INTERNATIONAL THEMATIC RESEARCH GROUP (ITRG)

"Renewable Energy"

Review of Activities

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International Thematic Research Group (ITRG) on Renewable Energy

- The Foundation Meeting of COMSATS' International Thematic Research Group (ITRG) on 'Renewable Energy' was held on 2nd November 2016, in Zahedan, Iran, in conjunction with the Regional Expert Meeting on 'Renewable Related Energy Focusing on Microalgae Technology Using Ocean Resources Including Solar and Fuel Cell' (31st October to 1st November 2016). The meeting was attended by about 40 research scientists belonging to Iran, Bangladesh, Kazakhstan, Syria and Spain.

- The meeting was jointly organized by COMSATS, the Iranian Research Organization for Science & Technology (IROST), and the University of Sistan and Baluchistan, Iran (host institution), and chaired by Prof. Nasrin Moazami (IROST), a prominent Iranian scientist, who was elected as the designated head of this ITRG.

International Thematic Research Group (ITRG) on Renewable Energy

- The participants at the meeting were divided in three groups (Bio Energy, Solar Energy and Fuel Cell Technology) in order to identify the common areas of research interests and chalk-out potential topics for possible joint collaborative research projects. As an outcome of these discussions, the following two topics were selected to be executed by the ITRG:
  - ✓ Development of Microbial Fuel Cells for Bioelectric Generation and Wastewater Treatment.
  - ✓ Measurements and Characterization of New Silicon Crystalline Solar Cells;
- It was decided that the group members will jointly prepare comprehensive project proposals on the afore-mentioned topics, which will be submitted to the donor agencies for acquiring necessary funds for their execution.
- The group members agreed to sharing the research facilities available in their respective institutions, and publish joint research papers based on their collaborative research findings, acknowledging the support provided by COMSATS.

International Thematic Research Group (ITRG) on Renewable Energy

- The ITRG on Renewable Energy is based at the Iranian Research Organization for Science and Technology (IROST), Iran, and presently has the following members:
  - Iranian Research Organization for Science and Technology (IROST) (Iran)
  - Sistan and Baluchistan University (Iran) (IROST's partner)
  - TUBITAK Marmara Research Centre (MAM), (Turkey)
  - Al Farabi Kazakh National University (KazNU) (Kazakhstan)
  - Higher Institute for Applied Science and Technology (HIAST) (Syria)
  - Institute of Fuel Research and Development (IFRD), Bangladesh Council of Scientific and Industrial Research (BCSIR), (Bangladesh)
  - Imo State University, Nigeria

Consultation Skype Meeting with COMSATS Secretariat

- A Skype meeting with officials of COMSATS' Secretariat, namely Dr. Kamran Jahangir, Advisor TAC, Mr. Farhan Ansari, Senior Assistant Director (Programmes), and Ms. Rida Bokhari, Senior Programme Officer (UK Desk), and Professor Nasrin Moazami (ITRG Group Head) and Dr. Foad Farhani (Acting President for International Cooperation, IROST), was held on September 25th, 2018.

Discussion:

- Dr. Farhani informed that ITRG is actively working on executing a localized project on 'Microalgae to Fuel', for which the feasibility study has already been conducted. The project can be transferred to other group members, which would require financial resources.
- Professor Moazami also shared the importance of Blue Economy as an emerging topic which may be explored as a future initiative by the organization.
- Professor Moazami informed the COMSATS officials that the Director of Iran National Science Foundation, Dr. Zargham, has agreed, in principle, to extend their support through the provision of grants for activities and projects carried out under the umbrella of IROST for the ITRG.

Follow up Activities

- ✓ Following the Skype meeting with officials from COMSATS Secretariat, a meeting was held at the Iran National Science Foundation (INSF) office to discuss the trilateral agreement (MOU) between INSF, University of Sistan and Baluchistan, and IROST to discuss the implementation of the agreement. In this meeting, Dr. Samimi, the Acting President for Research represented Sistan and Baluchistan University.
- ✓ Director of INSF, Dr. Nosratollah Zargham, declared the readiness of his foundation to consider financing of some projects, based on the submitted proposals, and after formal approval by COMSATS.

Meeting at INSF office:

from middle to right: Dr. Zargham, Director of INSF, Dr. Samimi, Sistan and Baluchistan University Acting President for Research, Dr. Farhani, IROST Acting President for International Cooperation, Dr. Parsa, INSF International Cooperation Office, Dr. Rostami, IROST International Cooperation Office.

Follow up Activities

- ✓ A collaborative project proposal by Prof. Moazami , the head of ITRG on “renewable Energy”, was sent to COMSATS for further consideration.
- ✓ We communicated with some members of the ITRG and Heads of Centers of Excellence asking for:
  - ❖ Information on their past and current research activities and future programs and goals related to ‘Renewable Energy’, so that we could include the same in our updated version of strategy plan to be shared with COMSATS,
  - ❖ Plans, if any, for collaborative research work and holding of expert meetings and workshops on topics of interest to the member countries of the ITRG on ‘Renewable Energy’,
  - ❖ Possibility of Publishing joint research papers based on collaborative research findings

The ITRG members were also informed about a technology transfer project entitled “Biofuel Production from Microalgae in Saline Water”, which IROST is currently working on and which could involve other members of the ITRG, too.

