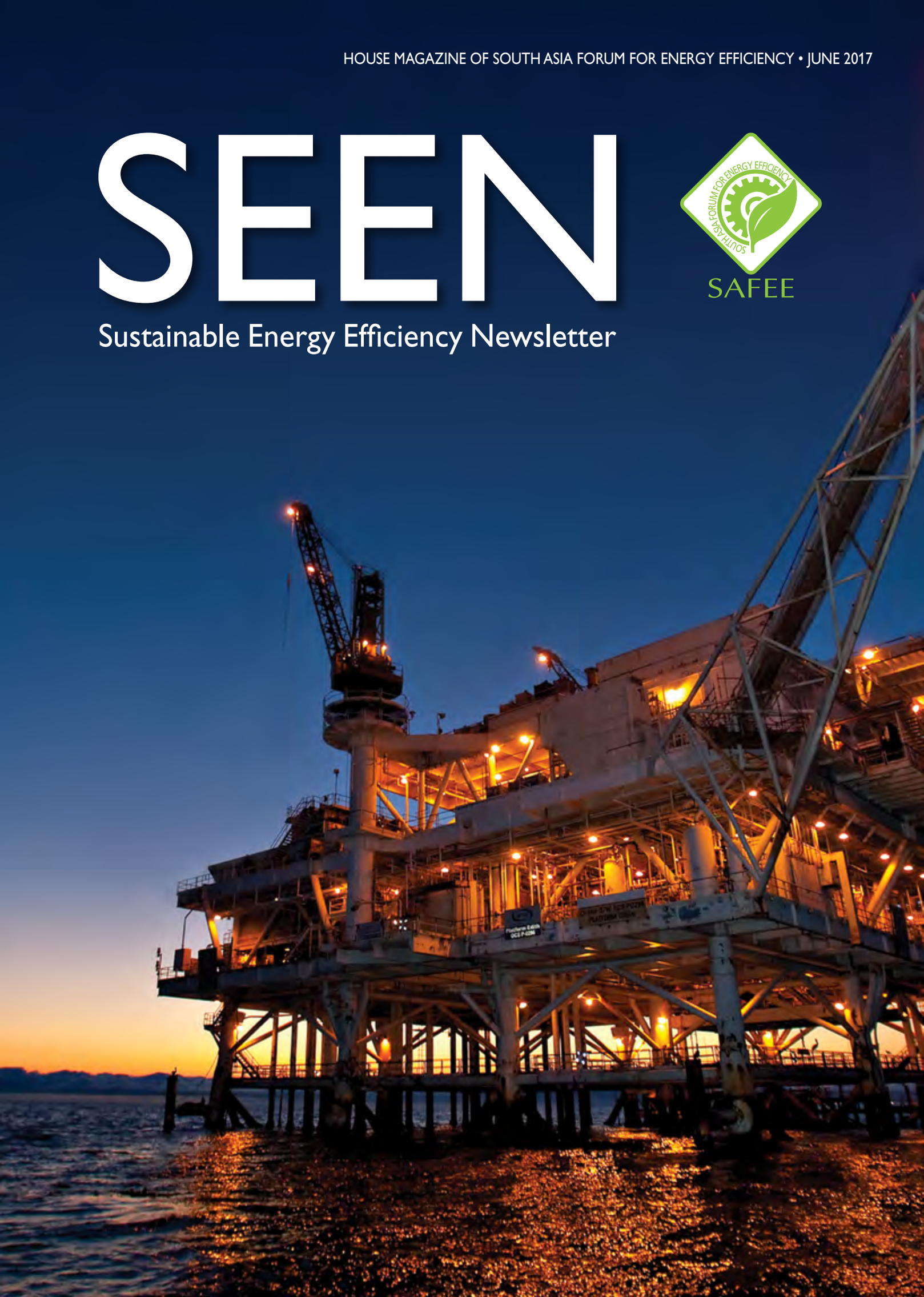
HOUSE MAGAZINE OF SOUTH ASIA FORUM FOR ENERGY EFFICIENCY • JUNE 2017

SEEN

SAFEE

Sustainable Energy Efficiency Newsletter



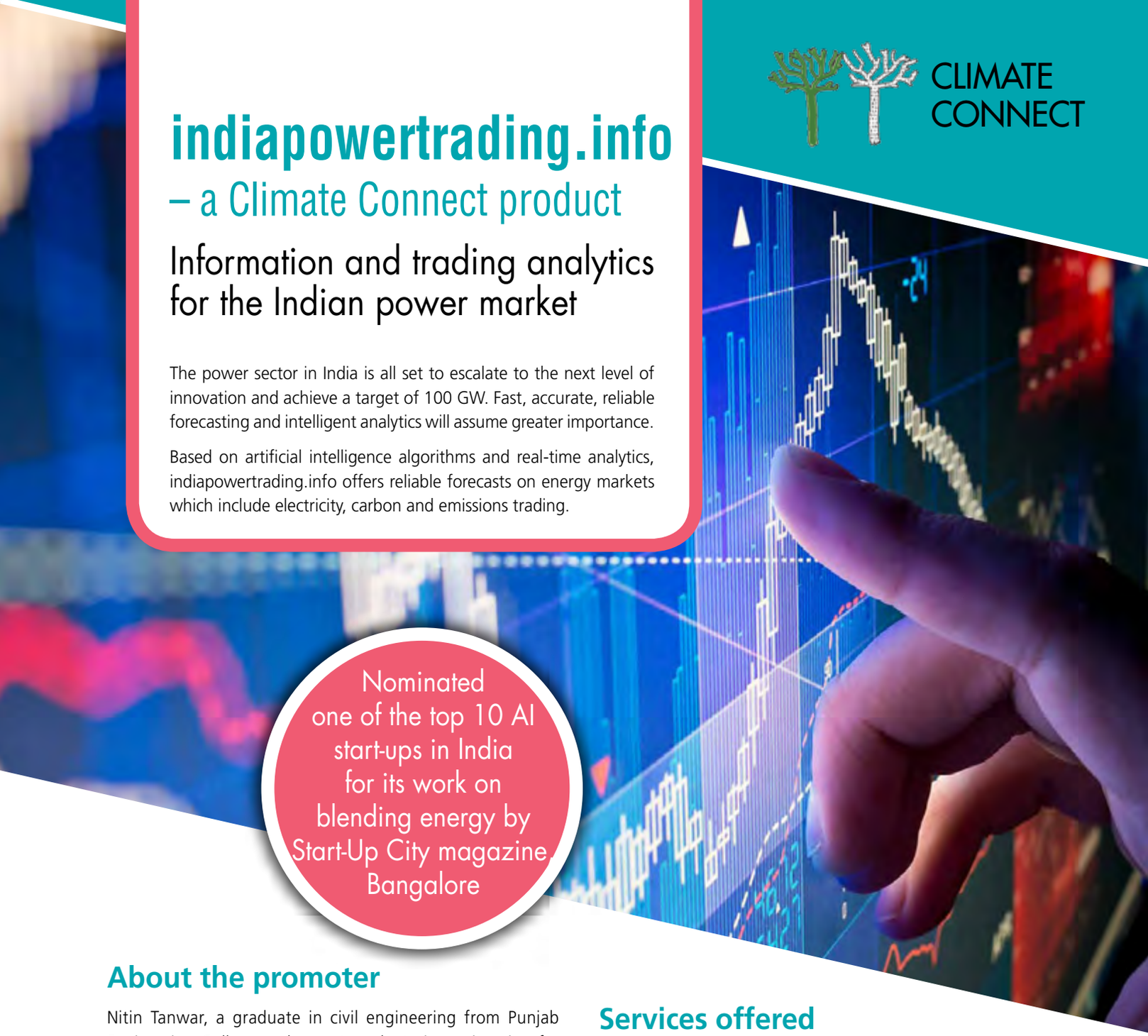
CLIMATE CONNECT

indiapowertrading.info
– a Climate Connect product

Information and trading analytics for the Indian power market

The power sector in India is all set to escalate to the next level of innovation and achieve a target of 100 GW. Fast, accurate, reliable forecasting and intelligent analytics will assume greater importance.

