Ministry of New and Renewable Energy Government of India

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Availability and accessibility of capital key for meeting the 2022 RE target

Innovative financing schemes putting the sector on road to recovery Integrated approach will help unlock the potential

Financing Pathways to Re-kindle Growth

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Dear Readers,

Welcome to the July-Sep 2015 Issue of BioPower India! Our theme for this issue is "Financing Pathways to rekindle growth in the bio-power sector". India, in its recently submitted Intended Nationally Determined Contributions (INDC) to the UNFCCC, has reinforced its commitment of increasing the power generation from renewable energy sources. One of the key ingredients to

ensure we achieve the government's target of 10GW for biomass power, is ensuring adequate financing. As most of our readers are aware, the biomass power sector has witnessed a chequered growth in the last few years.

Through this issue, it is our endeavour to share current innovations as well as potential pathways to re-kindle investor sentiment for the biomass power sector thereby improving its growth prospects. The lead article presents a scenario analysis comparing the potential credit availability vs requirement to meet the set target and discusses approaches which can be potentially adopted to re-build investor sentiment.

In our conversation with Mr. KS Popli, Chairman and Managing Director, IREDA, he discusses the new refinancing scheme formulated by IREDA for reviving existing biomass power projects which have been non-operational due to fuel availability and tariff concerns.

The spotlight in this issue is on Varam Power Project's 6MW biomass power plant in Andhra Pradesh which completed 13 years of operations successfully even as the biomass cost and feedstock availability varied drastically over the years.

The issue also features role of innovative financing instruments to promote renewable energy in India through our conversation with Mr. SB Nayar, CMD, IIFCL and Ms Namita Vikas, Senior President and Country Head – Responsible Banking, YES Bank. Finally, this issue also provides a view from the industry, from Dee Piping Systems and Boson Energy Ltd regarding the multi-stakeholder approach required to rekindle growth in the sector.

It is our constant endeavor at BioPower India to provide a platform for engaging in meaningful dialogue about the goings-on in the biomass sector in India, to facilitate conversations around the same and to showcase efforts made in the field. We do hope you enjoy this issue of BioPower India. Please send your feedback and let us know what other areas you would like us to cover. We look forward to hearing from you at biopowerindia.mnre@gmail.com.

VI Jam (V K Jain)

From our readers

It is indeed a great initiative and effort in the right direction. The need for this kind of initiative was being felt since long.

Congratulations to the Editorial Team for a nice coverage.

With regards, Yours sincerely,

Anand Chopra, Sr. Vice President Kalpataru Power Transmission Limited Sep 3, 2015



Shri Mahesh Giri, MP (Lok Sabha)

Oct 7, 2015

LEAD ARTICLE

Financing Pathways to Re-kindle Growth in the BioPower Sector



Aparna Khandelwal, Sustainability Outlook



Somil Daga, Sustainability Outlook

India, in its recently submitted Intended Nationally Determined Contributions (INDC) to the UNFCCC, has reinforced its commitment of achieving 175 GW renewable energy capacity by 2022.¹ It is envisaged to increase the installed biomass capacity to 10 GW from the current capacity of 4.4 GW. Out of the current installed biomass capacity, bagasse-based cogeneration plants constitute approximately 3 GW and biomass and gasification plants constitute the remaining 1.4 GW capacity.² policies, as discussed in the previous issue of BioPower India. This has increased the risk perception in the sector, leading to a gradual reduction in capital flowing in the sector.

However, it must be noted that out of all the renewable energy technologies, biomass is the only firm and reliable power source since it depends on agro and forest waste and residue as opposed to other renewable sources of energy like solar and wind that depend directly on the nature. Given India's primarily agriculture-dependent economy, agricultural waste is abundantly

Table 1 Growth in capacity of Bio Power capacity (including bagasse based co-gen and other biomass power)

Year	Total Bio Power Capacity (including bagasse cogenera- tion) (MW)	Biomass Power & Gasification total capacity (MW)	Biomass Power and Gasification capacity as % of total bio power capacity (%)
2010-11	2,664	997	37
2011-12	3,135	1,150	37
2012-13	3,602	1,265	25
2013-14	4,014	1,365	34
2014-15	4,418	1,410	32

Source: MNRE annual reports

The last few years have witnessed a chequered growth in biomass plants, as shown in Table 1. In the last 5 years, there has been only a 413 MW increase in capacity of biomass power plants, whereas bagasse-based cogeneration has seen a 1341 MW increase in its capacity during the same time. This, in part, is due to the misalignment between the centre and state available in the country, which can be used as fuel for biomass plants. It is estimated that India has a potential capacity of 18 GW biomass power plants³. Biomass used for power generated not only liquidates the rural economy, but also generates local employment. Hence, BioPower carries great potential as a renewable source of power in India.

¹ http://www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx
² http://mnre.gov.in/mission-and-vision-2/publications/annual-report-2/

³ mnre.gov.in/schemes/grid-connected/biomass-powercogen/

Asset backed finance has been key source of financing for Biomass Power plants

Investments in biomass power plants are dominated by asset-based finance. Banks and Non-Banking Financial Corporations (NBFCs) have been the main source of funding for biomass plants in India. Indian **Renewable Energy Development** Agency (IREDA) provides loans with repayment periods up to 15 years. Usually, the quantum of loan from IREDA is up to 70% of the total project cost, however in special cases this can go up to 75%. The interest rate offered by IREDA for biomass plants varies from 12.5% to 13.25%⁴. IREDA has funded biomass power projects in Punjab, Gujarat and Maharashtra among other states, with an INR 594.59⁵ crore worth of cumulative loans sanctioned of till 2013 for biomass power, and an INR 4460.97 crore worth of cumulative loans sanctioned of for both bagasse cogeneration and biomass power plants⁶.

Venture capital and private equity constituted a total investment of INR 120 crores in 2013 in this sector⁷.

International agencies like International Finance Corporation (IFC) have funded some biomass plants in India. As compared to investments in solar and wind energy, foreign investments in the bio-power sector have remained fairly low.

Table 2 Snapshot of biomass power projects and their lenders in last 10 years in India

Project Developer	Location	Size (MW)	Year of commissio ning	Amount of Ioan (INR crore)	Lender
Clarion Power Corporation Limited	Andhra Pradesh	12	2004	23.7	Andhra Bank
Rithwik Energy Systems Ltd	Andhra Pradesh	6	2004	12.7	Andhra Bank
Malwa Power Ltd.	Punjab	6	2005		IREDA
Shriram Powergen Limited	Tamil Nadu	7.5	2007	-	Axis Bank
Shalivahana Green Energy Limited	-	10	2008	-	IREDA
Rake Power Limited	Maharashtra	10	2008	39.5	IDBI + UCO
Shriram Non- Conventional Energy Limited	Tamil Nadu	7.5	2009	-	Axis Bank
Global Powertech Equipments Limited	Tamil Nadu	7.5	2010	30	Yes Bank Ltd
ETA Powergen Pvt. Ltd.	Tamil Nadu	10	2009	-	Indian Bank
Sanjog Sugars & Eco Power Pvt. Ltd.	Rajasthan	10	2011	-	Punjab National Bank
S.M. Environmental Technologies Pvt. Ltd. (Formerly Kalptaru Energy Venture Pvt. Ltd.)	Rajasthan	8	2010	-	Axis Bank
Orient Green Power Company Ltd.	Tamil Nadu	10	2011	24	State Bank of India
Shalivahana Green Energy Limited	Orissa	20	2011	90	IDBI + UCO
Shalivahana (Biomass) Power Project Limited	Madhya Pradesh	12	2011	50	State bank of Patiala
Amreli Power Projects Limited	Gujarat	10	2011	34.5	IREDA
Junagadh Power Projects Pvt. Limited	Gujarat	10	2011	46	IREDA
Shanti G.D Ispat and Power Pvt Ltd.	Chhattisgarh	15	2011	34.6	Union Bank of India
Abellon Cleanenergy Ltd.	Gujarat	9.95	2011	-	IREDA
Orient Green Power Company Ltd.	Rajasthan	8	2011	-	Central Bank of India
Greta Energy Ltd	Maharashtra	15	2012	-	PTC India Financial Services Ltd.

⁴ http://www.ireda.gov.in/writereaddata/Financing%20Norms%20%20Schemes%20_%2026%2007%202014.pdf

⁵ http://www.ireda.gov.in/writereaddata/Annual%20Report-2012-13%20ENGLISH%20VER%283%29.pdf

⁶ http://www.ireda.gov.in/writereaddata/Ireda%20%20Annual%20Report%202013-14.pdf

⁷ https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CCQQFjABahUKEwiV0uyqxLzIAhXGUo4KHX-

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lead article

Project Developer Location		Size (MW)	Year of commissio ning	Amount of Ioan (INR crore)	Lender
Orient Green Power Company Ltd.	Rajasthan	8	2013	54	Axis Bank
Viaton Energy Pvt Ltd.	Punjab	10	2013	62.7	State Bank of India
Orient Green Power Company Ltd.	Madhya Pradesh	10	2014	66.3	State Bank of India
Orient Green Power Company Ltd.	Maharashtra	20	2014	-	State Bank of India
Haveri Bioenergy Private Limited	Karnataka	10	2014	55	Bank of baroda
Dharwad Bioenergy Private Limited	Karnataka	10	2014	55	Bank of India
Orient Green Power Company Ltd.	Punjab	10	2014	60.72	Axis Bank
Orient Green Power Company Ltd.	Punjab	10	2014	60.9	Axis Bank
Orient Green Power Company Ltd.	Tamil Nadu	7.5	2014	39.2	Axis Bank
Shalivahana Green Energy Limited	-	23	-		IDBI
Sriram Power Gen Pvt. Ltd	Tamil Nadu	7.5	-	-	-
Agri Gold Projects Ltd	Andhra Pradesh	6	-	-	Andhra Bank
Sai Renewable Power Corp Ltd	Andhra Pradesh	4.5	-	-	Andhra Bank
Kalyani Renewable Energy India Limited	Maharashtra	15	-	-	State Bank o India + State Bank of Hyderabad
Synergy Shakthi Renewable Energy Ltd	Tamil Nadu	10	-	-	State Bank of India
Malavalli Power Plant Pvt Ltd	Karnataka	4.5	-	18.9	Karnataka Renewable Energy Developmen Ltd. (KREDL)
Turbo atom – TPS Projects Ltd.	Maharashtra	15	-	40	State Bank of India
Arya Energy Ltd.	Madhya Pradesh	12	-		State Bank of India
Sinewave Biomass Power Pvt Ltd	Maharashtra	10	-	58.4	State Bank of India
Maharashtra Vidhyut Nigam Ltd	Maharashtra	10	-	45	YES Bank
Matrix Agro Pvt Ltd.	Karnataka	6	-	31.8	Andhra Bank
Usher Eco PowerLtd.	Uttar Pradesh	16	-	85	Axis Bank
Yash Agro Energy Pvt. Ltd.	Maharashtra	8	-	35.9	State bank of India

For increasing investments and additional incentives, it is quintessential to create a less risky environment for potential investors.

Availability and accessibility of capital key for meeting the 2022 target

As per Sustainability Outlook's analysis, a total capital of INR 26,600 is required over the next 7 years for achieving an additional capacity of 5.6 GW to attain the target of 10 GW (assuming the average capital cost for a bio-power plant to be INR 4.75 crore/MW). Looking at the past trends (Table 1), if we assume that biomass plants will have a share of 30% out of the total 5.6 GW (of combined bagasse based cogen and biomass power plants), that is, 1.68 GW, the total debt required per year will be approximately INR 800 crores (assuming 70% of capital cost will be financed through debt).

We have projected the credit availability for the biomass sector (under two scenarios: Business as usual and Best case scenario) and compared it with the credit requirement to meet the set target. Based on projections by various rating agencies, an average growth rate of 13% has been assumed for projecting the total credit availability for the renewable energy sector in the future.⁸

Business as usual scenario will delay target achievement

Under the business as usual scenario, credit extension for biomass power plants has been assumed to follow a historical rate of 1% (FY2014). If India continues on its current trajectory for setting

Source: Developers and funders' websites, compiled by Sustainability Outlook

⁸ No change in sectoral limits/caps for lending has been assumed



Fig. 2 Scenario analysis for financing requirement to meet the 2022 target

Source: RBI Basic statistical Returns (2009-2015)⁹, MNRE annual reports (2009-2015), Sustainability Outlook analysis

up biomass power plants, it will have set up only an additional 866 MW capacity of biomass plants by the set target - with a whopping gap of 814 MW. Continuing at its current pace, the country is likely to achieve the 1680 MW target only by FY2025-26, 4 years later than its committed time frame.

Therefore, extension of further credit in the sector at a low interest rate is quintessential for providing the impetus to kick-start growth.

Best-case scenario- additional incentives needed to ensure accessibility of capital

Increase in extension of credit rate for biomass plants in the recent past has seen a fall from 4.4% in 2010-11 to 1% in 2014-15. Taking the best case scenario as the 2010-11 rate of 4.4% yearly increase in extension of credit for biomass sector, India will be able to achieve its target of total 10 GW by 2022.

