



CONNECTING DOTS

Solving global challenges through an integrated approach

Year-in-Review 2012-13

CEEW addresses development challenges at all levels of governance

Global



Sustainability finance



Energy-trade-climate linkages



Technology horizons



International co-operation

National



Resource efficiency & security



Renewables

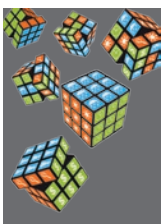


Water

Local/State



Integrated energy, environment and water plans



Description of the cover page image: CEEW's thematic research areas strive to integrate energy, environment and water at different levels of governance. This integrated approach is a challenging one, much like solving a Rubik's cube. Everyone agrees what the final solution should be like. The paths to reach the solution are many and the constraints each path poses, even more plentiful. It is a parable that captures the integrated picture presented by energy, environment and water. Unravelling it leads to a more chaotic configuration in the process, where one could question if the approach is the right one. It is a learning process where there are ups and downs; twists and turns. The Council on Energy, Environment and Water strives to find holistic solutions, overcome constraints, and help pave the pathway for sustainable development of the planet's resources.

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“...you have carved out a very distinct niche for yourself by taking an integrated approach to issues, which are becoming more and more important to all of us. It is quite remarkable what you have done in such a short span of time.”

Ambassador **Shivshankar Menon**, National Security Adviser of India
Excerpt from his keynote address at CEEW's Second Anniversary

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Ambassador Shivshankar Menon delivers a keynote lecture on Resources and National Security at CEEW's Second Anniversary celebrations

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In June 2013, the International Centre for Climate Governance ranked CEEW 15th globally and number one in India in its first ranking of climate-related think-tanks.

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Download our report:
www.ceew.in/annualreport

LEADERSHIP PERSPECTIVES

A message from our Chairperson and Co-Chairperson



Suresh Prabhu

India's economic growth has slowed down causing concerns to the industry and common man alike. Economic growth has slowed down for many reasons, the main reason being lack of robust policies and lack of implementation of policies that do exist. However, there seems to be less concern about the deteriorating condition of natural resources that are depleting fast and what remains is highly polluted. The type of energy we use is unsustainable. There have been public protests to change policies as more power plants continue to be installed. Despite these developments, there is no discussion on the linkages between the use of natural resources and economic growth.

CEEW has emerged as a leading think-tank that focuses on solutions to global issues as well as their application in local conditions.

The annual economic growth of a country cannot be sustainable unless the use of natural resources is factored in. Unfortunately, the slowdown of economic growth is also coinciding with the abuse of natural resource use in India. It is

an opportune time to develop a model wherein growth is based on the judicious and prudent use of natural resources without which no edifice of an economic model can ever be erected successfully.

Energy, environment and water are concerns of the common people anywhere in the world but particularly in a developing country like India. CEEW has demonstrated that we now have to address those concerns and look at a development model, which can take into account the sustainable use of natural resources. It endeavours to deepen understanding about the importance of a holistic development model that takes into account economic, social, ecological and political parameters.

CEEW has emerged as a leading think-tank that focuses on solutions to global issues as well as their application in local conditions. I am very confident of CEEW's ability to address present and future challenges in a meaningful way. This will help several countries in the world, particularly the poor, to chart out a new development model encompassing all their concerns.

In its short journey of three years, CEEW has produced absolutely remarkable results, which are inspiring for any young organisation. I wish to thank all stakeholders, both internal and external, for their cooperation. I am confident of their continued cooperation.

Suresh Prabhu

Chairperson, CEEW; Former Union Minister of Power, Environment & Forests, Industry, Chemicals & Fertilisers, Heavy Industry & Public Enterprises



Jamshyd Godrej

The decisions that India takes to tackle its development challenges - energy access, resources security, and climate change - will significantly shape the sustainability for the world. There are no easy solutions, given the complexity of the challenges we face. Indian policymakers need to identify opportunities, which could trigger a shift in the way global commons are governed today.

Indian industry will also have an important role to play in developing sustainable business practices, both in the production of goods and services and in the types of consumption behaviour it encourages. If industry innovates - such as with more efficient appliances, better designs of buildings, wastewater reuse, or waste-to-energy in industrial units - consumers will follow.

CEEW plays a unique role, first by developing the business case for sustainability across a range of interventions (energy efficiency, phase-down of hydrofluorocarbons, on-grid and off-grid renewable energy) and secondly, by outlining a cohesive framework for policies to facilitate action within and outside India. This solution-based approach has earned CEEW respect from governments, industry and civil society across the world. I congratulate CEEW for raising the bar of quality research in India. CEEW is now a key player for informing reasoned and rational public debate on the governance of the planet's resources.

Indian policymakers need to identify the opportunities for affecting a paradigm shift in the way global commons are governed today.

Jamshyd N. Godrej

Co-Chairperson, CEEW; Chairman, Godrej and Boyce Manufacturing Company Pvt. Ltd.

WHAT NEXT FOR CEEW?

A message from the Chief Executive Officer



Arunabha Ghosh

Three years is not a long period in an institution's history. But they can be memorable in several ways. In August 2013 CEEW completes three years of operations. In this time we have been engaged in 40 research projects, published 18 peer-reviewed policy reports and papers, been invited to advise governments around the world 44 times, engaged with industry dozens of times to encourage investments in clean technologies and improve efficiency in the use of resources, promoted bilateral and multilateral initiatives between governments on 16 occasions, helped state governments with water and irrigation reforms, and organised more than 40 roundtables, seminars, workshops and conferences. Throughout, our effort has been to demonstrate the value of our integrated approach to sustainability concerns, to have an international focus on issues of global concern, and to cherish our independence by ensuring that all our research and initiatives are in the public domain, not in the hands of a few. We were, therefore, enthused and excited when, in June 2013, CEEW was ranked as India's number 1 energy- and climate-related think-tank and 15th globally!

As this annual report will demonstrate, we have increasingly devoted our energies to solving problems. Having established a strong reputation for the quality of our research, we were keen to conceptualise projects that found practical solutions, whether within India or outside. For instance, we worked closely with the Government of Bihar to devise a strategy for restructuring the minor water resources department. Our recommendations were based on extensive field visits and consultations with field officials, farmers, water user associations and others, to ensure that they would indeed result in improved service delivery. Another example was how we built on our deep expertise in climate finance to design results-based financing instruments to expand the scale of deployment of solar hot water systems in urban India and for innovative business models for energy access in rural areas.

With our problem-solving hats on, we deepened our engagement with industry. Our project on climate change and business leadership in India demonstrated that using municipal solid waste as a source of alternative energy would offer new fuel sources to cement plants, thereby increasing their efficiency, reducing their emissions and

offering positive economic returns. Similarly, we worked with firms, industry associations and other research institutions to develop the business case for a phase-down of hydrofluorocarbons, which are far more potent as greenhouse gases than carbon dioxide. And at the global level, we showed leadership in pushing for open markets for clean energy products and services, offering innovative ways by which international trade disputes over clean energy could be reduced.

We took the lead in conceptualising and investigating what the resource nexus looks like from India's perspective.

So what next for CEEW? Two areas, in particular, stand out in our strategic vision for sustainability. First, we took the lead in conceptualising and investigating what the resource nexus looks like from India's perspective. Although there is a lot of concern about the energy-climate-food-water nexus, there is still a lot of work to be done for Indian policymakers and industry to fully grasp the complexity presented by the resource nexus. CEEW will build on its expertise in this area over the coming years to explain patterns in resource scarcity, impacts on commodity markets, vulnerabilities in resource supply infrastructure, and implications for geopolitics.

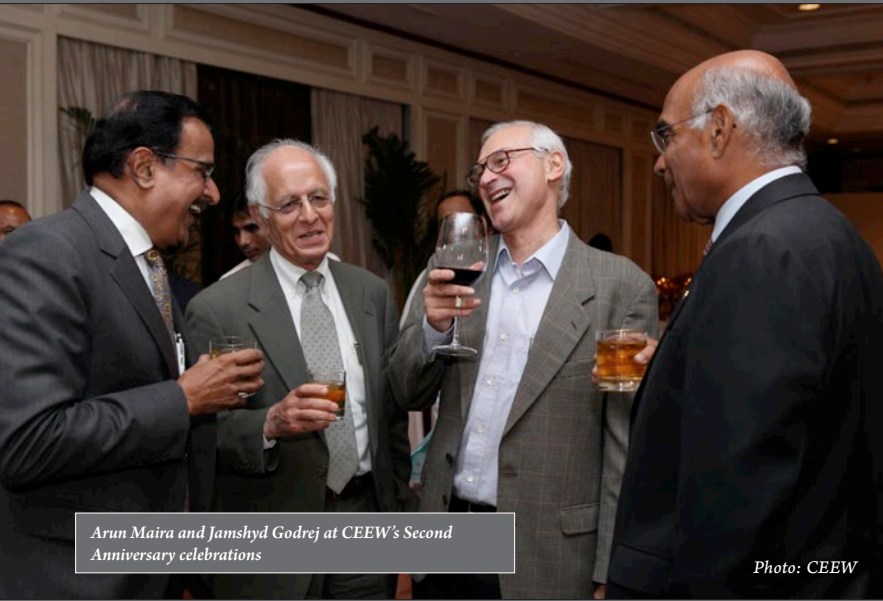
A second major focus of our work will be on promoting decentralised solutions, particularly in off-grid energy markets. We believe that by creating networks to deliver operational services to social entrepreneurs, an ecosystem of clean energy solutions could be built and expanded across the country. Clean and affordable energy – and water – forms the bedrock for human development, allowing children to go to school, improving life expectancy at home, and opening up livelihood opportunities for the poor. CEEW will work to build such an ecosystem in partnership with hundreds of social enterprises around the country.

We believe that by creating networks to deliver operational services to social entrepreneurs, an ecosystem of clean energy solutions could be built and expanded across the country.