Based on artificial intelligence algorithms and real-time analytics, indiapowertrading.info offers reliable forecasts on energy markets which include electricity, carbon and emissions trading.



Nominated one of the top 10 AI start-ups in India for its work on blending energy by Start-Up City magazine, Bangalore

About the promoter

Nitin Tanwar, a graduate in civil engineering from Punjab Engineering College and a post-graduate in engineering for sustainable development from University of Cambridge, UK, is a young entrepreneur with experience in trading energy and environmental commodities. Well known in the power sector, Tanwar began his career in trading energy and environmental commodities while he was based in London. He managed a trading fund of over USD 1 billion risk limits. In 2010, he founded Climate Connect to provide high quality data and price forecasts and, today, along with a team of about 25 highly qualified professionals, globally caters to over 50 customers.

Services offered

- Integration of Energy, Analytics, Technology and Intelligence
- Day ahead and fortnight power exchange price forecasts
- Real time solar generation forecasting & integrated control systems for grid-connected PV plants
- Asset performance management & load forecasting for DISCOMS
- MIS development for thermal power generators
- Automated bidding & power procurement algorithm
- Intelligent power market analytics

ACME · BAIN & COMPANY · DCM SHRIRAM · GMR · JINDAL STEEL & POWER · TATA POWER · एनटीपीसी NTPC · Piramal

IndiaPowerTrading.info

Plot No. 42, Top Floor, Pocket B-10, Sector 13, Dwarka, New Delhi-75

Tel: +91 11 4905 6961, Mobile: 8126272050, Email: info@climate-connect.com, Website: www.indiapowertrading.info.

Let's promote energy efficiency and energy equity

Dear Friends,

It is some time now since I last communicated with you through the columns of SEEN, the house magazine of SAFEE. The energy sector in the country and region is in transition. Many positive changes have happened and some are happening at a very fast pace, indicating a new energy mix and a bright and sustainable future. Renewable energy as a source of energy is now in the mainstream, competing with other resources and technology. The cost of solar power has gone down to below Rs 3 per unit which is great news for clean and green energy lovers, as it can now compete favourably with coal, gas and nuclear power options.

On the home front, SAFEE headquarters at Delhi has signed an MoU for its operations in Nepal and Bangladesh and very soon we hope to make forays into Sri Lanka and Myanmar. With this, our vision of synergizing the south Asia region with a common, shared vision of promoting energy conservation and efficiency through knowledge networkings and awareness drives, shall become a reality.

South Asia Forum for Energy Efficiency is an apolitical not-for-profit organisation respected for its values and views, working pro-actively since 2009 to serve humanity by conserving perishable resources and promoting efficient use of energy through environment-friendly means. We are also working to promote energy equity so that the fruits of modernization reach the farthest corner of the region and promote energy for all, specially through decentralised distributed generation and roof top solars.

I thank you all for your support and look forward to exciting times ahead, working together for the future of sustainable energy and energy security.

Dr V K Garg
Chairman, SAFEE

ENERGY EFFICIENCY INITIATIVES LAUNCHED BY GOI

The target of energy saving against these schemes during the XI plan period was 10,000 MW of avoided generation capacity. These initiatives have resulted in an avoided capacity generation of 10,836 MW during the XI plan period.

The Ministry of Power, through the Bureau of Energy Efficiency (BEE), has initiated a number of energy efficiency initiatives in the areas of household lighting, commercial buildings, standards and labelling of appliances, demand side management in agriculture/municipalities, small & medium enterprises and large industries, including the initiation of the process for development of energy consumption norms for industrial sub sectors, capacity building of State designated agencies, etc. The target of energy saving against these schemes during the XI plan period was 10,000 MW of avoided generation capacity. These initiatives have resulted in an avoided capacity generation of 10,836 MW during the XI plan period.

Schemes to promote energy efficiency and energy conservation

Demand Side Management (DSM)

Agricultural DSM (AgDSM)

It was initiated during the 11th five year plan by BEE with the objective to reduce peak demand, shift the time of energy consumption to an off-peak hour and overall reduction of energy consumption.

The proposition is simple; replace inefficient agricultural pump sets with pumps having higher energy efficiency (BEE star rated). The average efficiency of existing inefficient pump sets is 20-30% whereas efficiency range of new star rated energy efficient pump sets (EEPS) is 40-50%. Thus, the pumps with higher efficiency can significantly reduce energy consumption.

Major achievements of the scheme during 11th five year plan

- 11 detailed projects were prepared in 8 states for 11 DISCOMs covering 20,750 pump sets connected on 87 feeders. Average 40% (96 MUs) energy saving potential assessed.
- Punjab and Haryana mandated the use of BEE star-rated pump sets for every new agricultural connection in the State. In total, 1599 pumps were reported installed under the regulation in the State.

Municipal DSM

BEE initiated Municipal DSM in the 11th plan. Focus was to find energy-saving opportunities in Urban Local Bodies (ULBs).

The major loads in the municipality are water pumping systems, street lighting, sewage treatment and municipal buildings such as offices, hospitals, etc.

The following sectors have a high potential for energy-saving in the municipal corporation.

- Street lighting: By replacing inefficient HPSV and metal halide lamps with energy-efficient lighting fixtures like LED, T5 & induction lamps
- Water treatment/pumping: By replacing old inefficient pumps with energy efficient pumps with the highest star (5-star) rating by BEE
- Municipal buildings like schools, hospitals & offices: By replacing inefficient bulbs and FTL with energy-efficient lights and electrical appliances such as refrigerator, fans and air conditioners with 5-star rated appliances
- Sewage treatment/pumping: Pumping should be optimised as per size and capacity with highest rated ones as per BEE

Some achievements in the 11th plan

- Survey conducted in 175 ULBs across the country
- Bankable DPRs prepared, in 134 ULBs, after taking up investment grade energy audit (IGEA). Overall potential saving of 120 MW is estimated as part of avoided generation capacity through energy efficiency projects in 134 ULBs.
- MuDSM web portal developed under the programme consisting DPRs and knowledge materials developed under the programme.

Capacity Building of DISCOM

This programme is directed towards helping DISCOMs to reduce peak electricity demand so that they can delay contracting of additional capacity. Outcomes under this programme are as follows:

- Establishment of DSM cell by each DISCOM selected under this programme
- Creation of about 500 master trainers on DSM and energy efficiency from the officials of DISCOMs
- Capacity building of about 5,000 officials of DISCOMs by these master trainers
- Load research and preparation of DSM Action Plan for each DISCOM
- Adoption and notification of DSM regulation by respective State Electricity Regulatory Commission
- Incorporation of DSM plans along with multi-year tariff (MYT)
- Implementation of DSM programmes by the DISCOM
- Monitoring and verification of the DSM measures and reporting to SERC

Energy efficiency in small and medium enterprises sector

SMEs contribute about 8% to GDP besides representing 45% of the total manufacturing output. Statistics from MSMEs show that 180 clusters out of 388 are characterized as energy-intensive where energy consumption cost is 20-40%, signifying huge energy saving potential. BEE has initiated energy efficiency interventions in selected 25 SME clusters during the 11th plan. During the XII plan, implementations of 100 technology demonstration projects in 5 SME sectors are envisaged to facilitate large scale replication.

