



RE Digest

From IREF news desk

A brainchild of the Indian Renewable Energy Federation (IREF), **RE Digest** is taking forward its mission to track developments in the world of renewable energy news dissemination. In a space dotted by numerous news sites and online forums, **RE Digest** aims to approach the subject with a fresh perspective to convey information as is. Since renewable energy is about sustainability of life in its broader sense, the newsletter will cover all forms of alternative energies as well.

About IREF

The Indian Renewable Energy Federation (IREF), inaugurated on January 28, 2014 by the Union Minister for Renewable Energy Dr. Farooq Abdullah, is India's first multi-stakeholder, technology neutral, scale neutral platform for renewable energy, both off-grid and on grid, solutions.

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France adopts ambitious Energy Law

Renewables will supply 40 per cent of France's electricity demand in 2030, according to the energy transition law adopted by the French parliament. The target will mean adding around 2 GW a year on average, French wind energy association FEE estimated. The main provision for wind sees the trial of a single permit for onshore installations extended throughout mainland France. The law also makes it easier for local residents and authorities to own shares in wind power plants, with the aim of improving acceptability. The law also lays the foundation for a top-up mechanism to replace the guaranteed premium purchase price, in line with EU guidelines. (Wind Power Monthly)

India's Renewable Energy Production Up 16.44% in FY15

Power production from thermal (878.32 BU), nuclear (36.10 BU), hydro (129.24 BU), and renewable (61.78 BU) were all more than the target set for FY15. Overall, the performance of the power sector improved in fiscal 2014-15 with over 1,110 billion units, (BU), which was 8.85 per cent higher than the power generation during the corresponding period of the previous year, according to Ministry of Statistics & Programme Implementation. Renewable energy production was 16.44 per cent higher than that in the previous year. (India Infoline News Service)

Renewable Energy Power Projects in Priority Sector Lending

The Reserve Bank of India has included renewable energy projects under priority sector lending for which bank loans up to the limit of Rs. 15 crore to borrowers will be available for the renewable energy projects including both ground mounted and roof top plants. For the individual household, the loan limit is Rs. 10 lakh per borrower. The Department of Financial Services has advised all public sector banks to provide loans for the grid-connected roof tops solar systems as home loan/home improvement loan. So far nine PSBs, Bank of India, Syndicate Bank, SBI, Dena Bank, Central Bank of India, PNB, Allahabad Bank, IOB have given instructions to their branches.

In a communication to all central government ministries and departments, PSUs and organisations, State governments, educational institutions, Ministry of New and Renewable Energy said the price of solar power has fallen drastically in the last two to three years and it is economical to generate the power through grid-connected solar roof top systems for consumers in States where tariff is more than Rs. 7 per unit. Pay back time is about five-six years and the life of the plant is 25 years. The communication, according to sources, said that about 10 sq m area is required for 1.0 kWp solar roof system. (UNI)

CCEA nod for Intra-State Transmission System

The Cabinet Committee on Economic Affairs (CCEA), headed by Prime Minister Narendra Modi, has given its consent for the creation of an intra-State transmission system in the States of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Rajasthan. The estimated cost of the project is Rs. 8,548.68 crore, and will have Rs. 3,419.47 crore (40 per cent of the total estimated cost of project) contribution from the National Clean Energy Fund (NCEF). The activities planned under the project include establishment of 48 new grid sub-stations of different voltage levels with total transformation capacity of around 17,100 MVA by installing over 7,800 circuit-km of transmission lines in these seven States. The project is proposed to be completed within three to five years. The cost on creating intra-State transmission system is proposed to be met through a KfW loan (40 per cent of the total cost),

NCEF grant (40 per cent of the total cost) and the remaining 20 per cent as State contribution. (Hindu Business Line)



Indian Railways to produce 5 GW of Renewable Energy in 5 Years

Indian Railways has set a clean energy generation target of 10 per cent, which it aims to fulfill by 2020. The enterprise aims to put up wind turbines with a capacity of 170 MW on land that it owns. Also in the pipeline are photovoltaic panels with a total capacity of 15 MW to be installed at 200 railway stations, 20 office buildings and over 6,000 level crossing gates throughout the country. Indian Railways aims to increase its renewable energy installed capacity to 5 GW during the next five years. (www.globalconstructionreview.com)

REC, PFC, IREDA, Others to raise Tax-Free Bonds

The Union government recently permitted seven companies to raise Rs. 40,000 crore through tax-free bonds in FY16. Power Finance Corporation (PFC) is likely to be the first one to set the ball rolling on tax-free bonds. The company is seeking bids for its Rs. 300-crore tax-free bonds through private placement. The firm has fixed the coupon rates for its 10-year bonds at 7.16 per cent, 15-year bonds at 7.39 per cent and 20-year bonds at 7.45 per cent. The company has been allotted Rs. 1,000 crore of tax-free bonds in FY16 of which it is raising Rs. 300 crore on a private placement basis.

Other six companies that have been allotted tax-free bonds this fiscal include National Highways Authority of India, Indian Railway Finance Corporation, Housing and Urban Development Corporation, Indian Renewable Energy Development Agency, Rural Electrification Corporation and NTPC. NHAI has been allotted the largest amount of Rs. 24,000 crore. PFC, along with other public sector companies including, Rural Electrification Corp. Ltd. (REC) and Indian Renewable Energy Development Agency Ltd. (IREDA) plans to raise Rs. 5,000 crore by selling tax-free bonds to raise low-cost and long-term funds to help finance Union government's 2022 renewable energy target. (www.livemint.com)

BIOMASS

Sugarcane biomass produces Jet Fuel

Researchers, including those of Indian origin, have developed a new method to produce "eco-friendly" aviation fuel from sugarcane biomass that could lead to substantial cuts in GHG emissions. "We've combined chemical catalysis with life-cycle GHG modeling to create a new process for producing bio-based aviation fuel as well as automotive lubricant base oils," said Alexis Bell, a chemical engineer with joint appointments at Lawrence Berkeley National Laboratory and the University of California, Berkeley. "The recyclable catalysts we developed are capable of converting sugarcane biomass into a new class of aviation fuel and lubricants with superior cold-flow properties, density and viscosity that could achieve net life-cycle GHG savings of up to 80 per cent," Bell said. (indianexpress.com)

SOLAR

Photovoltaic Solar Energy Passes 1% Global Threshold

Solar power now covers more than 1 per cent of global electricity demand. In three countries in Europe – Italy, Germany and Greece – solar PV supplies more than 7 per cent of electricity demand, according to Solar Power Europe (previously EPIA – European Photovoltaic Industry Association). Last year, 40 GW of new solar capacity was installed worldwide, compared to 38.4 GW in 2013, notes Solar Power Europe (SPE) in its Global Market Outlook 2015-2019. Cumulative capacity is now 178 GW. In terms of generation, this is equivalent to 33 coal-fired power stations of 1 GW. China is currently the fastest growing market, installing 10.6 GW in 2014, followed by Japan with 9.7 GW and the US with just over 6.5 GW. (<http://www.ewind.es>)

India may rope in Flipkart, Amazon, Snapdeal to sell Solar Products

The Union government is roping in the popular marketing platforms of e-commerce companies Flipkart, Amazon and Snapdeal to promote solar energy in the country, according to a senior government official. The Ministry of New and Renewable Energy (MNRE) has been writing to these firms to showcase solar energy products such as water heaters, lanterns, chargers, house systems, lights and coolers on their platforms. Such demand side management intervention comes in the backdrop of the government pushing renewable energy to the top of its energy security agenda. MNRE has also put up a link on its website to help consumers set up solar rooftop installations. Those interested in setting up a solar rooftop installation will be able to do a feasibility calculation online. The interface will also allow them to get in touch with around 270 empanelled firms, which will set up the installations for them. MNRE has ensured that these firms will provide certified products. (Live Mint)

Solar leapfrogs Wind in India

Solar installations are set to exceed 2,500 MW this financial year (ending March 2016), topping the 2,400 MW target for wind, according to officials from the Union Ministry of New and Renewable Energy. “By next year, solar installations will overtake those for wind by several fold,” Tarun Kapoor, a joint secretary in the ministry said recently. India is planning 1,00,000 MW of solar installations by 2022, up from about 4 GW currently. (Bloomberg New Energy Finance)

