



Yale

# US—India Energy Partnership Summit

May 13–14, 2013 | Washington DC

Stimulating Technology, Trade, and  
Development

# Proceedings



# Contents

About TERI North America	3
US–India Energy Partnership Summit: The Series	5
Background Note	7
Preface by Dr R K Pachauri	9
Foreword by Dr Richard C Levin	11
Acknowledgements by Dr Annapurna Vancheswaran	13
Message from the Hon’ble Prime Minister of India	17
<b>Section 1: Keynote Addresses</b>	<b>18</b>
· It is Time to Take Conclusive Actions: Mr Al Gore	19
· Telecommunications Revolution — Model for Energy Sector: Mr Sam Pitroda	21
· Technology Partnerships for Creating New Breakthrough Models: Dr Rajiv Shah	23
· Cooperation on Energy Geopolitics: Ambassador Carlos Pascual	25
· The Context for Financing Clean and Efficient Energy Technology in India: Dr John Holdren	28
· Bright Prospects and Tremendous Opportunities: Mr Daniel Poneman	30
<b>Section 2: Plenary Sessions</b>	<b>34</b>
· Inaugural Session	35
· Opportunities for Bilateral Energy Sector Trade	38
· Financing Energy Efficient and Clean Technology Projects	41
· Energy Access, Growth, and Sustainability	44
<b>Section 3: Corporate Dialogue   Eve of Hope</b>	<b>48</b>
<b>Section 4: Thematic Tracks</b>	<b>54</b>
· Driving Energy Efficiency: Technology Innovation and Adoption	55
· Women and the Green Economy	57
· Empowering Energy Entrepreneurs	59



# About TERI North America

The Energy and Resources Institute North America (TERI NA) is a publicly supported, not-for-profit 501©(3) research organization, incorporated in Washington, DC, USA in 1990, as an initiative of TERI, New Delhi, India. The genesis of TERI NA is rooted in the realization that emerging global concerns about energy, environment, and sustainable development must bring together new partnerships between the developing and the developed world. It is also vital for such partnerships to recognize the socio-cultural-economic realities influencing the current patterns of development. TERI NA is an attempt to bridge the communication gap and overcome the barriers of understanding between the developing and the developed world. It has an organic link with TERI which has been deeply committed to formulating strategies suggesting global solutions to critical energy and environment related issues. TERI India has the distinction of being one of the first developing country institutions to launch research activities in the area of climate change. TERI NA's other affiliates include TERI Europe, TERI South East Asia, TERI Japan, and TERI Gulf.

TERI NA has organized several important seminars and conferences with active participation from the government, private sector, and research organizations in both the United States of America and India. These initiatives have contributed immensely towards developing long-term partnerships and collaborative programmes aimed at fostering stronger ties between the two nations. The global presence and reach attained by TERI are not only substantiated by its presence in different parts of the world, but also in terms of the wide geographical relevance of its activities.

Symbolic of this fact is the annual Delhi Sustainable Development Summit (DSDS), a major event focusing on sustainable development, the pursuit of the Millennium Development Goals (MDGs), and assessment of worldwide progress in these critical areas.



# US—India Energy Partnership Summit: The Series

The first US—India Energy Partnership Summit held in 2009 laid the foundation for a dialogue between the two countries on matters of collaborations between private organizations, research institutions, and government for clean energy and R&D of related technologies. In 2010, the second US—India Energy Partnership Summit discussed technologies and partnerships for energy security. These Summit discussions have contributed to many of the Memorandums of Understanding (MoUs) on clean energy inked between the governments of India and the United States of America.

The third edition of the Summit themed ‘Fostering Innovations for a Sustainable Future’, held in 2012 discussed innovations in the arena of clean energy for a secure future. It served as a vital platform for the two nations to discuss and debate strategies in the realm of energy efficiency and exploring avenues for synergy.

The following pages summarize the proceedings of the fourth edition of the Summit, themed ‘Stimulating Technology, Trade, and Development’, held in the US capital on May 13 and 14, earlier this year. It is hoped, these discussions and learnings will help shape opinions and also policies in the near future between the two countries in the field of technology and trade.



# Background Note

## US–India: Convergence of Interest

In these times of economic uncertainty, the pursuit of energy security remains high on the political agendas of both the United States and India. The US is the largest consumer of energy in the world, accounting for over 22 per cent of world primary energy consumption, while India is currently ranked fifth. This is when more than 400 million Indians do not have access to any source of electricity. Rapid economic growth and efforts towards meeting the country's legitimate development needs are set to increase India's appetite for energy. According to the projections of the International Energy Agency (IEA), India's primary energy demand will double from 537 Mtoe (million tonnes of oil equivalent) in 2005 to 1,299 Mtoe in 2030, with an average annual growth rate of 6.3 per cent. This will make India the third largest energy consumer in the world by 2030, after China and the US. In addition to the rapidly rising demand for energy, continuing dominance of fossil fuels in the energy baskets of both the US and India further exacerbates energy risks. Closely related is the issue of climate change, which has emerged as an issue of primary importance at the interface between development and environment.

## Clean Energy and Climate Change

Both energy and climate are areas that demand international collaboration. Being growing economies and large energy consumers, the US and India are at the forefront of this effort. The two countries face unique yet related challenges, and there is a potential for bilateral cooperation between them. As India strives to meet the energy needs of its large population while minimizing emissions, it stands to gain from its technology engagement with the US. This interaction offers vast business potential for energy industries in both countries. In the same vein, India and the US — both technology hubs in their own right — offer numerous opportunities for cooperation on technology development.

After the United Nations Climate Change Conference in Copenhagen in 2009, energy security and climate change concerns of both the countries, along with India's pressing development needs, drove urgent efforts to reassert a meaningful dialogue between the US and India on these topics. Continued cooperation in the areas of energy security and climate change is in the best interests of the US and India and advances several aspirations set forth in the 2012 "The Future We Want" outcome document of Rio+20.

## US–India Partnership: Major Milestones

During the Indian Prime Minister Dr Manmohan Singh's visit to the US in 2009, the two countries agreed on a comprehensive Memorandum of Understanding (MoU) to enhance cooperation on energy security, energy efficiency, clean energy, and climate change. Through this memorandum,

also known as the Green Partnership, both countries agreed to work jointly to accelerate development and deployment of clean energy technologies and to strengthen cooperation on adaptation to climate change, climate science, and reducing greenhouse gas emissions from forests and land use.

When President Barack Obama visited India for the first time in 2010, he and Prime Minister Singh reaffirmed their countries' strong commitment to taking vigorous action to address climate change, ensure mutual energy security, and build a clean energy economy that will drive investment, job creation, and economic growth throughout the 21st century.

The US–India Strategic Dialogue was launched in 2010 to serve as the capstone dialogue between the United States and India. The purpose of the dialogue was to assess progress, provide policy guidance, and propose new areas of cooperation across the breadth of the US–India relationship. The next strategic dialogue took place in New Delhi in June 2013.

Secretary of State John Kerry has reaffirmed the USA's commitment to maintaining a close relationship with India. He and his counterpart in India, Foreign Affairs Minister Salman Khurshid, recently spoke about taking the US–India relationship to new heights and expanding its breadth to diverse sectors.

In April 2012, the US finalized a model Bilateral Investment Treaty (BIT). Currently, a US–India BIT is in the mid-to-late stage of negotiations and could potentially be completed in 2013. The BIT, however, cannot be the ultimate goal, according to analysts and government officials from both nations. The US and India must seek to further strengthen their economic ties through steps that could potentially lead to a full Free Trade Agreement (FTA). One such step could be sector-specific agreements such as energy.

It was in recognition of the vast potential for US–India collaboration that TERI and Yale University joined hands to help build a partnership between the two largest democracies in the world and co-convened the US–India Energy Partnership Summit in 2009, 2010, and 2012.



# Preface

The economy of the world has reached a high level of globalization and at the same time trade relations between the US and India have expanded significantly. These developments have been supplemented by the strengthening of political and strategic links between the two countries as well. As the two largest democracies in the world, the US and India have to also find ways by which they can work in a coordinated manner to deal not only with challenges at the national level, but also those that are becoming increasingly important at the global level. To this extent, the challenge of climate change and ensuring global energy security become important issues for both societies.

The US–India Energy Partnership Summit has evolved as an extremely important event for the two countries to come together and deal with opportunities particularly for development and use of clean technologies, such that the comparative advantage of the two countries can be harnessed for their mutual benefit and for the benefit of global society as a whole. The Summit attracts important policy-makers from both countries as well as leaders from business and industry, research and academia, and civil society. Some of the issues dealt with at the Summit require such a combination of efforts by all stakeholders. This is what essentially provides a unique quality to the US–India Summit and a level of effectiveness which cannot be achieved through interactions within the confined circles of business, academia, or civil society individually.

The proceedings of the 2013 US–India Summit contained in these pages would provide very valuable insights and perspectives which would help in setting directions to both societies for working together towards a brighter and sustainable common future.

**Dr R K Pachauri**  
President, TERI North America





# FORWARD

Yale University is proud to continue its partnership with The Energy and Resources Institute North America to convene the 4th US–India Energy Partnership Summit. Having been closely involved in the establishment of this partnership, it gives me great pleasure to witness the growing success of the Summit each year.

India and the United States share an interest to adopt sustainable approaches to economic development as well as energy security, and the two countries have a critical role to play in the global scenario.

The 2013 Summit addressed another apposite theme, ‘Stimulating Technology, Trade, and Development’ — a key element in further strengthening the US–India relationship. The Summit is committed to providing a non-governmental platform for stakeholders from across sectors to discuss the various aspects of the two countries’ development, with a particular focus on sustainable energy.

It is hoped that this partnership and pertinent endeavour will go a long way in not only strengthening ties between the two countries but also in advancing the greater cause of sustainability.

**Dr Richard C Levin**

President and Frederick William Beinecke  
Professor of Economics, Yale University





# Acknowledgements

Consequent to the fourth edition of the US–India Energy Partnership Summit, jointly organized by TERI NA and the Yale University, two important dignitaries from the United States visited India — Vice President Joseph Biden and Secretary of State John Kerry. These high ranking officials, during their interaction with the Indian media and public at large, underscored the need for strengthening the bond between the US and India as well as enhancing cooperation at all levels. Launched in 2009, the Summit overlaid the first state visit of the Hon’ble Prime Minister Dr Manmohan Singh to the United States. Similarly in 2010, post the US–India Summit, India hosted President Obama’s first visit.

We are immensely delighted that our annual Summit has, in its humble way, paved a platform par excellence for policy-makers, entrepreneurs, scientists, students, and citizens from both sides to come together and chalk out destinies for the two nations and provide for the security and prosperity of their people.

The 2013 edition, titled ‘Stimulating Technology, Trade, and Development’, was hosted in the capital city of Washington, DC on May 13 and 14. The curtain raiser to the Summit was a high level corporate dialogue discussing the theme ‘The Energy and Development Nexus: A New Era of Corporate Leadership’? Over 40 industry leaders and government officials discussed the challenges that hamper growth, and how businesses on both sides can become more productive and streamlined. The leaders also talked about which role will better bilateral national cooperation and ease the advent of new business partnerships.