CEEW was created to demonstrate how high quality research could be leveraged, with the support of government, industry and civil society, to find solutions to problems that we see all around us. We have come a long way in three years; we are raring to go into the future.

Arunabha Ghosh
Chief Executive Officer, CEEW

EVENTS AND OUTREACH



Arun Maira and Jamshyd Godrej at CEEW's Second Anniversary celebrations

Photo: CEEW



Photo: CEEW

Lecture by Dr Arun Majumdar, first Director of U.S. Advanced Research Projects Agency-Energy (ARPA-E)



Photo: CEEW

Dr Isher Judge Ahluwalia, Chairperson, ICRIER chairs a CEEW-Veolia roundtable on regulatory frameworks for water management



Photo: IASS

Meeting of the International Working Group on Short Lived Climate Pollutants 2012, Potsdam, Germany



Mr Tarun Das with Prof. Radha Kumar

Photo: CEEW

Mr Tarun Kapoor, Joint Secretary, MNRE, launches CEEW's report on India's National Solar Mission

Photo: CEEW

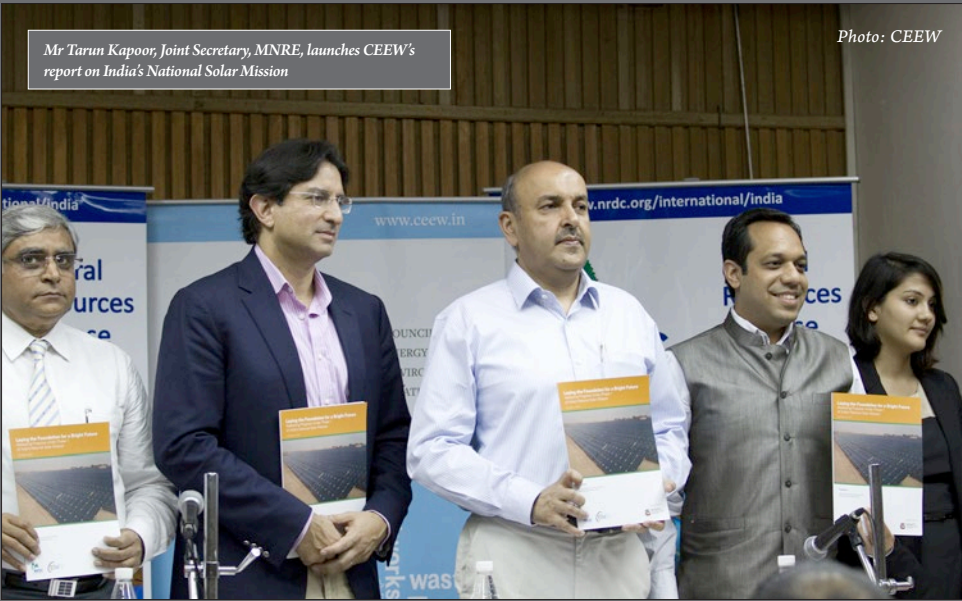


Photo: GLTE@Xynteo



Global Leadership & Technology Exchange in Berlin

Suresh Prabhu and Union Minister Farooq Abdullah at CEEW's session on Leapfrogging to a Clean Energy Future

Photo: CEEW



CEEW deposed at a special hearing of the Brazilian Senate in Rio de Janeiro

Photo: Agro Brasil@Rio+20, SENAR





INDIA'S RESOURCE NEXUS: PRIORITIES FOR ACTION

Resource security matters for India and the global economy



Photo: CEEW

(Above) Dialogue with Sir John Beddington, UK's Chief Scientific Adviser and Dr. R. Chidambaram, India's Principal Scientific Adviser



Photo: The Economist.

(Above) CEEW contributed to a white paper on India's Energy Future, released by former President Dr APJ Abdul Kalam



ARUNABHA GHOSH

Resource security matters for India. It has to simultaneously secure energy, water, and other minerals to support economic growth; meet basic needs for food, fuel, and water for a growing population; and manage the environmental constraints and consequences of increased resource use. It has to compete in international resource markets even as global energy and food prices have become more volatile in recent years.

Energy, food, water and climate form a resource nexus, affecting each other. In agriculture oil accounts for 42% of

energy use, so high or volatile crude oil prices drive food inflation and impact the fiscal balance. With subsidised but poor quality electricity, farmers over-extract groundwater for irrigation from more than 16 million electrified pumpsets, leading to both water and energy shortages, and land degradation.

As environmental constraints are driving the demand for greater resource efficiency, India has to balance the cumulative demand for greater resource use with the risks of exposing itself to greater price volatility and environmental pressures.

Food markets are affected if crops are diverted to produce biofuels. And if food security is largely measured by rising stocks of foodgrains, then continued production of water-intensive crops, like rice in our northern states, will further deplete water tables. More than 80% water is used in agriculture



The percentage increase in energy demand in India by 2030



Current gap between coal supply and demand



Estimated increase in India's oil imports by 2030

with groundwater taking a majority share. As groundwater levels fall rapidly, food output will be adversely affected unless demand side efficiency measures are adopted.

India has to develop the infrastructure for importing and transporting energy resources, promote distributed energy infrastructure, and promote water use efficiency in agriculture.

Water is also critical for energy. Thermal power plants use nearly 88% of water used in industry. More than 70% of existing and planned thermal and hydro power capacity is located or expected in water-scarce or water-stressed areas. Even renewable energy, such as concentrated solar power, needs water for cooling.

Climate change multiplies risks across all sectors, with energy infrastructure and agriculture vulnerable to extreme weather events, and to rising temperatures, and changes in the distribution and extent of rainfall.

In response to this resource nexus, India has to, first, develop the infrastructure for importing and transporting energy resources: greater capacity for coal imports on the western coast, more oil and natural gas terminals in the east, larger strategic reserves of oil, and greater inland freight and pipeline capacity. Secondly, promote distributed energy infrastructure. A blend of different renewable energy sources via smart microgrids could reduce the grid load, offer energy access solutions, and allow for productive uses of renewable energy (agricultural operations, remote telecom infrastructure, schools and hospitals, etc.). Thirdly, promote water use efficiency in agriculture through energy policy reform, latest technologies, improved cropping practices, and participatory irrigation management along with farmers.

ceew.in/resources



Photo: CEEW

(Above) CEEW Roundtable on Water and Food Security with Professor Roberto Lenton, University of Nebraska

(Below) Talk by Amory Lovins, Author of "Reinventing Fire"



Photo: CEEW

YESTERDAY

Increase in population; energy consumption and economic growth slow.

TODAY

Increase in population, increase in economic growth, rapid increase in energy consumption.

TOMORROW

Stable population, increasing energy demand, reduced use of fossil fuels.



SCALING UP ENERGY ACCESS SOLUTIONS THROUGH EFFECTIVE NETWORKS

India needs an action-oriented countrywide network to help scale up energy access solutions to serve 80 million households without electricity



RAJEEV
PALAKSHAPPA

India is the world's fifth largest electricity producer, but 45% of rural households do not have access to electricity. The off-grid sector can be served through a range of business models, across technologies and scales of operation, through leasing, sales of home systems, community-based products, and mini grids with productive anchor base loads. Moreover, energy access in rural areas offers opportunities that go beyond minimum requirements for electricity and heat. It creates the foundation for livelihoods, investments in more value added activities, and social benefits in the form of access to education or improved health outcomes.

Collaboration amidst competition

CEEW, with the support of USAID, has been working to understand the potential for a countrywide network to support the off-grid ecosystem. We identified 250 firms working in this sector in India (and the number keeps changing as the market grows!). We also engaged with more than 100 individuals/firms to understand challenges within the off-grid energy market and what needs to be done to alleviate bottlenecks to allow off-grid enterprises to replicate and scale their operations.

A countrywide network for energy access and renewable energy could deliver operational services to off-grid energy entrepreneurs at costs lower than if the firms had to internalise the costs. CEEW's extensive analysis



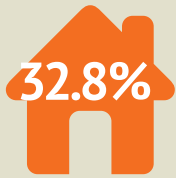
Photo: Arunabha Ghosh, CEEW

Installed SHW system in a rural home in Udupi district, Karnataka



Photo: Arunabha Ghosh, CEEW

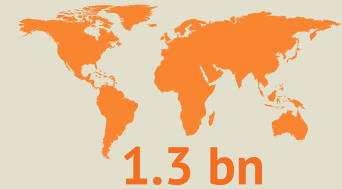
Vegetable vendor in Kundapur town, Udupi District, Karnataka, using rented solar charged lighting for his kiosk



Percentage of non-electrified households in India in 2011



Number of households that need to be electrified every hour to give electricity to all Indians by 2025



People without access to electricity globally

and stakeholder consultations across the country have revealed a need for services across several areas: market information; skills and training; technology and innovation; policy advocacy; and access to finance. Feedback from our consultations suggested that the network should initially focus on two core sets of services: technology innovation (including testing and certification), and skills & training. Specifically, the countrywide network would: work towards standardising performance benchmarks for technologies; support the creation of local technology testing facilities; and coordinate activities to support innovation linkages between firms and R&D institutions. On skills and training, the network would facilitate trainings for technicians and for managers of off-grid enterprises. Any of these tasks would likely cost individual firms more than if derived from the collective benefit of the network's services. Finally, there was strong support for the network to become the "go to point" for all information about the off-grid sector in India.

