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Just Transition Pathways for a Net-Zero Telangana

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SWANITI GLOBAL
THE GLOBAL CLIMATE AND
DEVELOPMENT INSTITUTE

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List of Abbreviations

CPO	Chief Planning Officer
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
DC	District Collector
DDUGKY	Deen Dayal Upadhyaya Grameen Kaushalya Yojana
DFO	Divisional Forest Officer
DIC	District Industry Centre
DISCOMs	Distribution Companies
DMF	District Mineral Foundation Fund
DPPH	Domestic Promotion and Publicity including Hospitality
FGD	Focus Group discussion
GDDP	Gross District Domestic Product
GDP	Gross Domestic Product
GIS	Geographic Information System
GM	General Manager
GST	Goods and Service Tax
INR	Indian National Rupee
ITI	Industrial Training Institute
KIPCL	Kaleshwaram Irrigation Project Corporation Limited
LPG	Liquified Petroleum Gas
MA & UD	Municipal Administration and Urban Development
MCD	Municipal Corporation Department
MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
MSME	Micro Small Medium Enterprises
MT	Million Tonne
MW	Megawatt
NTPC	National Thermal Power Corporation
OBC	Other Backward Class

OC	Opencast
PLI	Performance Linked Incentive
PMKVY	Prime Minister-Kaushal Vikas Yojana
PRI	Panchayat Raj Institutions
PV	Photovoltaic
RE	Renewable Energy
SC	Schedule Caste
SCB	Schedule Commercial Bank
SCCL	Singareni Collieries Company Limited
SME	Small and Medium Enterprise
ST	Schedule Tribe
TGIIC	Telangana Industrial Infrastructure Corporation ltd
TPP	Thermal Power Plant
TTAP	Telangana Textile and Apparel Policy
UG	Underground
ULBs	Urban Local Bodies

Executive Summary

As the world moves towards a net zero future—a prerequisite for limiting the rise in average global temperatures to 1.5°C above pre-industrial levels—coal phase down has become inevitable. India's net zero target year is 2070. However, some coal-rich states like Telangana are setting an even more ambitious target of going net zero by 2047, that is, 23 years before the national target. As Telangana, which produces 7% of the total coal in India, actively plans its net-zero future, it seeks to ensure that workers and communities are protected from the aftereffects of coal phase down.

To contribute to the understanding of Telangana's net zero future and just transition prospects, we conducted a study to examine its current levels of coal dependence and economic diversification potential. For this, we focused on two key coal-dependent districts in Telangana: Mancherial and Peddapalli. Currently, these districts collectively produce 45% of the state's coal. Furthermore, these districts are home to several coal-based thermal power plants, fly ash units, and coal-dependent MSMEs. Notably, Ramagundam, located in Peddapalli district, stands out as a significant hub for thermal power generation in India.

We conducted a mixed-methods study that included household and enterprise surveys in both districts to quantify coal dependence and unpack aspirations for understanding economic diversification. Additionally, we conducted multiple focus group discussions and semi-structured interviews to capture the nuanced realities, opportunities, and challenges related to diversification in these areas. Finally, we aligned our findings from field work with the existing policy landscape to identify potential support for new sectors.

Some key insights and recommendations are summarised below:

1. **Household dependency**

    a. **Employment**: In Mancherial, approximately 26% of the households within 0 to 5 km of the coal mines or thermal power plants for their livelihoods, while in Peddapalli, this figure is slightly higher at 28%.

    b. **Infrastructure**: In Peddapalli, 13% of sampled households live in housing provided by Singareni Collieries Company Limited (SCCL) or the National Thermal Power Corporation Limited (NTPC), 12% use SCCL electricity, 7% rely on company-supplied tap water, and 13% access healthcare services at SCCL dispensaries or hospitals. In Mancherial, 5% of households live in SCCL housing, 8% use SCCL electricity, and 11% make use of tap water facilities supplied by SCCL.

2. **Industrial dependency**

    a. **Business dependence on coal:** In both districts, 3 in 10 local enterprises are dependent on the coal sector for their businesses; and the majority of these enterprises are involved in coal transport or providing services to the coal sector.

    b. **Infrastructure:** In both districts, industrial dependence on the coal sector

for infrastructure is minimal. Only 2–7% enterprises are dependent on the coal sector for either water or electricity. Additionally, only 2% manufacturing-based enterprises in Peddapalli and 5% in Mancherial use coal-based boilers.

3. **Diversification**

   a. **Aspiration:** There are several sectors that people and industries in Peddapalli and Mancherial aspire to diversify into as the state strives to achieve its net zero target. In each district, at the sub-district or block level, there are comparative advantages for different sectors identified by this study (Table 1).

   b. **Challenges for diversification:** Despite the aspirations and the potential for diversification, these districts still face significant challenges. Apart from sector-specific challenges related to land, infrastructure and policy, key challenges include reliance on coal and the absence of a long-term district level diversification strategy.

Table 1: Potential sectors for diversification by district and block

Based on household and enterprise surveys, interviews, policy assessments, and an evaluation of the comparative advantages of each block, this table outlines potential sectors for diversification, along with the identified blocks. In both districts, solar manufacturing and assembly, textiles, and food processing have the highest potential.

District	Sectors	Blocks
Peddapalli	Solar manufacturing and assembly	Ramagundam, Manthani
	Agro-based industry: Food Processing	Ramagundam, Palakurthi, Odela, Srirampur, Sultanabad
	Textile	Manthani, Peddapalli, Julapalli
	Tourism	Ramagundam, Manthani, Eligaid
Mancherial	Agro-based industry: Food processing	Chennur, Hajipur, Kasipet, Bellampally, Tandur Jaipur, Naspur, Dandepally, Nennel, Kannepally
	Solar manufacturing and assembly	Mancherial, Naspur
	Textiles	Jaipur, Bheemaram, Dandepally, Mancherial, Bheemin

Recommendations

1. **The government, NGOs and other key sectoral stakeholders should engage extensively with local communities in coal districts through targeted plans to solicit ideas for economic diversification in order to ensure that the transition towards a low-carbon economy is 'just'.** Although conversations on net zero and just transition have become mainstream nationally and internationally, they are yet to capture the imagination of the people and industries in the coal communities of Telangana. Without the support of the people and communities, implementation of net zero and just transition plans would face stiff local resistance.

2. **Strategizing for economic diversification, a key element of just transition, needs to be done at the sub-district level in coordination with district- and state-level stakeholders. This requires the initiative on the district administration's part for creation of sectoral sub-district roadmaps.** To effectively plan for economic diversification, it's essential to focus on governance at the sub-district level, taking into account the comparative advantages and impending challenges of each block ("mandal"). A long-term strategy should be developed at the sub-district or block level, identifying potential sectors that can anchor future growth and job creation. These sectors for diversification may encompass one or more blocks at the same time. Throughout the process, the district administration, municipal corporations, chief planning officers, private sector, industry associations, and civil society must be actively engaged.

3. **State and district governments should leverage existing financing options for pilot projects in alternative sectors for economic diversification.** To effectively finance economic diversification into new sectors, district and state governments should utilize existing locally available resources, such as District Mineral Foundation (DMF) and corporate social responsibility (CSR) funds. Coal-mining and power companies like SCCL and NTPC Ltd., in collaboration with the district administration, can allocate CSR resources to provide skill training to workers and seed funding to local entrepreneurs for diversification into new sectors. This approach will not only help bridge skill gaps and promote entrepreneurship but also attract investments for other sectors.

4. **The state government in collaboration with district authorities and industry bodies should plan for attracting large-scale investments into the sectors identified for diversification.** Given that the state government is seeking investments in the state, it should consider routing domestic and foreign investments to coal-bearing areas. It can also host district-level investor meets to showcase investors potential sectors for diversification.

5. **The government should initiate targeted large-scale re-skilling of locals in the matching sectors identified for economic diversification.** Coal communities are primarily trained in traditional sectors such as coal mining, textiles, or agriculture, and often lack professional training in other new economic sectors. Therefore, considering the aspirations of households and enterprises, skilling in alternative sectors is required. In the short term, both central and state government schemes such as the Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) and the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) can be leveraged. By aligning training programs with future industry needs, the district

government can better prepare the workforce for emerging sectors and facilitate a smoother transition to clean energy.

6. **Just transition must be institutionalised.** Implementing just transition is a massive task which involves institutional coordination, financing, public acceptance, and planning. The creation of a three-tier task force on just transition was recommended by NITI Aayog in March 2023, the three levels being the centre, state and district. To this end, the Ministry of Environment, Forest and Climate Change, Government of India created a task force this year, and Jharkhand formed a state level-task force in 2023. On similar lines, Telangana's state government should also consider forming a task force to promote an equitable energy transition. If Telangana forms a task force in the state and in the districts of Mancherial and Peddapalli, it will be the first of its kind in the country.

1.0 Introduction

According to the World Meteorological Organization, there is an 80% likelihood that at least one year between 2024-2028 would temporarily exceed the 1.5 °C mark.[1] If emissions continue at the current rate, however, average global temperatures would almost certainly continue to rise beyond 1.5 °C in the long term. This would worsen climate disasters like wildfires, droughts, and floods, affecting every region of the world.

The continued burning of fossil fuels is the single most important reason behind the rise in global temperatures. As even more countries formulate policies to reduce their reliance on fossil fuels like coal, there is a growing momentum towards a coal phase down.[2] Countries like India have been at the forefront of the energy transition discourse in the Global South. India's G20 presidency in 2023 was pivotal in steering just transition and sustainable development goals.[3] The Indian government is also pushing for policies to strengthen action towards renewable energy deployment and energy efficiency in line with the its goal to go net zero by 2070.[4] In the short term, future demand projections show an overall increase in coal demand. But in the long term this demand may taper off as the deployment of clean energy technologies accelerates at scale. This is worrying for communities in coal-producing states, who rely on coal production for jobs, revenues, and social benefits.

Although the discussion on just transition planning for securing an economic future for coal communities has picked up momentum in some coal-dependent states in India, it is missing in others. One state where just transition is a new concept is Telangana. In the state, there is an urgent need to start planning for just transition for coal communities, considering that the state has declared a goal of net zero emissions by 2047, merely 23 years from now.

Given that coal is a fundamental element of Telangana's economy, examining the dynamics of its coal dependency and economic diversification prospects is crucial. Telangana is home to a large number of coal mines and power plants, particularly in the districts of Mancherial, Peddapalli, Jayashankar Bhupalpally, Komaram Bheem Asifabad, Khammam and Bhadradri Kothagudem.[5] Despite coal's critical role in energy production and local livelihoods, there remains a notable gap in comprehensive studies examining household and industrial coal dependence, as well as alternative livelihood options at the sub-district level.

Policymakers and scholars have advocated for a more systems thinking approach to understanding how local coal-dependent regions can diversify. Economic diversification is a long-term strategy to reduce dependence on a single fossil-fuel commodity. However, there is neither an established definition nor a metric to measure it.[6] According to UNFCCC, economic diversification is a shifting of an economy from a single income source to multiple income sources from more diversified sectors or markets.[7] While focus on economic diversification as a key element of just transition has gained traction, it is unclear how diversification actually works at the local level because diversification is rarely studied at the local level.

We aim to address this gap by conducting a first-of-its-kind diversification study in two key coal producing districts of Telangana: Mancherial and Peddapalli. We in-

vestigate the scale and type of coal dependency at the district level. Then, based on the understanding and local perceptions, identify new sectors for economic diversification, and the approaches required to pivot these communities into these new sectors. Mancherial and Peddapalli provide a strong foundation for analyzing coal dependencies and diversification options.

We selected these districts because they are among the top coal producers in the state and have a long history of coal dependency. Peddapalli is one of the highest coal-producing districts, with 10 mines and current coal production of 20 million tonnes (2023-2024). The district also hosts 3 power plants with a total capacity of 4,262.5 MW. Known as one of India's most industrialized zones, Peddapalli is home to some of the oldest coal-based thermal power plants, as well as coal-dependent industries such as cement. It is a key area for understanding potential diversification pathways for coal-dependent industrial regions. Similarly, in Mancherial, the state-owned Singareni Collieries Coal Company (SCCL) operates 17 mines, producing 13.4 MT of coal annually. The district is also home to the Jaipur Thermal Power Plant, which has a capacity of 1,200 MW.

As Telangana navigates its net-zero plans, the insights gained from analyzing coal dependencies in Mancherial and Peddapalli will be vital for shaping effective policies and strategies. By identifying viable alternative sectors and understanding local community aspirations, we can foster sustainable economic diversification that not only mitigates the impacts of reduced coal reliance but also enhances the resilience and prosperity of these communities.

In the next section (2.0), we explain our research questions and methodology. In section (3.0), we look at the case of Peddapalli and Mancherial and evaluate their coal dependence and diversification potentials. In the last section (4.0), we detail diversification strategies and recommendations for the districts, aligning them with relevant policy action.

2.0 Objective, Research Questions, and Methodology

RQ1: What is the type and scale of coal dependence in Peddapalli and Mancherial districts?

RQ2: What are the potential sectors of economic diversification that households and enterprises collectively identify?

RQ3: What are the challenges, opportunities and policy supports available for diversification in each of these districts?

To address these questions, we conducted mixed-methods research in both districts. This included two types of surveys: a household survey and an enterprise survey, which helped quantify and assess coal dependence and diversification prospects at both the household and industrial levels (RQ1). To hone in on our survey findings, we also conducted focus group discussions and several semi-structured interviews with relevant stakeholders such as coal workers, trade union leaders, and members of coal transport associations. We also collected secondary data from district department sources such as the district's statistical handbooks for 2022-23, DMF collection details, number of coal company-sponsored medical facilities, among others, to corroborate the results of the surveys.

To assess the key sectors and their diversification potential, we followed a two-stage process for this research. In the first stage, we identified key sectors for diversification using results from the household and enterprise surveys (RQ2). In the second stage, we assessed the natural potential of the identified sectors. Natural potential is identified on the basis of forward and backward linkages available in a particular block. Additionally, we engaged with district officials to understand if the government was undertaking any interventions in a particular block to promote a particular sector. For example, if people and industries collectively want tourism as one of the sectors, then we gauged if there were tourism spots in different blocks of the districts, and if a spot was popular and frequented by tourists, we assessed what kind of hospitality and public transport was available. Lastly, we investigated the existing government policy landscape pertaining to each sector.

Based on step one, we then outlined the diversification pathways for the district, addressing the strengths, weaknesses, comparative advantage and government support (RQ3) for each of the identified sectors.

2.1 Household survey

We conducted a survey of 265 households in Peddapalli and 336 in Mancherial to evaluate their dependence on the coal sector and to explore their aspirations and future livelihood options. The survey questionnaire was structured into four sections:

a) **Demographics**

b) **Employment**

c) **Social Infrastructure**

d) **Livelihood Aspirations**

We evaluate the diversification potential of households and enterprises by considering their aspirations and preferences for transitioning to non-coal sectors. We assess the aspirations of household members for alternate livelihoods in the event of coal mine closure. We do this by understanding the aspirations at two levels: 1) aspirations for children, and; 2) aspirational sector avenues for households.

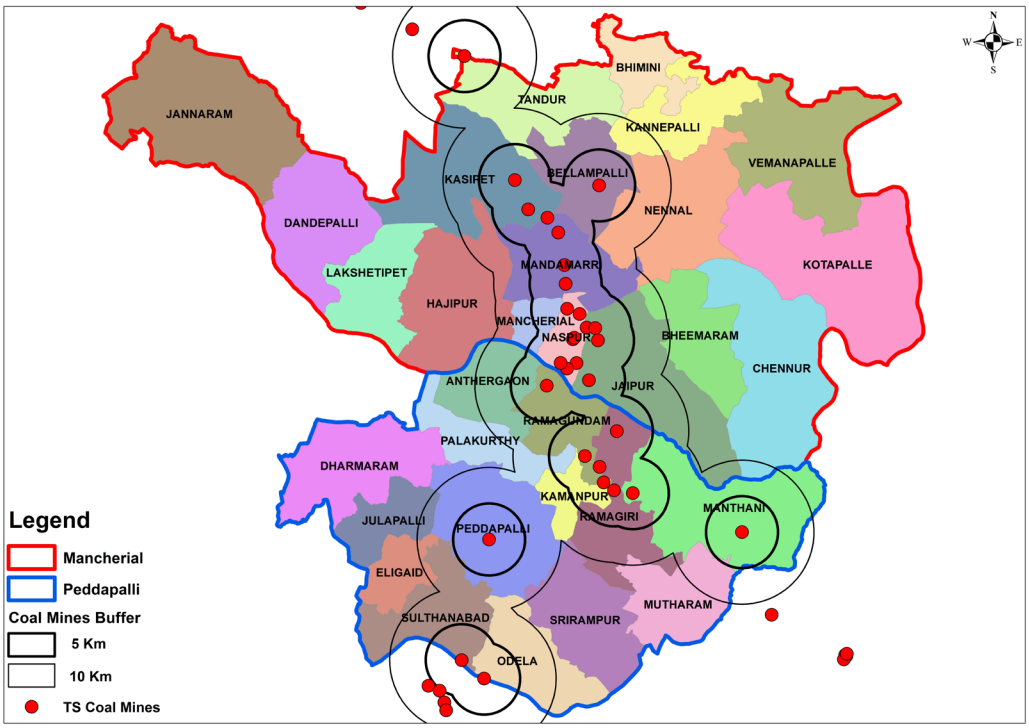
Sampling Methodology

For the household surveys, to ensure a uniform sample selection, we selected our sample by breaking the district's population into smaller sections, then randomly choosing households from each section. We did this to ensure 95% accuracy in our results, with a marginal 2% chance of error. The sampling process involved three key strata:

1. **Buffer zones:** We established a buffer zone of 0-5 km around the coal mines. This stratification is based on the assumption that households closer to the mines exhibit higher dependency on coal. We used Geographic Information System (GIS) tools to calculate the population living in each buffer zone.

Map 1: Sampling for households in the districts

Sampling locations in Peddapalli and Mancherial depict a buffer of 0-5 kms from the mine cluster. Surveys were conducted within a 0-5 km radius of each mine.



2. **Type of locality (urban/rural):** Each buffer zone was further classified into urban and rural areas, based on the 2011 Census data.

3. **Scheduled Caste/Scheduled Tribe population:** To address potential sampling bias, wards and villages were categorized based on the predominant community type, ensuring a 20% proportional representation.

Samples were drawn from each stratum according to its share of the district population. In order to get the variation within the village and in the sample locations, we surveyed 15 households in rural areas and 25 households in urban areas. The number of households chosen for each area was based on the need to ensure a balanced and representative sample across different locations.

The households were randomly selected to overcome sampling bias. In each sampled locality, every 10th household was surveyed and the left-hand rule was followed, which means from the starting point of the villages, every 10th household from the left was surveyed. This is a standard sampling technique and has been used extensively by scholars in past studies. [8]

Table 2: Buffer-wise sample for the districts

Number of households surveyed in the 0-5 km buffer in rural and urban areas

District	Category		Total
	Urban	Rural	
Peddapalli	194	71	265
Mancherial	189	147	336

Household Profile: Pedapalli

We surveyed 265 households in Peddapalli, with 73% identified as urban and 27% as rural. Among these households, 33% belonged to the Scheduled Castes (SC), 34% to Other Backward Classes (OBC), and 21% to the General category. These figures closely reflect the social categories reported in the 2011 Census.[9] The majority of households surveyed comprised four members, with the head of the household generally serving as the primary decision-maker. The average household income for our sample is $2,534 (₹2,12,887) while the per capita income reported for the region is approximately $2,040 (₹1,70,353).[10]

Table 3: Household characteristics of Peddapalli sample

Defining characteristics of household survey sample within the buffer, including reasons for migration and multidimensional poverty

Characteristics of the survey	Elements	0-5 km
Household characteristics	Average household size	4
	Average annual household income	$2,534 (₹2,12,887)
	Number of male respondents	180
Migration	Reasons for migration to Peddapalli	Employment in the coal sector and agricultural sector
Poverty	Multidimensionally poor	2.17% [11]

Household Profile: Mancherial

We surveyed 336 households in Mancherial, of which 56% were in urban areas, 44% were in rural areas. Our sample consisted of 36% General, 24% SC, 21% Other Backward Castes, and 12% ST communities. Among the respondents, 85% were male while only 15% were female. The average household size was approximately 3.6 members, with an average household income of $3,338 (₹2,80,366).

Considering the migration patterns, for 29% of the households it was either the mother or father that had migrated to Mancherial, while for 21% it was the grandparents who migrated to the district. Only 11% of the sample had respondents who had recently migrated here. Apart from those with an ancestral home in the district, the major reason for migration for almost 22% of the households was to work in the coal sector, while 13% had migrated for agriculture work.

In terms of living arrangements, 96% of the households had pucca houses[12], while others lived in mixed or semi-pucca houses.[13] Additionally, 38% of the households' owned land primarily for agricultural purposes.

Table 4: Household characteristics of Mancherial sample

Defining characteristics of household survey samples within the buffer, including reasons for migration and the multidimensional poverty rate

Characteristics of the survey	Elements	Description
Household characteristics	Average household size	3.62
	Average annual household income	$3,338 (₹2,80,366)
	Number of male respondents	288
Migration	Major reasons for migration to Mancherial	Employment in coal mines and thermal power plants
Poverty	Multidimensionally poor	4.43% [14]

2.2 Enterprise Survey

We conducted a survey spanning 424 registered and unregistered enterprises to get a comprehensive understanding of coal dependency and economic diversification prospects. Apart from focused questions about coal dependency, the survey included probes around industries' preferences about new sectors that can be established, and their readiness to diversify. We also assessed the challenges they face in the event of diversification. These survey questions were divided into five sections: General; Institution; Finance; Infrastructure; and Labor and Human Resources. These were chosen based on a previously developed economic diversification framework.[15]

Registered enterprises

For registered enterprises, we use stratified random sampling using three strata:

1. **Size of the district economy:** Given that the Gross District Domestic Product (GDDP) of both districts is under $20 billion, a sample size ranging from 120 to 185 registered enterprises was deemed appropriate. This sample size slightly exceeds the World Bank's enterprise survey methodol-

ogy, which recommends sample sizes based on GDDP.[16] The larger sample size was chosen to ensure robust data collection across a diverse set of industries, enhance the statistical reliability of the findings, and account for potential non-response or data quality issues. In this study, 125 registered enterprises were surveyed in Peddapalli and 189 in Mancherial. In addition, 55 unregistered enterprises were surveyed across both districts (see description below).