Rs. 15,000cr Subsidy on Solar Power

The Union government has set aside Rs. 15,050 crore capital subsidy and allowed bundling of solar with thermal power to bring down costs to Rs. 5 per kWh. The decision was taken at a Cabinet meeting, which also cleared a financing plan of Rs. 6,00,000 crore to set up 1,00,000 MW solar power by 2022. There was also a consensus to approach bilateral and multi-lateral funding agencies like World Bank and ADB to finance the massive solar capacity expansion. As per the Cabinet directive, finance and environment ministries will put together a proposal to seek financial support from the Green Climate Fund to part-finance the solar power capacities. Further, central power utilities, State governments and independent power producers will be roped in to mobilise finances. (www.mydigitalfc.com)

SECI to become Commercial Company

The Union government has approved a proposal to allow the Solar Energy Corporation of India (SECI) to register itself as a Section-

3 company to do commercial activities and rename it as Renewable Energy Corporation of India (RECI). SECI was a Section-8 company under the Companies Act, which provides for formation of companies with charitable objects. Under this provision, the commercial aspect of a business entity and its growth is completely prohibited. This decision, however, will enable SECI to own solar power plants for generating and selling electricity and take up other commercial activities like manufacturing of solar products and materials and power trading. Apart from solar power, the proposed RECI will take up development of all segments of renewable energy. (Business Standard)

Solar Tariff touches New Low of Rs. 5.05

Mauritius-based SkyPower Southeast Asia Holdings has offered a tariff of Rs. 5.051 a unit to the State government-owned MP Power Management Company, setting a new record low price in solar power generation. The offered price is without any subsidy and is lower than the Rs. 5.50 tariff under Viability Gap Funding. The offered price is without any subsidy component, putting a question mark on the need to have subsidy in solar tariffs, Manu Srivastava, principal secretary (new and renewable energy) in the Madhya Pradesh government, recently said. Offers for sale of 300 MW of solar power were opened after a third round of bidding in Madhya Pradesh. While the highest rate of procurement was Rs. 5.641 for 50 MW from Hero Solar; SkyPower set the record for lowest tariff in the country by beating majors like Reliance, Adani, ACME and Welspun. The company offered 50 MW for Rs. 5.051, another 50 MW for Rs. 5.10, and a similar volume at Rs. 5.29. (Business Standard)

MNRE releases State-wise Targets for Grid-connected Rooftop Systems

The Union government has set a target of installing 40 GW grid-connected solar rooftop systems in the country by 2022. The ongoing Grid-connected Rooftop and Small Solar Power Plants Programme aims to promote installation of grid-connected solar rooftop systems in residential, industrial, commercial and institutional sectors in the country. The State nodal agencies, SECI and Discoms of the respective States are the designated agencies for the implementation of the programme. MNRE has proposed State-wise tentative targets for installation of the grid-connected solar rooftop systems. This has been arrived at by dividing the 40,000 MWp country target in proportion to the State-wise power consumption and consequent solar power requirement to meet the corresponding RPO. Maharashtra (4,700 MW), Uttar Pradesh (4,300 MW), Tamil Nadu (3,500 MW), Gujarat (3,200 MW), Karnataka (2,300 MW), Rajasthan (2,300 MW) and West Bengal (2,100 MW) are the top States for the proposed target. (EnergyNext)

BIOFUEL

India set to allow 100% Bio-diesel for Vehicles

In a bid to push higher use of renewable energy, India is set to allow 100 per cent bio-diesel for vehicles. The decision will pave way for manufacture of new engines that can use this fuel. The compatibility of vehicle to level of bio-diesel blend will be defined by the vehicle manufacturer and the same will also be displayed on the vehicle, according to the Ministry of Road Transport and Highways. The government has already sent the draft notification of the same to law ministry for vetting.

(www.dailyindianews.com)

WIND

Wind Power Leading the Way in RE Technology

According to a new report from the European Commission, wind power is the renewable energy technology with the largest and most successful deployment over the last 20 years. The European Commission Joint Research Centre (JRC) released the third edition of its annual report on wind energy technology, market, and economy in Europe and the world in June 2015, highlighting the impressive growth of wind energy, which grew from 3 GW two decades ago to 370 GW of global cumulative capacity by the end of 2014.

In Europe specifically, wind energy accounts for 130 GW (both onshore and offshore) of electricity generation connected to the grid, with Denmark, Portugal, Ireland, Spain, Romania, and Germany generating between 10 per cent and 40 per cent of their electricity from wind. The report further suggests that wind energy will provide for at least 12 per cent of Europe's electricity generation by 2020, going a long way to the region's 20/20/20 goals.

(Clean Technica)

Wind Power sets Record as Countries Seek Climate Fixes

As global climate efforts intensify this year, a renewable power source is setting new records. Wind's costs are plummeting in the United States, and offshore farms are soaring in Europe — at least for now. Worldwide, wind power expanded more last year than ever before. According to new report by the European Wind Energy Association, Europe's offshore wind farms are producing record amounts of power. They tripled capacity in the first six months of this year compared to the same period of 2014, owing largely to “explosive growth in Germany and the use of higher capacity wind turbines”. In the U.S., wind now provides 5 percent of the nation's electricity, the Department of Energy reported. New markets are also emerging in Latin America and Africa, according to Stefan Gsaenger of the World Wind Energy Association.

(National Geographic)

FOWIND spots Offshore Wind Areas in India

Based on its recently released pre-feasibility reports (PFRs), the FOWIND Consortium has identified areas in Gujarat and Tamil Nadu for offshore wind development. The reports identify key offshore areas where detailed wind resource assessment can be undertaken. These studies will form the basis for future offshore wind feasibility investigations, while at the same time supporting companies and government institutions in developing a better understanding of typical offshore wind project considerations. FOWIND project partner DNV GL has taken the lead on the technical aspects, and partners World Institute of Sustainable Energy (WISE) and Center for Study of Science, Technology and Policy (CSTEP) are co-ordinating with multiple State agencies of Gujarat and Tamil Nadu to collect the required data and information. (www.offshorewind.biz)

Wind Capacity Addition drops in Q1 2015

Wind power capacity additions in the country fell to 319.2 MW in April-June 2015 quarter compared with 477.7 MW in the same period last year. Wind industry insiders do not see the capacity additions in 2015-16 to be higher than 2,300 MW recorded in 2014-15. A dip in investor sentiment is due to a

number of issues in the wind-rich States - Tamil Nadu, Maharashtra, Rajasthan and Gujarat. In Maharashtra, State-owned power utilities are not willing to buy power because the purchase tariff fixed by the State electricity regulatory commission is rather high at Rs. 5.75 a kWh. On the other hand, Gujarat is surplus in power and does not want more wind turbines. In Rajasthan, there are “serious right-of-way issues” and the State-owned utility is buying limited wind power, leaving the producers to sell in the market. The primary problem in Karnataka is that of acquiring land - people from outside the State cannot buy private land beyond a limit, and acquiring agricultural and forest land is difficult. Andhra Pradesh has “grid constraints”.

