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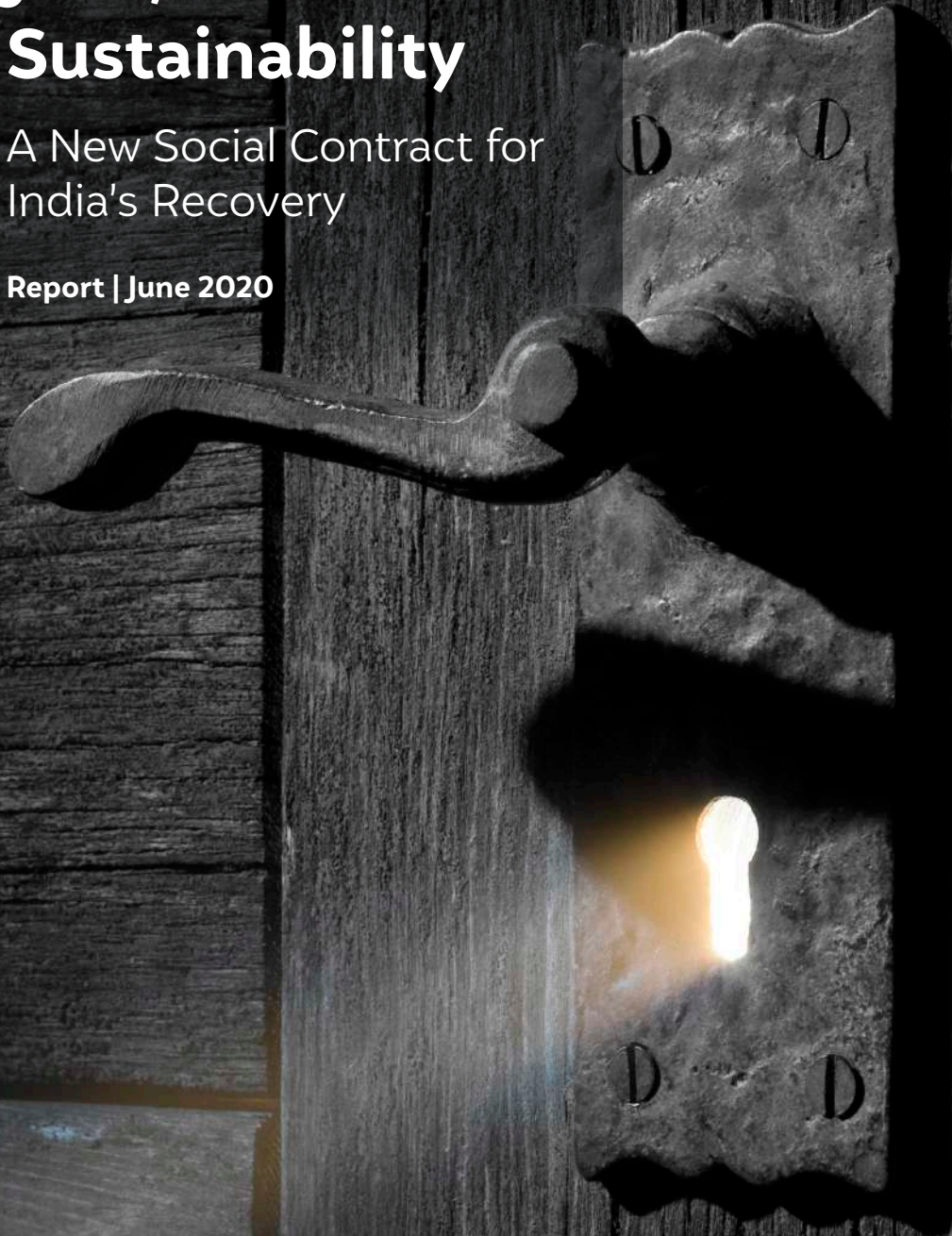
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Jobs, Growth and Sustainability

A New Social Contract for India's Recovery

Report | June 2020





Textiles, along with agriculture, food and beverage, and transport, comprise the bulk of India's household consumption basket, with extensive linkages across raw materials, manufacturing, and services. However, textile manufacturing MSMEs are among the most vulnerable, and need targeted support to tide over this economic downturn.
CEEW analysis



Jobs, Growth and Sustainability

A New Social Contract for India's Recovery

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The **National Institute of Public Finance and Policy** (NIPFP) is a centre for research in public economics and policies. Founded in 1976, the institute undertakes research, policy advocacy and capacity building in areas related to public economics. One of the major mandates of the institute is to assist the Central, State and Local governments in formulating and reforming public policies by providing an analytical base. The institute was set up as an autonomous society, at the joint initiative of the Ministry of Finance, Planning Commission, several state governments and distinguished academicians. It is registered under the *Societies Registration Act, 1860*.

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About CEEW

The Council on Energy, Environment and Water (CEEW) is one of South Asia's leading not-for-profit policy research institutions. **The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources.** The Council addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high-quality research; develops partnerships with public and private institutions; and engages with the wider public.

In 2020, CEEW once again featured extensively across nine categories in the 2019 Global Go To Think Tank Index Report, including being ranked as **South Asia's top think tank (15th globally) with an annual operating budget of less than USD 5 million for the seventh year in a row.** CEEW has also been ranked as South Asia's top energy and resource policy think tank in these rankings for the second year running. Further, it has consistently featured among the world's best managed and independent think tanks. In 2013, 2014 and 2016 CEEW was ranked among the world's 20 best climate think tanks.

In over nine years of operations, The Council has engaged in over 230 research projects, published over 160 peer-reviewed books, policy reports and papers, advised governments around the world nearly 530 times, promoted bilateral and multilateral initiatives between governments on 80 occasions, and organised nearly 300 seminars and conferences. In July 2019, the CEEW Centre for Energy Finance was launched by H.E. Mr Dharmendra Pradhan and H.E. Dr Fatih Birol.

The Council's major completed projects and contributions include the 584-page National Water Resources Framework Study for India's 12th Five Year Plan; the first independent evaluation of the National Solar Mission; India's first report on global governance, submitted to the National Security Adviser; irrigation reform for Bihar; the birth of the Clean Energy Access Network; policy briefs submitted to the PMO on accelerated targets for renewables, power sector reforms, environmental clearances, Swachh Bharat; pathbreaking work for the Paris Agreement, the HFC deal, the aviation emissions agreement, and international climate technology cooperation; developing the strategy for and supporting activities related to the International Solar Alliance (ISA); designing the Common Risk Mitigation Mechanism (CRMM); critical minerals crucial for Make in India; modelling 222 scenarios for India's low-carbon pathways; India's largest multidimensional energy access survey (ACCESS); climate geoengineering governance; circular economy of water and waste; and the flagship event, Energy Horizons.

The Council's current research focus includes launching a go-to-market programme to promote decentralised renewable energy-powered livelihood appliances; examining country-wide residential energy consumption patterns; raising consumer awareness and engagement on power issues; piloting business models for solar rooftop adoption; developing a renewable energy project performance dashboard; green hydrogen for industry decarbonisation; state-level modelling for energy and climate policy; reallocating water for growth; creating a democratic demand for clean air; raising consumer awareness on best AC servicing practices; and supporting India's electric vehicle ambitions.

The Council has a footprint in 19 Indian states, working extensively with state governments and grassroots NGOs. Our key ongoing research and engagements at the state-level include supporting power sector reforms in Uttar Pradesh and Tamil Nadu, scaling up solar-powered irrigation in Chhattisgarh, supporting climate action plans in Gujarat and Madhya Pradesh, evaluating community-based natural farming in Andhra Pradesh, examining crop residue burning in Punjab, and promoting solar rooftops in Delhi and Bihar.

The Council's Board is currently chaired by Mr Jamshyd Godrej. Some of our other illustrious board members include Mr Tarun Das, Dr Anil Kakodkar, Mr S. Ramadorai, Mr Montek Singh Ahluwalia and Dr Naushad Forbes. The nearly 80-member strong executive team is led by Dr Arunabha Ghosh.

About NIPFP

The National Institute of Public Finance and Policy (NIPFP) is a centre for research in public economics and policies. Founded in 1976, the institute undertakes research, policy advocacy and capacity building in areas related to public economics. One of the major mandates of the institute is to assist the central, state and local governments in formulating and reforming public policies by providing an analytical base. The institute was set up as an autonomous society, at the joint initiative of the Ministry of Finance, Planning Commission, several state governments and distinguished academicians. It is registered under the *Societies Registration Act, 1860*.

In its 43 years of existence, the institute has emerged as a premier think tank in India, and has made significant contribution to policy reforms at all levels of the government. It has maintained close functional links with the central and state governments all along, and has built up linkages with other teaching and research institutions both in India and abroad. Although the institute receives an annual grant from the Ministry of Finance, Government of India, and various state governments, it maintains an independent non-government character in its pursuit of research and policy.

Message from the Chairperson

We are living in unprecedented times. A crisis of the scale of the COVID-19 pandemic presents infinite problems across geographies, communities, industries, administrative agencies, and support services in a country as vast, diverse and densely populated as India. It has aggravated an already vulnerable economic situation. It has created a heart-wrenching humanitarian tragedy. It has put governments in a bind, having to choose between saving lives and protecting livelihoods. It has tested the resilience of communities and local administrators. It has shown up the weaknesses in multilateral institutions. And it is not over yet.

As India seeks to chart its own pathways out of the many crises it is facing, this is also a moment to consider new opportunities. The Council on Energy, Environment and Water (CEEW), which I chair, and the National Institute of Public Finance and Policy (NIPFP) have collaborated to assess and curate a set of economy-wide and sectoral issues that need policy, financial, technological and behavioural interventions to solve urgent problems and/or create an inclusive and more resilient economic system that can withstand future shocks.

The interlinkages between our economic world and the natural environment have been ignored for far too long. The pandemic is just one example of how humans are pushing planetary boundaries — and, in turn, the planet is pushing back. Climate change and biodiversity collapse threaten our way of life because we can expect more frequent and intense occurrences of widespread shocks, from zoonotic diseases to extreme weather events, from water and heat stress to decline in agricultural output, and to the destruction of our built infrastructure.

The two institutions responsible for this report have pooled their critical resource — their brainpower — to develop a set of solutions that respond to the here and now as well as envision a different future. The recommendations span a vast array of issues that will define the pace and direction of India's recovery.

I congratulate the two institutions and everyone who has contributed to conceptualising the philosophy of this report and in shaping its contents. I hope relevant authorities — at the Centre and in states — as well as key stakeholders from industry, agriculture and civil society will carefully consider the authors' counsel. And I hope we will do more than merely deliberate. A new world awaits our action.



Jamshyd N. Godrej
Chairperson, CEEW

Foreword

With the outbreak of the COVID-19 worldwide pandemic in early February, 2020, India is now in the midst of dealing with a combination of shocks — an emerging public health crisis and an administrative crisis to manage displaced labour in the backdrop of a stressed financial sector and a lagging economy. As these unprecedented times unfold, our initial public policy response has been two-pronged: First, to tackle the health emergency and, second, to restore the economy. While the health emergency may have its own course, it is evident that policymakers would have to take convincing economic decisions to lay down the economic recovery path. Two key challenges matter in shaping the economic recovery: the extent of fiscal outlay and the regulatory changes to address structural issues of the economy.

The COVID-19 pandemic has also presented some unique challenges. The economic trade-offs of policy actions have taken a new dimension as resources have competing demands between optimising efficiency and alleviating human distress. Should the focus be on restoring our growth trajectory, or should we compensate those who have been substantially destroyed by the pandemic and its consequences? The questions require answers that are based on clear assessments, objectives, institutional capabilities and financial capacity.

As the pandemic unfolds and policy responses get narrower, policymakers require guideposts and implementable solutions. To our benefit, researchers at the Council on Energy, Environment and Water (CEEW) and the National Institute of Public Finance and Policy (NIPFP) have put together a useful report that has explored problem areas and viable solutions that can guide policy action and direct the future course of research in this area.



Rathin Roy
Director, NIPFP

Preface

Imagination cannot be locked down. The times might seem surreal, but we are also fortunate to be present at the creation of a new world. Our responses will be tempered by policy, technology and finance. What shape the new world takes, however, can be liberated by our imaginations.

Soon after the largest lockdown in the world was announced, the Council on Energy, Environment and Water (CEEW) and the National Institute of Public Finance and Policy (NIPFP) agreed to work together on designing the response to the extraordinary situation in which India finds itself.

We are faced with a confluence of shocks to public health, economic output, employment and livelihoods, administrative capacity, and social cohesion. The responses to wicked problems cannot be linear. Such problems, by definition, are difficult to solve because of the contradictory demands of competing policy priorities with stakeholders clamouring for attention and resources.

Our approach was to confront the contradictions head-on. We recognised the challenges of assessing the economic situation in the face of data limitations. We prioritised equity to examine how to deliver minimum support to targeted beneficiaries. We looked for new drivers of investment and growth and also jobs. And we asked if there were greenfield opportunities that would build resilience against future shocks and be sustainable.

The main message of this report is that India needs a new social contract. This covenant between the state, the citizen and enterprise would have two pillars: A commitment to jobs, growth and sustainability; and building resilience against tail-end risks, which have low probability but devastating impacts.

A different world is possible. It would need us to build resilient infrastructure. It demands that we measure risks differently, not just perceived risks in the financial sector but the risks of not acting against unsustainable development that results in losses in the hundreds of billions. Fiscal and monetary stimuli can promote green entrepreneurship (in sustainable agriculture or clean energy or energy-efficient industries or sustainable mobility solutions). This different world would fix distorted subsidies and value ecosystem services in a manner that state support goes to the most vulnerable, rather than the privileged, and so that our consumption choices account for our footprints on the natural environment. These interventions could also create new jobs, in the millions.

This report contains solutions for the micro, small and medium enterprises (MSME) sector, for informal and migrant labour, to reduce environmental and public health risks, for food, water and energy security, to sustain clean air in our cities, to allocate subsidies equitably, to strengthen the power sector while boosting the energy transition, to encourage shifts towards cleaner fossil fuels, to deepen markets for renewables and distributed energy, and to build the hard and soft infrastructure to handle disasters.

In freeing our imaginations we have not lost sight of terrestrial moorings — of fiscal constraints, depressed demand, downbeat financial sentiment, and limited institutional capacity. Each set of recommendations presented in this document comes with details on the timeline (focusing on urgent versus systemic interventions and exit strategies), the implementing institutions (at different levels of governance), the resources required (or even saved), and, most importantly, the impact (and at times trade-offs) on jobs, growth and sustainability. The pathways outlined here are possible but need active interventions. This is not a document of the ideological; this is a manifesto by the analytical and for the practical.



Arunabha Ghosh
Chief Executive
Officer, CEEW



India must seize the opportunity to reduce its reliance on imported solar products and boost domestic manufacturing and services to tap global demand. This will add new jobs, contribute to economic growth, and reduce forex outflow.

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Conversion rate
INR 75.35 = USD 1

For future years, all prices in this document are in real terms. Please refer to the sources for details. All numbers based on CEEW analysis for the future undertaken specifically for this document are in 2019 constant prices.

Acronyms

AePS	Aadhaar-enabled Payment System	FTE	full-time equivalent
AD	accelerated depreciation	GWP	global warming potential
AC	air conditioner	GSTIN	Goods and Services Tax Identification Number
AIFTA	ASEAN-India Free Trade Agreement	GoI	Government of India
ASEAN	Association of Southeast Asian Nations	GHG	greenhouse gas
AMRUT	Atal Mission for Rejuvenation and Urban Transformation	GDP	gross domestic product
ABA	<i>Aatma Nirbhar Bharat Abhiyan</i>	GVA	gross value added
ACOS	average cost of supply	HVAC	heating, ventilation, and air conditioning
BoP	balance of payment	IPP	independent power producer
BYPL	BSES Yamuna Power Limited	ICAR	Indian Council for Agricultural Research
BEE	Bureau of Energy Efficiency	IMD	Indian Meteorological Department
BIS	Bureau of Indian Standards	IR	Indian Railways
CCC	cash conversion cycle	IREDA	Indian Renewable Energy Development Agency
CEA	Central Electricity Authority	ISPRL	Indian Strategic Petroleum Reserves Limited
CERC	Central Electricity Regulatory Commission	ICT	information and communications technology
CPCB	Central Pollution Control Board	IBC	Insolvency and Bankruptcy Code
CPSE	Central Public Sector Enterprise	IDSP	Integrated Disease Surveillance Project
CPSU	Central Public Sector Undertaking	IESM	Integrated Emergency Surveillance System
CGD	city gas distribution	IERP	Integrated Energy Resource Plan
CIL	Coal India Limited	IPDS	Integrated Power Development Scheme
C&I	Commercial and industrial	IWRM	integrated water resources management
CSC	Common service centres	ICE	internal combustion engine
CEPA	Comprehensive Economic Partnership Agreement	IEA	International Energy Agency
CAG	Comptroller and Auditor General	IoT	Internet of Things
CSR	corporate social responsibility	ISA	International Solar Alliance
CEEW	Council on Energy, Environment and Water	IPC	irrigation potential created
CEEW-CEF	CEEW Centre for Energy Finance	IPU	irrigation potential utilised
DST	Department of Science and Technology	JAM	<i>Jan Dhan - Aadhaar - Mobile</i>
DBT	direct benefit transfer	kg	kilogramme
DGTR	Directorate General of Trade Remedies	KYC	know your customer
DRE	distributed renewable energy	KUSUM	<i>Kisan Urja Suraksha Evam Utthaan Mahabhiyan</i>
Discoms	distribution companies	LCOE	levelised cost of electricity
GCM	Global Climate Models	LNG	liquefied natural gas
EWS	economically weaker section	LPG	liquefied petroleum gas
EV	electric vehicle	MNREGS	<i>Mahatma Gandhi National Rural Employment Guarantee Scheme</i>
EA	Electricity Act	MSME	micro, small and medium enterprise
EGoM	Empowered Group of Ministers		
EPC	engineering, procurement and construction		
FPO	farmer producer organisations		
FDI	foreign direct investment		
FTA	free trade agreement		

MSME-DI	Micro, Small and Medium Enterprises Development Institutes	NIPFP	National Institute of Public Finance and Policy
MSEs	micro and small enterprises	NISE	National Institute of Solar Energy
MSEFC	Micro and Small Enterprises Facilitation Council	NIWE	National Institute of Wind Energy
MUDRA	Micro Units Development and Refinance Agency	NLDC	National Load Despatch Centre
MFIs	micro-finance institutions	NMSH	National Mission on Sustainable Habitat
MMBTU	million British thermal units	NREC	National Renewable Energy Corporation
MLD	million litres per day	NREP	National Renewable Energy Policy
MT	million tonnes	NSSO	National Sample Survey Office
MoAFW	Ministry of Agriculture and Farmers' Welfare	NSDC	National Skill Development Council
MoC&I	Ministry of Commerce and Industry	NSO	National Statistical Office
MoD	Ministry of Defence	NTPC	National Thermal Power Corporation
MoEFCC	Ministry of Environment, Forest and Climate Change	NBFCs	non-banking financial companies
MoES	Ministry of Earth Sciences	NGOs	non-governmental organisations
MEA	Ministry of External Affairs	NMT	non-motorised transport
MoF	Ministry of Finance	NPAs	non-performing assets
MoFPI	Ministry of Food Processing Industries	OMCs	oil marketing companies
MoHFW	Ministry of Health and Family Welfare	O&M	operations and management
MoHA	Ministry of Home Affairs	PAT	Perform, Achieve and Trade
MoHUA	Ministry of Housing and Urban Affairs	PDS	public distribution system
MHRD	Ministry of Human Resource Development	PPE	personal protective equipment
MoMSME	Ministry of Micro, Small and Medium Enterprises	PNGRB	Petroleum and Natural Gas Regulatory Board
MoPNG	Ministry of Petroleum and Natural Gas	PV	photovoltaic
MoP	Ministry of Power	PNG	piped natural gas
MSDE	Ministry of Skill Development and Entrepreneurship	PLFs	plant load factors
MoSPI	Ministry of Statistics and Programme Implementation	PCT	pollution control technologies
M-SIPS	Modified - Special Incentive Package Scheme	PFC	Power Finance Corporation
MISHRII	MSME Information System for Holistic and Real-time Identification, Incentives and Support	PGCIL	Power Grid Corporation of India Limited
NAAQS	National Ambient Air Quality Standards	PPA	power purchase agreement
NABARD	National Bank for Agriculture and Rural Development	PPP	public-private partnership
NCAP	National Clean Air Programme	PSA	power sale agreement
NCEEF	National Clean Energy and Environment Fund	POSOCO	Power System Operation Corporation
NCLT	National Company Law Tribunal	PMGKAY	<i>Pradhan Mantri Garib Kalyan Ann Yojana</i>
NDMA	National Disaster Management Authority	PMJDY	<i>Pradhan Mantri Jan Dhan Yojana</i>
NEC	National Electricity Council	Saubhagya	<i>Pradhan Mantri Sahaj Bijli Har Ghar Yojana</i>
NEP	National Electricity Plan	PMUY	<i>Pradhan Mantri Ujjwala Yojana</i>
NHP	National Hydrology Project	PHCs	primary healthcare centres
NIC	National Informatics Centre	PDS	public distribution system
		PSUs	public sector units
		PT	public transport
		PPP	public-private partnership
		RCM	regional climate models
		RRBs	regional rural banks
		RE	renewable energy
		RBI	Reserve Bank of India
		RWA	resident welfare association
		RTS	rooftop solar

SHGs	self-help groups
STPs	sewage treatment plants
SMS	short message service
SIDBI	Small Industries Development Bank of India
SECI	Solar Energy Corporate of India
SECC	Socio-Economic Caste Census
SEZ	Special Economic Zone
SIPS	Special Incentive Package Scheme
SoP	standard operating procedure
SID	State Department of Industry
SDMA	State Disaster Management Authority
SPCB	State Pollution Control Board
SREP	State Renewable Energy Policy
TLTRO	Targeted Long-term Repo Operation
TRQ	tariff rate quota
UAM	<i>Udyog Aadhaar Memorandum</i>
UERF	Unified Emergency Response Framework
UBIN	Unique Business Identification Number
UIDAI	Unique Identification Authority of India
VAT	value added tax
VGf	viability gap funding
WUA	water users' associations
WASH	Water, Sanitation and Hygiene
WSN	Wireless Sensors Network
WHO	World Health Organisation



The Aatma Nirbhar Bharat Abhiyan (Self-reliant India Movement) presents a massive opportunity for Indian MSMEs to build capacity to deliver world-class goods and services at scale for the domestic and export markets.

Executive summary

A perfect storm

India is beset with a perfect storm of shocks. The COVID-19 public health emergency has led to an unprecedented, months' long lockdown of 1.3 billion citizens, which has displaced millions of migrant workers, put the economy under severe stress and stretched administrative capacity. The crisis has also exacerbated a crisis in multilateralism, which had already been ebbing on many fronts. The uncertainty around how long countries and communities would have to remain wary of the coronavirus has made it difficult to restart the economy and put long-term sustainable development at risk.

It is now evident that going beyond immediate relief measures to counter the crisis, India needs a major economic recovery plan to counter the short- to medium-term adversities.

The Government of India has announced a special economic and comprehensive package sized at 10 per cent of GDP, which includes interventions for immediate relief, liquidity, and payment deferrals. These announcements have been made in phases, starting with a relief package of INR 1.70 lakh crore (USD 23 billion) in March 2020 under the *Pradhan Mantri Garib Kalyan Yojana* (PMGKY) to provide food and cash in hand to the poorest of the poor; interventions by the Reserve Bank of India (RBI) worth INR 6.50 lakh crore (USD 86 billion) — 3.2 per cent of GDP — to support businesses, in particular micro, small and medium enterprises (MSMEs), and the broader, economy-wide interventions declared in May.

In parallel, the government has partially restarted bus and train services to allow migrants to return to their villages, and special flights to repatriate citizens stranded abroad. Some essential industries have been permitted to operate, with restrictions, only employing workers already available in those districts, and housing them within industrial compounds.

In his address to the nation on 12 May, Prime Minister Narendra Modi launched the *Aatma Nirbhar Bharat Abhiyan* (Self-reliant India Movement), exhorting citizens to be 'vocal for local', indicating the strategic shift in focus to a robust domestic production and supply chain, and a cautious outlook towards international trade.

Despite the right intentions, implementing these measures will not be easy. Financial aid to MSMEs would not be effectively distributed because of challenges with identifying and targeting those most in need. The challenge of millions of contract labourers and daily wage workers losing their livelihoods raises systemic choices: Will they return to the cities and, if not, what kinds of gainful employment could they find in the villages? The persisting need for social distancing and sanitisation directives will continue to disrupt supply chains, impede cash flow and cash recoveries, and make it difficult for businesses to resume normal operations.



**INR
20 lakh
crore**

Total outlay of
*Aatma Nirbhar
Bharat* special
economic and
comprehensive
package

Even as the immediate attention remains on the humanitarian emergency — for health services and relief to patients, stranded workers and vulnerable communities — India has set out to implement a recovery-cum-stimulus strategy.

Faced with the dilemma of containing the outbreak and saving lives, on one hand, and preserving businesses and livelihoods, on the other, the government has devised fiscal and monetary policy responses to cover two planning horizons: Immediate, to address relief measures to cushion the nationwide lockdown; and medium- to long-term, to deal with the socioeconomic aftereffects in terms of public healthcare, priorities for state expenditure, and regulations to operate businesses and establishments.

This road to recovery also critically depends on the exit strategies from the lockdown. Post-lockdown public finance would have to focus on two areas: A fiscal stimulus to alleviate the adverse impact on firms, self-owned enterprises, and migrant workers, and structural economic recovery through stabilisation of financial institutions and inflation rates, and increased rate of economic growth.

A new social contract

The COVID-19 pandemic gives us an opportunity to shape the economic recovery in a manner that would deliver **a new social contract between the state, the citizen and the enterprise, one that rests on two pillars: commitment to jobs, growth, and sustainability; and a razor-sharp focus on tail-end risks.**

Policymakers usually dismiss the trinity of jobs, growth, and sustainability as ‘impossible’. Often, public policy interventions prioritise two out of these three objectives. Building a new social contract rests on squaring this impossible trinity by reorienting the economic structure from being exclusionary to making sustainable development much more people-centric and inclusive.

India’s economic recovery path from the pandemic has significant trade-offs. As the full spectrum of the crisis unfolds, we must acknowledge two crucial dimensions. First, the past is no guide to the future means that the traditional methodology of deductive assessments based on trend or time series economic analysis is no longer useful, at least in the short run. Cross-sectional comparisons are also hampered by differential experiential trajectories.

The government must, therefore, implement a survey-based rapid data collection and investigation strategy so that policy can be designed based on inductive analysis, learning from the impact of the crisis on different geographies and socioeconomic conditions. This will also help repurpose public and private expenditure as the situation evolves.

The second dimension is the trade-off between economic optimisation and the alleviation of human distress. There are no easy answers to difficult questions:

- ▼ Should the effort be to incentivise migrant labour to remain in their workplaces with attractive remuneration packages and a commitment to better working and living conditions (such as commitments to a slum-free India, better quality public education, and healthcare)?
- Or should the government prevent a repeat of the unfolding tragedy by adopting a policy that leads to reduced concentration of workers and dispersion of economic activity to areas of the country from where the migrant labourers hailed?
- ▼ Should public resources be used to compensate those whose livelihoods will be substantially destroyed by the epidemic?



India needs a new social contract to square the ‘impossible’ trinity of jobs, growth and sustainability

Or should the focus be on supporting and growing resilient economic activities to maximise future output and welfare?

These questions may not have direct answers, but the solutions can only emerge with clear, defined objectives (drawn from a growing body of evidence) and the capacity to implement them through the administrative machinery.

Delivering on the promise of jobs, growth and sustainability would rest on some key principles: Informed decision-making (especially when traditional data sources are inadequate); equity in ensuring minimum support to targeted beneficiaries; using new drivers of investment and growth (especially in smaller towns and rural areas); and tapping greenfield opportunities to invest in and develop new areas which would be more resilient against widespread environmental and health shocks. This report is replete with examples and recommendations that fulfil these conditions.

De minimis multilateralism

On the global front, the crisis presents an opportunity to shift international conversations away from dilemmas of common interests and towards issues of **common aversions**.

Common interests, such as trade, finance and technology, bring countries to the negotiating table. But worries about relative gains and losses to each often result in inertia. Supply chains will shrink as countries seek to reduce overreliance on single sources or markets and aim for more localised value and job creation.

As objectives of countries and companies undergo major shifts, the scope for grand bargains is shrinking. The axioms of free trade, free movement of capital, or freedom of energy supplies are being questioned against a cruder metric: myopic self-interest.

For the time being, we must settle for *de minimis* multilateralism: What is the minimum on which our interests converge?

For new forms of international cooperation to emerge, we must focus on chronic risks that all countries would have an interest in avoiding. When international cooperation is ebbing, renewed drive for collective action can come from how we organise multilateral institutions to respond to shocks, whether health-related, environmental, or financial.

We must now develop the multilateral platforms that can prevent environmental crises of planetary scale and significance.

Help businesses survive, then thrive

Changing global equations will impact India's industry in both adverse and favourable ways. Sectors primarily dependant on imported raw materials or goods will be endangered if trade barriers rise; however, this presents a massive opportunity for MSMEs to build capacity to deliver world-class goods and services at scale for the local and export markets.

India's MSME sector represents 90 per cent of its industrial units, and contributed to 45 per cent of its total industrial value addition and almost half its exports—48.1 per cent—worth INR 11.1 lakh crore (USD 147.4 billion), in 2018-19.



Build new
multilateral
platforms to
identify and
avoid common
and chronic risks

However, most of these enterprises are informal and outside the formal trade and banking systems. Of the estimated 63.38 million unincorporated non-agricultural MSMEs, more than 63.05 million i.e. 99 per cent are micro, 0.33 million are small, and approximately 5,000 are medium. Almost 96 per cent of MSMEs are proprietary.

A second complexity is that 90 per cent of India's estimated 450 million-strong workforce is also informal, with 5-10 million new workers added annually. MSMEs employ about 40 per cent of these workers.

It is impossible to chart India's recovery without taking these millions of enterprises and their workers along. However, the MSME sector, despite its rapid expansion in the past few years, was already in distress before the COVID-19 lockdown, due to a perceived lack of creditworthiness. While short-term relief measures are imperative to ease working capital constraints, the benefits of indiscriminate lending will be short-lived and only delay the inevitable non-performance of assets.

Sustained revival of MSMEs hinges on addressing the challenge of rampant informality through deep structural and regulatory reforms, starting with proper identification of the enterprises and establishing accountability of all stakeholders.

In this report, we propose the creation of a nationwide, centralised digital platform, **MISHRII: MSME Information System for Holistic and Real-time Identification, Incentives and Support**. MISHRII would collect data on the size, distribution, and economic contribution of MSMEs and their workers to the national output, and seed details such as occupation, days of employment and monthly income into their Aadhaar-linked profiles. It should be linked with the goods and services tax (GST), value added tax (VAT), income tax, and other tax databases, and the banking network for direct benefit transfer (DBT). Access to real-time, credible information about MSMEs would allow their inclusion in formal business and banking systems; ensure efficient, targeted delivery of aid and incentives, and in the long run, allow tracking of compliances, such as goods and services quality, taxation, and environmental standards.

We also recommend the development of a vulnerability assessment framework of MSME sectors; measures to improve the creditworthiness of small businesses, and increasing the capacities of one, the *MSME SAMADHAAN* Delayed Payment Monitoring System to expeditiously clear government dues to micro and small enterprises, and two, the National Company Law Tribunal to efficiently manage insolvency cases.

Further, we believe that India must take appropriate protection measures against predatory practices of some trading partners to undercut product prices and route low-cost exports through the ASEAN countries under the cover of free trade agreements (FTAs). Such safeguards will prevent a collapse of our domestic industries, especially strategic ones such as ferrous and non-ferrous metals, textiles, pharmaceuticals, solar cells and modules, and heavy machinery.



Develop a nationwide real-time digital platform - MISHRII - to better identify, aid and track MSMEs

Secure resources and build resilience against tail-end risks

The international environment is beset with traditional security concerns. But the biggest threats are no longer states, nor non-state terrorist groups. The gravest concerns are about tail-end risks, which have low probability but can be catastrophic.

The COVID-19 crisis has amply demonstrated that India needs to invest in resilient infrastructure and governance systems to respond to low-probability but high-impact tail-end risks, which can have catastrophic consequences and choke the economy, imposing far greater costs than the investment needed to increase resilience.

In many sectors, regulations consider worst-case scenarios, such as, structural integrity of buildings in earthquakes, or capital reserves for insurance firms. On the battlefield, military strategists imagine the worst and prepare accordingly. Public health pandemics, food shocks, water scarcity, electricity grid collapse, or climate change-induced extreme events demand similar approaches.

We recommend that the government launches an **Environment and Health De-Risking Mission** to focus on risks posed by climate change, air pollution, chemicals, and antimicrobial resistance. For this, India must develop a **Climate Risk Atlas** covering critical vulnerabilities (coasts, urban heat stress, water stress, crop loss, vector-borne disease, and biodiversity collapse). De-risking strategies must be drawn up at the national level and, to begin with, for five most vulnerable states. Involving insurance companies in this process would help to secure investments in urban and coastal infrastructure once there is recourse against extreme events.

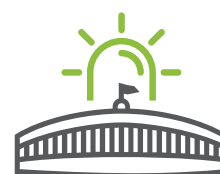
Increase food, water, energy security

The lockdown has disrupted supply chains of agriculture and horticulture produce, crashed farm-gate prices of fruits and vegetables, and led to closure of markets, causing farmers to lose thousands of crore worth of produce due to lack of retail offtake and storage facilities. The stoppage of supply networks has also deprived a significant proportion of urban poor, especially informal workers and daily wage labourers, of access to safe, affordable and nutritious food.

While the government has stepped in with urgent relief for 800 million poor people by doubling their usual monthly entitlements under the *Pradhan Mantri Garib Kalyan Ann Yojana* (PMGKAY) to free 5 kg of wheat or rice and 1 kg of preferred pulses, and provided various other income support through DBT, it is imperative for India to systematically enhance food security of citizens.

Learning from the COVID-19 crisis, we recommend **large-scale deployment of state-supported canteens to provide hygienic, affordable and nutritious cooked food thrice a day to all urban migrant workers** (approximately 30 million). This would require capital infusion of about INR 26,500 crore (USD 3.5 billion) for an estimated 60,000 canteens and 8,200 kitchens. We estimate the price per meal to be about INR 15 (USD 20 cents), which could cover operating expenses.

Each canteen serving meals to 500 beneficiaries could employ 20 people on average, generating 1.2 million jobs to serve the 30 million migrant workers. This will also initiate demand for diversification of food production through assured procurement.



Create a national Environment and Health De-Risking Mission, with a Climate Risk Atlas, to tackle tail-end risks

In parallel, the government should work with the National Bank for Agriculture and Rural Development (NABARD) to provide preferential 'post-harvest management' loans to farmers and Farmer Producer Organisations (FPOs) to procure low cost, energy-efficient, and preferably, renewable energy-powered technologies such as solar dryers, cold storages and agro-processing units. This will prevent wastage of produce and create jobs for small scale equipment manufacturers and post-harvest workers.

Equally important is securing India's water sources, which are in severe distress from decades of apathetic governance, inadequate budgetary allocations, archaic processes and technologies, and institutional mismanagement. The COVID-19 crisis has underscored the scarcity of clean water in the country, with millions of people having no recourse to even wash their hands.

It is crucial that we **reassess our water systems and reprioritise water governance**. This is a vast and emergent area, and in this report, we have noted indicative recommendations to improve irrigation efficiency (especially for small and marginal farmers), fast-track wastewater management, ensure piped water supply, sanitation and sewerage connection to households, and initiate data-driven water management for river basins.

India imports nearly 84 per cent of its oil, a rising share despite efforts to reduce oil import dependence to 67 per cent by 2022. Supply is threatened by shifting energy geopolitics, and reliability is affected by frequent change in suppliers, which results in a lack of affordable and predictable energy supply and prices.

India's energy security depends on the availability of adequate quantities of critical resources at affordable and predictable prices, with minimum risk of supply distortions to power industries and transportation, while ensuring sustainability for the environment and future generations. For the individual citizen, energy security means access to safe, reliable and affordable energy.

Our understanding of secure storage must evolve beyond vast underground caverns. Evolution of battery technologies will influence options, by speeding up electrification of MSMEs, which cite poor electricity quality as a top concern, and impacting the share of renewables in the electricity mix, increasing prevalence of distributed electricity, and adding to the resilience of grid-based systems. Towards this end, India must also **develop a circular economy and strategic reserves for critical minerals**, such as those likely to be used in energy storage applications.

Disaster-proof urban infrastructure

The pandemic is one tail-end risk; others include severe climate shocks. With growing environmental and health stress, such calamitous events are likely to occur more often and overlap with one another, overwhelming our capacity to respond.

A heating planet will put infrastructure investments at risk. Temperature extremes could damage the integrity of road surfaces and adversely affect water levels in reservoirs, heavy rains would inundate low-lying areas and damage sewerage infrastructure, and extreme climate events could destroy physical infrastructure.

The United Nations Office for Disaster Risk Reduction estimates that in the past two decades, India has suffered losses of INR 5.61 lakh crore (USD 79.5 billion) and INR 7.53 lakh crore (USD 100 billion) respectively due to extreme climate events and vector-borne diseases. This is *excluding* the COVID-19 crisis, which has exposed the fragility of India's emergency



Secure national resources through a circular economy and strategic reserves for critical minerals

preparedness and response systems, and the vulnerability of lives and livelihoods to a range of risks ensuing from a single crisis.

Disaster and emergency management requires strong governance frameworks and high community preparedness to methodically institute resilience and adaptation. This is critical to minimise damage to lives, livelihoods, infrastructure, and the economy, and facilitate quick recovery.

