

- Active collaborations with the key government functionaries at regional, state, and central level (as relevant) to design the model of convergence, primarily the channel of fund flow to support the local strategies and necessary institutional development
- Industry dialogue and discussions to amplify the need to reintegrate displaced workers locally to place impetus on enterprise creation around accessible products and support services
- Collaboration and discussion with institutional stakeholders such as training providers, schools, MFIs, CBO etc. to capitalize on their social and capital infrastructure

The identification of the stakeholders for the collaborative efforts may be subject to the design of the just transition program delivery modalities. For instance, a district-level intervention will require active anchorage and coordination with the district level functionaries such as the district magistrate office, skill development and livelihood program functionaries at the district level. Similarly, if the just transition program design and delivery are placed at the state level, then it would require collaboration and synthesis between state-level stakeholders– nodal state departments, and skilling agencies to coordinate the convergence efforts.

Capacity building of functionaries to actualize the convergent program delivery

For all the key stakeholders to work in a concerted manner with a shared vision of just transition through employment, skills, and livelihood interventions, strengthening their capacities becomes essential to enable them to appreciate their roles in the ecosystem for delivering the strategies.

Since just transition is still a new concept in India, the stakeholders, especially in the Government sector, need to be provided with all the knowledge and technical support to help them plan and aid implementation of programs to benefit the impacted mining workers in a targeted and need-based manner.

Capacity building for the stakeholders, especially the government task force, to empower them to forge collaboration to leverage infrastructural capacity/networks and support towards the programmatic measures, will help in utilising the existing streams of funding support and resources to finance the just transition at the community levels. The adequately informed and trained task force will be in a better position to design implementation modalities around governance, regulation, the creation of demand, supportive legislation, along with business and finance models.

Capacity enhancement/addition would primarily encompass – goal-oriented training sessions on program implementation in convergence model, framework and reference material for institutional convergence, guidelines for program pilots and scaling up, assessment of the existing ecosystem's sufficiency to cater to additional beneficiary group (mine workers) and setting up of new infrastructure if needed.

Monitoring and impact evaluation to assess the benefits of the programs to the miners

With all the multisectoral and multi-level involvement for the programs and interventions, it becomes more important to assess impacts and have suitable monitoring strategies in place to see that the desired outcomes are being achieved. Both concurrent and end project monitoring is essential through :

- Dynamic MIS to track the number of impacted workers across the locations
- Mapping the available vs availed program benefits for the workers
- Developing and measuring the impact indicators/key performance indicators such as capacity need metrics of the communities affected, number of workers benefitting through various programs, percentage increase/decrease in income post mine closures, tracking the unemployment percentage across the miners, tracking the employment assessment, mapping local opportunities to identify demand for retrenchment of the displaced mine workers etc.
- Financial monitoring to assess the social return on investment gained on funds mobilized for just transition programs
- Results monitoring and evaluation of trends to help shape better policies – assessment-based course correction

Quantitative indicators
% of the miners assessed for skill training /entrepreneurship support and connected with government schemes
% of miners getting jobs out of those connected with skilling programs
% of miners connected with capital and market linkages out of those provided entrepreneurship promotion support
Number of potential jobs identified in the alternate sectors
Number of miners re-employed by migration vs locally
% change in earnings of miners after support programs

Qualitative indicators	
Guidelines / SOP for just transition through skilling	Skilling and welfare program identification for miner support
Mapping industry prospects - key sectors/services/products for economic diversification	
Increased knowledge about skilling credit/market linkage	Stakeholder interactions conducted
Capacity building of stakeholders	Diversity in the beneficiary group (gender, age etc.)

Knowledge management

Considering the increasing focus on decarbonization and continuous phase out of coal mines, in the times to come, the effort to address the economic vulnerabilities of the miners is only expected to scale up across the coal dependent geographies. Therefore, one of the key outputs of designing the skill action plans is to create an exhaustive repository of blueprints and frameworks to help replicate and scale up similar transformative models across the country through

- Ready reckoners such as stakeholder wise SOPs, evaluation formats, implementation frameworks, process maps, charter of recommendations etc.
- Best practices compilation with success stories from global and national narrative
- Recommendations for forging interlinkages and interconnections, including between organizations, industries, implementation partners etc.

Proposed roadmap for states to implement just transition led skill development and livelihood enhancement programs

The fundamental elements discussed above maybe introduced by the states and/or other anchor bodies to lead the programmatic interventions as explained below

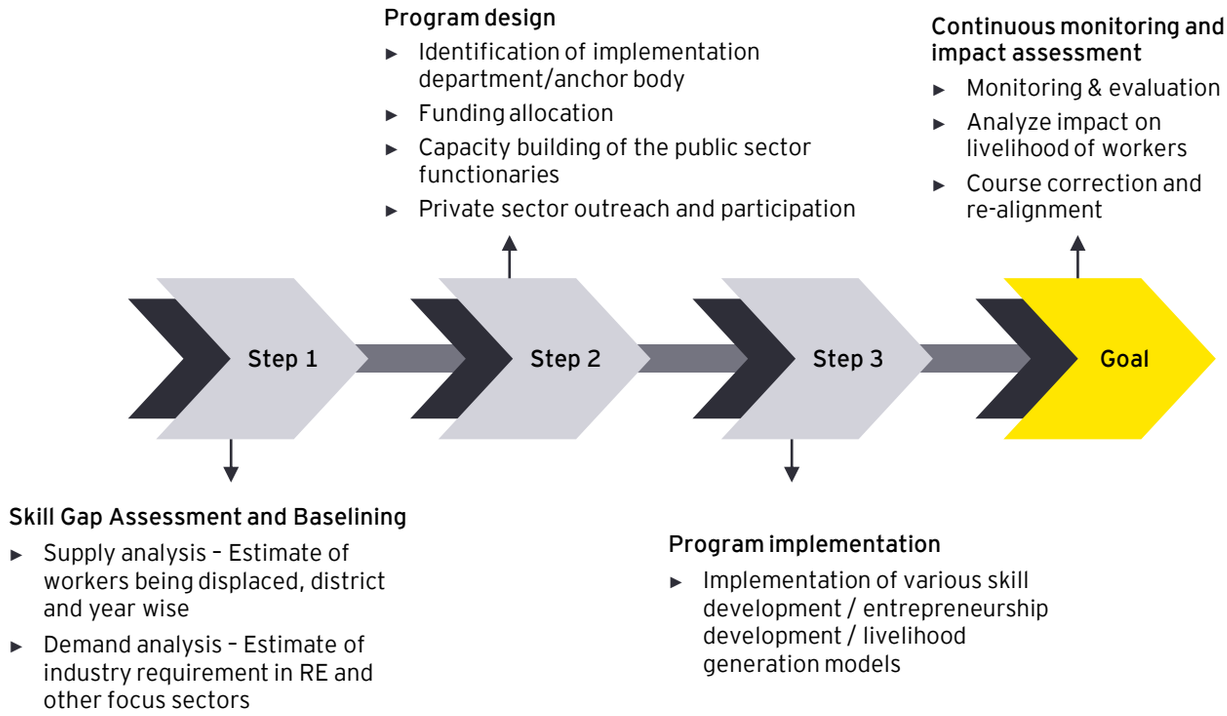


Figure 22
Roadmap for states to implement skilling and livelihoods programs to support transition of the coal mine workers

Skill gap assessment and baselining

The first step of initiating the programs begins with identifying the key characteristics of the transitioning worker group, to highlight their needs and better direct the focus of the planned interventions. On the demand side, a macro-level analysis of the state will also help to provide sectoral inputs to emphasize the potential employment and livelihood avenues for the transitioning workers. This aims to match the demand side potential with the aspirations and skill/competency levels of the transitioning group, to ideate and design interventions that match the need of both the supply and the demand side stakeholders.

- Assessment of industry demand for skilled manpower across sectors: As the states proceed towards decreasing the coal dependency and phasing out the thermal industry, the just transition must aim to develop an alternate transition pathway to reintegrate the human resources, especially the mining workforce, into the economy. To do so, the skill action plan must be aligned with the focus and high growth sectors of a state, which is expected to anchor public and private sector investments and drive employment creation. This will entail, an assessment of the growth of the existing key sectors of the state and the sunrise sectors of the state including the renewable energy sector. Even the government-run programs for rendering services and products to the people will account for overall state human resource requirement demand creation in the state
- Supply review: The key supply group would comprise the direct mining workforce and their dependents (in the working-age group) in some cases. To appropriately profile the supply group, collaborative support from the key stakeholders, CIL and other mine owners, is imperative, to identify the key districts where supply is located, demographic details etc. This will enable to align and plan the skilling and livelihood promotion activities for the mineworkers in an outcome-based and targeted manner

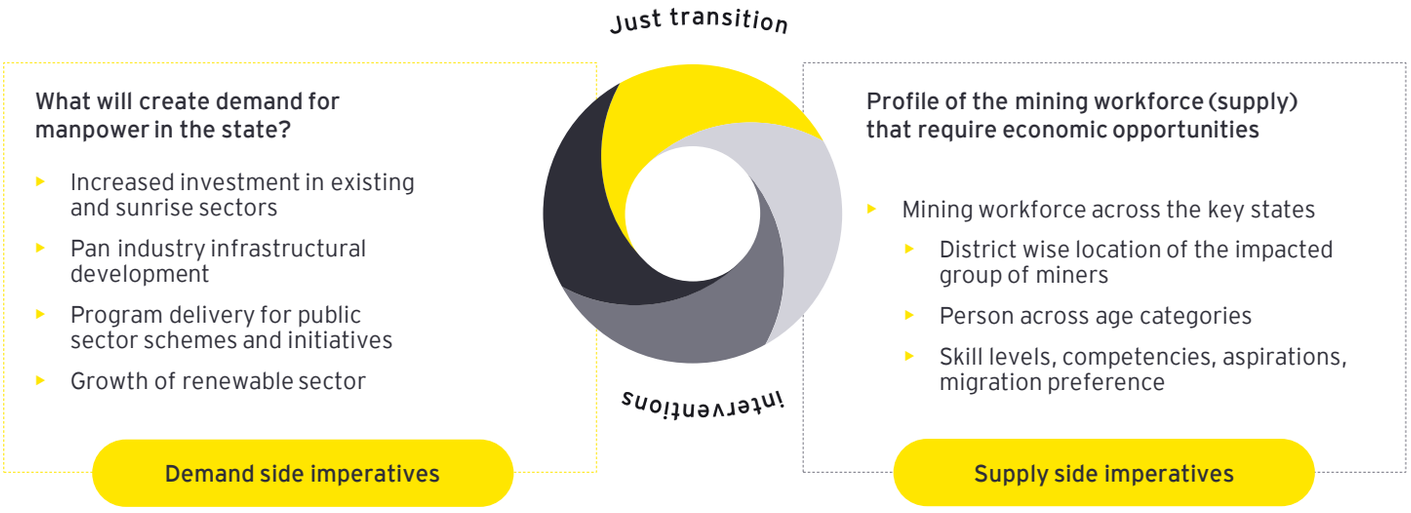


Figure 23
Demand and Supply mapping for skilling initiatives

Program design

Based on the results of the demand and supply assessment, the action plan at the state or district level will be designed to leverage and converge the existing financial and physical infrastructure across programs. In doing so, a package of measures would be available for transitioning workers to help them access skills, knowledge, and resources, that will enable them to get alternate livelihoods after getting adequately trained.

A dedicated team as just a transition coordination unit at the state or district level would be essential to drive the convergence modalities in coordination with the public and private sector stakeholders. The just transition coordination unit is proposed to be housed with the responsibility of strategizing relevant intervention programs, identifying the administration and implementation actors for convergence and organising the framework for subsequent implementation of skilling and livelihood creation programs in the respective states/districts

Just transition coordination unit to lead the overall program for livelihood promotion for the impacted workers		
Governance	The just transition coordination unit is proposed to be placed at the district or the state level	
	Option 1 – District level unit	Option 2 – State level unit
	Anchor body: DMF, District Magistrate office	Anchor body: Nodal skilling agency
	People centric approach through direct and targeted interventions, to build new skills of the displaced miners for enabling economic diversification	State level policy impact to prioritize displaced miners as beneficiaries across livelihood and training/skilling programs
Thematic area – Research and Policy	Industry mapping and sector profiling, beneficiary group profiling, welfare program identification, best practice repository, intervention need assessment, knowledge management (repository for SOPs, guidelines, handbooks, vison documents, policy frameworks, etc.), program pilot design, program scale up plans - detailed state program etc.	
Thematic area – Program convergence and management	Align program benefits to the impacted workers, identification/design of appropriate implementation models for training and entrepreneurship, program lifecycle management for the beneficiaries, financial resources streamlining, infrastructural assessment/expansion/investment	
Thematic area – Robust M&E and MIS	Programmatic and process monitoring/ICT enabled dashboards and reports, impact assessment, mid project reviews, end-line assessments	
Thematic area- Communications and IEC	Multi-stakeholder communications, dissemination of success stories, pan India consultations and discussions, advocacy with state, regional, and local institutions (industry, MFI, CBOs, NGOs etc.), invite collaborative action for a national transition plan	

Program implementation

At the program implementation stage, the key focus areas would be the identification of relevant programs and schemes to address the training and capacity building of the mineworkers, mobilization of the transitioning population, information dissemination about the training and entrepreneurship support programs that they can enrol in, onboarding of community-level organizations for counselling and awareness sessions, liaising with program stakeholders for linking the beneficiaries with relevant programs, ensuring institutional infrastructure being set up/leveraged through collaborations, onboarding of implementation partners and other related stakeholders, assessing the financial resources that can be leveraged through the programs and schemes and program management for this convergence led intervention framework.

In addition, as the states mature in their transition plan, they can design new interventions and programs, focusing on enhancing the skills and competencies of the transitioning workers and nurturing the aspirations of budding and/or active entrepreneurs in the affected locations. Based on the current skilling landscape, a few suggested models are given below:

- Delivering skilling programs
- Innovative suggestions for fostering entrepreneurship

a) Skill Development Model 1 - Training Partner-led model of training

This is the most common form of training implementation across large scale skill training schemes and programs in the country such as Pradhan Mantri Kaushal Vikas Yojana, Deen Dayal Upadhyaya Grameen Kaushalya Yojana, National Rural Livelihood Mission – Ajeevika skills, Deendayal Antyodaya Yojana – National Urban Livelihoods Mission – DAY-NULM, programs by state skill development missions etc.

