# Proceedings of the Practitioners Workshop on SSC Renewable Energy and Demand side Energy Efficiency Methodologies

## Summary

As part of an ongoing series of practitioner's workshops approved by the CDM Executive Board, the UNFCCC secretariat organised a full day workshop titled "Practitioners Workshop on SSC Renewable Energy and Demand side Energy Efficiency Methodologies"[1] at Wissenschaftszentrum, Bonn, Germany on 14 June 2010.

The purpose of the workshop was to take stock of early project implementation experience and expertise to facilitate the methodological work of Small Scale Working Group (SSC WG) and UNFCCC secretariat. Workshop mainly covered four themes including Solar Water Heating, Refrigeration and Air Conditioning, Building Energy efficiency and efficient pumping, irrigation distribution loss reduction in agricultural sector.

The participation was very good with more than 25 participants, 16% of which were women[2], comprising a mix of CDM methodological and industrial experts and project proponents having an experience of implementing small scale distributed energy efficient CDM projects, apart from the members from Small scale working group (SSC WG), World Bank, UNDP, Designated Operational Entities (DOEs), and secretariat staff members.

The workshop provided valuable input for the work of the SSC WG, particularly for the tasks mandated by the CMP and the Board (e.g., broadening the applicability of the methodologies, facilitating increased usability of methodologies including default operating parameters where possible without jeopardizing the environmental integrity of the methodologies).

## I. Mandate:

The UNFCCC secretariat, through the CDM-MAP 2010, has been mandated to run a series of interactions with CDM stakeholders to enhance the mutual understanding or CDM requirements and to seek means of simplifying requirements in line with the practical difficulties faced by practitioners.

## II. Opening of the workshop

Mr. Conor Barry, the Team Lead for the Organizational Stakeholder Development Unit of the SDM Programme of the UNFCCC Secretariat and Mr. Peer Stiansen, the Chair of the SSC WG welcomed the participants and highlighted the mandate provided by CMP and CDM EB in the context of improvement of the small scale methodologies, sustainable development benefits and the opportunity for addressing regional distribution of CDM activities.

[1] See agenda and input documentation/ presentations at https://cdm.unfccc.int/Panels/ssc_wg/workshop/100514/index.html

[2] Full list of participants is attached as an Annex I and Presenters/ Speakers profile is attached as Annex II to this document.

The opening of the workshop was followed by four thematic panels:

Session 1: *Viable SSC methodology for solar water heating projects and programs*
Session 2: *Viable SSC methodologies for installing efficient residential refrigeration and air conditioning equipment*
Session 3: *Viable SSC methodologies for building energy efficiency*
Session 4: *Viable SSC methodologies for efficient pumping, irrigation, distribution loss reduction in rural grids*

Each thematic panel opened with a series of presentations followed by a question and answer session. Summaries of the proceedings of the thematic panels are presented below as per the order in which they feature in the workshop agenda.

## III. Session 1: *Viable SSC methodology for solar water heating projects and programs*

The session was chaired by Mr. Conor Barry, UNFCCC Secretariat.

There were two presentations in the session as per the table below:

| Speaker | Organization | Title of presentation |
|---|---|---|
| Ms. Yukimi Shimura | Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. | Implementation experience from Vietnam |
| Mr. T. Ananth | Nuetech Solar Systems Private Limited | Implementation Experience from India |

Key methodological issues discussed in the session are included below:

- It is proposed to distinguish between the SWH technology types: Active SWH (equipped with circulation system with temperature control) and Passive SWH (which are simple to apply and are easily accessible by many households).
- Simplifications of the monitoring requirements are needed for passive SWH systems.

Main barriers identified using AMS-I.C are related to baseline determination and monitoring requirements:

- The baseline determination based on the amount of the hot water consumed may vary significantly due to different variables such as the behavioural effects; suppressed demand issues.
- The monitoring requirements of the methodology are very demanding: Installing temperature and flow meters may not be feasible even if it is on sampling basis, due to a combination of cost and practicality.
- It was proposed to use default value for efficiency of the SWHS using a matrix of constant parameters established by manufacturers and fixed ex-ante.

