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Clean technologies slow down CO2 emissions from energy

Energy-related carbon dioxide emissions rose to a record level in 2023, but the growth slowed from previous years thanks to the continued expansion of clean technologies, the International Energy Agency said this week.

CO2 emissions from energy rose by 1.1 percent in 2023, increasing by 410 million tonnes to a record 37.4 billion tonnes, slowing down from a gain of 490 million tonnes in 2022, the IEA said in its annual update on emissions.

The IEA said that without technologies such as solar panels, wind turbines, nuclear power, and electric cars, the global increase in energy-related CO2 emissions over the last five years would have been three times larger the 900 million tonnes registered.

Over 40 percent of last year's increase in carbon emissions from energy resulted from severe droughts in China, the United States, India and elsewhere which cut hydroelectric output and forced utilities to resort to fossil fuels.

Without the water shortfalls, global carbon emissions from power generation alone would have fallen last year.

Energy carbon emissions rose in China and India in 2023, while advanced economies saw a record fall even as their economies grew. Their emissions dropped to a 50-year low as coal demand fell back to levels not seen since the early 1900s.

For the first time last year, at least half the power generated in advanced

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Chipmaker TSMC's first plant to reboot Japanese industry

Chipmaker TSMC formally opened its first Japanese plant last month highlighting the Taiwanese firm's critical role in Tokyo's multi-billion dollar efforts to reboot its once-mighty semiconductor manufacturing industry.

That Japan turned to TSMC for help on an industry it once dominated reflects the Taiwan chipmaker's dominant position in the foundry business and Tokyo's heightened concern over China's growing prowess in a wide swathe of technology.

The arrival of TSMC, the world's leading contract chipmaker, in Japan is seen as having sparked investment across a sector vital to economic security even as the government eyes a greater prize with its backing for homegrown foundry venture Rapidus.

"The possibility of having TSMC build a fab in Japan really rallied support from disparate parts of the semiconductor industry," said Damian Thong, head of Japan research at Macquarie Capital Securities.

"They have built a snowball effect around it," he said.

By 2027, Taiwan is projected to control two-thirds of foundry capacity for advanced processes as its lead is eroded by aggressive expansion in the U.S., according to research firm TrendForce, with Japan increasing its global share to 3%.

TSMC, which is also building capacity in the U.S. and Germany, is targeting mass production at the fab later this year and has announced plans for a second plant, bringing total investment in the venture to more than $20 billion.

Partnering with companies including Sony and Toyota monthly capacity across the two fabs will exceed 100,000 12-inch wafers, strengthening Japan's access to chips, which are essential for the electronics, automotive and defence industries.

TSMC sees Japan as a natural fit with an industrious work culture suited to chipmaking and a government that is easy to deal with and generous with subsidies, Reuters has reported.

Japan has also benefited from Taiwan's willingness to approve the export of foundry and supply chain technology, particularly for advanced node technologies below 16 nanometres, said David Chuang, an analyst at Isaiah Research.

"With the prospect of fabricating more advanced roadmaps in Japan, it's reasonable to expect that foundry customers may be more inclined to commit to long-term development and procurement of capacity," said Chuang.

Japan can leverage its expertise in areas such as photoresists - chemicals that are needed for chipmaking - image sensors and packaging, which is becoming increasingly important to eke out chip performance gains, said Joanne Chiao, an analyst at TrendForce.

Momentum in Japan's chip sector is growing, with Taiwan chip companies arriving in Japan not only to support the TSMC plant but also being attracted by the industry's renewed dynamism, Reuters has reported.

ECONOMIC BOOST

In the chipmaking hub on the southern island of Kyushu where TSMC's plant is located, companies ramping up investment include power chip maker Rohm wafer maker Sumco and equipment maker Tokyo Electron.

The regional economic boost is forecast to hit 20.1 trillion yen ($134 billion) over a decade, according to the Kyushu Economic Research Center, with activity rippling out from fabs being constructed and run, and from consumption by workers.

A major bottleneck is labour shortages, said Soei Kawamura, a researcher in the business development department at the centre.

"Large companies like TSMC and Sony will be able to secure the necessary personnel, but the economic development of the Kyushu region will change depending on how many people can be recruited in the local semiconductor-related and other industries," he said.

The number of workers in Japan's chip-related businesses has declined by around a fifth over the last roughly two decades.

Leading domestic chip firms need to find 40,000 workers over a decade, according to estimates from the Japan Electronics and Information Technology Industries Association (JEITA).

Tokyo's grander vision is of building a homegrown champion through foundry venture Rapidus, which is headed by industry veterans and targeting mass production of cutting-edge chips on the northern island of Hokkaido from 2027.

A potential rival to TSMC, which has spent decades honing its processes, Rapidus is partnering with IBM and chip research organisation Imec. But its prospects for success are viewed with scepticism by many in the industry.

"I don't doubt TSMC will be dominant, but Japan will seek to prove that they are valid as a number two," said Macquarie's Thong. -- Reuters ■

Clean technologies slow down CO2 emissions from energy

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economies came from low-emissions sources like renewables and nuclear.

Even as China's emissions grew, it added as much solar PV capacity in 2023 as the entire world did in 2022.

"The clean energy transition has undergone a series of stress tests in the last five years – and it has demonstrated its resilience," said IEA Executive Director Fatih Birol.

"A pandemic, an energy crisis and geopolitical instability all had the potential to derail efforts to build cleaner and more secure energy systems. Instead, we've seen the opposite in many economies." – ERMD/AFP

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The voice of engineers

Islamabad decides to outsource management of power distribution companies

Pakistan has reportedly decided to outsource the management of power distribution companies usually called Discos. The reason is to ensure efficiency and attract investment besides reducing the losses.

The report said it was a Turkish Model which understandably was ascribed to for its result-oriented design.