Ambassador Robert Blake, Assistant Secretary for South and Central Asian Affairs, the US Department of State set the context for the afternoon discussions, and Mr Sam Pitroda, Chairman at National Innovation Council and Advisor to the Prime Minister of India on Public Information Infrastructure and Innovations delivered a keynote address on the occasion. Mr Roland Lance Ignon, Co-Director, New York Office, Sitrick and Company deserves a special mention for having led the deliberations with precision and finesse, making for a delightful and thought-provoking afternoon.

A standing ovation greeted the ‘Eve of Hope’ address delivered by Mr Al Gore, Former Vice President, United States of America on the

evening of day one of the Summit. The ardour and zeal with which Mr Gore spoke was truly inspiring. Indian dignitaries present at the 'Eve of Hope' included cabinet ministers from India, Dr Farooq Abdullah, Hon'ble Minister of New and Renewable Energy, Dr M Mangapati Pallam Raju, Hon'ble Minister of Human Resource Development, and Ms Nirupama Rao, the Indian Ambassador to the United States of America.

The evening also sensitized those present about the misfortune of many who are forced to live in darkness in unelectrified villages across the world. The funds raised from the evening will help extend 'hope' in the form of light to some of the less privileged and lend them a helping hand in making their lives better. A warm thank you to Mr Eric Roston, Sustainability Editor, Bloomberg for having woven the night together so splendidly.

A compilation of studies from TERI India was shared with Mr Gore and the Summit participants. This would have not been possible without the support of Mr Sanjeev Mehra and Mrs Karen Mehra who provided four young and talented researchers from TERI India with this unique opportunity through the 'GS Gives' Annual Giving Fund.

On the second day of the Summit, a series of plenaries were held to discuss on energy access, growth, and sustainability; how resources can be raised for financing energy efficient and clean technology projects; and on means and ways to be adopted for increasing opportunities for bilateral energy sector trade. The speaker lineup at each plenary was impressive and their thought-provoking statements are shared with you in the following pages.

The plenaries were interspersed with a series of parallel break-away sessions called Thematic Tracks. These sessions discussed niche topics related to the overall theme of the Summit, which were Driving Energy Efficient Technology Innovation and Adoption, Women and the Green Economy, and Empowering Energy Entrepreneurs, and provided for in-depth discussions with the delegates. A special thanks to Ms Kathleen Rogers (EDN), Ms Radhika Khosla (NRDC), and Mr Tom Weirich (ACORE) for sharing many of our responsibilities in putting up a brilliant show and for a successful introduction of the tracks at the Summit.

This note will be incomplete without acknowledging the magnanimous support of our Summit partners — Yale University, United Technologies, United States Agency for International Development (USAID), Ingersoll Rand, and PTC India. The Federation of Indian Chambers of Commerce and Industry (FICCI), for the second year in a row, supported the Corporate Dialogue and helped make it a success. We wish to particularly acknowledge USAID for their support in the preparation and publishing of this proceedings document.

Last but not the least, a special mention needs to be made for the undeterred effort and enthusiasm of the Summit Secretariat, which is housed in TERI New Delhi, and in particular my colleagues Mr Taylor Gregoire-Wright, Ms Aarti Narain, and Ms Vaaruni Eashwar for their meticulous and seamless planning. The young battalion of volunteers at the Summit needs a special acknowledgement for taking on the responsibilities of the Summit arrangements. I also need to thank my colleagues from the TERI Press with whose help we have overcome many of the technical glitches and brought out this publication, which will help us plan our next Summit scheduled for fall next year.

With the support and guidance of many, the US–India Energy Partnership Summit, co-hosted by TERI NA and Yale, has now emerged as a pre-eminent platform for policy-makers and distinguished leaders, thus forging a renewed commitment to sustainable development in both the countries.

**Dr Annapurna Vancheswaran**  
Vice-President, TERI North America



## **Message from the Prime Minister of India**

---

Special message from the Hon'ble Prime Minister of India, Dr Manmohan Singh, on the occasion of the 4th US-India Energy Partnership Summit



प्रधान मंत्री

Prime Minister

MESSAGE

I am pleased that the fourth India – US Energy Partnership Summit is being organized in Washington DC by TERI-North America and Yale University. The Partnership Summit is a particularly welcome initiative because energy is a key global challenge in this century and also constitutes one of the key pillars of the India-US Strategic Partnership.

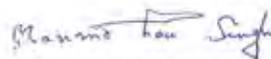
Access to clean, reliable and affordable sources of energy is a major policy priority for India, which seeks to pursue economic growth of 8-9% per year in a sustainable manner. This is imperative to give all our people a life of equity, opportunity and prosperity.

The scale of energy challenges in India requires not just investments, but also innovation in how we produce and consume energy. India's energy strategy places particular emphasis on clean and renewable energy and its efficient use. Our target is to increase renewable energy capacity from 25000 MW in 2012 to 55000 MW in 2017. Our National Solar Mission aims to achieve a capacity of 22000 MW by 2022. The rapid increase in national solar capacity from 8 MW in 2010 to 1700 MW in 2013 and the continuing increase in installed capacity for wind energy is a reflection of our commitment to enhancing renewable energy's share in our overall energy mix. Our National Mission for Enhanced Energy Efficiency and our National Mission on Sustainable Habitat have taken major strides in promoting efficient uses of energy in industry, transport, buildings and households.

In recent years, through the India-US Energy Dialogue, our bilateral cooperation has made remarkable progress in seeking solutions to the energy challenges of our times. President Obama and I have launched a number of bilateral energy initiatives, especially in the areas of clean and renewable energy and energy efficiency.

I am confident that this commendable initiative of TERI and Yale University will bring our energy experts into deeper engagement in an area of great importance for the prosperity of our two nations and for a sustainable future for our world.

I wish TERI and Yale University a very successful Partnership Summit.

  
(Manmohan Singh)

New Delhi  
11 May, 2013

# Keynote Addresses



# It is Time to Take Conclusive Actions

Eve of Hope Address by Mr Al Gore



**T**he Lighting a Billion Lives (LaBL) initiative undertaken by TERI under the guidance of Dr R K Pachauri has benefited thousands, and I immensely appreciate being a part of this platform. In the global context, black carbon, which results from the burning of biomass and traditional cooking fuels, is now, according to some scientists, an even larger problem than methane. It is a major contributor to global warming and indoor air pollution which causes respiratory diseases. India is a crucial player in resolving this crisis. But much has been said about this crisis, and the scope of bringing out any fresh perspective to this would be faint!

We have now reached the seven billion population mark and have quadrupled our numbers in less than 100 turns of our planet around the sun. At the same pace, we will add another billion people in the next 13 years, and so on. But the affluence of the people on our planet is also growing and in only 12 years we will globally double the number of human beings in the middle class. Within five years after that, we will go from the present two billion to five billion. This implies that the absolute numbers with the consumption patterns that we know from experience and history are increasing; this multiplied by the energy sources that we are highly dependent on. More than 85 per cent of the earth is powered by carbon-based fuels. But with the rise of the emerging economies, we have seen an orgy of global pollution as we put another 90 million tonnes into the atmosphere every

24 hours to run our planet. This has resulted in cumulative man-made global warming. According to the distinguished climate scientist James Hansen and his colleagues, enough extra energy to equal the amount of heat energy released by 400,000 atomic bombs is going off every 24 hours! This may have destructive consequences and, in this context, there is an urgent requirement of serious initiatives, especially at the grassroots level.

There are businesses and individuals who are serious about climate change and are taking the right measures. But our governments and markets are failing us and this is not exclusive to India. We have two very powerful tools — democracy and capitalism; these can shape the future of our world. The capitalist versus democratic system debate has to be decided by the world. But capitalism is recognized as the basis of every successful economy in the world. It unlocks the higher fraction of human potential and gives higher levels of political, economic, and spiritual freedom. It is a choice between the right and the wrong and that is destroying our future.

Democracy has been failing us because it has been hacked. No reform can be adopted. In India and in the US, we have subsidized kerosene and coal, respectively. This madness should be stopped. The question that arises here is 'what represents progress in the economy?' We don't count depletion of ground water which, in many parts of India and mid-west and south-west America, has reached a crisis stage. The definition of growth excludes the depletion of ground water and top soil, which needs urgent attention in both India and the United States. Every kilogram of corn grown in the American mid-west results in one kilogram of top soil going down the Mississippi river into the Gulf of Mexico. Our measurement of growth is our proxy for progress and does not measure the distribution of income. Inequality is increasing in India and the US rapidly. In the US, 93 per cent of additional national income, since our recovery, has gone to the wealthiest 1 per cent. The yardstick to measure progress doesn't measure pollution either. We use our atmosphere as an open sewer.

What does 'IBGYBG' mean? I didn't know. But apparently it was used by the bankers, traders, and brokers frequently in their emails. 'IBGYBG' means 'I'll be gone, you'll be gone'. Now, it seems that is the position we are taking on global warming! The time has come to awaken and take conclusive action.

# Telecommunications Revolution: Model for Energy Sector

High Level Corporate Dialogue Address by Mr Sam Pitroda



**T**he convergence from electro-mechanical to electronic and then to digital initially started at a cost of \$1,100 per line and this has been the same for about 30 years, despite the addition of new features and functionalities, computers, and software and store programmes. As a result, it took us about 110 years to get a billion telephones and it had been a luxury for the people at the top of the economic pyramid for a long time. Our work in India during the 1980s focused on access to telephones as opposed to telephone density because the cost structure was very different then. With the entry of mobile technology, all of a sudden the cost went down from \$1,100 a line to \$800 to \$500 to \$400 and it ultimately reached \$80. This way the number of telephone connections increased from a billion to six billion. From this we learnt that affordability, scalability, and sustainability go hand-in-hand when you are addressing the challenges at the bottom of the economic pyramid. In the process, all the utilities were broken up systematically everywhere in the world. The process started with the US in 1984. AT&T was split on the basis of deregulation, privatization, technology, innovations, and entrepreneurship, which were the key drivers in the telecom sector. In the process old companies died, new companies got created, and the whole industry underwent a massive transformation. My generation in the '60s could not think of Bell Labs disappearing altogether and Weston Electric and Northern Telecom not existing. A lot of companies merged and new telecoms were created which nobody had ever heard of. Companies such as Google, Cisco

(now Facebook), and Twitter came into existence. They were all telecom companies. It is said that the energy sector invests close to 4 per cent on R&D, biotech invests 20 per cent, defense 12 per cent, and telecom probably close to 12 per cent. Hence, we need to look at the energy sector more like telecom. Everyone is focused on incremental change because everyone wants to hold this monopolistic utility mindset. India witnessed the telecom revolution in 1984. At this time, around 80 per cent of energy was getting lost between source and user and this way there was no way out but to focus on how to distribute energy. It was also learnt that distributed energy and telecom were the only way to scale. During the '60s, we designed mega switches where hundreds of thousands of lines came at one location. But now everything was distributed. So today, there are a lot of similarities and opportunities to innovate.

