



BREAKING THROUGH

YEAR-IN-REVIEW | 2015-16



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“CEEW’s ACCESS study provides a holistic approach to analyse the deep distress in rural India due to poor electricity and cooking energy access and could be the handbook in all future discussion on this topic.”

SHRI PIYUSH GOYAL

Hon’ble Minister of State (IC) for
Power, Coal, New and Renewable Energy, and Mines



1st in South Asia (third year running) and 15th Globally among ‘Top Think Tanks with Annual Operating Budgets of Less Than \$5 Million USD’ as per the 2015 Global Go To Think Tank Index.



1st in South Asia (third year running) for ‘Best Institutional Collaboration’ involving two or more think tanks as per the 2015 Global Go To Think Tank Index.



2nd in India and 20th globally out of 240 think tanks as per the ICCG Climate Think Tank’s standardised rankings.

Download our report: www.ceew.in/annualreport

Leadership Perspectives



Six years ago, CEEW was envisioned as an independent research organisation that would examine the world's most pressing climate, energy and resource concerns through an integrated approach and international outlook. I congratulate Dr Arunabha Ghosh and his entire team for fulfilling this dream and for raising the bar with their world-class research outputs, convening power and policy engagement, year on year.

In 2015 the historic Paris Agreement was announced to combat climate change and to accelerate the actions and investments needed for a sustainable low-carbon future. In the run up to and during the crucial climate negotiations, CEEW's research on climate impacts, climate risks, energy access, global carbon space, HFCs, technology partnerships, and India's adaptation gap broke new grounds and aided key parties in India and abroad to dream of a better planet.

Over the last year, CEEW also shone through as a trusted partner of policymakers, collaborating with and informing key government institutions such as the Ministry of Environment, Forest and Climate Change, Ministry of New and Renewable Energy, Ministry of External Affairs, Ministry of Petroleum and Natural Gas, Ministry of Mines, Ministry of Railways, Department of Science and Technology, Ministry of Health and Family Welfare, and many others.

I am also proud that in 2016, CEEW was ranked the best in South Asia in two categories three years running (Global Go To Think Tank Index); and among the top 100 out of 6846 think-tanks in nine categories. This included CEEW being featured on a prestigious list of 'Best Managed Think Tanks' and 'Best Independent Think Tanks'. In 2016, CEEW was also ranked 2nd in India, 4th outside Europe and North America, and 20th globally out of 240 think tanks as per the ICCG Climate Think Tank's standardised rankings.

CEEW's small team of researchers is also growing in line with the institution's growth as a leading think-tank. I personally welcome the new recruits to this special institution and its team of creative innovators, whose commitment to creating a better world around them is remarkable.

I also express my gratitude to all the partners, whose constant cooperation has played a pivotal role in CEEW's progress.



JAMSHYD N. GODREJ
Chairperson, CEEW;
Chairman, Godrej and Boyce
Manufacturing Company Pvt. Ltd.

Breaking Through

In six years, CEEW has built up a reputation of quality research, impartial policy engagement and extensive public outreach. It is no mean achievement to have engaged in more than 130 research projects, published 70 peer-reviewed books, reports and papers (four books were published in the past year alone!), been tapped as a resource by official agencies (governments and international organisations within and outside India) at least 260 times, or organised 144 seminars, workshops and conferences. It is no mean achievement to be listed as South Asia's leading think-tank in multiple categories three years in a row, or among the world's 20 best climate think-tanks. Yet, these indicators and rankings do not fully capture the extent of our work and impact.



2015 was a breakthrough year in many respects. For international cooperation, the announcement of the Sustainable Development Goals followed by the historic Paris Agreement on climate change underscored two imperatives: the planetary boundaries are being breached by our actions; and *our collective action, as humanity, is the only way to protect our and the planet's future*. In 2015, India also broke the perceptions of being on the defensive in international negotiations and broke its own psychological shackles; *India came forward as a climate leader*. India demonstrated that, compared to many richer countries, its actions spoke louder than its words, that its ambitions for a cleaner future were disproportionately greater than others, and that India was ready to lead the world through new initiatives, such as the International Solar Alliance.

Having supported these international processes – along with our deep engagement on the ground – 2015 was also the year for CEEW to break through. It is no longer a “start up”. It has a phenomenally qualified and committed team. It has broken boundaries in academic research and new methodologies, collected vast quantities of primary data, responded in real time to requests from governments, yet maintained its independence throughout. *Without our independence, we are nothing. With it, we have nothing to fear.*

As we begin our seventh year of operations, and celebrate past achievements, it is more important to be cognisant of the tasks yet to be completed – or begun. As long as we keep working to solve problems, often *privileging equity over equality*, I am sure we will stay true to our course.

Two things will matter: an awareness of our ignorance; and a deep sense of one's integrity. The more innovative we become, the more data we collect, the more people we engage, or the more events we organise – there is a risk of beginning to believe that we know it all. This pathology afflicts individuals and institutions. The only way to avoid this delusion is to get proximate to the issues and the people. Not because we will learn more; rather because we will learn how little we know. An awareness of our individual and collective ignorance is the first step to gaining incremental wisdom. It's a lifelong effort.

But not knowing does not mean not seeking. I believe CEEW is a “seeking” organisation. It seeks better information, broader viewpoints and deeper impact. In seeking, we think and we act. But we do it within the constraints of the social and political systems of whichever village, town, city, state or country each of our projects targets. This requires deep self-belief in our work, our character and our integrity. There will be many who will question our motives. In the end, only our actions will matter.

Fight ignorance. Stay true. And raise the bar.

A handwritten signature in black ink, appearing to read 'Arunabha Ghosh', with a stylized flourish at the end.

ARUNABHA GHOSH
Chief Executive Officer,
CEEW



Events & Outreach



Mr Laurent Fabius, French Minister of International Affairs and International Development, at CEEW - Embassy of France in India's roundtable on energy storage



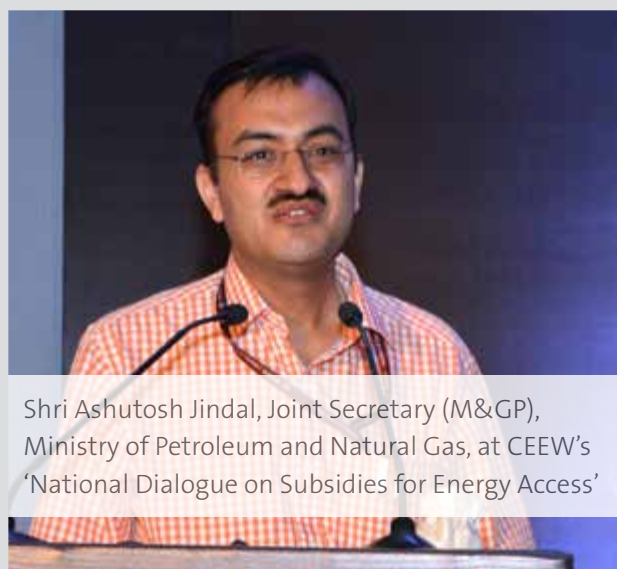
H.E. Tomasz Kozłowski, Ambassador of the EU to India, at the India-EU discussion on COP21 co-hosted by CEEW



Shri Balvinder Kumar, Secretary, Ministry of Mines, released CEEW's report on critical mineral resources



Shri Ravi Shankar Prasad, Joint Secretary, MoEF&CC, at the 'India Energy Access Summit' co-hosted by CEEW



Shri Ashutosh Jindal, Joint Secretary (M&GP), Ministry of Petroleum and Natural Gas, at CEEW's 'National Dialogue on Subsidies for Energy Access'



Shri Dharmendra Pradhan, Hon'ble Minister of State (IC) for Petroleum and Natural Gas, at CEEW's 'National Dialogue on Subsidies for Energy Access'



Shri Suresh Prabhu, Hon'ble Union Minister for Railways, at the launch of the book 'Energizing India', a joint CEEW - Shell - TERI effort



CEEW's Dr Arunabha Ghosh, Dr Vaibhav Chaturvedi and Ms Kanika Chawla at the COP21 climate negotiations held in Paris



Prof Sudipto Mundle, Emeritus Professor, National Institute of Public Finance and Policy, at CEEW's 'National Dialogue on Subsidies for Energy Access'



Shri N K Singh, Former Member of Parliament (Rajya Sabha), at the launch of the book 'Energizing India'



ENERGY ACCESS



National Dialogue

Subsidies for Energy Access

Equity, Efficiency and Effectiveness



Shri Dharmendra Pradhan released two CEEW reports on energy subsidies in May 2016

Arunabha Ghosh

Dharmendra Pradhan

Jamshyd Godrej

Nearly 300 million Indians remain without access to electricity and close to 800 million rely on traditional biomass for cooking. Access to continuous and reliable electricity services and clean forms of cooking energy could significantly improve the quality of life of millions of Indians and transform rural economies. Globally, 1.2 billion are electricity deprived and 2.7 billion do not have access to modern cooking energy sources.

CEEW's energy access team has worked closely with the Ministry of Petroleum and Natural Gas, the Ministry of New and Renewable Energy, the Indian Council of Medical Research, Columbia University, and the Indian Institute of Technology Madras to impact policies and programmes across a broad range of energy access issues. CEEW has a strong emphasis on using primary data for its energy access work.

CEEW's current projects on energy access include: evaluation of recent policies and programmes, such as the Prime Minister's Ujjwala Yojana and the Direct Benefit Transfer for LPG (DBTL) Scheme; evaluation of decentralised approaches to electrification; providing solar-based solutions for improving healthcare systems in rural India; and promoting sustainable deployment of solar-based irrigation. In 2015, the Minister for Power, Coal and New and Renewable Energy released CEEW's landmark ACCESS report based on India's largest energy access survey.

In 2016, the Minister for Petroleum and Natural Gas released CEEW's independent evaluation of the DBTL scheme. In the past, CEEW also played a leading role in setting up the Clean Energy Access Network (CLEAN) of hundreds of decentralised clean energy firms.

CEEW'S ENERGY ACCESS TEAM



Abhishek Jain



Aditya Ramji



Karthik Ganesan



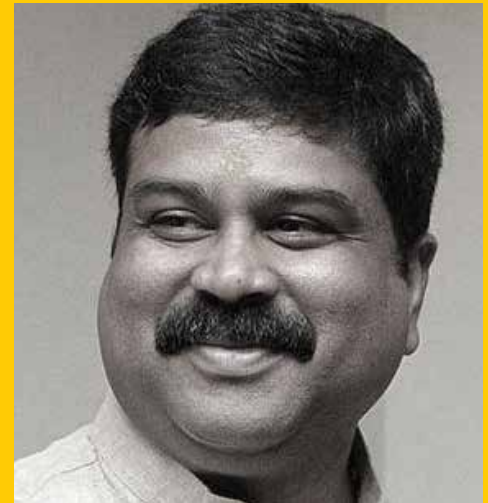
Hem Dholakia



Sunil Mani



Sarah Ashraf



“My Ministry had requested CEEW to independently and objectively analyse our energy subsidy reform measures and I am thankful to them for their analysis. CEEW’s research would help us improve our government’s schemes.”

SHRI DHARMENDRA PRADHAN

Hon’ble Minister of State (IC) for Petroleum and Natural Gas





Decentralised DC Approaches to Electrification

CEEW is undertaking a programme evaluation of a large scale pilot being implemented by IIT Madras, where solar DC home systems are being deployed at 4000 far flung households in some of the remotest parts of the Thar desert in Western Rajasthan.



Energy Subsidy Reforms

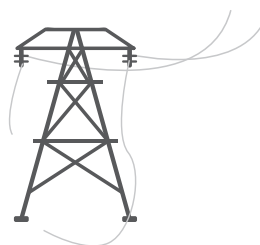
CEEW recently published studies, supported by the International Institute for Sustainable Development (IISD), on reforming kerosene subsidies and on evaluating the performance of the Direct Benefit Transfer Scheme for LPG (DBTL). The studies were released by the Petroleum and Natural Gas Minister at CEEW-IISD's National Dialogue on 'Subsidies for Energy Access' in May 2016.



Shri Narendra Taneja, National Convenor (Energy Cell), Bharatiya Janata Party, was a key speaker for the session on rationalising kerosene subsidies at CEEW-IISD's 'National Dialogue on Energy Subsidies'.



