

Editorial

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We are very happy to initiate a newsletter for the ambitious project “Scalable CSP Optimized Power Plant Engineered with Biomass Integrated Gasification” (SCOPEBIG). This is a unique project, which involves the design and development of a 3 MW solar – biomass hybrid power system in Dehri – on – Sone in Bihar. The project is funded by the European Union and the project team consists of Center for Study of Science, Technology & Policy (CSTEP), Therman, Energy Research Centre of the Netherlands (ECN), Bihar State Power Generation Company Limited (BSPCL) and National Centre for Scientific Research, France (CNRS).

The project is novel in several ways. One, we have chosen to implement it in Bihar, despite the fact that the solar radiation profile is not very good. However, Bihar has excellent biomass availability, particularly rice husk. Therefore, the project expects to demonstrate a model in which, solar and biomass can complement each other to generate steady power. Two, the project involves economic and policy studies to ensure that the technology is scalable and that it's not just a one-off project. Three, on completion of the project, the consortium will transfer all assets to BSPGCL, who will subsequently own and operate the power plant.

The Government of Bihar has kindly allocated land for the project in Dehri – on – Sone. The engineering designs



are now ready and we are about to commence construction of the plant. Through this newsletter, we will keep you regularly updated on the project progress. Our vision is to develop a state of the art solar – biomass hybrid power plant, which can be replicated in other parts of the country.

Project Updates

- **Breaking Ground event** marked the formal launch of the project on December 4, 2014. The event was attended by senior officials from Bihar State Power Transmission Company Limited (BSPTCL) and South Bihar Power Distribution Company Limited (SBPDCL).



Parabolic Trough



Biomass

In this issue:

Editorial P-1

Project Updates P-1

Updates from News Articles and Journals P-2

Interview with Dr. Johann HESSE P-3

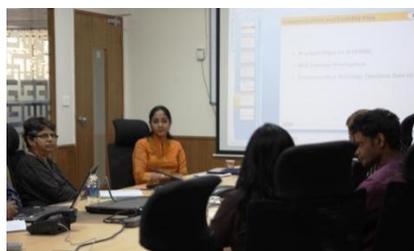


The Bhoomi Pooja (project inauguration) was conducted by Dr. Sonde along with a priest.

- A brochure was conceived and designed (both in English and Hindi) to be used as a communication material.
- A website was launched to primarily capture all the activities and important events related to the project.

Visits

Smita Singh, Project Manager-Energy and Environment, Delegation of the European Union to India visited CSTEP on March 06, 2014 for project updates.



CSTEP officials conducted a Biomass survey in February 2015 to primarily assess and establish a supply chain of Biomass for operation of the power plant.



Officials from Thermax and CSTEP along with Smita Singh, Project Manager from EU visited the Shive Solar Biomass Power Plant in early April 2015.



Updates from News Articles and Journals

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CSP Solar-Biomass Model in India

AORA solar, an Israeli based company has plans for a 24x7 solar biomass power plant in Ethiopia, Africa. These plants, at sub MW levels, are being proposed to provide off-grid power to rural communities.

Source: <http://cleantecnica.com/2015/01/19/csp-solar-biomass-model-india/>

Biomass Power/Cogen

In India, biomass provides 32% of the total primary energy used in the country. 500 million metric tons of biomass will be generated each year, and of that, about 30% will be surplus. This has a potential of about 23,000 MW along with bagasse generated from sugar mills. Presently, there are about 288 biomass plants in India with an installed capacity of 2665 MW. The tariff rate of biomass-based power varies from Rs. 3 to 5 per kWh depending on the states.

Source: <http://www.mnre.gov.in/schemes/grid-connected/biomass-powercogen/>

Leveraging Generation Synergies with Hybrid Plants

Thermosolar Borges plant is a solar-biomass hybrid power plant of 22.5 MW plant, which came online in 2012. It uses oil-based parabolic trough solar field to generate saturated steam while the biomass based boilers superheats this steam to 520°C. Natural gas is used as a back-up. The plant operates using Biomass alone during night.

Another CSP-biomass plant came up in Italy. This uses Fresnel based CSP (1 MW) retrofitted to an existing biomass plant (14 MW) to demonstrate a high efficient system.

Source: <http://www.powermag.com/leveraging-generation-synergies-with-hybrid-plants/>

Optimising design for hybrid CSP-biomass plants

A hybrid plant can be operated during day or night. Parabolic trough-based solar plants generate low temperatures compared to tower-based systems. Hybridisation helps in achieving high temperatures to the order of 520°C, thus high efficiencies are established in Borges plant. Boiler designs need to be optimised for multiple feed stocks of biomass which is suitable for CSP plants.

Source: <http://social.csptoday.com/technology/optimising-design-hybrid-csp-biomass-plants>

Biomass Sector in India – Problems and Challenges



In India, gasifier-based biomass power plants are good solutions for off grid applications. The capacity should be in the order of ~15 MW for grid connectivity and it is viable only if a plant is able to get biomass within 50 km distance. Biomass collection centres need to be initiated in villages to ensure that a good supply chain is established. The usage of energy crops need to be explored as a substitute for crop wastes, in case of crop failure.