There are seven broad areas where there are low hanging fruits today: auto, buildings, industries, lighting, smart grid and storage, IT, and transport. There is no sense in going through all the numbers but there are all kinds of numbers available for each sector in terms of usage and in terms of carbon dioxide emanation or emission. We need to question the fundamentals in the energy sector to see a substantial change in the next couple of decades. For instance, we heard about super conductors 20 years ago and it was thought that this would solve a lot of problems associated with losses.

We started with a Smart Grid Task Force and Smart Grid Forum in India. Immediately, there was a need to import a lot of these fancy meters. Then we realized that in India leakage was a major problem. Now the question was could we design a meter with focus on leakage, and this required out of the box thinking.

In an effort to enhance public information infrastructure, we are looking at connecting 250,000 panchayats to optical fibre. We have already connected 1,500 with 40 giga byte bandwidth with all our universities, R&D labs, and libraries. This will cost us about \$10 billion for connectivity. We are also putting together platforms for UID, GIS, cyber security, data centres, applications, and payments. In total, today we have more than 10,000 IT professionals working in the government on public information infrastructure. We will spend about \$20 billion to build public information infrastructure. Is there a way to use that for the power industry and energy sector? How do we ride on this public information infrastructure to really take advantage of IT in the energy sector? There has been a lot of talk about tapping solar power in a cost effective manner but if you take away the government subsidies, it is not easy to justify solar power even today. We know that the energy we receive from the sun amounts to about 175,000 million megawatts and we use less than probably 40 million megawatts. We need to think of more ways to harness it. The ultimate advantage is going to come from technology, innovation, entrepreneurship, new business models, new financing opportunities, and new partnerships between India and the US in various industry sectors.

The telecom sector had changed the face of India. The first phase of the telecom revolution is beginning to end and the second phase with broadband is now being unfolded. In 10 years' time, we would be able to see what telecom can do to our education, our agriculture, governance, health, and hopefully, the power sector.

# Technology Partnerships for Creating New Breakthrough Models

Keynote Address by Dr Rajiv Shah



**W**e recognize that the work done by Dr R K Pachauri — and under his leadership, that of TERI — has been critical in creating a global consensus that is nearly complete. At this platform we can have policy discussions that are informed by reality as opposed to conjecture. This energy partnership summit is emblematic of the strong and vibrant relationship our two countries (India and the US) have, and of our desire to come around some of the toughest and most challenging issues in the world and to bring science and technology and innovation to address them. Today, there is a whole generation of Americans who clearly understand their responsibilities to create the kind of world that can sustain us over time.

During a recent visit to India, we had the chance to meet with many of our newer partners in our India programme and partnership. We met with leaders of the philanthropic revolution that is taking place in India as new wealth accumulates, especially by those who have developed an expertise and real success in business and entrepreneurship. Today at USAID, we are working with the Nilekani family to reach 200 million children with textbooks, with the Ambani family to focus on child survival and global health, and with the Hinduja Family to address XDR (extensively drug resistant) Tuberculosis to make sure that hyper-resistant strains of that disease are addressed effectively in India with both technology and programme management. Such programmes are showing us new ways of solving traditional problems that we believe can have

relevance far beyond the Indian context.

This is most important in the area of clean energy and in our efforts to usher in a clean energy future. The energy partnership between India and the United States that focuses on off-grid, clean energy solutions - that are being developed and tested mostly in India - will have more relevance to helping about 800–900 million people who are accessible but live off-grid, who pay for energy through diesel but do not benefit from it economically or otherwise. Today, we are working with entrepreneurs, such as Mera Gaon Power who are using micro grids to help rural families light their homes and charge their phones in Uttar Pradesh. We are also working with partners such as Gram Power who are bringing smart grid technology to more than 8,000 villages across rural India and helping to develop business models on how to deploy household-based solar technology with smart grids and smart meters that can be low cost and affordable, even to the relatively resource-poor families. These partnerships are aimed at ushering in a new model of development that focuses on refining and improving business models so that we can reach out to those who are living in the poorest quintiles of the population. This segment spends the most to access the most basic services such as water, energy, and health care and, in return, they often get the least quality and consistency in service.

These are the types of efforts that have helped us through the partnership between India and the United States to pursue things such as reduction in coal consumption by 78 million tonnes over 16 years, thus avoiding 99 million tonnes of greenhouse gas emissions in India. This is equivalent to taking one and a quarter million cars off American roads. Together, as part of these efforts, we have worked to build the capacity of the distribution sector, training 37,000 engineers in different types of partnerships to help us achieve these results.

Through new partnerships, including the one during the last year when we deployed our Development Credit Authority, we have issued a \$4 million portable guarantee with the India-based Orb Energy, which is helping the company secure a loan and work towards bringing solar energy to rural markets. The move is important because of the fact that the vast amount of local wealth in India can be effectively deployed to take care of the energy deficits. We are now in the process of finalizing a \$100 million credit guarantee to support an India-based private equity fund called Nereus Capital. The firm aims at investing in renewable energy projects, unlocking local resources. Through partners such as Jonathan Winer (Managing Director, Nereus), we can reach dozens of entrepreneurs who can create both employment and outcomes in this sector. Our credit guarantee will help mobilize American institutional capital into the energy sector and generate an additional 500 MW on an annual basis.

We ultimately believe that by deploying science, technology, innovation, and the kind of financially innovative partnerships we have just highlighted, we can go from all these wonderful and relatively small-scale projects and programmes to real transformation that reaches hundreds and millions of people in India, and ultimately in Africa, Asia, and other parts of the world. After all, it is those technology partnerships that will help us create new models that will break through and reach millions of people with effective clean energy, meeting the growth needs of India and many other parts of the world, without experiencing threats to our climate and our human capacity to survive on this planet.

# Cooperation on Energy Geopolitics

Keynote Address by Ambassador Carlos Pascual



**T**he first issue that I want to put forward is how India manages an extraordinarily complex set of issues between energy investment requirements, commercial viability, the type of energy that it is going to use and the commercial viability, and the competitiveness of those energy sources. An estimated investment of \$1.62 trillion is needed in the power sector, including in generation, transmission, and distribution. In order to get that, it will be critical to attract private investment; one cannot depend only on public funds investing in specific technologies. The commercial viability of power utility will be the critical unit of analysis in attaining this private investment. The ability to successfully handle a commercial restructuring process will be critical to attracting the levels and type of private investment necessary to succeed.

In the current Five-Year Plan that India is implementing, there is certainly a stronger push on investment on renewables, but there is still a projection of greater accumulation of coal-fire capacity in the overall generation capacity of the country. In terms of import requirements, this indicates that India, a country which has consistently been able to supply enough coal and satisfy its needs, is going to be a more significant coal importer.

This whole equation gets even more complicated if we take into account what is going to be competitive in the future. Gas is likely to become increasingly more competitive and solar will also come in this range. So, how is this dynamic process going to be managed? The utility companies within India have to be at the centre point of all of these decisions. They are going to

be fundamentally critical to establishing the commercial viability of the sector — the key factor for the private sector to conduct their investment decisions. This is one area, which we have raised as part of a potential dialogue between the United States and India. The Department of Energy has done phenomenal work on exchanging knowledge about different technologies and how to drive down the cost of those technologies. And the step that we want to take is to combine the declining cost curves of those technologies, figure out how to make them competitive, and based on whether they are competitive, determine what kind of private investment is likely to be seen in the future, that is, I think the fundamental nature of the power system of India or how renewable it is or it is not.

The second question is regarding natural gas. The distribution network in the US has been critical in taking advantage of the gas resources we have, and spreading them around the country. Europe has invested phenomenally in LNG regasification capabilities, in pipeline capacity, and in making those pipelines move from West to East and North to South, and not just East to West. It has been combined with a whole series of competitive measures so that you cannot own the gas, transit system, and the distribution system. This has resulted in a significantly changed competitive disposition, where most of the Western European utilities have now re-negotiated their contract with Gazprom to reduce the prices and extend the financing terms. In India, there is a much more limited extent of infrastructure. In Japan, surprisingly enough, it is not very different — there are more regasification terminals, but very limited pipeline capacity. In China, there are many LNG terminals on the coast but not many pipelines beyond that. If there is to be a capacity to benefit from the kind of Gas Revolution we are seeing around the world today, there needs to be a mechanism which cannot only move that gas as LNG, but then have the terminals to receive it, the distribution network to move it throughout countries, and the ability to create a gas market.

So, the question we have posed to India is, as friends and partners, do we want to work together on this? Do we work together as partners to understand what are the investments in infrastructure that need to be made, how much of that investment and infrastructure might be made by the private sector, how much by individual countries, how much needs to be financed by multilateral banks, and how do you create the software of competition for that gas market in the future, so that countries are able to benefit from more competitive pricing? That is one of the most critical areas for cooperation that we might have, looking at the long-term relationship between our countries.

The final issue is the question of energy access and the importance of reaching the 400 million people who do not even have access to power in India right now. How do you create viable business models? While looking at distributed power generation, one of the things that India has to get right is how to combine financing for relatively small scale investments together with the availability of technology at the localized level, combined with the service capability of that technology and the ability to ensure quality control. One of the things we have learned is that contracts make a big difference, to the extent to which you have comparability in contracts, and both your finance world and your technology world understand them better. You have a better ability to bring banks and technology providers together, but we have to meet this challenge of understanding what is decentralized, and where you can have benefits from a central resource base, what gets grant finance, and what gets loan finance. Recently, USAID was sponsoring a partnership meeting that had potential partners from all over the country participating in a dialogue. This is just one idea that might be able to be developed further. If we think about external financing coming into the country, how does it move more broadly to a network of

participants who might be operating at a much smaller scale? One possibility is to have some form of development finance institution. It could be partly state or could be a cooperative of private entities and that institution might hold tenders to select partners, who would then come forward with proposals on how to combine financing of technology and the servicing of that technology. This may be separate from the establishment of some form of centralized resource base, which handles activities such as training participants in financial sectors, information, technology, and maintenance. And beyond that, looking at issues such as are there standard contracts that can be used, and are there standards that should be used in training to ensure that there is a minimum level of quality to which people are trained? If we cannot figure out a viable business model to address this issue and challenge of off-grid, decentralized power generation, then it will be difficult to reach out to 400 million people in India who currently do not have access to power. These issues are currently central in the bilateral relationship. The questions related to the commercial viability of utilities and how they affect investment and the nature of that investment, the way in which we can work together on the development of a regional gas market, and its implication for competition, and the way that we can work together for the development of business models for off-grid decentralized power generation are going to be critical factors in the overall character of our bilateral relationship and energy relations.

