

UN-ESCWA Study Tour for Policy Makers

**Ensuring Access to Modern Energy through
the use of Renewable Energy
Technologies – Indian Experience**

25–29 October 2015

Training hall, World Institute of Sustainable Energy (WISE), Pune, India



BRIEF REPORT ON STUDY TOUR

Organised by



World Institute of Sustainable Energy, Pune

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Background

Background

Lack of access to modern energy services in off-grid rural regions ranks among the top factors holding back development of rural communities. Extending the grid to these regions requires allocation of large public funding; such funding, however, is subject to national development prioritization, and unfortunately competing national needs and low return on investment for such projects lessen their chances of early approval.

Appropriate renewable energy application technologies can be an alternative to the grid in ensuring modern energy access to off-grid rural communities. They require smaller investments, follow a distributed electricity generation model, are locally installed and sized as per local needs, but most importantly they can be affordable to segments of rural communities.

Improving rural economies leads to job creation, increased income, and improved livelihood which translate into better social services. Improving productivity of local businesses follows this logic, and having access to energy might be a turning point to some farming and non-farming activities through acquisition of technology tools with high potential for improving productivity.

ESCWA is implementing the DA project “Building Capacities in Developing Appropriate Green Technologies for Improving the Livelihood of Rural Communities in the ESCWA Region” which aims to strengthen the capacity of ESCWA member countries to mainstream appropriate green technology initiatives into national development programmes and policies, in order to enhance livelihoods of rural communities.

The study tour follows a series of activities that started with the development of a methodology for assessing renewable energy needs in the rural productive sector which was validated during an expert group meeting that was organized for that purpose. Capacity building workshops for practitioners and policymakers were organized in Jordan, Morocco, Oman and Sudan to introduce the methodology.

Objectives

The study tour was aimed at enhancing the knowledge of policymakers and decision makers on policy options and builds their capacity for using policy tools to enable an environment conducive for investment in appropriate green technologies in rural areas in the region. It was envisaged to:

- ▶ Acquaint participants with successful experiences in the area of developing, promoting and implementing green technology initiatives
- ▶ Expose participants to successful experiences in the implementation of policies leading to an environment favorable to investment in the development, promotion and dissemination of appropriate green technology initiatives

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Major Outputs

Session	Inaugural Session
1	<p>Mr G M Pillai, DG, WISE, Dr Krishnan S Raghavan, Coordinator, Technology Transfer ,United Nations ESCAP-APCTT Mr Kohji Iwakami, Economic Affairs Officer, UN-ESCAP , Bangkok Mr Imad Sleiman, Consultant, Energy Section, Sustainable Development Policies Division (SDPD), UN ESCWA</p>

The welcome address was delivered by Ms. Praveena Sanjay, Director, World Institute of Sustainable Energy, WISE. She welcomed all the participants from Morocco, Jordan, Oman, Sudan, Mauritania, France, Laos, Lebanon and Nepal. She then introduced the dignitaries present for the inaugural session of this tour, Mr. G. M. Pillai, Director General – WISE; Mr. Krishnan S Raghavan, UNESCAP-APCTT; Mr. Imad Sleiman, UNESWA, Mr. Surendra Pimparkhedkar, Head-CRP-WISE. Mr. Pimparkhedkar presented the dignitaries with a flower bouquet to begin the proceedings.

Mr. Pimparkhedkar in his welcome address spoke about WISE and its work in enhancing Sustainable Energy, influencing public policy and capacity building of renewable energy in India. He spoke about the objectives and activities planned for the tour.

Mr. Pillai in his welcome address thanked UNESWA and APCTT for providing opportunity to conduct this study tour. He spoke about Indo-African relations and the importance of sharing experiences in renewable energy, in current scenario. He also mentioned the initiatives of WISE – APCTT, in the past. Following which Mr. Raghavan was invited to speak; he thanked WISE for their support. He highlighted the need for sharing successful experiences and lessons drawn from failures in sustainable energy development. He went on to present a short video on involvement of civil society in UN initiatives.