50% rural households receive electricity for less than 12 hours a day



46% rural households have an electricity connection, yet face severe issues in terms of quality and duration of supply



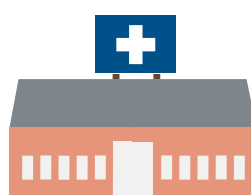
95% rural households across India's six most energy-deprived states continue to use traditional fuels for cooking



6 km median distance that someone from a rural household has to travel (one way) to get their LPG cylinder



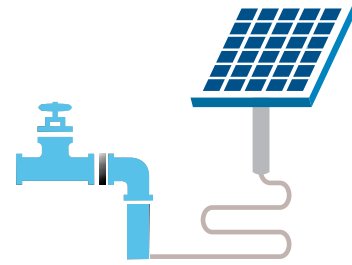
78% rural households prefer subsidy on solar lanterns in lieu of subsidy on kerosene



35 million citizens in rural India rely on un-electrified PHCs for primary health services

Solar Pumps for Sustainable Agriculture

CEEW research aims to strengthen policies for sustainable deployment of solar powered irrigation systems by focusing on identification of priority areas, streamlining of regulations, designing financial incentives, and facilitating innovative business models.



5.4 million solar pumps (~20 GW) in 2022, would account for only 15% of total number of irrigation pumps in the country



Solar for Powering Health and Education

CEEW, in collaboration with Oxfam India, published a study assessing the current state of electricity access in primary health centres and rural primary schools, two key institutions responsible for the last mile delivery of essential community services in rural India.

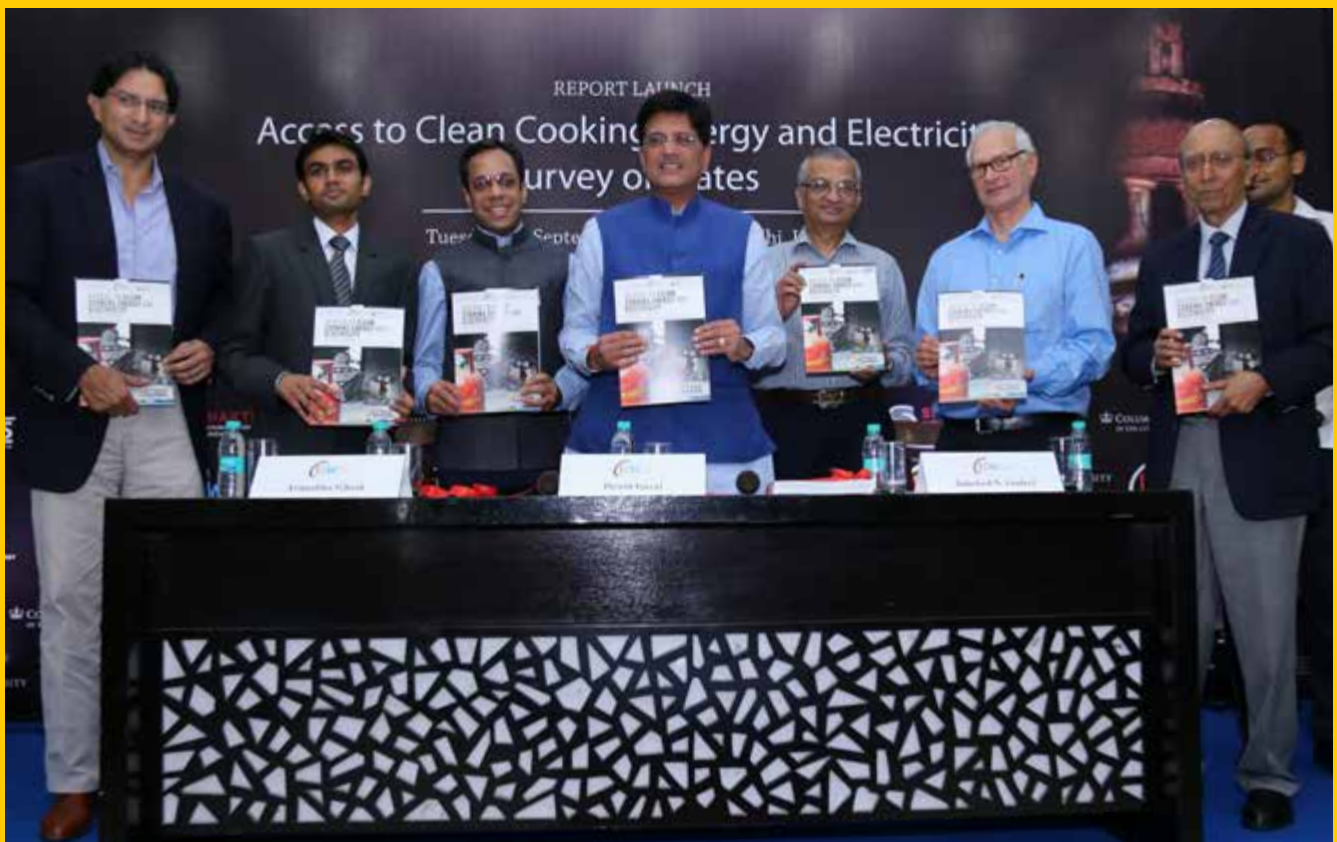


50% of rural primary schools in India are un-electrified

“The collaboration with CEEW will bring together synergies between the objective of ‘time to care’ as mandated in the National Health Mission (NHM) and clean energy as outlined under the National Solar Mission (NSM).”

DR SOUMYA SWAMINATHAN
Director General, Indian Council on Medical Research

Access to Clean Cooking Energy and Electricity – Survey of States (ACCESS)



8500+
households

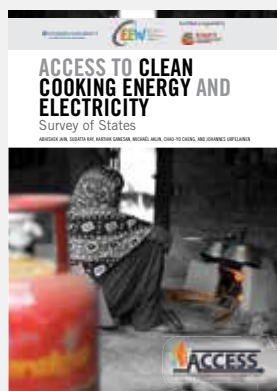
714
villages

6
states

2.5
million data
points

The ACCESS study is based on India's largest survey on energy access covering households across Bihar, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh and West Bengal. The study was conducted in collaboration with Columbia University and with the support of the Shakti Sustainable Energy Foundation.

CEEW'S KEY ENERGY ACCESS PUBLICATIONS



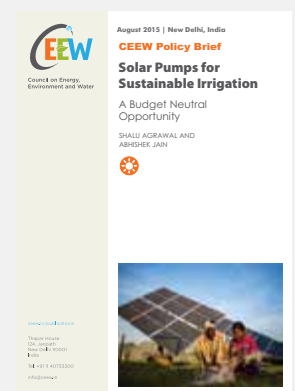
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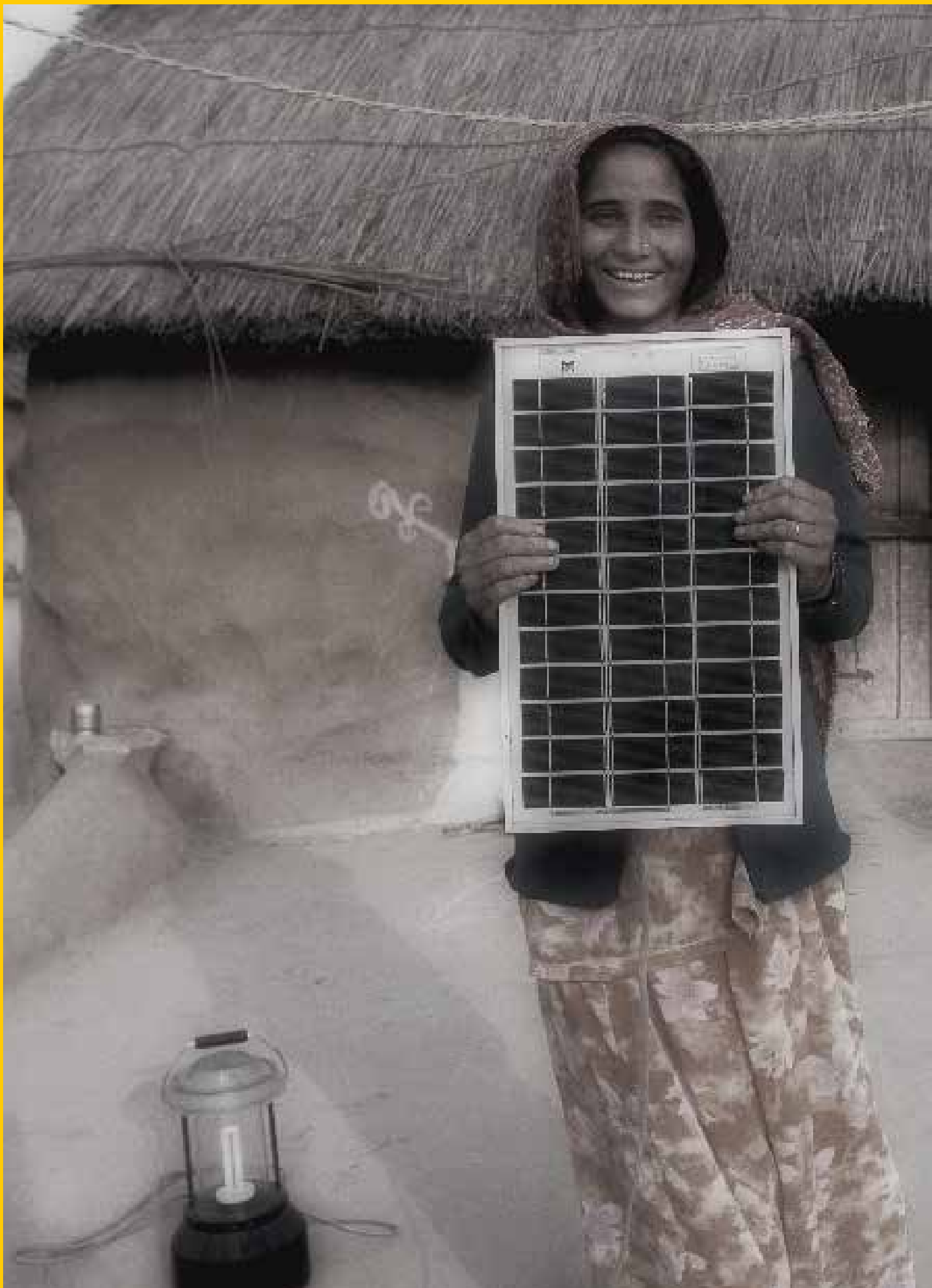
<http://bit.ly/1NUjtya>



<http://bit.ly/2clTXB9>



<http://bit.ly/2csqjxG>



RENEWABLES

The image features a traditional building with a thick, dark thatched roof. The wall is split into two sections: a bright white section on the left and a dark grey section on the right. A small, decorative metal object is mounted on the white wall. The foreground is a light-colored, textured surface, possibly a dirt or stone path. The entire scene is set against a solid yellow background.



Indian Prime Minister Shri Narendra Modi and French President Francois Hollande jointly launched the 'International Solar Alliance' at COP21

The time for transitioning to an energy future, with a significant component of renewable energy, has come. The political support being extended to this sector globally is unprecedented, including India's ambitious renewable energy target of installing 175 GW capacity by 2022.

CEEW's renewables team works closely with India's Ministry of New and Renewable Energy, the Indian Renewable Energy Development Agency, the International Renewable Energy Agency (IRENA), and the Renewable Energy Policy Network for the 21st Century (REN21) to examine India's diverse renewable energy challenges and provide recommendations for the way forward. CEEW is also a trusted aide of the recently announced International Solar Alliance (ISA), helping ISA make steady advances in the last several months.

CEEW's current major projects on renewable energy include: renewable energy finance; assessing the jobs and skills potential of the solar and wind sectors; exploring the solar potential of Indian Railways; and designing the roadmap for future renewable energy growth in India.

Earlier, CEEW had published the first independent assessment of India's solar mission; India's first report on Green Industrial policy; and a study on renewable energy applications beyond electricity. In November 2015, CEEW in collaboration with the Natural Resources Defense Council (NRDC) launched the 'Clean Energy Finance Initiative', which engages actively with multiple stakeholders to facilitate improved flow of finance into clean energy projects in India.

CEEW'S RENEWABLES TEAM



Kanika Chawla



Arunabha Ghosh



Neeraj Kuldeep



Manu Aggarwal



Anjali
Viswamohan

ques 2015



“CEEW has been a trusted resource partner for the advances made by the International Solar Alliance (ISA). Their independent analysis on renewable energy jobs and skills, and the risks plaguing the flow of investment into renewable energy in India is extremely valuable for the sector and for ISA’s mission.”

SHRI UPENDRA TRIPATHY

Secretary, Ministry of New and Renewable Energy



Solar Potential of Indian Railways

In June 2015, CEEW published a study 'Greening the Tracks' outlining the pathway to achieve 1 GW of solar power within Indian Railways. The study was released by the Union Minister of Railways, Shri Suresh Prabhoo, on the occasion of World Environment Day.



Risks to Renewable Energy Financing

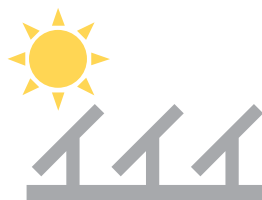
Based on in-depth interviews with 50 financiers, including experts from public banks, private banks, international funding agencies, and private equity and venture capital firms, CEEW published a paper analysing the role of risks in inhibiting the existing sources of renewable energy finance.