## IV. Session 2: Viable SSC methodologies for installing efficient residential refrigeration and air conditioning equipment

The session was chaired by Mr. Daniel Perczyk, Member SSC WG.

There were two presentations in the session as per the table below:

| Speaker | Organization | Title of presentation |
|---|---|---|
| Mr. Samuel N. Shiroff | BSH Bosch und Siemens Hausgeräte GmbH | Home Appliances CDM: Opportunities and Challenges |
| Ms. Anne Arquit Niederberger | Policy Solutions | High-Efficiency Refrigerators – Expanding the Applicability of AMS-III.X. |

Key methodological issues discussed included the below:

- The session highlighted the fact that there is a large energy saving potential from household appliances, >600 million fridges around the world that are >12 yrs old ( 500 kWh per unit per annum can be saved). Only two types of activities can potentially fit under currently approved methodology AMS-III.X i.e.
    - Refrigerator CDM programs implemented in situations where the price of refrigerators is also subsidized by the government;
    - Utility DSM programs mandated by law (e.g., Brazil).

  Further the following are barriers to implement projects under AMS-III.X:
    - "Low or no cost" requirement in AMS-III.X means significant CDM revenue must be generated in the absence of external funding;
    - Recycling facilities and HFC recovery and destruction as required in AMS-III.X also demands huge initial capital cost;
    - At present, most old fridges do not contain HFC-134a.

- The speakers recommended that recovery of Non-KP GHG gases (e.g. CFC) should be treated as a leakage contributing positively to emission reductions. Crediting of refrigerant and foam blowing agent recovery in addition to HFC-134a refrigerant will make the project more viable; in the meantime, such a component is often larger than the energy efficiency component, thus there will be a need to relax the cap of emission reductions from the avoided direct emissions of refrigerants currently enforced under AMS-III.X.

- Simplification of procedures and expansion of applicability of AMS-III.X were emphasized during the presentation and discussion, with an aim to lower transaction costs and encourage new type of programs. Particularly, the following possible simplification/expansion were proposed:
    - To expand the methodology to cover refrigerator exchange programs that are not heavily subsidized (without the requirement of "Low or no cost");
    - To allow the installation to be completed over a longer period of time (i.e > 1 year that is currently allowed);
    - To allow the baseline refrigerator replacement implemented not necessarily through direct installation;
    - To modify AMS-III.X to allow for viable new-fridge programs, e.g. through rebate.
    - To introduce energy efficiency label scheme as an option for benchmark establishment for new refrigerator programme.

- Allow flexibility in terms of whether a refrigerator project should belong to type II or type III ( in fact it is hard to apply AMS-II.C as the compressor of the refrigerator is not running continuously).

- With regard to the manufacturing of energy efficient domestic refrigerators, methodological issues and recommendations regarding AM0070 were also presented, including *inter alia*:
  - Top 20% of the market as benchmark is too stringent and impractical from implementation perspective (i.e. benchmark should reflect real savings by comparing with the average fridge);
  - In many development counties, data collection is very onerous or just not available;
  - Autonomous improvement factor is also too conservative.

- Another topic referred by Dr. Niederberger was related to the electric motor systems, which account for 40% of electricity demand globally across sectors. Discussion was initiated to improve the effectiveness of CDM in this aspect, i.e. to address the system efficiency, instead of only focusing on component efficiency; to consider simplified approaches using available data and/or default values.

## V. Session 3: *Viable SSC methodologies for building energy efficiency*

The session was chaired by Dr. Steven Schiller, Member SSC WG.

