

U.S.-Pakistan Centers for Advanced Studies in Energy

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Energizer

Second cohort of Pakistani students arrive to brighten country, lives

Pakistani engineering students are coming to ASU with the goal of learning how to help solve the country's power systems crisis

A second group of 33 graduate students (8 of whom went to OSU) and two faculty members from Pakistan recently arrived at Arizona State University to study energy engineering as part of a larger effort to boost development of solutions for Pakistan's growing energy needs. The exchange scholars will spend a semester in the U.S. carrying out energy-specific research. As part of the USAID-funded exchange program, a total of 200 scholars will each spend a semester in the U.S.

Dr. Sayfe Kiaei, project director of USPCAS-E and a Professor of Electrical Engineering in the Ira A. Fulton Schools of Engineering, believes that ASU is important to the program's goals because, "The center is a link between ASU's researchers and international development funding agencies as well as implementers who are working in developing countries worldwide." Read more on page 5.

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Message from the Project Director

I am pleased to report that USPCAS-E has made great progress on all five components in the last quarter. The first batch of Pakistani exchange scholars returned to Pakistan after successfully completing the Spring 2016 semester in the U.S. It was a delightful and enriching experience for both the students and ASU. The second batch of scholars recently arrived in the U.S. ASU has continued to work with both of our partner Pakistani universities to augment their applied and joint research projects. A senior delegation of NUST headed by President Muhammad Asghar visited ASU to foster a long-term relationship with ASU. We truly value our relationship with our partners because we feel this relationship will bring the people of the U.S. and Pakistan closer.

-Dr. Sayfe Kiaei, Project Director, USPCAS-E

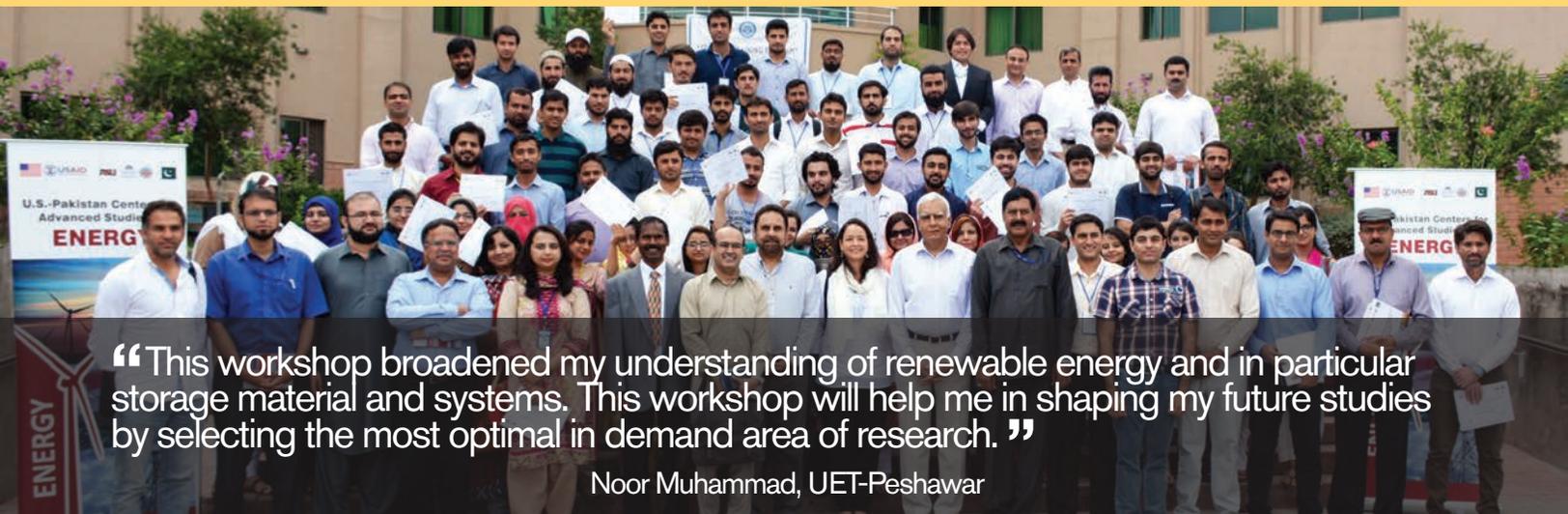


ASU facilitates 3-day technical workshop in Pakistan Batteries and Fuel Cells – An experiential approach

Over 70 participants including students, faculty and representatives from the industry gathered at the National University of Sciences and Technology (NUST) in Islamabad to attend a three-day technical workshop on batteries and fuel cells. Professor Arunachala Kan-

nan from ASU facilitated the workshop, which also included guest speakers from Pakistan's energy sector. The workshop provided participants with insight into batteries and fuel cells for stationary, automotive and portable applications. In order to help participants

brainstorm about solutions that work toward maximizing energy conversion and storage, the workshop included team and design exercises. This was the third in a series of technical workshops that ASU will deliver to engineering students and faculty in Pakistan.



