SUPPORTING JUST TRANSITIONS IN INDIA

JUST TRANSITION CASE STUDY - MARCH 2021

CIF
CLIMATE INVESTMENT FUNDS

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DISCLAIMER

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EXECUTIVE SUMMARY

India's energy sector is confronting the potential for deep, and possibly rapid, structural change, particularly in how energy is supplied to meet the country's rising demand. There are numerous drivers for an accelerated transition away from coal in India: the country's high vulnerability to climate change; the mounting risks of stranded coal assets; the lower-than-expected demand for coal-fired power; higher coal transportation costs; along with challenges related to land acquisition for coal mining and power generation. In addition, there is the rise of cheaper renewable energy that comes with significant co-benefits related to climate change, making it price competitive. Although India's relatively low per capita and historical carbon dioxide (CO_2) emissions mean that it carries little historical responsibility for climate change, it is, nonetheless, currently the third-largest emitter of CO_2 in the world, mostly due to its substantial demands for energy to drive its economic development. At the same time, it is also a country that is extremely vulnerable to climate change impacts.

Though these factors incentivize a transition to cleaner energy, there are significant barriers slowing or curtailing the scope of such a shift. These include India's current grid infrastructure that limits renewable energy penetration, and thus, its capacity to provide reliable electricity access for all — a key development priority for the country. This issue is compounded by the fact that India's coal power fleet is young, with only a limited number of power plants approaching retirement. Another important barrier is the threat of job losses in the coal sector, as well as associated businesses and livelihoods, both in the formal and informal sectors. Finally, issues related to India's political economy, energy security, and coal's cross-subsidization of the railways further complicate the country's transition away from coal. All the above drivers and barriers make just transitions planning vitally important to India's shift to inclusive and sustainable development.

Although not widely used in India until very recently, the just transition lens offers important insights into how development, energy, and climate considerations could be brought together to overcome barriers and tap into transition opportunities. It further provides an opportunity to connect numerous key concepts and movements that have shaped and been shaped by civil society, government, and labor in India. These concepts and associated movements include aspects of 'environmentalism of the poor', environmental justice, social justice, climate justice, capabilities (the ability to lead a reasonable life), and social inclusivity.

This case study is part of a series of case studies by the Climate Investment Funds (CIF) that explore and share lessons on how CIF investments have contributed to, or interacted with, efforts to ensure just transitions. The underlying assumption is that experiences from CIF investments will provide insights that can be used to enhance the contributions of future policy support, investment planning, financing, and implementation of just transitions. While CIF's past investments in India and other countries may have focused more on accelerating transitions towards renewable energy than on the transition away from coal, these transitions are closely interrelated.

The first part of this case study focuses on the energy transition from coal to renewable energy in India. The latter half focuses on CIF investments to draw out lessons on how this transition can be more just. An emerging just transition framework, developed under the Just Transition Initiative, is then used to illuminate and explore key dimensions of just transitions at the national and local levels. This just transition framework highlights the importance of considering both: 1) the distributional impacts of climate action, which includes the fair allocation of the benefits and harms associated with transitions; and 2) social inclusion that refers to the recognition of marginalized groups by including them in discussions and decision-making processes.

The empirical work on CIF projects examines how individual projects reflect just transition principles, processes, and practices, as well as how the projects contribute to a broader just transition at the national level. The framework enables reflections on CIF's contributions to the energy transition in India through both its programmatic approach, that is underpinned by cross-sectoral and multi-stakeholder dialogues, and scaled project support in India. This support included USD775 million in concessional finance that funded key analytical and modeling work, capacity building of government staff, and the lowering of financing costs. The funding has facilitated the establishment of a rooftop solar market and solar parks; the latter has contributed to bringing utility-scale solar tariffs to below the cost of coal-generated electricity. This, in turn, propelled the growth of India's solar sector from generating 32 megawatts (MW) in March 2011 to 38,794 MW in January 2021.

This case study examines the pressures of transitioning away from coal, the importance of ensuring that the energy transition in India is just and understanding the implications within the context of India, as well as the current and future roles of CIF and Multilateral Development Banks (MDBs) in such transitions. The study then identifies a number of implications for supporting just transitions in India:

- **Modeling:** ***Support complex system modelling on the barriers and drivers to the energy transition to better understand and predict distributional impacts.*** To inform planning, modeling of the interrelated barriers and drivers of the energy transition overlaid with the geographic distribution of burdens and benefits likely to be produced via particular transition pathways, is required. This modelling and the insights that it produces will provide a shared and informed basis for inclusive dialogues and planning while simultaneously mitigating the influence of narrow vested interests.

- **Social inclusion:** ***Recognize and empower marginalized stakeholders by establishing local-level platforms that formally engage and build their capacity to influence transition outcomes.*** Local transitions will require district-

level collaboration and capacity. The experiences of informal labor in the closure of coal mines and the impact of the loss of access to land for people without formal land rights highlights the importance of involving and empowering groups that have a central stake in transition processes.

- **Partnerships:** ***Establish working relations and capacity-building processes within and across national and state government departments for just transitions.*** Evident in the CIF and MDB work in India, which has helped to deliver the world's largest solar parks that produce some of the cheapest solar power, is the ability and need to build collaborative partnerships between governments at national and state levels.

- **Regional planning:** ***Priority geographical areas need to be identified and plans developed, based on the relative impact of barriers and drivers related to coal transitions.*** It is clear that the impacts of the transition will be disproportionately felt in five or six states in India, and within these states, a limited number of districts. The states likely to face the most rapid and significant transitions away from coal are Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh, West Bengal, and Telangana. It will thus be important to conduct vulnerability assessments and develop just transition plans for these priority areas.

- **Economic diversification:** ***Develop detailed economic transition plans, including priority activities, timelines, and budgets, through collaborative, informed, and empowered stakeholder engagement.*** Based on the modelling of drivers and barriers to the energy transition as well as broader economic modeling, transition plans should be developed. They should include: skills planning for re-skilling workers and communities; repurposing mines and power plants; rehabilitating mines, rivers, surrounding forests, and agricultural lands; as well as planning for economic diversification in previously coal-dominated areas.

- **Finance:** ***Develop budgets for the transition including funding requirements.*** This budgeting and finance needs to target not only clean energy projects but also simultaneously support areas that will be affected by the phase out of coal. In addition to corporate social responsibility funding linked to renewable energy projects finance could be accessed from the District Mining Foundation funds and sources of concessional finance to cover technical assistance and capacity building at the local level to support just transition processes.

- **Safeguards:** ***Establish the institutional frameworks, along with the environmental and social safeguards, required to support the implementation, monitoring, and learning related to just transitions.*** Complex and uncertain transition processes require multiple levels of stakeholders working together on the implementation, monitoring, evaluation, reporting, and learning associated with just transition processes. Environmental and social safeguards provide project level mechanisms to identify and mitigate local risks, but a wider lens, and other mechanisms, are required to ensure just transition outcomes at the local and national level. Additional institutional frameworks need to be built to coordinate, implement, monitor and progressively build the capacity required to ensure a just transition in India (and elsewhere).

- **Scale:** ***Identify and mobilize state, national, and international institutions to support and scale just transitions and broader transformational change.*** By starting in priority areas, identified through initial modeling, vulnerability assessments and mapping, the experience gained can be used to support emerging priority areas, as the transition accelerates both in India and other countries undergoing rapid transitions out of fossil-fuel economies. This learning can be fed into state, national, and international institutions to support the scaling of just transitions. CIF and partner MDBs, as well as broader climate finance institutions, are well-positioned to support these scaling processes.

ABOUT THE CLIMATE INVESTMENT FUNDS

The Climate Investment Funds (CIF) were created in 2008 to help finance accelerated transitions to low-carbon and climate-resilient development in low- and middle-income countries. Its four programs finance clean technology, energy access, climate resilience, and sustainable forestry initiatives. CIF operates in 72 developing countries through six Multilateral Development Banks (MDBs)[1] as its implementing agencies. It uses a programmatic approach focused on the development and implementation of country-led investment plans that are informed by multi-stakeholder consultations.

Over its first 12 years, CIF has operated as a laboratory for developing, implementing, and evaluating new approaches to climate investments, as well as learning from them. By lowering investment costs and risks, along with providing a collaborative platform for strategic and operational coordination, CIF has enabled MDBs to address prevailing barriers to the commercialization of new technologies, engaged private investors in first-of-a-kind projects, and contributed to transformational change.[2] CIF's portfolio consists of USD7.9 billion in committed funding that is mobilizing around USD60 billion in co-financing from other sources, including recipient governments, MDBs, the private sector, bilateral agencies, and others.

Transformational change in the CIF context is defined as "fundamental change in systems relevant to climate action with large-scale positive impacts that shift and accelerate progress towards inclusive, climate neutral, resilient, and sustainable development trajectories".[3] These transformations, occurring at different scales, ranging from individual actions to global systems and addressing multiple, interconnected components of a system or a value chain, often over extended time frames, are typically beyond the control of any one institution or intervention.

> The ideas and practices associated with just transitions require broader transformations that are not only relevant to the urgent challenges we face, but also supportive of deeper systemic change, i.e., occurring at the required scale, sustainable over time, socially inclusive, and fair.

As the challenges of climate change become more extreme and greenhouse gas (GHG) emissions continue to rise, demands for the transition away from emission-intensive forms of energy production are intensifying. So too are the calls for these transitions to be inclusive and just.

This is the second case study in a series being developed by CIF. The first case study focused on South Africa. These case studies are part of a broader effort by CIF to help climate funds, MDBs, policymakers, the private sector, the civil society, and other stakeholders understand and support just transitions in development contexts. This broader effort also includes the Just Transition Initiative — an outreach and research initiative launched in March 2020, in partnership with the Center for Strategic and International Studies (CSIS). The case studies draw on and inform the further refinement of the just transition framework developed through this partnership.

INTRODUCTION

INDIA'S ENERGY FUTURE

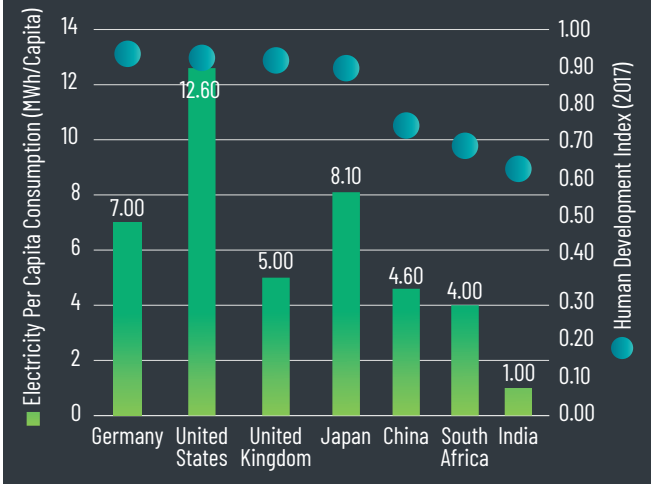
The Government of India's (GOI) 2030 Vision states, *"By 2031-32, we must transform India into a prosperous, highly educated, healthy, secure, corruption-free, energy-abundant, environmentally clean and globally influential nation."*

India is one of the fastest-growing economies in the world, with an average gross domestic product (GDP) growth rate of over 6.2 percent since 1990. The country's economic growth has enabled it to halve its poverty rate since the 1990s. Between 2011 and 2015, poverty declined from 21.6 percent to an estimated 13.4 percent [based on the 2011 international poverty line of USD1.90 per person per day, in terms of purchasing power parity (PPP)]. Nonetheless, India is still afflicted by widespread poverty: "In 2015, with the latest estimates, 176 million Indians were living in extreme poverty."[4] The COVID-19 pandemic is likely to lead to millions more households slipping back into poverty, with workers in the informal sector, inter-state migrants, and marginalized groups (including women and scheduled tribes) particularly at risk.[5]

Access to reliable, affordable, and sustainable energy is central to India's many productive economic activities and hence its potential for addressing multiple developmental challenges faced by the country. The graph below shows a high degree of correlation between the Human Development Index (HDI) and per capita electricity consumption. In countries such as India with lower HDIs a small improvement in access to electricity has a significant impact on community health and on education thus raising the HDI.

The correlation between HDI and access to electricity has informed a number of development initiatives in India. The national Saubhagya[6] program has officially achieved the electrification of almost 100

Figure 1
CORRELATION BETWEEN ELECTRICITY CONSUMPTION AND HUMAN DEVELOPMENT INDEX



Source: Gupta, V. 2020

percent of 'willing' households in India. However, it is estimated that 5.8 million households are still without electricity access.[7] These figures vary according to how 'households' are defined and do not take into account the reliability of supply.

India's cumulative historical contribution to carbon emissions is small, with per capita carbon dioxide (CO_2) emissions well below global averages as evidenced in the graph above. At the same time, due to its population of more than 1.2 billion, India is currently the third-largest emitting country in the world. In addition, India's emissions of CO_2 have doubled in the period 2005 to 2020.[8] The country's concern about its own contribution to global greenhouse gas (GHG) emissions also stems from the fact that India is particularly vulnerable to climate change impacts.

> *"In India, climate change will have more adverse impact as compared to many other countries. This is because India has a higher population density, larger spatial and temporal variability of rainfall, and more poor people who are vulnerable to climate variability."*[9]
> Jayaraman Srinivasan in 'India in a Changing World', 2019.

Recognizing this vulnerability, India's 2008 National Action Plan on Climate Change (NAPCC) set out a range of national missions, including initiatives related to energy efficiency and renewable energy. At the Conference of the Parties (COP15) in Copenhagen (2008), India announced voluntary targets to reduce the emissions intensity of its GDP by 20–25 percent from 2005 levels by 2020. Furthermore, in 2015, India established ambitious renewable energy targets, such as the development of 175 gigawatts (GW) of renewable energy by 2022. Then, in 2016, GoI formulated India's Nationally Determined Contributions (NDCs) that included a number of targets related to the energy sector:

- To reduce the emissions intensity of GDP by 33–35 percent from 2005 levels by 2030;
- To achieve an installed capacity of about 40 percent of cumulative electric power from non-fossil fuel-based energy resources by 2030, conditional on the transfer of technology and low-cost international finance;
- To create an additional carbon sink of 2.5–3 billion tons of CO_2 equivalent through additional forest and tree cover by 2030; and
- To better adapt to climate change by enhancing investments in sectors vulnerable to climate change, particularly agriculture, water resources, the Himalayan region, coastal regions, health, and disaster management.