Shri Tarun Kapoor, Joint Secretary, MNRE delivered the opening remarks at the 'Inter-Ministerial Roundtable', co-hosted by CEEW and the Clean Energy Access Network (CLEAN), during the India Energy Access Summit in August 2016.



57% CAGR required to meet 100 GW solar target, installed capacity to double every 18 months



15 billion USD required to meet the solar targets for FY 2016-17



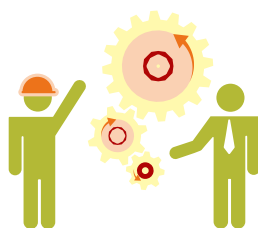
1% of barren and uncultivated land in India would be sufficient for 80 GW of grid connected projects



1.1 million jobs would be created by 2022 if India meets its 100 GW solar target



180,000 jobs are expected to be created by 2022 if India installs 60 GW of wind capacity



2,10,800 skilled site engineers and 6,24,600 semi-skilled technicians would be needed to meet India's 100 GW solar target by 2022

International Solar Alliance

CEEW is a close ally and supporter of the International Solar Alliance since its conceptualisation. CEEW works closely with the ISA Interim Secretariat, making recommendations for both operational processes and substantive work programmes.



121 countries supported the launch of the International Solar Alliance



Innovative Renewable Energy Financing

CEEW published two studies, in partnership with the Indian Renewable Energy Development Agency (IREDA) and the Natural Resources Defense Council (NRDC) on how green banks and green bonds, two fast-growing financing innovations, could assist dramatically ramp up solar and wind energy capacity. The studies were released by Hon'ble Minister of State (IC) Shri Piyush Goyal.



“CEEW is working with us as a strategic knowledge partner as we work to unleash attractive finance to meet India’s ambitious renewable energy target.”

MR K S POPLI
Chairman, IREDA




1.1 billion USD worth green bonds raised by India in 2015, fourth largest issuer in the world



Renewable Energy Jobs and Skills



 **1.1 million jobs** to be created in the solar sector by 2022 estimated to spread across business development (2%), design and pre-construction (3%), construction and commissioning (72%), operations and maintenance (23%)

In February 2016, during the Make in India week in Mumbai, the Council on Energy, Environment and Water (CEEW) and the Natural Resources Defense Council (NRDC) published studies highlighting that the lack of a skilled workforce and quality training programmes could pose a significant challenge to meeting India's ambitious target of 175 gigawatts (GW) of installed renewable energy by 2022.

CEEW'S KEY RENEWABLES PUBLICATIONS

June 2016 | New Delhi, India
CEEW Working Paper 2016/12
Money Talks?
 Risks and Responses in India's Solar Sector
 KANKA CHAWLA

<http://bit.ly/2c5okNV>

INTERNATIONAL IDEA
FILLING THE SKILL GAP IN INDIA'S CLEAN ENERGY MARKET: SOLAR ENERGY FOCUS

As India looks to bring fast-forward growth in energy security, and the impact of climate change, increasing energy security and energy efficiency are key. The report highlights the need for a skilled workforce to support the growth of solar and wind energy markets.

Number and Type of Skills Needed in India's Solar Sector by 2022

Category	Number of Jobs
Business Development	10,000
Design and Pre-construction	10,000
Construction and Commissioning	100,000
Operations and Maintenance	100,000
Total	220,000

<http://bit.ly/10jrOzC>

GREENING THE TRACKS
 Achieving the 1 Gigawatt solar PV target of the Indian Railways

<http://bit.ly/1KSMZhA>

Bulletin of the Atomic Scientists
70 Years Speaking Knowledge to Power
The big push for renewable energy in India: What will drive it?
 Anushka Ghosh

Abstract
 India's commitment to a fast and far-reaching renewable energy (RE) program is a landmark. The country has a history of promoting renewable energy and capacity expansion for its power sector. However, the solar target alone will require a significant expansion in the Indian RE sector. This article examines the challenges and opportunities for the Indian RE sector and discusses the role of government, industry, and academia in meeting the target.

Keywords
 renewable energy, energy access, energy security, green jobs, India, renewable energy, solar power, solar panel

<http://bit.ly/2cs19My>



RISKS AND VULNERABILITIES

CLIMATE CHANGE : A RISK ASSESSMENT

MONDAY, 13 JULY 2015

MUMBAI, IN



Shri S. Ramadorai released the book 'Climate Change: A Risk Assessment' at the Bombay Stock Exchange

Since the turn of the century, there has been recognisable increase in extreme weather events and ecological imbalances resulting in grave threats to rural and urban communities worldwide. It is critical to understand that the risks posed by climate change and environment degradation are non-linear: while average conditions may change gradually, the risks can increase rapidly. On a high carbon emissions pathway, the probability of crossing thresholds beyond which the inconvenient may become intolerable will increase over time.

CEEW's risks and vulnerabilities team has worked closely with the Ministry of Environment, Forests and Climate Change, UK Foreign and Commonwealth Office, Harvard University, Tsinghua University, Indian Institute

of Management Ahmedabad (IIM-A), IIT Gandhinagar, among others, to inform about risks for which human societies need to prepare and suggest adaptation measures.

CEEW's current major projects on risks and vulnerabilities include: assessing global climate risks; assessing India's climate adaptation gap; climate resilient and neo-traditional agriculture; climate risk and urban infrastructure; future heat-related mortality risks in urban areas; monitoring air quality; protecting traditional water bodies; and sustainable cities. In July 2015, CEEW and its partner institutions released a major multi-country study on climate risks, which was simultaneously launched at the London Stock Exchange and the Bombay Stock Exchange.

CEEW'S RISKS AND VULNERABILITIES TEAM



Arunabha Ghosh



Hem Dholakia



Vaibhav Chaturvedi



Rudresh Kumar Sugam



Mohit Sharma



Kangkanika Neog



“I congratulate CEEW for their efforts and hope this report on climate risk will trigger a public debate and help business investors, national security personnel, and other policymakers, begin a process of continuous risk assessment.”

MR S. RAMADORAI
Chairman, National Skill Development Agency (NSDA)
and National Skill Development Corporation (NSDC)





Rethinking Urbanisation

In October 2015, Dr Arunabha Ghosh chaired a session ‘Rethinking Urbanisation for a Good Life’ with H. E. Mr. Mehmet Kaplan, Minister for Housing, Urban Development and Information Technology, Ministry of Enterprise and Innovation, Government of Sweden as the key speaker.

Climate Risk Assessment

Experts from CEEW, Harvard University, Tsinghua University, and Cambridge University released an independent multi-country assessment of the risks of climate change in July 2015. The study applies the principles of risk assessment used in finance, insurance and national security to better understand and communicate the risks of climate change.

Heat Related Mortality Under Climate Change in Urban India

CEEW published a joint study with IIT Gandhinagar and IIM Ahmedabad providing a comprehensive assessment of mortality in 52 urban areas with a population of more than one million that are located in diverse climatic regimes in India.





CEEW's Dr Hem Dholakia moderated a COP21 dialogue on 'Climate Change and Health Risks' co-hosted with the Embassy of France in India in August 2015.



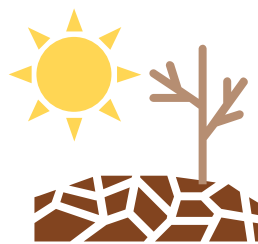
1000 times increase in probability of what is now a '100-year flood event' in Kolkata, with 1m of global sea level rise



6 times increase in frequency of flooding in the Ganges basin over the course of the century on a high emission pathway



1000 billion INR estimated direct damage costs due to floods, cyclones and temperature extremes over last five years



800 million people living across 450 districts in India currently experiencing significant increases in annual mean temperature going beyond the 20°C warming pathway



70-140% projected increase in heat stress related mortality in urban areas due to climate change in the late 21st century



5 locations in Delhi where CEEW, in collaboration with EPIC, independently measured air quality and traffic volumes during phase 1 of the Delhi government's odd-even experiment

Building Climate Resilient Farming Communities in Maharashtra

CEEW conceptualised a framework, in collaboration with the 2030 Water Resources Group, to leverage the Green Climate Fund (GCF) for creating better water management and irrigation services, through a market-driven model for building climate resilient farming communities in drought prone regions of Vidarbha and Marathwada in Maharashtra.



200 billion USD worth of crops could be lost in India by 2050 due to global warming



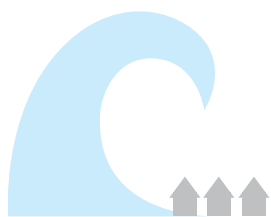
India's Adaptation Gap

CEEW's joint study with IIM Ahmedabad and IIT Gandhinagar reveals that total government spending on developing capacity and adaptation in India has grown consistently over the last decade and a mammoth USD 91.8 billion was spent on adaptation in 2013-14 alone.



“I commend the authors of India's adaptation gap report for putting together various financial, technological capacity building needs of India.”

SHRI ASHOK LAVASA,
FINANCE SECRETARY AND FORMER SECRETARY,
MOEF&CC



1 trillion USD needed by India from now until 2030 to adapt to the adverse impacts of climate change

Decoding Delhi Government's Odd-Even Experiment

THE ECONOMIC TIMES

WWW.ECONOMICTIMES.COM
NEW DELHI | 14 PAGES | ₹10 ONLY
SATURDAY, 16 JANUARY 2015

NO CONCLUSIVE PROOF TO SUGGEST ODD-EVEN A SUCCESS, SAYS THINK TANK

Air Quality Improved a Tad: CEEW

Our Political Bureau

New Delhi: As the much-debated odd even formula implemented by the Delhi government from January 1 to 15 drew to a close, the first of analysis on its impact has said that there is "no conclusive evidence to prove that the odd-even policy improved Delhi's air quality or reduced traffic congestion". The CEEW analysis also appears to contradict the perception that the odd even formula may have at least decongested the city due to vehicle rationing.

Independent think-tank Council on Energy, Environment and Water (CEEW) has assessed that there was only marginal improvement in air quality whereas there was 10% increase in vehicular movement at the monitored locations due to other vehicles rushing in and no decrease in number of private vehicles.



NO DECONGESTION



The vehicular movement increased 10% during this period, says CEEW

Policy research organisation TERI in its assessment of the scheme at four stations — Mandir Marg, Punjabi Bagh, Anand Vihar and RK Puram said the plan helped decongest the capital's roads but there was no let-up in air pollution levels which in fact increased in the first week of January. CEEW also came out with similar pollution assessment saying air quality only improved marginally in the second week. Weather factors, CEEW said, have

played a major role in the air pollution levels in this fortnight and this short duration has proven insufficient to make any conclusive assessments about the efficacy of the odd even formula.

CEEW in collaboration with the Energy Policy Institute at the University Of Chicago (EPIC) — measured air quality and traffic volumes at five locations — Connaught Place, GTB Nagar, IIT Delhi, Mathura Road, and Shadipur over the last three weeks. Delhi's PM 2.5 levels was almost as high during this period as in January 2014 when no such measures were taken. Due to unseasonal rains and winds, PM 2.5 levels dipped at 226 µg/m3 in January 2015.

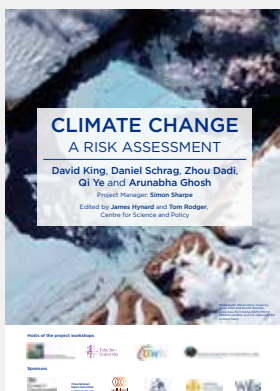
The study revealed that the daily average number of vehicles increased by 10% in the five locations during the first two weeks of January, as compared to the last week of December.



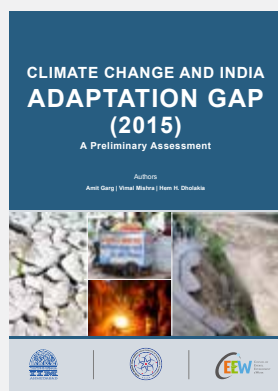
CEEW, in collaboration with EPIC, independently measured air quality and traffic volumes at 5 important locations (viz. Connaught Place, GTB Nagar, IIT Delhi, Mathura Road, and Shadipur) across New Delhi.

On the conclusion of phase one of the Delhi government's odd-even experiment, CEEW analysis found no conclusive evidence to prove that the odd-even policy improved Delhi's air quality or reduced traffic congestion.

