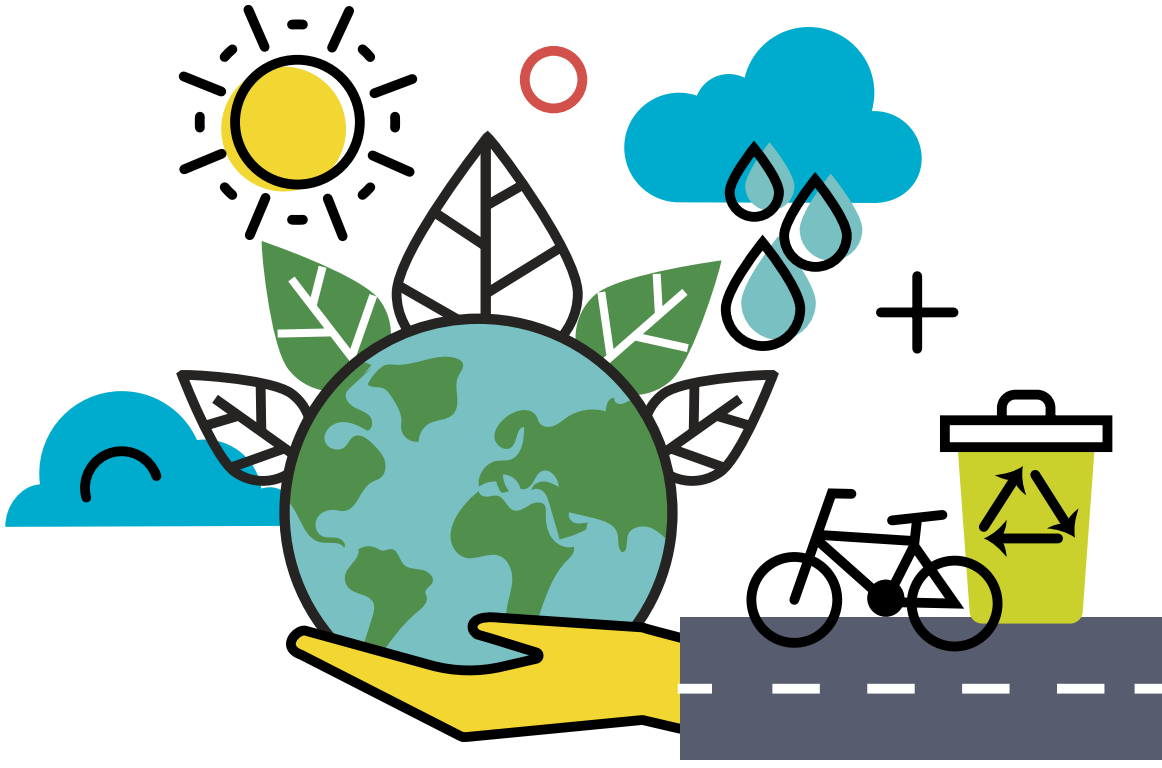
‘ENERGY MATTERS’

MORE POWER TO INDIA.

SHAKTI
SUSTAINABLE ENERGY FOUNDATION

Shakti Sustainable Energy Foundation seeks to facilitate India's transition to a sustainable energy future by promoting policies that encourage energy efficiency, renewable energy and sustainable transport solutions.



MESSAGE FROM THE CEO

Dear friends,

2016 was a significant year for climate and clean energy related activity in India. The Paris Agreement entered into force and India contributed to a successful Kigali Amendment to the Montreal Protocol to phase down the production and use of harmful HFCs. The impact of the government's investments in promoting solar energy generation began showing results in terms of incremental solar capacity being established, both grid scale and roof top. The Government acknowledged the untapped potential of distributed solar generation and released a draft policy, while the state of Uttar Pradesh took the lead in issuing a state-level mini grid policy, and regulations. Air quality became an issue of increasing concern, prompting demand for action from the public, media and the judiciary.

We invite you to learn more about our activities in 2016 in this report. Thank you for your support and interest in our work.

Krishan Dhawan
Chief Executive Officer,
Shakti Sustainable Energy Foundation

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STAKEHOLDERS DISCUSS COLLABORATIVE FRAMEWORK FOR NDC IMPLEMENTATION AT CONCLAVE HOSTED BY SHAKTI AND USIBC

The Paris Agreement is an opportunity to foster enhanced and strategic collaboration between key actors to realize the vision set out in India's Nationally Determined Contributions (NDCs.) Shakti, in partnership with the U.S.-India Business Council (USIBC), hosted a conclave on this theme, bringing together key stakeholders from the government, private sector and civil society to discuss opportunities for shaping the climate agenda.

The first session at the conclave focused on how the private sector could contribute to meeting the NDCs by investing in, and adopting clean energy and energy efficiency measures. Participants shared experiences from their national and global operations. They also discussed the need for innovative policy measures and financial instruments to grow the clean energy market.

The second session identified solutions to the challenges of integrating renewables in the grid. It also explored the opportunities for joint action between natural gas and renewable energy industries such as the development of hybrid technologies and energy system integration studies.

The conclave was attended by senior officials from government ministries and representatives from the private sector and civil society. Shri Gireesh Pradhan, Chairperson of the Central Electricity Regulatory Commission, provided the keynote address and Mr. Krishan Dhawan, CEO of Shakti, provided the opening remarks.

BUILDING A ROADMAP FOR IMPROVED BUS SYSTEMS IN CITIES

Buses are the backbone of urban mobility in India. They provide an affordable and sustainable means of transport to meet the increasing transport demand. But despite being an important mode of transport, their penetration is very low – only 1.29 buses for every 1,000 Indians. Improved bus systems can help address some of India's urbanization challenges as well as contribute to meeting our climate goals.

Recognizing this, Shakti has been supporting the "Bus Karo" campaign launched by World Resources Institute (WRI) India to advance bus transport in India. As a part of this campaign, a two-day workshop was recently held in Bengaluru in partnership with the Bengaluru Metropolitan Transport Corporation (BMTC) and the Karnataka State Road Transport Corporation (KSRTC). The theme of the workshop was 'Modernizing City Bus Services – Vision 2022' and the discussion focused on building consensus on a strategic vision for better bus services.

The workshop was attended by bus manufacturers, urban planners and sectoral experts, as well as officials of State Road Transport Undertakings (STUs) and Special Purpose Vehicles (SPVs) in charge of city bus services in Mumbai, Bangalore, Bhopal, Hyderabad, Ahmedabad and Delhi among other cities. Several measures were proposed for the development of a roadmap for upgrading city buses, their network, efficiency and financial structure.

Some of these measures included rationalising the taxes faced by city buses, setting up of a Unified Metropolitan Transport Authority which can coordinate, plan and finance the integrated management of urban transport systems, and exploring energy efficient alternatives like electric buses.

CLEANER TRANSPORT THROUGH A BETTER INSPECTION AND MAINTENANCE (I&M) PROGRAMME FOR IN-USE VEHICLES

The transport sector is an important contributor to air pollution in urban areas. Research has shown that poorly maintained and older vehicles are responsible for a major share of pollution in cities. Therefore, the management of this in-use vehicle fleet is an important step for the control of vehicular emissions.

Improving the current Inspection and Maintenance (I&M) programme for in-use vehicles is a key measure in this direction. The programme currently focuses on Pollution Under Control (PUC) certification for private vehicles and fitness tests for commercial vehicles. Shakti has been supporting The Energy and Resources Institute (TERI) to find ways to strengthen the design and implementation of the I&M programme.

An important outcome of this research is the development of a position paper that recommends changes to the current testing procedures and the institutional framework needed for the more improved implementation and monitoring of the programme. The recommendations were detailed further to specify the changes needed in the PUC and fitness testing regime.

The position paper was discussed in extensive detail at a workshop in New Delhi. The workshop was attended by policy makers and representatives from academia, civil society, business, and financial institutions. Perspectives emerging from this discussion are expected to inform further research on the I&M programme.

