

International Scientific Conference

**[MES 2015]**

**Micro Perspectives for  
Decentralized Energy Supply**

April 23 – April 25, 2015  
Bangalore, India



# AGENDA

Of the International Scientific Conference

Bangalore, 20.04.2015



**BREG**  
Berkeley Rural Energy Group

## Important Notes

### Electronic Material

Please find the conference agenda, the book of abstracts of all papers as well as the full scientific proceedings online.

**Agenda:** [www.microenergysystems.tu-berlin.de/conference/wp-content/uploads/2015/04/AGENDA\\_Final.pdf](http://www.microenergysystems.tu-berlin.de/conference/wp-content/uploads/2015/04/AGENDA_Final.pdf)

Full **Scientific Proceedings:** <https://opus4.kobv.de/opus4-tuberlin/frontdoor/index/index/docId/6281>

Book of Abstracts: Please find the latest version on our website.

### Participation Certificates

We can provide you with participation certificates. At the last day of the conference, April 24, from 3:30pm-4pm we will be at the registration/help desk to give out the certificates. Please make sure to fill out the evaluation form until then and hand them back to us. The evaluation form will be included in your conference kit.

### WIFI

There will be a WIFI network set up for the conference days. The network will be activated for the duration of the conference. The network name will be 'visitor', not requiring a password. In case you have any difficulties, you will receive set-up support at registration/help desk.

### No smoking and no drinking on the campus

Please note that smoking and drinking is strictly prohibited on the BMS Campus. Smokers, please make sure to exit the BMS Campus if you go for a cigarette break.

## Day 0

Wednesday, April 22<sup>nd</sup>

06:30 pm Informal Get-Together and Dinner

Registration required (e-mail to [conference-team@microenergy-systems.com](mailto:conference-team@microenergy-systems.com))

Venue: The Energy and Resources Institute, Southern Regional Centre, 4th Main, Domlur II Stage, Bangalore-560 071

# Day 1

Thursday, April 23rd

Registration and Opening session (venue: BM Sreenivasaiah Auditorium)

09:00am	Registration opens – please arrive early! Meet and Greet (Coffee/tea and snacks served)
09:30am	Inauguration Ceremony and introductory remarks
OPENING CEREMONY	<ul style="list-style-type: none"><li>• Dr. K. Mallikharjuna Babu (BMS)</li><li>• Prof. Daniel Kammen (University of California, Berkeley)</li><li>• Prof. Martina Schäfer (TU Berlin)</li><li>• Daniel Philipp (MEI)</li></ul>
10:30am	<b>Keynote speech: Dr. Leena Srivastava (TERI)</b>
11:00am	Logistics introduction by Suresh Ramaswamyreddy (BMS) and Liisa Andersson (MEI)

11:05am Break

Research Presentation Sessions

11:25am Block I	Session I Pathways for Sustainable Energy For All Room: <b>BM Sreenivasaiah Auditorium</b> Moderator: Sebastian Groh (MES)	Session II Minigrids – Implementation Room: <b>BSN Hall</b> Moderator: Chitra Narayanswamy (IRENA)
	Energizing one million rural households in India: A reality check <b>Amit Jain, Troy Hodges, Divyam Nagpal</b>	Development of a heuristic algorithm to design stand-alone microgrids for rural electrification projects considering distributed generation <b>Fredy Ernesto Canizares, Oriol Gomis-Bellmunt, Matteo Ranaboldo, Hannes Kirchhoff</b>
	Replacement of Dry-Cell Batteries via Solar charged Batteries <b>Peter Adelman, Catherina Adelman</b>	AC Solar Photo-voltaic Micro-Grid in Indian Reserve Forest Areas - Experiencing the Implementation Challenges <b>Kaustubh Rajendra Karnataki, Tejas Kumar, Shodhan S, Mitavachan H, Ganesh Shankar, J Srinivasan</b>
	An analysis of suitability of micro grids and solar home systems <b>Vikshut Mundkur, Felix Varghese, Ana Gajales</b>	Energizing rural India using micro grids: The case of solar DC micro-grids in Uttar Pradesh State, India <b>Debajit Palit, Sangeeta Malhotra</b>