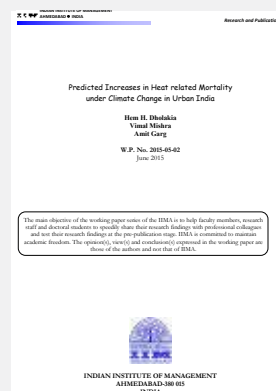
CEEW'S KEY RISKS AND VULNERABILITIES PUBLICATIONS



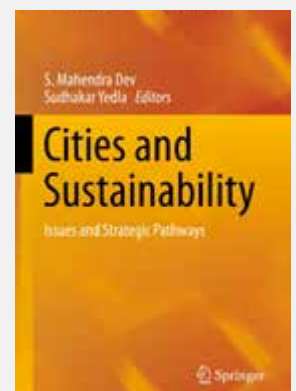
<http://bit.ly/2bXDl3u>



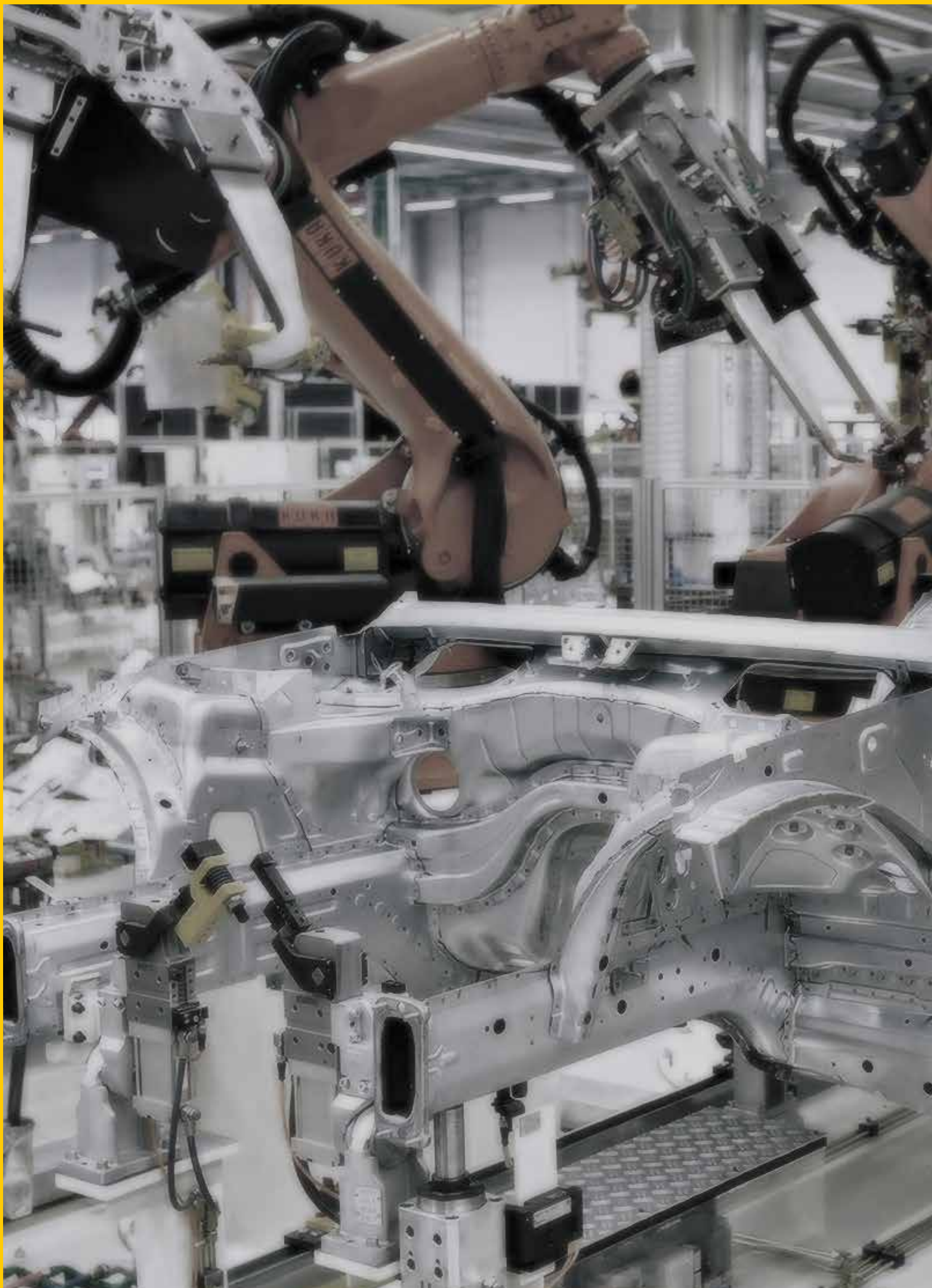
<http://bit.ly/2c5DyDs>



<http://bit.ly/2c5ppoQ>



<http://bit.ly/2c1pOXs>



A photograph of an automotive assembly line. In the foreground, a white car chassis is mounted on a conveyor belt. Several robotic arms are visible, some in the process of assembling parts. The background shows more of the factory floor with various mechanical components and structures. The overall scene is industrial and brightly lit.

LOW CARBON PATHWAYS

Book Launch

ENERGIZING INDIA

Towards a Resilient and Equitable Energy System

Thursday, 24 March 2016
New Delhi, India



Shri Suresh Prabhu released the book 'Energizing India: Towards a Resilient and Equitable Energy System', a joint CEEW - Shell - TERI effort published by SAGE

The Paris Agreement on climate change is being, rightly, hailed as a stepping-stone for collective action. However, the most ambitious part of the agreement - limiting temperature rise - will be the hardest to achieve. It is clear that the limited carbon space is going to shrink rapidly even if we aimed for 2°C. It is imperative that both developed and developing countries focus on efficient use of resources, invest in clean technologies and collaborate to invest in the economy of the future.

CEEW's low-carbon pathways team has partnered with the Ministry of Environment, Forest and Climate Change, Department of Science and Technology, and the Ministry of Mines to promote resource efficiency and low-carbon growth.

CEEW's current major projects on low carbon pathways include: developing analytical frameworks to identify

alternative pathways towards achieving India's low-carbon development goals; contributing to climate negotiations; low-carbon rural development; climate and sustainability finance; mitigating carbon emissions from aviation; assessing domestic action on climate change; nuclear power; and the business case for energy efficiency and emissions reductions.

In March 2016, the Union Minister of Railways released the book 'Energizing India: Towards a Resilient and Equitable Energy System', which was the result of three years of analytical work to develop scenarios for India's energy future up to 2050. Earlier this year, CEEW also published a report on critical minerals needed to boost Indian manufacturing.

In 2013, CEEW submitted a report on strategic industries and key technologies to the National Security Advisory Board.

CEEW'S LOW CARBON PATHWAYS TEAM



Vaibhav Chaturvedi



Karthik Ganesan



Vaibhav Gupta



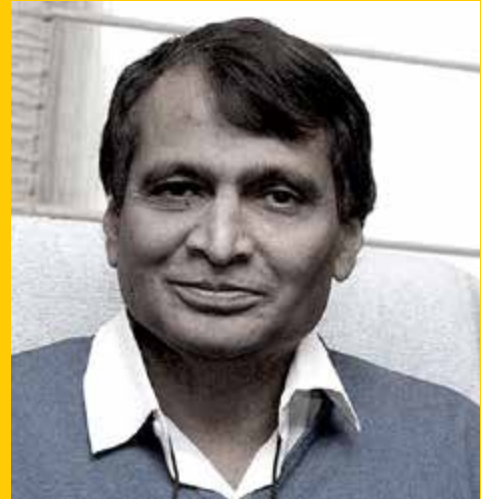
Anjali Ramakrishnan



Poonam Nagarkoti



Shruti Nagbhusan



“I would like to congratulate CEEW, Shell and TERI for the remarkable work that they have done. The book, Energizing India, will start a public debate towards developing long-term sustainable policies to strengthen the Indian energy sector and promote low-carbon growth.”

SHRI SURESH PRABHU

Hon'ble Union Minister for Railways





CEEW Modelling Analysis for India's INDCs

In April 2015, the Government of India requested CEEW to conduct sector-specific modelling in the buildup to the designing of India's INDCs. CEEW researchers, based on climate modelling outputs and internal research, proposed ambitions and commitments for India, across six key areas: adaptation, buildings, HFCs, renewables, technology partnerships and transport.



'China, EU, US to corner 28% of global carbon space by 2030'

BS REPORTER
New Delhi, 7 December

Nearly a third of the total remaining international 'carbon space' will be cornered by advanced economies such as the United States, European Union and China before 2100, leaving a smaller emission window for other countries, including India.

An analysis by Council on Energy, Environment and Water (CEEW) has pointed out the three entities would use up to at least 28 per cent of the carbon space, which is the maximum amount of carbon emissions permitted to all countries till the turn of

the end of the century. Panel on Climate Change, commissioned by the United Nations, had limited global emissions of carbon dioxide from pre-industrialisation level to 2900 Giga tonne (Gt-CO₂eq). An increase over this limit will trigger rise in the world temperature beyond two degrees Celsius and unleash a dangerous impact on climate.

Of the permitted emissions, a total 1000 Gt-CO₂eq of carbon dioxide equivalent is left for the world between 2015 and 2100. The CEEW study points out that China with a total emissions of 168 GtCO₂ eq, along with the US (70 GtCO₂ eq) and EU (50 GtCO₂ eq) will signif-

the end of the century.

Saying the report points out a dire situation for India, Arunabha Ghosh, chief executive officer of CEEW, said, "Countries need to start thinking right now about allocating carbon space based on principles of historical responsibility and economic capabilities."

India, with its ambitious renewable energy goals, has already committed to higher mitigation than its fair share, in effect freeing up carbon space for other developing countries. However, the same might not be true for it.

Developed countries and developing nations are engaged in a debate on

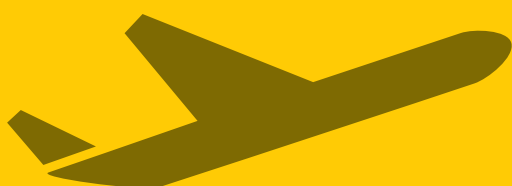
Global Carbon Space and India

CEEW's released its analysis on global carbon space during COP21 highlighting the little global carbon space that will remain for the rest of the world when the largest historical emitters continue emitting greenhouse gases.

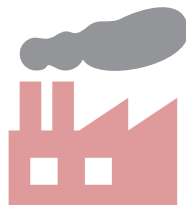


Carbon Emissions from Aviation

In the lead up to the negotiations on aviation emissions in Montreal, CEEW submitted a white paper 'Can India's Development Flight Take Off? What the ICAO Global Market Based Scheme Means for India?' to the Ministry of Civil Aviation (GoI).



38% global carbon space (1000 GtCO₂) estimated to be cornered by China, EU and the US by 2030



15.1 GtCO₂eq global emissions gap in 2030, despite the positive impact of the INDCs



12 minerals identified as critical (out of 49 non-fuel minerals evaluated) for India's manufacturing sector in 2030



740-2140 MT estimated coal imports required by India in 2050



120%-300% estimated increase in India's total primary energy demand by 2050



246,495 pending patent applications in India in 2015

Key Technologies to Boost Make in India

CEEW's study 'Make in India: How could we be strategic?' identified biotechnology, nanotechnology, micro and nanoelectronics, photonics, and advanced materials as the five key technologies having the maximum potential to stimulate growth in Indian manufacturing.



1% India's share in global patent applications in each of the five key technologies that could stimulate Indian manufacturing

CEEW co-hosted Mr Eyal Rosner, Chairman and Director of Administration, Fuel Choices Initiative, Prime Minister's Office, Israel for a session on 'Alternative Energy & Smart Transportation'.



PROFESSOR ASHUTOSH SHARMA

Secretary, Department of Science and Technology

"The CEEW study on critical minerals will assist policymakers and captains of industry to draw up plans to secure India's needs of identified critical minerals in pursuit of sustainable industrial growth."



MR BALVINDER KUMAR
Secretary, Ministry of Mines

"I congratulate the CEEW team for publishing this important study on India's critical minerals. The study will be extremely useful for framing policies that deal with national security and high-tech manufacturing."



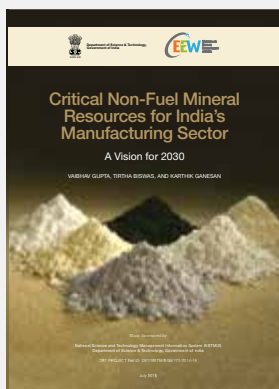
Critical Mineral Resources for India's Manufacturing Needs



Identified critical minerals used in a range of industries and modern applications such as **aerospace, automobiles, cameras, defense, entertainment systems, laptops, medical imaging, nuclear energy, and smartphones.**

CEEW published a study, supported by the Department of Science and Technology (GoI), providing a first-of-its-kind framework for India to assess the impact of critical minerals on the manufacturing sector, considering both economic importance and associated supply risks. The study was released by Shri Balvinder Kumar, Secretary, Ministry of Mines.