This model enables the private sector to build capacities for training through a private-public partnership model, by the provision of capital in form of soft loans and equity. Private sector participation also contributes to improved relevance and quality of skills training and improved training-employment and training-productivity linkages

Figure 24
Features of a Training Partner led model of skilling

Key features	Customized skill training programs	Livelihood interventions	Leverage existing funding and Govt. programs	Data backed interventions
Demand and Supply analysis	**Aspiration analysis and counselling**	**Training delivery**	**Placement / Entrepreneurship support**	**Monitoring and impact assessment**

▸ Data collection on manpower displacement
▸ Cluster wise analysis of job role wise demand
▸ Manpower requirement for Govt. projects / departments
▸ Identification of job roles for skills training
	▸ Aspiration analysis
	  ▸ Preference for wage employment / entrepreneurship
	  ▸ Willingness to migrate
	▸ Counselling
	  ▸ Availability of skilling programs
	  ▸ Availability of entrepreneurship support
	  ▸ Aptitude analysis
		▸ Identification of existing Govt. training programs
		▸ Connecting candidates with training partners in the region
		▸ Customized training design including modules for technical training, entrepreneurship, financial literacy, soft skills, basic internet platforms etc.
			▸ Technology platform for job matching
			▸ Multi-channel placement facilitation
			▸ Entrepreneurship support for candidates:
			  ▸ Handholding support for financial linkage
			  ▸ Market linkage support
			  ▸ Establishment and implementation of online sales channels
			  ▸ Marketing support
				▸ Monitoring of candidate training and placement
				▸ Monitoring of progress of entrepreneurs
				▸ Post placement support and tracking
				▸ Impact assessment on interventions on the lives of candidates

Key program elements	Stakeholders / Key actors
Strategy and policy (Program design, scheme governance/SLAs, financing, standardization of training content/payment norms, private sector collaboration, training target allocation, training of trainers, branding and communication etc.)	Nodal ministry (MSDE, MORD) / nodal state skilling agencies (SSDMS) supported by implementation/administration bodies such as National Skill Development Corporation, NABCONs, technical support agencies, Sector Skill Councils etc.[31]
Monitoring and quality assurance (partner onboarding, concurrent monitoring- CCTV led monitoring, database upload and monitoring, ERP based system collaboration with partners etc.)	
Program implementation (training infrastructure development, mobilization and enrolment of trainees, assessment and certification, placement, pot placement support)	Private training provider network, implementation agencies
How can this model be leveraged for just transition?	Case 1: State level skilling program can be devised for affected minors by a state-level nodal mining agency/ state level nodal skilling agency **or** Case 2 - Central level scheme can be designed for implementation across all the affected states To set upskilling infrastructure for industry-relevant roles in the mining districts to facilitate the training of the mine worker group

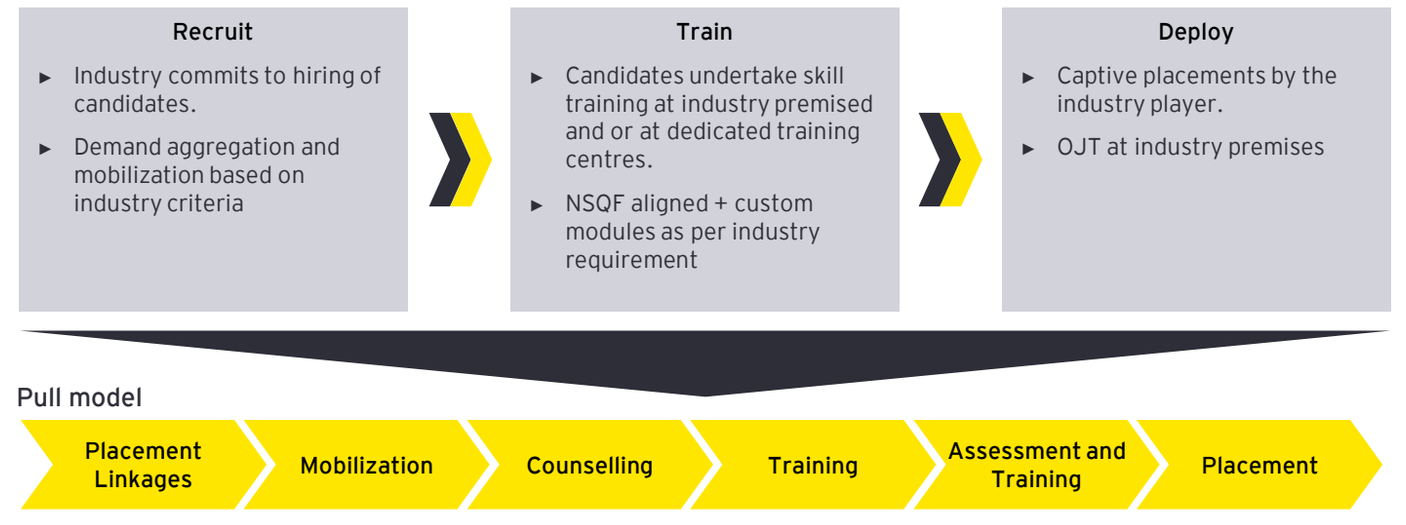
b) Skill Development Model 2- Recruit-train-deploy (RTD) model

- The RTD model of skill training implementation encourages industry participation in the skilling value chain, by placing candidate placement at the centre and start of the program lifecycle, making it an outcome-based model. The distinguishing feature of this model is that placement letters are issued to the candidates upfront, before the training commences, which is applicable subject to the candidate passing the final training assessment. The industry is positioned as a captive employer in this model, which may choose to set up its own training infrastructure or form a consortium with an existing training provider to offer training to the shortlisted candidates
- The RTD model is essentially a pull-based or an industry-driven skilling model with an upfront LOI/provisional letter for placement to create a pull for the youth. Pull forces for the industry through government policies and funding to encourage their participation in skilling. The industry is also incentivized through minimum sourcing costs and an opportunity to hire talent that has been trained to suit their organizational needs.
- It is best suited for targeted industry-specific training interventions in focused geographical locations and is currently being implemented in Bihar and Assam

[31] MSDE – Ministry of Skill Development and Entrepreneurship, MORD -Ministry of Rural Development, SSDM- State Skill Development Mission

Figure 25

Pull model in Recruit-Train-Deploy model

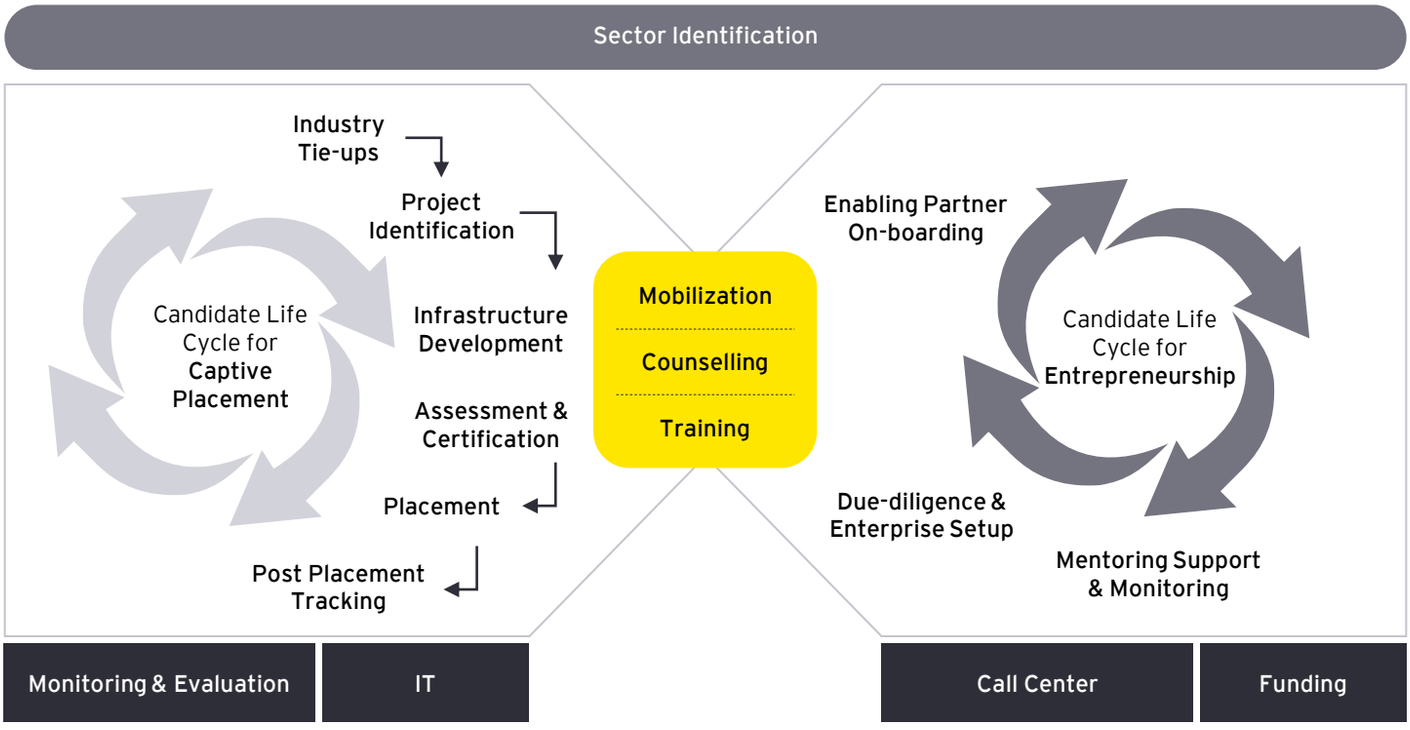


Key program elements	Stakeholders / Key actors
Strategy and policy (Program design, scheme governance/SLAs, financing, standardization of training content/payment norms, private sector collaboration, training of trainers, branding and communication etc.)	Nodal state skilling agencies (SSDMS) supported by technical support agencies, Sector Skill Councils etc.
Monitoring and quality assurance (partner onboarding, concurrent monitoring- CCTV led monitoring, database upload and monitoring, ERP based system collaboration with partners etc.)	
Program implementation (training lifecycle) (Mobilizing and recruiting the candidates, identifying / creating training infrastructure, training program implementation, assessment and certification, OJT, placement)	Industry as training provider with employment mandate
How can this model be leveraged for just transition?	► States can build an industry taskforce with members from high demand sectors, through MOUs and collaboration, to lead the RTD model of training for economic reintegration of the mining workforce that may get displaced. ► This will help to localize the training efforts, thus making them targeted and employment linked due to industry participation

c) Skill Development Model 3- Managed Services Operating Partner (MSOP)

- Several skilling programs in India have been conceived and implemented by central and state governments. Participation of private training providers to execute these programs at the ground level has helped the skill development programs reach out to the masses across every corner of the country, however, has also led to multiple responsibilities being housed with multiple agencies, namely training and placement with the training organizations, program management with nodal agencies etc.
- With the achievement of the significant physical target to provide skills training, there is a need to focus on improving the quality of programs, which can be better achieved if the end-to-end training lifecycle is managed and executed by a single entity.
- MSOP model of training delivery and program management places the end-to-end responsibility and accountability of training program strategy/design, implementation, and monitoring, along with all the allied processes of stakeholder outreach and program advocacy on one entity and helps to build single-point accountability. This also delineates the delivery and other responsibilities of the government stakeholders. This model addresses the challenges arising from multi-stakeholder involvement, redundancy in activities and lack of accountability that may impact program implementation
- The skill training programs under Meghalaya State Skill Development Society are being organized through the MSOP model where a single entity is responsible for –
  - Industry mapping and linkages
  - Training centre establishment aligned with standard SOPs
  - Mobilization and counselling of targeted youth
  - Training operations (in collaboration with industry)
  - Assessment and certification (with respective SSC)
  - Placement collaborations
  - Post placement support

Figure 26
MSOP model operative framework



Key program elements	Stakeholders /Key actors
Strategy and policy (Program design, scheme governance/SLAs, financing, standardization of training content/payment norms, private sector collaboration, training of trainers, branding and communication etc.)	Nodal state skilling agencies (SSDMS) /other apex bodies anchored by MSOP
Monitoring and quality assurance (partner onboarding, concurrent monitoring- CCTV led monitoring, database upload and monitoring, Aadhar linked attendance system, ERP based system collaboration with partners etc.)	
Program implementation (training lifecycle) (Mobilizing and recruiting the candidates, identifying / creating training infrastructure, training program implementation, assessment and certification, OJT, placement)	Training partner led training, facilitated by MSOP Placement ensured by MSOP through captive placement agreements, MOUs etc.
How can this model be leveraged for just transition?	▸ A just transition coordination unit or MSOP can be delegated the entire end to end program management and training lifecycle management by states. ▸ The MSOP can facilitate convergence of training programs at state level and ensure the workers have end to end support for accessing the skilling schemes

d) Model 1 for promoting entrepreneurship - Franchisee based service entrepreneurs

- The key feature of this model is the strategic association with the private sector for leveraging their franchise/retail network to engage the youth as entrepreneurs. This model of entrepreneurship aims to link the beneficiaries (entrepreneurs, SHGs etc.) with:
- **Government programs** being implemented for entrepreneurship support to leverage the seed funding and venture initiation support
- **Private sector** for knowledge transfer, capacity building, incubation support and market linkage. To primarily leverage the potential for setting up of product or services franchise establishments/retail outlets to deliver the last mile provisions to the customer.

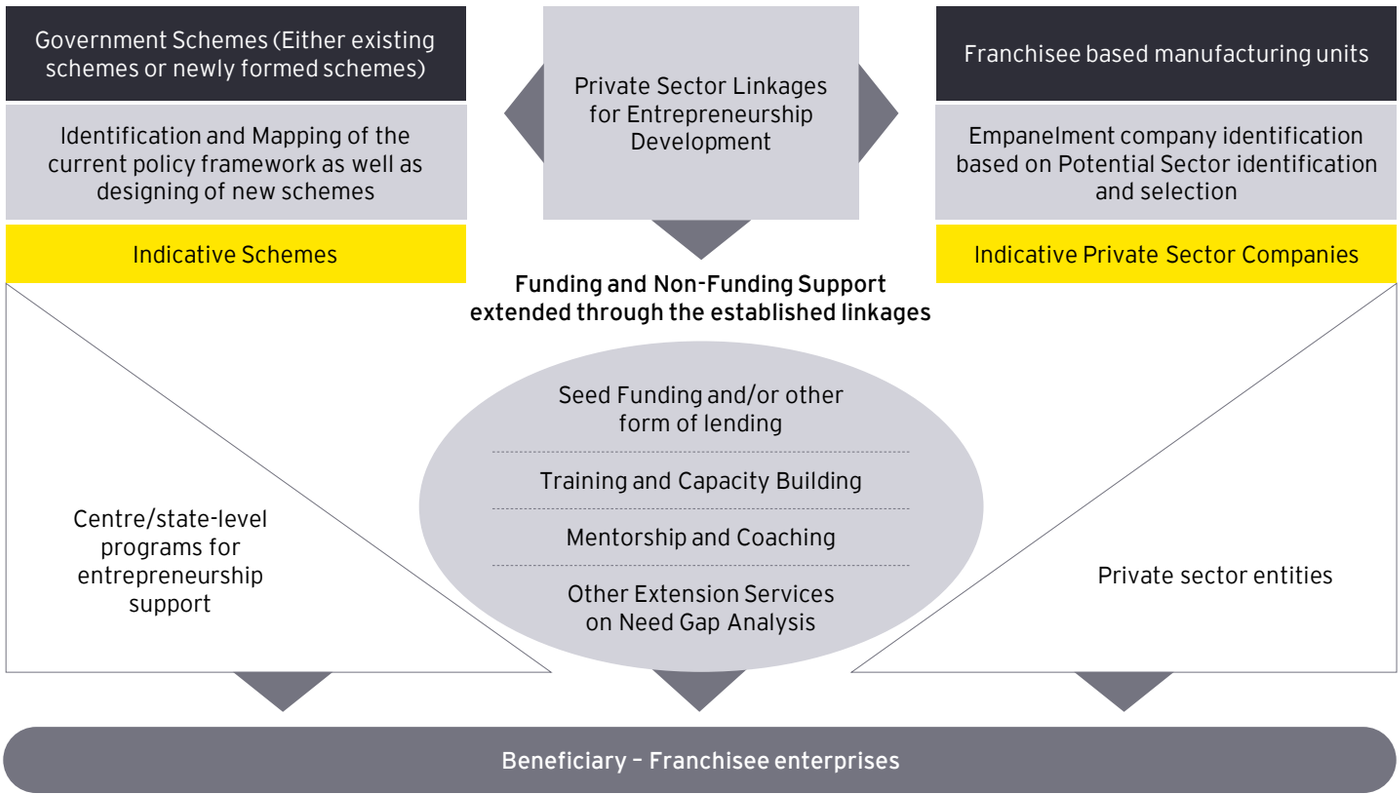


Figure 27
Ecosystem modalities of franchisee-based service entrepreneurs livelihood promotion model

Facilitation support to establishment linkages of the aspiring entrepreneurs with the public program and the industry

- Private sector engagement and geographical mapping of demand for franchise led business models and retail outlets
- Beneficiary identification and shortlisting to match the private sector demand
- Training need assessment and readiness assessment of the aspiring entrepreneurs
- Mentoring support by facilitating market exposure
- Knowledge sessions for business operations, entrepreneurial spirit, risk management, communication, sales skills etc.
- Facilitating access to formal training (English, IT, soft skills, entrepreneurship and life skills and financial literacy etc.) if needed
- Support with marketing and branding activities
- Support with accessing and processing applications for obtaining licenses, third party certifications and approvals if any

How can this model be leveraged for just transition?	▶ To support livelihood promotion of the mine workers, individuals can be identified, and using the above model they can be capacitated to become entrepreneurs. ▶ E.g., facilitating the local youth for setting up franchise for apparel stores, mobile network connection store/technology service center store, daily needs shops.