Mr. Sleiman then, welcomed all the delegates and thanked WISE and UN for their support in sustainable energy development. He spoke about UN’s goals and importance of energy access in development of rural areas. He hoped this tour would encourage a platform for sharing knowledge and experiences to encourage workable solutions for sustainable energy development. He concluded by thanking Mr. Krishnan, and Mr. Surendra for conducting this tour.

Session	
2	<p>Mr Surendra Pimparkhedkar, Fellow & Head, CRP, WISE Mr Tarun Singh, Scientist-C, Ministry of New and Renewable Energy (MNRE), GoI Mr Anand Wagh, Associate Fellow, CRP, WISE</p>

Mr. Pimparkhedkar, tour coordinator, WISE presented on “Institutional structure and framework for Renewable Energy and rural electrification in India”. This presentation provided information on Indian power sector situation, status of energy access in India and sources of energy in rural and urban areas. It included institutional structure of power sector planning, role of various agencies, rural energy schemes, nodal agency for renewable energy deployment in India and its functioning. He concluded by presenting the roadmap ahead RE development in India.

Mr. Tarun Singh, Scientist C, Ministry of New and Renewable Energy (MNRE), in his presentation “Energy Access – Policy, Promotion & Achievements – Indian Experience”, discussed the objectives of energy access policies in India. He explained the status of electrification, energy mix of India, decentralized RE solutions to improve village electrification and energy services provided by RE decentralized systems in India. He spoke at length about various programmes undertaken by MNRE, benefits available under the programmes and their progress. He concluded by speaking about initiatives taken up by Ministry of Power, and their objectives.

This was followed by presentation from Mr. Anand Wagh, Associate Fellow, WISE on “Viable RET options for off-grid energy generation in India”. He spoke about policy and regulatory provisions for RE in India, available technologies and their viability in rural scenario. He discussed at length about techno-commercial aspects of solar, wind, biomass and micro-hydro systems for off-grid energy generation.

Session

3

Mr Surendra Pimparkhedkar, Fellow & Head, CRP, WISE
Mr Satadru Chakraborty, Associate Fellow, CRP, WISE

Mr. Pimparkhedkar, in his second presentation “Regulatory Initiatives for development of RE technologies (grid connected and off-grid)”, discussed regulatory initiatives for grid connected RE systems and off-grid RE systems. He spoke about present regulatory regime for sale of electricity generated from grid connected RE projects in India, RE tariff setting approaches followed by electricity regulatory commissions, operation of RE certificate (REC) mechanism in India and net metering mechanism for solar PV based roof-top systems. He also presented the off-grid distributed generation based distribution franchise model (ODGBDF) for electrification of rural areas, which is in discussion for implementation in India. He concluded the presentation with salient features of the proposed model of rural electrification by RE technologies.

Mr. Satadru Chakraborty, Associate Fellow, WISE, discussed the Jawaharlal Nehru National Solar Mission Framework (JNNSM). He presented the framework of the three phases of the mission and its target. He also cited examples of solar parks set-up under the mission, the 100 GW solar development plan and the roadmap for its execution.

Session

4

Dr Priyadarshini Karve, CEO, Samuchit Enviro Tech Pvt. Ltd and Member, Appropriate Rural Technology Institute (ARTI), Pune

Dr. Priyadarshini Karve, CEO, Samuchit Enviro Tech Pvt. Ltd and Member, Appropriate Rural Technology Institute (ARTI), Pune shared her views on “Sustainable energy technologies for income generation and improving quality of life of rural people”. She discussed the uses of biomass to meet rural energy needs, the supply chain of the model, and the scope for employment and income generation for people in rural communities. She also shared the success stories of Samuchit Enviro, its business model, and products developed by them like decentralized biogas models, and institutional model for operation of these systems.

The presentations were followed by a documentary on solar thermal heating applications, which concluded the sessions for the day.

