

INDIA
ENERGY
FORUM

SOLAR POWER

New Targets, New Challenges

15th Sustainable Energy Summit 2015

9th October 2015, Hotel Le-Meridien, New Delhi

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India Energy Forum has been organising an annual national conference to focus on challenges and opportunities in developing clean energies over the years. These conferences have created a niche position and are attended by energy professionals' and policy makers from all over India.

The climate issues continue to loom before us. India has responded by setting its ambitious targets in terms of renewable energy (175 GW by 2022), distributed energy systems, water conservation, energy conservation (National Mission on Enhance Energy Efficiency), smart grids (smart grid mission with a clear roadmap), eco-friendly 100+ smart cities, new and progressive waste management rules (2015 rules), smart and eco-friendly transportation including electric vehicles (National Electric Mobility Mission Plan) etc. In most of these areas significant work would need to be done by 2030 and a clear momentum needs to be built by 2020.

In addition, India is committed to ensure that our carbon footprint will be contained and India will infact, reduce emission intensity by 20 to 25% by 2020. Renewables, Energy Efficiency and Nuclear Energy are real options.

This ambitious programme has turned Solar Sector into a \$100 Billion Investment Magnet: The government has officially approved an incredibly ambitious plan for India's fledging solar sector. From the current solar power generation capacity of 4GW, it aims to produce as much as 100 GW by 2022 – with a target of attracting a staggering \$100 billion into the sector over the next seven years. A fairly sizeable chunk of that goal be met, when Japan's SoftBank, along with telecommunication major, Bharati Enterprises, and Taiwan's electronic goods manufacturer, Foxconn, announced plans to invest \$20 billion for setting up 20GW of solar power in the country.

State wise Targets for 40GW Rooftop Solar by 2022: India has released a tentative year-by-year breakdown of individual state targets to reach its overall 40GW rooftop solar installation goal by 2022. A Plan for the 'Grid Connected Rooftop and Small Solar Power Plants Programme.

The Summit aims to address two most important issues viz.

1. **New Models for Solar Rooftop – State Policies & Regulations**
2. **Inter-state Transfer Infrastructure issues in Evacuation in Power :**

In addition it would also address:

- Hurdles with the growth of green energy
- Bridging knowledge gaps in key underlying scientific areas.
- Changing Dynamics of Renewable Energy
- Renewable Energy and Grid Issues impacting development of Green Energy.
- Building alliances and partnerships through national and global collaboration in research and technology developments on climate change under International and bilateral S&T cooperation arrangements.

THE ORGANISER

INDIA ENERGY FORUM: The Forum is a unique, independent, not for profit, research organization and represents energy sector as a whole. It is manned by highly qualified and experienced energy professionals committed to promoting sustainable energy policy.

The Forum's MISSION is the development of a sustainable and competitive energy sector, promoting a favourable regulatory framework, establishing standards for reliability and safety, ensuring an equitable deal for consumers, producers and the utilities, encouraging efficient and eco-friendly development and use of energy and developing new and better technologies to meet the growing energy needs of the society. Its membership includes all the key players of the sector including NTPC, NHPC, Power Grid Corporation, Power Finance Corporation, Reliance Energy, ONGC, Indian Oil Corporation, Neyveli Lignite, Coal India, Tata Power, Reliance Energy, Unocal, Alstom and over 70 highly respected energy experts. It works closely with prestigious chambers and trade associates including Bombay Chamber, Bengal Chamber, Bangalore Chamber, Madras Chamber, Maratha Chambers (Pune), PHD Chamber, Observer Research Foundation, IRADE, INWEA, India Coal Forum, PETROTECH & PETROFED.

15th Sustainable Energy Summit 2015

9th October 2015, Hotel Le Meridien, New Delhi

Programme

9.00 a.m. : Assembly & Registration

9.30 a.m. – 10.30 a.m. Inaugural Session

- **Introductory Remarks**
Mr. Amarjit Singh, Secretary General, IEF
- **Welcome Remarks**
Shri P S Bami, President, IEF & Former CMD, NTPC
- **Presentation**
Dr. D. Majumdar, Former CMD, IREDA*
- **Inaugural Address**
Mr. Anil Razdan, Former Secretary, Power & Chairman Power group IEF
- **Vote of Thanks**
Dr. (Mrs) Malti Goel, Hon. Convenor, Renewable Group, IEF

10.30 a.m. TEA

10.45 a.m.: Plenary I

Theme: New Models for Solar Rooftop –State Policies & Regulations

Chair: Mr Tarun Kapoor, Joint Secretary, MNRE*

Distinguished Panelists

- Dr Amarpal Singh, CEO, PEDDA*
- Mr. Abhilakh Singh, GM (Technical Services), IREDA*
- Shri Guru Inder Mohan Singh, Founder & COO, AmplusEnergy Solutions Pvt. Ltd.*
- Mr. Ronnie Khanna, Dy. Chief of Party (Renewable Energy), USAID *
- Shri Sunil Jain, CEO & ED, Hero Future Energies
- Mr. Amit Kumar, Head - North & Central Region, Tata Power Solar Systems Ltd.