2. **Sector classification (primary, secondary and tertiary):** Each sector is sub-classified into coal and non-coal, consisting of enterprises with direct and indirect dependency on coal, and use of coal-based boilers.

Table 5: Sector classification of registered enterprises

Sub-sector classification with specific examples from the registered enterprise survey

Sector	Sector examples of registered enterprise in the sample
Primary coal	Coal mining and quarrying
Primary non-coal	Agriculture, forestry
Secondary coal	Fly-ash brick, coal boiler-based manufacturing such as ceramics, food processing etc.
Secondary non-coal	Manufacturing without coal-based boilers in sectors such as textiles
Tertiary coal	Coal transporting; supply of machinery and machine parts to coal sectors
Tertiary non-coal	Maintenance and repair; retail and wholesale trade; accomodation and food service activities

3. **Firm size:** Each unit is classified into small, medium and large based on the number of people employed. Small enterprises employ below 20 workers, medium enterprises 20-100 workers, and large above 100 workers. We applied this classification based on our understanding and ground truthing, ensuring it reflects the actual characteristics of the firms in the local context.

Based on these criteria, the registered units are sampled and three screening questions were asked to eliminate non-eligible enterprises.[17] These questions include:

1. If the enterprise is registered with a registered under the Company's Act, 2013;[18]

2. If the enterprise is privately owned (not fully-owned by the government or municipality);

3. If the enterprise has more than 5 workers.

The enterprises were randomly chosen to be surveyed from the list of registered enterprises obtained from the district industries department.

Unregistered enterprises

Unregistered enterprises refer to those businesses that are involved in manufacturing activities or provide/render services but have not registered themselves perma-

nently with the relevant authorities, or have failed to file an EM-II (Entrepreneur's Memorandum) with the District Industries Centre (DIC) on or before the stipulated date of March 31, 2007.[19]

We included unregistered enterprises because they play a crucial role in the informal coal economy, particularly in regions like Telangana. According to estimates by the National Sample Survey Office (NSSO), 65.7% of MSMEs in the state remain informal and have not yet been formalized.[20] The process of formalization remains both costly and challenging for MSMEs in Telangana. For example, small businesses face a 35% rise in unit labor costs once they formalize. Additionally, manufacturing MSMEs are required to sacrifice 40-50% of their plot space in order to meet building regulations. Similar regulatory requirements impose significant financial burdens on MSMEs, often compelling them to remain informal in order to preserve cost-efficiency.[21] However, their contributions to local economies are often overlooked, yet they significantly impact livelihoods and community resilience.

In each district, we surveyed 55 unregistered enterprises using single-stage cluster sampling. We specifically targeted unregistered businesses in the primary market areas of the two districts with the highest concentration of such enterprises. This approach was chosen to ensure a representative sample from areas where the prevalence of unregistered businesses was most prominent. The questionnaire for these unregistered businesses was fairly similar to that used for registered enterprises. However, they were crafted without any technical jargon to ensure clear and effective communication.

Peddapalli enterprise profile

We surveyed 125 registered enterprises in Peddapalli. The sample included 56% enterprises from urban areas, while 44% were from rural areas of the district. These enterprises are spread across 10 blocks of the district, with a concentration in the Ramagundam area. The sample included enterprises that began operations as early as 1968 and as late as 2021. The main respondent was the owner or project manager or others in top management. Among these enterprises, only 4% had women

Table 6: Sector and firm-wise registered sample in Peddapalli

Registered enterprise survey sample divided into coal and non-coal categories based on direct and indirect dependence on the coal sector

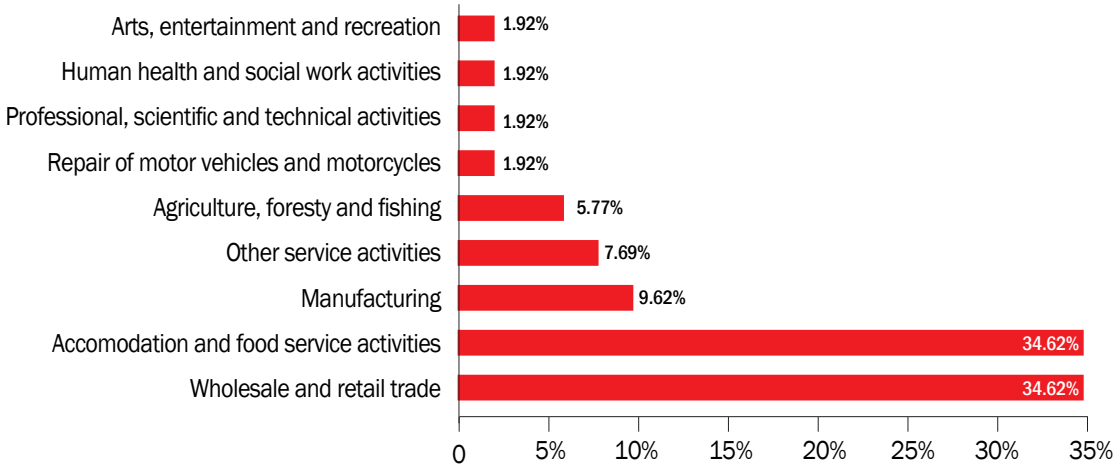
Sector	Total units covered	Small	Medium	Large
Primary coal	44	2	4	-
Primary non-coal	-	22	16	-
Secondary coal	21	5	1	-
Secondary non-coal	-	10	4	1
Tertiary coal	60	13	4	-
Tertiary non-coal	-	30	13	-
Total	125	82	42	1

owners. While 54% of the enterprises are sole proprietorship, 44% are partnerships.

Additionally, we surveyed 55 unregistered enterprises in Peddapalli, representing a diverse range of activities. The largest proportion of these businesses were in the accommodation and food services sector, followed by wholesale and retail trade, manufacturing, and agriculture and forestry, among others.

Figure 1: Sector-wise unregistered sample in Peddapalli

Distribution of unregistered enterprise survey samples. Majority fall in the food and accommodation businesses; and whole and retail trade.



Mancherial enterprise profile

We surveyed 189 registered enterprises in Mancherial. While 64% were from urban localities, 36% were based in rural areas. In this sample, the businesses began operations as early as 1962 and as late as 2021. While 80% of these enterprises

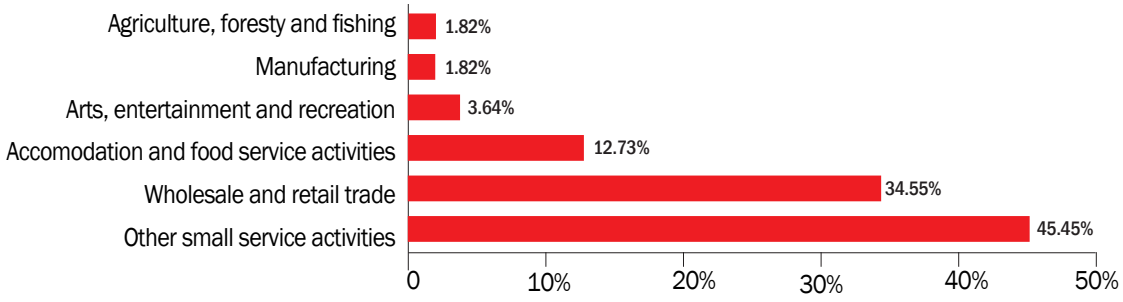
Table 7: Sector- and firm-wise registered sample in Mancherial

Registered Enterprise survey sample divided into coal and non-coal categories based on direct and indirect dependence on the coal sector.

Sector	Total units covered	Small	Medium	Large
Primary coal	50	0	3	0
Primary non-coal	-	22	24	1
Secondary coal	56	7	3	0
Secondary non-coal	-	17	27	2
Tertiary coal	83	5	12	1
Tertiary non-coal	-	30	35	0
Total	-	78	104	4

Figure 2: Sector-wise unregistered sample in Mancherial

Distribution of unregistered survey samples. The majority of enterprises are involved in miscellaneous service activities



were sole partnerships, only 14% were partnerships. Only 8% of them had women owners.

We surveyed 55 unregistered enterprises in Mancherial, the majority of which were involved in small miscellaneous service activities, wholesale and retail trade, and accommodation and food services.

2.3 Qualitative Research

The qualitative component of the research included focus group discussions (FGDs) and semi-structured interviews (see Appendix). We conducted 12 FGDs across both districts, engaging a range of stakeholders such as departmental coal workers, contractual coal workers, local business owners, community members, trade union representatives, and truck association members. These discussions aimed to explore the community's dependence on coal and their aspirations for economic diversification. Additionally, we carried out 23 semi-structured interviews with district officials, industry association leaders, trade union heads, and local elected representatives to gain insights into the policy initiatives that could support the districts' diversification potential.

2.4 Data audit

We employed multiple audit tools to ensure data accuracy. During the survey, we checked key indicators and skip logics on a daily basis using the statistical software STATA to check the outlier values in the collected data. This step also helped to ensure that the skip logic is working properly in the data collection application. Additionally, 10% of the sample was telephonically backchecked for the household surveys and standard protocols was followed to ensure good quality data collection. GIS tools were also employed to check the location of the survey and determine the spread of samples in the sampled locations.

Furthermore, debriefing calls with the surveyors were held more than twice a week to gather feedback and discuss insights related to data quality. In some cases, surveyors were retrained to improve the accuracy and consistency of the data. The field team also conducted daily spot checks to ensure adherence to protocol and to verify that no ghost forms were submitted.

2.5 Limitations

The survey design and data collection followed rigorous steps to ensure data quality and collect representative samples. Although all the protocols were followed, there were logistical and implementation constraints:

1. **Household survey sampling only in a 0-5 km buffer:** Due to time constraints and the study design, household surveys were conducted exclusively within a 0-5 km radius of the coal mines, rather than across the entire districts.

2. **Entry barriers in the officers' colony:** Accessing officials for the household survey was challenging due to restricted entry into the colony. To overcome this, we leveraged local contacts whenever possible and conducted qualitative surveys with SCCL officials.

3. **Inclusion of select topics:** Our study focused only on coal dependency and diversification to ensure a more targeted and in-depth analysis given the available resources and time constraints. Other relevant topics were not covered. For example, while land issues and the political economy of coal are undeniably important aspects of the broader context, they were outside the specific objectives of this research.

3.0 Results

In this section, we present the results of our surveys, quantifying coal dependence at both the household and enterprise levels for each district while also evaluating options for economic diversification.

3.1 Coal dependence and diversification in Peddapalli

Peddapalli, formed in 2016 with the bifurcation of Karimnagar district, is one of the four coal-producing districts in Telangana. The coal mines in the district are operated by Singareni Collieries Company Limited (SCCL), which has a coal mining history of over 100 years. It is also the oldest coal producin

Table 8: List of coal mines in Peddapalli

Operational mines in Peddapalli district with current and target production for 2024 and 2025.

Block	Coal mine	Type of mine	Target 2023-24 (T)	Actual 2023-24 (T)	Target 2024-25 (T)
Kampalpur	GDK 11 INC	UG	8,60,000	6,06,300	8,20,000
	VAKILPALLI	UG	3,50,000	3,49,995	3,50,000
	RG OC-2	OC	25,00,000	22,16,124	27,50,000
	RG OC-1 LEP	OC	3,0,00,000	36,94,686	35,00,000
	GDK5 OC	OC	3,0,00,000	35,05,215	36,00,000
Ramagundam	RG OC-3	OC	6,8,30,000	74,83,076	68,20,000
	RG OC-III EXT PH-2	OC	2,4,70,000	20,16,973	27,00,000
	GDK1&3 INC	UG	2,40,000	1,68,965	2,40,000
	GDK2&2A INC	UG	2,80,000	2,14,786	2,80,000
	ALP	UG	17,30,000	14,70,266	5,20,000

The district has a mix of coal mining and coal-based thermal power plants. With 5 open-cast (OC) and 5 underground coal (UG) mines, the district's total production was approximately 20.25 MT in 2023-24. [22] Currently, 3 of the 4 UG mines are loss-making.[23] Additionally, one OC mine (Ramagundam OC 1 expansion and phase 2) is likely to be closed in 2024 owing to exhaustion of reserves.[24] However, SCCL plans to compensate for these losses and augment production by opening new mines.

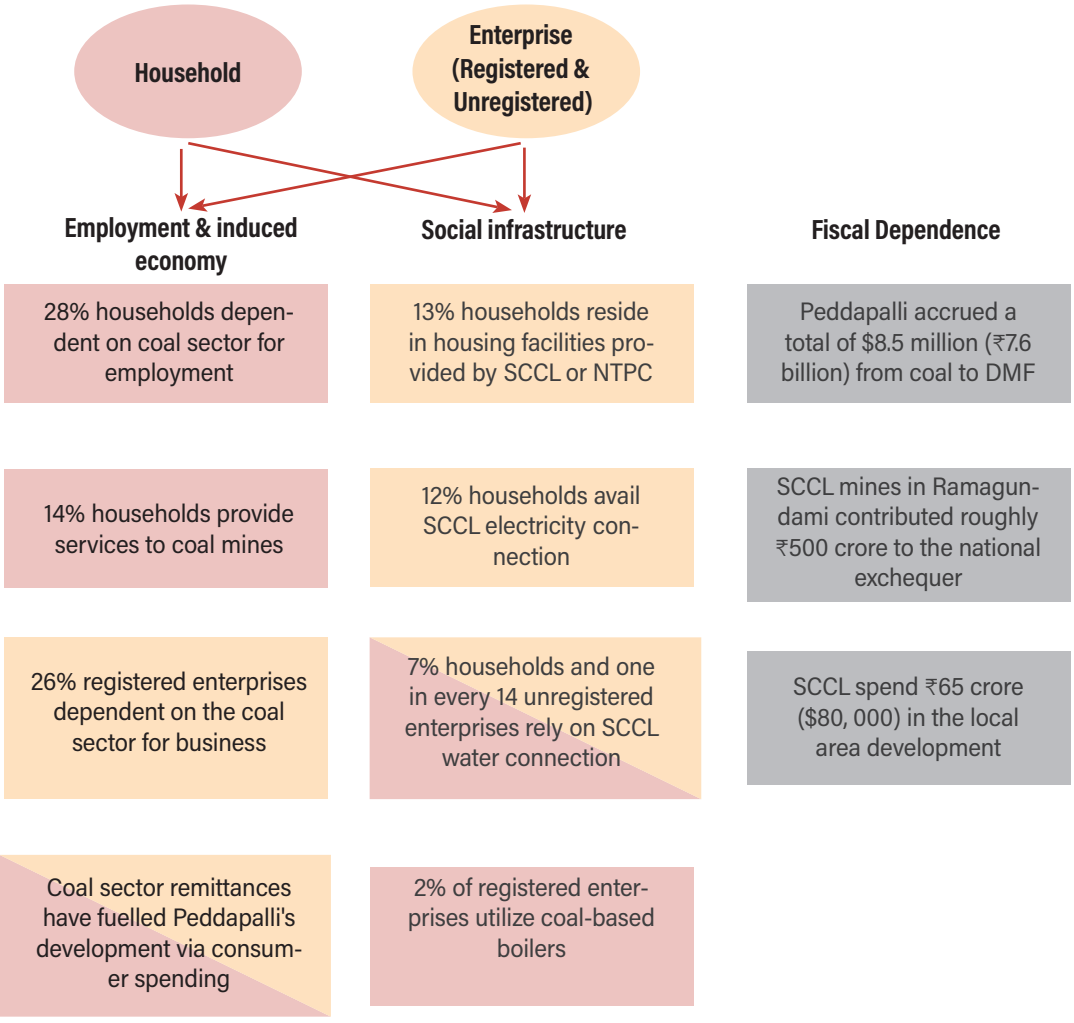
The district covers Ramagundam city, situated in the Godavari valley coalfields, which hosts some of India's oldest coal-based thermal power plants (TPP) (see Appendix). The NTPC Ramagundam TPP is the largest coal-based TPP in South India

with a capacity of 2600 MW.[25] Along with this, the district also has two other TPPs with a combined capacity of 1662.5 MW.[26]

Coal dependency in Peddapalli manifests in several ways and broadly falls under four categories—employment, housing and infrastructure facilities, fuel, and fiscal dependency (Figure 3).

Figure 3: Types of coal dependency in Peddapalli

Households and enterprises depend on the coal sector for employment and infrastructure. In addition, there is fiscal dependence of the district on the sector. We classified this dependence based on the mixed-methods findings. The color salmon indicates the coal sector's contribution to households; Khaki indicates the sector's contribution to enterprises; and salmon - Khaki indicates the contribution of the sector to both households and enterprises.



3.1.1 Employment and livelihood

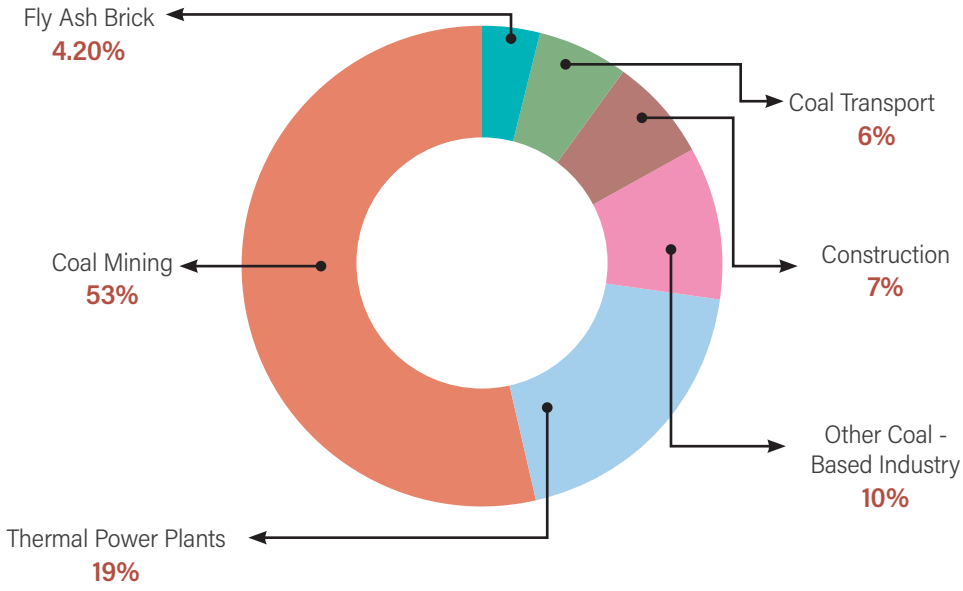
Employment in the coal sector can be categorized into three types: direct (working in the coal mines or for contractors), indirect (working in coal-dependent industries like thermal power plants and fly-ash brick manufacturing), and induced (operating businesses that support the coal sector, either by providing services or catering to

coal sector employees). A significant portion of the local workforce in Peddapalli is employed in mining and mining-related activities, with the coal sector being the primary source of income for many families. As of 2023, 13,552 people are directly employed in the coal mines in Peddapalli[27], with around 3,000 employed at the NTPC Ramagundam TPP.[28] According to the FGDs with coal transport association members, approximately 800-1000 trucks operate in Ramagundam and Godavarikhani areas of Peddapalli, employing 2,000 people (one driver and one helper per truck).[29]

In addition to direct employment in the mines, the coal sector supports a range of ancillary businesses such as transportation, machinery repair, and supply services, which further entrench coal in the local economy. Households also rely on coal companies for essential infrastructure services like electricity and water. Additionally, Peddapalli has 148 coal-based cement and fly-ash brick units that provide further employment. Our survey data reveals that 28% of households are directly dependent on the coal sector, with the largest share of employment in coal mining (53%), followed by thermal power plants (19%) and other coal-based industries (10%).

Figure 4: Coal employment in household sample in Peddapalli

The figure highlights the distribution of employment within the coal sector, with coal mining representing the largest share of jobs. In addition to mining, other jobs in the sector include a coal transportation, fly ash brick production, construction, and other coal-based industries



In terms of the type of coal employment, our sample has 2 per cent contractual workers with a formal contract and 1 percent coal pensioners. Unlike other coal regions in India where coal scavenging is widespread, especially Jharkhand, this practice is limited in Telangana. Our household sample has only 1 per cent coal gatherers. Typically, these coal gatherers get their coal directly from the mines for personal consumption or for selling inthe local markets.