At the UN Climate Action Summit in 2019, India raised its renewable energy target to 450 GW by 2030.

The Climate Action Tracker notes that "India could become a global climate leader with a '1.5°C compatible' rating if it enhances its NDC target, abandons plans to build new coal-fired power plants, and instead develops a strategy to phase out coal for power generation before 2040." The scale and speed required to meet these targets will require significant acceleration in the transition away from coal and towards renewable energy. This, in turn, will require a substantial focus on ensuring just transitions for workers and communities affected by this energy transition.[10]

CIF's Clean Technology Fund (CTF) has been supporting these targets with a total investment of USD775 million in various projects including the proposed installation of over 3 GW of solar power and associated transmission infrastructure. In particular, CTF's concessional financing is helping to offset the high upfront costs of large-scale solar park projects and de-risking investments in rooftop solar photovoltaics (PV).[11] CIF has also contributed to other renewable energy, transport, and energy efficiency projects in India.

OBJECTIVE AND INTENTION OF THE CASE STUDY

The objective of this case study is to reflect on CIF's engagement in India from the perspective of understanding and enabling just energy transitions at the national and local levels. The case study seeks to identify the drivers of and barriers to an energy transition in India and reflects on what a just transition at the national level should entail. Within this national context, the CIF projects provide grounded examples of ways in which issues of social inclusion and distributional impacts are reflected in project implementation.

A key intention of the case study is that insights are developed and used to enhance the contributions of future policy support, investment planning, financing, project design, implementation, and evaluation in support of just transitions. The emerging insights generated from the case studies will also be used to inform the refinement of the just transition framework and related resources being developed through the Just Transition Initiative.

It must be clarified that the CIF projects were not developed with explicit just transition objectives and frameworks in mind. The just transition framework is thus not being retrospectively applied to projects with an evaluative intent, but rather as an opportunity to think through the implications of just transitions and how they may be supported and enhanced. Key insights, including challenges and future opportunities, will also be synthesized across different case studies in order to elicit learning from CIF's experience. This is in line with CIF's mandate to serve as a learning laboratory for climate finance — to reflect on and learn from 12 years of operations, as one of the world's largest climate funds delivering multilateral finance at scale.

APPROACH/METHOD

This case study is based on an extensive literature review and key stakeholder interviews. Over 100 academic articles, book chapters, policy documents, popular articles, and newspaper articles were reviewed. The literature review was supplemented by and checked against the interpretations and positions of various groups through interviews with stakeholders working on just transitions, particularly in the energy sector in India. Eight interviews were conducted with locally-based stakeholders and international groups working in India. Additional interviews were held with representatives from CIF, Asian Development Bank (ADB), World Bank, project implementers, and the government (see Appendix 3).[12]

See a separate Mindmap for an overview of institutions working on just transitions in India. The institutions interviewed for this case study are highlighted in the Mindmap.

In addition, project planning documents, particularly the investment plans and reviews of various dimensions of CIF's work over the past decade, were accessed from its document repositories. Notes, reports, and video documentaries produced following the previous visits to CIF projects in India also informed this case study.

As the CIF project portfolio in India is concentrated on clean technology, particularly renewable energy, the focus of the case study is on the relationship between India's potential transition away from coal, its largest source of energy, and the expansion of its renewable energy sector. However, this does not imply that clean energy technology is the only area to consider when thinking about just transitions in India. Rather, this focused analysis of CIF projects seeks to provide grounded examples of how the key dimensions of just transitions, namely social inclusion and distributional

impacts, have played out at multiple levels in India's ongoing and accelerating energy transformation.

JUST TRANSITIONS AND RELATED CONCEPTS IN INDIA

> The term, 'just transitions', plural is used to acknowledge that there are multiple framings of just transitions related to a variety of theories of change and world views. This has resulted in a situation, whereby there is no one clear definition of just transitions, but rather a range of positions, principles, and practices.

Although the concept of just transitions has not been used explicitly or extensively in India until very recently, it offers important insights into how development, energy, and climate considerations could be brought together. It also offers an opportunity to connect numerous core concepts and movements, which have shaped and been influenced by civil society, the government, and labor in India, and have been influenced by them.

Within the context of India, there are a number of concepts and practices encompassing social inclusion and distributional impacts as core considerations. One approach with clear relevance to just transitions is **'environmentalism of the poor'**. It emerged from community mobilization in response to the threat posed by the government and private sector development interests in the natural resources upon which these communities depend.[13] Other influential approaches are **climate sustainability** and **climate justice.** While a 'climate sustainability' approach is broadly aligned with government and business development agendas, due to its focus on climate-friendly technology and green growth, a 'climate justice' approach highlights the vulnerabilities of marginalized communities. These communities' advocacy for their needs often place them in direct conflict with the government and corporate development agendas.[14]

Labor unions in India are also beginning to engage with the idea of just transitions, although their emphasis is predominantly on the **'right to develop'**, with the focus on linking emissions to both economic growth and social development.[15]

At the international level, India has highlighted issues of climate justice in relation to the unequal contributions to the causes of climate change and the unequal vulnerability to the impacts of climate change. It is with this approach in mind that NDCs submitted by India were subtitled: "Working towards climate justice". At the national level, the focus of government is more aligned with the climate sustainability framing due to the extreme vulnerability of large segments of the Indian population to the impacts of climate change.

The central focus on development needs within many of the approaches outlined above is important in India, as many Indians still lack access to basic social services, thus exacerbating their vulnerability to climate impacts and climate responses. In this sense, **just transitions for India are not solely about decarbonization and the associated impacts on workers and communities. Rather, they are also about the extension of modern energy services to those who lack them and the building of resilience within communities vulnerable to climate change.**

Just Transition concepts and practices help to connect many of the existing approaches in India and focus attention on the important questions related to change, including:

- Whose values and understandings of the world are recognized and legitimized?
- Who decides what kinds of transitions are needed and how are different groups included in the decision-making processes?
- Who benefits and loses in change processes?
- How can competing perspectives and the resultant benefits and harms be allocated in ways that are both safe and just for diverse stakeholders over extended geographic areas and time periods?

CONTEXT

India has experienced particularly high economic growth rates over several decades, contributing to hundreds of millions of Indians being lifted out of poverty. However, its endeavor to address inequality has been less successful. Inequality at the national level, combined with inequalities based on caste, religion, region, and gender, still threatens individual lives as well as social and political stability. In fact, poverty and inequality have increased globally and in India over the past three years (2018–2020), particularly with the impact of the COVID-19 pandemic and its associated lockdowns.[16]

Against this backdrop, the energy sector has played a critical role in meeting India's development goals. The country's substantial and sustained economic growth has been built upon a significant expansion of both its energy supply and energy demand. As such, the expansion of access to affordable energy has been a prerequisite for increasing employment and reducing poverty. At the same time, the energy sector is also responsible for substantial negative environmental externalities. These have exacerbated challenges related to poverty and inequalities, the provision of decent work, and improvement of livelihood options.

The relationship between India's economic growth and its broader sustainable development aspirations has international, national, and local dimensions. India's per capita CO_2 emissions (1.7 tons) are below half the international average (4.4 tons)[17] and its historical CO_2 emissions are also far below the figures of most developed countries. Nonetheless, India is currently the third-largest emitter of CO_2 at the global level, due to its very large population and growing demands for energy to drive economic development. Furthermore, India, particularly its impoverished population, is also extremely vulnerable to climate change impacts. Thus, it has an incentive to mitigate climate change by reducing its GHG emissions.

At the local level, the communities who rely on coal value chains for their survival are often the most susceptible to the impacts of coal mining on air

quality, land, forests, water, and agriculture. While there are benefits associated with shifting to cleaner energy sources, communities whose livelihoods today are locked into coal-dependent economic and energy structures may find it difficult to engage proactively with efforts to move away from coal.

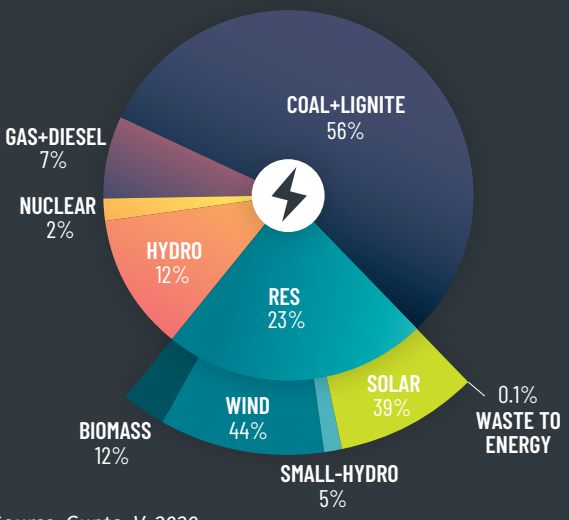
Therefore, navigating a transition away from a carbon-intensive economy is going to require careful consultations on the resultant benefits and harms as well as their distribution across international, national, and local scales, and over time horizons.

COAL IN INDIA

Coal in India has had a long and complex history. This is reflected in the evolution of the sector through colonial control, nationalization, and more recently, increasing privatization. Persistent across these ownership models have been issues concerning price and distribution controls, associated black market activity, poor working conditions, environmental degradation, the uncertainty of supply, and a range of other challenges.

These challenges have arisen, in part, due to the central role that coal has played, and continues to play, in key areas of India's development, including trade, industrialization, urbanization, and electrification. In fact, the sector's contribution to India's development has made it a sensitive national icon.[18] In 2019, coal provided 45 percent of India's total primary energy demand, with oil and natural gas contributing a further 31 percent. The majority of the oil is used in the transport sector. Over two-thirds of the coal is used for power generation, while 25 percent is used by industries, mostly steel and cement, but also in fertilizer and paper production. The importance of fossil fuels for the transport and some industrial sectors suggests that significant transitions will need to occur in response to climate change. **However, given the scale of coal's contribution to energy generation (see graph below) and the relatively small local production of oil and natural gas in India, it is coal, and particularly its role in electricity generation, which will require the greatest attention, with regards to a just, low-carbon transition in India.**

Figure 2
INDIA'S INSTALLED POWER CAPACITY MIX

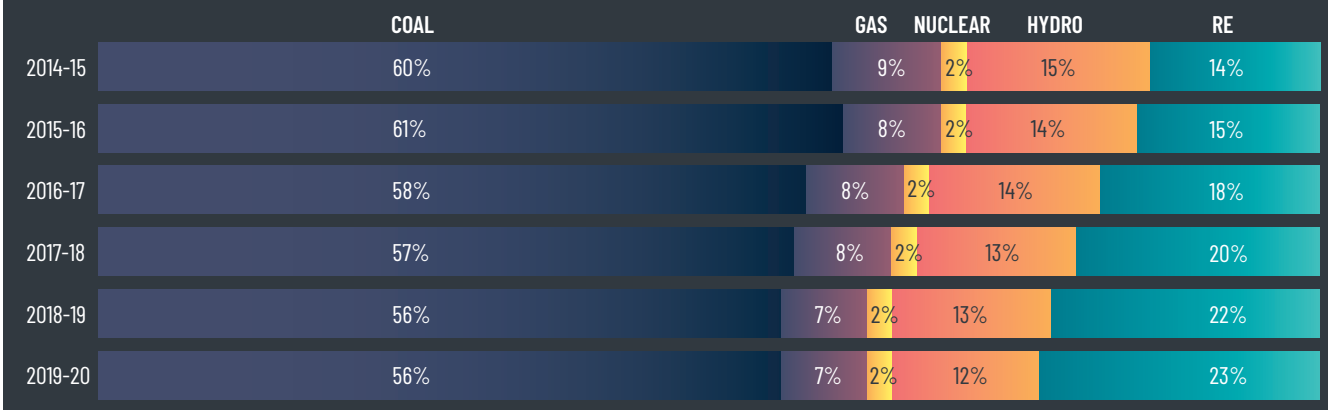


Source: Gupta, V. 2020

When the GoI submitted the country's investment plan to CIF in 2011, it anticipated that "economic growth, increasing prosperity and urbanization, rise in per capita consumption, and spread of energy access are the factors likely to substantially increase the total demand for energy and for electricity in particular".[19] By 2020, this situation has changed significantly. Substantial investments in the thermal and renewable power generation sectors, along with lower-than-expected growth in demand, have resulted in a situation of technical oversupply in the system and a concomitant lack of reliable access. With a total peak demand of approximately 180GW that is likely much lower than it would have been, if the energy system were able to support 100 percent access to reliable electricity, and an installed capacity of 374 GW, India has a large reserve margin.[20] Furthermore, there is substantial scope for greater efficiency, not to mention a reduction in transmission and distribution losses that currently stand at almost 20 percent, compared to a global average of eight percent.[21]

This apparent overcapacity needs to be understood against the background of extremely low per capita electricity consumption, rapid potential growth in demand as a result of increases in electric vehicles and air-conditioning, poorly functioning distribution companies (DISCOMs), and the government's commitment to improving the reliability of supply.

Figure 3
POWER CAPACITY MIX TRENDS IN INDIA



Source: CEA reports on installed capacity from 2015-2019

These factors suggest that there is both significant latent electricity demand within the system and emerging demand in the transport, residential, industrial, and other sectors.

While it is likely that both coal-fired power stations and renewable energy sources will contribute to the provision of power until at least 2050, there is a need to accelerate the phase-out of coal, given the gravity of climate change, in a way that is economically viable, globally responsible, nationally beneficial, and locally fair. The relative share of coal to renewable energy has begun to shift as evidenced in the graph above, however, as a gross amount, the use of coal to produce electricity continues to grow. The relative mix between coal-fired and renewable energy sources of power generation, and the total amount of coal used for electricity production, will depend on a number of barriers and drivers impacting the energy sector, and its transition away from coal.

BARRIERS AND DRIVERS AFFECTING COAL TRANSITION IN INDIA

In 2020, India had an installed capacity of just over 200GW from coal-fired power stations.[22] This generation contributed to the current total coal demand of a little over 0.9 billion tons per annum. Although the future demand for both coal-fired power generation and mining is difficult to predict and will depend on a number of variables, scenario modeling suggests that coal demand will increase until at least 2030. In some projections, grid-based coal-fired generation capacity is likely to peak at 260GW a little time after 2030, thus requiring 1 billion tons of coal for electricity generation alone. If coal demand is to peak by 2030, India will require significant investments in new renewables, including the deployment of approximately 500 GW of solar and wind capacity with adequate storage, relative to the 85 GW of installed capacity at present, to make up the shortfall in energy supply. These scenarios suggest that coal will remain dominant in the electricity sector, accounting for over 50 percent of the generation in 2030, even in scenarios that assume relatively fast transitions away from coal.[23]

BARRIERS TO AN ACCELERATED TRANSITION AWAY FROM COAL

In India, there is a strong political commitment to ensuring the affordability of energy as a basis to drive economic and social development. Until recently, coal was the cheapest way to provide this energy.