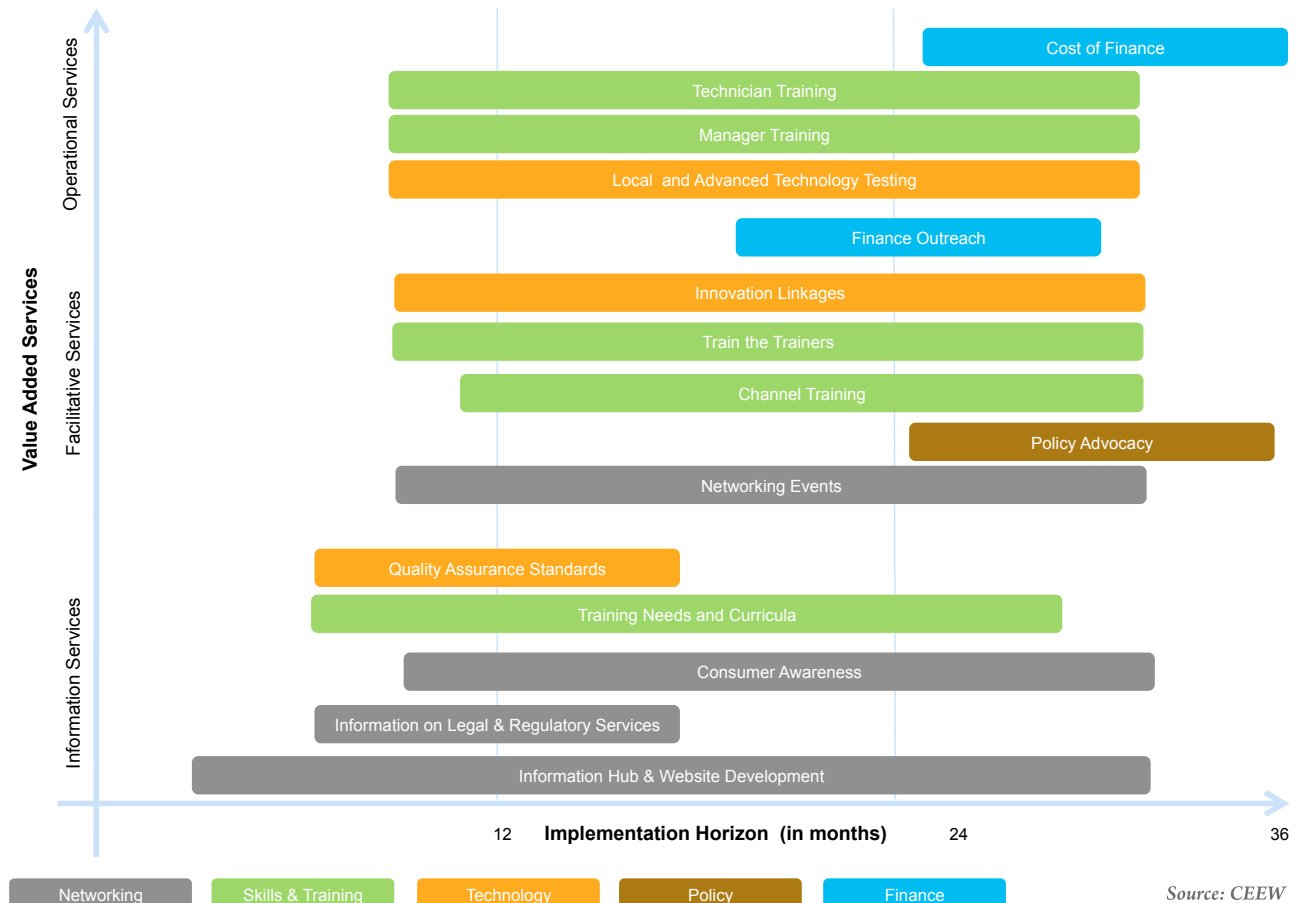


(Above) Multistakeholder consultation on off-grid energy solutions, Bangalore

We are continuing our discussions with stakeholders and formalising the roadmap to implement the network. In the meantime, keep in touch with our off-grid activities through

- ceew.in/energyaccess
- ceew.in/solar
- ceew.in/renewables

(Below) Diagram showing evolution of a countrywide network to promote off-grid energy access solutions.

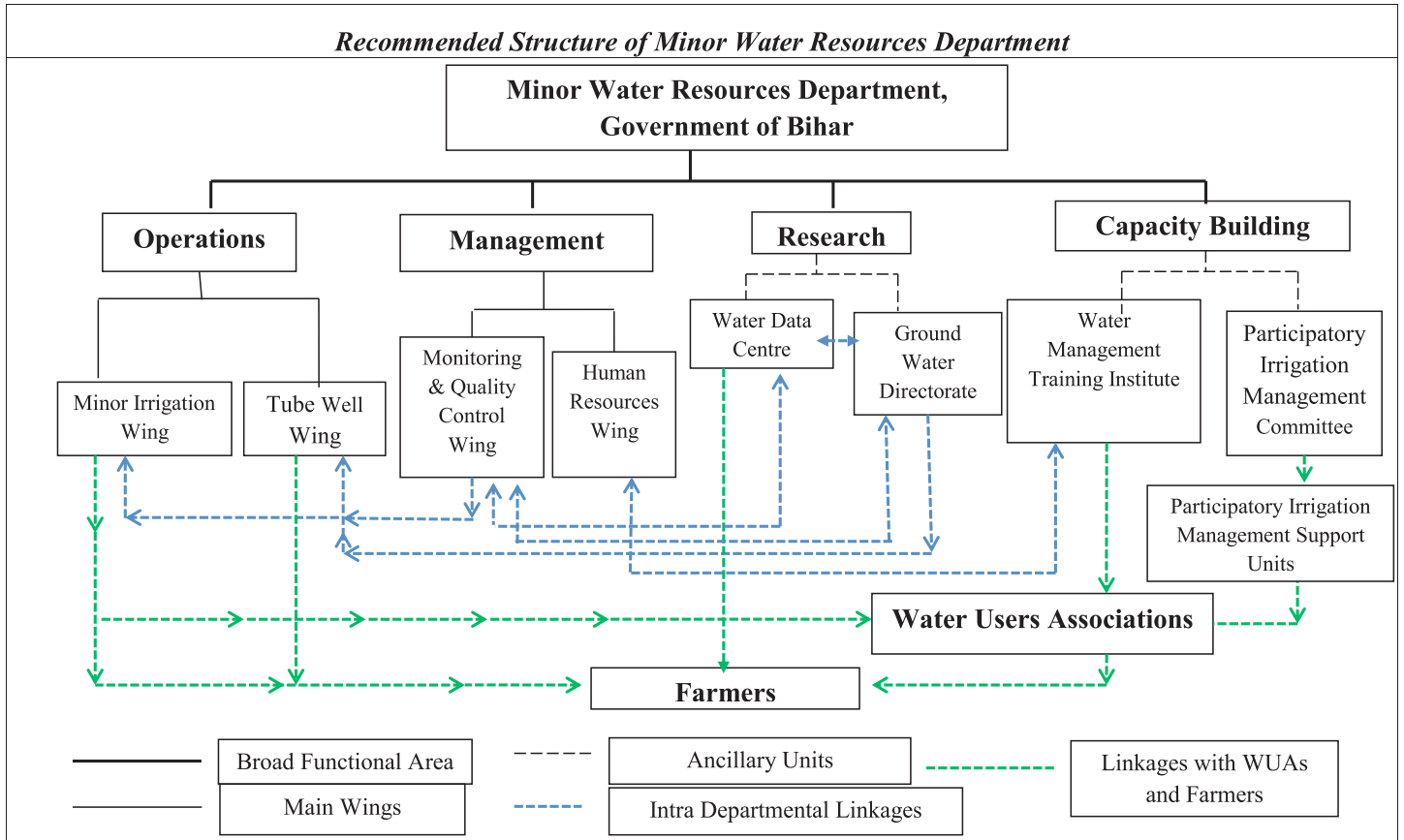


Source: CEEW



INSTITUTIONAL REFORMS FOR IMPROVED IRRIGATION SERVICES

Efficiency is critical for a resource-constrained economy; institutional reforms are part of the solution



Field surveys with farmers in Bihar

Source: CEEW

A dried-up well in the state of Bihar

Photo: Rudresh Sugam, CEEW



RUDRESH SUGAM

Bihar's is an agrarian economy and agricultural development depends on increasing irrigation and cropping intensity. For a state with 96% of the farmers classified as small and marginal, the focus must be on developing and maintaining minor irrigation infrastructure in the state.

When the Minor Water Resources Department, Government of Bihar requested CEEW to support its work, CEEW seized the opportunity to facilitate change in favour of the state's agriculture growth targets.

Farmers are the backbone of any agricultural system. CEEW conducted extensive field visits in five districts of Bihar besides conducting meetings with departmental officials at all levels. Our team also met Water User Associations to understand their challenges in



Sanctioned posts for Junior Engineers in the Minor Water Resources Department



Number of posts filled by regular staff



Number of posts suggested by CEEW

representing varied farmers' interests and engaging with irrigation officials. This was supplemented by secondary research on water-related institutions and practices in India and a few other countries.

The poor state of existing infrastructure and the lack of adequate human resource capacity meant that departmental officials were saddled with multiple responsibilities without supporting resources or technology. The resulting quality of service had increased mistrust among farmers. The department was keen to overturn this situation, rehabilitate the minor irrigation infrastructure and offer improved services.