Session

5

Mr Satadru Chakraborty, Associate Fellow, CRP, WISE
Mr Ashok Chaudhary, Sr. GM, Ankur Scientific Research Pvt. Ltd
Mr Ansuman Lath, Director, Gram Oorja Solutions Pvt. Ltd, Pune

Mr. Satadru Chakraborty, Associate Fellow, WISE began the first session of the day with his presentation on “Indian experience in development of decentralized distributed RE options for facilitating energy access in rural areas”. He spoke about various technology options for facilitating decentralized energy access in rural areas and presented various RE technology-wise case studies related to off-grid RE for rural energy access from India. He cited examples of successful business models of off-grid RE in rural areas and their impacts.

Mr. Ashok Chaudhary, Sr. GM, Ankur Scientific Research Pvt. Ltd, presented on “Innovation in Biomass solutions for Distributed Power Generation and Sustainable Economic Development of Developing Countries”. He spoke about the problems associated with energy access in rural areas, and how decentralized energy systems provide solutions to such areas apart from social benefits of providing employment opportunities in rural areas. He highlighted the benefits of biomass gasification, innovations from Ankur Scientific in biomass gassifier systems. The presentation also included information on biomass fuels which can be used for energy generation, and a video on Ankur Scientific. He concluded his presentation by citing examples of successful decentralized biomass systems across the World.

Mr. Anshuman Lath, Director, Gram Oorja Solutions Pvt. Ltd, shared his views and experiences on the role of solar PV mini-grids in rural energy access. He discussed about the potential of solar energy in India, the financial and policy level challenges in distributed generation. He cited example of Darewadi village with aid of a video presentation, which was electrified successfully by Gram Oorja solutions, and concluded by stating that the benefits of mini-grids are more than the energy services they provide.

Field Visit

1

Visit to BAIF Central Research Station located at Uruli Kanchan, Dist. Pune

This was followed by a visit to BAIF Central Research Station located at Uruli Kanchan, Dist. Pune. Mr. Rakesh K. Warriar, Jt. Programme Director, BAIF Development Research Foundation, presented on BAIF, its programs and role of RE in sustainable rural development. BAIF Development Research Foundation is a Pune based reputed voluntary organization established as not for profit Public Trust in 1967 to provide sustainable livelihood to the rural poor through climate-resilient agriculture, usage and management of natural resources such as renewable energy, livestock development, watershed development and agri-horti-forestry as major income generation activities. In the presentation, various renewable energy initiatives undertaken by BAIF were discussed.

Million SOLar Urja Lamps (SOUL) Program was implemented by BAIF in 3 states of India. Under the programme, Over 1.7 lacs solar study lamps assembled locally & distributed in schools in the

three states in a year. BAIF has also developed mobile and stationary structure based solar water pumps. The solar pumps installed in the BAIF campus were shown to the visiting team during the site visit. BAIF is implementing an Integrated Renewable Energy and Sustainable Agriculture Approach (IRESA) project with an objective of optimal use of existing resources for sustainable energy generation for cooking and value added organic manure production for soil fertility. The approach intends to enable the farmers to reduce dependence on external sources for fulfilling the energy needs and soil nutrient requirements.

The pilot project comprises of portfolio of activities around the central theme of household level biogas units. BAIF field staff guided the visitors through different components. The components of the project are given below:

- ▶ Pre-fabricated biogas unit (2 m³, family size) which is compact, standardized, failure-proof and clean.
- ▶ Integrated package consisting of a well-tested, low cost, in-house developed slurry filter. The filtered slurry (residue and filtrate) can be used for enhanced in-situ production of quality organic nutrients resulting in reduced chemical fertilizer use.
- ▶ Integration of composting and vermi composting using the sludge and other biomass to produce manure.
- ▶ Nutrition garden – cultivated with cash crops.

Day 3: 28 October 2015

Field Visit

2

Visit to 9.36 KW Solar PV based Mini-grid Project Project done by Gram Oorja Solutions Private Limited

The proceedings of the day involved a field visit to Darewadi hamlet, which is 130 kms away from Pune. This hamlet consists of 39 households (Population 220), which was electrified by Gram Oorja Solutions Pvt. Ltd. The hamlet is located in Junnar block of Pune district. Gram Panchayat of this hamlet is Devale & its distance from block headquarter is 40 km. The solar micro grid is in operation since July 2012. During the site visit, the visiting team was accompanied by three member staff of Gram Oorja. This hamlet is en-route steep terrain and cannot be accessed by road alone. The visit includes understanding the tedious nature of electrifying such an area. The hamlet is electrified by solar PV power plant of 9.6 kW. Complete ownership of plant and micro grid is of village energy committee. The technical details of the project is given below.