The federal government, it is revealed in the report has agreed with the International Monetary Fund (IMF) that it will engage a transaction adviser for long-term concessions by the end of April 2024.

The World Bank has offered grant-based technical assistance and risk guarantee instruments, which give greater confidence to prospective private concession holders and their lenders.

The International Finance Corporation (IFC) has expressed interest in providing transaction advisory services.

The government officials were reportedly informed in a recent meeting of the Cabinet Committee on Privatization (CCOP) that a long-term concession model had delivered the benefits of private sector participation in Turkey, Argentina, Brazil, Uganda, and other countries.

They noted that under such concessions, Turkey's 20 DISCOs attracted a much larger private sector investment than under the public sector, ensured much better service quality for consumers, and reduced losses by one-third in a decade.

The meeting was informed that Turkey secured the jobs of most of the staff of DISCOs for the first five years along with only a 3-5% long-term increase in tariffs.

Pakistan's policymakers noted that a similar experience was required to be followed in Pakistan whereby the government would agree with concession holders on a gradual reduc-

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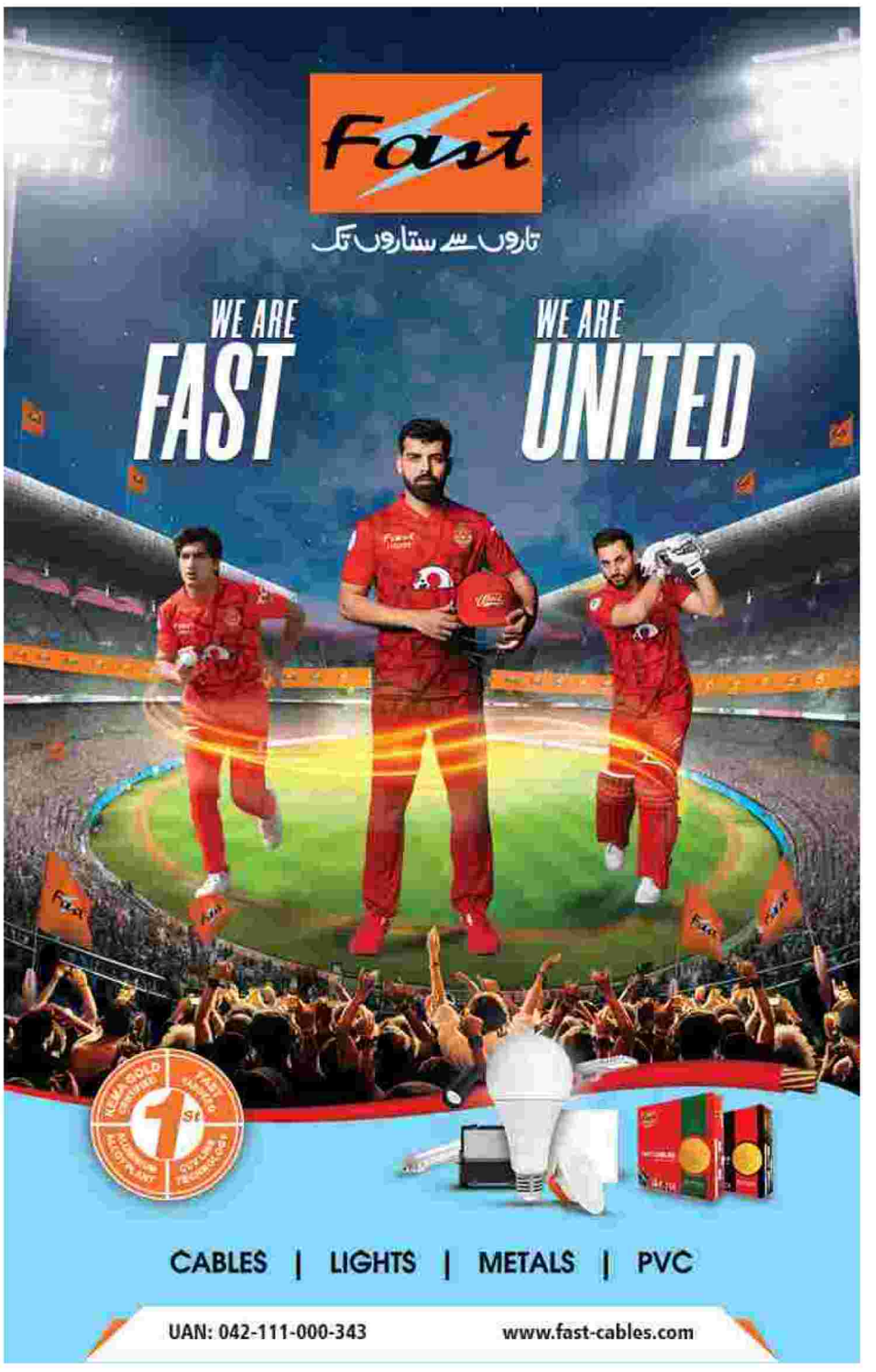


NUST to organize 'Women in Climate Action - Celebrating Resilience'

The National University of Science and Technology (NUST) in collaboration with GIZ Pakistan, Gender In¬tersectionality and Climate Change (GICC) is arranging a mega event titled "Women in Climate Action - Celebrating Resilience" on the occasion of International Women's Day on March 08. This empowering event will be organized at a local hotel to recognize and applaud the significant contributions of women in climate action, emphasizing their leadership, innovation, and impact on creating sustainable and climate-resilient communities.

The researchers, climate heroes, academia, and individuals from the development sector have been called to participate in the event featuring panel discussions, success stories, stalls showcasing women-led initia¬tives, and art and photo exhibitions.