12.00 Noon : Plenary II

Theme: Inter-state Transfer Infrastructure issues in Evacuation of Power

Chairman: Mr. V Subramanian, SG, INWEA & Former Secretary MNRE*

Distinguished Panelists

- Dr. Ashvini Kumar, Director, Solar Energy Corpn of India*
- Shri Y.K. Sehgal, ED, PGCIL*
- Mr. Sanjeev Gupta, MD, NEXGEN Financial Solutions Pvt. Ltd.*
- Shri P S Gopalan, Head (India Operation), Sun Edition* (or his colleague)
- Shri Rajnish Khanna, Country Head, Wind World Financial Consultancy

2.00 p.m.: LUNCH

*Confirmed

15th Sustainable Energy Summit 2015

Solar Energy – New Targets, New Challenges

BACKGROUND PAPER

Prepared by

Dr. (Mrs.) Malti Goel

Hon. Convenor, Renewable Energy & Environment Group

1. Solar Energy Scene of India

India is endowed with 300 clear sunny days in a year and solar energy potential is assessed as about 5000 trillion kWh/ year. As a Mandate of reducing adverse impact on environment from fossil fuels based generation; solar energy is taking centre stage in carbon dioxide mitigation.

The Government of India launched the Jawaharlal Nehru National Solar Mission (JNNSM) in 2010. In the Phase I of the mission grid connected solar energy capacity increased from 17.8 MW in 2010 to 1,044 MW in August 2012. In the phase II of the programme targets are addition of 10 GW grids connected and 1 GW off-grid solar power projects by 2017. The Ministry of New and Renewable Energy (MNRE) is implementing solar off-grid Programme under JNNSM and has, a Rooftop PV and Small Solar Power Generation Programme (RPSSGP) schemes to develop solar PV Projects with a maximum capacity of 20 MW per State.

Government of India has further announced target of achieving 100GW of solar energy by 2022. Under the new targets, schemes for developing solar parks and ultra-mega solar power plants are in the pipeline. It is proposed to set up 25 solar parks with more than 500 MW capacities each and five ultra mega solar projects. Solar rooftops have a share of 40% of total capacity i.e. 40 GW by 2022. State wise solar energy potential is show total of 749 GW, (Table 1).

Currently, central government was offering a 30 per cent subsidy for solar roof top systems, which is further, reduced to 15 per cent and will be gradually tapered off. To fulfill the targets, each state is coming up with guidelines and new models for installing solar rooftops. More than a dozen states have notified solar policies. Solar purchase obligations have also been redefined in Renewable Energy Purchase Obligations (RPOs). Recent policies of some of the States adopting market driven approach for solar PV installations are discussed below.

Table 1: State wise Solar Potential in India

S No.	State	Solar Potential (GWp)
1.	Andhra Pradesh	38.44
2.	Arunachal Pradesh	8.65
3.	Assam	13.76
4.	Bihar	11.20
5.	Chhattisgarh	18.27
6.	Delhi	2.05
7.	Goa	0.88
8.	Gujarat	35.77
9.	Haryana	4.56
10.	Himachal Pradesh	33.84
11.	Jammu & Kashmir	111.05
12.	Jharkhand	18.18
13.	Karnataka	24.70
14.	Kerala	6.11
15.	Madhya Pradesh	61.66
16.	Maharashtra	64.32
17.	Manipur	10.63
18.	Meghalaya	5.86
19.	Mizoram	9.09
20.	Nagaland	7.29
21.	Orissa	25.78
22.	Punjab	2.81
23.	Rajasthan	142.31
24.	Sikkim	4.94
25.	Tamil Nadu	17.67
26.	Telangana	20.41
27.	Tripura	2.08
28.	Uttar Pradesh	22.83
29.	Uttarakhand	16.80
30.	West Bengal	6.26
31.	Ut	0.79
	Total	748.98

Source: NISE

2. Current Status of Regulatory Framework for Solar Rooftops in India

In August 2013, the Forum of Regulators (FOR) published draft model regulations on grid-interactive solar rooftops based on net metering. This regulatory development provided a much-needed push to Indian solar rooftop sector. Since then, the Indian solar rooftop sector has grown tremendously in terms of the development of its policy and regulatory framework. By December 2014, a total of 356 MW capacity of solar rooftop was sanctioned under various schemes by the central and state governments; just over 10 percent of this capacity – around 40 MW of rooftop PV capacity – has already been commissioned.