As such, a range of structures, policies, previous investment decisions, existing infrastructure, and powerful interests, which benefit from the status quo, will need to be addressed to accelerate the transition to clean and affordable power. These barriers to an accelerated transition away from coal also have important implications for the possibilities of just transitions.

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Socio-economic barriers

- **Access to electricity**
  GoI's planning priorities have emphasized the correlation between access to electricity and the Human Development Index, with a particular focus on employment, education, health, and poverty levels. This has shaped the government's ambitious program that is focused on providing electricity to all villages and households.

  In 2019, the government declared that almost all 'willing' households had access to electricity. The reliability of this access, however, remains a concern: the Indian Human Development Survey found that 45 percent of the rural population had power outages of around 13 hours a day in 2011/2012, while a more recent World Bank report (2016), using satellite data, suggested that the intensity of power outages might have actually increased since 2013.[24]

  Reliable access to electricity is linked to the need for a stable grid with substantial peak capacity outside of dispatchable times for variable renewable energy. It will also require the institutional capacity of DISCOMs to manage the grid in such a way that it provides both stable and equitable access to electricity. A key barrier to the decarbonization of the electricity system is, therefore, the capacity of the grid to handle variable renewable energy sources, while simultaneously providing 24/7 access to electricity to the vast majority of a very large population.

- **Cross-subsidization of Indian Railways**
  The Indian Railways (IR) derives more than 40 percent of its freight revenue from coal and uses this coal income to subsidize passenger fares. It runs one of the largest railway systems globally and has the highest passenger volume (1 trillion passenger km per year) in the world. Passenger fares only cover 57 percent of the average cost of passenger transportation. Given the importance of rail transport, particularly for the poorer segments of the population, the reduction in fare subsidies is politically and socially sensitive. In addition, IR employs 1.3 million people. Any reduction in the transportation of coal, and thus transport subsidies and potential job losses, will require attention to avoid negative transition impacts and associated resistance to a transition away from coal.[25]

- **Geographic distribution of benefits and harms**
  The states in India with the highest solar radiation, and thus the greatest potential for solar power generation capacity, are in the

south and west of the country; they include Karnataka, Telangana, Rajasthan, Andhra Pradesh, Tamil Nadu, and Gujarat, amongst others.[26] The coal-rich states, on the other hand, are in the east; they comprise Jharkhand, Odisha, Madhya Pradesh, and Chhattisgarh. The states in the latter group are amongst the poorest in India, with approximately six percent of their total state revenues coming from coal mining royalties and contributions to the District Mineral Foundation (DMF) fund.[27] These amounts are specified by the federal government and collected by the state governments. A phase-out of coal could thus have significant socio-economic impacts in coal states through lost revenue, due to the shifts in energy production from coal found in the coal-rich central and eastern states to renewables in the western states rich in renewable energy generation capacity.

- **DMF funds**
  Started in 2015, DMF collects a percentage (between 10 and 30 percent) of the royalty paid by mining companies. These funds are intended to be used for the benefit of people living in the mining districts for developing skills, improving health services, and diversifying local economies. However, most of the funding is currently used for large infrastructure projects or not utilized at all. For as long as these funds are seen as general development funds for the district governments, their existence will incentivize mining.[28] However, if viewed as a resource to support just transitions, they could play an important role in accelerating the transition away from coal.[29]

Technological barriers

- **Phasing out coal-fired power stations**
  Relative to other countries, India's coal power stations are still quite young, with only a limited number approaching retirement. The 2018 National Electricity Plan (NEP) includes forecasted closures of the oldest coal power plants (22.7GW) up to 2021/22 due to normal end-of-life retirements and non-compliance with air quality regulations. An additional 25.6 GW of coal capacity is being considered for early retirement over the five years from 2021/22 to 2026/27.[30] With an installed capacity of a little over 282 GW at present, forecasted retirements represent only 17 percent of the existing capacity being decommissioned by 2027.

  Furthermore, during the same period, NEP 2018 revealed plans to build 94 GW of new coal-fired capacity between 2017/2018 and 2026/2027. Fifty GW of new coal-fired power generation is under

construction, with an additional 22 GW approved for construction. Accompanying these plans is the opening of 52 new coal mines since 2014, thus adding over 160 megatons (Mt) of mining capacity per year. While these newbuilds will increase efficiency, it also means that India would have a large coal fleet with projected retirement dates after 2050. Moreover, by increasing the Plant Load Factors (PLF)[31] from the current levels of below 60 percent to 85 percent, existing plants could deliver roughly 42 percent more power, thus further enhancing their financial viability, which would only delay the retirement of coal plants.

- **Limited integration of the grid for moving renewable energy to coal-dependent areas**
  Although the renewable energy target of 175 GW (estimated to be 20 percent of total demand by 2022) does not require major changes to the grid, any further integration of variable renewable energy, needed to meet the latest targets of 450 GW by 2030, will require the substantial expansion of the grid infrastructure and improvements to its management.[32]

  Currently, much of the renewable energy capacity in India is concentrated in regions that are far from the coal-based power producing areas. This has several implications, including the need for substantial new infrastructure to link renewable energy to the grid and ensure grid integration across states. Therefore, this will require high levels of central and state government coordination and capital development. If constraints in both the central coordination capacity and access to capital for interstate grid integration are not addressed, it is likely India's electricity grid will continue to rely on coal-fired power generation for quite some time.

- **Variability of renewable energy, lack of storage, and smart grids**
  A key consideration with renewable energy is its variability, particularly relative to peak demand for electricity. This will require both bringing in time-of-day pricing to encourage the shifting of demand to the times at which renewable energy (particularly solar PV) is available, and incentives to introduce storage capacity to ensure dispatchable power during evening peaks. The roll-out of net metering that allows independent power producers to feed into the grid and be compensated for electricity generation, as well as the enhancement of smart grid capacity that can integrate and distribute available energy responsively, will be required at scale.[33] Delays in the introduction of a grid system that can respond to variable renewable energy would entrench coal (and other fossil fuels) in the energy mix due to the latter's ability to provide base loads and peaking capacity at times when renewable energy is not available.

- **Local manufacturing/sourcing constraints**
  India's capacity to manufacture PV cells is only around 3 GW per annum, as the country does not manufacture any of the wafers used for making PV cells. Despite having an annual solar module manufacturing capacity of 16 GW, it is able to utilize only 60 percent due to its low solar cell manufacturing capacity. As a consequence, over 90 percent of its cells are imported, which causes concerns related to energy security. Further, as India does not currently manufacture lithium-ion batteries, it also raises concerns that India may be similarly dependent on imports for battery solutions.[34]

  At the same time, other storage technologies, such as green hydrogen and pumped (hydropower) storage, also come with their challenges, including limited technological capacity and access to land, respectively. Although the recently introduced Production-Linked Incentive Scheme includes support for the local manufacturing of both solar PV modules and advanced chemical cell batteries, there is still a strong preference for using local coal resources and generation capacity to enhance energy reliability and national security.[35]

Vested interests and political economies

- **Vested interests**
  A long history of price controls in the coal sector and the scarcity of job opportunities in coal-dependent areas have led to the establishment of a black market associated with coal. In some instances, this has led to the emergence and continued existence of criminal elements that benefit from the coal value chain. In addition, some national and local politicians, contractors, and others have utilized their ability to influence the coal supply chains and provide scarce jobs to their advantage. This has created a wide range of vested interests that have resisted changes to the status quo. These vested interests have the ability to mobilize substantial financial and political power to advocate or lobby for a protracted phase-out of coal.[36]

- **Government subsidies**
  A 2018 report found that GoI provided support across the coal value chain, in the forms of an estimated USD11.3 billion in public finance, USD2.1 billion in national subsidies, and USD3.4 billion in policy postponements during the financial year of 2016.[37] A more recent report (2020) suggested that since 2016, total government support for fossil fuels, and predominantly coal, has increased in India.[38] Although subsidies to renewable energy have also been rising, the International Institute for Sustainable Development estimates that support to fossil fuels is around five times the support to renewable energy.[39] Continued subsidization of the fossil fuel sector is likely to lead to stranded assets and workers/communities, thus making any future energy transitions more difficult to implement. At the same time, fossil fuel subsidy reforms could liberate some valuable financial resources that could focus instead on supporting just transitions in coal communities.

- **Power Purchase Agreements (PPAs) and DISCOMs**
  Power distribution — a state function — is currently one of the weakest links in India's power sector. Despite the central government's bailouts, power DISCOMs continue to incur significant financial losses that undermine the reliability and accessibility of electricity across India.

  The causes underlying the precarious condition of DISCOMs include: unpaid subsidies by state governments; unsustainable cross-subsidization of electricity consumers; a lack of technology and infrastructure development including smart-metering; along with expensive thermal PPAs. Many DISCOMs are locked into long-term PPAs for 90–95 percent of their peak demand with private independent suppliers. To maintain investor confidence in government contracts, it is extremely difficult to renegotiate or renege on these agreements. Even with a shift to renewable energy, states would still have to purchase (or pay for) the contracted amount of electricity from these suppliers, leaving them too debt-ridden for (even low) renewable energy tariffs. This increases the barriers to switching to new renewable energy generation.[40]

  Part of the just transition process in India will, therefore, require attention to these legacy contracts, including the possibility of financing the closure of inefficient, highly-polluting end-of-life coal plants surplus to a state's needs. This will have many co-benefits, though it will also mean that attention would need to be given to independent producers, DISCOMs, along with affected workers and communities.[41]

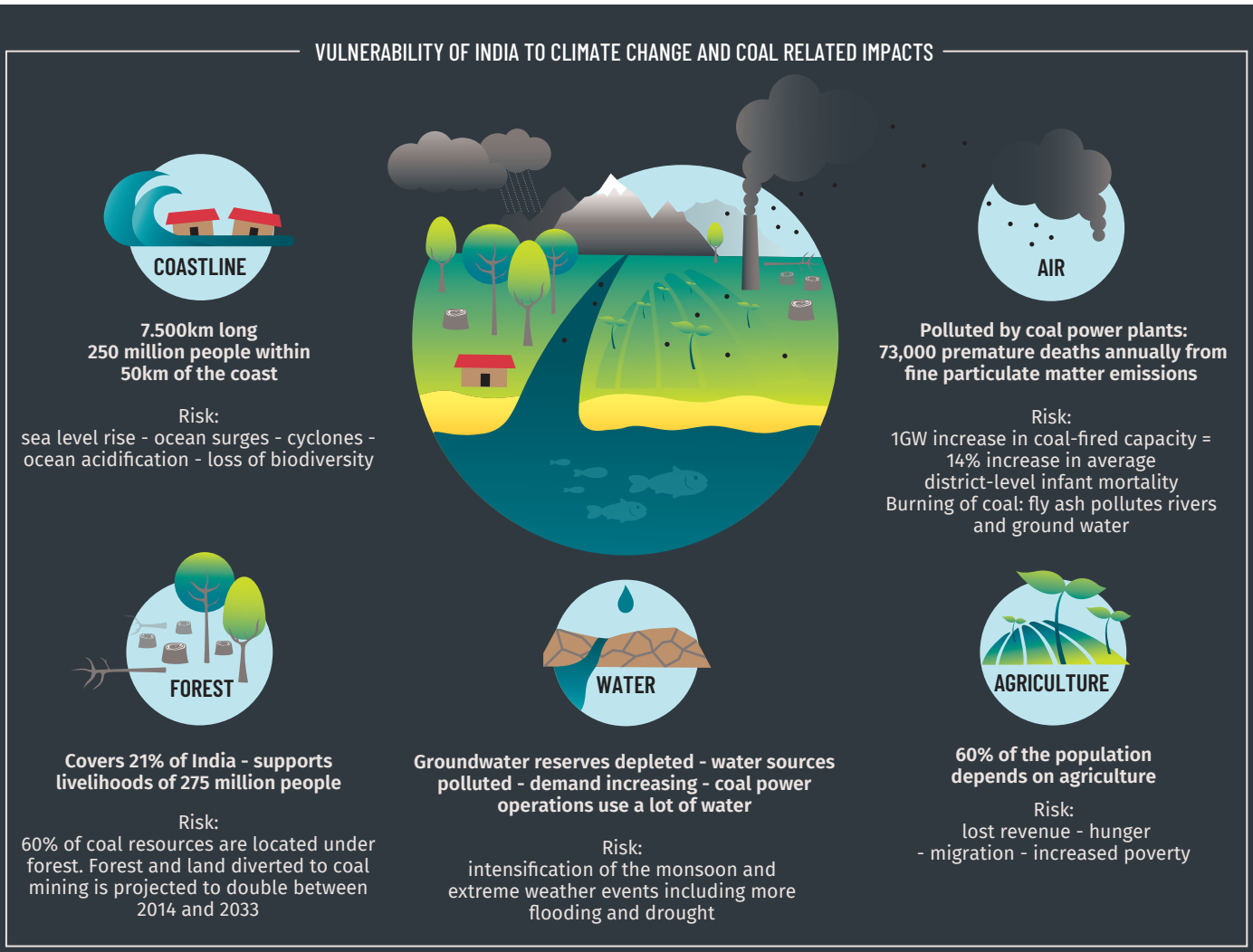
DRIVERS OF AN ACCELERATED TRANSITION AWAY FROM COAL

Despite the many barriers mentioned above, there are also many drivers of an accelerated transition away from coal.