India must evolve its emergency preparedness by building resilient physical and digital infrastructure, training relief personnel, and inculcating social and behavioural changes in citizens.

Investing in disaster resilient urban infrastructure would boost the economy and create jobs, but it is up to 30 per cent more expensive. Meeting these costs requires new financial solutions such as resilience bonds, or factoring in lower insurance premiums in future for infrastructure that has been designed to withstand more severe climate risks.

We recommend a **nationwide, centralised and real-time Integrated Emergency Surveillance System (IESM)** to facilitate a systematic and sustained response to emergencies and rapid restoration of business-as-usual operations. A **Unified Emergency Response Framework (URF)**, comprising a set of standard operating procedures (SOPs) for the public, should be mandated in school and university curricula, as well as community, corporate, and institutional training, to create an understanding of risks and inculcate behavioural adaptation to stress situations in citizens and communities.

Developing the Climate Risk Atlas, the IESM and the URF involve nominal costs, in the range of INR 5 crore (USD 0.66 million), with basic operation and maintenance expenses. The United Nations Inter-Agency Standing Committee's (UN-IASC) report on *Return on Investment in Emergency Preparedness* states that every INR 75.35 (USD 1) invested for preparedness saves over INR 150.7 (USD 2) in future response. Extrapolating this ratio to India's losses of INR 13.52 lakh crore (USD 179.5 billion) on disaster management in the past twenty years, **the government could have saved close to INR 6.76 lakh crore (USD 89.7 billion) if such systems were in place.** Such savings could then be directed to productive economic activities.

Public-private partnership (PPP) models should be used to improve urban systems to double as emergency infrastructure. For example, a well-oiled public transport system of buses and micro-buses would provide safe, clean and affordable mobility options for all citizens on usual days; during emergencies, these buses could be repurposed to deliver essential services and evacuate citizens.

Greening the economy: energy, infrastructure, and quality of life

The COVID-19 pandemic has compromised India's efforts to decarbonise its electricity sector, industries, transportation networks, and the aim to build sustainable cities and towns.

India's energy and infrastructure sectors have seen tremendous transformation over the past decade in terms of policy reforms, investment generation, on-ground deployment, and adoption of new technologies, digital interventions, sustainable materials, and resource-efficient processes.



**INR 6.76
lakh crore**

Indicative
national savings
with better
disaster and
emergency
preparedness
over past two
decades

In the past decade, 350 million Indians have got access to electricity. But more localised solutions are needed (via off-grid systems) for about 35 million last mile customers. Further, about 700 million got access to a liquefied petroleum gas (LPG) cylinder, but only a third of the rural population, in six most energy-deprived states, uses LPG as their primary cooking fuel.

Though the lockdown has put a temporary halt on major projects, the government has stepped up efforts to resume businesses by defining appropriate health and safety standards for the workforce and mandating strict on-ground enforcement.

In the middle of an economic crisis, however, environmental standards risk getting diluted or clean tech industries can shift down the list of priorities. How can we sustain sustainability in the aftermath of a pandemic-fuelled recession?

To maintain – and increase – fuel supply to consumers while minimising import bills and the burden on the exchequer, and staying on the course of sustainable development, the government is exploring new sources of energy, increasing efficient fuel use, and relooking at mechanisms and beneficiaries of various subsidies.

The problem with shifting from a brown to a green economy is that the time horizons for transition vary for different constituencies. The pace at which renewable energy projects can be set up is much faster than it takes to shut down polluting thermal power plants.

Moreover, disruptions are unequally distributed. Utility-scale renewables already employ 99,000 people, and current targets of 100 GW solar and 60 GW wind capacity are likely to generate about **1.3 million direct jobs on a Full-Time Equivalent (FTE) basis**¹⁰, comparable to 300,000 jobs in Coal India. But the geographical and skill distribution of these two energy-related workforces varies — and are not easily substitutable.

The demand-supply imbalance in the global petroleum sector has created a supply glut which could persist for two years. The International Energy Agency (IEA) has predicted a 5 per cent plunge in global natural gas demand amid the COVID-19 pandemic, leading to a 10-year low price for spot liquefied natural gas (LNG) Asian markets. The Indian gas system can only take limited advantage of these low prices as current demand is met by domestic production and long-term LNG contracts.

Shift to gas

Still, these prices offer interesting opportunities. India could **accelerate its shift to cleaner fossil fuels** by revising the natural gas utilisation policy to include polluting industries as priority sectors, which would be more cost-effective than enforcing pollution standards across thousands of businesses. The government should also expedite the city gas grid expansion via single window clearance to facilitate the process to lay pipelines, and prompt consumers to switch from LPG to piped natural gas (PNG) with incentives such as installation cost waivers.

The city gas distribution (CGD) network could create approximately 50,000 direct and indirect jobs by 2025¹¹. The switch from LPG to PNG in a shorter 5-year timeframe will reduce household emissions by 1,363 MTCO₂-eq over the next ten years¹².

The measures would spur investments by industries that are keen to switch to natural gas but need assurance of long-term stable prices and reliable supplies. These would also move India closer to its target of 15 per cent share of natural gas in the primary energy mix by 2030.



1.3 million
Direct full-time
equivalent jobs
to be created if
India achieves
160 GW of solar
and wind power
capacity by
2022

Similarly, India could take the advantage of the differential in procurement and sale prices of petrol and diesel to extend targeted subsidies, for example by providing *Pradhan Mantri Ujjwala Yojana* (PMUY) consumers extra LPG refills, which would increase their disposable income in these stressed times, and prevent a slide back to traditional biomass-based fuels.



As part of the COVID-19 relief package, the government has announced three free LPG refills for PMUY beneficiaries until 31 March 2021. **India could turn the low crude prices into LPG subsidy savings and provide up to six LPG refills to PMUY households in FY2021.** The extra free refills may need additional subsidy of around INR 6,000 crore (USD 796 million) — one-sixth of the current subsidy budget — which is already committed under PMGKY. This proposal allows savings between INR 5,500 crore (USD 730 million) and INR 25,000 crore (USD 3.3 billion), accounting for the extra margin of OMCs for refills where the cost of a refill is lower than its estimated market price.

INR 2.89 lakh crore

India's current annual spend to subsidise consumption of energy and energy products

India spends an astounding INR 2.89 lakh crore (approximately USD 38 billion) a year to subsidise energy and energy products consumption^{13,14,15}. This includes subsidies and cross-subsidies for electricity, natural gas for the North Eastern states, LPG, kerosene and fertilisers. While this benefits many households, farmers and informal enterprises, poor assessment of economic status — wealth, income, financial solvency of the beneficiaries — have made subsidies universal and inequitable. This is a large leakage of precious public resources, and has driven inefficiencies into the systems that deliver energy and energy products.

Reform electricity subsidies

In the electricity system, distortions caused by inefficient subsidies have resulted in sustained losses for discoms. The package of INR 90,000 crore (USD 11.94 billion) announced by the government as part of the COVID-19 relief package to help discoms pay generators is an outcome of this distortion and comes despite the significant subsidy that is already provided to keep prices low.

Clearly, a more lasting solution is needed, that signals the right prices to the consumers, triggers end-use efficiency, and addresses the needs of the vulnerable (households and farmers) and those that need strategic support (industries).

Unconditional income transfer might spur the consumption of demerit goods. To avoid this, we recommend retaining the current model of conditional transfers for LPG, with differential levels of support for varying wealth / income levels, till an alternative economic use case is made for conventional fuels.

For electricity, a direct income transfer could be made to households to support all or a portion of nominal consumption levels (commensurate to the needs of various climatic zones, housing conditions and wealth status). Support for electricity for farm use and fertilisers must be linked to farmers' household status and landholding size.

The industrial sector is likely to get a fillip from the steep drop of approximately 20-35 per cent in electricity tariffs — and become more competitive. Commercial activity and service sector offerings could benefit from tariff reduction in the range of 30-50 per cent across the states. Growth opportunities also exist in the measurement technologies in electricity supply¹⁶.



20 - 35%

Possible reduction in industrial sector electricity tariffs by efficiently targeting subsidies

Coal-based sources account for 70 per cent of India's power generation; 20 per cent of this comes from thermal power plants older than 25 years and constitutes a significant fixed cost burden for the discoms. The only reason these plants are in operation is the low-cost coal allocation and the resultant low power tariffs offered to the discoms.

This has major implications on air quality as well. An estimated 76,000 premature deaths occur annually due to coal power plant emissions¹⁷. Retrofitting these older plants with pollution control technologies (PCT) will cost around INR 14,260 crore (USD 1.89 billion), which would ultimately be passed on to the consumers¹⁸.

It is economically prudent to reduce fixed costs of older plants, bring in financial solvency for the many new, disused plants, and free up low-cost coal for efficient generators. We estimate savings in the range of INR 12,000 to 18,000 crore (USD 1.6 to 2.4 billion) through this decommissioning, which will accrue to the system and can be shared among participating discoms. Addressing inefficiencies in older assets will also improve air quality, competitiveness of renewables, and the overall financial health of the power sector.

Create robust markets for renewables

In recent years, India has seen drastic changes in the way we generate, transmit, distribute and consume power. Electricity, a concurrent subject in the Constitution of India, requires active participation of many stakeholders from the union and state governments, which makes policymaking, regulation and implementation extremely difficult to coordinate.

Already reeling from shaky balance sheets, the renewable energy industry has taken another big hit from the lockdown and requires urgent support to stay on course to achieve the target of 175 GW installed capacity by 2022. We recommend that the Ministry of New and Renewable Energy (MNRE) set up a multi-stakeholder task force to deal with COVID-19-specific sectoral issues such as late payments, curtailment, multi-authority coordination, and logistical problems, as well as force majeure-related costs for each under-construction project.

We must also address political economy roadblocks to scaling up renewable energy. Projects are besieged by centre-state conflicts due to non-alignment of priorities, and states making retrospective changes in policies or threatening to renege on PPAs and/or curtailing off-take.

The need for power sector reforms was well realised; but the changed scenarios due to the pandemic requires fast-tracking of reforms to address issues such as multiplicity of authorities, centre-state policy and implementation conflicts, managing depressed demand, and difficulties in revenue collection.

In this report, **we propose a rethink of the structural framework of India's power sector** to address these myriad issues: this includes setting up a multi-stakeholder **National Electricity Council (NEC)**, making an **Integrated Energy Resource Plan (IERP)**, establishing a **National Renewable Energy Corporation (NREC)**, and eventually, notifying a **National Renewable Energy Policy (NREP)**.

CEEW's preliminary calculations show that a cumulative amount of approximately INR 5,200 crore (USD 690 million) over 2021-28 could facilitate an economically viable market for 28 per cent of generation from onshore wind and solar PV by 2030, creating another 528,000 jobs.

We estimate that the financial outlay will become zero beyond 2028 due to rising competitiveness of renewables and falling grid integration costs. Accelerated renewable energy deployment will save forex from reduced coal imports. **Even if half the generated**



**INR 12,000
- 18,000
crore**

Potential
savings from
decommissioning
thermal power
plants aged over
25 years by
2024



**INR 6.75
lakh crore**

Potential forex
savings if half
the RE power
output in 2021-
30 replaces coal
imports

renewable power is used to replace imported coal, India can save over INR 6.75 lakh crore (USD 89 billion) during 2021 – 2030 (nearly ten times the proposed outlay over the same period). It would also abate over 4,650 MTCO₂ emissions as compared to business as usual between 2020–30.

This is also a good time to promote domestic solar manufacturing. Our conservative estimate is that solar modules worth INR 15,000 crore (USD 2 billion) would be required annually to meet the domestic demand of 10 GW per year. **Meeting the bulk of this demand through domestic production (>50 per cent) can avoid forex outflow of INR 7,500 crore (USD 1 billion).** In the long term, domestic manufacturers can tap the international market and supply modules to member countries of the International Solar Alliance (ISA).

Innovations in distributed renewable energy (DRE) can greatly enhance grid reliability through interconnected networks of micro-grid clusters, community solar systems, bioenergy, small hydro, wind and solar hybrids, and ‘behind-the-meter’ battery units and inverters. These micro-grids can disconnect from the main grid and operate autonomously and could mitigate a part of the impact in the unlikely event of a nationwide grid failure.

Building such networks requires concerted policy, regulatory, business, and technological interventions. DRE remains a huge opportunity (only 10 per cent of the targeted 40,000 MW installed so far). In this report, we have included suggestions to promote grid-connected micro-grids for urban and industrial consumers, build new discom-led business models for DRE, create new markets for rooftop solar (RTS), and promote innovation in DRE technologies.

We propose that the MNRE sets a target to achieve 20 GW of grid-connected micro-grid capacity by 2025. A CEEW study has found that an urban micro-grid system within the East Delhi area could provide a net benefit of around INR 1.08 per kWh to the discom if designed to optimise for the grid¹⁹. **Small- and large-scale micro-grids of 20 GW can employ around 1,10,000 workers for skilled and unskilled activities²⁰.** RTS installations could create about 50,000 skilled and unskilled jobs per 4 GW.

We recommend **a Centre for DRE Innovation to promote local entrepreneurship in rural and semi-urban areas** through schemes to set up and operate local DRE systems or micro-grids. Interest subsidy and tax deferral for the first five years may be offered to aspiring small businesses, along with options to upskill in DRE technology and business operations. 10 GW of DRE systems installed by local businesses in rural and semi-urban areas by 2025 could generate employment for around 55,000 people.

For rural energy access, we must think beyond infrastructure and connections, and consider affordability, reliability, safety and ease of use. **Recent research has identified an INR 3.77 lakh crore (USD 50 billion) market for clean energy solutions for productive uses in the rural economy²¹.**

RE-powered or energy-efficient solutions, such as solar-powered looms, sewing machines, cold storages, oil expellers, rice and flour mills, and food processors, can transform energy access from a consumption paradigm to an economic driver.

India could also ensure universal rural healthcare through a sustainable energy path: a CEEW study has shown that primary healthcare centres (PHCs) in Chhattisgarh with battery-supported solar PV systems have better outcomes, especially in maternal and neonatal cases, due to power supply for medical equipment and storage of drugs. Such a solution would cost as little as INR 28 per person to deploy and expand clinic-level solarisation of all unelectrified PHCs and sub-centres in the country²².



**INR 3.77
lakh crore**

India's rural
market potential
for productive
use of clean
energy solutions

We recommend that the government allocate dedicated capital in the national budget of **INR 600 crore, a mere 0.6 per cent of India's 2020-21 energy and healthcare budget, to electrify all sub-centres.** This would provide much needed medical facilities in these under-served areas, create thousands of healthcare and allied jobs, and incentivise medical equipment manufacturers to develop more efficient and rugged appliances suitable for rural services.

To catalyse this sort of potential, a new programme — Powering Livelihoods — aims to provide capital and technical support to help scale up enterprises that are deploying such innovations based on distributed energy for income-generating activities. Measures such as these will create jobs, generate significant cost savings from more energy-efficient operations, reduce emissions, and improve the wellness of citizens.

Make cities livable

The lockdown has given citizens in India's grossly polluted cities and towns a taste of clear blue skies, cleaner air, and a connect with nature, taking them a step closer to a democratic demand for clean air. It has also proved that a significant reduction in emissions can almost immediately improve ambient air quality.

To ensure that India continues to breathe clean air, cities should spend a part of the INR 4,400 crore (USD 584 million) allocated in this year's Union Budget to strengthen monitoring, augment the capacity of State Pollution Control Boards, and link post-lockdown bailouts and support mechanisms to stated and verifiable actions against air pollution. The government should also carefully assess bringing back industrial activity to pre-lockdown levels in critically polluted areas.

Stringent emission standards for industries, power plants and automobiles could create a large market demand for clean air technologies. For example, the air pollution control equipment market for stationary sources alone is expected to cross INR 780 crore (USD 104 million) by 2022²³.

Another aspect of quality of life and opportunities for additional livelihoods relates to sustainable cooling. There is a strong economic case to boost domestic air conditioner (AC) manufacturing capacity to meet local demand as well as feed into the expanding global heating, ventilation, and air conditioning (HVAC) market. The International Energy Agency (IEA) noted in 2018 that the global stock of ACs in buildings will grow to 5.6 billion by 2050, up from 1.6 billion today – which amounts to 10 new ACs sold every second for the next 30 years.²⁴

Sustainable cooling is set to be a major growth driver: energy efficient, low-global warming potential (GWP) refrigerants could service an eleven-fold growth expected in residential air conditioning until 2038, or cater to the four-fold growth expected in cold chains, helping lengthen the shelf life of produce, and consequently, farmers' incomes. **The servicing of low-GWP refrigerant AC units alone is expected to see a ten-fold increase in jobs over the next two decades from a base of 0.2 million technicians in 2017²⁵ to 2 million.** Cohesive development of this sector would provide employment to millions across the value chains, decarbonise the cooling sector, boost exports, and help India meet its climate commitments.

Similarly, we estimate that India's oil import bill could be reduced by INR 45,210 crore (USD 6 billion) per annum by 2030, and INR 2.86 lakh crore (USD 38 billion) per annum by 2050, if 30 per cent of car sales in India in 2030, and 50 per cent in 2050, are of electric cars.



INR 600 crore
Cost of solarising all unelectrified primary healthcare centres in India



2 million
Potential low-GWP AC servicing jobs in India in 2037, up 10x from 2017

Sustainability is an economically prudent choice, even when the economy is down. India has set a direction of travel for a transition in the electricity system. We now need consensus on a broader energy transition and must begin a discourse on an economic transition. We need belief not fatalism, the imagination of alternative futures, and action at scale.

We need vision to mediate across different time horizons and institutions to moderate the disruptions. **In a slowing economy, we must tap new pockets of growth and invest in resilient infrastructure. Both tracks can boost jobs, growth and sustainability*.**

* Ghosh, Arunabha. 2020. "In a slowing economy, the quest for sustainability". *Hindustan Times*. February 23. <https://www.hindustantimes.com/columns/in-a-slowing-economy-the-quest-for-sustainability/story-QF5VdcccOukw9biwYLwBBN.html>



Distributed renewable energy (DRE) based technologies are promoting local entrepreneurship, innovation and economic growth in rural and semi-urban areas, such as this solar-powered loom in Gujarat.

1. A new social contract: jobs, growth and sustainability

India is beset with a perfect storm of shocks. The COVID-19 public health emergency has led to an unprecedented, months' long lockdown of 1.3 billion citizens, which has displaced millions of migrant workers, put the economy under severe stress and stretched administrative capacity.

It is evident that going beyond immediate relief measures to counter the COVID-19 crisis, India needs a major economic recovery plan to counter the short- to medium-term adversities.

Such a plan will need deep pockets. The Government of India has already announced a special economic and comprehensive package of INR 20 lakh crore (USD 263.5 billion), equivalent to 10 per cent of India's GDP in 2019-20, which includes interventions for immediate relief, liquidity, and payment deferrals. These announcements have been made in phases, starting with a relief package of INR 1.70 lakh crore (USD 23 billion) in March 2020 under the *Pradhan Mantri Garib Kalyan Yojana* (PMGKY) to provide food and cash in hand to the poorest of the poor; interventions by the Reserve Bank of India (RBI) worth INR 6.5 lakh crore (USD 86 billion) — 3.2 per cent of GDP — to support businesses, in particular to micro, small and medium enterprises (MSMEs), and the broader, economy-wide interventions declared in mid-May¹.

The package of INR 1.7 lakh crore of in-kind and cash relief included: free 5 kg wheat or rice and 1 kg of preferred pulses per month for the next three months to 800 million poor people; INR 500 (USD 6.67) per month for the next three months to 200 million women *Jan Dhan* account holders; a front-load of INR 2000 (USD 26.54) to 87 million farmers under the existing *Pradhan Mantri Kisan Yojana* (PMKY), and an increase in daily wages from INR 182 (USD 2.4) to INR 202 (USD 2.7) under the *Mahatma Gandhi National Rural Employment Guarantee Scheme* (MGNREGS), which would benefit 136.2 million families. These funds were credited into beneficiary accounts via direct benefit transfer (DBT) to eliminate leakage, improve efficiency and minimise the movement of people during the lockdown. The interventions by the RBI were aimed at injecting liquidity in the economy, facilitate and incentivise bank credit flows, ease financial stress, and normalise markets.

In his address to the nation on 12 May, Prime Minister Narendra Modi launched the *Aatma Nirbhar Bharat Abhiyan* (Self-reliant India Movement), exhorting citizens to be 'vocal for local', indicating the strategic shift in focus to a robust domestic production and supply chain, and a cautious outlook towards international trade.



*Aatma Nirbhar
Bharat Abhiyan*
will build on
the pillars
of economy,
infrastructure,
technology-
driven systems,
demography and
demand

A significant portion of the stimulus is directed towards India's mammoth MSME sector, which employs 40 per cent of India's total 450 million informal workers. The stimulus addresses both demand and supply constraints of MSMEs and takes a systemic view to boost demand for this sector through enhanced local procurement via public tenders and virtual market linkages. A suite of financial and regulatory measures has also been offered to meet this demand.

The stimulus also aims to create additional liquidity for non-banking financial companies (NBFCs) and microfinance institutions (MFIs), so that businesses across the board have access to more debt. Emergency liquidity measures were also extended to alleviate short term distress for electricity utilities to maintain the viability of the power sector.

In parallel, the government has partially restarted bus and train services to allow migrants to return to their villages, and special flights to repatriate citizens stranded abroad. Some essential industries have also been permitted to operate, with restrictions, only employing workers already available in those districts, and housing them within industrial compounds.

Despite the right intentions, implementing these measures will not be easy. Financial aid to MSMEs would not be effectively distributed because of challenges with identifying and targeting those most in need. The challenge of millions of contract labourers and daily wage workers losing their livelihoods raises systemic choices: Will they return to the cities and, if not, what kinds of gainful employment could they find in the villages? The persisting social distancing and sanitisation directives will continue to disrupt supply chains, impede cash flow and cash recoveries, and make it difficult for businesses to resume normal operations.

Even as the immediate attention remains on the humanitarian emergency — for health services and relief to stranded workers and vulnerable communities — India has now set out to implement a credible recovery-cum-stimulus strategy.

The credibility and efficacy of the strategy would rest on it promoting a recovery that is inclusive, equitable, and fiscally and environmentally sustainable.

Faced with the dilemma of containing the outbreak and saving lives, on one hand, and preserving businesses and livelihoods, on the other, the government has devised fiscal and monetary policy responses to cover two planning horizons: Immediate, to address relief measures to cushion the nationwide lockdown; and medium- to long-term, to deal with the socioeconomic aftereffects in terms of public healthcare, priorities for state expenditure, and regulations to operate businesses and establishments. This road to recovery also critically depends on the exit strategies from the lockdown.

A new social contract

The COVID-19 pandemic gives us an opportunity to shape the economic recovery in a manner that would deliver a new social contract between the state, citizens, and enterprise. **This new social contract would rest on two pillars: commitment to jobs, growth, and sustainability; and a razor-sharp focus on tail-end risks.**

Policymakers usually dismiss the trinity of jobs, growth, and sustainability as 'impossible'. Often, public policy interventions prioritise two out of these three objectives. Building a new social contract rests on squaring this impossible trinity by reorienting the economic structure from being exclusionary to making sustainable development much more people-centric and inclusive.



The new social contract would rest on a commitment to jobs, growth, and sustainability; and a razor-sharp focus on tail-end risks

The question: How do we ensure jobs, growth, and sustainability in these challenging times?

- ▼ **Informed decision-making:** The challenge is to predict, forecast and plan in the absence of information as traditional data sources will take at least another year to survey and collate findings. In the interim, can rapid assessment surveys or other proxies provide viable insights?
- ▼ **Equity:** How do we deliver at least minimum support to targeted beneficiaries?
- ▼ **New drivers of investment and growth:** How do we ensure that planned investments go ahead and do not fall back, and find new avenues, for example, with MSMEs as drivers of employment and, therefore, growth, especially in smaller towns and rural areas?
- ▼ **Greenfield opportunities:** How do we convert this crisis into an opportunity to invest in and develop new areas which would be more resilient against widespread environmental and health shocks?



Tap greenfield opportunities that are more resilient to environmental and health shocks

Towards these ends, India should:

- ▼ **Identify green sectors** with high employment coefficients for new greenfield investment, given the low interest rates and liquidity injected by the RBI. This would stimulate the first pillar under the *Aatma Nirbhar Bharat Abhiyan* i.e. the economy.
- ▼ **Define project and non-project risks for sustainable investments** and institutionalise mitigation tools to address traditional investor conservatism and wariness due to the COVID-19 crisis. This approach would be particularly important to trigger additional investment under pillar two of the *Aatma Nirbhar Bharat Abhiyan*, namely infrastructure.
- ▼ **Use fiscal stimulus to drive entrepreneurial green activities** linked to agriculture, water, energy systems, healthcare, and industry. The entrepreneurial energy of India's citizens can be tapped to build resilient infrastructure (centralised and distributed), leverage latest technologies, create jobs and lengthen local supply chains, thus driving economic growth.
- ▼ **Leverage low oil prices** (and consequently higher tax revenues) to subsidise / give tax rebates for pollution mitigating equipment in power plants and industries. The increased tax revenues from duties on petroleum products could be deployed towards making India's energy infrastructure more environmentally sustainable.
- ▼ **Build resilience** in infrastructure and governance systems to respond to low-probability but high-impact tail-end risks. This is critical because, as the pandemic shows, such tail-end risks can bring the economy to a halt, imposing far greater costs than what would be otherwise spent to increase resilience. Climate risks are non-linear and could trigger shocks across many parameters — food, water, heat stress, vector-borne diseases, extreme weather events, etc. — compounding the pressures on weak infrastructure. Building resilience against tail-end risks would have to be the foundation of the five pillars of India's self-reliant recovery.
- ▼ **Drive a strong and sustained push for attitudinal and behavioural change.** A social contract comes with responsibilities of citizens, especially the more privileged, towards the state and each other. The stimulus proposed by the government and many of the institutional and governance reforms suggested in this document will depend on behavioural nudges for private citizens and economic actors. A new culture of discipline would have to rely on adherence to rules without exception, mindfulness on how individual irresponsible actions adversely impact others, and a consciousness on how minor behavioural shifts can transform the landscape.

Proposing credible relief and recovery strategies

The Council on Energy, Environment and Water (CEEW) and the National Institute of Public Finance and Policy (NIPFP) have collaborated to assess various economy-wide and sectoral strategies, deployed through direct/indirect fiscal measures, regulatory support, or in-kind incentives.

We have evaluated several aspects of the recovery process while proposing these measures, including:

- ▼ **Identifying the solutions:** A crisis of this scale presents infinite problems across geographies, communities, industries, administrative agencies, and support services. We have curated a set of economy-wide and sectoral issues that need policy and structural interventions to solve urgent crises and/or create resilient systems that can withstand future emergencies. The solutions cover the gamut of using existing tools to solve new problems, or innovating ways to address long-standing issues exacerbated by the pandemic. We have also proposed ways for the Indian government to stay the course of sustainable development, with continued focus on resource security, cleaner energy options, and decarbonisation. Each solution has been evaluated on its potential to impact jobs, growth and sustainability. Some solutions have trade-offs and have been selected judiciously as the better option in the current situation.
- ▼ **Income or in-kind support:** It is difficult to plan relief and recovery amidst a rapidly unfolding global emergency of uncertain scope and duration. Fiscal solutions could cost money to implement, and/or save money through policy changes and process improvements. The government must balance financial and in-kind support from limited resources to provide safety and food, water, energy, and income security to people. We have asked the question: Is it enough to provide monetary handouts and bailouts for immediate relief, or should we invest in sustainable systems that offer long-term benefits?
- ▼ **Timeline:** Each solution is defined as an immediate, medium, or long-term fiscal or strategic measure. We have taken a time horizon of eight quarters from April 2020 to March 2022 for this analysis, although some proposals would continue to be implemented beyond that date.
- ▼ **Central versus state action:** The COVID-19 crisis has put the spotlight on India's federal structure. There have been high points of success of centre-state collaboration, like the strict countrywide lockdown that helped contain the spread of the virus and kept fatalities low, as well as friction, as seen during the unexpected, unprecedented, chaotic and, at times, tragic migration of millions of informal workers and urban poor back to their home states.

Cash-strapped states have repeatedly petitioned the Centre for billions of rupees in aid and in-kind support such as bus and train services, medical equipment and staff, security personnel and emergency service workers, and rations and essentials, even though the Centre has little scope for intervention at the state-level. Each state has also set its own priorities and designed state-specific solutions ranging from on-ground assistance to people to monetary handouts, irrespective of directives from the Centre to standardise certain initiatives across states.

We have accounted for these pros and cons of the federal structure while proposing our interventions, by clearly stating the scope of each initiative, existing and proposed policy and legislative measures, implementing authorities, and potential sources of funds.

- ▼ **Institutional interventions:** The proposed measures require coordination between multiple existing institutions, and/or setting up of new ones, ranging from temporary task forces to permanent agencies. While recommending the creation of any new institution, we have considered its explicit and unique purpose; time, effort, and cost to set up and operate; responsibilities and authority levels, and linkages with existing bodies.
- ▼ **Managing the public emergency:** The lockdown has disrupted lives and livelihoods, caused fear and anxiety, and led to social isolation, stigma and prejudices against certain professions and communities. The exodus of migrant workers has underlined the urgent need to build resilient communities, with avenues for economic support, mixed income groups, decentralised co-working spaces, targeted amenities and open areas²⁶.

We have proposed certain urban planning tools and disaster management plans that can establish connectivity for essential supply chains, relief distribution, and evacuation. We recommend a participatory approach to accelerate decentralised economic revival, create a social net for migrants, and provide a buffer against further adversities and economic downturn (such as a second wave of COVID-19).

- ▼ **Exit strategies:** All temporary recovery measures undertaken to combat the immediate crises must have appropriate exit strategies. Embarking on well-intentioned but poorly planned ventures can lead to misuse and wastage of resources, and foster rent-seeking behaviour, thereby adversely impacting people, businesses and communities, and causing loss of trust and goodwill. We have proposed a clear timeline for the implementation of each initiative.



As the world's largest democracy, India should promote multilateral platforms that can prevent environmental crises of planetary scale and significance.

2. A new multilateralism for chronic risks

The COVID-19 pandemic presents an opportunity to shift international conversations away from dilemmas of common interests and towards issues of **common aversions**.

Common interests, such as trade, finance and technology, bring countries to the negotiating table. But worries about relative gains and losses to each often result in inertia. Supply chains will shrink as countries seek to reduce overreliance on single sources or markets and aim for more localised value and job creation. More than INR 6.25 lakh crore (USD 83 billion) have exited emerging markets during the crisis. Stimulus packages and relaxed monetary policy might reduce the liquidity crunch — but on the condition that the money be spent at home. Technology will pervade not just private lives but will be used for greater surveillance of what other governments are up to. There will be lesser trust in official data. As objectives of countries and companies undergo major shifts, the axioms of free trade, free movement of capital, or freedom of energy supplies will be questioned against a cruder metric: myopic self interest.

In the post-pandemic era, multilateralism has no guarantees. Many issues were already segregated by sector (energy, finance) or increasingly partitioned by geography (trade). There is now limited scope for grand bargains. For the time being, we must settle for *de minimis* multilateralism: What is the minimum on which our interests converge? But we can still drive international cooperation, on specific issues of common concern. Common aversions—outcomes we all wish to avoid—changes the approach to that of coordination. We all have an interest in avoiding pandemics, extreme weather events, or a collapse in agricultural output. The 75th anniversary of the United Nations presents an occasion to reorient multilateralism towards the most pressing challenges rather than overhauling the entire global governance architecture.

For new forms of international cooperation to emerge, we must focus on chronic risks that all countries would have an interest in avoiding. When international cooperation is ebbing, renewed drive for collective action can come from how we organise multilateral institutions to respond to shocks, whether health-related, environmental, or financial. We must now develop the multilateral platforms that can prevent environmental crises of planetary scale and significance.

Multilateralism for chronic risks would rest on two pillars, the principle of transparency and the principle of risk pooling. Towards that end, we must develop a Climate Risk Atlas for developing countries (see discussion on the risk atlas in section 4.1), and create a new Global Risk Pooling Reserve Fund*, which would combine the varied risks of environmental and health shocks across countries to provide vulnerable regions with a risk-resilience insurance cushion.



Pool resources
for collective
insurance
against
calamities in
future: the world
needs a Global
Risk Pooling
Reserve Fund

* Ghosh, Arunabha. 2020. "Multilateralism for Chronic Risks." *UN75 Global Governance Innovation Perspectives*. Washington, D.C.: Stimson Center, Doha Forum, and Council on Energy, Environment and Water.



India's economic recovery after the COVID-19 lockdown needs policy, financial, technological and behavioural interventions to solve urgent problems as well as build the foundation to square the trinity of jobs, growth and sustainability.

3. Economy-wide measures

A crisis of the scale of the COVID-19 pandemic presents infinite problems across geographies, communities, industries, administrative agencies, and support services in a country as vast, diverse and densely populated as India. We have curated a set of economy-wide issues that need policy and structural interventions to solve urgent problems and/or create an informed, integrated, and self-reliant yet globally agile economic system that can withstand future shocks.

In this section, we look at interventions to:

- ▼ Plan India's fiscal and monetary policy response to the COVID-19 pandemic
 - Assess the economic impact in the face of data limitations
 - Manage the unprecedented migration
 - Chart a strategic road to recovery
- ▼ Support small businesses
 - Identify micro, small and medium enterprises and their workers
 - Develop a vulnerability assessment framework of MSME sectors
 - Increase capacity of the *SAMADHAAN* system to expeditiously clear government dues
 - Improve creditworthiness of small businesses
- ▼ Increase capacity of the National Company Law Tribunal (NCLT) to efficiently manage cases
- ▼ Evaluate the impact on Indian trade

3.1 Plan India's fiscal and monetary policy response to the COVID-19 pandemic



Image: iStock

India's fiscal and monetary policy response to the COVID-19 pandemic has many dimensions, and depends largely on the planning horizon:

- ▼ **Immediate**, to address relief measures to cushion the nationwide lockdown, and
- ▼ **Medium to long-term**, to deal with the socioeconomic aftereffects of the pandemic in terms of public healthcare, priorities for state expenditure, and regulations to operate businesses and establishments in the near future.

The road to recovery is critically dependent on the exit strategies from the lockdown, which is rightly aimed at containing the outbreak and saving lives but has major consequences on livelihoods. The emerging situation for public finance post-lockdown has two main areas:

- ▼ A fiscal stimulus to cushion the adverse impact on firms, self-owned enterprises, and migrant workers, and
- ▼ Economic recovery in the medium term with stability of financial institutions, market prices and output growth.

India's three major challenges are to:

- ▼ Assess the economic impact in the face of data limitations
- ▼ Manage the unprecedented migration
- ▼ Chart the strategic road to recovery

3.1.1 Assess the economic impact in the face of data limitations

PROBLEM

It is challenging to conduct an impact assessment in India because most national aggregates such as gross domestic product (GDP) / gross value added (GVA) estimates by sectors, consumption expenditure, etc. come with a considerable time lag. Two high-frequency indicators — monthly industrial production and quarterly estimates of urban employment — can, at most, provide a snapshot of the economic situation.

The story of the large unorganised sector is much more complex. Surveys of informal manufacturing and service sector enterprises are available with a time lag of 3-4 years and, thus, do not provide updated information during periods of crisis. The other limitation of national aggregates is that they offer only a two-point comparability (or change) and have limited ability to capture economic shocks in real time or with a higher frequency. In the current situation of limited and scattered information, policy response would require good diagnostics before any remedial action is taken.

SOLUTION

As the first step, quick (thin sample) surveys must concentrate in three areas:

- ▼ **Rural Labour Enquiry²⁷:** The Labour Bureau provides estimates of rural employment, wages, and occupations, but regular surveys are not being conducted for a variety of reasons, which hinders assessments of socioeconomic conditions of rural and agricultural households. A quick survey can provide leads into the emerging scenario on daily employment, wages, and in-migration.
- ▼ **Consumption expenditure:** Household consumption expenditure is a prime macro-indicator to assess the demand side of the economy, the underlying growth trends, and the overall economic well-being. In the absence of recent data, a thin sample quarterly survey would best serve to understand the current and future demand trends of households.
- ▼ **Factory/establishment survey:** This is critical to assess employment conditions in organised as well as unorganised sectors. A quick survey of registered factories and informal self-owned enterprises could estimate the extent of job loss and likelihood of closure.

FISCAL

Conducting surveys is both an administrative and an economic decision. Nationwide surveys involve significant costs and personnel, and are conducted by the Ministry of Statistics and Programme Implementation (MoSPI) with substantial state funding.

TIMELINE

These surveys are an immediate requirement. However, given the nationwide lockdown and exodus of migrant workers to their home states, the survey results should be aimed for in the first or second quarter of 2021. This would provide policymakers a clearer picture of the state of household consumption, rural distress, and industrial units.

IMPLEMENTERS

The consumption expenditure and establishment surveys can be conducted by the National Statistical Office (NSO). A quick round of Annual Survey of Industries can also be convened. Surveys on wages and rural workers can be done by the Labour Bureau.

JOBS

This initiative to gather information has no direct impact on jobs.

GROWTH

A clear understanding of the socioeconomic impact of the lockdown will allow more cogent policymaking, and help plan and deploy effective relief and recovery measures.

SUSTAINABILITY

This initiative has no direct impact on sustainability.

3.1.2 Manage the unprecedented migration

PROBLEM

One of the most unanticipated consequences of the nationwide lockdown is the mass migration of migrant daily or casual workers. This will emerge as one of the central economic challenges as it has the potential to cascade into several other problems.

The immediate consequence is loss of wage work for at least a quarter before any industrial activity can restart. Also, even after the lockdown is lifted, there could be a considerable delay in restarting industrial and construction activity as the labour movement back to work sites remains uncertain.

SOLUTION

Tackling the migration labour problem is partly economic and partly administrative. The respective states would have to scale up testing and medical facilities to contain the spread of the pandemic, and immediately provide a one-time financial relief that can partly offset the wage loss.