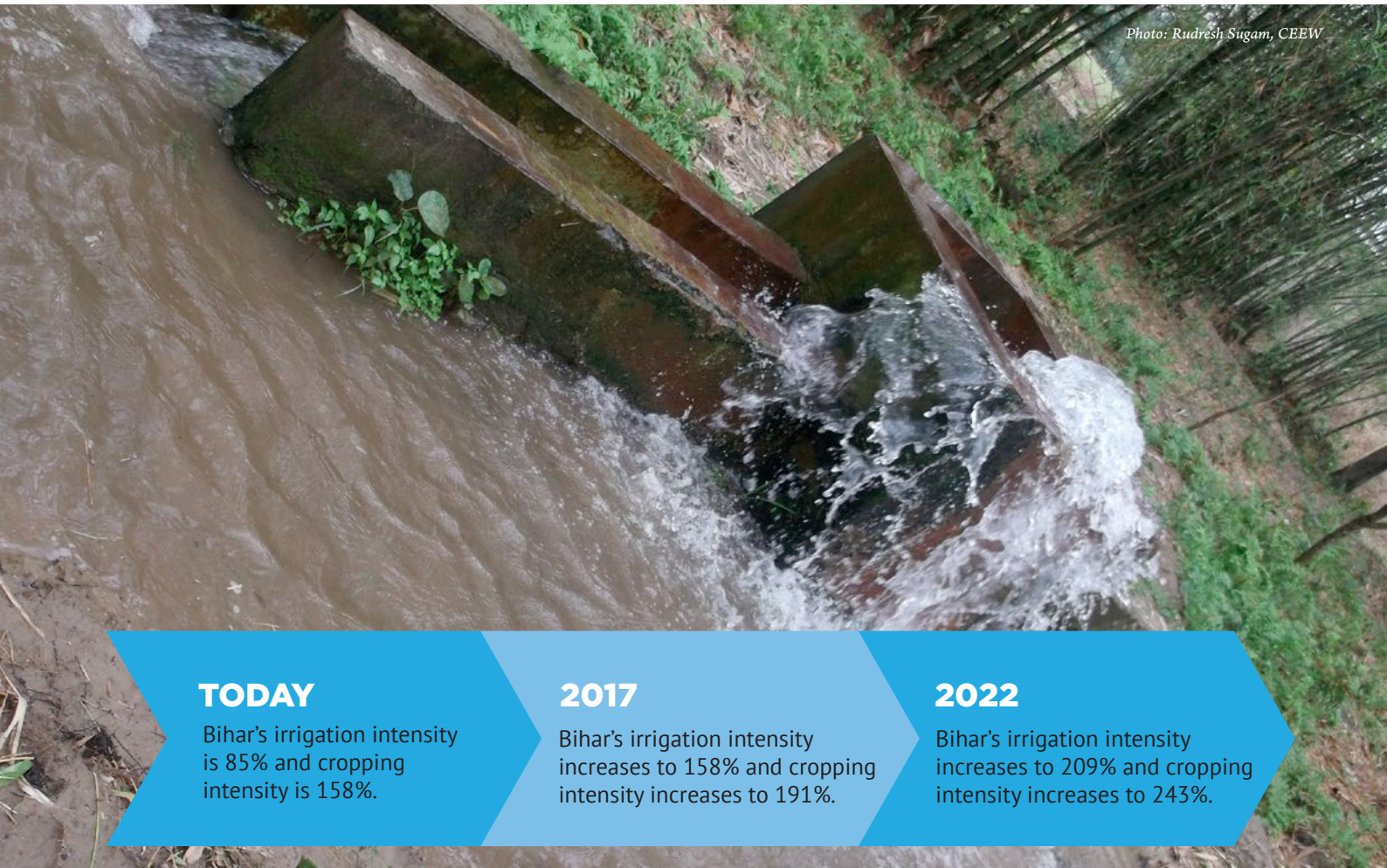
Institutions that have an appropriate structure, sufficient capacity, good leadership and properly defined priorities are the ones that work efficiently.

CEEW developed the strategy and roadmap for institutional restructuring in the department. The emphasis was on separating the service delivery divisions from the management and data/research units. In this manner, officials could be allocated appropriate responsibilities and formalised information exchanges would support intra-departmental coordination and engagement with farmers. CEEW now plans on linking this work with off-grid energy solutions for farmers and improved agricultural strategies for water use efficiency.

ceew.in/water

Groundwater overflowing in a minor irrigation system, Bihar

Photo: Rudresh Sugam, CEEW



TODAY

Bihar's irrigation intensity is 85% and cropping intensity is 158%.

2017

Bihar's irrigation intensity increases to 158% and cropping intensity increases to 191%.

2022

Bihar's irrigation intensity increases to 209% and cropping intensity increases to 243%.



DEVELOPING FINANCING MECHANISMS TO PROMOTE RENEWABLES

Promoting renewables requires long-term financing; funding based on performance can potentially spur greater private sector investment



RISHABH JAIN

of systems discourage consumers from opting for off-grid energy solutions. Entrepreneurs, on the other hand, have little incentive to expand markets or invest in R&D and business innovations because the government-approved framework encourages the business-as-usual scenario.

It is estimated that approximately 80 million households in India do not have access to electricity. Yet, there has been no major upsurge in the market for off-grid energy solutions in India. The lack of upfront finance, delays in the disbursal of subsidies, and poor performance

CEEW designed a “results-based financing mechanism” to incentivise vendors of SHW systems to reach a wider customer base in urban areas, such as non-commercial buildings, poor households, etc.

In one case, CEEW found that the deployment of solar hot water (SHW) systems was well below its true potential and was limited by four key challenges: declining product quality, high transaction costs in securing subsidies, unclear governance of subsidy schemes, and absence of incentives to expand into newer markets.

CEEW designed a “results-based financing mechanism” to incentivise vendors of SHW systems to reach a wider customer base in urban areas, such as non-commercial buildings, poor households, etc. The mechanism would encourage vendors to deploy more systems among new categories of customers. It would also offer performance bonuses for reaching

Photo: Arunabha Ghosh, CEEW



Students reading under lamps running on solar charged batteries with charging station behind (Primary School, Vandse Village, Udupi District, Karnataka)

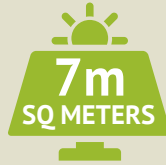


Photo: Arunabha Ghosh, CEEW

Operator of a solar kiosk stands outside the kiosk converted from a shipping container (water tanks and inverters visible), Dharmasthala Village, Dakshin Kannada District, Karnataka



Payback period for a Solar Hot Water system without subsidy

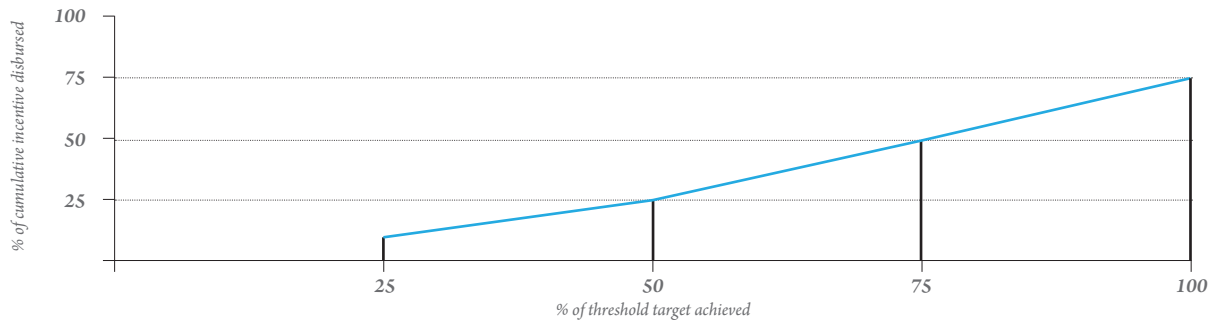


Solar water heating installations in India

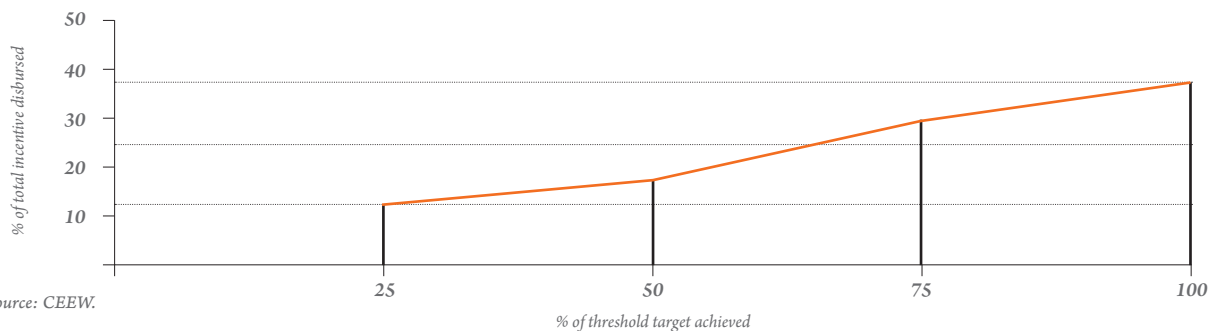


Renewable energy enterprises which offer variable usage payment model

Disbursement of cumulative incentive for solar hot water systems when compared to the threshold target achieved



Portion of incentive disbursed for solar hot water systems when compared to threshold target achieved



Source: CEEW.

poorer customers, low income neighbourhoods or retrofitting older buildings, with a pay-out structure based on exponentially rising bonuses for reaching higher shares of the target market.

In another case, CEEW found that there were three key challenges to encouraging further R&D and innovation in business models: limited research capacity and lack of interest among large firms; poor quality of existing systems increases risk perceptions of consumers for renewable energy systems; and limited working capital made it difficult for entrepreneurs to offer lower cost energy services to the poor.