As many as 16 states and 8 Union Territories have taken solar rooftop initiatives, wherein 16 regulatory commissions laid provisions for development of solar rooftops in their jurisdictions. With regard to policy formulation, the MNRE is actively pursuing – through state nodal agencies and the Solar City program of the Solar Energy Corporation of India (SECI) – the development and deployment of ambitious plans for the installation of 40 GW of solar rooftops by 2022. MNRE has also requested banks and financial institutes to provide soft loans and innovative funding for installation of solar rooftops. The Ministry is also in the process of developing a model implementation framework for solar rooftops in order to help distribution utilities to implement their solar rooftop programs successfully.

In this context, the PACE-D TA Program is providing its support to distribution utilities in Karnataka and Rajasthan for development of implementation framework for deployment of distributed solar power solutions. The program has assisted BESCO for developing implementation framework and guidelines for interconnection for grid connected small solar rooftop projects. In addition, it also assisted the Government of Karnataka in developing new and emerging business models such as feeder based small scale solar projects to cater to agriculture pump sets requirement for irrigation purpose. In order to promote distributed solar generation, the program has also organized a workshop / stakeholders consultation on solar rooftops in Bangalore. Moreover, to encourage domestic and other subsidized consumer categories the program is also working on exploring the concept of gross metering framework in partnering states. (source – Amarjit Singh, India Energy Forum, 2015)

Plenary I: New Models for Solar Rooftop –State Policies & Regulations

Solar rooftops are considered more acceptable for urban areas, since land is a scarce resource in India. Countries such as Germany, USA, Italy and Australia have imitated solar PV installations on rooftops programmes. The success in them has been possible due to proactive government policies, increased consumer awareness and availability of innovative financing schemes. Specific highlights of State Policies in Haryana, Chattisgarh and Delhi are presented below.

I. Haryana Rooftop Policy

Haryana Government has given a big push to solar power in the country. It announced that all buildings on 500 sq. yards will install solar rooftop by September 2015. It was made mandatory for all types of buildings, new or old.

Business models **for Rooftop Solar** prevailing in the market based on the ownership of the rooftop solar PV system are.

- (I) Self- owned solar PV system and
- (II) Third party owned solar PV system.

In self-owned system, the roof owner owns, operates, and maintains the roof top SPV system. The generated electricity is either consumed by the end-use loads or supplied to the utility grid or combination of both.

In third party owned system, the third party (a solar developer/system integrator or ESCU) owns the roof top solar PV system and sale electricity either to the roof owner or consumer or both. In this case roof owner is not allowed to avail certain financial benefits, such as tax benefits, capital subsidy, etc. For large institutions it may have benefits such as economy of scale, and centralized O & M network.

The four metering options has been proposed:

(i) Gross metering: Self owner

In this mechanism the rooftop PV system is owned by the roof owner. The entire electricity generated by the rooftop SPV system is supplied to the grid and in return, the system owner gets compensated at a predetermined regulated tariff.

(ii) Gross metering: Third party owner

Under this mechanism, the SPV systems installed on rooftops (government, residential, public, commercial, industrial, and institutional buildings), third party owner make a long term lease agreement with the roof owner, invests in equipment, sets up the projects, and sells the generated energy to the grid.

(iii) Net metering: Self owner

The solar electricity is supplied to roof owner's end-use loads and the surplus power is fed into the grid. The utility can purchase the surplus power or provide banking facility for a particular period of time. Two types of meters are required to be installed.

(iv) Net metering: Third party owner

The solar electricity is supplied to the roof owner's end use loads and the surplus power is fed into the grid. Third

parties can also lease out solar PV systems to interested roof owners. The rooftop owners in turn pay developers/ third parties a monthly lease rent.

Haryana Renewable Development Agency (HAREDA), plans a single window "solar facilitation centre" to be opened at the Rajiv Gandhi Renewable Park near Leisure Valley to promote solar energy. (Source- Gurgaon Hand book on Solar, Gurgaon First, 2015-16)

II. Chhattisgarh Rooftop Policy

Chhattisgarh policy focus is more on solar off-grid projects, as it is a power-surplus state. Chhattisgarh Renewable Energy Development Agency (CREDA) is setting up solar rooftop systems in remote areas to make them self-sufficient in meeting power requirements.