# The Context for Financing Clean and Efficient Energy Technology in India

Keynote address by Dr John Holdren



**T**he way I describe the essence of the energy-climate challenge is that without energy there is no economy; but without climate, there is no environment; and without economy and environment, there is no national well-being, no civil society, and no personal or national security. The way the world's economy meets its energy needs imperils both the climate and the environment. If you look at the global CO<sub>2</sub> emissions trajectory from 1990 to 2011, there is an interesting pattern. Although the per capita emissions of CO<sub>2</sub> in the developing world are smaller than in the industrialized countries, the developing world has more capitas and, therefore, passed the developed countries' aggregate emission of CO<sub>2</sub> in 2005 and the sum of industrial and transition economies in 2008.

This tells us that the problem cannot be solved without the participation of both parts of this picture. What one finds from the figures for 2011 is that the world is still astonishingly dependent on fossil fuels. The world fulfills 84 per cent of its energy needs from fossil fuels and that includes the contribution from traditional biofuels in that total. If you do not include the traditional biofuels, which are still important across most of the developing world, in this total, the fossil fuel percentage would be even higher.

The other message one wants to note here is that India is in third place among countries with the largest emissions, well ahead of Russia. Together, China, the United States, and India account for half of the global emissions of CO<sub>2</sub>.

The United States Government has had a long standing commitment to clean energy and climate finance. A few examples include the US Fast-Start Climate Finance Initiative; OPIC (Overseas Private Investment Corporation) has been rapidly increasing its commitments in renewable resources; global institutions for clean energy and climate finance - most importantly, the World Bank and its associated International Finance Corporation (IFC); and of course the Global Environment Facility - here too, there are ever strengthening commitments, in particular to fund clean and efficient energy as well as climate change resilience.

One does need to keep in mind, in thinking about financing and in the context of capital flows more generally, that official development assistance is actually a very small part. Only about 15 per cent of the OECD capital flows to developing countries. Private sector capital flows are much bigger, even remittances are bigger. Private philanthropy is smaller, but is actually about half of official development assistance. So, if you try to put those capital flows in context for the case of India, it's quite remarkable. In 2011, development aid to India totalled about \$3.2 billion; foreign direct investment totalled 10 times as much at \$32 billion - so what the private sector is doing in terms of foreign direct investment is ten times as big as development aid. Remittances in 2011 were twice as big as that at \$64 billion, government spending in India was \$285 billion, trade in terms of total imports to India \$570 billion and gross domestic investment about \$700 billion. So when one thinks about what the possibilities are and where the leverage is, we certainly need to think about how to condition and shape the environments in which these larger flows take place and not just about the smaller flows over which government entities and multilateral entities have direct control.

Another point worth making is that clean energy projects often require sequencing different types of capital, ie., more than one of these kinds of entities combined in sequence. For example, Husk Power, an Indian start-up based around rice husk fired power generators, has had funding initially from private philanthropy - the Shell Foundation; then domestic public finance - a subsidy from the Indian Ministry of New and Renewable Energy; then private sector capital; and finally development finance institution funding from OPIC. These combinations are increasingly important.

I want to emphasize on the mode of talking about the larger context for thinking about these issues, that there are important modes of international cooperation to energy technology development and deployment, besides financing per se. There are science and technology transfer and sharing activities that go on by multinational corporations; commercial joint ventures in high-tech industries; university to university, lab to lab, and agency to agency cooperative agreements; and of course, large-scale multilateral science and technology projects, including in the field of energy.

President Obama is strongly committed, and has been since the beginning, to cooperation in science, technology, and innovation internationally, including matters of energy and climate change. The cooperation between the United States and India has, of course, pre-dated the Obama administration. The number of landmarks include various cooperation agreements such as the Indo-US Science and Technology Cooperation Agreement in 2005; the US-India Energy Dialogue launched in 2005; these US-India Energy Partnership Summits initiated in 2009; the MoU on energy security, clean energy and climate change in 2009, which included the setting up of the US-India Clean Energy Research and Deployment Initiative and a Bilateral Dialogue on Climate Change. Landmarks continue with the US-India Strategic Dialogue; the US-India Partnership to Advance Clean Energy (PACE); and multilateral clean energy cooperation engaging the US and India, the centrepiece of which is the Clean Energy Ministerial.

# Bright Prospects and Tremendous Opportunities

Keynote Address by Mr Daniel Poneman



I would like to start by first putting the US-India relationship into proper context because I don't think you can understand the nature of our energy cooperation without understanding the broader fabric of US-India bilateral relations. As Prime Minister Manmohan Singh has stated, the energy aspect of the relations is indeed the main pillar of the relationship.

I am old enough to have watched the US-India bilateral relationship for close to 40 years now. And it has had, as everyone here knows, its ups and downs over the years, as any relations between two great nations, much less the world's two largest democracies, would. But I can tell you with confidence, that I have never seen a more robust, wide ranging and multi-faceted level of cooperation between our two countries. I really want to double down on the point that it's not just a matter of government officials talking to each other, it is also academic exchanges and business cooperation; and I think that the prospects for its continuous strengthening are extraordinarily favourable. And in that respect, it is worth noting that the Clean Energy Ministerial

(CEM) is really one of the main initiatives in the recent years, in terms of international cooperation. It is very important that India has hosted the CEM and the leadership role that India has played in a number of areas of cooperation, such as the Super-Efficient Equipment and Appliance Deployment (SEAD) initiative, has been significant. And, obviously, any time that we are dealing with countries of the size (and spectacular growth in the case of India) of the United States and India, the prospects for leveraging the kind of innovations that we have seen is something that has benefits that range far beyond our two nations and could extend to the rest of the world.

I also would like to recall the opportunity I had to visit TERI while in India. It is such an efficient building, with its natural lighting and ventilation, efficient use of water, etc. I think it shows the kind of things that we can do when India and the United States get together. However, if I could say that there was one thing in my visit to TERI that was more impressive than the physical plant, it was the people – in particular the students. We had a great session, with lots of really engaged students and faculty members as well, and that's really what it's all about. The focus that India has placed, as we have also placed, on STEM (Science, Technology, Engineering, Mathematics) education is absolutely critical to our collective future and I very much look forward to continuing that kind of cooperation. It really gives us hope when we see that kind of engagement, inquisitive nature, and the dynamism of students like those I met. It is clear that the prosperity that India has already enjoyed has created a good path to a great deal of future momentum. This is particularly important given that India's population is expected to grow by another 300 million people over the next 20 years – which is equivalent to a United States worth of people! And this creates a tremendous opportunity because all these people will need new infrastructure. The United States is very much a country of retrofits and you will be building physical plant and infrastructure – by some estimates, 80 per cent of which is yet to be built. And this is a great opportunity to get it right up front, to be conscious about energy efficiency and the importance of sustainability, when there is still time to make smart design decisions to build clean and smart the first time, rather than having to retrofit later.

It is a great opportunity to meet the efficiency targets that Prime Minister Singh has articulated and, in short, this is why we view our partnership and the energy relationship that the United States enjoys with India as so important. There are MoUs that just sit and gather mould and dust on the shelf; what I am very pleased about is that the cooperation we have embarked upon with India in the past few years has been anything but that. We have two aspects of our Partnership to Advance Clean Energy: PACE-R for the research side and PACE-D on development. And this shows the priority we attach to this relationship because we do try to be prudent at the Department of Energy on where we deploy our resources in terms of our engagements around the world. Under PACE-R, we have the Joint Clean Energy Research and Development Centre, which has been a very important initiative for us. It has harnessed the scientific know-how of our two nations and it has enabled us to discover the transformational scientific solutions in the areas of building efficiency, solar energy and advanced bio-fuels. It is the first ever joint funding opportunity announcement that we have conducted. On my visit to India, the same day I visited TERI, I went over to the office where they were reviewing the proposals on these funding opportunity announcements. So it was gratifying, when we had the US-Energy Dialogue here in Washington last September, to see the selections that had been made and to hear from the people who are doing that very important work. The research, of course, is only now just getting underway but the \$125 million in those three technology areas – solar building, efficiency and bio-fuels – will be of indispensable importance to us. This will entail the annual involvement of more than 95 government, private and, university entities in both countries over the next five years.

Now in June 2012, USAID, in partnership with the Ministry of Power and the Ministry of New and Renewable Energy launched a \$20 million assistance programme under the deployment side of PACE. This programme focused on strengthening the enabling environment, increasing access of finance, and enhancing the institutional and human capacity. I think is important to note here, the targets, included in Prime Minister Singh's letter that Ambassador Rao read to us, increased from 25000 – 55000 Mega Watts of solar energy by 2017. This is a very ambitious target but it is good to know that providence was less fickle in distributing solar resources than hydrocarbons. I think there is a great opportunity for India to be a real leader in this area.

These collaborations build off lessons that we have already learned here in the United States and are eager to share in partnership with our colleagues in India. In the United States, if you have seen the sort of famous flow-diagrams of energy inputs and energy outputs and the destination of the energy that we produce, we basically are not even at 50 per cent of energy efficiency in the United States. That is to say, out of an energy economy around the order of 100 quadrillion btu per year, over half of that is effectively thrown away. Now, the laws of physics will never permit us, of course, to achieve anything like 100 per cent efficiency but there is a tremendous upside in doing much better than we have done and, in fact, I would consider it a moral responsibility that we do so, considering our custodianship of this small planet we inhabit. In the building sector, for example, we in the United States have articulated a target of improving efficiency by 20 per cent by the year 2020. So, if you look at the amount of energy that is consumed by buildings in the United States, that would amount to a savings around the order of 4 quadrillion btu. That is equivalent to the annual consumption of Norway and Sweden combined for a year or a 100 million homes for a year, and so the upside potential of our energy efficiency investments is



extraordinary. I was particularly pleased to see that this Summit is addressing the very important issue of clean energy finance. With regard to renewable sources of energy such as wind and solar, it is all about the capital since there are no commodity costs, much less commodity risks. In terms of wind and the Sun, we don't have to pay for those resources obviously, so to have these become good parity kind of opportunities where we can really go toe-to-toe with the cheaper and not-as-clean forms of energy, we have got to get more creative in terms of our financial instruments. We need to lower the cost of capital. I think the same kind of creativity, innovation and entrepreneurial spirit that have been put into developing next generation bio-fuels, different types of photovoltaic cells, etc., need to be dedicated toward our financial instruments and credit markets. We need to ensure that both equity and debt capital are available to support these kinds of investments, because that is going to be absolutely critical to making them affordable and able to compete with other more traditional forms of energy.

You have heard me talk a lot, in these brief remarks, about the tremendous upside potential in the US-India energy partnership. Much has already been achieved and I think the prospects to achieve much more are vast and attractive from any variety of perspectives. As I alluded earlier, any two great nations will have challenges and I think that in the spirit of partnership and the growing maturity of the bilateral US-India relationship we should tackle these issues head on and be candid in discussing them because everyone has got various equities and interests they need to preserve and advance. We can only advance together to the extent that we can take those particular situations and concerns into account. When we encounter a problem or challenge; we will need to find ways to address these challenges so as to promote the efficiency, innovation, and creativity that will unleash the growth of our own economies — but in a way that we are able to also enhance our bilateral trade and increase the benefits to all people in both of our nations. The prospects ahead are bright; and the opportunities for investment, trade, commerce, and shared research and development are enormous.

