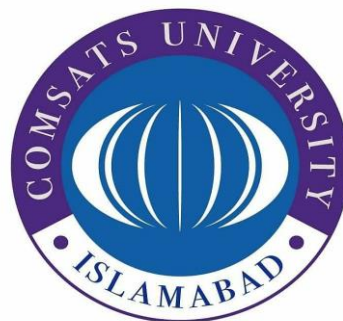


Energy Research Centre Newsletter

2021

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Director CUI Lahore Campus Message

The COMSATS Energy Research Centre (ERC) is envisaged to become a Centre of Excellence in the field of conventional as well as renewable and sustainable energy technologies. COMSATS University Isb, through this Centre aims to enhance the skills of energy managers, engineers, and researchers. The Centre is expected to provide a platform, where expertise from various multi-disciplinary fields would be integrated to generate new knowledge, that will both be applicable and relevant to the needs of the country.

ERC has performed consistently well during 2021 not only in teaching, capacity building and R&D activities, but also in collaborating with government and non-government organizations. A national symposium held by ERC on Emerging Technologies of Microgrids in Pakistan at Nishat Hotel in November 2021, was an excellent effort to bring together the relevant experts from academia, industry and government organizations. Their efforts to set up a think tank, namely, Sustainable Energy Technology Solution (SETS) Group, at this symposium is appreciable. It is hoped that ERC would initiate national debate on critical issues related to energy and help facilitate in the formulation of efficient and practical solutions from this platform. ERC's interaction with the national government bodies like NEPRA, NEECA, NTDC is also encouraging, and it is hoped that in coming times, they will make significant contributions for these organizations. ERC's efforts to enhance their capacity in energy efficiency and green buildings through national and international certifications symbolizes the Centre's sincerity to improve their expertise in these demanding new areas. I congratulate the team ERC on initiating consultancy services and in strengthening industrial ties through MoUs. I wish the ERC Head and her team all the best and hope to see a continuity in their productive efforts in the coming years.



Prof. Dr. Syed Asad Hussain
Director CUI Lahore campus

Head Academics & Research Message

COMSATS University Isb launched the Energy Research Centre (ERC) keeping in view the need to focus on the critical energy issues in the country. It was to act as a Center of Excellence to address the pressing energy related issues and to provide innovative solutions through research and development. The Centre would focus attention to create awareness on the reducing Carbon footprint by adopting clean and green technologies, help industry and transport sectors reduce the GHG emissions, and facilitate all sectors in optimal and efficient utilization of conventional as well as unconventional, renewable energy resources.

The Centre has come a long way since its inception and is making its mark in various areas through collaborative work, with the government, industrial and academic organizations. ERC has positioned itself to undertake the process of developing and strengthening the skills of industrial professionals in essential energy related skills through short technical courses, seminars, webinars and symposia. I appreciate their own capacity building through national and international certifications in this reference. Moreover, their initiation of providing consultancy services, particularly in terms of industrial energy audits will pave the way for the future sustainability of the Centre. ERC is contributing to government policies, such as Electric Vehicles, Energy Efficiency Measures, Microgrids, etc. ERC's futuristic role as an advisory body that helps major governmental organizations on policy framework is encouraging. The Centre's research output in terms of Impact Factor peer-reviewed publications and acquisition of research funding is also commendable.

Let me congratulate the Head ERC and her Team on their productive performance in 2021 and wish them all the best in coming years.



Prof. Dr. Muhammad Ahmed
Farooqi
Head A&R

Head ERC Message

In the perspective of introduction of new paradigms in the field of energy, ranging from new and clean energy resource generation, design and implementation of energy-efficient systems to the digitization of the grid, Energy Research Centre, COMSATS University Isb, is striving to create its niche in this vast and complex field. We redefined our mission and vision in 2020 and have adopted a three-pronged strategy ever since, which consists of creating awareness & trainings, carrying out research & development activities and providing consultancy services to industry and collaboration with the government/non-government organizations. The main objective is to utilize our multi-disciplinary ERC teams of Electrical, Mechanical and Chemical engineers, as well as bio-fuel scientist to come up with innovative solutions, enhance the Centre's capacity as well as that of our students and professionals in various areas of energy.