The session included two presentations as below:

| Speaker | Organization | Title of presentation |
|---|---|---|
| Mr. Tobias Hoeck | My Climate | Implementation experience with AMS-II.E |
| Ms. Monali Ranade | World Bank | A comprehensive methodology for building energy efficiency |

Key methodological issues discussed included the below:

- Tobias Hoeck presentation focused on the project experiences of My climate with applying methodology AMS-II.E to two project activities taking place in Bosnia and Herzegovina and Kyrgyzstan. Both of the projects involve insulation of residential buildings and in addition to that the Kyrgyzstan project includes introduction of efficient stoves. The speaker outlined ambiguities related to the applicability of the methodology in the context of projects having non-renewable biomass substitution component and introducing a combination of measures i.e., retrofit insulation of existing buildings and installation of efficient stoves as per the Kyrgyzstan project. It was noted that the methodology did not provide clear accounting procedures for project cases where a combination of measures are undertaken (insulation of the building and introduction of the efficient appliances).

- Regarding the application of AMS-II.E to projects involving multiple insulation measures it was suggested that a new approach on how to attribute the ER when multiple energy efficiency measures are implemented was required.
- Mr. Hoeck also highlighted the difficulties faced in defining baseline, especially when a heterogeneous fossil fuel mix was identified including the use of non-renewable biomass as an energy source. It was noted that currently the AMS-II.E did not provide procedure to account for non-renewable biomass displacement. It was suggested the methodology for the buildings energy efficiency AMS-II.E to be revised to cover project activities substituting the non-renewable biomass.
- For determining of the heterogeneous baseline a revision of AMS-II.E is required to include the non-renewable biomass component in a mix of fuels used such as wood, coal and electricity and an approach for classification of buildings into clusters regarding type and climate zones may be needed.
- Mr. Hoeck highlighted that in many of the project situations it was found that there was unmet energy demand and such situations were difficult to be addressed methodologically e.g. the baseline energy consumption did not provide the heating up to the level of comfort actually needed.
- It was proposed that methodology should provide procedure to address the issue of suppressed demand.
- The speaker also suggested to consider practical aspects of the monitoring requirements since they were crucial for the project feasibility. The monitoring of each building was perceived to be not practical, hence it was proposed to have computer modelling followed by sample based monitoring (classification of the buildings into clusters regarding their type and climate zone).
- It was proposed that the monitoring under IIE should be amended to include:
  - Computer simulation model and sample based monitoring;
  - Measure fuel consumption for the cluster based on the sample monitoring;

- Ms. Monali Ranade's presentation focused on the new building efficiency methodology submitted by the World Bank. The speaker highlighted the fact that there was a large energy saving potential from building energy efficiency measures. Ms. Monali Ranade stated that most of the demand side energy efficiency methodologies consider component-wise effects e.g. energy efficient equipment ( AMS-II.C and AMS-II.J); building energy efficiency ( AMS-II.E) and renewable energy appliances( AMS-I.A and AMS-I.C) and thus there was a room for creating a comprehensive framework.
- The following issues related to the methodologies considering different components were identified:
  - A need of precise census of components;
  - Lack of procedures to account for interactive effects between components;

- The speaker noted that the existing approved methodology for building efficiency AMS-III.AE provides comprehensive approach for considering efficiency technologies, renewable energy technologies and efficient building design practices, however it is restricted to grid electricity applications.
- It was proposed that to cover comprehensively project activities for simultaneous implementation of multiple energy efficiency measures and displacement of a mix of

energy sources consumed a new building energy efficiency methodology may be needed.

- It was described that the proposed new methodology provided a step-wise approach for determining of GHG emission reductions covering electricity and thermal energy based on whole-building simulation using eQUEST/DOE-2.2 tool.
- The proposed methodology is applicable to existing buildings, retrofits and new designed buildings. It was explained that the following parameters were to be taken into account in the proposed methodology:

  - building design parameters such as building geometry, location of building surfaces such as windows, building shades, position of the building and others
  - thermal properties of the building including layer-by-layer description of the building materials with their conductivity, specific heat and density.
  - specification of the space conditioning system including its performance.