Standard and Labelling

The objectives of the Standards & Labelling Programme are to provide the consumer with an informed choice about energy saving and thereby realise the cost-saving potential of the marketed household and other equipment. This is expected to impact energy savings in the medium and long run and at the same time, position the domestic industry to compete in such markets where norms for energy-efficiency are mandatory. The scheme is invoked for 19 equipment/appliances, i.e. room air conditioners, fluorescent tube lights, frost-free refrigerators, distribution transformers, induction motors, direct cool refrigerators, electric storage type geysers, ceiling fans, colour television sets, agricultural pump sets, LPG stoves, washing machines, laptops, ballasts, floor standing ACs, office automation products, diesel generating sets & diesel operating pump sets of which the first 4 products were notified under mandatory labelling from 7th January 2010.

Energy Conservation Building Code (ECBC)

Energy conservation building code (ECBC) sets minimum energy standards for new commercial buildings with a connected load of 100kW or contract demand of 120 KVA and above. BEE has developed a voluntary star rating programme for buildings which is based on the actual performance of a building, in terms of energy usage in the building over its area expressed in kWh/sq m/year. Currently, the voluntary star labelling programme has been developed for 4 categories of buildings (day use office buildings, BPOs, shopping malls and hospitals) and put in the public domain.

Strengthening Institutional Capacity of State

Strengthening of State Designated Agency (SDAs)

33 State designated agencies (SDAs) have been notified under the Energy Conservation Act. In addition, Jammu & Kashmir has enacted legislation, in line with the Energy Conservation Act and established an agency. Out of 34 SDAs, 15 are renewable energy development agencies, 9 are power departments of the State governments, 6 are electrical inspectorate offices, 3 are distribution companies and 1 is a standalone SDA. The major roles and responsibilities of SDAs are to coordinate, regulate and enforce the various provisions of the Act at the State-level.

Major Achievements

- Internet platform developed by 26 SDAs
- 47 demonstration projects implemented in street lighting and water pumping stations
- LED village campaign implemented by 28 States
- Investment grade energy audit completed in 491 government buildings

The following 3 sub-schemes are being approved to support SDAs during the XII Plan

- To provide financial assistance to the SDAs to strengthen their institutional capacities and capabilities
- To make contributions to the State Energy Conservation Fund
- To develop human resources to promote energy efficiency

Contribution to State Energy Conservation Fund (SECF) Scheme

The State Energy Conservation Fund (SECF) is an instrument to overcome major barriers for the implementation of energy efficiency projects. The scheme envisages a contribution to all the State/UTs with a maximum ceiling of Rs 4.00 crore for any State/UT provided in two instalments of Rs 2.00 crore each. The second instalment of contribution to SECF is released only after the states have provided a matching contribution to the BEE's first instalment.

School Education Programme

BEE is implementing the students' capacity building programme under the energy conservation awareness scheme for the 12th five-year plan and intends to prepare the text/material on energy efficiency and conservation for its proposed incorporation in the existing science syllabi and science text books of NCERT for classes 6th to 10th.

Human Resource Development (HRD)

A sound policy for creation, retention and upgradation of skills of human resources is very crucial for penetration of energy efficient technologies and practices in various sectors.

National Mission for Enhanced Energy Efficiency (NMEEE)

National Mission for Enhanced Energy Efficiency (NMEEE) aims to strengthen the market for energy efficiency by creating conducive regulatory and policy regime and envisages fostering innovative and sustainable business models in the energy efficiency sector. NMEEE has spelt out four initiatives to enhance energy efficiency in energy-intensive industries which are as follows:

Perform, Achieve and Trade (PAT)

A regulatory instrument to reduce specific energy consumption in energy intensive industries, with an associated market based mechanism to enhance cost effectiveness through certification of excess energy saving which can be traded.

Market Transformation for Energy Efficiency (MTEE)

To accelerate the shift to energy efficient appliances in designated sectors through innovative measures and make the products more affordable.

i) Bachat Lamp Yojana (BLY)

The Bachat Lamp Yojana (BLY) scheme has been designed on the public private partnership mode. The umbrella framework for BLY is registered as a Clean Development Mechanism (CDM) Programme of Activities (PoA). Private investors can participate in the BLY scheme, develop CDM projects and distribute CFLs in co-ordination with the State Electricity Distribution Companies (DISCOMs). The private investor invests in the BLY project and earns carbon credits for the same. BEE acts as an overall coordinator for BLY projects.

ii) Super-efficient Equipment Programme (SEEP)

SEEP is a programme designed to bring accelerated market transformation for super-efficient appliances by providing financial stimulus at critical point/s of intervention. Under this programme, the ceiling fan has been identified as the first appliance to be adopted. SEEP for ceiling fans aims to leapfrog to an efficiency level which will be about 50% greater than market average by providing a time bound incentive to fan manufacturers to manufacture super-efficient (SE) fans and sell the same at a discounted price.

Energy Efficiency Financing Platform (EEFP)

To create mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings.

Framework for Energy Efficient Economic Development (FEEED)

Under this initiative, there are two funds viz., Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE) and Venture Capital Fund for Energy Efficiency (VCFEE).

i) Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)

It is a risk-sharing mechanism to provide commercial banks with a partial coverage of risk involved in extending loans to energy efficiency projects. The Government of India has approved around Rs 312 crore for PRGFEE. The guarantee provided by the fund will directly support financing of energy efficiency projects.

ii) Venture Capital Fund for Energy Efficiency (VCFEE)

The VCFEE provides risk capital support to energy efficiency investments in new technologies, goods and services. The Government of India has approved about Rs 210 crore for the VCFEE. The fund helps to create the volume in EE deal flow by the fund manager of VCFEE through advertising and soliciting opportunities in energy efficiency area. Energy service companies (ESCOs) and companies that plan to undertake energy efficiency projects in the energy performance contracting mode are key potential beneficiaries of VCFEE.

iii) National Energy Conservation Award and Painting Competition

National energy conservation awards are presented to industry and other establishments and prizes to winners of the annual painting competition on energy conservation for school children, every year, by the Ministry of Power with the objective of promoting energy conservation among all sectors of the economy.

WORLD ENVIRONMENT DAY 2017

Challenges of Energy Mix and Tariffs in Power Trade

The power sector in India is undergoing a paradigm shift from fossil to non-fossil energy resources with a target to add 175 GW of renewable energy by 2022. The changing energy scenario has added to the volatility of power tariff affecting different stakeholders like:

- Generators
- DISCOMS
- Lenders
- Exchange
- Regulators
- Load Dispatch Centres

Various stakeholders have put forward different views regarding balance between power procurement through long-term power purchase agreements and short-term market. The recent jump in renewable energy generation and change in supply-demand dynamics has fuelled this debate further.

Before going into detailed discussion about the power market scenario, it is prudent to review the genesis of short-term power transactions. Prior to power trading as a business concept, power exchanges between the states/vertically integrated utilities were characterized by

- Small, intermittent volumes
- Mostly in the nature of emergency support
- Without any commercial arrangements
- Non-payment or payment delays with resulting disputes

In 1999, the Power Trading Corporation (PTC) was formed as a Government of India initiative for the development of the power market and incentivizing transactions in market-based instruments. Its key role was to initiate development of short-term power markets, introduce innovative products for customers and optimise utilization of existing resources along with continuous development of new products as per market requirements. Power exchanges became operative in 2008. Initially, the scope of growth in power exchange-based transactions was limited due to lack of transmission capacity, inter-connections, sustained shortages, both in energy and peak demand, lack of initiatives and scepticism about success of trading was widespread.

New products like short & medium-term transactions for peak/off-peak load balancing were brought into the market which eventually paved way for the power market we see today. Some of the crucial aspects introduced include

- Hours of supply
- Round the clock
- Evening peak / morning peak
- Night off-peak / afternoon off-peak
- Power for balancing unscheduled interchanges (UI)

Impact of policy liberalization in the power sector

The Indian power market today, as it stands, has been shaped by some significant policy initiatives undertaken by the central government and regulators. These include the Electricity Act 2003, and the subsequent amendments and the National Electricity Policy 2005, and its subsequent amendments.

