

13<sup>th</sup> World Congress on **Biofuels and Bioenergy**  
&  
14<sup>th</sup> Global Summit and Expo on **Biomass and Bioenergy**  
August 26-27, 2019 | Vienna, Austria

## **Biomass based rural energy systems in the third world: An engineering challenge**

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In the developing world, rural population still depends largely on biomass for cooking. Besides, traditional rural artisans making pottery, bell-metal craft, bangles, hand-tools etc. use biomass based furnaces. Decades back, the problem of improving the traditional systems using biomass particularly cook stoves was taken up by selected researchers across the globe with the last decade seeing a sharp increase in the concern over emissions from biomass as health hazards and agents of climate change. Efforts to develop and disseminate clean cooking devices have met with limited success due to several challenges on the ground. Ironically, the impact of large scale exploitation of the forest resources and that of traditional use of biomass have been put in the same basket leading to an undue rejection of this fuel by policy makers while it qualifies to be a fuel for a sustainable future due to its renewable nature, carbon neutrality and decentralized availability. The need of the hour instead is to provide more technical inputs in close engagement with the users along with social awareness and mobilization to result in better technologies acceptable to the user. This has been the focus of work group of researchers at IIT Delhi which has been trying to use scientific methodologies for design and development of a downdraft gasifier cook stove, producer gas burner, pottery kilns, furnaces for bangle making and bell metal craft etc., and (ii) design of testing protocols for cook stoves, hood for emission measurement. Scientific rigor and interaction with the users wherever possible have been at the core of the approach followed. Despite that, there are many challenges in the adoption of the technologies which will be highlighted in this talk. Specific recommendations will be made emphasizing the need for coordinated efforts to make biomass an energy resource for sustainable development.

### **Recent Publications:**

1. Sutar K B, Kohli S and Ravi M R (2017) Design, development and testing of small downdraft gasifiers for domestic cookstoves. *Energy* 124:447-460.
2. Sutar K B, Ravi M R and Kohli S (2016) Design of a partially aerated naturally aspirated burner for producer gas. *Energy* 116:773-785.
3. Sutar K B, Kohli S, Ravi M R and Ray A (2015) Biomass cookstoves: A review of technical aspects. *Renewable and Sustainable Energy Reviews* 41:1128-1166.
4. Ravi M R, Dhar P L and Kohli S (2007) Energy audit and improvement of an up draught pottery kiln. *SESI Journal* 17:70-86.
5. Yadvika, Sreekrishnan T R, Santosh and Kohli S (2007) Effect of HRT and slurry concentration on biogas production in cattle-dung based anaerobic bioreactors. *Environmental Technology* 28:433-442.

### **Biography**

Sangeeta Kohli is trained as a Mechanical Engineer with specialization in Thermal Science and Engineering and is currently a faculty member at IIT Delhi. She focusses on using her technical training for design, development and analysis of biomass based rural energy systems. She, along with her colleagues and students has developed the smallest downdraft gasifier cook stove using solid biomass at the lab scale, which is being developed as a product. She is particularly interested in working with rural communities for developing technical solutions for the rural energy needs and also encouraging students to take up such projects as part of their engineering education.

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