Many households also engage in business activities connected to SCCL. These are small household businesses engaged in local manufacturing, retail, or services, often directly or indirectly supporting coal companies through their energy consumption, use of coal in production, and involvement in the distribution and transport

> Our businesses thrive due to the proximity of the mines and the presence of Singareni employees who frequently come to our shops for their daily needs
>
> Focus group discussion with local businesses in Peddapalli

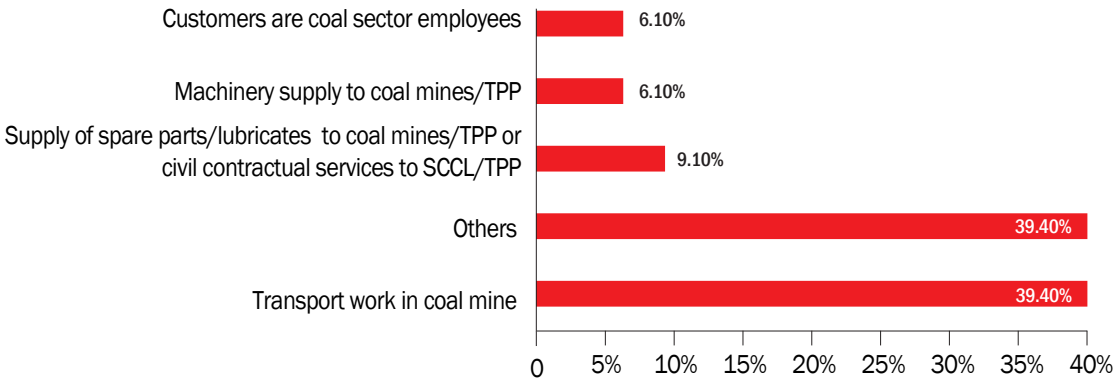
of coal. Our survey indicates that 14 per cent of the households provide services to the coal mines, or derive businesses from coal sector employees. Among these, a significant portion relies on the coal sector for around 25 per cent of their business revenue. For approximately 65 percent of the household business, customers reside in coal colonies, while for 22 per cent of these households, workers from the nearby mines, siding areas or thermal power plants are the major customers.

This dependence illustrates how closely local businesses and the coal industry are intertwined. Furthermore, around 33 per cent of these service-providing households have been affected by coal mine closures previously.

Based on our enterprise survey, 26 per cent of registered enterprises depend on the coal sector for their business. Among these, the majority are involved in providing transport facilities and other services to the mines and TPPs, while 9 per cent supply spare parts and equipment to coal companies.

Figure 5: Type of coal dependence in registered enterprises in Peddapalli

Distribution of enterprises in the registered survey sample. Majority of the enterprises work in the coal transport sector.



3.1.2 Housing

Housing is a vital service offered by both SCCL and NTPC. For example, all 962 employees of the GDK 9 mine in Ramagundam live in company housing. According to our survey, 13% of households reside in these facilities, a significant majority (97%) lives in quarters supplied by SCCL, while only 3% occupy NTPC housing. Previous mine closures have had a considerable impact on housing conditions—30% of respondents reported that these closures had led to abandoned colonies. Additionally,

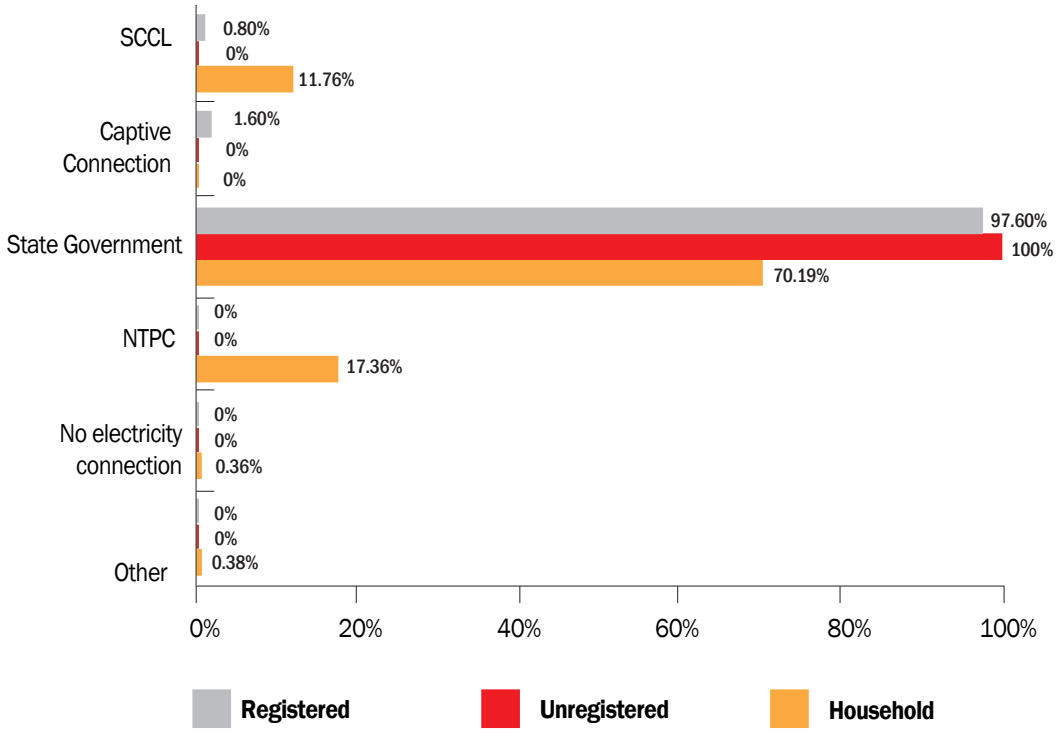
7% noted that some colonies became illegally occupied following mine shutdowns, and 3% observed an increase in rent in the remaining occupied areas.

3.1.3 Electricity

Based on our survey, overall 30% households get electricity from NTPC and SCCL, these being mainly employees of SCCL and NTPC. However, the majority of the households (70%), not employed with the coal sector, rely on state-provided electricity connections. Similarly, 97% of registered enterprises rely on state connections, while 2% avail SCCL or captive electricity connections. Additionally, 100% of unregistered enterprise sample rely on state-provided connections.

Figure 6: Household and enterprise electricity supply source in Peddapalli

Electricity connection availed by households and enterprises. State government connection is the major source of electricity for all categories



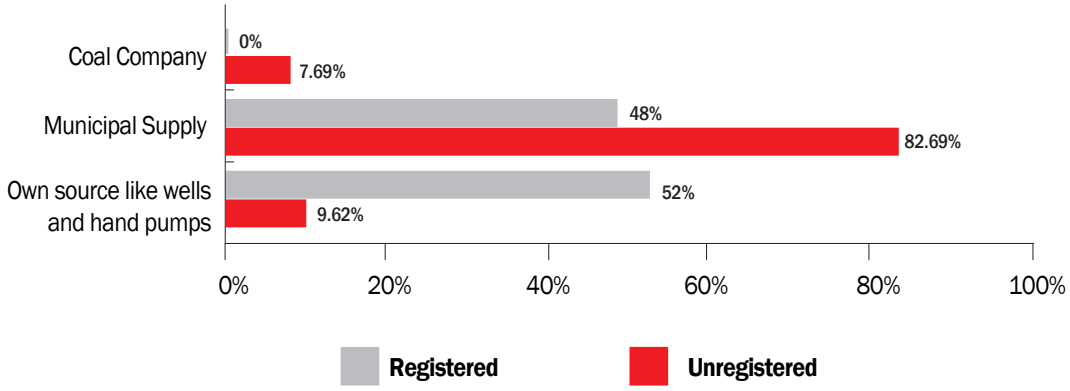
3.1.4 Water

In terms of water supply, municipal tap water is the major source for 74% of the households, while 7% rely on company-provided tap water and tankers. Although all of the registered enterprises rely on either municipal supply or on personal sources like wells or handpumps, 7% of unregistered enterprises avail water connections provided by the coal companies. This is enabled by an informal arrangement between unregistered enterprises and the coal companies.

Additionally, the primary rivers flowing through the district are the Godavari and Manair. Key water sources include the Yellampally Reservoir on the Godavari River, located in Anthergaon Mandal, and Medaram Cheruvu. Furthermore, the Sri Ram Sagar Project canal serves as another significant water supply source for the district as per the official district reports.

Figure 7: Enterprise water supply source in Peddapalli

Water supply sources for registered and unregistered enterprises. Wells and hand pumps for registered and municipal supply for unregistered are the major sources.



3.1.5 Health

SCCL provides medical facilities to the local communities. Currently, SCCL runs one main hospital at Kothagudem and 6 area hospitals at Godavarikhani, Ramagundam, Mancherial, Bellampalli, Bhupalpally, and Mandamarri.[30] Based on our survey, 13% of our household sample rely on the SCCL hospital or a dispensary. Similarly, 14% of the sample use medical cards provided by SCCL or NTPC. However, a significant number of households (33%) use state-provided medical facilities.

3.1.6 Coal as fuel

Coal is primarily used as a fuel in household cooking, and in industrial manufacturing activities like raw materials for coal-based boilers. Although the use of coal as the primary cooking fuel is rampant in other states, our survey does not indicate any such dependence in Peddapalli; 98% of the sampled households use LPG for cooking. Only 2% use either wood or electricity.

According to our enterprise survey, only 2% of registered enterprises use coal-based boilers, primarily for heating and energy generation. In unregistered enterprises, the use of these coal boilers is virtually non-existent, with no businesses reporting their use.

3.1.7 Fiscal dependence on coal

Peddapalli's fiscal dependence on the coal industry significantly impacts local government revenues and overall economic development. As the top contributor to District Mineral Fund (DMF) collections in Telangana, the district had accrued a total of $8.5 million (₹ 7.6 billion) from coal by 2023.The District Mineral Foundation (DMF) created under the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act) is a government initiative in India aimed at utilizing the funds generated from mining activities to benefit local communities, particularly those living in areas affected by mining operations.[31] As of October 2023, 400 projects had been approved, amounting to $38.8 million (₹ 324 crore).[32]

Corporate social responsibility (CSR) under Section 135 of Company Act, 2013 mandates large businesses to spend 2% of their profit for the development of the local area and society.[33] CSR plays an important role in the development of the area where companies are operating. In Peddapalli, SCCL's CSR funds are an important financial instrument which help in the creation of infrastructure, skilling, etc. In the fiscal year 2022-23, SCCL spent $8,0000 (₹65 crore) on local area development whereas in 2023-24 SCCL spent $250,000 (₹ 2.12 crore) (one of the projects is in Dharmapuri constituency which falls in two districts). The money spent under CSR in these two fiscal years was mainly on water and sanitation, skilling, and building new community infrastructure.

In addition to the district's direct fiscal dependency, coal production in Peddapalli also contributes to indirect tax collection in the country. Under the Goods and Service Tax there is a compensation cess of ₹400 (around $5) per metric ton of coal production. In the year 2023-24, SCCL's mines in Ramagundam contributed roughly $59 million (₹500 crore) to the national exchequer. [34]

In conclusion, dependence on coal in Peddapalli is evident in both households and local enterprises, reflecting a reliance on this resource for energy and livelihoods. For many families and businesses, coal is a key source of employment, and supports essential social infrastructure including electricity, water, and healthcare facilities. Local businesses, particularly in manufacturing, depend heavily on coal for their energy needs; although no dependence on the coal sector is captured in unregistered enterprises. Additionally, Peddapalli is the highest contributor to DMF in Telangana, thereby contributing immensely to community and infrastructure development. Overall, this reliance underscores the significant role coal plays in daily life and economic activities in the region.

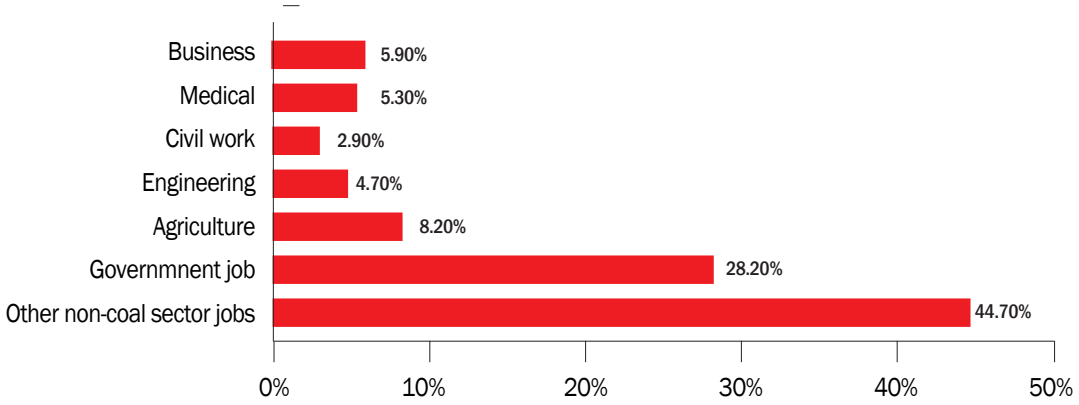
3.2 Diversification Pathway for Peddapalli

3.2.1 Household diversification aspirations

Nearly 36% of households still prefer their children to work in the coal sector, while 64% encourage them to explore new sectors for career opportunities. Among those interested in non-coal sectors, 44% would like their children to pursue a field of their choice, 28% aspire for government jobs for their children, and 8% show a preference for a career in agriculture.

Figure 8: Occupational aspiration for children in Peddapalli

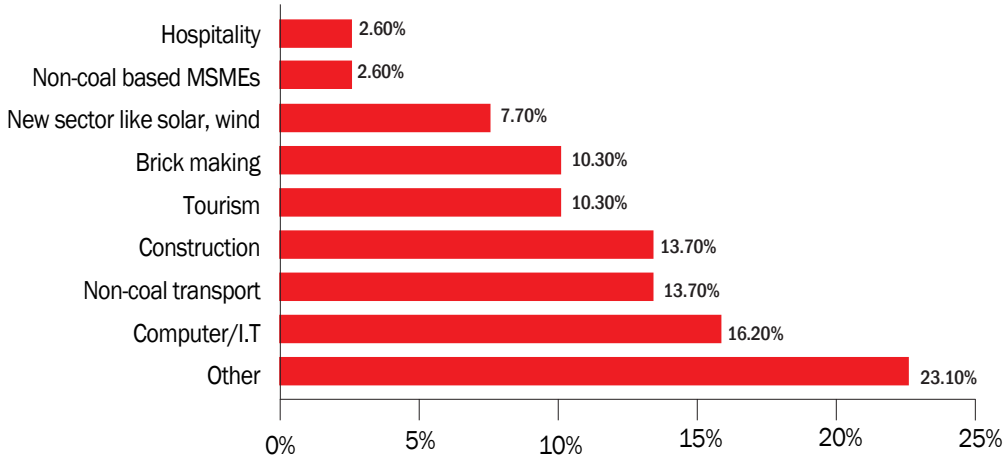
This indicates the preference of households for any non-coal sector employment opportunity for their children. Other major jobs include work in the government sector or agriculture.



As concerns livelihood options for households following mine closures, 44% of respondents expressed a preference for starting their own businesses, while 23% indicated they would like to seek new jobs in non-coal sectors in Peddapalli. Additionally, 14% want to pursue agriculture in Peddapalli, and 4% plan to return to their native places for agricultural opportunities; while 9% want to migrate to a new place for work.

Figure 9: Preferred sectors for household business diversification in Peddapalli

Based on their aspiration, household businesses want to expand to other sectors (miscellaneous), the IT sector and the construction industry.



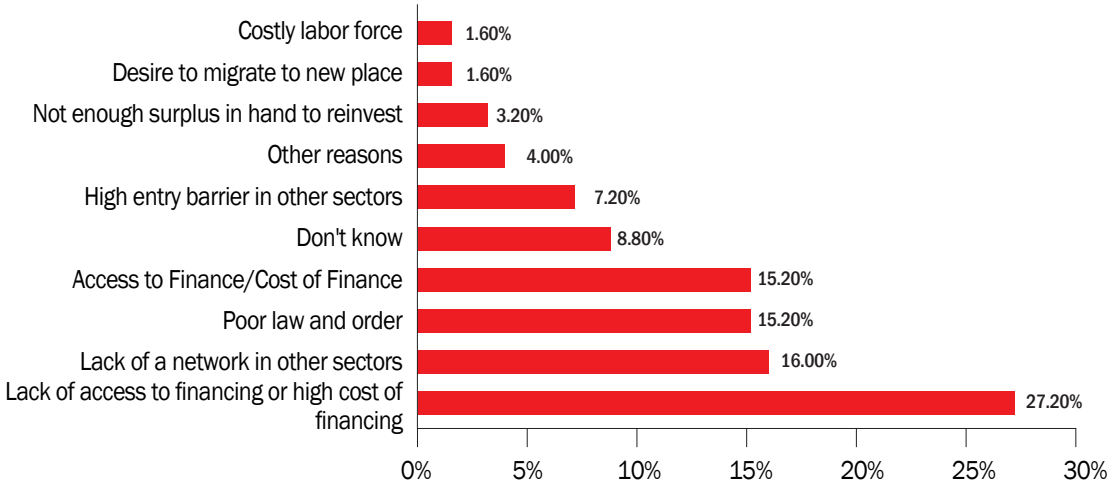
3.2.2. Industrial diversification aspirations

Based on our survey, we find that only 9% of registered enterprises are considering diversifying into non-coal sectors, while the remaining 91% plan to continue their current coal or non-coal business. This is an important finding that indicates local businesses find it hard to believe in any form of future coal phase down.

Among those not looking to diversify, 27% cite a lack of expertise in other sectors as the primary barrier, and 16% mention insufficient networks in alternative industries. Additionally, 15% of enterprises indicate that limited access to or high costs of financing are significant obstacles to diversification.

Figure 10: Registered enterprises' reasons for not diversifying in Peddapalli

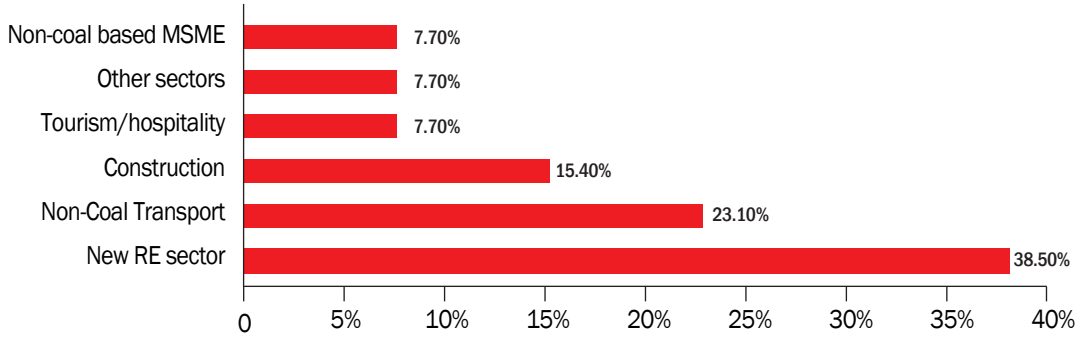
Factors that contribute to the registered enterprises' decision to not diversify include lack of expertise and network in other sectors and limitations of access to finance.



In terms of the preferential sectors for diversifying, 38% of registered enterprises would prefer moving to the RE sector, especially manufacturing, while 23% prefer the non-coal transport sector. Other preferred sectors include construction and tourism.

Figure 11: Preferred sectors for registered enterprises in Peddapalli

Registered enterprises aspire to diversify their operations into new sectors, with a particular focus on renewable energy (RE) and non-coal transport.



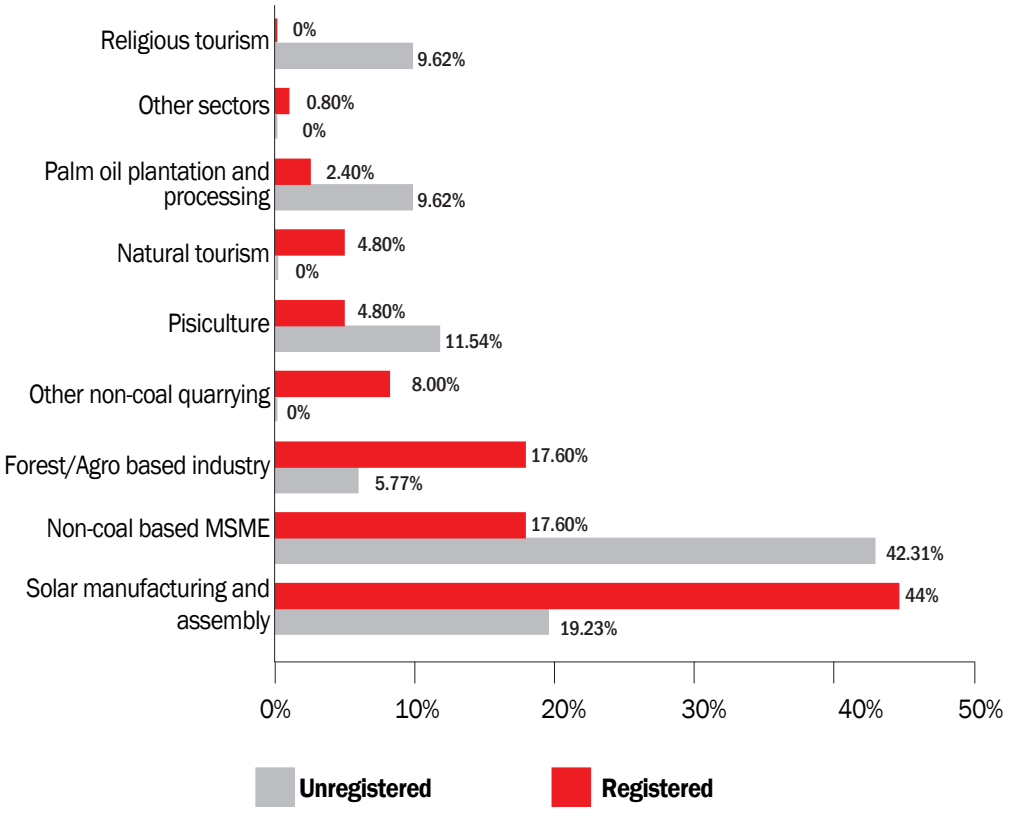
According to local insights, both registered and unregistered enterprises identified potential new sectors for diversification in Peddapalli. A significant portion of registered enterprises (44%) view solar manufacturing as a viable option, while 42% of unregistered enterprises believe that non-coal MSMEs, such as textiles and pharmaceuticals, should be developed. Additionally, both groups mentioned agriculture-based industries, pisciculture, and religious tourism as sectors worth exploring.