Some of the most significant and impactful features and provisions of the Electricity Act 2003 are:

The intent and objective of the Electricity Act 2003 is to develop the power market through increased competition, more players and protect consumer interests

Development of Power Market – EA 2003, Section 66, "The Appropriate Commission shall endeavour to promote the development of power market…", guided by the National Electricity Policy

- Suitable safeguards to prevent adverse effect on competition
- Recognized trading as a distinct activity
- Definition under section (2) (47): "Purchase of electricity for resale thereof"
- Adequate and progressive provisions governing open access both

i) to transmission networks (inter-state and intra-state) and

ii) to distribution networks

National Electricity Policy 2005 was perhaps among the most consequential policy instruments introduced by the Govern-

ment of India leading to a boom in the private sector. The policy allowed new power plants to sell up to 15% of their capacities outside long-term power purchase agreements. This move allowed new investment opportunities in the power sector, increased competition, especially in the private sector, and led to reduction in power prices in the short-term market.

Impact of renewable energy growth

Over the last few years, the renewable energy sector witnessed unparalleled drop in the tariff. Weighted average tariff bids for solar PV power projects have dropped from Rs 12.16/kWh in December 2010 to Rs 2.44/kWh in May 2017. The first wind energy auction in the country also witnessed tariff bids being placed at significant discounts to the feed-in tariffs. Some of the recently discovered tariffs for solar and wind power projects are competitive, or even lower than, cost of generation of coal-based power plants. This makes for another supportive case for DISCOMS to give up long-term PPAs with thermal power plants in favour of long-term PPAs with renewable energy projects.

Impact of emergence of thermal IPPs & new market instruments

Liberalization in power policy led to a sharp jump in investment by the private sector which was mirrored in the rapid increase in thermal power capacity in the private sector. The thermal power capacity owned by the private sector increased from 9,771 MW at the end of FY2007-08 to 84,197 MW at the end of FY2016-17. The share of private sector in India's total thermal power installed capacity increased from 10.6% in FY2007-08 to 38.5% in FY2016-17.

Previous bid results for solar power projects

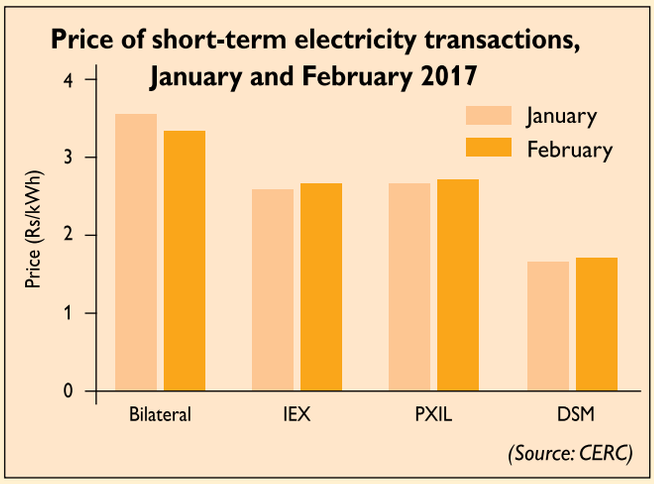
State & Year		Capacity on Offer (MW)	Highest Bid (Rs./kWh)	Lowest Rs./kWh)	Weighted Avg. Price (Rs./kWh)
NSM Batch 1	Dec'10	150	12.76	10.95	12.16
NSM Batch2	Dec'11	350	9.39	7.49	8.79
Orissa Phase 1	Mar'12	25	8.98	7.0	8.36
Orissa Phase 2	Dec'12	25	9.50	7.28	8.73
Karnataka	Apr'12	60	8.5	7.94	8.34
Madhya Pradesh	Jun'12	125	12.45	7.9	8.05
Tamil Nadu	Mar'13	150	14.5	5.97	6.48
Rajasthan	Mar'13	75	8.25	6.45	6.45 (L1)
Andhra Pradesh	Apr'13	226	15.99	6.49	6.49 (L1)
Punjab Phase 1	June'13	270	8.75	7.2	8.41
Uttar Pradesh Phase 1	Aug'13	130	9.33	8.01	8.9
Karnataka Phase 2	Aug'13	130	8.05	5.5	6.87
Madhya Pradesh Phase 2	Jan'14	100	6.97	6.47	6.86
Andhra Pradesh Phase 2	Oct'14	500	5.99 (7.03 Level.)	5.25 (6.17 Level.)	5.75 (6.75 Level.)
Karnataka	Nov'14	500	7.12	6.71	6.94
Telangana	Nov'14	500	6.9	6.46	6.72
Punjab (Capacity 5-24 MW)	Feb'15	100	7.45	6.88	7.17
Punjab (Capacity 25-100 MW)	Feb'15	100	7.56	6.88	7.16
NTPC Anantapur	May'15	250	-	-	6.16 (L1)
Uttar Pradesh Phase 2	June'15	215	8.6	7.02	8.04
Madhya Pradesh	June'15	300	5.641	5.051	5.36
Telangana Group 1	August'15	500	5.8727	5.4991	5.73
Telangana Group 2	August'15	1500	5.8877	5.1729	5.62
Punjab	Sept'15	500	5.98	5.09	5.65
Uttarakhand	Oct' 2015	170	5.99	5.57	5.766
AP 500 MW Bundling scheme	Nov'2015	500	4.63	4.63	4.63
AP 350 MW Bundling scheme	Dec'2015	350	4.63	4.63	4.63

State & Year		Capacity on Offer (MW)	Highest Bid (Rs./kWh)	Lowest Rs./kWh)	Weighted Avg. Price (Rs./kWh)
Haryana (State scheme)	Dec'2015	150	5.00	5.00	5.00
Rajasthan 420 MW Bundling	Jan'2016	420	4.36	4.34	4.351
UP 100 MW Bundling	Jan'2016	100	4.78	4.78	4.78
Rajasthan 100 MW Bundling (DCR)	March'16	100	5.07	5.06	5.068
Telangan 50 MW Bundling (DCR)	March'16	50	5.19	5.19	5.19
MH 450 MW VGF	Jan'16	450	4.43	4.41	
UP 165 MW VGF	Feb'16	125	4.43	4.43	
Jharkhand 200	March'16	102	5.59	5.20	5.464
Jharkhand 1000	March'16	999	5.48	5.08	5.356
Telangan 350 MW Bundling	May'16	350	4.67	4.66	4.667
Karnataka 500 MW Bundling	May'16	500	4.80	4.78	4.79
MH 50 MW (VGFDCR)	June,16	50	4.43	4.43	4.43
AP 400 MW (VGF)	June,16	400	4.43	4.43	4.43
Karnataka 920 MW (VGF)	June,16	920	4.43	4.43	4.43
Karnataka 50 MW (VGFDCR)	June,16		4.43	4.43	4.43
CG 100 (VGF)	June,16		4.43	4.43	4.43

(Source: CERC, SECI)

This sharp rise in installed capacity flooded the new markets – power exchange and short-term bilateral segment – with cheap electricity which led to a decline in power prices. Prices in the bilateral power market have fallen by 44% between 2008-09 and 2015-16, while prices of various contracts traded at the power exchanges have seen a much sharper fall of 65% during the same period.

The DERC, in its tariff order for FY2015-16, encouraged BSES Rajdhani Power Limited to actively engage in banking contracts. Delhi will have surplus power which can be banked during non-peak hours and the DISCOM can take back electricity during peak hours. Delhi-based DISCOMS have successfully implemented such transactions in the recent past and come up with banking tenders quite frequently.