However, only extension of adequate credit will not ensure a spur in growth in the sector. Adequate availability of capital must be complemented with additional incentives and measures to ensure the available capital is also made accessible to the developers. For developers, extension of medium and long-term loans coupled with affordable rates is essential. Once credit is made accessible, other regulatory measures must be in place to ensure continuity and viability of the plants. Proper revision and implementation of feed-intariffs, Renewable Purchase **Obligations (RPOs), Renewable** Energy Certificates etc. are some avenues that can achieve this and build a robust and sustainable biomass sector.

Building an investorfriendly environment key to spur growth

To facilitate the aforementioned mechanisms for increasing investments and additional incentives, it is quintessential to create a less risky environment for potential investors.

Banks have sectoral caps to limit their exposure to any one sector, or technology. As renewable deployment increases, more banks are nearing their sector exposure limits for power which is leading to decreased credit availability for renewable energy as a whole and biomass power in particular. Reduced credit availability along with increased risk perception of the biomass sector is hampering its growth potential.

⁹ https://www.rbi.org.in/Scripts/AnnualPublications.aspx?head=Basic%20Statistical%20Returns#



Therefore, alternate sources of credit need to be explored to fill this emerging gap. Instruments such as green bonds, though recently introduced in India, have proven useful worldwide to increase loans (on more favorable terms than vanilla debt¹⁰) to the sector. In March 2015, the EXIM Bank of India issued a five-year USD 500 million green bond. YES Bank, in February 2015, raised INR 1000 crore via green bonds. Green bonds can be used specifically for biomass sector to ensure greater flow of capital into the sector.

Another avenue is to promote active engagement with international funding agencies/ multilateral financing institutes such as Asian Development Bank, IFC, JICA etc. and continuously seek pacts with other countries to tap into international sources of capital for the biomass power sector in India.

Also, unlike other sources of renewable energy, biomass power projects require significant working capital due to high costs of operation for a biomass plant- of which procurement, transportation and storage of fuel forms a major component. Therefore, not only do project developers need to create a robust fuel collection model to ensure efficiency in fuel collection and storage, but they also require support in form of financial products such as working capital loans to help meet operating expenses (which may fluctuate drastically due to change in prices of feedstock). Such measures/ financial products can also help increase investor confidence in the biomass power sector as a whole.

A few positive steps have already been taken by the policy makers in order to improve the investor sentiment in this sector. As discussed in the previous issue, Central Electricity Regulatory Authority has recognized the need for regular revision of tariffs for biomass power plants depending on the availability and price of feedstock. Moreover, the apex financing institution for renewable energy, IREDA has announced a re-financing scheme for existing biomass plants, which would provide comfort in the form of refinancing of up to 30% of loan outstanding at concessional rates to biomass power projects which have either been shut down or have been operating at extremely low Plant Load Factor (PLF). Also, as per RBI guidelines renewable energy power projects now fall under the purview of priority sector lending.

A robust and investor-friendly environment facilitated by multistakeholder and international engagement, efficient regulatory policies will certainly help re-kindle investor interest and drive growth in the Indian biomass sector.

Aparna Khandelwal is the Business Lead for Sustainability outlook, a division of cKinetics Consulting. Aparna has 8+ years of experience across sectors linked to sustainability with specialization in business advisory, program management, market intelligence, financial modelling and investment assessment. Her core expertise lies in Renewable Energy, Sustainable Finance and Impact Investing

Somil Daga is an Associate with cKinetics Consulting focussing on project development of renewable energy projects in both rural and industrial setting.

¹⁰ Vanilla debt implies standard version of debt, i.e, fixed rate borrowing with no additional features such as convertibility rights or warrants.

IN CONVERSATION WITH

"Innovative Financing Schemes Putting the Biomass Sector on the Road of Recovery"



BioPower India spoke to Mr. KS Popli, Chairman & Managing Director, IREDA regarding financing mechanisms including the refinancing scheme launched for reviving Biomass power projects

IREDA's National Clean Energy Fund (NCEF) Refinancing Scheme is designed to address challenges and revive the affected projects by improving their viability.

India's renewable energy sector has seen significant growth in recent times. What has been your experience as a financier? Could you share some of IREDA's key highlights in the past year?

The year 2015 was marked with several significant developments in the renewable energy sector. The first most important International event "RE-INVEST 2015" attracted several investors and Green Energy Commitments to the tune of 273 GW of renewable energy capacity during next 5 years. The Government has also put a lot of thoughts, resources and policy push into the renewable energy space. The biggest push came in the form of setting up a target of 175 GW of renewable energy capacity by 2022, of this 10 GW would be Biomass power. India's commitment on climate change for reducing the emissions intensity of its GDP by 33-35% over 2005 levels, also focuses on to achieve about 40% generation from non-fossil fuel based energy resources by 2030. In addition, there has been several policy measures at state & central level, which triggered the renewable movement in the country. Declining capital costs more specifically for solar power also played a significant role in the expansion of renewable energy deployment.

Several renewable energy technologies are today seen as mature technologies and costcompetitive in comparison with conventional power generation technologies.

IREDA is a uniquely placed institution established under MNRE that is solely dedicated for financing renewable energy projects in India. As on March, 2015, IREDA has financed 2168 projects with cumulative loan disbursements of Rs.16,940 crores for a capacity addition of about 6000 MW.

In the recent past, IREDA has introduced several innovative financing mechanisms like structured / flexible repayments linking with seasonal generation, longer door-todoor repayment periods of more than 10-15 years and higher Debt Equity ratio for solar and wind projects. We have also introduced a new scheme namely "Securitization of future cash-flows" for meeting the additional fund requirements for future business expansion in RE projects and NCEF refinancing scheme to revive existing biomass power and small hydro projects. Apart from the above, for meeting the immediate fund requirements towards implementation of RE projects, instruments like Bridge Loan Scheme & Short term loan assistance are gaining popularity among project developers. To ensure credit flow into the RE sector, IREDA has tied up new lines of credit with international agencies like AfD, KfW, ADB during the past year.

Can you please share more details regarding the NCEF fund

With India's commitment towards climate change, ecologically sustainable growth, at the same time addressing India's energy security challenge, the National Clean Energy Fund was established by the Government of India by levying a cess on coal of Rs. 50/ tonne subsequently raised to Rs.200 per tonne of coal produced in India as also on imported coal. An amount of Rs.12,000 crores per annum (approx. USD2 billion) is being mobilized which is being used for supporting Renewable Energy Projects and clean technologies.

By the end of 2014-15, an amount of INR 16,388.81 crore has been collected as coal cess for National Clean Energy Fund (NCEF). As per the budget estimates during 2015-16 an amount of INR 13,118.04 crore will be collected as coal cess for NCEF as opposed to INR 8,916.46 crore in 2014-15.

The commissioned biomass power plants have faced unforeseen issues such as feedstock price escalation, low tariffs etc., which has impacted their viability. How can some of these challenges be addressed to encourage the participation of other mainstream financial institutions in this sector?

In number of states, state regulators have provided a fixed tariff for biomass projects and the developers have entered into PPAs with the utilities based on the same. However, now keeping in view the difficulties being faced by the biomass developers, the biomass projects are being provided two part tariff with variable cost to be reviewed every two years. If regulatory intervention can be made for the projets, that have faced huge feed stock prices esclation, then only those projects can be put on track. Further, an allocation of Rs.200 crores has been made from National Clean Energy Fund (NCEF) to help **Biomass and Small Hydro projects** below 5MW which are facing difficulties in repayment of their dues to lenders because of fuel prices esclation or other reasons. The National Clean Energy Fund scheme would provide comfort in the form of re-financing part of loan component at concessional rate to those needy projects. For effective utilization of NCEF Funds, it is proposed that the support would be provided to projects where there is a possibility of revival of their operations.

Could you provide an overview of the key features of this refinancing scheme?

In this scheme, the refinance is limited to 30% of the outstanding loan, which shall be provided to scheduled commercial banks and financial institutions at a concessional interest rate of 2%, which shall be passed by the Bank/FIs to the project developers at the same rate, subject to minimum refinance amount of INR 1.50 crore per project and maximum refinance amount of INR 10 crore per project.

Repayment period for the refinance amount should be coterminus with the repayment period of Bank/FIs for that project and the maximum repayment period shall be 10 years apart from moratorium/ grace period of 6 months from the date of disbursement/ release of refinance loan.

Which renewable energy technologies are considered under the scheme?

Grid connected combustion based Biomass power plants and Small Hydro power plants up to installed capacity of 5 MW are eligible under this refinancing scheme.

What are the eligibility criteria for the affected power plants to avail the benefits of this scheme?

This scheme will benefit a certain category of biomass power plants which meet the eligibility criteria. This includes:

- Plants should have been commissioned during 01.04.2003 and 31.03.2013 and their viability affected due to abnormal fuel cost escalation issues or any other force majeure condition
- The eligible plant should have operational history of at least
 2 years after commissioning of the plant and the average PLF for
 2 years (in case of plant operated for more than 2 years, then the average PLF of any 2 years)
 should be at least 20% in case of biomass power projects
- The project should also have minimum average Debt Service Coverage Ratio (DSCR) of 1.1 after taking into account refinance amount and should be able to service the loan
- The plant should be revived / operationalized within 6 months after the approval of the refinance loan and in case the plant is not revived within 6 months of the loan sanction, the sanction will be cancelled.

What kind of loans/ developers are not eligible for this scheme?

Few categories of plants/ promoters/entities will not be eligible for refinance under the scheme. These include:

- Those declared wilful defaulters, as per RBI norms
- Those declared non cooperative borrowers, as per RBI norms
- The projects which are nonoperational since last 5 years
- Companies with cash profits as per the latest audited balance sheet/annual report

 The plants/loans, which availed One Time Settlement (OTS) are not eligible under the scheme

The following components of finance/loans are not eligible under the scheme:

- Loan Sanctioned against securitization of future cash flows.
- Working Capital Limits/Loans.
- Funded Interest Term Loans (FITL)

Are there any eligibility criteria for Banks / Financial institutions also? If yes, please elaborate more on that.

Scheduled commercial banks and financial institutions which can avail this scheme, should be profit-making entities for the last three years and should have no accumulated losses. Their Capital Adequacy Ratio should be in conformity with the prescribed regulatory norms. Also, Gross Non-Performing Assets as a percentage of Gross Advances should normally not exceed 5% for the entire portfolio of the lending institution. However, this condition will not be applicable to State/ Central PSU Banks/Govt. NBFC's/ Govt. Fls.

What other conditions are imposed on the Banks/FIs to ensure that the plant is revived with refinancing scheme?

The lender needs to confirm to IREDA that the project is commercially viable post refinancing/ restructuring. Release of refinancing will be effected only post receiving this confirmation from the Bank/Fls. Also, the Banks/FI need to obtain an undertaking from the promoter that they will run the project for at least 3 years after the refinance with an average PLF of 40% in case of biomass power plants. Moreover, the commercial banks/ financial institutions need to have proper pre and post-disbursement supervision and follow-up of loans to ensure operations of the plant and also timely / regular repayment of the loans.

Are there any caveats to ensure that this scheme amount is used properly and plant operation is ensured after refinance?

The project should be revived/ operationalized within 6 months after the approval of the refinance loan and in case the project is not revived within 6 months of the loan sanction, the sanction will be cancelled. In case, if the lending bank does not repay the loan in any two subsequent quarters, during the currency of the loan, the refinance amount will be recalled, and in that case the lender will have to return the NCEF refinance amount in one go (without any penalty).

What's your outlook for the biomass sector in India?

The bioenergy sector requires more support with attractive tariff policies at state level to harness its potential. There is also need to support these projects through innovative instruments like NCEF schemes etc. A lot of biomass power generation capacity can be achieved, by addressing supply chain issues, formalizing biomass feedstock markets, regulating prices and regularly revising tariffs on the basis of fuel availability.

Mr. K.S Popli, Chairman & Managing Director, Indian Renewable Energy Development Agency Limited (IREDA) has over 33 years of diversified experience in power sector in design, engineering, erection, appraisal and finance of power projects in generation, transmission, distribution, renovation and modernization, energy efficiency as well as renewable energy. Before joining IREDA, he has held different positions at Power Finance Corporation (PFC) for 14 years and at National Hydroelectric Power Corporation (NHPC) for 11 years

SPOTLIGHT

Feedstock Management and Integrated Operations Key to Stability and Profitability of Biomass Power Sector: Varam Power Projects



AVN Prasad, Director, Varam Power Projects Pvt Ltd

VPPL plant at Chilkalapalem has been able to maintain an average PLF of 70 – 75% and Varam's successful management of feedstock availability has been a key principal factor

The biomass power sector has seen some difficult times with close to 50 percent of the power plants in the country facing heavy losses and being shut down consequently due to escalating raw material costs and a mismatch between generation cost and tariffs. Inability to pass on the feedstock costs have led biomass power plants to function well below their capacity and, in some extreme cases even suspend operations. Immense fluctuation in fuel costs coupled with absence of adequate and appropriate fuel handling systems are key reasons for the biomass power plants being perceived as non-performing assets (NPA) by the bankers.