According to an official of NUST, the event would feature an insightful panel discussion, a successful storytelling session, an articles writing competition, and an art and photo exhibition in addition to project and product exhibits. The insightful panel discussion will be aimed at providing a comprehensive understanding of the multifaceted challenges and opportunities women face within the realm of climate action. The success storytelling session will highlight the women doing notable work in cli¬mate action and give them a platform to narrate their stories and experi¬ences and the hardships they have faced in their tremendous efforts.

The art and photo exhibition will feature captivating visuals of women from various backgrounds, cultures, and professions, the display will high¬light the collective power they har¬ness in addressing climate challenges. The project and product exhibits will feature dedicated stalls of the proj¬ects and products by women-led ini¬tiatives, related to environmental sus¬tainability and climate action giving women a platform to accentuate their efforts. The article writing competi¬tion, being arranged in collaboration with the GICC is aimed at stimulating thoughtful discourse on the intersec¬tionality of gender and climate resil¬ience. All voices of Pakistan have been invited to become part of its efforts to amplify the importance of Women in Climate Action by participating in an `Article Writing Competition'. The last date for submission of the ar¬ticles was February 29. The details of the event can be accessed through the website: gicc.nust.edu.pk -- APP

Open letter to Bilawal Bhutto Zardari *from an engineer*

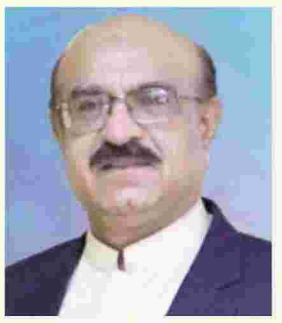
Honorable Bilawal Bhutto Zardari,
Chairman
PPPP,
Asalam o Alaikum,

On behalf of the National Engineers Association, I extend my heartfelt congratulations on your victory in the general elections of 2024 and the remarkable success achieved by the Pakistan Peoples Party, particularly in Sindh. The overwhelming support you have received reflects the trust and confidence the people of Sindh have placed in your leadership.

I would also like to commend your outstanding choice of Engr. Syed Murad Ali Shah as the Chief Minister of Sindh and Engr. Syed Owais Qadir Shah as the Speaker of the Sindh Assembly. As representatives of the engineering community, we eagerly anticipate the positive impact that Engr. Murad Ali Shah and Engr. Syed Owais Qadir Shah will have on the overall development of Sindh. We have great hopes that they will prioritize the welfare of engineers, address their concerns, and create an environment that fosters growth, innovation, and opportunities for the engineering profession in the province.

In addition to conveying our congratulations, I would like to take this opportunity to highlight some key issues faced by engineers in Pakistan, particularly in Sindh, which we hope you being a well-educated leader of Pakistan will address:

1. Jobs: A significant number of engineers in Sindh are currently unemployed. We request your attention and support in creating employment opportunities for qualified engineers, thereby utilizing their skills for the betterment of the country.



2. Internship Opportunities: It is crucial to establish a mechanism for internships at the government level in Sindh. By providing engineering graduates with practical training opportunities, you will enhance their employability and bridge the gap between theoretical knowledge and real-world application.

3. Technical Allowance: We urge you to ensure that engineers in Sindh receive the technical allowance that recognizes their specialized skills and knowledge. This financial support is essential in motivating engineers and acknowledging their significant contributions to the development of the province. It is worth noting that engineers in Balochistan, KPK provinces, and some areas in Punjab receive technical allowances.

4. Career Progression and Service Structure: We request your support in establishing an Engineers' Service Structure. This structure will provide engineers with a clear career progression path, ensuring fairness and transparency in promotions, compensation, and

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Renewable energy sector: charting the agenda for 2030 and beyond

Pakistan's ambitious renewable energy plans need to be coupled with close attention to addressing the system's constraints to reduce the volume of unserved energy on the one hand and accommodate the intermittency of renewable energy on the other.

This was the consensus evolved at a webinar titled, 'Emerging trends in Pakistan's renewable energy sector: charting the agenda for 2030 and beyond', which was organized by Sustainable Development Policy Institute here. Highlighting the current challenges being faced by the power sector and the milestones that need to be crossed to achieve a stable and sustainable energy ecosystem, speakers said that the addition of renewable energy is non-negotiable in today's climate but this should be coupled with modernization of the grid.

Sadia Dada, Chief Marketing and Communications Officer at K-Electric, shared an overview of KE's Investment Plan which had already been submitted to the regulator, and outlined the company's plans to expand the utility's transmission and distribution capacity readying it to take on approximately 1200 MW of renewable energy by FY 2030 as envisaged under the utility's Power Acquisition Program (PAP). She maintained that these programs are being made in alignment with national targets under the Indicative Generation Capacity Expansion Plan (IGCEP) and entail a long-term, optimal cost strategy plan for the expansive growth of power generation within a set of prevailing policies and technical and socioeconomic considerations.

"In the next seven years, we aim to reduce our reliance on imported fuels to 51% while increasing our dependence on green sources to 49%. We must look at our approach in a holistic manner because our priority is to maintain energy security for our customers. We've seen that climate change is impacting countries which were previously relying heavily on renewable energy, making it difficult to maintain grid stability." She said cities like Karachi also present a unique case study, where we see power demands peaking twice in a 24- hour period, which requires a case-specific approach".

Dr Irfan Ahmed, Energy Consultant, was of the view that renewable energy projects are front-loaded and require upfront heavy investments. He said that to deal with this issue Pakistan needed to be 'self-reliant' and would have to eventually go for local manufacturing as the country has foreign exchange constraints. He maintained that Pakistan's electrical network is 'bumpy' and this leads to frequent damage to electrical plants and revenue loss, therefore, it is of paramount importance that we can repair the nonoperational plants locally and produce spare parts for their sustainable operations otherwise we would continue to face these problems.