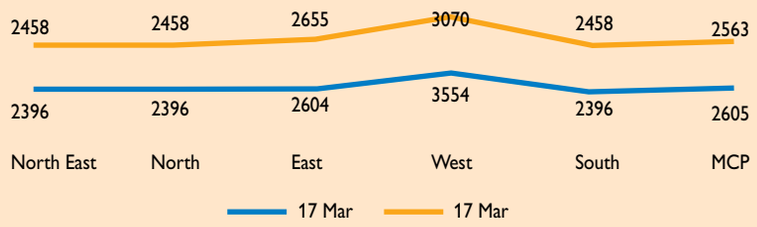
Year	Price of electricity traded through traders in bilateral market (Rs/kWh)	Price of electricity traded through power exchanges (Rs/kWh)
2008-09	7.29	7.49
2009-10	5.26	4.96
2010-11	4.79	3.47
2011-12	4.18	3.57
2012-13	4.33	3.67
2013-14	4.29	2.90
2014-15	4.28	3.50
2015-16	4.11	2.72

(Source: CERC)

Thus, increased use of short-term market contracts can also be an important demand-response mechanism.

Due to the recent decline in demand in electricity, several thermal power plants faced long shutdown periods leading to under-utilization of installed capacity. This under-utilized capacity can now be sold through open access in the short-term markets. A DISCOM that does not have a long-term PPA with a particular power plant can sell acquire

Change in pricing of electricity (Rs/MWh) in power exchange in March 2017, w.r.t. March 2016



(Source: IEX)

electricity from it if un-requisitioned surplus is available. This leads to overall improvement in system efficiency.

However, there remain serious concerns among lenders about the financial sustainability of power plants pursuing short-term market on a large scale. According to an estimate, around 45 GW of coal-based capacity in the private sector is facing risk of loan defaults worth Rs 1,900 billion. Lenders would certainly like to see sustained revenue for these power plants which may not be promised in the short-term market.

Major stakeholders in the Indian power sector expressed their views on the balance between long-term power purchase agreements and procurement from short-term market.

Power Exchange

Stakeholders in the Indian exchange market suggest that the power market should follow the short term procurement route rather than continuing with long-term agreements. In support of their opinion the following points can be stated.

- Since the low cost green energy generation in India is growing rapidly, long-term agreement will not hold good in future.
- Continuing with long-term PPAs will lead to wrong pricing mechanism and increase burden for DISCOMS.
- Due to long-term PPAs, there will be no price competition in the power market as the mechanism will be a static one leading to higher power purchase prices.
- Existing PPAs can continue but no new long-term PPAs should be signed. Stakeholders foresee that in next 10-15 years the whole of the market will come under STOA.
- In the near future no new fossil based power plants will be developed.
- Power market needs to follow the power linkage mechanism similar to that of coal mines swapping mechanism.
- URS and Merchant Capacity Discoms will start procurement from open access so excess/surplus for generators long-term PPAs.

Regulators

According to a regulatory body, there should be a mix of long-term as well as short-term PPA contracts for power purchase. The following key points that concludes the need for a mix of two types of purchase agreement are –

- Since the old projects offer less tariff and cost effective mixing, two power plants (one costly and another less costly) for example, Jhajjar and Farakka power plants of NTPC will help to keep the tariff low
- PPA should be signed for the base demand only, the seasonal variations and peak should be arranged through the medium and short term market.
- Scheduling/DSM of Renewable Energy will be at stake if the market becomes dynamic.
- For long-term PPAs, over time, price decreases leading to certainty of tariff.
- If the purchase happens to be in short-term, then the power price will increase due to the down drift of coal generation in monsoon season. Thus, several factors will create an uncertainty in price mechanism.
- Regulators suggest that there should be 9-11% short-term power purchase agreement at maximum
- Only benefits for short-term procurement are that the buyer does not have to pay fixed cost, if it is not buying from energy.

Generators

A leading power generator was of the view that there should be long-term PPAs for power procurement in order to maintain the grid stability and for resilience of power market in case of any short-term market failures. Only the tenure of PPAs can be decreased from 25 years, that too, depending upon discussion and taking into account several parameters and views of lenders and dispatch centers.

DISCOMS

According to different state distribution companies, following key issues should be considered as priority to improve the condition of DISCOMS.

Fuel quality, transportation leakage, theft of fuel, storage losses, and conversion effciency should be taken care of.

Transmission effciency, metering accuracy, distribution effciency should be as per standard parameters.

There should be a strong consistent and non-contradictory policy to promote short-term power markets and government needs to take care of the implementation of those regulations and policies

Power analytics and management should be introduced for demand management and forecasting.

- Load shedding should not be used as a tool for balancing the power network.
- There should be proper mechanism for energy effciency and DSM.
- Proper tariff structure along with break up should be available for all the consumers.
- Development of standard protocol and measurement is necessary.

- Governance need to be improved keeping electricity out of political issues.

Energy Storage

Energy storage system in India is an emerging technology which will change the nature of intermittency of non-conventional energy sources. Increased shift towards distributed as well as large-scale renewable energy projects has resulted in substantial potential strain to the existing grid.

The intra-day and seasonal fluctuations in solar and wind power generation are expected to increase adaption of energy storage systems. The importance of off-grid PV systems with storage has pushed the Ministry of New and Renewable Energy (MNRE), through the Jawaharlal Nehru National Solar Mission (JNNSM), to offer a higher capital subsidy for PV systems with energy storage. The Central Electricity Regulatory Commission in this regard has published a staff paper stating different aspects and technologies of energy storage system and their implementation.

The application of storage system in the grid will lead to

- Optimization of generation
- Better control over intermittent generation from renewable sources
- Reliable operation of power system
- Reduction in deviation from schedule dispatch or drawl
- Storage of excess generation
- Optimization of ancillary service

Technology-wise the storage can be broadly classified into two:

The battery storage

The different types of chemical-battery storage model that are available in the market include sodium-sulphur batteries, sodium-nickel-chloride batteries, vanadium redox batteries, iron-chromium batteries, zinc-bromine batteries, zinc-air batteries, and lead-acid batteries.

Pump hydro storage

Some of the major pump storage plant across India are- Purulia pump storage, Sardar Sarovar Pumped Storage, Tehri Pumped Storage, Srisailam Pumped Hydro Storage, Nagarjuna Sagar Pumped Hydro Station, etc.

Few of the major challenges that the market will face due to storage deployment are:

- Cost competitiveness
- Environmental issues related to disposal of batteries
- Policy framework
- Safety aspects of battery storage technologies

Different types of storage technologies and there capacity:

Type of Storage	Range of Capacity
Pumped Storage	250-1000 MW
Electrochemical Battery Cell	100-200 MW
Flywheel	10-20 MW
Compressed Air	0-180 MW

(Source: CERC, staff paper 2017)

Summary

A general view seen emerging from the points shared by various stakeholders is that long-term as well as short-term markets could, and perhaps should, operate in tandem. Both have their own advantages and short-comings. Policy conditions should perhaps allow stakeholders access to short-term markets as well giving a relatively level-playing field compared to the long-term market and then let the market forces decide the basic power price and demand-supply scenario.

IPPs: independent Power Producers
DSM: Demand Side Management
STOA: Short-Term Open Access
PPA: Power Purchase Agreement

Young Energy Professionals' Forum

South Asia Forum for Energy Efficiency (SAFEE) was formed on April 6, 2009. Since then, it has been proactively working in the region to promote greater awareness about energy efficiency and conservation.

The energy sector across the globe is witnessing a paradigm shift in the way energy is produced, transmitted and utilized. The last few years have witnessed a technological revolution in both the fossil and non-fossil energy resources and their utilization. Renewable energy has leap-frogged to the front line of energy supply and use. The changing energy scenario requires a dynamic approach for efficiently managing the resources in a most cost effective and environment-friendly way. Young energy professionals are contributing in a major way to affect the process and business models in industry.