Figure 28

Connecting the aspiring entrepreneurs with the welfare scheme as service providers for last mile delivery services led entrepreneurship development model

e) Model 2 for promoting entrepreneurship: Last-mile delivery services led entrepreneurship development model

This entrepreneurship model aims to channel the service offerings of the SHGs and entrepreneurs to address the demand created by the delivery of public services under government-funded schemes and programs.

Most of these social welfare programs are implemented to provide meals and rations at subsidized rates, provide free of cost health services, maintenance of public convenience infrastructure, provide grievance redressal, provide information and services through common service platforms etc. Delivering these services would require setting up of basic infrastructure as well dispensing the last mile services to the beneficiaries



Cross-cutting challenges in the current service delivery mechanisms

- Conflict between multiple scheme guidelines
- Limited on-ground governance and quality management processes
- Logistical hurdles and costs involved in the widespread outreach of schemes
- Limited awareness regarding schemes and services amongst citizens
- Limited literacy in villages preventing people from availing services, especially digitised services
- Limited support infrastructure required for service delivery
- Limited coordination between various stakeholders
- Limited beneficiary management practices

This service delivery demand if aggregated can be mapped to identify, and onboard potential entrepreneurs with relevant service and skill offerings, therefore creating livelihood options for many youths	
The facilitation support in this regard will be multipronged that will require	▶ Engaging with government stakeholders and aggregating the demand – identify themes of the services, geographies, scale of services ▶ Identification of the potential entrepreneurs to link with the demand of services, mapping of the services offering ▶ Facilitating capital/seed funding support if required in of the cases ▶ Capacitating the aspirants with product development or service delivery skills by conducting training need assessment and facilitating association with training providers ▶ Support with accessing and processing applications for obtaining licenses and approvals if any ▶ Awareness and knowledge disseminations on third party certifications, if required
How can this model be leveraged for just transition?	▶ To support livelihood promotion of the mine workers, individuals can be identified and linked up with the government program delivery ecosystem, to register them as service providers, wherever the program permits so. ▶ E.g., Provision of culinary services for mid-day meals, provision of infrastructure for housing common grievance centers etc. ▶ In a situation, where the mining areas have limited alternate sectors, such models can be leveraged to involve the workers meaningfully without having to migrate

f) Model 3 for promoting entrepreneurship: Micro Business Facilitation Centers for startups

Micro Business Facilitation Centers for start-ups aim to provide incubation support and end-to-end facilitation to the SHGs/aspiring entrepreneurs in the impacted regions, for their entrepreneurial transformation journey.

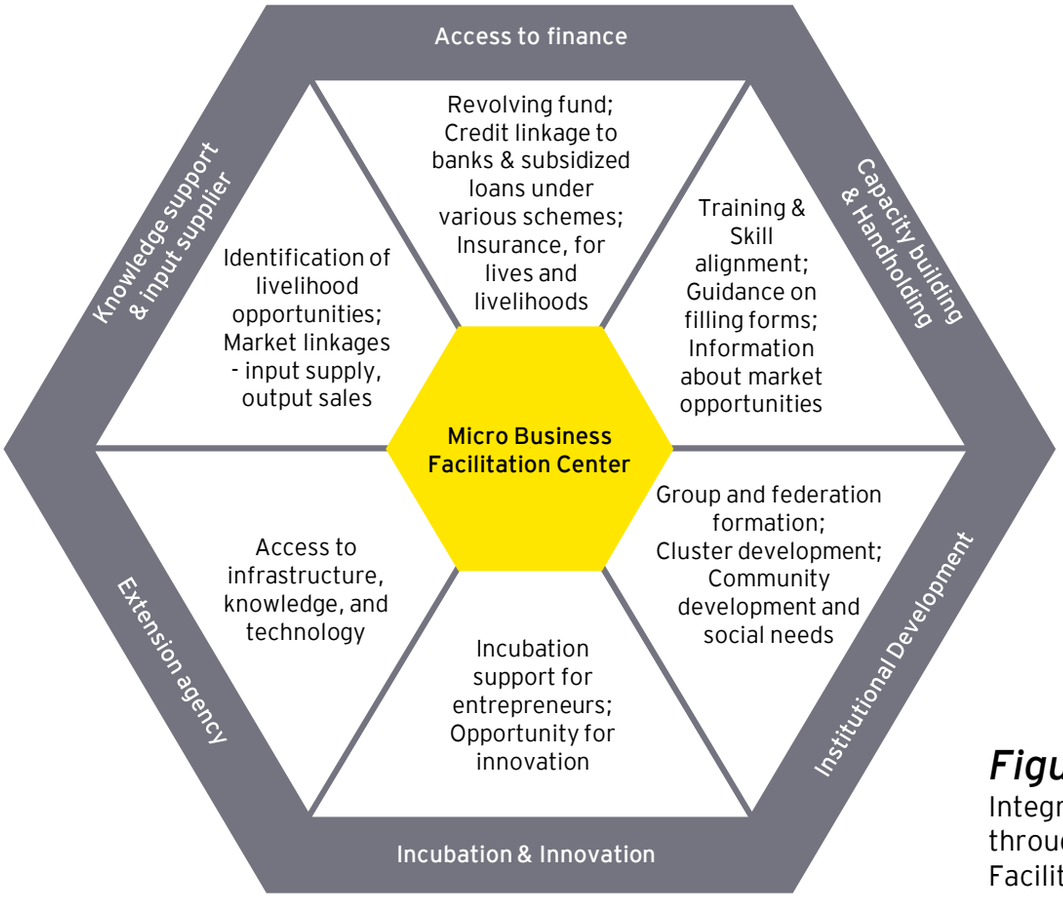


Figure 29
Integrated ecosystem support through Micro Business Facilitation Centers for start ups

This model aims to provide a holistic entrepreneurial development environment to budding entrepreneurs through capacity building, enterprise establishment support and mentoring services,	
Capacity building of identified potential entrepreneurs in employable skills and entrepreneurship Value Chain	▶ Identify benchmark and facilitate training and learning modules for English, IT, soft skills, entrepreneurship and life skills and financial literacy ▶ Devise the training plan based on the location and product need ▶ Developing appropriate instructional material on training and capacity building
Execution and program management for new Enterprises Established	▶ Identification and supporting active entrepreneurs and bringing them to a visible platform for easy access to markets and capital ▶ Readiness Assessment of existing entrepreneurs for entering the market with their goods and services ▶ Supporting the entrepreneurs to create linkage with banks/financial institutions / funding agencies /cooperatives for arranging financial assistance ▶ Create the market linkages ▶ Facilitate formation and infrastructure set-up for enterprises
Mentoring of entrepreneurs and support with business set up and continuity	▶ Facilitate linkage for stakeholders along the value chain ▶ Help in setting up the required infrastructure ▶ Assist in third party certification/ participatory guarantee ▶ Assist in the application procedures for obtaining required licenses/ approvals ▶ To upgrade members' skill through appropriate design and technology intervention to enable them to use quality raw material, tools, and equipment. ▶ To produce value added items that match quality standards of the buyers and the end users ▶ To provide adequate infrastructure support for improved quality and productivity and to enable artisan's access to a larger market segment ▶ To ensure effective participation of all members involved in production and marketing process for optimal growth in human resource, production, business, and income ▶ Continuous mentoring and hand holding to generate increased income by adopting and implementing improved technology, know-how and processes ▶ Feedback gathering and incorporation if required
How can this model be leveraged for just transition?	▶ For the mining regions that also boast region specific produce/skills, the workers can be encouraged and supported for entrepreneurship uptake through this holistic model ▶ E.g., cotton silk is a key produce across some districts in Jharkhand. In such areas, mine workers if provided with the ecosystem support can be encouraged for entrepreneurship, thus leveraging on the unique offerings of the region

Continuous monitoring and impact assessment:

▶ The program interventions once implemented also need to be tracked for progress, to ascertain if the planned objectives are being met. The proposed M&E framework is intended to be – focused on multiple stakeholders, harnessing the existing knowledge, consultative and participatory, quality driven and periodic, analytical and result oriented and multi-disciplinary. The M&E domains relevant for just transition programs are:

Physical progress monitoring	Financial progress monitoring	Quality assurance
Course correction based on concurrent monitoring and feedback		

- Additionally, the development of a monitoring manual for capacity building of stakeholders and members of the just transition coordination unit is also recommended. The manual may cover the following – introduction to skill and entrepreneurship interventions for just transition, framework and outline of the convergence model, brief descriptions of the programs under the convergence model (objectives, stakeholders, key result areas etc.), description of key variables to measure the success of interventions, monitoring and evaluation concept, result tracking framework and mechanism, lessons from M&E, resources for M&E (reports, formats, SOP, logic, variables etc.), approach amongst the key topics

The monitoring of programs is relevant across the pre-program phase, program phase and post-program phase:

Key M&E activities at preprogram phase

- Development of standardized reporting formats to capture relevant data and information about program and financial achievements
- Conducting base line studies – identification of beneficiaries, mapping skill and education level, identifying aspirations, sector profiles etc.
- Framework for pilot programs

Key M&E activities at Program Phase

- Day-to-day monitoring of the program elements to track and record progress
  - Beneficiary level progress across intervention lifecycle
  - Intervention wise participation
  - Market linkages and demand mapping
  - Infrastructure creation- need analysis
  - Increase/decrease in income of program beneficiaries
  - Fund utilization against physical progress
  - Stakeholder's collaboration
  - Capacity building of stakeholders
  - IEC efforts, etc.)
- Process quality monitoring to identify critical gap areas in on ground program implementation
- Mid program evaluation Digital integration and enablement for program monitoring – Facilitate technology integration by setting up of ERP for program management, LMS for aggregating industry demand, mapping skills of beneficiaries with demand from industry

Key M&E activities at Post program Phase

- Outcome studies (end-term / impact assessments) to measure, analyze and assess the effectiveness of interventions on the transitioning group
- Road map for program replication across locations
- Sustainability plan

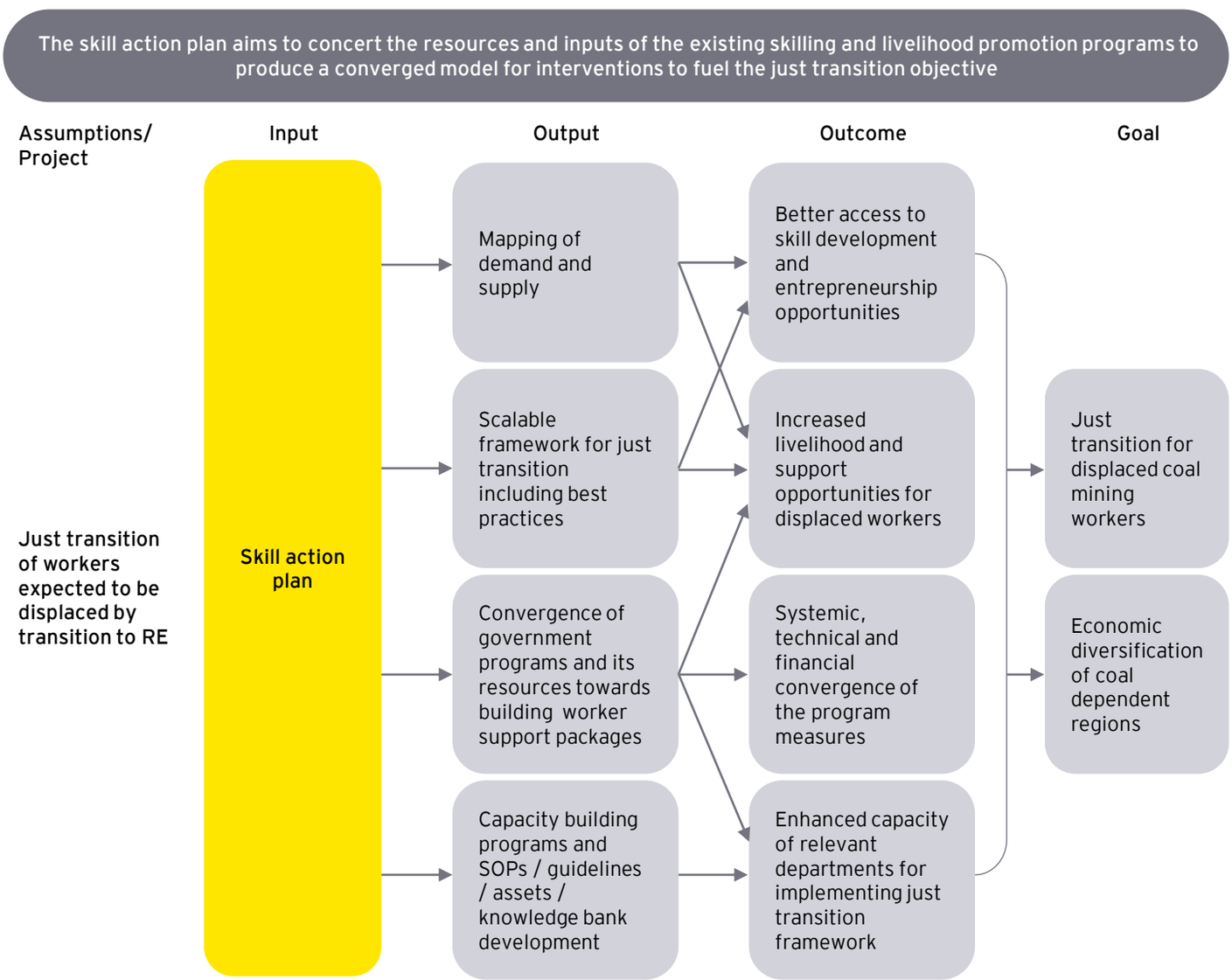
Way forward through proof of concept and subsequent scale-up for nationwide skill development initiatives for leading just transition due to coal phase-out

The energy transition journey to take place equitably and inclusively, warrants that the states are supported through a blueprint of framework and last-mile actions to facilitate the transition of the miners that stand to face a potential loss of livelihoods due to mine closures. This enabling input is proposed to be introduced through State Skill Action plans, to facilitate the processes for leveraging the existing financial, technical, policy and project implementation networks and resources as inputs to realize the just transition imperatives for the impacted workforce.