Dr Khalid Waleed, SDPI Research Fellow, said that the country's transition to renewable energy should be gradual and orderly so that it would not create more problems for the energy ecosystem. He further emphasized the need to create a conducive environment and explore distribution generation models so that the balance between load and generation centers might be bridged effectively. This requires national dialogues to shore up investor confidence in transmission and distribution projects, he added.

Fozan Waheed, Renewable Energy Expert, spoke about how sudden curtailments in wind power projects jeopardize the grid and make it prone to blackouts. Citing international examples, he mentioned that China invests up to USD 75 billion in their grid to ensure long-term energy security as well. He further said the sustainability and success of Pakistan's energy sector rests in its ability to learn from the best practices of leaders in the energy space, introspect on the available resources and knowledge pool, and prepare a forward-looking strategy that incorporates these elements to address the country's specific needs.

Abubakar Ismail, Head of Energy & Sustainability, Amreli Steels Limited, remarked that more and more industries are embracing solar power with increasing interest in wind and biomass energy sources as well, however, the current economic conditions pose significant challenges to investment across all sectors, including renewable energy. He added that to foster growth and development in the renewable energy sector, economic and political stability is imperative. He maintained that open access policies and the implementation of a Competitive Trading Bilateral Contract Market (CTBCM) are crucial steps towards enhancing energy adoption in Pakistan and these measures would promote competition, efficiency, and transparency in the energy market, ultimately benefiting consumers and producers. The session was concluded on vote of thanks to all the participants by Ubaid ur Rehman Zia, the moderator of the session and Senior Research Associate & Head of the Energy Unit at SDPI. -- ER

Karachi University, IEEE Education Society Karachi organizes

International Symposium on 'Generative AI'

The esteemed Department of Computer Science (DCS), Karachi University, and IEEE Education Society Karachi Section along with QSImpact Pakistan hosted an exceptional International Symposium on "Generative AI," a groundbreaking exploration into the realms of artificial intelligence poised to redefine the future of technology.

The international symposium took place at the DCS auditorium, well-orchestrated under the dynamic leadership of venerated Chairman Dr. Sadiq Ali Khan and actively hosted and supported by a dedicated and learned team of Student Advisors, namely Dr. Humera Bashir and Dr. S. M. Khalid Jamal.

This international symposium marked to be a pivotal gathering of leading minds and innovators in the field of Computer Science. Distinguished luminaries and

experts from academia and industry have graced the symposium with their profound insights and expertise. Among them, we were honored to have among speakers Prof. Dr. Enrique Nava, Associate VC, University of Malaga, Spain, Prof. Dr. Bhawany Shankar Choudhary (S. I.), Meritorious & Emeritus Professor, Engineer M Zakir Sheikh, Director NCRA, Mehran University and President QSImpact Pakistan, Dr. M. Naseem Chairman Department of Software Engineering Sir Syed University, and Mr. Adnan Zaidi Chief AI officer, Proxima, & Kaggle Grand-Master (Pakistan), who will delivered keynote addresses on the latest advancements and applications of generative AI.

In his address to the attendees of the "Generative AI" symposium, the Chairman of the Department, Dr. Sadiq Ali Khan, delivered a compelling message echoing the spirit of innovation and exploration. With eloquence and authority, he underscored the profound impact of generative AI on the future of technology and society at large. Encouraging students to embrace curiosity and ingenuity, he emphasized the importance of pushing boundaries and thinking beyond convention. "Today marks a pivotal moment in our journey towards unlocking the potential of AI," he declared, igniting a sense of excitement and possibility among the audience. Through his impassioned address, the Chairman inspired attendees to embark on a quest for knowledge and discovery, laying the foundation for a future defined by creativity, collaboration, and transformative breakthroughs.

Prof Dr Bhawany Shankar Chowdhry appreciated the efforts of Dr Sadiq in the IEEE Karachi Section, he endorsed that through Dr Sadiq's dedicated efforts IEEE Education Society was established the first time in the IEEE Karachi Section. He witnessed that in the previous tenure of Dr Sadiq UBIT department actively performed academic activities in order to promote the learning environment for the students, he explained the key benefits of IEEE as a member.

In his riveting keynote address at the "Generative AI" symposium, the esteemed Guest of Honor Prof. Dr. Enrique Nava Associate VC, University of Malaga, Spain, illuminated the audience with profound insights and cutting-edge perspectives. With eloquence and expertise, he traversed the intricate landscapes of artificial intelligence, unveiling the transformative power of generative AI in shaping the future of technology. Drawing from his rich experience and scholarly pursuits, he captivated the audience with compelling narratives and visionary foresight. "Generative AI holds the key to unlocking unprecedented opportunities for innovation and discovery," he proclaimed, igniting a sense of wonder and anticipation among the attendees. His address transcended geographical boundaries, transcending language barriers to resonate deeply with the diverse audience. Through his enlightening discourse, the keynote speaker from Spain left an indelible mark, inspiring attendees to embark on a journey of exploration and innovation in the dynamic realm of AI.

Attendees actively involved in key topics such as machine learning algorithms, neural network architectures, deep learning techniques, and the transformative potential of generative AI across various sectors. Through engaging discussions and presentations, participants gained invaluable insights into the cutting-edge developments shaping the future of AI technology.

The symposium showcased cutting-edge research projects and advancements in generative AI through research presentation sessions. Attendees had the opportunity to interact with leading researchers and explore groundbreaking research initiatives shaping the future of AI innovation.

Last but not least DCS proudly acknowledges the active participation of students, who are playing a vital role in shaping the future of AI innovation and will continue to be the base for future developments. From active listening to volunteering behind the scenes, students contributed to the vibrant academic atmosphere and enriched the symposium experience. -- PR

Saleem Habib University organizes Intl Conference

'Emerging Trends in Biomedical Engineering, Science and Technology'

The 1st International Conference on Emerging Trends in Biomedical Engineering, Science and Technology (ICETBEST 2024), organized by the Department of Biomedical Engineering, Salim Habib University concluded on February 29, 2024.