However, providing such relief will require identification and a direct benefit scheme. Two policy options would be most effective in such a situation:

- ▼ **A one-time cash transfer**, and
- ▼ **Provision of basic food supplies per person**, from the Public Distribution System (PDS) for three months, before some industrial activity restarts.

FISCAL

Distributing money through DBT and food via the PDS will adversely impact the finances of state governments, especially in the states of Uttar Pradesh, Bihar, Jharkhand, and West Bengal as they are home to almost all migrant workers. However, this fiscal measure is an essential relief intervention to prevent millions of workers and their families from slipping into further distress.

TIMELINE

The measure must be deployed on priority as it involves the livelihood of workers.

IMPLEMENTERS

Central and state governments will have to coordinate to deliver comprehensive relief: each state government can provide a one-time DBT, while food and other financial assistance can be provided under centrally sponsored schemes.

JOBS

There is no estimate yet of the number of jobs lost due to the outward migration of the informal workforce from their places of work.

GROWTH

India's estimated 450 million informal workers comprise 90 per cent of its workforce, with 5-10 million workers added annually²⁸. Lifting this despondent migrant workforce back on their feet is crucial to ensuring the country's economic stability.

SUSTAINABILITY

This initiative has no direct impact on sustainability.

TRADE-OFF

This measure will put a huge financial burden on central as well as state governments, more so since revenue income from economic activities and taxes are severely compromised due to the ongoing lockdown. However, this relief measure must be undertaken to ensure the survival and wellbeing of the country's economically weaker population who have lost all sources of livelihood.

3.1.3 Chart a strategic road to recovery

PROBLEM

Formulating a post-pandemic recovery map for India requires:

- ▼ assessing the immediate distress to daily / casual workers in sectors that have taken the maximum brunt of the lockdown,
- ▼ preventing the closure of firms and establishments in the near future, and
- ▼ revisiting the constraints on state finances.

Formulating the recovery roadmap will be an iterative process as the interventions are deployed and more data come to the fore, thus allowing a clearer understanding of the on-ground scenarios and, consequently, better targeting of the measures.

The Central government's much-needed, major economic package of INR 20 lakh crore (USD 263.5 billion) requires some more clarification:

- ▼ What measures will contribute to the recovery package?
- ▼ How will those contributions be funded?
- ▼ How will the resources be spent?

SOLUTION

The immediate policy concern is to offset the financial losses due to the lockdown and collapse of businesses (supply chains).

Post-lockdown, major production units – automobile, chemicals, garments, plastics, etc. may face manpower and demand shortages. The policy must ensure that these industrial units operate at their optimal capacity at the earliest.

Most of the supply chain vendors are service sector MSMEs (labour, technicians, managerial staff, warehouses and transport). While major industries will likely survive despite the financial hardship, the MSMEs are already severely affected due to a demand collapse of the final product.

Agriculture, food & beverage, textiles, and transport have the largest share of the household consumption basket, and at the same time have considerable linkages across all the three sectors of the economy: raw materials, manufacturing, and services. Similarly, hotels and restaurants would also face financial and manpower losses due to the displacement of workers. These supply chains must be prioritised.

FISCAL

The first round of fiscal incentives was announced at the start of the lockdown in March, 2020. Some of these, like relaxation in tax filings, etc. were regulatory, while targeted initiatives on provident fund contribution, welfare schemes, etc. were part of the fiscal stimulus package. This was followed by several smaller measures, and then the massive *Aatma Nirbhar Bharat Abhiyan* economic package in early-May.

These stimuluses and revenue expenditure across social sector schemes, DBT or other subsidy-based schemes will exert huge pressure on central and state government funds. However, a freeze in capital expenditure may hit sectors of construction, steel, cement, and labour engagement. Resuming construction activity would be a key policy decision.

TIMELINE

These measures have been announced with adequate urgency and must now be deployed on priority.

IMPLEMENTERS Union and state governments, their various nodal agencies, and the RBI should collaborate to ease bottlenecks and remove red tape, and quickly reach relief to the beneficiaries.

JOBS The implication for jobs would vary by sector and has been explored in detail in later sections.

GROWTH These interventions are essential to restart the economy after the lockdown and mitigate its catastrophic impact on people, livelihoods, and businesses to revive India's growth trajectory.

SUSTAINABILITY This initiative has no direct impact on sustainability.

TRADE-OFFS Expenditure priorities may get largely confined to wages, salaries, medical, and establishment expenses. This in turn could curtail discretionary spending on travel, repairs, and maintenance, leading to a demand squeeze for durable goods.

India's economic recovery path from pandemic, however, has much larger trade-offs. As the full spectrum of the crisis unfolds, we have two important dimensions to tackle its consequences. First, the fact that the past is no guide to the future means that the traditional methodology of deductive assessment based on trend or time series economic analysis is no longer useful. Cross-sectional comparisons are also hampered by differential experiential trajectories.

Hence the government must implement a survey-based rapid data collection and investigation strategy so that policy can be designed based on inductive analysis, learning from the impact of the crisis on the geographies of different socioeconomic conditions. This will also help repurpose public and private expenditure going forward.

The second dimension is the trade-off between economic optimisation and the alleviation of human distress. We have many difficult questions to address in this case as opposed to other types of crisis:

- ▼ Should the effort be to incentivise migrant labour to remain in their workplaces with attractive remuneration packages and a commitment to better working and living conditions (such as commitments to a slum free India, better quality public education and healthcare)?
- Or should the effort be to prevent a repeat of the unfolding tragedy by following a policy that leads to de-concentration of workers and dispersion of economic activity to areas of the country where the migrant laborers hail from?
- ▼ Should public resources be used to compensate those whose livelihoods will be substantially destroyed by the epidemic?
- Or should the focus be on supporting and growing resilient economic activities to maximise future output and welfare?

These questions may not have direct answers, but the solutions can only emerge with clear, defined objectives (drawn from a growing body of evidence) and the capacity to implement them through the administrative machinery.

3.2 Support small businesses



India has an estimated 63.38 million unincorporated non-agricultural MSMEs. Of these, more than 63.05 million i.e. 99 per cent, are micro, 0.33 million are small, and approximately 5,000 are medium. Of all the MSMEs, 95.98 per cent are proprietary²⁹.

MSMEs represent 90 per cent of India's industrial units and contributes to 45 per cent of total industrial value addition. MSMEs also contributed almost half the country's exports—48.1 per cent—worth INR 11.1 lakh crore (USD 147.4 billion), in 2018-19³⁰.

India's estimated 450 million informal workers comprise 90 per cent of its total workforce, with 5-10 million workers added annually. About 40 per cent of these workers are employed with MSMEs³¹.

The government has, over the years, taken steps to formalise the financing of MSMEs by setting up a nationwide network of regional rural banks (RRBs), small finance banks, NBFCs and MFIs; the specialised Small Industries Development Bank of India (SIDBI), and more recently, the Micro Units Development and Refinance Agency (MUDRA) under the *Pradhan Mantri MUDRA Yojana*.

The MSME sector, despite its rapid expansion in the past few years, was already in distress before the COVID-19 lockdown due to a perceived lack of creditworthiness. While short term relief measures are imperative to ease working capital constraints, the benefits of indiscriminate lending will be short-lived and only delay the inevitable non-performance of assets.

Sustained recovery and revival of this sector hinges on addressing the challenge of rampant informality, since most of these enterprises, especially in the voluminous micro segment, are not registered with the government. Creating a resilient MSME sector

requires deep structural and regulatory reforms, starting with proper identification of the enterprises and establishing accountability of all stakeholders.

Proposed relief and recovery actions:

- ▼ Identify micro, small and medium enterprises and their workers
- ▼ Develop a vulnerability assessment framework of MSME sectors
- ▼ Increase capacity of the *SAMADHAAN* system to expeditiously clear government dues
- ▼ Improve creditworthiness of small businesses

3.2.1 Identify micro, small and medium enterprises and their workers

PROBLEM

The inability of the central and state governments to efficiently reach financial and in-kind relief to MSMEs and their workers during the COVID-19 lockdown, leading to the arduous mass migration of millions of workers from cities back to their native places, has illustrated the difficulties in rolling out targeted, large-scale support to such an informal sector without visibility on who they are, where they are, what they do, and their financial status.

The problem of accurate identification is two-fold:

- ▼ The sheer number of MSMEs, especially the informal one-person or micro enterprises, and
- ▼ The informal arrangements of employing workers, with little or no records.

On 13 May 2020, the government announced a collateral-free loan of INR 3 lakh crores (USD 39.8 billion) for MSMEs³². However, only a fraction of the total MSMEs are currently connected to any form of formal banking/NBFCs/MFIs or semi-formal systems such as the *Pradhan Mantri Jan Dhan Yojana* (PMJDY). Without these linkages, most of these enterprises will not have easy access to this loan.

A key challenge is the enrolment of these unknown MSMEs into an identification system that also provides visibility into the financial health of these enterprises.

SOLUTION

In the immediate term, the Ministry of Micro, Small and Medium Enterprises (MoMSME) should compile assorted existing national and state-level databases as best as possible to identify and secure information about these informal workers and business units.

In the **medium to longer term**, however, it must build an accurate, scalable, and real-time information system to identify and serve genuine beneficiaries of government schemes and aid. **This e-system could be named MISHRII (MSME Information System for Holistic and Real-time Identification, Incentives and Support).**

MISHRII is a sugar substitute sweetener common in Indian households!

NON-FISCAL / STRATEGIC

There is a nominal cost to build the online information system. The major benefit will be the access to real-time, credible information about MSMEs and informal workers via a national, digital database, ensuring efficient, targeted delivery of aid and incentives.

TIMELINES

This initiative needs both, immediate and medium to long term measures.

Immediate

- ▼ One option to identify workers is through the *Jan Dhan - Aadhaar - Mobile* (JAM) trinity, a major database of the Indian citizenry. However, this system is rife with errors, duplications, and authenticity issues, and not reliable unless cross-verification parameters are instituted.
- ▼ MSME-related information is presently scattered across datasets such as the *Udyog Aadhaar Memorandum* (UAM) which has 13 million self-registrations, the MSME Databank, and the Goods and Services Tax Network (GSTN)³³. The first two datasets have self-certified, voluntary information provided by businesses / individuals and

are hence not reliable, while the GSTN is a statutory requirement only for businesses with turnovers exceeding INR 40 lakhs (USD 0.05 million) per year.

- ▼ The MUDRA and SIDBI also have partial records of MSMEs. Approximately 10 million enterprises have availed MUDRA loans annually since its launch in 2015, mostly in the 'Shishu' category (up to INR 50,000 (about USD 664)), directed at proprietary micro units identified via this dataset³⁴. SIDBI's vast network and portfolio will yield information on entities it has financed and refinanced.

Medium to long term

- ▼ The fourth (and the last) census on MSMEs was conducted in 2006-07. It is thus imperative to take a fresh census of MSMEs and issue them a **Unique Business Identification Number (UBIN)** so that they can be recognised and referenced³⁵. MSMEs can be segregated at national, state, or sectoral levels.
- ▼ The MoMSME should develop one nationwide, centralised online platform to identify and track MSMEs (through their UBINs) and informal workers. This platform should collect data on the size, distribution, and economic contribution of these workers to the national output, and seed details such as occupation, days of employment and monthly income into their *Aadhaar*-linked profiles. This platform should be linked with the goods and services tax (GST), value added tax (VAT), income tax, and other tax databases, and the banking network for DBT.
- ▼ Informal workers who wish to benefit from government support systems, will have to provide visibility into their financial health. This will enable the authorities to:
 - Identify beneficiaries of minimum wages under the *Wage Code, 2019*, and
 - Maintain an authentic database to better target policies and welfare schemes on matters such as life and disability cover; health and maternity benefits; old-age protection; education, housing, etc.
- ▼ The MSME e-platform **MISHRII** may be developed over time, but its architecture should be formalised by the first quarter of 2021. The Unique Identification Authority of India (UIDAI) can then import data from various individual and enterprise identity systems to populate it.
- ▼ The UIDAI has the skill sets, resources, experience, and reach to rapidly expand the *Aadhaar* database to capture employment details, cross-linked with bank account information, of individuals interested in availing government aid or incentive schemes. This can be piloted on a voluntary basis to check for efficacy before mass-scale deployment. Now is an opportune moment, given the powerful impetus of aid, for the MSMEs and their employees to register. The UIDAI can use the mobile short message service (SMS) to collect and authenticate information. This method is commonly used by power distribution companies and city gas distribution networks for metering.

IMPLEMENTERS The MoMSME, SIDBI and UIDAI should take the lead in developing the MISHRII, with the MoMSME being the nodal agency.

JOBS This initiative has no direct impact on jobs.

GROWTH This visibility of the MSMEs and their workers will allow the government to develop targeted and effective policy measures and interventions, thus making them more productive and resilient in the longer term.

SUSTAINABILITY This initiative has no immediate direct impact on sustainability. However, the potential to get incentives and support during trying times could lower the temptation to dilute sustainability standards further to save costs. Further, an advanced database could help to track and enforce compliance with environmental standards by the MSMEs in return for government aid.

TRADE-OFF The J–A–M trinity, especially *Aadhaar*, has come under scrutiny for privacy issues. To offset such concerns, the registrations on MISHRII should be kept voluntary for those interested in availing government incentives and aid.

3.2.2 Develop a vulnerability assessment framework of MSME sectors

PROBLEM

The MSME sector is often considered as a homogenous group. But there are major differences in their exposure to risk, profitability and ability to quickly recover from setbacks. The recovery of MSMEs from the COVID-19 crisis depends on several vulnerability factors:

- ▼ Financial health, including cash flow and debt,
- ▼ Product and services markets with different demand revival trajectories,
- ▼ Availability of a migrant workforce from other states, and
- ▼ Exposure to the export market.

The high baseline risks in this sector makes the failure of many firms, especially in the micro segment, inevitable. Thus, it is imperative that enterprises that demonstrate the willingness and propensity to survive, be saved through proactive action.

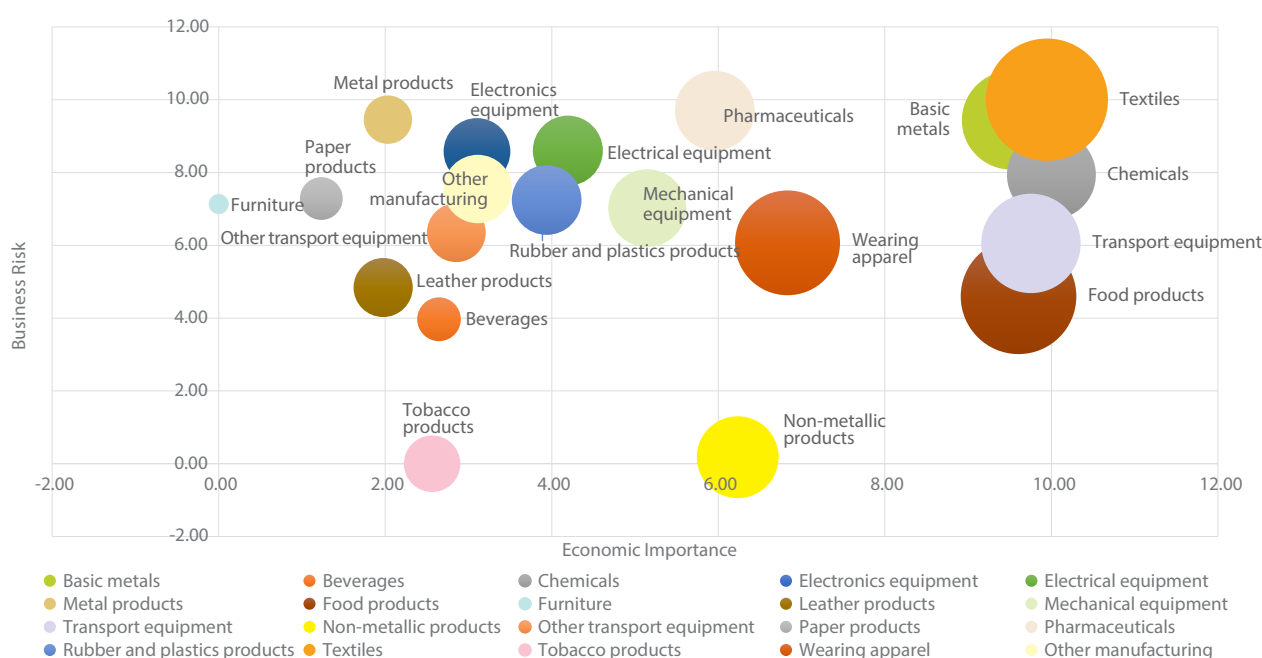
The government's generous INR 3.7 lakh crores (USD 49.1 billion) package for the MSMEs can provide them much needed liquidity³⁶. However, it does not prioritise the beneficiaries based on their economic importance and vulnerability of sectors. Also, the package is a short-term intervention and does not address the long term systemic and external challenges that impact each MSME sector.

SOLUTION

We recommend that the MoMSME develop a **vulnerability assessment framework** of MSME sectors to efficiently target support measures by accounting for varying levels of vulnerabilities and sectoral nuances, resulting in effective use of government resources.

As a case study we have developed a two-dimensional matrix to compare the relative vulnerability of MSME sectors across two parameters:

- ▼ **Economic importance:** This indicator represents the relative contribution of an MSME sector to economic value addition (represented by GVA and employment). Higher the economic value addition and employment, higher the economic importance.
- ▼ **Business risk:** This indicator represents the liquidity of the MSMEs, which in turn is represented by a fraction of working capital supported by available cash resources (represented by cash in hand and at bank), and their cash conversion cycle (CCC) i.e. the time taken for the enterprise to recover its receivables. A lower value of cash to working capital ratio, coupled with a high CCC, presents a high business risk as the enterprises reopen after the COVID-19 crisis. Figure 1 illustrates the vulnerability matrix.

Figure 1 Assessing the vulnerabilities of India's MSME sectors

Source: CEEW analysis

The **three most vulnerable sectors** as per the matrix are:

- ▼ Textile manufacturing
- ▼ Chemical products
- ▼ Metal products

The sector-wise vulnerability assessment framework would help:

- ▼ **Revive the tail-end of the value chain:** Support measures should be driven by demand side economics, which means revival of MSMEs at the tail-end of the value chain. Enterprises in critical supply chains and markets, especially those that are export-oriented or have high employment elasticity (rubber and plastic products, electrical and optical equipment, transport equipment, and textiles), need special attention.
- ▼ **Synergise interventions with existing support measures:** The COVID-19 recovery measures should factor in existing support schemes such as cash transfers, especially to micro industries, as they constitute more than 99 per cent of all MSMEs.

FISCAL

This solution proposes a framework to target fiscal and non-fiscal support measures for MSMEs. Developing such a matrix will incur nominal cost. Cost of actual support depends on the nature and extent of measures adopted by the government.

TIMELINE

This vulnerability matrix should be developed at the earliest to prioritise financial assistance for the MSMEs.

IMPLEMENTERS

The MoMSME and its designated regional Development Institutes (MSME-DI) should implement this with support from independent think tanks.

JOBS

The MSME sector is India's largest employer after agriculture, with an estimated 117 million workers, representing 40 per cent of the national workforce in 2017-18³⁷. These livelihoods depend directly on the viability of the sector, and targeted interventions will preserve most of these despite the COVID-19 crisis while creating new opportunities.

GROWTH

The MSME sector represents 90 per cent of India's industrial units and contributes to 45 per cent of total industrial value addition. MSMEs also contributed 48.1 per cent of the country's exports, worth INR 11.1 lakh crore (USD 147.4 billion), in 2018-19³⁸.

Further, textile, the largest commodity in India's merchandise export basket, is predominantly manufactured by MSMEs³⁹. This sector contributed 12.2 per cent of total exports in 2018-19 and is crucial for India's forex earnings⁴⁰.

Ensuring the vast and rapidly growing MSME sector's revival after the lockdown will prevent a structural collapse of the economy, and set India back on its growth trajectory.

SUSTAINABILITY

This initiative has no direct impact on sustainability.

3.2.3 Increase capacity of the *SAMADHAAN* system to expeditiously clear government dues



INR 10,582 crore

Amount owed by central and state government departments and PSEs to MSEs (April 2020)



40,000

Delayed payment applications filed by MSEs in the *SAMADHAAN* portal since 2017



18,000

Delayed payment cases taken up for resolution by MSEFCs

Data points: CEEW compilation

PROBLEM

As per the MoMSME's *SAMADHAAN* Delayed Payment Monitoring System, various central and state government departments and public sector enterprises (PSEs) collectively owe approximately INR 10,582 crore (USD 1.4 billion) to micro and small enterprises (MSEs). Of these, applications worth only INR 599 crore (USD 79.5 million) have been disposed of by the Micro and Small Enterprises Facilitation Council (MSEFC). This includes INR 91 crore (USD 12 million) of INR 1,978 crore (USD 262.5 million) outstanding with central ministries, departments and central public sector enterprises (CPSEs)⁴¹.

Since the launch of the *SAMADHAAN* portal in 2017, over 40,000 applications have been filed, of which only 18,000 have been taken up by the MSEFCs as active cases for resolution. Further, the MSEFCs have to clear these applications within 90 days as per the *MSME Development Act 2006*, but that has not been the trend, with unresolved applications pending since 2017⁴². The *SAMADHAAN* system also has a high rejection rate of approximately 55 per cent, which has led to over 9,000 cases being arbitrated in the MSEFC courts.

These delayed and contested payments pose a huge challenge for the MSEs, which are already constrained by high fixed costs, revenue streams disrupted by the COVID-19 lockdown, and a major liquidity crisis perpetuated by the reluctance of banks, MFIs and NBFCs to lend to them.

In a major relief, on 13 May 2020, the Finance Minister announced the clearing of all MSME receivables from the government and CPSEs within 45 days⁴³. However, it is unclear how the process will be accelerated given the limitations on travel and availability of MSE and MSEFC representatives due to the crisis.

SOLUTION

The government should prioritise clearing the receivables of all MSEs who are long term suppliers with a good track record on a provisional basis. This will reduce the number of cases that need to be addressed within the 45-day timeline.

Further, the government needs to immediately issue a directive to the states to expand the capacity of the MSEFCs so that the resolution of the cases can be expedited.

FISCAL	Clearing outstanding dues to MSEs involves pay-out of funds but does not create any additional burden as these funds should have been provisioned by the procuring agencies. However, in case these agencies are themselves cash-strapped and unable to pay the dues, the central government would have to step in with additional liquidity. This particularly applies to pending dues from state governments that are currently in financial distress and may not prioritise MSE payments.
TIMELINE	This capacity should be increased immediately to support the government's directive to clear MSE dues within 45 days as part of urgent relief efforts.
IMPLEMENTER	The MoMSME, their state nodal agencies, central and state government departments and public sector enterprises should pay their outstanding dues to MSEs.
JOBS	Recovering these long-outstanding dues will infuse liquidity into MSEs and allow them to pay wages to their employees, preventing further job losses and erosion of workforce.
GROWTH	Ending lengthy arbitration with government departments and PSEs for outstanding payment will provide relief to MSEs and allow them to focus on their businesses. This will contribute to India's economic recovery, and in turn, add to government taxes as well as household income and spending.
SUSTAINABILITY	The Ministry should establish a strong framework to conduct business between government departments and MSEs. This will help to prevent the accumulation of such dues in the future, build trust, ensure smooth flow of capital, and increase the resilience of these small businesses withstand such emergencies.

3.2.4 Improve creditworthiness of small businesses

In order to cushion the impact of the COVID-19 pandemic on the MSME sector, on 23 April 2020, the RBI tried to inject liquidity into the market through the targeted long-term repo operation 2.0 (TLTRO 2.0)⁴⁴. To avoid a repeat of TLTRO 1.0, where the offered INR 1 lakh crore (USD 13.27 billion) had been channelled primarily to large corporates with high credit ratings, TLTRO 2.0 preconditioned that banks must lend half of the offered INR 25,000 crore (USD 3.32 billion) to small and medium NBFCs and MFIs so that the intended support reaches the MSMEs. However, RBI received bids for only INR 12,850 crore (USD 1.70 billion) as banks showed little interest in increasing exposure to a sector already plagued with NPAs and delinquencies, which are expected to increase manifold in the wake of the crisis.

The RBI has also provided special refinance facilities for INR 25,000 crore (USD 3.32 billion) to the National Bank for Agriculture and Rural Development (NABARD) for refinancing of RRBs, cooperative banks and MFIs, and INR 15,000 crore (USD 1.99 billion) to SIDBI for on-lending / refinancing. But these, too, have found few takers. This risk aversion of banks to lend to MSMEs reflects the reality that organised finance remains elusive for these enterprises.

PROBLEM

The MSME sector is marred by low creditworthiness. Credit growth of MSMEs has been steadily declining for several months now due to widespread NPAs and payment defaults, and the risk appetite to lend to these units has taken a severe hit in the current economic crisis. It is now clear that liquidity injections will not ensure last mile credit delivery.

On 13 May 2020, the government introduced a collateral- and guarantee-free loan of INR 3 lakh crore (USD 39.81 billion), with a one-year moratorium on interest payment, to MSMEs as immediate financial relief⁴⁵. To encourage lenders, the government has provided full credit guarantee on this amount. While this will infuse liquidity in the short term, it is a tremendous strain on government funds and does not address the creditworthiness of MSMEs.

SOLUTION

There is a high risk of a significant proportion of these loans turning into NPAs, which would reiterate the lack of creditworthiness of MSMEs. The government should **mandate the lenders to introduce a mechanism to track the fund utilisation and financial health of the borrowers on a monthly basis, and intervene at the first signs of distress.**

NON-FISCAL / STRATEGIC

This tracking mechanism will provide visibility into gradual NPA build-up and allow the lenders and the government to take timely corrective action. Moreover, this is an opportune moment to institute formal tracking of MSME financing as a business practice and bring them into the ambit of core banking.

TIMELINE

This tracking mechanism should be instituted immediately, to coincide with the disbursement of these loans.

IMPLEMENTERS

The MoMSME and Ministry of Finance (MoF) should constitute a joint task force to evaluate this mechanism as a pilot, and eventually institutionalise it for the MSME sector.

JOBS

This is a compliance measure and has no direct impact on jobs. However, improving the creditworthiness of MSMEs will benefit millions of workers employed in this sector.

GROWTH

This mechanism will introduce fiscal discipline in the lenders as well as the enterprises, and over time, will improve the creditworthiness of MSMEs and integrate them into mainstream banking. It will also alert the government to NPA build-up, which can freeze up capital and impede growth. This will enhance the overall economic prism of the country.

SUSTAINABILITY

This initiative has no direct impact on sustainability. However, since lack of access to capital has been a major hindrance for MSMEs to adopt cleaner technologies, improved creditworthiness would eventually help them install energy efficient equipment and technologies⁴⁶.

3.3 Increase capacity of the National Company Law Tribunal to efficiently manage cases



PROBLEM

Since its inception on 1 June 2016, the National Company Law Tribunal (NCLT) has received about 62,000 cases, of which over 40,000 cases were disposed of, and 21,500 cases were pending as of March 2020⁴⁷. The number of cases referred to the NCLT is estimated to be rising at a rate of 10 per cent annually due to the introduction of the *Insolvency and Bankruptcy Code* (IBC).

In April 2020, the Cabinet suspended sections of the IBC that trigger insolvency proceedings against defaulters for a period of six months, extendable to one year⁴⁸. While this will ease the pressure on stressed businesses in the near term, we can expect an exponential increase in the number of cases referred to the NCLT after the sections are resumed and the RBI lifts COVID-19 related moratorium on recognition of NPAs.

The NCLT was already struggling to manage its caseload before the pandemic. It took an average of 350 days to resolve cases as opposed to the mandated maximum of 270 days for companies and 135 days for start-ups and small companies. The NCLT's judgments are frequently litigated in courts, further delaying the final resolution of these cases.

SOLUTION

There is an urgent need to increase the bench strength of the NCLT. There are currently 15 open positions for judges that should be filled immediately; however, it would **need a much higher bench strength to address the peak in bankruptcies. We recommend that the NCLT consider adding temporary benches to handle this surge.** These branches should also geographically cover major business centres countrywide to ease access for MSMEs.

STRATEGIC	This intervention relates to the business as usual functioning of the NCLT and does not require a separate financial outlay, although a modest increase might be needed to set up the temporary benches.
TIMELINE	The capacity should be increased within the next 8 to 12 months. The recruitments should start immediately to ensure that the benches are in place in that time frame.
IMPLEMENTER	The Ministry of Corporate Affairs (MoCA) must initiate the process to fill the open positions for judges and the temporary expansion of bench strength.
JOBS	This measure can create over 1500 direct jobs once approved capacity is recruited. It also indirectly impacts employment across all companies referred to NCLT for resolution.
GROWTH	This measure will expedite clearance of bad assets and allow for better liquidity in banks and, consequently, recovery of industrial ecosystems. Not initiating these steps, on the other hand, will result in increased NPAs on the bank balance sheets, resulting in increased provisioning, and overall freezing of credit lines that will be detrimental to the entire economy.
SUSTAINABILITY	This initiative has no direct impact on sustainability.

3.4 Evaluate the impact on Indian trade



PROBLEM

The global lockdown and trade restrictions have led to a precipitous fall in consumer demand, leading to a massive inventory build-up. The post-lockdown period will globally see companies liquidating their inventories and flooding the markets with cheaper products when faced with tepid demand rebound.

An analysis of the merchandise trade balance across India's Free Trade Agreements (FTAs) reveals that the Association of Southeast Asian Nations (ASEAN) and Comprehensive Economic Partnership Agreement (CEPA) countries have been reaping the benefits of India's positive trade balance (Figure 2). In 2017, India imported electrical machinery worth INR 7.94 lakh crore (USD 100.544 billion) from ASEAN countries, with about 412 per cent coming from Singapore⁴⁹. Further, the imports saw a big jump from 2018 to 2019: electrical machinery and parts grew by 158 per cent and capital goods by 142 per cent⁵⁰.

This matter warrants scrutiny, because while Singapore has a thriving electronics industry that mainly produces semiconductors, there is no evidence of a large manufacturing base of electrical machinery⁵² and capital goods like power and mechanical equipment⁵³. This indicates a possible re-exporting of goods in violation of the FTA's 'country of origin' clause which mandates a minimum 35 per cent value addition by the exporting country to avail concessions.

Given China's dependence on exports to maintain its manufacturing industry, it may undercut product prices and route low-cost exports through the ASEAN countries under the cover of FTAs. This could pose a serious threat to Indian industries, especially in the post-pandemic recovery period since ASEAN trade constitutes a major share of India's positive trade balance.

Figure 2 India's merchandise trade balance across existing FTAs

Note: ASEAN – The Association of Southeast Asian Nations Free Trade Agreement
 CEPA – Comprehensive Economic Partnership Agreement with Japan and South Korea
 SAFTA – The South Asian Free Trade Area
 MERCOSUR – India MERCOSUR Preferential Trade Agreement with Brazil, Argentina, Uruguay, and Paraguay

Source: CEEW analysis

India must take appropriate protection measures against such practices to prevent a collapse of its own industries, especially strategic ones such as ferrous and non-ferrous metals, textiles, pharmaceuticals, solar cells and modules, and heavy machinery.

SOLUTION

We recommend that the government immediately initiate two measures:

- ▼ **Identify goods categories with an unusual trade balance:** The immediate requirement is to identify the goods categories which lie in the suspicious category of violating the rules of origin country as per Article 7 of the trade agreement between India and ASEAN countries. For this, the *Customs Tariff Act, 1975* can be modified, on the similar line of changes proposed in the budget 2020-21⁵⁴, to have a clause to state the provenance of the 'country of origin' for goods being imported into India. This also serves to institutionalise ethical trade practices.
- ▼ **Enforce and track Rule 4 of ASEAN-India Free Trade Agreement (AIFTA):** To revive the manufacturing sector and protect domestic industries from dumped imported goods, the Government of India (GoI) must urgently enforce and track the 35 per cent minimum value addition requirement as per rule number 4 of the AIFTA⁵⁵.

STRATEGIC

This is a trade/diplomatic intervention requiring no financial outlay.

TIMELINE	This measure should be implemented immediately as most of the Asian countries are having an early recovery from the COVID pandemic and will rapidly liquidate their built-up inventories at a discounted price.
IMPLEMENTERS	The Ministry of Commerce and Industry (MoC&I) needs to immediately revise the <i>Customs Tariff Act</i> to empower customs officials to track and confirm any origin fraud. Both the MoC&I and Ministry of External Affairs (MEA) should enforce the FTAs and take necessary steps to safeguard Indian businesses.
JOBS	<p>Implementing this protection measure would:</p> <ul style="list-style-type: none"> ▼ Prevent the immediate risk of collapse of India's domestic industries and, at least temporarily, protect their employment base, and ▼ Provide an opportunity to grow the manufacturing base, and create additional jobs.
GROWTH	The domestic manufacturing sector is in transition, moving away from low- to medium-value to high-value manufacturing. Hence, it is crucial to provide the industry a level playing field by blocking any ' <i>origin fraud</i> ' in the existing FTAs. But this needs to be done thoughtfully, to protect against non-competitive trade practices while avoiding the temptation to indefinitely support inefficient industries. The case for growth rests on fair competition — at home and abroad.
SUSTAINABILITY	This initiative has no direct impact on sustainability.
TRADE-OFFS	<p>The GoI tightened its trade norms on 18 April 2020 by amending its foreign direct investment (FDI) policy. Now, entities of countries that share a land border with India can invest in greenfield projects or existing ones only with GoI approval, irrespective of the sector or the amount of FDI allowed via automatic route. It also restricts transfer of investments / future FDI resulting in beneficial ownership, thus safeguarding against round-tripping of investment.</p> <p>This change impacts citizens, companies and investing entities of seven neighbouring countries, but is expected to mainly address apprehensions of Chinese firms taking over financially stressed Indian firms in the wake of the pandemic.</p> <p>Further, in May 2020, the GoI notified amendments to the <i>General Financial Rules 2017</i> to henceforth disallow global tenders up to INR 200 crore (USD 27.3 million) in government procurement.</p> <p>The influx of low-cost imports that circumvent intercountry taxation has created huge business ecosystems in India. Imposing restrictions on supply chains, especially during an economic crisis, would adversely impact these enterprises as well as suppress demand from buyers due to increased prices. Increased scrutiny could also upset the balance of relationships with trading partners.</p>



India should create an Environment and Health De-risking Mission to increase emergency preparedness, secure critical resources, and build resilient infrastructure and governance systems to counter tail-end risks.

4. Secure resources and build resilience against tail-end risks

India needs to invest in resilient infrastructure and governance systems to respond to low-probability but high-impact tail-end risks. This is critical because, as the pandemic shows, such tail-end risks can bring the economy to a halt, imposing far greater costs than what would be otherwise spent to increase resilience.

Climate risks are non-linear and could trigger shocks across many parameters — food, water, heat stress, vector-borne diseases, extreme weather events, etc. — compounding the pressures on weak infrastructure. As a nation, we need to increase preparedness and secure our critical resources to counter such risks to, first, ensure the safety of our citizens during such catastrophic events, and second, facilitate recovery with minimum loss of lives and livelihoods.

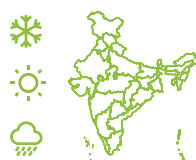
In this section, we propose measures to build resilience in some critical areas:

- ▼ Create an Environment and Health De-risking Mission
- ▼ Build capacity for emergency response and disaster management
 - Develop a nationwide Integrated Emergency Surveillance System (IESM)
 - Promote public-private partnership to build emergency preparedness infrastructure
 - Create a Unified Emergency Response Framework (UERF) for citizens
- ▼ Food security
 - Provide affordable access to safe and nutritious food for informal workers
 - Manage post-harvest loss of fruits and vegetables
- ▼ Water security
 - Provide plot-scale irrigation advisories to farmers to improve irrigation efficiency
 - Fast-track wastewater management
 - Ensure piped water supply, sanitation and sewerage connection to households
 - Build basin-scale info-base for all river basins for data-driven water management
- ▼ Energy security
 - Enhance oil and critical minerals security for the country
 - Improve cooking energy security for the household
- ▼ Strategic decarbonisation
- ▼ Improve air quality and keep a second COVID-19 wave at bay

4.1 Create an Environment and Health De-risking Mission



INR 5.61 lakh crore
Damages due to over 300 extreme climate events encountered by India since 1990



INR 5 crore
Estimated cost of developing a Climate Risk Atlas for India

Data points: CEEW analysis

The international environment is beset with traditional security concerns. But the biggest threats are no longer states, nor non-state terrorist groups. The gravest concerns are about tail-end risks, which have low probability but can be catastrophic.

The pandemic is one such risk; others include severe climate shocks. With growing environmental and health stress, such calamitous events are likely to occur more often and overlap with one another, overwhelming our capacity to respond.

In many sectors, regulations consider worst-case scenarios, such as, structural integrity of buildings in earthquakes, or capital reserves for insurance firms. On the battlefield, military strategists imagine the worst and prepare accordingly. Public health pandemics, food shocks, water scarcity, or electricity grid collapse demand similar approaches.

PROBLEM

Climate risks such as extreme weather events, impacts on health and infrastructure, or destruction of biodiversity are dangerous because these risks are non-linear, rising with time and triggering further collapse of ecosystems, leading to a long tail of disastrous consequences.

SOLUTION

Create an **Environment and Health De-Risking Mission** to focus on risks posed by climate change, air pollution, chemicals, and antimicrobial resistance.

Develop a **Climate Risk Atlas** for India covering critical vulnerabilities: coasts, urban heat stress, water stress, crop loss, vector-borne disease, and biodiversity collapse.

- ▼ By April 2021, develop a **National Environment and Health Risk Index**, with annual updates and improvements in methods.
- ▼ Add state-specific indices to the national index. States should update their action plans on climate change and air pollution with a deeper understanding of environment and health risks.
- ▼ To begin, draw up de-risking strategies at the national level and for five most vulnerable states. The Environment and Health Risk Index can then be linked to disaster risk reduction plans under national and state disaster management authorities.
- ▼ Involve insurance companies as investments in urban and coastal infrastructure need adequate recourse against more frequent extreme weather events.