- ▶ Solar Photovoltaic capacity : 9.36 kWp
- ▶ Solar Modules : 240 Wp, 39 Nos. mono-crystalline, Bosch make
- ▶ Battery bank : 48 V, 600 Ah, VRLA, Amaron make
- ▶ Inverter: 5 kW, 2 no. Sunny Island SI 5048 and 10 kW, 1 no. Sunny mini central, SMA make
- ▶ Mini-grid : 230 V, 50 Hz, 17 RSJ poles, grid length ~1.5 km

The project was done by Gram Oorja in partnership with Bosch Solar Energy AG as a research and pilot project. The cost of the project was INR 3 million. Electricity consumption is metered and consumers are charged for their usage, which can take care of operations and maintenance of the plant. Current collection from all beneficiaries is approximately INR 5, 500 per month and will be increasing with realization of latent demand. The project is supplying electricity to 10 TV sets,

2 computers, 2 water pumps and 1 flour mill in apart from providing basic home and street lighting. The visiting team learnt about the layout of the plant, evacuation system (distribution system) and connections to households. Gram Oorja staff has explained the working of the solar PV based mini-grid system and its benefits to the visiting team. Interaction with the villagers and their experience upon electrification taught the visiting team about the many benefits of mini-grids in such inaccessible areas.

Day 4: 29 October 2015

Session

6

Mr Shailendra Shukla, CEO & Director, Chhattisgarh Renewable Energy Development Agency, Raipur

Ms Surabhi Rajagopal, Principal Consultant, SELCO Foundation

The proceedings for the day were started by Mr. Shailendra Shukla, CEO & Director, Chhattisgarh Renewable Energy Development Agency. Mr. Shukla discussed the role of State Nodal Agency (SNAs) in rural energy access, the need for sustainable use of available resources to meet energy needs. He introduced the participants to the model for solar PV development in Chhattisgarh state particularly solar PV based mini-grids, and remote village electrification status in the region. He spoke about different public institutions running on solar power and uses of solar pumps for irrigation. He concluded his presentation by citing examples of energy services provided to rural institution and household by biomass gassifiers and household level biogas plants respectively.

Ms. Surabhi Rajagopal, Principal Consultant, SELCO Foundation shared her experiences in sustainable energy. She spoke about energy access issues related to poorest population in the World. She introduced the participants to SELCO model, and its ecosystem approach to promote sustainable livelihoods in rural India. She also explained the roles of various agencies involved in the SELCO model. Support given by SELCO for development of rural entrepreneurs for implementing the model was also discussed.

After this presentation, all participants were invited to share their experiences with rural energy access and renewable energy applications. The participants also gave their feedback on the study tour. The certificates were presented to all participants, to conclude the session.

Visit

3

Visit to Maharashtra Energy Development Agency (MEDA), Pune

The final session of this tour involved a visit to Maharashtra Energy Development Agency (MEDA). MEDA is the state nodal agency working under the Ministry of New and Renewable Energy, Government of India for promotion of renewable energy in the state of Maharashtra. The participants were introduced to the organizational structure of MEDA, activities and various programmes (grid connected and off-grid RE) implemented in the state by MEDA, by General Manager, MEDA. He concluded the session by speaking about the projects of MEDA in enhancing rural energy access using decentralized systems.

Suggestions and Recommendations

Ensuring access to energy in rural areas of developing countries is faced with many challenges – technological, social and economical. Decentralized energy solutions play a crucial role in meeting the energy needs of people living in areas which are otherwise considered inaccessible for grid extension. However, setting up off-grid systems does not only meet the local energy needs, it also enhances the livelihoods of local population and provides employment and income. Using renewable energy sources to meet the energy needs will make render the system to be sustainable. The renewable energy systems discussed during the classroom sessions and the implementation of such projects seen in the study tour could help in reducing the emissions and provide livelihoods to the most vulnerable regions across the World. The participants were in consensus that decentralized RE systems will be crucial to meet the energy needs, and a sustainable approach for achieving a carbon neutral model for energy access.