NOVEMBER 2016

AGREEMENT REACHED FOR HFC PHASEDOWN AT KIGALI

In a landmark step to combat climate change, nearly 200 countries, including India, adopted an agreement in Kigali, Rwanda to phase down hydrofluorocarbons (HFCs) by amending the Montreal Protocol. HFCs—used mostly in air conditioning and refrigeration—have high global warming potential. Reducing their consumption by switching to more climate-friendly alternatives will have significant climate benefits.

In April 2015, India, for the first time, indicated its willingness to agree on a HFC phase down under the Montreal Protocol. This development in part paved the way for an amendment to be agreed in Kigali in 2016.

The Kigali agreement establishes timetables for all developed and developing countries to freeze and then reduce their production and use of HFCs. In April 2015, India proposed baseline and freeze years of 2028-30 and 2031 respectively for developing countries. At Kigali, India advanced the baseline and freeze years by four and three years respectively. India will make its first reduction, a 10% cut, by 2032.

India also announced its decision to mandate companies to capture and then incinerate HFC-23, a by-product of HCFC-22 and a super greenhouse gas. In a significant step forward, India will unilaterally control the emissions of HFC-23 without any financial support from the Multilateral Fund for the Implementation of the Montreal Protocol.

INDIA LAB LAUNCHES THREE INNOVATIVE GREEN FINANCE INSTRUMENTS

The India Innovation Lab for Green Finance recently endorsed three innovative green finance instruments that will help unlock the private investment required to meet India's clean energy targets.

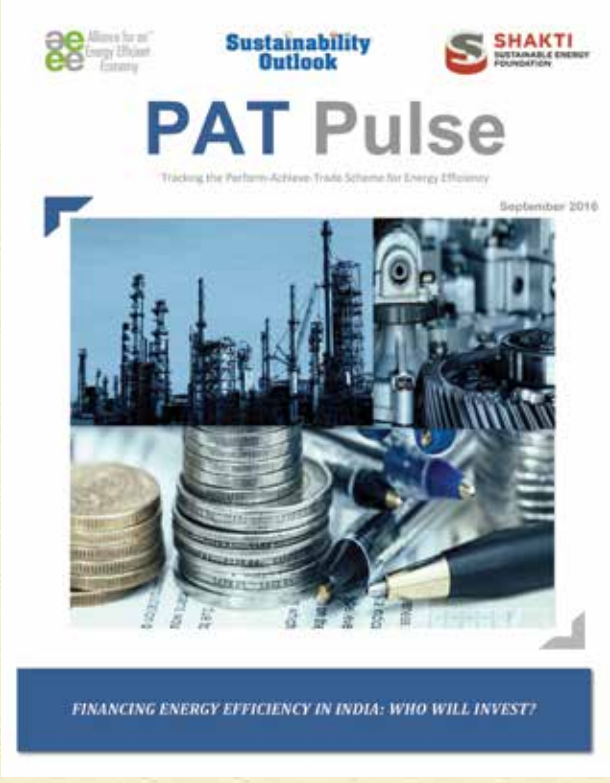
The three instruments, selected from among a highly competitive pool, and refined and developed over the course of the last year, will now move forward for piloting in India. They include a rooftop solar financing facility, a new peer-to-peer lending platform for green investments for investments for small and medium enterprises (SMEs), and a currency hedging instrument.

This announcement is in partnership with the Lab's mentors including the Indian Ministry of New and Renewable Energy, the Ministry of Finance, the Indian Renewable Energy Development Agency (IREDA), the Asian Development Bank, ReNew Power, the World Bank, and the development agencies of the French, UK, and US governments, among others.

The Lab is hosted and funded by Shakti Sustainable Energy Foundation with additional financial support from the UK Government, the David and Lucile Packard Foundation, and the Oak Foundation. The Climate Policy Initiative serves as the Lab's Secretariat.

The Lab also announced a new call for ideas for innovative green finance instruments for its 2016-2017 cycle.

NEW EDITION OF PAT PULSE FOCUSES ON FINANCING ENERGY EFFICIENCY INTERVENTIONS



PAT Pulse, the Shakti-supported briefing paper series on the Perform, Achieve and Trade (PAT) scheme continues to provide relevant insights. The new paper focuses on financing energy efficiency interventions under the PAT scheme. Previous analysis conducted under the aegis of PAT Pulse has estimated the investment potential of industrial energy efficiency interventions for designated consumers to be around Rs. 34,000 crores by 2020 (this does not include the thermal power sector).

As a follow-up, the new paper attempts to identify the most optimal financing routes to unlock this potential. Based on high level stakeholder engagement and industry analysis, it identifies two key determinants of overall financing patterns: the size of the company as well as its willingness to contribute to the overall financing of energy efficiency. It suggests that cross-cutting technologies across industries have maximum potential under the ESCO model. It also identifies better financing routes for the Chlor-Alkali and Aluminium sector, and the Cement and Fertilizer sector.

Given that the second phase of the PAT scheme is now underway, the paper also presents important updates regarding Energy Savings Certificates to facilitate trading under the PAT mechanism.

ELECTRIC VEHICLES: THE WAY FORWARD

With more and more vehicles plying on Indian roads, cities are experiencing increasingly high levels of pollution and traffic congestion. Promoting public transport can help ease some of these problems. It is in this context that electric buses can play a positive role since they are a cleaner mode of transport. Both the National Electric Mobility Mission Plan 2020 and the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme promote the adoption of electric vehicles.

The benefits of electric vehicles are well recognized. They are a cleaner mode of transport, and when powered by renewable energy, can strengthen India's energy and economic security. More importantly, they can address the variable nature of renewable energy resources by acting as a balancing resource for the grid. But for these benefits to be realized, it is important to have the required policy and infrastructure interventions that will support the transition of public transport systems to electric vehicles in an optimal way.

Building on this need, Shakti is supporting the development of an implementation roadmap for the electrification of public transportation in two important metros: Bengaluru and Kolkata. Shakti and its partners recently organized a roundtable in Bengaluru bringing together experts to discuss the roadmap in extensive detail. The roundtable provided a deeper understanding of policy design and implementation for electric vehicles, and the challenges and opportunities related to vehicle grid integration.

WITH A FOCUS ON FREIGHT TRANSPORT, CHENNAI LAUNCHES FREIGHT PARTNERSHIP

The demand for freight transport is constantly increasing in cities and towns, contributing further to congestion, pollution, and traffic accidents. Therefore, there is a need to plan for sustainable and integrated transport policies that optimize the use of all transport modes in the urban network for goods. This can help reduce the distance travelled by freight vehicles and thereby decrease emissions.

Given this, Shakti is supporting IIT-Madras to develop a comprehensive planning framework for freight transport, using the city of Chennai as a case study. As a first step, a stakeholder meeting was recently convened in Chennai bringing together transporters, academia, research organisations and government authorities. The discussion at this meeting helped to develop insights on improving the efficiency of the freight sector in Chennai.

The stakeholder workshop served as a platform for the launch of the Chennai Freight Partnership, led by the Madras Chamber of Commerce and Industry (MCCI) and the Centre of Excellence for Urban Transport, IIT Madras. The aim of this partnership is to improve efficiency, sustainability and safety in freight movement in Chennai.

OCTOBER 2016

INDIA RATIFIES PARIS AGREEMENT

India officially ratified the Paris Agreement on climate change on October 2nd, 2016 bringing the world's first universal climate change agreement one step closer to becoming a reality.

The agreement will come into force after it has been ratified by at least 55 countries which account for 55% of global greenhouse gas emissions. With India's move, a total of 62 countries accounting for almost 52% of emissions have ratified the agreement.

India has significant obligations to meet under the agreement – reducing the emissions intensity of its gross domestic product by 33-35% from 2005 levels, generating 40% of its cumulative electric power from non-fossil fuel-based energy resources and increasing tree cover, creating an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent. This should be achieved by 2030.

The timing of the ratification is important given that it precedes the 28th Meeting of the Parties to the Montreal Protocol (MOP 28) and 22nd session of the Conference of the Parties (COP 22), to be held in Kigali, Rwanda and Marrakesh, Morocco in October and November 2016 respectively. Once the agreement comes into force, India will expect a concrete roadmap from developed nations to mobilise funds to help developing countries move to a low-carbon growth path.