To create a razor-sharp focus on tail-end risks:

- ▼ Apply the principles of risk assessment
 - Assess risks in relation to objectives, or interests i.e. what we wish to avoid
 - Identify the biggest risks and worst-case scenarios
 - Consider the full range of probabilities: an extremely low probability may correspond to an extremely high risk, if the impact is catastrophic
 - Use the best available information: a best estimate is better than no estimate
 - Take a holistic view: assess direct as well as systemic or compound risks, for example, how a water crisis could trigger food shocks, migration, and social instability
 - Be explicit about value judgments
- ▼ Broaden participation in the risk assessment process
- ▼ Involve leaders and decision-makers in defining objectives and interests
- ▼ Gather information and assess risk by involving:
 - Scientists, to lead the understanding of climate change and its direct impacts
 - Experts in risk from fields such as defence, intelligence, insurance, and public health
 - Economists, technologists, sociologists, and political scientists, to assess interactions across and impacts on various human systems
- ▼ Build capacity — for the weakest links
 - The COVID-19 pandemic has exposed the limits to centralised decision-making without resilience and capacity of local officials. The weakest links can unravel the best planned responses. Report to the highest decision-making authorities but build district-level crisis response capacities, including decentralised infrastructure.

FISCAL	There will be minimal fiscal outlay for this. The estimated cost of developing a Climate Risk Atlas for India is INR 5 crore (USD 0.66 million).
TIMELINE	The first stage of the Environment and Health Risk Index should be completed by April 2021, with further revisions and updates on an annual basis.
IMPLEMENTERS	The Ministry of Environment, Forest and Climate Change (MoEFCC) and the Ministry of Health and Family Welfare (MoHFW) would have to jointly chair this Mission. A Mission Director and a co-Mission Director could be appointed by the respective ministries, with contributions from the Ministry of Earth Sciences (MoES), the Department of Science and Technology (DST), and the National Disaster Management Authority (NDMA). In addition, there would be a significant role of research organisations with the capability to collect, analyse and disseminate data on a range of environmental and health risks using the latest technologies. The results of the annual Environment and Health Risk Index exercise should be reported to a larger body comprising the Prime Minister's Office, the Ministry of Home Affairs (MoHA), MoF, Ministry of Defence (MoD) and MEA.
JOBS	The direct impact on jobs would be small since this is primarily a technical exercise.
GROWTH	Since 1990 India has encountered nearly 300 extreme climate events with INR 5.61 lakh crore (USD 79.5 billion) in damages ⁵⁶ . Loss and damage costs India INR 37,675 - 45,210 crore (USD 5-6 billion) each year. Investing in a low-cost Environmental and Health De-risking Mission could avoid billions of dollars in infrastructure and economic losses.
SUSTAINABILITY	In India, vulnerability is not well measured. Most losses from natural disasters, thus far, have been uninsured, which disguises the damage. Various risks can escalate insurance premiums and further exclude the poor. The Environment and Health De-risking Mission, the first of its kind in the developing world, would greatly increase resilience against future shocks. It would also boost India's leadership via the Coalition for Disaster Resilient Infrastructure.

4.2 Build capacity for emergency response and disaster management



The United Nations Office for Disaster Risk Reduction estimates that in the past two decades, India has suffered losses of INR 5.61 lakh crore (USD 79.5 billion) and INR 7.53 lakh crore (USD 100 billion) respectively due to extreme climate events and vector-borne diseases⁵⁷. The unprecedented scale of the COVID-19 pandemic has exposed the fragility of India's emergency preparedness and response systems and emphasised the vulnerability of lives and livelihoods to a range of risks ensuing from a single crisis.

Effective preparedness is a long-term, integrated and multifaceted approach to disaster and emergency management. It strengthens governance frameworks and community preparedness, and systematically builds resilience and adaptation.

India must evolve its emergency preparedness by building resilient physical and digital infrastructure, training relief personnel, and inculcating social and behavioural changes in citizens and communities.

Proposed solutions:

- ▼ Develop a nationwide Integrated Emergency Surveillance System (IESM)
- ▼ Promote public-private partnership (PPP) to build emergency preparedness infrastructure
- ▼ Create a Unified Emergency Response Framework (UERF) for citizens

4.2.1. Develop a nationwide Integrated Emergency Surveillance System (IESM)



INR 2 crore

Estimated cost of IESM software development and initial data digitisation



INR 6.76 lakh crore

Indicative national savings with better disaster and emergency preparedness over past two decades



USD 2 billion

Amount saved in future emergency response for every USD 1 billion invested in preparedness

Data points: CEEW analysis

PROBLEM

During emergency/ disaster scenarios, relief agencies and citizens do not have access to credible and updated information, which leads to misinformation, miscommunication, and a lack of coordination between stakeholders.

SOLUTION

India should develop a nationwide, centralised, structured, and real-time digital disaster/ emergency surveillance and management system. MoHA could scale up the basic surveillance and tracking system of the national Integrated Disease Surveillance Programme (IDSP) database and State Disaster Management Authorities (SDMA) to serve the entire range of emergency preparedness activities.

The proposed **Integrated Emergency Surveillance System (IESM)** would provide information on:

- ▼ National and local accidents, disasters, and extreme climate events
- ▼ National and state-level response and relief efforts
- ▼ Targeted instructions for various authorities and citizens
- ▼ Government and aid agency services

Major features of IESM:

- ▼ Cloud and data analytics-based backbone
- ▼ Active database of disaster / emergency hotspots
- ▼ A comprehensive Climate Risk Atlas with geo-tagged interfaces of critical infrastructure such as police and fire stations, hospitals, relief help desks, shelter houses, and warehouses
- ▼ Multi-user interface for central and state nodal agencies, and citizens
- ▼ Facility to avail and monitor response services for post-emergency restoration

The IESM would facilitate a systematic and sustained response to emergencies, ensure safety of lives and property, and lead to rapid restoration of business-as-usual operations. Citizens can voluntarily register on the IESM to receive real-time, hyper-local and customised information.

States like Odisha and Kerala have managed the COVID-19 crisis more effectively than other states by using IESM prototypes. The Odisha Government's unified COVID-19 portal managed inflow of its migrant workers and allowed efficient contact tracing, restricting total cases of COVID-19 cases to 1269 with only 7 fatalities as of 25 May 2020, despite the onslaught of super cyclonic storm *Amphan* in mid-May.

FISCAL

The IESM software development and initial data digitisation cost is estimated at INR 2 crore (USD 0.27 million). Running costs include software / database maintenance and day-to-day operation of the IESM.

TIMELINE

Initiate IESM development within 3 months and complete roll-out within 12 months.

IMPLEMENTERS

Implementing the IESM requires the collaboration of several authorities:

- ▼ MoHA would be the nodal agency for IESM
- ▼ The NDMA would be the main coordinating agency to deploy the IESM in states and districts through SDMAAs
- ▼ IDSP and the Ministry of Health and Family Welfare (MoHFW) will be the health domain supporting agency
- ▼ National Informatics Centre (NIC) would provide info-tech related technical assistance to MoHA and NDMA to develop, maintain and streamline the ISEM, supported by State Informatics Centres
- ▼ State Disaster Management Departments (SDM) would be the state focal points

JOBS

All 720 districts of India with *Jan Seva Kendras*, should be equipped with a dedicated person to manage the local IESM on a 24x7 basis in 3 shifts. There should also be state- and central-level integration centres. **Approximately 3500 direct jobs will be created from IESM management and maintenance.**

GROWTH

As per the UN-IASC report on '*Return on Investment in Emergency Preparedness*', every INR 75.35 (USD 1) invested for preparedness saves over INR 150.7 (USD 2) in future response⁵⁸. Extrapolating this ratio to India's losses of INR 13.52 lakh crore (USD 179.5 billion) in disaster management⁵⁹ in the past twenty years on extreme events and pandemics (*excluding* the COVID-19 crisis), **the government could have saved close to INR 6.76 lakh crore (USD 89.7 billion) if such a system were in place.** Similar savings are being forecast here, which may be directed to productive economic activities.

SUSTAINABILITY

The IESM will enable coordinated preparedness and response by national and sub-national agencies and enhance community awareness and resilience.

4.2.2. Promote public-private partnership (PPP) to build emergency preparedness infrastructure

PROBLEM

Approximately 79 per cent of India's districts are vulnerable to climate extremes and disasters such as floods, droughts, and storms^{60,61}. India's emergency preparedness infrastructure depends largely on government funding, which is often inadequate and inefficiently deployed. This has led to major gaps in infrastructure and poor maintenance of existing systems, reducing emergency response to ad-hoc local action.

SOLUTION

India needs to invest in cost-effective technologies to build new emergency preparedness infrastructure and upgrade existing systems. The *National Disaster Management Act* provides for infrastructure development in PPP mode, using private funding to supplement government spending for critical infrastructure such as primary, community, district-level and private healthcare centres and hospitals; warehouses for relief equipment and essential goods (food, water, medicines), and shelter homes, camps, and community centres. A joint central-state provision can implement this through risk transfer mechanism⁶².

During non-emergency situations, PPP centres can be used for state-sponsored schemes such as check-up and vaccination drives, maternity centres, and emergency treatment. Revenue could be generated from 70 per cent of the population using the facilities, with free treatments for the 30 per cent patients belonging to the Economically Weaker Section (EWS). Services for EWS families should be linked with the government's *Ayushman Bharat* scheme to enhance efficacy.

For example, in Odisha, private partners have developed 62 per cent of the state's COVID-19 hospitals and quarantine centres in PPP mode by channelling corporate social responsibility (CSR) funds, which has greatly helped manage the outbreak in the state.

NON-FISCAL / STRATEGIC

This measure will enhance the emergency preparedness capacity of any state through a robust governance framework, operational efficiency, and increased asset creation. The PPP mode will enhance the governance framework and operational efficiency through private sector accountability. In addition, private finance will help in asset creation at a quicker pace.

TIMELINE

This measure can be initiated within six months post-lockdown.

IMPLEMENTERS

PPP projects require the collaboration of several authorities:

- ▼ NDMA would be the focal nodal agency facilitating and monitoring the PPP mode of infrastructure development in hotspots through SDMAs
- ▼ MoHFW would support and monitor health-related infrastructure
- ▼ The state departments dealing with the industrial sector would support and coordinate with partners to facilitate PPP mode
- ▼ The private sector can partner with state governments to develop emergency infrastructure by expressing interest to NDMA and state industry departments

JOBS	A 50-bed facility provides 100 healthcare and allied services jobs; such facilities will generate employment for healthcare professionals and improve India's ratio of 1.34 doctors per 1,000 citizen ⁶³ (2017). Similarly, other facilities will provide jobs for local and specialised personnel.
GROWTH	These facilities will expand the reach of affordable and efficient healthcare and relief services to people, and allow rapid recovery from emergency scenarios, thus directly improving productivity of individuals and authorities.
SUSTAINABILITY	Improving emergency preparedness infrastructure would help meet India's UN sustainable development goals (SDGs), in particular, Goal 3: Good Health and Well-being, and Goal 11: Sustainable Cities and Communities.

4.2.3. Create a Unified Emergency Response Framework (UERF) for citizens

PROBLEM

The *National Disaster Management Act* is restricted to emergency service providers and government agencies in terms of instruction and implementation. There is no formal percolation of this information to the public, resulting in on-ground confusion and chaos during emergencies. This has been demonstrated during the COVID-19 crisis as many people did not follow government instructions for social distancing, leading to aggravated spread of the infection, and increased fatalities. Public services, workplaces, and community hubs have been forced shut for a prolonged period as citizens remain at high risk due to low awareness and compliance of safety precautions.

SOLUTION

The Government should create a **Unified Emergency Response Framework (UERF)**, comprising a set of standard operating procedures (SOPs) for the public. This should be mandated in school and university curricula, as well as community, corporate, and institutional training.

Emergency preparedness creates an understanding of risks and inculcates behavioural adaptation to stress situations among citizens, resulting in improved community resilience and minimising loss and damage to life and property.

For example, following the Fukushima Daiichi nuclear accident in 2011, Japan developed a standardised nuclear emergency guideline for medical institutions, residential complexes, government and non-government officials. Training and drills are mandated under a standardised sectoral response guideline for school children, medical professionals, and citizens⁶⁴.

NON-FISCAL/ STRATEGIC

This measure will have the dual benefits of enhancing community resilience and a smooth emergency response system ensuring quick restoration to the business as usual scenario. Clear demarcation of roles and responsibilities of the authorities and citizens will aid smooth information flow and coordination during any disaster/pandemic.

TIMELINE

This measure should be initiated within six months and implemented nationwide within a span of 18 to 24 months. Behavioural change will take longer to observe and, therefore, a lot of public communication and nudge strategies would have to continue for longer.

IMPLEMENTERS

Creating and deploying the UERF requires several authorities:

- ▼ MoHA would be the nodal ministry for the UERF
- ▼ The Ministry of Human Resource Development (MHRD) would mandate and coordinate with the institutions under it to ensure timely implementation of UERF
- ▼ Authorities such as the National Skill Development Council (NSDC) would ensure the deployment of the UERF via their affiliated organisations
- ▼ The NDMA and the respective SDMA would be the central and state level coordinating and monitoring agencies for the UERF

JOBS	Community experts such as emergency workers, teachers, social workers, self-help groups (SHGs) and resident welfare associations (RWAs) could be trained as trainers to permeate this knowledge. Certified trainers may be given a government stipend or allowed to run private courses.
GROWTH	Informed and adaptive citizenry can minimise the impact of people-related issues during emergencies by practicing safety-first measures. Positive behavioural changes and increased resilience could reduce insurance premiums in vulnerable areas, if risk evaluations find that the ability of communities to prevent disasters or cope thereafter is increasing.
SUSTAINABILITY	Systematic information dissemination and training will increase community resilience to withstand disasters.

4.3 Food security



The COVID-19 lockdown has disrupted food supply chains across the country, but the impact has been especially devastating on the informal workers and urban poor, who lost their livelihoods and were displaced from their homes – and often forced to journey for thousands of kilometres back to their villages. It has also led to a crisis in the wholesale food sector, with widespread wastage of fruits and vegetables due to lack of retail offtake and storage facilities. This underlines the need for India to build capacity to ensure access to food and proper storage and supply network of harvested crops.

Taking this into account, we have suggested recommendations to:

- ▼ Provide affordable access to safe and nutritious food for informal workers
- ▼ Manage post-harvest loss of fruits and vegetables

4.3.1 Provide affordable access to safe and nutritious food for informal workers



60,000 canteens

Estimated to serve three meals a day to about 30 million urban poor workers



INR 26,500 crore

Capital investment required to set up 60,000 canteens and 8200 kitchens



1.2 million

Potential jobs, with each canteen employing 20 people to serve 500 beneficiaries

Data points: CEEW analysis

PROBLEM

As the public health and consequently the macroeconomic crises prolong, a significant proportion of urban poor, in particular, informal workers would continue to struggle to gain affordable access to safe and nutritious food. Poor accessibility to food would aggravate malnutrition-induced comorbidities, making the population more vulnerable to COVID-19 and other infections. Among adults, 23 per cent of women and 20 per cent of men are considered undernourished in India⁶⁵. Further, malnourished adults are less able to work, leading to loss of productivity and wages.

SOLUTION

Large-scale deployment of state-supported canteens to provide hygienic, affordable and nutritious cooked food at affordable rates can be operationally budget-neutral. These canteens should incorporate low-cost, but nutritious and environmentally sustainable food items in the plate, providing a clear demand signal for diversification of food production through assured procurement.

IMPLEMENTERS

State governments will support the programme with implementation by Urban Local Bodies / Municipal Corporations, in collaboration with local non-governmental organisations (NGOs) and private entities as service providers.

FISCAL

Serving food three times a day to all urban migrant workers (~30 million), particularly daily wage labourers, would require a capital investment of about INR 26,500 crore (USD 3.5 billion) for an estimated number of 60,000 canteens and about 8,200 kitchens⁶⁶.

However, the food can be priced in a manner that the operating expenses are entirely covered. Initial estimation suggests that the food could be priced at about INR 15 (USD 20 cents) per meal.⁶⁷

TIMELINE

The programme should be implemented in a phase-wise manner starting from now for the next two years, first covering areas with a high population of vulnerable migrant or low wage workers.

JOBS

Each canteen serving meals to 500 beneficiaries could employ around 20 people on average, generating 1.2 million jobs to serve the 30 million migrant workers⁶⁸.

GROWTH

The canteens would help provide affordable, nutritious and safe food to the vulnerable population, thus improving their health and general well-being and avoiding loss of productivity due to under-nourishment.

SUSTAINABILITY

The initiative would contribute towards equitable access to food while helping improve the diversification in food production and dietary patterns. Procurement of agricultural produce from farmer collectives or farmer producer organisations (FPOs) by assuring market offtake at pre-determined prices will stimulate demand for high nutrient coarse cereals like millets, sorghum, etc. which have a lower adverse environmental impact. This will contribute towards reducing our excessive reliance on low nutrient staple crops and increase the awareness of nutritious diets among consumers. Over time, the procurement levers can further nudge farmers towards more sustainable approaches, such as natural farming, etc.

TRADE-OFFS

The initiative may lead to adverse impacts on informal food vendors in terms of loss of sales/livelihoods. Some of them could be absorbed as employees in the canteens themselves, providing them with greater job security. Others may need to be upskilled to enable them to move to more remunerating jobs or livelihoods.

Land constraints could be a barrier to establish canteen facilities, especially in Tier 1 cities.

4.3.2 Manage post-harvest loss of fruits and vegetables

PROBLEM	The COVID-19 lockdown has disrupted the supply chain of agriculture and horticulture produce, crashed farm-gate prices of fruits and vegetables, and led to closure of markets, causing farmers to lose thousands of crore worth of produce. Even before the pandemic, gaps in cold chain infrastructure and inadequate post-harvest management solutions such as drying units, processing units, and storage facilities at farm-gate and FPO level posed major barriers to managing perishable commodities. Post-harvest losses amount to 16 per cent of India's total fruit and vegetable produce ⁶⁹ .
SOLUTION	<p>The government should work with NABARD to extend a refinancing package to banks to provide preferential 'post-harvest management' loans to farmers and FPOs. These loans should be utilised to procure low cost, energy-efficient, and preferably, renewable energy (RE)-powered post-harvest technologies such as:</p> <ul style="list-style-type: none"> ▼ Solar dryers to dehydrate and process excess fruits and vegetables to increase the shelf life of perishables, and provide value additions in the form of processed produce, ▼ Cold storages to extend the shelf life of the horticulture produce, thereby avoiding distress sales by the farmers and enhancing their bargaining capacity, and ▼ Agro-processing units, such as solar-powered grading and sorting machines, multi-purpose food processors, etc. to enhance the value of produce and thus, increase local incomes. <p>These solutions, costing between INR 15,000 - 15,00,000 (USD 200 - 20,000) based on the capacity and specifications of the system, can be implemented by FPOs across all the states. The loan amount could be capped at INR 5,00,000 (USD 6,641) for smaller FPOs (up to 20 farmers) and up to INR 15,00,000 (USD 20,000) for larger FPOs.</p> <p>Standardised and simple assessment (Excel-based) tools can be created to familiarise bankers with these technologies and speed up viability assessments and loan disbursals.</p>
IMPLEMENTERS	Ministry of Food Processing Industries (MoFPI) and Ministry of Agriculture and Farmers' Welfare (MoAFW) should notify NABARD to extend refinancing package to RRBs as well as scheduled commercial banks for them to extend loans to FPOs, who could adopt such post-harvest management solutions.
NON-FISCAL	This intervention has no fiscal implication for the government and the refinancing should be extended through NABARD.
TIMELINE	The scheme should be made available within the next three months for two years.
JOBS	Direct and indirect job creation through demand impetus to small scale agro-processing equipment manufacturers, particularly of energy-efficient or RE-powered variants. Further, additional jobs would be created in the operations of these post-harvest management activities.
GROWTH	Cost-effective, small scale post-harvest management solutions would not just arrest current loss in income due to wastage of some produce, but would also help to increase and diversify farmers' incomes, through greater value addition.
SUSTAINABILITY	The interventions will make India's agricultural and food system more resilient, while reducing the wastage of high-value perishable commodities, and consequential adverse environmental impact.

4.4 Water security



India is grappling with increasing water security and governance related issues. Most of India's water management institutions were developed during a water surplus era and are struggling to keep pace with evolving water challenges⁷⁰. A complex institutional structure comprising multiple departments of assorted ministries further complicate water management. In the wake of the COVID-19 pandemic, it will be crucial to reassess our water systems and reprioritise water governance to address the vulnerabilities of various stakeholder groups.

The principles of Integrated Water Resources Management (IWRM)⁷¹, also adopted by India's National Water Mission, form the basis of our recommendations. IWRM focuses on *“coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment”*. These have been sequenced as measures to support the immediate priorities for economic recovery and the systemic changes for better water governance:

- ▼ Provide plot-scale irrigation advisories to farmers to improve irrigation efficiency
- ▼ Fast-track wastewater management
- ▼ Ensure piped water supply, sanitation and sewerage connection to all households
- ▼ Develop basin-scale info-base for all river basins for data-driven water management

4.4.1 Provide plot-scale irrigation advisories to farmers to improve irrigation efficiency

PROBLEM

In India, 80 per cent of surface and groundwater is used for agriculture. Investments in construction of irrigation systems over the past 60 years has increased major and medium Irrigation Potential Created (IPC). However, there is a 23 per cent gap between IPC and Irrigation Potential Utilised (IPU), indicating low returns on high capital investment in surface irrigation⁷².

The lack of regular monitoring of irrigation canal conveyance and supply efficiency and assessment of the seasonal demand of water for irrigation as per the cropping calendar exposes farmers to the risks posed by climate change. It is imperative to communicate this information to farmers on a regular basis to ensure adequate irrigation supply and protect farmers' livelihoods, especially now as we prepare to enter a post-COVID-19 recovery phase.

SOLUTIONS

Provide plot-scale irrigation advisories for farmers to improve irrigation water use efficiency in command areas. **This is an opportunity to affect a major shift towards demand-side efficiency in water use in agriculture.** Measures include:

- ▼ Emphasise demand-based irrigation supply through state irrigation departments, Water Users' Associations (WUA), mapping of farms in command areas using satellite imagery, and cropping calendars using remote sensor-based crop identification techniques
- ▼ Use Wireless Sensors Network (WSN) of Internet of Things (IoT) devices to monitor soil water content, soil nutrients, evapotranspiration and water level in irrigation command areas to facilitate adoption of deficit irrigation techniques using crop productivity models
- ▼ Provide advisories via SMS to small holder farmers, informing them of crop water demand, canal discharge schedule and rainfall predictions to maximise water use efficiency
- ▼ Encourage MSMEs and start-ups to participate in these efforts to establish timely local support for calibration and maintenance of instruments
- ▼ Invite inputs from academia and research through multi-stakeholder groups

FISCAL

This will be a fiscal measure, however budgetary outlay has not been assessed yet. There could be provision for reallocation of budget under the *National Hydrology Project* (NHP).

TIMELINE

This effort should be completed by March 2022, the period during which small and marginal farmers are likely to face additional stress over market uncertainty.

IMPLEMENTERS

Ministry of Jal Shakti, state irrigation departments, Indian Meteorological Department (IMD), Ministry of Agriculture, and Indian Council for Agricultural Research (ICAR).

JOBS

Promotion of MSMEs and start-ups in the water sector could generate new jobs for skilled labour. The details of total jobs should be assessed and jobs census in this sector should be conducted.

GROWTH

The solution caters to the needs of vulnerable farmer communities for timely weather inputs which could support farmers improve productivity and growth rates in agriculture.

SUSTAINABILITY

These interventions would build resilience against immediate water stress and non-linear climate risks and their impacts on agricultural productivity.

4.4.2 Fast-track wastewater management

PROBLEM

Almost 80 per cent of water supply flows back into the ecosystem as wastewater. It is estimated that around 37.7 million Indians are affected by water-borne diseases annually, 1.5 million children are estimated to die of diarrhoea alone, and 73 million working days are lost due to water-borne diseases each year^{73,74}.

India's current capacity to treat wastewater is estimated at 37 per cent, or 23,277 million litres per day (MLD), against a daily sewage generation of approximately 61,948 MLD⁷⁵. Most STPs do not work at full capacity and do not conform to prescribed standards. Effluent discharge tax or fees and tradable effluent discharge permits are popular incentive-based options to reduce industrial pollution, but enforcement has been weak. The brunt of such inefficiencies is faced by the rivers.

The COVID-19 lockdown has led to decreased effluent discharge, especially from industries, leading to visible improvement in water quality, which needs to be sustained and even improved. With the pandemic adding to the public health burden, it is critical that India reduces the health burdens imposed by water-borne diseases. The pandemic gives an opportunity to strategically prioritise wastewater management.

SOLUTIONS

Fast-track wastewater management to maintain river health. Measures include:

Short-term (time-sensitive and based on latest scientific evidence)

- ▼ Ramp up efficiency of STPs: While limited evidence indicates that the COVID-19 virus is not infectious when contracted through wastewater, initial reports suggest that wastewater can be used to measure the virus circulation in a population; if India starts using sewage surveillance as a tool in the coming months, wastewater utilities will be pressed to improve efficiency⁷⁶
- ▼ Provide standard Personal Protective Equipment (PPE) to sanitation workers
- ▼ Separate treatment of wastewater from hospitals as a precautionary measure

Long-term

- ▼ Set up common effluent treatment plants for industrial clusters, and levy penalties on high-polluting industries
- ▼ Ensure sewer connection or decentralised treatment for all domestic households
- ▼ Increase the number of monitoring stations and broaden the scope of monitoring from conventional compounds (such as Biological Oxygen Demand, total suspended solids, faecal coliform, and oil and grease), to non-conventional pollutants (such as ammonia, chlorine, and iron) that have hazardous health impacts
- ▼ Enable adoption of circular economy for wastewater in the long-term, only after efficient tertiary treatment
- ▼ Encourage economic viability of institutions to achieve the target of 100 per cent coverage in water supply and sewage connections
- ▼ Encourage adoption of PPP models for water treatment, distribution and sewage treatment
- ▼ Set up independent state-level water pricing committees in each state to decide fair water pricing for drinking, industrial use, wastewater reuse, etc.

FISCAL	India's wastewater treatment plant market stood at around INR 18,084 crore (USD 2.4 billion) in 2019 and can potentially reach INR 32,400 crore (USD 4.3 billion) by 2025 due to growing demand for sophisticated municipal water and STPs ⁷⁷ . Several central and state government programmes like <i>Namami Gange</i> , <i>Yamuna Action Plan</i> and <i>National River Conservation Plans</i> etc. are already allocating capital for improving wastewater management.
TIMELINE	Since schemes to manage piped supply, sanitation and hygiene already exist, this should be completed by March 2024, in alignment with the <i>Har Ghar Jal</i> scheme.
IMPLEMENTERS	<p>Planning and alignment between schemes should be done by the Ministry of Jal Shakti, supported by the MoEFCC, Ministry of Housing and Urban Affairs (MoHUA) and Central Pollution Control Board (CPCB). A special COVID-19 task force should ensure efficiency of STPs and sewage surveillance.</p> <p>Local water/wastewater utilities and State Pollution Control Committees (industrial pollution) should take up implementation, with regulation by SPCB.</p>
JOBS	Privatisation of services will create more jobs for skilled labour. However, exact assessment of jobs needs to be carried out.
GROWTH	A CEEW study establishes that direct benefits of resources recovered from wastewater could make an economically attractive case for practitioners to adopt circular economy pathways to manage wastewater ⁷⁸ .
SUSTAINABILITY	Sewage management will lead to better water quality in rivers as well, thereby supporting <i>Namami Gange</i> and similar objectives for other major river systems. While the COVID-19 virus is not transmitted through sewage, ensuring wastewater management will safeguard the population from future public health shocks, including pandemics from water-borne diseases.

4.4.3 Ensure piped water supply, sanitation and sewerage connection to all households

PROBLEM

The World Health Organisation (WHO) has reiterated the importance of hand washing as a measure to tackle COVID-19. This has brought the inequity in access to safe and sufficient water for sanitation to the forefront.

According to the National Sample Survey Office's (NSSO) 76th round⁷⁹, only 22.6 per cent of rural households and 56.9 per cent urban households receive potable water through piped supply into their yards or homes. Additionally, around 29.3 per cent of urban and 72.4 per cent of rural households still rely on hand pumps, tube wells, public taps, piped water from neighbours, protected or unprotected wells, and private or public taps. **The use of such public sources during a contagious pandemic leaves 0.6 billion Indians vulnerable.**

Further, almost 50 per cent of rural households and 25 per cent of urban households did not have exclusive access toilets in their houses. To close the loop of the domestic water cycle, it is crucial to ensure connection of all households to either a centralised sewage treatment system or decentralised arrangements like septic tanks.

SOLUTION

Access to water services for the most vulnerable as an emergency relief measure and accelerated combined piped supply, sanitation and sewerage connection to all households should be implemented as a medium-term measure.

FISCAL

The total project cost is estimated to be about INR 3.6 lakh crore (USD 47 billion) to connect all rural households to water supply under the *Jal Jeevan Mission*, while estimates for urban connections are yet to be assessed. Moreover, India would have to invest INR 14 lakh crore (USD 186 billion) for clean water and sanitation by 2030⁸⁰. The budget for water supply is already allocated under supply and sanitation – *Swachh Bharat Mission, Har Ghar Jal, Atal Mission for Rejuvenation and Urban Transformation (AMRUT)*, etc. This is also a strategic solution to ensure safe and sustainable water access, sanitation and hygiene for all. Exact fiscal estimate for COVID-19 recovery has not been assessed.

TIMELINE

Within the next six months: Use innovative tools to identify vulnerable communities, especially in COVID-19 hotspots, with no or limited access to water and ensure emergency supply through ready low-infrastructure solutions like water tankers. Crowdsourced data through mapathons can help in the identification process. Mapathons are coordinated online mapping events often employed for disaster risk assessment to gather data at a low-cost.

Medium-term

- ▼ Align programmes like AMRUT, *Swachh Bharat Mission, Har Ghar Jal, Namami Gange*
- ▼ Continue rigorous implementation of *Jal Shakti Abhiyan* for 2020
- ▼ Make inclusive policies through comprehensive social assessments
- ▼ Integrate innovation and global best practices in research and development, data management, technology, administration and policy making
- ▼ Augment water supply through rigorous demand-side water management, improved water efficiency and reuse. If farmers managed their inputs better to become more water productive, enough water can be saved and reallocated to provide water to all

- ▼ Replace freshwater supply with reused water for non-potable purposes like landscaping and horticulture in urban areas, to free up fresh water for domestic supply

IMPLEMENTERS

The Ministry of Jal Shakti should create a committee to plan the alignment of the three utilities, comprising representation from states, MoHUA, MoEFCC, academia, NGOs, etc.

- ▼ Central government should play an advisory and planning role, while state and local governments should take up implementation
- ▼ Local authorities led by the state governments should work on the immediate relief measures
- ▼ On-ground NGOs should be leveraged to tackle issues related to identification of vulnerable communities, technological solutions, awareness building, and water supply

JOB

These measures would increase the job opportunities in the water and sanitation sectors in immediate and medium terms. The International Water Association study assessed that there are severe Water, Sanitation and Hygiene (WASH) staff shortages in many developing countries due to a variety of reasons ranging from reluctance to invest in this component, rigidly imposed government staff quotas, poorly targeted education, unattractiveness of the sanitation sector, and the absence of continuous learning and professional development⁸¹. Similar assessments are crucial for India.

GROWTH

Specifically, investments in safe drinking water and sanitation have been shown to foster economic growth, with high rates of return⁸². Ensuring safe and sustainable water and sanitation will provide people the opportunity to focus on livelihoods, which is linked to growth. Equitable access to water and sanitation will provide relief to those who suffer from social exclusion and belong to disadvantaged groups and is critical to maintaining a healthy, educated and productive workforce.

SUSTAINABILITY

Access to clean water and sanitation is United Nations Sustainable Development Goal (SDG) #6. Safe water, sanitation and hygiene is a right and will assure prosperity of all citizens in the long run. This recommendation aims to ensure that water and sanitation become basic human rights and should be ensured despite short-term financial trade-offs. Moreover, reduction in water-related diseases would lessen the public health burden and increase productivity of the workforce.

4.4.4 Build basin-scale info-base for all river basins for data-driven water management

PROBLEM

Managing water resources, at any scale, is strongly linked to the availability of data. This becomes particularly crucial now, as we enter the post-pandemic era, as robust water data would be crucial to support vulnerable communities who are already at risk due to climate change and now due to the pandemic. Basin-level water accounting and auditing provides a framework to systematically acquire, analyse and quality control water-related information and evidence⁸³.

A water database to map temporal and spatial variation in water resource availability; forecast present and future water demands in a basin; monitor water use-efficiencies of projects and track environmental status and development pathways considering climate change impacts could substantially support marginalised communities like small and marginal farmers and small industries through informed allocation of water.

SOLUTIONS

Develop basin-scale information base for all river basins to initiate data-driven water management. This proposal would also tie in with the call for technology-based systems as one of the pillars for India's self-reliant recovery. Measures include:

- ▼ Develop water balance models using data from remote sensing, climate models and ground observations for all the river basins in India at basin or sub-basin scale
- ▼ Model transport of water pollutants and sediments to understand water quality data
- ▼ Downscale Global Climate Models (GCM) or Regional Climate Models (RCM) to basin-scale (preferably 250 or 500 metre spatial resolution) to assess the impact of climate change on water availability
- ▼ Complete assessment of future water demand scenarios till 2050 accounting for climate change scenarios, changes in land use, sectoral demand (domestic, irrigation and industrial) and environmental flow requirements
- ▼ Develop a policy for data collection and dissemination covering standardisation of site selection, instruments, measurement accuracy, calibration and validation protocols, and database management
- ▼ Encourage start-ups to participate in these efforts to establish timely local support for operation and maintenance activities and to promote capacity building and innovation in the water sector

All water infrastructure related decisions like interlinking of rivers, development of irrigation command areas, water storage structures, hydropower dams or inland waterways should be based on comprehensive information and adaptive scenario analysis.

FISCAL/STRATEGIC

NHP is being implemented to expand the network of hydro-meteorological sensors, establishing real-time data collection networks for capturing data related to meteorology, surface water, groundwater, water quality, and storage⁸⁴. The project outlay is INR 3,680 crore (USD 488 million). Increased scope of this assessment may require additional budget.

TIMELINE

Whereas the lack of basin-level information has for long constrained water governance, the proposed solution should be implemented in at least five major river basins by March 2022, with the efforts continuing for other river basins subsequently.

IMPLEMENTERS	This requires collaboration between the of Jal Shakti, MoEFCC, IMD, Central Water Commission, Central Ground Water Board, National Remote Sensing Council, CPCB and SPCB, Pollution Control Committees, MoAFW.
JOB	Promotion of start-ups in the water sector could generate new jobs for skilled labour. However, there is no specific assessment of this.
GROWTH	The most important growth benefit of this exercise would be to reduce water-related risks when making investment decisions for large infrastructure, whether in agriculture or industry. India can pioneer water management solutions and extend services to other countries, thus generating revenue. Better data will lead to better water governance and cost savings. Investment in research and development activities and capacity building in the water sector will reduce dependence on development loans and international agencies.
SUSTAINABILITY	Data-driven water governance will prevent misuse of this precious resource by various consumers in industry, households and agriculture, and allow for balancing water use between socioeconomic activities and ecosystems. It will increase equity and efficiency in water resource and service allocation and distribution.

4.5 Energy security



Image: iStock

India's energy security depends on the availability of adequate quantities of critical resources at prices that are affordable and predictable, with minimum risk of supply distortions, to ensure sustainability for the environment and future generations.⁵² For citizens, energy security starts with energy access. India's energy transition involves access to safe, reliable and affordable energy for millions of Indians.

In this section, we focus on strategies to:

- ▼ Enhance oil and critical minerals security for the country
- ▼ Improve cooking energy security for the household

4.5.1 Enhance oil and critical minerals security for the country



INR 1.13 lakh crore

Amount saved by India per USD 10 decline in oil prices



84%

Share of oil imported by India in 2019; target is 67% by 2022



5.3 MT

India's total underground petroleum reserve capacity

Data points: CEEW analysis

PROBLEMS

India's energy security scenario is in constant flux due to four main issues⁸⁶:

- Availability of adequate quantities of critical resources:** India imports nearly 84 per cent of its oil, a rising share despite efforts to reduce oil import dependence to 67 per cent by 2022. Supply is threatened by shifting energy geopolitics, and reliability is affected by frequent change in suppliers.

West Asia currently supplies 55 per cent of India's oil imports (Iraq 25 per cent). Iran was a top three supplier in 2016, but slipped down as India received its first-ever US crude in 2017. Prior to 2015, India's main crude suppliers were Saudi Arabia, Iraq, Nigeria and Venezuela.

- Lack of affordable and predictable energy prices:** India's oil import bill varies significantly from year to year (Table 1). This makes it difficult to budget for tax revenues or fossil fuel subsidies (INR 1.27 lakh crore (USD 16.8 billion) in FY2015, INR 70,829 crore (USD 9.4 billion) in FY2018). Such variations also affect industrial competitiveness, especially where the share of energy input cost is high.

Imported gas prices have further complicated the equation. The gas glut has plunged Asia's spot market prices to under USD 4 per metric million British thermal units (MMBTU). India, locked in to procure 8.5 MT gas from Qatar at USD 9-10 per MMBTU, is trying to renegotiate contracts.