  Some of the main parameters used to determine the baseline scenario are based on the assumption for the building category and they include the following:
  - the internal loads (occupancy, lighting and equipment density; internal load schedules)
  - building operations - control temperatures, window opening occupant behaviour.

- It was explained that the baseline scenario was based on the initial assumption for the building category and the relevant underlying characteristics; the adjustments of the ex-ante calibration of the baseline and project scenario were done using measured and published data, whereas the ex-post calculation were based on actual weather data and emissions factors. The conditions under which the post installation calibration to be undertaken were also presented.

## VI. Session 4: *Viable SSC methodologies for efficient pumping, irrigation, distribution loss reduction in rural grids*

The session was chaired by Mr. Gajanana Hegde, UNFCCC Secretariat.

The session included the three presentations:

| Speaker | Organization | Title of presentation |
|---|---|---|
| Mr. Manu Maudgal and Mr. Srinivasan Ramaswamy | Bureau of Energy Efficiency/ GTZ | A program for pumping energy efficiency |
| Dr. Mr. Santosh Deshmukh | Jain Irrigation Systems Ltd | Drip irrigation in distributed small farms |
| Ms. Monali Ranade | World Bank | Loss reduction in distribution networks |

Methodological issues discussed included the below:

- Difficulty in determining life time of old pumps due to the unavailability of data (purchase order of pumps, invoice of pumps are always not retainedby users in

developing countries); equipments are usually refurbished hence difficult to estimate the "real" life time.

- Contributions not only coming from energy saving but also from changes in farming practices (Drip irrigation vs flood irrigation method).
- Viability discussed for implementation in India and Africa. However, applicability in other countries may be subject to different farming practices.
- AMS II.A (Loss reduction from the distribution system) is for the projects such as upgrading distribution, replacing components and refurbishing systems. However, due to the characteristic of the project where the grid/transmission company owns the transmission line, the most projects with this methodology is involved in refurbishing systems including upgrading substation, line, transformer etc. However, the implementation of this common activity as a CDM is difficult because 1) methodology is silent on how to calculate the emission reduction; 2) difficult to identify remaining lifetime of equipment (especially POA application) such as when 20,000 transformers are involved as in the example project; 3) calibration of equipment specially for transmission companies. Therefore, clarification is required in II.A on how to consider the emission reduction in the system.
- Monitoring of contributions from small segments of line replacements extremely difficult and costly.
- Suggested the secretariat to carry out the function of validation (instead of DOE) for small scale project to avoid high transaction costs.
- AMS II.F is the methodology for emission reduction from reduction of the loss of water from irrigation system (drip system via watering the root zone of the plant) to reduce electricity consumption. Speaker indicated that watering the root zone can provide additional benefit such as less soil loss. Further whether reduced usage of fertilisers on account of application through drip system was creditable under the CDM was discussed. Participants felt although it is an eligible component it might be difficult to monitor and quantify. .
- Agricultural energy efficient pumping (AMS-II.C):
  - Need for simpler monitoring requirements (particularly for pumping head monitoring and scrapping of old pumps having residual life)
- Drip Irrigation in Farms (AMS-II.F):
  - No projects are registered so far
  - Drip irrigation is clearly more energy efficient than flood irrigation but may have high initial costs
  - Need for simpler monitoring requirements (for example use of default values) as 100% monitoring is costly
- Loss reduction activities (AMS-II.A):
  - Problematic methodological requirements (such as increasing capacity/ load additions and residual life of equipment)
  - More suitable for POA, but with refinements such as determining sample size across multi-components.

## VII. Closing Remarks

Mr. Hugh Sealy, the Vice-Chair of the SSC WG thanked the project participants and stakeholders for sharing the practitioners perspectives of methodology implementation and considered these inputs very valuable for the work of the SSC WG to increase the usability of the methodologies. He stated that SSC WG will take this work further by devising a work plan with the aim to deliver methodological solutions taking into account issues raised at the workshop and engaging the project participants and stakeholders in this endeavor.