There have been only a handful of plants that have been able to tackle most of these challenges and have sustainably operated their plants for over a decade. Varam Power Projects Limited (VPPL)'s 6 MW plant at Chilkalapalem village in Srikakulam District, Andhra Pradesh is leading by example. The plant has been set up on over 27.3 acres wherein approximately 54% of the area is occupied by the generation equipment and about 20% is allocated for storage of the feedstock and the rest of the area is set aside as green belt.

Varam Power's primary business mission is to utilize low-density crop residues for biomass power generation. The plant was commissioned in 2001 and has already completed 13 years of operations successfully even as the biomass cost has shot from about INR 700 per tonne (average annualized purchase price) when it first started out to over INR 2,500 per tonne currently – through this journey, the plant has been able to maintain a consistent average PLF of above 70%. Table 1 summarizes the salient operating and performance characteristics of the Project.



Framing Success

Things haven't always been rosy for Varam. Even as the company commenced operations, some of the key assumptions and approaches on the feedstock availability and costing came under a shadow.

The region where the project has been set up has a predominantly agriculture based economy. The region was selected as it was rich in biomass with significant presence of rice husk as also paddy straw, casuarina, jute stick and castor stems. Traditionally the agro based residues were burnt on the fields leading to high volume of particulate emissions leading to air pollution. Hence the alternate use presented through the biomass power plant offered a significant social and environmental advantage as well.

However things played out a bit differently. Over time demand for rice husk grew due to industrialization, primarily from the growth of lot of small and middle scale industries like solvent oil extraction plants, ethanol plants and beverage plants that sprouted in the region. These industries started competing with the power plant for sourcing & utilizing of rice husk as an ideal fuel. Consequently the cost for rice husk escalated considerably. Also, due to small paddy mills being the only source for rice husk, the availability of feedstock resources in sufficient quantities also seemed to present a potential concern.

As feedstock price varied, the project started experiencing losses since the tariff structure didn't allow for absorption of the price fluctuations in the biomass feedstock. This problem got further exacerbated with the introduction of the two part tariff. While the principle seemed fine, the initial approach left Varam facing substantial losses. Varam was forced to approach the Appellate Tribunal for Electricity which subsequently ruled in their favour and hence the company is expected to recoup the losses in considerable measure.

Figure 1: Historical variation in plant load factor







*Note: Drop in PLF in FY13-14 due to fire at the plant because of which it was shut for almost 6 months for execution of repairs

Table 1: Salient operating and performance characteristics of the Project

Plant summary	
Fuel	Rice Husk and other agricultural residue
Fuel consumption	27 TPH
Alternator capacity	7.5 MVA
Steam pressure	65 kg/cm ² (g)
Steam temperature	492 °C
Boiler efficiency	91.6 % on NCV (Net calorific value)
Availability	>7000 hours/year
Auxiliary consumption	10% of generated power
Annual fuel requirement	>70,000 MT
Plant Load Factor (PLF)	70 - 75%
Gross generation per annum	42 million units
Financial summary	
Capital Expenditure	INR 24.4 Cr
O&M Expenditure	11.8% of Capital
O&M Annual escalation	4%
Debt : Equity Ratio	75 : 25
Interest on Working Capital	12%

spotlight

Plant load factor (PLF) 6 5 [ariff (INR/ KWh)) 4 3 2 0 02-'03 60,-80 11-'12 12-'13 04-'05 05-'06 07-'08 13-'14 8 10-'11 Ś , 14-'15 ,-90 ,-60 5 с-Ю Variable cost Fixed cost

Figure 3: Annual tariff variation for generated power

Even as it approached the Apellate Tribunal, Varam responded to the challenge by enhancing its focus on the feedstock supply chain as also leveraging several of its other levers.

Creating a virtuous cycle of biomass supply chain

The challenge of building a stable, efficient supply chain is typically magnified by three factors: farmer education, logistics management and demand-side stability.

Keeping these issues in mind, Varam employed procurement officers who conducted periodic visits to the villages around the plant to motivate the farmers to bring the residual agro waste to the plant. These officers were made accountable for handling the feedstock supply chain, with a focus on procuring biomass from rice millers and small farmers from within a 30 km radial distance from the plant.

Over the years, while Varam Plant has primarily depended on rice husk (little over 50% of the feedstock consumed annually is husk), seasonal agro residues like red gram stalk, jute sticks, saw dust, ground nut shells, bagasse, prosopis cuttings and casuarina branches have also been used according to the seasonal availability.

Technology

Conventionally biomass power plants have been established with low pressure boilers (65 psi). One of the key decisions made by Varam in its project design was to instead have High Pressure boilers. With biomass fuels becoming more expensive, presence of these high pressure boilers have allowed the project to achieve better fuel to steam conversion and evaporation ratios and thus help generate a higher output in a more efficient fashion.

In addition, Varam team started focusing on pre-treatment. Pretreatment (primarily drying) has helped to improve biomass characteristics and make handling, transport, and conversion processes more efficient and cost effective.

Diversity of revenue flows

Varam had successfully registered under the Clean Development

Mechanism (CDM). It proved to be a major relief for the plant as during that time, the company was suffering under liquidity crisis and losses. Income from CER credits contributed an additional 7-8% to the revenue for initial 10 years of operation. Without the CDM credits it would be difficult for the plant to have sustained for so long.

Integrated Operations a key pre-requisite

Varam success at several levels has been possible only due to a focused commitment on the operational approach as also human resource training.

While most biomass plants with similar number of operating years operate at an average PLF of 40%, the Varam plant has been able to maintain an average PLF of 70 – 75% and Varam's successful management of feedstock availability has been a key principal factor.

Pre-treatment (primarily drying) has helped to improve biomass characteristics and make handling, transport, and conversion processes more efficient and cost effective.





Further given the importance of achieving a stable power output in spite of fluctuations in the fuel supply, the plant has been equipped with a multi-fuel fired traveling grate boiler. This has allowed the plant the ability to handle multiple fuels and thus become more resilient (rather than be constrained by dependence on a single fuel source).

Also, the boiler design has been undertaken to ensure that variations in properties such as moisture content, ash content and fusion temperatures due to fuel mixing do not compromise the plant performance.

Operation and maintenance is a substantial portion of the expenditure on the biomass power plant as compared to other renewable energy sources. A carefully developed plant operations approach represents a critically important variable to optimize the production and commercial viability of the plant. Exceptional performance can only be achieved by treating plant operations as an investment, not an expense. The most notable element in this thinking is to frame an appropriately trained and motivated workforce as also a performance-oriented operations culture. To ensure the project is implemented proficiently and for the plant to be profitable the project proponents need to focus on the operational capability right from the beginning.

Appropriate skilling of the labor and technicians engaged in operations and maintenance of the plant is a key prerequisite to minimize problems and increase productivity

As is evident, for a plant to be able to perform well and sustain the healthy performance, proper maintenance is essential. Appropriate skilling of the labor and technicians engaged in operations and maintenance of the plant is a key pre-requisite to minimize problems and increase productivity.

In case of Varam, the usage of multiple fuels requires frequent shut down of the plant, change of parts and restart after cleaning up slag deposition. To ensure efficient combustion of multiple fuels, operators have been trained to focus on reduction of unburnt carbon

Box 1: Strategies to improve plant performance

- Regular maintenance of the plant with periodic clearance of slag deposition
- Closed-loop optimization of fuel and air mixing by manipulating fuel and air levels to balance combustion in the furnace
- Pre-treatment (drying and cutting) of biomass feedstock for optimum utilization of fuel
- Appropriate information flow and proper coordination between feedstock procurement officers and Operations teams
- Installation of central control and monitoring systems with remote access
- Installation of an integrated biomass fuel moisture sensor to allow a biomass-fueled power plant to monitor feedstock moisture content and adjust combustion processes
- Measurement of flue gases to determine combustion efficiency
- Upgrading technology with timely replacement of equipment with periodic inspection of the system

losses as these fuels differ in moisture and calorific values. Box 1 above lists some of the key strategies adopted by Varam to enable a holistic and streamlined operation.

Plant operations cannot be established and sustained without a sophisticated support and oversight structure. Varam Power has successfully demonstrated the collective institutional platform required for exceptional plant operations.

Mr. AVN Prasad, Director Varam Power Projects is responsible for finance as well as matters related to fuel procurement and pricing. A Masters in Business Administration (with specialization in Entrepreneurship) from Ball State University, (Indiana, USA), he joined the family business in 2004.

IN CONVERSATION WITH

"Increasing Capacity to Lend will be Key for Growing the Bio-Power Sector"



BioPower India spoke to Mr. SB Nayar, Chairman & Managing Director, India Infrastructure Finance Company Ltd (IIFCL) on the role of innovative financing instruments to promote renewable energy sector in India, particularly Biomass power.

Capacity to lend to the renewable energy sector, capacity to implement projects in a timely manner, capacity for proper power evacuation and capacity to pay for power need to be enhanced

What's your outlook for the Indian RE market considering the 175 GW target the government has set?

Renewable energy certainly holds a bright future. Over time it is inevitably going to become a compulsion to move to renewables and increase their share in India's electricity mix. The technologies are likely to improve leading to further reduction in costs. Some mega scale renewable energy based power projects have already achieved grid parity and soon most renewables will achieve it and cost of generation may go below the present tariff rates. The renewable energy target of 175GW as defined by the Government of India can be achieved provided a few challenges are dealt proficiently. The key requirement is enhancing capacity in the system - capacity to lend to the renewable energy sector, capacity to implement projects in a timely manner, capacity for proper power evacuation and capacity to pay for power need to be looked into.

What in your opinion are the present challenges or the key deterrents for investments in the renewable energy sector (especially biomass power) in India?

At a macro level, renewable energy falls under the power sector and most banks have reached their sectoral caps for lending to the sector. This is adversely affecting the credit flow to the renewable energy sector. Removal of renewable energy sector from specific caps for power sector can help channel more funds to renewable energy projects. Separate credit caps may be stipulated for each renewable energy technology if desired.

From a lender's perspective, there are primarily two major concerns regarding lending to renewable energy projects. The first key concern is counter party risk. In grid connected renewable energy power plants, the key concern for lenders is the viability of distribution companies (the counter party in this case) and their ability to buy power and make timely payments to the developers. There have been instances where distribution companies (DISCOMs) have defaulted or delayed their payments to the developers, thereby rendering the power plant unviable. Thus, the health of the counter party is of prime concern for the lenders. Currently, the renewable energy sector is performing well relatively compared to the thermal power sector, but we need to realize that it's the same counter parties for both thermal and renewable energy based power plants and thus it is extremely important that the health of discoms is improved to accelerate the progress of renewable energy deployment.

The second key challenge is transmission of renewable power which is currently a bottle neck in many plants. Proper evacuation of renewable energy power from its generation source and maintaining the stability of the central grid with increasing proportion of renewables in the total electricity mix will be key to future growth. Another challenge specifically for large biomass plants is regular supply of feedstock at reasonable prices. Since fuel costs forms a significant proportion of the total operating costs of a biomass plant, availability of feedstock in line with projected prices is one of the key factors impacting financial viability of biomass power plants. Formulating a proper pricing mechanism/ regulation for feedstock should be set to reduce variability of tariff.

What policy measures are required to be taken to revive the biomass sector?

From a policy perspective, it will be productive if the State Electricity Regulatory Commissions (SERCs) adopt some of the recommendations put forward by Central Electricity Regulatory Commission (CERC). One of the key recommendations was to revise the feedstock prices annually based on independent surveys.

Biomass power as a technology is operation and maintenance (O&M) intensive. It needs people with management experience in the operation and maintenance which includes tasks such as setting up a sustainable feedstock supply chain which will ensure constant supply of fuel for the power plant. The developers also need to plan the project in detail, especially the management of operations and have a good understanding of the various factors affecting the power plant. There should be adequate focus on assessing management capability and bandwidth while sanctioning subsidies/other incentives for biomass power plants such that projects which get selected honour their contracts/PPAs appropriately.

Could you elaborate on some of the steps been taken by IIFCL to promote RE sector financing?

One of the key initiatives undertaken by IIFCL, was to get flexible structuring for infrastructure projects (of which electricity generation is a sub-set) approved by RBI. Better known as 5/25 scheme, lenders can now fix longer amortization period for loans to projects in the infrastructure sector, for say 25 years (instead of 12-15 years earlier) based on the economic life of the asset, with periodic refinancing, say every 5 years. Large renewable energy projects also fall under the category of infrastructure projects and we were instrumental in getting the loan tenures aligned with the requirement of the sector. This benefitted the lenders in terms of improved Asset Liability Management (ALM) and developers in terms of tenure. This move by IIFCL ensured that other lenders also followed suit.

IIFCL has also introduced a "Credit Enhancement Scheme", which is also applicable to the renewable energy sector (the 1st successful bond issuance was in the renewable energy sector). Under the scheme, IIFCL will provide a partial credit guarantee to enhance ratings of bond issues, enabling channelization of long-term funds for infrastructure projects. Under this scheme IIFCL can extend partial credit guarantee to the extent of 20% of total project cost. The guarantee / credit enhancement extended by IIFCL can extend the credit rating of the project bonds to its desired credit rating (minimum AA rating) subject to a maximum of 50% of the total amount of Project Bonds issued. The minimum tenure for the bonds is 5 years with or without lock in.