The second and final day of the conference, attended by dedicated delegates and participants from all over Pakistan as well as abroad included technical sessions, oral presentations, poster presentations, project demonstrations, keynote speeches, and hands-on workshops.

The conference was declared officially closed in a ceremony addressed by Vice Chancellor SHU and Conference Patron Prof. Dr. Shakeel Ahmed Khan and Conference Secretary Engr. Muhammad Shaheer Mirza.

Chief guest Engr. Muhammad Najeeb Haroon, Chairman of the Pakistan Engineering Council (PEC) also addressed the moot. Engr. Farooq Arbi, General Secretary of IEP Karachi Centre, and Mr. Masood Ahmad, Chairman of HDAP and CEO of Hospicare Systems also spoke at the ceremony.

At the end, shields, and certificates were distributed among delegates and recipients of the Best Poster, Best Paper, and Best Project awards.■

Engr. Dr. Aneel Kumar to be conferred with National Engineering Excellence

Engr. Dr. Aneel Kumar, Pro Vice-Chancellor, Mehran University of Engineering and Technology, Jamshoro will be conferred with the National Engineering Excellence Award by the Institution of Engineers Pakistan (IEP) on World Engineering Day.

The World Federation of Engineering Organization (WFEO) working under the aegis of UNESCO celebrates the UNESCO World Engineering Day (WED) on 4th March every year.

The Institution of Engineers Pakistan (IEP), being a constituent member of WFEO also celebrates World Engineering Day on 4th March every year in a befitting manner.

This year, IEP has decided to celebrate this Day on 4th March 2024 at 6:30 pm at Expo Centre, Johar Town, Lahore, and to award National Engineering Excellence Awards to distinguished Engineers who have contributed to the betterment of society in general and Engineering Profession in particular.■

Islamabad decides to outsource management of power distribution companies

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tion in liabilities through loss reduction without a significant increase in tariffs.

They said that DISCOs would then secure a much better value from privatization. There was unanimity of views among the policymakers that the handing over of DISCOs to provincial governments was unlikely to result in the required strategic shift.

Furthermore, provincial authorities had laid several conditions for taking over the ownership of DISCOs, which may not be supportive of efforts to improve their operational performance and may delay the process further.

There was consensus that privatization was the best solution. However, the policymakers stated that the sale of government assets had often come under legal and political pressure on account of the valuation of assets. Any sale of assets at throwaway prices had the potential to derail the entire process.

In addition, legacy issues about the ownership of assets (DISCOs vs Wapda) still existed and had been a major hurdle in the way of privatization.

The Power Division was of the view that the concession model would bring the desired results. It was proposed that initially two smaller DISCOs, the better-performing Gujranwala Electric Power Company (Gepco) and the poor-performing Hyderabad Electric Supply Company (Hesco), may be earmarked. The Power Division told the meeting that the power sector's longstanding difficulties stemmed primarily from the operational performance of 10 DISCOs.

The key challenges faced by DISCOs included poor governance and inadequate investment. Therefore, they were placed on the active privatization list but the process could not move forward.

During the tenure of the previous government, a committee was constituted for the transfer of DISCOs to provinces. The committee submitted its report to the then prime minister, who gave the directive that the summary may be placed before the new cabinet.

During a meeting of the executive committee of the Special Investment Facilitation Council (SIFC), held on September 26-27, 2023, the minister of privatization called for taking an appropriate course for transferring the management of DISCOs to the private sector.

The SIFC apex committee, during a meeting on October 4, 2023, agreed with the proposal and decided that the recommendation of the privatization minister about private sector participation in the management of DISCOs, including management contracts/ outsourcing, should be approved.

A summary will be moved to the cabinet to revive its earlier decision on private sector participation and withdraw the proposal of "provincialisation".

It was observed that the concession model/ outsourcing would be discussed and a firm proposal would be presented by the energy minister and the privatization minister in the next CCOP huddle.

The Power Division revealed that to come up with a workable solution to introduce a private sector-oriented culture of governance and management, modern expertise, information and communication technology and attract adequate investment in DISCOs, extensive consultations were held with the relevant entities and international financial institutions to develop a model for private sector participation in line with Pakistan's ground realities.

The CCOP observed that the case relating to private sector participation in the operation of DISCOs through long-term concession contracts fell within the domain of the Privatisation Commission rather than the Power Division. Therefore, the matter should be dealt with by the Privatisation Commission. --ERMD

Sustainable Manufacturing: Engineering Processes for Reduced Environmental Impact

Engr. Dr. Muhammad Nawaz Iqbal

A key component of contemporary engineering is sustainable manufacturing, which seeks to reduce the negative effects of industrial activities on the environment. When it comes to developing and putting into practice sustainable manufacturing techniques focusing on resource conservation, waste reduction, and general environmental stewardship, engineers are essential. This calls for an integrated approach to engineering procedures that takes into account every stage of the life cycle of the product, from the extraction of raw materials to their eventual disposal. The choice of raw materials is the first step towards the idea of sustainable manufacturing. Finding and using materials with a smaller environmental impact is the responsibility of engineers. This entails assessing the life cycle assessment (LCA) of materials in order to comprehend the environmental impact that they have, taking into account extraction, processing, transportation, and disposal at the end of the material's life. One of the main goals of sustainable manufacturing is energy consumption optimization. By utilizing renewable energy sources and energy-efficient technologies, engineers look for creative ways to reduce the amount of energy used in manufacturing operations. In order to increase productivity and lower energy waste in manufacturing, this involves implementing sophisticated manufacturing technologies like automation and robotics. A key component of sustainable production is waste reduction. Lean manufacturing techniques are used by engineers to reduce material waste and energy usage in the production process. This entails streamlining the production process to cut out pointless procedures, make better use of available resources, and lessen the manufacturing industry's total environmental impact. Reuse and recycling are essential elements of sustainable production. To provide things a second life cycle, engineers build techniques that make it easier to recycle materials and component parts. In order to reduce the requirement for fresh raw materials, this entails creating closed-loop systems where resources may be recovered, remanufactured, and reintegrated into the manufacturing process. Using the concepts of the circular economy is a smart move for sustainable production. Engineers take end-of-life considerations into account when designing goods, taking into account things like biodegradable materials, ease of disassembly, and recyclability. By doing this, items are guaranteed to add value to a closed-loop system, reducing waste and encouraging a regenerative manufacturing strategy. One of the most important factors in sustainable manufacturing is water conservation. Engineers work to limit the adverse ecological effects of industrial operations by designing processes that use the least amount of water possible and implementing water recycling technologies. This entails effective water management techniques, water treatment technology, and cooling system optimization.