**Participants Feedback**

Those in attendance were supportive of the participatory workshop approach to gathering methodological inputs, and thanked the Secretariat for organizing. Many participants are optimistic that significant barriers to project development will be removed through the simplification of the methodologies.

- - - - -

## Annex I - List of participants

| Name of participants | Title/Organization | E-mail address |
|---|---|---|
| Mr. Peer Stiansen | SSWG Chair | / |
| Mr. Hugh Sealy | SSWG Vice Chair | / |
| Mr. G. B. De Melo | SSWG member | / |
| Ms. Carolyn Luce | SSWG member | / |
| Mr. Daniel Perczyk | SSWG member | / |
| Mr. A.K. Perumal | SSWG member | / |
| Mr. Steven Schiller | SSWG member | / |
| Mr. Michiel Ten Hoopen | SSWG member | / |
| Ms. Yukimi Shimura | MUMSS | shimura-yukimi@sc.mufg.jp |
| Mr. T. Ananth | Nuetech Solar Systems Pvt Ltd | ceo@nuetechsolar.com |
| Mr. KR Surendra Kumar | Nuetech Solar Systems Pvt Ltd | info@nuetechsolar.com |
| Dr. Anne Niderberger | Policy Solutions | policy.solutions@comcast.net |
| Mr. Samuel N. Shiroff | BSH Bosch und Siemens Hausgeräte GmbH | Samuel.Shiroff@BSHG.com |
| Ms. Monali Ranade | World Bank | mranade@worldbank.org |
| Mr. Manu Maudgal | Indo German Energy Programme - Bureau of Energy Efficiency-GTZ | manu.maudgal@gtz.de |
| Mr. Srinivasan Ramaswamy | Indo German Energy Programme - Bureau of Energy Efficiency-GTZ | Srinivasan.ramaswamy@gtz.de |
| Mr. Jens Burgtorf | Indo German Energy Programme - Bureau of Energy Efficiency-GTZ | jens.burgtorf@gtz.de |
| Dr. Santosh K Deshmukh | Jain Irrigation Systems Ltd | deshmukh.santosh@jains.com |
| Mr. Kanda Sandeep | Tüv-Süd | sandeep.kanda@tuev-sued.de |
| Mr. Tobias Hoeck | My Climate | tobias.hoeck@myclimate.org |
| Mr. Dong Nan | ERM CVS | Nan.dong@erm.com |
| Mr. Li Tao | ERM CVS | tao.li@erm.com |
| Mr. Liu Yang | ERM CVS | Eddie.Liu@erm.com |
| Mr. Matt Spannagle | UNDP | matt.spannagle@undp.org |

## Annex II - Profile of Presenters/ Speakers

The profiles of the speakers/ presenters are mentioned below:

**Yukimi Shimura**
Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.

Yukimi Shimura is CDM/JI Consultant at Clean Energy Finance Committee of Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.(MUMSS). She is currently responsible for Latin American activities, apart from giving consulting services for methodology development and conducting policy researches. Prior to joining MUMSS in 2006, she was responsible for CDM capacity building activities in India and Thailand at the Institute for Global Environmental Strategy (IGES), and for energy statistics/balances for non-OECD member countries at the International Energy Agency (IEA) of OECD. She holds a MSc. in Energy and the Environment from the University of Calgary.