The state has a total solar energy capacity of 52.6 MW of which 33 MW is expected to be in off-grid solar rooftop. Key features of the policy are

- (I) The Chhattisgarh State Electricity Regulatory Commission (CREDA) is encouraging state/ central departments and industrial/commercial consumers to invest in projects so that it can meet the majority of its expenses without central or state government support.
- (II) CERC is prioritizing grid-connected solar capacity addition allowing open access and assure connectivity with the distribution system or transmission system irrespective of their installed capacity.
- (III) CREDA is encouraging the development of rooftop solar projects under the CERC's regulations which have a control policy applicable from April 2013 to April 2016. Net metering system for 50 kW to 1 MW solar rooftop projects is offered. It also offers a subsidy of Rs 40 per watt for solar projects that have up to 10 kW of capacity, Rs 25 per watt for 10-15 kW projects, and Rs 15 per watt for 50-100 kW solar projects.
- (IV) More than 33 MW of solar rooftop capacity had been assessed at around 704,552 sites in Chhattisgarh: more than 8.3 MW by industrial consumers, 2.6 by domestic consumers and 1.2 MW by banks and commercial consumers.
- (V) CREDA has installed solar rooftop systems at most tourist places, forest guest houses, government buildings, commercial tax offices, district hospitals, primary health care centres, community health centres, educational institutions police stations, remote villages, etc. in the state. Small-and medium scale industries are adopting the renewable energy service company (RESCO) model to get solar power. (Source - Renewable Watch, Vol-5, No-9, July 2015)

III. Delhi Solar Energy Policy

The Delhi Solar Energy policy for the period 2015-20 has been notified on 10 September 2015. The draft policy has extensively covered regulatory aspects, and other facilitation for implementation. rooftop solar systems offer sustainable energy, environmental benefits, low gestation period, low transmission and distribution losses, reduced need for distribution infrastructure, and peak load offset that reduces costs for the DISCOMs and ultimately for the consumers. A target of generating 2 GW solar rooftop power by 2025 has been set. Delhi government has made it mandatory for all its government buildings to install solar panels by 2020. It is proposed to generate 1 GW by 2020 and double the generation by 2025, which is 6.6 per cent of the Capital's peak power demand.

Delhi has a capacity of 31 square kilometres to harness the solar energy on rooftops, It can be converted to solar energy potential of 2.5 GW, of which 26 per cent areas is under the government, 25 per cent in commercial sector, and the largest of 49 per cent lies with domestic sector.

DERC has notified the terms and conditions for determination of Tariff for procurement of Power for grid connected sola PV regulations for determination of Tariff for projects of 25 kW or more. Payback time for commercial, industrial and the government is expected to be 5.5 years and it will save Rs. 15,000 each year/kW. No subsidies are recommended from the Delhi government and performance based incentives for households coming forward for installation of solar panels. Strongly advocated in household generation a saving of Rs. 11,500/- per year/ kW has been calculated, which means the cost of installation could be recovered by the owner in seven years. Group Net metering and Virtual net metering are proposed.

Under the solar policy, formulated by the Delhi Government a 5 MW solar plant is planned to come up on the Delhi Secretariat building. It is also planned to install solar panels on roofs of bus shelters of Delhi Transport Corporation.

Plenary II: Inter-State Transfer Infrastructure/ Issues in Evacuation of Power

At present, the Indian power sector has more than 270,000 MW of generation capacity, and over 700,000 km of transmission lines up to the 1,200 kV level, with nearly 572,00 km having been electrified. Commendable progress has been made in terms of reforms and restructuring after the enactment of the Electricity Act, 2003, to bring about competition and efficiency and create a vibrant electricity market. New target for Renewable Energy are installation of 175 GW of renewable energy capacity across the country by 2021-22. The most fundamental issues that will be faced in scaling up renewables to these proportions will be Power evacuation and off-take, as well as mobilizing investment.

State transmission and distribution (T & D) utilities are under severe financial pressure, To resolve these Power Grid Corporation of India's (Power grid) board is invest in the Green Energy Corridors: Inter-State transmission Scheme, which are aimed at transmitting renewable energy from generation points to load centres by creating intrastate and interstate transmission infrastructure. The project spans eight renewable energy-rich states: Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat, Maharashtra, Rajasthan, Himachal Pradesh and Jammu & Kashmir.

