BHASKARA

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Editorial

Prof. VS Chandrasekaran
Advisor, CSTEP

In solar power plants, in order to have secure supply after sun light hours, it is necessary to have reliable storage systems in place. This is usually in the form of battery storage in Photo Voltaic (PV) plants or molten salt storage systems in Concentrated Solar Plants (CSP). Battery storage is capital and maintenance intensive and also batteries require periodic replacement. On the one hand molten storage systems in CSP plants are also capital intensive requiring a larger solar field. Storage options such as pumped hydro, flywheel storage and high pressure storage devices still remain to be proved commercially. On the other hand hybridisation modules can be easily integrated with CSP plants to generate power beyond sunlight hours. Hybridisation using fossil fuels such as coal or gas defeats the purpose of renewable energy. Bio mass will remain the preferred option because of its ecological attributes. In India the need for hybridisation assumes a greater significance because of the relatively large period of 3 to 4 months during the monsoons. It is difficult to manage the monsoon months using thermal storage alone.

The SCOPEBIG project which will generate steam at lesser temperature will ideally suit regions such as Bihar where the solar radiation is moderate. The biomass that will be used in the project is rice husk. Biomass is considered a renewable energy source because the carbon in biomass is regarded as part of the natural carbon cycle. In using rice husk as biomass, the natural carbon cycle will be of relatively for a short period which is an added advantage. The SCOPEBIG project in Bihar will be an important milestone in India's quest for power and renewable energy ambitions and will set the trend for future programs.

From Left: Mr. Ranjee Singh, Mr. S P Shrivatsava, Mr. Parthasarathi Das, Mr. Vineeth Bhasin and Ms. Smita Singh

Project Updates

- ☐ Completed the levelling of land
- ☐ Completed the formalities for all the required clearances
- ☐ Completed plant configuration and layout
- ☐ Developed supply chain for biomass in the project vicinity underway
- ☐ Processing and ordering major equipment underway

SCOPEBIG project site

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Visits

Nov 23: A team visited SCOPEBIG project site at Son Nagar, Barun, Aurangabad District, Bihar

Teams:
European Union: Ms. Smita Singh, Project Manager, Delegation of European Union to India;
CSTEP: Thirumalai, Project Investigator; S P Shrivatsava, Consultant;
Thermax: Vineeth Bhasin, Parthasarathy Das;
Others: Ramjee Singh, Contractor for site development

Objectives:

- ☐ Inspect the project site and identify site requirements
- ☐ Visited a potential biomass (rice mill) supplier (Maa Padmavathy Rice Mill) located near the project site.

SCOPEBIG project site

From Left: Mr. Ramjee Singh, Mr. S P Shrivatsava, Mr. Parthasarathi Das, Mr. Vineeth Bhasin and Ms. Smita Singh

Team at Maa Padmavathy Rice Mill in Radhua, Aurangabad district

News Articles Update

Compiled by
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Senior Research Engineer, CSTEP

Solar Power Now India's 2nd Largest Renewable Energy Technology

As on October, solar power stood as the second largest renewable energy technology and has overtaken biomass in terms of installed capacity. The total installed capacity of solar power is 4579 MW, while biomass stands at 4550 MW. The total solar and biomass power added in this financial year so far is 827 MW (target 1400 MW) and 132 MW (target 400 MW) respectively. Solar power is expected to achieve beyond the target set in the current and subsequent financial years. It is projected to reach an installed capacity of 19 GW by March, 2017.

Source:https://cleantechnica.com/2015/12/03/solar-power-now-indias-2nd-largest-renewable-energy-technology/

Scope of Biomass Fuel Vast

The dependency on the oil from Dubai can be stopped by utilising all the agricultural and forest waste as fuel. The large capacity biomass plants require huge volumes of biomass and sourcing and transporting will be a difficult. Therefore, decentralised plants would be a better option as it requires smaller volumes biomass for operation which can be locally sourced.

Source:http://www.newindianexpress.com/cities/thiruvananthapuram/Scope-of-Biomass-Fuel-Vast/2015/11/24/article3143449.ece

India Announces New Climate Change Targets

Govt. of India set a target to reduce the intensity of greenhouse gas emissions to 33-35% by 2030 compared to the 2005 levels. This can be accomplished by generating 40% of the electricity demand through renewable energy resources. Additionally, India would also increase the forest cover to reduce the 2.5-3 billion tonnes of CO2 equivalent. Towards this, it requires an investment of about $2.5 trillion.

Tata Power Offers Rooftop Scheme

Source:http://viainfotech.biz/Biomass/theme5/document/Magazines/Akshay%20Urja/Vol%209,%20Issue%20%202,%20October%20%202015.pdf

Journal Articles Update

Increasing the efficiency of parabolic trough plants using thermal oil through external superheating with biomass

Presently, CSP is not competing with PV due to cost factor. This paper investigates on how to reduce the cost of parabolic trough plant having molten salt storage by combining with biomass technology. This is done through superheating the steam generated from CSP by biomass, thus by increasing the plant efficiency and power generation. A simulation was performed on a 50 MW plant with 7.5 hours of molten salt storage. It has been observed that the plant efficiency is increased up to 10.5% and cost can be reduced by 23.5%. This paper attempts to demonstrate the advantages of having biomass hybridisation for higher efficiency and cost optimisation.