Within a year's span, we have explored multiple national and international research fundings, expanded our scope to short technical courses, related to various current energy topics, from Webinar Series of Energy, and acquired training, in addition to national and international on energy efficiency and green buildings. It is our firm belief that to offer credible training and consultancy services, our team needs to be duly qualified. Two ERC faculty members got formal Trainers of Trainers certification from National Energy Efficiency and Conservation Authority (NEECA) and the GBCI's EDGE Green Building Certification. We initiated Lahore campus's electrical energy audit, and successfully completed an industrial energy audit. Our work on Microgrids was acknowledged by Ajman University, UAE in the form of a joint project. We contributed in NEPRA's Microgrid Policy as well as gave formal feedback to NEECA on energy efficiency policy.

We significantly contributed towards the approval of BS/MS Energy Systems Engineering academic programs for CUI-Lhr from CUI statutory bodies. We offered multiple trainings in collaboration with ECE Dept., CUI-Lhr and from our core faculty resource for the benefit of new entrants in the energy field and relevant industrial sectors. As, Head ERC, I delivered multiple national & international talks on digitization of the grid, its efficiency and reliability with the utilization of Smart Metering and Data Analytics, Machine Learning, Artificial Intelligence, etc. ERC established working relation in the form of MoUs with ETRC, PRESCON Engineering Pvt Ltd and soon it would be with EPTeck Pvt Ltd.

With newly acquired project fundings by almost all our faculty members, we hope to continue R&D work, relevant to energy and make sincere efforts for the formulation of modern and optimal solutions. I would like to congratulate and thank the ERC team for their consistent performance in the Year 2021 and sincerely hope that with continued hard work in the year 2022, they would outperform themselves.



Dr. Sobia Baig
Head ERC

Energy Research Centre, CUI-Lhr held a symposium on November 4th 2021 at Nishat Hotel, Lahore, on Emerging Microgrids Technologies in Pakistan, attended by prominent energy related industry, academia, and government organizations.. The symposium was arranged under the approved PSF project on Microgrids funded by Pakistan Science Foundation. Director CUI Lahore inaugurated the event and emphasized on the development of Microgrids in Pakistan through research and development for sustainable power infrastructure. The aim of the symposium was to highlight the significance of Microgrids in Pakistan more specifically the rural areas Of Pakistan. Several industries including SBEEC (Pvt) Ltd, Jolta Batteries, PRESCON Engineering (Pvt) Ltd, Government sector organizations, such as National Energy Efficiency and Conservation Agency, National Transmission and Dispatch Company, Pakistan Science Foundation, Punjab Government and universities including Punjab University, University of Engineering and Technology Lahore etc. took part in the event.



Dr. Sobia Baig, PI of the Project highlighted the significance of microgrids in Pakistan and its feasibility in the rural areas. Dr. Sobia also explained the status of the approved project, the developed microgrid lab and results so far achieved.

Dr Sobia Baig

The event was marked with technical talks from prominent experts.



Dr. Sardar Mohazzam

MD NECA



Prof. Dr. Syed Asad Hussain

Director CUI Lahore



Masrroor

MD SBEEC



Rehan Askam

COO Jolta Batteries



Dr. Kamal Shahid

Assistant Professor PU



Dr. Bilal Massod

Manager NEPRA



Mr. Abdul Rauf

Scientific Officer PSF



Group Photo



Group Discussion

Formation of SETS Group

Energy Research Center with its aim to develop strong industry and academia linkage constitutes SETS Group. The prime objective is to solve the local industry energy-related problems using indigenous low-cost solutions through research and development. The existing member of SETS group includes industry, academia, and research centers. The members of SETS group shall also provide jobs and internships to the students and will also collaborate in joint calls for proposals in the future. The meeting of SETS group will be conducted twice a year. A large number of participants were made signatories of this group. The list of members include the following:

1. National Energy Efficiency and Conservation Authority (NEECA)
2. Punjab Energy Efficiency and Conservation Agency (PEECA)
3. University of Engineering and Technology, Lahore
4. Pakistan Science Foundation (PSF)
5. Prescon Engineering Private Limited
6. Jolta Batteries
7. Planning and Development Department Lahore
8. Punjab University.
9. National Transmission and Dispatch Company (NTDC)



ERC conducted an Online Symposium on Advantages and Challenges of Wind Energy

Symposium on Advantages and Challenges of Wind Energy

***0.5 CPD Credit Points**

TALK TITLE
Challenges of the Impact of Wind Generation in the Conventional Generation System

SPEAKER
Prof. Edimar José de Oliveira
 Federal University of Juiz de Fora
 INERGE
 Inct de energia elétrica

7TH April, 2021.
TIME: 3PM GMT+5
Pakistan Std. Time

OTHER SPEAKERS

Dr. Tareq Manzoor
 Assistant Professor,
 ERC, CUI Lahore

Dr. Aamer Bilal
 Assistant Professor,
 ERC, CUI Lahore

Dr. Xiandong Ma
 Senior Lecturer,
 Lancaster University UK.

ORGANIZER
DR. SOBIA BAIG
 Energy Research Center, CUI Lahore
 Vice Chair IEEE Lahore Section

Registration link : <http://bit.ly/ercpcpd21>

ERC conducted an online symposium on Advantages and Challenges of Wind Energy on 7th April 2021. International and national speakers were invited to deliver talks regarding wind energy. Two hundred and sixty five participants registered for this event, while one hundred and thirty participants attended the symposium and ninety two people viewed online through ERC Facebook Page. Head ERC, Dr. Sobia Baig moderated the sessions.

Prof. Edimar Jose de Oliveira and Dr. Xiandon Ma were international speakers from Brazil and United Kingdom respectively. Dr Tareq Manzoor and Dr Aamer Bilal from COMSATS University, Lahore Campus also delivered talks.



EDGE Green Building Certification



Buildings in the urban areas are the larger consumers of electricity. There has been considerable growth in the residential, commercial, and industrial buildings in Pakistan. Being one of the highest consumers of electricity, water and construction materials, the significance of energy saving in this sector cannot be ignored. Keeping in view the exponential growth in buildings and associated energy consumption levels, ERC realizes the need of green buildings in the country. For this purpose, Dr. Sobia Baig and Dr. Fawad Azeem trained and obtained the international certification, “Excellence in Design for Greater Efficiencies (EDGE)” offered by International Finance Corporation. Both the faculty members are now certified EDGE Experts and can internationally provide services to the public and private sector buildings for obtaining the green building certification. The certification will ensure 20% less electricity, water and embodied material used in the buildings. It is worth mentioning that there are only 100 EDGE Experts in South Asia, while there are only 13 in Pakistan. Head ERC Dr.Sobia Baig and Dr. Fawad Azeem are among the thirteen Pakistani EDGE Experts, enlisted in the global EDGE list of experts.



NEECA Energy Trainers

National Energy Efficiency and Conservation Authority (NEECA) initiated a Certified Energy Auditor and Energy Managers program named as “Training of Trainers” across Pakistan. The aim of the certification was to develop a skilled human resource of Energy Auditors and Energy Managers who will further train the industrial professionals, academicians and managers on Energy Audits, Energy efficiency and conservation. The training was conducted by NEECA and Climate Technology Center and Network (CTCN). CTCN is the operational arm of the UNFCCC Technology Mechanism, hosted by the UN Environment Programme and the UN Industrial Development Organization (UNIDO). Out of more than one hundred participants across Pakistan, thirty candidates successfully passed the Training of Trainers certification. Dr. Sobia Baig and Dr. Fawad Azeem from Energy Research Center COMSATS University successfully passed the certification that includes training, written exam and subsequent interview conducted by international energy auditor experts CTCN. In this regard a ceremony was held by NEECA where participants were awarded certificates of completion.