Most renewable energy rich states do not offer adequate creditworthiness for large-scale capacity addition. Tamil Nadu having an installed wind capacity of 7, 400 MW and Rajasthan with 4,000 MW of solar and wind capacity have already faced power evacuation challenges and under utilization of capacities. Gujarat and Punjab and the only two exceptions with profitable discoms and well-develop T & D infrastructure.

India's power grid has come under tremendous strain especially because of variability and uncertainty. The challenges can be summarized as

- (I) How the grid scenario will change over the next seven to ten years, during which India is expected to add more than 150 GW of renewable power capacity is not known
- (II) How the government will address the issue of discom financial losses is vital in making a power purchase agreement (PPA) and is not known.
- (III) The Renewable projects have short gestation period but it takes longer to put transmission arrangements in place as there are significant challenges at the pre-and post-commissioning stages.
- (IV) Challenges in the Right of Way (RoW) and ensuring the readiness of substations and transmission infrastructure which are required to be completed before the commissioning of the project to avoid delays in evacuating power are to be addressed
- (V) Most of the new renewable energy capacity is coming up in concentrated pockets where cheap land is available and the solar or wind generation potential is attractive. However, many of these locations do not have substations to draw such large amount of power. There have to be connected through utility-scale substations that too are far away from the project area. Hence, kilometres of high tension conductors are required.

As the renewable energy capacity scales up, integrating large amounts of power with the grid would be a bigger challenge in terms of scheduling and balancing. (Source - D. Khattar, Pressure points, Renewable watch, July 2015.)

14th Sustainable Energy Summit 2014
**Renewable Energy – Dynamic Role in
Power Sector**

25th November, 2014, India International Center, Delhi

Summary & Recommendations

Executive Summary of the 14th Sustainable Energy Summit 2014 Theme: “Renewable Energy – Dynamic Role in Power Sector”

25th November, 2014, Multipurpose Hall, IIC, New Delhi

- ❖ India Energy Forum held its 14th Sustainable Energy Summit on the theme **Renewable Energy – Dynamic Role in Power Sector** on 25th November, 2014 at IIC, New Delhi. The issues and opportunities for meeting the set targets were deliberated in the inaugural session and two Panel discussions.
- ❖ In the Inaugural Session Mr. Amarjit Singh, SG, IEF made the introductory remarks. Welcome address was given by Mr. P S Bami; President, IEF. Mr. Anil Razdan, Former Secretary, MoP and Chairman, Power Group, IEF delivered the Special Address. In his address he cited examples from China and USA, which are having the largest share in RE. Share of renewable energy in global energy is 21.3% including 16.2 % from hydro-electric power.
- ❖ Shri K S Popli, CMD, IREDA in his inaugural address, remarked that total capacity from renewable energy sources exceeded 31,000 MW in August, 2014. He said IREDA being the only government financial institution in the country in the renewable energy sector, it is taking several innovative measures to promote investment for the development of renewable sources of electricity that in the Indian power sector renewable electricity generation has been growing at an accelerated pace
- ❖ Dr. (Mrs.) Malti Goel, Convenor, Environment & Renewable Group, IEF presented vote of thanks. She said that solar energy use was in 1960s & 1970s micro generation for uses in charging of small gadgets like watches, phones etc. or for Space applications, Today macro and mega generation are becoming the focus. He said Renewable energy has become an important agenda of India's energy planning process especially after climate change has taken centre stage in the domestic and global energy policy. She thanked eminent dignitaries on the Dias, Shri Deepak Gupta, ex-Chairman of the Group, distinguished panelists and participants on behalf of India Energy Forum.
- ❖ In the **Plenary I** chaired by Dr. (Mrs.) Malti Goel, Former Adviser, DST, several Issues and Concerns in project financing for meeting the targeted growth were raised. She presented the theme paper on 'Changing Dynamics of Renewable of Renewable Energy'. and invited Distinguished Speakers to give their views. Dr. Harish K. Ahuja President, Hindustan Power projects Pvt Ltd. highlighted the role of investment planners and regulators in the anticipated growth. Mr. S. Venkatachalam MD, Orient Green Power Company Ltd., Chennai suggested somewhat coalification approach to be adopted for renewable energy, where states could have different prices depending upon availability of resource. Social issues are to be kept in view in expanding use of renewable energy sources.
- ❖ Mr. Sanjeev Gupta, MD, Nexgen Financial Solutions Pvt. Ltd. spoke on strategies for financing of mega solar projects, need for incubation fund and equity and revenue generation. Mr. G.S. Patra, GM, Power Finance Corporation (PFC) described the project appraisal and disbursement systems adopted by PFC. Dr. Bharath Reddy, SCIL gave an outline of larger solar projects with Solar Corporation of India.
- ❖ In the **Plenary II** chaired by Mr. V. Raghuraman, Director, Suzlon Energy Ltd. Issues in Renewable Energy Technologies and Manufacturing & Infrastructure were discussed. The Distinguished Speakers were Mr. Amit