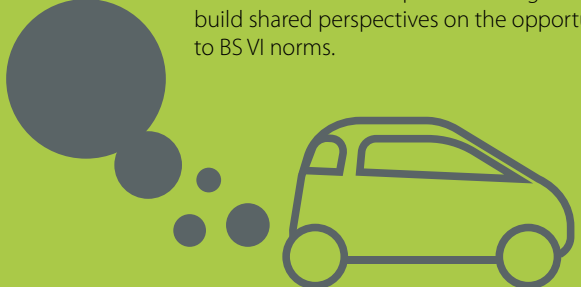
INDIA LEAPFROGS TO BHARAT STAGE VI VEHICULAR EMISSION NORMS

India has notified the implementation of the Bharat Stage VI emissions standards for all vehicles nation-wide from 2020. The notification skips the Stage V norms earlier scheduled for 2019, and sharply advances the implementation timeline by nearly four years, against the earlier envisioned 2024. This is a significant step towards reducing air pollution in Indian cities.

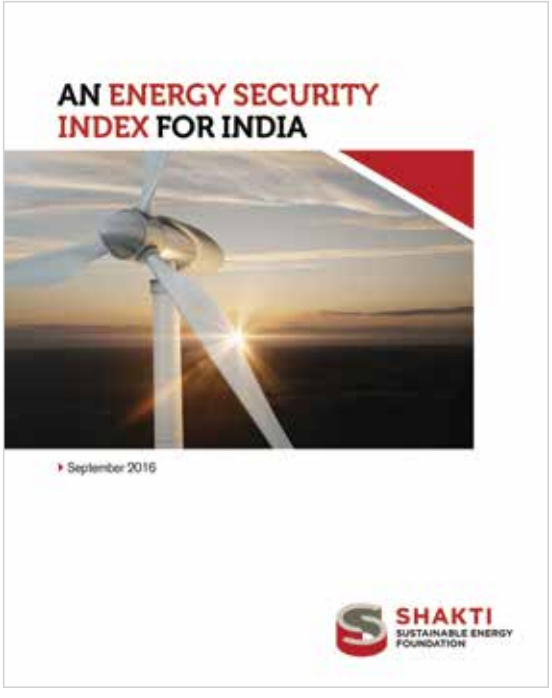
Efforts by several Shakti-supported partners contributed significantly to this notification. Over the years, Shakti facilitated sustained engagement with policy makers and other stakeholders to provide thought leadership and to build shared perspectives on the opportunity to leapfrog to BS VI norms.

Studies supported by Shakti informed this discourse, particularly by highlighting how air quality and public health benefits of the standards justify the investment in producing the required ultra-low sulphur fuel. These efforts, supported by the development and dissemination of concise, clear policy briefs, have helped stakeholders gain a better understanding of the wide-ranging implications of this transition.

India takes the lead amongst developing countries with this notification. The move will make a huge impact and significantly bring down vehicular pollution in India.



AN ENERGY SECURITY INDEX FOR INDIA



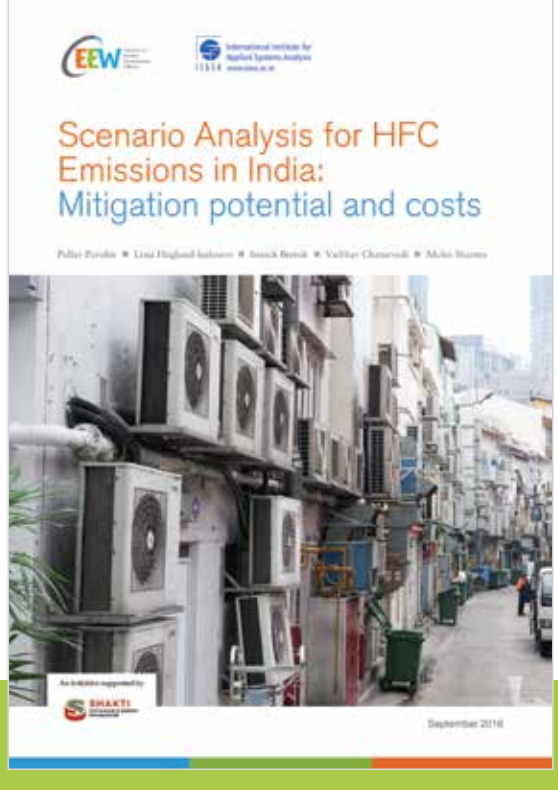
On September 8th 2016, Shakti in partnership with the NITI Aayog, and with McKinsey & Company as a knowledge partner, organized a stakeholder consultative workshop on 'Progressing a Holistic Perspective on India's Energy Security', in New Delhi. The workshop brought together representatives from government, thinks tanks, academia and civil society to discuss the merits of assessing India's energy security in the wider context of the country's unique challenges such as energy access, affordability and environmental sustainability.

The workshop marked the launch of the India Energy Security Index and its web portal. The index is a customised tool that tracks India's energy security on a multi-dimensional basis. Besides this, the index will help to set energy aspirations, monitor progress and measure the impact of policy actions.

The discussion was enriched by contributions from Mr. Shyam Saran, former Foreign Secretary and Prime Minister's Special Envoy for Climate Change, Mr. Amitabh Kant, CEO of the NITI Aayog and Mr. Jamshyd N. Godrej, Chairman of the Board of Directors at Shakti.

SIGNIFICANT MITIGATION POTENTIAL FOR HFCS

Countries met in Kigali, Rwanda to negotiate a potentially landmark agreement to control the use of HFC refrigerant gases under the Montreal Protocol. Several countries, including India, have already presented amendment proposals to the Protocol. In the lead, up to Kigali, a group of philanthropic donors and developed countries have pledged US $80 million for supporting an early transition away from HFCs in developing economies.



The timing of these developments is ideal, as they come on the heels of new research on HFC mitigation potential and costs under different phase-down scenarios for India. As per this research, in the 'business as usual scenario', Indian HFC emissions are expected to increase 50 times between 2010-2050, with a sharp increase in HFC emissions from the air-conditioning and refrigeration sectors. At the same time, there are significant opportunities to reduce HFC consumption and emissions in India if identified technical and financial challenges are overcome. More than a third of the mitigation potential is attainable at zero or below zero marginal cost primarily due to the availability of inexpensive low-GWP alternatives and energy-efficiency benefits.

Shakti has supported the Council on Energy, Environment and Water (CEEW) to undertake this study in collaboration with the International Institute for Applied Systems Analysis (IIASA).

STRENGTHENING THE EMISSIONS STANDARDS SETTING PROCESS FOR INDUSTRIES

A report supported by Shakti has reviewed the process for setting up industry-specific emissions standards for India. A well-defined process lays the foundation for more robust and impactful emission standards. This in turn can help control air pollution from the rapidly growing industrial sector, and safeguard public health.

The findings of the report indicate that progress has been made in developing emission standards, and improvements are visible in several industries. At the same time, a few areas of improvement remain still. A stronger evidence base is required to inform the standards, as also greater clarity in the process followed for setting the standards and a more inclusive process that entails engagement with stakeholders. The report identifies specific ways to address these and other pertinent challenges.

A first of its kind, the report is a starting point for further deliberation on appropriate options for emissions abatement technology and processes. It has been prepared by Ricardo India Private Limited, in partnership with the Public Health Foundation of India (PHFI) and the Council on Energy, Environment and Water (CEEW).