ERC faculty members have acquired energy audit certification and now they are presenting their services to the local industry. Team COMSATS Energy Research Centre along with the technical team of PRESCON Engineering (Pvt) Limited led by Dr. Fawad Azeem conducted a successful Energy Audit of Ali Embroidery Mills Limited. The activity was conducted under an approved MoU between COMSATS University and PRESCON Engineering under the industry-academia linkage. Dr. Fawad Azeem presented the audit findings in the presentation to the higher management of Ali Embroidery Mills Limited followed through detailed recommendations and analysis report. The technical team and management of Ali Embroidery were satisfied with the recommendations and showed their interest in performing the energy audit activity for their second unit in coming future.



ERC faculty members Dr Fawad Azeem, Mr. M .Anus along with students and technicians of ECE Department conducted detailed energy audit of Faculty Block of COMSATS Lahore. Energy usage with the help of scientific equipment was recorded. A report containing facts and figures along with findings and recommendation was prepared and submitted to Head ERC.



MOU with ETRC

Energy Research Centre and Energy Training and Research Center signed MoU for conducting joint energy related courses. The aim of the MoU is to develop skilled human resource in the field of renewable energy. The MoU signing ceremony was held at COMSATS University Islamabad, Lahore campus on 24th February 2021. The campus director, head academics and research, HoD Energy research centre and officials from ETRC were present at the event. The first course that will be offered will be “Certified Solar System Engineer Course” from this joint venture.



MOU with PRESCON Engineering (Pvt) Ltd

Energy Research Centre and PRESCON Engineering Private Limited joined hands to strengthen the Industry-Academia linkage. The MoU signing ceremony was held at COMSATS University Islamabad Lahore campus on 26 August 2021. The main objective of the MoU is to solve energy related industrial problems using indigenous solutions through research and development. Both parties have also agreed to conduct joint courses on conventional and renewable energy resources. So far, an energy audits of a textile mill and various courses have been jointly conducted under the MoU, Head ERC Dr. Sobia Baig, Dr Fawad Azeem, Additional Registrar Dr Rashid Ahmad Khan, and the General Manager PRESCON Engineering, Mr. Umair Khan were present in the signing ceremony.





Head ERC along with faculty members conducted a meeting with SMEDA(Small medium enterprises development authority) at CUI Lahore campus.After formal introductions, both organization officials discussed various areas of collaboration, defined their core expertise areas and both agreed to conduct trainings and short courses for development of human resources required by labour market.

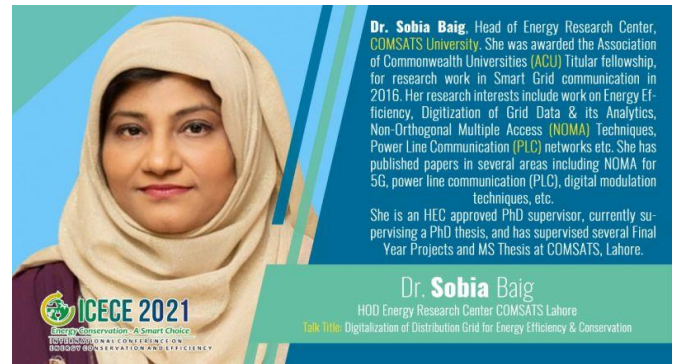




ERC faculty had a meeting with EP Teck (Pvt) Ltd, a renowned startup company with offices in Germany and Pakistan. The collaboration will be established in smart sensors and microgrids. An MoU will be shortly signed to formalize the collaboration.



Dr. Sobia baig delivered an invited talk on Digitalization of Distribution Grid for Energy Efficiency and Conservation, on March 17th, 2021, in the International Conference on Energy Conservation and Efficiency, Virtual Conference.



Webinar: Barriers to Women in STEM : Where Does it All STEM From ? ADB CHIP TRAINING & CONSULTING

3:00 PM
December 1, 2021

Dr. Sobia Baig has done her Masters and PhD in Electronics Engineering from Ghulam Ishaq Khan Institute. She is a Chartered Engineer, and Member Institution of Engineering and Technology, IET-UK. She has been promoted to Senior Member, IEEE in 2017. She has been Head of Department at the Department of Electrical Engineering, COMSATS Institute of Information Technology, Lahore, Pakistan from September 2013 till September 2016. She was awarded the Association of Commonwealth Universities (ACU) Titular fellowship, for research work in Smart Grid communication in 2016 and availed it for research work at Infolab 21, Lancaster University UK. She is an HEC approved PhD supervisor.