Kumar, Head – North & Central Region, Tata Power Solar; Dr. Sudhakar Sundaray, Research Associates. TERI; Mr. Dwipen Boruah, MD, GSES India Sustainable Energy Pvt. Ltd; and Mr. Vivek Garg, Sr. Manager, Emergent Ventures. It was concluded that renewable technologies require large initial capital investment as well as consumer friendly policies. These projects face high technology and high cost risk. Infrastructure development is a major concern in expansion of various schemes such as solar roof and mega solar projects.

- ❖ The Summit was very well attended by distinguished participants from industry and other stake-holder organizations. IIT Delhi Alumni also attended in large number.

The Recommendations of the Summit and the Programme are attached.

14th Sustainable Energy Summit 2014

Theme: “Renewable Energy – Dynamic Role in Power Sector”

RECOMMENDATIONS

1. Renewable Energy is having a very dynamic role in the power sector planning. We are not fortunate in having all the fossil fuels other than oil & coal resources. By 2030, 90 percent crude is likely to be imported. 50 percent of gas has to be imported and may be 40 percent of coal will also have to be imported. The power installed capacity today is about 253 gigawatts (GW) of which thermal is about 70 percent, hydel is 16 percent, nuclear is about 2 percent and renewable energy is 12.5 percent. There are challenges to increase solar energy production to meet the target of 100 GW by 2019. The dependence on imports is already for 70 percent of the solar cells. Yet bigger challenge is the financial challenge, about Rs. 5,75,000 crores would be required, which is more than our defense budget. Other challenge is to reduce the operational cost of grid connected solar energy.
2. ‘Make in India’ is very sensible policy and important challenge is solar cell manufacturing within the country. The target of 100,000 MW by 2019 in terms of indigenous production is a challenge, which does not seem to have a solution in the very near future, unless appropriate policy measures are introduced. For example, Land is a scarce commodity in India, given the population. Just as we have, multi circuit transmission towers, we will have to reengineer the way we are generating electricity or collecting heat from solar systems. This will lead to multilayered solar PV panels for sheer lack of availability of land. We would need good tracking systems so that by rotating panels to track the intensity of sun, efficiencies can increase to almost 25%.
3. Infrastructure would be a major bottleneck for adding one lakh MW Solar. A target of 8,000 MW per annum is set for wind i.e., 40,000 MW in the next five years. Provision of transmission network, availability of land, purchase of renewable power would be other bottlenecks. Availability of long-term finances, availability of storage, grid integration, these are some of the problems that need to be resolved. In this context, Power Grid has carried out a study on transmission network and Green Energy Corridor. Multilateral agencies like KfW, Asian Development Bank and World Bank are coming forward to provide funds.
4. To solve land availability issue two states they have come up with a Land leasing model which can be a win-win for all the stakeholders. In the leasing model; the lease rent is available to the landowners for say twenty five years. With regard to renewable purchase obligation (RPO) targets the thinking is that we should increase it to 10% instead of 5% and also we need to define a renewable generation obligation (RGO).
5. Besides policy challenges, there are many examples of innovations taking place in solar PV and thermal energy. The large scale innovation in parabolic through technology for solar thermal that can reduce the installation cost by up to 25 percent than the concentrating solar power is becoming possible. We can also think in terms of having 100 percent of renewable energy in the shopping malls. Then offshore wind is a

discussion point requesting, underwater transmission line to transmit offshore wind power. We can also optimize windmills; and can really gain ten to fifteen percent power by simulating design innovation. Similarly new solar cell materials, like copper Indium gallium sulphite have shown a higher efficiency. Innovative renewable energy products are capturing the market. Industry needs to think in these directions.