The same can be theoretically illustrated through the theory of change framework.

Figure 30

Theory of change framework to position the skills plans as an imperative input for just transition of mine workers



Facilitators/buy ins for skill action plans:

Buy in from state / central Govt. for implementation /pilot programs

Identification of anchor body for implementation

Availability of funding for skill/ entrepreneurship development

While the phase-down of coal is at its initial stage at the moment, it offers a suitable time to strategize and implement the recommended measures and plans across key geographies to carry out proof of concept for the just transition skilling and livelihoods framework. It shall also be noted that for the interventions through a skill action plan to be actualized, the facilitators and buy-in factors (refer to figure 30) are imperative. It provides the governance and financial fulcrum for the programs to succeed.

The rationale of proof of concept

For a quick gestation period to implement the skilling and entrepreneurship support interventions, the state skill action plans aim at leveraging the financial and institutional framework of the existing programs and schemes through a convergence model. To crystalize the implementation modalities of the just transition led convergence framework for skilling and livelihood creation, it necessitates that the program design framework is put to test, to enable feedback, course correction, re-alignment of stakeholders with intended roles, liaising routes, funding channel finalization, and other key learnings. The key takeaways from the proof-of-concept process will be aimed at **building a robust repository with go-to reference material for any of the stakeholders to scale up their state skill action plan for just transition through the convergence mode**

Key considerations for proof of concept: Proof of concept will in effect be the implementation of a sample skill action plan in pilot mode and the following considerations will play a key role in the same:

- Selection of a district for the pilot (basis of selection – stakeholder recommendation, districts with largest estimated displacement, ecosystem awareness and contextual understanding due to prior engagement in the region)
- Identification of just transition coordination unit – team composition
- Identification of government unit/stakeholder as an anchor body (e.g., district magistrate office, and district skill committee), which will be responsible for direct engagement and housing of the just transition coordination unit
- Permission and approval for access to the mining sites to conduct a baseline assessment of the transition group
- Access to key government stakeholders to identity programs and schemes and minuting the key features of the convergence model
- Stakeholder consultation and dialogues to ensure buy-in with convergence model to ensure the concerted and outcome-based approach

Key outcomes from proof of concept

The proof-of-concept apart will play a key role to finalize the modalities and key features of the convergence framework proposed.

- The proof of concept will yield results that will help to finalize the framework of state skill action plans for just transition which subsequently can be socialized with the larger stakeholder group — coal and non-coal industries, state-level functionaries across social welfare programs and districts, state and central level authorities closely related to the just transition objective

- The **just transition go-to package** will help the stakeholders to have access to a **robust repository of ready reckoners to scale up the proof of concept or pilot modalities** as per the scale of desired target group and geography. The repository will feature the following (indicative list, not exhaustive):
  - Introduction and rationale for skill action plans for just transition
  - Framework for skill action plan covering the core themes and road maps
  - SOP for baseline study and training needs assessment of a transitioning group of target beneficiaries (coal mine workers)
  - SOP for conducting sectoral analysis at the state and/or district level
  - SOP for target group mobilization and counselling
  - SOP for onboarding of NGOs, CBOs, and other community-level enablers to facilitate mobilization and information dissemination
  - Collection of relevant schemes by stakeholders involved and key objectives categorized by themes, financial models, and institutional arrangement
  - Guidelines for program mapping basis training need assessment and baseline results
  - Framework and modalities of the convergence model for skilling and livelihood promotion
  - Stakeholder and process maps
  - Global and national best practice collectives
  - Proof of concept experience and knowledge transfer
  - Program design framework
  - Key consideration for design scale-up plan
  - Innovative skill and entrepreneurship promotion models
  - Reporting frameworks and formats
  - M&E module – reporting formats and guidelines
  - and other supporting documents



6

Fueling just transition for 5 states through skill development initiatives



Just transition plan based on skill development and livelihood promotion initiatives to be driven by the focus industries in the affected region to create alternate income generation avenues

A just movement from thermal sources of energy generation to cleaner and greener avenues requires a cross-sectoral approach to address the economic vulnerabilities of people that were engaged in the sector

The framework to promote alternate livelihoods for the miners would primary be based on

- Identification of high demand industries and sectors (incl. renewable energy) in the impacted region
- These sectors to be identified through investment trends, government policy and impetus, local demand etc.
- The skill plan will aim at suggesting key programs and schemes that can be leveraged for reskilling and upskilling of the mining workforce, to enable their economic diversification and prevent livelihood loss
- It would also aim to identify the aspiring entrepreneurs to provide the ecosystem to encourage them to harness the local potential
- While skilling is important to empower the workforce, the just transition can only be wholly realized, through an integrated approach, where the mining employers as well as the alternate sector employers participate in this collaboratives action to focus on providing employment to the displaced workers
- While a few districts offer opportunities in alternate industries, some of them have a mono-economy characteristic, therefore necessitating a tailored approach for both.

Chhattisgarh

Snapshot	
District with UG mines[33]	Surguja, Surajpur, Koriya and Korba
Estimated number of direct jobs in UG mines[34]	~17,000
Estimated number of jobs to be created in the renewable sector[35]	~8,100
Major industries of the state	Metals and Minerals, Power, ESDM, steel, aluminium, food processing and textiles and apparel, minor forest produce
Upcoming industries	IT-ITes, Defense, New and Renewable Energy, Automotive, Pharmaceutical & Biotechnology, Textile, Plastic,
Key sectors that the youth is getting trained in the UG mine regions	Electronics and Hardware, Construction, Management, IT-ITeS, Logistics, Apparel, Power, Retail, Beauty and Wellness, Telecom

Renewable energy potential

In line with the global impetus on just transition, the state government launched its just transition plan, a green economy strategy set up to cushion the impact of the shift away from coal.

- The state Government has declared renewable energy as a priority under the State Industrial Policy and has an employment potential of almost 10,000 persons.
- Estimated solar PV grid potential based on identified across the state is approximately 1,000 MW. It has a 500 MW solar park in Rajnandgaon developed by CREDA. Lanco Solar in collaboration with the state government has set up a 100-MW solar cell manufacturing plant for solar PV projects in a special economic zone in Rajnandgaon[36]

Priority sectors[37]

- Metals and Minerals, Power and Electric Design systems and Manufacturing and textiles and apparel are the key industrial clusters.
- The industrial clusters which are primarily concentrated around the Raipur, Bilaspur and Rajgarh

[33] Pai, S; Zerriffi, H; Kaluarachchi, S, 2021, "Indian coal mine location and production - December 2020", https://doi.org/10.7910/DVN/TDEK8O, Harvard Dataverse, V1

[34] Estimated based on https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb/pdf

[35] EY estimates based on primary industry interactions

[36] https://www.thehindubusinessline.com/companies/lanco-solar-inks-pact-with-chhattisgarh-govt-for-100mw-plant/article7908730.ece

[37] IBEF state summary for Chhattisgarh (2021), Accessed from : https://www.ibef.org/states/chhattisgarh.aspx ,

Invest India, State Profile of Chhattisgarh. Accessed from https://www.investindia.gov.in/state/chhattisgarh

Department of Commerce & Industries, Government of Chhattisgarh

Chhattisgarh State Industrial Development Corporation (CSIDC)

District (DIC) Profiles.

Figure 31

Key sectors and industrial clusters in Chhattisgarh

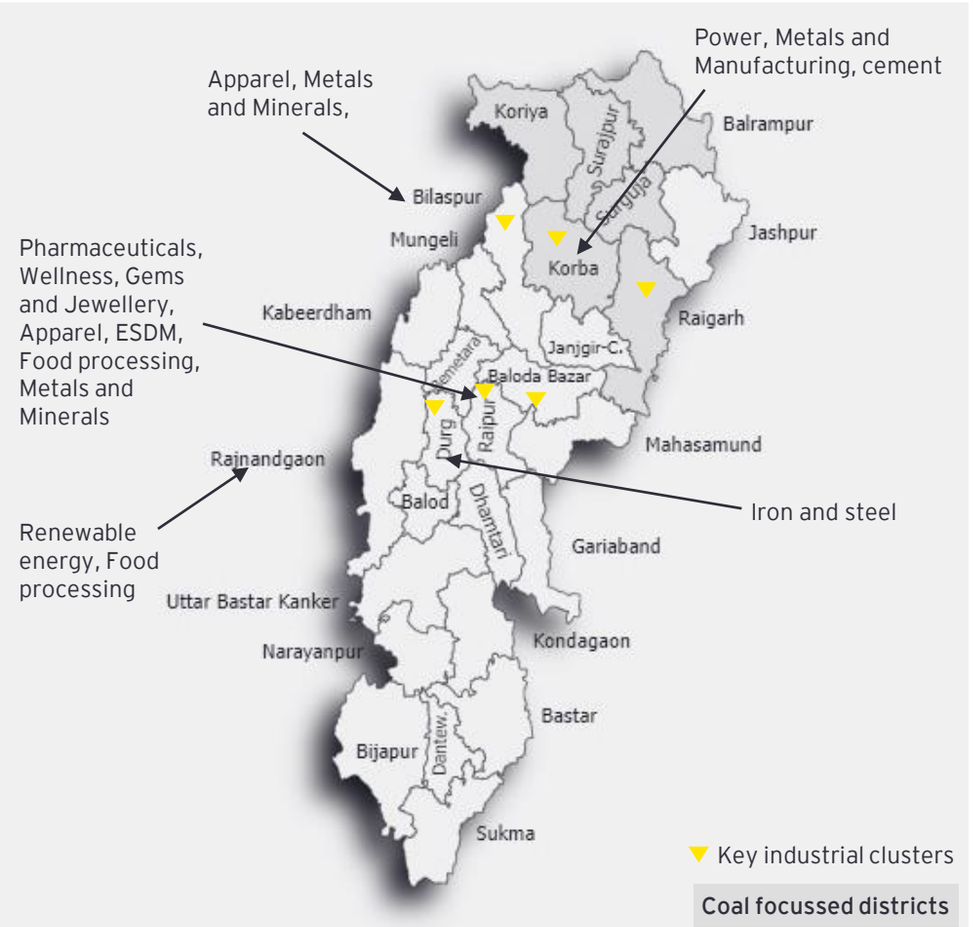


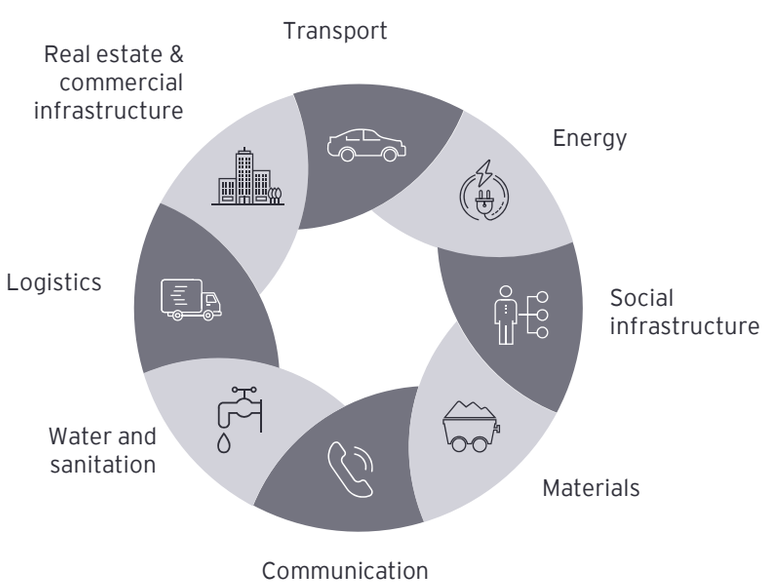
Figure 32

Priority sectors and districts with infrastructure led investment potential in Chhattisgarh

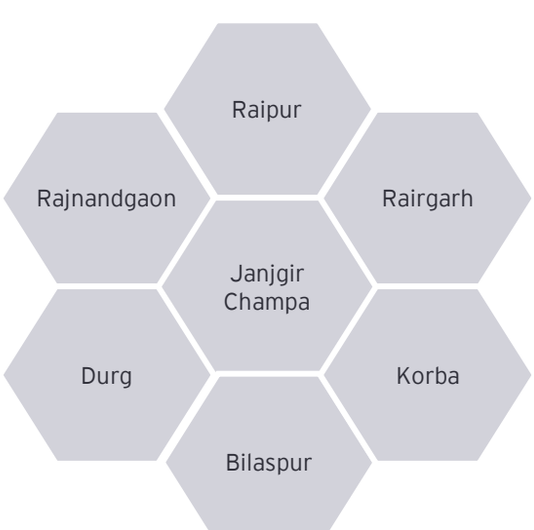
Investment/growth avenues

Regarding the industrial growth through large scale infrastructure building opportunities in the state, the following sectors have a potential of channelling x

Key sectors with large scale infrastructure led growth potential



Districts with highest investment potential



Imperatives of the skill plan

Key sector identification and supply side assessment of districts with UG mines

Korba		
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[38]**	
Metals, mining and agriculture	Management	18.51%
Sunrise sectors/high investment potential projects[39]	Electronics and Hardware	14%
Infrastructure development – Transport (roads and bridges), energy, public infrastructure development, railways	Telecom	9.43%
	Iron and Steel	9.26%
	Hydrocarbon	9%

Koriya		
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[40]**	
Metals, mining and agriculture	Construction	32.48%
Sunrise sectors/high investment potential projects[41]	Beauty and Wellness	15.49%
Infrastructure development – Railways	Logistics	14.77%
	Healthcare	11.06%
	Management	7.91%

Surguja		
Key industries/sectors	Top 5 sectors that youth is currently getting trained in	
Minerals, ready-made garments & embroidery, agriculture	Beauty and Wellness	15.16%
	IT-ITeS	13.80%
Sunrise sectors/high investment potential projects	Electronics and Hardware	13.61%
Infrastructure development – transport sector	Telecom	12.27%
	Healthcare	11.69%

Surajpur		
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[44]**	
Mineral based, Agro-based	Automotive	21.28%
	Management	21.10%
Sunrise sectors/high investment potential projects[45]	Tourism & Hospitality	12.18%
Infrastructure development – transport sector	Healthcare	10.55%
	Telecom	8.24%

[38] Based on skill training numbers across flagship scheme PMKVY

[39] Invest India (2021), Investment opportunities in Chhattisgarh. Accessed from https://indiainvestmentgrid.gov.in/states/chhattisgarh

[40] Based on skill training numbers across flagship scheme PMKVY

[41] Invest India (2021), Investment opportunities in Chhattisgarh. Accessed from https://indiainvestmentgrid.gov.in/states/chhattisgarh

[42] Based on skill training numbers across flagship scheme PMKVY

[43] Invest India (2021), Investment opportunities in Chhattisgarh. Accessed from https://indiainvestmentgrid.gov.in/states/chhattisgarh

[44] Based on skill training numbers across flagship scheme PMKVY

[45] Invest India (2021), Investment opportunities in Chhattisgarh. Accessed from https://indiainvestmentgrid.gov.in/states/chhattisgarh

Primary recommendations:

- The challenge of transition in Chhattisgarh's case is further made complex by the limited presence of alternate industries in the state other than coal and mineral mining and the low socioeconomic standards of the population in these areas.
- Larger transition can be fuelled by sowing seeds of alternate economies and the creation of social and commercial infrastructure in these regions by financial leverage from DMFs and investments from public and private stakeholders. From the social intervention point of view, the skills of the larger population of miners need to be developed to empower them
- Agriculture support packages are also relevant for the transition plans in these districts since it is an alternate sector across almost the districts identified
- The districts also have the sizeable tribal population, therefore necessitating a more integrated and inclusive effort to skill and focus on empowering and conserving the local's skills/products
- Employment guarantee schemes such as MNREGA and regional development programs run by DMF, should focus on mobilizing the transitioning workforce and aim to enhance their diversification