WAVE ENERGY

First Grid-Connected Wave Energy Facility

An electrical generating plant powered by wave energy has commenced operations near Perth, Australia. Built by Carnegie Wave Earth, the Perth Wave Energy Project is the first and only operational wave power plant anywhere in the world that uses multiple wave units. The facility has a peak generating capacity of 240 kilowatts — enough to power up to 2,000 homes. Almost \$100,000,000 has been invested to bring the technology out of the laboratory and make it suitable for commercial use. All of the electricity from the facility will be purchased by the Australian Department of Defense, which is vitally interested in getting its power from renewable, local sources. (<http://planetsave.com>)

ENERGY STORAGE

IL&FS to build Hybrid Systems with Storage Facilities

IL&FS Energy Development Company Ltd (IEDCL) plans to construct two solar PV and wind integrated power systems with energy storage facilities: A 1,000-MW integrated power system in the Anantapur district of Andhra Pradesh and a similar but smaller scale 150 MW power system in the village of Nana Layja located in Kutch, Gujarat. The energy storage component of the project will mainly focus on the various types of battery technologies currently available and emerging in the Indian market. IEDCL is currently selecting consultant for evaluating and selecting energy storage technologies for the new wind-solar farms. IEDCL has existing renewable portfolio of 800 MW and has plans to deploy 5,000 MW over the next 5 years. (Energetica India)

ACME Cleantech rolls out India's 1st Power Storage System

Gurgaon-based ACME Cleantech Solutions launched Lithium-ion based power storage technology for high energy storage. Named EcoGrid Energy Storage System, the product is priced at Rs. 3.5 lakh per unit of 5 KVA. The first target consumer base for this product would be residences, small commercial units and any industry where diesel consumption is high. The company is looking to sell close to 5 MW worth of units in the current fiscal. The company has already launched the product in the European market through an MoU with a major European utility, the name of which the company didn't disclose. The company will manufacture EcoGrid at its facility based in Rudrapur, Uttarakhand. (Business Standard)

GEO THERMAL

Scotland sets up Fund to explore 5 Geothermal Sites

The Scottish government has awarded £2,34,000 to conduct feasibility studies at five geothermal heating project sites. The exploration will take place in Fife, West Lothian, North Lanarkshire and Aberdeenshire. The studies will assess geology, costs, environmental impact and overall heating potential within each site.

Heat is estimated to account for over half of Scotland's total energy use and is responsible for nearly half of Scotland's GHG emissions, according to a recent study commissioned by the government. Geothermal energy could significantly cut the estimated £2.6 billion a year spent on heating by householders and the non-domestic sector. (renewables.seenews.com)

TECHNOLOGY SOLUTIONS

Energy Storage: A look at The Top 10 Countries

For storing intermittent energy sources such as wind and solar, companies across the world are breaking new ground on the technology front. A chart published by BBC this year lists the top 10 nations of the world in terms of energy storage capacity. This includes number of projects and storage capacity, and lists both operating storage facilities and those under construction. The information for the graph was sourced from the US Department of Energy's (DOE) Global Energy Storage Database.

In terms of power storage capacity, China, Japan and the US are way ahead of the other energy storage frontrunners. To trace the types of energy storage technologies used, five different sources were tracked. In general, electrochemical and thermal sources made up the original group. Electromechanical sources dominated from 1978–2012, but their share of the pie has diminished. Electrochemical (think batteries) has grown rapidly since the turn of the millennium. Thermal storage has grown about twice as fast since 2006, overtaking electromechanical in 2013. (Source: US DOE)

Top 10 countries by energy storage capacity

Country	No. of projects*	Power (KW)
China	96	33,305,770
Japan	78	28,793,301
US	391	21,656,535
Spain	61	8,029,926
Germany	58	7,165,830
Italy	50	7,132,697
India	18	7,013,260
Switzerland	23	6,437,610
France	23	5,833,075
South Korea	41	4,741,118

* INCLUDES OPERATIONAL PROJECTS AND THOSE UNDER CONSTRUCTION SOURCE: DOE GLOBAL ENERGY STORAGE DATABASE

RENEWABLES SURGE FORWARD

Key findings of REN21's Global 2015 Renewables Status Report

- According to REN21's newly released Global 2015 Renewables Status Report, renewable energy's record year led to the uncoupling of the global economy's growth from CO2 emissions.
- In 2014, renewables made up an estimated 59 per cent of net additions to global power capacity and represented far higher shares of capacity added in several countries around the world. **By the year-end, renewables comprised an estimated 27.7 per cent of the world's power generating capacity. This was enough to supply an estimated 22.8 per cent of global electricity demand.**
- With 135 GW added, the total installed renewable power capacity worldwide stood at 1,712 GW, up 8.5 percent from the year before.
- **The solar photovoltaic capacity has grown at a phenomenal rate:** Up 68-fold, from 2.6 GW in 2004 to 177 GW in 2014. Asia eclipsed all other markets, accounting for almost 60 per cent of global additions of solar PV.
- There has been **strong growth in wind power** capacity (up almost 8-fold, from 48 GW in 2004 to 370 GW in 2014). In 2014, **India was the world's fifth largest wind market** (2.3 GW, up 34 per cent over 2013) with a cumulative capacity of 22.5 GW.

- Wind power attracted nearly half of India's total investment, with \$3.4 billion.
- An estimated 37 GW of new hydropower capacity was commissioned in 2014, raising the global total to approximately 1,055 GW. By far, the most new capacity was installed in China (22 GW), with significant capacity of 1.2 GW (4.3 per cent of global total) added in India.
- In 2014, renewable energy supplied more than 25 per cent of final energy use in the heating sector, of which over two-thirds was traditional biomass. **Modern renewable energy supplied** the remaining third, or **about 8 per cent of the world's total final energy use for heat production.** Asia uses the largest amount of modern renewable energy in the heating sector overall, driven primarily by the amount of industrial bio-heat used in India and other Asian countries.
- **New investment in renewable power and fuels** (not including hydropower >50 MW) increased worldwide by 17 per cent over 2013, to \$270.2 billion. Including large-scale hydropower, new investment in renewable power and fuels **reached over \$301 billion.** Investment in India rose 14 per cent in 2014 from \$1 billion to \$7.4 billion.

You can find more about renewable energy developments in India and elsewhere by consulting: www.ren21.net/gsr. A Hindi version of the key findings will be made available soon. Also check out REN21's newly revamped Renewables Interactive Map (www.ren21.net/map) which contains extensive country-level data.

MNRE issues Draft National Renewable Energy Act, 2015

The Ministry of New & Renewable Energy (MNRE) has recently published the Draft National Renewable Energy Act, 2015. The draft proposes a holistic framework to promote the use of grid-connected and off-grid renewable energy applications. Some of the key provisions proposed in the draft for promoting renewable energy generation including wind energy generation, are mentioned below:

- Formulation of National Renewable Energy Policy and National Renewable Energy Plan for suitable policy guidelines and growth planning in the sector.
- National Renewable Energy Committee for co-ordination and review of renewable energy development and deployment activities.
- Establishment of National RE Fund to be funded from proceeds of the National Clean Energy Fund.
- Cost of grid connectivity beyond interconnection point (line isolator on ongoing feeder on HV side of the pooling sub-station) to be borne by utility.
- Provision of considering renewable energy generation as deemed generation, in case the grid is not available for power evacuation after the project has commenced generation or is already operational.
- In case of wind power projects, the cost of grid connectivity till the interconnection point to be borne by the wind energy generator and the interconnection point shall be the line isolator on outgoing feeder on HV side of the pooling sub-station.
- Definition of “hybrid systems”, which includes integrated wind/solar/biomass systems in the draft.
- Obligation on generating companies establishing a coal and lignite-based thermal generating station to establish a renewable energy generation capacity not less than 5 per cent of the thermal power capacity installed.

RERC finalises Wind Tariff for FY 2015-16

The Rajasthan Electricity Regulatory Commission (RERC) issued an order on 29th May, 2015, finalising the applicable tariff for wind energy projects getting commissioned in FY 2015-16. Separate tariffs have been specified based on location of wind power plants within the State as given in Table 1.

Particulars	Tariff in Rs./kWh without AD benefits	Tariff in Rs./kWh with AD benefits
Wind power plants located in Jaisalmer, Jodhpur & Barmer districts	5.74	5.44
Wind power plants located in districts other than Jaisalmer, Jodhpur & Barmer districts	6.03	5.72

Maharashtra government finalises Renewable Energy Policy, 2015

The Maharashtra government has finalised its Renewable Energy Policy. The policy will be known as the Maharashtra Renewable Energy Policy, 2015. A regional committee will be established to monitor the overall progress of policy implementation and will be headed by the principal secretary of energy, Government of Maharashtra. The policy defines various guidelines and has set targets for wind energy development in the State. A total of 5,000 MW capacity of wind energy projects is targeted to be commissioned during the policy period. 1,500 MW out of the total target will be used to fulfill renewable purchase obligation (RPO) of distribution companies and the rest 3,500 MW can be utilised for inter-State/intra-State open access/captive consumption/REC. Some of the incentives provided under the new policy are given below:

- Wind generators will be given permission for re-powering.
- Land acquired for commissioning of a wind project will be deemed as non-agricultural land.
- Concessions will be granted for these projects to get NOC from the State pollution control board.
- Supervision charges for grid evacuation will be waived off.
- Wind energy projects can register themselves as industrial unit.