Pakistan Pakistani engineering students battle energy crisis, gender roles

Supportive parents, a hunger for scientific knowledge and progressive academic programs fuel engineering success

Two Pakistani women have important insight into their country's colossal energy crisis.

Engineers Warda Mushtaq and Syeda Mehwish are master's students that came to Arizona State University as part of the U.S.-Pakistan Centers for Advanced Studies in Energy (USPCAS-E) program.

Supportive parents, a hunger for scientific knowledge and progressive academic programs have fueled their successes in engineering, a field dominated by men in Pakistan and most parts of the world.

Their cohort, composed of 25 Pakistani engineering students, spent the spring semester learning new research techniques and tackling energy-related projects alongside ASU researchers.

Renewables key to solving Pakistan's energy crisis

Many engineers remember the device or question that first ignited their passion for discovering scientific and technological solutions. For Syeda, her interest began with a fascination with how televisions and radios worked.

Raised in southwestern Punjab, Pakistan, Syeda says, “my earliest and fondest memories of childhood involved the wonders I could see and hear through these devices.”

For Warda, her interest in engineering came later. Though born in Pakistan, she spent her childhood and teenage years in Saudi Arabia until she returned to her home country to pursue an undergraduate degree.

“I have seen how posh the lifestyle of many communities in the Middle East is, compared to our lifestyle here in Pakistan,” she says.

She feels that the energy crisis facing Pakistan, in particular, is causing the majority of the societal and economic strain in Pakistan.

The energy crisis is deeply concerning, as the energy supply is far less than what the growing heat-wave prone country demands.

An over-reliance on imported fossil fuels and not enough emphasis on untapped renewable energy sources have greatly contributed to the national crisis.

“My research is focused on the fabrication of low-cost photovoltaics...available to everyone in Pakistan, from our largest city to the smallest villages,” says Warda.

Syeda worked with Associate Research Professor Govindasamy Tamizhmani in the Photovoltaic Reliability Lab on ASU's Polytechnic campus.

“I am looking at making electricity cheaper for rural [communities] by proving the feasibility of standalone power plants in remote locations,” says Syeda.

because of the USPCAS-E program.

Syeda enjoyed collaborating on her research at ASU, which she calls “a melting pot for people from all regions of the world.”

Warda describes her initial introduction to ASU as surprising.

“I think we were all a little shocked at how huge ASU is and just how much research goes on here,” she says.

Warda says the USPCAS-E program jumpstarted her research career and has been “an amazing experience.”

She was so committed and excited about the opportunity USPCAS-E provided that she turned down a prestigious Fulbright doctoral program fellowship, offered by the United States Educational Foundation in Pakistan, to spend the semester at ASU. In addition to funding from USAID, Syeda won the British Council's Scholarship for Women in Energy in 2013.

Both Warda and Syeda have returned to Pakistan to continue their careers in advancing renewable energy.

“I've always thought the focus of research should be on how something is going to affect your community, what the real-world application is,” says Warda. “I see a lot of that kind of purpose-driven research here [at ASU], and that's something I look forward to applying back home.”

Both students aim to pursue a doctoral degree.



Master's students Warda Mushtaq (left) and Syeda Mehwish (right) spent the spring semester at Arizona State University with a cohort of Pakistani students as part of the U.S.-Pakistan Centers for Advanced Studies in Energy (USPCAS-E) program. Photographer: Nick Narducci / ASU

“I feel very passionate about using my skills to do something for my community, to contribute to resolving the energy crisis,” says Warda.

At ASU, Warda worked in Assistant Professor Zachary Holman's lab on advanced generation photovoltaics. Her research aspires to help solve Pakistan's energy crisis with increasingly affordable solar power alternatives to fossil fuels.

Solar power is one of the most feasible energy solutions in Pakistan, believes Warda, “but it's very expensive because all solar cells are imported.”

These alternative energy power plants could improve access and sustainability in rural communities in Pakistan, and across the world, if their feasibility can be proved.

The research contributions of engineers like Warda and Syeda aim to address this complex problem and are championed by leaders at their university.

Time at ASU boosts research potential

Both Syeda and Warda decided to pursue a master's degree in energy systems engineering at NUST, in part,

President (Rector) National University of Sciences and Technology (NUST) visits ASU

In late August, Muhammad Asghar, President of the National University of Sciences and Technology based in Islamabad, Pakistan visited Arizona State University. Zuhr Khan, USPCAS-E Project Director at NUST and Communications Director Muhammad Javeed Sarwar joined him for the visit. The purpose for their visit was to learn more about ASU's strategy in advancing interdisciplinary research, academics and global development. In addition to these goals they explored building collaborations between ASU and NUST in joint graduate degrees and research projects. The delegation received an overview of ASU Lightworks, International Development, OKED and the Global

Outreach and Extended Education group. The delegation toured ASU's Interdisciplinary Science and Technology Building, the Energy Research Center, the Macro Technology Works, the Flexible Electronics and Display Center, the Solar Power Lab, the Arizona Center for Algae Technology and Innovation as well as the ASU Polytechnic Technology Center. The delegation also met with the leadership at the Ira A. Fulton School of Engineering as well as Michael Crow, ASU's President. This effort aids the long term sustainability of the project and continues to help strengthen U.S.-Pakistani relations going forward into the future.