Key schemes/programs that can support skilling for the miners in Chhattisgarh	Key schemes/programs that can support entrepreneurship promotion for the miners in Chhattisgarh
▸ Pradhan Mantri Kaushal Vikas Yojana	▸ Mudra Yojana
▸ Skilling schemes by Ministry of Minority affairs	▸ Chief Minister sewing machine assistance scheme
▸ DDU GKY	▸ Mukhyamantri Yuva Swarojgar Yojna
▸ Chief Minister Skill Development and Family Empowerment Scheme etc	▸ MSME led interventions for handholding support

Jharkhand

Snapshot	
District with UG mines[46]	Bokaro, Dhanbad, Hazaribagh, Ramgarh, Ranchi
Estimated number of direct jobs in UG mines[47]	~23,000
Estimated number of jobs to be create in the renewable sector[48]	~9,600
Major industries of the state	Agro-based industries, food processing, mining and mineral, heavy and light engineering, chemicals, healthcare and wellbeing, sericulture (tussar silk), handicraft, handloom, steel, tourism, auto components, power/energy
Upcoming industries	Textile and apparels, automobile, and electric vehicles Electronics System Design and Manufacturing (ESDM)
Key sectors that the youth is getting trained in	Media and Entertainment, Apparel, Green Jobs, Furniture and Fittings, Sports, Electronics and Hardware, Telecom, Agriculture, Construction, Management

[46] Pai, S; Zerriffi, H; Kaluarachchi, S, 2021, "Indian coal mine location and production - December 2020", https://doi.org/10.7910/DVN/TDEK8O, Harvard Dataverse, V1

[47] Estimated based on https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb/pdf

[48] EY estimates based on primary industry interactions

Renewable energy potential[49]

- Jharkhand is endowed with an enormous potential for utilizing and adopting renewable energy (RE) owing to its abundant solar insolation and has the potential to generate over 20,000 jobs. This number is further to be increased, as Jharkhand Renewable Energy Development Authority (JREDA), along with the Ministry of Power and the state government, is leading the way for various largescale projects in the state. Out of which some of the key projects are:
  - Adani Power (Jharkhand) Ltd has notified a SEZ for the renewable power industry in the state[50].
  - JREDA has announced solar rooftop projects with target of 500 MW in Jamshedpur and Ranchi. This will create 24,000 jobs in these two cities.[51]
  - TP Saurya Ltd. to develop a 15 MW solar project at Jamshedpur[52]
  - JREDA with Solar Energy Corporation of India (SECI) plans to establish floating solar plant in the Getalsud reservoir in Ranchi.
  - Thetaitangar Hydel Power Project (INR 195 crore)
  - Raidih Hydel Power Project (INR 172 crore)
  - Kurdeg Hydel Power Project (INR 165 crore)
  - Ranchi Power Transmission Project (INR 5000 crore)
- Jharkhand Urja Sancharan Nigam Limited Grid Substation Development Project (INR 5000 crore)

Priority sectors[53]

- The key industries of the state are Agro-based industries, food processing, mining and mineral, heavy, and light engineering, chemicals, healthcare and wellbeing, sericulture (tussah silk), handicraft, handloom, steel, metallurgy, tourism, auto components, power/energy
- Main industrial clusters are in Bokaro, Dhanbad, Jamshedpur, Deoghar, Hazaribagh, Singbhum and Ghatshila to name a few

[49] Investment opportunities in Jharkahand in the RE sector, https://indiainvestmentgrid.gov.in/opportunities/electricity-generation-renewable/jharkhand?sector=3&district=241%2C248%2C250%2C253%2C255%2C258%2C259%2C260%2C263%2C264

[50] https://economictimes.indiatimes.com/industry/energy/power/govt-approves-adani-powers-rs-14000-cr-jharkhand-sez-project/articleshow/68240390.cms?from=mdr

[51] Original source: Report on the potential of solar energy in Jamshedpur, prepared by the Center for Environment and Energy Development (CEED), JREDA and the Central University, Jharkhand, as quoted in The times of India (Aug 2018), New policy for rooftop solar power plant soon.

[52] https://www.business-standard.com/article/news-cm/tata-power-to-develop-15-mw-solar-power-project-for-tata-steel-jamshedpur-121030300504_1.html

[53] IBEF state summary for Jharkhand, Accessed from https://www.ibef.org/states/jharkhand-presentation

Invest India State profile of Jharkhand. Accessed from https://www.investindia.gov.in/state/jharkhand

Rising Jharkhand (PHD Chamber, accessed from https://www.phdcci.in/wp-content/uploads/2019/01/Rising-Jharkhand-Economic-Profile-_final-for-Print-Low-size-updated.pdf)

MC MSME, District Profiles (DIC),

Jharkhand Industrial and Investment Promotion Policy 2021

Department of Industry Jharkhand,

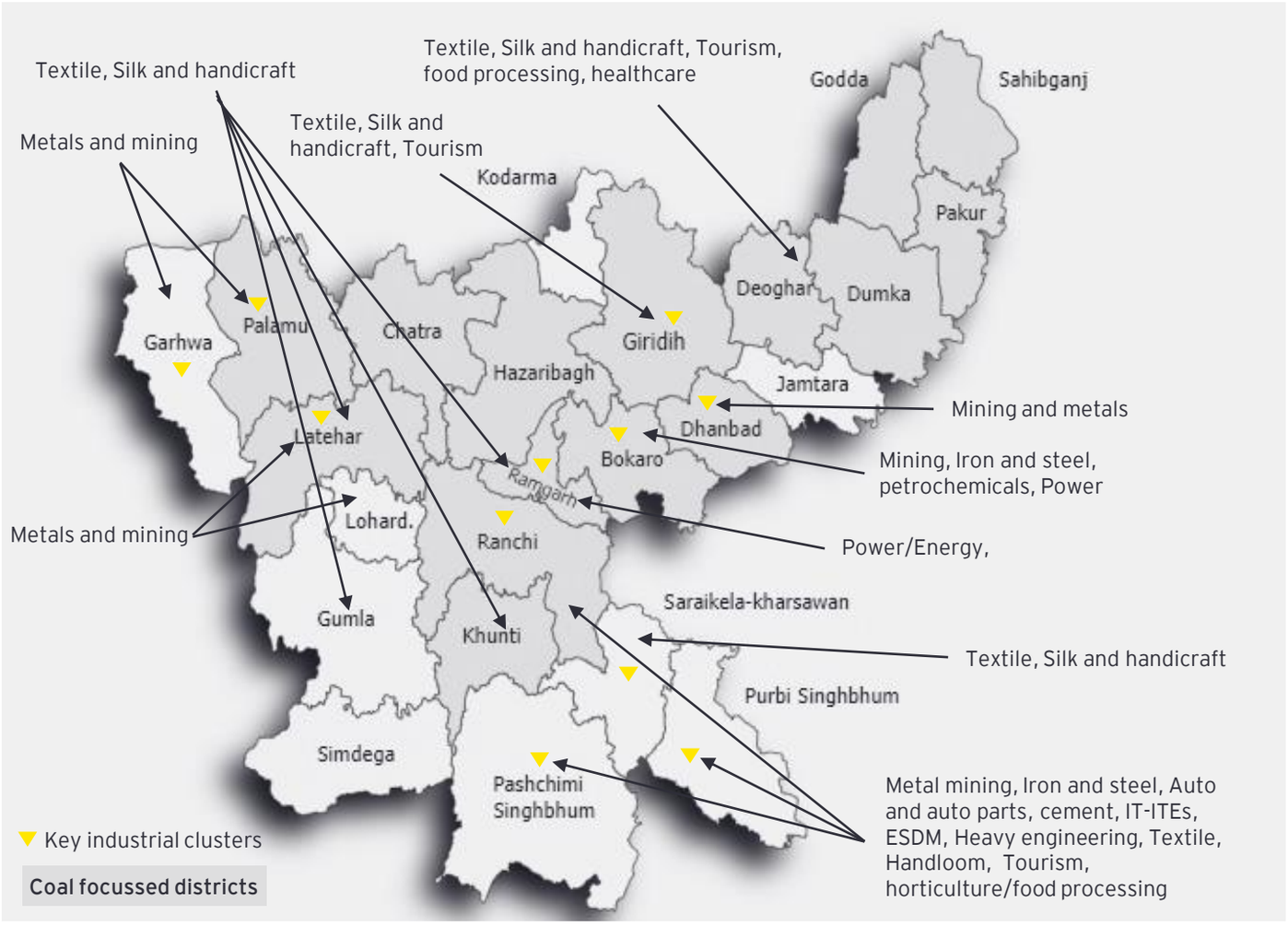


Figure 33

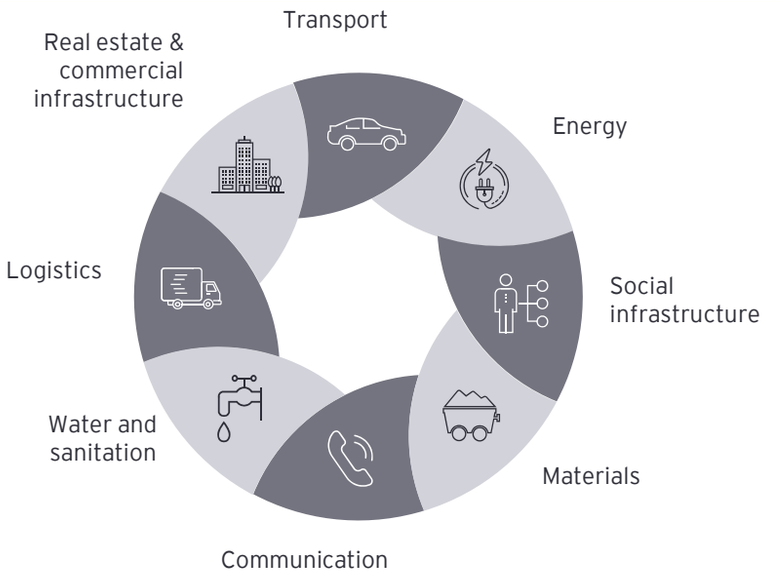
Key sectors and industrial clusters in Jharkhand

- The recent Jharkhand Industrial and Investment Promotion Policy 2021 which aims at creating 5 lakh jobs and envisages a multimillion-dollar investment pipeline, has further highlighted the focus to set up labour-intensive enterprises in the state through technology and skill up-gradation across pharmaceuticals, light engineering, garment, apparels, cosmetic industry, agro and food processing.
- The policy also aims to develop Jharkhand as a textile hub.

Investment/growth avenues

- The state is actively seeking investment avenues to build a robust infrastructural backbone to provide a conducive environment for a multisectoral economy. In the recent Jharkhand Industrial and Investment Promotion Policy 2021, 15 focus sectors have been identified, of which7 are focus sectors - textile and apparel, automobile, auto components and electric vehicles, agro-food processing, meat processing industries, pharmaceuticals and electronics system design and manufacturing (ESDM).
- Jharkhand has reported the potential of leveraging private and public investments for over 500 large scale infrastructure development projects across multiple sectors, of more than INR 3.75 lakh crore, which places a positive premise for job creation potential in the state. The key districts that stand to benefit through these planned investments are Ranchi, Dhanbad, Seraikela Kharsawan, West Singhbhum, Hazaribagh, and Ramgarh. The key thematic areas for the investments are illustrated below

Key sectors with large scale infrastructure led growth potential



Districts with highest investment potential

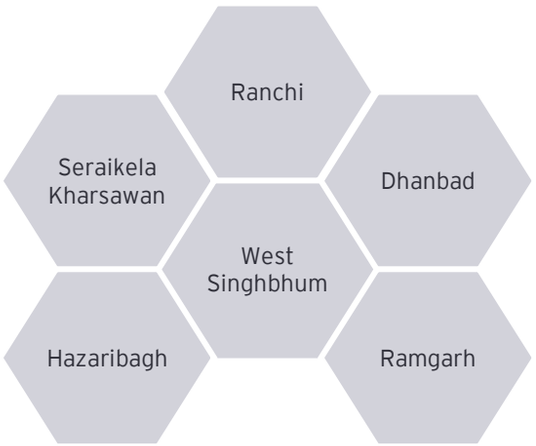


Figure 34

Priority sectors and districts with infrastructure led investment potential in Jharkhand

Imperatives of the skill plan

Key sector identification and supply side assessment of districts with UG mines

Ranchi

Key industries/sectors

Metal mining, Iron, and steel, Auto and auto parts, cement, IT-ITEs, ESDM, Heavy engineering, Textile, Handloom, Tourism, horticulture/food processing

Sunrise sectors/high investment potential projects[55]

Infrastructure development – Pharmaceuticals, Power/energy/, housing, road transport, social& commercial infrastructure, aviation

Top 5 sectors that youth is currently getting trained in[54]

Automotive	17.23%
Furniture and Fittings	12.16%
Media and Entertainment	11.38%
Apparel	7.13%
Beauty and Wellness	4.98%

Dhanbad

Key industries/sectors

Agro-based, Metals and Minerals, Garments & embroidery, wooden furniture

Sunrise sectors/high investment potential projects[57]

Infrastructure development – Chemicals and petrochemicals, road transport, leather footwear, healthcare, urban amenities, railway, housing, education

Top 5 sectors that youth is currently getting trained in[56]

Construction	12.08%
Agriculture	10.75%
Management	10.65%
IT-ITeS	8.77%
Telecom	6.59%

[54] Based on skill training numbers across flagship scheme PMKVY

[55] Invest India (2021), Investment opportunities in Jharkhand. Accessed from https://indiainvestmentgrid.gov.in/states/jharkhand

[56] Based on skill training numbers across flagship scheme PMKVY

[57] Invest India (2021), Investment opportunities in Jharkhand. Accessed from https://indiainvestmentgrid.gov.in/states/jharkhand

Hazirabagh	
Key industries/sectors Agro-based, Mineral based, tourism, power/energy, glass, alloy steels	**Top 5 sectors that youth is currently getting trained in**[58] Mining 21.19% Media and Entertainment 19.36% Furniture and Fittings 13.40% Domestic Workers 10.24% Apparel 5.10%

Bokaro	
Key industries/sectors Sericulture, Apparels/garments, wooden furniture, steel fabrication, engineering, food processing **Sunrise sectors/high investment potential projects**[60] Infrastructure development – airports, oil/gas storage, railways, roads and bridges, energy generation	**Top 5 sectors that youth is currently getting trained in**[59] Telecom 15.42% Retail 13.53% Rubber 10.03% Construction 8.72% Furniture and Fittings 5.31%

Primary recommendations:

- Considering the mineral-rich nature of the state and heavy dependence on coal, the districts discussed above (except Ranchi), need a more structured approach to address the socio-economic diversification plan
- The miners can transition out of the coal mines and obtain work in factories, plants and refractories for steel, alloy, glass, aluminium batteries, cement, general manufacturing equipment etc.