Sustainable manufacturing techniques lower the amount of hazardous materials used and the amount of detrimental byproducts generated by incorporating the concepts of green chemistry. Assuring that manufacturing operations adhere to the values of security, wellness, and environmental responsibility, engineers create processes that emphasize the use of ecologically friendly chemicals. Engineers using sustainable manufacturing use life cycle assessment (LCA) as a critical tool. Through life cycle assessment (LCA), a product's or process's environmental impact can be thoroughly examined. With Life Cycle Assessments (LCAs), engineers can reduce their overall environmental impact by pinpointing opportunities for process optimization, making well-informed decisions, and improving their work. Engineers are always looking for new ways to innovate eco-friendly materials in sustainable production. This entails investigating and creating substitute materials that have a less carbon footprint, are biodegradable, or can be recycled in order to have a lower environmental impact. A more ecologically conscious approach to manufacturing benefits from the use of sustainable resources. Achieving manufacturing sustainability targets requires collaboration throughout the supply chain. Engineers and suppliers collaborate extensively to guarantee that raw materials are sourced ethically and meet sustainability standards. Working together, we are able to create best practices, certifications, and industry standards that support sustainability across the industrial ecosystem.

Making the switch to more ecologically friendly activities requires investing in sustainable manufacturing technologies. Engineers support and use cutting-edge technologies including digital manufacturing, intelligent manufacturing systems, and additive

manufacturing (3D printing). These technologies improve accuracy, cut down on waste, and help make manufacturing processes more sustainable and efficient overall. Engineers are key players in determining how industrial practices will develop in the complicated and multidimensional subject of sustainable manufacturing. An approach to production that is more sustainable and conscientious is made possible by engineers, who include the concepts of resource productivity, decreased waste, and preservation of the environment into every phase of the manufacturing process. A mentality that is essential for the planet's long-term health is promoted via sustainable manufacturing, which also tackles the present environmental issues.■

Sales Blog for Young Engineers and Entrepreneurs

Types of Goods with Sales & Marketing Approaches

A Lively Conversation between a Father and his Daughter

Muhammad Tariq Haq | ESL

Once upon a time there lived a young but ambitious girl named Amna. Amna had always been fascinated by the world of business and aspired to follow in her father's footsteps. Her father, Mr. Abdullah, was the Marketing Director of a renowned blue-chip company. One evening, as Amna sat with her father in their cozy living room.

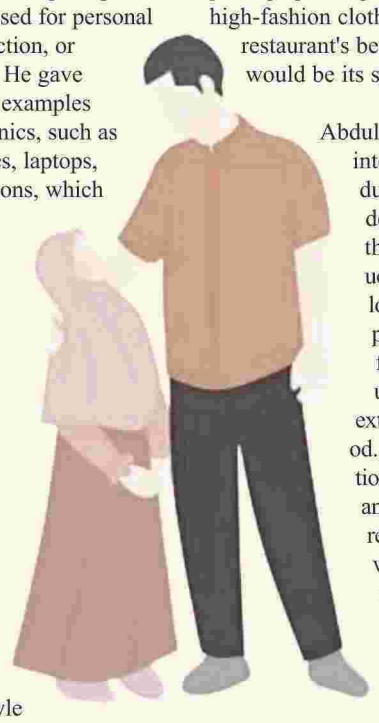
"Father," Amna began, "just like you I am also interested in business, and I would love to understand the various types of goods. Can you please explain them to me?"

Mr. Abdullah smiled warmly at his daughter's curiosity and began to explain.

He started with convenience goods, describing them as easily accessible products that are frequently purchased and require minimal effort for consumers to obtain. He mentioned snack foods like chips, candy bars, and soft drinks, which can be found in convenience stores and vending machines. He also mentioned personal care products like toothpaste, shampoo, and soap, which are readily available in most supermarkets and drugstores.

Amna listened intently, her eyes sparkling with excitement. She was eager to learn more.

Mr. Abdullah then moved on to consumer goods, explaining that these encompass a wider range of products purchased for personal use, satisfaction, or enjoyment. He gave fascinating examples like electronics, such as smartphones, laptops, and televisions, which are more expensive and purchased for long-term use and entertainment. He also mentioned clothing and apparel, highlighting how they cater to personal style and fashion preferences, allowing individuals to express themselves.



In between he also touched upon Shopping Goods and Specialty Goods! Specialty goods have particularly unique characteristics and brand identifications for which a significant group of buyers is willing to make a special purchasing effort. Examples include specific brands of fancy products, luxury cars, professional photographic equipment, and high-fashion clothing. A restaurant's best dish would be its specialty.

Next, Mr. Abdullah delved into consumer durables, describing them as products with a longer lifespan intended for repeated use over an extended period. He mentioned appliances like refrigerators, washing machines, and ovens, which are essential for daily household activities. He also mentioned electronics like televisions, smartphones, and laptops.