IIFCL also plans to introduce a mezzanine financing scheme. This will be useful for the developer as instead of increasing equity funding which is more costly, they can avail of subordinate debt.

What are the other initiatives in the pipeline for IIFCL?

We believe that more funds can be channelized from the banking sector and incentives can be given to the renewable energy sector. Infrastructure debt funds (IDFs) can be evaluated as an option to channelize more debt. IIFCL has already embarked on this path and set up IDFs. We are currently in the process of setting up a Infrastructure Debt Fund of INR 1000 crores specifically for green initiatives. Such funds have more flexibility in terms of Initiatives such as the mezzanine financing through sub-debt or even refinancing schemes such as the one being introduced by IREDA can help give the biomass power market a much needed push.

the product structure compared to bank debt. They can offer lower interest rates which can be collected on a quarterly or half yearly basis instead of a monthly routine. IIFCL is also looking to get the climate bond certification for the fund which will be issued by the London-based Climate Bond Standards Board.

Separately, we have also signed a MoU with USAID to provide technical assistance for increasing investment in renewable energy in the country.

What's your outlook for the Indian Biomass power market? Where do you see scope of improvement with regards to the financing aspect of the biomass power market?

The biomass sector needs to be rejuvenated. Looking at the sector from a financing perspective, new innovative financing schemes need to be introduced. The green bond market in India needs to be strengthened. Such bonds have an advantage of providing long tenure loans which will be beneficial to the developers in the renewable energy sector. Even initiatives such as the mezzanine financing through subdebt or even refinancing schemes such as the one being introduced by IREDA can help give the biomass power market a much needed push.

Mr. S. B. Nayar, Chairman & Managing Director (CMD) of India Infrastructure Finance Company Limited (IIFCL), possesses rich experience of around 37 years in finance and banking industry. A certified Associate Member of Indian Institute of Bankers, Mr. Nayar started his career at State Bank of India as an Officer in 1976. Immediately, prior to joining IIFCL, Mr. Nayar was the CEO& MD of IFCI Limited. Mr. Nayar had also been the member of the High Level Committee on Financing Infrastructure of Government of India, under the auspicious of the Planning Commission.

INDUSTRY SPEAK

Targeted Interventions Needed to Re-build Investor Sentiment for Biomass Power sector



K.L Bansal, Chairman & Managing Director, Dee Piping Systems

Successful models in place backed by effective tariff policies will revive the sector again and attract the investor community.

Biomass-based power projects are amongst the best examples of how technology can be leveraged for social benefit by creating a viable socio-economic business model. India being an agricultural economy has always wanted to harness the true potential of biomass and available agro-waste which has a potential of 18 GW capacity. The Govt. has set very ambitious targets for Renewable Energy and is aiming to develop 10 GW of Biomass capacity by 2022. These biomass power projects not only provide clean power but also good employment opportunities in rural areas and thus contribute in the development of the nation.

However, we have not been able to tap into the potential of this sector appropriately. Biomass is the only renewable energy sector, for which the fuel is not free for operation though it is said to be abundantly available.

Currently, a lot of the biomass projects across country are operating at suboptimal capacity due to higher fuel prices, inefficient fuel supply chain mechanism or unviable tariffs etc. This has a cascading effect on future investments in the sector. Because we have limited successful commercial demonstration model projects to showcase, investors are not very keen in investing in Biomass projects.

However, we believe that with successful models in place backed by effective tariff policies the sector will revive again and attract the investor community.

Challenges related to fuel availability and tariffs have deterred investors in the past

Renewable energy segments like wind, solar and hydro are bound by one or more natural limitations like geographical location, weather, etc. For example wind energy generation is confined to coastal areas and desert, solar energy depends upon weather conditions such as cloud cover, rainfall, etc. and is limited to few hours during the day and hydro power plants is mostly effective in hilly areas. Contrary to these, biomass power has no natural constraint apart from agricultural waste availability which is in abundance across India but irregular tariff policies and high fuel cost have marred the growth of this sector.

Revision of tariff by some of the State Electricity Regulatory Commissions has not kept pace with the increasing cost of biomass, making biomass power plants commercially unsustainable. Hence, change in tariff based on prevailing fuel cost has emerged as one of the key barriers to the faster growth of the sector.

Also, biomass from agriculture is available only after harvesting period which can stretch only for 2-3 months in a year thus posing a challenge to fuel availability for the whole year. Thus there is a need to procure and store required quantity of biomass within this stipulated time which requires huge investments and is one of the key concerns of developers and investors. Other challenges plaguing the sector include immature biomass supply chain, high transportation costs, etc.

All these factors have created significant business risks for the investor. Financial institutions have increased the rate of interest for biomass segment, given the increasing fuel risk and high cost of operation. Also, the term loans have been given on a short tenure, thereby not allowing these projects to create any liquidity. Moreover, the sector has not had backing of foreign investment unlike the wind and solar sector, which have mostly been in limelight in renewable space.

Positive steps by policy makers ensuring revival of sentiment

Central Electricity Regulatory Commission (CERC) and the Ministry of New and Renewable Energy (MNRE) have already acknowledged that the biomass sector is facing challenges and have formed task force committees as well to remove these barriers.

The revised regulations notified by Central Electricity Regulatory Commission (CERC) in May 2014 for biomass is a very welcome and timely step to resolve various problems faced by biomass developers in the sustained operation of their power plants. CERC has acknowledged and recognized the issues and collected actual field level information/data from various stakeholders and performed systematic analysis of various technical, financial, and operational parameters before approving normative values to these parameters critical for determination of generic tariff for biomass power. Another important recommendation was to revise the fuel price annually based on an independent survey.

State Electricity Regulatory Commissions must take cognizance of the revised regulations notified by Central Electricity Regulatory Commission (CERC) and pass on the benefits to the biomass power producers so that their plants can run economically. This definitely

Continuous innovations required to overcome fuel related struggle

Dee Piping Sytems commissioned the first of its kind, a 6 MW biomass based power generation project for Malwa Power Private Limited (MPPL) in April 2005. During the first year of operations, MPPL's biomass plant was operated on rice husk, which was available at reasonable prices in 2005-06. The first major problem arose when the price of rice husk shot up with the increase in the state's industrial growth, while biomass power tariffs remained stagnant at Rs 3.49 per kWh. As a result, it became unviable for us to use this fuel for power generation. The firm, therefore, shifted to cotton stalks. However, a key challenge in using cotton stalks was transporting large volumes of the material from remote areas. In order to tackle this issue, the company decided to set up open purchase centres in remote areas to help farmers sell cotton stalks at their door step. In the first phase, 8-10 such centres were set up in 2006-07 by taking land on lease. The results were encouraging and the company succeeded in procuring 50,000 metric tonnes (MT) of wet cotton stalks (25,000 MT in dry form) against the annual fuel requirement of 70,000 MT. However, transportation in an unchipped form over a distance of more than 40-50 km was a challenge. We, therefore, installed chipping machines at the purchase sites for storage in dry form. In 2007-08, with about 25 collection centres equipped with chipping and transportation arrangements, the company succeeded in procuring over 100,000 MT of wet cotton sticks (50,000 MT in dry form), the highest ever collected in the state so far. During the same year, the plant recorded a plant load factor (PLF) of 92 per cent, the highest in its ten years of operations.

Soon thereafter, following MPPL, several brick kiln owners and other captive users began opting for cotton sticks as fuel material, thereby intensifying the competition and driving cotton stick prices upwards. Unable to procure cotton sticks at the increased prices, the company switched to using biofuels such as dry leaves from plantations. Over time, it started sourcing other agro-waste such as wild grass, sarkanda, nadda, juliflora, wheat straw, gowara straw and moong straw. However, the commissioning of new biomass plants in 2009-10 in the adjoining areas, and that too with a higher tariff of Rs. 4.50 per unit (with annual escalation and provision of reviewed power tariffs as per biomass price escalation) under the NRSE Policy, 2006, presented a new set of challenges. The buying capacity of the new plants was much higher and they started taking away the biomass by paying higher rates. In order to tackle this issue, the company decided to change its fuel procurement strategy by shifting to energy plantations. In the first phase, it planted 500 acres of Eucalyptus and 250 acres of Napier Bajra by hiring land with dense plantation on lease. The model did not achieve the desired results and contributed just 5% to the fuel mix. This was not enough to meet the project's fuel requirements, As a result of stagnant tariff and increased fuel costs the PLF for FY 12 and FY 13 dropped down to 70.6% and 47% respectively. Then we focussed on developing mechanism for utilization of paddy straw agro waste as fuel for the biomass plant by playing a supportive role in associating farmers with bailer machine manufactures and gave them assurance of procuring the paddy straw waste at a good price. We have achieved PLF of more than 75% during FY 14 and 77% in FY 15 after tariff revision and simultaneously we had developed mechanism to utilize paddy straw fuel.

will give a positive thrust to the sector.

Most importantly, these amended norms should be applicable to existing plants as well and State regulatory must take some step in that context. Andhra Pradesh Commission has already passed an order and amended the norms for existing plants. (Haryana has also considered the CERC recommendations.)

New interventions along with continuation of existing initiatives will help re-energize the sector

Though policy makers have taken positive steps to ensure the revival of the sector, more specific interventions are required to reenergize the investor sentiment towards the biomass power sector. Fiscal incentives such as 80% accelerated depreciation, concessional import duty, excise duty, tax holiday for 10 years etc., are available for biomass power projects but are not enough to support the growth of the sector.

Unless there is a revival of the existing plants and viable feed in tariffs in place, investors will not show further interest in the sector.

Financial restructuring of outstanding loans for which MNRE has already initiated the process and extended working capital finance during seasonal procurement season (Oct. to Dec.) and allocation of degraded land for in-house energy plantation will surely help existing biomass to perform and will contribute in improving the confidence of other prospective developers and investor community.

The benefits which developers used to get from sale of CDM credits are practically nil these days and that has contributed to making some of these projects unviable.

Another key aspect is to build a successful fuel collection model where we believe developers can play an instrumental role with support from MNRE.

Also, the Punjab Government is providing 50% subsidy on balers which has enabled farmer community to collect paddy straw in large quantities. The subsidy has been in place for the last 3 years and has benefitted not only the farmers and project developers but also led to prevention of burning of paddy stubble in the nearby plant regions, thereby decreasing the associated air pollution. We believe other states should also provide such subsidies and further support the maximum utilization of agro-waste and can potentially extend the support to shredders and other chipping machineries as well.

The biomass power sector has matured over the years and the way MNRE and CERC are addressing the practical problems faced by projects we believe that the sector will soon regain its momentum. Investors must also take the responsibility in making the world more sustainable and should consider Indian biomass sector as an opportunity and come forward to support the sector like they have supported solar and wind.

Mr. Krishan Lalit Bansal is the founder and Chairman & Managing Director of DEE Piping Systems, one of the leading international engineering enterprises offering single source solution for piping systems to power and other process sectors and operating two Biomass Power Plants in the state of Punjab. He holds a degree in Mechanical Engineering from Punjab Engineering College.

IN CONVERSATION WITH

"Banks need to Leverage the Positive Market Sentiment and Direct more Capital towards Renewable Energy Sectors"



BioPower India spoke to Ms Namita Vikas, Senior President and Country Head – Responsible Banking, YES Bank on the role of innovative financing instruments to promote renewable energy sector in India, particularly biomass power. YES Bank is one of the few private banks actively involved in the renewable energy sector. What were key drivers for the bank for entering this domain? How do you see the renewable energy market shaping up in India?

The global challenges of food, energy and water security, in addition to emerging climate crisis, demand a surge forward towards a "new-normal" where governments and organizations need to transcend from a reactive to a proactive mode. We believe that banks being central to economy, are harbingers of industry action. As banks finance growth and development, and in a way, the emissions associated with them, it is important for the sector to play a leadership role in India's response to sustainability development.

YES BANK has always placed considerable emphasis on providing banking and financial solutions to Sunrise sectors of the Indian economy. Renewable energy is one such focus identified by the Bank which also fits in perfectly with YES BANK's Responsible Banking ethos of mainstreaming a business case for sustainability across a wide spectrum of stakeholders. At YES Bank, we are moving the needle with interventions that include climate finance advocacy and action, and are one of the largest financers of renewable energy among the private lenders, and earlier this year, launched India's first ever green infrastructure bonds, the proceeds of which would be used to finance green infrastructure projects including wind, solar, biomass and small hydro.

Over the next decade, India faces some of the biggest financing challenges - ending financial exclusion for millions of Indians, providing modern infrastructure and secure water access to all its citizens, investing in enterprises and institutions that can provide livelihoods to millions of job seekers entering the workforce each year. Apart from this, India has committed to achieving 100GW solar, 60 GW wind, 10 GW bio, 5 GW small hydropower by 2022, which means that Indian financial system has to stretch to meet these aspirations.