Mainstream approaches to planning, financing, executing and maintaining rural energy systems have not been successful. Rural energy services need a different approach, and require tailor-made approaches to meet the requirements.

This study tour has also called out for more such experience sharing platforms, which can provide lessons from success stories and failures, amongst the stakeholders. The dynamics of different countries are different in policy and regulatory environment they function in, but the approach to achieving energy access can inspire future approach.

Annexure 1

List of Officials and Speakers

The information on the officials and speakers who participated in tour is provided in the list below:

	Name & Designation	Organisation	Contact details
1.	Mr Ashok Chaudhuri Sr. General Manager - Business Development	Ankur Scientific Energy Technologies Pvt. Ltd. Ankur, Near Old Sama Jakat Naka, Sama Road, Baroda – 390 008	0265 - 2793098 9429535519 ashok.chaudhuri@ankurscientific.com, ascent@ankurscientific.com
2.	Mr Shailendra Shukla CEO & Director	Chhattisgarh Renewable Energy Development Agency CSERC Building, 2nd Floor, Shanti Nagar, Raipur – 492 001	0771-4019222, 4019231 94252 05897 mrshailendra.shukla@gmail.com
3.	Mr Anshuman Lath Director	Gram Oorja Solutions Private Limited NCL Innovation Park, Pashan Pune – 411 008	(020) 6400 1402 94235 82193 anshuman@gramoorja.in
4.	Mr Tarun Singh Scientist C	Ministry of New and Renewable Energy, GoI Block – 14, C.G.O Complex Lodhi Load New Delhi – 110 003	9540710730 tarun.singh@nic.in
5.	Dr Priyadarshni Karve CEO	Samuchit Enviro Tech Pvt Ltd Flat No. 6, Ekta Park Co-op Hsg. Soc, Behind Nirmitee Showroom, Law College Road, Erandwana Pune – 411 004	91 (020) 25460138, 91 9226894206 pkarve@samuchit.com, samuchit@samuchit.com
6.	Ms Surabhi Rajagopal Principal Consultant	SELCO Foundation # 690, 15th Cross, 2nd Phase J P Nagar Bangalore – 560 078	91 99000 74427 surabhi@selcofoundation.org
7.	Mr Surendra Pimparkhedkar Fellow & Head, CRP	World Institute of Sustainable Energy (WISE) Plot No. 44, Hindustan Estate, Road No. 2, Kalyani Nagar Pune – 411 006	Tel: (020) 2661 3832 / 3855 cra@wisein.org / psurendra@wisein.org
8.	Mr Anand Wagh Associate Fellow, CRP	World Institute of Sustainable Energy (WISE) Plot No. 44, Hindustan Estate, Road No. 2, Kalyani Nagar Pune – 411 006	Tel: (020) 2661 3832 / 3855 anand@wisein.org
9.	Mr Satadru Chakraborty Associate Fellow	World Institute of Sustainable Energy (WISE) Plot No. 44, Hindustan Estate Road No. 2, Kalyani Nagar Pune – 411 006	Tel: (020) 2661 3832 / 3855 satadru@wisein.org

Annexure 2

List of Participants

The information on participants who attended the tour is given in the list below:

	Name & Designation	Organization	Country	Contact details
1.	Mr El Habib El Andaloussi Chief Energy Section, Sustainable Development and Productivity Division (SDPD)	United Nations – Economic and Social Commission for Western Asia (UN-ESCWA) United Nations House, Riad El-Solh Square, P.O. Box 11-8575, Beirut-Lebanon	France	Tel. +961 1978 527 Fax +961 78 867 491 Mob: +961 78 861 491 elandaloussi@un.org habib.elandaloussi@gmail.com
2.	Dr Krishnan S. Raghavan Coordinator, Technology Transfer	Asian and Pacific Centre for Transfer of Technology (APCTT), United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) C-2 Qutab Institutional Area New Delhi	India	Tel: (011) 3097 3758 (D) / 3097 3710 srinivasaraghavan@un.org
3.	Mr Ali Flieh Salem Khawaldeh	Ministry of energy and mineral resource	Jordan	ali@memr.gov.jo
4.	Mr Saman Odeh Saman Makhamreh	Ministry of Energy And Mineral Resource	Jordan	Saman.Makhamreh@memr.gov.jo
5.	Dr Wael Anwar Yosuf Ababneh Director of Rural Electrification	Ministry of Energy and Mineral Resource Amman, Jordan	Jordan	Tel. +962 6 580 3060 (Ext.109) Mob: +962 6 5863321 consultant@memr.gov.jo ababneh.wael@gmail.com
6.	Mr Nizar Khalil Saleh Al-Halasa Innovation Consultant ESCWA Technology Centre	United Nations – Economic and Social Commission for Western Asia (UN-ESCWA) PO Box 1438 Amman 11941 Jordan	Jordan	Tel. +962 6 53 43 346 Fax +962 6 53 41 092 halasa@un.org
7.	Mr Syvang Xayyavong Deputy Director Renewable Energy Development Division Electrical BC's, Eng; Environmental M. Eng	Ministry of Energy and Mines Institute of Renewable Energy Promotion Nong Bone Road P O box 4708 Vientiane, Lao PDR	Lao	Tel. (856-21) 285 144 Fax (856-21) 413 013 Mob: (856-20) 2390 2458 syvang38@gmail.com x_syvang@yahoo.com
8.	Ms Lara Geadah	United Nations – ESCWA P O Box: 11-8575, Riad el-Solh Square Beirut, Lebanon	Lebanon	geadah@un.org
9.	Ms Bothayna Rashed Economic Affairs Officer – Energy Section, Sustainable Development Policies Division (SDPD)	United Nations – Economic and Social Commission for Western Asia (UN-ESCWA) United Nations House, Riad El-Solh Square, P.O. Box 11-8575, Beirut-Lebanon	Lebanon	Tel. +961 1978571 Fax +961 1 981510 rashed@un.org bothaynar@gmail.com

	Name & Designation	Organization	Country	Contact details
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11.	Mr Imad Sleiman Consultant, Energy Section, Sustainable Development Policies Division (SDPD)	United Nations – Economic and Social Commission for Western Asia (UN-ESCWA) UN House, P O Box: 11-8575, Riad El-Solh Square Beirut, Lebanon	Lebanon	Tel. +961 1 978 581 Mob: +961 3 141710 Fax +961 1 981 510/1/2 <i>sleimani@un.org</i> <i>sleiman.imad@gmail.com</i>
12.	Ms Reem Irany Energy Engineer	Lebanese Centre for Energy Conservation (LCEC) LCEC Engineering Office Nassif Karam Building (4th floor) 240 Badaro Street Park Beirut 2058 7703	Lebanon	Tel. +961 1 389 189 Fax +961 1 389 589 <i>reem.irany@lcecp.org.lb</i>
13.	Ms Aurore Feghaly General Director of Oil	Ministry of Energy and Water Lebanon	Lebanon	Tel. +961 1 280 966 Fax +961 1 280 969 Direct +961 1 280 970 Mob: +961 3 183 335 <i>aurore.feghaly@gmail.com</i>
14.	Mr Cheikh Limam Ahmed		Mauritania	<i>cheikhelm@gmail.com</i>
15.	Mr Mohamed Ahmed Mohamed Zeine	National Authority for Radioprotection and Nuclear Safety and Security	Mauritania	<i>medval@ymail.com</i>
16.	Mr Abdelali Dakkina Director of Strategy and Development	National Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) Less Patios Space, Building B3, Anakhil Avenue and Ben Barka Avenue Intersection, Hay Riad – Rabat	Morocco	Tel. +212 6 61 83 39 48 Fax +212 5 37 71 79 29 <i>a.dakkina@aderee.ma</i>
17.	Mr Boubker Chatre Chief RE Section	Ministry of Energy, Mines, Water & Environment Morocco	Morocco	Tel. +212 5 37 68 84 03 Fax +212 6 41 99 38 71 <i>b.chatre@mem.gov.ma</i>
18.	Mr Mouly Abderrahmane EL ALAOUI EL IZZI Manager – Rural Electrification Projects	ONEE	Morocco	<i>i.elalaoui@onee.ma</i>
19.	Mr Mukesh Ghimire Senior Officer	Ministry of Science, Technology and Environment Alternative Energy Promotion Centre Khumaltar Height, Lalitpur	Nepal	Tel. +977 1 5539390 / 5539391 Fax +977 1 5542397 <i>mukeshghimire@gmail.com</i>