Renewables and storage getting cheaper

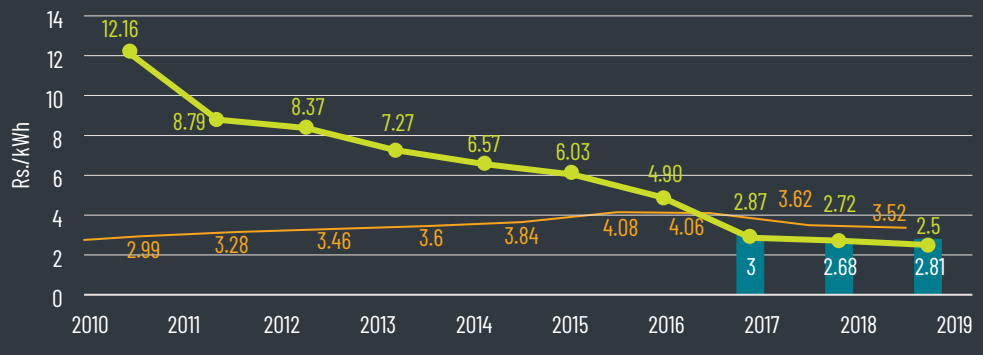
Globally, installing new renewables costs increasingly less than the cheapest fossil fuels, with solar and wind cost reductions showing little sign of abating. India is leading the world in having the lowest weighted-average total installed costs of USD618/kilowatt (kW) of utility-scale PV as of 2019. This translates into a weighted average levelized cost of electricity (LCOE)[42] of USD0.045/kilowatt-hour (kWh). In the same year, the lowest country average for the residential and commercial sector rooftop solar PV was also found in India (USD0.062/kWh). Onshore wind in 2019 was approximately USD0.053/kWh. For utility-scale PV and onshore wind, the weighted average LCOE of new projects is lower than the cheapest fossil fuel-fired options in India. These prices followed significant falls in the costs of renewables: the weighted-average costs of electricity of utility-scale PV and onshore wind in India plunged by 85 percent and 79 percent, respectively, between 2010 and 2019. India also has some of the cheapest hydropower in the world and the lowest weighted average LCOE for biomass-fired electricity generation.[43]

The cost of lithium-ion battery storage has also seen reductions of over 87 percent in the past decade.[44] A recent report on the cost of grid-scale lithium-ion battery storage in India concluded that,



Data sources: Bhati 2020; Dubash 2019.

Figure 4
GENERATION TARIFF TRENDS IN INDIIA



Source: Gupta, V. 2020

with appropriate policy support, the cost of PV, plus storage LCOE, could be USD0.056/kWh in 2020, USD0.047/kWh in 2025, and USD0.040/kWh in 2030. This is substantially less than the cost of operating coal-fired power stations to cater to peak demand.[45]

In addition to lithium-ion battery storage, there are a wide range of storage technologies globally, such as pumped hydro, other electrochemical battery cells, flywheels, and compressed air, which offer alternative performance characteristics, and thus, grid applications and potential cost reductions in the energy system. An analysis by The Energy and Resources Institute (TERI) suggests that an aggregate battery storage capacity of 60 GW would have substantial benefits, in terms of increasing the amount of renewable energy available for use and reducing the need for coal-dependent base load.[46]

Emission intensity commitment in NDC

India has committed to reducing the emissions intensity of its GDP by 33–35 percent by 2030 from 2005 levels. Emissions intensity (CO_2 per GDP) is made up of two variables: energy intensity (energy per GDP) and 'fuel mix' (CO_2 per energy). Although India is likely to meet, and possibly exceed, its NDCs' emission intensity targets, its coal-based power sector produces 1.08 tons of CO_2 per megawatt hour (MWh) on average. This is amongst the highest 'fuel mix' ratio in the world due to the inefficiency of India's existing coal fleet. By comparison, a newer ultra-supercritical plant produces 0.67 tons of CO_2/MWh, lower than India's average by 45 percent. This suggests the need to separate the older inefficient performers from the newer, more efficient coal power plants, and take steps to decommission the inefficient plants first.

Stranded assets and reluctance of finance institutions to fund new coal

Existing and new coal investments risk becoming stranded assets, understood here as the loss of value and potential bankruptcy or the closure of assets in the fossil fuel value chain.[47] In India, the introduction of the Insolvency and Bankruptcy Code in 2016, along with the subsequent related reporting requirements by the Reserve Bank of India, has revealed significant stress and potential stranding in the coal mining and energy sectors. Chhattisgarh, Odisha, and Jharkhand have been identified as being the most at risk from asset stranding, with 58 percent, 55 percent, and 27 percent of their state capacities categorized as stressed, respectively.[48] These three states combined represent 22 percent of all operational coal power plants in India.

Drivers for stranding consist of: the cost of coal (including transport costs); the shortages of coal; the financial distress of DISCOMs; water scarcity; air pollution regulations; the cost competitiveness of renewables; the lower-than-predicted demand for electricity; and climate change policies. The reporting requirements, related to stressed assets and the increasing risks associated with fossil fuels, are also

increasing the cost of capital and making it more difficult to access finance for new coal developments. Furthermore, there will be rising pressure to close non-performing coal assets, with global estimates suggesting that closing inefficient coal power plants alone could contribute to halving the power sector's emissions. In India, the impact of the closure of inefficient coal power plants is likely to be even more pronounced.

Increasing, yet lower-than-expected demand

The impacts of the COVID-19 pandemic and associated responses have reduced energy demand in India over the short term. As India's economy recovers from the impact of COVID-19, the demand for energy, and particularly electricity, will again increase, although the rate of increase is likely to be lower than projections in current policy and planning documents.

During the 2018/2019 financial year, the actual electricity demand was 22 percent lower than projected in the 2011 energy survey, thus resulting in coal plants running at capacities far lower than their capabilities. Moreover, with another 3,300 MW of coal-fired power capacity added in the first six months of 2019, and the responses to the COVID-19 pandemic further reducing demand in 2020, running hours or PLF had been further limited to less than 60 percent of capacity.

The low marginal cost of renewable energy, along with renewable purchase obligations, means that renewable energy is considered a must-run, thereby further reducing the demand for coal-fired power.[49] A recent analysis suggests that a large proportion of the pipeline of new coal plants could be canceled or risk becoming stranded assets.[50]

High cost of transport

The high ash content (that is incombustible), along with the high cost of coal transport by IR, means that although the mined price of coal in India is relatively cheap, the delivered price is highly dependent on the distance between the pithead and end-users. In 2017, the crossover distance at which imported coal would be competitive with local coal was 1,460 km. This has

contributed to the increasing number of coal power plants built along the coast, which are designed to use higher-quality imported coal. It is also likely to result in higher PLF and lower costs for pithead mines, particularly as the grid becomes more integrated and efficient. The mines relying on IR for coal delivery are likely to become increasingly unviable, compared to renewable energy, pithead power plants, and power plants using imported coal.[51]

Competing demand for limited land

Most coal production is opencast mining that uses up large areas of land. In addition, coal-based power generation also requires land for operations and waste disposal. The disposal of fly ash, in particular, leads to the depletion of large areas of land, along with long-term environmental impacts on local communities and associated health risks.

Even with compensation, access to new land is very difficult. The competition for land has resulted in local resistance to coal mining and substantial delays in new developments, thereby creating land acquisition bottlenecks for both renewables and coal. However, as renewables are often located in less productive land, while the location of coal is in highly-productive agricultural and forest land, renewable energy has an advantage when it comes to this highly emotive issue.

Box 1:

COAL PHASE-OUT: IMPACT ON FORMAL AND INFORMAL LABOR

The Annual Budget, presented in India in February 2020, advised utilities to close down old thermal power plants whose carbon emissions are violating the norms of the National Clean Air Program.[52] According to this proposal, coal-fired power plants, with a power generation capacity totaling 166,000 MW, would need to be shut down.

This transition from coal will potentially threaten the livelihoods of several million people directly and indirectly benefiting from coal incomes/subsistence across India's coal belt.[53] Formal employees of Coal India Limited (CIL) have been declining from a peak of over 500,000 in the 1990s to about 300,000 at present. Most of this decline has occurred, despite rising output, due to the mechanization of the sector and the informalization of labor through the use of contract labor. It is estimated that there are 1.2 million workers in India's coal sector, including employees of CIL and private producers, as well as informal workers in the mining and generation sectors, but excluding those from coal transport.[54]

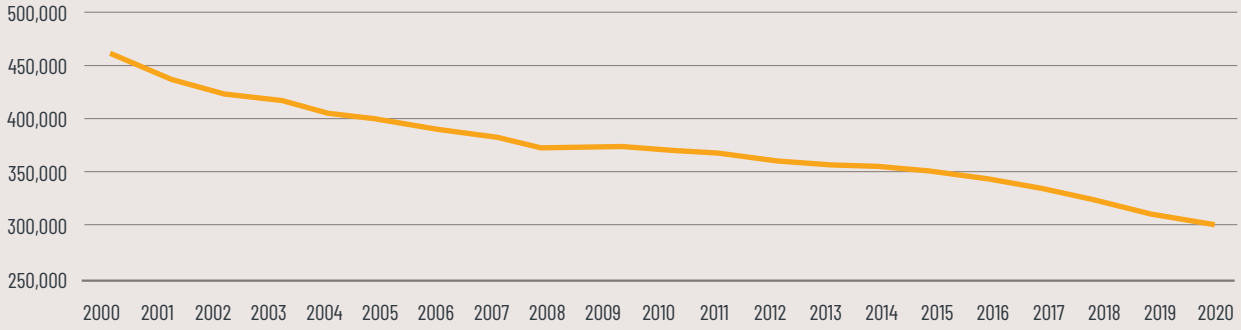
Transport comprises both rail and road transport. Coal accounts for approximately 40 percent of India's rail network revenue and the rail sector formally employs 1.3 million people. The coal trucking industry hires about 0.5 million people: truck drivers, coal loaders, and maintenance workers for around 150,000 trucks.

Clustered around these core activities are substantial secondary employment opportunities in both the formal and informal sectors. Much of this employment is focused in coal-producing states consisting of Jharkhand, Odisha, Chhattisgarh, West Bengal, Madhya Pradesh, and Telangana.[55] There is significant uncertainty regarding the number of people benefiting indirectly through coal-related incomes. It has been estimated that for every formal job in coal, 3–10 additional jobs/livelihoods are dependent on coal in the coal mining districts.

Several proposals to shut down old plants are accompanied by suggestions to re-use the land for alternative energy purposes. However, to ensure that transitions away from coal are truly 'just', a mapping of socio-economic impacts, systematic protections, and financial incentives is needed. There is a pressing need to develop a systematic approach to the re-employment of both formal and informal labor impacted in the transition. This need, evident across the coal value chain, is particularly pertinent to informal labor.

For formally-employed miners, the appeal of coal mining jobs lies in the provision of a stable salary

Figure 5
FORMAL CIL EMPLOYEES IN THE INDIAN COAL MINING SECTOR



Source: Adapted from Spencer et al 2018

and guaranteed pension, which compensates for the negative aspects, including significant health risks, the possibility of on-site (particularly underground) accidents, poor living environments, etc. In contrast, informal labor has precarious employment conditions that exclude most of the benefits available to the formal workforce. CIL pays USD1,100 (INR80,000) per month, along with family health expenses, education, housing, and other benefits. As a comparison, a private mine contractor may pay informal workers USD200–300 (INR15,000–25,000) a month, and many will pay less than this amount. Yet, although the informal workers are poorly paid and in precarious employment positions, their wages are significantly better than the state average. In Jharkhand, for example, the annual per capita income is USD1,000. Moreover, 64.2 percent of the workforce in Jharkhand is classified as self-employed, with slightly over half of the rural households (53.4 percent) in the state falling under at least one category of deprivation. This means that any transition out of the coal sector is likely to have a highly negative impact on workers' income unless new opportunities for decent work are developed through economic diversification in coal-dependent areas.[56]

In the power production sector, the Badarpur Power Plant in New Delhi provides an illustrative example of the differential impact between formal and informal labor. This plant was New Delhi's largest power generator for over 45 years and contributed to more than 10 percent of particulate matter (PM2.5) in the city. It had an installed capacity of 705 MW and was spread across 2,160 acres, out of which 1,680 acres were used for fly ash disposal. It employed around 1,200 people, of which more than 450 were contractual workers.

When the plant closed, formal employees were offered employment at the Tughlaqabad sub-station; however, contractual workers were not re-employed. With the help of local labor unions, they sought urgent relief from the government. Their demands included support through alternate employment in the National Capital Region, adequate compensation, the payment of all statutory dues, and the issuance of service certificates. These demands were not met, and eventually, their only remaining option was to seek other work at lower wages. There was no transition plan in place for contractual workers, leaving them worse off and vulnerable.[57]

Examples such as Badarpur bring out the importance of a systematic approach to re-employment, governance, and the collaboration of the different stakeholders, such that the impacts on affected workers and communities are minimized. Studies suggest that the phasing-out of coal can create long-term unemployment and earnings reductions of up to 30 percent over at least 15–20 years.[58]