What's your view on financing the RE sector (especially biomass power) in India? What are the present challenges for investments in this sector? Given India's broadened development agenda, it is crucial to align the financial system with sustainable development. India has some extremely capital-intensive development targets, which must be achieved in parallel to its shift towards being a low carbon growth trajectory. With its stated commitment to achieving 175 GW in renewable energy capacity, including 10 GW of biomass, India will require massive public and private financing which is both an opportunity and a challenge.

In the last few years, viability of renewable energy projects has significantly improved, and with improved technology, improved business models with lower risks, and stronger government backing (financial and policy), the RE sector has been able to attract strong funding support.

However, as a funding institution, the challenges we often encounter in financing renewable energy include land acquisition, rapidly evolving technology, and the fact that most players in this segment are still small. But there are few mitigating factors as well, for example, the longer term risks are mitigated by ensuring power generating firms receive generationbased incentives (GBI).

The government has institutionalized funds towards climate action which need to be disseminated in a speedy manner. Single window and speedy clearances of projects contributing to climate action would fast track projects.

What specific interventions are required to address these gaps and re-kindle the growth of this sector?

In general for the entire RE sector, greater policy & regulation intervention would help finances flow smoothly into the sector. For example, the RBI recently included renewable energy in Priority Sector Lending (PSL) requirements. As per the RBI guidelines, banks can lend up to a limit of INR 15 crore to solutions like solar based power generators, biomass based power generators, wind mills, micro-hydel plants, and for non-conventional energy based public utilities such as street lighting systems, and remote village electrification.

In a move that signals progress, the recent Indian union budget has allocated around USD 525 million (INR 3200 crores) towards water security, renewable energy including USD 82 million to Ultra Mega Solar Power Projects and implementation of the Green Energy Corridor Project, which will be accelerated to facilitate the evacuation/transfer of renewable energy across the country.

The government also recently out laid INR 100 Crore towards "National Adaptation Fund" to meet the vagaries of climate change. However, effective execution will be critical to actualize the benefits of these initiatives from both public and private sector, with facilitation from financial institutions, which are the conduits of capital. Similarly, the Green Climate Fund¹² can be a source of funds for biomass projects once it goes live.

From a financial sector perspective, one of the biggest deterrents to formal lending in sustainability linked sectors is the perceived high risks. There is a strong business case for creating risk guarantees for lenders that can mitigate some of these perceived risks.

What are the steps being taken by YES Bank to promote and accelerate the growth of Renewable Energy (particularly Biomass) based projects in the country? From a financial sector perspective, one of the biggest deterrents to formal lending in sustainability linked sectors is the perceived high risk. There is a strong business case for creating risk guarantees for lenders that can mitigate some of these perceived risks

At the 1st Renewable Energy Global Investors Meet & Expo (RE-Invest 2015) hosted by the Ministry of New and Renewable Energy, that was held earlier this year, YES BANK was the first Bank to have made a commitment of funding 5,000 MW of renewable energy projects by 2020. The bank was also a pro bono knowledge partner for the meet. Last year, the bank had also made a commitment of funding 500 MW of Clean Energy projects at the United Nations Climate Change Summit 2014 in New York, where it was the only Indian bank attending.

To fund its commitments, YES BANK issued India's FIRST ever Green Infrastructure Bonds raising an amount of INR 1,000 crore. The issue, launched on February 16, 2015 witnessed very strong demand from leading investors. The bonds are for a tenor of 10 years and the amount raised will be used to finance green infrastructure projects in renewable energy including solar power, wind power, biomass, and small hydel projects.

Most recently, YES BANK further raised INR 315 crore through the issuance of Green Infrastructure Bonds to the International Finance Corporation, marking the first ever investment by IFC in an emerging market green bond.

¹² The Green Climate Fund (GCF) is a fund within the framework of the UNFCCC founded at COOP 16 as a mechanism to assist developing countries in adaptation and mitigation practices to counter climate change.

Do market based mechanisms such as CDM credits and RECs play a role in incentivizing growth of the biomass power projects in India?

Biomass projects qualify for CDM benefits, and benefit from the fact that they are of relatively low cost and are backed with sound technology. However, given the current state of the CDM mechanism, where Certified Emission Reduction (CER) rates are at one of their lowest since they were first mooted, they are becoming less popular as an incentive. Additionally, there is almost zero market trade happening. Alternatives to the CDM mechanism, global financing mechanisms such as the Green **Climate Fund and Global** Environment Facility can be used to fund clean technology in the developing economies.

Having a credible, certified scheme such as the CDM is necessary to drive carbon emissions offsetting initiatives in the private sector, and provide a credible route for finances to flow into developing economies. This was recently proposed by Shri Prakash Javadekar as well, who proposed a green credit that can spur the flow of critical technologies from developed economies.

What's your outlook for the Indian renewable energy market?

Even as of now, close to 300 million Indians do not have access to electricity, which underlines the importance of scaling up India's power generation capacity. At present, more than two-thirds of India's power production capacity is thermal based. Given that globally, energy production contributes highest to carbon emissions (approximately a quarter of total emissions), it is extremely important for energy starved nations, such as India, look at clean energy to fill this production gap, while at the same time move away from thermal based production.

At present, the installed Renewable energy capacity in India is about 37 GW and if it has to reach the 175 GW target by 2022, must keep adding over 20 GW capacity every year. We believe this is an achievable target, and an optimistic approach by the government opens up a plethora of opportunities for the finance sector in accelerating green business.

Overall, In the Indian context, as the market is ripe with new investments, banks need to look at leveraging this positive market sentiment and direct more capital towards renewable energy sectors.

Ms. Namita Vikas spearheads sustainable development, climate action and CSR at YES BANK. As a climate action specialist, she has been elected to Global Steering Committee of United Nations Environment Program-Finance Initiative (UNEP FI) and is Vice Chair of UN Natural Capital Declaration (NCD). She was also elected as the UNEP FI Chairperson for APAC. In addition, she serves on YES FOUNDATION board and guides its overall strategy. Ms. Vikas holds qualification in CSR, sustainability (Svenska Institutet), economics (Mumbai University) and is a certified independent director with around 26 years of experience.

INDUSTRY SPEAK

Make Renewable Energy Technologies Work Together to Create True Impact, Growth and Prosperity



Aditya Sharma, Senior VP Asia, Boson Energy SA



Heike Zatterstrom, CCO, Boson Energy SA

Distributed biomass based co-generation is a vital complement to an energy system with centralized solar and wind Biomass is on the verge of making a big comeback into the modern energy system – in the shape of its incarnation **gasification based co-generation**. These are highly energy efficient and advanced high temperature technologies that can play pivotal roles in energy systems, and support growth and prosperity building while respecting flora, fauna and human needs.

Biomass' key contributions to the future proof energy system are;

- Distributed generation for redundancy, speed of deployment, and cost;
- Thermal generation for high final energy efficiency;
- Local fuel sourcing for social and economic impact by creating jobs, reducing waste, and use of marginalized land for plantation;
- Municipality approved solutions for complete location flexibility, and;
- Reliable baseload energy in commercial scale for a local entrepreneurial eco-system.

Renewable energy on the world scene

The world over, an unprecedented amount of investment is going into renewable energy. As per the Renewables 2015 Global Status Report from REN21; the renewable energy sector attracted \$270bn in investment in 2014, representing 58.5% of net addition to global power capacity.

The Energiewende model from Germany was long considered a leading reference model for this shift; and to a large extent inspired by the German model, almost \$150 billion of investment has gone into solar technologies and \$90 billion into wind technologies globally in 2014. India, on its part, has set an ambitious plan to add 100GW of solar energy capacity and 60 GW of wind projects by 2022 – most of them at utility scale.

Investments in utility scale solar and wind in Germany has been driven by subsidies, fiscal incentives, and grid priority. It has created an impressive installed name-plate base, but has also resulted in a) high incentive costs, b) massive infrastructure investments to cope with prioritised intermittent generation in the grid, and c) a complete profitability crash in conventional centralised generation. A conventional generation that remains (a crippled but vital) backbone of the German energy system, just as it does in most economies – and in several European countries incentives to intermittent generation are now being reduced or removed.

A complete societal impact system approach can give India a unique leap-frog opportunity

India and other developing countries have had the opportunity to watch the policies and investments in solar and wind, and has a unique opportunity to learn from it and leap-frog to the next generation energy system, just like they had, and took, the opportunity to largely skip a fixed telephony for a mobile ditto, and also with the internet now.

Key to building a resilient energy system for growth and prosperity is to avoid a silo approach; and to look at how not only power, but also thermal energy, fits into the complete societal system. And realize that there is not one or two silver bullet technologies, no one ready made and functioning system solution to import and implement; but rather look at local demand and potential supply and infrastructure and come up with a truly Indian solution where resilience, final energy efficiency, and cost efficiency is the mantra.

- Intermittent technologies carry high hidden costs from an energy- and societal system perspective and will continue to do so for a long time to come. Recent studies in India as well confirm this picture. 'Free fuel' is far from free. In addition to hidden costs there is also land use; and in the case of CSP in India typically astonishing amounts of water consumed per MWe produced, in areas where there is little of it. But intermittent generation have their place in the system, no doubt about it.
- Conventional centralized largescale generation has its place too, with the massive power demand growth that will continue. But adding capacity takes time, land, and money; and it is costly and slow to build a grid that can deliver

all that power to end-users. Lagging transmission capacity growth has already brought down the average Plant Load Factor to 65% by the beginning of 2015.

 Distributed co-generation from solid fuels such as biomass, has an absolute key role to play in an energy system that is built with a societal impact and local prosperity building as the main criteria – and what other criteria is of any relevance at the end of the day.

Distributed co-generation from biomass as a tool for societal impact and local prosperity building

The Indian government clearly understands that biomass is an important part of a future energy system. A biomass potential of 18GW has been established, a target of 10GW by 2022 has been fixed, tariffs are being fixed, and investors are invited to invest in biomass.

But more can be done to understand the vast potential of distributed co-generation from a complete system impact perspective. And implement processes to ensure that the total cost and benefits to society are considered and evaluated when PPAs or project proposals are evaluated. Rather than pitting technology X against technology Y on a limited set of factors; many situations call for a base of solution X, a section of solution Y, and complemented with technology Z.

Distributed co-generation from biomass for instance has a number of characteristics that India should ideally be considered in any evaluation process:

Speed, flexibility and redundancy of distributed generation

Many small units hooked up to interconnected mini-grids can create redundancy by design over large areas, without requiring costly and time-consuming transmission investments. Especially important in Distributed generation has an important role to play all the way from the smartest of cities to the most remote of underdeveloped areas

situations of rapid urbanization where high energy density is required and heavy infrastructure cannot keep up with the urban sprawl. It also reduces energy system complexity while ensuring control and energy security through local sourcing and operation. Distributed generation has an important role to play all the way from the smartest of cities to the most remote of underdeveloped areas.

High final energy efficiency from thermal generation

Bringing down scale, turns 'excess heat' into 'success heat'. The 1.5+ MWth of thermal energy from a 1MWe cogeneration plant can provide onsite heat and steam for manufacturing industries or power cold storage that would boost food security and/or reduce produce

Bringing down scale, turns 'excess heat' into 'success heat'

wastage in a rural area considerably. Or both power and cool hospitals, data centres, and office complexes.

Local long-term jobs and revenues from local fuel sourcing In contrast to 'free fuel' solutions, biomass co-generation becomes a positive part of the local socioeconomic system and improves the regional trade balance. It creates local jobs at all skill levels – from biomass supply, to operation and maintenance. And in agricultural regions it can create revenues from both crop residue problems and marginalized land.

Low environmental impact to communities and environment

Exceptionally low environmental impact and community nuisance, in combination with the local socioeconomic contribution makes biomass gasification one of few 'IMBY' energy technologies (welcome 'In My Back Yard') as opposed to any of the centralized solutions that are all opposed in a BANANA way ('Build Absolutely Nothing Anywhere Near Anything') creating very real issues with delays in permitting and committed rollout schedules.

Low system costs and high energy security from local base load generation

Base-load generation on small industrial scale improves energy security and can power local industries and entrepreneurs, hospitals and schools, and remote communities; in a way that intermittent generation cannot in a cost effective way.

See the illustration for an overview of several key factors – and biomass defending its position as an important part of a resilient energy system.

	1 MWe	1 MWe	Biomass 1 MWe
Capacity Utilisation Factor	19%	20%	85%
Power Output MWe	1665	1755	7445
Thermal Output MWth	-	-	13400
Final Energy Output MWe+th	1665	1755	20845
Output Profile	ţ۷.	tww.	ŧ,
Hidden Cost (Transm., Storage)	High	High	
Local Long term jobs	8	۵	Å

Boson Energy SA, 2015 (Solar and wind CUF from MNRE/CSE)

Conclusions

India has an opportunity to adopt a societal impact- and prosperity building approach to the development of a resilient energy system. We are pleased to see that some steps are already taken in that direction through studies on socioeconomic and environmental effects of different technologies. For example under the MNRE-UNDP/GEF Project on "Removal of Barriers to Biomass Power Generation in India".