Key schemes/programs that can support skilling for the miners in Jharkhand	Key schemes/programs that can support entrepreneurship promotion for the miners in Jharkhand
▶ Pradhan Mantri Kaushal Vikas Yojana ▶ Pandit Deen dayal Upadhyay Antyodaya Yojna ▶ Deen Dayal Upadhyaya Grameen Kaushalya Yojana ▶ National Urban Livelihood Mission ▶ Advanced Vocational Trainng scheme ▶ Saksham Jharkhand Kaushal Vikas Yojana (SJKVY) etc	▶ Mudra Yojana ▶ MSME led interventions for handholding support ▶ Sakhi Mandal loans for female micro entrepreneurs ▶ Tejaswini Rural Women Empowerment Programme ▶ Mlinda Sustainable Environment Private Limited ▶ Jharkhand Livelihood Promotion Hunar Abhiyan (ASHA Scheme) 2020 – Rural women self-employment opportunities

[58] Based on skill training numbers across flagship scheme PMKVY

[59] Based on skill training numbers across flagship scheme PMKVY

[60] Invest India (2021), Investment opportunities in Jharkhand. Accessed from https://indiainvestmentgrid.gov.in/states/jharkhand

- Jharkhand has a large sericulture base and is the largest producer of tussar in India with a thriving handicrafts market. Entrepreneurship support can be provided to transitioning workers who wish to start their ventures. Jharkhand Silk, Textile and Handloom Corporation Limited (JHARCRAFT), State Khadi Board and MSME development institute networks might be leveraged to promote entrepreneurship and provide handholding support to the aspiring entrepreneurs
- Other schemes relevant would include: Mudra Yojana, DMF support, Didi Bagia Yojana, collaboration with entrepreneurship support institutes such as Saheed Nirmal Mahto Institute, Apparel Training Centre, Namkum. The textile IT park that has been proposed will also be an opportunity to capitalize on the mobilization of the transitioning workers

Madhya Pradesh

Snapshot	
District with UG mines[61]	Anuppur, Betul, Chindwara, Shahdol and Umaria
Estimated number of direct jobs in UG mines[62]	23,000
Estimated number of jobs to be created in the renewable sector[63]	26,000
Major industries of the state	Agriculture and food processing, textiles, pharmaceuticals, tourism, chemicals and minerals, engineering and equipment manufacturing, power,
Upcoming industries	Automobile and engineering, defense, IT-ITES, ESDM, renewable energy, plastic, urban development, logistics
Key sectors that the youth is getting trained in	Electronics and Hardware, Apparel, Retail, Telecom, Management, Logistics, Beauty and Wellness, Media, and Entertainment, IT-ITeS, Construction

Renewable energy potential[64]

- Madhya Pradesh's total installed capacity of renewable power is 5.38 GW. Additionally, about 10,950 MW of projects are under implementation in the state. This makes renewable energy a high potential sector for employment growth.
- One of the world's largest single-site solar projects, the REWA Ultra Mega Solar project has been made operational at 750 MW[65]
- Solar parks are being developed in the Neemuch, Shajapur, Agar, Morena, Chhatarpur and Sagar districts of the state. The parks, with a combined power generation capacity of 4500 MW, will be set up at about INR 18,000-crore investment[66]
- A 600 MW floating solar project is being set up on the Narmada River at Omkareshwar, worth an investment of more than INR 3000 crore.
- Under the Atmanirbhar Madhya Pradesh roadmap 2023, the state government aims to install over 2,00,000 solar pumps

[61] Pai, S; Zerriffi, H; Kaluarachchi, S, 2021, "Indian coal mine location and production - December 2020", https://doi.org/10.7910/DVN/TDEK8O, Harvard Dataverse, V1

[62] Estimated based on https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb/pdf

[63] EY estimates based on primary industry interactions

[64] Investment opportunities in Madhya Pradesh in the RE sector, https://indiainvestmentgrid.gov.in/opportunities/electricity-generation-renewable/madhya-pradesh?sector=3&district=310%2C311%2C314%2C318%2C320%2C325%2C328%2C331%2C332%2C335%2C339%2C341%2C810%2C350%2C352%2C356

[65] https://energy.economictimes.indiatimes.com/news/renewable/pm-modi-to-inaugurate-asias-largest-750-mw-rewa-solar-plant-this-week-all-you-need-to-know/76828988

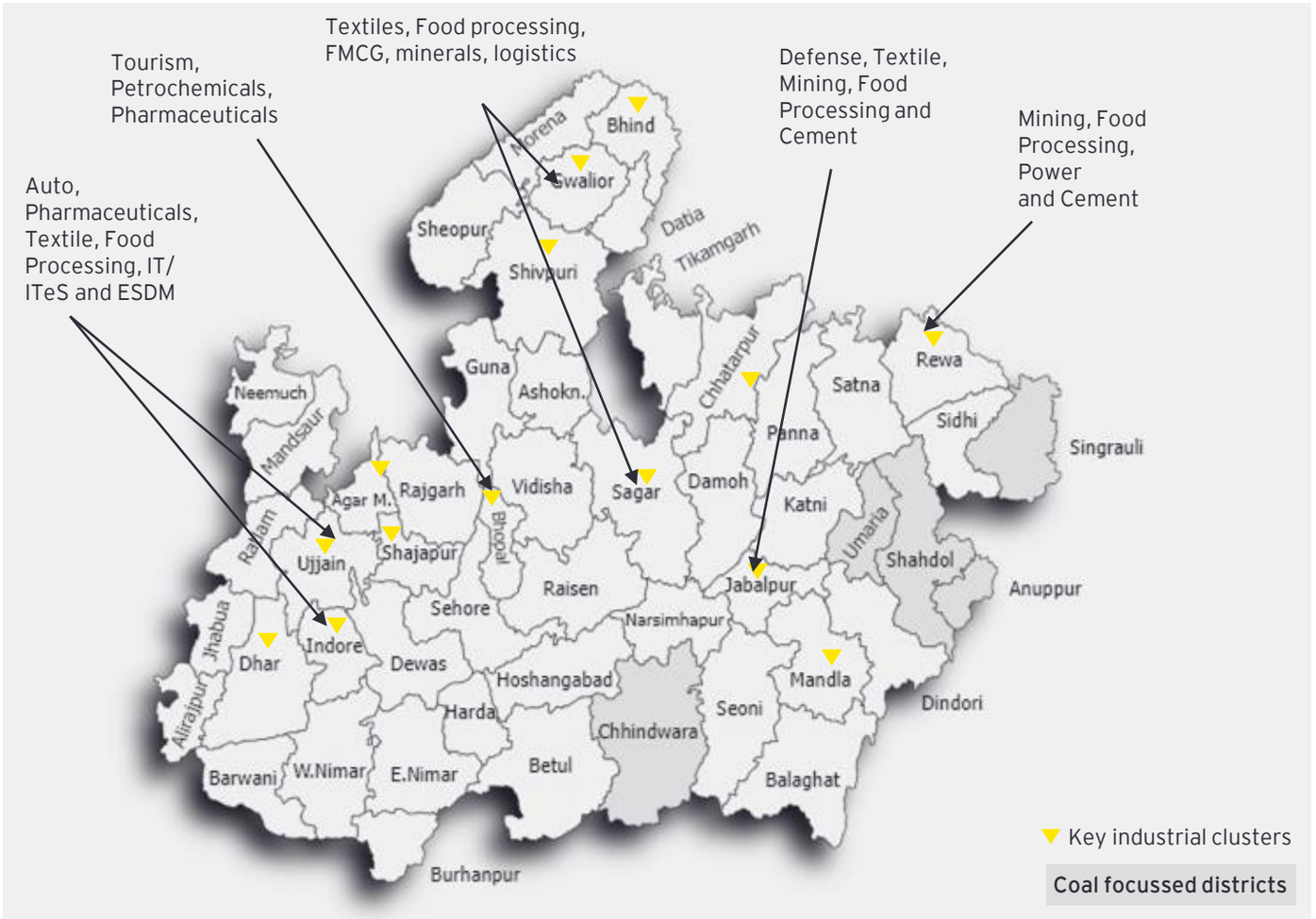
[66] https://government.economictimes.indiatimes.com/news/technology/agar-shajapur-neemuch-solar-project-will-change-future-landscape-of-hybrid-renewable-energy-parks-in-madhya-pradesh-sanjay-dubey-principal-secretary-energy-gomp/85822926

Figure 35

Key sectors and industrial clusters in Madhya Pradesh

Priority sectors[67]

- Though agriculture is a dominant sector for the state, through its strong support infrastructure, the state is also catching up in other industrial sectors such as Agribusiness and food processing, automobile and engineering, defence, IT-ITES, ESDM, Pharmaceuticals, renewable energy, textiles, chemicals and minerals
- Key industrial clusters in Madhya Pradesh are located in Bhopal, Indore, Jabalpur, Ujjain and Gwalior, which are expected to contribute to a significantly high proportion of employment generated during 2012-22.



Investment/growth avenues

Additionally, over 1,000 projects are in the pipeline with an investment potential of more than INR 8 lakh crore across the following sectors

[67] IBEF state summary for Madhya Pradesh (2021), Accessed from: https://www.ibef.org/states/madhya-pradesh.aspx, Invest India State Profile of Madhya Pradesh. Accessed from https://www.investindia.gov.in/state/madhya-pradesh

Department of Industrial Policy and Investment Promotion, Government of MP

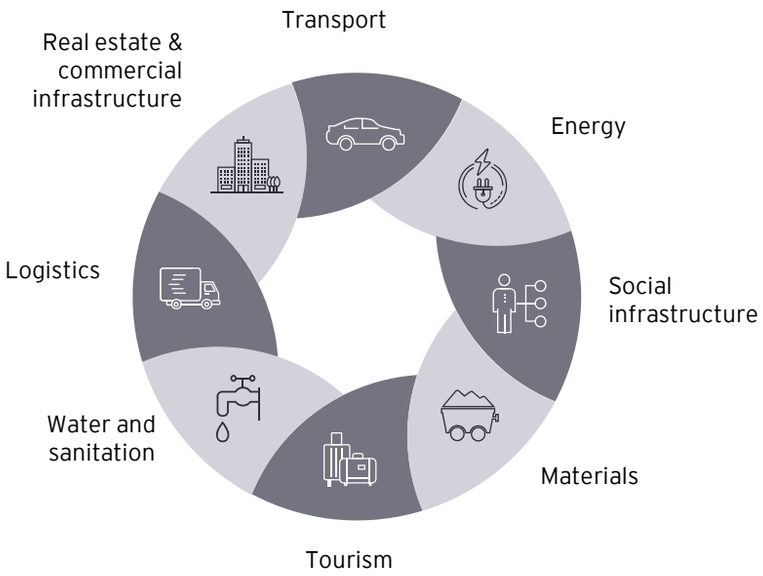
Department of Industries, Government of MP

Department of Planning, Economics & Statistics, Govt. of M.P.,

Industries in Madhya Pradesh (maps of India, accessed from https://www.mapsofindia.com/madhya-pradesh/economy/industries.html)

District profiles (DIC Websites)

Key sectors with large scale infrastructure led growth potential



Districts with highest investment potential

Bhopal	Jabalpur
Betul	Anuppur
Chhindwara	Chhatarpur
Gwalior	Indore

Figure 36

Priority sectors and districts with infrastructure led investment potential in Madhya Pradesh

Imperatives of the skill plan

Key sector identification and supply side assessment of districts with UG mines

Anuppur

Key industries/sectors

Forestry, Paper based, wood/wooden based furniture,

Sunrise sectors/high investment potential projects[69]

Infrastructure development – Chemical, agro and agro processing, machinery, and equipment manufacturing

Top 5 sectors that youth is currently getting trained in[68]

Electronics and Hardware	20.37%
Management	17.58%
Construction	13.72%
Furniture and Fittings	13.08%
BFSI	11.75%

Betul

Key industries/sectors

Power (thermal/coal-based industries), Wood/wooden based furniture, metal, food processing

Sunrise sectors/high investment potential projects[71]

Infrastructure development –water and sanitation, healthcare, energy, irrigation, tourism, renewable energy, railways

Top 5 sectors that youth is currently getting trained in[70]

Electronics and Hardware	35.39%
Apparel	11.53%
Telecom	6.18%
Construction	6.03%
Domestic Workers	5.51%
Iron and Steel	4.99%

[68] Based on skill training numbers across flagship scheme PMKVY

[69] Invest India (2021), Investment opportunities in Madhya Pradesh. Accessed from https://indiainvestmentgrid.gov.in/states/madhya-pradesh

[70] Based on skill training numbers across flagship scheme PMKVY

[71] Invest India (2021), Investment opportunities in Madhya Pradesh. Accessed from https://indiainvestmentgrid.gov.in/states/madhya-pradesh

Chindwara		
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[72]**	
Agro -based, textile, Metal based (Steel Fab)	Electronics and Hardware	17.68%
	Apparel	13.67%
Sunrise sectors/high investment potential projects[73]	Beauty and Wellness	8.17%
Infrastructure development – Healthcare, education, transport	Construction	7.22%
	Telecom	6.68%
	Agriculture	5.77%

Shahdol		
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[74]**	
Agro-based, thermal Power, apparels, minerals	Apparel	23.30%
	Handicrafts and Carpet	15.69%
Sunrise sectors/high investment potential projects[75]	Electronics and Hardware	9.30%
Infrastructure development – plastics, steel, chemical	IT-ITeS	8.52%
	Construction	6.21%
	Mining	5.73%

Umaria		
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[76]**	
Agro- based, Thermal Power	IASC	64.56%
	IT-ITeS	9.24%
Sunrise sectors/high investment potential projects[77]	Construction	6.77%
Infrastructure development – roads, educational institutes, irrigation, energy	Electronics and Hardware	6.73%
	Logistics	6.48%

Primary recommendations:

- According to a recent iFOREST report, the majority of coal mining districts in the state are running towards coal exhaustion. The closing of exhausted and unprofitable mines has huge socio-economic implications for the district and associated sub-district. More than 50% of the people in these districts are coal-dependent, with 85% of rural households having the highest-earning member making below INR 5,000. This strengthens the need for diversifying the skills of the inhabitants of the districts to enhance their avenues for livelihood promotion
- The key to activating a skill development and livelihood promotion-based just transition plan, would be to identify the job roles for training. The roles should be in line with key demand sectors of the state to ensure that the training result in gainful employment/livelihood avenue
- Subsequent step would entail the identification of the key programs to access skill training and entrepreneurship support opportunities

[72] Based on skill training numbers across flagship scheme PMKVY

[73] Invest India (2021), Investment opportunities in Madhya Pradesh. Accessed from https://indiainvestmentgrid.gov.in/states/madhya-pradeshh

[74] Based on skill training numbers across flagship scheme PMKVY

[75] Invest India (2021), Investment opportunities in Madhya Pradesh. Accessed from https://indiainvestmentgrid.gov.in/states/madhya-pradesh

[76] Based on skill training numbers across flagship scheme PMKVY

[77] Invest India (2021), Investment opportunities in Madhya Pradesh. Accessed from https://www.investindia.gov.in/state/madhya-pradesh

Key schemes/programs that can support skilling for the miners in Madhya Pradesh	Key schemes/programs that can support entrepreneurship promotion for the miners in Madhya Pradesh
▶ Pradhan Mantri Kaushal Vikas Yojana ▶ Deen Dayal Upadhyaya Grameen Kaushalya Yojana ▶ MP Mukhya Mantri Kaushalya Yojana ▶ MM Kaushal Smvardhan (MMKSY)	▶ Mudra Yojana ▶ Stand Up India ▶ Prime Minister Employment Generation Programme (PMEGP) ▶ Mukhyamantri Yuva Udyami Yojana ▶ Mukhya Mantri Swavalamban Yojana ▶ Mukhya Mantri Swarozgar Yojana ▶ Mukhya Mantri Aarthik Kalyan Yojana