01:00pm Lunch Break

Exhibition Stalls Open

Research Presentation Sessions				Exhibition Stalls Open
02:00pm Block II	Session III Implementation and Business Models Room: <b>Faculty Development Centre</b> Moderator: Liisa Andersson (MEI)	Session IV Financing Room: <b>BM Sreenivasaiah Auditorium</b> Moderator: Sophie Wiesner (ADA)	Session V Technologies for Agriculture Room: <b>BSN Hall</b> Moderator: Suresh Ramaswwamyreddy (BMS)	
	<p>Solar lighting for rural households: A case of innovative model in Bihar, India <b>Debajit Palit, Sangeeta Malhotra, Manish Kumar Pandey, Nikita Bankoti</b></p> <p>An inclusive strategy to trigger solar technology market: Case studies of rural distribution models from Ethiopia <b>Arvind Garimella, Debajit Palit, Rita Effah, Etsub Assefa</b></p> <p>A post-Kyoto CDM bioenergy business model built on systems expansion <b>Erik O Ahlgren</b></p> <p>Diffusion of Alternative Electricity Supply Solution in Bangalore: The Emergence of a Market for Middle-Income Customers with New Aspirations Case Studies of SELCO and BCIL Promoting Photovoltaic Systems <b>Haruki Sawamura, Akil Amiraly</b></p>	<p>The role of microfinance in energy access – changing roles, changing paradigms and future potential <b>Sebastian Groh, Hadley Taylor</b></p> <p>Implementing a Green Microfinance Strategy - The Case of CONTACTAR <b>Raluca Dumitrescu, Natalia Realpe Carrillo, Lukas Kahlen</b></p> <p>Special Presentation: <b>Anurag Bhatnagar</b> (SEWA's Hariyali Initiative)</p>	<p>Techno-Economic Feasibility of PV Irrigation in Egypt <b>Hany Abd Elaziz Abd Elrehim, Hannes Kirchhoff</b></p> <p>Microfinancing decentralized solar energy systems in India: The stage set for diversification to irrigation <b>Satish Pillariseti</b></p>	
03:30 pm Afternoon Break				

Research Presentation Sessions		
03:45pm Block III	Session VI Local Grid Access Room: <b>BSN Hall</b> Moderator: Shradha Kapur (CKinetics)	Session VII Linking Energy Access and Development Room: <b>BM Sreenivasaiah Auditorium</b> Moderator: Dr John Holmes (Smart Villages Initiative)
	Development of a Compact DC-DC Converter with Solar Charge Controller for Solar DC Nano Grid System <b>Mahmud Ibrahim, Shahriar Ahmed Chowdhury</b>	Smart Villages: energy access as a catalyst for development <b>Dr John Holmes, Terry van Gevelt</b>
	Passive Droop Control in a Decentralized 12V DC Energy Access Micro-grid with Lead Acid Batteries <b>Hannes Kirchhoff, Michael Schmid, Peter Adelman, Kai Strunz</b>	Decentralized Energy Generation, Rural Electrification and Smart Grid Solutions at the Brazilian Power Sector: An Overview of the Improvements, Bottleneck and Incentives Established through New Regulatory Framework 2009 2011) <b>Gheisa Roberta Telles Esteves</b>
	Development of a test framework for evaluating USB charging ports of pico PV systems and solar home systems <b>Bagus Fajar Ramadhani, Norbert Pfanner, Friedemar Schreiber, Martin Jantsch</b>	Improving the Performance of Solar PV Installation in Rural Locations in Nigeria: A Case Study <b>Mobolaji Agbolade Onasanya, Andrew Wright</b>
05:15 pm Afternoon Break		
Evening Session (venue: <b>BM Sreenivasaiah Auditorium</b> )		
05:30pm	<b>Welcome Speeches and Keynote</b> <ul style="list-style-type: none"><li>Suresh Ramaswamyreddy (BMS) and Sebastian Groh (MES)</li><li>Sophie Wiesner (ADA)</li></ul>	
06:15pm	Panel Discussion Panelists	Title: <b>The road to SE4ALL: Are smart minigrids an answer?</b> <ul style="list-style-type: none"><li>Prof. Saifur Rahman (Virginia Tech)</li><li>Prof. Peter Adelman (University of Applied Sciences Ulm)</li><li>Sampath Dechu (IBM, India Research Laboratory)</li></ul> Moderation: Dr. Parimita Mohanty (The Climate Group)
07:15pm	Cultural Program and <b>Conference Dinner</b>	
09:30 pm End of Day 1		