In terms of the preferred sector for diversifying, 38% of registered enterprises prefer moving to the RE sector, while 23% prefer moving to the non-coal transport sector. Other sectors include construction and tourism. Unregistered enterprises, on the other hand, prefer diversifying to the tourism sector or agro-based industries.

Similarly, only 6% of unregistered enterprises plan to diversify. Among those not planning to diversify, lack of expertise in other sectors is the main reason for 46% of the enterprises; while 11% perceive the entry barrier to be too high in many sectors. Unregistered enterprises, on the other hand, prefer diversifying into the tourism sector or agro-based industries.

Figure 12: New sectors for Diversification in Peddapalli

Strategic sectors for Investment in the district based on insights from the enterprise survey



Institutions

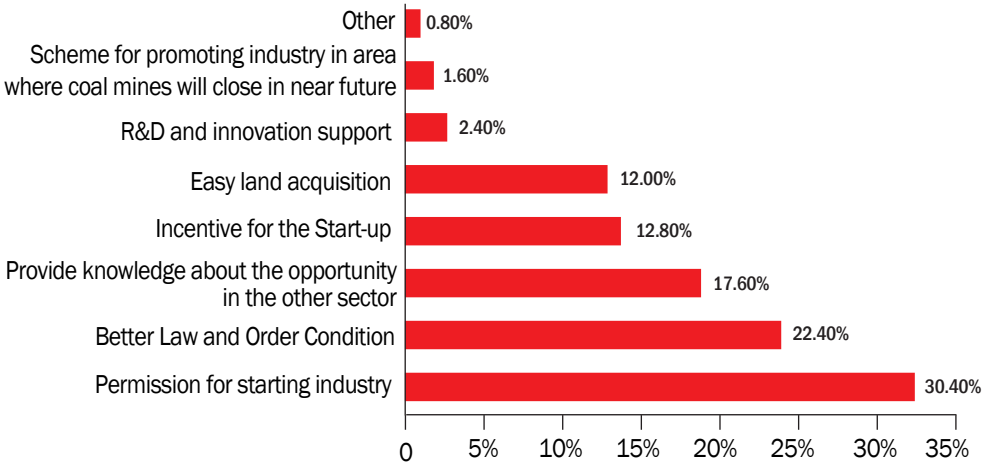
When we asked industries about the kind of institutional support they require, nearly 30% suggest that they would need official permission to start a new industry while 22% want better law and order. Apart from this, they seek opportunities to learn more about other sectors for business development and easy land acquisition. Addition-

ally, these units perceive land registration reforms crucial to the process, and single window clearance can greatly impact diversification prospects.

No support has been provided for diversification of unregistered units. When asked about the support required, almost 58% of these units require government support and permits for starting a new business, indicating a need to formalize these units. They also feel that electricity tariffs should be reformed and a single window clearance system put in place.

Figure 13: Institutional support required for diversification of registered enterprises in Peddapalli

Institutional support for the diversification of registered enterprises is required in three key areas: streamlined processes for obtaining business permits, enhanced law and order, and accessible learning opportunities to explore emerging sectors.

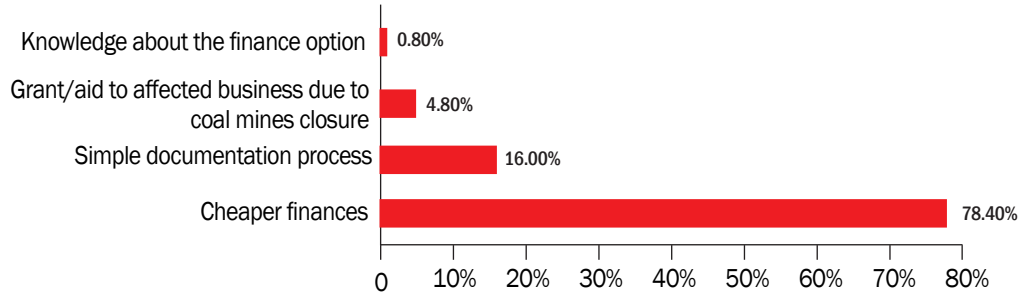


Financing

The majority of registered enterprises (65%) and unregistered enterprises depend on scheduled commercial banks (SCBs) for loans and financial support. When asked about diversification, 78% of registered enterprises would require cheaper finance for diversification, while 16% would like easy documentation for securing loans. Similarly, most of these enterprises feel securing finance is difficult due to high interest rates, cumbersome documentation process, and difficulties in finding a guarantor. Nearly 63% unregistered enterprises would also like cheaper financing options for diversification, while 11% require aid for businesses affected by coal mines closure.

Figure 14: Financial support required by registered enterprises in Peddapalli

Significant financial support for registered enterprises includes access to lower-cost financing.



Infrastructure

When asked if the existing infrastructure is adequate for diversifying the business, 74% of registered and 100% of unregistered replied in negative. For the majority of the registered enterprises, road access to interior parts of the districts and public transport are additional amenities needed for business diversification. On the other hand, the majority of unregistered enterprises require cheap and reliable electricity, water supply, and market access for branching out to new businesses.

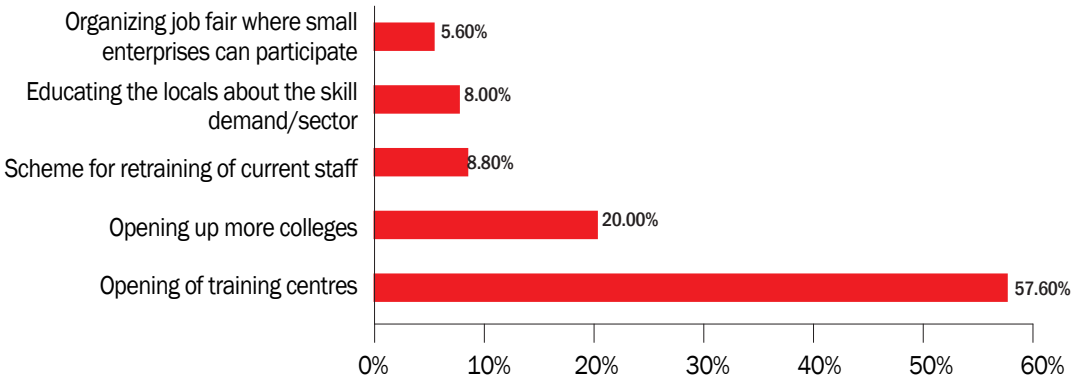
Labor

Nearly 53% of registered enterprises feel that they have enough skilled labor for diversifying into new businesses. Among those units lacking skilled labor, 54% feel that workers are trained for one kind of industry, while 13% feel that highly skilled workers have migrated to other regions outside Peddapalli. Therefore, in order to get skilled workers, 58% of registered units feel opening training centres would be helpful, and 20% believe opening more colleges would benefit the youth and increase their employability.

As for unregistered enterprises, 40% feel they have enough labor to diversify their business; and similarly to registered enterprises, the majority of them (64%) are trained for one kind of occupation. Around 47% want more training centres, while 34% perceive they would benefit from job fairs where small enterprises can participate.

Figure 15: Labor support required by registered enterprises in Peddapalli

Major support for labor from registered enterprises include options for enhancing skills by opening training centres and colleges.



3.2.3 New sectors for diversification

Economic diversification in Peddapalli represents a strategic shift towards developing sectors beyond coal aimed at enhancing sustainability and resilience in the local economy. Historically reliant on the coal sector, the region can benefit from exploring alternative industries, such as agriculture, tourism, and renewable energy. This transition can not only reduce dependency on a single resource but also create job opportunities, foster innovation, and promote sustainable development.

By investing in diverse sectors, Peddapalli can secure a more stable economic

future while addressing environmental concerns and improving the quality of life for its residents.

Map 2: Block-wise sectors for diversification in Peddapalli

We identified potential sectors in different blocks based on our survey findings, interviews, and focus group discussions, taking into account the existing comparative advantages and policy support for each sector.

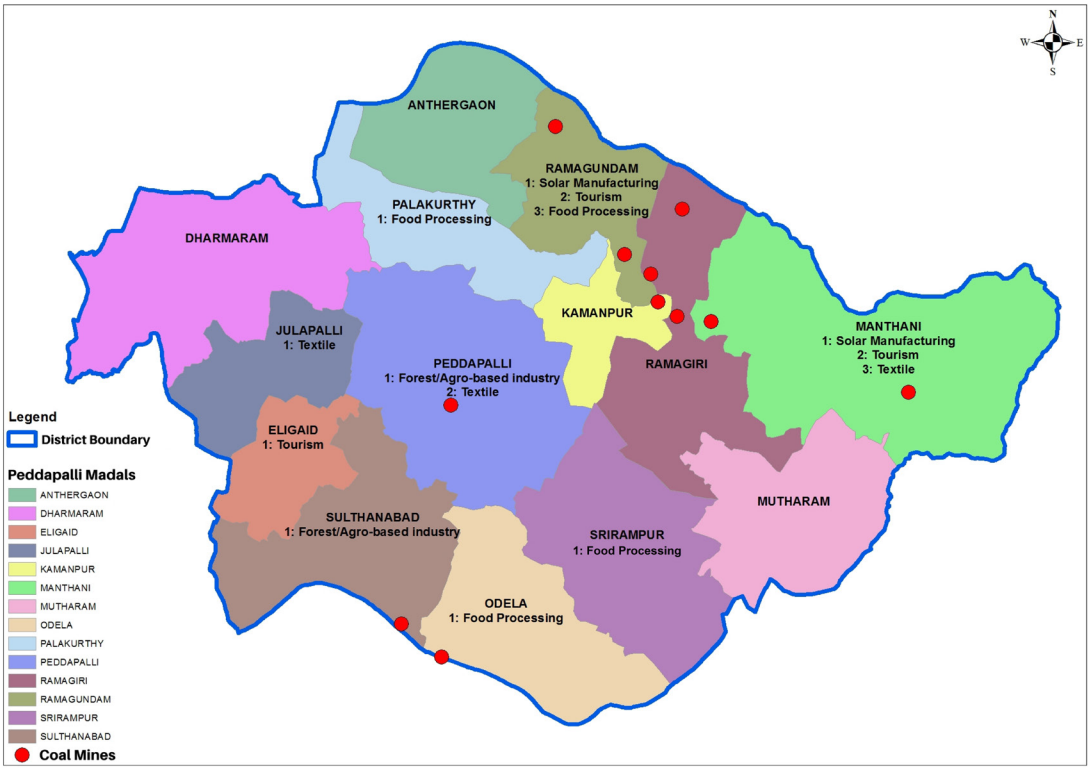


Table 9: New sectors for diversification in Peddapalli

The table below shows industrial aspiration, comparative advantage, and government and private support for potential future sectors of diversification.

Sector	Aspiration base	Comparative advantage	Government/private support
Solar manufacturing and assembly **Focus blocks:** Ramagundam; Manthani	**Local enterprise** 44% of registered enterprises and 19% unregistered enterprises perceive solar manufacturing and assembly as a potential sector for diversification.	**Land acquisition incentive** The state supports development charges of ₹25,000 ($298) to be paid to the panchayats by the developer, based on which the panchayat can decide to grant permission for setting up solar projects or parks. **Government incentive** Incentives include the establishment of solar park implementation agencies, zero distribution and loss charges for solar rooftop projects, subsidized tariffs, and the option for consumers to choose between net or gross metering for selling solar power to DISCOMs, among other benefits. **Growing energy demand** Peddapalli has 58 solar rooftops with a total capacity of 495.5 kW.35 This growth is also fueled by increasing consumer demand and the efforts of SCCL to install solar PV projects on overburdened (OB) sites.	**State policy support** Telangana has an existing Solar Power Policy (2015) that promotes the adoption and installation of rooftop, pump set, and off-grid solar power generation. Additionally, the policy facilitates access to loans of up to ₹150 million under priority sector lending in the state. **Private sector push** NTPC has set up India's largest floating solar in Ramagundam with a capacity of 100 MW, boosting the overall solar power generation in the district.
Agro-based industry: Food processing **Focus blocks:** Ramagundam, Palakurthi, Odela, Srirampur, Sultanabad	**Local enterprise and household** 17% of registered enterprises and 14% of households want to pursue agriculture and agri-based businesses. Additionally, 9.62% of unregistered enterprises want to pursue palm oil processing.	**Agriculture resource endowment** Peddapalli is endowed with agro-resources including paddy, maize, cotton, and chilly, with a net sown area of 119,181 hectares. District offers investment seed processing, feed mixing plant, cotton ginning mill. **Credit potential for agriculture** Peddapalli has substantial farm credit for rural lending and development activities. Of the total credit potential, 80% (or ₹264,369) is projected for agriculture and allied activities in 2023-24.	**State/district policy support** Peddapalli has 54 Rythu Vedikas, or farmer welfare centres, which offer support with crop management, skill development, and improved marketing facilities. Additionally, the Mission Kakatiya initiative aims to establish sustainable irrigation infrastructure and ensure 24/7 free power supply to farmers. The national mission on edible oilseed (NMEO-OS) focuses to promote value chain creation. The mission aims to create 600 value chain clusters in 347 identified districts. The PM-Formalisation of Micro Food Processing Enterprises Scheme provides

			credit link subsidy to maximum Rs. 10 lakh ($11,980) to FPO/individuals/NGOs. Additionally, Rs. 40,000 ($475) seed money can be provided to SHGs who want to purchase tools, etc. **Assistance for agri-business development** Muthuram Farmer Producer Company Ltd. provides marketing facilities, input support and training, and has a membership of 525 farmers in Peddapalli.
Tourism Focus blocks: Ramagundam, Manthani, Eligaid	**Local enterprises and households** 10% of households involved in businesses are looking to diversify into tourism. Among registered enterprises, 7% express a preference for expanding into tourism, while 9% unregistered enterprises view tourism as an important area for diversification.	**Untapped tourist spots** Peddapalli is a captivating destination known for its rich cultural and natural attractions. Highlights include the Buddhist Maha Stupa in Dhulikatta, Ramagiri Fort, and Sabbitham Waterfalls. Its proximity to the Godavari River offers lush landscapes ideal for nature enthusiasts and adventure seekers, making it an appealing choice for diverse tourists. **Adequate infrastructure** Peddapalli is well-connected by road and railway, with a major railway line linking northern and southern India passing through the district. This accessibility can significantly enhance tourist numbers.	**State initiative for advancing the tourism sector** Telangana has an upcoming draft tourism policy that will promote investment in the sector.[36] The policy will provide incentives for subsidies, tax reimbursements, and knowledge support for the sector, with special emphasis on mega tourism projects, **SSCL support to boost mine tourism** SCCL has proposed to convert several decommissioned mines into tourist destinations; notably the Medipally mine in Ramagundam. Efforts include creating scenic viewpoints, floating cafeterias, and recreational activities like fishing and boating **Leveraging central government support** The central government has set up schemes such as Dekho Apna Desh and the Domestic Promotion and Publicity including Hospitality (DPPH) scheme to encourage domestic tourism by promoting local attractions and creating world-class destination
Textile manufacturing (Blocks: Manthani, Peddapalli, Julapalli)	**Local enterprises** 42% unregistered and 17% registered enterprises perceive non-coal MSMEs such as textiles as an important sector for diversification	**Abundant cotton production** Peddapalli produces cotton over a total area of 6,3274 acres, highlighting the potential of the crop.	**Leveraging government support: The Telangana state Textile policy (2017-18)** This was introduced to boost the textile sector in the state through various supportive measures and incentives.

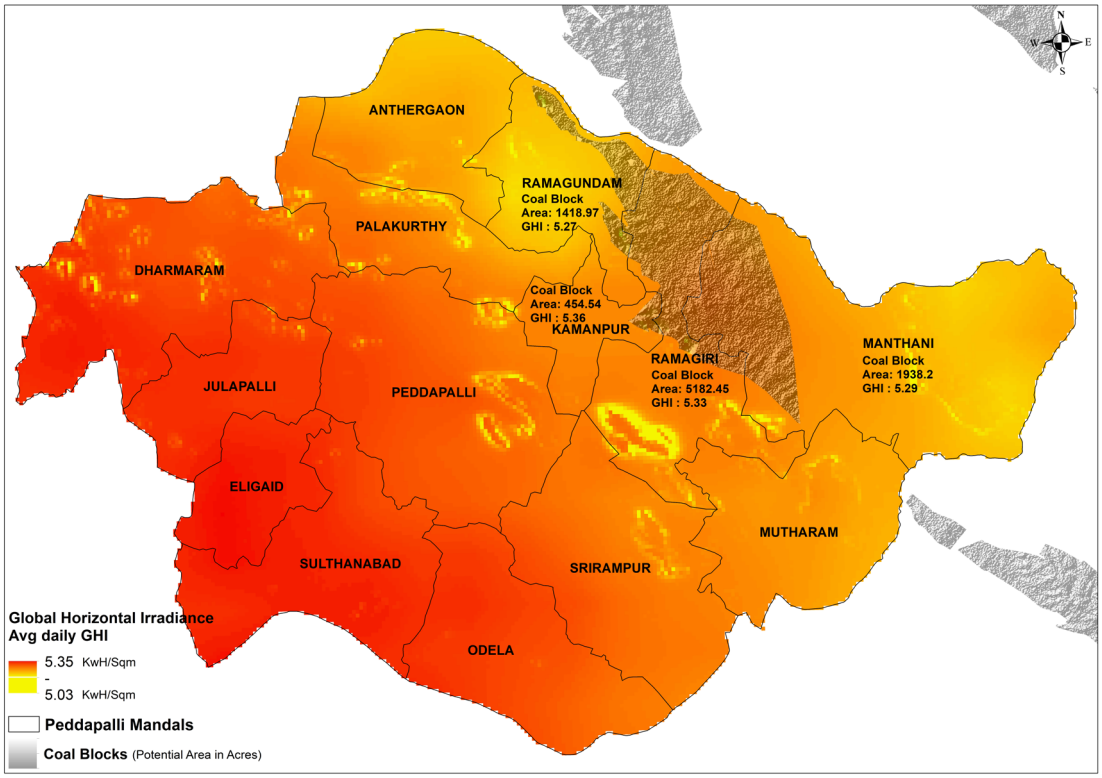
Solar manufacturing and assembly

Telangana is one of the top solar states in India, with a solar power potential of 20 GW. [37] The Telangana Solar Policy, 2015 was announced with an aim to increase solar power to 5000 MW in 4 years. [38] Loans of up to $1.8 million (₹15 crore) under priority sector are available for RE projects in the state.[39] Other incentives include 100% stamp duty exemption to developers and payment of a development fee of $298 (₹25,000) to panchayats or local governing bodies for acquiring land for setting up manufacturing units. Peddapalli is a significant site for solar energy projects, demonstrating the region's potential in this sector. Currently it has the largest floating solar power plant in Ramagundam with a capacity of 100 MW. SCCL too has installed a 22 MW solar power generation unit atop its OC-1 mine in Ramagundam. The district is also pushing for solar power to be used in agricultural pumps. Additionally, the district has 58 solar rooftops with a total capacity of 498.5 kW. [40]

Interviews suggest that owing to the state's policy push and awareness campaigns, the solar sector has garnered much interest among businesses. Our survey shows 44% of registered enterprises and 19% of unregistered enterprises are keen to diversify into solar manufacturing and assembly. Local businesses also perceive this sector to be lucrative considering the growing demand. The blocks of Ramgundam and Manthani are suitable for this sector to thrive. Both the blocks are on the main

Figure 16: Solar potential in different blocks in Peddapalli

The figure shows the Global Horizontal Irradiance (GHI) distribution across the mandals of Peddapalli district, highlighting average daily GHI values (in kWh/m²) and coal blocks. The GHI values were derived using solar radiation datasets combined with spatial analysis in GIS tools, and coal blocks were traced using CMPDI data. Additionally, extracted the area for solar potential on coal blocks by integrating the Land use/Land Cover (LULC) and slope analysis.



transport line, making it easy to obtain supplies and equipment, while also having a high workforce population. Additionally, Ramgundam already has gathered momentum, with the setting up of the floating solar power and through SCCL's efforts.

While the solar manufacturing sector presents a viable option for employment and non-coal sector diversification, efforts need to be made to train the local workforce. Some local enterprises, though interested, lack expertise in the sector. Suryamitra centres that provide skilling and training to youth in the solar sector need to be set up in Peddapalli, with a dedicated monitoring mechanism to enhance employability in the sector. The district should also consider financial incentives for maintenance and net metering to enhance uptake and installation.

Challenges

1. **Technical knowledge:** Although there is interest and market demand, there is a lack of expertise in Peddapalli due to limited opportunities to explore this sector. While Suryamitra centers provide training opportunities to the youth, it is limited to solar panel installation and maintenance. Without exposure to advanced technologies and hands-on training, potential workers may not acquire the necessary skills. This can deter investment from companies looking to establish operations in the area.

2. **Energy reliability:** Solar manufacturing relies heavily on consistent energy supply for processes like panel fabrication and assembly. Interruptions can lead to production delays and reduced efficiency.

Opportunities

1. **Job creation:** Considering the aspirations of local enterprises, this is a viable sector for creating non-coal jobs. Setting up solar panel production facilities can lead to various roles, from assembly line workers to engineers and quality control specialists. Additionally, expanding solar manufacturing will require a robust supply chain, creating jobs in procurement, logistics, and inventory management.

2. **NTPC's solar project:** NTPC's establishment of India's largest floating solar project in Ramagundam, with a capacity of 100 MW, highlights a pivotal moment in the country's renewable energy landscape. This initiative not only boosts solar power generation in the district but also opens up opportunities for the solar manufacturing sector.