Maharashtra

Snapshot	
District with UG mines[78]	Chandrapur, Nagpur, Yavatmal
Estimated number of direct jobs in UG mines[79]	~5400
Estimated number of jobs to be create in the renewable sector[80]	~64,000
Major industries of the state	Tourism, Auto & auto components, Textiles & Apparels, IT-ITes, BFSI, Food processing, Food Processing and Oil and Gas
Upcoming industries	Electrical vehicle, Aerospace & Defence, Industry 4.0, Textiles, Biotechnology, Medical devices, Logistics, ESDM, Minerals, Green energy
Key sectors that the youth is getting trained in	Agriculture, Media and Entertainment, Electronics and Hardware, Construction, Retail, Tourism & Hospitality, Beauty and Wellness, Apparel, Logistics, Automotive

Renewable energy potential[81]

The state ranks fourth in terms of installed capacity of renewable energy and has the potential of employing over sixty thousand persons. The state aims at 25,000 MW of installed capacity aimed by 2025, of which 11000 MW has been installed. Key RE projects in the pipeline are:

- Proposed investment of over INR 70,000 cr by JSW for hydropower and wind power plants - potential to employ over 15,000 persons in Nasik, Kolhapur, Solapur, Satara and Osmanabad
- Solar power project worth INR 52 crores in Nasik
- Location key solar power projects are planned: Ahmednagar, Akola, Amravati, Aurangabad, Buldhana, Dhule, Jalgaon, Jalna, Kohlapur, Latur, Nagpur, Nanded, Osmanabad, Sangli, Satara, Solapur

[78] Pai, S; Zerriffi, H; Kaluarachchi, S, 2021, "Indian coal mine location and production - December 2020", https://doi.org/10.7910/DVN/TDEK8O, Harvard Dataverse, V1

[79] Estimated based on https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb/pdf

[80] EY estimates based on primary industry interactions

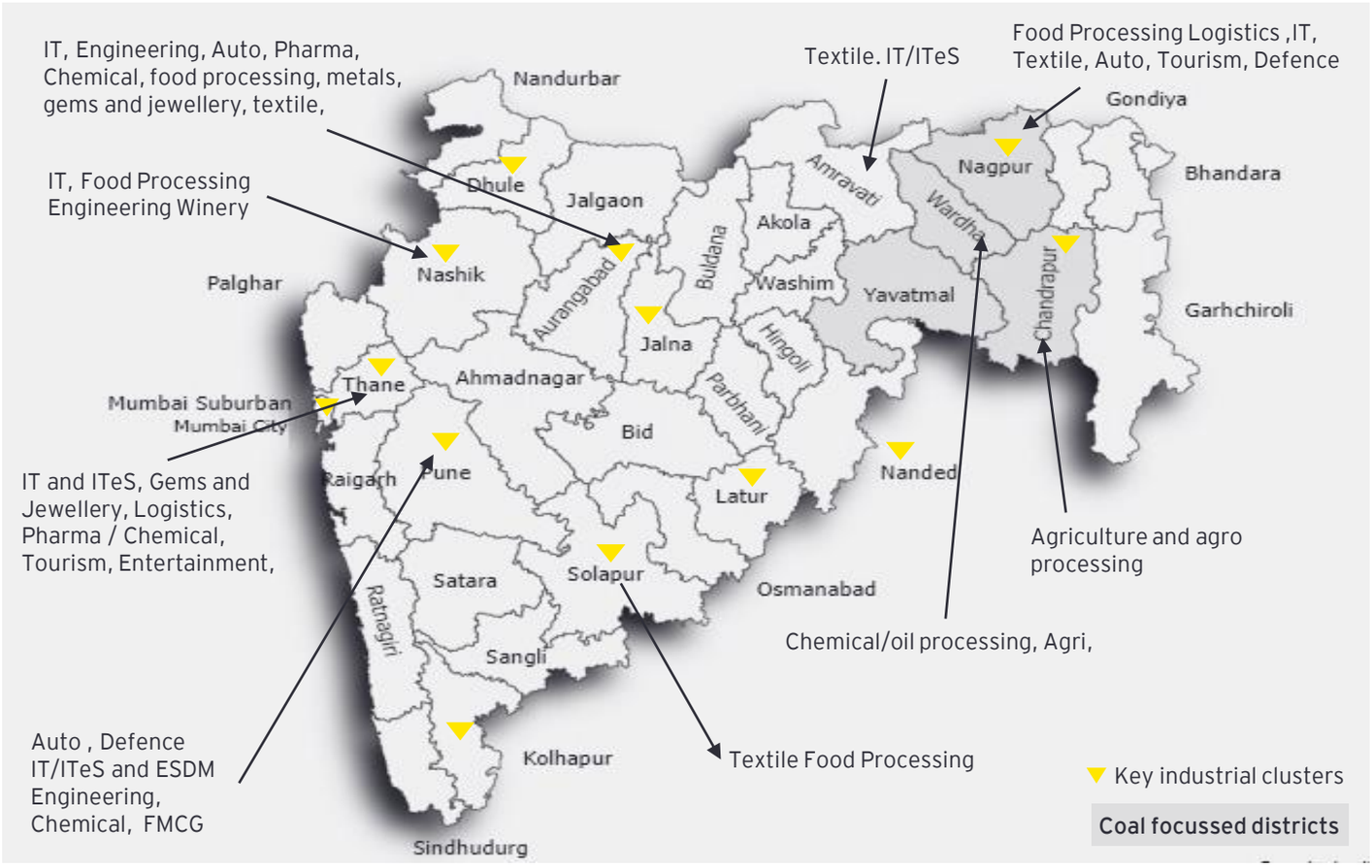
[81] Investment opportunities in Maharashtra Pradesh in the RE sector, Accessed from https://indiainvestmentgrid.gov.in/opportunities/electricity-generation-renewable/maharashtra?sector=3&district=361%2C362%2C363%2C364%2C365%2C366%2C367%2C368%2C369%2C370%2C371%2C372%2C373%2C374%2C375%2C376%2C379%2C380%2C381%2C382%2C383%2C385%2C386%2C389%2C390%2C392%2C393%2C394%2C395%2C396

Figure 37

Key sectors and industrial clusters in Maharashtra.

Priority sectors[82]

Tourism, Auto & auto components, Textiles & Apparels, IT-ITES, BFSI, Food processing, Food Processing and Oil and Gas are key sectors of the state to anchor the transition of the minors and help with economic transition.



Investment/growth avenues

Additionally, over 1,600 projects are in the pipeline with an investment potential of more than INR 14 lakh crores across the following sectors

[82] IBEF state summary for Maharashtra, Accessed from: https://www.ibef.org/states/maharashtra.aspx,

Invest India Maharashtra Profile https://www.investindia.gov.in/state/maharashtra

Magnetic Maharashtra Highlights, accessed from https://www.midcindia.org/documents/20181/26611/About+Maharashtra.pdf/4b840810-7d61-4538-8c6f-def617df4c12, Focus sectors accessed from Maharashtra Industrial Development Corporation

District wise industrialization and sector presence, Accessed from https://maitri.mahaonline.gov.in/pdf/Industrial%20Scenario-in-Maharashtra0622.pdf

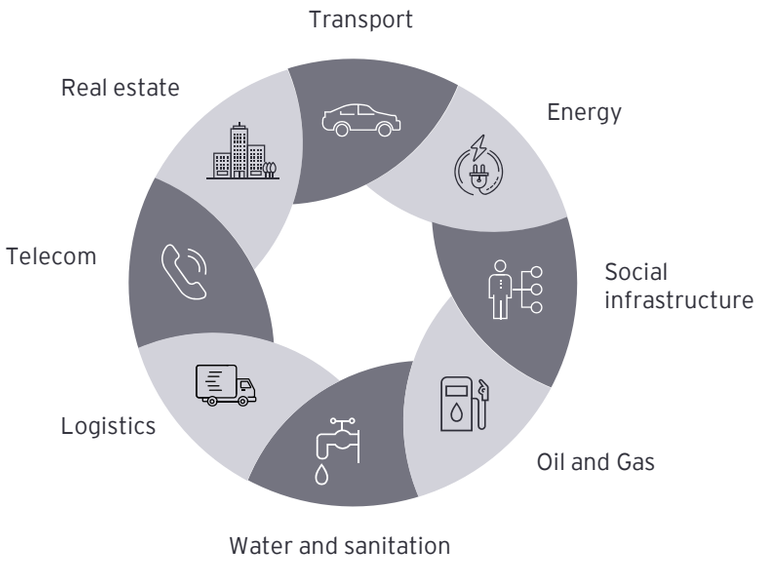
Economic Survey of Maharashtra (2020-21)

FICCI&SPJIMR (2017), Maharashtra 2025. Accessed from http://ficci.in/spdocument/20956/FICCI-SPJIMR-Report_2017.pdf

Vision 2030, Maharashtra – Planning Department, Government of Maharashtra

Industries in Madhya Pradesh (maps of India)

Key sectors with large scale infrastructure led growth potential



Districts with highest investment potential

- Mumbai
- Nagpur
- Pune
- Solapur
- Thane
- Wardha
- Chandrapur
- Bhandara
- Gondia

Figure 38
Priority sectors and districts with infrastructure led investment potential in Maharashtra

Imperatives of the skill plan

Key sector identification and supply side assessment of districts with UG mines

Nagpur

Key industries/sectors

Furniture, Agro processing, Automotive, Textile (silk handloom)

Sunrise sectors/high investment potential projects[84]

Infrastructure development – transport/roadways

Top 5 sectors that youth is currently getting trained in[83]

Agriculture	24%
Domestic Workers	10%
Electronics and Hardware	10%
Leather	9%
Construction	6%

[83] Based on skill training numbers across flagship scheme PMKVY

[84] Invest India (2021), Investment opportunities in Maharashtra. Accessed from https://indiainvestmentgrid.gov.in/states/maharashtra

Chandrapur	
Key industries/sectors	**Top 5 sectors that youth is currently getting trained in[85]**
Food processing, metal fabrication, textile, construction (for metro/airport), IT-ITES	Agriculture 56%
	Electronics and Hardware 11%
Sunrise sectors/high investment potential projects[86]	Construction 6%
Infrastructure development – Logistics, Construction (highways, Smart City Project)	Retail 5%
	Apparel 4%

Yavatmal	
	Top 5 sectors that youth is currently getting trained in[87]
Key industries/sectors	Retail 14%
Food processing, agri-based industries	Apparel 13%
	Electronics and Hardware 11%
	Agriculture 9%
	Logistics 5%

Primary recommendations:

- The key to activating a skill development and livelihood promotion-based just transition plan, would be to identify the job roles for training. The roles should be in line with key demand sectors of the state to ensure that the training results in gainful employment/livelihood avenue.
- Subsequent step would entail the identification of the key programs to access skill training and entrepreneurship support opportunities.

Key schemes/programs that can support skilling for the miners in Maharashtra	Key schemes/programs that can support entrepreneurship promotion for the miners in Maharashtra
▶ Pradhan Mantri Kaushal Vikas Yojana	▶ Mudra Yojana
▶ Pramod Mahajan Kaushalya va Udyojakta Vikas Abhiyan (PMKUVA)	▶ Prime Minister Employment Generation Programme (PMEGP)
▶ Pandit Deen dayal Upadhyay Antyodaya Yojna	▶ Skill Upgradation and Mahila Coir Yojana (MCY)
▶ Deen Dayal Upadhyaya Grameen Kaushalya Yojana	▶ Domestic Market Promotion (DMP)
▶ National Urban Livelihood Mission	▶ Entrepreneurship Skill Development Programme (ESDP)
▶ Kiman Kaushalya Vikaas Kaarayakram	▶ Assistance to Training Institutions (ATI)
▶ Industry Linked Skill Development Programme	▶ Collaboration and assistance from MSME-Tool Room (Indo German Tool Room) and Nagpur, MSME-Development Institute, Nagpur
▶ Maharashtra Agriculture Special Project	
▶ Skill Development Training in Construction Sector	

- GoM in collaboration with National Dairy Development Board and Mother Dairy Fruit & Vegetable Pvt Ltd., has started a special project to increase milk production in 11 districts including Nagpur, Chandrapur, Wardha and Yavatmal. The impacted population might be mobilized to leverage the program benefits.
- Yavatmal and Wardha also fall under the Dr Punjabrao Deshmukh Jaivik Sheti Mission to promote organic farming, which can be leveraged to diversify the districts.
- Employment guarantee schemes such as MNREGA and regional development programs run by DMF should focus on mobilizing the transitioning workforce and aim to enhance their diversification.

[83] Based on skill training numbers across flagship scheme PMKVY

[84] Invest India (2021), Investment opportunities in Maharashtra. Accessed from https://indiainvestmentgrid.gov.in/states/maharashtra

[85] Based on skill training numbers across flagship scheme PMKVY

West Bengal

Snapshot	
District with UG mines[88]	Bankura, Paschim Bardhaman, Purulia
Estimated number of direct jobs in UG mines[89]	40,000
Estimated number of jobs to be created in the renewable sector[90]	9,800
Major industries of the state	Agriculture and horticulture, logistics, power, textiles, food processing, leather, electronics, healthcare, IT-TES, gems and jewellery
Upcoming industries	Power (Gas), mines and minerals, logistics
Key sectors that the youth is getting trained in (statewide)	Apparel, Retail, Electronics and Hardware, Agriculture, Beauty and Wellness, Tourism & Hospitality, Telecom, Healthcare, Construction, Leather

Renewable energy potential[91]

West Bengal has a total installed power generation capacity of 11,061.88 MW where 9,097.62 MW is contributed by thermal power, 1,396.00 MW by hydropower and 568.26 MW by renewable power

- In 2020, the state had launched a 200 MW solar energy park in Dadanpatra, East Midnapore.
- The state plans to set up solar photovoltaic power project worth $21 million in Cooch Behar, Purulia, and Murshidabad.

Priority sectors[92]

The key industries in the state are agriculture, food processing, horticulture & floriculture, mining, beverage(tea), leather, steel, textiles, IT-ITES, financial services, and gems and jewellery. The key industrial areas are Haldia, Kolkata, Asansol-Durgapur, Kharagpur, and Siliguri.