I would like to end by saying that no matter what challenges we face, the broad and deep ties that bind us — those of culture, interest, value systems, and of being the two largest democracies in the world — are the bedrock of the US-India relationship that will sustain us and contribute to the solutions to all kinds of problems. We have come a long way in this relationship in the last several years. It has been gratifying, in fact, has been sort of a vertiginous ascent, but I think there is a lot of head room in this relationship to take much further; there is a lot more positive work that we can do. And frankly, I would submit to you, we can do much more working together than we can working individually. This is precisely because we have the same set of interests, and we bring the same set of values, innovation, and desire to work together towards this common end. As we move forward together, we will continue to expand our cooperation to promote a secure and a stable world; to advance technology and innovation; to expand mutual prosperity and global economic growth; to support sustainable development; and to lead the global community in achieving a clean energy future.

# Plenary Sessions



# Inaugural Session



## Welcome Address by Summit Co-Chairs

Dr R K Pachauri, President, TERI NA  
 Dr Richard C Levin, President, Yale University (via video)

## Special Address

HE Ms Nirupama Rao, Ambassador, Embassy of India to the USA

## Remarks from the Guest of Honour

Dr Farooq Abdullah, Hon'ble Minister of New and Renewable Energy, Government of India

## Keynote Address

Mr Daniel Poneman, Acting Secretary of Energy, US Department of Energy

**T**he fourth annual US–India Summit was a meeting of minds from the world’s two largest democracies to discuss pathways forward in technology, trade, and development. India and the United States have historically shared similar views on a number of issues, including ideas about freedom and individual liberty, and the last two decades have seen India and the United States align on numerous common strategic interests. This convergence has helped drive the two great nations closer and has increased levels of cooperation between India and the United States in business, science, and technology. TERI North America (TERI NA) aims to capitalize on the common interests and issues faced by both nations in order to stimulate

greater collaboration in developing technologies, generating trade, and furthering development to enhance energy access and security and to promote green growth. In his welcome address, the President of TERI NA, Dr R K Pachauri stated that the United States is going through a major energy transition due to several recent developments, adding that situations are very different now as compared to earlier. On the need for collaboration between India and the United States, Dr Pachauri said that there have been global developments that require the democracies of India and the United States to work together, and he believes that there is a need to develop a dynamic relationship between these two democracies, which are experiencing a growing discovery of shared values and interests.

HE Ms Nirupama Rao, Ambassador of India to the United States, spoke of how TERI NA has been at the forefront of the collaboration between India and the US in the areas of climate change, energy, and environment. Ms Rao described the impressive and tangible growth of collaboration and cooperation in the field of energy between India and the US in the recent past, calling it a very important and crucial pillar of our strategic dialogue. She elucidated on the energy dialogue held at the inter-government level between India and the US, which has focused on the need to strengthen energy security and to promote sustainable and environment-friendly development through research, innovation, and collaboration, stating that such collaboration is important since energy security is essential for livelihoods and promotes faster, more sustainable economic development. Describing the importance of energy security for India, Ms Rao said that greater energy access is about life, survival, and building a brighter future. She added that both nations need to focus on reducing their dependence on conventional fossil fuels and accessing non-conventional and greener sources of energy, and stressed the importance of collaboration in this area. Ms Rao spoke of the immense potential of collaboration on clean energy development and regular exchanges between both countries in multiple sectors, such as oil and gas, power and energy efficiency, coal use, and non-conventional and renewable sources of energy. Ms Rao concluded by saying that energy trade is of strategic interest for both the sides and should be prioritized accordingly, specifically the export of US natural gas. She further added that the Indian market is expected to grow rapidly and, therefore, a stable trade arrangement in this particular sector will be a benefit to both the countries and lead to geopolitical gains vis-à-vis their relations with allies and partners.

India's Union Minister of New and Renewable Energy, Dr Farooq Abdullah, began by emphasizing the need for action if there is to be a change, advocating that India and the United States must combine their efforts and work together before things can improve. Global energy consumption is growing at an average of two per cent every year, and three-quarters of this originates from fossil fuel energy resources. While energy consumption growth is faster in developing countries, including India, nevertheless around 78 million households are still without energy access, Dr Abdullah said. Renewable energy has the potential to address concerns about unsustainable fossil fuel and climate change. He also expressed that the challenge before the world is to make renewable energy technology convenient, efficient, safe, and affordable.

India is at a new threshold of growth, Dr Abdullah said, and the growing Indian economy will demand more energy. However, at present, India is energy deficient and has only around a third of the global average per capita energy consumption. Dr Abdullah elucidated that furthermore, energy security concerns will also be significant. Estimates suggest that in future over 90 per cent of liquid fossil fuels and up to 45 per cent of India's coal would need to be imported. Vulnerability to volatile prices will increase India's trade deficit. This would make India's economic growth hostage to imported energy.

Dr Abdullah advocated an alternative development strategy primarily based on sustainable and indigenous energy resources. He then elucidated India's goals in the arena of renewable energy, where renewable power represents about 13 per cent of total installed generation capacity. He also expressed the Indian government's intention to add a further 30 GW in off-grid energy infrastructure. He further stated that the initial momentum provided by the existing renewable power policy and regulatory framework can be carried forward through the development of indigenous technologies, which can be aided by technology transfers. He described India's efforts to create a domestic manufacturing ecosystem and offer equal opportunities for investment to both national and international developers, focusing on the acquisition and absorption of knowledge technologies and skills by local actors. Dr Abdullah concluded by stating that India needs substantial investments in renewable energy and has ample opportunities for trade and investment.

Mr Daniel Poneman, Acting United States Secretary of Energy, began by describing the partnership between India and the United States as robust, with a multi-faceted level of cooperation between the two nations that extends beyond governments to include academia and business, adding that most initiatives in the recent past have focused on clean energy. He stated that India's focus on STEM (Science, Technology, Engineering, and Mathematics) education is critical to the collective future of both nations, and as estimates expect India's population to grow by another 300 million in the next 20 years, it is critical to be conscious about energy efficiency and sustainability to build clean and smart infrastructure. Mr Poneman opined that the partnership and energy relationship that the US enjoys with India is extremely important and, provided India can achieve its very ambitious target of 25 GW to 55 GW of solar resources by 2017, he believes India could be a real global leader in renewable energy.

# Opportunities for Bilateral Energy Sector Trade



## Chair

Dr Terry F Yosie, President and CEO, World Environment Center

## Keynote Address

'Cooperation on Energy Geopolitics'

Ambassador Carlos Pascual, Special Envoy and Coordinator International Energy Affairs, Energy Resources Bureau, US Department of State

## Panelists

Mr Deepak Amitabh, Chairman and Managing Director, PTC India Limited

Dr Charles K Ebinger, Director – Foreign Policy, Energy Security Initiative, The Brookings Institution

Mr Henry Steingass, Regional Director, South and South East Asia, USTDA

Mr Venkatesh Valluri, Chairman and President, India Region, Ingersoll Rand India

**T**he relationship between India and the United States has undergone a significant transformation in the last decade, broadening its scope from issues of national security to those of economy, bilateral trade, public policy, and issues concerning civil society.

An issue of particular importance in the bilateral relationship is the growing concern over climate change. This is currently being discussed by parties in India and the United States and attempts

are underway to create a framework for a treaty that will help generate investments and create trade opportunities in the energy sector. However, despite efforts to try and achieve cooperation and collaboration between both nations in the recent past, there are a slew of challenges that must first be overcome in order to create an environment that will stimulate bilateral energy trade.

The keynote address elaborated on three specific issues. The first relates to meeting the investment requirements, ensuring commercial viability, and choosing between competing energy sources in India. The second issue is regarding natural gas. It is imperative for India to establish the necessary infrastructure for facilitating consumption of natural gas in the country. It is necessary to construct the required LNG terminals, domestic production facilities, and, most importantly, pipelines for transporting gas within the country. There are significant opportunities here for collaboration between the two countries. The final and most important issue is enhancing energy access in India. Here again, the issue of facilitating and making available the right mechanism for financing is critical.

The challenges of grossly under-penetrated and over-regulated markets would, in fact, serve as key opportunities if addressed in the right manner. Interventions are, therefore, needed in regulation and capacity creation in order to tap the huge potential that exists for bilateral energy sector trade.

India has to address the problem of inadequate grid and distribution network infrastructure. This situation is creating a problem of suppressed demand, as there is too much latent demand in the system. The universal supply obligation, which is cast upon the distribution utilities, restricts itself to providing power connections and does not take into consideration security issues. Distortions in primary energy and fuel pricing, developing the industrial structure, coping with issues of pricing power and potential existence of stranded capacity, along with unmet demand are some of the other issues that were pointed out. It was also stated that these issues provide an opportunity for collaboration between India and the United States.

With regard to a market for trade between the US and India, there exist opportunities for bilateral trade. However, in the absence of effective pricing and credit worthy off-takers, these have not come to fruition. It was further stated that this lack of opportunities is likely to continue until there is stronger regulation, a greater improvement in billing and collection, a reduction in power theft, and investments are actually made in the power sector. Further, opportunities for India to engage with its neighbouring countries were also identified.

The USTDA focuses on working with sponsors in India, who can introduce modern solutions — ideally stemming from the US — to the Indian energy sector. They are increasingly focusing on the private sector due to their perceived ability for the uptake of modern solutions. The opportunities range from small scale to micro grid and to the larger scale, looking at gas pipeline infrastructure and LNG imports. Observations show distribution utilities managed by the private sector with lower loss profiles in percentage terms. However, there exists the potential for the ability to decrease those losses further and to enhance the efficiency of the system. The examples of a few private sector investments were cited, including Reliance Infrastructure in Mumbai and solar power developers. There have been many successes as well as challenges in the Indian solar energy sector and there continues to be opportunity for trade in this arena. Natural and unconventional gas also hold great potential as areas of cooperation and trade, particularly shale gas, coal-bed, and coal-mine methane. Technology development and sharing will also be an important aspect of the collaboration on gas development.

Micro and smart grids hold great potential and opportunity for collaboration. The example of the wireless telecom industry was cited, where there was a push from the users to drive policy, instead

of vice versa. This approach should similarly be adopted for micro and smart grid energy, with the growing demand influencing policy. The power sector in the future will be driven through a process and solution network, where the users create demand, which in turn guides policy creation. Innovation and technology and energy efficiency are critical in order to achieve such a scenario. The two are interlinked, with innovation and technology being necessary for achieving energy efficiency. The strategy for bilateral trade and driving business will need to take into account both the short-term and the long-term in order to build and maintain a stronger relationship between India and the United States.

### **Key Learnings**

- Discussions among parties in India and the United States are underway and attempts are being made to create a framework for a treaty that will help generate investments and create trade opportunities in the energy sector.
- Despite efforts to try and achieve cooperation and collaboration between both nations in the recent past, there are a slew of challenges that must first be overcome in order to create an environment that will stimulate bilateral energy trade.
- It is necessary to construct the required LNG terminals, domestic production facilities, and most importantly pipelines for transporting gas within the country. There are significant opportunities for collaboration between the countries.
- Enhancing energy access in India is an important issue - facilitating and availability of the right mechanism for financing are critical.
- There exist several opportunities for bilateral trade, many of which have not yet come to fruition. Stronger regulation, investments and infrastructure will contribute to the realization of these opportunities.