Table 1 India's oil imports, 2014-20

India's oil import bill (FY)	INR lakh crore	USD billion
2014 - 15	8.51	113
2015 - 16	4.82	64
2016 - 17	5.27	70
2017 - 18	6.63	88
2018 - 19	8.43	112
2019 - Jan 2020	6.63	88

Source: Petroleum Planning and Analysis Cell, Ministry of Petroleum and Natural Gas. 2020. "Imports/Exports". Government of India. https://www.ppac.gov.in/content/212_1_Import-Export.aspx

- Supply disruptions:** Safe passage for energy security involves maritime security cooperation. In future it may also include technological challenges, political

implications, and stability and security of maintaining trans-border electricity grids if India increases trade of (non-fossil) electricity.

- Energy transition-related risk of stranded assets:** The world's largest investors are shaping a new reality: in December 2019, 631 non-American investors representing INR 2788 lakh crore (USD 37 trillion) in assets urged governments to elevate climate action; the next month, BlackRock, which manages assets worth INR 527 lakh crore (USD 7 trillion), announced its intent to exit investments with 'high sustainability-related risk'. This has grave implications for oil exporters: in a 2°C scenario, the world's 13 largest oil companies would lose INR 21 lakh crore (USD 360 billion) in value (INR 67 lakh crore (USD 890 billion) in a 1.5°C scenario).

Coal will be harder hit, as less than a quarter of the remaining coal reserves can be burnt in a 2°C scenario. Coal mining companies have lost 74 per cent of value since 2011. India, despite pronouncements to increase coal production, needs to seriously assess the risk of stranded assets and determine at what stage investment in new coal capacity will become unviable.

SOLUTIONS

India has been investing in strategic oil reserves to avoid supply disruptions. The three underground petroleum reserves at Vizag (1.3 MT), Mangalore (1.5 MT) and Padur (2.5 MT), at full capacity can provide fuel security for nine days. Only about 55 per cent of this capacity is full; remaining 45 per cent will now be filled with excess crude supplies of state oil refiners created by the drastic fall in demand due to the COVID-19 lockdown. This is an opportunity to fill up the reserves at lower prices.

But our understanding of secure storage must evolve beyond vast underground caverns. Evolution of battery technologies will influence options, in particular by speeding up electrification of millions of MSMEs that cite poor electricity quality as a top concern. Batteries will also impact the share of renewables in the electricity mix, increase prevalence of distributed electricity, and add to the resilience of the grid-based system. Towards this end, India must also develop a circular economy and strategic reserves for critical minerals⁸⁷, such as those likely to be used in energy storage applications.

FISCAL/STRATEGIC

The strategy outlined here is both strategic in nature and offers savings on government expenditure. Each USD 10 decline in oil prices saves India INR 1.13 lakh crore (USD 15 billion) in external payments⁸⁸. Similarly, developing a circular economy for critical minerals, to be used in energy storage, would shield India from the risk of supply shocks and also reduce external payment outlays.

TIMELINE

The actions to shore up strategic oil reserves should be undertaken within the FY2021 during which time the global oil prices are likely to remain depressed. The push for a circular economy on critical minerals should aim for at least 10 per cent reduction in import requirements against business-as-usual scenarios by end of FY2022.

IMPLEMENTERS

The Indian Strategic Petroleum Reserves Limited (ISPRL), under the Ministry of Petroleum and Natural Gas (MoPNG), would be the competent authority for the strategic oil reserves. NITI Aayog and Ministry of Mines (in coordination with MoEFCC) could drive the mission for self-reliance in critical minerals.

JOB

There will be an additional jobs premium in promoting the recycling industry associated with batteries recycling, reuse, and harvesting of critical minerals.

GROWTH

Energy security will be central to India's growth prospects as it shifts from relative autocracy to deeper integration into global energy markets. It will be the most significant

player at the margin and shape the dynamics of energy markets for the next three decades⁸⁹.

SUSTAINABILITY

Historically, energy security has been affected by shifts in either technologies, economics or geopolitics. Now, there are transformations on all these fronts. India must frame the debate to stay ahead of the game. India's energy future is going to be shaped within a highly carbon constrained world and it would have to make strategic choices about its energy mix and the policy imperatives associated with a secure and resilient energy system.

4.5.2 Improve cooking energy security for the household

PROBLEM

PMUY has provided LPG connections to 80 million socio-economically poorer households to accelerate their transition towards cleaner cooking fuel. This has increased LPG penetration to 97 per cent, but most rural and economically poor households continue to rely on easily available, free-of-cost traditional biomass as their primary cooking fuel.

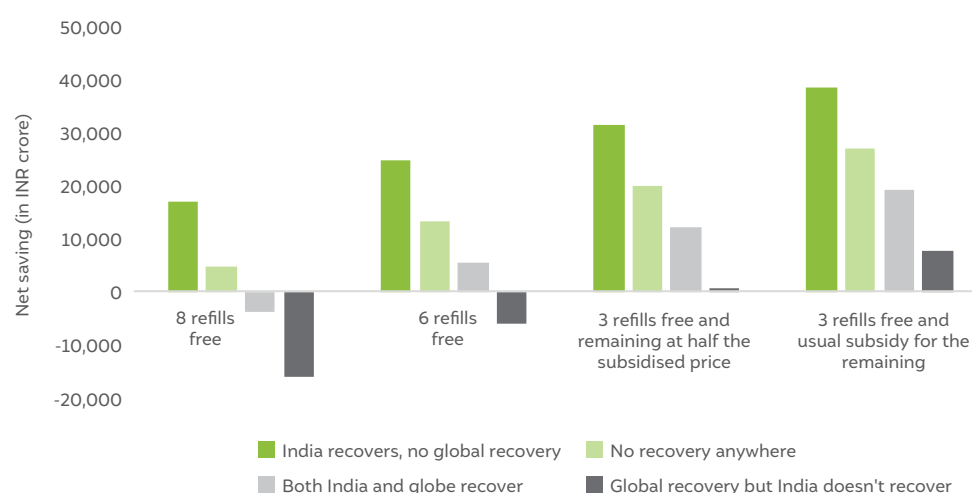
The COVID-19 pandemic has pushed millions of Indians into severe economic distress from income and/or livelihood loss. This cash crunch will make it even more difficult for PMUY consumers to pay recurring costs for LPG refills, further increasing their dependence on traditional biomass, and thus undermining the health benefits of PMUY.

SOLUTION

As part of the COVID-19 relief for economically poorer sections of the society, the GoI has announced three free LPG refills for PMUY beneficiaries until 31 March 2021. The massive fall in global crude oil prices has created an opportunity for India to use the LPG subsidy savings to provide more free LPG refills to PMUY households in FY2021. This will increase their disposable income in these stressed times and further help them in their transition towards clean cooking fuel.

Due to the decline in crude oil prices, most of the allocated budget for LPG subsidy would remain unutilised, even after the government provides the announced three free refills to PMUY households (shown by the last set of columns in Figure 3). We recommend that the government should provide **three more free LPG refills to PMUY households i.e. six refills in FY2021**. These additional refills can be extended within the current LPG subsidy budget. Even in the worst-case scenario i.e. if global crude oil prices start increasing (on back of global economic recovery), and India does not recover economically (shown by all the dark grey bars in Figure 3), the next three LPG refills can still be provided at 50 per cent of the subsidised price to these beneficiaries within the existing budget.

The government should consider leveraging the Aadhaar enabled Payment System (AePS) to effectively implement this measure, as beneficiaries report significant challenges in accessing advance payments made in the bank accounts⁹⁰. The oil marketing companies (OMCs) could forge a collaboration with India Post Payments Bank (IPPB) to enable easier payment for the refills.

Figure 3 LPG subsidy scenarios to extend additional support to PMUY households

CEEW analysis: Here we show the net fiscal savings across different scenarios of economic recovery and LPG subsidy provision. Each set of four columns represents a domestic LPG subsidy scenario. Each colour of the column represents different economic recovery scenario for India vis-à-vis the globe. Green bars represent the net savings where the oil prices remain constant at current level throughout the financial year due to no recovery in global oil demand. Dark grey bars represent a scenario where global recovery has led to a recovery in oil prices, but India does not recover, further depreciating the Indian Rupee. Light green and light grey bars show the scenarios in between. The net saving accounts for the additional margin by OMCs for the refills where the cost of the refill is lower than the estimated market price of the refill.

FISCAL

In the worst-case scenario, where oil prices increase consistently on the back of a global recovery in demand and India does not recover economically, the proposed recommendation of six free refills may require an additional subsidy of around INR 6,000 crore (USD 796 million), which is one-sixth of the current subsidy budget. These resources are already committed under PMGKY. In all other scenarios of global vis-à-vis Indian economic recovery, **this recommendation allows net savings between INR 5,500 crore (USD 730 million) and INR 25,000 crore (USD 3.3 billion)**. The net saving accounts for the additional margin by OMCs for the refills where the cost of the refill is lower than the estimated market price of the refill (for instance, as is the case in the month of May 2020).

TIMELINE

The initiative can start in July-August 2020 when most PMUY households would end their current quota of three free LPG refills, and there would be greater clarity on economic recovery.

IMPLEMENTERS

Under the guidance of the MoPNG, the OMCs will have to extend the additional advance cash into the PMUY beneficiaries bank accounts, which they can use for payment of the LPG refill. To ease the payment mechanism, OMCs should work with National Payments Corporation of India (NPCI) to enable AePS based direct deduction of the money from the beneficiaries' account or the OMCs can work with the IPPB to facilitate refill payments from beneficiaries' accounts at the point of delivery. The MoF would need to approve the use of existing LPG subsidy budget to extend these additional free refills to PMUY beneficiaries.

JOBS

LPG promotion should be converged with livelihood promotion for women through the *National Rural Livelihood Mission*. The transition to LPG will save time spent by women in cooking, which can be used towards livelihood activities through SHGs. Further, livelihood opportunities are needed for migrant labourers choosing to remain in their villages. The government should extend interest-free MUDRA loans to microentrepreneurs to set-up small scale briquetting and palletising units to process locally available biomass into commercial fuel for local industries such as kilns, dhabas, etc⁹¹. Initial risks can be mitigated through the *Mahatma Gandhi National Rural Employment Guarantee Scheme* (MNREGS) to support workers in such plants for the first six months. Since freely available biomass is a major hindrance to sustained LPG use, these alternative value chains will generate employment and facilitate the transition to cleaner cooking fuel.

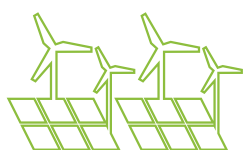
GROWTH

Despite a fiscal implication for only one year, the initiative would yield long term benefits in terms of increased LPG usage. It would save money and increase the number of refills for PMUY households and provide additional liquidity to the PMGKY by eliminating the need for additional funds to provide free refills. The LPG subsidy budget allocation for FY 2020-21 is sufficient to cover these additional free refills.

SUSTAINABILITY

Studies have found that providing free LPG fuel to women during pregnancy led to 85 per cent of those households buying the second LPG cylinder on their own post-pregnancy⁹². Utilising the current low crude oil prices to provide free LPG cylinders to PMUY households for a prolonged period will prevent households from backsliding to traditional biomass options, and also enable them to experience the health and convenience benefits of LPG over a longer period. This could potentially result in sustained LPG use and achieve the objective of eliminating exposure to indoor air pollution and consequential comorbidities among the population.

4.6 Strategic decarbonisation



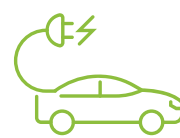
INR 82,885 crore

Annual investment in India's RE infrastructure over past three years



1.3 million

Direct full-time equivalent jobs to be created if India achieves 160 GW of solar and wind power capacity by 2022



INR 45,210 crore

Possible reduction in oil import bill per annum by 2030 if electric cars comprised 30% of total car sales

Data points: CEEW analysis

Decarbonisation is important to achieve sustainable development goals. India is increasing the share of non-fossil energy in its electricity generation and reducing emissions intensity through measures such as coal cess, enhanced energy efficiency across sectors, and incentives for low-carbon vehicles.

PROBLEM

Government support for low-carbon interventions, globally, has primarily been through fiscal incentives. During the imminent post-COVID-19 recession, there will be pressure to reallocate these budgets to urgent economic recovery measures. In India, government spending is likely to be constrained for at least two years and could lead to plans for a transition to a low-carbon economy being side-lined.

SOLUTION

Prioritise decarbonisation policies based on **budgetary cost** and **strategic imperatives**.

Two strategic imperatives should remain in focus despite the fiscal stress:

- ▼ **Competitiveness of Indian industry:** India has one of the highest electricity prices for the industrial sector among major exporting nations, which severely impacts competitiveness. Lower electricity prices will boost manufacturing in India. Electrification of the industrial sector will also reduce greenhouse gas (GHG) emissions, and shift the burden to the power generation sector, where it is abated more cost-effectively.
- ▼ **Energy security:** A large proportion of India's imported oil is used for transportation. This import volume and expenditure will continue to rise as the number of vehicles increases, hence it is critical to continue laying the groundwork for a higher penetration of electric vehicles to offset this energy risk and cost.

NON-FISCAL/ STRATEGIC

The government should continue its push to increase RE capacity, specifically solar-based electricity, which is already cost effective compared to other fossil and low-carbon alternatives. Solar requires no fiscal support till its share in the electricity generation mix increases beyond 15 per cent; at that point, support for storage and other grid management interventions would be imperative.

The government should also continue the Bureau of Energy Efficiency's (BEE) Perform, Achieve and Trade (PAT) scheme and superefficient appliances scheme given their robust administrative infrastructure and strong performance.

TIMELINE

Near term, after the COVID-19 lockdown is lifted.

IMPLEMENTERS

The Ministry of Power (MoP) and relevant state-level government departments would be instrumental for implementing electricity pricing reform. The Ministry of Heavy Industries and Public Enterprises should continue devising and implementing appropriate policies for creating an ecosystem for electric vehicles.

JOBS

Increased competitiveness of Indian industry will directly lead to job creation. India's targets of 100 GW of solar and 60 GW of wind power capacity are likely to generate about 1.3 million direct jobs on a Full-Time Equivalent (FTE) basis⁹³. The latest estimates suggest that 61,000 jobs have already been created in utility-scale solar and wind power sectors; the rooftop solar sector employs another 38,600 people⁹⁴. Domestic manufacturing of solar PV modules and wind components could employ an additional 45,000 and 10,000 people, respectively⁹⁵.

GROWTH

Decarbonisation would reduce India's oil import bill, increase energy security, and provide long-term benefits of more resilient energy systems. For example, India's oil import bill could be reduced by INR 45,210 crore (USD 6 billion) per annum by 2030, and INR 2.86 lakh crore (USD 38 billion) per annum by 2050, if 30 per cent of car sales in India in 2030, and 50 per cent in 2050, are of electric cars (CEEW analysis). Further, over the past three years, approximately INR 82,885 crore (USD 11 billion) has been invested annually in India's RE infrastructure; with required investment upwards of INR 2.26 lakh crore (USD 30 billion), this sector is a highly attractive investment destination for the next decade⁹⁶.

SUSTAINABILITY

Directly helps to achieve India's renewable energy targets and SDGs.

TRADE-OFF

Government may prefer, at least in the near term, to utilise the budget allocated for decarbonisation for emergency relief and recovery measures.

4.7 Improve air quality and keep a second COVID-19 wave at bay



PROBLEM

Air pollution was responsible for more than 1 million premature deaths in India in 2017⁹⁷. Additionally, air pollution exerts an additional burden on the economy in the form of lost workdays and reduced crop yields. Estimates suggest that in 2018-19 India could have harvested an additional 40 million tonnes of wheat had the atmosphere been as clean as it was 50 years ago⁹⁸.

In 2017, approximately 80 per cent of India's population was exposed to PM_{2.5} greater than 40 µg/m³, which is the limit recommended by the National Ambient Air Quality Standards (NAAQS) in India⁹⁹. **This is particularly concerning as a growing body of research points at the insidious link between exposure to air pollution and increased mortality due to COVID-19.**

Finally, we find that the emission control solutions for large stationary and mobile sources implemented by the Government are effective, but their benefits can get neutralised in a bid for rapid economic recovery post-COVID-19¹⁰⁰.

SOLUTIONS

The natural rebound in the form of blue skies bears evidence to the fact that a significant reduction in emissions can almost immediately translate into improvements in ambient air quality.

The Union Budget, based on the recommendation of the 15th Finance Commission, has allocated INR 4,400 crore (USD 584 million) for formulating and implementing plans in million-plus cities. This allocation must be honoured and not repurposed for other relief measures. To ensure that India continues to breathe clean air, cities could spend the allocated money to:

- **Strengthen monitoring:** Air pollution measurements are critical to identify sources and locations of concern and evaluate the effectiveness of measures to reduce

emissions. To develop a monitoring network of comparable strength (to China and the West), India would need 4000 monitors at an estimated capital cost of ~ INR 4,080 crore (USD 540 million)¹⁰¹. A sizable share of the budget could provide for the installation of continuous air quality monitors in cities that are poorly studied and to create new evidence for action.

- ▼ **Augment strength and capacity of State Pollution Control Boards (SPCB):** A 2016 Comptroller and Auditor General (CAG) report highlighted the acute shortage of technical workforce in SPCBs¹⁰². Compared to the California Air Resource Board's strength of over 1300 employees, the strength of Maharashtra PCB responsible for improving air quality in 18 non-attainment cities stands at less than 600 employees¹⁰³. In addition to increasing the strength of SPCBs, a significant share of the grant should be used to improve the capacity of existing Board employees through structured training programmes on monitoring, assessing, and reporting pollutant emissions in addition to analysing measured concentrations. Fiscal allocations aside, there is a need for explicit covenants that prioritise air quality as industrial activity is ramped up.
- ▼ **Link bailouts and support mechanisms in the post-lockdown period to stated and verifiable actions against air pollution:** Bailouts for industrial units should be linked with explicit conditions of meeting emission standards. Continuous monitoring for larger industrial sources and improved reporting from smaller units (on energy use and emissions) would be critical to ensure that bailed out units do not exacerbate the pollution problem. Equally, in critically polluted areas, an informed decision on bringing back industrial activity to pre-lockdown levels must be carefully assessed.

FISCAL/ STRATEGIC

The budgetary provision exists, but the mechanism for payouts and monitoring needs to be worked out. Implementation of the above solution warrants coordination across centre, state, city and regional levels. Both inter-department and cross-state coordination would be needed.

TIMELINE

The initial allocation to cities must be immediate, and SPCBs should develop a year-on-year monitoring expansion plan for the duration (till 2024) of the National Clean Air Programme (NCAP).

IMPLEMENTERS

MoEFCC and MoHUA will be the central coordinating agencies. Implementation will require a coordinated effort from state governments, state departments of environment and executing agencies including pollution control boards and urban/rural local bodies, state and city transport service providers and clean technology providers.

JOBS

Air pollution mitigation would create jobs in pollution monitoring, pollution control and steer innovations in air pollution research. For instance, the vehicle emission control industry alone supports 70,000 jobs in North America. In 2015, the U.S. environment industry supported 1.73 million jobs¹⁰⁴. Growth of clean energy, clean technology and clean transportation could potentially generate millions of jobs in India.

GROWTH

Stringent emission standards for industries, power plants and automobiles could create a large market demand for clean air technologies. The air pollution control equipment market for stationary sources alone is expected to cross INR 780 crore (USD 104 million) by 2022¹⁰⁵.

SUSTAINABILITY

Addressing air pollution warrants a cross-sectoral mitigation strategy. In addition to technical emission controls for stationary and mobile sources, CEEW analysis finds that sustainable development measures including enhanced public transport, increased use of cleaner cookstoves, improved waste management and agricultural production practices can provide NAAQS-compliant air quality to about 85 per cent of the Indian population¹⁰⁶.



This is a good time for India to drive sustainable growth by promoting domestic renewables-powered and energy-efficient solutions to convert energy access, especially in rural India, from a consumption paradigm to an economic driver.

5. Greening the economy: energy, infrastructure and quality of life

India's energy and infrastructure sectors have seen tremendous transformation over the past decade in terms of policy reforms, investment generation, on-ground deployment, and adoption of state-of-the-art technologies, digital interventions, sustainable materials and resource-efficient processes.

Though the COVID-19 pandemic has put a temporary halt on major projects, the government has stepped up efforts to resume work by defining appropriate health and safety standards for the workforce and mandating strict on-ground enforcement.

There are numerous possible interventions to improve these core sectors of the economy. Here, we have selected an indicative set of recommendations to:

▼ Rethink energy economics

- Provide income support to consume energy and energy products
- Finance the energy transition in post-pandemic India

▼ Strengthen power and renewable energy sectors

- Continue power sector reforms
 - Revisit legacy issues of the power sector — subsidy and losses
 - Decommission old and inefficient thermal power plants
- Support renewable energy projects
 - Set up a Ministry task force to address COVID-19 related sectoral issues
 - Support under-construction RE projects facing force majeure
 - Provide flexible financing covenants for project developers
 - Promote solar manufacturing
- Create an institutional framework for the power sector
 - Set up a Ministry task force to address COVID-19 related RE sector issues
 - Make an Integrated Energy Resource Plan (IERP)
 - Establish a National Renewable Energy Corporation (NREC)
 - Notify a National Renewable Energy Policy (NREP)
- Invest in distributed renewable energy (DRE)
 - Promote grid-connected micro-grids for urban and industrial consumers
 - Build new discom-led DRE business models
 - Create new markets for rooftop solar
 - Promote innovation in DRE technologies

▼ **Shift to cleaner fossil fuels**

- Revise natural gas utilisation policy
- Expand city gas distribution infrastructure

▼ **Build resilient transport and urban infrastructure**

- Accelerate procurement of buses and micro-buses
- Rebuild India's HVAC manufacturing sector for sustainable cooling

5.1 Rethink energy economics



India's energy sector has struggled to keep pace with the exponentially increasing demand as more of its citizens get access to electricity connections, household cooking gas supply, and public and private transportation. In parallel, the rapid economic growth has generated major demand from the commercial and industrial sectors.

To maintain – and increase – fuel supply to consumers while minimising its import bills and the burden on the exchequer and staying on the course of sustainable development, the government is exploring new sources of energy, increasing efficient fuel use, and relooking at mechanisms and beneficiaries of various subsidies.

In this section, we encourage a rethink of India's energy economics to:

- ▼ Provide income support to consume energy and energy products
- ▼ Finance the energy transition in post-pandemic India

5.1.1 Provide income support to consume energy and energy products

PROBLEM

India spends an astounding INR 2.89 lakh crore (~ USD 38 billion)^{107,108,109} a year in subsidising energy and energy products consumption. This includes subsidies and cross-subsidies for electricity, natural gas for North-Eastern states, LPG, kerosene and fertilisers. The subsidised consumption benefits many households, farmers and informal enterprises. However, given the poor assessment of economic status – wealth, income, financial solvency of the beneficiaries, subsidies have become universal and inequitable. This is a large leakage of precious public resources, and has driven inefficiencies into the systems that deliver energy and energy products. Public agencies mask these inefficiencies under the garb of unmeasured universal subsidised consumption.

In the electricity system, this distortion has resulted in sustained losses for discoms over the years. The package of INR 90,000 crore¹¹⁰ (USD 11.9 billion) announced to help discoms pay their generators is effectively an outcome of this distortion and comes despite the significant subsidy that is already provided to keep prices low. Clearly a more lasting solution is needed – one that signals the right prices to the consumers, triggers end-use efficiency and also addresses the needs of the vulnerable (households and farmers) and those needing strategic support (industries).

LPG supply, under the purview of the Centre, has conditional transfers through a direct benefit transfer (DBT) mechanism, based on consumption. But this offers the same level of support to virtually all consumers, barring a very small addition for PMUY consumers. DBT is also used to provide urea to fertiliser companies, to give farmers access to a subsidised commodity. This does not address the skewed nutrient ratios and the inequitable distribution across farmers with different holding sizes.

SOLUTION

We propose the following options that can rein in the subsidy bill while ensuring equitable outcomes for end-consumers:

- ▼ **Establishing wealth or income driven categorisation of population:** The Socio-Economic Caste Census (SECC) offers a window into the diversity in wealth and income across the country. However, an exhaustive mapping and classification of the population might need a repeat of such a census, to gather more details on attributes of households. This could perhaps be a part of the decennial Census that is due to happen in 2021. The categorisation will have to be more comprehensive than simple exclusion and inclusion criteria that the SECC has been used to arrive at. In our ongoing study using a pan-India residential energy consumption survey, we have recreated a wealth-based classification of the population that reasonably correlates with income and is more reliable, as income reporting tends to be poor and unreliable¹¹¹. A combination of a wealth and social indicators from an SECC-like exercise could help households more appropriately.
- ▼ **Conditional transfer based on consumption to deserving groups and individuals:** Unconditional income transfer might spur the consumption of demerit goods; for example, conventional solid fuels could again compete with cleaner cooking fuels. To avoid this, we recommend retaining the current model of conditional transfers for LPG till an alternative economic use case is made for conventional fuels. However, differential levels of support must be offered at varying wealth / income levels to ensure equity in end-use and prevent households from lapsing to solid fuels for want of money.

▼ **Unconditional transfer as income to deserving groups and individuals:**

Unconditional transfers are to help support a consumption level that ensures a decent standard of living. For electricity, we suggest that based on estimated nominal consumption levels commensurate to the needs of various climatic zones, housing conditions and wealth status, a direct income transfer be made to households to support all or a portion of this consumption. Support for electricity for farm use and fertilisers must be linked to farmers' household status and land-holding size. A varying subsidy provision to ensure that larger land-holding farmers do not receive a disproportionate share of subsidy is necessary.

**FISCAL/
STRATEGIC**

The budgetary provision exists in the case of LPG and fertilisers and the main ask is for a reallocation across consumers. In the case of electricity, cross-subsidies provide an equal chunk of the subsidy support today and this needs to find fiscal room. Part of this will have to be from increased tax-revenues from industry and commercial sector – sharing the benefits of cheaper production and contributing to public resources. Bringing electricity under the ambit of GST will also be crucial to unlock gains for intermediate consumers that can be shared. The rest will have to be from growing the economic pie and the potentially increased revenue base of government.

TIMELINE

Establishing the need for this transition must be prioritised in the next few months. The process of carrying out the Census to ascertain the endowments of households will happen in due course over the next year. Meanwhile, the mechanism for targeting must be established, taking into account central ministries, departments and states. The roll-out of DBT could be as early as 2022, signalling a significant transition as India celebrates 75 years of Independence. Periodic declarations via know your customer (KYC) forms would ensure that the classifications of wealth / income status are current and reliable.

IMPLEMENTERS

This will have to be driven by the high-powered Prime Minister's Office. The main task will be driving coordination between the Centre, states, industry, farmer lobbies and key development sector organisations to chart the course of this ambitious plan. The administrative and banking machinery would have to be leveraged during implementation, akin to the rapid deployment of the PMUY scheme.

JOBS

The direct impact on jobs is uncertain; however, this will lead to increased industrial activity and help formal commercial establishments flourish due to with lower energy costs. Since much of the farm sector is currently unmetered, increased metering and monitoring could potentially create new jobs in the electricity sector. Consumer liaison roles will become crucial.

GROWTH

The industrial sector is likely to get fillip from the steep drop of approximately 20-35 per cent in electricity tariffs and become more competitive. Commercial activity and service sector offerings could benefit from tariff reduction in the range of 30-50 per cent, across the states. Growth opportunities also exist for the measurement technologies in electricity supply.¹¹²

SUSTAINABILITY

Economic and environmental sustainability is at the core of this plan. Income transfers bring in more allocation efficiency¹¹³ and ultimately drive efficiency in distribution and consumption as well. This is critical for the power sector as more than two-thirds of the electricity in the coming decade will be provided by coal-based generation. This will drive generation efficiency and could unleash the potential of decentralised generation as end-consumers will see more parity in delivered price from alternatives to the grid. The direct income transfer to farmers will help drive balance in the use of various fertiliser inputs

and pave way for changes in cropping patterns, thus boosting less fertiliser-intensive and natural farming practices.¹¹⁴

TRADE-OFFS

As with all plans to target support, identification and privacy concerns are likely to be raised by many groups. Parting with data for these needs (to authorised government entities) is crucial and equally the need for protecting such data from unauthorised access. Across economic groups, there will be alterations to tax liabilities to help fund the gaps caused by the loss of cross-subsidy for electricity supply. Income transfers and measurements of consumption by design increase the transparency associated with the operations of public utilities and the service delivery process.

Electricity theft is also likely to intensify, as prices go up and with direct transfers, households have more of an incentive to distort consumption levels. There are likely to be a lot of losses for intermediaries in this process and many well-off citizens are likely to see a rise in the cost of consuming energy and energy products. Richer farmers and richer strata of households, which form powerful lobbies could resist this move and create barriers.

None of these is a reason not to pursue the proposal. Managing the political economy of energy consumption and subsidisation in India has always been a challenge, but the pandemic now forces us to re-evaluate our wasteful, distorted and inequitable subsidy structures in a time of severe fiscal constraints.

5.1.2 Finance the energy transition in post-pandemic India



INR 76,000 crore

Bond market flows estimated through a credit enhancement subsidy of INR 4,600 crore over 5 years



110,000

Potential new utility-scale solar and wind sector jobs from enhanced credit flow



INR 1.9 lakh crore

Potential additional GDP from multiplier effect of enhanced credit in infrastructure investment

Data points: CEEW analysis

PROBLEM

The COVID-19 outbreak could slow the pace of India's energy transition by impacting new investments in the RE sector in at least two ways:

- ▼ **Heightened counterparty risk:** Decline in economic activity has significantly reduced electricity demand, resulting in increased power curtailment and overcapacity generation. The financial health of discoms has deteriorated with plummeting revenue collection from commercial and industrial (C&I) consumers, amounting to 70 per cent of income. This is likely to result in payment delays to developers and dampen investor appetite for new RE capacity.
- ▼ **Constrained financial flows:** Build-up of stressed assets in the financial system will limit the flow of credit from financial institutions into renewables, which could be worsened by restricted exposure in the power sector.

SOLUTIONS

We propose the following three measures to ease the flow of finance to the RE sector:

- ▼ **Increase transparency to build confidence:** Regulators must enforce the must-run status of RE to minimise curtailment and increase the transparency of aggregated plant-level generation performance to build trust in the rationalisation of curtailment. Transparency could be increased through a **dedicated National RE Database** of performance data, combining and verifying data inputs from load despatch centres and power producers. Such a transparent database would allow easier dispute settlement in case of conflict relating to off-take and would allow independent power producers (IPPs) to have more consistent cash flows and predictable risk profiles.

FISCAL

This has financial implications to the extent of the minimum prescribed offtake, which is already a part of existing RE PPAs through the must-run or deemed generation clause.

TIMELINE

The must-run or deemed generation clause and the agreement to report performance data should be included immediately in all new tenders. The database should be implemented as soon as it can be developed.

IMPLEMENTERS Implementation should be a joint effort of central (Solar Energy Corporate of India (SECI), NTPC) and state tendering agencies. The Central Electricity Authority (CEA) and CEEW-CEF are currently developing a National RE Database (in beta testing).

- ▼ **Separate or bifurcated sectoral exposure limits for RE:** As lending to the RE sector is subsumed under banks' power sector exposure, it competes with other power sector projects for credit. Existing thermal assets and other power sector lending leave limited headroom for lending to RE. A separate sectoral exposure category for RE should be created to ensure that credit flow to the sector is not constrained.

STRATEGIC This intervention is a regulatory non-fiscal measure.

TIMELINE This intervention should be implemented within the next 3 months to enhance capital flow in these credit-constrained times.

IMPLEMENTER The primary lever for this is action would be a reclassification by the RBI.

- ▼ **Enhance financial institutions' capacity to lend to the RE sector by recycling bank capital:** Refinancing lenders' loan books would enhance credit flow to the RE sector. A limited-time credit enhancement subsidy could stimulate bond market flows, freeing up bank capital for fresh lending.

FISCAL CEEW-CEF estimates that a credit enhancement subsidy of INR 4,600 crore (USD 611 million) spread over five years could mobilise bond market flows of INR 76,000 crore (USD 10 billion)¹¹⁵.

TIMELINE This should be implemented within the next 3 months to ease credit flow.

IMPLEMENTER Subsidy credit enhancement products should be administered by a dedicated credit enhancement guarantee corporation, under the MoF, as envisioned in the Budget 2019-2016 and routed through existing providers.

JOBS Utility-scale solar and wind sectors generate employment at the rate of 3.45 jobs per MW and 1.27 jobs per MW respectively¹¹⁷. This could create an additional 110,000 jobs¹¹⁸.

GROWTH These measures will lower oversupply risks to RE deployment and resolve viability challenges from lower payments from curtailed power, and solve the imminent liquidity crunch. In the solar sector alone, this could facilitate the doubling of installed capacity from 32 GW to 64 GW through efficient use of public money by leveraging capital 16.5 times¹¹⁹.

Considering the multiplier effect of infrastructure investment on economic growth across sectors, the credit enhancement could add INR 1.9 lakh crore (USD 25 billion) overall to India's GDP^{120,121}.

SUSTAINABILITY Advancements made in sustainable RE generation will enable a shift towards higher RE targets of 450 GW aimed for 2030. This measure would advance decarbonisation of the electricity mix and aid India's move to fulfil its Paris Agreement commitment of 40 per cent non-fossil electricity capacity by 2030.

5.2 Strengthen power and renewable energy sectors



In recent years, India has seen drastic changes in the way we generate, transmit, distribute and consume power. In just the past decade, 350 million Indians have got access to electricity. But more localised solutions are needed (via off-grid systems) for about 35 million last-mile customers. Also, for rural energy access, we must think beyond infrastructure and connections and consider affordability, reliability, safety and ease of use.

Inefficient legacy issues such as poorly targeted subsidies and low output, polluting thermal power plants, drain precious resources. The promising RE sector was already beset, even before the COVID-19 crisis, with lengthy payment delays, off-take curtailments, and issues such as state-level renegotiations of PPAs and consequent litigations. The lockdown has halted project development, dispersed workers, and disrupted supply chains, severely stressing the industry.

Electricity, a concurrent subject in the *Constitution of India*, requires the active participation of many stakeholders from the union and state governments, which makes policymaking, regulation and implementation extremely difficult to coordinate.

The need for reforms in the power sector was well realised, but the changed scenarios created by the pandemic requires fast-tracking of reforms to address issues such as multiplicity of authorities, centre-state policy and implementation conflicts, managing depressed demand, and difficulties in revenue collection.

This is also a good time to capitalise on domestic and global opportunities to promote domestic RE-powered or energy-efficient solutions and convert energy access from a consumption paradigm to an economic driver.

We propose a rethink of the structural framework of India's power sector to:

- ▼ Continue power sector reforms
- ▼ Support renewable energy projects
- ▼ Create an institutional framework for the power sector
- ▼ Invest in DRE

5.2.1 Continue power sector reforms

The need for reforms in the power sector was well realised; but due to changed scenarios brought in by COVID-19 there is an urgent need to fast track these reforms, with some added points to reminisce. The pandemic has resulted in lesser demand and difficulties in revenue collection. Also, it is high time we understand that old and inefficient power plants need to be done away with as they act as lag in power sector.

Considering the concerns of discoms as well as the power sector as whole, we have proposed measures to:

- ▼ Revisit legacy issues of the power sector — subsidy and losses
- ▼ Decommission old and inefficient thermal power plants

Revisit legacy issues of the power sector - subsidy and losses



67,000

Additional meter readers needed to ensure timely billing of agricultural and household consumers under *Saubhagya*



INR 3,000 crore

Outlay needed to waive electricity bills of households consuming less than 50 units per month, for April-June 2020

Data points: CEEW analysis

PROBLEM

Due to the lockdown, economic activities have come to a standstill, resulting in a sudden drop in demand (28 per cent y-o-y)¹²³. Distribution companies (discoms) are facing the twin challenges of losing revenues from high-paying C&I consumers while facing difficulty in generating bills and collecting revenue from domestic and agricultural consumers. Discoms are staring at a revenue loss of more than INR 30,000 crore (USD 3.98 billion) during April and May 2020¹²⁴, besides the accumulated dues of INR 92,000 crore (USD 12.21 billion) to be paid to the generators as of February 2020¹²⁵.

The demand crisis has also reinforced the systemic inefficiencies prevalent in the power sector. For instance, C&I establishments may take several months to return to normal production levels; till then, their power demand will remain muted and as a result, the reliance on cross-subsidies will be a double whammy for the discoms. In 2017-18, cross-subsidies from C&I consumers amounted to INR 75,000 crore (USD 9.95 billion)¹²⁶.

The need of the hour is to break the twin challenges of expensive power and low revenue recovery during this financial year.

SOLUTIONS

We recommend the following measures to enhance the revenue recovery and bring down power purchase costs for discoms:

- Build political consensus across party-lines to reduce cross-subsidies:** Cross-subsidies are a political reality of each state and doing away with them will require extensive engagement across all consumer groups, particularly farmer groups and households. An all-party agreement is immediately needed to allow for costs to be passed through without political opposition. Pursuant to this, the regulatory commissions must take *suo motu* steps to pass through full costs of power delivery to all categories of consumers for this financial year. Subsidies to consumer categories like unmetered agricultural consumers may be considered by the state governments.

NON-FISCAL

This is a regulatory process to be followed to allow full pass-through of electricity costs to consumers and reduce reliance on government support. This will free up fiscal space to cater to other priorities.

TIMELINE

Engagements with different actors and consumers to discuss cross-subsidy reduction in the subsequent tariff petitions must start immediately.

IMPLEMENTER Regulatory commissions must take *suo motu* steps to pass through full costs of power delivery to all categories of consumers.

- ▼ **Increase in electricity duty for domestic consumers:** A differentiated electricity duty to target wealthier households with high consumption, such as those using more than 200 units of electricity per month¹²⁷, could be in effect until there is a recovery in demand from C&I consumers.

FISCAL Many states do not even have an electricity duty in place and so this can take the form of targeted taxation, unlike other indirect taxes which affects all consumers.

TIMELINE This is an immediate measure, which can be implemented in FY2021.

IMPLEMENTERS Respective state governments must review and arrive at a mechanism that will sit well with their consumers and commensurate to their requirements to help support discom finances.