	Name & Designation	Organization	Country	Contact details
		GPO Box 14364 Kathmandu, Nepal		mukesh.ghimire@aepc.gov.np mukeshghi@hotmail.com
20.	Mr Khalil Ibrahim Zahir Al Zeidi Senior Renewable Energy Engineer	Public Authority for Electricity and Water P O Box 1889, P C 130, Azaiba, Sultanate of Oman	Oman	Tel. +968 246 11647 Fax +968 246 11445 khalil.al-zidi@paew.gov.om
21.	Ms Maimouna Hilal Zahir Al Far'i RE Analyst	Public Authority for Electricity and Water	Oman	maimuna.al-farie@paew.gov.om
22.	Mr Ahmed Said Saif Salim Al Maawali RE Section	Rural Areas Electricity Company	Oman	ahmed.almawali@reefia.h.com
23.	Mr Abdullah Sabil Abdullah Al Balushi Development and Specifications RE Engineer	Schlumberger	Oman	abdullah.albalushi@reefia.h.com
24.	Mr Salaheldin Hassabelgabo Abdelrazig Ibrahim MD – Policies Planning and Projects	Ministry of Water Resources And Electricity Khartoum	Sudan	salahelgabo@yahoo.com
25.	Mr Ahmed Mohamed Elhassan Elhussein Conventions Department Manager	Ministry of Water Resources and Electricity General Directorate of Investment, Finance & Contracts Khartoum, Sudan	Sudan	Tel. +249 124936622 Fax +249 912231751 shanina1960@yahoo.com ahmed.elhassan@wre.gov.sd
26.	Mr Abdel hafiz Fadl Alla Babiker Elabbas	Electricity Regulatory Authority – Sudan Al-jama'a Avenue. Al-mu'alim tower, first floor, Khartoum Sudan P O Box. 6881 Postal Code: 1113	Sudan	Mob: +249 123 499116 abufina007@hotmail.com
27.	Mr Yasir Abdalla Saied Elhag Director	Ministry of Water Resources and Electricity Sudanese Thermal Power Generating Co. Ltd Renewable and Alternative Energy Directorate Khartoum, Sudan	Sudan	Tel. +249 123497630 Fax +249 183 520481 sudanrenen@gmail.com
28.	Mr Kohji Iwakami Economic Affairs Officer, Energy Security and Water Resources Section Environment and Development Policies Division	UN Economic and Social Commission for Asia and the Pacific (ESCAP) United Nations Building, Rajadamnern Nok Avenue Bangkok 10200, Thailand	Thailand	Tel: +66 2288 1542 Fax +66 2288 1059 iwakami.unescap@un.org

Annexure 3

Photographs of the Study Tour

Photographs



Inaugural session (LtoR): Mr Surendra Pimparkhedkar, Fellow & Head, CRP, WISE, Mr G M Pillai, Founder Director General, WISE, Mr Kohji Iwakami, UNESCAP, Dr Krishnan S Raghavan, APCTT-UNESCAP, and Mr Imad Sleiman, UN-ESCWA



Participants were enthusiastic and attentive throughout the training programme



Valedictory Function (above) **Mr G M Pillai**, Founder Director General, WISE handing over the certificate to participants (below) Group photo of the participants and organisers.