Source:http://www.sciencedirect.com/science/article/pii/S0196890413006572?np=y

India's first solar thermal parabolic trough pilot power plant

This paper deals with the 5 MWth CSP plant test facility, National Solar Thermal Power Testing, Simulation and Research Facility, built by the Indian Institute of Technology Bombay (IITB). The objective of the project was to supply power to the national grid and use the facility for testing components. The total power generated through the combination of two technologies is 3 MWth from parabolic trough and 2 MWth from Fresnel. Abengoa supplied parabolic trough solar field and balance of the system was by IITB. It uses Therminol VP-1 as heat transfer fluid and operating range of temperature is 12-400°C. The solar field covers an area of 8000 m2 (1500 m×5.3 m) with 3 loops. This project helped India to

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understand the design and operation of solar thermal power plants and the learning curves (improper loading of aluminium frames resulted cracks, cost factors due to imported components, importance of galvanization etc.) for maintenance of the power plants.

Source:http://www.sciencedirect.com/science/article/pii/S1876610214006493

Barriers of Commercial Power Generation Using Biomass Gasification Gas: A review

The commercial exploitation of power generation from biomass gasification suffers mainly from challenges in logistics and technology. The main barriers are involved in supply chain management, pre-treatment, conversion of biomass to gas, cleaning of the product gas etc. The product gas from the gasification should be in specified composition and tar levels for efficient power generation. Though they are different varieties of updraft and downdraft gasifiers available in the market, the most efficient one is yet to be developed for commercial purpose. The efficient gasification along the gas cleaning units would generate highly burnable gas with less tar content, which essentially reduce the requirement of biomass. This paper reviews the above said aspects.

Source:http://www.sciencedirect.com/science/article/pii/S136403211300614X

Interview

Dr. Hisham Zerriffi
Assistant Professor and Ivan Head South/North Research Chair, Liu Institute for Global Issues

Dr Zerriffi's research is at the intersection of technology, energy and environment, with a particular focus on rural areas of the developing world. Much of his research focuses on institutional factors impacting the diffusion of new technology, determinants and patterns of household energy choice and welfare implications of rural energy use.

What are the barriers and opportunities for gasification technology?

The opportunities for gasification of agricultural residues are immense in a country like India with its extensive agricultural base. However, there are some barriers that need to be addressed. Aside from ensuring a conducive policy and regulatory environment, there are two main issues: 1) The need for viable business models that ensure profitability for the plant and sufficient revenue to maintain and operate the system 2) Mitigating the volatility in price and availability of residues that can affect the plant's economics as well as impact other residue users.

What are the lessons that could be applied to an emerging market like India?

India should continue to develop policies and regulations that are appropriate for its national and sub-national context but at the same time try to learn from both best practices and challenges in other jurisdictions. Improving the use of renewable portfolio standards, harmonising regulatory systems between states and the national government, avoiding poor subsidy design, and a host of other policy and regulatory issues are ones that have been faced by other governments seeking to promote renewable energy technologies. India can learn from these efforts as it moves forward on its ambitious goals of expanding access to the grid and increasing significantly its renewable energy generation.

How do you foresee the development of Concentrated Solar Power (CSP) thorough biomass gasification/combustion?

CSP is, of course, a technology that has already been installed in a number of countries worldwide and continues to grow. However, by coupling it with biomass gasification, this may open up a new set of applications (in terms of scale and location) for CSP, as well as change the economics to be even more favourable.

What are the policy and technology interventions required for proliferation of solar biomass hybrid technologies?

From a policy (and regulatory) perspective, it is critical that there be both supportive approaches to new technology deployment as well as a degree of policy and regulatory certainty. This can initially mean financial support (in the form of subsidies on capital, favourable interest rate loans, etc.) but ultimately it has to understand that developers are being paid a price that can ensure viable business operations. Part of this is ensuring that the commercial financial sector (both domestic and foreign investors) is playing a role and the institutional mechanisms (e.g. Auctions, power purchase agreements, etc.) are well developed. On the technology side, a key issue will be ensuring the supply of quality components and that the human capital and processes are in place for design, installation and maintenance.

In your opinion should projects like SCOPEBIG act as a stepping stone/impact for penetration of Solar-Biomass hybrid plants in India?

It is important to demonstrate the viability of both the technology and the business model when promoting a new approach to power generation. For this, SCOPEBIG is a promising pilot. At the same time, too many projects get stuck at the pilot stage with low numbers of installations. It will be important, therefore, to be conscious of how SCOPEBIG will specifically help move forward this technology approach and help the sector achieve scale. A key area here may, in fact, be how a project like SCOPEBIG solves the residue supply problem and whether it can demonstrate a viable approach to residue sourcing that is sustainable.

Consortium Partners

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