CERC proposes Draft Amendment to REC Regulations

The Central Electricity Regulatory Commission (CERC) has published draft of the Fifth Amendment to its Renewable Energy Certificate (REC) Regulations. Based on the draft, it is proposed that captive power producers (CPP) and portion of power for self-consumption will no longer be eligible for RECs. Besides, open access (OA) projects availing of concessional wheeling, banking or cross-subsidy benefits will not be eligible for RECs. The aforesaid amendments have been cited to be proposed in the light of CPPs' contribution to the piling up REC inventory and also to avoid any undue benefit to CPP or third party-based OA transactions.

GERC orders GUVNL to follow Tariff Orders

The Gujarat Electricity Regulatory Commission (GERC) has warned the State-run Gujarat Urja Vikas Nigam Ltd. (GUVNL) to comply with its tariff orders while making payments to the solar PV power project developers. The power regulator also directed GUVNL to make differential payment to the developers according to the tariff determined by it in 2012. A group of solar power developers had approached GERC as the State's power holding company had purchased power at Rs. 9.8/unit instead of Rs. 11.25/unit as determined by the regulator. Coming down heavily on GUVNL, the regulator observed that the government company was “unilaterally and arbitrarily paying the tariff”.

Meantime, GERC has proposed to reduce the solar power tariff for new plants coming up in the State. For the first time, the electricity regulator will be introducing the reverse bidding system for sale of solar power. Under this system, GERC will fix the upper limit to be charged per unit of solar power. The power producers who seek to enter into a PPA with the State power distribution companies will bid for the lowest rate of power. GERC has proposed to set the upper limit of solar power as Rs. 6.68/unit from a fixed price of Rs. 8.39/unit for new plants coming up between July 2015 and March 2018.

The Rs. 43,000-crore mammoth “Green Energy Corridor” (GEC) project undertaken by the Union government aims to synchronise the electricity produced from renewable sources, such as solar and wind, with conventional power stations in the grid. The government has set aside \$7.9 billion for the project. Rolled out in the States of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Rajasthan, Tamil Nadu and Jammu & Kashmir, the programme is scheduled to finish by the end of 2017. Power Grid Corporation of India is implementing the inter-State transmission component of GEC while the intra-State transmission aspect is being taken care of by the respective States.

While the huge transmission capacity build-up is supposed to strengthen inter /intra-State transmission infrastructure, there are some pertinent issues that need to be debated upon. RE Digest posed critical questions to experts from the renewable energy industry to bring out such issues to the fore.



IREF: Asset Utilisation - The energy generated by renewables is infirm and a dedicated transmission infrastructure would entail underutilisation of assets. This brings forward the question that whether this project would be financially viable at the prevalent transmission/wheeling tariffs?

IREF: Resource Potential Assessment - Though the Union government has set ambitious targets (175 GW renewable energy by 2022), it is yet to carry out reassessment of the resource potential which is essential for GEC project implementation. Most estimates predicting a higher potential are independent researches or studies by international agencies. Under this scenario, whether the infrastructure for last mile connectivity should be built as part of GEC before commencement of development of the respective RE projects? How should the mismatch between RE generation plans and transmission plans be addressed?

IREF: Energy Storage - The project calls for development of energy storage facilities and has earmarked Rs. 2,000 crore for the purpose. However, the GEC project report does not offer any plan to implement this component. (a) It is not clear whether PGCIL or STUs or the RE generators will implement the energy storage facilities and thereafter who will maintain them. (b) A related issue is whether the proposed investment in energy storage facilities would be sufficient to address the intermittent nature of RE generation. We request your views on the above two issues.

IREF: Spinning Reserves - Large-scale integration of RE into the grid will require spinning reserves to be able to handle generation variability. It will also need necessary balancing. However, there has not been any progress in this space so far. Can the GEC project be successfully implemented without comprehensively addressing this issue?



Mr. A. Velayutham
Ex-Member, MERC

Answer 1: Asset Utilisation - The project is not viable at the prevalent transmission/wheeling tariffs. The tariff policy towards RE power evacuation needs revision. Possibility for using this line for telecom business and short-term open access may have to be explored. Price cap for evacuation cost has to be supported. The extra cost has to be met through special green fund or any other viability gap funding.

Answer 2: Resource Potential Assessment - Government approved location-based resource potential assessment is essential. Renewable energy generation plan and associated transmission plan may be initiated thereafter. Renewable energy generation shall not be restricted for want of associated transmission.

Answer 3: Energy Storage -

a) Centralised government agency under central transmission utility (CTU) may undertake the execution and maintenance of energy storage projects.

b) The RE power variability would be addressed by energy storage facilities along with other regulation reserve facilities, including ancillary support services.

Answer 4: Spinning Reserves - Spinning reserve is one of the regulation reserves. All the regulation reserve services, which are necessary to take care of renewable energy generation variability, have to be in place. Timely implementation of the same is essential to implement the GEC project.



Mr. A.S. Karanth
Wind Energy Expert



Inter-country co-operation is taking place in Europe and the continent is setting up a system to manage and use the RE power even at much higher percentage of grid penetration. We, in India, should implement the same principle to manage renewable power generation across different States (some with and without RE potential).

Answer 1: Asset Utilisation - We first need to understand the question of viability. Viable for whom? Wind farm/ project investor or to the government, which shall carry out the project? Yes, this is not going to be financially viable, as it looks like, in the short-term, for both. But there is a necessity/compulsion for the Union government to carry out this investment, on the sidelines as it does so many other welfare activities. To ensure the future of effective generation and renewable energy use, this highway needs to be created for the traffic to grow. This is basic infrastructure needed to facilitate the nation's growth.

At the same time, if the onus of investment is placed on renewable energy investors, it will curtail the very willingness to invest. The Union government has set a target for adding both solar and wind power. If the investment in green corridor is planned mainly to cater to this and the transmission network so created is not fully utilised for any reason, then also there will be technical difficulties in managing the grid.

Answer 2: Resource Potential Assessment - My opinion is to have the power evacuation system integrated with the current system but this enhancement should take place in stages at different regions, based on the cumulative addition of RE power as per the current targets set. I think setting up an exclusive grid network (corridor) for renewable energy power may be technically challenging.

Answer 3: Energy Storage - Energy storage is in its infancy. We need to learn quite a bit. The energy storage projects need to be planned in an incremental manner, basically to take care of small quantity of RE power, rather than go after total storage system matching the considered RE power addition. However, there has to be some initiative towards setting up of demonstration projects of different capacities, suiting the applications of balancing wind/ solar etc., and also to take care of grid authorities' concern and call of helplessness to manage so far claimed destabilisation of grid, due to infirm renewable energy.

The grid authorities (load dispatch centres) who constantly manage the national grid seem to be having dislike to this infirm RE power. In some incidents, RE power projects - either going off due to some technical problems or because of

sudden variation in weather – have posed challenge in managing and stabilising the grid. As a result, grid authorities often complain that RE power is not manageable. They claim this disturbs the grid in terms of voltage and frequency management, in providing the contracted quality of power supply to consumers. To tackle this situation, it is essential to have energy storage as a stand-by arrangement. The government should first bring in energy storage to balance intermittent renewable energy and thermal power in a grid system on a small scale and learn from experience before going in for large investment.

Answer 4: Spinning Reserves - According to me, this is an independent subject and not necessarily to be linked with the Green Energy Corridor project. We need to refer to smaller countries and learn how they have addressed larger renewable energy penetration. Of course, in some cases, this has been made possible due to inter-country co-operation in respect of transfer of power. If this can be done across oceans and large distances and is able to generate abundant renewable energy power, we need to seriously examine the power system in India and manage accordingly.

