

**INTERNATIONAL HANDS-ON TRAINING ON  
ENERGY AUDIT FOR ENERGY PROFESSIONALS IN DEVELOPING COUNTRIES  
MUMBAI, INDIA  
04-14 MAY 2011**

***PARTICIPATING COUNTRIES:*** 17 Developing Countries (Including 15 Member Countries and 2 Non-member Countries of the NAM S&T Centre)

***NUMBER OF PARTICIPANTS:*** The Training was attended by 38 trainee participants from 17 countries. There were 24 resource persons and trainers from India.

Energy efficiency and conservation are important elements of energy planning and policy as these are aimed at the reduction in energy consumption and energy demand per capita and offsetting the increase in energy supply needed to keep up with the population growth. This strategy reduces the rise in energy costs and also the need for energy imports. The reduced energy demand can provide more flexibility in choosing the most preferred methods of energy production. Energy conservation facilitates the replacement of non-renewable resources with renewable energy. It is often the most economical solution to energy shortages, and is a more environmentally benign alternative to increasing the energy production. Energy efficiency represents a cost-effective approach to raising profitability, enhancing competitiveness and improving environmental performance. The possibilities range from relatively simple and low-cost process modifications to sophisticated and more costly investments in pollution prevention technologies.

To deliberate on the above issues the Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre) in association with the Centre for Energy Studies and Policy Analysis (CESPA), Trivandrum, India and the Society of Energy Engineers and Managers (SEEM), India organised a 11-days 'International Hands-On Training on Energy Audit For Energy Professionals in Developing Countries' during 4-14 May 2011 at Jawaharlal Nehru Port Trust (JNPT), Navi Mumbai, India. Eminent knowledge partners and supporting organisations such as the International Copper Promotion Council of India (ICPCI), Indian Society of Lighting Engineers (ISLE); Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE); Petroleum Conservation Research Association

(PCRA), India; Maharashtra Energy Development Agency (MEDA); Synergy Consultants Pvt. Ltd.; See-Tech Solutions Pvt. Ltd.; and Kirlosker group played a key role in the overall execution of this training programme.

The Hands-On Training programme was opened in Indian traditional way by lightning of oil lamps. In the Inaugural Session Mr. Umesh Kapre, Secretary, SEEM Maharashtra Chapter welcomed the delegates. Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre presented the genesis of the event and also briefly described the activities of the NAM S&T Centre. This was followed by the Presidential Address by Mr. Dalip Singh, President, SEEM - India. After the address by the Guest of Honour, Prof. Dr. Mahmoud Mohamed Abdellatif Sakr, Vice President, Academy of Scientific Research & Technology (ASRT), Egypt, Mr. L. Radhakrishnan, IAS, Chairman, Jawaharlal Nehru Port Trust (JNPT), India gave the Inaugural Address.

In the latter part of the Inaugural Session the representatives of some partner and supporting organisations, namely, Dr. Prakash Barjatia, Chairman, ISLE; Mr. P. K. Sinha, Joint Director & Regional Coordinator, PCRA; and Mr. Maharana, General Manager (Operations), JNPT informed the participants about their significant contributions made in the direction of energy efficiency.. The session was concluded with the Vote of Thanks by Mr. Shishir Athale, Chairman, SEEM Maharashtra Chapter, Mumbai.

The Hands-On Training was attended by 38 trainee participants from 17 countries, namely, Botswana, Brunei, Cambodia, Egypt, India, Indonesia, Iraq, Malawi, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, Sri Lanka, Tanzania, Togo and Uganda. There were 24 resource persons and trainers from India.

22 overseas trainee participants were from Botswana [Mr. James Jakoba Molenga, Acting Principal Engineer (Renewable Energy), Botswana Technology Centre (BOTEC), Gaborone]; Brunei [Mr. Muhammad Robin Yong bin Abdullah, Engineer Supervisor, Authority for Building Control and Construction Industry, Ministry of Development, Dr. Rohaniyati Binti POKLWDSP Haji Md Salleh, Executive Engineer, Mechanical and Electrical Department, and Ms. Justina Liew Vun Ching, Executive Engineer, Head of Safety Unit in Public Works Department (PWD), Ministry of Development]; Cambodia [Mr. Khlaing Amradararith, Deputy Head Office, Energy Efficiency and Conservation in Building and Factory, Energy Management