# Financing Energy Efficient and Clean Technology Projects



## Chair

Hon'ble David B Sandalow, Fellow, Columbia University Center on Global Energy Policy; Former Under Secretary of Energy (Acting) and Assistant Secretary for Policy and International Affairs, US Department of Energy

## Keynote Address

'The Context for Financing Clean and Efficient Energy Technology in India'

Dr John Holdren, Assistant to President Obama for Science and Technology and Director, White House Office of Science and Technology Policy

## Panelists

Dr Steven Girvin, Deputy Provost for Science and Technology, Yale University

Mr Michael Schulhof, Managing Director GTI Capital Group, LLC

Mr Jeff Seabright, Vice President, Environment and Water Resources, The Coca-Cola Company

Mr William Sisson, Director, Sustainability, United Technologies Research Center, United Technologies Corporation (UTC)

Mr Todd Stern, Special Envoy for Climate Change, US Department of State

**A**t the opening session of the Clean Energy Ministerial in April 2013, Hon'ble Prime Minister Dr Manmohan Singh spoke extensively about energy access for development. In his speech, he underscored the importance of financing energy efficient and clean technology projects.

The extraction of the energy requirements of economies all over the world is putting the climate and environment at peril. A look at the data of global CO<sub>2</sub> emissions for the period 1990–2011

shows that the per capita emissions of CO<sub>2</sub> are far less in the developing world when compared to that of industrialized countries. With each passing day, commitments towards funding clean and efficient energy and climate change resilience, especially from the US, are being strengthened. Only 15 per cent of the OECD capital flows to developing countries. Capital flows and remittances from the private sector are much larger than private philanthropy. There is a remarkable development in these capital flows when placed in the Indian context. In terms of foreign direct investment, the private sector contributions are ten times over that of development aid; remittances were twice over at \$64 billion for India in the year 2011. Government spending is \$285 billion, trade is at \$517 billion, and gross domestic investment about \$700 billion. In such a scenario, it is vital to devise ways which create conditions conducive for larger capital flows.

Myriad sources fund clean energy projects, and transfer of technology proves to be a great impetus to them. The US–India commitment towards science, technology, and innovation on issues of energy and climate change dates back to times prior to the Obama administration. The two countries have come together on these matters at many summits and meets. Yale University lays great stress on its long range strategic planning. It houses a multi-university research consortium to pursue detailed modelling of climate change and extreme weather advances that will take place in the north-eastern regions of the US over the next century. The deployment of such projects in selected regions of India will prove very beneficial.

The greenhouse effect has now been a long and well-known phenomenon — by the close of the 19th century, the mechanism by which CO<sub>2</sub> warms the earth's atmosphere was well understood. As early as 1917, the well-known technologist Alexander Graham Bell had begun to advocate the use of alternatives in place of fossil fuels, which found little or no favour amidst the populace.

As far as financing of research is concerned, supporting unfettered, curiosity-driven research will have long-term benefits. New innovations do not necessarily guarantee financial success or returns, or widespread adoption of the technology. An accurate comprehension of the social context which facilitates the adoption of new technologies is indispensable; a good example of this is the non-traditional cookstoves. The issue of financing can be viewed from a very different lens when government and corporate spending are being measured. India makes for an interesting laboratory where new ideas can be tried, tested, and accordingly expanded. A good idea, sound capital, passion on the part of the management, and attention to minute detail — with a sense of urgency — are some essential ingredients for an entrepreneur to start a new venture. Understanding risks and devising ways to minimize damage form the crux of how ideas translate into successful ventures.

As stated before, foreign direct investment has supported many opportunities in the field of energy efficiency. Investments have to be made in ways coherent to challenges around sustainability. While efforts to include women as part of the entrepreneurial retail model have been aggressive, much needs to be achieved with respect to establishing clean energy infrastructure and demand. The opportunities for future growth that FDI presents are numerous; it is imperative that merchant power plants in the renewable sector are enhanced, for direct sales to customers.

Cost-effective energy efficiency improvements can help MNCs cut their demand for power. Professional help from the energy service sector, energy performance contracting, finding ways to create an enabling environment, as well as setting the right kinds of building standards and ratings are a few means to achieve this. For example, TERI's green building ratings system GRIHA (Green Rating for Integrated Habitat Assessment) is critically important to help drive a high bar for improvements in the build environment in the Indian context. Financing as well as

other barriers stemming from information sharing, behavioural, and transactional patterns should also be borne in mind.

Information-based programmes have an important role to play and can influence financing in two ways. First, they educate the market about the various benefits of energy efficiency in enhancing the value of the property. Second, they help the financial institutions gather data required to identify and assess the risks, uncertainties, and benefits of financing projects on energy efficiency, which in turn helps realize the value of certain co-benefits. Information, disclosure, and labelling have a fundamental role to play in breaking down the barriers and allowing the financial community to step in.

Impoverished developing countries have always sought financing from wealthier countries. At the 2009 Copenhagen Negotiations, three main agreements on funding were reached, which in turn were amplified at the Cancun Climate Change Conference the next year. The first agreement provided for a contribution from donor countries of \$30 billion of the sources for the period 2010–12. The second agreement was that the contributory sum was to be raised to \$100 billion a year from all sources combined — public, private, and carbon markets — by 2020. The third agreement initiated the setting up of a new fund which took the shape of the Green Climate Fund. While efforts should be steady to attract private funds to expand this corpus, it is essential that public funds are leveraged to the hilt.

The Indian Government's efforts to mobilize investment have been commendable and its Solar Mission is an important policy initiative. However, challenges continue to hamper steady growth. In India, local power is expensive and there is a lack of ability on the part of the state-owned power distribution companies to meet demands. This has a direct bearing on the riskiness of the power purchase agreements. In the long-term, less risk leads to cheaper financing.

India has huge potential for solar energy and financing is critical for its successful implementation. Facilitation of financial assistance will assure India of a successful march towards a future powered by renewable energy.

### Key Learnings

- The way the world's economy meets its energy needs is imperilling both the climate and the environment.
- Commitments towards funding clean and efficient energy and climate change resilience, especially from the US, are strengthening. An environment where larger capital flows take place needs to be conditioned and shaped.
- There is an emphasis on international cooperation for development of energy technology and its deployment, besides financing.
- Financing curiosity-driven research will have enormous benefits in the long-run. Investments have to be made in a manner compatible with the challenges around sustainability. Public funding should be leveraged to the maximum feasible extent and an effort needs to be made to mobilize private capital.
- An understanding of the social context is necessary for the adoption of new technologies.

# Energy Access, Growth, and Sustainability



## Chair

Ms Nisha Desai Biswal, Assistant Administrator for Asia and Near East, USAID

## Panelists

Mr Vinod Agarwal, Chairman and Managing Director, Applied Solar Technologies

Ms Aimee Christensen, Founder and Chief Executive Officer, Christensen Global Strategies

Dr David J Jhirad, Professor and Director–Energy, Resources and Environment Center, School of Advanced International Studies, Johns Hopkins University

Mr Jacob Moss, Director, US Cookstoves Initiative, US Department of State

Dr R K Pachauri, President, TERI NA

Ambassador Manjeev Singh Puri, Ambassador and Deputy Permanent Representative of India to the United Nations

**C**urrently, more than 400 million Indians do not have access to electricity or clean forms of energy. This limits their economic opportunity as it impinges on access to education, results in a higher rate of spoilage in crops, and aggravates inefficiency in agriculture. Along with the limitations mentioned above, there are well-documented impacts of indoor air pollution on health, primarily from burning unprocessed biomass in inefficient end-use devices. Providing electricity and clean forms of energy to about one-third of Indians is a monumental imperative, both for India and the world. To add another level of complexity to the already existing problems, India's demand for energy is set to grow by more than 50 per cent by just 2020. As a result, concerted actions are required to keep up with the ever-growing demand in a way that addresses both environmental and health concerns.

Amongst the various energy services required for development and growth, if we focus on energy services related to cooking, almost 160 million households in India use biomass-based inefficient devices for cooking which have associated health and environmental impacts. Providing access to clean cooking energy, however, has its own set of challenges, one of which is a profound lack

of awareness among users about the risks associated with cooking over an open fire. Academic studies have been conducted in the past to create such awareness, but these have catered to only a small section of the population which in some cases may not be representative of the underserved population. A recent study, titled 'Global Burden of Disease', highlights the health risk associated with air pollution that results from the smoke of solid fuels such as wood, charcoal, dung, and coal as the fourth highest health risk factor around the world. In India alone, more than 1 million deaths have been recorded from the use of traditional cooking stoves — a major source of indoor air pollution. This is also documented as the single worst health risk factor in all of South Asia.

The WHO study mentioned above also indicates that the mortality trends associated with indoor air pollution from traditional cook stoves is much higher than the trends associated with malaria, tuberculosis, and HIV. Furthermore, and in order to put the problem in perspective, the estimates of deaths related to inhalation of emissions from traditional cook stoves now exceeds the cumulative impact from HIV, malaria, and TB which adds up to approximately 10 million deaths per year. Also, the mortality trends related to malaria, tuberculosis and HIV are expected to decrease over the coming 20 years – except the mortality associated with cook stoves, which is expected to increase.

Another issue with the provision of clean cooking energy is the definition of 'improved cookstove'. Not all cookstoves available today are 'improved cookstoves'. Many of them follow some set standards on thermal efficiency and specific fuel consumption but not all cookstoves are making a significant dent in emission reduction. From a larger perspective, most of the available improved cookstoves are either aiming at saving the impact on forestry, or saving the time spent by women on cooking and collecting fuel, or, from a long-term climate perspective, are aimed at reducing CO<sub>2</sub> emissions. As a result, and by definition, these stoves seek out appropriate technologies to save fuel. There are a couple of them which are very good for saving fuel, including two that are available in India. However, in order to really reduce the emissions, efforts would have to be made to reduce emissions of Short-Lived Climate Pollutants (SLCPs) such as black carbon along with a reduction in CO<sub>2</sub> emissions. This requires advanced combustion devices such as the *Philips Chulha* smokeless stove and the *Eco Chula*, which have been developed in India. The development of these cook stoves is an emerging business. Clean fuels such as LPG, biogas, and ethanol are also looked at as an alternative, which are in accordance with WHO standards, but would need significant investments from public and private sectors alike and do not emerge as a possible solution in the coming few decades.