- ▼ **Awareness and incentives to promote timely payment of electricity bills:** Only a small fraction of domestic and agricultural consumers pay electricity bills online. As a result, revenue collection during the time of movement restriction or from sparsely populated areas is often challenging. Moreover, many consumers are wrongly interpreting the temporary moratorium on electricity bill payment as waivers, as per a quick telephonic survey conducted by CEEW. Effective and clear communication by discoms on payment timelines, means of getting access to bills, and payment modes available will heighten awareness for bill payments. Incentives and improved access to online payment modes would be crucial to enable penetration of e-bill payment*.

NON-FISCAL MoP could issue a letter to states encouraging discoms to implement these measures to enhance revenue collection, which is crucial for delivering reliable supply to its consumers. These actions must continue in the medium term to ensure a transition to electronic bill payments by most consumers.

TIMELINE This measure needs immediate implementation (in the next 1-2 months) to enhance revenue flow.

IMPLEMENTERS Respective discoms can implement it.

- ▼ **Safety net for vulnerable consumers:** Central and state governments could consider waiving-off the electricity bills (not duties) of domestic consumers with low-consumption for a period of three months (April-June 2020), and directly compensate discoms for expenses towards this consumption. Discoms can use a lifeline electricity consumption level of 50 units/month to identify consumers in need of such support. Nearly 50 per cent of Indian households, mostly rural, consume less than 50 units per month¹²⁸.

FISCAL The proposed safety net would require an additional outlay of around INR 3000 crore (USD 0.40 billion), over three months. **This outlay is less than 5 per cent of the total annual power subsidy on offer across the states.**

* Balani, Kanika; Mani, Sunil and Agrawal, Shalu. "Solving for Billing and Revenue Collection Challenges: A CEEW Blog Series." Council on Energy Environment and Water. April. Accessed 2020. HFCs in India. New Delhi: Council on Energy, Environment and Water.

TIMELINE This needs immediate implementation to provide a safety net for the vulnerable consumers.

IMPLEMENTERS Central and state governments must work in tandem to determine the resource requirements. Additional power from the central pool can be allocated to states to the extent that it meets the needs of poorer consumers.

- ▼ **Restructuring PPAs in accordance with pragmatic demand projections under different scenarios of economic recovery:** The drop in demand has been largely borne by the thermal power producers, as thermal generation dropped by 27.5 per cent in the week following the lockdown¹²⁹. The financial stress associated with low utilisation of plants would only increase this year. Rationalising the PPA fixed costs to determine the most efficient assets, an optimal allocation of coal (among operational plants) and ensuring merit-order dispatch will be crucial. A compensation package for moth-balled units to cover short-term liabilities must be worked out. Central Electricity Regulatory Commission (CERC) estimates savings to be in the order of INR 6000 crore (USD 0.80 billion), for just five states¹³⁰.

NON-FISCAL There is need for coordination between various stakeholders to aid renegotiation. Moreover, it will also help with restricting and compensating aggrieved parties based on overall savings that can be achieved over the life of these assets.

TIMELINE This should be implemented in the latter half of 2020, extending to the next three fiscal years i.e. till FY2024.

IMPLEMENTERS This can be implemented by MoP, through its key agencies CERC and NLDC, in coordination with state agencies such as state LDCs, gencos and discoms.

- ▼ **Clearing dues:** States must set a clear time-bound roadmap to clear the unpaid bills to discoms (by various state government departments), amounting to INR 50,000 crore (USD 6.64 billion).

FISCAL This would require ring-fencing the expenditure dedicated towards power bills of all state departments. It would also need creating a mechanism for direct transfer to discoms against invoices.

TIMELINE It should be implemented in the near term, after the COVID-19 lockdown is lifted.

IMPLEMENTER This needs commitment of the respective state governments.

- ▼ **Filling the gaps in metering, billing and revenue collection:** Discoms must continue the ongoing efforts to achieve universal metering of all consumers, particularly the agricultural and rural domestic consumers. In order to ensure timely delivery of accurate bills, discoms need to strengthen their management system, keep a check on erroneous bills, recruit more human resources, and provide appropriate incentives to meter readers. Billing based on metered units should be mandated to bridge trust gap between consumers and discoms, which in turn will lead to timely payments. Almost all *gram panchayats* in India have common service centres (CSC), which provide digital services to citizens in rural and remote locations. However, electricity bill payments through this CSC network are active only in 13

states and 3 Union Territories. During April-December 2019, 11.4 million electricity bills were paid through CSCs, accounting for less than 0.6 per cent of total domestic consumers paying an average bill of INR 112/month¹³¹. Activating electricity bill payments in the remaining CSCs will make bill payment more convenient for rural consumers and significantly improve revenue collection.

NON-FISCAL	Regulators must allow discoms to spend more on metering, billing and collection, and full pass through of these costs. For instance, to ensure timely and accurate bill generation for newly electrified households and all agricultural consumers, discoms will need to spend INR 850 crores (USD 113 million) on human resources (meter readers) ¹³² . In very high loss making areas, discoms could consider installing smart meters. These expenses will have a multiplier effect on discom revenues. However, states may have to support roll-out, if capex resources are not available and cannot be recovered through tariffs or duties.
TIMELINE	It should be implemented in latter half of 2020, extending to next three fiscal years i.e. till FY2024.
IMPLEMENTER	Discoms need to provide clear time-bound implementation strategy and monitoring of the revenue collection trajectories post-implementation.

JOBS These interventions have the potential to expand service sector related jobs in consumer focused activities like billing and collection. These are essential value-added services that will result in local employment creation and augment discom revenues. For instance, an additional 67,000 meter readers are required to ensure timely billing of agricultural consumers and households electrified under *Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya)*. By enabling additional services such as bill payments at all CSCs, a commensurate number of local jobs could be created.

GROWTH The annual losses of the sector are as high as INR 30,000 crore (USD 3.98 billion) even after a total subsidy of INR 90,000 crore (USD 11.94 billion). These losses not only make working capital more expensive but result in persistent underinvestment in the sector against crucial upgradation needs. As a result, the status quo continues on many fronts – especially power procurement and non-compliance with renewable purchase obligations. Clearing the discoms books by allowing for full-recovery and addressing key issues of cost of power purchase and billing would enable a flood of change in the sector and unleash innovation in the distribution sector as well.

SUSTAINABILITY Current loss levels are in the range of 23 per cent of the Average Cost of Supply (ACOS). Bringing these losses down to less than 10 per cent would improve delivery efficiency and, ultimately reduce the need for procuring additional electricity. In turn, this would reduce emissions and water footprint commensurately. Passing the true cost of electricity to all consumers will also incentivise energy conservation behaviour and uptake of more efficient appliances, which in turn would lower the carbon footprint of consumers and the country as a whole.

TRADE-OFFS A significant contribution (more than INR 80,000 crore (~ USD 10.6 billion)) to public sector finances comes from entities involved in electricity generation, coal production, coal transportation and involved in the transmission business via cesses, taxes, dividends and royalties. Rationalising the cost of power could dent government revenues in the short-run but will have positive implications in the long run.

Decommission old and inefficient thermal power plants



**INR 12,000 -
18,000 crore**

Potential savings from decommissioning thermal power plants aged over 25 years by 2024



45 MT

Potential reduction of coal if India produces power from the most efficient plants



INR 14,260 crore

Cost for retrofitting older thermal power plants with Pollution Control Technologies (PCT), which would ultimately be passed on to the consumers.

Data points: CEEW analysis

PROBLEM

Power procurement amounts to 70 per cent of total costs of discoms across India. With 70 per cent of the generation coming from coal-based generation sources, any inefficiency in the procurement from thermal plants needs to be removed. Plants older than 25 years contribute to over 20 per cent of the coal-based generation and constitute a significant fixed cost burden for the discoms. The only reason these plants continue to generate power is the low-cost coal allocation and the resultant low power tariffs offered to the discoms.

Plants identified for retirement consume 155 MT of coal a year. This is a premium commodity given the sector's liquidity challenges and serial waivers being offered to generators, discoms and retail consumers. Coal India Limited (CIL) is unable to increase enough production, as a result, coal imports have been rising steadily despite stated policy goals to reduce imports to nil.

Another major problem is air pollution. An estimated 76,000 premature deaths occur annually due to coal power plant emissions¹³³. Retrofitting these older plants with Pollution Control Technologies (PCT) will cost around INR 14,260 crore (USD 1.89 billion), which would ultimately be passed on to the consumers¹³⁴. Addressing inefficiencies in older assets will have positive implications for air quality, competitiveness of renewables, and overall financial health of the power sector.

SOLUTION

Accelerated phase out of these power plants over the next few years (versus the two-step phase out by 2027 proposed in the National Electricity Plan (NEP)) will ensure that newer plants operate at optimal plant load factors (PLFs). Currently, 75 per cent of the total demand is met by coal power plants. As per the NEP, up to 48 GW capacity will be phased out by 2027. It is possible for plants younger than 20 years (today) to cater to more than 50 per cent of the total power demand in 2027. CEA estimates that contribution of coal to overall power generation will be nearly 50 per cent in 2029-30 and the current capacity (with aggressive phase outs) and 61 GW of projects under various stages of construction will be more than sufficient to meet India's demand.

NON-FISCAL / STRATEGIC	This is a strategic and technological solution, which requires centre-state coordination and contract renegotiations.
TIMELINE	This should be done in the latter half of 2020, extending to the next three fiscal years i.e. by FY2024. Plant-specific solutions for reallocating coal linkages requires a dedicated effort which can span a few months.
IMPLEMENTERS	MoP will be the main coordinating agency. Implementation will require multiple authorities like CEA, CERC, central and state gencos, CIL and state governments.
JOB	Retiring older plants will impact indirect jobs in the local economies of the areas they are based in, and these people would have to be deployed to other employment avenues. The direct jobs will be transferred to upcoming plants.
GROWTH	It is economically prudent to reduce fixed costs of older plants, bring in financial solvency for the many new, disused plants, and free up low-cost coal for efficient generators. We estimate savings in the range of INR 12,000 to 18,000 crore (USD 1.6 to 2.4 billion) through this decommissioning, which will accrue to the system and can be shared among participating discoms.
SUSTAINABILITY	We estimate a reduction of nearly 45 MT of coal if India produces power from the most efficient plants in its fleet. Overall emissions from the power sector would reduce GHG emissions as well as criteria pollutants, which would positively impact air quality.
TRADE-OFFS	<p>Decommissioning will likely increase the cost of coal-based generation as the fixed cost for newer plants will be higher by about 30 paise per unit. However, it will yield major gains for the financial system as non-performing power assets will start generating, thereby allowing for more lending to the sector.</p> <p>Reallocation of coal will require extensive coordination with the Indian Railways (IR), though it may improve its finances.</p> <p>The imbalances created in power transmission will require assessment and may need additional investment to evacuate electricity to the demand centres.</p>

5.2.2 Support renewable energy projects



The outbreak of pandemic has brought the entire RE sector to a standstill. Multiple stakeholders are impacted at various levels. Moreover, the dependence of the sector on imports from other countries has put a huge burden on domestic supply chain. But this also provides an opportunity for India to strengthen its RE sector on the pillars of the *Aatma Nirbhar Bharat Abhiyaan*. We propose that stakeholders:

- ▼ Set up a Ministry task force to address COVID-19 related RE sector issues
- ▼ Support under-construction RE projects facing force majeure
- ▼ Provide flexible financing covenants for project developers
- ▼ Promote solar manufacturing

Set up a Ministry task force to address COVID-19 related renewables sector issues

PROBLEM	The RE sector is highly differentiated, with multiple players across the value chain who operate seamlessly in normal times. They include manufacturers, Engineering, Procurement and Construction (EPC) and Operations and Management (O&M) service providers, developers, and aggregators. COVID-19 impacts the survival and growth of all these units, especially the smaller segments with multiple players, which do not get adequate representation.
SOLUTION	MNRE should set up a central task force to deal with all sectoral issues arising from COVID-19, including late payment from discoms, curtailment, logistical problems due to the lockdown, interpretation of notifications and guidelines by other ministries which may also be applicable to the RE sector, contractual issues between developers and state agencies, etc. This task force should be the single point of connection between industry and the government.
STRATEGIC	Setting up this task force will not require any extra monetary resources. It will only be a streamlining of the procedure within MNRE, which has been handling these issues.
TIMELINE	Given the urgent need for relief, this measure should be implemented immediately. The task force should be active as of now for at least the next six months, and may be extended as required till the sector returns to normal.
IMPLEMENTERS	The MNRE is best suited to play this role. Alternatively, the RE Facilitation Board of the MNRE could be assigned this additional responsibility.
JOB	The solar and wind sectors currently employ about 50,000 permanent employees and over 80,000 people in various construction and installation activities ¹³⁵ . Active support from the Ministry would help protect this workforce and ensure continued job creation.
GROWTH	The task force would facilitate smooth execution of the current pipeline of 62 GW of solar and wind generation capacity which is at various stages of project development ¹³⁶ . This effort will drive ease of doing business and increase investor and industry confidence.
SUSTAINABILITY	This coordination mechanism will ensure uninterrupted supply of services and benefit operational plants as well as those under construction. The 62 GW capacity pipeline is central to India's decarbonisation commitment.

Support under-construction renewable energy projects facing force majeure

PROBLEM

According to MNRE, India currently has around 62 GW of RE projects in various stages of installation, and the Ministry has granted a blanket extension for under-construction projects¹³⁷. However, we foresee a major contractual issue with PPAs that do not provide for costs arising out of a force majeure event such as the COVID-19 lockdown, fixed costs of maintaining project sites, working capital interest costs, overheads, change in the prices, unanticipated currency rate fluctuations, etc. Entities across the value chain would have to bear these unexpected costs.

SOLUTION

We recommend that MNRE and MoP take urgent cognisance of this issue and direct tendering agencies such as SECI and NTPC to assess the force majeure-related costs for each under-construction project in consultation with developers and service providers. After assessment, the agency may direct Indian Renewable Energy Development Agency (IREDA) to extend no cost working capital loans for these sums to project developers to pay their service providers.

As learning from this event, future versions of the PPA must contain provisions to allocate costs during such force majeure events. The guidelines for tariff-based competitive bidding issued by the MNRE could also be amended accordingly.

FISCAL

Bearing the interest costs on these loans will involve immediate expenditure on part of the relevant agencies and they may even require additional allocations. These costs are likely to be expensive for each individual player but on an aggregate, we do not estimate that they will cause a major impact on MNRE and MoP budget allocations. Moreover, the government will eventually end up bearing these costs anyway because the developers will most likely claim increased tariffs or other contractual reliefs. Providing immediate relief will keep businesses viable. It will also help prevent any litigation in this regard and facilitate smooth operations across the sector.

TIMELINE

This is a high priority issue as these costs are accruing in the short term and are due immediately.

IMPLEMENTERS

The operationalising of these recommendations would require MNRE, MoP, and IREDA to work in conjunction with SECI and NTPC.

JOBS

This does not create any additional direct jobs, but would safeguard existing jobs and keep the sector viable for future job creation.

GROWTH

If unaddressed, these force majeure-related costs arising from these projects will move up the value chain, compounded with interest costs, and eventually may even translate into multiple petitions before the electricity regulators demanding for release of tariff. This recommendation helps avoid that scenario.

SUSTAINABILITY

Addressing this issue will ensure that there are no further delays in project completion. Further, a proactive approach will increase investor confidence during a stressful time. In the medium run, this will keep India's energy transition growth story alive and thriving.

TRADE-OFF

If unaddressed, these costs would move up the value chain and the government would end up bearing them anyway. The trade-off is going to be between bearing them immediately versus at an unspecified later date through NPAs, litigated project outcomes, etc.

Provide flexible financing covenants for project developers

PROBLEM

The lockdown-induced demand-side disruptions have lowered RE generation by about 10 per cent, leading to strained cash flows and severely constrained the ability of many project developers to meet their debt payment obligations¹³⁸. RBI has permitted a three-month moratorium on 27 March 2020, but the problem of accrued interest payments, especially for working capital loans, continues¹³⁹.

Further, different players will suffer differently: larger projects may be cushioned by their contractual debt service reserves, while promoter-backed projects may have group-level liquidity to sustain through the recession. Smaller projects, however, backed by MSMEs and especially prevalent in RTS, bio energy and other distributed energy segments, would likely find it difficult to arrange for cash flows even after the three months.

The banking sector is also in severe crisis and lenders have already expressed reluctance to be flexible with their debt covenants without the RBI's intervention.

SOLUTIONS

RBI should permit banks and financial institutions to be more flexible with individual lenders while maintaining a close watch on the financial health of the lenders and their ability to recover, utilising the information covenants made by the borrower. Relaxations could include:

- ▼ Borrowers drawing down unutilised portions of their sanctions despite occurrence of 'material adverse effect'
- ▼ Relaxed maintenance of debt service and other cash reserves by the borrower
- ▼ Temporary fluctuation in financial ratios such as debt to equity, interest coverage, etc. to allow borrowers access to other debt
- ▼ Eased covenants related to project activity, including performance, revenue projections, inspection reports, etc.
- ▼ Disputes or claims under the underlying project documents are to be expected; lenders should quickly give consent or relax provisions in relation to changing counterparties and provisions in the project documents
- ▼ Waiver of mandatory prepayment or cash sweep provisions by lenders to ensure liquidity of borrowers

STRATEGIC

The RBI has eased monetary policy and there is sufficient liquidity in the banking channels. This regulatory measure, if implemented by the financial institutions, will provide comfort to cash-strapped project developers. While there is no fiscal impact of the measure, there is a danger of unmonitored project debt becoming non-performing. Hence, the measure should come with stringent information covenants from borrowers and strict review and monitoring by lenders.

TIMELINE

Implementing this intervention immediately will alleviate the financial stress brought on by the extended lockdown and other COVID-19 related disruptions.

IMPLEMENTERS

The primary obligation of such an intervention lies with RBI, and implemented through the lending agencies such as banks and NBFCs.

JOBS

This will indirectly prevent job losses due to business closures.

GROWTH

The most important benefit will be that project developers can obtain liquidity to meet immediate expenses like fixed costs, overheads and workforce costs, and channel funds into projects such that their viability remains intact in the medium run.

SUSTAINABILITY

This will help prevent closures of green energy businesses, especially in the MSME sector, which may be viewed as low priority and high risk for lenders with limited capital.

TRADE-OFF

Lenders may adopt a flexible approach, but only if RBI issues a guidance on this matter. Without such flexibility, liquidity may be allocated to projects which do not require it, or defaults may be triggered by lenders on projects which have the potential to be viable post-COVID-19. This may trigger mandatory prepayment of loans, which can further deteriorate cash flows, and affect future project activity of developers and consequently of the entire sector.

Promote solar manufacturing



INR 15,000 crore

Conservative cost of solar modules needed to meet 10 GW domestic demand per year



INR 7,500 crore

Possible forex outflow savings per year if half of the required solar modules are made in India



INR 4,500 - 5,000 crore

Estimated collections from safeguard duties on solar cells and modules since August 2018

Data points: CEEW analysis

PROBLEM

In the past five years, India, on an average, has imported solar cells and modules worth INR 17,600 crore (USD 2.6 billion) annually to meet the demand-supply mismatch¹⁴⁰. Imported solar modules meet 80 to 90 per cent of the demand. These imports will be hindered by the COVID-19 lockdown and disruption and uncertainty in the global supply chain. With plans to significantly install solar power capacity every year, India must seize this opportunity to reduce its reliance on imported products and at the same time, boost domestic manufacturing to tap the global demand. This will add new jobs, contribute to economic growth, and reduce forex outflow.

SOLUTIONS

India can take the following measures to reduce import dependence and limit the adverse impact of COVID-19 on the domestic solar sector:

- ▼ **Set tariff barriers:** In August 2018, MoF, on the advice of the Directorate General of Trade Remedies (DGTR), had recommended a two-year safeguard duty on solar cells and modules, set to expire in July 2020. Going forward, a safeguard duty in the form of a Tariff Rate Quota (TRQ) should be implemented for at least five years. Under the TRQ, a lower duty must be levied on the first 5 GW of imports (assuming this is 50 per cent on the annual demand). Once imports cross this quota, a higher duty can be levied. The duty must be differential i.e. higher on modules and lower on solar cells. The United States had implemented a similar safeguard duty on solar cells and modules in 2018¹⁴¹. This intervention will ensure bids with attractive tariffs and support local manufacturing.
- ▼ **Provide fiscal support:** The government must assess the impact of fiscal interventions such as production subsidy, capex support, interest subvention, tax rebate or electricity subsidy, and accordingly prioritise them. The Ministry of Electronics and Information Technology's Special Incentive Package Scheme (SIPS) and Modified-SIPS (M-SIPS), launched in 2007 and 2012 respectively with the aim to offset disability and attract investments in electronics manufacturing, are good examples of such incentive support.
- ▼ **Indigenise the value chain:** A strategic plan is needed to increase market share of domestic solar products beyond 50 per cent. In the short term, India can focus on setting up an additional 10 GW of manufacturing capacity for ingots, wafers, cells, and modules. The government must provide fiscal and regulatory support to incentivise both domestic and foreign manufacturers to scale up their facilities in India. It must give preference to companies focusing on high-efficiency products. Import of machinery to manufacture these products should be exempted from customs duty, ensuring competitiveness in the global market.

- ▼ **Accelerate the pace of existing interventions:** The government has tried to support domestic solar manufacturing by assuring off-take. It must accelerate the pace of such interventions and prioritise the bids under the 12 GW Central Public Sector Undertaking (CPSU) scheme and the *Kisan Urja Suraksha Evam Utthaan Mahabhiyan* (KUSUM) scheme. Recently, two developers won a bid to set up a 12 GW project and an additional 3 GW of solar cell and module manufacturing capacity¹⁴². There must be no delays in signing PPAs in such cases.

FISCAL

Implementing tariff barriers would not lead to additional costs, but tariffs discovered in bids may increase. Fiscal interventions will require budgetary allocation. CEEW-CEF estimates that approximately INR 4,500 to 5,000 crore (USD 600 to 650 million) has been collected by the MoF from safeguard duties since August 2018. To avoid additional cost, the MoF can allocate this revenue to the MNRE to incentivise domestic manufacturing; for instance, INR 2,000 crore can support 10 GW of domestic cell and module production for one year if INR 2 per watt is provided to domestic manufacturers¹⁴³. Such financial support will ensure correct use of the collected duty and reduce additional burden on the exchequer.

TIMELINE

The tariff quota should be implemented immediately to prevent dumping of solar modules and cells into India. The other fiscal interventions – production subsidy, capex support, interest subvention, tax rebate and electricity subsidy – should be implemented within one year, based on their impact potential and ease of implementation.

IMPLEMENTERS

This intervention will require several different agencies to play a role as detailed below:

- ▼ Tariff quota – DGTR and MoF
- ▼ Production subsidy - MNRE, MoF and MoC&I
- ▼ Capex support - MNRE
- ▼ Electricity subsidy - MNRE and state nodal agencies, through local discoms
- ▼ Interest subvention - RBI, IREDA and Power Finance Corporation (PFC)

JOBS

Integrated cell and module manufacturing generates around 2.6 FTE jobs per MW of output 10 GW of additional cell and module manufacturing capacity could generate 26,000 jobs in photovoltaic (PV) manufacturing. Additional jobs can be created in ingot and wafer manufacturing¹⁴⁴.

GROWTH

CEEW conservatively estimates that solar modules worth INR 15,000 crore (USD 2 billion) would be required annually to meet the domestic demand of 10 GW per year. Meeting the bulk of this demand through domestic production (>50 per cent) can avoid forex outflow of INR 7,500 crore (USD 1 billion). In the long term, domestic manufacturers can tap the international market and start by supplying modules to member countries of the International Solar Alliance (ISA).

SUSTAINABILITY

Reduced reliance on imported products will make the sector self-sufficient, competitive, and resilient to supply chain disruptions. It will increase India's energy security and support energy transition efforts while creating domestic value.

TRADE-OFF

Levying a safeguard duty can increase solar tariffs. CEEW-CEF analysed the impact of the current safeguard duty (August 2018 to July 2020) and estimated that tariffs could have been 6 to 10 per cent lower without the safeguard duty¹⁴⁵. A similar trend may be witnessed if the period of safeguard duty is extended. Also, without greater domestic research and development, new technologies may not get deployed in India.

5.2.3 Create an institutional framework for the power sector

Electricity is a concurrent subject in India and states have autonomous decision-making powers. Over the years, the sector has grown rapidly and multiple institutions are involved in policy-making, implementation, operations and governance. Each institution has a set of functions to perform, objectives to meet, and jurisdictions to serve (Figure 4). In this section, we suggest some changes to the existing institutional structure and roles to increase the sector's performance and efficiency. The changes suggested in **green** are explained in the following sections.

Figure 4 Suggested changes to the institutional framework governing India's power sector

Ministries	Direct: MoP, MNRE (Implement NREP)		Allied: MoC, MoPNG, MoEFCC, Dept of Atomic Energy, MoST, MoHI&PE, MoC&I, MoA, MoRTH, MoHUA, MoRD, MoSD&E, MoF, NITI Aayog				<div>National Electricity Council</div> <div>(Statutory central-state coordination, review and monitoring committee)</div>
Central level statutory/ autonomous bodies	Central Electricity Regulatory Commission NTPC, NHPC, DVC	Central Electricity Authority (Make an IERP) PFC, REC, IREDA	National Load Dispatch Centre SECI → NREC	Central Transmission Utility	Bureau of Energy Efficiency NIWE, NISE, CPRI, NPTI	Appellate Tribunal for Electricity (APTEL)	
Regional & state level statutory bodies	State Electricity Regulatory Commissions State Discoms	State Energy/Power Departments State Nodal Agencies	Regional Load Dispatch Centres State Load Dispatch Centres		Regional Power Committees		
Operating entities	Generation utilities Independent Power Producers		Transmission utilities Trading/Market entities		Distribution utilities		

Source: CEEW-CEF analysis

In this context, our recommendations are to:

- ▼ Set up a National Electricity Council (NEC)
- ▼ Make an Integrated Energy Resource Plan (IERP)
- ▼ Establish a National Renewable Energy Corporation (NREC)
- ▼ Notify a National Renewable Energy Policy (NREP)

Set up a National Electricity Council (NEC)

PROBLEM

The power sector is evolving rapidly. There are drastic changes in the ways we generate, transmit, distribute and consume power. Electricity, being a concurrent subject in the *Constitution of India*, requires active participation of many stakeholders from the union and state governments. But with several institutions engaged in policy making, regulation and implementation, it is difficult to maintain alignment and coordination.

SOLUTION

We recommend that a **National Electricity Council (NEC)** be constituted within three months of the amendments to the *Electricity Act, 2003* coming into force, through a central government notification. Statutorily, the NEC would be an advisory body with powers to direct tasks to central government agencies in line with their primary roles and responsibilities. It will play an active role in review, monitoring progress, oversight, and coordination between central and state institutions. The NEC should convene at a frequency notified through the *Electricity Act*, ideally once in a quarter. The NEC must act in a transparent and time-bound manner, and publish information regarding its activities and meetings, including advice shared with the central and state governments.

The NEC should have members from central line ministries and their agencies and one senior-level representation from each state. The NEC can be housed within the MoP, with the Secretary, MoP and Secretary, MNRE as co-chairs. Joint Secretaries from various ministries, departments, agencies dealing with power, RE, energy efficiency, urban development, rural development, coal, petroleum and natural gas, environment, forest and climate change, finance, external affairs, agriculture, skill development, labour and employment, science and technology, and industry and commerce should be part of the NEC.

In addition, one representative each from central agencies like CEA, Central Transmission Utility, NLDC, NITI Aayog, Forum of Regulators and Regional Load Dispatch Centres, as well as from financing institutions such as PFC, REC and IREDA, should be inducted as members.

The major functions of the NEC should be to:

- ▼ Monitor and evaluate implementation of national policies, including the physical progress against targets/trajectories
- ▼ Identify interventions to address bottlenecks being faced at the state/regional levels
- ▼ Make recommendations to the central government to modify the *National Tariff Policy* and formulate the National RE Policy
- ▼ Monitor the application of grants and funds (for instance, loans to discoms), and any other designated funds or loans allocated by the central government to reduce sectoral risks
- ▼ Coordinate on matters related to grid planning and integration of high quantum of RE, in line with the stated medium- to long-term targets
- ▼ Direct relevant line ministries to prepare guidelines, model frameworks, and develop proactive approaches for states to customise and adopt to ease/remove bottlenecks to establish a sustainable power sector.
 - Making integrated resource plans of supply and demand side resources
 - Planning and execution of electricity infrastructure projects

- Frameworks to ease land procurement and allocation for projects under environmental regulations
 - Subsidy calculation and effective modes of disbursement to consumers
 - Opportunities to develop new technologies and applications
 - Proposing new business models for discoms which can help increase their revenues and reduce their cross-subsidy burden
 - Best practices on creation of manufacturing hubs, RE project planning, large-scale project development models, grid operations, bidding of RE projects, cost-effective procurement options and methods, inter-state trading of electricity, calculation of actual cost of electricity supply, peak load shaving, optimising on distribution network strengthening
 - Best practices around skilling and capacity building, safety and quality standards, waste disposal, etc.
- ▼ Consider strategic bets that India could take to be able to gain a competitive edge over its global counterparts, for example: expansion of indigenous manufacturing of existing and emerging RE technology and equipment; export of equipment and services, and demonstrating leadership in the upcoming battery storage value chain

NON-FISCAL/ STRATEGIC

This strategy is critical, without which the likelihood of success of the *Electricity Act* and the relevant policies will be reduced. This mechanism is necessary to meet the goals, targets and transition pathways of the national policies and regulations. Primarily, administration costs will be incurred for organising meetings. As the NEC will be housed under the MoP, the budgetary allocation for travel and meetings may be made by MoP.

TIMELINE

This intervention should be implemented within three months of the amendments to the *Electricity Act of 2003* coming into force to enhance probability of success, and address the concerns of the power sector which have been exacerbated by COVID-19.

IMPLEMENTERS

MoP would be the nodal agency for this intervention, with other departments, agencies, and ministries playing key roles.

JOBS

This intervention has no direct impact on jobs but will play a critical role in keeping the sector robust, and support existing and future jobs in the sector.

GROWTH

The NEC could remove bottlenecks for initiatives undertaken by the union and state governments to significantly improve the ease of doing business. An efficient decision-making process can increase investor confidence, leading to greater flow of investments and deployments in the sector. This would increase sustainability of the sector and add to economic growth.

SUSTAINABILITY

The NEC process will ensure timely implementation of reforms that will in turn accelerate renewable energy deployment and clean energy transition.

Make an Integrated Energy Resource Plan (IERP)

PROBLEM

As per section 73 of the *Electricity Act, 2003*, CEA develops a national electricity plan for a five-year horizon. This plan covers aspects such as (a) demand forecast for different regions; (b) capacity addition plans for generation (coal, hydro, gas, renewable, etc.), and transmission infrastructure; (c) technologies, innovation, and R&D; (d) funding requirement; (e) and skills/jobs assessment. The key challenges hampering effective planning and implementation are:

- ▼ **Suitability of the methodology:** Despite rapid technological and fuel mix advancements in the power sector, demand forecasting methodologies have remained unchanged, resulting in Electric Power Surveys being way off the mark.
- ▼ **Top-down process, lack of state participation:** At present, the CEA prepares the national electricity plan based on data received from different agencies. The CEA is assisted by the MoP, MNRE, NITI Aayog, BEE and Central Public Sector Undertakings (CPSUs) such as NTPC, Power System Operation Corporation (POSOCO), Power Grid Corporation of India Limited (PGCIL), PFC, etc. Various state agencies and power companies are only invited for comments on the draft national electricity plan with minimal inputs in its formulation.
- ▼ **Lack of enabling infrastructure and funds:** Lack of monitoring / measurement infrastructure (such as smart metering) and poor availability of funds with the states are also major barriers. These have had second-order consequences in the sector such as overcapacity, low thermal PLFs, curtailment of RE power, high aggregate technical and commercial losses, and financial distress across the value-chain, particularly distribution.

SOLUTION

We believe that an IERP framework, under the aegis of the NEC proposed in section 5.2.3, is essential for India's power sector development. The IERP must ensure that:

- ▼ All energy choices/resources are evaluated
- ▼ Risks are assessed for a variety of energy portfolios
- ▼ Energy demand and profile is accurately estimated
- ▼ Supply reliability is ensured
- ▼ Cost of electricity supply is minimised (not just financial but also economic cost)
- ▼ Actions related to energy supply are compliant with regulatory/market mechanisms

To achieve these, a combination of top-down and bottom-up approaches is needed. Key steps should include:

- ▼ CEA, in collaboration with the CERC, must design the national guiding / model framework for states to prepare their IERPs every three years. Components should:
 - Define basic and advanced modules, components, and horizon of IERP exercise and establish linkages between the modules
 - Define steps/process to undertake IERP
 - Suggest tools, methods, data requirements, and data collection formats for effective power sector planning
 - Capture international best practices and learning
 - Develop a risk assessment framework that reflects cost implication mapped to the relevant stakeholders

- Map the modules to states' preparedness – identify categories of states eligible for different modules. This includes listing of enablers/drivers and barriers/disablers to using a module
 - Suggest possible institutional structures to implement the above frameworks at the state-level
 - Develop possible roles and responsibility matrices – who does what and when, who could anchor the exercise, what could be the institutional interdependencies - mapping the modules/steps/flowchart
 - Enable access to the states on technical knowhow, simulation tools, and experts to formulate state-level IERPs
- ▼ Once states start adopting modules of the IERP, the CEA must consolidate the outputs, propose adjustments to state plans to optimise, and finalise the national energy plan
 - ▼ Based on this exercise, targets under the national policies must be set
 - ▼ NEC must ensure that the CEA conducts the necessary activities to come up with the model framework and guidelines, review progress against milestones, and facilitate adoption by states

STRATEGIC

Conducting the IERP should be a strategic and a vital part of the CEA's mandate. To follow a robust process and methodology, adequate funds can be deployed through the GoI's Integrated Power Development Scheme (IPDS) fund.

TIMELINE

The CEA can develop a model guiding framework in six to eight months and disseminate amongst all states over the following four to six months.

IMPLEMENTERS

The primary implementation responsibility would lie with the CEA, with coordination with several other agencies like the CERC.

JOBS

This intervention would have no direct impact on jobs.

GROWTH

The IERP will help spur investments into economically desirable technologies.

SUSTAINABILITY

A robust and rigorous IERP process will ensure that the electricity mix and infrastructure that is built has the least economic cost to the country.

Establish a National Renewable Energy Corporation (NREC)



INR 5,200 crore

Proposed outlay between 2021–28 of a viable market for 28% wind and solar generation by 2030



4,650 MTCO₂

Reduced emissions from 2020–30 if India achieves 28% power generation through solar and wind by 2030



0.53 million

Potential new jobs if NREC supports installation of another 130 GW of wind and 200 GW of solar by 2030

Data points: CEEW analysis

PROBLEM

The share of solar and wind generation capacity in India has recently reached 20 per cent. While India would have to significantly ramp up its efforts to achieve and exceed the ambitious 175 GW RE capacity target, an increasing share of solar and wind generation capacity would lead to a series of challenges that could derail these energy transition ambitions. These include:

- ▼ **RE PPAs:** Continuous decline in solar and wind tariffs has resulted in re-negotiation of existing contracts signed at higher tariffs, making states and other RE buyers apprehensive of signing new PPAs. Further, in an asymmetric information environment, bilateral contracting processes are either long or costly or result in biased contracts, exposing RE projects to high operational risks.
- ▼ **Project development:** Inherent inefficiencies in lengthy and costly project development processes across states are a key constraint to rapid RE deployment: these include Centre- and state-level investment-grade resource assessments, access to land, and supporting infrastructure development (roads, water, and transmission interconnections).
- ▼ **Cost of RE:** Although generation costs of RE have declined rapidly making it the cheapest source of electricity at the margin, other system costs such as the cost of integrating RE, loading costs to make RE dispatchable, and fixed cost implications on discoms under long-term conventional PPAs increase the landed price and raise inhibitions in bulk buyers.
- ▼ **Financial support to RE:** Currently, RE projects receive various types of financial support via multiple mechanisms such as Viability Gap Funding (VGF) scheme, accelerated depreciation (AD), tax holidays, concessional loans (PSL, IREDA), exemptions from transmission charges, etc. which burden the exchequer and other power system players.

The redundant overlaps among these provisions, revisions, and variations have created an uncertain investment and project development environment.

SOLUTION

MNRE should lead the effort to expand the scale and scope of SECI to become the **National Renewable Energy Corporation (NREC)** by empowering it to address systemic inefficiencies and market risks for sustained RE growth in the long run. The NREC will:

- ▼ **Act as a centralised entity for RE power developers and buyers:** The NREC will sign PPAs, and bundle and sell contracted RE power to discoms and large buyers through power sale agreements (PSAs) at a single pooled price; these PSAs would be used to fulfil RPO targets in full with no exceptions
- ▼ **Pool RE tariffs for new and existing buyers:** Any decline in RE tariff with new capacity addition would be transferred uniformly to all buyers to address uncertainty around declining RE tariffs
- ▼ **Streamline and standardise contracting, procurement and payment processes,** and publish relevant information for transparency, build confidence among RE stakeholders, and facilitate investment and reduced transaction costs and project risks
- ▼ **Fast-track project development liaising with central and state agencies** to facilitate land procurement and evacuation infrastructure and collaborate with national institutions like National Institute of Solar Energy (NISE) and National Institute of Wind Energy (NIWE) to identify high potential RE zones in the country
- ▼ **Execute one transparent and simple financial support and disbursal mechanism** to alleviate the concerns of RE buyers till other structural reforms allow complete parity between RE and conventional power

The NREC route for RE procurement can be voluntary for states and they could continue to do independent tenders. However, participating states would receive the following benefits:

- ▼ Reduced adverse tariff impact on discoms from RE procurement, integration, and balancing
- ▼ Reduced transaction and complexity costs by dealing with one seller instead of individual developers
- ▼ Zero burden of integrating RE projects with state grids because all NREC-procured RE could be connected to the interstate grid
- ▼ RE-rich states will be able to easily countrywide markets

FISCAL/ STRATEGIC

NREC is an institutional structure proposed to address project development and tail-end risks in the utility-scale RE sector and implement targeted financial support mechanisms over a fixed period.