SEPTEMBER 2016

REAL TIME DATA ON AIR QUALITY TO FIGHT POLLUTION

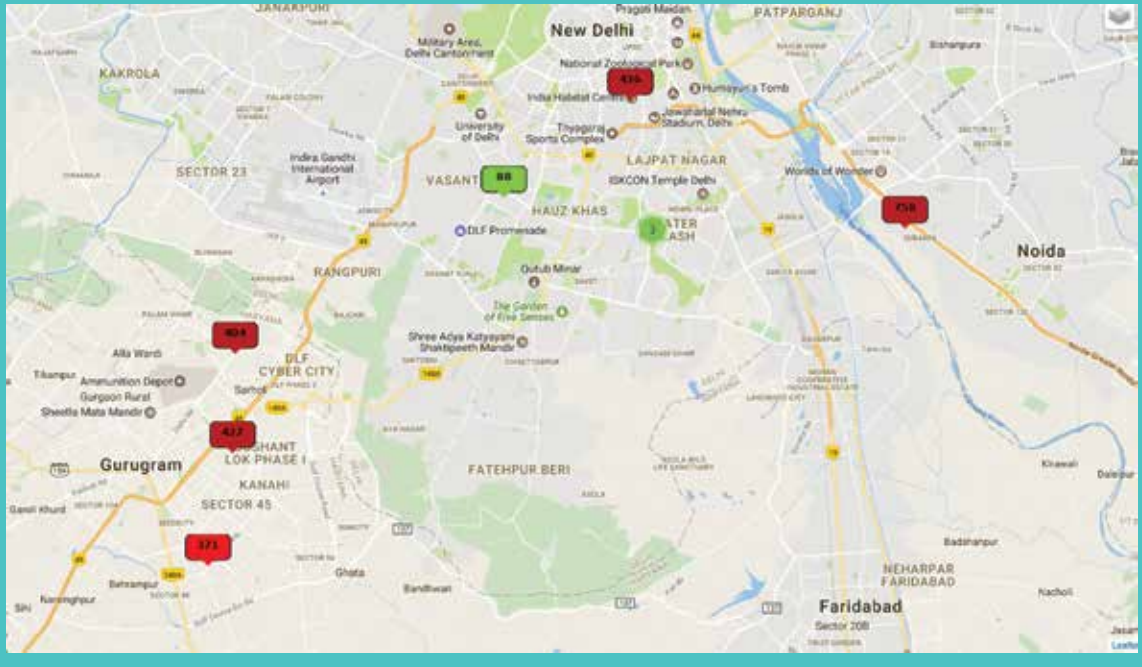
Recent studies and growing public awareness have brought attention to the deteriorating air quality in Indian cities. The World Health Organization (WHO) has ranked 13 Indian cities amongst the top 20 most polluted cities in the world. The impact of poor air on public health is an increasing concern, with pollution levels reaching their highest in 2015.

Given this, Shakti is taking concrete steps towards better air quality management in Indian cities. We are currently supporting the installation of low-cost air quality monitors in 10 cities under "Breathe", an independent air quality monitoring network that measures pollution levels in cities across India. The monitors measure the ambient concentrations of particulate matter and live-stream the data online for easy access.

The availability of this data is critical to addressing the information gap that exists regarding air quality in our cities. Citizens now have access to information on local air pollution levels, leading to increased public awareness. At the same time, this data is also an important precursor for more informed policy action on controlling air pollution.

Currently, Breathe monitors are operational in some metros and a few tier-II cities that are on the WHO's list of 20 most polluted cities - Allahabad, Agra, Delhi, Patna, Kanpur, and Lucknow. See snapshot below.

http://api.indiaspend.org/dashboard/



AQI	Remark	Color Code	Possible Health Impacts
0-50	Good		Minimal impact
51-100	Satisfactory		Minor breathing discomfort to sensitive people
101-200	Moderate		Breathing discomfort to the people with lungs, asthma and heart diseases
201-300	Poor		Breathing discomfort to most people on prolonged exposure
301-400	Very Poor		Respiratory illness on prolonged exposure
401-500	Severe		Affects healthy people and seriously impacts those with existing diseases

NATIONAL SUMMIT BUILDS MOMENTUM FOR DRE

The India Energy Access summit, held through 10th-12th August 2016 in New Delhi, brought together energy practitioners, policy makers, civil society and other stakeholders to discuss the theme of sustainable development though decentralized renewable energy (DRE) access.

The summit was organised by The Climate Group and the Clean Energy Access Network (CLEAN) in partnership with the Ministry of New and Renewable Energy. Shakti was a strategic partner to this summit.

Mr. Krishan Dhawan, the CEO of Shakti, addressed the participants and focused on how DRE could play a key role in meeting India's growing energy aspirations. He highlighted the need to shift the DRE narrative from that of a stopgap mechanism to one that considers it as an essential and integral part of the universal energy supply solution.

Following India's commitments at Paris, it is important to ensure that India's energy demand is met in a sustainable manner. DRE is one way to achieve this goal and the summit served as a platform to share the achievements and best practices of stakeholders in the sector and showcased the significant progress made over the last 12 months.

SMART SOLUTIONS, MORE ENERGY EFFICIENT INDUSTRIES

Industries can achieve performance efficiency and cost savings through Smart Manufacturing Solutions – this is the theme of the latest edition of PAT Pulse, a briefing paper series on India's Perform, Achieve and Trade (PAT) scheme.

In essence, Smart Manufacturing solutions use the data generated from the information and communication technology (ICT) infrastructure in a factory to improve the existing capacity and processes. This data promises greater efficiency for manufacturing facilities across the board. It can provide the basis for making more informed decisions on various links of a factory's value chain and assist in predictive maintenance.

Smart solutions are gradually gaining traction, even if at a slow pace. The analysis suggests that by 2020, the market penetration of Smart Solutions is likely to increase by at least 30% on an average across various industries in India. This will lead to significant productivity improvement and energy savings - which can support India's energy efficiency ambitions.

PAT Pulse has been produced by Sustainability Outlook and the Alliance for Energy Efficient Economy in collaboration with Shakti.

WORKING TOGETHER TO STRENGTHEN THE ESCO INDUSTRY

Harnessing the potential of Energy Service Companies (ESCos) can provide the support and expertise needed for energy efficiency projects. A study supported by Shakti has identified actions that help the ESCO industry become more attractive to investors and realize its market potential. The findings of this study were extensively discussed at a national level workshop held recently in New Delhi.

The workshop highlighted three important themes to support the industry's growth - enhancing the credibility of ESCos, establishing robust Monitoring and Verification (M&V) protocols and increasing financing. These measures can lead to development of more viable ESCO projects.

Mr. Saurabh Kumar, Managing Director of the Energy Efficiency Services Limited (EESL) provided the inaugural address for the workshop. Participants included representatives from ESCOs, financial institutions, government, industry and civil society. This helped contribute to the development of a holistic perspective on how the ESCo industry could transform the energy efficiency market.

An important outcome of the workshop was that participants acknowledged the need to develop process and sector specific domain expertise amongst ESCOs, which would add value to the end customers, and enhance the market credibility and technical capacities of ESCos.

THE PROMISE OF SMART GRID ENABLED DEMAND SIDE MANAGEMENT SOLUTIONS

Smart Grid enabled Demand Side Management (DSM) solutions took centre stage at the recent meeting of the Utility CEO Forum on DSM. Smart Grid technologies can enable the collection of vast amounts of real-time data about consumer behaviour and the operation of the grid. This means that consumers gain enhanced information on their energy use patterns and can respond to price signals or other utility incentives, which in turn can boost DSM efforts.

The Forum focused on several aspects related to this theme: existing and new smart grid technologies, what systems they constitute and their key DSM functionalities and applications. Participants acknowledged the need for this convergence proposing the need for strong policy measures that would deploy such solutions on a larger scale. The discussion also focused on how Smart Grid technologies could support other national programs, such as the Smart Cities Mission and Digital India, to achieve the common goal of smart and sustainable development.

Mr. Anil Razdan, former Secretary of the Ministry of Power, chaired the Forum meeting. Mr. Gireesh B. Pradhan, Chairperson of the Central Electricity Regulatory Commission, Mr. P. Ravi Kumar, Additional Chief Secretary (Energy) of the Government of Karnataka and Mr. Prabhu N. Singh, Director of the National Smart Grid Mission attended the meeting and contributed to the discussion. Other participants included chairpersons of electricity regulatory commissions, senior officials of electricity utilities and a few companies offering smart solutions from across the country. Various case studies were shared to highlight the opportunities and challenges around Smart Grid systems that could integrate DSM and energy efficiency as central goals.