Key recommendations for the solar sector in Peddapalli

Focus Blocks: Ramagundam, Manthani

1. **Skill development for creating employability:** In the survey, both households and enterprises show interest in the solar energy sector. SCCL and NTPC are also commissioning solar parks in the district. To create more jobs for the locals, training in solar installation and manufacturing needs to be imparted. District administration can strategize for training in consultation with the state government, keeping the central government's skill development target in mind.

2. **Promoting local entrepreneurship:** As discussed above, there are ample opportunities for solar manufacturing and production in the district. It was observed during interviews and surveys that the local businesses were not aware of government schemes and incentives designed for this sector. To promote local entrepreneurship in the sector, the General Manager and Manager, Ease of Doing Business, District Industrial Centre, the district collector, along with FTCCI and CII (Telangana chapter) could create awareness about the available business options in the sector and train people from the local communities.

Agro-based industry: Food processing

Agriculture is the backbone of Peddapalli's economy, supported by its rich agricultural resources. This resource base is fundamental in supporting the agro-based food processing industry. The region cultivates a variety of crops, including paddy, maize, cotton, pulses, oilseeds, and chilli across a total net sown area of 119,181 hectares.[41] Additionally, there are 567 fish rearing tanks and 128 fishermen cooperative societies.[42] The sector employs 46,000 cultivators and 6,000 workers in agriculture and allied activities. [43]

Given its significance, agriculture remains a primary focus for the district, which has implemented several initiatives to bolster this sector. Programs such as Mission Kakatiya, the Rythu Bandhu scheme, and Project Kaleshwaram have enhanced farming quality through improved irrigation infrastructure, free power supply, and access to credit facilities, among other support measures.

Table 10: Block-wise agriculture potential in Peddapalli district

Overview of main crops and the potential industries that could be established

Blocks	Main Crop	Average holding size (ha)	Total cultivable area (ha)	Total irrigated area (ha)	Proposed industry
Peddapalli	Paddy, cotton	0.67	16,513	9,666	Seed processing
Srirampur	Paddy	0.74	11,434	5,399	Cotton Ginning Mill, Seed Processing, Rice Milling, Palm oil manufacturing
Sultanabad	Paddy, cotton	0.70	13,867	8,612	Rice bran oil manufacturing, rice mills

Source: Handbook of Statistics, Peddapalli district (2021-22); Peddapalli district profile, District Industries Centre

According to our survey, 17% of registered enterprises and 14% of households express interest in pursuing agriculture or agro-based industries if coal production decreases in Peddapalli. Given the local preference and the government's emphasis on the sector, agriculture has the capacity to absorb employment from the coal industry.

Major blocks that can be considered for this industry include: Ramagundam, due to a strong agricultural base; Palakurthi, as it's a major producer of paddy and pulses suitable for setting up processing units; and Odela, known for cotton cultivation ideal for cottonseed oil extraction and processing. The district industry plans

recommend establishing seed processing units in the Peddapalli and Srirampur blocks. Additionally, the administration is working to promote palm oil cultivation by proposing a $20.3 million (₹170 crore) palm oil factory in Peddarathpalli village, Srirampur.[44] Sultanabad block, on the other hand, is well-suited for rice bran oil production and rice mills.

While agricultural industries present a viable option, it is essential to enhance storage facilities and provide skill training in order for farmers to maximize their potential.

Challenges:

1. **Lack of infrastructure:** Setting up agro-based industries requires extensive facilities like cold storages, investments in food parks, processing facilities etc., which are not developed in the district. This limits the ability to preserve and process agricultural products, reducing their market value and shelf life.

2. **Limited value creation:** Currently, crops are being harvested for market use without any value addition. For instance, while Peddapalli cultivates significant quantities of paddy, cotton, and oilseeds, these crops are often sold in raw form. This lack of value addition prevents farmers from maximizing their earnings and diminishes the overall economic impact of the agricultural sector.

Opportunities:

1. **Utilizing coal transport:** Peddapalli's extensive coal transportation network presents a unique opportunity to support agro-based industry. By leveraging existing logistics and transportation resources, the district can enhance its agricultural sector and create new employment opportunities. The established network of trucks and transportation services for coal can be repurposed to transport agricultural products, reducing logistics costs for farmers and agro-based businesses.

Recommendations for agro-based food processing in Peddapalli

Focus Blocks: Ramagundam, Palakurthi, Odela, Srirampur, Sultanabad

1. **Create Farmer Producer Organization (FPOs):** The district is one of the major producers of paddy, cotton, chillies, and oil seeds. In the study there was concern about the infrastructure like cold storage, processing unit etc. as most of the farmers are marginal. In the PM-FME scheme, there is provision of community infrastructure which can be used by FPOs. The district administration along with district agriculture officers and FPOs, Muthuram Farmer Producer Company Limited can identify the community resources in the different block of the district as per the resource availability and comparative advantages.

2. **Infrastructure Development:** The food processing industries need few necessary infrastructure to flourish. In the district along with the common infrastructure, the district administration and DIC also needs to promote

the infrastructure required by the entrepreneurs. In this context, Integrated Cold Chain and Value Addition Infrastructure Scheme provision can be used.

3. **Promote "one district, one product" under PMFME:** Paddy is the district product under PMFME. To add value and increase the income of paddy based industries, rice can be processed to produce rice bran edible oil. Rice bran oil is also part of the National Mission on Edible Oil (NMEO). In this regard, the district administration, Department of Food Processing, and the District Industrial Center can collaborate to promote local entrepreneurship to invest in the sector.

4. **Branding and promotion:** PM-FME scheme has the funds and provisions for the promotion of the district product. FPOs and local entrepreneurship can use these funds to promote their local product and their products to create a market. The agriculture extension office at the district level along with the department of public relations need to develop a branding strategy for the ODOP product.

5. **Training for farmers and local entrepreneurs:** The district administration can use the DDU-GKY and PM-KVY schemes to promote skill development in the sector. Additionally, Raythu Vedikas scheme can be used to train farmers on crop management, and train local people on modern techniques. Additionally, agriculture extension centers along with district administration can help farmers with the skills required for the branding and promotion of the product.

Tourism

The tourism sector in Peddapalli has immense potential, and could prove to be one of the strategic and most important sectors for economic diversification. A major railway line which connects north and south India passes through Peddapalli district. The district is rich in natural, historic and cultural heritage and home to various lesser-known tourist spots such as Ramuni Gundalu, Ramagiri Fort, Sabitham Waterfalls and Buddhist circuits which are over 2000 years old. Developing tourism infrastructure and promoting these destinations could create employment opportunities, help local businesses, and attract investments in hospitality and other related sectors. Also, the tourism sector is a labor-intensive sector. It can accommodate laborers displaced from the coal industry so that their livelihoods are not affected due to the transition.

Our survey shows that 7% of registered and 9% of unregistered enterprises want to venture in the tourism sector as part of the diversification process. Additionally, 10% of households involved in business also view it as an aspiring sector in the district.

Tourism is known for its multiplier effect. The local economy will thrive with the revenue generated from tourists. Restaurants, hotels, souvenir shops, and local transport services will benefit from the arrival of tourists. By developing these historical, cultural and natural assets, the tourism sector can offer a sustainable and long-term alternative to the coal industry.

However, diversifying into tourism necessitates extensive planning and a commitment to a long-term strategy. We will analyze the strengths, challenges, opportu-

nities, and policy framework for the sector in Peddapalli.

Challenges:

1. **Lack of awareness about tourism outside the state and insufficient marketing:** Although Peddapalli boasts several tourist attractions, many remain largely unknown to visitors outside the state. This lack of recognition can be attributed primarily to insufficient and ineffective tourism marketing efforts within the district. Effective marketing could highlight Peddapalli's unique cultural heritage, natural beauty, and adventure opportunities, attracting visitors who are eager to explore off-the-beaten-path locations. By investing in a robust tourism marketing strategy, Peddapalli can enhance its appeal and encourage greater visitor engagement, ultimately contributing to the local economy.

2. **Lack of district-level support for tourism:** Peddapalli has a wealth of notable tourist attractions, yet it currently lacks a dedicated program or committee for tourism development. Although in December 2020 the Telangana Tourism Ministry launched the TS-Industrial Project Approval and Self-Certification System (TS-iPASS) service to aid in the process of issuance of various licenses, certificates and clearances for the hospitality industry, no such policy has been implemented in Peddapalli.[45]

   This absence of structured support presents several challenges, including limited resources and guidance for businesses looking to enter the tourism sector, and a lack of marketing efforts to promote local attractions. As a result, the potential for growth in this vital industry remains largely untapped, making it difficult for both local enterprises and the community to fully benefit from tourism.

Opportunities:

1. **Potential for alternative livelihood options:** Based on our survey responses, it is evident that local enterprises want to venture into the tourism sector. With better government policy support, the sector is a viable alternative to the coal sector. Since there is limited technical knowledge required, low-skilled locals can be easily hired. Additionally, the tourism-linked hospitality sector can provide for lucrative business opportunities.

2. **Potential for creating district tourism development plans:** The Telangana government has proposed to prepare comprehensive district tourism plans for several districts including Hyderabad, Rangareddy, Nalgonda, Adilabad, and Suryapet.[46] Additionally, 477 tourism sites have been identified for upgrading existing tourist amenities.[47] However, Peddapalli is missing from the list. Considering the many tourism sites located in the district and local enterprises' enthusiasm to venture into the sector, Pedappali's inclusion in the list is warranted.

Key recommendation for the tourism sector in Peddapalli

Focus Blocks: Ramagundam, Manthani, Eligaid

1. **Development of a tourism plan:** Multiple tourist spots in the district which may be less popular have the potential to become major tourist attractions. A strategy is needed to develop the tourist circuit for the overall experience of the visitor that would create new avenues for the tourists to spend, and in turn help the districts and their locals to earn more revenue. These circuits would also help to attract different kinds and segments of the tourist population. To this end, the district administration along with the tourism department could create a roadmap for the development of the tourist sector, and agencies like the Archeological Survey of India and Ministry of Tourism could provide assistance with the upkeep and protection of these sites. The district has the distinct advantage of having coal mines which could be developed along with ecoparks to attract tourists. The location can boost tourism given that Telangana is the only state in southern India with coal mines. SCCL and the district administration should identify the coal mines which would be suitable for mine tourism and the identified mines could be integrated in the tourist circuit.

2. **Creating accommodation and other infrastructure:** The major challenge in the district is the lack of proper accommodation facilities to cater to tourists. The district needs to incentivize investment in different tourist locations. The district administration could identify the land and markets along the tourist circuit for development. Along with accommodation, local transportation is a major challenge given that there is no app-based service available. The district administration can collaborate with the Telangana State Road Transport Corporation (TSRTC) and also promote local travel agencies that could help to generate employment in the district. The district in consultation with enterprises and the tourism department can use the DMF to create the basic infrastructure around these tourism spots.

3. **Skill development:** The hospitality industry usually performs well if the quality of service and food is good, services which require skilled human power. In the enterprise survey and interviews, respondents reported a skill gap in the food and service sectors. To overcome this skill gap, the district administration along with skill development departments and skilling agencies could define a strategy to identify priority trade skills required for the sector. The central government schemes DDU-GKY and PMKVY could be leveraged to fulfill the skill gap. This would help both the district administration to overcome the skill gap and also help meet the target of the scheme. Employment in the same district would help to overcome the problem of attrition in the scheme.

4. **Organizing a dedicated tourism week:** The district has sites for tourism but due to the lack of promotion, the district has not been able to attract enough tourists. The district administration along with the tourism department and Telangana state's department of information and public relations could organize a dedicated tourism week in the state. The central government's DPPH scheme and DMF could be used for this purpose. In this era of digital content, social media influencers, local artists, and media outlets could be invited to promote the event. The event could be organized by both Mancherial and Peddapalli districts together, given they are neighboring districts and both have the potential to attract tourists from different parts of Telangana state and from the neighboring state of Maharashtra. The event

needs to be integrated into the district's annual event calendar so that with time it could become a regular event so that over time, this recurring initiative can help the district to gain prominence in the tourism landscape of the country.

Textiles

The textile sector in Peddapalli is primarily dependent on cotton, and still at a preliminary stage, with activities limited to ginning and spinning. Peddapalli has immense potential to become a textile hub by expanding into higher value-addition activities like dyeing and garment manufacturing, but the sector faces several hurdles. The absence of textile parks and skilled labor has limited the potential for growth in this sector.

Our survey shows 42% unregistered and 17% registered enterprises perceive non-coal MSMEs such as those manufacturing textiles as important for diversification. Streamlining the state's textile policy for infrastructure development, encouraging investments in textile clusters, creating skill development programs for local youth, combined with better transport connectivity to major markets, could lead to higher employment while helping Peddapalli to become a textile hub.

Opportunities

1. **Textile zone/clusters:** Creating textile clusters can consolidate the entire value chain, reducing costs and boosting production.

2. **Skill development programs:** Establishing training centers for textile-related skills can increase local employment and reduce dependency on external labor.

3. **Government incentives:** Utilizing state and central government textile policies that offer financial assistance and subsidies for new textile units.

4. **Market access:** Improved transport connectivity with Hyderabad and neighboring districts can help in quicker access to national and international markets.

Recommendations for the textile sector in Peddapalli

Focus Blocks: Manthani, Peddapalli, Julapalli

1. **Value chain creation:** Peddapalli is a cotton-producing district. Currently, the value chain is not streamlined and it is fragmented and unorganised. To promote the textile sector in the districts, the value chain needs to be streamlined. In this context, the Department of Textile at the state level and the district administration need to develop a roadmap for the development of the value chain. To develop the sector, the state government's T-TAP scheme can be used along with seeking investment from established industry players. In the short term, the cotton produced in the district could be used as raw material in nearby textile parks.This would incentivize private players and farmers to invest in the value chain.

2. **Development of infrastructure and textile park:** The state government under its T-TAP policy envisions to promote the textile sector as a major

industry for employment generation and enhancing cotton producers' income. District households and enterprises also have aspirations to seek work in the sector. State governments departments, mainly industry and textile, need to plan the creation of a textile park in the district, and the district industry center should create the roadmap for the same. The District Collector could earmark the land for this textile park. The creation of a textile park would incentivize MSME players to invest in production and also help transporters to increase their business.

3. **Employment generation and skill development:** The textile sector, being labor intensive, has the potential to provide job opportunities in the district. A skilled labor force in the district would be a major attraction for any investor. Major initiatives for skilling in the textile sector could include leveraging the DDU-GKY scheme for skill development. The district administration along with a training partner (project implementation agency) and the nodal office at the district level could coordinate and push for a higher target for the trade. Additionally, SCCL's CSR funds could be used to promote skill development in the textile sector, given that training and employment come under the mandate of CSR.

3.3 Coal dependence and diversification in Mancherial

Mancherial district, formed in 2016, is situated in the northern part of Telangana. According to the 2011 census, it has a population of approximately 800,000 residents.[48] The district is an industrial hub, particularly known for its extensive coal mining activities, housing some 17 coal mines with a total production of 13.4 million tonnes in 2023-24.[49] Additionally, Mancherial is home to a coal-based power plant in Jaipur mandal with a capacity of 1200 MW. [50] Along with its industrial prominence, the district boasts rich natural landscapes, including the Godavari river basin, and a diverse cultural heritage, making it a unique and important part of Telangana.

Table 11: List of coal mines in Mancherial

Operational mines with actual production, with opencast mines contributing most to the production in 2023-24

Block	Coal mine	Type of mine	Target 2023-24 (T)	Actual 2023-24 (T)	Target 2024-25 (T)
Kasipet	KASIPET	UG	3,40,000	1,45,854	2,40,000
	KASIPET2	UG	3,00,000	97,140	2,00,000
	KK OC	OC	20,00,000	17,74,334	20,00,000
Bellampalli	SK	OC	2,40,000	67,318	1,20,000
	Goleti	OC	4,00,000	-	1,00,000
Mandamarri	KK1 INC	UG	30,000	16,331	-
	RK OCP-1	OC	14,60,000	18,72,328	7,00,000
	RK 1A INC	UG	40,000	23,077	-
Mancherial	SRP OC-II	OC	35,00,000	31,72,897	32,00,000
	IK OC	OC	15,00,000	12,21,807	15,00,000
	RK 5 INC	UG	2,70,000	2,77,012	2,70,000
	SRP 1 INC	UG	1,50,000	1,14,110	1,20,000
	SRP 3&3A INC	UG	2,80,000	2,30,178	2,80,000
	KK5 INC	UG	2,00,000	1,96,638	2,00,000
Jaipur	RK 6 INC	UG	1,80,000	1,94,903	1,80,000
	RK 7 INC	UG	3,60,000	3,38,674	3,60,000
	RK-NT	UG	1,60,000	1,60,845	1,60,000
	IK 1A INC	UG	2,40,000	1,95,663	2,40,000

3.3.1 Employment

Mancherial is one of the mining hubs of Telangana, with SCCL employing 15,000 in coal mining in the district, while the thermal plant in Jaipur mandal employs a total of 1,500.[51] In addition, there are some 1,000 coal trucks in the district employing 3 people per truck.[52] Based on focus group discussions with truck drivers, there is an increased reliance on railway transportation for coal. Currently, the drivers get to transport coal only 3 to 4 times per month, as industries prefer the railway network for its cost-effectiveness when importing large quantities of coal.

Our survey indicates that 26% of households are involved in the coal sector. Of

Figure 17: Type of coal dependency in Mancherial

Our analysis, based on mixed-methods findings, categorizes household and enterprise dependence on the coal sector. The colour salmon represents the coal sector's contribution to households, khaki indicates its impact on enterprises, and salmon-khakhi signifies the sector's shared contribution to both households and enterprises

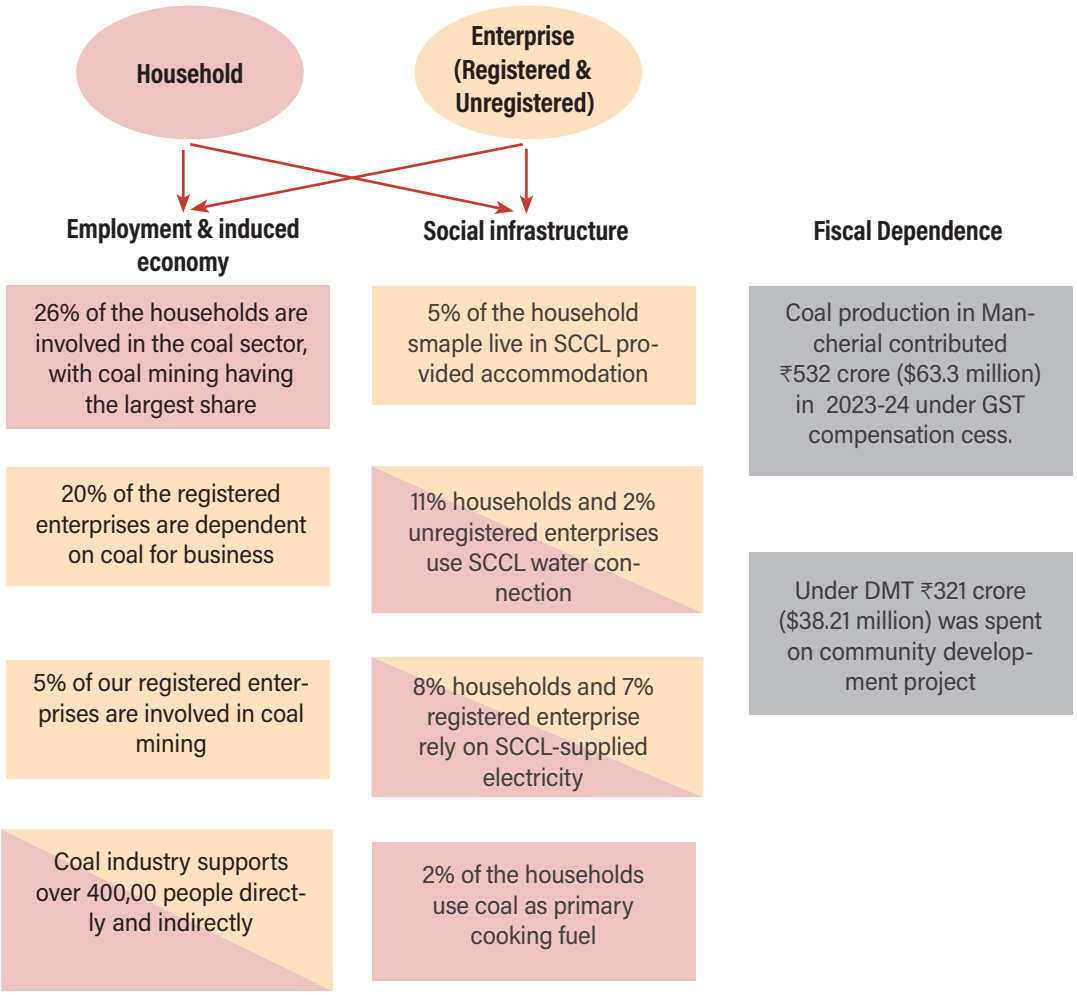
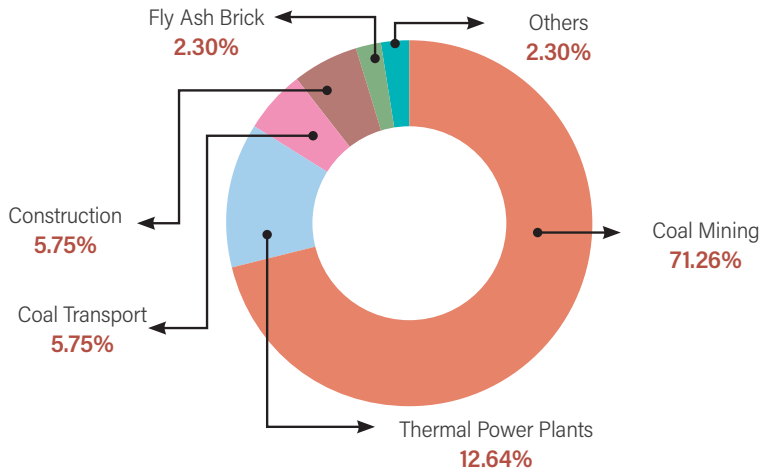


Figure 18: Type of household coal employment in Mancherial

Employment in the coal sector is significant, as coal mining accounts for the largest share of household jobs

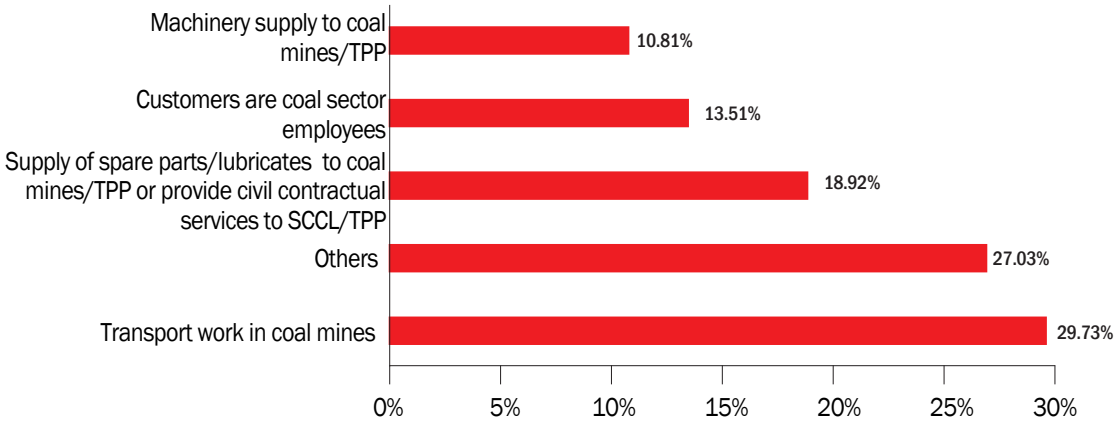


this, the largest share is that of coal mining, followed by coal-based thermal power plants. Additionally, 5% of registered enterprises are involved in coal mining. When asked if the enterprises cater to coal mines, 26% supported the sector by supplying machinery, transport work in coal mines, or providing civil contractual services.