CEEW'S KEY LOW CARBON PATHWAYS PUBLICATIONS



<http://bit.ly/2bfv5d7>



<http://bit.ly/2c7QYjQ>



<http://bit.ly/21f8zFt>



<http://bit.ly/1su9rKz>



TECHNOLOGY





Shri Susheel Kumar released CEEW - IIASA's report on India's long - term HFC emissions

Technology is widely recognised as one of the most powerful tools for combating climate change and promoting sustainable development. Technology transfer (and associated financing) has been a key demand during two decades of climate negotiations, including the COP21 negotiations in Paris. COP21 witnessed the launch of two key partnerships based on technology: the International Solar Alliance, a partnership of countries, which will promote technology cooperation among other programmes; and Mission Innovation, a group of 19 countries, pledging to double R&D investments for clean energy technologies.

CEEW's technology team has worked closely with the Ministry of Environment, Forests and Climate Change,

NITI Aayog, Embassy of France in India, the India Energy Storage Alliance (IESA), and the Indo-US Science and Technology Forum to make technology central to India's climate strategy and energy transformation.

CEEW's current major projects on technology include: modelling HFC emissions; business case for phasing down HFCs including examining costs and patents; energy storage technologies; and horizon technologies for India's low carbon growth. Earlier, CEEW had organised India's largest public conference on climate geoengineering governance with the University of Oxford and released the first-of-its kind multi-sectoral analysis of India's long-term HFC emissions with the International Institute for Applied Systems Analysis (IIASA). In 2011, CEEW had also facilitated the \$125 million India-US Joint Clean Energy R&D Centers.

CEEW'S TECHNOLOGY TEAM



Vaibhav Chaturvedi



Arunabha Ghosh



Lekha Sridhar



Shikha Bhasin



Neeraj Kuldeep



Kanika Chawla



“I would like to appreciate CEEW’s efforts for the commendable analysis they have done on India’s long-term HFC emissions. I hope that more civil society organisations in India bring out such independent research.”

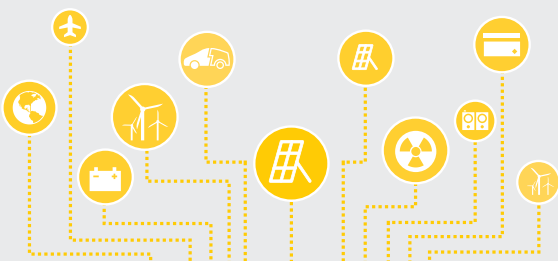
SHRI SUSHEEL KUMAR

Secretary (BM), Ministry of Home Affairs and
Former Special Secretary, MoEF&CC



Technologies for National Energy Policy

In collaboration with NITI Aayog, CEEW led a high-level stakeholder discussion, which highlighted the need to strategically view future energy-related technologies and address the key policy changes required to accelerate technology transfer and foster technology partnerships.



Mitigation Potential and Costs of India's HFC Emissions

In collaboration with IIASA, CEEW published a study analysing the maximum feasible reduction possible across HFC emission sectors based on the advanced control technologies/options (ACT) available globally and the cost optimal strategy.



At the consultation on horizon technologies, CEEW's Dr Vaibhav Chaturvedi highlighted the need to constitute an independent and autonomous expert committee with a clear mandate and well defined objectives.



500 million tonnes

CO₂ equivalent HFC emissions in 2050 in India, if unabated

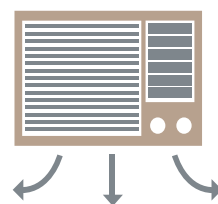


<2% India's share in global

HFC emissions in 2010, compared to 39% (USA), 24% (China), 14% EU, 8% Japan



7% India's estimated share in global HFC emissions in 2050

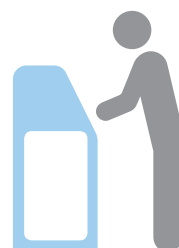


37% share of the residential air-conditioning sector to India's HFC emissions



11.6 billion Euros

cumulative mitigation cost of the Indian HFC proposal, one third compared to other proposals



5 billion INR market opportunity to battery manufacturers offered by petrol pumps and rural ATMs

Energy Storage Technologies for Renewable Energy

The dynamics of the battery market in India are changing rapidly, with the increasing demand for advance battery technologies and emerging application areas. CEEW has analysed the opportunities that exist for energy storage technologies and their applications for the renewables sector.



2.2 GWh of energy storage needed to meet MNRE's target of installing 10,000 micro-grids



Climate Technology Partnerships

There is an urgent need for effective global partnerships to harness technology, innovation and finance. CEEW's two papers analyse 30 technology partnerships of the past, the barriers to and conditions of success, and how we could design two new and effective partnerships: on energy access and decentralised energy; and on energy storage and grid balancing.



30 technology partnerships reviewed by CEEW scholars



"I thank the Council on Energy, Environment and Water for mainstreaming technology in India's policy statements."

SHRI ANIL JAIN
Advisor (Energy), NITI Aayog

Phasing Down Hydrofluorocarbons (HFCs)



64%
of total

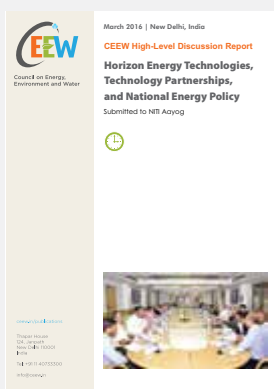
HFC emissions emitted between 2010 and 2050 would be avoided if India's Montreal Protocol proposal were accepted.

In collaboration with IIASA, in May 2015, CEEW published a study containing the first-of-its kind modelling analysis quantifying India's HFC emissions if these chemicals were to replace hydrochlorofluorocarbons (HCFCs). CEEW also recently examined the patents for alternatives to HFCs.

CEEW'S TECHNOLOGY PUBLICATIONS



<http://bit.ly/2cduSeq>



<http://bit.ly/2cgQ7e3>



<http://bit.ly/1NMbY8G>



<http://bit.ly/2cgOBIO>



GREENHOUSE GASES AND MONITORING REPORTING VERIFICATION

A grayscale photograph of an industrial facility, likely a refinery or chemical plant, with several tall smokestacks emitting thick plumes of white smoke. The scene is set against a dark, overcast sky. A horizontal bar with a rainbow gradient (orange, green, blue) is positioned below the title text.



Phase I 2007 - 2012 for all sectors and all gases as per IPCC reporting format



Economy Wide Emission Estimates



Industry Emission Estimates



Energy Emission Estimates



AFOLU Emission Estimates



Waste Emission Estimates

Homepage of GHG Platform - India website

At the core of the Paris Agreement on Climate Change is the aspiration of greater transparency based on a robust mechanism for monitoring, review and verification (MRV) of greenhouse gas (GHG) emissions and related actions. Designing the nuts and bolts of this mechanism will require another set of contentious negotiations. But a lot of hard work will be needed at home, too, with implications for how India counts emissions.

CEEW's GHG and MRV team works closely with the Ministry of Environment, Forests and Climate Change to complement the national reporting process on the GHG emissions inventory and to further explore the specific areas of improvement for emissions reduction in the years ahead.

CEEW's current GHG inventory and MRV projects include: preparing national and state-level emission estimations from the manufacturing sector (energy use, industrial processes and product use); analysing existing policies that drive emission reductions and corresponding monitoring mechanisms; and developing an independent assessment framework for an integrated MRV arrangement in the context of GHG reporting and mitigation actions for India. In July 2016, CEEW, as part of India's first civil society platform for GHG estimation and analysis (GHG Platform India), released an independent estimate of India's industrial emissions, using a bottom-up approach by assessing a wide range of fuel use, industrial process, and product use in more than 200,000 industrial units

CEEW'S GHG AND MRV TEAM



Karthik Ganesan



Vaibhav Gupta



Tirtha Biswas



Sumit Prasad



CEEW Co-Launches GHG Platform - India Website

CEEW, in collaboration with CSTEP, ICLEI South Asian Centre, Shakti Sustainable Energy Foundation, Vasudha Foundation and WRI India, jointly launched India's first civil society web platform for GHG estimation and analysis. The platform (<http://ghgplatform-india.org>) showcases national estimates for GHG emissions from 2007-2012 by accounting CO₂, CH₄ and N₂O gases across key sectors such as Energy, Industry, Waste and Agriculture, Forestry and Other Land Use (AFOLU).



25% contribution of industries to India's total GHG emissions



22 developing countries have already made considerable progress in developing a domestic MRV framework



200,000 industrial units evaluated to estimate GHG emissions from the entire manufacturing sector



2012 estimates for India's GHG emissions assessed a full year ahead of Govt's formal estimation



6% CAGR for industrial emissions (energy and process) between 2007 and 2012



1%-9% deviation in CEEW estimates from national inventories, at the highest level





COP21 NEGOTIATIONS

Team CEEW at COP21

In December, CEEW scholars (Dr Arunabha Ghosh, Dr Vaibhav Chaturvedi and Ms Kanika Chawla) participated in the COP21 Conference in Paris, where they showcased several of India's climate change adaptation and mitigation initiatives, as well as CEEW's pioneering climate and energy-related research. CEEW's activities in Paris included active engagement with the Ministry of Environment, Forests and Climate Change and support for the India Pavilion. Additionally, CEEW also presented the Indian standpoint at sessions hosted at the EU and IETA pavilions, in several other public forums, and with the Indian and foreign media.



OTHER SPEAKING ENGAGEMENTS AT COP21

In addition to the CEEW sessions, Dr Arunabha Ghosh (CEO) and Dr Vaibhav Chaturvedi (Research Fellow) were key speakers at the following sessions:

Impact of Climate Change on Water Resources

Session organised by Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India. CEEW presented on the energy-water nexus.

Delivering Climate Action through Trade: The Environmental Goods Agreement & Beyond

Session organised by the International Centre for Trade and Sustainable Development and the National Foreign Trade Council (IETA Pavilion).

Fossil fuel subsidies: The Barrier to Stronger Climate Action

Session organised by IISD. CEEW showcased India's reform efforts (EU Pavilion).

Showcasing India's Climate Actions

Session organised by Confederation of Indian Industry, Shakti Sustainable Energy Foundation, and Vasudha Foundation. CEEW presented on how policymakers, developers, investors and innovators were driving the renewables revolution in India.



SESSION 1: CLIMATE RISK AND ADAPTATION

This session hosted by CEEW at the India Pavilion focused on global climate change risk assessment, comparing the risks India faces with those faced in other regions, other countries, the composite adaptation efforts already underway in India across sectors, and the adaptation funding needs and technology gaps.



SESSION 2: TECHNOLOGY ASPECTS OF CLIMATE CHANGE

This session was co-hosted in partnership with the Technology Information, Forecasting and Assessment Council at the India Pavilion and focused on climate technologies and innovative proposals for effective technology partnerships, which can both further India's climate change agenda, as well as display India's climate leadership.

SESSION 3: CITY RESILIENCE: REAL WORLD MEASURES THAT SAVE LIVES AND REDUCE CARBON

This session, co-hosted in partnership with the Natural Resources Defense Council, Public Health Foundation of India and CDKN, focused on real world measures that save lives and reduce carbon, discussing examples of urban resilience solutions from India, Europe and the United States.



Nations Unies
Conférence sur les Changements Climatiques 2015
COP21/CMP11
Paris, France



CEEW's Recent Publications

Books / Reports

Van de Graaf, Thijs, Benjamin K. Sovacool, Arunabha Ghosh, Florian Kern, and Michael T. Klare, eds. (2016) 'The Palgrave Handbook of the International Political Economy of Energy'. London: Palgrave Macmillan.