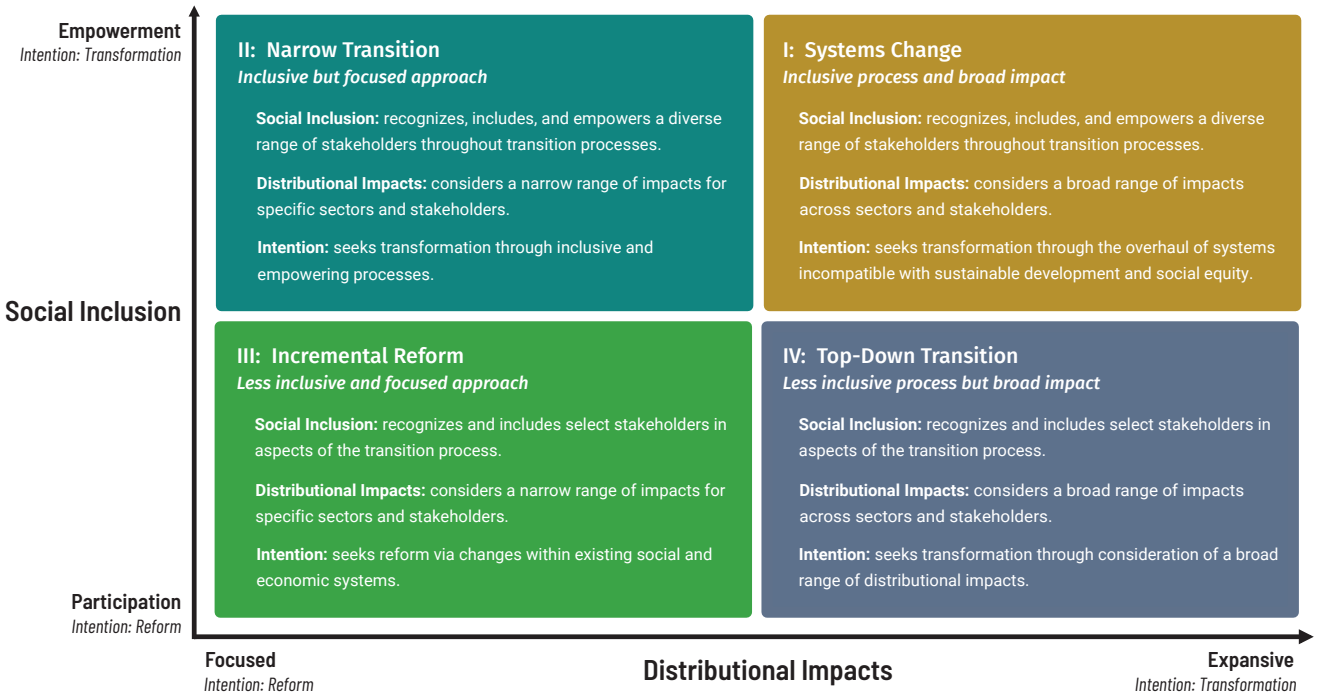
In contrast, the renewable energy sector has been creating new job opportunities, though this does not imply a one-on-one match between those losing their jobs and those gaining new jobs. In India, jobs in solar power grew by 36 percent between 2016 and 2017 to 164,000. The International Renewable Energy Agency (2018) estimated that there were 432,000 direct renewable energy jobs in India in 2017, not including those in large-scale hydro power, along with many distributed renewable energy technologies and their applications in solar parks and rooftop solar energy. With significant acceleration in new renewable energy sources and increasing targets, as well as a rising emphasis on the manufacture of renewable energy components, including batteries, in India, this number is likely to grow significantly.[59] A study published by the Climate Policy Initiative suggests that, under an "optimistic but realistic scenario", renewable energy has the potential to contribute up to 4.5 million domestic jobs by 2042.[60]

JUST TRANSITION FRAMEWORK IN THE CONTEXT OF INDIA

Since its early development in the labor movement in the US in the 1990s, the concept of just transitions has sought to integrate economic, social, and environmental justice concerns. As the concepts and practices associated with just transitions spread, it has been reinterpreted to reflect the politics and interests of its various advocates.[61] This has resulted in no one clear definition of just transitions, but rather a range of positions. In seeking to make sense of these varying positions, the Just Transition Initiative, drawing extensively on existing literature, has developed a broad framework that maps out diverse approaches, ideologies, and priorities along two continua related to social inclusion and distributional impacts, with a cross-cutting consideration related to the depth of intended change. The framework, applicable to different geographical scales (local, national, regional, and global) and time horizons (short-, medium-, and long-run), is situated within a global ambition of limiting climate change-related temperature rise to below 2°C.

Social inclusion, or procedural justice, refers to the recognition of all groups, with a proactive emphasis on marginalized groups, by including them in discussions and decision-making processes; enabling broad stakeholder participation such as the ability to shape the outcomes of change processes; and ensuring that governance structures are in place to influence local, national, and international transitions. At one end of the spectrum, socially inclusive actions ensure the recognition and participation of a diverse set of stakeholders and vulnerable groups to allow them some degree of influence, although this consultation may be relatively surface-level. A more expansive approach to social inclusion in just transitions empowers these groups to influence and potentially own decision-making processes that affect their economic and social well-being. All this requires governance structures and institutions at the local, national, and international levels that enable procedural justice in transition processes.

Figure 6
JUST TRANSITION FRAMEWORK: KEY ELEMENTS



Distributional impacts refer to the allocation of the benefits and harms associated with economic, social, and environmental changes. This includes addressing issues of access to resources, historical injustices (restorative justice), the current allocation of transition impacts, and the consideration of future outcomes of transition processes. Evident within distributional justice issues is a continuum from a narrow focus on specific issues, impacts, and/or stakeholders (e.g., coal mine workers at a particular mine) to a more expansive perspective that incorporates issues of local and global sustainability, including greater equity and well-being.

Implicit within the elements of social inclusion and distributional justice are considerations related to the depth of intended change. On one end of the **intention spectrum** is 'reform' that indicates the desire to achieve change within existing social and economic systems. On the other end is 'transformation' that indicates a desire to overhaul existing social and economic systems that are potentially incompatible with sustainable development and social equity. Strategic reforms may be needed as incremental steps towards the transformation.

A deep and complex transformation is required to achieve both social inclusion and distributive justice in responding to the urgent challenges of climate change and development. It is exactly this level of engagement that has informed the establishment of CIF and its commitment to cross-sectoral dialogues as an important practice in country engagement and climate finance.

KEY CONSIDERATIONS FOR JUST TRANSITIONS IN INDIA

A closer look at the elements of a just transition described above can bring out significant considerations of importance to the context in India when planning and implementing a just energy transition. This process involves both the identification of aspects of social inclusion and distributional justice evident in current transition processes, as well as 'absences' or aspects revealed to be missing, when one applies a just transition lens to current practices.

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SOCIAL INCLUSION AND PROCEDURAL JUSTICE

Recognition

The way in which different voices are included or excluded can shape the formulation of transition debates and influence the outcomes of transition processes. These processes of recognition play out at varying geographic scales and across time.

At the international level, an example of recognition in the formulation of climate change responses is evident in the impact of a seminal article by Agarwal and Narain in 1991. It shows how insufficient attention to historical accountability has unfairly burdened developing countries with the responsibilities for mitigating climate change.

At the national and local levels, India has had a long history of social and environmental activism focused on the local people's rights to have their histories and futures recognized. They range from early protests against the commercialization of forests under British rule through Gandhi's freedom movement to post-independent movements, such as the Chipko movement (that has contributed to redefining the role of women in Indian society), and more recently, the Koyla Satyagraha movement against coal mining in the tribal areas of central India. These struggles for recognition, while manifesting as struggles for ecological and livelihood sustainability, are, at their core, struggles to be recognized as full members of society with equal rights.[62]

Yet there continue to be marginalized groups who are often not recognized as direct stakeholders in energy transitions in India. For example, the Adivasi (Indigenous Tribes) have suffered disproportionately from India's reliance on coal.[63] Many of India's coal reserves are located in the central and eastern states of Chhattisgarh, Jharkhand, and Odisha, where more than a quarter of the country's Adivasi population lives. Adivasis are routinely shut out of decisions on the acquisition of their lands for coal mines, with many evicted, poorly compensated, and made to wait years for resettlement.[64]

Dalits (Scheduled Castes) are also often discriminated against, both in terms of conditions of employment and land agreements. In many instances, the compensation for land acquired for both coal and renewable energy generation goes to landowners, while Dalits seldom receive compensation as landless laborers on other people's lands.[65]

Other marginalized groups consist of informal workers across the coal supply chain (e.g., 'cycle wallahs' who transport coal on bicycles). Perceived as peripheral to formal transition processes, they have no job security; yet, they are directly impacted by the industry. Within the marginalized groups (Adivasi and Dalits) and the informal workers, women and children are often the most exploited.

Considering all these marginalized groups as direct stakeholders in decisions, who should be included in the planning and implementation processes, is a critical element of justice in transitions.[66]

Participation

Going beyond just the recognition of issues and stakeholders entails ensuring meaningful participation. This includes meaningful engagement at the local, state, and national levels on a wide range of issues related to the transitions to a low-carbon economy, as well as greater public and democratic participation in energy systems to ensure that development needs are met. It also encompasses building capacity across diverse sectors of society to enable them to engage in decision-making processes at different levels and exert influence. Although public participation is often written into planning policy, the institutional structures and capacity for engagement are often lacking.

Deliberate policy discussions on coal phase-outs at the national and local levels are an important aspect

of participation and just transitions. At the national level, the government, civil society, business, and labor need to be a part of the social dialogue that shapes a national just transition policy. At present, no convening body has the mandate or institutional structure to support such a dialogue in India, as is the case in many countries.

At the state level, spaces need to be created for the above-mentioned groups to contribute to and influence the alignment of statewide development programs and associated funding. Finally, at the local level, these groups need to be empowered to participate in local just transition planning, including the allocation of DMF funds.

One of the most contentious subjects in which communities in India have consistently fought for is their rights to participate in decision-making related to land. Failures in participatory processes have often led to both protest and litigation, in the cases of both coal and renewable technologies.

Since 2011, communities in Rajasthan have filed 15 cases against solar plants in the state's high court. These are mostly by landless and marginalized communities who have been excluded from development planning, as they have no title deeds to the government land that they use for grazing, nomadic passages, and funerals. This issue was identified in a 2012 report by the Natural Resources Development Centre and the Council on Energy, Environment and Water. It noted that "as the solar energy market matures, it is critical that government policies and (private) developers minimize the impact on the local communities." This will entail dialogues on the history of how land is used and how records of land use have been kept in order to ensure both procedural and distributional justice.[67] Ultimately, regardless of the level of the 'cleanness' of the technology, participatory processes cannot be neglected.

Ensuring recognition and participation will require greater coherence between policy and development plans at the national and state levels, which has important implications for local development and communities.

DISTRIBUTIONAL IMPACTS

Distributional impacts related to access to clean and reliable energy

India has committed to providing all its citizens with basic services and energy access, while acknowledging the implications of climate change.

Although the government has claimed that all households in India have access to electricity, issues with quality of access (i.e., the reliability of supply) and affordability mean that large parts of the population still rely on biomass and kerosene for cooking, heating, and lighting. Since women and girls are doing most of the cooking and primarily fetching solid fuels, the effort and risk associated with poor access to electricity is highly gendered.

Reliable access is also hampered by the electricity DISCOMs' struggles with a range of financial and distributional inefficiencies that disincentivize their prioritization of poor energy consumers. As DISCOMs lose their high-paying customers to distributed renewable energy (e.g., rooftop solar), the challenge of providing affordable and reliable access to poorer households is likely to become even more pronounced.

Access is thus a multidimensional challenge that will require substantial technology transitions, enhanced grid reliability, inter-state collaboration, the increased financial stability/sustainability of DISCOMs, additional investments, and planning that addresses health, gender, and urban/rural divides. The intended and unintended impacts on access to clean, reliable, and affordable energy, particularly for groups who are already vulnerable, must be a specific focus in energy transitions and climate change responses.

Distributional impacts related to the environment

Coal mining and coal-based power generation have both local and global impacts on the environment, which in turn, threatens the health and livelihoods of people in India and globally. Deforestation, land degradation, water pollution, water scarcity,

underground coal fires, air pollution, and emission of GHG gases are all seldom factored into the costs of coal and coal-based electricity generation.

These costs are also distributed unequally in India, with the poorer coal-producing states bearing the brunt of these pollutants, while richer states benefit from the electricity produced. Similarly, indigenous communities, with a long history of relying on forests for their livelihoods, are disproportionately impacted by forest-clearing for coal mining and power generation. Although deforestation, CO_2 emissions, and associated climate change have global impacts, it is the poor and vulnerable communities who are the most affected by the adverse effects.[68]

Distributional impacts related to employment

Based on a scenario that is consistent with India achieving its NDCs and recent commitments to renewable energy expansion, it is estimated that although employment in the coal sector would decline slightly, the job creation potential of renewable energy is far greater than the job reductions anticipated in the coal sector.[69] Under an extremely ambitious decarbonization scenario of the power sector in India, the coal sector-based employment is expected to decline by about 52 percent between 2020 and 2050. At the same time, according to this scenario, direct employment in the renewable sector would be almost five times that of direct employment losses in the coal sector. However, these new jobs will not translate into a one-to-one exchange of jobs from coal to renewables. Moreover, it would be even more difficult to quantify and predict the losses and gains in indirect and informal jobs, with the phasing out of coal and the opening up of alternative livelihoods.

The transition will require careful management to mitigate the negative impacts on displaced workers (direct, indirect, formal, and informal). Over 80 percent of the impact of the transition on employment will happen in the states of Jharkhand, Odisha, Chhattisgarh, West Bengal, Madhya Pradesh, and Telangana. More specifically, the impacted communities might be linked to mines and power plants with the following characteristics. While some are nearing the end of their productive lives or exerting a significant environmental impact, the distance between the mine and the power plant it is supplying is yet another factor for closure. By identifying areas of likely closures, focused support can be offered to vulnerable workers. This will require significant diversification of economic opportunities and associated skills development to support workers in taking up new opportunities, both locally and further afield.

Distributional impacts related to communities

Phase-outs away from coal would have significant financial, social, and political impacts for local government and communities in these states, as royalties from coal account for approximately six percent of the income for the Indian states of Chhattisgarh, Madhya Pradesh, Jharkhand, and Odisha. In addition, CIL and public power utilities have contributed to the development of townships, schools, water supplies, roads, etc. in regions that would otherwise not have received these services. CIL currently ranks in the top 20 companies by quantum of Corporate Social Responsibility (CSR) spend in India.[70]

However, while coal sustains livelihoods near mines and power stations, its negative externalities are more diffuse in affecting a far greater number of people through pollution, loss of forest cover, and displacement.[71] This is resulting in increasing resistance to the negative impacts of coal mining and thermal power stations.

A just transition will lead to attention being given to both workers and communities that have benefited from the coal sector, as well as communities who have suffered from a loss of livelihood opportunities and negative health impacts. Just transition initiatives need to identify the specific mines and power plants likely to be retired or become stranded due to the drivers identified earlier in this study. These mines and power plants, along with associated value chains and communities who are highly concentrated geographically, could provide a focus for identifying and mitigating the impacts of the energy transition in India.

CIF IN INDIA

Table 1:
CIF PROJECTS IN INDIA

NAME OF PROJECT AND APPROVAL DATE BY TRUST FUND COMMITTEE	PARTNER MDBS	CTF VALUE (USD MILLION)	CO-FINANCE BY CIF PARTNER MDBS (USD MILLION)	TOTAL COST (USD MILLION)
Rajasthan Renewable Energy Transmission Investment Program (2013)	Asian Development Bank (ADB)	200	300	800
Development Policy loan to promote green growth and sustainable development in Himachal Pradesh (2013)	International Bank for Reconstruction and Development (IBRD)	100		
Solar Rooftop Investment Program guaranteed by India Solar Transmission Project (2015)	ADB	175	330	505
	IBRD	125	470	1095
India Solar Park Transmission (2016)	ADB	50	175	450
Scaling up demand-side Energy Efficiency Sector Project (2020)	ADB	48	250	298
Shared infrastructure for Solar Parks (2016)	IBRD	25	75	200
Innovation in solar power and hybrid technologies (2017)	IBRD	40	150	400

ROLE OF CIF IN DECARBONIZING INDIA'S POWER SECTOR

CLIMATE FINANCE LANDSCAPE IN INDIA

When India submitted its NDCs under the Paris Agreement, it was estimated that at least USD2.5 trillion would be required to meet the targets set out for the 2015–2030 period. This amount would require international support to supplement the climate finance available domestically.