According to focus group discussions with local businesses in the Ramakrishnapuram area, while a significant portion of the population is employed by SCCL, others have ventured into businesses such as carpentry, retail shops, and truck repair services.[53] The livelihood of most businesses in the area is intricately tied to the operations of SCCL's coal mines. Additionally, interactions with communities near the mines indicate that the coal industry supports over 400,000 people both directly and indirectly in Mancherial district. [54]

Figure 19: Type of coal dependency among registered enterprises in Mancherial

Distribution of enterprises in the registered survey sample shows that the majority are involved in transport work in coal mines



3.3.2 Housing

Based on our survey, only 5% of the household sample live in accommodation provided by SCCL, while 81% own the houses, and 9% live in rented houses. Previous mine closures have impacted housing facilities, especially the maintenance of housing colonies, as the company discontinued regular repairs and upkeep.

3.3.3 Electricity

The survey indicates a significant reliance on state government electricity connections among enterprises. Among registered enterprises, a substantial 91% utilize state government electricity, while only 7% opt for electricity supplied by SCCL. By contrast, 100% of unregistered enterprises also use state government electricity, highlighting its dominance as the primary source of power for both registered and unregistered businesses. Among households, 89% use electricity connections provided by the state government, while 8% rely on SCCL connections and only 2% use NTPC connections. (See Figure 20.)

3.3.4 Water

In terms of water supply, the enterprise survey data reveals distinct patterns between

Figure 20: Electricity source for households and enterprises in Mancherial

Electricity connection availed by households and enterprises. State government connection is the major source of electricity for all categories.

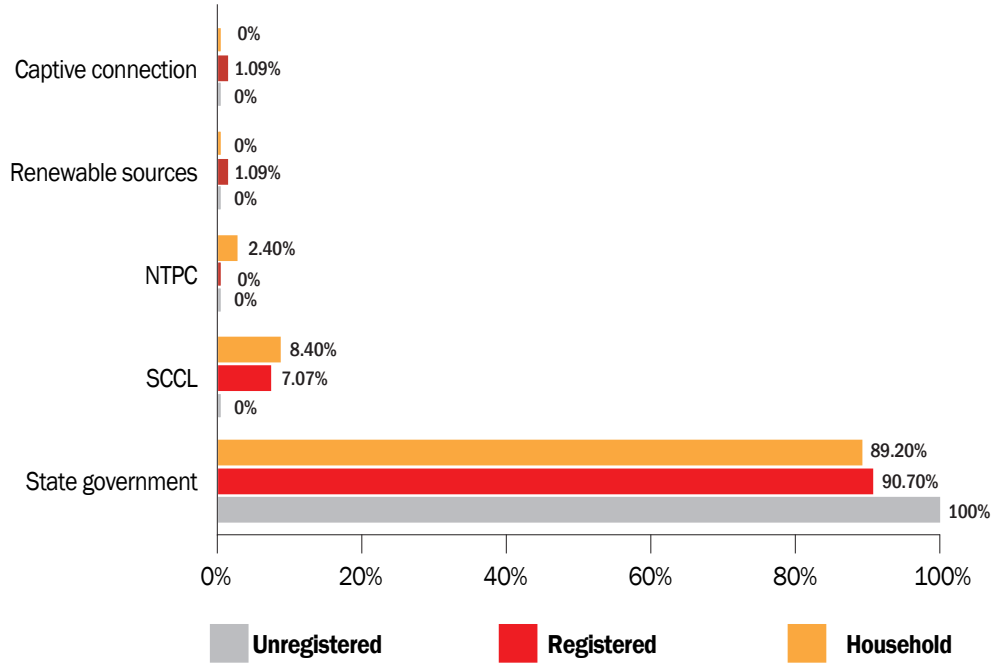
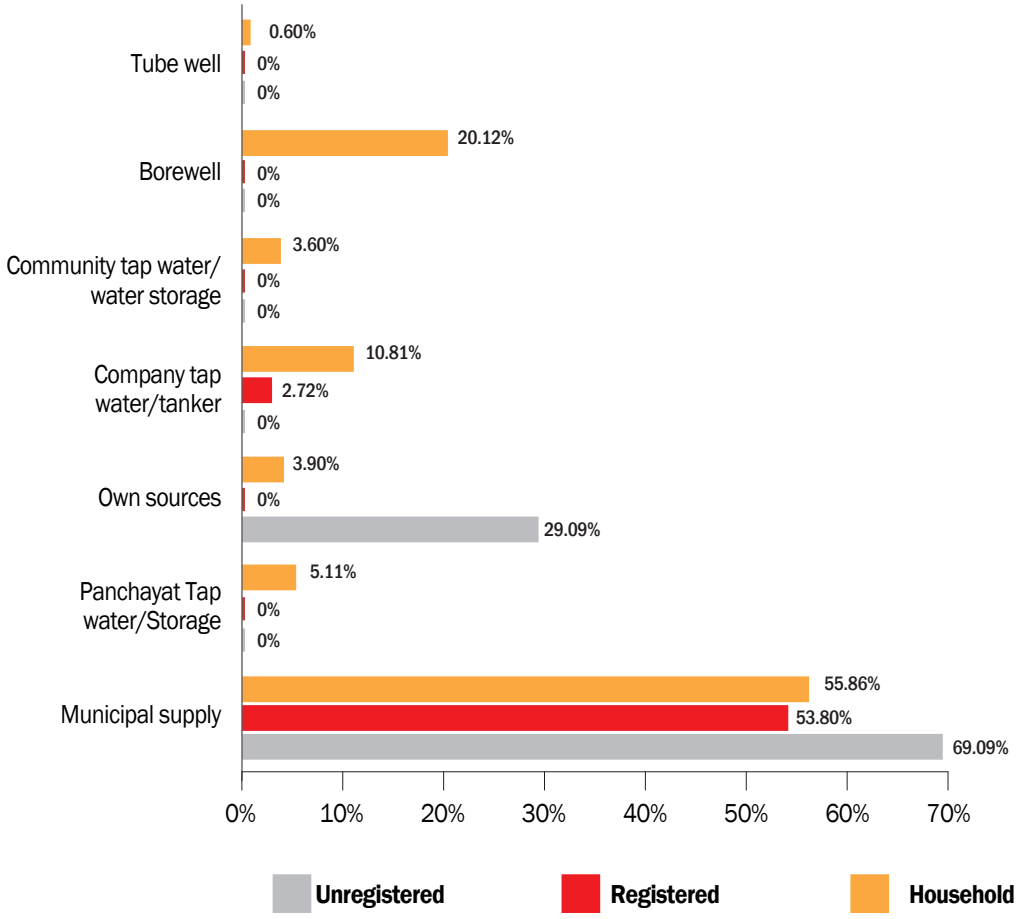


Figure 21: Water supply source for households and enterprises in Mancherial

Water supply sources for registered and unregistered enterprises. Municipal supply is the major source of water for all categories



registered and unregistered enterprises. Among registered enterprises, 54% utilize municipal water, while 43% rely on their own sources such as pumps and wells, with only 2% accessing water through SCCL. In contrast, 70% of unregistered enterprises depend on municipal water supply, and 30% use their own sources, showing no reliance on water supplied by SCCL. This suggests a significant reliance on municipal sources for both categories of businesses, particularly among unregistered enterprises, while registered enterprises demonstrate a notable use of self-sourced water, indicating that SCCL is not a major water supply source for these businesses.

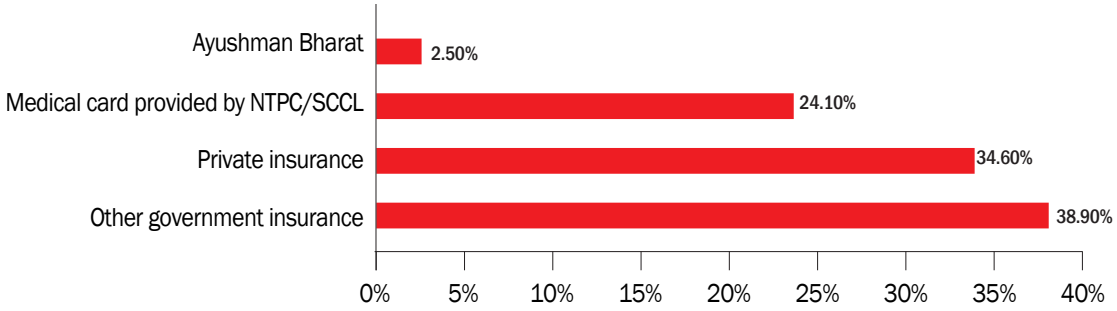
According to the household survey, 55% use a municipal tap water connection, while 19% use borewells. However, 11% of the sample use an SCCL tap water connection or tankers.

3.3.5 Health

The household survey reveals that 49% of households have members with medical insurance. Among these insured households, 24% have medical cards from either SCCL or NTPC, while 35% opt for private insurance. Significantly, 33% of insured households report that their coverage extends to all members. Additionally, SCCL operates hospitals in four locations: Mancherial, Bellampalli, Bhupalpally, and Mandamarri.

Figure 22: Source of medical insurance in sampled households in Mancherial

Medical insurance options for households. Majority of the households opt for government insurance followed by private insurance.



3.3.6 Coal as fuel

Our survey reveals that 5% of registered enterprises in the manufacturing sector rely on coal-based boilers for fuel. Notably, the majority of these businesses would consider switching to solar-based heating options if coal were to become unavailable. Additionally, none of the unregistered enterprises in our sample use coal-based boilers. In terms of the primary cooking fuel, only 2% of the households use coal, while 92% use LPG and 5% use wood.

3.3.7 Fiscal dependence

Coal contributes to the district exchequer both directly and indirectly. In the Mancherial two major sources of fiscal dependencies are DMF and CSR. The district mineral foundation is an important source of the fund for the district. Since the inception of the fund, the district has collected ₹576 crore ($68.5 million) of which ₹321 crore ($38.21 million) is spent on 7,607 projects. These projects play an important role in the overall infrastructure and rural development of the district.

Additionally, CSR also contributes to the district's fiscal budget indirectly. For CSR, companies spent 2% of their profit on local area development. In the fiscal year 2022-23 SCCL spent roughly ₹4.9 crore ($5.82 million) whereas in the year 2023-24 SCCL spent similar amounts in Mancherial district. The major areas under which the money is spent are health and nutrition, community infrastructure development, etc.

In addition, coal production in Mancherial contributes to the overall national indirect tax collection. Under the GST compensation cess, coal produced in the Mancherial contributed ₹532 crore ($63.3 million) in the fiscal year 2023-24.

Mancherial is a mining hub in Telangana heavily reliant on the coal sector for employment and livelihoods. Both households and businesses exhibit a strong dependence on this industry for jobs and social infrastructure. While Mancherial is traditionally an urban centre, its coal sector also supports a thriving induced economy. Furthermore, fiscal contributions through the DMF and CSR initiatives have bolstered community development projects in the district, helping to address various local needs and enhancing the overall quality of life.

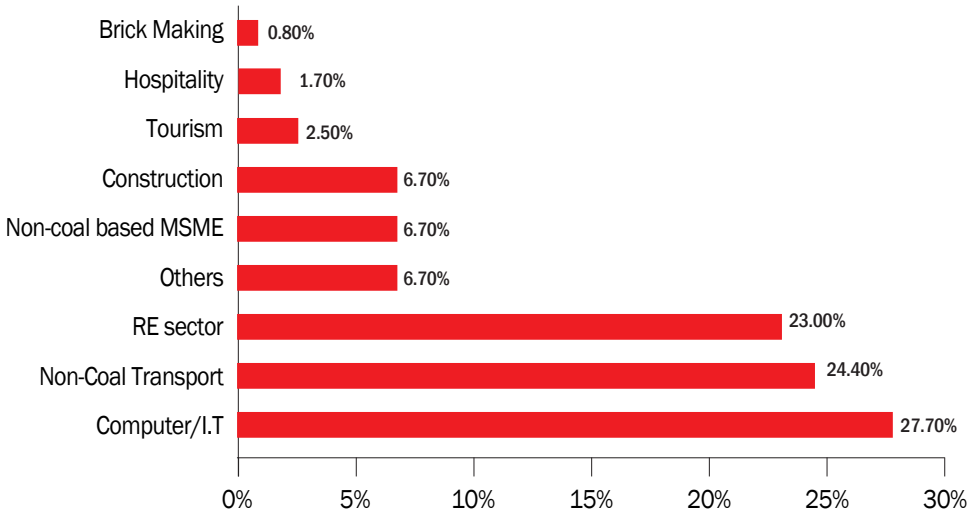
3.4 Diversification Pathway for Mancherial

3.4.1 Household diversification aspirations

Our household survey indicates that 26% of the households want their children to work in the mining sector, while 74% have aspirations for their children in non-coal sectors. Additionally, in case of coal mine closures, overall, 35% of the households would prefer finding jobs in non-coal sectors like IT, non-coal transport and RE sector, while 23% would shift to agricultural activities in Mancherial and 20% want to start business in non-coal sector majorly in construction.

Figure 23: Preference for future occupational sectors for children in Mancherial

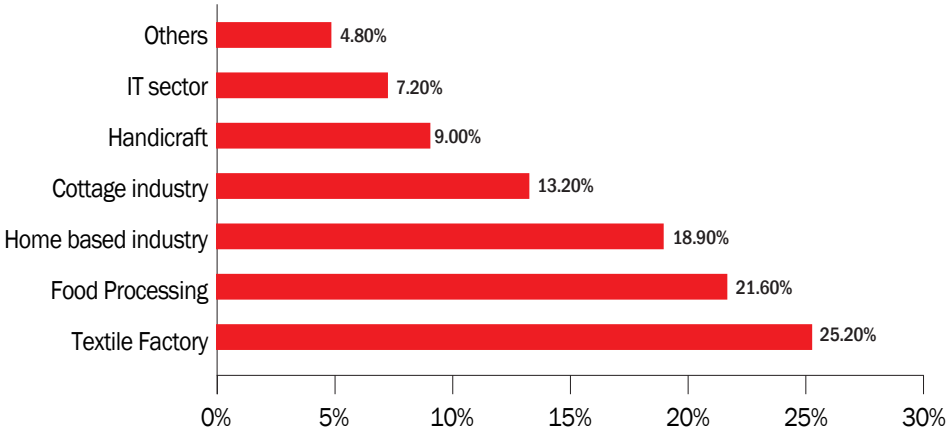
Preference among households for non-coal-sector employment opportunities for their children. These sectors include IT, non-coal transport and renewable energy (RE) sectors



Our household survey of Mancherial reveals promising opportunities for new sectors. Notably, 25% of households identify textiles as a viable industry, indicating a strong interest in leveraging local skills and resources. Meanwhile, 21% of residents see potential in food processing, which could enhance the agricultural sector and

Figure 24: Preferred sectors for households business diversification in Mancherial

Preference among households for non-coal-sector employment opportunities for their children. These sectors include IT, non-coal transport and renewable energy (RE) sectors



create jobs for local farmers. Additionally, 19% of households perceive home-based industries as a viable option, reflecting a growing trend toward entrepreneurship and self-employment.

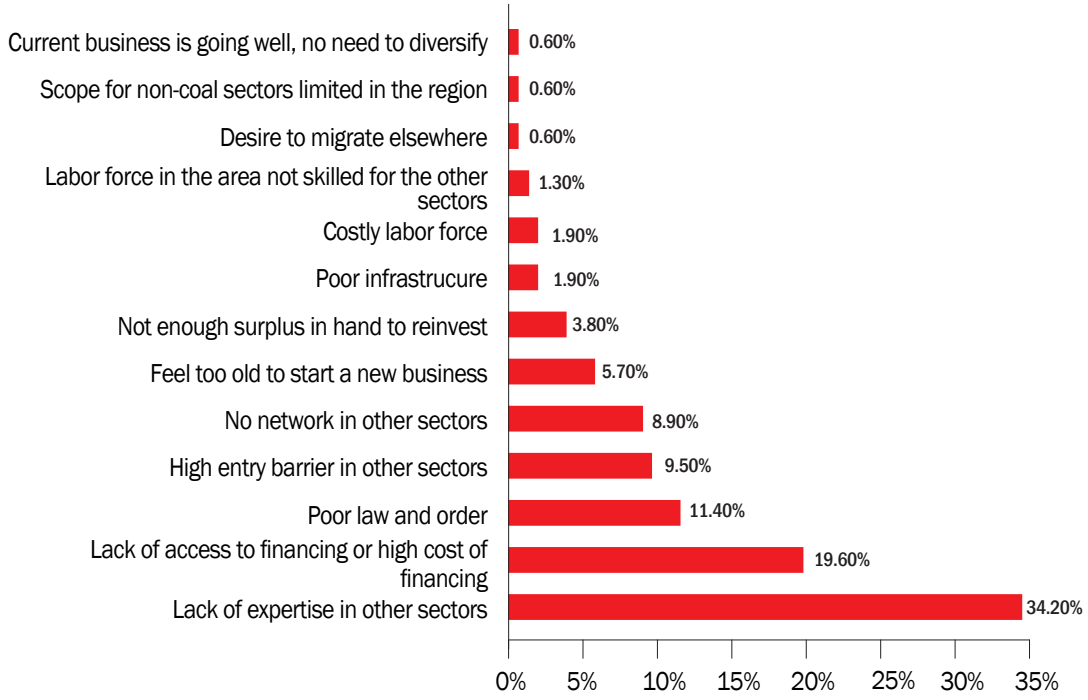
3.4.2 Industrial diversification aspirations

Our survey reveals that while 16% of registered enterprises are contemplating diversification into other sectors, a substantial 84% prefers to continue with its current business focus. Among those opting not to diversify, 34% point to a lack of expertise in other sectors as their primary barrier, while nearly 20% cite access to finance as a significant challenge. Other reasons for their reluctance include a poor law and order situation (for 11% of enterprises) and high entry barriers in other sectors (for 9%).

In contrast, regarding unregistered enterprises, a striking 96% do not wish to diversify, leaving only 4% planning to explore other sectors. The primary reasons for their reluctance include a lack of expertise in other sectors, cited by 32% of these enterprises, and concerns about poor law and order, mentioned by 25%.

Figure 25: Registered enterprises' reasons for not diversifying in Mancherial

Factors that contribute to registered enterprises' decision to not diversify include lack of expertise and lack of a network in other sectors, and limited access to financing

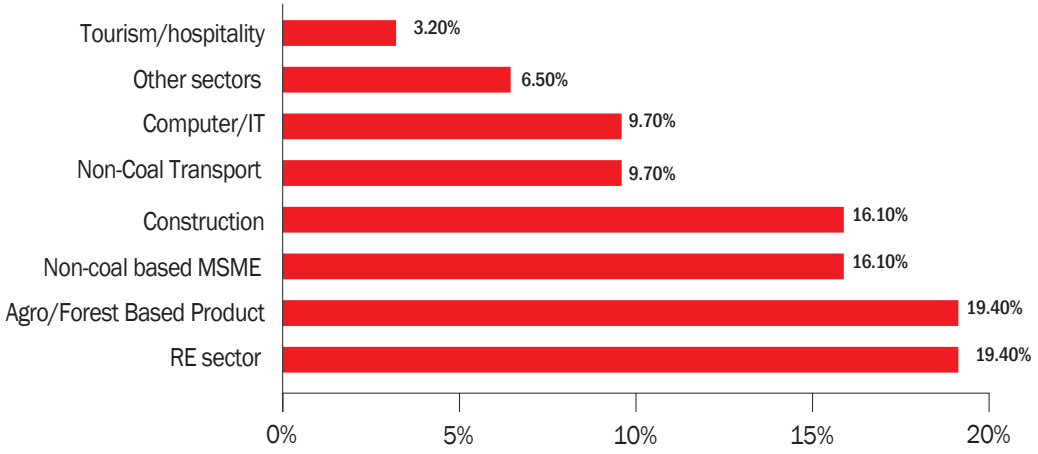


Among registered enterprises, 19% express a desire to diversify into renewable energy (RE) sectors, particularly solar manufacturing. Additionally, 19% are interested in agriculture and forest-based products, while 16% prefer non-coal-based MSMEs such as food processing and small-scale packaging. Similarly, all unregistered enterprises show a more focused interest, primarily leaning towards the RE sector (50%) and non-coal-based MSMEs (50%).