#ItAllSTEMsFrom #16DaysofActivism

PANELIST 1
DR. SOBIA BAIG
HEAD OF ENERGY RESEARCH CENTRE & ASSOCIATE PROFESSOR COMPUTER ENGINEERING DEPT. COMSATS

STEM4WE
GETTING THE BALANCE RIGHT

Dr.Sobia Baig presented her views on an online webinar, titled, Barriers to Women in STEM, By Asian Development Bank on December 1, 2021.



INERGE Seminar Series

Digitalization of the Grid for an Efficient Energy Distribution System

11 de novembro
quinta - 15h

Com **Dr. Sobia Baig**
COMSATS University Islamabad

Organização:
INERGE
Instituto Nacional de Ciência e Tecnologia em Energia Elétrica

INERGE inaugurated this November 11th, the INERGE Seminar Series. The event will feature a series of lectures throughout the year on technological innovations in the area of smart grids. Dr.Sobia Baig presented her talk on the Digitalization of the Grid for an Efficient Energy Distribution System in the first seminar. This Lecture was part of the collaboration established between CUI Lahore Campus and INERGE Brazil.

Dr. Fawad Azeem was invited as a guest speaker at Institute of Energy and Environment Engineering (IEEE), Punjab University on 18-October-2021. Dr. Fawad delivered lecture on, Analytical techniques in the Research of Electrical Engineering.



12th Webinar titled "High Temperature thermal energy storage -Experimental and thermal study from the webinar series was delivered by Yousif Muhammad , Doctoral researcher at DTU(Technical University of Denmark). Rock-bed based high-temperature thermal energy storage systems provide a cheaper and sustainable alternative for energy storage for both power-to-power and heat-to-heat applications. In this presentation, he talked about the experimental results obtained from their 1 MWh and 500 kWh pilot plants and CFD analysis of the pilot plant and up scaled storage unit.

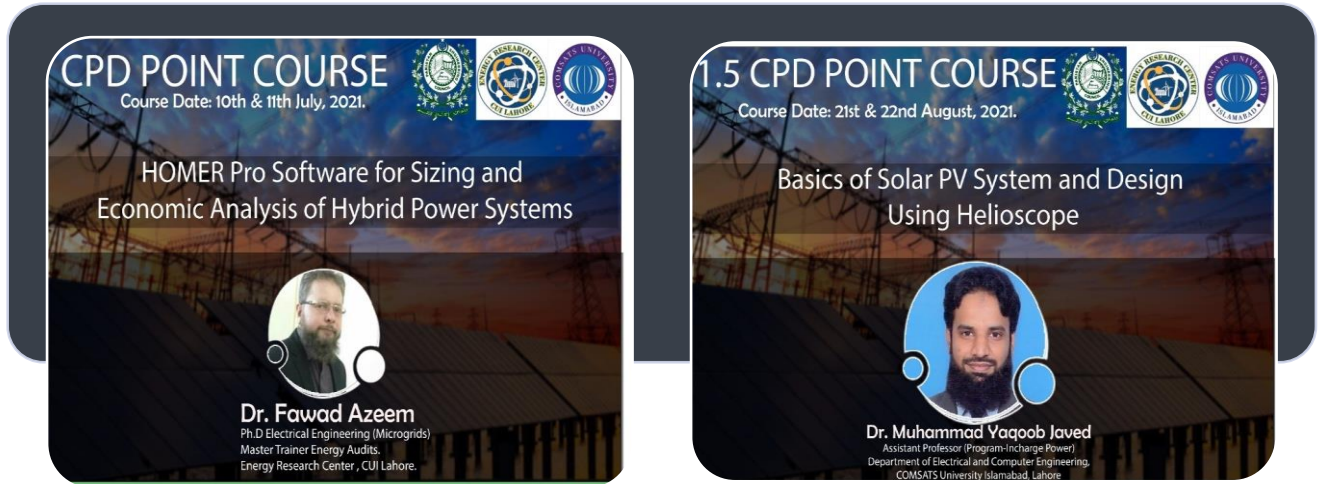
Contribution of ERC in the Development of BS and MS Energy Systems Engineering Degree Programs