I understand that in European countries like Germany where wind power generation goes beyond 60 per cent on an average (some days it has even gone beyond 120 per cent), grid authorities do not instruct wind power projects to shut down. Instead they have put in place mechanisms which are used to share the extra power generated. This additional power is sold to neighbouring countries, sometimes even at lower tariff, to keep producing the power and not having to shut down generation. This is a commercial issue. But this needs to be reviewed from an overall economic angle and not singled out for monetary loss. Inter-country co-operation is taking place in Europe and the continent is setting up a system to manage and use the RE power even at much higher percentage of grid penetration. We, in India, should implement the same principle to manage renewable power generation across different States (some with and without RE potential). For this, there is a necessity for us to learn from others' experiences and implement schemes connected with the proposed the green energy corridor project.



Mr. Pashupathy Gopalan
President (Asia-Pacific), SunEdison



The last mile connectivity needs to be built as part of the Green Energy Corridor project well in advance by identifying prospective renewable energy resource-rich areas in consultation with respective State governments, State renewable energy nodal agencies as well as RE developers.

Answer 1: Asset Utilisation - Power generation from renewable energy sources like wind and solar has a low capacity utilisation factor. I agree that a dedicated transmission infrastructure for a specific renewable generator would result in less utilisation of the system. However, POWERGRID, the company which is working on the Green Energy Corridor project with the government, has designed inter-State transmission system (ISTS) under this project in such a way that the utilisation of such a system would be higher as several sources of renewable energy will get connectivity to one substation which will in turn be connected to the State transmission system. This means that there will be different substations (load centres) with varying levels of load which will then get connected to the main transmission system to balance the power loads from renewable energy-rich substations (with low CUFs) and substations handling conventional power (with high CUFs) resulting in overall utilisation of the ISTS.

In view of the above, there is a need to rationalise transmission charges for GEC strengthening within a State. The Green Energy Corridor Report submitted earlier to the ministry suggested that the total capital expenditure requirement towards intra-State grid strengthening should be considered through suitable funding arrangements such as a grant from the National Clean Energy Fund (20-25 per cent) and viability gap funding (VGF) [20-25 per cent] in order to reduce the transmission charges on account of lower utilisation.

Answer 2: Resource Potential Assessment - The gestation period of renewable energy power plants such as solar and wind power projects is about six to 12 months depending upon the project size as compared to thermal power plants, which take much longer. In order to facilitate evacuation of such power, it is necessary to integrate the plant/ pooling station with either State grid network or directly with inter-State transmission system. Also, generally due to requirements of large parcels of land and renewable resource being better in remote/rural areas, renewable power plants are located in far-flung locations where reach of STU as well as ISTS network is almost absent.

Development of necessary transmission systems to strengthen the STU or ISTS network takes considerable time i.e. three to four years, as compared to the gestation period of power generation from a renew-

able energy plant.

Therefore, the last mile connectivity needs to be built as part of the Green Energy Corridor project well in advance by identifying prospective renewable energy resource-rich areas in consultation with respective State governments, State renewable energy nodal agencies as well as RE developers.

Answer 3 & 4: Energy Storage and Spinning Reserves - Addition of large amounts of renewable energy can impose heavy burden on the system operators who must be prepared to obtain power from other sources of generation (mostly pumped storage, battery storage, open cycle gas-based plants, combined cycle plants, demand response and other ancillary services) to respond to the unpredictable frequencies in renewable energy generation. Effective grid integration of renewable energy in a State would require some key regulatory mechanisms like:

- a. Forecasting:** Effective renewable energy forecasting is essential for a system operator to reduce the uncertainty in the variability of renewable power. All renewable energy generators should provide real time resource and generation data to the entities that are responsible for forecasting and scheduling. The Central Electricity Regulatory Commission (CERC) has already come out with a draft mechanism for public consultation.
- b. Intra-day electricity market:** As more renewable energy generation comes online, the day-ahead forecast errors in net load are expected to increase and the need for intra-day transactions and/or ancillary services will increase. An intra-day market could provide a key platform that can be utilised to transact excess or deficit energy within a balancing area closer to real time dispatch.
- c. Ancillary services:** Ancillary services such as demand response and battery storage can enable the State load dispatch centres (SLDCs) to utilise these resources in real-time to accommodate for the net load forecast errors. Currently, there is no ancillary market mechanism in India.

All the above three mechanisms need to work together to integrate renewable energy into the grid without compromising on system security and by keeping integration costs low and equitable.

NATIONAL CLEAN ENERGY FUND

To support entrepreneurial ventures and research in clean energy technologies, the Government of India announced the creation of a special corpus in the Union Budget 2010-11. Called National Clean Energy Fund (NCEF), it was formed on the basis of the “polluter pays” principle, wherein a carbon tax - clean energy cess – of Rs. 50 was levied on each tonne of coal mined or imported. The clean energy cess, which was doubled in FY 2013-14 Budget to Rs. 100 per tonne, was further increased in fiscal 2014-15 Union Budget to Rs. 200 per tonne of coal.

The non lapsable fund, under the Ministry of Finance, offers assistance as loan or viability gap funding, to projects shortlisted by the Inter-Ministerial group. However, NCEF assistance is only up to a limit of 40 per cent of the total project cost. Projects funded by any other arm of the Government of India or those that have received grants from any other national/international body are not eligible.

By the end of March 2012, NCEF was worth Rs. 3,864-crore. While the government has not specified the ways to utilise the NCEF money, an allocation of Rs. 200 crore from the fund was proposed for environmental remediation programmes and another Rs. 200 crore for the Green India Mission in 2011-12.

The Green India Mission was initiated by the Ministry of Environment & Forest as one of the eight missions under the National Action Plan on Climate Change (NAPCC). The mission was approved by the Prime Minister’s Council on Climate Change in February 2011. Total mission cost is Rs. 46,000 crore over ten years starting from the year 2012-13, coinciding with the 12th and 13th Five-Year Plan period. The Mission aims to increase forest and tree cover on five million hectare area and to improve quality of forest cover on another five million hectare area as well as to improve ecosystems services, forest based livelihood income of about three million households and to enhance annual CO₂ sequestration.

An Inter-Ministerial Group, chaired by the Finance Secretary in the Ministry of Finance (and comprising of Secretaries of Departments of Expenditure and Revenue at Ministry of Finance, Principal Scientific Advisor to the Government of India, a representative of Planning Commission and a Representatives of Ministry sponsoring the proposal and other Ministries concerned with that specific proposal) recommends projects eligible for funding under NCEF.

Upon recommendation by NCEF, the final approval is given by the Minister of the concerned nodal ministry (which initially approved and decided to take the project submitted by the public or private entity to NCEF) if the project cost is below Rs. 150 crore; by Minister of Finance and the Minister of the concerned nodal ministry if the project cost is between Rs. 150 crore and Rs. 300 crore; and by the Cabinet Committee on Economic Affairs if the project cost is above Rs. 300 crore.

Among the beneficiary projects are off-grid solar schemes, projects tendered by the Union government under viability gap funding and all solar projects, which would come up in strategic and defence locations. A part of NCEF would also finance the ambitious Green Corridor project. The soft loans disbursed by IREDA under its several schemes are also sourced from NCEF.

With effect from June 2014, the Union government has decided that NCEF will also finance schemes/programmes of the Ministry of New and Renewable Energy that are already appraised through Standing Finance Committee (SFC)/ (Expenditure Finance Commission) EFC channels, if balances are available with the NCEF after financing projects approved by the Inter-Ministerial Group. According to an MNRE official, up until September-end 2014, NCEF had recommended projects worth Rs. 18,577 crore in cumulative terms.

Financial Year	Projects recommended by NCEF (Project cost in Rs. crore)
2011-12	573.05
2012-13	3,276.11
2013-14	1,477.65
2014-15 (up to September 2014)	13,250 (after certain sanctioned projects of previous years were downsized to include another project)

However, even after four years, it turns out that NCEF is ill-utilised and directionless. The Comptroller and Auditor General of India had raised red flags on the handling of NCEF accounts in its report on the Union government’s accounts for fiscal 2012. The government auditor, in its report, said that while Rs. 3,646.01 crore (Rs. 1,066.46 crore in 2010-11 and Rs. 2,579.55 crore in 2012-13) had been collected through clean energy cess, only Rs. 1,066.46 crore was transferred to NCEF.

Though after increasing the coal cess to Rs. 200 per tonne, NCEF has over Rs. 17,000 crore in its kitty, not much has been allocated to the renewable energy sector. Reportedly, the finance ministry is using the NCEF for fiscal balancing.