**T. Ananth**
Nuetech Solar Systems Private Limited

Mr. T Ananth, 49 years, Chief Executive Officer, M/s Nuetech Solar Systems Private Limited, is an Engineering graduate from RV College of Engineering, having over 20 years experience in the solar energy industry. He started as a sole distributor for M/s Best & Crompton (Solar Energy Division) for the state of Karnataka in the year 1989 and went on to establish one of the first full fledged manufacturing units in Bangalore, M/s NAMSI Solar Pvt. Ltd., and served as its Managing Director till 2003. NAMSI Solar, in the year 1994, was among the first batch of Intermediaries of IREDA. Mr. T Ananth is a Solar Energy Consultant, recognized by Consultant Development Center, Govt. of India and has rendered User oriented consultancy services to many organizations and institutions including NTPC Ramagundam, MediCity Hyderabad, Hotel Motimahal, Bangalore among others. He is also a CDM Consultant, having got his first insight into CDM was as a project under Canada CDM Small Projects Facility sponsored by Department of Foreign Affairs & Trade, Government of Canada and Canadian International Development Agency. He has been the Consultant to Nuetech Solar, which has successfully received the Host Country Approval. He is now in charge of taking forward the CDM project to its logical conclusion. He is the Founder President of SOLAR CLUB, a unique and first ever exclusive association of Users of Solar Energy, which was established in the year 1994 and is over 1000 member strong. He is presently the Working President of Karnataka Solar Manufacturers' Association (KASMA) who had also served as its President for two earlier terms, between 1992 and 1998. A Rotarian from Rotary JP Nagar, Bengaluru, Mr. Ananth has launched "Rotary Green Brigade", a movement among the School Children in South Bangalore. It aims to sensitize the future citizens about Global Warming Climate Change, with a target of about 1000 high schools and at least touching 1 million children in its first phase. During the academic year 2009-10, the launch year, The Rotary Green Brigade successfully reached its target of 100 schools and one lakh children. He is a recipient of "Man of the Year" award in the year 1997, instituted by M/s Global Economic Council, New Delhi for his contributions to the Renewable Energy Field.

**Anne Arquit Niderberger**
Policy Solutions

Anne has been working in the field of climate change and energy research, policy, capacity building, and consulting since 1989, shifting her focus from science to government policy and, since 2001, to strategic consulting. One focal area of her consulting work is energy efficiency, and she can draw on in-depth practical knowledge of related developments in China, Europe and the USA. Anne was instrumental in launching and serves on the Board of Directors of TopTen USA, which is creating a high-efficiency benchmark for consumer products, equipment and services. And she is heavily engaged in the UN negotiations leading up to the Copenhagen climate summit this December.

An expert on carbon markets from the outset, Anne represented the Government of Switzerland in the UN climate negotiations from 1991-2000, serving as lead negotiator on the Kyoto Protocol market mechanisms. She established Swiss carbon market activities in the 1990s on behalf of the State Secretariat for Economic Affairs. As a consultant, she conceived the innovative Swiss Climate Cent fund, under which oil importers voluntarily contribute 1.5 Swiss cents to a climate mitigation fund for each liter of gasoline/diesel sold, thereby channelling USD 80 million annually into climate mitigation activities, including in the domestic building sector. Anne has become a leading expert on energy efficiency under the Clean Development Mechanism (CDM) and was recently quoted in The Economist on the subject. She has provided expert input to the UNFCCC Secretariat and drafted a number of approved quantification methodologies for energy efficiency.

She holds an A.B. degree with High Honors in Earth Sciences from Dartmouth College and a Ph.D. in Oceanography from the University of Hawaii. She was a Visiting Scholar at Columbia University's School of International and Public Affairs in 2003-04 and has published extensively on sustainable development, climate change and clean energy issues.

**Samuel N. Shroff**
BSH Bosch und Siemens Hausgeräte GmbH

Samuel Neal Shiroff is the director in the Growth Markets department, at BSH Bosch and Siemens Home Appliances Group– located in Munich, Germany. Sam is responsible for developing and implementing the business models based CSR, CDM and other CO2 credit. BSH is currently active in this area with its plant oil cooking stove as well as its conventional home appliances.

Born on May 3rd, 1976 in Pennsylvania, USA, Samuel studied Communication and History at Boston College. Samuel was awarded a Fulbright Scholarship in 1998, which was completed at Frankfurt University, Germany. Sam has an MBA from Colorado State University.