A significant number of enterprises in Mancherial see potential in new sectors.

Figure 26: Preferred sector for diversifying for registered enterprises in Mancherial

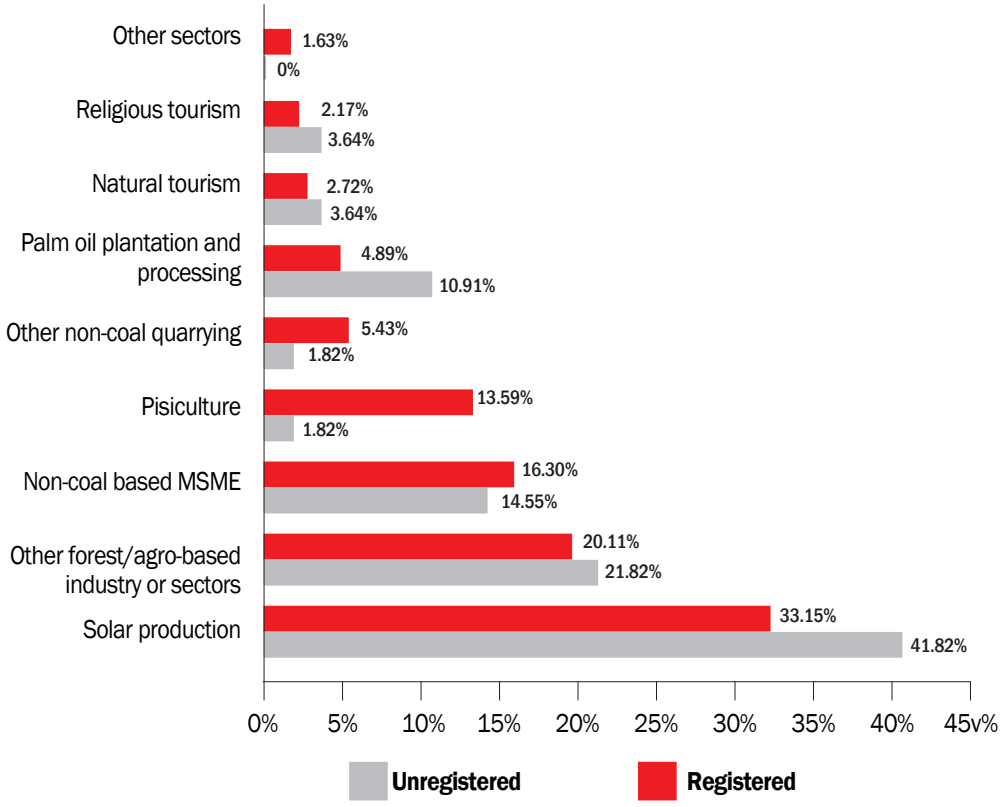
Registered enterprises aspire to diversify their operations into new sectors, with a particular focus on agriculture/forest-based products and renewable energy (RE).



Notably, 33% of registered and 42% of unregistered enterprises identify solar manufacturing units as a viable opportunity for the district. Additionally, 20% of registered and 22% of unregistered enterprises highlight forest and agro products as promising sectors. There's also interest in non-coal-based MSMEs, with 16% of registered and 15% of unregistered enterprises backing this sector.

Figure 27: New sectors for diversification in Mancherial

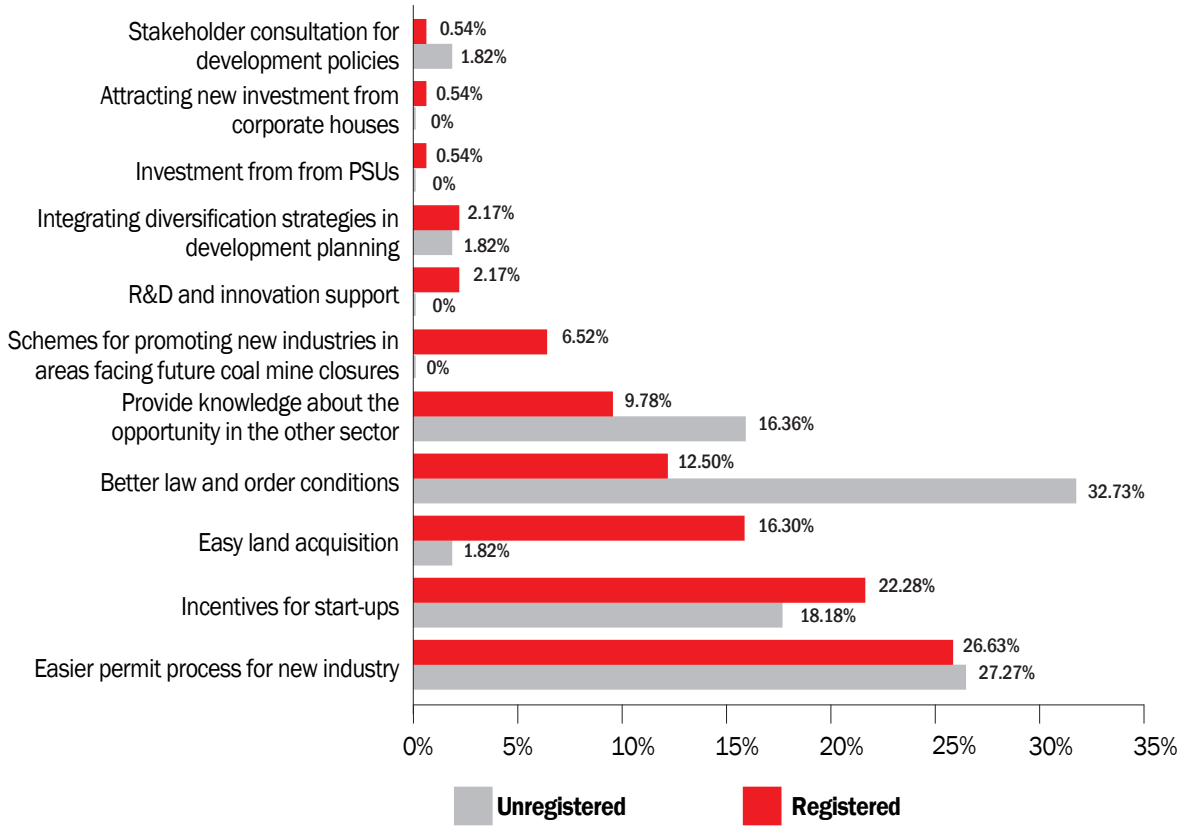
Strategic sectors for investment in the district based on insights from the enterprise survey



Similarly, none of the unregistered enterprises received any institutional support; and while the majority of these enterprises (33%) would like better law and order conditions and support from the government to diversify, 27% would benefit from faster processing for a permit for starting a new industry.

Figure 28: Institutional support required in sampled enterprises in Mancherial

Institutional support for the diversification of registered enterprises is required in key areas: streamlined processes for obtaining business permits, incentives for start-ups, and enhanced law and order, among others.



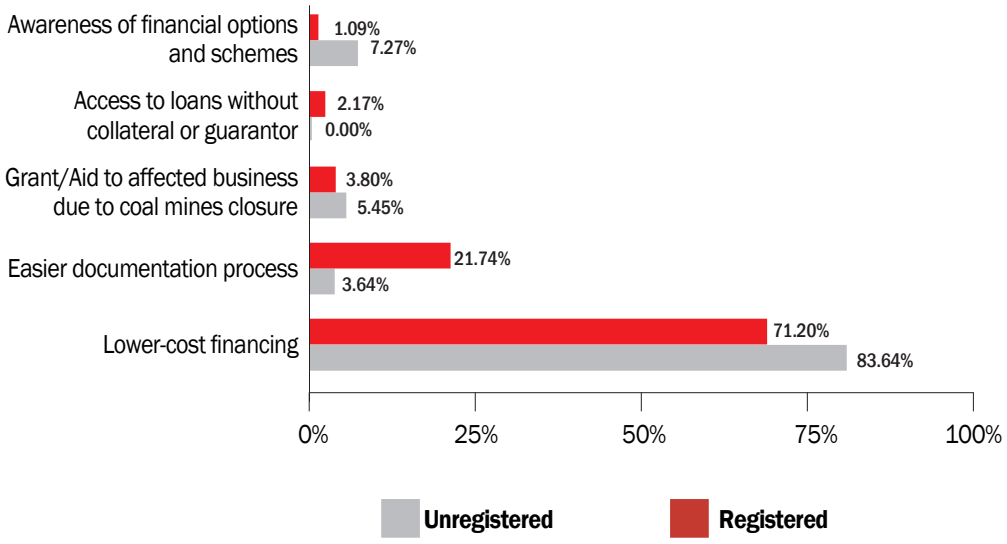
Financing

Of registered enterprises, 77% have credit facilities, primarily from scheduled commercial banks (SCBs), for expanding their business. However, the main reason the other 23% did not apply for credit was either high interest rates, or for some enterprises, sufficient availability of capital. When asked about how much capital they would borrow for diversification, 49% of these enterprises foresee borrowing more than 50% but less than 75% of their planned investment, while only 7% would borrow more than 90%. For 96% of these enterprises, these loans will come from scheduled commercial banks. However, the majority of these enterprises perceive that securing finance would be challenging due to cumbersome documentation.

In contrast, only 22% of unregistered enterprises have availed credit facilities from SCBs. Those who didn't apply for credit cite sufficient availability of capital as the major reason. Unlike registered enterprises, 51% of the unregistered want to borrow more than 75% of their planned investment when they diversify. Another 30% would borrow more than 90%.

Figure 29: Financial support required in sampled enterprises in Mancherial

Significant financial support for registered enterprises includes access to lower-cost financing



Both registered and unregistered enterprises primarily seek cheaper financing options to support their diversification efforts. However, there is a notable difference in their additional requirements: while nearly 22% of registered enterprises also emphasize the need for easier documentation processes, unregistered enterprises do not share this concern. This distinction suggests varying operational structures and resource access across the two types of enterprises.

> “Singareni has the potential to further diversify its energy portfolio by exploring the establishment of wind power mills in overburdened areas and additional solar power plants, leveraging its vast resources and expertise
>
> Focus group discussion with SCCL workers in Mancherial

Infrastructure

The majority of the registered and unregistered enterprises avail state government electricity connections and municipal water supply. When asked whether they have adequate infrastructure to diversify to other sectors, 27% registered enterprises and 11% unregistered enterprises perceive to have such facilities such as a round-the-clock electricity connection, sufficient water supply, and good road connectivity.

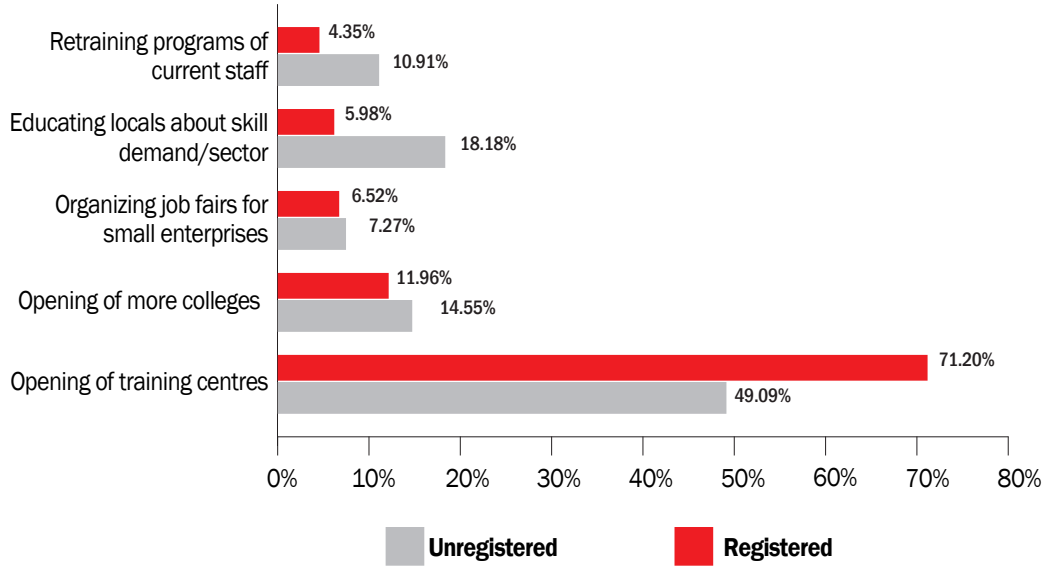
Both registered and unregistered enterprises in the district require robust infrastructural support to thrive. Key needs include access to affordable water and electricity, improved road access to interior areas for efficient movement of goods, enhanced public transportation options for better market access, and reliable

internet connectivity to facilitate business operations and communication. Addressing these requirements is crucial for creating an environment that supports the growth and sustainability of local businesses.

Labor

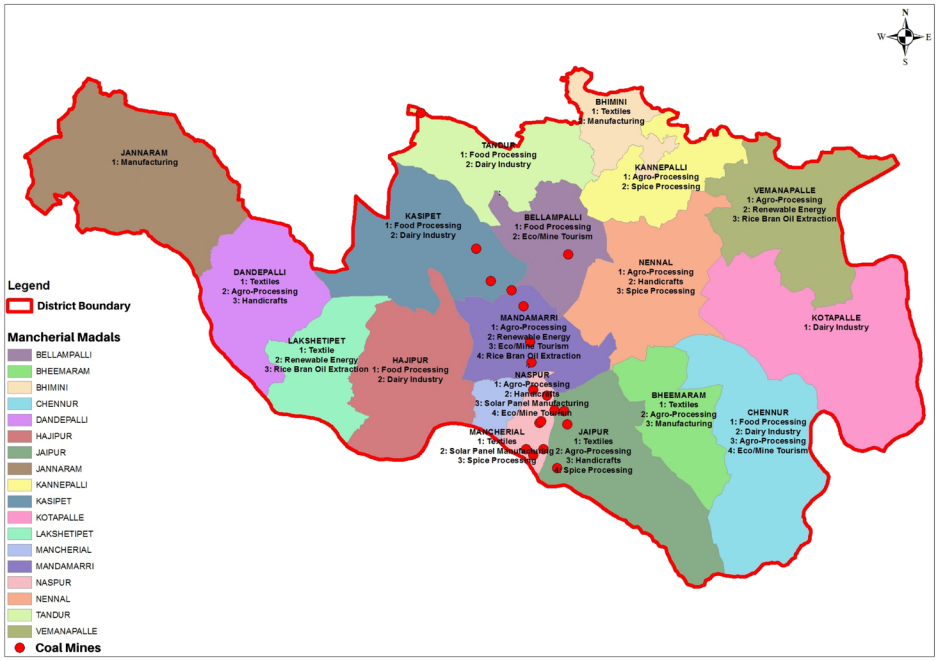
The survey indicates that the majority of registered enterprises (54.3%) believe they have a sufficiently skilled labor force for diversification, compared to 36% of unregistered enterprises. However, both groups identify a significant barrier: most workers

Figure 30 : Labor support required in sampled enterprises in Mancherial



Map 3: Block-wise sectors for diversification in Mancherial

Potential sectors and blocks were identified based on our survey findings, interviews, and focus group discussions, taking into account the existing comparative advantages and policy support for each sector.



are trained for specific industries, which limits their ability to transition into new sectors.

In terms of labor support, a significant majority of both registered and unregistered enterprises express a strong need for more training centres. This demand underscores the critical need to address skill gaps in the workforce, as many businesses face challenges in finding qualified employees. Expanding access to training can enhance productivity and boost competitiveness. Additionally, opening more colleges for learning vocational skills, educating locals about other sectors, and retraining current staff in other skills are other types of labor support required by these enterprises.

3.4.3 New sectors for diversification

Economic diversification in Mancherial, traditionally reliant on coal mining, is essential for sustainable development and resilience in the event of a coal phase down. By strategically investing in non-coal sectors, the region can generate new employment opportunities and stimulate local entrepreneurship. This shift towards a diversified economy is vital for improving the quality of life for residents and ensuring a robust, adaptable local economy. Based on our surveys and FGDs, we highlight three sectors for diversification in Mancherial—solar manufacturing, food processing, and textiles.

Table 12: New sectors for diversification in Mancherial

The table below shows industrial aspiration, comparative advantage, and government and private support for potential future sectors of diversification.

Sector	Aspiration base	Comparative advantage	Government/private support
Agro-based industry: Food Processing (Blocks: Chennur, Hajipur, Kasipet, Bellampally, Tandur Jaipur, Naspur, Dandepally, Nennel, Kannepally)	**Household and enterprise aspiration** 21% households, 14% unregistered and 16% registered enterprise perceive it as a viable sector	**Abundant agricultural produce** Mancherial has abundant resources such as paddy, maize, mangoes, spices and palm oil. Palm oil is being actively promoted for crop diversification, with the farmers earning as much as Rs. 1,50,000 per annum. [55]	**State government's support** Telangana State Industrial Infrastructure Corporation (TSIIC) has offered incentives to set-up a Hyderabad-Mancherial industrial corridor. 56Additionally, one of the major focus areas of Telangana's 2024 MSME policy is food processing.[57] Efforts are being made to this end by strengthening the warehouse and storage ecosystem, and creating a raw material directory. **One District One Product (ODOP) Scheme** This scheme envisages mango-based products as part of a program highlighting the fruit's importance in the district **Prime Minister's Employment Generation Programme (PMEGP)** This scheme provides financial assistance to new and existing

			businesses, helping entrepreneurs establish food processing units. It includes subsidies for setting up small enterprises. **Pradhan Mantri Kisan SAMPADA Yojana** This scheme focuses on modernizing and expanding food processing units, providing financial support for setting up processing plants, cold storage, and logistics facilities.
Solar Manufacturing and Assembly (Blocks: Mancherial, Naspur, Bellampalli)	**Household and enterprise aspiration** 23% households, 33% registered and 42% unregistered enterprises perceive it as a viable sector.	**Proximity to existing power infrastructure** Government's focus on renewable energy, potential for local, and regional demand for solar panels. **Industrial Base** Mancherial already has a working industrial base and skilled labour force, including coal and mining employees, which maypresent an opportunity for shifting towards solar manufacturing. The district is strategically located, with major highways and rail networks going through, which facilitates transportation of raw material and finished goods	**The Solar Power Policy (2024)** This scheme of Telangana state promotes development of solar energy projects by offering exemptions on wheeling, transmission, and cross-subsidy charges. The state government also gives away several incentives for solar manufacturing units such as land, power and capital expenditure subsidies. **India's Production Linked Incentive (PLI) scheme:** This scheme is for high-efficiency solar PV modules at the national level that provides financial aid to manufacturers of solar plants.58 Moreover, if the mandate of self-reliant India in solar energy (Atmanirbhar Bharat) is successful it would reduce imports and support local manufacturing, which can go a long way in helping Mancherial to be a future hub for manufacturing of solar products.
Textiles (Blocks: Jaipur, Bheemaram, Dandepally, Mancherial, Bheemini)	**Household aspiration** 25% households consider it a suitable sector for diversification	**Access to raw materials** With the presence of a developed Industrial ecosystem, Mancherial also has easy access to raw materials and markets in Hyderabad. The district also has a large pool of ready labour that will be accustomed to industrial processes, leading it into textiles **Skilled workforce** Due to training centres and already existing textile-related activities, there is availability of skilled workers in the sector and options for retraining.	**Telangana Textile and Apparel Policy (2017-18):** The scheme aims to improve the textile base with an integrated value chain approach. **Other incentives** The government has a vision to promote ease of doing business and by providing fiscal incentives, the schemes will further incentivize the setting up textile manufacturing units in Mancherial. Meanwhile, procurement policies followed by the Cotton Corporation of India have secured a stable input supply to cotton-based textile manufacturing

Agro-based industry: Food processing

Our survey indicates that 16% of registered enterprises and 14% of unregistered ones, along with 21% of households, view food processing as a major sector with significant potential for establishment in Mancherial. Food processing industry already plays a significant role in the local economy and food supply chain, benefiting from a strong agricultural backdrop. The region cultivates 37 principal crops like paddy, mango, and oilseed.59 Under the One District One Product scheme, mango and mango-based products have been selected for Mancherial, which boasts a remarkable yield of 1,724 kg of the fruit per acre.60 Based on our survey findings and discussions with local communities, this sector can be set up in several blocks including Chennur, Hajipur, Kasipet, Bellampally, Tandur, Jaipur, Naspur, Dandepally, Nennel, and Kannepally, considering their agriculture potential.

Challenges

1. **Lack of a product line:** Although Mancherial has enough agricultural resources, more value-added products from agricultural resources have not been well-established. For example, the district produces 29,899 tons of mango annually[61], but other value-adding products such as mango pulp and pickles are limited. Consequently, the entire value chain for such products has not been established.