Pallav Purohit, Lena Höglund-Isaksson, Imrich Bertok, Vaibhav Chaturvedi, Mohit Sharma (2016) 'Scenario Analysis for HFC emissions in India: Mitigation Potential and Costs' CEEW-IIASA Report, September

Vaibhav Gupta, Tirtha Biswas, Karthik Ganesan (2016) 'Critical Non-Fuel Mineral Resources for India's Manufacturing Sector: A Vision for 2030' CEEW-DST Report, July

Abhishek Jain, and Aditya Ramji (2016) 'Reforming Kerosene Subsidies in India: Towards Better Alternatives', May

Abhishek Jain, Shalu Agrawal, and Karthik Ganesan (2016) 'DBTL Performance Evaluation: Insights from the World's Largest Subsidy Benefit Transfer Scheme', May

Suman Bery, Arunabha Ghosh, Ritu Mathur (2016) Energizing India: Towards a Resilient and Equitable Energy System. New Delhi: SAGE

Richard Ponzio and Arunabha Ghosh (2016) Human Development and Global Institutions: Evolution, Impact, Reform. London and New York: Routledge

Vaibhav Gupta, Karthik Ganesan, and Arunabha Ghosh (2016) 'Make in India: How could we be strategic', February

Amit Garg, Vimal Mishra and Hem Dholakia (2015) 'Climate Change and India: Adaptation Gap (2015) - A Preliminary Assessment', December

Abhishek Jain, Sudatta Ray, Karthik Ganesan, Michael Aklin, Chao-Yo Cheng, and Johannes Urpelainen (2015) 'Access to Clean Cooking Energy and Electricity: Survey of States' CEEW Report, September

Journal Papers /Book Chapters / Other Papers

Pallav Purohit and Vaibhav Chaturvedi (2016) 'Techno-economic Assessment of Biomass

Pellets for Power Generation in India', CEEW-IIASA Working Paper, September

Kanika Chawla (2016) 'Money Talks? Risks and Responses in India's Solar Sector', CEEW Working Paper, June

Arunabha Ghosh (2016) 'India's Resource Nexus: What Scope for Cooperation with China?' in China and India: Towards Cooperation between the Giants of Asia, edited by Kishore Mahbubani, Huang Jing, and Kanti Bajpai. London: Routledge

Karthik Ganesan and Arunabha Ghosh (2016) 'India and Singapore: Two Brands of Entrepreneurship' in India and Singapore: 50 years of diplomatic relations, edited by Tan Tai Yong and Ashok K. Bhattacharya. Delhi and Singapore: Ananta Aspen Centre; and Institute for South Asian Studies

Arunabha Ghosh and Sudatta Ray (2015) 'Fixing Climate Governance through Effective Technology Partnerships' CIGI Fixing Climate Governance Series - Paper No 3, November

Arunabha Ghosh, Anupama Vijayakumar, and Sudatta Ray (2015) 'Climate Technology Partnerships: Form, Function and Impact' CIGI Fixing Climate Governance Series - Paper No 2, October

Abhishek Jain and Paul Kattuman (2015) 'Decision-Making and Planning Framework to Improve the Deployment Success of Decentralized Rural Electrification in India' in Sustainable Access to Energy in the Global South, edited by Silvia Hostettler, Ashok Gadgil and Eileen Hazboun. Geneva: Springer International Publishing Switzerland

Policy / Issue Briefs

Vaibhav Chaturvedi, Bhaskar Deol, Steve Seidel, Anjali Jaiswal, Ankita Sah, Mohit Sharma, Nehmat Kaur, and Stephen O. Andersen (2016) 'Cooling India with Less Warming: Examining Patents for Alternatives to Hydrofluorocarbons', CEEW-NRDC-C2ES, IGSD Policy Brief, September

Arunabha Ghosh, Kanika Chawla, Neeraj Kuldeep, Manu Aggarwal, Anjali Jaiswal, Sameer Kwatra, Nehmat Kaur, Bhaskar Deol, and Eric Weiner (2016) 'Greening India's

Financial Market: Opportunities for a Green Bank in India', CEEW-NRDC Policy Brief, August

Rudresh K Sugam, Poulami Choudhury, and Jennifer Hartl (2016) 'Promoting Neo-Traditional Agriculture to Achieve Food and Livelihood Security, and Climate Change Adaptation' CEEW-UNESCO Policy Brief, July

Mohit Sharma, Kangkanika Neog, Rudresh Kumar Sugam, and Aditya Ramji (2016) 'Decentralised Waste Management in Indian Railways' CEEW Issue Brief, June

Arunabha Ghosh, Kanika Chawla, Anjali Jaiswal, Sameer Kwatra, Meredith Connolly, Nehmat Kaur, Bhaskar Deol, Anna Mance, Douglass Sims, Sarah Dougherty, Jeff Schub, and Rob Youngs (2016) 'How Green Bonds Can Drive Clean Energy Deployment', May

Arunabha Ghosh, Kanika Chawla, Anjali Jaiswal, Sameer Kwatra, Meredith Connolly, Nehmat Kaur, Bhaskar Deol, Anna Mance, Douglass Sims, Sarah Dougherty, Jeff Schub, and Rob Youngs (2016) 'Investigating Opportunities for a Green Bank in India' Interim Report, May

Vaibhav Gupta, Tirtha Biswas, and Karthik Ganesan (2016) 'Mineral Resource Security for a Low-Carbon Indian Economy' Policy Brief, April

Shalu Agrawal, Aditya Ramji, and Hem H Dholakia (2016) 'Solar for Powering Health and Education in India' CEEW-Oxfam Issue Brief, February

Council on Energy, Environment and Water, and Natural Resources Defense Council (2016) 'Identifying the Skill Gap Challenge Facing the Wind Industry' CEEW-NRDC Issue Brief, February

Arunabha Ghosh, Kanika Chawla, Neeraj Kuldeep, Anjali Jaiswal, Meredith Connolly, Nehmat Kaur, Bhaskar Deol, Sameer Kwatra (2016) 'Filling the Skill Gap in India's Clean Energy Market-Solar Energy Focus', CEEW-NRDC Policy Brief February

Shalu Agrawal and Abhishek Jain (2015) 'Solar Pumps for Sustainable Irrigation: A Budget-Neutral Opportunity' CEEW Policy Brief, August

Vaibhav Chaturvedi and Mohit Sharma (2015) 'China's role in Global HFC emissions matters for phase-down proposals' CEEW Policy Brief, August

Other Publications

Council on Energy, Environment and Water, Indian Renewable Energy Development Agency Limited, and Natural Resources Defense Council (2016) 'Setting up a Green Bank: A Solution to India's Clean Energy Finance Barriers', Factsheet, August

Ganesan, K., Gupta, V., & Biswas, T. (2016). Industrial Emissions. Version 1.0 dated July 15, 2016, from GHG platform India: GHG platform India-2007-2012 National Estimates - 2016 Series <http://ghgplatform-india.org/data-and-emissions/industry.html> (Methodology Report)

Council on Energy, Environment and Water and Institute for Defence Studies and Analyses (2016) 'Understanding National Security Implications of Climate Risks', Discussion Report, May

Council on Energy, Environment and Water (2016) 'Horizon Energy Technologies, Technology Partnerships, and National Energy Policy', High-Level Discussion Report, March

Council on Energy, Environment and Water (2016) 'Getting a Deal: CEEW Climate Research, Engagements and Contributions to COP21 Negotiations', January

Council on Energy, Environment and Water and Natural Resources Defense Council (2015) 'India: Addressing Climate Change and Moving Towards a Low-Carbon Future' Fact Sheet, December

(Above list contains only major CEEW publications published since August 2015)



BOOKS/REPORTS 10

JOURNAL PAPERS/
BOOK CHAPTERS/
OTHER PAPERS 7

POLICY/ISSUE BRIEFS 12

Tracing CEEW's Six Year Journey

Key Milestones and Achievements



JUL 2016

Jointly launched GHG Platform-India, an independent web portal estimating GHG emissions



JUL 2016

Published first-of-its-kind assessment of minerals critical to boost Indian manufacturing



JUN 2016

Ranked 2nd in India, 20th globally amongst leading climate think-tanks by ICCG



MAY 2016

Petroleum and Natural Gas Minister delivered keynote address at CEEW's National Dialogue on Energy Subsidies



JUN 2014

Organised Climate Geoengineering Governance conference with University of Oxford



JUL 2014

Co-Founded Clean Energy Access Network (CLEAN)



OCT 2014

Submitted reports on Environmental Clearances, Power Reforms, Solar, and Swachh Bharat to the PMO



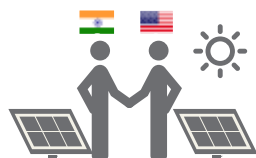
JAN 2015

Featured once again on University of Pennsylvania's 'Global Go To Think Tank Index'



JUN 2014

Ranked number 1 climate think-tank in India for second year running by ICCG



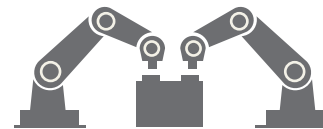
MAR 2014

Hosted Dr Ernest Moniz, US Energy Secretary, for a dialogue on Scaling Decentralised Clean Energy in India



JAN 2014

Featured on University of Pennsylvania's '2013 Global Go To Think Tank Index' - Topped India in three categories



NOV 2013

Submitted Report on Strategic Industries to the National Security Advisory Board



JAN 2010

Idea for a think-tank to integrate energy, water and environment conceived



AUG 2010

CEEW starts operations in a single empty room in Gurgaon



OCT 2010

Conceptualised and enabled the Maharashtra-Guangdong Partnership on Sustainability



JUL 2011

Facilitated the \$125 million India-US Joint Clean Energy R&D Center



MAR 2016

Railways Minister released the book 'Energizing India: Towards a Resilient and Equitable Energy System'



FEB 2016

Released reports on renewable energy jobs and skills at the Make in India Week



JAN 2016

Featured as one of world's best managed and independent think tanks on the 'Global Go To Think-Tank Index'



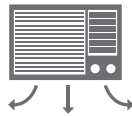
DEC 2015

Showcased climate leadership during COP21 climate negotiations in Paris



FEB 2015

Environment Minister delivered keynote address at CEEW's Climate Day



MAY 2015

First-of-its-kind multi-sectoral analysis of India's long-term HFC emissions released



JUL 2015

Published major multi-country report on Climate Change: A Risk Assessment



SEP 2015

Minister of Power, Coal and New & Renewable Energy released ACCESS report, based on India's largest energy access survey



NOV 2013

Published report on Urban Water and Sanitation in India



JUN 2013

Ranked number 1 climate think-tank in India, 15th globally, by International Centre for Climate Governance (ICCG)



MAR 2013

CEO Dr Arunabha Ghosh nominated Young Global Leader by World Economic Forum



SEP 2012

Published study on minor irrigation reform for the Indian State of Bihar



SEP 2011

Published a 584-page National Water Resources Framework Study for India's 12th Five Year Plan



DEC 2011

Submitted first ever report on India and Global Governance to the National Security Adviser at the PM's Office



MAY 2012

Published the first assessment of India's 22 gigawatt National Solar Mission



AUG 2012

National Security Adviser of India delivered keynote lecture at CEEW's Second Anniversary

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Together with our partners in India and across the globe, we aim to achieve the highest standards of research in finding solutions to sustainability issues – and implement those solutions to make a difference to the world.

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- Indian Institute of Management Ahmedabad (IIMA)
- Indian Institute of Technology Gandhinagar (IITGn)
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- Indian Renewable Energy Development Agency Limited (IREDA)
- Indian Renewable Energy Federation (IREF)
- Institute for Advanced Sustainability Studies, Germany
- Institute for Defence Studies and Analyses (IDSA)
- Institute for Governance and Sustainable Development (IGSD)
- Institute for Science, Innovation and Society (INSIS),
- Institute for Social and Economic Research and Policy (ISERP), Columbia University
- International Centre for Trade and Sustainable Development (ICTSD), Switzerland



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Trustee

Former Chairman, Atomic Energy Commission; and Former Secretary to the Government of India, Department of Atomic Energy



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Trustee

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- Ministry of Railways
- Ministry of Water Resources, Government of India
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- Skoll Global Threats Fund
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- Terrawatt Initiative, France
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- The Climate Group
- The Energy and Resources Institute (TERI)
- The Nand and Jeet Khemka Foundation
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- UK Foreign and Commonwealth Office
- UNDP
- UNESCO
- United Nations Foundation
- United States Agency for International Development (USAID)
- University of East Anglia, UK
- University of Mumbai
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- World Resources Institute

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- Helping CEEW gain visibility
- Contributing your valuable expertise and talent



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ARUNABHA GHOSH
Chief Executive Officer

Public Policy, International Relations, Human Development, Energy & Resource Security, Renewable Energy Policy, Water Governance, Climate Governance, Energy-Trade-Climate Linkages; Worked @ Princeton, Oxford, UNDP, WTO; WEF Young Global Leader

Runs, Sings & Bakes; Connects dots

"If your dreams do not scare you, they are not big enough"

Ellen Johnson Sirleaf



VAIBHAV CHATURVEDI
Research Fellow

Climate Policy, Energy Policy, Integrated Assessment Modeling, Forest Management Grad, IIM Ahmedabad Doctorate in Economics, Pacific Northwest National Lab (USA) Post-Doc

Music Enthusiast, Avid Reader & Nature Lover

"There ain't no such thing as a free lunch."



KARTHIK GANESAN
Research Fellow

Energy Access, Energy Poverty, Nuclear Energy, Fiscal Policies for RE, Quantitative Techniques and Choice Modelling, Economic Valuation, Lee Kuan Yew School of Public Policy (NUS), IIT Madras

Football Enthusiast, Long Distance Running, Scrabble Fanatic, Quizzing

"If I have seen further, it is by standing on the shoulder of giants"

Isaac Newton



HEM H DHOLAKIA
Senior Research Associate

Public Health, Climate Change Adaptation, Urban Studies, Air Quality, Public Policy; Doctorate in Public Systems, IIMA; Exercise Scientist, Brighton University

Trekker, Scuba-Diver, Theatre & Music Lover

"Natura valde simplex est et sibi consona."

Isaac Newton



KANIKA CHAWLA
Senior Programme Lead

Climate & Energy Policy, Renewable Energy Finance, Green Jobs, International Cooperation and Governance; UNEP, REN 21

“She’s mad, but she’s magic. There’s no lie in her fire.”