In 1999 he took a position in Deutsche Bank where he represented the bank's investment in the Prototype Carbon Fund of the World Bank. In addition he focused on promoting, expanding and improving the bank's sustainable development and corporate citizenship activities. In 2003, Sam became executive director of the Bellagio Forum for Sustainable Development (BFSD) – an international network of corporate and private foundations, multi-lateral and media organizations striving to attain environmental balance, economic stability and social progress throughout the world. Sam has several publications on the subject of sustainable development and responsible investment practices for foundations.

**Monali Ranade**
World Bank

Monali is working with the World bank. She has degrees in Mathematics and Economics. She has worked for almost 10 years in the field of energy efficiency, with more than 5 years working directly with CDM projects and methodologies.

**Tobias Hoeck**
My Climate

Tobias Hoeck is working at myclimate since 2008 as Project Leader, Carbon Offset Projects. He is responsible for the development of carbon offset projects in Africa with a special focus on community-based project activities (solar and efficient cook stoves, efficient lighting, or biomass energy). He studied Geography, General Ecology and Geology at the University of Bern, specialised in the areas of sustainable development and development cooperation. He has a background in sustainable resource

management and development cooperation and worked several years at the Centre for Development and the Environment at the University of Bern for international development projects (GEF project for "sustainable land use in the Pamir-Alai mountain range in central Asia", World Bank project for "the application of Geographical Information Systems in Tajikistan", scientific paper about "energy resource usage and land degradation in Tajikistan"). Furthermore, he was working as an intern at the WWF Switzerland in Zurich on energy efficiency and the climate campaign.

**Manu Maudgil**
Bureau of Energy Efficiency/ GTZ

Manu Maudgal is working towards promoting the use of CDM and other market based initiatives for uptake of energy efficiency in India. He is working with the GTZ, under the Indo-German Energy Programme with the Bureau of Energy Efficiency. Prior to this, he was Head –CDM & Energy (North India) with TUV Nord a leading international Designated Operational Entity. He started his career as environment consultant (Environment Management Systems viz. ISO 14001) with India's leading Industry association Confederation of Indian Industry (CII). During course of his work-experience he has interacted and worked in teams involving leading Environment and Energy sector professionals in India and abroad. He is a B.Tech Chemical & Bio Engineering (National Institute of Technology-Jalandhar, India) and Masters in Environment Management (SIES-IIEM, Mumbai, India). He currently is nominated as Country Expert for an International Energy Agency DSM Task and is member of the DOE Advisory Committee of the Indian Council for Forestry Research.

**Srinivasan Ramaswamy**
Bureau of Energy Efficiency/ GTZ

Srinivasan Ramaswamy is a chemical engineering graduate from Annamalai University.
He had also completed a 2 year post graduate programme in fuel efficiency conducted by National Productivity Council. In the initial 10 years he has provided consultancy services in Industry in implementing energy saving measures. In the last 20 years he has been working to enable energy efficiency delivery mechanism through policy interventions viz.: Actively participated in formulating and the enactment of Energy Conservation Act in India, Responsible for introduction of standards and labelling programme in India, Worked in energy efficiency financing issues and was actively involved in introducing energy service companies in the country, Participating in energy efficient public procurement, Involved in the design and development of the Bachat Lamp Yojana PoA and development of new M&V approaches.

**Dr. Santosh Deshmukh**
Jain Irrigation Systems Ltd

Santosh has done his Bachelors degree in Agricultural Engineering from MPKV, Rahuri and Doctorate in Water Science and Technology from Indian Agricultural Research Institute, New Delhi. Recipient of National Merit Scholarship and Senior Research Fellowship by CSIR. Have several research publication on his name in the area of wastewater irrigation. He is working with JAIN IRRIGATION SYSTEMS LTD., for last 3 years. He started his career as design engineer and now due to his interest in climate change and sustainability he has risen to the position of he Chief Coordinator of Corporate Sustainability in short span of time. He is looking after various CDM projects along with all climate change issues, water and carbon foot printing and sustainability reporting of the Indian Agriculture Major – Jain Irrigation Systems Ltd. Jalgoan in the State of Maharashtra, India.