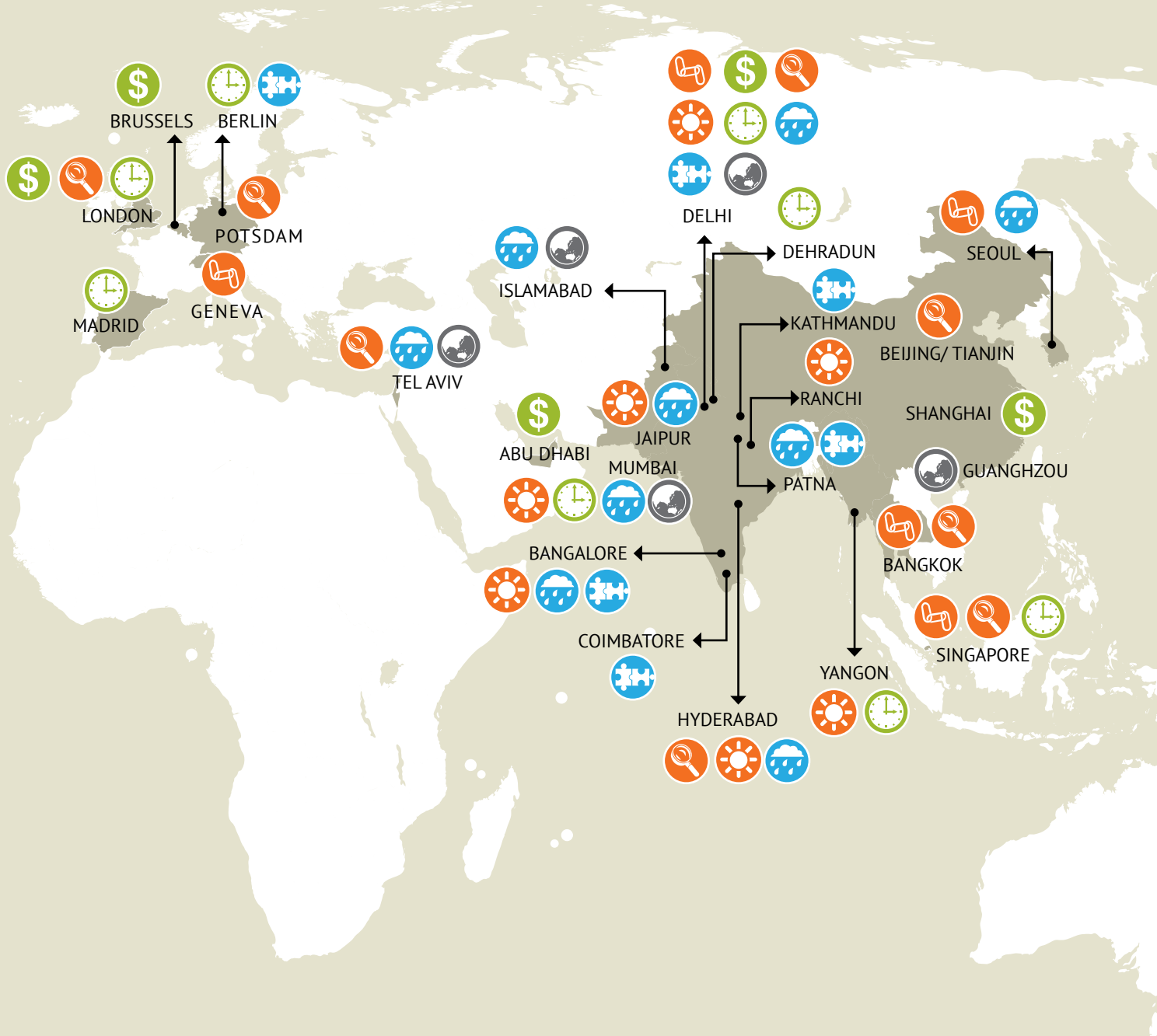
Again, CEEW designed a financing mechanism that could support businesses reliant on a “pay-as-you-use” electricity pricing model, supplemented by better after sales service. The financial instrument could work as an interest free loan, which is disbursed to the system vendor upon the sale of the system to the consumer. This would reduce the risk that the energy services company faced, allowing it to scale up volumes and sales.

CEEW’s approach to sustainability finance is grounded in developing solutions in consultation with stakeholders that actually deliver or consume energy, water or climate-friendly services. Only then can we feel confident that our proposals are indeed solving real problems.

ceew.in/susfinance

INTEGRATED | INTERNATIONAL | INDEPENDENT

The world map showcases places where CEEW has engaged in projects or presented its work. The icons represent thematic areas of CEEW's work, each of which is studied in depth while also focusing on its linkages with other development concerns.



Energy-trade-climate linkages



Sustainability finance



Technology horizons



Renewables



Resource efficiency & security



Water



Integrated energy, environment and water plans

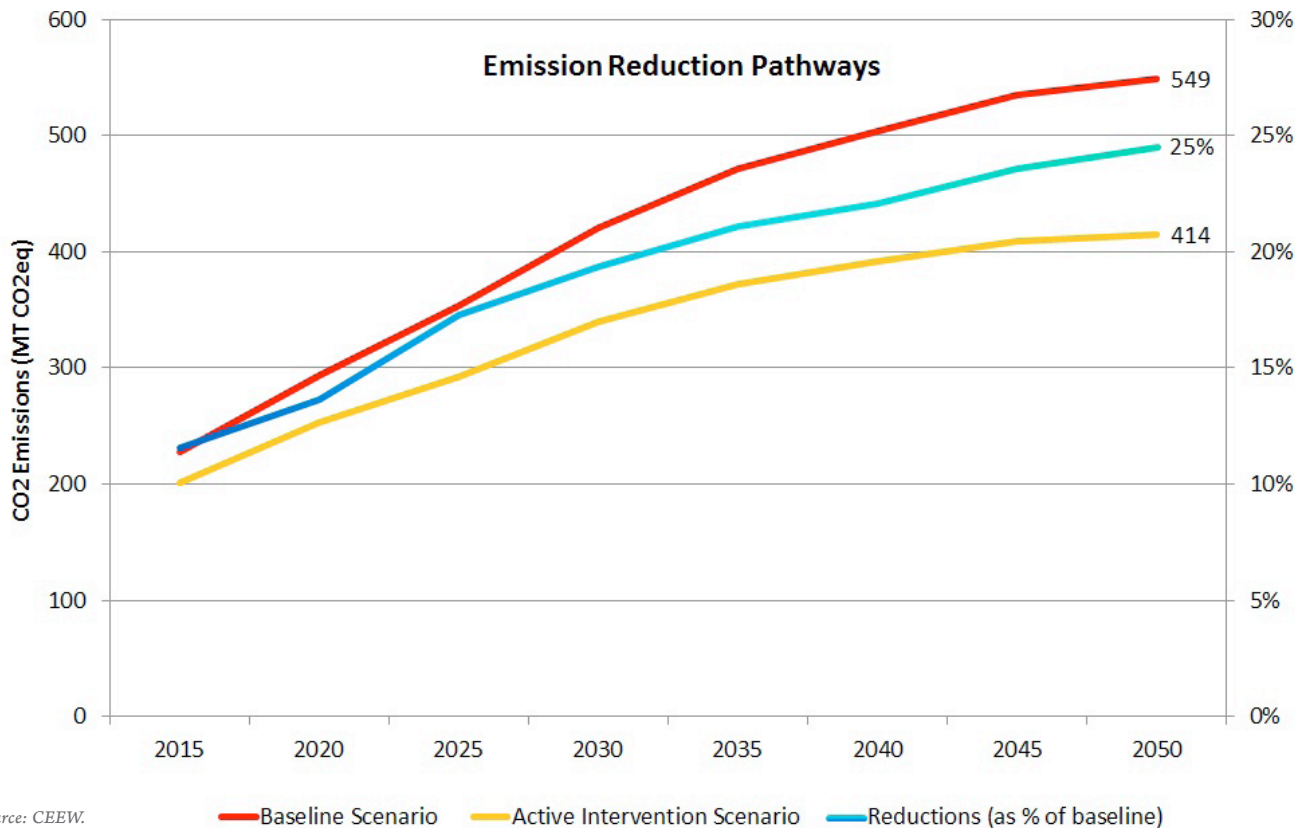


International co-operation



CLIMATE CHANGE AND BUSINESS LEADERSHIP

Helping to identify the most cost-effective interventions for reducing carbon intensity in the Indian cement industry



Source: CEEW.



KARTHIK GANESAN

Energy efficiency in Indian industry has increased in the past 15 years. The Perform-Achieve-Trade scheme is another policy intervention to promote cost-effective energy efficiency across several industrial sectors. However, in the long run, a focus on energy efficiency alone does not guarantee absolute

reduction in greenhouse gas emissions. Moreover, carbon trading markets have suffered globally thanks to a stalemate in climate negotiations. India is impatient for economic growth but cannot wait for climate negotiations to put the world on a more sustainable trajectory. Instead, is there a business case for reducing emissions in Indian industry while also driving growth?

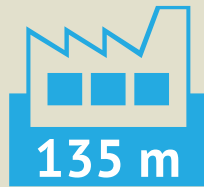
By 2050, the cement industry can reduce emissions by 25% (against BAU) in a profitable manner, without relying on revenues from carbon trading mechanisms.

In this joint study with the Environmental Defense Fund (EDF), we set out to understand the financial barriers that delay interventions aimed at mitigating climate change and move towards a more sustainable manufacturing process. The cement industry, contributing to about 7 per cent of India's emissions, was a logical choice for the study. The primary focus was on investment and revenue (earning and saving) implications for a chosen set of interventions.

In order to gauge the positioning of various firms and estimate their capacity for taking up interventions, the cement industry was classified into clusters – based on a composite view of the technology, process and product mix that exists in the various plants. The interventions studied were classified under three categories: energy efficiency improvements, clinker substitution, and use of alternate fuels and raw materials (AFR).