KPIs that we encourage government, industry, and investors to apply widely when assessing complete system solutions include:

- (a) Capacity Utilisation Factor (CUF), capturing the ratio of power generated compared to the name-plate capacity
- (b) Final Energy Efficiency (FEE), demonstrating combined efficiency in delivering energy in the final form in which it is consumed



- (c) Societal Cost of Electricity (SCoE) generation: an assessment of capital-, operational-, and socio-economic cost on a complete system level per unit of generation, over the lifecycle of a particular project
- (d) Local socio-economic and environmental impact: including local jobs and sourcing revenues, skills development, eco-system, nuisance, and community acceptance.
- (e) Technology and project resilience: Risk of the technologies involved becoming obsolete or changing policies affecting project business case

An integrated approach will help unlocking the estimated 18GW of biomass potential – and create more

fundamentals before the investment is written off.

An integrated approach will help unlocking the estimated 18GW of biomass potential – and create more. And develop clear economic drivers towards a structured, market driven feedstock supply chain with important certainty around quality, quantity, and price. Such a development would attract foreign investment at a different scale, and minimise the need for fiscal support.

Boson Energy is committed to contribute to realising the full biomass energy potential in India – including research and skills development in a Centre of Excellence; capacity building across the complete value chain; and rolling out distributed high-efficiency cogeneration technology for biomass to the market – together with global and local partners.

Please feel free to contact us at india@bosonenergy.com.

Aditya is responsible for developing Boson's markets in Asia, and in particular India – where the focus is on smart distributed energy solutions based on local solid fuels. Aditya has 17 years of India experience and 6 years in Europe, working with global leaders in metals & mining, energy and finance. Aditya is a Certified Energy Risk Professional from GARP, an MBA in Finance, a Cost and Management Accountant and also a Chartered Secretary with fellowship.

Heike is a seasoned strategy-, management-, and communications consultant. Prior to Boson, he spent eight years with Gurgaon based global research- and analytics power house Evalueserve – focused on operations and business development primarily in Europe. He has also spent three years at AOL Europe, where he was the leadclient of analytics services executed from India. Heike holds an MSc in Accounting & Managerial Finance and Marketing from the Stockholm School of Economics, Sweden.

Policy Updates

Punjab State Electricity Regulatory Commission (PSERC) released determined renewable energy tariffs for projects to be commissioned in FY 15-16

Issue Date – July 24, 2015

In May 2015, the commission had released a draft staff paper for determination of the generic levellised generation tariff for RE Projects for FY 2015-16 and solicited comments/suggestions from the stakeholders on the same.

After careful consideration of the comments/suggestions, the Commission after revised Station Heat Rate (SHR) and Calorific Value (CV) as 4126 kCal/kWh and 3174 kCal/kg as against existing 4000 kCal/kWh and 3300 kCal/kg respectively for biomass based projects (considering the Second Amendment, 2014 and Third Amendment, 2015 by CERC as brought out above post the Order of the Commission dated 05.09.2014).

After considering all the submitted comments and suggestions the commission released the final tariff.

Generic Tariff for RE technologies for FY 2015-16

FY 15-16	Levellised Fixed Cost (₹/kWh)	Variable Cost (FY 2015- 16) (₹/kWh)	Applicable Tariff Rate (₹/kWh)	Benefit of Accelerated Depreciation, if availed (₹/kWh)	Net Applicable Tariff Rate upon adjusting for Accelerated Depreciation benefit (₹/kWh)
Biomass Power Projects (other than rice straw) with water cooled condenser	2.70	5.06	7.76	0.18	7.58
Non-Fossil Fuel based Co-Generation Projects	2.23	4.57	6.80	0.14	6.66
Biomass Gasifier Power Projects	2.66	4.86	7.52	0.13	7.39

Also, the Commission also observed that, the proceeds of carbon credit from approved Clean Development Mechanism (CDM) project are to be shared between the generating company and concerned beneficiaries in the second year onwards after the Commercial Operation Date (COD) of the generating station (According to CERC RE Regulations 2012 adopted by the Commission).Thus 100% of the gross proceeds on account of CDM benefit are to be retained by the project developer in the first year after the COD and the share of beneficiaries shall be 10% in the second year and progressively increase by 10% every year till it reaches 50%, where after the proceeds are to be shared in equal proportion.

It is, however, clarified that sharing of the CDM benefit, if any, shall be applicable after the sale proceeds from Carbon Emission Reductions (CERs) are received by the project developer and not from the date of commissioning.

Source:http://www.pserc.nic.in/pages/Generic %20Tariff%20Order%202015-16.pdf

Maharashtra Electricity Regulatory Commission (MERC) released the Maharashtra Renewable Energy Policy 2015

Issue Date - July 20, 2015

Under the new Renewable Energy Policy, Maharashtra state has set a total target of 14,400 MW capacity power projects based on new and renewable energy sources to be installed in the next 5 years. Out of this, 300MW would be of Biomass based power projects and 1,000MW of bagasse based cogeneration projects. Project specific guidelines for biomass power are as follows:

Bagasse /Agricultural cogeneration projects: It will be mandatory for the project developers to sell power primarily to any distribution licensee in the state for fulfilling the RPO at a preferential tariff determined by MERC. After fulfilment of RPO of the distribution licensee the project developer will have the option of captive use or third party sale within or outside the state.

Incentives for project developer:

- Exemption from supervision charges for setting up grid evacuation arrangement.
- Exemption from electricity duty for captive power plants for 10 years from the date of commissioning
- Exemption from sales tax on purchase of sugarcane (as mentioned in Government resolution no. Bagasse-2013/C.R.165/Energy-7 dated 31.01.2014 for all projects having capacity more than 3MW (35 lacs units).

 Projects that have obtained infrastructure clearance under earlier policy will get the benefits mentioned under the prevailing policy.

Biomass power projects:

MSETCL/MSEDCL will help developers with grid evacuation of LV/HV/EHV projects and Grid.

Incentives for project developer:

- Exemption from electricity duty for captive power plants for 10 years from the date of commissioning.
- Promotional elements will be applicable on projects which have got infrastructure clearance from MEDA from 1st April 2015 onwards and which get commissioned.
- All projects shall get capital subsidy up to 1 Cr from green energy fund.

Source:http://www.mahaurja.com/PDF/MEDA_ ConsolidatedPolicy2015.pdf

Maharashtra Electricity Regulatory Commission (MERC) extends period of applicability of generic tariff order for renewable energy

Issue - July 21, 2015

Maharashtra Electricity **Regulatory Commission determines** the Generic Tariff for renewable energy sources at the beginning of each financial year. Accordingly the Commission has issued a suo moto Order on 7 July, 2014 determining the Generic Tariff for RE technologies for the fifth year of the Control Period, i.e., FY 2014-15 which was applicable for new RE Projects commissioned during that Financial Year. Since extended applicability of the Generic Tariff Order dated 7 July, 2014 in Case No. 100 of 2014 is upto 31 July, 2015 and regulatory process for revising RE

tariff regulations for the next control period has not been completed yet, the Commission is of the view that the MERC Order in Case No. 100 of 2014 needs to be extended further upto 31 October, 2015.

Source:http://www.mercindia.org.in/pdf/Order %2058%2042/Order-92%20of%202015-21072015.pdf

Punjab Electricity Regulatory Commission (PSERC) takes stern steps on RPO compliance note after Punjab State Power Corporation Limited (PSPCL) filed petition

Issue - July 28, 2015

The Punjab Electricity Regulatory Commission (PSERC) in response to a petition filed by Punjab State Power Corporation Limited (PSPCL) pertaining to RPO compliance of FY 2014-15, in which the PSPCL had requested the commission to carry forward the net shortfall in RPO targets for FY 2014-15 of 811.51 MUs Non-Solar and 3.62 MUs solar energy (excluding compliance of carry forward of 2013-14) to next financial year (FY 2015-16).

Earlier the commission had allowed PCPCL to carry forward the unmet RPO of FY 13-14 to FY 14-15 which were be met along with the RPO for FY 2014-15. PSPCL in its petition provided the status of its RPO compliance for FY 14-15 including for FY 2013-14, which is given in the table below 2014-15:

	Net shortfall in RPO targets			
RPO	FY 2014-15	FY 2013-14		
Non-Solar	811.51 MUs	178.14 MUs		
Solar Energy	3.62 MUs	41.51 MUs		

PSPCL in its petition for carry forward of RPO cited various reasons for non-compliance of RPO. The reasons cited by PSERC were:

- 1. Delay in commissioning of the new NRSE Projects by developers during FY 14-15.
- 2. Failed to purchase Non-Solar RECs due to alleged financial constraints faced by PSPCL.
- 3. Non-operationalization of four Micro Hydel Power Projects of PSPCL.
- 4. Non-revival of 10 MW rice straw based project at Jalkheri.
- 5. Low generation from the existing / newly commissioned NRSE Projects.

Additionally PSPCL also stated that it was due to factors beyond control of PSPCL and RPO targets being set by the commission are unachievable. However the reasons cited by PSPCL for shortfall in RPO compliance for FY 2014-15 were not accepted by the commission. The commission also stated that it does not accept the argument of alleged financial constraints of PSPCL as the Commission had approved the amount of ₹98.00 crore exclusively for this purpose.

The commission also cited the Hon'ble APTEL Judgment which has issued directions to State Electricity Regulatory Commissions and Joint Electricity Regulatory Commission to enforce RPO. Thus the Commissions are bound to enforce their respective RPO Regulations. Furthermore PEDA had also stated that PSPCL could have made full RPO compliance by arranging to purchase RE power from outside the State and also by purchasing RECs.

The commission in its judgement has allowed carrying forward the shortfall in RPO compliance for FY 2014-15 to FY 2015-16. This shall be in addition to the RPO compliance for FY 2015-16 specified in the RPO Regulations. Additionally the commission has directed PSPCL to comply with the RPO obligations latest by 30th Dec 2015 and communicated that failing which further action as per regulations may be initiated.

Source: http://www.pserc.nic.in/

The Karnataka Electricity Regulatory Commission (KERC) has proposed an amendment to its RPO (Renewable Purchase Obligation) regulation for captive co-generation plants using fuel other than renewable energy sources.

Issue Date – August 4, 2015

The commission had issued regulations for procurement of energy from renewable sources Regulations, 2011 which came into effect from April 2011. The regulation specified the obligation for every grid connected captive plant or captive co-generation plants having capacity exceeding 5 MW consuming from sources other than renewable, to purchase a minimum of 5% of its consumption from renewable source.

The Hon'ble Appellate Tribunal for Electricity (ATE) had passed an order on 10th April 2015, upholding the exemption of co-generation plants from RPO obligation after being challenged by a petition filed by GERC. The commission thus after deliberating on this order decided not to impose RPO on any consumer utilizing electricity generated from co-generation plants using fuel other than renewable energy sources.

Source: http://www.karnataka.gov.in/kerc/Downloads/COURT-ORDERS-2015/Order-04.08.2015 Impostition_of_Renewble_Purchase_Obligation.pdf

UP to announce Biomass Energy Policy 2015

Issue - August 28, 2015

Uttar Pradesh is targeting 1,000 MegaWatt (MW) in the new draft of the UP Biomass Energy Policy 2015, which is being finalised. Uttar Pradesh has 592.5 MW of biomass power plants installed as on 31.03.2011 according to MNRE. UPNEDA is soliciting suggestions from experts and general public before the government implements it. The policy would be effective for the next 10 years and be subject to amendments.

As per the policy a maximum of 2 acres of land per MW can be acquired for the biomass plant. The government is also considering providing 100% stamp duty exemption on acquiring private land for setting up biomass power plant.

The biomass fuel is to be sourced from within a 25 km range of the plant and new schemes are to be framed for the same.

Source: http://upneda.org.in/policies

Rajasthan Electricity Regulatory Commission (RERC) released Biomass,

Biogas and Biomass Gasifier Tariff Regulations, 2015

Issue Date – Sep 9, 2015

On May 15, 2015 RERC had released a draft order soliciting comments/suggestions from the stakeholders on the draft tariff order or the Biomass, Biogas and Biomass Gasifier based power plants getting commissioned during FY 2015-16. The commission has now released the final order for FY 2015-16

The Commission has decided that total biomass fuel price for FY 2015-16 would be Rs 2743/MT (=Rs2643 as base price+ Rs 100/MT as average storage and feeding charges) and it would be Rs 2875/MT (=Rs2775 with 5% escalation on the base price of Rs2643/MT + Rs100/MT) for FY 2016-17.

Tariff for biomass based power plants getting commissioned during FY 2015-16

	Water Coole	d Condenser	Air Cooled	Condenser
FY 2015-16	Without Availing AD Benefit	With AD Benefit Availed	Without Availing AD Benefit	With AD Benefit Availed
Fixed charges (Rs/kWh) (Levellised for 20 years)	2.75	2.57	3.00	2.81
Variable Charges (Rs/kWh)	3.82	3.82	4.12	4.12
Applicable Tariff (Rs/kWh)	6.57	6.39	7.12	6.93

Tariff for biomass gasifier based power plants getting commissioned during FY 2015-16

	Biomass Gasifier based power plants		
FY 2015-16	Without Availing AD Benefit	With AD Benefit Availed	
Fixed charges (Rs/kWh) (Levellised for 20 years)	2.50	2.37	
Variable Charges (Rs/kWh)	3.81	3.81	
Applicable Tariff (Rs/kWh)	6.31	6.18	

Source: http://rerc.rajasthan.gov.in/TariffOrders/Order218.pdf , http://rerc.rajasthan.gov.in/TariffOrders/Order224.pdf

Disclaimer: The regulations presented here are summaries of the original and should not be referenced for legal or commercial purposes. For the original regulations, refer to the websites of the issuing agency.