6. There is a huge financing issue in implementation of 100 gigawatts. We need mature institutions to achieve these targets. For example in Solar rooftops, net metering has been adopted by more than 12 States. With this, consumer can not only generate the power, but they can also sell the power to grid as per their consumption limit defined by the regulatory commission. Challenge for most of the consumers is getting permit from the discoms because ultimately solar is a very disruptive product. Utilities are very slow in terms of responding to consumers for setting up the rooftops, but distribution companies have to take the responsibility like other countries are doing. A Regulator has to plan for next ten years and allow discoms fixed costs of the infrastructure.
7. Wind industry has been shifting from State to State, it had started from Tamil Nadu and then a little bit in Karnataka, where there were various forest issues etc., then Andhra a bit, and then in Maharashtra. Now people are looking at Rajasthan and Madhya Pradesh because Madhya Pradesh has offered a tariff of about Rs.5.90. At least the seven or eight wind energy rich States in the country need to be really pushed to achieve a level of something like 10,000 megawatts of wind per year. There is an excess of manufacturing capacity because of slow down. There is shortage of land and grid evacuation availability. Wind turbine manufacturers are expecting IRR based pricing and that is one big change that has happened in the last few years.
8. A credit mechanism which is now in place for infrastructure financing called 520 model that allows not just 70 percent of the debt to be given, but also allows to go up to even 80 percent. It takes funding plan not for traditional 5, 7 and 10 years but right up to the twenty years. Three critical things to put up some of these projects; are a clear revenue assurance, such that at least till the parity comes into place, you are not to be left behind in supplying your power. It also means the assurances that are will get that money. Secondly most important thing about availability of a long-term debt of a kind which allows complete tenure to be leveraged as also a tariff which is possible to be delivered. It means lower cost, higher tenure and least possible equity investment. Another model which allows equity to come into two tranches, one upfront and one at the end ten percent each. National financial support mechanism of the government. Obviously some financial instruments and interventions are needed which allow the produce, even if it is at a higher price, to become at par with the other power such that nobody loses in the process and somebody takes that bid. It is possible if RE is made priority sector eventually. Tariff assurance, being deliberated today is feed in tariff versus the bid tariff.
9. PFCs, RECs, IREDA's banks, and institutions who meet on a daily basis to tie up various lines of credit. There is not much credit offtake across the globe at this point of time. The commodities market like China and the other parts of the world are not really in that bullish phase. To promote innovative financing 520 model allow them to go for 80 percent financing directly by RBI. But the problem is the risk profile increases. If we can produce successful models, solar risk profile will come down. If the tenure is stretched longer debt service

coverage ratio improves, because volume of cash flow available to cover that debt increases substantially, risk profile goes down, the interest rates comes down, and tariff will come down.

10. Power Grid Corporation has Project Appraisal and Sanction System for loan disbursement. Two stage appraisal process involve analysis track record of promoters (3 years balance sheet, project const./operation experience, etc.) and credit worthiness of promoters (credit history, ability to bring equity, etc.). Disbursement schedule and drawal is decided by the borrower. Progress-linked disbursement ensure effective utilization of funds. Period of Finance is moratorium of 6 months after commissioning (12 months for solar projects) and repayment period is upto 12 years. In PFCGEL, we have moratorium of 12 months after commissioning and repayment period for solar projects upto 12 years and other projects upto 15 years.
11. It was suggested that there is a great need for up scaling rooftop solar market to achieve India's ambitious SPV target. TERI has estimated that India has market potential of 124 GW of rooftop solar PV in urban areas. Residential sector will be the biggest consumer market in rooftop solar. To upscale residential market, policy makers should fame policies around commoditizing rooftop solar PV systems. TERI has recently published, the strategies need to be followed for commoditization of rooftop solar PV in India in the book "Reaching the sun with rooftop solar".
12. The deliberations pointed out those renewable technologies require large initial capital investment as well as consumer friendly policies. These projects face high technology and high cost risk. Human resource development is another barrier for achieving targeted growth. Solar industry has to enlarge its manufacturing capabilities. Infrastructure development is a major concern in expansion of various schemes such as solar roof and mega solar projects.

7th Nuclear Energy Conclave

A Unique opportunity to know all about Nuclear Energy

3rd November, 2015 Metropolitan Hotel, Bangla Saheb Road, New Delhi

THEME: Creating Conditions for Rapid Capacity Addition of Nuclear Power in India

Theme address:- Dr Anil Kakodkar, INAE Satish Dhawan Chair of Engineering Eminence BARC & Chairman, Nuclear Energy group IEF

Inaugural Address:- Dr Jitendra Singh, Minister of State, Prime Minister's Office, Department of Atomic Energy & Ministry of Personnel, Public Grievances & Pensions

For Registration:- Email: indiaenergyforum@gmail.com, Tel: 011-41021422/23

14th Sustainable Energy Summit 2014

25th November 2014, Multipurpose Hall, IIC, New Delhi

Theme:

“Renewable Energy – Dynamic Role in Power Sector”