NREC could leverage its position as a central government entity to reduce the soft costs associated with project development. Many countries, including the United States, aim to reduce the Levelised Cost of electricity (LCOE) for utility-scale solar by roughly 50 per cent by 2030, mostly by reducing soft costs.

CEEW's preliminary calculations show that a cumulative amount of **approximately INR 5,200 crore (USD 690 million) over 2021-28** could facilitate an economically viable market for 28 per cent of generation from onshore wind and solar PV by 2030. Our estimate is that the financial outlay will become zero beyond 2028 due to increasing competitiveness of RE and falling grid integration costs.

Through subsidy reform, it is possible to consolidate the outlay under existing financial support mechanisms and redirect it to bulk buyers such that it nullifies any additional cost that the procurer would have to bear if they buy RE over conventional power.

TIMELINE	Additional powers and functions can be allocated to SECI over the next six months to one year, under rules and regulations set out by the CERC, to transition it into the NREC.
IMPLEMENTER	Primary responsibility lies with MNRE to empower and expand the scope of SECI.
JOBS	The NREC would support installation of additional 130 GW of wind and 200 GW of solar capacity by 2030. Total employment in the sector would increase by 5,28,000 between 2021 and 2030.
GROWTH	Accelerated RE deployment will save forex from reduced coal imports. Even if half the RE generation is utilised to replace imported coal, India can save more than INR 6.75 lakh crore (USD 89 billion) over 2021-30 (nearly ten times the proposed outlay over the same period). High RE potential sites would offer the cheapest clean electricity which will improve the competitiveness of Indian industry. Higher utilisation of the existing transmission network under NREC would defer investment in creation of additional infrastructure.
SUSTAINABILITY	The NREC model could accelerate growth of utility-scale RE, reduce emissions from the power sector, and attract investments to the sector and the country. Through the NREC, we can target to reach 28 per cent of the generation through solar PV and onshore wind by 2030. As a result, through 2020 - 2030, over 4,650 MTCO ₂ emissions will be abated as compared to business as usual.
TRADE-OFF	The NREC model could be a win-win solution to address the sector risks, and at the same time, bring down the soft costs, induce efficiency in deployment and financing. However, SECI may take time to build deep technical expertise for non-solar technologies like wind, hybrid, biomass, small hydro, waste to energy and their interaction with each other.

Notify a National Renewable Energy Policy (NREP)

PROBLEM

The political economy roadblocks in scaling RE across the country are manifested as centre-state conflicts, states making retrospective changes in policies or threatening to renege on PPAs and/or curtailing RE, and discoms holding back payment to RE generators. Countrywide deployment of RE requires states to be aligned with the national targets, and that they are motivated to deploy more RE capacity rather than doing so out of threats of penalties.

SOLUTION

We recommend that MNRE and MoP co-develop and co-implement a **National RE Policy (NREP)** to ensure constant alignment in objectives and actions between the Centre and the states. The NREP's objectives and development and monitoring process should be set in the *Electricity Act, 2003* to reduce discretion and ensure policy certainty. The NREP must:

- ▼ Allow accounting of all costs, benefits, and co-benefits of meeting the national RE targets,
- ▼ Establish principles of cost and benefit sharing to ensure that states are motivated to maximise deployment, and
- ▼ Enable active and equitable participation from all states.

Features of the NREP

- ▼ Define medium and long-term targets for RE deployment, including mandatory targets for utilisation of RE for electro voltaic charging and emission reduction
- ▼ Specify a uniform annual RPO trajectory for all states to ensure equitable contribution, while giving them freedom to choose the technology / clean energy fuel mix to meet the RPO targets
- ▼ Set out incentives and other mechanisms to achieve stated targets, including market-based instruments and mechanisms to reduce, socialise, or eliminate the additional cost of integrating and procuring RE until other electricity reforms ensure complete parity to RE
- ▼ Create an enabling environment for manufacturing of critical equipment and components by increasing availability of low-cost financing, ensuring commercial viability of nascent RE and/or complementary technologies that can support grid integration, removing barriers to project deployment, ensuring skilling, re-skilling and capacity-building, and promoting investment in physical infrastructure
- ▼ Specify aims, objectives and suggested subjects for research and development, innovation, and demonstration programmes to build confidence in new technologies and applications

NON-FISCAL/ STRATEGIC

The NREP is a strategic intervention to bring the Centre and states together to create long-term policy certainty and a conducive environment for investment in RE. The policy will consolidate existing efforts and initiatives and lay out a roadmap and strategies to accelerate RE growth. It does not entail any cost, if required, existing incentives and financial support can be re-structured and streamlined as per the provisions of the NREP.

TIMELINE

The recently proposed amendments to the *Electricity Act, 2003* mention the introduction of an NREP. The first NREP must be notified within six months of the notification of the amended Act, and thereafter, once every five years.

The states, too, must prepare their respective State Renewable Energy Policy (SREP) within a year from the notification of the amendments and thereafter, once every five years; in the interim, the states must consolidate existing policies in force and notify as the SREP. The SREPs must adopt the uniform targets set out under the NREP.

IMPLEMENTERS MNRE and MoP along with NEC, proposed in section 5.2.3, must monitor the progress made under the NREP. Together they will facilitate necessary coordination between the Centre and the states, and the removal of implementation bottlenecks.

JOBS Through clear direction, NREP will support accelerated capacity installations which will in turn create additional skilled and unskilled jobs in the RE sector. Utility scale solar PV and onshore wind could result in 528,000 new jobs between 2021-30. Similarly, other RE segments will also generate employment as they scale-up.

GROWTH Accelerated RE deployment will save forex from reduced coal imports. Policy certainty and clarity can facilitate indigenisation of the manufacturing base, thus increasing competitiveness of domestic manufacturers and reducing dependence on RE equipment imports. Also, RE being the most affordable source of electricity, its large-scale adoption will make businesses and industry globally competitive. Our agriculture productivity and commercial activity in villages will increase through solar-based solutions.

SUSTAINABILITY NREP will provide an enabling environment for meeting the GoI's ambition to deploy 450 GW of renewable energy capacity by 2030, which will in turn increase energy security and reduce emissions.

5.2.4 Invest in distributed renewable energy (DRE)

The COVID-19 crisis has shown how an unprecedented calamity can bring the entire world to a standstill. Electricity is an essential resource that can make or break a country's response in such circumstances. The risk is amplified by the spread of critical infrastructure such as transmission lines and generation stations across vast and diverse geographies, beyond the borders and controls of individual states. It is thus crucial to build a resilient and reliable electricity infrastructure that can withstand physical, financial, resource-related, and even cyber-based threats.

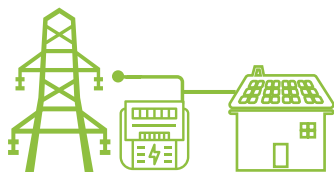
India's distribution network and utilities have been plagued by a host of issues, and even today, do not have the physical or financial capacity to provide 24x7 power to all consumers. Distributed renewable energy can play a big role in bridging these gaps through a range of local and distributed solutions.

An integrated distributed network of micro-grid clusters, community solar systems, aggregated solar plants, other sources such as bio energy, small hydro, and wind, and 'behind-the-meter' battery units and inverters can greatly enhance grid reliability. These micro-grids and systems can also disconnect from the main grid and operate autonomously and could thus mitigate a part of the impact in the unlikely event of a nationwide grid failure. Building such a network requires concerted policy, regulatory, business, and technological interventions.

We propose the following measures:

- ▼ Promote grid-connected micro-grids for urban and industrial consumers
- ▼ Build new discom-led DRE business models
- ▼ Create new markets for rooftop solar (RTS)
- ▼ Promote innovation in DRE technologies

Promote grid-connected micro-grids for urban and industrial consumers



INR 1.08 per kWh

Potential net benefit to discom from optimised urban micro-grid system if deployed in BYPL's license area in East Delhi



110,000

Skilled and unskilled jobs created by 20 GW of small- and large-scale micro-grids

Data points: CEEW analysis

PROBLEM

The power grid is coming under increased stress from rising peak demand and a higher proportion of unpredictable load from activities such as EV-charging, cooling, and local power generation. Expensive grid infrastructure upgradation and management is required to meet consumer demand and ensure reliable power supply in such scenarios. Additionally, high dependence on power procured from large plants located far from the demand centres creates supply risk and warrants investment in expensive transmission networks. A viable alternative is micro-grids – smart grids with localised generation, that support a designated set of local loads and can operate synchronously with the main grid as well as independently (islanding).

SOLUTION

We propose that the MNRE sets a target to achieve 20 GW of grid-connected micro-grid capacity by 2025 under the NREP (see section 5.2.3). This will accelerate the deployment of micro-grids across urban and industrial clusters. The policy should set clear guidelines for deployment of micro-grids among different consumer categories and geographies, and state the regulatory changes needed for smooth integration and management. Proposed guidelines:

- ▼ **Include technical specifications** for generation sources, batteries, and components, since optimum design and deployment of micro-grids would benefit consumers and the grid.
- ▼ **Set the criteria to select industrial clusters** in areas such as Special Economic Zones (SEZs), where multiple generation sources and flexible loads can be integrated. Micro-grids of 50 - 100 MW capacity can be installed in industrial clusters.
- ▼ **Set the criteria to choose urban residential and commercial clusters** where micro-grids can be used to decongest the grid and flatten the load curve. Micro-grids of less than 1 MW and 1 - 5 MW capacity can be installed in residential and commercial clusters, respectively.
- ▼ **Define ownership models between consumers, discoms, and third parties.** Models with discom co-ownership promoted as micro-grids can substitute grid infrastructure upgrades.

Micro-grids benefit distribution networks through load levelling, minimising power procurement from expensive sources, and deferral of network upgradation. Consumers can benefit from financial savings and greater self-sufficiency. **A CEEW study in partnership with BSES Yamuna Power Limited (BYPL) shows that an urban micro-**

grid system deployed within the BYPL license area can provide a net benefit of around INR 1.08 per kWh to the discom if designed to optimise for the grid¹⁴⁶.

STRATEGIC This is a policy intervention with no direct fiscal outlay.

TIMELINE The policy could be implemented in 2021 with validity till 2025.

IMPLEMENTERS This can be implemented by MNRE under the proposed NREP.

JOBS 20 GW of small- and large-scale micro-grids can create around 110,000 jobs for skilled and unskilled workers¹⁴⁷.

GROWTH Deferred investment in grid infrastructure by the debt-laden discoms can contribute to their financial recovery, which in turn will have a positive ripple effect across the sector.

SUSTAINABILITY Installing micro-grids with high RE generation technologies can contribute to India's overall emission reduction targets while greening the electricity consumption of industrial, commercial and residential consumers.

Build new discom-led DRE business models



INR 18,000 crore

Estimated investment to deploy
4 GW discom-led community RTS



50,000

Potential skilled and
unskilled jobs created by
4 GW of RTS

Data points: CEEW analysis

PROBLEM

Discoms are facing revenue losses due to higher uptake of RTS among their lucrative C&I consumers. Additionally, large-scale proliferation of RTS across distribution networks without proper planning and integration can lead to grid instabilities and even higher revenue losses for the discoms. Moving more residential consumers to the RTS segment can help alleviate this burden.

However, there is a low uptake of DRE such as RTS in the residential sector due to market challenges such as high capital investment, lack of access to finance, and few suitable roof spaces¹⁴⁸.

SOLUTION

Component B of the existing incentive scheme of Phase - II of the *Grid-Connected Rooftop Solar programme* provides achievement-based incentives to discoms for installing aggregate capacity up to 18,000 MW¹⁴⁹. This could be modified to include incentives for deployment of new discom-led business models of RTS installation in the residential sector for 4,000 MW (~ 22 per cent) of 2022 target.

- ▼ Quick deployment in the residential sector by addressing local market challenges
- ▼ Additional revenue and reduced cross-subsidies for discoms
- ▼ Improved grid integration and management through better control of system locations and operations
- ▼ Discoms can aggregate and cluster the systems in multiple locations to operate them as single units, creating virtual power plants with better grid operations

CEEW, in partnership with BYPL, has identified multiple discom-led business models to benefit both discoms and consumers¹⁵⁰. Two promising models are:

- ▼ **Discom-led community solar model**, where the discom aggregates residential communities to install shared systems, and
- ▼ **The solar partners' model**, where the discom aggregates and deploys large systems installed in multiple locations through third-party ownership and lets consumers subscribe to the solar energy.

CEEW analysis shows that a discom-led community solar deployed in East Delhi can provide BYPL a net gain of INR 0.26 per kWh¹⁵¹.

FISCAL	The proposed solution requires budget reallocation from the existing RTS scheme: approximately INR 1,500 crore (USD 197.6 million) of the total allocated central financial assistance of INR 11,814 crore (USD 1.56 billion) ^{152,153} .
TIMELINE	It is necessary to implement this in the next three to four months as the RTS sector attempts to make a recovery post the lockdown period.
IMPLEMENTER	MNRE should issue the guidelines under the existing RTS scheme.
JOBS	Deployment of 4 GW of RTS could create around 50,000 jobs for skilled and unskilled worker ¹⁵⁴ .
GROWTH	Deployment of 4 GW of RTS requires an estimated investment of around INR 18,000 crore (USD 2.4 billion) ¹⁵⁵ .
SUSTAINABILITY	Increased RTS deployment substitutes power generation from thermal plants and hence, contributes to reduction in emissions. It will also contribute towards achieving India's target of 175 GW of RE by 2022 and SDGs 7, 11 and 13.
TRADE-OFF	The budget will be reallocated from the existing <i>Grid-Connected RTS Phase II programme</i> , from the incentives that discoms could claim for RTS deployment in their licence area, but the net claimable incentives would remain the same.

Create new markets for rooftop solar

PROBLEM

India's RTS industry, struggling to gain foothold even before the pandemic, has now come to a standstill with the extended lockdown. Even after the lockdown is lifted, the impending recession will likely dissuade consumers from investing in RTS, which is not seen as a necessity but a luxury. It is imperative to prevent the collapse of market demand, and new markets must be created to compensate for lost business.

SOLUTION

We propose two options to create new markets for RTS:

- ▼ Aggressive promotion of new solar-based applications to domestic consumers for uses such as charging batteries and appliances, and to institutional users such as primary healthcare centres (PHCs)¹⁵⁶. A CEEW study in Chhattisgarh noted that PHCs with solar PV and batteries have better health outcomes¹⁵⁷.
- ▼ A nationwide awareness campaign targeting different consumer categories to reiterate the benefits of investing in RTS as a safe, clean, and reliable source of electricity and provides guaranteed savings from lower cost per unit of power.

Universal healthcare in rural India by solarising PHCs

In an open letter, CEEW and several institutions from the healthcare and RE sectors have urged the GoI and the global development community to ensure universal rural healthcare through a sustainable energy path.

Sub-centres in Chhattisgarh with solar PV with batteries have better healthcare outcomes (especially for maternal and neonatal cases). Such a solution would cost as little as INR 28 per person to deploy.

The group proposes a four-step intervention:

- **Expand clinic-level solarisation of all unelectrified PHCs** and sub-centres at a national scale,
- **Allocate dedicated capital in the national budget:** INR 600 crore, a mere 0.6 per cent of India's 2020-21 energy and healthcare budget, could electrify all sub-centres,
- **Ensure long-term operations** by allocating budget for ongoing system operations and maintenance, and
- **Promote innovation by incentivising medical equipment manufacturers** to develop more efficient and rugged appliances suitable for rural services.

Source: Abraham, Mathew, Arunabha Ghosh, Sudarshan H, Harish Hande, Sanjeev Jain, Adwait Joshi, Arvind Kumar, et al. 2020. 'Open Letter to the Government of India and Global Development Community: A Sustainable Energy Path to Universal Healthcare in Rural India', April 30.

FISCAL/STRATEGIC

Current market prices for solar systems and solar with battery systems are at par with grid electricity and diesel-powered back-up systems, respectively. This initiative does not require any additional fiscal support.

An awareness campaign could be run from the budget of INR 66 crore (USD 8.8 million) allocated for capacity building and awareness creation under MNRE's *Grid-Connected RTS Phase – II programme*¹⁵⁸.

TIMELINE	This should be implemented in the near term, after the lockdown is lifted, to retain the recent momentum for RTS amidst the COVID-19 related slowdown.
IMPLEMENTER	MNRE should implement both the proposed solutions.
JOBS	New market development in the sector can create direct jobs in the RTS and DRE supply chains.
GROWTH	It will contribute to India's target of 40 GW RTS capacity by 2022.
SUSTAINABILITY	Increased RTS deployment substitutes power generation from thermal plants and hence, contributes to reduction in emissions. It will also contribute towards achieving India's target of 175 GW of RE by 2022 and SDGs 7, 11 and 13.
TRADE-OFF	Consumers may not choose to make this high upfront investment amidst a recession, in which case the public spending on these solutions may not have high returns, but equally the recession linked loss of consumer appetite makes behavioural interventions even more important.

Promote innovation in DRE technologies

PROBLEM

Innovations in grid management such as smart grid technologies, advancements in power electronics, and information and communications technology (ICT) can significantly improve grid integration of DRE and demand side management, leading to optimum grid performance. However, India is lagging in grid modernisation, and there is an urgent need to advance research and development to facilitate:

- ▼ Design and development of indigenous low-cost technological solutions suited for Indian grids
- ▼ Identification and rapid deployment of cost-effective technologies at scale

SOLUTION

We propose an MNRE scheme to promote local innovation, with two components:

Component A: Set up a '**Centre for DRE Innovation**' in partnership with the Department of Science and Technology's (DST) *Mission Innovation* programme as a platform for individuals, universities, start-ups, and companies working on new DRE solutions. The Centre will monitor developments across the country, identify promising ideas, and facilitate their development, testing and piloting. This could be achieved in partnership with discoms, grid operators, private investors, venture capitalists, and the industry.

Component B: Promote local entrepreneurship in rural and semi-urban areas through a scheme to set up and operate DRE systems or micro-grids locally. Interest subsidy and tax deferral for the first five years may be offered to aspiring small businesses, along with options to upskill in DRE technology and business operations. The scheme could target 10 GW of systems installed by local businesses by 2025.

MNRE could partner with the Ministry of Skill Development and Entrepreneurship (MSDE) to offer dedicated DRE entrepreneurship training packages in its training centres under the *Skill India* initiative, or through the Skill Council for Green Jobs.

FISCAL

The annualised budget to set up and operate the Centre for DRE Innovation could be 5 per cent of MNRE's annual R&D budget, which is INR 1 crore (USD 0.13 million) for 2020¹⁵⁹. A part of the finances can be availed from the Mission Innovation programme. For component B, interest subsidy alone would require around INR 1,400 crore (USD 185.8 million) for 10 GW capacity by 2025¹⁶⁰. This funding could be procured through allocation from the National Clean Energy and Environment Fund (NCEEF), issuing bonds in the capital market, or raising capital to buy the interest.

TIMELINE

This should be implemented towards the end of 2020.

IMPLEMENTERS

MNRE in partnership with DST and MSDE should implement this scheme.

JOBS

Component A will create jobs for the skilled workforce while component B will create jobs for both skilled and unskilled workers. Deployment of 10 GW of systems could generate around 55,000 jobs in rural and semi urban areas by 2025¹⁶¹.

GROWTH

These interventions can lead to increased innovation and entrepreneurship, leading to economic growth and serving the national objective to build a self-reliant energy sector.

SUSTAINABILITY

An informed workforce would drive higher adoption of clean energy technologies.

5.3 Shift to cleaner fossil fuels



Low Asian LNG spot prices provide an excellent opportunity for India to move towards achieving its target of 15 per cent share of natural gas in the primary energy mix by 2030. This will result in job creation, CO₂ reduction and cost savings from more energy-efficient operations. In this context, we suggest the following recommendations:

- ▼ Revise natural gas utilisation policy
- ▼ Expand city gas distribution infrastructure

5.3.1 Revise natural gas utilisation policy

PROBLEM

The Indian government's natural gas utilisation policy aims to provide preferential access for certain sectors to cheaper and limited domestic gas supplies. The recent trend of low Asian LNG spot prices (pre-dating COVID-19) provides an opportunity to re-visit the policy, which, in its 2019 revision, prioritised city gas distribution (CGD) projects over thermal power, primarily to provide an impetus to the ongoing fight against air pollution¹⁶².

The policy currently does not cover GHG emissions and particulate pollutants from industries. Although pollution standards govern industrial sectors, enforcement is hindered by the limited capacity of local officials. Studies indicate that India is on the path to becoming the world's largest sulphur emitter. Now as refineries produce Bharat Stage Emission Standards (BS) VI-compliant fuels, the additional sulphur will be passed on to the heavier refinery fractions, and subsequently combusted at industrial facilities. Hence the gains from better transportation fuels could be offset by losses in increased industrial emissions.

SOLUTION

The MoPNG should amend the *Natural Gas Allocation Policy* to include polluting industries as priority sectors. This will be more cost-effective than enforcing pollution standards across thousands of businesses. The strong policy signal will spur investments by industries that are keen to switch to natural gas but need assurance of long-term stable prices and reliable supplies. This will also incentivise the use of cheaper natural gas instead of burning residual oil in furnaces and unlock competitive advantage through cost savings via energy efficiency, a particularly important consideration in the post-COVID-19 economy. It will also stop cheaper residual fuel oil imports from flooding the market. The CPCB and SPCBs' lists of polluting industries can be a good starting point to identify potential industries.

NON-FISCAL / STRATEGIC

Despite competitors, the relative cost advantage of domestic gas has disappeared with falling LNG prices globally. By including industries, the decreasing share of domestic gas allocation across the existing priority sectors can be met by spot LNG.

TIMELINE

This measure can be implemented in the next three months.

IMPLEMENTERS

The MoPNG should issue a directive to the Empowered Group of Ministers (EGoM), while the Petroleum and Natural Gas Regulatory Board (PNGRB) should facilitate the deployment.

JOB

New jobs will be created along the gas distribution network; however, a study is required to quantify the potential number of jobs.

GROWTH

Incentivising natural gas would enable companies to shave off significant environmental compliance costs and reparations related to ash handling and disposal. Further, access to both domestic and imported gas supplies will enable discoms to pool and maintain stable power prices for industries, enabling the latter to make better investment decisions.

SUSTAINABILITY

Benefits include improved operational efficiency, and lower GHG and criteria pollutant emissions, which will help India meet its emission reduction targets under the Paris Agreement.

TRADE-OFF

Increasing gas consumption in the economy would increase India's fuel import bill and cause loss of jobs and revenue along the domestic coal supply chains.

5.3.2 Expand city gas distribution infrastructure

PROBLEM

The demand-supply imbalance in the global petroleum sector has resulted in a supply glut of hydrocarbon fuels¹⁶³, which can persist for two years, as mentioned by the International Gas Union¹⁶⁴. The International Energy Agency (IEA) forecasts a 5 per cent plunge in global natural gas demand¹⁶⁵ amid the COVID-19 pandemic, resulting in a 10-year low price of USD 2.5 to 3.0 per MMBtu (March 2020) for spot LNG Asian markets. The Indian gas system can only take limited advantage of these low prices as current demand is met by domestic production and long-term LNG contracts.

A PNG connection costs four times more in upfront costs than an LPG connection (INR 6,000 versus INR 1,500) (USD 80 versus USD 20); existing LPG connections are legacy inclusions in households whereas the cost of switching to PNG has to be borne by the consumer, which poses a financial burden. This is a significant hurdle disrupting rapid expansion of new PNG connections.

SOLUTIONS

We propose the following measures:

- ▼ Expand residential CGD networks in the next 3 to 5 years to gain some advantage from the low LNG prices as PNGRB after the conclusion of the 10th bidding round has cumulatively offered 228 Geographical Areas to be covered by 2030
- ▼ Incentivise residential CGD consumers to shift from LNG cylinders to PNG by subsidising the upfront cost of connection as PNG is affordable for consumers without access to subsidised cylinders. Moreover, the city gas segment can support gas prices up to USD 16/MMBtu¹⁶⁶
- ▼ Expedite the gas grid expansion by providing single window clearance via MoPNG and PNGRB to facilitate the process of laying pipelines and unobstructed biddings

FISCAL

PNGRB estimates that PNG consumption will expand from 5 to 26 per cent of the households by 2030. We estimate LPG subsidy savings from the rapid penetration of PNG by 2025 to be over INR 1 lakh crore (USD 13.27 billion) even if the government fully subsidises the INR 6,000 (USD 79) cost of a PNG connection at an outlay of INR 25,000 crore (USD 3.31 billion).

TIMELINE

The government can immediately start providing subsidies for the upfront cost of PNG connections. Resolving relevant regulatory hurdles in the residential sector within the next year will allow for quicker expansion of the CGD.

IMPLEMENTERS

The MoF, MoPNG, and PNGRB should conduct a cost-benefit analysis. The MoPNG should propose the subsidy measure to be approved by the MoF. The PNGRB should initiate the formation of a single clearance window by the end of the second quarter of 2020.

JOBS

The CGD network could create approximately 50,000 direct and indirect jobs by 2025¹⁶⁷.

GROWTH

Expanding the CGD network would increase natural gas consumption and thereby support India's target of 15 per cent share of gas in its primary energy mix.

SUSTAINABILITY

The switch from LPG to PNG in a shorter 5-year timeframe will reduce household emissions by 1,363 MTCO₂-eq over the next ten years¹⁶⁸.

5.4 Build resilient transport and urban infrastructure



India's transport and urban infrastructure is increasingly being exposed to climate risks. Building resilience in these systems is critical to ensure minimum impact on lives, livelihoods, infrastructure, and the economy. In this context, we propose measures to:

- ▼ Accelerate procurement of buses and micro-buses
- ▼ Rebuild India's HVAC manufacturing sector for sustainable cooling

5.4.1 Accelerate procurement of buses and micro-buses

PROBLEM

Transportation is a derived demand that allows people to access employment, education, healthcare, and other essential needs. While households in the middle-income category spend only up to 5 per cent of their earnings on transportation, low-income households spend between 6-10 per cent of their limited income on the same. In the absence of an affordable bus-based public transport (PT) option amidst the COVID-19 crisis, low-income households will be disproportionately impacted by the higher burden of transport expenses. Many will be forced to opt for lower-income jobs close to home or even forego suitable livelihood opportunities, reducing their quality of life and increasing health risks.

SOLUTIONS

The government should:

- ▼ **Promote PT travel with enforcement of social distancing interventions** (50 per cent seating capacity, mandating masks, etc.). This will require 50-80 per cent more buses to meet the current demand
- ▼ **Support cities to procure and operate more buses** (micro-buses of 12-14 seaters in smaller cities) with high-frequency operations in dedicated bus lanes
- ▼ **Devise VGF models for public and private bus service providers** and rope in additional contract and permit private buses (used for schools, corporates, and for tourism)
- ▼ Manage travel demand by **encouraging telecommuting and staggered timings** for offices
- ▼ **Enhance active modes** (walk, cycle) with safe and connected non-motorised transport (NMT) infrastructure for short trips (< 5km), thus managing crowds in buses. Close to 40 per cent of the urban population commutes less than 5 km¹⁶⁹
- ▼ **Dissuade the use of personal vehicles** via pricing mechanisms including parking, congestion and fuel taxes. These additional revenue streams can cross-subsidise PT

FISCAL

A grant of INR 15,000 crore (USD 2 billion) should be given to city transport authorities to procure and operate 3 lakh buses (estimated for 2020) to meet PT demand¹⁷⁰. This grant can be used alongside urban transport funds collected by cities as parking tickets, FSI premium, advertisements, fuel cess and challans for traffic violations.

TIMELINE

The procurement process can start within 3-4 months. The planning and design of the integrated NMT and PT systems will take six months.

IMPLEMENTERS

MoHUA should offer grants for bus procurement and operations to the state transport departments, which shall be nodal agencies to provide financial assistance to PT operators or special purpose vehicles (SPVs) and monitor the PT system in cities.

JOBS

Access to affordable means of transport has direct implications on livelihoods. It is estimated that 2.5 times more jobs are created in high unemployment communities by providing transit¹⁷¹. Further, jobs will be created in the bus segment of automotive manufacturing. Approximately 13 workers are employed for each bus manufactured, versus 4-6 workers per vehicle for auto-rickshaws, cars and SUVs¹⁷².

GROWTH

Large numbers of buses plying in the city often help create demand for street redesign. This involves construction and maintenance of dedicated bus, bicycle, and walking infrastructure, which stimulates the economy, and allows for the service economy to

boom. Street vendors for food and consumables are seen in many urban centres in the West, populating spaces vacated by reduced private transport movement.

SUSTAINABILITY

The rise in motorisation in India has been accompanied by rising air pollution and deaths among the young and productive population. Bus-based PT will help reduce local air pollution and build on the *National Mission on Sustainable Habitat* (NMSH) by providing safe, clean and affordable mobility options. PT also ensures equitable access to employment opportunities for all citizens and will save forex on oil imports.

TRADE-OFF

Directing investment towards PT, while restricting private vehicle uptake, can exacerbate the slump in vehicle sales faced by the automotive sector. However, a global trend of changing travel preferences towards shared-mobility and reduced car sales were already underway before COVID-19. Support for the auto industry and jobs in this sector should be directed towards cleaner technologies and sustainable mobility business models. This should be accompanied by a re-skilling and transition programme for the current Internal Combustion Engine workforce for EV manufacturing.

5.4.2 Rebuild India's HVAC manufacturing sector for sustainable cooling



2 million

Expected 10x increase in AC servicing jobs by 2037, up from a base of 200,000 in 2017



INR 400 crore

Estimated cost of training and certifying 2 million AC servicing technicians over the next 15-18 years

Data points: CEEW analysis

PROBLEM

Household air conditioner (AC) penetration in India is currently less than 10 per cent, with demand for space cooling expected to grow eleven times in the next 20 years¹⁷³. India's AC demand is largely met through imports from China as entire systems or key components with units assembled in India. The IEA noted in 2018 that the global stock of ACs in buildings will grow to 5.6 billion by 2050, up from 1.6 billion today – which means 10 new ACs being purchased every second for the next 30 years. The bulk of the energy demand growth for space cooling by 2050 will come from emerging economies, with India, China and Indonesia contributing half of that¹⁷⁴.

India is one of the world's top refrigerant manufacturing hubs, but most refrigerants used in Indian ACs are not climate-friendly and need to be phased down as per India's commitments under the Montreal Protocol, between 2029 and 2047¹⁷⁵. Shifting to climate-friendly refrigerants and investing in complementary AC manufacturing capacities are opportunities to build a globally competitive supply chain to make ACs in India and reduce import dependence.

SOLUTIONS

Maharashtra, Gujarat, Tamil Nadu, Punjab, and Haryana are India's major manufacturing hubs for AC components, systems and refrigerants. Import substitution and increased investment in domestic manufacturing of efficient HVAC units and low-global warming potential (GWP) refrigerants are opportunities for post-COVID-19 economic recovery.

This initiative should be prioritised under *Make in India* so that India can evolve into a critical export hub of the global AC supply chain while catering to its domestic market.

Policy certainty and regulatory frameworks to encourage indigenous manufacturing will facilitate investments in supply chains and create market readiness¹⁴⁷. The government should:

- ▼ **Ensure medium- to long-term policy certainty to signal upcoming market reforms** related to the refrigerant transition to the industry and regulators. Medium-term limits should be imposed on the permissible GWP value as per India's phase-down timeline, based on the commercial viability of application-specific refrigerants
- ▼ **The Bureau of Indian Standards (BIS) should mandate standards for components** to encourage domestic manufacturing of high-standard components. This would allow local producers to make inroads into India's domestic market and avail import substitution. Currently, most AC components imported into India

have a minimal standard threshold, and higher standard components would not be available to manufacturers at the current low prices

- ▼ Set up a **fast-track window to develop and update standards** for alternatives to high-GWP refrigerants and components manufactured in India
- ▼ **Create authorised benchmarks** to reference low-GWP refrigerant usage
- ▼ **Minimise competing policy mandates** via technological guidelines to ensure that:
 - Energy efficiency enhancements are aligned with the impending refrigerant transition so that industry makes investments towards both technical priorities;
 - Building norms reflect the need for climate-friendly cooling or space comfort to generate demand; and
 - Cold chain development encourages the manufacturing and use of low-GWP refrigerants.
- ▼ Develop **public and bulk procurement programmes** for low-GWP end-products to create demand and build value chain capacity
- ▼ **Update training curricula** to include low-GWP alternative refrigerants and institutionalise training and certification schemes for service technicians
- ▼ **Institutionalise the collaborative R&D programme** on low-GWP refrigerant technologies announced by the GoI in 2016 to encourage innovations to support this transition¹⁷⁷

FISCAL

Training and certifying 2 million servicing technicians for operations and maintenance of low-GWP refrigerant AC units, over the next 15-18 years, would cost approximately INR 400 crore (USD 53 million)¹⁷⁸.

TIMELINE

These solutions can be implemented soon after the lockdown has been lifted.

IMPLEMENTERS

This initiative should be implemented by the Department for Promotion of Industry and Internal Trade, MoC&I, in cooperation with the Ozone Cell, MoEFCC, the Ministry of Chemicals and Fertilisers, BIS and state governments.

JOB

In the servicing sector alone, a ten-fold increase in jobs is expected over the next two decades from a base of 0.2 million in 2017¹⁷⁹.

GROWTH

India will exhibit high growth in its cooling demand over the next two decades¹⁸⁰. The measures indicated here are in line with giving a boost to local supply chains, catering to domestic demand, building the infrastructure for cold chains, and boosting overall economic growth¹⁸¹. This is what a self-reliant, sustainable cooling sector can achieve. Furthermore, Balance of Payment (BoP) savings from reduced imports, revenues from duties on imports, increased component and refrigerant exports, and catering to higher domestic demand will boost industrial growth and competitiveness.

SUSTAINABILITY

Reviving manufacturing capacity and investments in climate-friendly alternatives and associated components will re-confirm India's commitments under the Montreal Protocol.

TRADE-OFF

Increased domestic manufacturing will adversely impact Indian businesses that depend on imported components and re-sell them for assembling.

Endnotes

- 1 Ministry of Finance, Government of India. 2020. "Finance Minister announces Rs 1.70 Lakh Crore relief package under Pradhan Mantri Garib Kalyan Yojana for the poor to help them fight the battle against Corona Virus." *Press Information Bureau*. Accessed 19 May, 2020. <https://pib.gov.in/PressReleaseSelfFramePage.aspx?PRID=1608345>
- 2 Soni, Sandeep. 2019. "Nearly half of India's exports came from MSMEs in FY19, up from 7.5% in FY18." *Financial Express*. July 23, 2019. <https://www.financialexpress.com/industry/sme/nearly-half-of-indias-exports-came-from-msmes-in-fy19-up-from-7-5-in-fy18/1653526/>
- 3 Tiwari, Sanjay. 2019. "How structured trade finance solutions help MSME explorers & importers." *The Economic Times*. July 10, 2019. <https://economictimes.indiatimes.com/small-biz/trade/exports/insights/how-structured-trade-finance-solutions-help-msme-exporters-importers/articleshow/70153295.cms>
- 4 Sharma, Yogima Seth. 2020. "National database of workers in informal sector in the works." *The Economic Times*. January 19, 2020. <https://economictimes.indiatimes.com/news/economy/indicators/national-database-of-workers-in-informal-sector-in-the-works/articleshow/73394732.cms?from=mdr>
- 5 CEEW analysis
- 6 CEEW analysis
- 7 CEEW analysis
- 8 Bery, Suman, Arunabha Ghosh, Ritu Mathur, Subrata Basu, Karthik Ganesan, Rhodri Owen-Jones. 2017. *Energizing India: Towards a Resilient and Equitable Energy System*. New Delhi: SAGE.
- 9 Gupta, Vaibhav, Tirtha Biswas, Karthik Ganesan. 2016. *Critical Non-Fuel Mineral Resources for India's Manufacturing Sector: A Vision for 2030*. New Delhi: Council on Energy, Environment and Water. <https://www.ceew.in/publications/critical-non-fuel-mineral-resources-india%E2%80%99s-manufacturing-sector>
- 10 Ghosh, A. et al., 2015. *Clean Energy Powers Local Job Growth in India*. New Delhi: CEEW-NRDC.
- 11 CEEW analysis
- 12 CEEW analysis
- 13 Ministry of Chemicals, Government of India. "Notes on Demands for Grants". <https://www.indiabudget.gov.in/doc/eb/sbe6.pdf>
- 14 Vibhuti, Balasubramanian Viswanathan, Danwant Narayanaswamy, Christopher Beaton, Karthik Ganesan, Shruti Sharma and Richard Bridle. 2020. *India's Energy Transition 2020*. Winnipeg: International Institute for Sustainable Development.
- 15 PFC. 2020. *Report on Performance of State Utilities 2017-18*. New Delhi: Power Finance Corporation. https://www.pfcindia.com/DocumentRepository/ckfinder/files/Operations/Performance_Reports_of_State_Power_Uilities/Report_on_Performance_of_State_Power_Uilities_%202017_18.pdf
- 16 PFC. 2020. *Report on Performance of State Utilities 2017-18*. New Delhi: Power Finance Corporation. https://www.pfcindia.com/DocumentRepository/ckfinder/files/Operations/Performance_Reports_of_State_Power_Uilities/Report_on_Performance_of_State_Power_Uilities_%202017_18.pdf
- 17 Verma, Madhulika. 2018. "76000 premature deaths due to Non-Compliance of Emission Standard for Coal Based Power Plants in India." *Greenpeace India*. December 7. <https://www.greenpeace.org/india/en/press/3209/76000-premature-deaths-due-to-non-compliance-of-emission-standard-for-coal-based-power-plants-in-india/>
- 18 Garg, Vibhuti, Danwant Narayanaswamy, Karthik Ganesan, and Balasubramanian Viswanathan. 2019. *India's Energy Transition: The cost of meeting air pollution standards in the coal-fired electricity sector*. International Institute for Sustainable Development.
- 19 Tyagi, Akanksha, Neeraj Kuldeep, and Aarushi Dave. 2020. *Assessing the Economic Feasibility of Urban Microgrids: A Discom and Consumer Perspective Cost-Benefit Analysis*. New Delhi: Council on Energy, Environment and Water.
- 20 CEEW analysis
- 21 Waray, Sanchit, Sasmita Patnaik, and Abhishek Jain. 2018. *Clean Energy Innovations to Boost Rural Incomes*. New Delhi: Council on Energy, Environment and Water.
- 22 Abraham, Mathew, Arunabha Ghosh, Sudarshan H, Harish Hande, Sanjeev Jain, Adwait Joshi, Arvind Kumar, et al. 2020. "Open Letter to the Government of India and Global Development Community: A Sustainable Energy Path to Universal Healthcare in Rural India." *Public Health Foundation of India*. April 30.
- 23 TechSciResearch. 2017. "India air pollution control and monitoring study." May. Accessed May 13, 2020. [https://www.techsciresearch.com/admin/gall_content/2017/5/2017_5\\$thumbimg112_May_2017_070949977.pdf](https://www.techsciresearch.com/admin/gall_content/2017/5/2017_5$thumbimg112_May_2017_070949977.pdf)
- 24 IEA. 2018. "The Future of Cooling – Opportunities for Energy-Efficient Air Conditioning," *The Future of Cooling*, Vienna: IEA.
- 25 Ministry of Environment, Forest & Climate Change. 2019. *India Cooling Action Plan*. New Delhi: Ministry of Environment, Forest & Climate Change.