Exhibition Stalls Open

## Day 2

Friday, April 24th

Morning Session (venue: BM Sreenivasaiah Auditorium)

09:15am

Panel Discussion  
Panelists

Title: **Financing Sustainable Energy for All**

- Mitra Ardrion (Lumeter Networks)
- Dimitry Gershenson (Berkeley Rural Energy Group)
- Charles Cole Navarro (ADB-Energy for All)
- Anurag Bhatnagar (SEWA, Hariyali)

Moderation: Shradha Kapur (CKinetics)

10:15am Break

Research Presentation Sessions

10:30am  
Block IV

Session VIII

Evaluation and Assessment

Room: **BM Sreenivasaiah Auditorium**

Moderator: Dr. Timothy Walsh

A comparative study of electricity supply and benefits from microgrids, solar home systems and the grid in rural South

**Narasimha D. Rao, Anjana Agarwal, Davida Wood**

Multi criteria selection of RETs sites using Simple Additive Weighting (SAW)

**Mary Suzan Abbo, Izael Pereira Da Silva**

You are what you measure! But are we measuring it right? An empiric analysis of energy access metrics based on a multi-tier approach in Bangladesh

**Sebastian Groh, Shonali Pachauri, Narasimha D. Rao**

Introducing Solar LED Lanterns to Rural Kenya: Sustainability Assessment of Environmental, Economic, and Social Impacts

**Masaru Yarime, Jacob Kithinji Peters, Samuel Wanjohi Kiru**

Session IX

Political Economy of Distributed Electricity Generation

Room: **Faculty Development Centre**

Moderator: Mattijs Smits

(Wageningen University) and Jonas van der Straeten (MES)

Electrification in Tanzania from a Historical Perspective – Discourses of Development and the Marginalization of the Rural Poor  
**Jonas van der Straeten**

Is a grid connection the best solution? Frequently over-looked arguments assessing centralized electrification pathways

**Catherina Cader**

Session X

Indian Case Studies

Room: **BSN Hall**

Moderator: Hari Dilip Kumar (MEI)

Institution as the catalyst for productive use of electricity in livelihood cluster: Case for energy plus approach from Andhra Pradesh, India  
**Arvind Garimella, Martand Shardul, Saswata Chaudhury, Debajit Palit**

Urjaa Samadhan – towards self-sustaining solar economies in Orissa, India

**Anna Harnmeijer, Vijay Bhopal, Jamie Cross, Debajit Palit, Prasanta Biswal, Sagar Mahapatra, Jelte Harnmeijer**

Decentralized renewable energy interventions in India as eco-innovations: forms and drivers  
**Gopal K. Sarangi, Arabinda Mishra**

Exhibition Stalls Open

12:00pm Lunch Break

Special Presentation (Venue: BM Sreenivasaiah Auditorium)

01:00pm

**Key Take-Aways – Mini-Grid Workshop**

Identifying the missing link: Enabling low-income markets through clean mini-grid solutions

- Debajit Palit (TERI)
- Sebastian Groh (MEI)
- Dominic Fernando (Schneider Electric)