Many of the financing facilities available domestically are supported by international development finance institutions. These institutions seek to address shortcomings in the domestic market, which impact energy transitions, including the short tenure of loans; high capital costs; inadequate debt finance; a lack of understanding of the emerging renewable energy market; the risk of stranding assets within current investment portfolios; and an aversion to risks associated with new technologies. For example, the International Finance Corporation (IFC) supported renewable energy-focused private equity funds, while ADB introduced one of the first partial risk guarantee facilities in India and the World Bank Group's Partial Risk Sharing Program provided support for energy efficiency programs.

India has also accessed a range of international climate funds, including the Global Environment Facility, the Green Climate Fund, the Adaptation Fund, and CIF. In addition to funding the various 'missions' under NAPCC, and to a lesser extent, the State Action Plans for Climate Change (SAPCCs), these funds have been channeled through a range of public, private, and civil society organizations. This has led to a highly-decentralized climate finance landscape in India, with "a wealth of stakeholders at the national and subnational level, in both the public and private sectors [that] could be engaged to develop a clearer sense of opportunities and priorities using both domestic and international finance."[72]

In parallel to an emerging policy landscape associated with climate change responses, both globally and in India, CIF and partner institutions, including MDBs, have supported and continued to support cross-sectoral dialogues to coordinate climate-related investments in India. This convening role and the ability to strategically support national- and state-level priorities provide an opportunity for CIF and its partners to contribute to just transitions through their investment decisions and support within India.[73]

CIF'S COUNTRY INVESTMENT PLAN – SUPPORTING INDIA'S RENEWABLE ENERGY AMBITION

In 2010, CIF's CTF invited GoI to apply for funding. In collaboration with ADB, IBRD, and key national stakeholders, the government submitted the CTF Country Investment Plan (CIP).

The development of the CIP (2011) coincided with the development of the 12th Five Year Plan in India and the work of the Expert Group on Low Carbon Strategies for Inclusive Growth. Both documents called for "faster, sustainable and more inclusive growth". Assumptions at the time included continued rapid economic growth of approximately eight percent per annum, which would result in a projected increase in installed power generation capacity from 172 GW to 377GW and emission increases from 719 million tons of CO_2 equivalent to between 1,452 and 1,620 million tons of CO_2 equivalent by 2020. GoI noted that while it had identified a range of initiatives to reduce emission increases, "these programs need to be provided with adequate funding as well as other essential implementation support". CIP noted that "tariffs for solar power were still nearly two to three times that of conventional power" and that the funding support from CTF would be vital for reducing costs to the point where "solar power would achieve tariff parity with conventional power". At the time, it was acknowledged that this was an ambitious and far-sighted plan, which was why "the financing would have a very significant transformative impact".

In response to changing market and policy contexts, CIP was revised in 2015: "With a view to the transformational changes and financing needed for India to achieve its ambitious target for renewable energy in the next eight years, the GoI has revisited the original CIP to consider how the CTF resources


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could maximize the benefits and leverage more investment in attracting generation capacity into solar parks in a more cost-effective manner."[74]

These revisions reflected the assurance of support for GoI plans provided by the initial CTF allocation of USD775 million in 2011. GoI increased its national solar power ambitions under the National Solar Mission (NSM) to 100 GW by 2022. Of this amount, 60 GW were to be sourced from large and medium scale grid-connected solar projects and 40 GW from rooftop solar power. The revised CIP accordingly focused on solar parks infrastructure through supporting common infrastructure facilities, such as transmission systems, rooftop solar PV systems, and innovative renewable energy generation by the Solar Energy Corporation of India (SECI). The Ministry of Finance, the Ministry of Environment, Forest and Climate Change, the Ministry of New and Renewable Energy (MNRE), the India Renewable Energy Development Association (IREDA), state-level governments, and in the case of the rooftop solar program, national banks participated in the CIP revision.

At the time of developing both the initial and revised CIP, ADB assisted GoI in the development of several solar parks. This collaboration included "first of a kind" pioneer projects in India, which were challenged by issues related to "first-mover risk", the evacuation for intermittent renewable power, low-utilization factors related to transmission, and the large-scale development of solar parks.

The analytical work performed by the Energy Sector Management Assistance Program (ESMAP), as well as the World Bank Group (IBRD and IFC) on the initial project activities under NSM and CIP (2011–2013), revealed that the lack of participation of national and commercial banks was a roadblock to achieving targets set for solar parks and future rooftop solar plans. These insights informed the on-lending approach that both IBRD and ADB took to working with the State Bank of India and the Punjab National Bank in the subsequent solar rooftop projects. The ESMAP/World Bank study also informed the focus on solar parks in the revised CIP and the subsequent phases of NSM.

COUNTRY INVESTMENT PLAN IMPLEMENTATION

During the initial phase of the CTF projects, MDBs worked closely with the state governments that were, in turn, supported by MNRE and SECI. The technical assistance, provided through CTF under the Shared Infrastructure for Solar Parks project, aimed to improve the project management capacity of state government staff, assist in the planning of the expansion of relevant infrastructure, and support the integration of renewable energy into the national grid. Similarly, the technical support, along with the capacity-building program associated with the rooftop solar power built capacity in the financial sector for providing finance to small-scale renewable energy projects, helped state DISCOMs to integrate these initiatives into their planning and operations as well as developed skills in the renewable energy sector.

By lowering the cost of financing and facilitating technology transfer in the establishment of solar parks, as well as contributing to a concessional financing pool for rooftop solar power, CTF support helped to overcome the need for high up-front capital and lack of access to long-term credit at attractive rates. The presence of MDBs also reduced the risk perception and encouraged private investment. At the time of CIP and subsequent CTF project development, the renewable energy sector was dependent on subsidies.

However, as is evident in the Rewa project described below, CTF-supported initiatives contributed to bringing utility-scale solar tariffs to grid parity with coal-fired thermal power stations. It is also clear, with regards to solar rooftop projects, that CTF co-financing strengthened the capacity of financial institutions to assess and fund small-scale solar projects. This, in turn, led to a significant decrease in financing costs for borrowers and contributed to India's solar sector growing from 32 MW in March 2011 to 37,464 MW in December 2020.[75]

Less evident in CIP and subsequent project documents is a focus on the social and economic impacts beyond the project-level social and environmental safeguards. During the interview process for the development of this case study, it was noted that for project lending, MDBs have tended to place an emphasis on the social and environmental impacts within and adjacent to project sites while placing little emphasis on broader state and national level impacts. In contrast policy lending tends to have a greater impact, and thus focus, on national- and state-level policy programs. Mindful of the fact that these planning processes and associated documents were developed before a just transition lens was being applied it is important to acknowledge that rather than making a retrospective judgement this case study seeks to identify insights for better just transition planning going forward. In the context of the need for a just transition an important emerging question is how social inclusion and distributional impacts related to broader state- and national-level project impacts, can receive greater attention in project planning and safeguard processes by key stakeholders in development finance initiatives including MDBs and appropriate level government institutions.

This is, however, changing, and the IBRD representatives interviewed noted that they are now being approached by the Ministry of Coal/Ministry of Power to help prepare for mine closures. Approaches include the repurposing of both mines and power plants as well as the development of alternative economic and employment options, such as battery and PV panel manufacturing in India. The expansion of focus opens new opportunities for both benefiting from and contributing to some elements of the rapidly emerging focus on just transitions in India and globally.

The following boxes present deeper dives into a few of the areas supported through CIF and its partner MDBs, thus providing insights that can be used for future investment planning and climate finance initiatives. Since neither CIP nor subsequent project plans were developed with an explicit just transition focus, the analysis below is not meant to be a performance assessment or an evaluation exercise, but an effort to understand key considerations and draw important lessons to inform future work on this topic.

PROJECT CASE 1

PROMOTING SOLAR PARKS IN INDIA

Informed in part by an ESMAP/World Bank review of NSM Phase 1, as well as early successes in ADB- supported solar parks in India, GoI launched its ambitious 'Scheme for Development of Solar Parks and Ultra Mega Solar Power Projects' in 2014. A key objective of this scheme was to accelerate the development of the solar capacity of large solar parks to reach the initial target of 20 GW, which was later revised upwards to 100 GW by 2022. Two major solar park projects that received funding from CTF are described below, specifically with regards to insights they might offer for just transition planning and implementation.

INSIGHTS FROM BHADLA SOLAR PARK IN RELATION TO JUST TRANSITIONS

Bhadla Solar Park, spread across more than 14,000 acres, is the world's largest solar park with a capacity of 2,245 MW. Phase III achieved a levelized tariff (over 25 years) of USD0.36 (INR2.44) per kWh, further reducing record-low tariffs achieved by Rewa just three months before.[76] CIF co-financed ADB's support to the Rajasthan Renewable Energy Corporation (RRECL) to design and plan the solar park's infrastructure. In addition, ADB worked with the national transmission utility under a separate CTF project to evacuate the power from the solar parks in Bhadla to the national grid.

Land acquisition challenges and recognition of marginalized communities

ADB has in place environmental and social safeguards to assess and mitigate the potential negative impacts of funded initiatives. In 2012, it commissioned a study into the likely land-related impacts of the Rajasthan Renewable Energy Transmission Investment Program and the Bhadla Solar Park. A high-level summary of the findings concluded that "there will be no impact on Indigenous Peoples in the park area. Also, there will be no private land acquisition and resettlement involved in the solar park." These conclusions assumed that people in the area were "non-titleholders and usually cultivate some of the government land illegally when it is feasible and especially when they get good rain". ADB also developed a Resettlement Framework and Indigenous Peoples Planning Framework as broader guidelines to address potential future impacts. These frameworks were prepared in line with national laws and policies, along with ADB's social safeguards. As the executing and implementing agency for the development of the solar park, RRECL, responsible for the land acquisition, was required to use these frameworks to ensure that all negative impacts were mitigated and that private developers followed these guidelines.

Despite these safeguards, the number of legal challenges related to solar parks in India, including Bhadla, have been increasing. At the heart of the issue is a blind spot in the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and

Resettlement Act (2013) that focuses on private land, but does not address a situation where government-held land is used for informal economic activities. In the case of Bhadla, all the land is classified as government-owned 'wasteland'. Yet, many rural households, mostly Dalits and Adivasis, who do not own any agricultural land, are driven to use government-held lands. It is these government-held lands that are earmarked for renewable energy developments, particularly solar energy. Although there is only one reference (newspaper article) to Bhadla, specifically with regards to the legal challenge on the basis of land,[77] the vast tracts of land required for large solar parks highlights the need for adequate and ongoing attention to be given to this aspect of their development.

Insight: *Issues related to land acquisition raise several considerations relevant to just transitions. These include who is recognized as legitimate claimants, what opportunities there are for marginalized communities to participate in the planning and safeguard processes, and ultimately, what rights marginalized communities have to compensation, including access to alternative livelihoods.[78] In this instance, the safeguards process, though applied fully, may not have been sufficient or nuanced enough to recognize justice issues beyond existing local legislations. This suggests the need to revisit existing national policy (such as the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (2013)) and institutional safeguard processes with a just transitions lens. In doing so it will be necessary, going forward, to develop and apply a wider range of tools and interventions, which can address just transition concerns beyond the project level safeguards processes and existing policy requirements.*

There are also important considerations with respect to the accountability of different stakeholders, including national policy makers and finance institutions, state-level executing agencies, and private developers. There is evidence that RRECL [with the support from ADB and Council of Transforming India (CTI) Technical Assistance] sought to address some of the issues identified above. However, the lack of detail in available documentation suggests that further work may be required to develop and implement guidelines with an explicit just transition focus.

Benefits for local communities

ADB's planning documentation for the Bhadla Solar Park required that "efforts be made by RRECL and the developers to integrate the approach towards inclusive growth including social and economic development of the communities/ stakeholders within the area of operation". This resulted in the preparation of the Community Development Policy, the Community Development Action Plan, a Gender Action Plan, along with CSR policies and investments by RRECL and individual developers. These investments were benchmarked at one percent of the Detailed Project Reporting costs and contributed to:

- The creation of income-generating activities and alternate livelihoods specifically for women:
  - 150 women were provided vocational training on embroidery work and handicrafts.
  - 75 women were trained in basic accounting, finance management, and negotiation skills.
  - 415 women benefited from Micro Enterprise Development Training on Animal Husbandry (Goat Rearing).
- The promotion of improved maternal/ child health and safe motherhood:
  - Health camps were conducted for 200 women and adolescent girls.
- Improved access to water and electricity:
  - 156 households had improved access to potable water.
  - 74 households were electrified through home light systems.
- Employment opportunities:
  - About 40 percent of the local workforce of 1,000 come from nearby villages. Most of the local workforce are employed in low-skilled jobs, such as security and solar panel cleaning.
  - Some landowners were able to procure more productive land with the compensation received, thus potentially creating employment opportunities for laborers in the area.

Insight: *The development of solar parks in remote locations creates many socio-economic opportunities that may otherwise have not existed. They also create benefits further afield such as cleaner and cheaper electricity that have the potential to support human development and economic growth. In the transition processes, these social and economic benefits could be proactively*

distributed in ways that contribute to more inclusive and equitable development. The focus on the communities in the near vicinity could be expanded to take into account systemic changes at local, regional, and national levels with a view to contributing more intentionally to a just transition.

The provision of electricity to the state and national grids is a tangible way in which benefits can travel to communities further afield. However, there is a need to focus attention on the impacts of renewable energy projects on the energy sector at large, by taking into account coal communities, i.e., communities further away from the projects. Finance institutions could use country-level dialogues to highlight the broader systemic impacts of the energy transition and ensure that investment decisions support just transitions across geographic areas and impacted communities.

Environmental Impact

The Bhadla Solar Park is located in a desert landscape with extremely low agricultural value and limited livestock grazing. Due to the arid environment, the solar park has introduced technologies to reduce water use to a minimum. Bhadla has a total capacity of 2,245 MW and is expected to reduce CO_2 emissions by approximately 4 million tons per annum.[79] It has also reduced the demand for coal-fired power stations, coal mines (often in more productive lands), and emissions from coal transport.