We now invite the young energy professionals (YEP) from industry and academia to join SAFEE and constitute a Forum within SAFEE, driven by their own agenda and initiatives. The YEP Forum shall deliberate on strategies for sustainable energy future through informed debates, issue based surveys, field work and research facilitating the policy advocacy agenda of SAFEE and offer constructive suggestions to a clean, sustainable and energy efficient future.

For more details, log on to www.safeeindia.org

Impact of e-waste – climate change and global warming

Meena Mehta
Assistant Professor, Department of Computer Science, Maharaja Agrasen College, New Delhi, India

Introduction

E-waste includes broken, obsolete or simply old electronic or electrical equipment such as computers, mobile phones, television sets and refrigerators. Such wastes contain dangerous chemicals such as heavy metals like lead and cadmium, flame retardants like PDBEs, and other toxins. Unfortunately, even today the general public are not aware of the severe environmental impact of improper disposal of e-waste.

This poses a threat to people who handle or recycle such waste without taking adequate safety measures. Even if e-waste is burnt or buried, the toxic fumes can emanate from the incinerator ash or landfill sites. As production and consumption of electronic and electrical equipment grows worldwide, so does the challenge of dealing with the waste. The fact that many manufacturers design their products to become quickly defunct so that consumers have to buy more (known as 'planned obsolescence') adds to the problem. The move towards digital television in many countries also means that millions of analogue television sets – each containing toxic lead – will need to be disposed off. Even in industrialized countries with strict regulations, the disposal of e-waste is still an occupational health risk. But in poorer nations that lack adequate waste management and recycling facilities, the risk is significantly greater.

In China, India and many African countries, poor people including children find work scavenging the dumps to recover valuable metals and reusable electronic equipment. UNEP's 2010 report predicted that by 2020, waste from old computers could increase by 200 to 400 percent in China and South Africa and by 500 percent in India. Mobile phones would be seven times greater in 2020 than in 2007 and, in India, 18 times greater.

This problem is compounded by the fact that e-waste from industrialized countries often ends up in poorer ones, even if they have rules banning such imports.

Does e-waste belong in your garbage?

Have you ever wondered what happens to your e-waste or electronic waste when you dump them in your regular garbage can? Chances are your old electronic gadgets will either end up in landfills, where it will take a long time to decompose, or it will land up with scrap dealers who use primitive methods to process e-waste. If all e-waste ends up in landfills or with the informal e-waste recycling sectors and scrap dealers, there'll be a lot of pollution to deal with. E-waste from old gadgets and end of life electronics need to be disposed of/recycled in a specific manner to ensure that they don't harm or pollute the environment.

GLOBAL ENERGY MANAGEMENT AWARDS 2017

India, the world's largest and fastest growing democracy has today emerged as a leader in the global landscape with a promising growth. As per a study, India topped the list of countries attaining maximum FDI. This has been possible through the Make in India initiatives launched by the Government of India.

Since its inception in 2009, the South Asia Forum for Energy Efficiency (SAFEE) has been catalyzing growth and promoting energy conservation, efficiency and equity. In 2015, SAFEE launched the Green India initiative to acknowledge and encourage entrepreneurship that promotes efficiency, especially in the energy sector.

In 2016, the South Asia Forum for Energy Efficiency announced the Global Energy Management Awards for industry and academia to recognize excellence and award organisations and individuals for their initiatives and innovation in promoting energy efficiency and conservation. The Global Energy Management Awards were presented at the Swami Vivekananda Urja Utsav, held on January 12, 2017 at India International Centre, New Delhi. Seven organizations and two individual entrepreneurs received the prestigious Global Energy Management Awards. It is proposed to make this programme that recognizes and promotes excellence in energy efficiency and conservation an annual feature.

HEARTIEST CONGRATULATIONS TO THE RECIPIENTS OF THE SAFEE GLOBAL ENERGY MANAGEMENT AWARDS, 2017

Bharat Heavy Electricals Limited
Central Foundry & Forge Plant
Haridwar, Uttarakhand
Category: Foundry, Ferrous & Non Ferrous

Bharat Heavy Electricals Limited
Heavy Electrical Equipment Plant,
Haridwar, Uttarakhand
Category: Manufacturing Industry, Power

Luminous Power Tech Pvt Ltd (Unit-4)
Gagret, Himachal Pradesh
Category: Engineering Industry

Maithon Power Limited
A Joint Venture Company of Tata Power & DVC, Dhanbad, Jharkhand
Category: Power, Thermal

National Thermal Power Corporation Ltd
Kawas Gas Power Project, Surat, Gujarat
Category: Power, Thermal (Gas based)

National Thermal Power Corporation Ltd
Korba Super Thermal Power Station,
Chattisgarh
Category: Power, Thermal

ONGC Tripura Power Company Ltd
Palatana, Gomati, Tripura
Category: Power, Thermal

Arunav Sharma
Founder & CEO
Rising Sun Energy, New Delhi
Category: Energy Entrepreneurship

Nitin Tanwar
Founder & CEO
Climate Connect, New Delhi
Category: Energy Entrepreneurship

GEM Awards 2018

You are invited to participate in
Global Energy Management Awards 2018
if you are a large, medium, small or micro organisation dealing in

Power: Generation, Transmission, Distribution

Renewable Power: Solar, Wind, Others

Industry: MSME Sector, Consultancy & Engineering Advisory Services

Individual Awards: Entrepreneurship, Energy Audit

Classification of organisations for the purpose of awards shall be based on the investment in plant and machinery/equipment

Further details to be announced on our website www.safee.org

Energy Scenario in Bangladesh

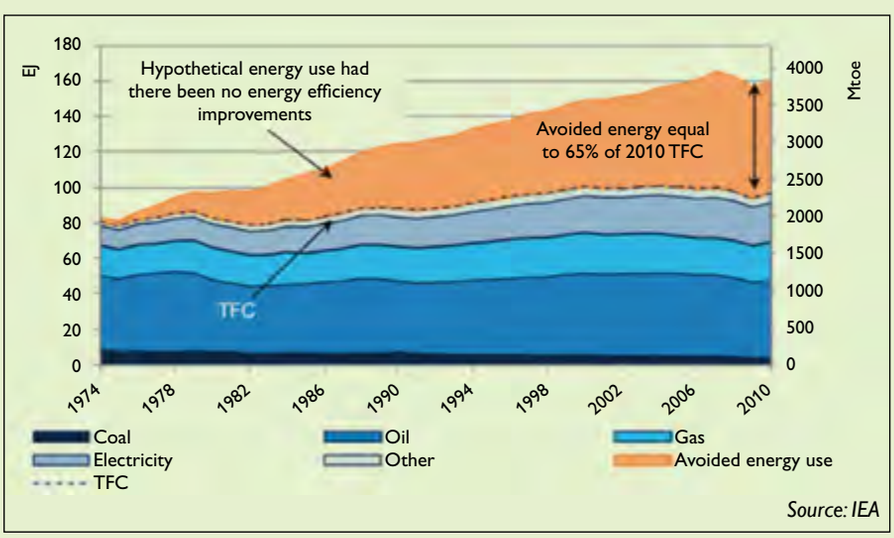
From 'Invisible' to 'First' Energy: Policy Changes for Catalyzing Transformation towards Energy Efficiency

Abstract: Energy efficiency has historically received less attention compared to other primary energy sources like oil, coal, nuclear and other renewable and alternative energy sources. Recent studies have revealed that practicing energy efficiency can contribute more energy input in the economy compared to any other primary energy sources. Some of the important, pertinent, and fact-based evidences of the cumulative benefits of practicing energy efficiency are shared in this article. A set of specific policy recommendations is also made to promote energy efficiency in Bangladesh.