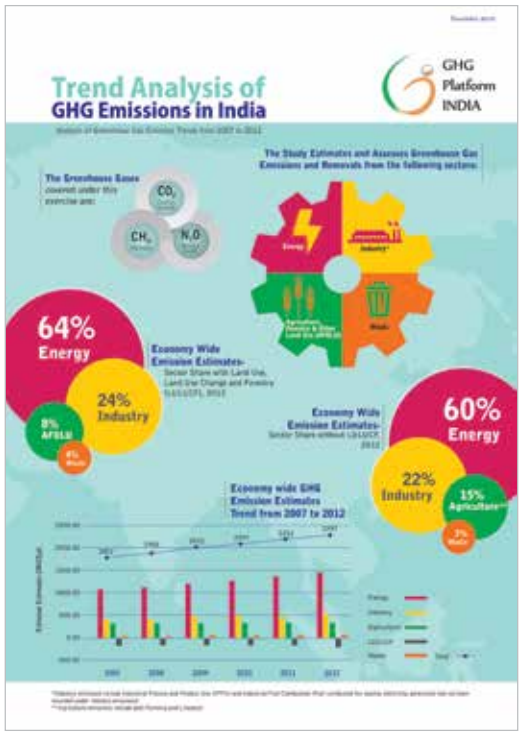
AUGUST 2016

A FIRST FOR INDIA: CSO PLATFORM FOR GHG ESTIMATION AND ANALYSIS

On 15th July 2016, Shakti in collaboration with eminent civil society partners, launched the GHG Platform-India, a first of its kind civil society initiative that provides an independent assessment of greenhouse gas (GHG) emissions for the country. The platform currently provides national-level data for the Energy, Industrial Processes, Waste, as well as Agriculture, Forestry and Other Land Use (AFOLU) sectors from 2007 to 2012.

The launch of the platform marks an important step in making GHG emissions data more transparent and easily accessible. The data can be used to track emissions, understand development trends and inform energy and climate action, a relevant need in context of the commitments made by India at COP 21 in Paris.

The complete data sets and methodology are publicly available on the platform website. In his opening address, Mr. Krishan Dhawan, CEO of Shakti, highlighted that "the transparency that the platform has been able to instil in preparing the emission estimates vastly increases their utility and robustness."



The platform is a partnership between the Council on Energy, Environment and Water (CEEW), Center for Study of Science, Technology and Policy (CSTEP), ICLEI Local Governments for Sustainability South Asia (ICLEI-SA), Shakti Sustainable Energy Foundation, Vasudha Foundation and World Resources Institute (WRI) India, along with a few sectoral experts. It draws from a technical collaboration with a similar civil society initiative in Brazil, the "System for Estimation of Emissions of GHG" (SEEG). The Platform is supported by Shakti and Oak Foundation.

AN INNOVATIVE PUBLIC TRANSPORT INFORMATION SYSTEM TO IMPROVE BUS SERVICES

The availability of up-to-date and accurate public transport information systems can help make bus services more reliable. It can also encourage passengers to use buses rather than private modes of transport. In India, where the mode share of buses has been declining over the last few years, public transport information systems can increase bus ridership, improve the quality of transportation and boost public confidence.

Therefore, Shakti has supported the development of an innovative passenger information system that uses IT-based solutions to collect and provide this information. This involved developing a methodology for collecting bus network data through flock sourcing techniques, and an android based mobile app called Routemaster, which was created specifically for this purpose.

The collected data was converted to the General Transit Feed Specification (GTFS) format to show data about bus operations. Passengers can use the web version of the app to get information on bus operations and print or view it online, as needed. This data collection methodology and the mobile app are being tested in the city of Hyderabad. We hope to create similar bus information systems in other cities.

NOW, A DSM CURRICULUM IN THE MAKING

Shakti is supporting the Indian Institute of Technology, Bombay (IIT-B) in its efforts towards becoming a resource centre on demand side management (DSM). An important component of this initiative is to help stakeholders develop and upgrade their knowledge around DSM. The immediate focus is on mainstreaming DSM as a formal course curriculum amongst engineering and management institutions across the country. This will enable an important stakeholder group – the academic community, including students– to benefit.

Drawing on its expertise, IIT-B has developed a curriculum on DSM that includes modules on technology options, load research, energy auditing and demand response, amongst others. This curriculum was extensively deliberated on at a two-day workshop in Mumbai last month, which was attended by faculty members from various universities and engineering institutes. Critical inputs were received to shape the structure and modules. Various case studies on successful DSM projects were presented by practitioners and utilities.

Six universities across the country are already contributing to the material preparation for this course. Participants agreed that such a curriculum would be extremely useful to bridge the knowledge gap in the DSM space and to equip professionals entering the market to design and implement DSM programmes.

SCALING UP NEW, BETTER INSTRUMENTS FOR GREEN FINANCE

In early 2016, the India Innovation Lab for Green Finance selected four promising instruments that could drive finance to renewable energy and green growth in India. Following this, the Lab moved the ideas forward for further design and refinement.

Among these ideas are an innovative peer-to-peer lending platform to raise debt finance for Small and Medium Enterprises (SMEs), and a facility to provide debt financing to rooftop solar PV projects using an aggregation model. Drawing on the expertise of the Lab Members, proponents, and external experts, who formed working groups for the four instruments, the Lab Secretariat has developed prototypes for each instrument.

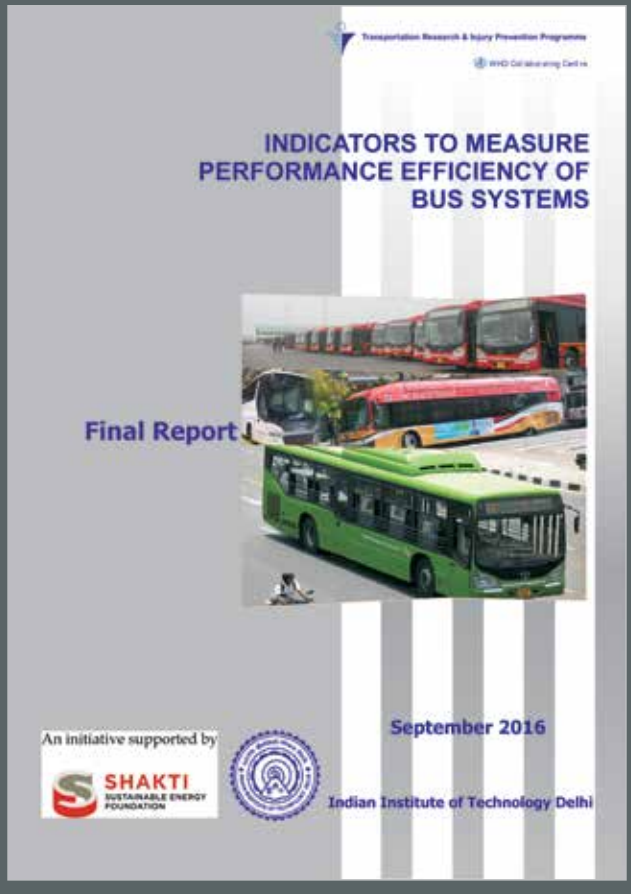
The four prototypes were discussed in detail at the recent Lab meeting in New Delhi, an important effort in making each instrument pilot-ready. Lab members and other participants offered important perspectives on the implementation plans, go-to-market strategies and impact. By developing and demonstrating the real-world effectiveness of these instruments, the Lab hopes to address investment barriers and scale up green finance. In her closing remarks at the meeting, Ms. Sharmila Chavaly, Joint Secretary at the Ministry of Finance, underscored the need to fast track such efforts.

IMPROVING BUS TRANSIT PERFORMANCE IN INDIA

Public bus services in India are operated and managed by State Road Transport Undertakings (STUs). In the process, a huge amount of data is generated on route planning, fares, fleet strength, volume of services and other important transport-related indicators. With the introduction of Intelligent Transport Systems (ITS), the quality and quantity of collected data has significantly increased. This data holds much potential to improve operations management and in turn, increase customer satisfaction as well.

Recognizing this, we supported a review of the existing data maintenance practices and performance measurement indicators of STUs to see where improvements could be made. Drawing on the findings of the review, a revised set of indicators for performance measurement and data reporting have been developed. In addition to this, recommendations have been proposed for using newer and updated technology for data collection.

When adopted, the recommendations can lead to an increase in the share of bus transport, which in turn can lessen pollution and congestion and reduce the demand for energy. The recommendations have received positive feedback from the Association of State Road Transport Undertakings, the nodal agency for all STUs in the country.