**Research Presentation Sessions**

01:30pm  
Block V

**Session XI**

Bottom-up Microgrids Reaching Scale:

DC Technology in Practice

Room: **Faculty Development Centre**

Moderator: Hannes Kirchhoff (MES)

Input from the Lab: **Bruce Nordman**, Environmental Energy Technologies Division Lawrence Berkeley National Laboratory: DC technology as a smart and efficient distribution platform

Input from the field: **Fabio De Pascale**, CEO Devergy (tbc) – Energy access with DC Microgrids and Remote Monitoring- Experiences from East Africa

Paper Presentation: **Timothy Walsh**, Solar Energy Research Institute Of Singapore (SERIS)- Solar DC nano-grids – A promising low-cost approach to village

Paper-Presentation: **Shahriar Chowdhury**; Director, Centre for Energy Research, United International University Dhaka- Solar DC Grids for Rural Electrification; an Overview

**Session XII**

RETs in energy access and application

Room: **BSN Hall**

Moderator: Jonas van der Straeten (MES)

Mitigating the effects of spot shading on the power output of a solar module  
**James Wafula, Izael da Silva**

Treatment of Reverse Osmosis Rejected Water Using Solar Energy – A Case Study

**Praveen T. Hunashikatti, Prathima B, Manjunath Kalmath, K.R. Suresh**

Green economy via Decentralised Energy generation and Waste Management being achieved by a 60kg/day Kitchen Waste Biogas Plant at Postal Training Centre, Mysore, India

**Shamsundar Subbarao, Narayana K. Dhananjaya**

03:30pm Afternoon Break

Exhibition Stalls Open

Public Event (venue: <b>BM Sreenivasaiah Auditorium</b> )		
04:00pm	Business Plan Competition Venue: BM Sreenivasaiah Auditorium	Poster Session Venue: BM Sreenivasaiah Auditorium (Reception Area) Moderation: Liisa Andersson (MEI)
	Introduction by Charles Cole B. Navarro (ADB-Energy For All)	Presenters:
	Presentation of the 3 finalists of the Business Plan Competition	<ul style="list-style-type: none"><li>• An Induction Generator Controller for Mihunga Pico Hydropower Scheme in Kasese, Western Uganda <b>Teddy Nalubega, Izael da Silva, Abbo Mary Suzan</b></li><li>• Benefits and Challenges of Off-grid Rural Electrification: Case of mini- hydropower in Bulongwa-Tanzania <b>Joseph Ngowi, Lennart Bängens, Erik O. Ahlgren</b></li><li>• Hydrokinetic turbines for rural electrification in remote areas: Technical solutions and case study <b>Juliana Baumgartl, Dr. Karl Kolmsee, Dr. Clarissa Belloni</b></li><li>• Decentralized Energy Systems via State funding for Roof-Top Solar Power on Govt. Buildings for Green Government Initiative &amp; Personal Solar Power via State Support for Social and National Security <b>Jandhyala Krishna Kishore</b></li><li>• Micro Energy Harvesting <b>Gowdara Narayanappa Rameshaiah</b></li></ul>
	<b>Announcement of the winners and Awards Ceremony</b>	
Evening Session (Venue: <b>BM Sreenivasaiah Auditorium</b> )		
5:00pm	Panel Discussion Panelists	Title: Business Models for SE4ALL <ul style="list-style-type: none"><li>• Rupesh Shah (Simpa Networks)</li><li>• Dr. H. Harish Hande (SELCO)</li><li>• Thomas Gottschalk (Mobisol)</li><li>• Syed Istiaque Ahmed (Rahimafrooz Bangladesh)</li></ul> Moderation: Daniel Philipp (MEI)
6:00pm	Closing Keynote Dr. H. <b>Harish Hande (SELCO)</b>	
6:20pm	Fairwell of the organizers: <b>Jonas van der Straeten</b> (MES) and <b>Suresh Ramaswwamyreddy</b> (BMS)	
06:30pm End of Day 2		

Exhibition Stalls Open



## Day 3 (Optional)

Saturday, April 25th

### Excursion Day – 2 Alternatives

#### 1) Field Trip in collaboration with TERI: **Tholapalli and Bagepalli**

We will visit two villages, field sites of The Energy Resource Institute. In the selected villages there are cook stoves and solar home light systems are installed. To reach the villages, there will be a 2 hour drive by the group bus, we will leave at 9AM and reach back in early evening.