Prof Khasru
Head, International Think Tank
The Institute for Policy, Advocacy and Governance (IPAG)

When US President Gerald Ford signed the Energy Policy and Conservation Act (EPCA), 1975 (Alliance to Save Energy, 2013), it was the first of its kind of federal policy that was enacted to promote energy efficiency in the United States. In the next couple of years, multiple laws and policies were penned in the US and also in other developed economies to support energy efficiency. The Oil Embargo of 1973 and the ensuing global energy crises were the catalyzing factors behind the policy-level shift to energy efficiency. Since then, the world has seen global, regional, national, and even local level policies related to energy efficiency. Standing on the verge of depleting global hydrocarbon resources, an International Energy Agency (IEA) study found that the global supply of crude oil, other liquid hydrocarbons, and biofuels are expected to be adequate to meet the world's demand for liquid fuels up to 2040 (Energy Information Administration, 2016). Implementing energy efficiency in every sector will be critical to safeguard availability of energy in the future. Emerging economies like Bangladesh need to understand the enormous potential of enacting energy efficiency related policies and the required governance transformation for effective policy implementation.

Energy efficiency, in its simplest and basic version, is defined as the process or mechanism of producing the same amount of product or services by using fewer amounts of primary resources. Therefore, saving one unit of energy is equivalent to producing one unit of energy (in fact it will be more than one unit considering the energy loss in transformation, transmission and distribution). An article published by The Economist termed energy efficiency as the cheapest and cleanest of all forms of energy (The Economist, 2015). Developed economies were successful in extracting benefits from effective implementation of efficient energy policies. An IEA study revealed that eleven IEA member countries (e.g. America, Australia, Britain, Denmark, Finland, France, Germany, Italy, Japan, The Netherlands and Sweden) have saved the equivalent of 1.4 billion tonnes of oil in 2011, worth $743 billion, by adopting energy efficient policies since 1970 (The Economist, 2015). However, from government policy to public media, energy efficiency gets the least attention compared to other energy sources like crude oil, coal, nuclear, bio-fuel, hydropower, solar and other renewable and alternative sources. This is the reason energy efficiency is often termed as the 'invisible energy' or the 'fifth energy'. Although several analyses revealed that within a specific timeframe, energy saving amounted from energy efficiency is more than any other primary fuel consumption (e.g. fossil fuel, bio-fuel, solar, nuclear, etc.). The following chart depicts the amount of energy saved by adopting energy efficiency policies in the mentioned eleven countries compared to other primary energy sources:



Source: IEA

From Megawatts to Gigawatts

Envisioning a Greener Tomorrow with Renewable Energy

ENCOURAGING GREEN-POWER TODAY
ENERGISING INDIA'S TOMORROW

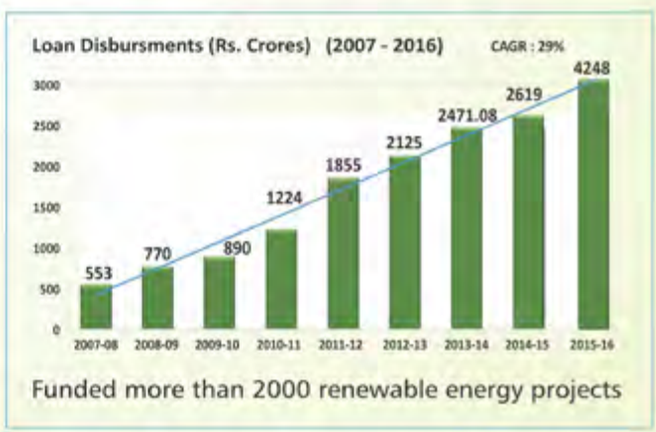
Supporting RE Since 1987

GoI's target of 5x increase in renewable energy capacity to 175,000 MW by 2022

4th largest wind installations in the world

One of the largest solar programs in the world with planned capacity of 100 GW by 2022

IREDA funded projects are helping in avoiding 13 million tonnes of CO_2 emissions per annum



Funded more than 2000 renewable energy projects

इरेडा
IREDA

[Mini Ratna Category-I PSU]
IS/ISO 9001 : 2008 & 2013 Certified

Indian Renewable Energy Development Agency Ltd.

(A Govt. of India Enterprise)

A Mini Ratna PSU under Ministry of New and Renewable Energy

www.ireda.gov.in

(Note: TFC represents the total final consumption, the primary axis represents total energy consumption in exajoules; the secondary axis represents million tonnes of oil equivalent consumption).

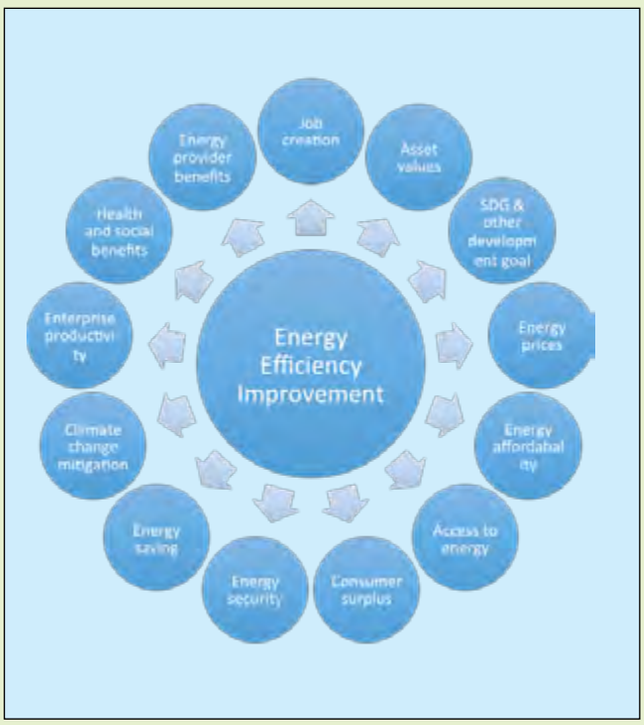
From this chart it is apparent that fuel saving due to energy efficiency improvements has been increasing from its early adoption in the '70s. In 2010, energy efficiency saved 65 per cent of fuel needed for total final consumption which is higher than any other fuel consumption. Along with saving significant amount of primary fuels, Ryan and Campbell, 2012 identified 12 direct benefits from energy efficiency practices (The International Energy Agency, 2013). At this context, it will not be imperative to term energy efficiency as the 'First Energy' instead of limiting its potential by terming it as Fifth Energy or the Invisible Energy.

Energy efficiency is also perceived as an important tool for Bangladesh to achieve 'Vision 2021: Electricity for All'. To promote energy efficiency practices in the country, the government has established the Sustainable and Renewable Energy Development Authority (SREDA), under the Power Division of the Ministry of Power, Energy and Mineral Resources. Effective policies and pricing mechanism are two important factors driving the energy efficiency market. Over the past five years, investment in energy efficiencies has been stimulated primarily by policy interventions. SREDA already has published the 'Energy Efficiency and Conservation Master Plan up to 2030'. This policy provides overall guidance for the efficient of usage energy usage in the country. However, effective implementation of energy efficiency might face certain roadblocks in Bangladesh. Decrease in the fossil fuel price in the global market made the market less interesting to adopt energy efficiency measures. Subsidies on fossil fuel also distort the energy efficiency rollout. Fossil fuel subsidy consequently reduces investment potential in energy efficient technologies. Lack of proper infrastructure and capacity are two other major tailbacks.