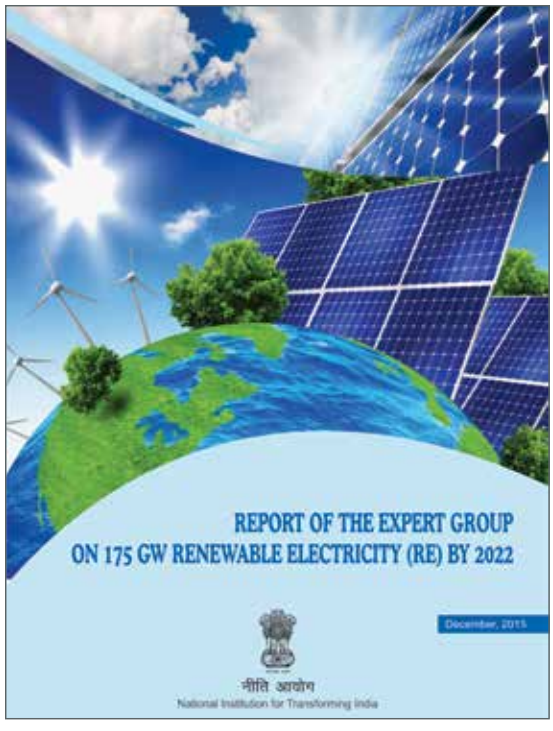
JULY 2016

SHAKTI CONTRIBUTES TO ROADMAP TO ACHIEVE THE AMBITIOUS TARGET OF 175 GW RE BY 2022

In 2015, the NITI Aayog formed an Expert Group to assess the financing support required to meet the target of 175 GW of renewable energy by 2022. Shakti was part of this group consisting of two other civil society organizations. The final report prepared by the group was recently released in New Delhi and has contributed to the discourse around renewable energy targets for India.

One of the key highlights of the report is that it assesses the extent of the financial support that may be required to meet the target of 175 GW of RE by 2022. Taking this forward, the report analyses the various financial and policy mechanisms to cover the incremental cost of renewable energy until grid parity is achieved. It also explores the financing requirements and potential business models to achieve 40 GW of solar by 2022.

The report was released in the presence of Mr. Arvind Panagariya, Vice Chairman of the NITI Aayog, Mr Amitabh Kant, CEO of the NITI Aayog and Mr. Ratan Watal, Principle Adviser (social sector) to the NITI Aayog, representatives from the Ministry of New and Renewable Energy and other stakeholders.



DSM IMPLEMENTATION MAKES HEADWAY IN UTTAR PRADESH

Shakti is working with multiple distribution utilities and regulatory agencies across various states to strengthen the demand side management (DSM) ecosystem in India. One of these states is Uttar Pradesh where we are assisting the Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA), the nodal agency for energy efficiency and renewable energy. Under the aegis of the Uttar Pradesh Electricity Regulatory Commission (UPERC), we recently hosted a workshop with UPNEDA on planning and designing DSM projects.

This workshop saw participation from important stakeholders including Mr. Desh Deepak Verma, Chairman of the UPERC, Mr. Sanjay Agarwal, Principal Secretary (Energy), Mr. Partha Sarthi Sen Sharma, Secretary to UP's Chief Minister and Ms. Sangeeta Singh, Director of the UPNEDA. It was well attended by representatives from distribution companies, municipal corporations, UPNEDA, UPERC, industry and consumer association groups.

Discussions revolved around the lack of capacity and awareness for DSM implementation and the increasing need for bankable business models. Experience sharing and group exercises formed an important component of the workshop to help participants plan DSM programmes. The milestone of one crore LED bulbs distributed under the Unnat Jyoti by Affordable LED's for All (UJALA) programme was highlighted as a stepping stone to further DSM-based interventions in the state.

A GREATER VISION FOR INDIA'S WIND SECTOR: 200 GW BY 2032

On the occasion of Global Wind Day, Shakti along with the Indian Wind Turbine Manufacturers Association and the Indian Wind Energy Association organised a Wind Discussion Forum in New Delhi. The highlight of the event was the launch of the Wind Vision 2032 report for India that has been prepared under the aegis of the Forum.

Wind energy is expected to play an important role in meeting India's energy security ambitions. This report estimates a target for wind sector that is ambitious and visionary, yet achievable with coordinated efforts: 200 GW of wind capacity by 2032. It lays out an action plan to reach this target which includes steps that need to be taken in the areas of grid integration, financing, and policy and regulatory support, amongst other relevant issues.

The meeting brought together policy makers, representatives from government agencies, think tanks, investors and project developers with an interest in wind energy. It was chaired by Dr. Pramod Deo, Former Chairperson, Central Electricity Regulatory Commission. Ms. Varsha Joshi, Joint Secretary, Ministry of New and Renewable Energy, was the Chief Guest at the event.

MAY 2016

INDIA'S OFF-GRID SECTOR GETS FOCUS AT THE GLOBAL SANKALP SUMMIT

Shakti has been investing in a series of initiatives to promote off-grid energy access in India. We are currently working in collaboration with Intellecap to offer technical assistance and capacity building support to social enterprises and financial institutions - key stakeholders in the off-grid clean energy sector.

With the increased thrust on rural electrification, the case for off-grid energy in India is becoming stronger. But several challenges need to be addressed for social enterprises and financial institutions to realize their full potential. What are the issues faced by off-grid energy enterprises in accessing funding, and financing institutions in disbursing it? What sort of alternative funding mechanisms are available? How can financial institutions assess the performance of enterprises and guide investments?

As a part of our initiative, these and other important themes were discussed at a workshop that was held on the side-lines of the Global Sankalp Summit 2016. Key representatives from the sector – off grid enterprises, ESCOs, investors, banks and various industry bodies – helped supply some of the answers to these questions. Amongst other perspectives, the need for increased capacity building of off-grid enterprises was underscored, which in turn would enable the inflow of investments in the sector.

NEW REPORT: BEST PRACTICES FOR TRAFFIC SIGNAL OPERATIONS IN INDIA

Traffic signals are an important component of a city's transportation system. They have a significant impact on congestion and fuel consumption of vehicles as well as the safety of pedestrians and cyclists crossing the intersections. Around 15-20% of the total fuel used by vehicles in cities is spent while idling at traffic intersections, making them hotspots of poor air quality.

Clearly there is considerable scope to improve the operation of traffic signals, which in turn can lead to better and more sustainable traffic management. To contribute to this effort, Shakti has supported the development of the first-of-its-kind best practice guidelines for traffic signal operations in India. These guidelines are useful for efficiently timing traffic signals at intersection to reduce delays, vehicle idling and associated emissions. They are intended to be of use particularly to personnel involved in the management of traffic in cities particularly the traffic police.

The guidelines were recently shared with the Hyderabad Traffic Police and received positive feedback. They can be used as a starting point for improving traffic signal systems in Indian conditions and as a capacity building tool for traffic police in other cities.

MINI GRIDS TO GET A NATIONAL FRAMEWORK FOR THEIR DEVELOPMENT

The Ministry of New and Renewable Energy is in the process of drafting a national guideline framework for the development of mini grids, which is aimed at helping the country meet its growing demand for energy. Shakti, the Centre for Science and Environment and the Clean Energy Access Network are part of a committee constituted by the MNRE for this purpose.

As a part of this effort, the committee organized a stakeholder workshop at the Shakti office to discuss some practical and feasible measures that could be included under the proposed framework. It is important now to build a strong ecosystem for the development of mini grids which can minimize the risk associated with investments and mobilize capital.

Many pertinent issues came up for discussion at the workshop including the urgency to mainstream mini grids, operational frameworks, infrastructure requirements, project development procedures for ESCOs, and access to capital. The outcomes of this consultation have been conveyed to the MNRE. We are now working closely with the other committee members to finalize the draft framework.