As the conversation progressed, Mr. Abdullah explained capital goods, which serve a distinct purpose in the production of other goods and services. He mentioned machinery and equipment, buildings and infrastructure, vehicles for business use, and technology and software as examples. He emphasized that these assets are investments made by businesses to enhance productivity, efficiency, and overall operational capabilities.

Finally, Mr. Abdullah touched upon commodities, describing them as raw materials or primary agricultural products that can be bought and sold. He mentioned energy commodities like crude oil and natural gas, precious metals like gold and silver, agricultural commodities like wheat and corn, and industrial metals like copper and aluminum.

As the evening drew to a close, Amna thanked her father for his insightful explanations. She felt a renewed sense of purpose and determination to pursue her dreams in the world of business. She also understood that as nature of goods varies from convenience to capital, how the focus of sales and marketing efforts varies accordingly from promotion (pull marketing) to personal selling (love marketing)!

Open letter to Bilawal Bhutto Zardari

Contd from page 4

growth opportunities.

5. Non-Engineer Heads of Engineering Departments: We have observed that some engineering departments in Sindh are headed by individuals who do not possess an engineering background. We kindly request you to review and rectify this situation by appointing qualified engineers to such positions, ensuring that decisions are made based on technical expertise. In some areas, non-engineers are heading technical projects.

6. Engg Projects, Industries, and IT Parks in Sindh: Furthermore, as representatives of the engineering community, we would like to emphasize the importance of promoting and facilitating engineering projects, industries, and IT-related initiatives in Sindh. We believe that the establishment of engineering projects and industries will not only create employment opportunities for engineers but also contribute significantly to the economic growth and development of the province.

In particular, we strongly urge your support in the creation of IT parks in Sindh. These dedicated spaces for technology companies and startups will foster innovation, attract investment, and provide a conducive environment for the growth of the IT sector. By promoting IT parks, Sindh can position itself as a hub for technology and digital innovation, creating numerous job opportunities for engineers and other professionals in the field.

We kindly request your attention and commitment to providing the necessary infrastructure, resources, and policies that will enable the establishment of engineering projects, industries, and IT parks in Sindh. By doing so, you will not only harness the potential of the engineering community but also contribute to the overall economic and technological advancement of the province.

We firmly believe that by addressing these issues and ensuring the well-being and professional growth of engineers in Sindh, you will not only empower the engineering community but also contribute to the overall progress and prosperity of the province.

We have great faith in your leadership and look forward to witnessing the positive changes that you, Engr. Murad Ali Shah, and Engr. Syed Owais Qadir Shah will bring to Sindh. We stand ready to support your endeavors and collaborate with you in achieving our collective goals.

We are confident that under your leadership, the engineering community in Sindh will thrive and contribute to the development of our great nation.

Yours sincerely,
Engr. Abdul Rehman Shaikh,
General Secretary ■

Future of Education

Adnan Riaz (F I B E R C A S T)

Education in Pakistan is undergoing transformation, with initiatives such as online learning gaining traction in alignment with the global market, projected to reach $350 billion by 2025. However, challenges like access and quality persist, highlighting the need for reforms to ensure Pakistani students can benefit from and contribute to the evolving global educational landscape. Here are key points about the changing landscape of education along with relevant numerical data:

Rise of Online Learning:

The global online education market is projected to reach $350 billion by 2025, with a compound annual growth rate (CAGR) of 9.23% from 2020 to 2025.

During the COVID-19 pandemic, there was a significant surge in online learning adoption, with an estimated 1.6 billion learners affected worldwide.

Example of Coursera: Coursera is a leading online learning platform that offers courses, specializations, and degree programs from top universities and institutions worldwide. It has over 82 million registered learners and partners with over 200 universities and organizations globally.

Skills-Based Education:

The World Economic Forum's Future of Jobs Report 2020 projected a 41% increase in demand for critical thinking skills by 2025. According to LinkedIn's Workplace Learning Report, 57% of Learning and Development (L&D) professionals prioritize skills-based hiring.

Example of P-TECH (Pathways in Technology Early College High School): P-TECH is a public-private partnership model that offers high school students a blend of traditional high school coursework and industry-aligned skill development. Students graduate with a high school diploma and an associate degree in a STEM field, providing them with valuable technical skills and a pathway to careers in technology.

Lifelong Learning:

A survey conducted by Pew Research Center found that 87% of workers believe it will be essential to get training and develop new skills throughout their work life. The need for continuous learning is underscored by the fact that by 2030, as many as 375 million workers globally may need to switch occupational categories due to automation and artificial intelligence.

Example of Singapore's SkillsFuture Initiative: The SkillsFuture initiative in Singapore promotes lifelong learning and skills development among individuals of all ages. It provides subsidies and support for individuals to upgrade their skills, explore new careers, and stay relevant in a rapidly changing job market.

Technology Integration:

Worldwide spending on educational technology (EdTech) reached $102 billion in 2020. The adoption of learning management systems (LMS) by educational institutions has been steadily increasing, with the global LMS market expected to reach $29.9 billion by 2025.

Example of Estonia's E-Estonia Initiative: Estonia has integrated technology extensively into its education system through initiatives like the e-Estonia project. This includes the use of digital platforms for administrative tasks, e-textbooks in schools, and e-learning resources, demonstrating a comprehensive approach to technology integration in education.

Global Collaboration and Cultural Exchange:

Since its inception in 2014, the Erasmus+ program in Europe has supported over 5 million people in higher education mobility. Virtual exchange programs have gained traction, facilitating global collaboration and cultural exchange among students from different parts of the world.

Example of eTwinning: eTwinning is a European Union program that promotes collaboration among schools in different countries through online projects, professional development opportunities, and teacher networking. It facilitates cultural exchange, language learning, and the development of digital literacy skills among students and educators.

Alternative Credentialing:

Alternative credentials, such as badges, certificates, and microcredentials, are gaining popularity. According to a report by HolonIQ, the global market for alternative credentials is estimated to be worth $13.8 billion.