The return on investments that directly result from energy and emissions intensity reductions in the cement sector till 2050



The amount of CO2 that can be offset in the year 2050 from cement plants in India



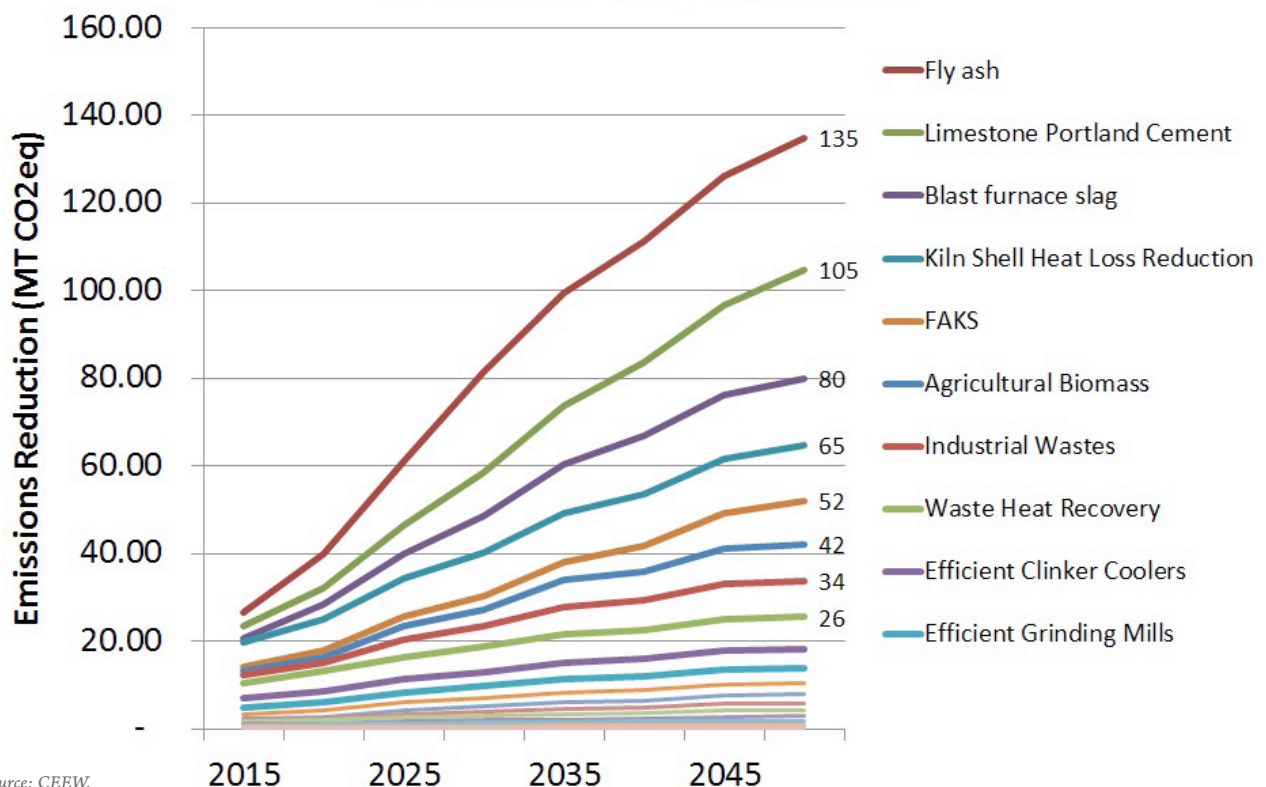
Units of electricity that could be saved through the chosen interventions in 2015

The study suggests that the most significant intervention is the use of AFR. Given the lower cost of waste-based fuels and raw materials (in the near term) and the compliance requirements on waste generators in disposing them in a safe manner, they offer the highest potential and are the most cost-effective. AFRs currently have low penetration and the focus needs to shift to addressing issues such as supply chain reliability, modification of standards, and identifying environmental risks in order to make the changes more palatable to the various stakeholders in the industry and to the society at large. In short, our effort is to ensure that one side's problem (waste generation) becomes another side's solution (energy and raw materials for cement plants). We hope to enable extensive engagements between these and other stakeholders as the next milestone of the project.



ceew.in/eeplans

GHG Reduction Potential of Interventions



Source: CEEW.



PREVENTING TRADE DISPUTES OVER CLEAN ENERGY

The imperatives of climate change mitigation and energy access mean that markets for clean energy products and services should remain open



ARUNABHA GHOSH

Nearly 2 billion people in the world have no access to modern sources of energy. In India 80 million households claim not to have electricity. Renewable energy connects economic growth, social development and the imperative of responding to climate change.

But efforts to scale up renewable energy are being obstructed by a range of barriers to sourcing the best technologies from global markets. Subsidies, tariffs, standards, public procurement policies,

In 2010, clean energy was only 8% of global power generation capacity, but 34% of new capacity addition.

and local content requirements are slowing down or outright hampering possibilities for large-scale use of renewable sources.

Rather than focusing on energy access, renewable energy policies have, instead, become tools to achieve other objectives: generating fiscal revenue, developing local industries, creating jobs, and stimulating the economy, to name a few. Consequently, renewables remain artificially more expensive than they need to be, delaying access to the poor and postponing the day when they can serve as viable substitutes for fossil fuels.

CEEW studied how clean energy subsidies vary in both form (including financial transfers, preferential taxes, regulations, and infrastructure support) and purpose (from energy access at one end to promoting clean energy exports at the other). Some of these measures correct market failures, while others distort trade. This is why disputes are emerging across the world over clean energy subsidies, even though subsidies for fossil fuels – which reached US\$523 billion in 2011, up 30% from 2010 – actually far exceed those for renewable energy, which are barely one-sixth that amount. Or, local content requirements, by requiring that a minimum share of local content be used in the final product, have resulted in reduced competition, delayed technology deployment, and higher prices for renewables.

These flawed measures assume that the renewable energy pie will always remain small, when current trends indicate otherwise. In 2010, clean energy was only 8% of global power generation capacity, but 34% of new capacity addition. As the pie expands, all countries could benefit, either from improved access to cheaper technologies or newer markets. Another logical fallacy is the assumption that if one country has a large share of the market for clean energy products today, it would always remain in pole position. In reality, a global supply chain for renewable energy products is developing.



Panel discussion on green innovation and technology diffusion at a symposium at Rio+20



Op-ed on preventing trade disputes on clean energy



Ratio of subsidies for clean energy to subsidies for fossil fuels globally



Clean energy share of new electricity capacity added globally in 2010



Number of ongoing clean energy-related international trade disputes



Photo: ICTSD, Geneva; ITD

Policy Dialogue on Climate Change Mitigation Measures, Trade and Development, Bangkok, September 2012

In order to reduce the threat of trade disputes, major renewable countries, including India, have to, first, develop a new trade framework to permit measures that promote energy access while prohibiting trade distorting measures that only seek mercantilist gains. Secondly, common metrics are needed to count subsidies. Thirdly, the relationship between rationalising fossil fuel subsidy programmes and the use of subsidies to promote clean energy sources should be further investigated. Fourthly, independent assessments of alleged adverse impacts

of subsidy policies could reduce the threat of unilateral trade sanctions or other penalties. Fifthly, countries could use regional trade agreements more imaginatively as tools for promoting renewables. Finally, a Sustainable Energy Trade Agreement would leverage a critical mass of countries to elucidate complex international rules on sustainable energy and improve market access.

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Photo: CEEW

Union Cabinet Minister Farooq Abdullah addressing CEEW's session on Leapfrogging to a Clean Energy Future



Photo: GGS@2012

Global Green Growth Summit 2012



COOLING INDIA WITH LESS WARMING

The business case for phasing down HFCs in room and vehicle air conditioning

In 2006, there were approximately 2 million room air conditioning units in India; this number had grown to around 5 million by 2011. Nearly all four-wheel vehicles being sold in India now come equipped with air-conditioning. While this means greater comfort during India's long 'cooling seasons', it also means potentially adverse climate impacts from the refrigerants used in these air conditioning units – primarily hydrochlorofluorocarbons (HCFCs). While HCFCs are being phased out under the Montreal Protocol, to protect the ozone layer, they are being replaced by hydrofluorocarbons (HFCs). HFCs have a global warming potential hundreds of times higher than CO₂, making them a key factor in the battle against climate change.

What's driving India's air conditioning market?

- Market penetration is low.
- The number of households and income levels are increasing while the number of people per household is decreasing.
- Many locations in India have long cooling seasons with high temperatures and humidity.
- Most residential buildings have access to electricity at prices that are affordable to middle class Indian customers.
- Almost all new four-wheeled vehicles sold in India come equipped with air conditioning.

In response, Indian industry is already developing chemical alternatives for refrigerants that are more climate friendly and energy efficient. As room and vehicle air conditioning expands in India, consumers, companies, and government authorities have important choices to make. They could take advantage of business and technological opportunities while mitigating climate change, improving air quality, and making air conditioning more efficient and less costly to operate.

Choices made in the next few years will shape whether Indian consumers, companies, and government authorities can turn the challenges of the room and vehicle air conditioning expansion into a business advantage and technological opportunity.

CEEW has been working with its project partners – the Natural Resources Defense Council, the Institute for Governance and Sustainable Development, and The Energy Resources Institute – to investigate the business case for avoiding HFCs in new air conditioners and motor vehicles. We recently presented our findings at an Open Ended Working Group meeting of the Montreal Protocol in Bangkok. Over the coming year we will be continuing our dialogue and research with companies and industry associations.