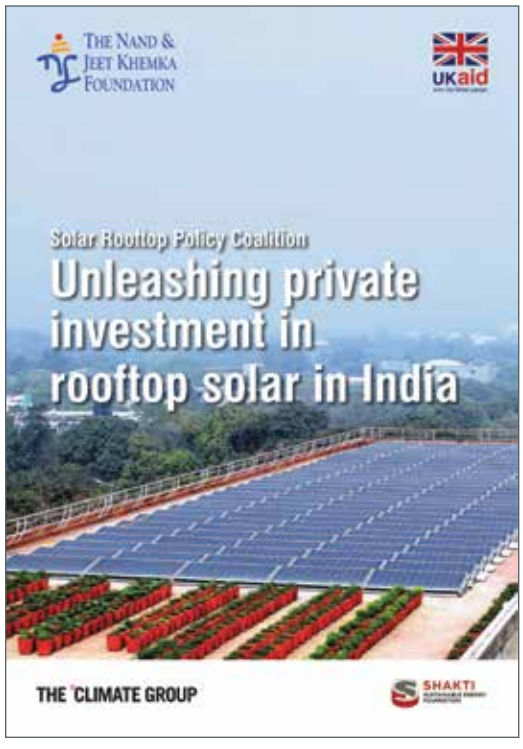
APRIL 2016

REPORT BY SOLAR ROOFTOP POLICY COALITION: UNLEASHING PRIVATE INVESTMENT IN ROOFTOP SOLAR

The Solar Rooftop Policy Coalition released its report titled Unleashing Private Investment in Rooftop Solar in India, which analyses the rooftop solar sector and makes recommendations to enable India meet its target of 40 GW rooftop solar capacity by 2022. Specifically, the report recommends measures that could facilitate progress towards this target without any additional subsidies. These are compelling findings given the role rooftop solar is required to play in meeting India's renewable energy targets and energy security.

The coalition consists of the Nand and Jeet Khemka Foundation, The UK Department for International Development, The Climate Group and Shakti Sustainable Energy Foundation. It was established in 2015 to support the development and implementation of policies that can scale up private investment in rooftop solar.

This report is a collaborative effort with the coalition bringing together contributions from more than 20 partners and also working in close consultation with the Ministry of New and Renewable Energy. It is anticipated that its findings will inform and support all the stakeholders involved in setting policy and regulation for this sector.



UP'S NEW MINI GRID POLICY TO BOOST POWER SUPPLY IN RURAL AREAS

The recent UP Mini-Grid Conclave comes against the backdrop of the announcement of the state's new mini-grid policy, the first in India. The conclave was hosted by the Rockefeller Foundation as part of its Smart Power for Rural Development (SPRD) initiative that plans to electrify 1,000 villages in Uttar Pradesh and Bihar over the next three years. Shakti is working closely with the Rockefeller Foundation around the SPRD initiative, providing inputs for policy and regulatory requirements for mini-grid deployment.

Addressing the conclave, UP Chief Minister, Shri Akhilesh Yadav said that the UP government plans to continue its efforts in providing electricity in rural areas to improve the quality of lives and uplift the economy. It is expected that the mini grid policy will encourage future investments in the sector and address the challenge of rural energy access in the state.

The SPRD initiative was discussed in extensive detail by Mr. AshvinDayal, Associate Vice-President and Managing Director of Asia. In addition, Mr. Krishan Dhawan, CEO of Shakti moderated a session on the policy and regulatory actions that are required to facilitate the investment and growth of mini grids in the state.

KEY CASE STUDIES INFORM THE EE AND DSM CONVERSATION AT THE FIRST REGIONAL UTILITY CEO FORUM MEET

The 'Utility CEO Forum on DSM' hosted its first regional meeting in early March 2016 in Mumbai bringing together several stakeholders to showcase nation-wide success stories on energy efficiency and DSM interventions. The Forum has been regularly convening since 2013 to identify concrete opportunities that can fast track DSM in India. Building on these efforts, the regional meeting marks an important milestone, particularly as utilities deal with the challenge of addressing the rising electricity demand.

A key objective of the meeting was to highlight select efficiency and DSM case studies in street lighting, domestic appliances, agriculture pumping and tri-generation markets. These case studies revealed tremendous potential for energy savings, and the resultant improved financial health of utilities along with several other indirect benefits to society. The keynote address was provided by Shri B.P Pandey, Additional Secretary, Ministry of Power, who highlighted the importance of energy efficiency in meeting national electrification and energy security targets.

Various stakeholder perspectives informed the discussion particularly since representatives from state and central governments, utilities, technology suppliers, civil society organizations and experts attended the meeting.

INDIA-U.S. COOPERATION ON CLIMATE CHANGE AND ENERGY

On March 9-11, 2016, the US-India Track II Dialogue on Climate Change and Energy held its sixth meeting in Washington DC, bringing together an array of prominent US and India thought leaders to explore opportunities to enhance our partnership on climate change and energy. Shakti has been supporting the participation of the Indian side since the inception of the Dialogue in 2010.

The discussion reinforced the rapidly evolving national energy and climate position of both countries, particularly in light of the Paris Agreement. Mr. Jamshyd Godrej (Chairman, Godrej and Boyce Manufacturing Company) and Ms. Carol Browner (Distinguished Senior Fellow, Center for American Progress) co-chaired the discussion which explored future areas of collaboration in the areas of climate change, energy policy, mobilizing investment, technology innovation and air quality.

Several eminent Indian and American civil society members have engaged with the dialogue process as greater bilateral consensus has emerged over the past few years. A prior initiative of the Dialogue for building climate resilience in both countries has matured in to an official bilateral partnership between India and the US.

HARNESSING THE POTENTIAL OF ESCOS

For the past three years, Shakti has been working with the Alliance for an Energy Efficient Economy (AEEE) to scale up the ESCO sector in India. This project held a national workshop that brought together key stakeholders to promote a deeper understanding of ESCO-based project design and implementation.

As a step in this direction, Shakti and AEEE launched a virtual knowledge base, AESCoNet, to disseminate information about market opportunities and appropriate financial models to drive ESCO growth. Mr. Krishan Dhawan, CEO of Shakti provided the opening remarks at the workshop stressing on the need for a more favourable environment for the ESCO market and the mobilization of investments.

The workshop brought together financial institutions, ESCO companies, bilateral and multilateral agencies and regulators to seek inputs on accelerating the ESCO market. Unlocking its potential can lead to immense efficiency gains for the country.

MARCH 2016

FOUR CITIES SUPPORTED BY SHAKTI TO DEVELOP THEIR SMART CITY PROPOSALS MAKE IT TO TOP 20 LIST

A new chapter in India's urban history has begun with the Smart Cities Mission taking material shape. The Government recently released the list of 20 Smart Cities out of the 98 cities shortlisted for the Mission, selected on the robustness of their Smart City Proposals.

We are pleased that four cities supported by Shakti to develop their Smart City Proposals – Visakhapatnam, Kakinada, Jaipur and Udaipur – made it to this list. We engaged with ICLEI- SA to provide technical assistance to these cities with a specific focus on integrating sustainable mobility and building energy efficiency considerations into their proposals.

Our support enabled the inclusion of critical policy and project level action plans in the proposal including integrated multi-modal transport solutions, car restraint measures and green buildings in all four cities. The importance of these urban centres as drivers of India's growth story cannot be underestimated, given that all 20 will be the first to get funds worth Rs 100 crores each year over the next five years, under the Smart City Mission.

INDIA TO NOTIFY STAR LABELLING FOR PASSENGER CARS

Efforts by Shakti supported partners helped lead to a draft notification by the government to start a labelling program for passenger cars based on their fuel efficiency. This is a significant step forward to put India on a low-carbon growth pathway, setting an important precedent for similar actions around various vehicle types.

The design of this programme is based on technical assistance and research conducted by PricewaterhouseCoopers (PwC) and supported by Shakti. When the car labels are displayed, consumers will have valuable information on fuel economy, energy use, fuel costs, and environmental impact, which will enable more informed decision making, at the time of purchasing a new car. The label will also allow comparison with other car models in the same weight class.

Our contribution to the labelling programme follows through on our previous work to support the notification of fuel efficiency standards for passenger cars in 2015, which will be implemented by 2017. Going forward, we will focus on supporting the implementation of the labelling programme, while also pushing for environmentally sustainable transport policies.