There will be a small cost for the transportation and food required by each participant (approx. 20USD, we will inform those interested with further details.

If you have any further questions, please approach Hari Dilip Kumar.  
Please RSVP by April, 15th 2015 to Hari Dilip Kumar, [hari.kumar@microenergy-international.com](mailto:hari.kumar@microenergy-international.com)

#### 2) Cultural: **Belur and Halebidu**

On this cultural excursion, we will visit Belur and Halebidu. They are towns in the Hassan District of Karnataka and they are famous for the temples of the Hoysala Dynasty. Belur lies on the banks of the River Yagachi and is situated approx.. 222 km from Bangalore whereas Halebidu is 238 km from Bangalore.

The group will travel by bus, stop on the way for lunch and arrive back in the evening.

Please make sure to bring along a water bottle and a hat to protect your head.

If you have any questions, please approach Prof. Netravathi.

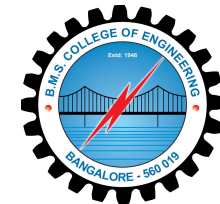
Please RSVP until April 20th, 2015 to to Prof. Nethravathis,  
[Nethravathis.eee@bmsce.ac.in](mailto:Nethravathis.eee@bmsce.ac.in)

# [MES 2015]



## ORGANIZERS AND SUPPORTERS

**BMS College of Engineering (BMSCE)** was founded in the year 1946 in Bengaluru by Late Sri. B M Sreenivasiah as the first Engineering College under private enterprise and nurtured by his illustrious son Late. Sri. B. S. Narayan. The patrons of the college are Dr. B.S. Ragini Narayan (Donor Trustee) and Dr. P. Dayananda Pai (Trustee & Chairman). Started with only three courses, BMSCE today offers 13 UG & 16 PG programmes with 14 Research Centres offering PhD programmes. At present, professors from different disciplines are working in the area of solar energy applications, bio-diesels and hybrid energy for sustainable rural development.



**The Postgraduate Program Microenergy Systems (MES)** at the Technische Universität Berlin is a multi-disciplinary research group that devotes itself to the analysis of the planning, the potential assessment, the design of products and services, the implementation, the use and the impacts of small scale energy systems in structurally weak areas. Our approach focuses on concepts for a decentralized energy supply on household or community level, where production and consumption of energy are spatially interlinked.



**The Berkeley Rural Energy Group (BREG)** is a network of NGOs, technology firms, and diverse UC Berkeley student and faculty participants from energy, economics, public health, engineering, sociology, and beyond located in the San Francisco Bay Area, California, USA. The mission of BREG is three-fold: (1) to better network the Bay Area intellectual community that focuses on remote energy access in developing countries; (2) to provide expertise in energy development and dissemination to outside foundations, NGOs and companies who are interested in enabling remote energy access in developing country communities; (3) to conduct interdisciplinary research in the field of rural energy development.



**MicroEnergy International (MEI)** is a private consulting company founded in Berlin in 2004 with a strong background in energy engineering and economics, microfinance, management and social sciences. MEI has more than ten years of experience in more than 30 countries in Latin America, Africa and Asia. MEI works with microfinance institutions, energy product & service providers, international development actors and research institutions in order to set up clean energy microfinance schemes.



**ADA - Inclusive Finance. Increasing Autonomy. Improving Lives.** Over the past 20 years, ADA has been dedicated to building and catalysing the financial inclusion of populations excluded from conventional banking channels in developing countries. ADA is a Luxembourgish NGO and pursues its goals with the backing of the Luxembourg Development Cooperation.