Source: <http://www.bioenergyconsult.com/biomass-india/>

The feasibility of hybrid solar-biomass power plants in India

Off-grid tri-generation plants at lower scales (2-10 MW) are recommended for hybrid solar biomass power plants. Industrial process heating is also a viable option using hybrid option. Technological improvements need to be focused to increase the heat cycle efficiencies for low-scale plants. Hybrid plants are competitive option in compared to standalone renewable plant.

Source: <http://www.sciencedirect.com/science/article/pii/S036054421200607X>



Interview

Dr Johann HESSE

Head of Cooperation
Delegation of the European
Union to India and Bhutan



What is the role of EU in energy space, in particular RE?

Energy plays a fundamental role in today's world and Europe is no exception to this. Concerning renewable energy, the EU aims to get 20% of its energy from renewable sources by 2020. Renewables include wind, solar, hydro-electric and tidal power as well as geothermal energy and biomass. More renewable energy will enable the EU to cut greenhouse emissions and make it less dependent on imported energy.

The political decision to embark on an energy dialogue between EU and India was agreed at the 5th EU-India Summit, held in Hague, Netherlands in November 2004. This resulted in the setting up of the EU-India Energy Panel, which met annually to agree on priority areas for mutual cooperation. The commitment was later renewed and reconfirmed in February 2012, while adopting the EU-India Joint Declaration on Energy Cooperation, identifying priority areas for mutually beneficial joint activities, namely coal, clean coal, energy efficiency, energy safety, energy security, renewable energy and smart grids. The principal objective of the Declaration is aimed at bringing together Europe (EU institutions, EU Member States and EU private actors) and Indian stakeholders to support India in its efforts towards a sustainable economy.

Under the on-going EU-India bilateral cooperation, the EU is supporting the development of off-shore wind as well as solar-biomass hybridisation with a total commitment of a € 12 Million grant. Other technical working groups to promote dialogues on renewables and smart grids are organised between relevant institutional and government stakeholders on both sides, as well as relevant market

actors, such as energy regulators, business representatives, research institutes and academia, transmission system operators and distribution system operators.

For India, renewable energy is expected to supplement conventional power generation in rural areas in particular, therefore addressing India's chronic problem of energy access.

Why do you feel that SCOPEBIG kind of projects acts as a stepping stone/impact for penetration of Solar-Biomass hybrid plants in India/European nations?

India has pioneered solar and wind technologies, but hybridisation can get a visible boost in India by promoting global partnerships to enhance knowledge and experience sharing. The EU decided to support the solar-biomass hybridisation in India as it was assessed that at present the hybridisation technologies deployed in India are quite limited and at a very nascent stage. Through this EU funded project, it is aimed to showcase how India can enhance its capacity utilisation factor (cuf) of a particular plant by using the latest and tested technologies which have worked in Europe.

Considering the selected site for the SCOPE-BIG project is a remote district in the state of Bihar, this project will surely contribute to the overall social development of that district with electrification of remote rural areas, creating significant employment potential for skilled and semi-skilled workers, the use of locally available biomass resources for green energy production, thus contributing to new types of economic activity and sustainable development plans.

How do you see the impact of this project in promoting partnerships between European and Indian industry?

The involvement of EU partners in this project, namely CNRS- France and ECN-Netherlands aim to bring in the gasification and testing technologies being adopted in these countries to be now applied and used under this

project in India. Any modifications required as per the ground conditions will be done here and once the technologies are tested positively, these could be used for other hybrid projects as well and the EU companies can find some strong basis to form partnerships with Indian companies for new project that come up in future.

The SCOPE BIG project aims at testing the solar and biomass hybridisation and maybe later other hybrids like solar-wind or wind/biomass may also be explored based on EU best practices.

What are specific roles to be played by the Indian Govt. /Industry in this domain for proliferation?

Both Government and Industry have a role to play in supporting and promoting renewable energy in India. Meeting the current challenges of the electricity market, in particular the integration of variable renewable energy in the grid and ensuring security of supply requires a market design that provides for coordination of capacities at national level as well as state level, enabling consumers to better participate in markets and allowing energy to be exchanged across states with more ease.

The Government needs to ensure that a policy framework is in place and that financially viable and sustainable models to support renewable energy in the country are available- with easy access to finance. Incentives are needed to move from traditional sources of energy to renewable sources, both for industries as well as for households. Once the policy is in place the industry will in no time respond to the incentives and invest in this sector. What is needed is a long term policy framework to ensure sufficient long term viability.

Additionally, there is a lot of enthusiasm amongst foreign players to explore opportunities and partner with India since the Indian Government's vision to make "doing business in India" easier and simpler has been announced.

Consortium Partners



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For questions please contact scopebig@cstep.in

This project is implemented by CSTEP.