BIHAR ISSUES NOTIFICATION FOR CLEANER BRICK TECHNOLOGY

2016 marks an important milestone for Shakti's multi-year effort to promote the switch to cleaner and more energy efficient brick kiln technologies. The Bihar State Pollution Control Board (BSPCB) issued an order for brick kilns in Patna and neighbouring districts to upgrade to cleaner technologies after the current brick making season. The order also prevents the setting up of new kilns unless they use cleaner technology and requires existing kilns in the rest of the state to upgrade by mid-2017.

The BSPCB notification is an important policy development – a first for a state pollution control board to ask brick makers to move away from traditionally used technologies. Several Shakti-supported initiatives undertaken by our partners, Greentech Knowledge Solutions Pvt. Ltd., Development Alternatives and Urban Emissions, have contributed to this notification by providing the technical evidence that helped lay the foundation for this measure.

Our earlier efforts led to the establishment of an Interdepartmental Task Force for Modernisation of the Brick Industry. Building on this, we continued to promote cleaner bricking making and alternative building materials. We also supported efforts to highlight the contribution of brick kilns to air pollution in Patna, and proposed solutions for reducing the resultant emissions. With the notification now announced, we will work with various stakeholders to support its implementation.

The India Lab selects four innovative ideas to drive green finance. The India Innovation Lab for Green Finance has selected four new, innovative ideas for green finance instruments to move forward for further design and development. Members of the Lab, consisting of experts from government, finance, infrastructure and renewable energy met in New Delhi to vote on four ideas with the most potential to scale up capital for green infrastructure in India.

The open 'call for ideas' from November 2015 to January 2016 resulted in over 60 promising ideas for facilitating financial flows in to large-scale renewables, energy efficiency and related investments. In selecting the four most promising ideas, Lab Members focused on ideas that could be replicated and scaled up quickly, by driving more private finance and also by leveraging public finance.

Mr. Tarun Kapoor, Joint Secretary of the Ministry of New and Renewable Energy, announced the winning ideas and lauded the progress made by the Lab since its launch in November 2015. The ideas will now undergo further analysis and refinement to assess their potential for implementation.

FEBRUARY 2016

SCALING UP FINANCE FOR GREEN INFRASTRUCTURE – INDIA INNOVATION LAB

The India Innovation Lab for Green Finance was launched last year to provide solutions to the financing challenges to investment in green infrastructure. The Lab is hosted and funded by Shakti with additional financial support from the UK Government and the David and Lucile Packard Foundation.

The Lab organized an event in New Delhi, attended by key stakeholders from government, the financial services industry and civil society organizations, who deliberated on how the flow of finance could be scaled up for investment in infrastructure to support cleaner economic growth.

Mr. Krishan Dhawan, CEO of Shakti, provided an overview of Shakti's vision on green finance and how crowdsourcing innovative financing ideas would be key to the growth of green infrastructure. The discussion was informed by valuable inputs from Mr. Tarun Kapoor, Joint Secretary, MNRE and Dr. Gireesh Shrimali, Director of Climate Policy Initiative, India (the India Lab Secretariat).

The Lab has already received over 60 proposals in response to its call for funding ideas than can unlock the private investment needed to meet India's clean growth targets. Shortlisted ideas will be taken forward for in-depth analysis and to develop pilot-ready instruments.

THE FIRST EDITION OF PAT PULSE IS OUT

Low-cost retrofit projects dominated the first phase of the Perform, Achieve and Trade (PAT) scheme, with almost 65% of the projects falling under this category. In addition, more than 60% of the projects implemented under this scheme were relevant across sectors (and not sector specific), thus presenting strong potential for cross-sectoral learning.

These were the findings of the recently released first edition of PAT Pulse, a briefing paper series on the PAT scheme, developed in consultation with a broad group of stakeholders. PAT Pulse has been produced by Sustainability Outlook and the Alliance for Energy Efficient Economy in collaboration with Shakti. It aims to provide an evidence-based assessment of stakeholder views to enable information sharing and to inform the second phase of the scheme.

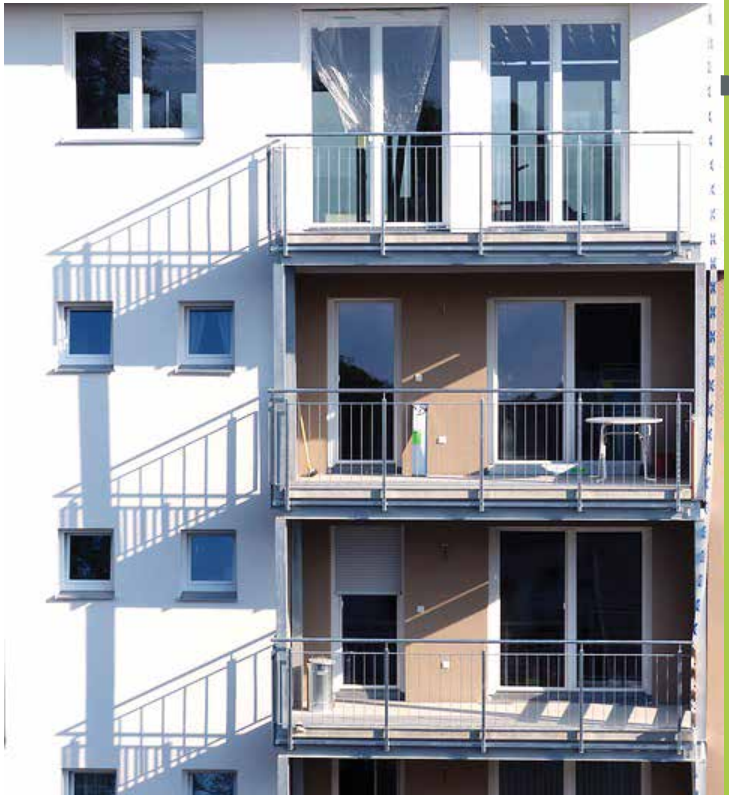
This edition also provides policy updates regarding proposed amendments to the PAT mechanism as well as a timeline for including more designated consumers under the scheme's ambit. Further, it showcases innovative solutions that are expected to improve energy efficiency in industries.

STAKEHOLDER WORKSHOP ON ECBC IMPLEMENTATION ROADMAP IN MADHYA PRADESH

Shakti has been supporting the Madhya Pradesh Urja Vikas Nigam (MPUVN) to develop a roadmap for the implementation of the Energy Conservation Building Code (ECBC) in the state. The Code aims to encourage energy efficiency in the building sector, and its nationwide implementation is expected to lead to substantial energy savings. The final workshop for discussing the draft roadmap and the next steps for Code implementation was organised in Bhopal by Shakti in partnership with the European Union.

The roadmap has been prepared by Urban Management Centre (UMC) with technical inputs from the Centre for Environmental Planning and Technology University (Gujarat) in collaboration with various stakeholders.

Mr. Sanjay Seth, Energy Economist, Bureau of Energy Efficiency (BEE) set the context for the workshop. Experts deliberated extensively on the roadmap further informing its development. The setting up ECBC cells with support from the EU – India Technical Cooperation Energy Programme was also discussed. The cells are expected to further provide technical and capacity building support to aid Code implementation in the State.



SECOND BRIEFING PAPER LAUNCHED UNDER THE INDIA CLIMATE REPORT SERIES

The climate change discourse continues post-COP 21 as India's attention turns to domestic actions to meet its INDC and Paris Agreement commitments. Several policy initiatives have been launched that, if implemented effectively, will enable the country to make a noteworthy contribution to the global fight against climate change.

To help inform the domestic actions on climate change, Shakti launched a briefing paper series last year to provide an up-to-date account and analysis of India's efforts on this front. The goal of this series is to promote informed discussion and debate on important developments that are likely to shape climate policy in India.

Shakti released the second briefing paper under this series. Drawing on expert analysis and insight, this post-COP 21 paper covers three main themes: India's Intended Nationally Determined Contribution (INDC), recent climate-related developments and climate finance. Other important policy developments covered include the notification of revised emission standards for coal-based thermal power plants and adoption of an accelerated timeline for achieving Bharat Stage VI emission standards for vehicles.

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