Photo: NRDC, USA

OUR MAJOR PUBLICATIONS



Photo: CEEW

Books and reports



Arunabha Ghosh et al. (2012) Concentrated Solar Power: Heating Up India's Solar Thermal Market under the National Solar Mission, Report (Addendum to Laying the Foundation for a Bright Future: Assessing Progress under Phase I of India's National Solar Mission), September, New Delhi: Council on Energy, Environment and Water; and Natural Resources Defense Council



Arunabha Ghosh, Arundhati Ghose, Suman Bery, C. Uday Bhaskar, Tarun Das, Nitin Desai, Anwarul Hoda, Kiran Karnik, Srinivasapuram Krishnaswamy, Radha Kumar, Shyam Saran (2011) Understanding Complexity, Anticipating Change: From Interests to Strategy on Global Governance, Report of the Working Group on India and Global Governance, December, pp. i-70



Arunabha Ghosh, with Himani Gangania (2012) Governing Clean Energy Subsidies: What, Why and How Legal?, August, Geneva: International Centre for Trade and Sustainable Development



Martin A. Burton, Rahul Sen, Simon Gordon-Walker, and Arunabha Ghosh (2011) National Water Resources Framework Study: Roadmaps for Reforms, October, New Delhi: Council on Energy, Environment and Water, and 2030 Water Resources Group, pp i-68



Rudresh K. Sugam, and Arunabha Ghosh (2012) Institutional Reform for Improved Service Delivery in Bihar: Economic Growth, Agricultural Productivity, and a Plan for Reorganising the Minor Water Resources Department, Research Report submitted to the Government of Bihar, July, New Delhi: Council on Energy, Environment and Water, and International Growth Centre, Patna



Martin A. Burton, Rahul Sen, Simon Gordon-Walker, Anand Jalakam, and Arunabha Ghosh (2011) National Water Resources Framework Study: Research Report Submitted to the Planning Commission for the 12th Five Year Plan, September, New Delhi: Council on Energy, Environment and Water, and 2030 Water Resources Group, pp. i-584



Council on Energy, Environment and Water; and Natural Resources Defense Council (2012) Laying the Foundation for a Bright Future: Assessing Progress Under Phase 1 of India's National Solar Mission, Interim Report, April, pp. i-37



Arunabha Ghosh (2010) Harnessing the Power Shift: Governance Options for International Climate Financing, Oxfam Research Report, October, pp. 1-90

OUR MAJOR PUBLICATIONS

Papers/Book Chapters



Arunabha Ghosh, and David Steven (2013) "India's Energy, Food, and Water Security: International Cooperation for Domestic Capacity," in *Shaping the Emerging World: India and the Multilateral Order*, edited by Waheguru Pal Singh Sidhu, Pratap Bhanu Mehta, and Bruce Jones. Washington, D.C.: Brookings Press



Rajeev Palakshappa et al. (2012) "Cooling India with Less Warming: The Business Case for Phasing-Down HFC's in Room and Vehicle Air Conditioners," Council on Energy, Environment and Water; Natural Resources Defense Council ; The Energy and Resources Institute; and The Institute for Governance and Sustainable Development, November



Vyoma Jha and Rishabh Jain (2012) "Results-Based Financing for Off-grid Energy Access in India," Case-study on the Economics of Results-Based Financing in Study by Vivideconomics for Energy Sector Management Assistance Program (ESMAP), World Bank, Washington DC, October



Arunabha Ghosh (2012) "Industrial demand and energy supply management: A delicate balance," Empowering growth - Perspectives on India's energy future, A report from the Economist Intelligence Unit: 26-32, October



Arunabha Ghosh, Benito Müller, William Pizer, and Gernot Wagner (2012) "Mobilizing the Private Sector: Quantity-Performance Instruments for Public Climate Funds," Oxford Energy and Environment Brief, The Oxford Institute for Energy Studies, August, pp. 1-15



Sachin Shah (2012) "Institutional Reform for Water Use Efficiency in Agriculture: International Best Practices and Policy Lessons for India," CEEW Working Paper 2012/3, April



Arunabha Ghosh (2011) "Seeking Coherence In Complexity: The Governance Of Energy By Trade And Investment Institutions," *Global Policy 2* (Special Issue): 106-119



Arunabha Ghosh (2011) "Strengthening WTO Surveillance: Making Transparency Work for Developing Countries," in *Making Global Trade Governance Work for Development*, edited by Carolyn Deere-Birkbeck. Cambridge: Cambridge University Press



Jason Blackstock, and Arunabha Ghosh (2011) "Does geoengineering need a global response - and of what kind?" Background Paper, Solar Radiation Management Governance Initiative, Royal Society UK, Chicheley, March

Policy Briefs & Legislative/ Government Briefings



Rudresh Sugam and Urvashi Sharma (2013) "Private sector participation in water management and water for all," Issue brief for the Second CEEW-Veolia Water Roundtable on Urban Water Management, 11 February



Rudresh Sugam (2012) "Water Utility Management in the Urban Water Sector," Issue brief for the First CEEW-Veolia Water Roundtable on Urban Water Management, 20 December



Karthik Ganesan (2012) "Climate Change and Business Leadership: Pathways to GHG emissions reduction and Sustainability in the Indian cement industry," Paper presented at the Third National ICRN Conference on Climate Change, Indian Institute of Science, Bangalore, 4 November



Vyoma Jha (2012) "Trends in Investor Claims over Feed-in Tariffs for Renewable Energy," *Investment Treaty News*, July



Arunabha Ghosh (2012) "Water governance priorities in India, South and East Asia, the case for integrated energy, environment and water plans, and Rio+20 goals," Briefing to the Brazilian Federal Senate, Environment, Consumer Rights and Oversight Committee & Agriculture and Land Reform Committee, Rio de Janeiro, 20 June



Arunabha Ghosh (2011) "Briefing on global governance to Ambassador Shivshankar Menon, National Security Adviser, Government of India" Prime Minister's Office, New Delhi, 20 December



Arunabha Ghosh (2011) "Governing clean energy subsidies: Why legal and policy clarity is needed," *Bridges Trade BioRes*, November



Vyoma Jha (2011) "Cutting Both Ways?: Climate, Trade and the Consistency of India's Domestic Policies," CEEW Policy Brief, August



Arunabha Ghosh (2010) "Negotiating around Tradeoffs: Alternative Institutional Designs for Climate Finance," European Climate Platform Report No. 10, Centre for European Policy Studies, Brussels, 9 December



Arunabha Ghosh (2012) "Case for an integrated energy, environment and water approach in Rajasthan," Confederation of Indian Industry Rajasthan State Annual Session, Jaipur, 17 March

Selected Keynote Lectures & Speeches



Suresh Prabhu (2013) "Role of stakeholders in increasing food production," Keynote lecture at the National conference on "Doubling Food Production in Five Years", New Delhi, 4 February



Suresh Prabhu (2011) "Tangible Reforms in Governance Process: Effective Leadership, is at the Heart of it All, in 21st Century India," Good Governance Dialogue Series by the Friends of Good Governance (FOGG), December 2011



Arunabha Ghosh (2013) "Renewable Energies and Trade: Addressing tensions and challenges," Speech at a high-level policy dialogue at the World Trade Organisation meeting of Ambassadors, Geneva, 21 January



Arunabha Ghosh (2011) "Geopolitics of energy security: Five framings from a global Indian perspective," Lecture at Aspen España – ESADEge conference on The Coming Energy Market, Madrid, 24 November



Arunabha Ghosh (2012) "India's Energy Scenarios: Planning for the Future," Lecture at the University of Petroleum and Energy Studies (UPES), Dehradun, 3 December



Arunabha Ghosh (2011) "Why is climate change such a wicked problem?," Lecture at China Foreign Affairs University, Beijing, 23 September



Rajeev Palakshappa (2012) "Laying the Foundation for a Bright Future," Presentation at the INTERSOLAR India 2012 Conference, Mumbai, 5 November



Arunabha Ghosh (2011) "Governing geoengineering: Play, pause or stop, and how," Lectures at Chinese Association for Science and Technology Annual Meeting, Tianjin, 21 September 2011; and Chinese Academy of Social Sciences, Beijing, 26 September



Ambassador Shivshankar Menon (2012) "Resources and National Security," Keynote Address by India's National Security Adviser on CEEW's Second Anniversary, New Delhi, 23 August



Arunabha Ghosh (2011) "Four transitions in global governance," Keynote lecture at the 10th Anniversary of the Clarendon Fund Scholarships, University of Oxford, Oxford, 17 September



Arunabha Ghosh (2012) "Sustainable Development in a Deeply Globalised Economy," Speech during the Rio+20 United Nations Conference on Sustainable Development, Rio de Janeiro, 20 June



Arunabha Ghosh (2011) "International Cooperation and the Governance of Geoengineering," Keynote lecture to the Intergovernmental Panel on Climate Change, Expert Meeting on Geoengineering, Lima, 21 June



Suresh Prabhu (2012) "Overview of India's clean energy markets," Speech at the NRDC and Environmental Entrepreneurs roundtable on Advancing Clean Energy Opportunities in India, San Francisco, 7 June



Arunabha Ghosh (2011) "Designing Climate Finance Institutions," New York University-UAE Ministry of Foreign Affairs Workshop on Climate Finance, NYU Abu Dhabi Campus, Abu Dhabi, 22 January



Arunabha Ghosh (2012) "Governing Clean Energy Subsidies: The Case for a Sustainable Energy Agreement," Global Green Growth Summit, Seoul, 11 May



Arunabha Ghosh (2010) "Should bottom-up meet top-down? Lessons for institutional design in climate governance," Post-Copenhagen Global Climate Cooperation: Politics, Economics and Institutional Approaches, Shanghai Institutes for International Studies, and Friedrich Ebert Stiftung, Shanghai, 29 September



Arunabha Ghosh (2012) "Governance in the face of uncertainties: data gaps, institutional coordination, and multiple level decision-making," Workshop on Climate Change and Water Cycle and Communicating Uncertainty, Princeton University, Princeton, 31 March



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Chairman, Solar Energy Corporation of India; Former Director, Bhabha Atomic Research Centre (BARC); Former Chairman, Atomic Energy Commission; and former Secretary to the Government of India, Department of Atomic Energy

“Facilitating the holistic management of energy, environment and water, CEEW has successfully triggered an integrated approach to development and environmental sustainability by both researchers and policymakers. CEEW’s recent ranking as the top climate think-tank in India and 15th globally, as well as its growing league of donors and partners, is an endorsement of its excellence in its areas of operation.”