2. **Lack of infrastructure:** The food processing industry has not been established because of inadequate infrastructure in terms of establishment of food parks. Although an area of around 1870 acres was set aside for industrial parks in 2014, little to no has been taken to develop it.[62] This lack of development not only hinders potential investment but restricts local farmers from accessing value-added processing opportunities. Without modern facilities, the region would also struggle to compete in a global market that increasingly demands efficient and high-quality food products.

Opportunities

1. **Diversification of products:** The industry includes processing units for cereals, pulses, and oils, along with value-added products like snacks and packaged foods. This diversification would help cater to both local and regional markets.

2. **Employment opportunities:** The food processing sector provides significant employment to the local population. It offers jobs in manufacturing, quality control, marketing, and logistics, contributing to the overall economic development of the region.

3. **Government support:** The Telangana state government has been promoting food processing through various schemes and incentives, aiming to attract investment and enhance infrastructure. Initiatives include subsidies for equipment, training programs, and assistance in obtaining necessary licences.

Key recommendations for food processing sector in Mancherial

Focus Blocks: Chennur, Hajipur, Kasipet, Bellampally, Tandur, Jaipur, Naspur, Dandepally, Nennel, Kannepally

1. **Promotion of MSME in food processing:** The district has a diversified cropping pattern, which gives the district the option to set up product processing for multiple products. Varied MSMEs can be promoted in Mancherial. There are multiple government schemes which could help in developing infrastructure for the growth of small enterprises in the sector (see Table 12). These schemes could also help to bridge the financial gap. The district administration along with the Development Commissioner, MSME, Telangana could create a holistic plan with the sub-district as its focus. The district administration along with the GM, DIC Mancherial and agriculture extension officer, FTCCI and CII, Telangana chapter could focus on the current PMEGP scheme to promote livelihoods and entrepreneurship in the sector.

2. **Infrastructure development:** In order to promote the food processing sector in the district, the development of a supply chain and cold storage facilities is most essential. The Integrated Cold Chain and Value Addition Infrastructure Scheme aimed at reducing wastage and enhancing the shelf life of perishable products provides financial assistance for setting up cold chain facilities and value-added processing units. The DIC and chamber of commerce could help enterprises to complete the application process with the Ministry of Food Processing Industries of Government of India.

3. **Promotion of mango-based products:** Mango is the product under "one district, one product" under the PM-FME. PM-FME is a centrally sponsored scheme that aims to promote small and marginal farmers by providing them with infrastructure, branding, capacity, and capital subsidy support. Bellampally and adjoining blocks have roughly 40,000 acres under mango cultivation in the districts.63 The advantageous location of the districts could also help to promote mango-based food processing in the district. The MoFPI along with the Department of Food Processing, Telangana, DIC and the district administration should try to attract investment from the bigger players like Pepsico and Paper Boat among others in the mango-based pickle or drink segment. At the same time, the PM-FME scheme could also be leveraged to create SHGs and common infrastructure to help local women to generate livelihoods.

4. **Development of a food park in Mancherial:** The state government aims to bring 10,000 acres under a special food processing zone.[64] Under the scheme, the size of the park would be between 200 and 1000 acres. The district administration can plan the development of the park in the Bellampalli mandal, given its connectivity and availability of land. The district administration, DIC and the state's food processing department could come up with a proposal. The Department of Industry and chamber of commerce need to strategize to encourage investment into food parks.

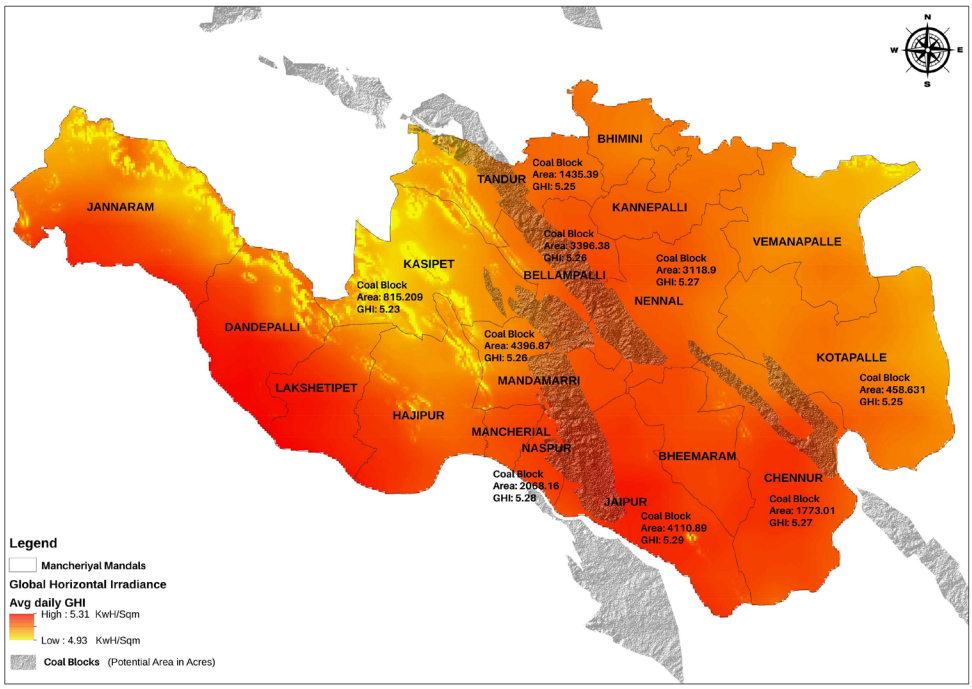
Solar manufacturing and assembly

Our survey shows that one-third of registered enterprises and one-fourth of households have shown interest in solar manufacturing and assembly and consider this a viable sector for the future. A major reason for this could be investment in solar farms in the district along with government incentives.

The PM-Surya scheme has also played an important role here, as local

Figure 31: Solar potential in different blocks in Mancherial

The figure shows Global Horizontal Irradiance (GHI) distribution across the mandals of Mancherial district, highlighting average daily GHI values (in kWh/m²) and coal blocks. The GHI values were derived using solar radiation datasets combined with spatial analysis in GIS tools, and coal blocks were traced using CMPDI data. Additionally, we extracted the area for solar potential in coal blocks by integrating the Land Use/Land Cover (LULC) and slope analysis.



enterprises feel that this will create opportunities both in manufacturing and installation, and therefore both registered and unregistered enterprises have high hopes for the sector.

Solar energy, abundant in sunny regions like Telangana, can create new avenues of economics and employment while catering to a global energy transition. The Mancherial and Naspur blocks of the district are ideal for setting up solar manufacturing units.

Opportunities

1. **Market for solar manufacturing:** Solar manufacturing can be an anchor for the district, as segments of the solar industry like photovoltaic (PV) module assembly, solar inverters, storage systems, and solar panel mounting structures can be developed here. India is seeking to expand its solar capacity, and has set a target of 500 GW of non-fossil-fuel energy capacity by 2030[65], which could create a promising market for solar products.

2. **Job creation:** When private companies wish to invest in the manufacturing of solar energy products, they may also look towards investing in an area like Mancherial region which has skilled manpower and other infrastructural facilities. Additional job growth from solar manufacturing comes in all skill levels that support this industry; whether high-skill jobs such as design and engineering, or medium-skill jobs in assembly and logistics.

Challenges

1. **Need for investment:** The first challenge is the large investment that needs to be deployed upfront for setting up solar manufacturing plants. Since creating new solar projects is a highly capital-intensive process, this depends largely on the kind of incentive the investors are seeking, or how willing they are to put their trust in a governmental source. Secondly, the technologically skilled labor in that particular field of solar energy may require upskilling and vocational training, which is also a major investment.

2. **Competition from other manufacturing hubs:** One of the other important hurdles is stiff competition from solar manufacturing hubs in India and across the world, which have a cost advantage on account of economic scale. It will take significant policy interventions and local partnerships to foster a strong enabling environment.

Key recommendation for solar sector in Mancherial

Focus Blocks: Mancherial, Naspur, Bellampalli

1. **Skill development:** During the study, both households and enterprises show an interest in solar manufacturing and installation. The ambitious PM-SURYA scheme directed toward household roof solar will also generate demand for both manufacture and installation of solar panels. The state government is also enthusiastically promoting solar energy in the state. All these activities will create momentum and employment in the sector. To utilize this opportunity, the skill of the local people is needed. The district administration could use the DDU-GKY PV solar installation trade programme for installation. The central government is also eager to train one million youths under the PM-Surya scheme. The district administration could do well to identify youths who would like to be trained in solar installation and manufacturing. The Telangana Skill University, a unique institution reputed in the skilling space, also teaches a course on renewable energy. The district administration along with the skill development department must popularize this educational opportunity among the locals. Additionally, SCCL's CSR funds could be used to train members of the families affected by the project in solar manufacturing and installation. These initiatives would help the district administration to overcome the skill gap and promote the solar sector in the district.

2. **Land repurposing:** The coal block in the district would offer up more than 10,000 hectares of land for repurposing in case of the phase down. At present, most of the mines are open cast, with high stripping ratio. So, to extract coal more overburden is removed, and more void is also created. These void and overburden dumps could become solar production sites. The higher GHI in the district also supports solar energy production. To that end, the SCCL Director office and district administration can identify and plan land repurposing. Where forest land is involved Divisional Forest Officers (DFO) could also be engaged in repurposing. Additionally, the forest department could be approached where modification of post-mining land use is required.

3. **Seeking private sector investment and mobilizing local entrepreneurs:** The solar sector requires a different nature of enterprise and quantum of invest-

ment based on the activities enterprises are involved in or planning to invest into. Solar production requires capital for and investment in PV and land. At the same time, installations could be carried out by SME or local businesses. The district administration needs to focus on both kinds of enterprises for the holistic development of the sector in the district. To attract solar production enterprises, the district needs to identify land, and strengthen transmission and other necessary infrastructure. District administration along with the state transmission company and Telangana Renewable Energy Development Corporation (TGREDCO) need to work together to strengthen infrastructure and also identify land to attract investments. Additionally, to promote entrepreneurship in solar installation, the district administration needs to identify vendors and help local businesses mobilize funding through the help of district industrial centers.

Textiles

Mancherial, whose fortunes have been tied to coal mining in its past, is now looking at a new beginning with investments moving into textile manufacturing. In line with Telangana's rejuvenated focus on industrial diversification and job creation, textiles could serve as a new engine of growth for Mancherial.

Contract farming is labor-intensive and leads to substantial employment, especially for women, due to the fact that it leverages the district's infrastructure.

1. **Access to raw materials:** With the presence of a developed industrial ecosystem, Mancherial also has easy access to raw materials and markets in Hyderabad. The district also has a large pool of ready labor accustomed to industrial processes, making the transition into textiles easier. Moreover, with the availability of agricultural produce like cotton, there exists an opportunity to create a generation-to-garment ecosystem in Mancherial.

   The textile industry provides a wide range of opportunities which includes spinning, weaving, dyeing and garmenting. With textile manufacturing having the ability to spawn SMEs that can cater to both domestic and export markets, it has all the ingredients for becoming a growth engine for the local economy.

Opportunities

1. **Economies of scale:** Thanks to large-scale cotton cultivation in Telangana and the global demand for textile products, the district can also benefit from economies of scale, higher productivity and lower costs if textile clusters are established. Mancherial can tap into the global market for sustainable and ethical textiles, introduce environmental measures and compete in established markets like organic cotton and handloom products.

2. **Creation of training institutes:** Opening more new vocational training institutes and skill development centers would help in the area of workforce training. Government initiatives like “Make In India” are advocating for textiles to be manufactured through local production, and monetary subsidies could be availed for the same. Mancherial could host integrated textile parks,

critical to securing private sector investments that would guarantee that the entire manufacturing process, from cotton ginning to garment manufacturing, takes place locally.

Challenges

1. **Absence of infrastructure:** A significant gap in textile manufacturing in Mancherial is the absence of dedicated infrastructure and supply chain networks for textile production. Investments in spinning mills, weaving centers, and garment manufacturing units have been proposed to encourage the industry syndicate build up in the district. Textile manufacturing, moreover, is a competitive space and Mancherial would need to compete on quality or specialize in established segments like sustainable fashion in order to stand out.

2. **Limited global market:** Another difficulty involves global market access (global logistics and international regulation). Also, the district would have to adopt sustainable practices in ways that meet environmental standards as well as ethical and consumer demands from around the world.

Key recommendations for the textile sector in Mancherial

Focus Blocks: Jaipur, Bheemaram, Dandepally, Mancherial, Bheemini

1. **Develop infrastructure to promote the sector:** Mancherial has the advantage of strong road infrastructure and connectivity to major commercial centers like Nagpur–the newly announced Nagpur and Vijayawada expressway will pass through the district. This can act as an impetus for growing the textile sector, but the state government along with the industry infrastructure corporation and the state's textile department will need to create infrastructure for processes like ginning, spinning and weaving. Additionally, till the development of the proper infrastructure and commercial centre the district should coordinate with the nearby textile park and industry to procure from the farmer, this will attract investment from the local business communities and will help to create infrastructure for the supply of the raw material in the short run.

2. **Market linkage:** The agriculture extension service and DIC should help the farmer and FPOs to get market access so that cotton farmers can sell their product in neighboring states.

3. **Inter-district coordination:** Mancherial and Peddapalli are both significant cotton producers offering considerable potential for the development of a textile park. However, with existing textile parks in neighboring regions, it may not be feasible to establish one in each of the districts. In the context of a Just Transition, which calls for economic diversification, both districts need to collaborate strategically to share the benefits of the textile park and cotton. The districts can coordinate on infrastructure facilities for the textile sector such as a logistics hub and production units. This collaborative approach would not only optimize resource utilization but also create economies of scale, boosting the sector's growth and sustainability in both districts.

4.0 Recommendations

The districts of Peddapalli and Mancherial in Telangana are highly dependent on coal. This dependence is both financial and infrastructural, and at both household and enterprise levels. While there are several recommendations that apply to both districts, there are also specific suggestions tailored to address the unique challenges faced by each region.

4.1. Recommendations for the districts

1. **District administration should start long-term planning for economic diversification with a sub-district focus:** In both districts the area within 5 kms radius of the mines has one in the four households dependent on coal for employment. Similarly, one in four enterprises are dependent on the coal companies or its employees for their business revenue.These two numbers suggest that people in both the districts are dependent on coal for their income. Given the dependency, the district administration needs to initiate long-term economic diversification planning. The planning and strategy must be done in collaboration with the state government's department of Industry and commerce, planning and skill development to diversify the district's economic base. Our work shows that both dependency and diversification prospects vary at a sub-district level. Therefore, district administration, while planning for economic diversification should have an explicit focus on sub-district levels.

2. **Once the future sectors for economic diversification are identified, the district government should focus on skill development of locals in new sectors:** In our study we find that there is a significant skill gap that inhibits industries from diversification. So, to promote diversification and also create opportunities for the local communities, skill development is needed into new sectors. The district administration can use the central government schemes like DDU-GKY and PMKVY in the shorter run. The finding of this study could be used to identify the aspirations of people and the needs of the industry. Then people can be trained in those sectors.The state government should plan the skill target keeping in mind the Net Zero target and Just Transition. District administrations should provide the ground input and plan implementation accordingly.

3. **Districts must strengthen basic infrastructure to reduce local communities' dependency on coal companies:** In both districts, approximately one in six households rely on coal companies for basic infrastructure services such as electricity and water. However, this dependency is lower when it comes to enterprises. Beyond direct infrastructure support, SCCL contributes to rural development through CSR initiatives within an 8 km radius of the mines. To reduce this dependency over time, it is crucial to enhance local infrastructure through the efforts of urban local bodies and rural development departments. Key institutions for this work include the Rural Development Department, Municipal Corporations, and District Collectors. State and central government schemes should be effectively leveraged to support these initiatives. This approach will not only improve the quality of life in these areas but also create opportunities to redirect CSR funds towards other Just Transition objectives.

4.2. Recommendations for the state government

1. **The state along with relevant stakeholders must raise awareness and promote the concept of 'Just Transition' for effective action:** The study found that the terms "Just Transition" and "coal phase-down" are not well-known or widely discussed at the district level or at the state headquarters. As part of the diversification and planning process, it is essential to raise awareness about the concept of Just Transition and its implications, ensuring that its meaning and context are understood at all levels—ranging from state authorities to coal-affected communities. To achieve this, think tanks, research organizations, civil society organizations (CSOs), district administrations, and coal companies should collaborate on conducting studies, workshops, and awareness campaigns. Additionally, the state government can engage with various stakeholders to address the existing knowledge gap and promote broader understanding.

2. **Institutionalising of Just Transition for coordinated action and relevant policy making:** Just Transition is a significant undertaking that involves multiple dimensions, including institutional coordination, finance, public acceptance, and strategic planning, among others. To initiate this process, institutionalizing Just Transition is crucial. In March 2023[66], NITI Aayog recommended the establishment of a three-tier task force for Just Transition, with layers at the central, state, and district levels. In line with this, the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, formed a national task force in 2024[67], while Jharkhand set up a state-level task force in 2023.[68]The Telangana state government should also establish a state-level task force to promote Just Transition. At the district level, no district has yet formed a task force; however, if Mancherial and Peddapalli create district-level task forces, they would become the first in the country, setting a model for other coal-producing districts.

3. **The state can utilize DMF and CSR funds for local development and skill training :** The district administration has access to DMF (District Mineral Foundation) funds[69], which can be utilized to build infrastructure that supports economic diversification in the regions. In parallel, CSR (Corporate Social Responsibility) funds can be leveraged by the district administration, in collaboration with SCCL, to support skill development programs aligned with local aspirations and the district's diversification goals. For example, DMF funds could be used to develop infrastructure such as bus stops, public toilets, and pavements near the Ramagiri Fort in Peddapalli. Similarly, CSR initiatives focus on 13 broad areas of investment, with key priorities including livelihood support, skill development, health, and basic services (such as drinking water and sanitation).[70] Coal companies, in collaboration with the district administration, can use CSR funds to address local priorities for economic diversification, while also meeting the aspirations of the community by providing relevant skills and training.

4. **Collaborative pilot projects on economic diversification are key for just transition planning and necessary action:** Currently, the district administration, in collaboration with CSOs, knowledge partners, and industry stakeholders, should initiate pilot projects focused on economic diversification. These pilots will not only provide critical information for planning but also serve as evidence of which strategies are effective, which are not, and where improve-

ments are needed. Furthermore, these pilot projects will serve as models for other coal-producing districts, guiding them in developing their own Just Transition strategies. CSR funds can be used to support pilot projects in areas where mines are closing due to resource depletion or financial unviability. In such cases, coal companies, district administrations, skill development departments, and civil society organizations should work together to identify appropriate sectors for skill development and design pilot projects that address local needs and opportunities for diversification.

5. **State planning should integrate Just Transition by leveraging regional comparative advantages and promoting inter-district collaboration:** The state's long-term planning and vision should incorporate the principles of Just Transition. In doing so, it is essential to consider the comparative advantages and unique challenges of each region when developing diversification and development strategies. Additionally, inter-district coordination is crucial; for example, to develop a tourism strategy for both Mancherial and Peddapalli, the districts must collaborate to create a cohesive tourist circuit.

Appendix 1

Interviewees and Discussants

Stakeholder	District/State
Member of Legislative Assembly (MLA)	Mancherial
Additional Collector	Mancherial
Zilla Panchayat Chief Executive Officer (ZP CEO)	Mancherial
District Rural Development Agency (DRDA)	Mancherial
General Manager (GM) Singareni Collieries Company Limited (SCCL)	Mancherial
District Industries Centre (DIC)	Mancherial
District Transport Office (DTO)	Mancherial
District Medical and Health Officer (DMHO)	Mancherial
Chief Planning Officer (CPO)	Mancherial
General Manager (GM), Singareni Collieries Company Limited (SCCL), Srirampur area (SRP)	Mancherial
Mine Manager Srirampur (SRP)	Mancherial
All India Trade Union Congress (Sec-AITUC)	Mancherial
Assitant Mine Manager (RK)	Mancherial
Lorry Union	Mancherial
Contract Coal Workers	Mancherial
Coal Workers	Mancherial
Additional Collector	Peddapalli
District Rural Development Agency (DRDA)	Peddapalli
District Industries Centre (DIC)	Peddapalli
Chief Planning Officer (CPO)	Peddapalli
General Manager (GM), Singareni Collieries Company Limited (SCCL),Ramagundam (RG-1)	Peddapalli
President, The Indian National Trade Union Congress (INTUC)	Peddapalli
President, Hind Mazdoor Sabha (HMS)	Peddapalli

Centre of Indian Trade Unions (Sec-CITU)	Peddapalli
Lorry Union	Peddapalli
Coal Workers	Peddapalli
Member, Federation of Telangana Chambers of Commerce & Industry (FTCCI)	Peddapalli
Chief Executive Officer (CEO), Federation of Telangana Chambers of Commerce & Industry (FTCCI)	Telangana
Secretary, Federation of Telangana Chambers of Commerce & Industry (FTCCI)	Telangana

Note: This is not a complete list of outreach for this report, and should be considered an illustrative sample of total outreach conducted for this report.

Appendix 2

List of Thermal Power Plants in Peddapalli

TPP	Owner	Unit	Date of Commission	Capacity (MW)
Telangana Super Thermal Power Project (TSTPP)	NTPC	Unit 1	October 2023	800
		Unit 2	March 2024	800
NTPC Ramagundam	NTPC	Unit 1	November 1983	200
		Unit 2	May 1984	200
		Unit 3	December 1984	200
		Unit 4	June 1988	500
		Unit 5	March 1989	500
		Unit 6	October 1989	500
		Unit 7	August 2004	500
Ramagundam B TPP	Telangana State Power Generation Corporation Limited	Unit 1	October, 1971	62.5

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