Based on statistics available with Press Information Bureau, dated 6th August, 2015, up to the year 2014-15, an amount of Rs. 16,388.81 crore had been collected as coal cess for the National Clean Energy Fund (NCEF). As per budget estimates, during 2015-16, an amount of Rs. 13,118.04 crore would be collected as coal cess for NCEF, as against a collection of Rs. 8,916.46 crore in the year 2014-15, Minister of State (IC) for Power, Coal & New and Renewable Energy Piyush Goyal said in a written reply to a question in the Lok Sabha. Out of 44 projects recommended for NCEF support in renewable energy, 30 projects are awaiting allocation under NCEF, the minister added.

The government has collected Rs 40,000 crore as cess on coal through the National Clean Energy Fund, but even as intended beneficiaries continue to wait for disbursement, it has allocated just over 1 per cent of this amount to the Ministry of New And Renewable Energy (MNRE). Worse, of the Rs. 500 crore of the NCEF amount disbursed to it, the ministry has spent just Rs. 1.6 crore on clean energy projects over the past three years.

Q&A with **Mr. Ashok Lavasa**, Secretary,
Ministry of Environment, Forests and Climate Change

India's Comprehensive INDCs to highlight requirement of Technology Transfer & Finance



Mr. Ashok Lavasa



All the effort at development which is now taking place, if it has to be driven by clean technology, then that technology should be made available to developing countries. I don't think it is anybody's case in the world that developing countries should not continue with economic progress.

With the Paris climate meet in sight, hopes for a new, universal and legally-binding agreement are rising. If countries manage to clinch an agreement - one that will commit all nations to take and progressively strengthen their national action plans over time - the Summit could become a game changer and set a strong and irreversible course towards a low-carbon and climate-resilient world. India, an active participant in the UNFCCC climate negotiations, is at an advanced stage of finalising its Intended Nationally Determined Contributions (INDCs) and is on course to meet the deadline for submission of INDCs before 1st October, 2015. IREF caught up with Mr. Ashok Lavasa, Secretary, Ministry of Environment, Forests and Climate Change, to know the Indian government's stand on issues of technology transfer, adaptation, mitigation and additional finance.

IREF: When is India likely to come up with its country commitment or Intended Nationally Determined Contributions (INDC) and submit it to UNFCCC?

Mr. Lavasa: According to the Lima Action plan or Lima Call for Action, all the countries are expected to submit their INDCs before 1st October, so we should be doing it well before that. We are working at what the contours of our INDCs should be. We are having consultations with the State governments because 32 States and Union territories have prepared their State action plans for climate change. We have had very detailed consultations with the industry. We have spoken to other ministries in the government of India. Besides, we have had discussions with academic institutions, civil society and scientific community. We want to take all the stakeholders on board because INDCs are expected to represent the nation's determination and voluntary action. In any case, India feels that it is very important and urgent to take action against the adverse effects of climate change.

We want to make the INDCs comprehensive. We feel that the INDCs which have been announced by various countries

so far only focus on mitigation. India feels that while mitigation is important, other elements of the convention are equally, if not more, important.

IREF: What are the various components that are being envisaged to be included in the INDC submission?

Mr. Lavasa: As I said, mitigation is important but we feel that adaptation is extremely important especially for a country like India, where there is such a variation in temperature, so much of geographical diversity - There is an entire Himalayan ecosystem which has one kind of vulnerability; there is a 7,000-km long coastline which has a different kind of vulnerability. We have the agriculture community which is also bearing the brunt of adverse effects of climate change. So many events have taken place whether they are floods or cyclones. All these things are real circumstances that India is facing and government has taken several initiatives for adaptation. We want to give high importance to adaptation. Similarly, we want to emphasise a point that whether it is adaptation or mitigation, all these actions to be taken by any country require a lot of resources. The

availability of resources or the means of implementation, as they are called, are important. We feel that the availability of technology and the terms of technology transfer are very important. The capability or capacity building of various countries is relevant. So all this together will form an effective action plan for dealing with the ill effects of climate change.

IREF: How will the government's new targets for renewable energy (175 GW by 2022) be embedded in the INDCs?

Mr. Lavasa: *The total capacity of solar power, 10 years ago, was almost non-existent. However, the segment has come a long way since by having installed 4,000 MW as of 2015.* I think government of India has taken an extremely bold and progressive initiative in announcing its intention of harnessing so much of renewable energy. Now it is for the investor community to respond. The government has not said that the entire capacity will be financed from the government coffers. However, the government has certainly made a policy declaration by which it has expressed its intention to absorb so much of renewable energy in its electricity system for which investments will be required whether it is to upgrade and modernise the grid, or to create a regulatory mechanism by way of introducing RECs or enforcing RPOs. Market forces have been facilitated by the policies of the Government of India. All in all, the government has framed a policy; it has a programme in place as well as the regulatory framework. The environment is conducive for people to invest in renewable energy in India. So it is an invitation to all those people who think that investment in solar energy makes good sense either in terms of returns or in terms of their commitment to use non-fossil sources. If the investor community in the world thinks that here is a country where there is such a huge opportunity for creating renewable energy based resource, then they should come and invest.

The way the INDCs are crafted, it is not necessary that you can attribute every programme with a certain number. Yes, the Ministry of New and Renewable Energy will calculate that if we put so much of renewable energy then so much of electricity will be generated and so much of CO2 emissions will be saved; but how much weightage it has in the INDC will be difficult for us to say at this stage.

There are a number of things when government announces a policy. Take the case of the power sector. So when the government said that it wants to add 88,000 MW in the 12th Plan, it did not mean that all the capacity will be created by government investment. Even in conventional sources now, all the capacity is being created by non-government funding. Even government organisations like NTPC and others are raising money from the market. Similarly, the generation companies in the private sector or public sector are raising funds from the market. So the point that needs to be appreciated is that here is a government which has declared its intention of adding 175 GW of renewable energy in its system. The potential exists, the electricity demand exists and the policy framework is there. Now is the time for the international and the domestic investor community to take full advantage of the eco-system that has been created by the government. Yes, the plan is ambitious and it is so because in the past efforts have not been made. Currently, the renewable energy portfolio of India stands at 34,000 MW; 10 years ago it seemed difficult. In fact, when the economic liberalisation process started in 1991-92, we probably had less than 1 MW of renewable energy. All this 34,000 MW has happened in the last 15 years. So the momentum is there. The mar-

ket is also responding and the solar power rates are coming down fast with the current solar power tariff hovering at Rs. 5.38 per unit. And in Andhra Pradesh, a further reduction is expected. While the target may appear formidable, it is achievable.

IREF: For renewable energy scale up, how will the UNFCCC process help in fostering partnerships in technology such as storage? Where is that negotiation going? What roadblocks do you see there?

Mr. Lavasa: The issue of technology is very important and that is what India has been highlighting. All the effort at development which is now taking place, if it has to be driven by clean technology, then that technology should be made available to developing countries. I don't think it is anybody's case in the world that developing countries should not continue with economic progress. After all, so much of population in the world resides in the developing countries and they have their aspirations and governments of these countries have their responsibility towards development.

We are now talking of sustainable development goals. If the sustainable development goals and the development aspirations of the developing countries and its population have to be fulfilled then it will have to come from the resources which are available. And, according to our understanding, technology is also a resource. So wherever this technology exists in the world which is environment friendly I think that should be made available to developing countries. And it should be made available without IPR costs because there is no point in giving a technology where the cost of transferring technology is a barrier. In fact, we have been advocating in all the international fora that it is high time that the world gets together and pools its resources for research and development in these technologies. And wherever these technologies are already available, the IPR cost should be borne by the Green Climate Fund.

The real challenge is that some of the countries have been taking the position that because these technologies belong to the private world therefore governments do not have the wherewithal or the means to make these technologies available. Our request has been that even if government can not direct private companies because of their own legal arrangement to give this technology to us, it is certainly possible for the Green Climate Fund to set apart some portion of the fund which will pay for the IPR costs of these technologies.