[88] Pai, S; Zerriffi, H; Kaluarachchi, S, 2021, "Indian coal mine location and production - December 2020", https://doi.org/10.7910/DVN/TDEK8O, Harvard Dataverse, V1

[89] Estimated based on https://iopscience.iop.org/article/10.1088/2633-1357/abdbbb/pdf

[90] EY estimates based on primary industry interactions

[91] Investment opportunities in West Bengal in the RE sector, https://indiainvestmentgrid.gov.in/opportunities/electricity-generation-renewable/west-bengal?sector=3&district=688%2C691%2C693%2C695%2C696%2C697%2C699%2C700%2C704%2C705%2C708%2C710

[92] IBEF state summary for West Bengal. Accessed from : https://www.ibef.org/states/west-bengal.aspx,

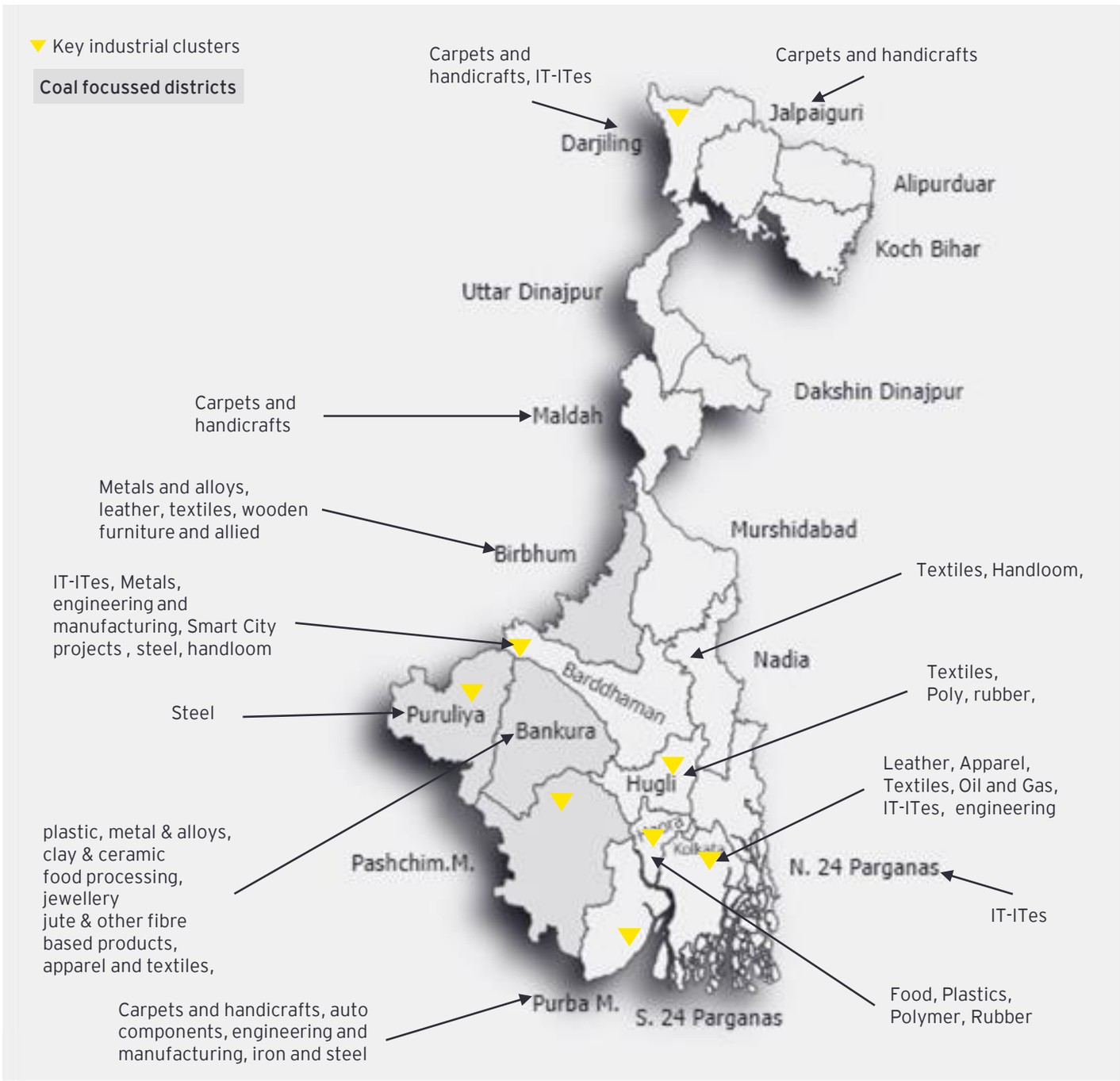
Invest India State Profile for West Bengal. Accessed from https://www.investindia.gov.in/state/west-bengal

State Industrial Profile of West Bengal (2018-19). Accessed from http://www.msmedikolkata.gov.in/uploads/2021/03/SIP-2018-19.pdf

West Bengal Industrial Development Corporation

Figure 39

Key sectors and industrial clusters in West Bengal.



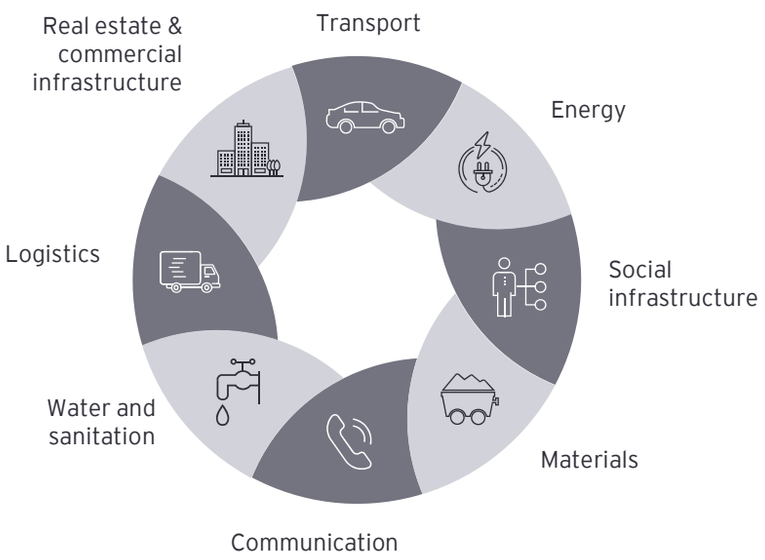
Investment/growth avenues

Additionally, over 1,300 projects are in the pipeline with an investment potential of more than INR 6 lakh crores across the following sectors

Figure 40

Priority sectors and districts with infrastructure led investment potential in West Bengal

Key sectors with large scale infrastructure led growth potential



Districts with highest investment potential

Kolkata	Paschim Bardhaman
Purulia	Birbhum
Paschim Medinipur	Darjeeling

Imperatives of the skill plan

Key sector identification and supply side assessment of districts with UG mines

Bankura

Key industries/sectors

Chemical / Chemical-based manufacturing

Sunrise sectors/high investment potential projects[94]

Infrastructure development – water and sanitation, healthcare, railways, chemicals and petrochemicals, energy, transport

Top 5 sectors that youth is currently getting trained in[93]

Agriculture	41.86%
Telecom	7.57%
Beauty and Wellness	6.24%
Electronics and Hardware	5.24%
Construction	4.91%

Paschim Bardhaman

Key industries/sectors

Food processing, metal fabrication, textile, construction (for metro/airport), IT-ITES

Sunrise sectors/high investment potential projects[96]

Infrastructure development – Transport, commercial, social, and real estate, oil and gas, metals and mining, agriculture, sanitation, railway

Top 5 sectors that youth is currently getting trained in[95]

Retail	13.56%
Green Jobs	11.51%
Hydrocarbon	9.59%
Construction	8.59%
IT-ITES	7.85%

[93] Based on skill training numbers across flagship scheme PMKVY

[94] Invest India (2021), Investment opportunities in West Bengal https://indiainvestmentgrid.gov.in/states/west-bengal

[95] Based on skill training numbers across flagship scheme PMKVY

[96] Invest India (2021), Investment opportunities in West Bengal https://indiainvestmentgrid.gov.in/states/west-bengal

Purulia

Key industries/sectors

Steel, Power & Cement

Sunrise sectors/high investment potential projects[98]

Infrastructure development – transport, railways, healthcare, transport, electricity

Top 5 sectors that youth is currently getting trained in[97]

Agriculture	19.60%
Retail	13.46%
Telecom	11.56%
Healthcare	11.51%
Management	9.25%
Plumbing	7.04%

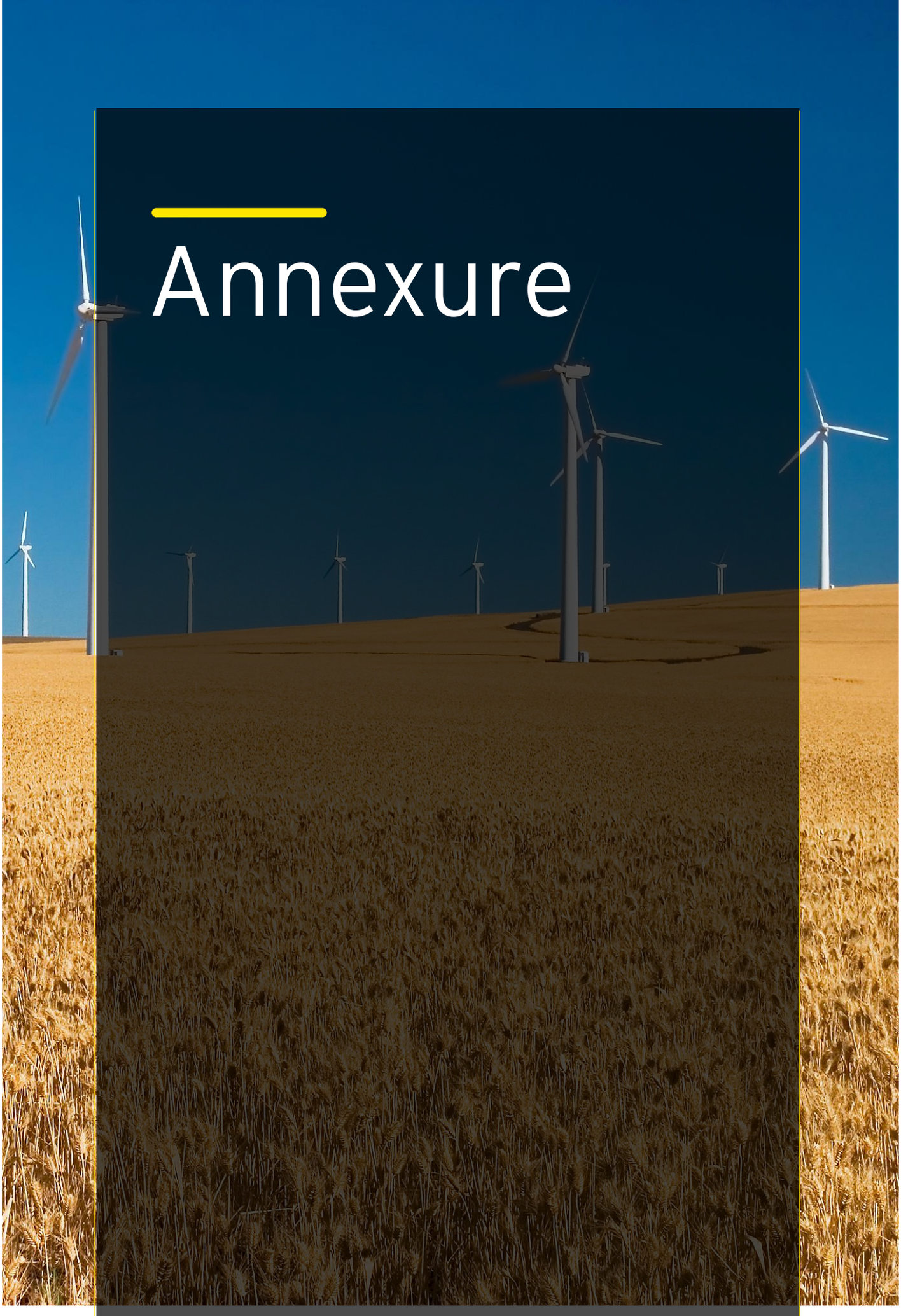
Primary recommendations:

- The key to activating a skill development and livelihood promotion-based just transition plan would be to identify the job roles for training. The roles should be in line with key demand sectors of the state to ensure that the training result in gainful employment/livelihood avenue
- Paschim Bardhaman, Purulia and Bankura, the regions with underground mines also boast active industrial clusters for various sectors with large infrastructure projects being underway. In addition, these areas are also hubs of art and craft industries such as textiles, jute and fibre-based industries, handloom, ceramics etc., that can be lucrative avenues for entrepreneurs.

Key schemes/programs that can support skilling for the miners in West Bengal	Key schemes/programs that can support entrepreneurship promotion for the miners in West Bengal
▶ Pradhan Mantri Kaushal Vikas Yojana ▶ Deen Dayal Upadhyaya Grameen Kaushalya Yojana ▶ Utkarsh Bangla	▶ Mudra Yojana ▶ Prime Minister's Employment Generation Programme ▶ Karma sathi Prakalpa ▶ Entrepreneurship Skill Development Programme ▶ Finance clinic ▶ Udiyaman Swanirbhar Karmasansthan Prakalpa ▶ Bangla Swanirbhar Karmasansthan Prakalpa ▶ Self-employment schemes under West Bengal Minorities Development & Finance Corporation ▶ Swami Vivekananda Swanirbhar Karmasansthan Prakalpa ▶ Muktidhara ▶ Jaago ▶ Swarna-Jayanti Sahari Rojgar Yojana ▶ Swarna-Jayanti Gram Swarojgar Yojana (SGSY) ▶ Special Component Plan (SCP) and Tribal Sub Plan (TSP)

[97] Based on skill training numbers across flagship scheme PMKVY

[98] Invest India (2021), Investment opportunities in West Bengal https://indiainvestmentgrid.gov.in/states/west-bengal



Annexure

Annexure 1 – Human resources demand analysis for Renewable Energy Sector in 5 states across Engineering & construction and operations and maintenance

Engineering & construction - Solar ground mounted

Job Role	Human resource requirement				
	Jharkhand	West Bengal	Madhya Pradesh	Maharashtra	Chhattisgarh
Solar PV installer (Civil)	95	98	204	527	80
Solar PV installer (Electrical)	68	70	146	376	57
Solar project helper (civil)	143	146	306	790	120
Solar project helper (electrical)	136	139	291	753	114
Warehouse keeper	12	13	26	68	10
Security	147	151	314	813	123
Construction workers	1,832	1,882	3,931	10,163	1,537
Lorry/truck operator	611	627	1,310	3,388	512
Total	**3,043**	**3,125**	**6,529**	**16,879**	**2,553**



Engineering & construction – Wind					
Job role	Human resource requirement -				
	Jharkhand	West Bengal	Madhya Pradesh	Maharashtra	Chhattisgarh
Construction technician (electrical)- wind power plant			66	162	
Construction technician (civil) - wind power plant			69	170	
Construction technician (mechanical) - wind power plant			20	48	
Crane operator			66	162	
Helper - electrical			197	485	
Helper - civil			138	339	
Helper - mechanical			20	48	
Security			197	485	
Construction workers			1311	3232	
Lorry/truck operator			328	808	
Total			2,409	5,938	

Operation and maintenance - Solar ground mounted					
Job role	Human resource requirements				
	Jharkhand	West Bengal	Madhya Pradesh	Maharashtra	Chhattisgarh
Solar PV maintenance technician (electrical)	611	627	1,310	3,388	512
Solar PV maintenance technician (civil/mechanical)	305	314	655	1,694	256
Solar project helper	1,527	1,568	3,276	8,469	1,281
Grass cutter / ground main/ gardener	305	314	655	1,694	256
Security	916	941	1,966	5,082	769
Cleaner	1,222	1,254	2,621	6,776	1,025
Driver	122	125	262	678	102
Total	5,008	5,143	10,745	27,780	4,202

Operation and maintenance - Solar rooftop					
Job role	Human resource requirements				
	Jharkhand	West Bengal	Madhya Pradesh	Maharashtra	Chhattisgarh
Solar PV maintenance technician (Suryamitra)	203	205	558	1144	177
Solar project helper- O&M	811	820	2232	4575	708
Total	1,014	1,025	2,790	5,719	885

Operation and maintenance - Wind					
Job role	Human resource requirements				
	Jharkhand	West Bengal	Madhya Pradesh	Maharashtra	Chhattisgarh
O&M mechanical technician - wind power plant			295	727	
O&M electrical technician - wind power plant			590	1454	
O&M civil technician - wind power plant			118	291	
O&M helper			590	1454	
Unskilled worker			590	1454	
Total			2,183	5,381	

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