“I am delighted to visit ASU and see first hand the kind of dynamic research that goes on at state-of-the-art energy labs.”

Muhammad Asghar, President of NUST

Networking for a brighter future

Pakistani scholars attended Arizona Student Energy Conference (AzSEC)

Pakistani exchange scholars attended the two-day 5th Annual Conference on Renewable Energy Science, Technology, and Policy in Flagstaff, Arizona.

During the two days, graduate students and post-docs from Arizona's top universities came together with the state's leading renewable energy

experts and researchers to explore latest developments and innovations in the fields of renewable energy science, technology, and policy.





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The partnership will further the long history of U.S.-Pakistani relations through the interaction of people; government, research, industry and academia in order improve energy stability in Pakistan.

Technology and Policy

Technology and policy research are key to creating sustainable energy systems that will help enhance Pakistan's economic potential.

The USPCAS-E program supports Pakistan's economic development by strengthening the universities involved and by encouraging applied research. Project topics range from research on battery technologies, photovoltaics and fuel cells to energy policy and energy-efficient buildings.

The range of skills that the exchange students acquire in these areas will help Pakistan meet its energy challenges, while equipping students to succeed in their future engineering careers. "The students, who are very shy in the beginning, adapt to our laboratory working

culture quickly," says engineering Professor Arunachala Kannan, the USPCAS-E technical lead for fuel cell and battery research. "They develop skills in communication, technical and social aspects during their stay working in the multicultural melting pot."

Addressing the roots of Pakistan's energy crisis

"Pakistan's energy system is in crisis," says Clark Miller, Director of the Energy Policy Lab at ASU. "To address that crisis requires a new commitment to energy policy, innovation and leadership."

USPCAS-E is working to prepare young energy leaders to tackle that challenge. "All of the students in the USPCAS-E programs, in Pakistan and at ASU, are receiving basic training in energy policy to ensure that they can contribute effectively as engineers to the energy policy process," Miller says. "We are also providing specialized training in energy policy and the social dynamics of energy transitions to a small group of USPCAS-E faculty and students through semester-long

programs here at ASU."

The Human Component

Technology and policy are not the only key points of the USPCAS-E initiative. Cultural exchange, soft skills, networking within the industry and bringing disadvantaged students and women to the forefront of the energy field are all important components.

Saqib Sattar, who was a part of the first cohort of Pakistani students to begin studies at ASU in early 2016, spent a great deal of time in the Photovoltaic Reliability Lab. He has some advice for the recent cohort of students. "Being an exchange student doing research at ASU means that you will be exposed to number of different [types of] equipment in the lab that will help you in learning many new things as well as getting hands-on experience," Sattar says. "Also you will get the opportunity to meet with people from various cultures and will get to know about them and their culture."

"This is a dream come true. As a female engineer from Pakistan, I am excited to be here. ASU has a very dynamic research environment and I hope to enhance my energy-based research skills."

Maryam Shah Jehan, Exchange Student UET-Peshawar

“So my advice to the current exchange students at ASU is to realize that this is a great opportunity for them not only to develop their technical skills but also soft skills which are very necessary to be successful in your field, so they should make full use of this once-in-a-lifetime opportunity.”

Hafiz Malik, a student from the new cohort says he is “loving the tapestry of cultures” at ASU and is looking forward to heeding Sattar’s advice.

The new cohort includes more than twice as many female students compared to the previous group of graduate students, bringing the total up to five women.

The group also includes one visiting

female faculty member, Dr. Rabia Liaquat, who says that the total student exchange experience benefits both countries and students economically and culturally, and enhances the professional development of faculty and students alike.

Through the networking opportunities the program provides, Dr. Liaquat says, “ASU can help us to interact with other universities for the future, and can connect us with university fellows in our field.”

Andrew Sarracino, the USPCAS-E international visits coordinator, helps acclimatize the exchange scholars to life in the United States. He says the female students, “are paving the path for more young women in Pakistan so

that they are empowered to help their country overcome its energy challenges.”

Graduate exchange student Nafeesa Irshad says there are “very few females in Pakistan in the energy field. We are going to take the lead.”

Irshad says of her experience at ASU thus far that, “people are very supportive and helpful.”

Future cohorts of exchange students will arrive at ASU each semester through 2019 to help bolster the exchange of culture and research between the United States and Pakistan.



Promoting applied research in energy

USPCAS-E awards 17 research grants

In order to help mitigate energy-specific ongoings and anticipated challenges that affect the lives of Pakistanis and hamper economic growth, USPCAS-E recently awarded a total of 17 research grants to academic researchers. These research grants are providing Pakistani researchers an opportunity to conduct

independent energy-related research that will address the day-to-day energy challenges faced by Pakistanis. The research being carried out is redirecting researchers’ focus away from overly theoretical concepts and toward innovative applied research solutions that are sustainable. The research

projects are focusing on power systems, energy policy, solar energy, solar photovoltaic systems, thermal energy and energy materials. A total of 30 research grants will be awarded through USPCAS-E.