PROGRAMME

- 9.30 a.m. **Inaugural Session**
Introductory Remarks
Mr. Amarjit Singh, SG, IEF
Welcome Remarks
Mr. P S Bami, President, IEF
Theme Address
Mr. Anil Razdan Former Secretary Power and Chairman, Power Group IEF
Inaugural Address by:
Mr. K.S. Popli, CMD, IREDA
Vote of Thanks
Dr. (Mrs.) Malti Goel, Convenor, Environment & Renewable Group, IEF
- 10.30 a.m. Tea
- 10.45 a.m. **Plenary I: Changing Dynamics of Renewable Energy**
Chairperson: Dr. (Mrs) Malti Goel, Convenor Renewables IEF
Distinguished Speakers
Dr. Harish K Ahuja, President, Hindustan Power projects Pvt. Ltd.
Mr. S. Venkatachalam, MD, Orient Green Power Company Limited,
Mr. Sanjeev Gupta, Managing Director, NEXGEN Financial Solutions Pvt. Ltd.
Dr. Bharath Reddy, Director (solar), Solar Energy Corporation
Mr. G.S. Patra, GM, Power Finance Corporation Limited
- 12.15 pm **Plenary II: Renewable Energy Technologies and Manufacturing & Infrastructure Issues**
Chairperson: Mr. V. Raghuraman, Director, Suzlon Energy
Distinguished Speakers
Mr. Amit Kumar, Head – North & Central Region, Tata Power Solar Systems Ltd.
Dr. Dwipen Boruah, Managing Director, GSES India Sustainable Energy Pvt. Ltd
Mr. Vivek Garg, Sr. Manager, Emergent Ventures
Dr. Sudhakar Sundaray, Research Associate, TERI
- 1.45 p.m. LUNCH

Calendar of Events of 2015

- **Chennai Summit**
November, 2015, Chennai

- **15th Sustainable Energy Summit**
Theme: Solar Power :New Targets, New Challenges
9th October, 2015; Hotel Le Meridien, New Delhi

- **5th Roundtable Conference on Coal**
Theme: Energising Coal Sector -- The Eco-Friendly Way
30th October 2015; Hotel Le Meridian, New Delhi

- **7th Nuclear Energy Conclave**
Theme: Creating Conditions for Rapid Capacity Addition in Nuclear Power in India
3rd November, 2015; The Metropolitan Hotel, New Delhi

- **18th India Power Forum**
Theme: New Challenges for the Power Sector
17th November, 2015; Hotel Imperial, New Delhi

- **14th Petro India**
Theme: Oil Price Volatility : Consequences & Policy Responses
4th December, 2015; Hotel Le Meridien, New Delhi

For further information, please contact:

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15th Sustainable Energy Summit 2015

9th October 2015, The Hotel Le-Meridien, New Delhi

Steering Committee



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CMD, IREDA
Chairman Steering Committee



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Patron, IEF and Former Secretary,
(MoP&NG)



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VP, IEF & Chairman
Vayunandana Power Ltd



Shri Pradeep Chaturvedi
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Shri Sanjeev Gupta
MD, Nexgen
Financial Solutions Pvt. Ltd.



Shri V Raghuraman
Director, Suzlon Ltd



Shri Amarjit Singh
MBE
Secretary General, IEF



Dr (Mrs) MaltiGoel
Hon. Convenor, Renewable
& Environment Group &
Former Adviser Sr. Scientist,
Min of Science & Tech.



इरेडा IREDA

INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY LTD.

FINANCING AND PROMOTING SELF-SUSTAINING INVESTMENT IN ENERGY GENERATION FROM RENEWABLE SOURCES, ENERGY EFFICIENCY AND ENVIRONMENTAL TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT.

OPERATIONAL AREAS

- Wind Energy
- Solar Energy
- Hydro Power
- Biomass Power
- Energy Efficiency & Conservation
- Cogeneration
- Waste to Energy
- Power Evacuation System

DEVELOPMENT ACTIVITIES

- Investor's Manuals
- Business Meets
- Administrating MNRE Schemes

SCHEMES

- Take-over loans from Banks/FIs
- Project Financing
- Equipment Financing
- Bridge Loan against SDF

NEW INITIATIVES

- Securitization against receivables
- Financing IPPs/ SPVs
- Consortium/ Co-finance
- Performance Guarantees
- Consultancy & Advisory Services

LOAN SANCTION Rs in Cr



Role of IREDA

Dedicated FI for Renewable Energy
Pioneered RE Financing in the country
Catalyzed Banks & FIs to finance RE
Developed Innovative financing models

LENDING TERMS
MIN. LOAN: Rs 50 lakh
LOAN: Upto 75% of Project Cost
INTEREST: 11-50% p.a. onwards
MORATORIUM: Upto 12 months
REPAYMENT: Upto 15 Years