On the other hand, focusing on energy services related to lighting, the contours of the problem are significantly different from the ones associated with providing universal access to clean cooking energy services. In the domain of clean lighting, a lot of technologies are available, but success stories are available only in isolation. Large scale upscaling of clean lighting technologies is not possible unless there is a bigger understanding as to why this technology is needed and, furthermore, if adequate volumes exist to get the private sector players interested. Here, demand generation and then subsequent distribution of energy services is the tricky part. The target customers, the underserved, are usually those who can't afford more than \$2 a month for their entire energy consumption, of which expenditure on lighting is a small portion. To add to the conundrum, past experience also suggests that lighting initiatives, in order to be sustainable, should not be completely dependent on government subsidies. They have to be a viable commercial activity, otherwise they will only run for a few years, that is, till public support is available. In the lighting landscape, there are several business models available, such as

the business model being promoted by Applied Solar Technologies, where the company has been exploring easier ways of distribution and collection. This particular initiative operates on a fee-for-service model where the company collects a fee for a delivered energy service — in this case, lighting from lanterns. The model targets common places of interest in villages, such as milk centres or wells, where people go every day, to distribute charged batteries and collect discharged ones. Here again, though the distribution costs are minimized, the challenge is collection of money from the end users, and so an even more effective model is required.

SPEED (Smart Power for Environmentally sound Economic Development), another initiative in this sphere, launched about three years ago, highlights a different set of challenges. SPEED, aimed at social and economic development in addition to providing green energy, has contrary to its title, moved at a snail's pace. The project's modus operandi includes the establishment of hybrid mini grids in villages to power a variety of end uses including water pumping, agro-processing, and increasing access to information. The model followed under SPEED envisages the creation of village level Energy Saving Companies (ESCOs) supported by a variety of private project developers. The slow gait of progress is reflective of a variety of issues, of which problems related to investment and aggregation are the dominant ones. All private developers associated with the project have indicated a requirement of lowering the interest rates from 15 per cent to 7–8 per cent. However, on the contrary, the financial institutions have increasingly been seeing such investments with suspicion and, perceive them as a high risk investment. As a result, even securing minimum levels of investments in terms of debt and equity is difficult. Further, the International Finance Corporation (IFC) and many banks are trying to create the right investment and reduce risk to private developers. However, such institutions, particularly IFC, consider economies of scale with minimum investment levels of at least \$20 million, which represents at least 50 of these mini grids or more. The task here then becomes that of aggregation i.e., — who becomes an aggregator, and who will take these individual mini grids and package them for investment? In essence, SPEED and other similar projects need blending of capital to de-risk investments along with identification of some appropriate entities, whether in India or anywhere else, which can play the role of aggregators and some other entities in between that will deliver the service. In this context, Mr David Jhirad also highlighted the way forward where they are planning to have a major meeting in Delhi to bring some investable portfolios to the table.

It was also suggested that the telecom industry serve as an example. Cell phones, though not an indigenous technology, brought about a sea change in the developing world. Similarly, such technologies for the energy sector, from the developed world, can have a widespread and revolutionary impact in the developing world. Countries such as the USA have great potential for research and development of such technologies and this also presents an opportunity for collaboration and trade.

In summary, the key barrier to financing the underlying system for universal energy access is lack of awareness at the level of financial institutions. It is known that the major barrier for attracting investment at a reasonable rate of return is that financial institutions often do not know how to quantify the risk and as a result they often overestimate the risk. This leads them to charge a higher rate of return on that investment which makes these projects infeasible. As mentioned above, it is required to align different types of investment. Technology development in the clean energy sector is another area that needs major attention. Beyond financing, there are massive trade barriers in the sphere of clean technology, whether it is the tariff or content requirements, and so addressing those trade barriers at the bilateral or the multilateral level is something the clean energy industry needs to focus on. The International Centre for Trade and Sustainable Development in Geneva is

working on a sustainable trade initiative, where about \$500 billion trade is coming into India, for which they are recruiting companies to form a coalition of like-minded companies to work with governments. Governments and companies alike need to play a role in providing a vision and then a road map so that various stakeholders — developers, financiers, investors, and end users — know where they are going, how to get there, and what each one's specific role in helping to achieve universal energy access is.

Further, apart from finance and trade, in order to make any initiative sustainable at the grassroots, women play a vital role, especially in the green economy. Hence, in order to be successful in scaling green energy there is a need to empower and enable women as entrepreneurs as they are the primary energy consumers.

There is little doubt in the fact that India is an energy poor country. There is a huge need to get rid of this energy poverty. The time is ripe to make a real solid and massive investment including in research and development for some other way of solving the energy climate conundrum and the lack of infrastructure in the developing world.

### **Key Learnings**

- There is a profound lack of awareness among users about the risks associated with cooking over an open fire and this is posing a challenge in providing access to clean cooking energy.
- Alternative clean fuels such as LPG, biogas, and ethanol need significant investments from public and private sectors alike.
- SPEED and other similar projects need the blending of capital to de-risk investments along with identification of some appropriate entities, whether in India or anywhere else, which can play the role of aggregators, and some other entities in between that will deliver the service.
- The key barrier to financing the underlying system for universal energy access is lack of awareness at the level of financial institutions.
- Governments and companies alike need to play a role in providing a vision and then a road map for the various stakeholders — developers, financiers, investors and end users.
- There is a need for massive and consistent efforts towards research work to solve the energy-climate conundrum and apply it in our country, though it will take some time to reach the masses.

# Corporate Dialogue | Eve of Hope



# High Level Corporate Dialogue

In Partnership with FICCI (Federation of Indian Chambers of Commerce & Industry)



## Moderator

Mr Roland Lance Ignon, Co-Director, New York Office, Sitrick and Company

## Welcome Address

Dr R K Pachauri, President, TERI NA

## Opening Remarks

Ambassador Robert Blake, Assistant Secretary for South and Central Asian Affairs, US Department of State

## Keynote Address

Mr Sam Pitroda, Chairman, National Innovation Council and Advisor to the Prime Minister of India on Public Information Infrastructure and Innovations

The curtain raiser to the fourth edition of the US–India Energy Partnership Summit was a High Level Corporate Dialogue revolving around the theme ‘The Energy and Development Nexus: A New Era of Corporate Leadership?’

The second edition of the Dialogue witnessed over 40 business leaders discussing common interests that relate to energy and informed business strategy, challenges that loom largest with regard to energy and growth, bilateral national cooperation on energy issues, how business partnerships can be enhanced, and methods that need to be adopted to make cooperation between US and Indian businesses seamless and productive. The overarching goal of the Dialogue was to develop insight into and new appreciation for how cooperation on energy issues between American and Indian companies can lead to competitive advantages in domestic and global markets.

The Dialogue followed an interesting format, wherein, after setting the context through a keynote address and a set of special remarks from Mr Sam Pitroda and Ambassador Robert Blake, respectively, the floor was thrown open for the participants to respond to a set of questions by the moderator. This provided for a delightful, thought provoking session which actively engaged all who were present. Delivering the Keynote Address at the High Level CEO Dialogue, Mr Pitroda, the Chairman of the National Innovation Council and Advisor to the Indian Prime Minister on Public Information Infrastructure and Innovations, called for a change in the mindset in approaching the energy sector to achieve greater efficiencies that will be vital for contributing to development and the environment. Applying the lessons from the telecom sector’s quantum leap will be the key to achieving a breakthrough in the energy sector. The telecommunications revolution can be a

model for the energy sector. Mr Pitroda stressed that distributed technology is the only way to go for energy efficiency in the power sector, following the breakthrough in the telecommunications sector that has scaled up the number of telephones in India to almost a billion. Other aspects of the telecommunications revolution are the changes in the regulatory framework, the participation of the private sector, and the technological innovations that have lessons for the energy sector.

Dr R K Pachauri, President of TERI NA, highlighted the role the private sector can play in the energy sector. Huge benefits will accrue to society from the sustainable and efficient development of the energy sector, he said. Dr Pachauri called for initiatives in this area by the world's two largest democracies, India and the US. For this to happen, he said, the industry and business will have to come together.

Ambassador Robert Blake, the US Assistant Secretary of State for South and Central Asian Affairs, said that under President Barack Obama, the US has placed great emphasis on cooperation in the clean energy sector. The Partnership to Advance Clean Energy (PACE) has managed to mobilize \$1.7 billion to finance clean energy initiatives. A \$125 million public-private joint research centre has been created, which will be led by 95 government research and private organizations. Clean energy cooperation will be a key element in the upcoming US–India strategic talks, Mr Blake said. He said that the US was interested in promoting regional cooperation in the energy sector. One such project which the US was promoting was the Turkmenistan-Afghanistan-Pakistan-India gas project.

The Dialogue delved in great depth into the themes of energy efficiency and growth, energy access, and the private sector. Participants discussed at length how the corporate sector and government can encourage the expansion of energy efficient practices and technologies on a large scale while enabling economic growth, and at the same time, mitigate climate change.

It was unanimously agreed that inventing efficient technologies requires persistence, creativity, and, above all, collaboration. A similar set of factors influence the financing of these technologies. An important question arose during the deliberations as to what means were to be devised to secure financing of such technologies. Will a situation of status quo suffice, wherein traditional financing mechanisms provide for the next generation of energy efficient technologies? Or will new ways need to be devised? Fair and efficient energy markets are the means to an end when we speak of widespread energy access initiatives. There are various ways in which the US and India can combine their efforts to create and sustain competitive energy markets. The participants deliberated on how to establish avenues that cater to the needs of all, giving primacy to the needs of the 'needy'.

The Dialogue also discussed ways in which the private sector can contribute to expanding energy access and how businesses will be impacted by this.

### Key Learnings

- A change in mindset is required when approaching the energy sector to achieve greater efficiencies that will be vital for contributing to development and the environment.
- The telecommunications revolution can be a model for the energy sector, and holds the key to achieving a breakthrough in the energy sector.
- Distributed technology is the only way to go for energy efficiency in the power sector.
- The private sector can play a vital role in the energy sector — great benefits will accrue to society from the sustainable and efficient development of the energy sector.
- Clean energy cooperation between countries, particularly regional energy cooperation is critical.
- Persistence, creativity, and collaboration are the key requirements for inventing efficient technologies.
- Fair and efficient energy markets are the means to an end with regard to widespread energy access initiatives.

# Eve of Hope

In Support of Lighting a Billion Lives (LaBL)



## Welcome Address

Dr R K Pachauri, President, TERI NA

## Special Address

HE Ms Nirupama Rao, Ambassador, Embassy of India to the USA

## Addresses by the Guests of Honour

Dr Farooq Abdullah, Hon'ble Minister of New and Renewable Energy, Government of India

Dr M Mangapati Pallam Raju, Hon'ble Minister of Human Resource Development, Government of India

## 'Eve of Hope' Address

Mr Al Gore, Former Vice President, United States of America and Co-Founder and Chairman, Generation Investment Management

**D**elivering the Keynote Address at the 'Eve of Hope', Mr Al Gore said the crisis of the environment was a crisis of democracy and of capitalism — two systems that are supposed to draw on the “wisdom of the crowds” and ideally drive human development. But “both India and the US can take some pride and feel joy,” he added, saying, “Democracy is the destiny of humanity.” Referring to the Lighting a Billion Lives (LaBL) Campaign of TERI which

brings solar lamps to villages without electricity, he called it “a wonderful visionary project.” He added that India is a crucial player in solving the crisis we face.