Charles Bukowski

Travel, Food, Partition Literature, Political Junkie, Militantly Liberal



ABHISHEK JAIN
Senior Programme Lead

Energy Access, Industrial Sustainability, Project Management, Cambridge MPhil in Engineering for Sustainable Development, Chevening Scholar, IIT R Grad in Mechanical Engineering

“We can’t solve the problems by using the same kind of thinking we used when we created them.”

Albert Einstein

Writing, Poetry, Trekking, Photography & Nature Walks



RUDRESH KUMAR SUGAM
Senior Programme Lead

Water Governance, IWRM, Resources Mapping & Nexus, Climate Change, GIS, TERI, Yale

“Absence of evidence is not evidence of absence.”

Carl Sagan

Superbikes & Singing



VAIBHAV GUPTA
Programme Lead

Energy & Mineral Resource Security, Environmental Policy & Law, EMS (ISO 14001), Indian School of Mines (Dhanbad)

“Some goals are so worthy, it’s glorious even to fail”

Capt M.K. Pandey

Sketching, Music & Sports; Be all you can be!



ADITYA RAMJI
Programme Lead

Energy Access, Energy Poverty, Public Health, Domestic Climate Policy, Choice Modeling, Decentralised Energy Solutions, Impact Assessment, Economics @TERI University

Music, Travel, Roller Skating, Xtreme Sports

“Man is the measure of all things.”

Protagoras



ANJALI RAMAKRISHNAN
Programme Associate

Climate & Energy Policy, Energy System Analysis, Economic Evaluations, Energy-Climate Nexus, Economics @ TERI University. Worked at TERI & IIP

Food, Hiking, Crafts and Baking

“Even if you’re on the right track, you’ll get run over if you just sit there”

Will Rogers



MOHIT SHARMA
Programme Associate

Energy & Climate Systems, Renewable Integration, Modeling and Systems Analysis, Sustainability in Urban Ecosystems, Technical University of Denmark Post-Grad in Sustainable Energy, NIT Grad in Chemical Engineering

Philosophising, Playing Music, Singing & Writing

“The universe is wider than our views of it.”



LEKHA SRIDHAR
Programme Associate

Climate Policy, Renewable Energy on Humboldt Fellowship, Public Policy at Oxford, Environmental Litigation, NALSAR Hyderabad

Board Games, Sci-fi, Fantasy, Pop Culture

“No one remembers the singer. The song remains.”

Terry Pratchett



MANU AGGARWAL
Research Analyst

Renewable Finance, International Cooperation, International Development, Energy Derivatives, Trading, Business Analytics, CFA, Thapar University Graduate

Foodie, Politics, Running, Travel Junkie, Floyd Aficionado, Trekking, Philosophy, Books

“There are times to stay put, and what you want will come to you, and there are times to go out into the world and find such a thing for yourself.”

Lemony Snicket



SARAH ASHRAF
Research Analyst

Energy Access, Water Governance, Resilience Development and Coping Mechanisms; Economics @ GIPE, Pune and University of Mumbai

Mumbai, Poetry, Sports & Fostering Cats

“The key question to keep asking is, Are you spending your time on the right things? Because time is all you have”

Randy Pausch



TIRTHA BISWAS
Research Analyst

Mineral Resource Management, Security & Policy Reforms; Mineral Processing ; Coal; Data Analytics; Erasmus Mundus Scholar; Indian School of Mines

Epicure, Reading & Billiards

“You can never cross the ocean until you have the courage to lose sight of the shore.”

Christopher Columbus



NEERAJ KULDEEP
Research Analyst

Renewables, Data Analytics, Modeling, GHG Inventory, Sustainability, Smart Cities, Biogas; IIT Bombay Graduate

Trekking, Travelling, Running & Biking

“There is always another perspective but the choice is always yours”



SUNIL MANI
Research Analyst

Development Economics, Energy and Health, Impact Evaluation, Policy Analysis; Masters in Economics, Shiv Nadar University

Nature, Travel, Trekking, Running & Cricket

“People who wonder whether the glass is half empty or half full miss the point. The glass is refillable.”



POONAM NAGARKOTI
Research Analyst

Energy Modelling, Sustainability, Renewables, Environment Management Post-Grad, Life Sciences and Education Grad

Travel, Gardening, Crafts and Nature

“When the going gets tough, the tough get going.”

Joseph Kennedy



SHRUTI NAGBHUSHAN
Research Analyst

Climate Change Mitigation, Energy Planning, Energy Access, Social Justice; Masters in Climate Change and Sustainability Studies, TISS; Post-Grad in Journalism, St. Xaviers Mumbai; Mechanical Engineer

Board Games, Puzzles, Painting, Trekking

“Time stays long enough for anyone who will use it”

Leonardo Da Vinci



KANGKANIKA NEOG
Research Analyst

Water Resources, Hydrological Modelling, Geographical Information Systems, Postgraduate in Environmental Studies and Resource Management, TERI University.

Music Aficionado, Cinema Enthusiast, Fiction Freak

“Only from the heart can you touch the sky.”

Rumi



SUMIT PRASAD
Research Analyst

Energy Efficiency - Perform Achieve & Trade (PAT) & Demand Side Management (DSM), Climate Change, Environmental Social & Governance Research, TERI - MBA Business Sustainability, National Institute of Engineering - Mysore

Football, Travel

“The person with big dreams is more powerful than one with all the facts”

Albert Einstein



ANJALI VISWAMOHANAN
Research Analyst

Energy Law & Policy, Project Finance Lawyer, Gujarat National Law University

Travel, Movie & TV Show Buff, Aspiring Polyglot

“Why stop dreaming when you wake up?”

Neil Gaiman



SHIKHA BHASIN
Associate Fellow

Innovation Systems, International Technology Cooperation, Renewable Energy Policies, International Climate Politics, London School of Economics and Politics Masters in Global Politics, Advisory Board Member of UNFCCC’s Climate Technology Centre, Worked at the German Development Institute, Energy research Centre of the Netherlands

Fanatic about baking, travelling, reading and eating

“There is nothing noble in being superior to your fellow man; true nobility is being superior to your former self”

Ernest Hemingway



DIVYA KHANNA
Communications Specialist

Strategic Communications, Content Specialist, Brand Management, Public Relations, Digital Media Management; XIC Post-Grad in Journalism, Masters in International Development, University of Manchester; Worked at Commonwealth Human Rights Initiative, CNN IBN.

Reading, Traveling, Movies

“Fear kills more dreams than failure ever will”

Suzy Kassem



POOJA RASTOGI
Events Coordinator

Strategic Event/Conference/
Exhibition Planning & Execution,
Customer Relationship
Management, Conceptualisation,
Price Negotiation, Procurement;
English Grad

Travel, Movies, Music

**“In a gentle way, you
can shake the world”**

Mahatma Gandhi



AARTI KATYAL
Office Administrator

Administrator, Executive Assistant to
CEO; Post-Grad in HR & Supply Chain
Management.

Music, Dance, Art, Cooking & Cinema

**“Don’t waste a good
mistake. Learn from
it.”**



VIKAS PANDEY
Senior Finance Officer

Budgeting, MIS Preparation, Internal
Audit, Statutory Compliance Check,
Fund Management, Financial
Reporting, FCRA ; Qualified
Chartered Accountant - ICAI, MBA -
ICFAI University

*Philosophising, Playing Music, Singing
& Writing*

**“Risk comes from not
knowing what you’re
doing”**

Warren Buffett



SANDHYA SINGH
Administrative Assistant

Office Administration, HR Executive,
MBA- HR & IT, ‘A’ Level from DOEACC
Society, ‘OCA’ Certification from
ORACLE

*Travelling, Dancing, Cooking &
Reading*

**“Confidence comes not
from always being right
but from not fearing to be
wrong”**



KAMAL SINGH
Finance and Accounts Executive

Company Accounts, Taxation,
Auditing & Internal Control,
Financial Management; Accounting
Technician Course (ATC) from ICAI

Cricket, Music & Social Work

**“The most wasted
day in life is the day
in which we have not
laughed”**

Charlie Chaplin

“Special thanks to Shalu Agrawal, Aditya Bahadur, Poulami Choudhury, Marutendra Karyee, Pallav Purohit, Sudatta Ray, Ankita Sah, Mihir Shah, Simon de Stercke, and Komal Verma for their contribution to CEEW over the last year.

We would like to thank the following interns for their support: Anubha Aggarwal, Shaloni Dash, Antara Khaitan, Payal Mitra, Aniket Saha, Nandini Shandilya, and Vaishali Vasudev.



Inflexion Points

Since October 2014, Dr Arunabha Ghosh has been writing a monthly column 'Inflexion Points' for the Business Standard, one of India's leading business dailies. Over the last year, he has shared his thoughts and insights on a range of issues including climate action, climate technology partnerships, COP21 climate negotiations, critical minerals, decentralised energy, energy security, global political economy, International Solar Alliance, and renewable energy finance and skills.

Energy security, not independence

Brown coal and lignite energy reserves will grow faster than that of any other country in the G-20. India's share in the daily oil needs that are expected to rise to 25 per cent by 2024. India will not be the highest energy consumer, but will remain at the highest. India, it will be a rising power in global energy markets with strong national interest in self-sustaining markets.

The Indian government is deeply concerned about the rising share of oil in its energy mix. India's oil needs are expected to rise to 25 per cent of its demand in 2024, up to 30 per cent in 2034 and to 40 per cent in 2049. Coal imports have been rising year on year, reaching over 20 per cent of demand. By 2030, imports of oil are likely to rise to the level of 2014-15.



INFLEXION POINTS

While ownership of assets might have limited role in times of crisis, it has a major role in the long-term strategy because of the huge investments required. India's energy security is not just about oil and gas demand in 2024, but also about the financial resources to compete with other countries, the risks of exporting to politically fragile areas, and the opportunity cost of not selling more production in the future.

Critical minerals for new mines minister

A Power, Coal and Petroleum Minister will be appointed to oversee the critical minerals sector. The new minister will be responsible for the overall strategy of the critical minerals sector.

India's mining sector has been under a lot of pressure. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.



INFLEXION POINTS

There is a lack of clarity on resource availability of key minerals. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.

Effective climate tech partnerships

Technology is widely recognised as one of the key drivers for climate change. The government is looking for ways to attract investment and improve the sector's performance.

The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.



INFLEXION POINTS

US Department of Energy's SunShot initiative was designed with this purpose. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.

Put off-grid on radar

Over 1000 villages were identified as off-grid. The government is looking for ways to attract investment and improve the sector's performance.

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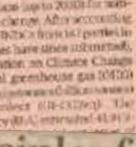
INFLEXION POINTS

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For a few degrees more

The Paris Agreement on climate change is being widely hailed as a stepping stone for collective action. It is a landmark agreement.

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INFLEXION POINTS

The Paris Agreement on climate change is being widely hailed as a stepping stone for collective action. It is a landmark agreement. The government is looking for ways to attract investment and improve the sector's performance.

10 principles for climate negotiations

Principle 1: Climate action can be achieved if the global community is united. The government is looking for ways to attract investment and improve the sector's performance.

The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.



INFLEXION POINTS

Principle 1: Climate action can be achieved if the global community is united. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.

Shining the light on climate action

At the core of the Paris Agreement on Climate Change is the aspiration of greater transparency based on a robust mechanism for review and verification of greenhouse gas emissions and related activities. But a lot will be needed to make it happen.



INFLEXION POINTS

Other products are accurately to these units but better factors exist on the economic metrics that define them. To generate the best climate action, we need to do more.

Wanted! Clean energy investors

The biggest challenge for the renewable energy sector in India today is the shortage of investment. India has the potential to become a global leader in clean energy.



INFLEXION POINTS

Investors are needed to fund the growth of the renewable energy sector. The government is looking for ways to attract investment and improve the sector's performance.

An unsettled political economy

In late February, a World Trade Organization (WTO) panel ruled against India on domestic content requirements for solar panels. The government is looking for ways to attract investment and improve the sector's performance.



INFLEXION POINTS

The WTO panel ruled against India on domestic content requirements for solar panels. The government is looking for ways to attract investment and improve the sector's performance.

Building the International Solar Alliance

The International Solar Alliance (ISA) is an exciting and bold initiative. Launched on the first day of the COP21 climate negotiations in Paris, it is the first of its kind.



INFLEXION POINTS

The ISA is an exciting and bold initiative. Launched on the first day of the COP21 climate negotiations in Paris, it is the first of its kind. The government is looking for ways to attract investment and improve the sector's performance.

Skill up or scale down ambitions

The current rate of installing new electricity capacity in the United States is about 10 gigawatts (GW) per year. India is looking for ways to attract investment and improve the sector's performance.



INFLEXION POINTS

The current rate of installing new electricity capacity in the United States is about 10 gigawatts (GW) per year. India is looking for ways to attract investment and improve the sector's performance.

India's solar market: What's next?

India's solar market is growing rapidly. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.