Insight: *Given the impact of climate change on vulnerable communities globally, any delay in the decarbonization of the energy system is likely to be fundamentally unjust. By providing alternatives to environmentally-destructive and polluting coal value chains, Bhadla and other renewable energy initiatives address an important dimension of just transitions related to future distributional impacts.*

INSIGHTS FROM REWA SOLAR PARK IN RELATION TO JUST TRANSITIONS

Situated in Madhya Pradesh, the Rewa Solar Park, a 750MW solar power project, gained international recognition for bringing down the solar tariff to grid parity in February 2017. At a levelized tariff (over 25 years) of USD0.49 (INR3.30) per kWh, the Rewa Ultra Mega Solar project achieved the lowest tariff ever awarded for a solar project in India without viability gap funding at that point in time.[80 81] This aspiration had been set in NSM and CIP. It is also significant that this was achieved by a project that, for the first time, was led by a state entity, in partnership with national organizations. A collaborative effort across the World Bank Group and CIF unlocked both public and private funding for infrastructure development. A total of USD100 million in loans and grant funding was raised for the Solar Parks project, of which USD18 million were disbursed for the Rewa solar project. The role of IFC as the Transaction Advisor on the Rewa project has been described as pivotal to the success of the project in attracting large-scale private finance calculated at over USD575 million.

Land acquisition challenges

Given the potential complexities and delays associated with land acquisition, the Rewa project secured more than 90 percent of the land prior to the bidding process to build confidence in bidders and reduce project costs. The Rewa project acquired both government and private land. It is important to highlight that the majority of the land used for developing the solar park was on government land (more than 85

percent). The Madhya Pradesh government used the MP Consent Land Purchase Policy (2012) and the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act, 2013 to acquire the private land. Landowners were compensated at the prevailing market value plus an additional amount for immovable assets and a one-time solatium/compensation payment. Where landowners refused to provide consent, their lands were not acquired and the project areas structured accordingly. To curb the use of fertile land, approvals for land use changes were limited to 'wasteland' and 'mono-crop' land.

Although landowners were recognized and compensated in this instance, international and local studies suggest that from an economic and social perspective, getting annual land rentals is preferable over an upfront payment of compensation. This option provides a regular source of income for the landowners. However, a common challenge to both approaches (outright purchases and rental agreements with owners) is that workers on the land and others who may use the land are not recognized or compensated in these agreements. Therefore, clear state- and national-level policies are needed to address the interests and concerns of landowners, investors, developers, and other stakeholders who will be affected by various land lease models.

Insight: *The security of land acquisition was important for bringing down the cost of electricity generated at Rewa — a benefit that could be passed on to consumers. However, there is a risk that, without opportunities and support for the generation of alternative livelihoods, the ex-landowners and others who depend on employment or access to the land would be left worse off due to the solar park development. A range of alternative models, including lease agreements, community ownership models, benefit sharing (e.g., a small percentage of total revenue being paid back to the community), local economic development, and diversification, could be considered from a distributional impact perspective. In many of these models, non-landowners will still lose opportunities to benefit from the land and will thus require attention in the transition processes.*

Local community benefits

The guidelines for the establishment of the Rewa Solar Park called for the setting up of CSR funds, with contributions from the project investors/developers, equivalent to one percent of the total investment. As with the Bhadla project, this payment was linked to the environmental and social management framework (ESMF) developed by IREDA and included in the agreement with Rewa Ultra Mega Solar Limited (RUMSL). Based on ESMF, an environmental and social impact assessment needs to be carried out for each sub project and a sub project specific environmental management plan integrated into the contract document with RUMSL. RUMSL thus mirrored this requirement in the agreement with developers who are required to set aside one percent of the profit after tax for socio-economic projects.

CSR thus works at two levels: (i) CSR funds of developers, which are used for local area development, including individual needs; and (ii) RUMSL funds used for district-level initiatives, such as the district hospital under construction in Rewa CSR.

According to interview data, the CSR teams of the developers meet with opinion leaders and call local village meetings to identify local priorities for CSR investments and projects. Some of these are focused meetings with marginalized tribal households. Much of this work seeks to fill the gap between government provisions and local community needs, and it was noted that "there is no specific plan but rather individual developer responses to community requirements." At the district level, RUMSL-funded projects include: water facilities, mobile health clinics, skills training, enhanced water infrastructure at schools, investment in the district hospital, and career guidance.

Insight: *There is currently a tension between local-level consultation and responsiveness to community priorities on the one hand and a more coherent and strategic approach to local community development on the other. The distributed responsibility for local area development across RUMSL and developers makes it difficult to capture a consolidated picture of the developers' contributions to development impacts on local communities. There is an opportunity for international-, national-, and state-level stakeholders to formalize and monitor a consolidated local area development strategy that is informed by inclusive and transparent community participation.*

Environmental impacts

The location of the Rewa Solar Park on low-productivity land, in conjunction with the reduction in the need for coal mining and coal-fired power stations, creates a number of environmental benefits. These include decreased deforestation in coal mining areas, reduced water use and pollution, improved air quality, as well as the decline of 1.5 million tons of CO_2 emissions per annum.

Twenty-five percent of the electricity produced at the Rewa Solar Park is provided to the Delhi Metro, which means that 290 trains serving 2.6 million passengers per day are running on solar power. Innovative time-of-day scheduling and PPAs between RUMSL and Delhi Metro provide models for transforming the public transport sector.

Insights: *The decarbonization of the energy and transport sectors reduces the risk of climate change disasters, and thus, the vulnerability of resource-poor communities globally and within India. By offering alternatives to environmentally destructive and polluting coal value chains, as well as providing models for transforming aspects of the transport sector, the Rewa Solar Project addresses distributional impacts associated both with vulnerability to climate risk, and potentially, the provision of cheaper, more sustainable transport systems. These benefits need to be recognized alongside the losses suffered by coal-dependent workers in order to prevent a narrow interpretation of just transitions (i.e., focused solely on coal workers' interests) being used to stall urgent climate action.*

PROJECT CASE 2

FACILITATING ROOFTOP SOLAR ACCESS

Although NSM (2015) had set a target of 40 GW of rooftop solar energy by 2022, the initial uptake of rooftop solar energy had been slow, with installed capacity reaching just 1 GW early in 2018. This slow progress was largely due to the unavailability of commercial loans at a concessional rate and the lack of experience with regards to the financing, installation, and management of the rooftop sector in India.

However, in late 2016 and early 2017, in line with the updated CIP, CTF and partner MDBs unlocked significant financial support for rooftop solar energy. IBRD made available a line of credit (LoC) amounting to USD625 million through the State Bank of India, while ADB made a LoC of USD500 million available through the Punjab National Bank. Until then, banks had tended to issue loans to rooftop developers at a rate of 10–14 percent, depending on the credit rating of the borrower and the risks associated with the project. With CTF funding and MDB support, the interest on loans was reduced to 8.5–9.5 percent. This finance, available at a low cost, to developers, customers, aggregators, and intermediaries who qualified in terms of technical capacity, relevant experience, and creditworthiness as per the respective bank's loan scheme documents, enabled the large-scale deployment of rooftop solar energy, using different business models.

In addition to finance institutions and developers, a key link in rolling out rooftop energy is DISCOMs. They are responsible for providing and operating the local grid networks and the integration of the rooftop solar into the grid, as well as managing the supply of electricity to customers.

Ultimately, the development of rooftop solar energy is not only a technical and financial process, but also a social and institutional learning and capacity development process. For this reason, CTF, IBRD, and other partners in the rooftop projects have included a USD13 million technical assistance and capacity building program known as the Sustainable Partnership for Rooftop Solar Acceleration in Bharat (SUPRABHA). SUPRABHA offers technical assistance to 17 states to support: (i) policy and regulatory updates; (ii) national media campaigns; (iii) improving readiness for lending; along with (iv) scalable, standardized, and sustainable training modules.

Financing

The cross-subsidization of grid tariffs by the commercial and industrial (C&I) sectors for the residential and agricultural sectors has resulted in rooftop solar energy becoming increasingly financially attractive for the C&I sector. In a number of states, the costs associated with establishing and using rooftop solar power are substantially below the tariffs charged by DISCOMs to C&I customers.[82] Despite these benefits, project financing and pricing agreements with DISCOMs have been stalling progress in the sector. By making long-term concessional finance available to the sector and helping both investment managers in the commercial banks and officials in the DISCOMs understand the emerging financial

opportunities available through solar rooftop installations, the uptake within this sector is increasing.

Insights: *By supporting the use of existing rooftops, rather than forests or agricultural land, concessional finance contributes to an innovative solution to land pressures. However, little attention appears to have been given to the possible unintended negative outcome of the current focus on financing C&I consumers who pay a premium for electricity and thus cross-subsidize poorer customers. As C&I customers reduce their consumption of electricity provided through DISCOMs, the latter's income will decline. This would increase the cost of electricity and prompt those who can afford it to opt for self-generation (e.g. rooftop solar), thereby further weakening the DISCOMs and negatively impacting the remaining customers.*[83] *This has the potential to cause significant injustices, in terms of equitable access to energy and potential job losses in the DISCOMs. Just transitions require finance institutions and government to look beyond individual projects to the broader distribution of benefits and harms across the energy sector.*

Skills

Under the SUPRABHA Technical Assistance Program, the Skill Council for Green Jobs has partnered with 14 training institutions to train bankers, entrepreneurs, DISCOM officers, rooftop solar developers, and maintenance staff across 17 states. A total of 1,542 participants have been trained since mid-2018.

The aim of the training program designed for loan appraisal officers is to provide them with a thorough understanding of the structure of the Grid-Connected Rooftop Solar PV sector, business models, financing opportunities, risks and risk mitigation strategies, as well as project costing and evaluation. In the case of the training program for DISCOM officers, it provides an in-depth understanding on streamlining the processes of inspection and integration into the grid across the consumer spectrum. The Entrepreneurs Training program module, seeks to enable entrepreneurs to understand project management approaches, business models, financing opportunities, risks and risk mitigation strategies, along with costing, thus further accelerating the growth of grid-connected rooftop solar systems across the consumer spectrum.

Insights: *The focus on skills development within just transition discussions and initiatives is often limited to reskilling coal miners to help them find alternative employment. However, just transitions, more broadly, are going to require significant decarbonization across the entire economy, and this, in turn, will open up a wide range of new employment and livelihood opportunities. The SUPRABHA program demonstrates that skills will be required across the entire economy, and particularly, across the emerging renewable energy sector, including the up-skilling of investment analysts, policy makers, distribution utilities officers, developers, installers, and maintenance staff. As areas such as new energy-efficient building standards, industrial decarbonization, the rehabilitation of coal mining areas, and the repurposing of coal fired power stations develop, so too will new opportunities arise and new skills be needed. This suggests that a key component of just transitions will be to anticipate new skills requirements across entire sectors and put in place the institutions and curricula needed to support the development of existing and emerging skills needs.*


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IMPLICATIONS AND OPPORTUNITIES

The review of national literature, project documents, and interviews, which informed this case study, has provided insights into supporting just transitions in India and revealed opportunities in this area. The first part of the study highlights the drivers and barriers to a transition toward more sustainable energy production. The second part of the study provides insights into how CIF, MDB partners, and government institutions have supported this energy transition. This support has contributed to renewable energy becoming increasingly competitive, thus accelerating the energy transition in India. As this transition accelerates (and simultaneously becomes more urgent), so do concerns about social inclusion and distributional justice. The following section provides some implications and opportunities for CIF, MDBs, and other stakeholders to contribute to ensuring that the energy transition in India is also a just transition.

The barriers to and drivers of a transition out of coal suggest that a detailed and broad system-level modeling of the benefits and burdens on workers and communities, associated with decarbonizing the economy, needs to be undertaken. While the costs of not mitigating climate change for India are likely to be high, the political economy of coal will create resistance to transitioning to cleaner energy. System-level modeling, with a focus on sustainable development, will identify the distribution of benefits and harms associated with the energy transition. It will also inform decisions on who needs to be involved in transition dialogues and how distributional impacts across sectors and geographic areas could be addressed.

The geographic distribution of benefits and burdens have to be mapped to understand the implications of an energy transition and plan for just transitions. The impacts of the transition away from coal will be disproportionately felt in five or six states in India, and within these states, a limited number of districts. The states likely to face the most rapid and significant transitions away from coal are Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh, West Bengal, and

Andhra Pradesh. The phasing-out of coal in the north and east of India, along with the development of solar and wind projects, particularly in the south and west of India, requires the awareness of the geographic distribution of the impacts. The narrow CSR investments around renewable energy projects are insufficient to address, or compensate for, the impact on distant coal-dependent workers and communities. What is required is information and planning with a broader geographic view on transitions and the use of this information to intentionally plan for a just transition at a national level.

Opportunities for economic diversification in the areas affected by the phase-out of coal need to be identified and supported. Many of these areas have had their development stunted by the dominance of coal; as such, developing new economic opportunities will require substantial support. Restoring ecological infrastructure (especially forests), addressing water and land pollution, as well as developing local infrastructure such as roads, all provide multiple co-benefits for job creation and improved livelihoods. In addition, existing infrastructure, such as railway connections and transmission infrastructure, could be leveraged to support the development of new industrial sectors. Programs that focus on ecological restoration and resilience, such as the people, nature and climate program of CIF, could consider placing an emphasis on coal-dependent communities and areas. Central to the success of economic diversification will be the development of new skills amongst workers and communities to enable them to take up and create new jobs and livelihoods.

Local-level platforms for social inclusion and building the capacity of marginalized stakeholders to influence just transition outcomes is critical to attain the goals of a just transition. The experiences of informal labor in the closure of coal power stations and the court cases linked to land highlight the need to recognize and empower marginalized stakeholders in energy transitions to ensure just transitions. Failure to do so results in resistance and delays in response to the overlooked negative impacts on local jobs and livelihoods. National government and international groups are amongst the institutions that could support socially inclusive processes to bring government, business, civil society, and labor groups, including informal labor and Indigenous land users, together to discuss and plan for national- and local-level priorities within transition processes.