IREF: What are the likely asks from India for international support in terms of ---

- a) Technology transfer (Smart grid etc);**
- b) Additional Finance; and**
- c) Higher targets conditional upon support**

Mr. Lavasa: Whatever contributions the various countries are declaring, all of them are predicated on the availability of resources. The adaptation requirement of India may require a few billions of dollars; the mitigation requirement may also call for significant financial resources. The sustainable development goals incidentally, which are being negotiated, have issues of implementation as well. So, all in all, the ability of any country to use its resources will depend on availability of these resources. And we feel that unless these resources are augmented we may not be able to make a very significant and speedy progress and that is where the global community has to understand the importance of the means of implementation.

While India is fully committed to make its contribution, we feel that the augmentation of resources will vastly improve the capability of the developing countries to achieve their contributions. In fact, if the world community is serious and it feels that in the interest of saving this planet from the ill effects of climate change we need to take so much action, then it must make available to the developing countries the resources which will enable them to take this action.

We have heard many countries say that whatever funding is already being made available through bilateral resources or multilateral resources or private investment, all of that should be counted towards their contribution whereas the position is that these resources were coming to the countries anyway. So, in the case of solar power, for example, if the government of India invites bids for solar power and if some companies based in Europe or United States or Canada bid for these and as a result of that they invest \$1-2 billion in India, how can that be counted towards that country's contribution because if we didn't have robust policies and if we didn't have this competitive framework those companies would not have invested. It is a business decision which they are taking. It is not a contribution that they are making to help us rather it is an investment, which they are making based on commercial considerations, for which they will receive a return on equity. Similarly, bilateral assistance, which has been available to India for many years and for a variety of works cannot be treated or counted as the developed country's contribution. It has to be new and additional, and it has to be predictable finance.

IREF: How will India be justifying its country commitment (INDC) on equity and ambition?

Mr. Lavasa: We feel that we have to take action to deal with the ill effects of climate change in the interest of our country. If others are not taking action as per their historic responsibility I think it is something which they should ponder over. It bothers us that those who have contributed to the accumulation of carbon in space do not want to take commensurate and compensatory steps today. It is their responsibility and they should take these measures. It is only when the developed countries take corrective steps, will it become possible for countries like India - which are developing, which have huge infrastructure deficits, have development goals to achieve - to undertake gigantic task of development in a sustainable way. So, we feel, these countries should be very ambitious about their own targets. We feel that the targets that they had taken in the Kyoto Protocol, if those have been fulfilled, there are still five years left and they should continue to enhance their ambition level because in the first place itself the targets were not ambitious enough. Those who had taken targets and have fulfilled them should continue their efforts and those who had take low targets and have not fulfilled these, they should also continue their efforts.

The pre-2020 action is important. I don't think it can be anybody's case that we will all act after 2020 when the Paris agreement comes into force. Climate change is taking place every day. So mitigation and adaptation measures have to be taken now and therefore in order to fulfill the principle of equity, it is important that those who have been historic emitters must take steps in line with the cumulative damage that they have caused. As far as India is concerned, we are very ambitious. We have launched a number of programmes and government is committed to fulfilling these programmes and even stepping them up further.

IREF: What role can the industry play in clinching a good climate deal in Paris? What can be the role of the civil society organisations in supporting India's stand in the climate negotiations?

Mr. Lavasa: First of all, it is very important for all stakeholders, whether it is industry or civil society, to understand what is in our national interest. What is in our national interest is that we should be determined to take action to save this planet. We should be able to do whatever is required whether it is in terms of changing your lifestyle or it is terms of taking efficiency measures so that we can all make our contributions. Industry has been taking part in some of the missions on climate change particularly the National Mission for Enhanced Energy Efficiency and National Solar Mission. There are many missions in which the industry has already contributed and we expect that it will continue to contribute, continue to employ environment-friendly technologies, and continue to reduce their specific energy consumption so that the emission intensity of our growth comes down.

India had voluntarily taken up a target of reducing the emission intensity of its growth by 20-25 per cent by 2020 and we are happy that we have already, till 2010, come down by about 12 per cent. We are very confident of achieving the voluntary target. The 2014 UNEP report says that India is one the countries which is on course to achieve its target.

As far as civil society is concerned, I think it plays an extremely important role in educating people, in bringing out the right interest of the country, and in communicating with the masses about what are government policies and where the interest of the nation lies. Even in evolving our INDCs, we have had a very active interaction with the civil society and industry. We feel that their role will be fairly significant in conveying to the world what their efforts have been, what the national efforts have been, and thus bringing about an environment of goodwill and co-operation throughout the world so that we can make a very effective and meaningful agreement.

IREF: India is trying to enter into energy co-operation with Bhutan, Bangladesh and possibly Nepal. There is immense potential for green energy corridor in the SAARC region. Can these regional initiatives form a part of India's INDC at a future point?

Mr. Lavasa: So far, the regional initiatives that have been contemplated have not been factored in as far the INDCs are concerned. But, certainly, this is a good direction to go in, to have regional integration of energy between our neighbouring countries and ourselves. Already, there is a trade in energy which goes on between Bangladesh and India, and Nepal and India. Even Pakistan has expressed its interest in buying electricity from India. With Bhutan, we have a very robust arrangement. So the energy market in the region is moving towards integration. Further developing that integration and the infrastructure, which will support this integration, are moves in the right direction. It will help both sides - the neighbouring countries as well as India. However, efforts have to be made by the neighbouring countries as well, and at this point, we don't want to pre-judge the issue. We will continue to make our efforts, as we feel that there is scope for further co-operation.

Finally, India feels that the commitments made in the past by countries should not only be legally binding but should in fact be a moral and ethical commitment.

The interview with Mr. Lavasa was conducted before the announcement of INDCs by the Indian government.

CLEAN ENERGY TRANSPORT: New Developments

RE Digest presents a series on clean fuel transport to chronicle the developments in the segment. In the 1st part of the series, we enumerate examples from the category of electric bus.



ELECTRIC BUSES

BYD Electric Bus: The BYD electric bus or BYD ebus, called K9 in China, is an all-electric bus model manufactured by Chinese automaker BYD. Powered with its self-developed Iron-phosphate battery, allegedly featuring the longest drive range of 250 km (155 miles) on one single charge under urban road conditions, BYD electric bus was rolled off line on September 30, 2010 in Hunan province of China. The electric power consumption of BYD electric bus is less than 100kWh/60mins. Having a top speed of 96 km/h, it can accommodate 31 seats.

Other than K9, BYD also offers F3DM, F6DM and e6 models.

The K9, having a 12-meter body length and 18-tonne weight with one-step low-floor interior for passengers' comfort, is reportedly priced at S\$395,000 - S\$592,600. It has been running/tested in China and many other countries and regions such as India, Japan, Hong Kong, U.S., Colombia, Chile, Spain, Netherlands and Denmark. BYD claims that its electric buses do not cause any emission or pollution and the chemicals contained in the battery can be recycled without any toxins.

EV350 by GreenPower: In 2014, GreenPower launched the EV350 transit bus, which is an electric powered transit bus deploying electric drive and battery technologies with a lightweight chassis and low floor body. GreenPower's bus is based on a flexible clean sheet design and utilizes a custom battery management system and a proprietary Flex Power system for the drive motors. GreenPower integrates global suppliers for key components such as Siemens for the two drive motors, Knorr for the brakes, ZF for the axles and Parker for the dash and control systems.

Versa EV: Indian commercial vehicle manufacturer Ashok Leyland launched the Versa EV from its UK arm Optare Plc. at the Bus and

Special Vehicles Show organised by SIAM in Greater Noida, Delhi NCR in January 2015. The vehicle is targeted for use as feeder, in airport tarmac and intra-city applications. The low-floor bus minimises environmental impact, including zero emissions and zero noise, while matching the performance of a diesel vehicle. The electric bus, which can accommodate up to 44 seats, will be marketed in India from 2017 onwards. It does about 90 miles (144 km) on a single charge, with a consumption of 1 unit of electricity per km.

Proterra's EcoRide BE35: Called the Ecoliner by Foothill Transit in West Covina, California, it is the world's first heavy duty, fast charge, battery-electric bus. Proterra's ProDrive drive-system uses a UQM motor and regenerative braking that captures 90 per cent of the available energy and returns it to the TerraVolt energy storage system, which in turn increases the total distance the bus can drive by 31-35 per cent. It can travel 30-40 miles on a single charge, is up to 600 per cent more fuel-efficient than a typical diesel or CNG bus, and produces 44 per cent less carbon than CNG.