**The Energy and Resources Institute (TERI)** is a dynamic and flexible not-for-profit organization with a global vision and a local focus. The Institute was established in 1974 with the initial focus on documentation and information dissemination. Research activities, initiated towards the end of 1982, were rooted in TERI's firm conviction that efficient utilization of energy and sustainable use of natural resources would propel the process of development. All activities in TERI, the largest developing-country institution working towards sustainability, move from formulating local- and national-level strategies to shaping global solutions to critical issues.



The **Energy for All Initiative** was formed by the Asian Development Bank in 2008, to build platforms for cooperation, exchange, innovation, and project development for solutions to widespread energy poverty. We've brought together key stakeholders from business, finance, government, and NGOs for a singular purpose: to drive action towards a goal of providing energy access to 100 million people in Asia and the Pacific Region by 2015.



**The Karnataka Renewable Energy Development Limited (KREDL)**, is an organization working under the purview of Energy department, Government of Karnataka. The objectives of the KREDL are to promote renewable energy in the state and to initiate all necessary actions for energy conservation in the state. The KREDL works through various governmental agencies, private organizations, NGO's and accredited energy auditors.



**The Smart Villages Initiative** aims to provide policy makers, donors and development agencies concerned with rural energy access with new insights on the real barriers to energy access in villages in developing countries –technological, financial, social and political – and how they can be overcome. We have chosen to focus on remote off-grid villages, where local solutions (home- or institution-based systems, and mini-grids) are both more realistic and cheaper than national grid extension.



**The Mission of Technical Education Quality Improvement Program (TEQIP)**, a World Bank Initiative, is to develop and nurture a Technical Education System in the country which would produce skilled manpower of the highest quality comparable to the very best in the world and in adequate numbers to meet the complex technological needs of the economy; and provide the nation a comparative advantage in the creation and propagation of innovative technological solutions and in the development of a technological capacity of the highest order, both for its application in economic development of the country and for becoming a major supplier of technology and technological services in the world.



**ME SOLshare Ltd.** was founded in 2014 as an affiliate of the German consulting company MicroEnergy International GmbH. SOLshare targets Bangladeshi households and small businesses in densely populated off-grid villages. These communities need a flexible, stable, and sufficient electricity supply for lighting, phone charging, entertainment and business generating activities at an affordable price point. The main activities of SOLshare are the design, management of manufacturing and sale of an innovative charge controller for Solar Homes Systems (SHS) which manages interconnection between multiple users to a decentralized, low voltage DC micro-grid and facilitates electricity trade.



**Energypedia** is a wiki-based platform for collaborative knowledge exchange on renewable energy and energy access in developing countries. Recognizing that development in the 21st century requires that all actors have access to information, energypedia is working to leverage Web 2.0 technologies in order to remove knowledge barriers and expand the diffusion of information addressing the topics climate change, renewable energy and sustainable energy access for all. Through the platform we strive to create the right environment and provide the right tools for stakeholders engaged in the energy sector to collaborate, create and share knowledge and practical experience.



**New Ventures India** was incubated as a part of the World Resources Institute (WRI), a leading global environmental think tank based in Washington DC – providing business development services to environmentally-focused small and medium enterprises (SMEs) in emerging markets. New Ventures addresses the key barriers to “green” entrepreneurial growth by building in-country support networks for environmental enterprises and increasing their access to finance. They work with key players in the environmental space: entrepreneurs, investors, think tanks, financial institutions, banks, technical incubators and large corporations, primarily in India and cover South Asia and South East Asia.



**Emerge Alliance** is an open industry association developing standards leading to the rapid adoption of DC power distribution in commercial buildings. These innovative standards integrate interior infrastructures, power, controls and devices in a common microgrid platform to facilitate the hybrid use of AC and DC power throughout buildings for unprecedented design and space flexibility, greater energy efficiency and improved sustainability. The Alliance will simplify and accelerate market adoption of EMerge Alliance standards.