Delivering the Special Address, HE Ms Nirupama Rao said that innovative technologies and programmes are crucial for the future of the people of India.

Dr R K Pachauri spoke about the LaBL Campaign, an initiative which was close to the hearts of everyone at TERI, which brought about a transformational change for the million-plus people in India and other countries who are benefitting from this innovation. “The extent to which the lives of beneficiaries of this programme improve radically is an amazing discovery, which goes far beyond our most optimistic expectations,” he said.

Dr Farooq Abdullah, affirming India’s commitment to renewable energy, said that there was a need for technology to achieve this goal and called for easy transfer of technology. He pointed out that 40 per cent of Indian people do not know what electricity is, and 80 per cent of the energy needs of India are being fulfilled by inputs such as coal, gas, and petroleum. Renewable sources of energy are essential for both national energy security as well as for development.

Dr M Mangapati Pallam Raju pointed to the LaBL Campaign, saying, “We have to collectively move faster.”

On the occasion, TERI NA also released its publication titled ‘Clean Energy Solutions: A Compilation of Studies from TERI India’. The issues addressed by TERI researchers in the publication deal with a range of subjects, such as the potential applications of smart grids, the challenge of universal energy access, knowledge flows in the field of industrial ecology, how to design policies for improved environmental governance, and others. Dr Pachauri thanked Mr Sanjeev Mehra, Managing Director at Goldman Sachs, and his wife, Mrs Karen Mehra, who made the publication possible.





# Thematic Tracks



# Driving Energy Efficiency: Technology Innovation and Adoption

In Partnership with Natural Resources Defense Council (NRDC)



**E**nergy efficiency is the fastest, cleanest, and cheapest way to meet energy needs, both in the US and in India. Investments in efficiency could cut the US energy consumption by 23 per cent by 2020, save customers nearly \$700 billion, and create up to 900,000 direct jobs. India could save \$42 billion each year by largely improving energy efficiency in buildings, which currently consume more than 30 per cent of the country's electricity. As the second fastest growing major economy in the world, India is at a unique crossroads in determining the future of its development path. Two-thirds of the commercial and high-rise buildings that will exist in India by 2030 are yet to be built. The use of air conditioners in Indian homes and businesses is projected to rise exponentially from 3 million units in 2009 to approximately 300 million units by 2030. Energy efficiency, particularly in buildings and appliances, presents a singular opportunity for both India and the US to save energy and energy costs, increase energy security, create green jobs, and protect communities against the adverse impacts of climate change. Despite opportunities for enormous benefits from efficiency, significant cost-effective energy efficiency remains untapped in both countries.

The NRDC roundtable focused on initiatives that governments and businesses can undertake to enable the US and India to be key partners in advancing energy efficiency solutions. A series of questions were discussed by the group of over 40 participants from business, technology, and government organizations. A few questions that were raised were as follows: what are the

strategies in government, business, and technology sectors that are effective in advancing energy efficiency? How can such best practices be shared and implemented between both countries? What are the challenges and obstacles facing private companies for implementing energy efficiency and what can the government do? What are the opportunities for technological innovation and increased bilateral cooperation in the energy sector?

Overall, the experts unanimously agreed that the greatest opportunity for advancing energy efficiency occurs in cities and buildings. NRDC's Executive Director, Mr Peter Lehner, discussed international best practices such as New York City's Greener, Greater Buildings Plan. An interesting outcome of the city's plan was when architects discovered that simply measuring energy use provided a critical first step towards increasing energy efficiency. This is an opportunity for India as well, and NRDC's work with stakeholders across India demonstrates such win-win situations. Former Secretary of Commerce John Bryson drew examples from energy efficiency in utilities and discussed how similar breakthroughs can be possible in business and government in India.

Energy efficiency is an 'invisible resource' and yields tremendous cost and energy savings. Additionally, energy efficiency comes in various forms and opportunities for both the US and India, through retrofitted and newly efficient building envelopes, air conditioning systems, windows, lighting, and appliances. Adopting energy efficient measures will help achieve energy security, protect lives, and help power the economies of both the US and India.

### Key Learnings

- It is important for governments to view energy efficiency as a source of energy that enables access and growth, without advocating for specific products. Increasing compliance is a vital step in implementing efficiency. Further, measuring and benchmarking energy use in buildings is a critical test of the effectiveness of government efficiency policies.
- The social benefits of energy efficiency need to be accounted for. Beyond energy savings, the social and economic benefits of energy efficiency, including increased access to energy and potential for economic growth are important factors to consider for the government and business community.
- Education and training are needed to advance efficiency. Training and building professionals and imparting them with adequate skills is required for successful operations, installation, and maintenance of new efficiency systems. At the consumer level, for businesses and technology companies, the role of occupant behaviour is vital.
- Financial incentives are important since financing often poses hurdles to adoption of energy efficiency measures. Banks and financial institutions can create diverse financing mechanisms such as providing incentives to property owners and developing successful energy service company models, and can work with governments to support efficiency mortgages.
- Lastly, targeted research and development initiatives can scale up energy efficiency and adoption of newer technologies. Creative solutions, such as city-to-city partnerships, especially within the US-India bilateral relationship, can be mutually beneficial to both countries for addressing their current and projected energy needs.

# Women and the Green Economy

In Partnership with Earth Day Network



**P**anelists on the Women and the Green Economy panel included Dr Loretta Moore, Associate Vice President for Research and Scholarly Engagement and Professor, Department of Computer Science, Jackson State University; Ms Caroline McGregor, US Department of Energy, Policy and International Affairs; Ms Richenda Van Leeuwen, Executive Director, Energy and Climate, Energy Access Initiative, UN Foundation; and Ms Kathleen Rogers, President Earth Day Network. The energetic discussion focused on the comparative opportunities and challenges faced by women leaders in India and the US.

Greater transparency and accountability in corporations will help to identify what is missing if women are not progressing equally as men in a particular industry. Initiatives that highlight effective practices at the international level must happen more often. Women must also be able to ask questions or seek guidance about energy issues with the confidence that they will be heard. Lack of such confidence may arise from cultural barriers, but may be overcome through local initiatives, especially in places such as India where energy is a domestic concern for millions of women. Both small and medium enterprises (SMEs) as well as large corporations can advance gender equality with regard to energy. Finally, law has a fundamental role to play in the gradual internalization of fair corporate and social behaviour towards women's roles in the energy sector, both as consumers and high level decision-makers.

Specific recommendations from the panelists included:

- Increase the number of women in the energy sector in India, primarily in key positions all along the supply and management chain — especially given that the customer base is basically an important nexus between energy access and health outcomes.
- Address institutional challenges in academia to women's leadership — timing of tenure track, child care, and family responsibilities, and increasing opportunities in international cooperation through networking.
- Improve access to capital and cultural barriers, including safety for women to travel.
- Create sponsors, not just mentors, to help women move up the leadership ranks.
- Educate and raise awareness of leadership opportunities, impact, and role models for women in STEM and the green economy.
- Develop criteria and reporting systems for companies to monitor progress and create accountability in advancing women's leadership.
- Educate and involve boys and men in understanding and supporting advancement of women.

### Key Learnings

- Greater transparency and accountability in corporations will help ensure equal progress of women in the organization.
- Law has a fundamental role to play in the gradual internalization of fair corporate and social behaviour towards women's roles in the energy sector, both as consumers and high level decision-makers.
- The number of women in the energy sector in India should be increased, primarily in key positions along the supply and management chain.
- Education, awareness of leadership opportunities, and impact as well as role models are essential for women in STEM and the green economy.
- Criteria and reporting systems need to be developed for companies to monitor progress and create accountability in advancing women's leadership.
- Men have a critical role of support to play in the advancement of women — they should be educated and more involved in the process.

# Empowering Energy Entrepreneurs

In Partnership with American Council on Renewable Energy (ACORE) and Cleantech Open South East



**A** need exists for a nucleus effort that can connect and provide training to two forms of entrepreneurs — social- and business-oriented — to propel the green energy economy. We should be looking at how we can enhance entrepreneurs’ access to innovative clean energy trusts/funds, even at the village level. In addition, the Indian Government is interested in increasing off-grid renewable energy development as part of the 12th Five-Year Plan, and is looking at having over 3 GW of capacity on line by the end of the Plan.

Many of the industry leaders who participated in this session see the linkage between the drive behind entrepreneurship and innovation in India and village level electrification/mini grid projects as symbiotic opportunities to achieve access to energy for a wide number of people in India. This would achieve significant socio-economic changes at the village level, while at the same time achieving critical federal goals.

A number of ideas were provided to enable frameworks for consulting and financial collaboration, oversight, coordination, and overall project management of the grand challenge of energy access. In addition, the group reviewed corporate sponsorship of regional Indian entrepreneur incubation centres that could train entrepreneurs and provide corporate entities a means to fulfill social responsibility goals. The entrepreneur incubation centres could provide skills and act as the catalyst to deploy business models that promote solar home systems, pico grids, micro grids, and mini grids that support energy access and other SE4ALL (UN Secretary-General’s Sustainable Energy for All) aspirational goals. Most importantly, these centres would provide an immediate opportunity for entry into the Indian marketplace while also off-setting some costs to donors for market entry.

These entrepreneur incubation centres could, in addition, plug directly into existing entrepreneur-run businesses. For example, Applied Solar Technologies India Pvt. Ltd already contributes 2,000 cell phone towers for power generation expansion as energy hubs for micro grids and micro grid utilities run by entrepreneurs trained at the incubation centres. These centres could also assist in creating partnerships that would assist with technology selections and financial incentives to reduce costs for micro and mini grid installations.

The session ended with a call to act on this challenge around entrepreneur incubation centres that could be co-organized with TERI, the newly formed Indian Renewable Energy Federation (IREF), ACORE, Global Cleantech Open, USAID, the US Department of State, and others, as well as to consider how to scale up and catalyse financing and investment to replicate successful models throughout India.

### Key Learnings

- In order to propel the green energy economy, there is need for a nucleus effort to connect and provide training to entrepreneurs.
- Entrepreneurs' access to innovative clean energy trusts/funds needs to be enhanced at all levels of operation.
- Symbiotic opportunities to achieve greater access to energy as well as socio-economic changes exist in the link between the drive behind entrepreneurship and innovation in India and village level electrification/mini grid projects.
- Entrepreneur incubation centres are key to empowering energy entrepreneurs. Not only will they provide skills and catalyse the deployment of business models that promote greater energy access, they will also provide an immediate opportunity for entry into the Indian marketplace while off-setting some costs to donors for market entry.
- Greater collaboration is required to promote and establish entrepreneur incubation centres as well as address how best to scale up, finance, and replicate successful business models.



# Summit Partners

## Premier Partner



---

## Associate Partners



**USAID**  
FROM THE AMERICAN PEOPLE



---

## Track Partners



---

## Corporate Dialogue Partner



**Summit Secretariat**

TERI North America

Email: [terina@teri.res.in](mailto:terina@teri.res.in)

<http://www.terina.org/usindiasummit/>