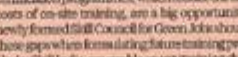


INFLEXION POINTS

India's solar market is growing rapidly. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.

First, ramp up training programmes through ISAT

India's solar sector is growing rapidly. The government is looking for ways to attract investment and improve the sector's performance. The new minister will be responsible for the overall strategy of the critical minerals sector.



INFLEXION POINTS

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India unveils global solar alliance of 120 countries at Paris climate summit

business today in

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133.84 6.62% 35.23 6.87% -9.12 -390 -6.77%

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Any deal in Paris unlikely to keep global temperature rise in check: Arunabha Ghosh

Sarika Malhotra Last updated: December 8, 2015 12:10:48T



Arunabha Ghosh, CEO of the Council on Energy, Environment and Water.

WE RECOMMEND Arunabha Ghosh, CEO of the Council on Energy, Environment and Water, tells BT's Sarika Malhotra that India's leadership of the International Solar Alliance is an example of the country setting the agenda for action on climate change.

BT: At the Paris talks, PM Modi spoke extensively about national commitments being consistent with the space carbon space nations occupy. How were his

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HIDDEN TREASURE FOR MAKE-IN-INDIA

Study Spots 12 Minerals for India's Economic Growth

CEEW study says these minerals will support govt's low-carbon plans for

Our Bureau

Kolkata: Twelve critical minerals could play an important role in the success of 'Make in India' programme and the sustainable growth of the Indian economy, a study released by the Council on Energy, Environment and Water (CEEW), a leading policy research body said on Tuesday. The critical minerals including beryllium, germanium, rare earths (heavy and light), rhenium, tantalum, etc find specialised use in a range of industries and modern applications, such as aerospace, automobiles, cameras, defence, entertainment systems, laptops, medical imaging, nuclear energy and smartphones.

These critical minerals will also play a role in nurturing the domestic manufacturing capacity to support the government's low-carbon plans, such as the 100GW (giga watt) solar target, faster adoption and manufacturing of hybrid and electric vehicles, and the national domestic efficient lighting programme.

The CEEW study comes on the heels of the National Mineral Exploration Policy, 2016 (NMEP) unveiled earlier this month, which focuses on prioritisation of regional and detailed exploration critical minerals of importance to industry and national security.

The study, supported by the Department of Science and Technology

Critical Minerals

12 minerals (out of 49 evaluated) critical for domestic manufacturing in 2030

India 100% dependent on imports for 7 of the 12 critical minerals



China leading supplier of 6 of 12 minerals

THE 12 CRITICAL MINERALS & THEIR USES

BERYLLIUM: nuclear & aerospace, airbags & alloys used in Hubble Space telescope

CHROMIUM: stainless steel, leather tanning

GERMANIUM: semi-conductors, fibre optics, infrared night vision, wide angle camera lenses

GRAPHITE: batteries, electric vehicles, smartphones, cameras, solar panels LED components

LIMESTONE: cement & iron production

NIOBIUM: used as a super alloy in aerospace, missiles, jets, computer screens, camera lenses

RARE EARTH ELEMENTS: clean energy (solar, windmills, electric vehicles), flat screen TVs, portable X-rays, nuclear reactors

RHENIUM: oven filaments, x-ray machines, turbine blades, water resistant materials

SILICON: solar panels

STRONTIUM: Glow-in-dark paints and plastics, wireless devices and memory chips

TANTALUM: laptops, desktops, smartphones, nose cone of supersonic aircraft, aircraft engines and rocket engines

ZIRCONIUM: military applications, specialty alloys, jewellery, nuclear fuel cladding, high temperature ceramics



SOURCE: COUNCIL ON ENERGY, ENVIRONMENT, WATER

gy (DST), provides a first-of-its-kind framework for India to assess the impact of critical minerals on the manufacturing sector. The country presently has no declared domestic reserves for majority of the identified critical minerals and

may be heavily import dependent on China for a few of them over the coming years, the study pointed out. "The study will open new vistas for R&D and collaborations for securing assured supplies of critical minerals," Ashutosh Sharma



60 किस देश में कितना उत्सर्जन उत्सर्जन में चीन अमेरिका

राज्य का चायला, शोधकर्ता, CEEW

गु डोलकिया, शोधकर्ता, CEEW

2015-16 Highlights @ CEEW

COMMENT



Rethink India's energy strategy

Address the needs of poor and rural households, target subsidies and support low-carbon industries, urge **Arunabha Ghosh** and **Karthik Ganesan**.

India's policy makers have three big energy goals: providing everyone with access to energy, securing energy supply and ensuring energy security, and ensuring energy access to all. These important concerns must be prioritized. Energy access cannot be achieved by providing a single target such as supplying power to India's 247 million people. India has deep divides in the quantity and quality of energy consumed across income groups and between rural and urban households. Fuel subsidies are being diluted due to the need to reduce them to reduce energy security on heavy demand. And because of the need to reduce them, larger subsidies, there is little left in the global carbon budget before planetary safety limits are breached. Clean energy and alternative growth is imperative.

India's energy priorities should be reformulated to address its different energy demands of citizens of various economic strata. In doing energy subsidies to benefit the poor, we are providing low-carbon industry.

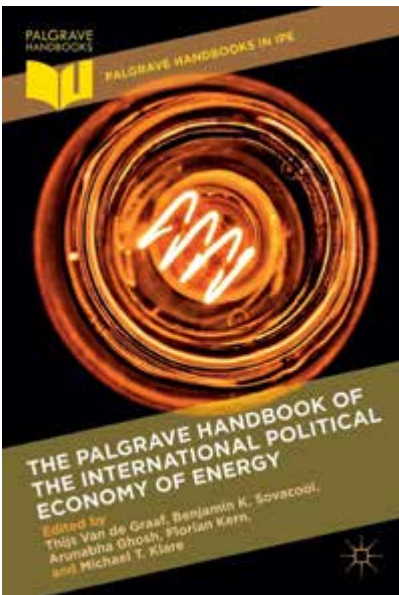
ENERGY SECURITY India has to have a reliable 24/7 electricity supply. It is being currently short of peak demand times such as during evening hours. More than one-third of India's households, mostly poor and rural, are not connected to the electricity grid. For those that are, households have to queue a day. The poorest households consume one-quarter of the energy of those at the highest income levels. Urban centers are in effect subsidised by rural areas, which are being provided for the industrial sector. The poorest households pay 10% more per unit of energy than the rich.

India's energy security depends on its ability to deliver more electricity through the grid while deepening cleaner energy sources. The Indian government has announced ambitious plans for renewable energy up to 175 gigawatts (GW) of installed capacity by 2022. There are many challenges of achieving this target. First, the availability of resource data on which to base decisions and managing risks to the high and variable variability across the grid in terms of energy prices and intermittence. Meanwhile, the promise of reliable electricity through centralized and decentralized

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2015'S MOST INFLUENTIAL OPINION PIECES

Dr Arunabha Ghosh and Karthik Ganesan's comment essay 'Rethink India's energy strategy' published in May was picked as one of 2015's most influential expert opinions by Nature's editorial team.



THE PALGRAVE HANDBOOK OF THE INTERNATIONAL POLITICAL ECONOMY OF ENERGY

Edited by **Trijntje Van de Graaf, Benjamin K. Sovacool, Arunabha Ghosh, Florian Kern, and Michael T. Klare**

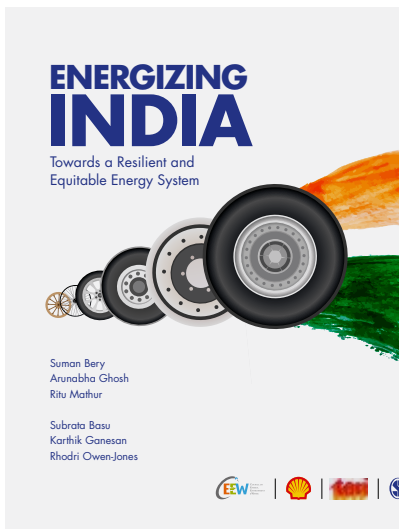
THE PALGRAVE HANDBOOK OF THE INTERNATIONAL POLITICAL ECONOMY OF ENERGY

This handbook, co-edited by Dr Arunabha Ghosh, is the first volume to analyse the International Political Economy, the who-gets-what-when-and-how, of global energy.



PERSONNALITÉ D'AVENIR

In September, the French Ministry of Foreign Affairs and International Development hosted Dr Arunabha Ghosh in France for a series of meetings and interactions with senior government officials, climate experts and captains of the industry as part of its 'Invitation Programme for Promising Personalities'. During his visit, Dr Ghosh had meetings with advisers to President François Hollande, Minister Laurent Fabius, Minister Ségolène Royale, COP 21 inter-ministerial team, Ministry of Economy and Finance, and French National Institute for Intellectual Property.



ENERGIZING INDIA

Towards a Resilient and Equitable Energy System

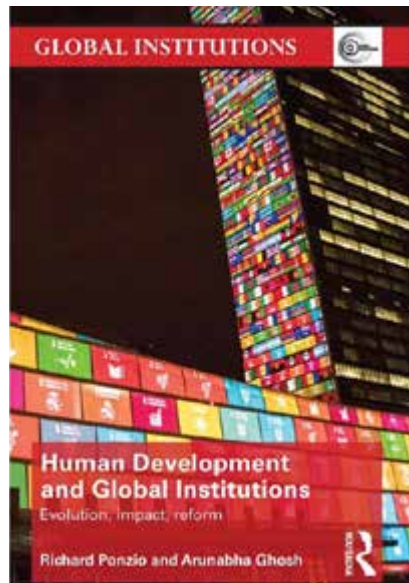
Suman Bery
Arunabha Ghosh
Ritu Mathur

Subrata Basu
Karthik Ganesan
Rhodri Owen-Jones

CEEW | Shell | TERI | IISD

ENERGIZING INDIA

The book written jointly by CEEW, Shell and TERI provides insights on India's energy transformation and the cross-cutting challenges it faces. The book provides seven scenarios and three modelling techniques for a 2050 time horizon.



GLOBAL INSTITUTIONS

Human Development and Global Institutions

Evolution, impact, reform

Richard Ponzio and Arunabha Ghosh

HUMAN DEVELOPMENT AND GLOBAL INSTITUTIONS: EVOLUTION, IMPACT, REFORM

A quarter century after the Human Development Report was first published, Dr Arunabha Ghosh's recent book (co-authored with Richard Ponzio) discusses the foundational ideas associated with human development, examines the concept's evolution and discusses how it has embedded into international policy frameworks and global institutions.



THE ACCESS FILM

The ACCESS short film on realities and challenges of energy access in rural India was premiered in September 2015 in the presence of Hon'ble Minister Shri Piyush Goyal. This film is based on CEEW's ACCESS (Access to Clean Cooking Energy and Electricity – Survey of States) study.

Nations Unies

Conférence sur les Changements Climatiques 2015

COP21/CMP11

Paris France



CEEW's Climate Research and COP 21 Contributions

JAN

- Dr Arunabha Ghosh and Ms Laurence Tubiana (Special Representative of the Minister of Foreign Affairs for COP21) led a discussion on 'The Climate Question: COP21 in Perspective' at an India-French Dialogue organised by Science-Po-CERI

FEB

- Hosted the first public discussion on India's INDCs with the Environment Minister as the keynote speaker

MAR

- Hosted conference on 'Risks of Climate Change to Global Economic Development and Security'
- Published study 'The Costs of Climate Change Impacts for India'

APR

- Conducted sector-specific modelling in the buildup to the designing of India's INDC on the request of the Government of India

MAY

- Published study on 'India's Long-Term HFC Emissions'
- Co-hosted dialogue on 'Technology Partnerships' with the Embassy of France in India

JUN

- Railways Minister released study on 'Solar Potential of Indian Railways'
- Published study on 'Predicted Increases in Heat Stress Related Health Impacts'

JUL

- Book on 'Climate Change: A Risk Assessment' released at the Bombay Stock Exchange

AUG

- Co-hosted dialogue on 'Climate Change and Health Risks' with the Embassy of France in India

SEPT

- Published two papers on 'Technology Partnerships'
- Co-hosted media briefing on 'India's Climate Change Perspectives and Priorities' with Vasudha Foundation

OCT

- Co-hosted dialogue on 'Towards Paris and Beyond: Means of Implementation and Cooperation' with the Delegation of the European Union in India
- Published analysis decoding India's INDCs

NOV

- Co-hosted a roundtable discussion on 'Energy Storage Collaborations' with the Embassy of France in India
- Published joint study on 'India's Adaptation Gap'

DEC

- CEEW scholars participated in the COP21 Conference in Paris, showcasing CEEW's research and several of India's climate change adaptation and mitigation initiatives

130+

research projects undertaken

70+

peer-reviewed policy reports and papers published

260+

times advised governments around the world

50+

occasions promoted bilateral and multilateral initiatives between governments

140+

conferences and seminars organised







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