A Review of Activities

- ✓ Renewable Energy Institute has been established at University of Sistan and Baluchistan, which is our close partner in the ITRG and one of the parties in the trilateral agreement regarding the support of activities for development of renewable energies in ITRG on “renewable Energy”.
- ✓ Proposed formation of a working group on Renewable Energy, with members from prominent researchers from Universities and Research Centers and Industry. The working group shall accelerate the activities of the ITRG on “Renewable Energy” in Iran.
- ✓ Publication of research papers in national and international journals in the fields of energy (SDG7)
- ✓ Execution of projects on related areas such as Biogas, solar energy, wind energy, Biofuel, etc., using financial support provided by IROST and other private and government sectors. Some examples are given in the next sections.

SDG7 related projects carried out at IROST

1. Techno-Economic Feasibility Study of Using Solar Energy for Power Generation at Khor & Biabanak Potash Complex, Iranian Mines & Mining Industries Development & Renovation (IMIDRO), Tehran, Iran
2. Technical and Economic Feasibility Study of an off-grid Solar-Pumping System for Three Different Capacities at Khor & Biabanak Potash Complex, Iranian Mines & Mining Industries Development & Renovation (IMIDRO), Tehran, IRAN
3. Design and Construction of a Downdraft Biomass Gasifier in Accordance with the terms of Biomass Resources in Iran, Iranian Research Organization for Science and Technology (IROST), Tehran, Iran,
4. Modeling and Conceptual Designing of a Small Scale Fluidized Bed Gasifier to Manage and Generate Energy from Wastes in Iran, Noandish Energy Engineering Company (NEECO), Tehran, Iran
5. Feasibility Study and Techno-Economic Analysis of Designing Solid Polymer Fuel Cell and Auto Thermal Reforming of Natural Gas Combined Heat and Power System (CHP), Tadbir Behsazi Tateis, Tehran, Iran

SDG7 related projects carried out at IROST

6. Design and construction of Parabolic Hybrid Thermo-solar Chemical reactors for Hydrogen Production
7. Development of a 2-kW floating air turbine
8. Production of polypyrrole and polyphenol copper complexes for solar cell application
9. Design and construction of a small model of waterwheel generating electricity from the river stream

SDG7 related projects carried out at Renewable Energy Institute (Sistan and Baluchistan University)

The following SDG7 related projects have been carried out at Renewable Energy Institute of Sistan and Baluchistan University, which is our close partner in the ITRG on Renewable Energy:

- Cultivation, Dewatering and Lysing of different types of microalgae including; Nano-chloropsis and Chlorella in collaboration with IROST
- Application of microalgae cells in wastewater treatments
- Combined technologies of MFC and microalgae processing for sewage treatment and electricity generation
- Water and wastewater managements in the university of Sistan and Baluchistan using advanced technologies (i.e. membrane technologies and microalgae processing, as well as renewable energies)
- Application of IGF (induced gas flotation) and electrophoresis techniques to coalesce extracted oil and its separation from microalgae biomass
- Design and manufacturing of nano-filtration ceramic and polymer membranes
- Design and manufacturing of high porous adsorbents including MOFs for environmental applications
- Tubular Microbial fuel cell
- High efficient and low cost Ceramic membrane for microbial fuel cell
- Experimental Investigation of the Possibility of Thermal Energy from Water Wells of Sistan and Baluchistan University

SDG7 related projects carried out at Renewable Energy Institute (Sistan and Baluchistan University)

- Performance assessment of a basin solar still equipped to multi-tray evaporator, photovoltaic cells and phase change material
- Performance evaluation of a greenhouse solar dryer equipped to photovoltaic cells and phase change material
- Performance assessment of a solar greenhouse equipped with photovoltaic thermal collector and phase change material
- Design of a solar concentrator to create a surface with very high temperature
- The effect of fins geometric parameters on the time and amount of energy storage of the heat exchangers containing phase-change materials
- Investigation of Phenomenon of Sub Synchronous Oscillations and Protection Problems in the Presence of Wind Power Plants in the Transmission Network of North of Sistan and Baluchestan Province and Providing a Suitable Solution
- Construction of off-grid Vertical Wind Turbines in Capacity of 1 kW and 2 kW and 5 kW.
- Construction of On-grid Vertical Wind Turbine in Capacity of 2 kW
- Construction of On-grid Vertical Wind Turbine for installation on highways in Capacity of 2 kW
- Design and construction of a photovoltaic solar power plant of 20 kilowatts

Future Programs

- ✓ **Establishment of scientific and technological cooperation with partners from other COMSATS member countries on the following focus areas:**
  - ❑ Innovative technologies for sustainable development and utilization of clean/renewable energy resources (SDG7)

- ✓ **Capacity Building Activities**
  - ❑ We intend to collaborate with other COMSATS member countries to enhance capacity building activities, through the provision of advanced technological and vocational training for researchers, university staff and technical manpower and holding of Expert Meetings, Workshops, etc., in related areas of energy, which may be of interest and technological importance to the members.

- ✓ **Expert Meetings, Workshops, etc.**
  - ✓ Expert Meeting on “Innovative Technologies for Sustainable Development and Utilization of Clean/Renewable Energy Resources”
  - ✓ Training Workshop on “Improving Efficiency of Energy Intensive Industrial/Domestic HVAC Systems”
  - ✓ Expert Meeting on “Solar Thermal Desalination Technology”
  - ✓ Expert Meeting on “Bio-Energy Technology”

Thank you for your attention