MISSION ACTIVITIES

Regional Workshop on Policy and Regulatory Framework for Biomass Power Generation

A regional workshop on policy and regulatory framework for biomass power generation was organized by Odisha Renewable Energy Development Agency (OREDA) at Bhubaneshwar on 21st August 2015 with funding support from the MNRE-UNDP/GEF Biomass Power Project.

A number of stakeholders participated in the workshop which included state government officials, project developers, technology suppliers, bankers, researchers and students from universities.

Inaugural Session

The inaugural session was attended by Shri GC Pati, Chief Secretary, Govt. of Odisha, Shri Upendra Tripathy, Secretary, MNRE, Govt. of India, Shri CJ Venugopal, Principal Secretary, Sc & T Dept, Govt. of Odisha, Shri Sudarshan Das, Chief Executive, OREDA, Dr. SN Srinivas, Programme Officer, UNDP, Shri VK Jain, Director & NPC, MNRE and PMC staffs among all others.

Shri Venugopal in his welcome address highlighted the importance of renewable energy in India's energy mix and emphasized the importance of renewable energy plants achieving grid parity. He suggested that technology providers and bankers should bring down the cost of production and cost of capital to achieve this.

Dr. S.N. Srinivas, briefed on the uniqueness of the biomass energy amongst renewables and the achievements of the MNRE- UNDP/GEF Biomass Power Project. He shared his visit experience to Gussing District, Austria wherein 20 grid connected gasifiers of size 2-3 MW have been installed and are successfully operating. He described that proper biomass management practices and higher FiT for smaller power plants are the major reasons for the successful operation and both the approaches should be tried in India. Dr. Srinivas, informed that GBI for selected MW sized gasification power plants are supported under the project, which would generate the required data input to CERC for the consideration of higher FiT.

Guest of Honour, Shri Upendra Tripathy in his address recalled his experience during his sub-collector days where solar systems of 1 to 2 Watt were seen as an achievement and lauded the country for the current achievements in the renewable sector. Secretary informed the participants that he was sure that the Ministry would achieve the target of 175 GW by 2022. He briefed upon the recent developments in the sector including the Priority Sector Lending (PSL) for renewable energy projects up to Rs. 15 crores and soon-to-be issued tax free Green Bonds worth Rs. 5,000 crores. Shri Tripathy also touched upon on other initiatives by the Ministry such as establishment of RE Museum at NISE and setting up of International Agency International Agency for Solar Policy & Application (InSPA). He informed the gathering that a meeting of Energy Ministers

of 108 sunshine countries is being organized by MNRE in November 2015. On a separate note, he suggested OREDA to be self-reliant by implementing RE power plants for income generation.

Shri GC Pati in his inaugural address lauded the efforts of MNRE and Government of India for bringing back renewable energy from the fringes. He acknowledged the importance of electricity for industrial development and at the same time expressed that damage to environment should be least in generation of electricity. Shri Pati, informed that GoO is strongly committed to the RE cause and to solve the issues faced by the RE, especially biomass sector. He urged upon the nodal department for RE, Dept. of S&T, GoO to convene regular meetings to sort the issues faced by the developers. He also thanked the Secretary, MNRE for announcing the one-time grant for OREDA.

Shri Sudarshan Das, delivered the vote of thanks addressing the guests and the participants.

Plenary Sessions

The workshop had 5 plenary sessions on a) Scope, approval & regulatory framework for biomass power plants in Odisha, b) Biomass resource assessment & fuel linkage, c) Sharing of project experiences, d) Financing biomass power plants and e) Experience sharing from pipeline projects.

Mr. Sunil Choudhury from Star Light Energy Pvt. Ltd, shared his experience in a developing a 15 MW project, the hurdles faced and reasons for dropping the project. He opined that the capacity of the biomass power plants should be smaller in order to manage the biomass supply issue effectively. He expressed that similar to a coal power plant, biomass power plants should ensure proper backward integration of fuel supply chain. He suggested the establishment of biomass collection centres to ensure successful operation of the plant with higher PLF.

Mr. Komariah, MD, Shalivahana Green Energy Limited shared his experience in developing and operating a 20 MW biomass plant at Dhenkanal District, Odisha, The plant was commissioned in 2011 and ran for almost a year until 2012. The plant was shut down for a period of 3 years and restarted its operations only in the month of June, 2015. He explained that the restarting of the plant almost required the same set of procedures for starting a new plant, which further aggravated the problem. He suggested that tariff revision by respective SERCs should be made annually in line with CERC recommendations.

Dr. Rajan, IISc presented on the Biomass Atlas and its features. He explained about the various inputs going into the Biomass Atlas and quoted that the factual accuracy of the Biomass Atlas would be in the range of $\pm 20\%$ from the actual data. He agreed that an indicative fuel price structure can be included in the Biomass Atlas for more meaning interpretation and decision making.

Shri VK Jain, Director and NPC of the MNRE-UNDP/GEF Biomass Power Project presented the achievements of the project so far. He expressed that constructive action plan should be laid out to sustain the sector in the long run. He mentioned that under the project, Model Investment Projects (MIPs) are being supported for establishing fuel linkage systems and implementing innovative features in the technology. He suggested that OREDA should develop project proposals with all licenses and approvals before tendering the same to developers.

Shri. Balaji, Director, Cummins Cogeneration presented the experience in developing and operating a 1 MW Gasification Power Plant at Sattur, Tamil Nadu. The overall plant has been built with a footprint of 1.2 acre including the fuel storage space at a cost of Rs. 10.5 crore. He explained the technological innovations in the project, including usage of Cummins lean gas 500 kW gas engines. Currently the plant is exporting power to a Taj Group hotel through open access electricity sales, since the grid electricity sale is not viable for the plant. He summarized the following as the major impediments to the sector: a) ineffective REC b) cross subsidy charges for third party sales c) lengthy approval process d) lack of EPC players in gasification e) availability of trained man power in gasification and f) cost of fuel. He also explained that with REC, the cross subsidy, wheeling and transmission charges for third party sale are doubled which makes such sales pretty much unviable. Answering a question, Mr. Balaji explained that scheduling is not a problem for the plant but tariff is.

Shri. Kiran from Thermax Ltd., presented on the 1 MW Gasification Power Plant at Washim (Maharashtra) which is currently under commissioning. This plant is based on indirect fluidized bed gasification technology with technologies from ECN and Dahlman, The Netherlands. The overall cost of the plant is Rs. 13.5 crores. Mr. Kiran claimed that usage of soya stalks and tar removal has been the major problem faced during the commissioning. The plant is expected to be commissioned in another 2 months.

Shri, SK Dey, AGM, IREDA gave a presentation on the proposed IREDA – NCEF refinancing scheme and banker's perspective on funding biomass projects. He suggested that for successful operation of biomass power plants, two part tariff, biomass collection and storage, long term fuel purchase agreement, minimum 50 km distance between two power plants etc., are essential. He informed that refinancing scheme would not help revive the projects in few states such as Karnataka, Gujarat, etc., without any favourable tariff by respective SERCs.

A presentation on Scope of Biomass power projects in Odisha and Proposal for Study on biomass zoning in Odisha was delivered by Ms. Tanushree Bhowmik, NPM, MNRE PMC on behalf of OREDA.

A presentation on the 20 MW Shalivahana Green Energy Limited was given by Shri Narayana Reddy. He briefed on the SGEL activities and its foray in renewable energy. He explained the history of the plant operation from year 2011 and the difficulties faced by the plant including fuel availability, cost of fuel, vandalism faced near the plant, non-implementation of RPO & REC, timely release of payments from DISCOMS, etc.

Shri Md. Alam from AK Power Solution shared his experience in developing a 6 MW biomass power plant. He suggested that the biomass power plant developers should have energy plantations to ensure sustained plant operation. He also suggested that SNAs should develop the required land, process and then hand over to the developers for biomass plant implementation.

The concluding session of the workshop was moderated by Shri VK Jain, Director & NPC, MNRE receiving comments from the various participants of the workshop. Some of the major recommendations were: a) Annual electricity tariff revision by Odisha Electricity Regulatory Commission in line with CERC guidelines b) Exit policy from PPAs with DISCOMS allowing the project developers to sell through open access c) Simpler approval process d) Exemption from water development charges and VAT on biomass purchase e) Net metering of import & export electricity f)Biomass zoning to ensure sustainable operation of biomass power plants g) Removal of cross subsidy charges for open access electricity sales and h) Policy for restricting inter-state biomass trade.

AROUND THE WORLD

Latest News

Andaman to get biomass power plant

July 8, 2015:

INR 5 crore has been allotted for a 1 MW biomass power plant in Andaman and Nicobar Islands by the Environment, Forests and Climate Change Ministry.

In an interaction with the media following the 6th meeting of the National CAMPA (Compensatory Afforestation Fund Management and Planning Authority) Advisory Council (NCAC) Mr. Prakash Javadekar (Environment, Forests and Climate Change Minister) said support will be provided for the pilot project which will primarily use agricultural residue for power generation. According to the minister, the NCAC has INR 250 crore at its disposal and following the meeting, it has decided to allot INR 162 crore for several environment projects including the Andaman power plant. Source:http://pib.nic.in/newsite/PrintRelease.as px?relid=123079

Creation of intra state transmission system in the States of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Rajasthan

Jul 16, 2015:

The Cabinet Committee on Economic Affairs approved the creation of an intra-State transmission system in seven states namely Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Rajasthan. The transmission system is estimated to cost ₹8,548.68 crore wherein the government will contribute ₹ 3419.47 crore from National Clean Energy Fund while German bank KfW will lend similar amount and the remaining contribution would be made by states.

Under the envisaged project activities, 48 new grid sub-stations of different voltage levels with total transformation capacity around 17100 MVA (Mega Volt Ampere) and over 7800 ckt-kms (Circuit Kilometers) of transmission lines are to be established. The project is proposed to be completed within a period of three to five years.

The cost on creating intra-state transmission system is proposed to be met through KfW loan (40 percent of the total cost), NCEF grant (40 percent of the total cost) and the remaining 20 percent as State contribution.

Source: http://pib.nic.in/

India crosses 20% of its renewable energy target

July 31, 2015:

Latest figures published by the ministry of new and renewable energy (MNRE), indicate that India has accomplished about 20% of its 175-gigawatt renewable energy target for 2022 by the end of July, 2015. The figures show India currently has installed capacity of 36.6 GW of on-grid and 1.17 GW of off-grid renewables. The country has seen a capacity addition of 421.3 MW in wind energy, 357.7 MW in solar energy, 75.2 MW in small hydro power and 12 MW in waste to energy systems in the gridconnected segment. While biopower hasn't seen any additions yet, a total of 400 MW has been targeted this year.

Source: http://mnre.gov.in/

IREDA's INR 2,000-Cr Tax-Free Bonds gets 'AA+' rating by India Ratings and Research

Aug 6 2015:

India Ratings and Research has assigned a 'IND AA+' rating with stable outlook to state-run Indian Renewable Energy Development Agency's Rs 2,000-crore tax-free bonds. The fact that the government is providing guarantees for IREDA's multilateral debt, which formed 57 per cent of its borrowings at FY15 reflects systemic importance that IREDA holds, the agency said. IREDA contributed 14.4% annually to renewable energy capacity additions over the past 6 years. With India's increased renewable energy target 175 GW by 2022 IREDA's significance will increase too.

IREDA's market share dipped from FY2013, however India Ratings believes its role in meeting the funding gap by way of innovative financing will strengthen in the near future.

IREDA was instituted by MNRE and is a government-owned public financial institution and has been registered with the Reserve Bank of India since February, 1998. The main objective of the entity was to provide financial assistance to techno-commercially viable renewable energy projects and energy efficiency projects.

Source: http://profit.ndtv.com/news/corporates/ article-india-ratings-assigns-aa-to-iredas-rs-2-000-cr-tax-free-bonds-1221025 India – Mongolia sign MoU to establish basis for cooperative institutional relationship to encourage and promote technical bilateral cooperation on new and renewable energy

Aug 12 2015:

The Union Cabinet chaired by the Prime Minister, Shri Narendra Modi gave its ex-post-facto approval for the Memorandum of Understanding (MoU) between India and Mongolia for a duration of 5 years. The MoU was signed at Ulaanbaatar during Prime Minister's visit to Mongolia on 17th May, 2015.

The MoU will aid in the establishment of a cooperative institutional relationship, will encourage and promote technical bilateral cooperation on the new and renewable energy, on the basis of mutual benefit, equality and reciprocity.