and Research, Department of Energy Technique (MIME), Phnom Penh]; Egypt [Prof. Dr. Mahmoud Mohamed Abdellatif Sakr, Vice President, Academy of Scientific Research & Technology (ASRT), Cairo]; Indonesia [Dr. Ophirtus Sumule, Deputy Director, Ministry of Science and Technology, Jakarta Pusat]; Iraq [Mr. Haider Hammoodi Abdulhadi, Ministry of Science and Technology, Directorate of Researches and Renewable Energy; and Mr. Rashid Khalaf Mahmood, Head / Senior Chemist, Department of Studies, Planning and Pursuance, Ministry of Oil]; Malawi [Mr. Lameck Kabambalika Nkhonjera, Lecturer, Dept. of Physics and Biomedical Sciences, The Polytechnic, University of Malawi, Blantyre]; Malaysia [Ms. Rosnida binti Mohd. Yusof, Principal Assistant Director, Environment and Energy Branch, Public Works Department Headquarters of Malaysia, Kuala Lumpur, and Dr. Tan Ching Sin, Head of Energy Security, Institute of Energy Policy and Research (IEPR), Universiti Tenaga Nasional (UNITEN), Kajang]; Mauritius [Mr. Ashley Purmanund, Senior Electrical Engineer, Ministry of Energy and Public Utilities (MEPU), Port Louis]; Myanmar [Dr. (Mrs.) Thida Swe, Deputy Director, Myanmar Science and Technology Research Department, Yangon]; Nepal [Dr. Suresh Kumar Dhungel, Senior Technical Officer, Nepal Academy of Science and Technology (NAST), Kathmandu]; Nigeria [Mr. Ismail Ibraheem Idris, Senior Scientific Officer, Raw Materials Research and Development Council (RMRDC), Abuja, and Mr. Badmos Soliu Adebare, Scientific Officer, National Biotechnology Development Agency (NABDA), Federal Ministry of Science and Technology, Abuja]; Sri Lanka [Mr. Kodithuwakkuge Jayasinghe, Principal Research Engineer, National Engineering Research & Development Centre (NERD), Ekala, Ja Ela]; Tanzania [Mr. Styden N. Rwebangila, Energy Engineer Renewable Energy Section, Ministry of Energy and Minerals, Dar es Salaam]; Togo [Mr. Abdoulaye Robil Nassoma, Engineer in Energy, Direction Generale De L'energie, Lome]; and Uganda [Mr. Geoffrey Bakkabulindi, Head, Energy Efficiency Program, Centre for Research in Energy and Energy Conservation (CREEC), Makerere University, Kampala, and Mr. Davis Bariho Bagamuhunda, Energy Systems Engineer, Uganda Industrial Research Institute, Kampala].

The Indian trainee participants were Mr. V. S. Babaram, Deputy Manager (Electrical Maintenance), Mr. A. G. Wadatkar, Assistant Manager (Electrical Maintenance), Mr. T. N. Chavan, Assistant Manager (Electrical Maintenance), Mr. S.

S. Gurav, Assistant Manager (Crane Maintenance), Mr. B. D. Sinkar, Assistant Manager (Crane Maintenance) and Mr. Mukund Digambar Dongre, Superintendent (AC Maintenance) from JNPT, Navi Mumbai; Mr. Sunil Patel, Mr. Prashant Joshi and Mr. Vishal Bhapkar from Kirloskar Brothers Ltd., Pune; Mr. Geetesh Goyal, Business Partner, Goyal Krishi Kendra, Pachore; Mr. Jaydeep Neminath Lengade, Proprietor, Aditya Consultants, Karnataka; Mrs. Deepa S. Kumar, Energy Technologist, Energy Management Centre, Kerala; Mr. Jignesh Patel, Assistant Manager (Power Quality and Energy Conservation), Amtech Electronics (I) Ltd.; Mr. Ashish Bhgwat, Technical Executive, Senergy Consultants / EEMPL, Mumbai; Mr. Sharad Kale, G. M. Technical, Mumbai; and Mr. Gaurav Gaur, Research Assistants from the NAM S&T Centre.

During the Hands-On Training, lectures were delivered by eminent Indian experts and professional Dr. Prakash Barjatia, Chairman, Mumbai State Centre, ISLE [on 'Lighting Energy Efficiency'], Mr. M. C. Jain, Chairman, SEEM Chhattisgarh Chapter [on 'Energy Efficiency in Industries'], Mr. Ravindra Datar, Senergy Consultant (P) Ltd. [on 'Energy Audit Report'], Mr. S. B. Mahajani, Deputy General Manager, Amtech Electronics (India) Ltd. [on 'Harmonics: Cause, Effects and Mitigation Techniques'], Mr. Dalip Singh, President, SEEM [on 'Energy Efficiency through Power Quality']; Mr. Virender Kumar Gupta, ICPCI [on 'Energy Management through High Efficiency Motors (HEMs)']; Mr. Venugopala Rao, PCRA [on 'Steam Generation and Distribution']; Shirish M. Deshpande, Director, Energetic Consulting Pvt. Ltd. [on 'Energy Efficiency in Buildings' and 'Energy Efficiency in Pumping Systems']; Mr. Sharad Kale, PGDER –WTC-MERC, Mumbai [on 'E.C. Act 2001']; Mr. Mohtasib Najeeb Mahammed, Senior Executive, Siemens Ltd. [on 'Selection of Engineering Equipments with Energy Efficiency Focus Motors & Drives']; Mr. Mohtasib Najeeb Mahammed, Senior Executive, Siemens Ltd. [on 'Selection of Engineering Equipments with Energy Efficiency Focus Motors & Drives']; Mr. Pradeep Sharma and Mr. Sanjay Moghe from Kirloskar Bros. [on 'Kirloskar Solar Pumping System', 'Automation in KBL Pumps & Systems' and 'Life Cycle Costs In Pumps and Pumping Systems']; Mr. P. C. Lohia, Sr. VP Engineering, Reliance Industries and ISHRAE Mumbai Chapter [on 'Case Studies in Energy Audit Proves the Point']; Mr. Kunal Godse, See-Tech Solutions Pvt. Ltd. [on 'Save Electricity Bill with See Tech']; Mr. R.L. Birla, PEER Services, Mumbai [on 'Enriching Energy