Tindo: It is an experimental battery electric bus being tested in Adelaide, Australia. The word "Tindo" comes from the aboriginal word for sun. The bus will get its electricity from a photovoltaic system on Adelaide's central bus station.

Ebus22 Electric Bus: The Ebus22 Electric Bus is equipped with 130 kWh lithium iron phosphate battery technology providing up to 125-mile range from a single charge. The use of lithium-ion enables the battery to be significantly smaller and lighter than most energy storage systems. At \$395,000 it is half the price of a BYD or Proterra.

Source: Internet

Hybrid Solar Power Device that also Stores Energy

Start-up SunVault Energy has developed a graphene hybrid device that can function both as supercapacitor and a battery storage system. It is modular in design, meaning it can be shaped to power. "Our technology uses more of the graphene's surface area, which creates a more densely created product. This increases the conductivity and storage within the device," explains CEO Gary Monaghan. SunVault was originally developing a 3-dimensional solar

appliance that collected energy on three sides while generating and storing power, "with zero to minimal reliance on additional power from the grid." After encountering lifespan issues with the biocel technology storing the energy, the company decided to focus on the storage side first. SunVault's technology could also be used in a smartphone or to power an electric vehicle.

Source: www.renewableenergyworld.com

State At A Glance - Karnataka

An active player in the power generation business, Karnataka is recognized for having installed the first hydropower generating station in the country as early as 1901. Though coal and natural gas are the primary energy sources of the State, renewable energy sources are being adopted in a big way. The share of renewable energy sources out of the total installed capacity stood at 29.7 per cent, according to data available with the Central Electricity Authority.

While the State is endowed with abundant hydro power potential, it reels under severe electricity shortage. According to the State energy department, the power deficit in Karnataka was 15 per cent in March 2015. It also faces acute transmission corridor constraints, making it difficult to import power from other States. Up to February 2015, the installed capacity for power in Karnataka was 14,802 MW, comprising 4,749 MW renewable energy, which included wind energy (2,623 MW), small hydro (785 MW), biomass (113 MW), co-generation (114 MW) and grid-connected solar (84 MW), according to Karnataka Renewable Energy De-



velopment Limited (KREDL) data.

KREDL plans to construct a renewable energy park and green building on the two acres it has received from Karnataka Power Transmission Corporation Limited (KPTCL) at Nagarbhavi. The proposed project, to come up at a cost of Rs. 45-50 crore, would include several renewable energy models. The agency has invited tenders from private companies for project development and hopes to complete the project in one-and-a-half years.

Certain key issues have to be ironed out to give a boost to the renewable energy segment in the State. At present, KERC regulations do not allow RECs to RE generators under the third party sale category. Based on a clarification issued by the Ministry of Power regarding amendment of tariff policy (dated 20.01.2011), the HC has ruled in favour of KERC. Another matter relates to the RPO trajectory that has

been constant and as a result offers little incentive to State utilities to procure more renewable energy power. Besides, the time-consuming process of forest land allocation has been a long standing issue in the State.

Table 1: Installed capacity (in MW) of power utilities in Karnataka (including allocated shares in joint and central sector utilities) as on April, 2015

Ownership/ Sector	Thermal				Nuclear	Hydro	RES (MNRE)	Grand Total
	Coal	Gas	Diesel	Total				
State	2,720.00	0.00	127.92	2,847.92	0.00	3,599.80	137.33	6,585.05
Private	2,060.00	0.00	106.50	2,166.50	0.00	0.00	4,372.90	6,539.40
Central	1,549.51	0.00	0.00	1,549.51	475.86	0.00	0.00	2,025.37
Total	6,329.51	0.00	234.42	6,563.93	475.86	3,599.80	4,510.23	15,149.82

Source: CEA

Country At A Glance - NEW ZEALAND

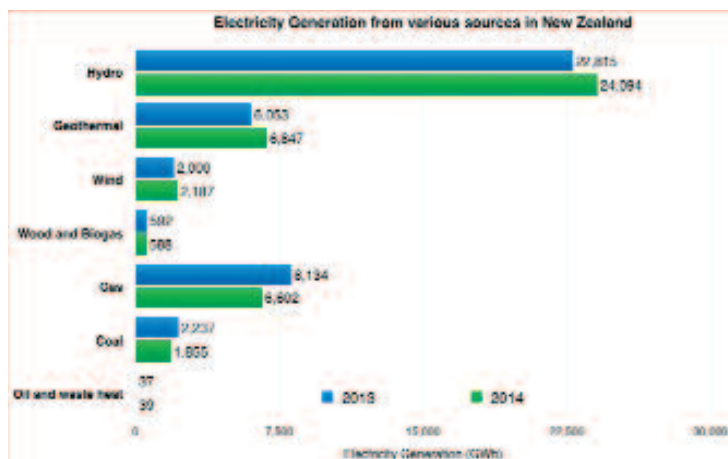
Even though New Zealand is inhabited by a comparatively small population and blessed with abundant natural resources, it is a net importer of energy, in the form of petroleum products. From the year 1975 up until 2008, the ratio of non-renewable and renewable energy sources remained consistent, with almost 70 per cent of primary energy supply being met by hydrocarbon fuels. However, the share of renewable energy sources in power generation began to increase since 2009.

In the year 2014, this fossil fuel vs renewables ratio decreased to about 60 per

cent with renewables contributing a 39.5 per cent share in New Zealand's total primary energy supply, according to the Ministry of Business, Innovation and Employment. Out of all renewables, the country mainly harnesses geothermal energy and hydropower. The share of renewable energy sources in power generation has been increasing since 2009 in the country.

According to the latest Energy in New Zealand (ENZ) annual report, the share of geothermal energy in energy supply was 22.2 per cent, hydropower accounted for 9.7 per cent, and the remaining 7.7 per cent





Data source: Ministry of Business, Innovation and Employment, Government of New Zealand

Source: IREF research

came from other renewables such as biomass and wind.

New Zealand is building on its already impressive green energy record by breaking up with coal power once and for all. The country recently announced that it will close its last two remaining coal power plants in 2018, as it moves towards a goal of 90 per cent renewable energy by 2025.

The electricity generation from various energy sources in New Zealand during 2013 and 2014 is given in the bar chart.

EVENTS TO LOOK OUT FOR...

Municipalika 2015

9-11 December 2015,
Jaipur, Rajasthan



Municipalika 2015, 13th International Conference and Exhibition, is being organised at Jaipur, from 9th to 11th December 2015, with Rajasthan as host State. India's biggest international conference and exhibition on sustainable habitat and smart cities, the conference will be attended by over 1,000 delegates from all over India and abroad (including ministers, secretaries to govt, mayors and municipal commissioners,

commissioners and directors of municipal administration, urban local bodies, water and waste utilities, national and international urban stakeholders). Other than this, 5,000 professional visitors, from

over 300 Indian cities and towns, are expected to attend the event. Some of the key areas to be covered in Municipalika 2015 include renewable energy, energy efficiency, solar cities, green cities and buildings, waste-to-energy etc.

For more information, visit:
<http://www.municipalika.com>



ENERASIA 2015

2-4 December, 2015,
Ahmedabad, Gujarat

The 2nd edition of ENERASIA will held at the GMDC Ground, Ahmedabad, from 2nd to 4th December, 2015. The annual global energy summit has received formal support from Energy & Petrochemicals Department, Government of Gujarat. The programme highlight is the Indo-African Energy Conclave, which is being organised to strengthen energy co-operation between India and African countries. More than 100 exhibitor companies from India and abroad, around 1,500 business delegates as well as delegations from more than 15 countries are

scheduled to take part in the mega event. A high-tech exhibition will witness participation of companies from oil & gas sector, power sector, new energy resources sector and petrochemical industry. Besides, seminars at the event will see distinguished speakers from India and abroad delivering presentations on a vast range of subjects including energy trends, efficiency aspects, policies and technology.

For information, visit: <http://www.enerasia.in>

IREF members are entitled to a 20 per cent discount.