Coordination and follow-up across multiple agencies, as well as levels of planning and implementation to monitor impacts on vulnerable groups, are necessary. Social inclusion should be evident in the development of CIPs, associated projects, NAPPCCs, SAPCCs, and local projects. Evidence of recognition, participation, and appropriate governance structures for marginalized groups thus needs to be more carefully tracked across the planning and implementation of projects. Nationally inclusive planning is required, beyond the project level. It should incorporate and respond to transitions at a regional level and inform the design of a portfolio of interventions across different locations and communities who, together, help to pursue a just transition within India.

Local governments will require national-level, and potentially, direct international-level support to fund allocations to ensure just transitions. Local governments are well-positioned to understand and address local needs and opportunities. However, as income from coal mining and associated businesses diminish, there is likely to be resistance to a transition away from coal, unless services are maintained and new income opportunities created. This will require the transfer of funds across state boundaries via the national government. These efforts could be supported by international climate funds.

CIP, along with the Rewa and Bhadla Solar Parks, provide evidence that the work of CIF and MDBs can support both national- and state-level governments. This experience needs to be used to inform the socio-economic development in states affected by the transition away from coal. The use of coal mining royalties from DMF, for instance, for just transition processes needs to be supported and progressively subsidized to ensure and enable just transitions. In addition, new funds for the equitable distribution of benefits and harms need to be developed in relation

to renewable energy projects. These funds need to extend beyond local-level CSR funding.

CIF, in collaboration with MDBs and other partners, is well-positioned to assist developing countries in building country-level knowledge, capacity, and development project experience as it relates to just transitions. The research by ESMAP and the World Bank Group, along with early projects by ADB, which informed the approach to developing solar parks, had significant impacts on the cost of solar power in India. Similarly, the SUPRABHA Technical Assistance Scheme has built capacity in: the state banks for sustainable finance, DISCOMs for integrating renewable energy into the grid, and the renewable energy sector through skills development. There are opportunities to build a just transition focus into these initiatives and other capacity-building programs to share better practices and expand them into a range of institutions. This, in turn, will empower both institutional employees and their stakeholders to engage in and support systemic change in ways that contribute to just transitions.

State- and district-level governments are mandated to plan for local transitions, based on the particular balance of barriers and drivers related to the climate-related transitions in their specific contexts. CIF and MDBs could engage with and support state- and district-level governments to plan for and finance local-level transitions. This could include leveraging DMF to support just transitions at the local level. It will also require support for developing new economic and livelihood opportunities that generate income, as the DMF funds diminish due to the phase-out of coal mining. Given the negative impacts of coal mining and coal power stations on the local environment, specific support may be required to stimulate reforestation programs, water quality improvement, and the restoration of agricultural productivity in areas negatively affected by coal mining and pollution from coal power plants.

GoI, in partnership with CIF and other climate finance institutions, can make significant contributions to just transitions by proactively linking the various climate mitigation programs and national missions, with a view to reducing negative impacts related to the transition away from coal. India has set ambitious targets for the expansion of renewable energy, reductions in emissions intensity, and forest rehabilitation. These areas all offer co-benefits, including significant job creation potential. Although this case study has focused on CIF projects related to renewable energy, there are other areas of ambition related to the emerging program areas of CIF. This creates an expansive set of opportunities to support just transitions by opening up new climate-related employment for workers and communities who may lose jobs or livelihoods due to transitions out of the fossil fuel sector in India. This employment need not only be in the energy sector, but could expand to include: repurposing power stations for a range of manufacturing and tourism facilities; rehabilitating power plants and mines to accommodate renewable energy, ecosystem services, and agricultural activities; along with diversifying manufacturing, based on existing infrastructure, such as roads, water, electricity transmission, large buildings, etc.

CIF, MDBs, and climate funds can play a convening role through a programmatic approach that leverages the roles they play across states. The different contexts of the states, both in terms of the energy transition and climate vulnerability, will require central planning and simultaneous support for local-level energy transition initiatives to overcome negative distributional impacts. The opportunities and challenges created through the development of renewable energy in some parts of India need to be considered alongside those associated with the phase-out of coal in other parts of India. Both sets of opportunities and challenges need to be considered within the broader development aspirations of the country and individual states. By focusing more specifically on the states needing to phase out coal, climate funds and multilateral development institutions can play an important role by supporting national coordination, as well as the allocation of benefits and the mitigation of burdens. This can be done through energy transition and broader climate-related development initiatives.

CONCLUSION

The ongoing tension between India's development aspirations, based in part on access to cheap electricity and the vulnerability of many people to climate change, has, in recent years, become a false dichotomy. Renewable energy is increasingly cheaper than coal-based generation. The impacts of climate change, air and water pollution, the declining cost of renewables, and global commitments to climate change mitigation measures suggest that the transition away from coal will occur faster than is currently predicted in national plans.

However, several systemic barriers to just energy transitions require attention and strategic interventions. Barriers identified in this study include: the variable integration of renewable energy into the national grid and the need for substantial storage capacity; the cross-subsidization of railways transport; vested interests benefiting from the status quo; and significant government subsidies of fossil fuels.

Throughout the transition processes, issues of social inclusion will require the recognition, inclusion, and empowerment of a diverse range of stakeholders. India has a rich tradition of struggle for recognition, social inclusion, democratic processes, and fairer distributional impacts in India. The development of principles and practices, associated with climate justice at the international and national levels, as well as local-level struggles linked to 'environmentalism of the poor', provides many of the building blocks for just transitions in India. Civil society groups and labor could be supported to build on this history to strengthen social inclusion in transition processes.

Just transitions also require distributional impacts to be considered across a broad range of sectors, geographic scales, time horizons, and stakeholders. The relationship between the rapidly developing renewable energy sector and the coal sector is a key arena for considering just transitions in India. A key insight that has emerged through this case study is the geographic distribution of the benefits and harms, with many of the benefits of the energy transition being concentrated around the renewable energy projects in the south and west of India, while many of the negative impacts on coal-dependent workers and communities are and will continue to be experienced in the central and eastern areas of the country. This will require national-level intervention to ensure that cross-regional support is put in place, particularly as subsidies and revenue linked to coal value chains diminish within the context of responding to climate change.

At the same time, significant opportunities exist to ensure that new employment and livelihoods are created. This will require that attention be given to: land rights and compensation linked to both renewable energy and the proposed expansion of coal mining; the protection and rehabilitation of forests; the repurposing of coal power stations; the restoration of agriculture; as well as the diversification of economic opportunities associated with the expansion of renewable energy.

APPENDIX: LIST OF INTERVIEWEES

Over 30 individuals from 13 different institutions, representing the government, research/academia, labor congress and labor research affiliates, civil society organizations, renewable energy associations and broader business initiatives, the private sector, development finance institutions, and knowledge partnerships, were consulted for the development of this case study. The insights from these interviews are reflected in the case study in relation to the stakeholder group represented.

ORGANIZATION	INTERVIEWEES
Asian Development Bank (ADB)	Christian Ellermann, Cristina Santiago, Jiwan Sharma Acharya, Karan Chouksey
BSES Yamuna Power Ltd	Sunil Kumar Sharma
Climate Investment Funds (CIF)	Abhishek Bhaskar, Daniel Morris, Mafalda Duarte
Council on Energy, Environment and Water (CEEW)	Neeraj Kuldeep
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Ashish Chaturvedi, Winfried Damm
European Union Delegation in India	Edwin Koekkoek
Indian Institute of Technology (IIT)	Prof Pradip Swarnakar
Initiative for Sustainable Energy Policy (ISEP)	Brian Blankenship
International Bank for Reconstruction and Development (IBRD)	Abhinav Goyal, Amit Jain, Chandrasekar Govindarajalu, Mani Khurana, Parthapriya Ghosh, Rajeev Topno, Simon J. Stolp, Surbhi Goyal
International Forum for Environment, Sustainability & Technology (iFOREST)	Srestha Banerjee
Ministry of New and Renewable Energy (MNRE)	Dr. P.C. Maithani
National Skill Development Corporation (NSDC)	Jaikant Singh
University of British Columbia, PhD Student	Sandeep Pai

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
C&I	Commercial and Industrial
CIF	Climate Investment Funds
CIL	Coal India Limited
CIP	Country Investment Plan
CO2	Carbon Dioxide
COP	Conference of the Parties to the UN Framework Convention on Climate Change
CSR	Corporate Social Responsibility
CTF	Clean Technology Fund
CTI	Council of Transforming India
DISCOM	Distribution companies
DMF	District Mineral Foundation
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoI	Government of India
GW	Gigawatt
ha	Hectare
HDI	Human Development Index
IBRD	International Bank for Reconstruction and Development
IFC	International Finance Corporation
INR	Indian Rupee
IR	Indian Railways
IREDA	India Renewable Energy Development Association
km	Kilometer

kW	Kilowatt
kWh	Kilowatt-hour
LCOE	Levelized Cost of Electricity
LoC	Line of Credit
MDB	Multilateral Development Bank
MNRE	Ministry of New and Renewable Energy
Mt	Megaton
MW	Megawatt
MWh	Megawatt hour
NAPCC	National Action Plan on Climate Change
NDCs	Nationally Determined Contributions
NEP	National Electricity Plan
NSM	National Solar Mission
PLF	Plant Load Factors
PM	Particulate Matter
PPP	Purchasing Power Parity
PV	Photovoltaics
RFCTLARR	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement
RRECL	Rajasthan Renewable Energy Corporation
RUMSL	Rewa Ultra Mega Solar Limited
SAPCCs	State Action Plans for Climate Change
SEC	Solar Energy Corporation of India
SUPRABHA	Sustainable Partnership for Rooftop Solar Acceleration in Bharat
TERI	The Energy and Resources Institute
UN	United Nations
USD	United States Dollar

ENDNOTES

1 Climate Investment Funds, 2020.

2 Climate Investment Funds, 2020.

3 Climate Investment Funds, 2020.

4 World Bank, "Poverty & Equity Brief: India", 2020.

5 World Bank, "India Development Update", 2020.

6 The Saubhagya Scheme was a GoI project to provide electricity to all 'willing households'. It was announced in 2017 and three years later the GoI announced that the target had been achieved. The definition of 'willing household' is vague but appears to exclude any household that did not apply for an electricity connection – and millions of households chose not to do so based largely on affordability concerns.

7 Brent, 2019; Nair, 2020; Urpelainen, 2019.

8 IEA, 2021.

9 Srinivasan, 2091 in Dubash, 2019.

10 Climate Action Tracker, 2020.

11 CIF, 2015.

12 Due to the COVID pandemic, it was not possible to conduct field visits and interviews in situ.

13 Martinez-Alier et al., 2016.transport, and waste disposal. Therefore, there are many local complaints, as shown in the Atlas of Environmental Justice (EJatlas).

14 Swarnakar, 2019 in Dubash 2019.

15 Roy, Kuruvilla, and Bhardwaj, 2019

16 World Bank, "Poverty & Equity Brief: India", 2020; World Bank Group, 2020.

17 IEA, 2021.

18 Bhattacharjee, 2017.

19 Government of India, 2011.

20 Central Electricity Authority, 2021.

21 Kumari, 2019.

22 National Power Portal, 2021.

23 Ali and Tongia, 2019; Tongia, Sehgal, and Kamboj, 2020.

24 Samad and Zhang, 2016.

25 Sahai and Kamboj, 2020.

26 Dawn et al., 2016.

27 Pai and Carr-Wilson, 2018.

28 Shalya, 2020.

29 Aggarwal, 2020.

30 Central Electricity Authority, 2018.

31 PLF is the ratio of average power generated by the plant to the maximum power that could have been generated in a given time or the installed capacity.

32 Ali and Tongia, 2020.

33 Bijlani, 2020.

34 Gupta, 2020.

35 Gupta, 2020.

36 Goyal, 2018.

37 Worrall et al., 2019.

38 Geddes et al., 2020.

39 Geddes et al., 2020

40 Rajasekhar and Tongia, 2020; Garg and Shah, 2020Rs. 90,000 crore was initially earmarked for electricity Distribution Companies (DisComs

41 Garg and Shah, 2020.

42 Vishnoi, 2019.

43 IEA, 2020

44 Bloomberg NEF, 2019

45 Deorah et al., 2020.

46 Spencer et al., 2020.

47 International definitions of 'stranding' tend to focus on the under-recovery on investments due to climate change and climate change policy, while definitions in India emphasize stressed assets and highlight issues of delays in payment of interest.

48 Worrall et al., 2019.

49 IEA, 2020.

50 Worrall et al., 2019.

51 Tongia, Sehgal, and Kamboj, 2020.

52 Sitharaman, 2020.

53 Urpelainen, Sais, and Pelz, 2020.

54 Worrall et al., 2019.

55 Pai and Zerriffi, 2021.

56 Sengupta, 2020.

57 Financial Express, 2019.

58 Climate Transparency, 2019.

59 Worrall et al., 2019.

60 Mehra et al., 2018.

61 Stevis, 2013.

62 Roy and Martinez-Alier, 2019.

63 Amnesty International India, 2016

64 Chandran, 2016; Herbert and Lahiri-Dutt, 2004.

65 Sharma, 2015.

66 Thadani, 2021.

67 Chari, 2021.

68 Bhati, 2020.

69 Institute for Advanced Sustainability Studies, 2019.

70 Tongia, Sehgal, and Kamboj, 2020.

71 Bhati, 2020.

72 Jha, 2014.

73 Jha, 2014; Sarangi, 2018.

74 Quote from the IP 2015 add ref.

75 National Power Portal, 2021.

76 Dutta, 2017.

77 Chari, 2020

78 This compensation could include access to reskilling, building of community structures, the creation of alternative employment opportunities, and enhanced access to decision-making so as to influence development opportunities in the region.

79 ABD, n/d

80 SEC, 2020.

81 Viability Gap Funding (VGF) means a grant, one-time or deferred, provided to support infrastructure projects that are economically justified, but falls short of financial viability.

82 PWC, 2018.

83 Tongia, Sehgal, and Kamboj, 2020.

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The Climate Investment Funds (CIF) were established in 2008 to mobilize resources and trigger investments for low carbon, climate resilient development in select middle income and developing countries.
To date, 14 contributor countries have pledged over US$ 8 billion to the CIF, which is expected to leverage an additional $60 billion in co-financing for mitigation and adaptation interventions at an unprecedented scale in 72 recipient countries.
CIF's large-scale, low-cost, long-term financing lowers the risk and cost of climate financing. It tests new business models, builds track records in unproven markets, and boosts investor confidence to unlock additional sources of finance. The CIF is the largest active climate finance mechanism in the world.

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