ERC faculty members in collaboration with ECE department, CUI-Lhr prepared and submitted scheme of studies (SoS) regarding BS Energy Systems engineering and MS Energy Systems Engineering. It is pertinent to mention here that the same have been notified by the CUI statutory bodies. The programs will be launched from CUI Lahore campus in future after approval from concerned academic regulators and ERC faculty members are proud to be a part of it.

ERC & Sustainable Development Goals Policy (SDG 7) for HEIs

Dr. Bilal Ahmad along with Dr. Tareq Manzoor and other ERC faculty members prepared Sustainable Development Goals (SDG 7) policy for COMSATS University. Detailed observations and recommendations were presented to CUI Administration for necessary actions. Adherence to SDG 7 Goals and objectives will not only enable CUI to contribute as a green campus, but will also improve its ranking worldwide as its given due weightage in TIMES New Ranking System for Universities.

ERC has started professional development short courses for capacity building of students and young professionals in different topics related to energy. In this regards, four courses have been conducted in 2021, three of these were conducted online due to COVID 19 restrictions and one course was conducted on CUI Lahore Campus. ERC Faculty members and other ECE departments faculty members contributed in this regards. A good number of students and professionals attended the courses.



- 1
- **HOMER PRO** Software for sizing and economic analysis of hybrid power systems.
 - Dr. Fawad Azeem (Assistant Professor ERC)

- 2
- **Basics of Solar PV System and Design using Helioscope**
 - Dr. Yaqoob Javed (Assistant Professor ECE)



- 3
- **Thermal system design course**
 - Dr. Tareq Manzoor (Assistant Professor ERC)

- 4
- **Machine Learning Python Workshop**
 - Dr. Muhammad Jawad (Assistant Professor ECE)



Certificates were awarded to the course attendees and students gave a positive feedback towards these courses. This initiative will allow students to acquire skills in the latest energy technologies.



ERC Academic Collaboration

- University of the Punjab
- CERAD UET Lahore
- USPCASE-NUST
- Aalborg University Denmark
- University of Malaya
- UJFJ, Brazil
- Lancaster University UK
- SCUT China



AALBORG UNIVERSITY

ERC's Academic Collaborations within CUI

- Architecture Department
- ECE Department
- Humanities Department
- Chemistry Department



ERC's Industrial Collaborations

- ETRC
- EpTeck
- Presscon Engineering (PVT) Ltd
- Crescent bahuman
- Al Rehman Switch Gear
- Circutor
- Jolta batteries



ERC's Government Collaborations

- NEPRA
- NEECA
- LESCO
- NTDC
- PEECA



Policy Framework Contributions

- NEECA
- Microgrid NEPRA
- World Bank



Sr. #	Title of Project	Amount (Million PKR)	Principal Investigator	Funding Agency	Department	Status Approved/Ongoing
1	Implementation and Testing of Microgrid in Rural Communities with Maximum Penetration of Renewable Energy Resources in Pakistan	6.8	PI: Dr. Sobia Baig. Co-PI:Dr.Fawad Azeem	PSF	ECE	Ongoing
2	Analysis of energy storage materials and systems for energy applications	6.4	Dr Tareq Manzoor	HEC	ERC	Ongoing
3	CFD analysis of engine exhaust system	2	Dr Tareq Manoor	PSF	ERC	Approved
4	Design, optimization based on CFD analysis of combustion of multiphase system in diesel engine	2	Dr.Tareq Manzoor	PSF	ERC	Approved
5	Basic Research and Capacity Investigation for Distributed Bio Energy Utilization via Thermo-Chemical Conversion	8.8	Dr Zakir	PSF	ERC	Ongoing
6	Bioethanol Production from lignocellulosic agricultural waste:biorefinery concept and its industrial implications.	3.7	Dr.Bilal	HEC NRPU	ERC	Approved
7	Pre-Farming Controlled Crop Assessment Simulator to Enhance the Crop Quality for Optimum Yield and Agricultural Sustainability	5.6	PI: Dr. Fawad Azeem Co-PI: Dr. Sobia Baig	HEC NRPU	ERC	Approved