The MoU will also help in strengthening bilateral cooperation between the two countries. *Source: http://pib.nic.in/*

Low cost financing for renewable energy projects

Aug 13 2015:

The Government has taken some major steps in mobilizing low cost financing for renewable energy projects by coordinating with different Ministries/Departments. This includes low cost borrowing through multi-lateral and bi-lateral agencies i.e. World Bank, Asian Development Bank, KfW Germany, etc. Renewable energy projects have also been included in the Priority Sector Lending Norms of Commercial Banks. Additionally the government has also given approval for issuance of tax free infrastructure bonds for funding renewable energy projects during the FY 2015-16.

Sh. Piyush Goyal, Minister of State (IC) for Power, Coal & New and Renewable Energy also stated that the Rural Electrification Corporation (REC) is providing Renewable Energy loans at the rate of interest which is 0.75% less than the conventional energy generation projects. Furthermore, no restrictions have been put on the loan amount for and all viable renewable energy projects will be eligible for funding. More over for rural electrification the Government is providing a grant through REC for Decentralized Distributed Generation under Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY).

Source: http://pib.nic.in/

Orient Green Power Co. Ltd (OGPL) raised INR 250 crore via preferential allotment

Aug 19 2015:

Renewable energy developer Orient Green Power Co. Ltd (OGPL) raised Rs.250 crore through preferential allotment of shares to its existing promoter Shriram Venture Ltd (SVL) and its subsidiaries, and financial investors, including EW Special Opportunities Fund II Pte. Ltd, Ecap Equities.

These funds were to be utilized to pay off existing debts and as capital expenditure. As on 31 March, the total consolidated debt of the company was at INR 1,923 crore. This transaction comes amidst the increased efforts of the government in pushing the energy security agenda.

In the past five years the Shriram Group has invested up to INR 550 crore (via open offers, preferential allotments and secondary purchases) including this transaction.

Merchant banker Equirus Capital acted as the adviser to OGPL and Shriram Group for the fund raising. Equirus Capital stated that a preferential allotment was made at a price of INR 14.56 per share, which has been determined as per capital market regulations. The investment is a strong vote of confidence by the promoters and investors in the business and management of OGPL said Mr.Ajay Garg, managing director of Equirus Capital. OGPL is one of the leading players in wind and biomass energy. They have 428 MW of operational wind assets and 106 MW of operational biomass

assets currently. The company had also demerged their biomass business on 13th June.

"The investment will enable the company to augment its wind energy capacity and to reduce its interest outgo and outstanding debt. The improved cash flows will strengthen the financial position thereby enabling OGPL to better capture the significant growth opportunities in the renewable energy space," said S. Venkatachalam, managing director OGPL. Immediate plans include adding 57 MW of wind power generation capacity in Andhra Pradesh and Madhya Pradesh. These will be in place by the middle of next year. This will add to its existing wind generation capacity of 435 MW across multiple locations. Source: http://www.thehindubusinessline.com/ companies/ogpl-to-raise-250-cr-to-expandretire-debt/article7558083.ece , www.livemint.com

Memorandum of Understanding between India and United States of America on cooperation to establish the Pace Setter Fund

Aug 21 2015:

The Union cabinet gave approval for the Memorandum of Understanding (MoU) on cooperation to establish the Pace Setter Fund. The fund has been set up to support he Promoting Energy Access through Clean Energy track of the U.S. – India Partnership to Advance Clean Energy (PACE) between India and United States of America.

This MoU was signed at New Delhi on 30th June, 2015.

The PACESetter Fund, a joint INR 500 million (\$8 million U.S. Dollars) has been drawn on a 50:50 sharing basis. The fund was established in June by the governments of India and the United States to push the pedal on commercialising innovative off-grid clean energy solutions by providing earlystage grant funding, which would allow businesses to develop and test innovative products, systems and business models.

Source: http://pib.nic.in/

Odisha to set up National Institute of New Energy

September 8, 2015:

Odisha Government will soon sign a memorandum of understanding (MoU) with the Ministry of New and Renewable Energy (MNRE) to set up a National Institute of New Energy in Bhubaneswar. The state government would provide 15 acres of land and the project cost is pegged at Rs 250 crore.

"The institute will carry out research and development of best possible technology for wind and other renewable energy sources in coastal states. Small pilot project demonstrations will also be done here. The site selection process is underway near Indian Institute of Technology (IIT)-Bhubaneswar at Arugul," Hemant Sharma, managing director, Green Energy Development Corporation of Odisha limited (GEDCOL) said on the sidelines of the second edition of Odisha Energy Conclave - 2015 organised by Indian Chamber of Commerce (ICC).

He also said "The Rs 250 crore project will come up on a 15 acre plot near Arugul and besides IIT Bhubaneswar. While the union government will fund the institute, the state government will provide the land and other facilities."

Currently India has three R&D institutes in the country, namely National Institute of Solar Energy, an autonomous R&D institution in the field of solar energy in Haryana, National Institute of Wind Energy (NIWE) at Chennai and Sardar Swaran Singh National Institute of Renewable Energy (SSS-NIRE) at Kapurthala in Punjab.

Earlier this year the Union government had set a target to increase renewable energy capacity to 175 GW by 2022.

At present the non-conventional sources of energy accounts for 14 per cent of the total energy mix in country. Total renewable energy installed capacity in the country is about 35 GW, out of which Odisha's contribution is meagre 116 MW (0.3 per cent), rued J B Mohapatra, joint secretary, MNRE.

The Odisha government has set an ambitious target to add 3 GW renewable energy capacity by 2022. The target included 2.3 GW in the solar sector, 350 MW from wind sources, 150 MW from the small hydro-electricity projects, 180 MW from biomass and 20 MW from municipal solid waste.

Source:http://www.orienvis.nic.in/index1.aspx? lid=900&mid=4&langid=1&linkid=565

GE takes IISc biomass tech for power plants in the US

September 9, 2015:

An indigenously developed biomass power generation technology developed by Indian Institute of Science (IISc) is being taken to the US by General Electric.

The biomass gasifier technology that is fuelled with agro-waste and wood had been licensed by GE from IISc is to be used to power plants in California which will be set up by Phoenix Energy. Dr.S.Dasappa from the Centre for Sustainable Technologies, IISc said, "Technology transfers typically happen from the North to the South. In gasifier technology, it flows from the South to the North."

"GE officials had scouted across the globe and found this platform – power generation from biomass at IISc. The technology available with us is the best in the world." While the indigenous gasifier technology is getting attention in US, and has installations in countries such as Zambia, the uptake in India is still very slow.

India has a vast amount of biomass waste such as rice husk, wood chips from trees such as eucalyptus, coconut shell, sawdust, sugar cane trash, coffee husk and other agri residue that can be converted into energy. The scientists at IISc estimate India can generate 15,000 MW of electricity using agro and crop waste of 120-140 million tonnes using a distributed model of having 1-6 Mw power plants across the country.

"There is little parity with biomass and solar and other renewable energies. If it happens – this can provide grid quality 24/7 power giving direct and indirect employment," said Dasappa. Karnataka offers as much as INR 12 a unit of power generated by solar, but pays less to biomass-based gasifier projects.

Source: http://www.business-standard.com/ article/companies/ge-takes-iisc-biomass-techfor-power-plants-in-the-us 115090800817 _1.html

NTPC pre-closes oversubscribed Rs 700 crore tax-free bond issue

September 24, 2015:

State run NTPC has pre-closed its Rs 700 crore public issue of tax free bonds which was oversubscribed by 11.04 times of the base issue size of Rs 400 crores and 6.31 times of overall issue size of Rs 700 crores. The retail portion was oversubscribed by 6.60 times (of the total issue size allocated to retail). The issue has three tenures - 10 years, 15 years and 20 years with coupon rate of 7.36%, 7.53% and 7.62% respectively for retail investors.

In July of this year, the government had approved the plan to raise Rs 1000 crore through tax free bonds including Rs 700 crore through public issue. NTPC was amongst the seven state run entities including NHAI and IRFC which were given permission to raise Rs 40,000 crore in the current fiscal through tax free bonds.

Source: http://www.business-standard.com/

AROUND THE WORLD

DATEBOOK

Bioenergy Australia Conference 2015

Date	:	30 November - 2 December 2015
Location	:	Launceston, Tasmania
Type of event	:	Conference
Organizer	:	Bioenergy Australia
Key themes	:	The conference will consider the many facets of bioenergy including: biomass resources and supply chain aspects, conventional and advanced liquid biofuels, algae and other future feedstocks, pyrolysis, hydrothermal processing and bio-char, gasification, Biogas production and utilization, energy-from-waste heat and power, biorefining and biochemicals etc
Link	:	http://www.bioenergyaustralia.org/pages/bioenergy-australia-conference-2015.html

World Bio Markets Brasil 2015

Date	:	30 November - 1 December 2015
Location	:	Sao Paulo, Brazil
Type of event	:	Conference
Organizer	:	Green Power Conferences
Key themes	:	The conference will cover roundtable/panel discussions on securing Feedstock, new markets, biopower updates and future opportunities, market updates, cogeneration, assessing new technology innovation that will support and help drive business growth, investment panel
Link	:	http://www.worldbiomarketsbrasil.com/

tcbiomass 2015: The International Conference on Thermochemical Biomass Conversion Science

Date	:	2-5 November , 2015
Location	:	Chicago, Illinois, United States
Type of event	:	Conference
Organizer	:	Gas Technology Institute (GTI)
Key themes	:	The conference will bring together experts in biomass gasification, pretreatment, pyrolysis, and upgrading to explore progress in the bioeconomy and will focus on developments in the conversion of renewable resources into a variety of fuels, chemicals and energy products
Link	:	http://www.gastechnology.org/tcbiomass/Pages/default.aspx
Type of event Organizer Key themes Link	::	Conference Gas Technology Institute (GTI) The conference will bring together experts in biomass gasification, pretreatment, pyrolys and upgrading to explore progress in the bioeconomy and will focus on developments in conversion of renewable resources into a variety of fuels, chemicals and energy products http://www.gastechnology.org/tcbiomass/Pages/default.aspx

Scheme to Support Promotion of Grid Interactive Biomass Power and Bagasse Cogeneration in Sugar Mills in the Country during the 12th Plan Period

The Ministry of New and Renewable Energy announced the extension of Central Financial Assistance (CFA) for "Promotion of Grid Interactive Biomass Power and Bagasse Cogeneration in Sugar Mills" during the 12th Plan period at a total cost of INR 310 Crores only.

Under this scheme, the capital subsidy is provided for setting up of biomass combustion based power plants and bagasse cogeneration projects in private/cooperative/public sector sugar mills:

- 1. To promote setting up of biomass power projects with minimum steam pressure configuration of 60 bar and above for power generation (grid interfaced on commercial basis).
- 2. To promote cogeneration projects for surplus power generation from bagasse in private/cooperative/public sector sugar mills with minimum steam pressure configuration of 40 bar and above (Grid interfaced on commercial basis).
- 3. To promote bagasse cogeneration projects for surplus power generation in cooperative/public sector sugar mills with minimum stream pressure of 60 bar and above, taken up through BOOT/BOLT model by IPPs/State Govt. Undertakings or State Government Joint Venture Company (Grid interfaced on commercial basis).

The amount of CFA for biomass combustion power projects would be calculated based on installed capacity and for bagasse cogeneration project in sugar mills on surplus power exported to grid.

CFA for Biomass Power Project and Bagasse Cogeneration Projects by Private/ Joint/Coop./ Public Sector Sugar Mills

Types of Project	Capital Subsidy for Special Category States (NE Region, Sikkim, J&K, HP & Uttarakhand)	Capital Subsidy (Other states)
Biomass Power projects	INR 25 lakh X © MW) (Max. support of INR 1.5 Cr per project.)	INR 20 lakh X (C MW) (Max. support of INR 1.5 Cr per roject.)
Bagasse Cogeneration by Private sugar mills*	INR 18 lakh X (C MW) (Max. support of INR 1.5 Cr per project.)	INR 15 lakh X (C MW) (Max. support of INR 1.5 Cr per project.)
Bagasse Co-generation projects by cooperative/ public sector sugar mills*	Rs.40 lakh (40 bar & above) Rs.50 lakh (60 bar & above) Rs.60 lakh (80 bar & above) per MW of surplus power@ (max. support INR 6.0 crore per project)	Rs.40 lakh (40 bar & above) Rs.50 lakh (60 bar & above) Rs.60 lakh (80 bar & above) per MW of surplus power@ (max. support INR 6.0 crore per project)

*For new sugar mills, which are yet to start production and existing Pvt. & Co-op. sugar mills employing backpressure route/seasonal/ incidental cogeneration, which exports surplus power to the grid, subsidies shall be one-half of the level mentioned above.

[®]Power generated in a sugar mill (-) power used for captive purpose i.e. net power fed to the grid during season by a sugar mill.

Here C is the capacity in MW.

For further details please refer http://mnre.gov.in/file-manager/grid-biomass/scheme-Biomass.pdf



INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY LIMITED 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 Loan from Banks/Fls
- Project Financing Equipment Financing
- Bridge Loan against SDF

NEW INITIATIVES Securitization

- against receivables
- Financing IFFs/SPVs
- Consortion / Co-finance
- Performance Grantees
- Consultancy &
- **Advisory Services**

Loan Sanction Rs. in Cr.



Role of IREDA



updated as on 14.07.201

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