The following policy recommendations are made to promote energy efficiency practices in Bangladesh:

- Identification of barriers for cost-effective energy efficiency investment and strategies formulated for overcoming or minimizing those barriers.
- Identification of both low-hanging-fruits and long-term opportunities for energy efficiency improvements. Cost-benefit analysis needs to be done before implementing any strategies. Alternative scenarios should be mapped and assessed before selecting the most appropriate one.
- Harmonization among other energy, environment and climate related plan and policies. Conflict among the policies needs to be eliminated to the extent possible for better energy efficiency implementation.
- Distortion in the market, especially in the fossil fuel pricing should be eliminated. This can be done by adopting short, mid and long term strategies.
- Promotion of private investment and PPP model in energy efficiency project
- Buildings have great energy saving potential. Energy efficient building code should be introduced and enforced. Special measures to be developed to increase energy efficiency of existing buildings.
- Specific provision to be made for energy efficiency labelling of appliances and equipment. It is already mentioned in the 'Energy Efficiency and Conservation Master Plan up to 2030'. However, specific incentives should be introduced to encourage implementation.
- Market favourable policies for energy efficient policies
- Bangladesh already has made significant progress in phasing out energy inefficient lighting products and distributing energy efficient lighting products. Such programmes should be continued to phase out energy inefficient lighting products entirely.
- Transport sector is one of highest energy intensive industry. Mandatory fuel efficiency standards for the vehicle should be maintained. Policy needs to be enacted to phase out energy inefficient vehicles.

Bangladesh's aspiration to become an upper middle income country by 2021 depends significantly on energy access and affordability. Till date, natural gas is the most important primary fuel in Bangladesh. Domestic reserve of natural gas is depleting and within the next decade this resource might get exhausted. While diversifying its energy portfolio is necessary, of equal importance is maximizing energy efficiency to ensure energy security in the country.



NTPC Limited

(A Govt. Of India Enterprise)

" To be the world's leading power company, energizing India's growth"

एनटीपीसी NTPC

A Maharatna Company

KAWAS GAS POWER PROJECT

ADITYANAGAR, SURAT (GUJARAT) - 394 516

SAFEE beyond boundaries: Nepal & Bangladesh

The South Asia Forum for Energy Efficiency has been functioning since 2009 and is respected for its in-depth analysis and unbiased views on policy initiatives in the energy sector and for promoting greater awareness in energy efficiency and conservation.

While SAFEE has been making forays in promoting energy issues in neighbouring countries, it now has a strong presence in Nepal and Bangladesh.

In 2016, SAFEE signed an MoU with Mr Laxman Neupane to represent SAFEE in in Nepal. Mr Neupane is an energy economist of repute, headquartered in Kathmandu.

Recently, on the occasion of Swami Vivekananda Urja Utsav 2017 and the Global Energy Management

Awards ceremony, Secretary General, SAFEE Mr J K Mehta singed an MoU with Mollah Amzad Hossain, editor of Energy and Power, a magazine of Bangladesh to start SAFEE operations in Bangladesh. Under these bilateral MoUs, representatives from SAFEE India can participate in energy events organised by SAFEE Bangladesh and SAFEE Nepal on complimentary, mutual and reciprocal basis. Experts from these countries may also join hands with SAFEE India for a holistic review of the energy sector in other South Asian countries and suggest measures to improve energy efficiency and conserve energy.

Discussions are on with Sri Lanka to establish a base in this island country and with others to reach out to the energy fraternity in other neighbouring countries of South Asia.

SAFEE Fact Sheet

South Asia Forum for Energy Efficiency (SAFEE) came into existence on April 6, 2009. The mission of the Forum is Engineering Energy Efficiency. It works proactively to disseminate relevant information, provide a forum for knowledge networking and provide knowledge support in the vital area of energy conservation and efficiency.

Objectives

- To promote energy efficiency through benchmarking of best practices within the country and region.
- To publish best practices case studies, surveys, reports, etc on energy efficiency in the industry sector
- To share knowledge and promote regional networking for exchange of information and resources
- To form an association of experts from regions for studies on relevant energy issues.
- To foster partnerships with leading academic institutions and regional energy forums with a common agenda.
- To create awareness among the general public about energy conservation efficiency and equity.
- To promote energy efficiency practices by instituting awards and scholarships
- To disseminate information on government initiatives and policies on energy efficiency & conservation
- To mentor and support energy efficiency policies & practices

Agenda for action

To meet these objectives, the following activities will be undertaken:

- Conduct survey of energy saving initiatives in the relevant sectors in India
- Conduct workshops on Best Practices in Energy Efficiency
- Collaborate with other organisations with similar objectives for knowledge sharing, information dissemination and promoting energy efficiency in relevanat sectors
- Prepare white paper on relevant energy efficiency & energy conservation issues and challenges.
- Promote Smart Grids and IT based solutions for energy efficiency.
- Organise programmes to educate and facilitate greater energy access to rural people and alleviate energy poverty
- Formation of Young Energy Professionals' Forum
- To effectively network with sector experts and organisations for greater appreciation of SAFEE activities
- Actively campaign for greater use of renewable energy resources and clean energy, especially in rural areas through distributed generation
- Form industry-academia partnerships to facilitate excellence in engineering
- Increase outreach to South Asian countries
- Publish Sustainable Energy Efficiency Newsletter (SEEN)
- Organise Global Energy Management (GEM) Awards

Some events held

- Akshay Urja Diwas in 2009, 2010, 2011, 2012
- Swami Vivekananda Urja Utsav in 2013, 2014, 2015, 2016, 2017
- World Environment Day in 2013, 2014, 2015, 2016
- Road Shows to promote EuroAsia Energy n Foundry at Delhi, Mumbai, Chennai, Kolkata, Doha, London, China, Durham and Montreal
- National Foundry Day Celebration at Faridabad
- Agenda 2014: Green India Initiative, Catalizing Sustainable Growth (Green Industry, Green Cities, Green Villages), New Delhi
- PAT Policy & Implementation, New Delhi
- CEOs' Conclave on Energy Efficiency at Raipur and on Clean Coal at Delhi
- Signing of MoU with Nepal and Bangladesh
- CEOs Round Table
- Global Energy Management Awards, 2017

GLIMPSES OF SOME SAFEE EVENTS

SWAMI VIVEKANANDA URJA DIWAS 2009-2017

WORLD ENVIRONMENT DAY 2013 – 2015

EUROASIA ENERGY N FOUNDRY ROAD SHOWS

Delhi, Mumbai, Chennai, Kolkata, Doha, London, China, Durham and Montreal

Energy Day Celebration

Agenda 2014: Catalyzing Sustainable Growth

CEOs' Conclave, Raipur

Jharkhand Investors' Forum

National Metallurgists' Day

CEOs' Round Table

Remembering

Vijay Prakash Saha

"Death ends a life, not a relationship"

Mr Vijay Prakash Saha, a mechanical engineer, was Chairman & Managing Director of Akshya Electro Metallurgy Ltd. Over the years, he was associated with several government departments & organisations, both state & central, professional associations and institutes.

Mr Saha was Founder Chairman of South Asia Forum for Energy Efficiency which was formed in April 2009 and since then, he was the driving force of SAFEE, steering all its activities.

Mr Vijay Prakash Saha left for his heavenly abode on 24th November 2016, leaving a vacuum in his friends and industry circle. He is remembered by his colleagues, friends and acquaintances as a true leader and motivator, full of energy and optimism and a live wire speaker at every forum.

The members of SAFEE deeply grieve his untimely demise and his absence shall be felt at SAFEE at all times.

May his soul rest in peace.

With best compliments of

Green Power for the Future

ONGC Tripura Power Company Limited

Corporate Office:
6th Floor, A Wing, IFCI Towers, 61, Nehru Place
New Delhi 110019, Phone: +91-11-26402100
Fax No: +91-11-26227532 / 33

Registered Office:
Badarghat Complex, Agartala, Tripura 799014
Phone: 0381-265272 • Fax No: 0381-265234

SAFEE

South Asia Forum for Energy Efficiency

Secretariat: 533 DDA Sector, 22 DWARKA, New Delhi 110077
Tel: +91 11 45304479 • Email: info@safeeindia.org/safeeindia@gmail.com
Website: www.safeeindia.org