Sr. #	Title of Project	Amount (Million PKR)	Principal Investigator	Funding Agency	Department	Status
1	A Micro level Policy Design for Tree Plantation in Major Sectors of Pakistan	2700 GBP	Dr Fawad Azeem	ACU Commonwealth Climate Resilience Challenge Grants	ERC	Submitted
2	Interconnection & coordination of multi-microgrids to promote penetration & efficient utilization of renewable energy	5	Dr Fawad Azeem	THE EIGHTEENTH SESSION OF CHINA-PAKISTAN COMMITTEE ON SCIENCE AND TECHNOLOGY COOPERATION	ERC	Submitted
3	Implementation Model of Smart DC Microgrids in Unelectrified Areas of Pakistan	3	Dr Fawad Azeem	PIDE	ERC	Submitted
4	Design of Solar Powered Multipurpose Pumps for Small Scale Farming Communities	9815C HF	Dr Fawad Azeem	Solar Irrigation for Agricultural Resilience (SoLAR) Innovation Fund (IF) Grants: Round 2	ERC	Submitted
5	Mini-grids and Access to Electricity in SAARC	12000 USD	Dr Fawad Azeem	SAARC Mini-grids and Access to Electricity in SAARC	ERC	Submitted
6	SAARC Renewable Energy for Food Storage in SAARC	7000 USD	Dr Fawad Azeem	SAARC Renewable Energy for Food Storage in SAARC	ERC	Submitted
7	Design and Control of Renewable Energy based Hybrid AC/DC Microgrid	30000 AED	Dr Fawad Azeem	AU Funded Research Grants	ERC	Submitted

				Application Form		
8	Performance and Recovery of Flue Gas Energy from Boiler via Heat Exchanger	15.4	Dr Sobia Baig Dr Tareq Manzoor	HEC TTSTF	ERC	Submitted
9	Efficient and Flexible Fuel Combustion System through Flameless Regime	9.0	Dr Tareq Manzoor	PSF	ERC	Submitted
10	Design and Analysis of Solar PV-thermal Hybrid System Technologies'	6.0	Dr Tareq Manzoor	HEC NRPU	ERC	Submitted
11	A study on prototype solid state graphene/ceramic hybrid electrolyte with lithium titanate anode lithium-ion battery for electric vehicles works in temperature range of Pakistan'.	19.6	Dr Tareq Manzoor	HEC NRPU	ERC	Submitted
12	Design and Analysis of high-performance energy efficient optoelectronic devices for Pakistan	19.3	Dr Tareq Manzoor	HEC NRPU	ERC	Submitted
13	Modeling the Thermoelastic Interactions with Varying Heat Source	13	Dr Tareq Manzoor	HEC NRPU	ERC	Submitted
14	Development of micro texturing machine for enhancing the efficiency of automotive components"	17	Dr Tareq Manzoor	HEC NRPU	ERC	Submitted
15	Computational design and development of phase change composite materials for thermal energy storage application	19.3	Dr Tareq Manzoor	HEC NRPU	ERC	Submitted

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ERC Faculty Members:

- Dr. Sobia Baig (HEAD ERC)
Email: drsobia@cuilahore.edu.pk
- Dr. Tareq Manzoor (Assistant Professor ERC)
- Dr. Bilal Ahmed Zafar Amin (Assistant Professor ERC)
- Dr. Fawad Azeem (Assistant Professor ERC)
- Muhammad Anas (Lecturer ERC)

For any query please contact us on info.erc@cuilahore.edu.pk

“Everything is energy and that’s all there is to it. Match the frequency of the reality you want and you cannot help but get that reality. It can be no other way. This is not philosophy. This is Physics”
Albert Einstein