International Advisory Board



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Gunter Pauli – Founder of the “Zero Emissions Research and Initiatives” and the Blue Economy concept



Björn Stigson – Former President, World Business Council for Sustainable Development (WBCSD)



Anders Wijkman - Member of the Temporary Committee on Climate Change of the European Parliament

My association with CEEW is a result of my association with CEEW’s Chairperson Suresh Prabhu. I got to know Suresh when working with the World Bank in Delhi. Suresh was (and is!) unique among political leaders who have held high office in areas such as power, water and the environment. He is unique because he is young, because he practices an open style of consultation and government, because he is smart, and because he has enormous drive, energy and commitment. And Suresh is (almost) unique in terms of leadership of a think tank in that he knows what it is to be a politician and policy maker, and knows that simple “one note samba advocacy” (as our Brazilian colleagues call it), may leave advocates feeling virtuous, but it will never change policy.

I have been delighted to see CEEW emerge as a unique think-tank, firmly embedded in the knowledge of how, for better or worse, politics and policy actually work, but also deeply committed to helping India move forward in dealing with the formidable array of water/energy/environment/climate/development challenges that it faces. I am honored to serve on the Advisory Board of the CEEW.

Executive Team

Our executive team continued to expand this year. Our team comes from a range of backgrounds including engineers, economists, social scientists, management graduates, information analysts, specialists in water, oil and gas, and minerals, communications, administration, and so on.



Left to right (top to bottom): Charles Miller, Rishabh Jain, Nirmalya Choudhury, Prachi Gupta, Rudresh Sugam, Rajeev Vishnu, Arunabha Ghosh, Faraz Ahmed, Karthik Ganesan, Vishnu Nanduri, Rajeev Palakshappa, Swati Trehan, Huijuan Wu, Nolwenn Montheil, Vaibhav Gupta, Meena Sarkar, Himadri Sinha, Poulami Choudhury, Sanyukta Raje, Priyanka deSouza

Our Partners

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.

- Administrative Staff College of India ((ASCI)
- Asian Development Bank (ADB) India
- Aspen Institute India
- Brookings Institution
- Center for Study of Science, Technology and Policy (CSTEP)
- Centre for European Policy Studies, Brussels
- Centre for International Governance Innovation (CIGI), Canada
- Confederation of Indian Industry (CII)
- Department for International Development (DFID) India
- Environmental Defense Fund (EDF), United States
- International Centre for Trade and Sustainable Development (ICTSD), Geneva
- International Finance Corporation (IFC)
- International Growth Centre (IGC)
- International Institute for Sustainable Development (IISD) Geneva
- Lee Kuan Yew School of Public Policy, National University of Singapore
- Ministry of New and Renewable Energy (MNRE), India
- Ministry of Water Resources, India
- Natural Resources Defense Council (NRDC), United States
- New York University School of Law
- Oxfam International
- Planning Commission, Government of India
- Royal Society, United Kingdom
- Shakti Sustainable Energy Foundation
- Shell International
- The Nand and Jeet Khemka Foundation
- United States Agency for International Development (USAID)
- Veolia Water India
- Vivid Economics
- World Bank
- World Economic Forum (WEF)
- WWF India
- 2030 Water Resources Group (WRG)

“ I am developing an analytical framework to classify strategic industries and technologies for India from the perspective of economic development, resource security and national security. This goes along with a unique assessment of critical non-fuel mineral resources, which will be essential for India’s manufacturing competitiveness, economic growth and national security.”

VAIBHAV GUPTA,
Programme Officer

“ At CEEW, I am working on exploring feasible alternatives to achieve energy security for India and identifying various enabling and disruptive technologies for the Indian economy.”

FARAZ AHMED,
Programme Officer

Join CEEW in its quest for exploring sustainable development pathways for the world

CEEW's research and partnerships with government, industry and civil society are geared towards finding and implementing sustainable development solutions around the world.

What we know is that this will require carefully-tailored, innovative policies, developed with a holistic view of the tradeoffs between different needs and, yet, finding opportunities for co-benefits and positive linkages.

How can this be done? While we have partnerships at the global, regional and national levels, the proof of our approach needs local solutions and innovations. CEEW is pioneering the development of integrated energy, environment and water plans at the state level that could help achieve multiple development objectives while maintaining environmental sustainability over time.

You could play an important role in supporting CEEW

We invite you to join hands with us and our existing donors and partners to build a world class research think-tank that aims to offer policy innovations within and outside India,

You can support us by

- Offering financial support
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- Creating partnerships with CEEW
- Helping CEEW gain visibility
- Contributing your valuable expertise and talent

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MAJOR HIGHLIGHTS 2012-13

June 2012 Presents findings on governance of clean energy subsidies at the Global Green Growth Summit 2012 and Rio+20 Summit

May 2012 Publishes the first assessment of India's 22 gigawatt National Solar Mission

April 2012 Releases paper on water use efficiency in agriculture at the first India Water Week 2012



August 2012 National Security Adviser of India delivers keynote lecture at CEEW's Second Anniversary

March 2013 Conducts consultations with USAID administrator Rajiv Shah and renewable energy companies; Arunabha Ghosh from CEEW nominated Young Global Leader by the World Economic Forum



September 2012 Proposes institutional reforms to restructure Bihar's Minor Water Resources Department; participates in India-Pakistan water dialogues



October 2012 Undertakes field visits spanning over 600 kms in rural India to study energy penetration challenges



January 2013 Presents ideas on a Sustainable Energy Trade Initiative to WTO ambassadors in Geneva during a high-level policy dialogue



November 2012 Hosts Amory Lovins, author of "Reinventing Fire"; Arun Majumdar, first director of U.S. Department of Energy's ARPA-E; and Sir John Beddington, UK's Chief Scientific Adviser



December 2012 Conducts a roundtable on water utility management, the first in a series focusing on key urban water management issues

CEEW IN THE PRESS



Business Standard
ISSUES AND INSIGHTS
Want clean energy? Avoid trade disputes
Subsidies, tariffs and public-procurement policies are trade barriers in large-scale use of renewable sources



Energy Next
Your guide to Renewable
Industry Update National Solar Mission
'Increase energy access for the poor'



live mint
India's resource nexus: priorities for action
India's priority aim should be
Anushka Ghosh



THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1858
Solar side up
Solar industry needs



Business Standard
ISSUES AND INSIGHTS
What's eclipsing India's solar sector?
Market is far from mature; the government



THE ECONOMIC TIMES
Economy & Corporate
Govt Plans Water Audit for Industry
Water For Development
Industry wise water consumption (%)



THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1858
Don't impose anti-dumping duty, say solar power producers



THE FINANCIAL EXPRESS
READY TO LEAD
SBI evaluates introducing T+1 settlement cycle



THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1858
Sharing the burden
The Centre must make richer, more developed states switching to renewable energy and reducing the



THE FINANCIAL EXPRESS
Reviving the power of electricity
Power sector will keep on facing financial crises unless competitive pressures compel DISCOMs to play lesser



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Think of water before it rains again
India needs a long-term drought-proofing plan to create water security for the country. But it seems we are also facing another drought of ideas to deal with this daunting challenge



THE FINANCIAL EXPRESS
Reflect
APPLIES SLOWDOWN CAN'T GLOOM OVERSET BY BULLISH VIEW OF GLOBAL COMPONENT SUPPLY



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THE FINANCIAL EXPRESS
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“A sustainable world is not possible without a sustainable India. I hope that my association with CEEW will contribute to debate and actions to advance sustainability in India as well as enhance the role that India needs to play internationally on the issues of energy,, environment and water.”

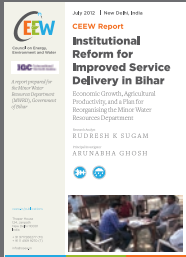
Björn Stigson, Partner, Stigson Partners; Former President, World Business Council for Sustainable Development (WBCSD)

“In the short period of 3 years, CEEW has established itself as a leading think-tank working to the highest global standards. CEEW is on its way to make a real difference to the future of policy-making and research.”

Tarun Das, Founding Trustee, CEEW

“CEEW has a clear strategic vision and is making practical interventions to scale up solutions in important areas like water, climate change and energy policy. The Council has made a sizeable contribution in a short period of time.”

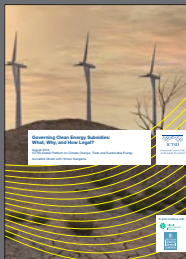
Peter Bakker, World Business Council on Sustainable Development (WBCSD)



Institutional Reform for Improved Service Delivery in Bihar

Economic Growth, Agricultural Productivity, and a Plan for Reorganising the Minor Water Resources Department

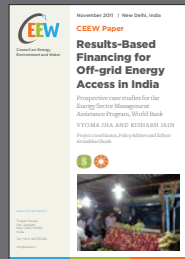
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Governing Clean Energy Subsidies

What, Why and How Legal?

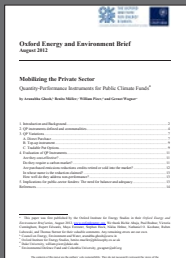
AUGUST 2012



Results-Based Financing for Off-grid Energy Access in India

Prospective case-study for the Energy Sector Management Assistance Program (World Bank)

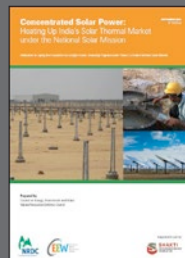
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Mobilizing the Private Sector Quantity-Performance

Instruments for Public Climate Funds

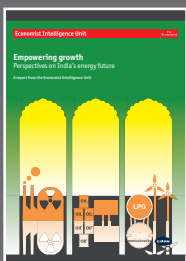
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Concentrated Solar Power

Heating Up India's Solar Thermal Market under the National Solar Mission

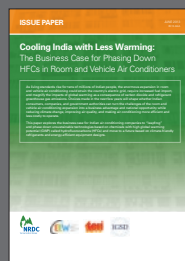
NOVEMBER 2012



Industrial demand and energy supply management

A delicate balance

OCTOBER 2012



Cooling India with Less Warming

The Business Case for Phasing-Down HFCs in Room and Vehicle Air Conditioners

NOVEMBER 2012



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