- 26 Gupta, Rajat and Anu Madgavkar. 2020. "Getting Ahead of Coronavirus: Saving lives and livelihood in India" *McKinsey & Company*. Accessed May 13. <https://www.mckinsey.com/featured-insights/india/getting-ahead-of-coronavirus-saving-lives-and-livelihoods-in-india>.
- 27 Ministry of Labour and Employment. 2016. *Rural Labour Enquiry - Report on General characteristics of Rural Labour Households (66th Round of N.S.S 2009-2019)*. Shimla: Government of India.
- 28 Sharma, Yogima Seth. 2020. "National database of workers in informal sector in the works." *The Economic Times*. January 19, 2020. <https://economictimes.indiatimes.com/news/economy/indicators/national-database-of-workers-in-informal-sector-in-the-works/articleshow/73394732.cms?from=mdr>
- 29 Tiwari, Sanjay. 2019. "How structured trade finance solutions help MSME explorers & importers." *The Economic Times*. July 10, 2019. <https://economictimes.indiatimes.com/small-biz/trade/exports/insights/how-structured-trade-finance-solutions-help-msme-exporters-importers/articleshow/70153295.cms>
- 30 Soni, Sandeep. 2019. "Nearly half of India's exports came from MSMEs in FY19, up from 7.5% in FY18." *Financial Express*. July 23, 2019. <https://www.financialexpress.com/industry/sme/nearly-half-of-indias-exports-came-from-msmes-in-fy19-up-from-7-5-in-fy18/1653526/>
- 31 Sharma, Yogima Seth. 2020. "National database of workers in informal sector in the works." *The Economic Times*. January 19, 2020. <https://economictimes.indiatimes.com/news/economy/indicators/national-database-of-workers-in-informal-sector-in-the-works/articleshow/73394732.cms?from=mdr>
- 32 Ministry of Finance, Government of India. 2020. "Finance Minister announce measures for relief and credit support related to businesses, especially MSMEs to support Indian Economy's fight against COVID-19." *Press Information Bureau (PIB)*. Accessed 14 May, 2020. <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1623601>
- 33 Pandey, Radhika, Amrita Pillai. 2020. "Covid-19 and MSMEs: The 'identification' problem." *Ideas for India (I4I)*, April 20, 2020. <https://www.ideasforindia.in/topics/macroeconomics/covid-19-and-the-msme-sector-the-identification-problem.html>
- 34 MUDRA. 2019. *Annual Report 2018-2019*. New Delhi: Ministry of Micro, Small and Medium Enterprises. https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=2ahUKEwin3ZmPyLLpAhVpxjgGHabTAVMQFjADegQ-IBBAB&url=https%3A%2F%2Fwww.mudra.org.in%2FDefault%2FDownloadFile%2FMudra%2520AR%25202018-19_English%2520Website.pdf&usg=AOvVaw1oqq7ouapBEchht_5GoXy
- 35 Reserve Bank of India. 2019. *Report of the Expert Committee on Micro, Small and Medium Enterprises*. Accessed May 6, 2020. <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/MSMES24062019465CF8CB30594AC29A7A010E8A2A034C.PDF>
- 36 Ministry of Finance, Government of India. 2020. "Finance Minister announce measures for relief and credit support related to businesses, especially MSMEs to support Indian Economy's fight against COVID-19." *Press Information Bureau (PIB)*. Accessed 14 May, 2020. <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1623601>
- 37 Mukherjee, Deep Narayan, Vipul Mahajan, Rahul Vithani, Saloni Sinha, R.K. Singh, R.P. Mishra, Pranava Piyush. 2018. *MSME PULSE*. New Delhi: TransUnion CIBIL and SIDBI
- 38 Soni, Sandeep. 2019. "Nearly half of India's exports came from MSMEs in FY19, up from 7.5% in FY18." *Financial Express*, July 23, 2019. <https://www.financialexpress.com/industry/sme/nearly-half-of-indias-exports-came-from-msmes-in-fy19-up-from-7-5-in-fy18/1653526/>
- 39 The Growth Lab at Harvard University. 2019. "International Trade Data (HS, 92)." Accessed May 5, 2020. <https://doi.org/10.7910/DVN/T4CHWJ>
- 40 Ministry of Textiles, Government of India. 2019. "India's share in Global Total Exports." *Press Information Bureau (PIB)*. May 3, 2020. <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1580265>
- 41 Ministry of Micro, Small and Medium Enterprises. 2020. "MSME SAMADHAAN - Delayed Payment Monitoring System". Accessed May 14, 2020. https://samadhaan.msme.gov.in/MyMsme/MSEFC/MSEFC_Welcome.aspx
- 42 Ministry of Micro, Small and Medium Enterprises. 2020. "Draft rules of Micro & Small Enterprises Facilitation Council (MSEFC) under The Micro, Small and Medium Enterprises Development Act 2006 (27 of 2006)." Accessed 14 May, 2020. http://dcmsme.gov.in/publications/state_ut_rules/Draft%20rules%20of%20MSEFC.pdf
- 43 Press Information Bureau. 2020. "Finance Minister announce measures for relief and credit support related to businesses, especially MSMEs to support Indian Economy's fight against COVID-19." Accessed 14 May, 2020. <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1623601>
- 44 Reserve Bank of India. 2020. "Press Release: Reserve Bank Announces Targeted Long - Term Repo Operations 2.0 (TLTRO 2.0)." Accessed May 13, 2020. <https://rbidocs.rbi.org.in/rdocs/PressRelease/PDFs/PR2237379D65C898244520B79D8889EE42888E.PDF>
- 45 Ministry of Finance, Government of India. 2020. "Finance Minister announce measures for relief and credit support related to businesses, especially MSMEs to support Indian Economy's fight against COVID-19." *Press Information Bureau (PIB)*. Accessed 14 May, 2020. <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1623601>
- 46 Biswas, Tirtha, Sachin Sharma, Karthik Ganesan. 2018. *Factors Influencing the Uptake of Energy Efficiency Initiatives by Indian MSMEs*. New Delhi: Council on Energy, Environment and Water.
- 47 Chitravanchi, Ruchika. 2020. "Govt ramps up capacity of the NCLT Benches to boost decision making." *Business Standard*. Accessed April 24, 2020. https://www.business-standard.com/article/economy-policy/govt-ramps-up-capacity-of-the-nclt-benches-to-boost-decision-making-120031601566_1.html

- 48 The Economic Times. 2020. "Govt decides to suspend up to 1 year IBC provisions that trigger fresh insolvency proceedings: Report." Accessed April 24, 2020. <https://economictimes.indiatimes.com/news/economy/policy/govt-decides-to-suspend-up-to-1-year-ibc-provisions-that-trigger-fresh-insolvency-proceedings/articleshow/75323344.cms?from=mdr>
- 49 The Growth Lab at Harvard University. 2019. "International Trade Data (HS, 92)." Accessed May 5, 2020. <https://doi.org/10.7910/DVN/T4CHWJ>
- 50 Pattanayak, Banikinkar. 2019. "Surge in imports from Singapore under lens." *The Indian Express*, December 4. <https://indian-express.com/article/business/surge-in-imports-from-singapore-under-lens-6149404/>
- 51 CEEW analysis
- 52 Pattanayak, Banikinkar. 2019. "Dumping by China? Singapore imports surge under the scanner." *Financial Express*, December 4. <https://www.financialexpress.com/economy/dumping-by-china-singapore-imports-surge-under-the-scanner/1783675/>
- 53 Singapore Economic Development Board (EDB). 2020. Advanced Manufacturing. Accessed May 13, 2020. <https://www.edb.gov.sg/en/our-industries/industries-and-key-activities/advanced-manufacturing.html>
- 54 Swain, Smarak. 2020. "How Budget counters 'origin fraud' in FTAs" *The Hindu Business Line*, February 12. <https://www.the-hindubusinessline.com/opinion/how-budget-counters-origin-fraud-in-ftas/article30794429.ece>
- 55 Ministry of Commerce and Industry. 2009. "Agreement on trade in goods under the framework agreement on comprehensive economic cooperation between Republic of India and ASEAN nations." Accessed May 13, 2020. <https://commerce.gov.in/trade/ASEAN-India%20Trade%20in%20Goods%20Agreement.pdf>
- 56 UNDRR. 2019. *Global Assessment Report on Disaster Risk Reduction*. Geneva: United Nations Office for Disaster Risk Reduction (UNDRR). <https://www.undrr.org/publication/global-assessment-report-disaster-risk-reduction-2019>
- 57 UNDRR. 2019. *Global Assessment Report on Disaster Risk Reduction*. Geneva: United Nations Office for Disaster Risk Reduction (UNDRR). <https://www.undrr.org/publication/global-assessment-report-disaster-risk-reduction-2019>
- 58 UN-IASC. 2017. *Return on investment in emergency preparedness*. Geneva: United Nations Inter-Agency Standing Committee (UN_IASC). https://interagencystandingcommittee.org/system/files/return_on_investment_in_emergency_preparedness_phase_2.pdf
- 59 UNDRR. 2019. *Global Assessment Report on Disaster Risk Reduction*. Geneva: United Nations Office for Disaster Risk Reduction (UNDRR). <https://www.undrr.org/publication/global-assessment-report-disaster-risk-reduction-2019>
- 60 IMD. 2019. "Enhanced rainfall activity over foothills of Himalayas and northeast India." *IMD bulletin*. Accessed May 7th. https://mausam.imd.gov.in/imd_latest/contents/press_release.php
- 61 Goodess, Clare, Colin Harpham, Nikki Kent, Ramesh Urlam, Sushma Chaudhary, and Hem H. Dholakia. 2020. *Making Madhya Pradesh's Smart Cities Climate Resilient*. New Delhi: Council on Energy, Environment and Water. <https://www.ceew.in/publications/making-madhya-pradesh%E2%80%99s-smart-cities-climate-resilient>
- 62 Risk transfer, defined as shifting the responsibility or burden for disaster loss to another party through legislation, contract, insurance or other means, can play a key role in helping to manage natural hazard risk and mitigate or minimise disaster losses.
- 63 WHO norm is 1:1,000 for doctors-to-citizens ratio. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6259525/>
- 64 Tsujiguchi, Takakiyo & ITAKI, Chieko & KITAYA, Taichi & SHIROMA, Yoshitaka & Kashiwakura, Ikuo. 2018. *Nuclear Emergency Protection Measures and Standards: Outline of Evacuation Exit Inspections in Japan*. Japanese Journal of Health Physics. 53. 169-175. 10.5453/jhps.53.169. https://www.researchgate.net/publication/329198509_Nuclear_Emergency_Protection_Measures_and_Standards_Outline_of_Evacuation_Exit_Inspections_in_Japan
- 65 Rao, Nivedita. 2017. "Malnutrition in India: The National Nutrition Strategy explained." *PRS Blog*. September 8. Accessed May 13, 2020. <https://www.prsindia.org/theprsblog/malnutrition-india-national-nutrition-strategy-explained>
- 66 CEEW analysis
- 67 CEEW analysis
- 68 CEEW analysis
- 69 Jha, Shyam Narayan, Rajesh Kumar Vishwakarma, Tauqueer Ahmad, Anil Rai 2016. *Assessment of Quantitative Harvest and Post-Harvest Losses of Major Crops/Commodities in India*. Technical Report, Ludhiana: ICAR-All India Coordinated Research Project on Post-Harvest Technology.
- 70 Saleth, R Maria. 2004. *Strategic analysis of water institutions in India: Application of paradigm*. Research Report 79, Colombo, Sri Lanka: International Water Management Institute.
- 71 Global Water Partnerships. 2018. "Global Water Partnerships." About IWRM. June 11. Accessed May 05, 2020. <https://www.gwp.org/en/gwp-SAS/ABOUT-GWP-SAS/WHY/About-IWRM/>
- 72 Kim, Narae, Swastik Das, Kangkanika Neog, and Rudresh Sugam. 2018. *The Perfect Storm*. New Delhi: United Nations in India and Council on Energy, Environment and Water.
- 73 Basu, S. 2015. *Unsafe water stunting growth of Indian children: report*. Down To Earth. August 17. <https://www.downtoearth.org.in/news/un-safe-water-stunting-growth-of-indian-children-report-40391>
- 74 Kim, Narae, Swastik Das, Kangkanika Neog, and Rudresh Sugam. 2018. *The Perfect Storm*. New Delhi: United Nations in India and Council on Energy, Environment and Water.

- 75 Ministry of Environment, Forests and Climate Change, Government of India. 2016. "National status of wastewater generation & treatment." *ENVIS Centre on Hygiene, Sanitation, Sewage Treatment Systems and Technology*. http://www.sulabhenviis.nic.in/Database/STST_wastewater_2090.aspx.
- 76 KWR Water Research Institute. 2020. "Q&A on COVID-19 Sewage Surveillance." *KWR Water Research Institute*. <https://www.kwrwater.nl/en/frequently-asked-questions-covid-19/>.
- 77 Research and Markets. 2020. "Analysis on India's \$4.3B Wastewater Treatment Plants Market, 2015-2025 - Increasing Demand for Sophisticated Municipal Water and Sewage Treatment Plants." *GlobeNewswire*. March 10. Accessed May 05, 2020. <https://www.globenewswire.com/news-release/2020/03/10/1998009/0/en/Analysis-on-India-s-4-3B-Wastewater-Treatment-Plants-Market-2015-2025-Increasing-Demand-for-Sophisticated-Municipal-Water-and-Sewage-Treatment-Plants.html>
- 78 Sugam, R. K., Jain, A., Neog, K. 2017. *Circular Economy Pathways for Municipal Wastewater Management in India: A Practitioner's Guide*. Washington D. C: 2030 Water Resources Group.
- 79 National Statistical Office, Government of India. 2018. *NSS 76th round: Drinking water, sanitation, hygiene and housing conditions in India*. NSSO Survey Report, New Delhi: Ministry of Statistics and Programme Implementation, Government of India
- 80 Standard Chartered. 2020. "We've launched our Opportunity2030: Standard Chartered SDG Investment Map." *Standard Chartered Press Release*. <https://www.sc.com/en/media/press-release/weve-launched-our-opportunity2030-the-standard-chartered-sdg-investment-map-study/>.
- 81 International Water Association. 2014. *An Avoidable Crisis: WASH Human Resource Capacity Gaps in 15 Developing Countries*. London: IWA Publishing. <http://www.iwa-network.org/downloads/1422745887-an-avoidable-crisis-wash-gaps.pdf>
- 82 WWAP (United Nations World Water Assessment Programme). 2016. *Water and jobs*. Paris: The United Nations. <https://reliefweb.int/sites/reliefweb.int/files/resources/243938e.pdf>.
- 83 Batchelor, Charles, Jippe Hoogeveen, Jean-Marc Faurès, and Livia Peiser. 2017. *Water accounting and auditing - A sourcebook*. Rome: Food and Agriculture Organisation of the United Nations.
- 84 Ministry of Jal Shakti. 2016. *National Hydrology Project*. Accessed May 05, 2020. <http://nhp.mowr.gov.in/HomeNew/NHPIndex-new.aspx>.
- 85 Bery, Suman, Arunabha Ghosh, Ritu Mathur, Subrata Basu, Karthik Ganesan, Rhodri Owen-Jones. 2017. *Energizing India: Towards a Resilient and Equitable Energy System*. New Delhi: SAGE.
- 86 Ghosh, Arunabha. 2020. "Many avatars of energy (in)security." *Business Standard*, 25 February. https://www.business-standard.com/article/opinion/many-new-avatars-of-energy-in-security-120022500031_1.html
- 87 Gupta, Vaibhav, Tirtha Biswas, Karthik Ganesan. 2016. *Critical Non-Fuel Mineral Resources for India's Manufacturing Sector: A Vision for 2030*. New Delhi: Council on Energy, Environment and Water. <https://www.ceew.in/publications/critical-non-fuel-mineral-resources-india%E2%80%99s-manufacturing-sector>
- 88 Bhaskar, Utpal. 2020. "Price war sends crude tumbling, but turmoil to India's advantage." *Mint*. 10 March. <https://www.live-mint.com/industry/energy/price-war-sends-crude-tumbling-but-turmoil-to-india-s-advantage-11583778620775.html>
- 89 Bery, Suman, Arunabha Ghosh, Ritu Mathur, Subrata Basu, Karthik Ganesan, Rhodri Owen-Jones. 2017. *Energizing India: Towards a Resilient and Equitable Energy System*. New Delhi: SAGE.
- 90 The Hindu. 2020. COVID-19 relief scheme: Poor find access to accounts hard, says study. 06 May. Accessed 5 14, 2020. <https://www.thehindu.com/news/national/covid-19-relief-scheme-poor-find-access-to-accounts-hard-says-study/article31521803.ece>.
- 91 Mani, Sunil, Abhishek Jain, Saurabh Tripathi, and Carlos F. Gould. 2020. "The drivers of sustained use of liquified petroleum gas in India." *Nature Energy* <https://doi.org/10.1038/s41560-020-0596-7>.
- 92 Pillarisetti, Ajay, Makarand Ghorpade, Satish Madhav, Arun Dhongade, Sudipto Roy, Kalpana Balakrishnan, Sambandam Sankar, et al. 2019. "Promoting LPG Usage during Pregnancy: A pilot study in rural Maharashtra, India." *Environmental International* 540-549.
- 93 Ghosh, A. et al., 2015. *Clean Energy Powers Local Job Growth in India*, New Delhi: CEEW-NRDC.
- 94 Kuldeep, N. et al., 2019. *Powering Jobs Growth with Green Energy*, New Delhi: CEEW-NRDC-SCGJ.
- 95 Kuldeep, N. & Ghosh, A., 2020. "Building the workforce for India's emerging clean energy sector." In: S. Mehrotra, ed. *Reviving Jobs: An Agenda for Growth*. New Delhi: Penguin.
- 96 Chawla, Kanika and Arunabha Ghosh. 2019. *Greening New Pastures for Green Investments*. New Delhi: Council on Energy, Environment and Water.
- 97 Balakrishnan K, Sagnik Dey, Tarun Gupta. 2019. "The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: The Global Burden of Disease Study 2017." *Lancet Planet Health* 26-39.
- 98 Fischer, Tony. 2019. "How air pollution is holding down wheat yields in India." *IFPRI Blog*. October 11. Accessed May 13, 2020. <https://www.ifpri.org/blog/how-air-pollution-holding-down-wheat-yields-india>.
- 99 Balakrishnan K, Sagnik Dey, Tarun Gupta. 2019. "The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: The Global Burden of Disease Study 2017." *Lancet Planet Health* 26-39.
- 100 Purohit, Pallav, et al. 2019. *Pathways to Achieve National Ambient Air Quality Standards (NAAQS) in India*. New Delhi: Council on Energy, Environment and Water.

- 101 Michael Brauer, et al. 2019. "Examination of monitoring approaches for ambient air pollution: A case study for India." *Atmospheric Environment*. Vol 216 (116940)
- 102 Comptroller and Auditor General of India. 2016. "Union Government Chapter 8 Monitoring by State Pollution Control Board Report 39 of 2016." Accessed May 13, 2020. <https://cag.gov.in/content/union-government-chapter-8-monitoring-state-pollution-control-board-report-39-2016>.
- 103 Maharashtra Pollution Control Board. 2019. *Annual Report, 2018-2019*. Accessed May 13, 2020. http://www.mpcb.gov.in/sites/default/files/about-us/annual-report/MPCB_AR_Eng16032020.pdf.
- 104 Warner, Mandy. 2017. "Cleaning the air saves lives and creates an engine for job growth." *Environmental Defence Fund*. June 26. Accessed 14 May 2020. <http://blogs.edf.org/climate411/2017/06/26/cleaning-the-air-saves-lives-and-creates-an-engine-for-job-growth/>
- 105 TechSciResearch. 2017. "India air pollution control and monitoring study." May. Accessed May 13, 2020. [https://www.techsciresearch.com/admin/gall_content/2017/5/2017_5\\$thumbimg112_May_2017_070949977.pdf](https://www.techsciresearch.com/admin/gall_content/2017/5/2017_5$thumbimg112_May_2017_070949977.pdf).
- 106 Purohit, Pallav, et al. 2019. *Pathways to Achieve National Ambient Air Quality Standards (NAAQS) in India*. New Delhi: Council on Energy, Environment and Water.
- 107 Ministry of Chemicals, Government of India. "Notes on Demands for Grants". *Government of India*. <https://www.indiabudget.gov.in/doc/eb/sbe6.pdf>
- 108 Vibhuti, Balasubramanian Viswanathan, Danwant Narayanaswamy, Christopher Beaton, Karthik Ganesan, Shruti Sharma and Richard Bridle. 2020. *India's Energy Transition 2020*. Winnipeg: International Institute for Sustainable Development.
- 109 PFC. 2020. *Report on Performance of State Utilities 2017-18*. New Delhi: Power Finance Corporation. https://www.pfcindia.com/DocumentRepository/ckfinder/files/Operations/Performance_Reports_of_State_Power_Uilities/Report_on_Performance_of_State_Power_Uilities_%202017_18.pdf
- 110 Joshi, Anshul. 2020. "PFC-REC to infuse Rs 90,000 crore liquidity injection to ailing discoms: Nirmala Sitharaman" *ETEnergy-World*. 13 May 2020. <https://energy.economictimes.indiatimes.com/news/power/pfc-rec-to-infuse-rs-90000-crore-liquidity-injection-to-ailing-discoms-nirmala-sitharaman/75719574>
- 111 Agrawal, Shalu, Sunil Mani, Karthik Ganesan, Abhishek Jain, and Johannes Urpelainen. 2020. *India Residential Energy Survey (IRES)* 2020. New Delhi: Council on Energy, Environment and Water (CEEW) and Initiative for Sustainable Energy Policy (ISEP).
- 112 PFC. 2020. *Report on Performance of State Utilities 2017-18*. New Delhi: Power Finance Corporation. https://www.pfcindia.com/DocumentRepository/ckfinder/files/Operations/Performance_Reports_of_State_Power_Uilities/Report_on_Performance_of_State_Power_Uilities_%202017_18.pdf
- 113 Gupta, Sanjeev, Marjin, Verhoeven, Robert Gillingham, Christian Schiller, Ali Mansoon, Juan Pablo Cardoba. 2000. *Equity and Efficiency in the Reform of Price Subsidies: A Guide for Policymakers*. Washington D.C: International Monetary Fund.
- 114 Gupta, Niti, Saurabh Tripathi, and Hem Himanshu Dholakia. 2020. *Can Zero Budget Natural Farming Save Input Costs and Fertiliser Subsidies? Evidence from Andhra Pradesh*. New Delhi: Council on Energy, Environment and Water.
- 115 Source: CEEW analysis
- 116 Ministry of Finance, Government of India. 2019. "Key Features of Budget 2019-20." <https://www.indiabudget.gov.in/budget2019-20/doc/bh1.pdf>
- 117 Neeraj Kuldeep et al. 2017. *Greening India's Workforce*. New Delhi: Council on Energy Environment and Water.
- 118 Source: CEEW analysis
- 119 Source: CEEW analysis
- 120 Dangra, Abhishek. 2016. "The Missing Piece in India's Economic Growth Story: Robust Infrastructure" *S&P Global*. Accessed 14 May 2020. <https://www.spglobal.com/en/research-insights/articles/the-missing-piece-in-indias-economic-growth-story-robust-infrastructure>.
- 121 Assumes a debt-equity ratio of 80:20
- 122 Neeraj Kuldeep et al. 2017. *Greening India's Workforce*. New Delhi: Council on Energy Environment and Water.
- 123 Agrawal, Shalu, and Danwant Narayanaswamy. 2020. "Unpacking India's Falling Electricity Demand During the Lockdown. Navigating India's Power Crisis During Covid-19: A CEEW Blog Series." Council on Energy Environment and Water. April. Accessed 2020. www.ceew.in
- 124 The Economic Times. 2020. "Discoms to suffer Rs 30K cr revenue loss, face Rs 50K cr liquidity crunch due to lockdown." Accessed 13 May 2020. <https://economictimes.indiatimes.com/industry/energy/power/discoms-to-suffer-rs-30k-cr-revenue-loss-face-rs-50k-cr-liquidity-crunch-due-to-lockdown-cii/articleshow/75197545.cms?from=mdr>
- 125 PRAAPTI. 2020. "Payment Ratification and Analysis in Power Procurement for Bringing Transparency in Invoicing of Generators." *Ministry of Finance*. Accessed May 10, 2020. <https://www.praapti.in>.
- 126 PFC. 2018. "Report on Performance of State Power Utilities for FY 2017-18." *Power Finance Corporation*. www.pfcindia.com.
- 127 In most Indian states, domestic consumers with consumption more than 200 units are charged cost-reflective tariffs. Thus, these consumers can be considered economically better off than those with lower consumers.

- 128 Chuneekar, Aditya, and Sapekshya and Dixit Shantanu Varshney. 2016. "Residential Electricity Consumption in India: What do We Know?" *Prayas Energy Group*. www.prayaspune.org.
- 129 Agrawal, Shalu, and Narayanaswamy, Danwant. 2020. "Unpacking India's Falling Electricity Demand During the Lockdown. Navigating India's Power Crisis During Covid-19: A CEEW Blog Series." *Council on Energy Environment and Water*. April. Accessed 2020. www.ceew.in.
- 130 CERC. 2018. "CERC Discussion Paper on Market Based Economic Dispatch of Electricity: Re-designing of Market." *Central Electricity Regulatory Commission*.
- 131 CSC. 2020. "CSC TARANG - CSC Monthly e-Magazine." Vol. II. New Delhi: CSC e-Governance Services India Limited. https://csc.gov.in/assets/e-magazine-tarang/CSC_Monthly_Magazine_Tarang_March_2020_English.pdf.
- 132 To cover 26 million households electrified under Saubhagya and 21 million agricultural connections, more than 67,150 meter readers would be required, assuming that one meter reader generates 700 bills per month. If the discoms compensate meter readers at INR 15/bill, an annual expense of INR 850 crore will be incurred on the additional human resource.
- 133 Verma, Madhulika. 2018. "76000 premature deaths due to Non-Compliance of Emission Standard for Coal Based Power Plants in India." *Greenpeace India*. December 7. <https://www.greenpeace.org/india/en/press/3209/76000-premature-deaths-due-to-non-compliance-of-emission-standard-for-coal-based-power-plants-in-india/>
- 134 Garg, Vibhuti, Danwant Narayanaswamy, Karthik Ganesan, and Balasubramanian Viswanathan. 2019. *India's Energy Transition: The cost of meeting air pollution standards in the coal-fired electricity sector*. International Institute for Sustainable Development.
- 135 Kuldeep, N. et al. 2019. *Powering Jobs Growth with Green Energy*. New Delhi: CEEW-NRDC-SCGJ.
- 136 Ministry of New and Renewable Energy, Government of India, 2020. "Renewable Energy Sector Makes Rapid Strides in 2019." *Press Information Bureau (PIB)*. Accessed May 10, 2020. <https://pib.gov.in/PressReleaseDetail.aspx?PRID=1598948>
- 137 Ministry of New and Renewable Energy, Government of India, 2020. "Renewable Energy Sector Makes Rapid Strides in 2019." *Press Information Bureau (PIB)*. Accessed May 10, 2020. <https://pib.gov.in/PressReleaseDetail.aspx?PRID=1598948>
- 138 CEEW Centre for Energy Finance. 2020. "Financing the energy transition in a post Covid-19 India." Accessed May 10, 2020. <http://cef.ceew.in/masterclass/analysis/financing-energy-transition-in-post-covid-19-india>
- 139 Reserve Bank of India. 2020. "COVID- 19-Regulatory Package." Circular No RBI/2019-20/186, 27 March.
- 140 Department of Commerce. 2020. "Export Import Data Bank." Accessed on May 12, 2020. <https://commerce-app.gov.in/eidb/icomq.asp>
- 141 Presidential Order. 2018. "President Trump Approves Relief for U.S. Washing Machine and Solar Cell Manufacturers." Accessed on May 12, 2020. <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/january/president-trump-ap-proves-relief-us>
- 142 ETEnergyworld. 2020. "Adani, Azure top bidders for manufacturing-linked solar tender," *Economic Times*, January 17, 2020. <https://energy.economictimes.indiatimes.com/news/renewable/adani-azure-top-bidders-for-manufacturing-linked-solar-tender/73326210>.
- 143 India's combined cell and module manufacturing capacity is approximately 10 GW
- 144 Neeraj Kuldeep et al. 2017. *Greening India's Workforce*. New Delhi: Council on Energy, Environment and Water.
- 145 Dutt, Arjun, Manu Aggarwal, and Kanika Chawla. 2019. *What is the Safeguard Duty Safeguarding? Analysing Impact on Solar Manufacturing and Deployment in India*. New Delhi: Council on Energy, Environment and Water.
- 146 Tyagi, Akanksha, Neeraj Kuldeep, and Aarushi Dave. 2020. *Assessing the Economic Feasibility of Urban Microgrids: A Discom and Consumer Perspective Cost-Benefit Analysis*. New Delhi: Council on Energy, Environment and Water.
- 147 CEEW analysis
- 148 Kuldeep, Neeraj, Selna Saji, and Kanika Chawla. 2018. *Scaling Rooftop Solar: Powering India's Renewable Energy Transition with Households and DISCOMs*. New Delhi: Council on Energy, Environment and Water.
- 149 Ministry of New and Renewable Energy (MNRE). 2019. No. 318/331/2017 - Grid Connected Rooftop - Office Memorandum. Government of India. <https://solarrooftop.gov.in/notification/Notification-21082019-143301.pdf>.
- 150 Kuldeep, Neeraj, Selna Saji, and Kanika Chawla. 2018. *Scaling Rooftop Solar: Powering India's Renewable Energy Transition with Households and DISCOMs*. New Delhi: Council on Energy, Environment and Water.
- 151 CEEW analysis
- 152 CEEW analysis
- 153 Cabinet Committee on Economic Affairs (CCEA). 2019. "Cabinet Approves Phase-II of Grid Connected Rooftop Solar Programme for Achieving Cumulative Capacity of 40,000 MW from Rooftop Solar Projects by the Year 2022". *Press Information Bureau (PIB)*. <https://pib.gov.in/PressReleasePage.aspx?PRID=1565282>.
- 154 CEEW analysis
- 155 CEEW analysis based on current market price for RTS system at INR 45,000 per kW.
- 156 Abraham, Mathew, Arunabha Ghosh, Sudarshan H, Harish Hande, Sanjeev Jain, Adwait Joshi, Arvind Kumar, et al. 2020. "Open Letter to the Government of India and Global Development Community: A Sustainable Energy Path to Universal

- Healthcare in Rural India". *PowerforAll*. April 30. https://www.powerforall.org/application/files/4415/8858/5596/Open_Letter_A_Sustainable_Energy_Path_to_Universal_Healthcare_in_Rural_India_FINAL.pdf
- 157 Ramji, Aditya, Sasmita Patnaik, Sunil Mani, and Hem Dholakia. 2017. *Powering Primary Healthcare through Solar in India: Lessons from Chhattisgarh*. New Delhi: Council on Energy, Environment and Water.
 - 158 Cabinet Committee on Economic Affairs (CCEA). 2019. "Cabinet Approves Phase-II of Grid Connected Rooftop Solar Programme for Achieving Cumulative Capacity of 40,000 MW from Rooftop Solar Projects by the Year 2022". *Press Information Bureau (PIB)*. <https://pib.gov.in/PressReleasePage.aspx?PRID=1565282>.
 - 159 Ministry of New and Renewable Energy (MNRE). 2020. "Notes on Demands for Grants, 2020-2021 - Demand No. 7." *Government of India*. <https://www.indiabudget.gov.in/doc/eb/sbe70.pdf>.
 - 160 CEEW analysis
 - 161 CEEW analysis
 - 162 Boersma, Tim, Akos Losz, Astha Ummat. 2017. *The Future of Natural Gas in India: A Country at a Crossroads*. New York: ColumbiaSIPA - Center on Global Energy Policy
 - 163 Fulwood, Mike. 2020. *\$2 gas in Europe is here: who will blink first?* Oxford Energy Comment, Oxford Institute for Energy Studies (OIES).
 - 164 Cocklin, Jamison. 2020. "LNG Supply Glut Likely to Outlast Demand for Years, Says IGU." Accessed May 04, 2020. <https://www.naturalgasintel.com/articles/121826-lng-supply-glut-likely-to-outlast-demand-for-years-says-igu>.
 - 165 Dobbs, Kevin. 2020. "IEA Forecasts Record Drop in Natural Gas, Oil Demand Amid 'Historic Shock' from Coronavirus." Accessed May 04, 2020. <https://www.naturalgasintel.com/articles/121842-iea-forecasts-record-drop-in-natural-gas-oil-demand-amid-historic-shock-from-coronavirus>.
 - 166 OIES. 2015. *Gas Pricing Reform in India: Implications for the Indian gas landscape*. OIES PAPER: NG 96, Oxford Institute for Energy Studies.
 - 167 CEEW analysis
 - 168 CEEW analysis
 - 169 Soman, Abhinav, Harsimran Kaur, and Karthik Ganesan. 2019. *How Urban India Moves*. New Delhi: Council on Energy, Environment and Water. https://www.ceew.in/sites/default/files/CEEW%20-%20How%20Urban%20India%20Moves%20Report%20PDF%202022Oct19_compressed.pdf.
 - 170 TRIPP. 2018. "National estimation of city bus fleet in India". Transportation Research and Injury prevention Programme (TRIPP), Indian Institute of Technology (IIT) Delhi.
 - 171 Plano, Chris. 2015. "More Jobs Created Through Public Transportation Than Roads." *Mobility Lab*. <https://mobilitylab.org/2015/01/22/more-jobs-created-through-public-transportation-than-roads/>.
 - 172 Department of Heavy Industries. 2016. "Automotive Sector - Achievement Report." https://drive.google.com/file/u/1/d/oB-Tv7_upCKANu1jxQWdYMDAzNGM/view?usp=drive_open&usp=embed_facebook.
 - 173 Ministry of Environment, Forest & Climate Change. 2019. *India Cooling Action Plan*. New Delhi: Ministry of Environment, Forest & Climate Change.
 - 174 IEA. 2018. "The Future of Cooling – Opportunities for Energy-Efficient Air Conditioning," *The Future of Cooling*, Vienna: IEA.
 - 175 Bhasin, Shikha, Apurupa Gorthi, Vaibhav Chaturvedi, and Torgrim Asphjell. 2019. *Acting on Many Fronts: Incentives and Regulations to Phase-down HFCs in India*. New Delhi: Council on Energy, Environment and Water.
 - 176 Bhasin, Shikha, Apurupa Gorthi, Vaibhav Chaturvedi, and Torgrim Asphjell. 2019. *Acting on Many Fronts: Incentives and Regulations to Phase-down HFCs in India*. New Delhi: Council on Energy, Environment and Water.
 - 177 Ministry of Environment, Forest and Climate Change. 2016. "Environment Ministry announces Major Initiative for R&D into Next Generation HFC refrigerant alternatives." *Press Information Bureau (PIB)*. Accessed 15 May 2020 <http://pib.nic.in/news-ite/mbErel.aspx?relid=149825>
 - 178 Bhasin, Shikha, Apurupa Gorthi, and Vaibhav Chaturvedi. 2020. *A Universal Certification System for India's Refrigeration and Air-conditioning Servicing Sector*. New Delhi: Council on Energy, Environment and Water. (forthcoming).
 - 179 Ministry of Environment, Forest & Climate Change. 2019. *India Cooling Action Plan*. New Delhi: Ministry of Environment, Forest & Climate Change.
 - 180 Ministry of Environment, Forest & Climate Change. 2019. *India Cooling Action Plan*. New Delhi: Ministry of Environment, Forest & Climate Change.
 - 181 Bhasin, Shikha, Apurupa Gorthi, Vaibhav Chaturvedi, and Torgrim Asphjell. 2019. *Acting on Many Fronts: Incentives and Regulations to Phase-down HFCs in India*. New Delhi: Council on Energy, Environment and Water.



Imagination cannot be locked down. The times might seem surreal, but we are also fortunate to be present at the creation of a new world. Our responses will be tempered by policy, technology and finance. What shape the new world takes, however, can be liberated by our imaginations.



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