Audits]; Mr. Rajesh Deshpande, Director, Energetic Consulting Pvt. Ltd. [on 'From Audit Reports to Implementation']; and Dr. R. Harikumar, Energy Management Centre, Kerala and Vice President, SEEM [on 'Energy Management – Assessing the Organisation's Preparedness', 'Energy Audit', 'Energy Efficiency Scenario in India' and 'Energy Monitoring, Targeting & Reporting']. The overseas participants presented their country / institutional status reports and research papers in the Country Presentation sessions.

While the Technical Presentation sessions were respectively chaired by Mr. Dalip Singh and Prof. Dr. Mahmoud Mohamed Abdellatif Sakr; Dr. Prakash Barjatia and Dr. Tan Ching Sin; Mr. Venugopala Rao and Mr. Geoffrey Bakkabulindi; and Mr. Dalip Singh and Mr. Venugopala Rao, the Country Presentation sessions were chaired by Mr. Venugopala Rao and Mr. Davis Bariho Bagamuhunda; Mr. Muhammad Robin Yong bin Abdullah and Dr. Rohaniyati Binti POKLWDSP Haji Md Salleh; Mr. G. Krishnakumar and Mr. Styden N. Rwebangila; Ms. Justina Liew Vun Ching and Ms. Rosnida Binti Mohd. Yusof; Mr. Badmos Soliu Adebare and Dr. Suresh Kumar Dhungel; and Mr. James Jakoba Molenga and Mr. Ashley Purmanund.

In addition to the technical presentations and country reports, demonstration of various measuring equipments such as flow meter, power quality analyser, thermal imager etc was made by Mr. Pradip Thakur, Sioux Power Solutions. See Tech provided a software tool to the participants, which calculates or analyses various parameters once we input the measured data. An innovative talk was delivered by Mr. R. Birla and Mr. C. Jayaraman of SEEM- India addressed the participants. A special lecture on 'South-South Cooperation in Science and Technology – The Role of NAM S&T Centre' was delivered by Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre.

Participants were also taken to the private terminal inside the JNPT port, namely, Gateway Terminals Indian Pvt. Ltd. where Mr. Suhas Karandikar, Engineering Head through his presentation on 'GTI Engineering and Cost Saving Initiatives' and an interactive talk informed the participants about the innovative practices being used by GTI to minimise the energy consumption and saving on its expenses.

Mr. Venugopala Rao was the chief mentor of the event who delivered a round of lectures and provided day to day clarification to the participants' queries on various issues during the discussion rounds. All the participants (Indian and foreign) of the Hands-On Training were divided into four groups and for each group, mentors and JNPT coordinators were identified to help the participants in sampling and data collection from various sites at JNPT port and residential areas, and in analysing the data taken from the these sites. While Mr. Kale, Mr. Atul and Mr. Ashish from Senergy Consultants Pvt. Ltd.; Mr. Prashant Joshi, Mr. Sunil Patil, Mr. Vishal Bankar from Kirloskar Bros.; Mr. A. Auddy and Mr. Vishnu from I.S.L.E.; Mr. Ajit Datar (SEEM), Mr. Gignesh Patel (Amtech) and Mr. Ariz Ahamed from SEE-Tech, Nagpur; and M/s Pramod D. Khatal, Shailesh Tambade and Mr. Bapat from M/s ECPL, Mumbai played the role of the mentor, Mr. Dongare, Mr. T. N. Chauhan, Mr. V. S. Baburam and Mr. Waltker were the coordinators from JNPT.

Since Jawaharlal Nehru Port Trust (JNPT) complex was taken as a case study for energy audit exercise, Mrs. Deepa S. Kumar, Energy Technologist, Energy Management Centre, Kerala presented a draft 'Quick Recommendations' to suggest the avenues where energy conservation and saving could be possible in JNPT.

In the Concluding session, a special Participants' Interactive Forum was also organised, which was moderated by Prof. Arun P. Kulshreshtha, in which the discussion was highly interactive in nature and the participants made specific suggestions and comments. Subsequently, a set of recommendations titled 'Mumbai Resolution on Energy Management in Developing Countries' was adopted after considerable deliberations and debate.

As a token gesture on improving the environment, planting of trees by the participants was organised almost each day in the Smruti Van, the forest area in the JNPT grounds. The participants were also taken via sea route to a world heritage monument, 'Elephanta Caves', and then to the Gateway of India and Hotel Tajmahal in Mumbai. The Chairman of JNPT, Mr. L. Radhakrishnan, IAS, hosted a banquet dinner on the penultimate evening of the hands-On Training.

The participants thanked the organizers of the Hands-On Training for the successful and fruitful organisation of the event and for excellent hospitality and the

arrangements made for the delegates, and unanimously hoped that more similar events will be held in future.