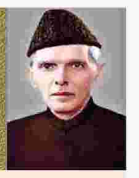
Example of Mozilla Open Badges: Mozilla Open Badges is an open standard for digital badges that recognize and showcase individuals' skills and achievements. It allows learners to earn badges from various sources and display them online, providing a flexible and portable way to demonstrate competencies to employers and educational institutions.

Equity and Access:

Despite progress, approximately 258 million children and youth worldwide were out of school prior to the COVID-19 pandemic, according to UNESCO. Issues of digital equity persist, with disparities in access to technology and internet connectivity affecting students' ability to participate in online learning.

Example of One Laptop per Child (OLPC): The OLPC initiative aims to provide affordable laptops and digital resources to children in developing countries, bridging the digital divide and improving access to education. It has deployed millions of laptops worldwide, enabling students to access educational content, collaborate with peers, and develop digital literacy skills.

Pakistan can significantly enhance its education system by leveraging online learning, where the global market is projected to reach $350 billion by 2025. Prioritizing skills-based education can align with the 41% increase in demand for critical thinking skills by 2025. By fostering global collaboration, Pakistan can tap into initiatives like student exchange programs, benefiting from the engagement of over 82 million learners worldwide.■



فرمانِ قائداعظمؒ

ایمان ، اتحاد ، تنظیم

آزادی اور قربانی

پس جہاں تک ممکن ہو ہمیں اپنے حریفوں کو سمجھانے کے لئے عقل اور دلیل سے کام لینا چاہیے۔ میں جانتا ہوں کہ دلیل اور عقل ہمیشہ ہی کامیاب نہیں ہوتیں لیکن ہمیں اپنی طرف سے پوری کوششیں کرنی چاہیئے۔ جو لوگ فی الحال لاہور کی قرارداد پاکستان کے خلاف ہیں' ہمیں ان کے دل میں غیر ضروری تلخی پیدا نہیں کرنی چاہیے۔ آخر ہمیں ضرورت ہی کیا ہے؟ مجھے پورا پورا یقین ہے کہ ہمارے یہی حریف ایک نہ ایک دن محسوس کر لیں گے کہ ہندوستان کے انتہائی پیچیدہ مسئلے کا واحد اور بہترین حل قیام پاکستان ہے کہ جس کے قیام کی نظیر پوری دنیا کی تاریخ میں نہیں ملتی۔

(پنجاب مسلم سٹوڈنٹس فیڈریشن۔2 مارچ 1941ء)

آوازِ اقبال

اقبال کا ترانہ بانگ درا ہے گویا
ہوتا ہے جادہ پیما پھر کارواں ہمارا

آہ! یہ دست جو اے گل رنگیں نہیں
کس طرح تجھ کو یہ سمجھاؤں کہ میں گل چیں نہیں
کام مجھ کو دیدۂ حکمت کے الجھیڑوں سے کیا
دیدۂ بلبل سے میں کرتا ہوں نظارہ تر
تو شناسائے خراش عقدۂ مشکل نہیں
اے گل رنگیں ترے پہلو میں شاید دل نہیں
زیب محفل ہے شریک شورش محفل نہیں
یہ فراغت بزم ہستی میں مجھے حاصل نہیں
اس چمن میں' میں سراپا سوز و ساز آرزو
اور تیری زندگانی بے گداز آرزو
توڑ لینا شاخ سے تجھ کو مرا آئیں نہیں
یہ نظر غیر از نگاہ چشم صورت میں نہیں

شفاف انتخابات: انجینئرنگ جامعات کی مدد لی جائے

حالیہ انتخابات پاکستان کی تاریخ میں غالباً سب سے زیادہ متنازع ثابت ہوئے ہیں۔ الیکشن سے ایک رات پہلے ہی مختلف ویڈیوز میں پری پول دھاندلی کی نشان دہی ہوتی جارہی تھی اور رہی سہی کسر انتخابات کے روز انٹرنیٹ سروس اور موبائل سروس کی بندش نے پوری کردی۔ انتخابات کے بعد سے مبینہ دھاندلی کیخلاف شروع ہونے والے احتجاج میں ہارنے والی جماعتیں ہی نہیں جیتنے والی بھی شامل ہیں۔ حد یہ ہے کہ بعض حلقوں میں دو امیدواروں کو دو الگ الگ فارم 45 پکڑا دیئے گئے اور اپنے اپنے فارم 45 میں دونوں ہی جیت چکے جبکہ بعض میں فارم 45 میں کامیاب امیدوار فارم 47 میں شکست پاتا ہے۔ غور طلب بات یہ ہے کہ آخر کیا وجہ ہے کہ تقریباً تمام ہی الیکشنز میں دھاندلی کے الزامات کے باوجود انتخابی طریقہ کار اور انداز نہیں بدلا جارہا۔ بہرحال تمام تحفظات اور احتجاج کے باوجود یہ خوش آئند ہے کہ ملک میں جمہوری حکومت کی تشکیل ہورہی ہے۔ لیکن وقت آگیا ہے کہ جو بھی حکومت آئے وہ انتخابی طریقہ کار کو صاف و شفاف بنانے پر کام کرے۔ اس کے لئے سب سے اہم تو انتخابی عملے کی درست تربیت ہے۔

حالیہ الیکشن میں اکثر پولنگ اسٹیشنز پر غیر تربیت یافتہ عملہ تھا جسے فارم 45 تک بھرنا نہیں آتا تھا۔ اس سلسلے میں تجویز ہے کہ الیکشن کمیشن محض انتخابات سے چند روز پہلے عملے کی تربیت نہ کرے بلکہ عموماً "عملہ اساتذہ پر مشتمل ہوتا ہے اس لئے بہتر ہوگا کہ سال میں کم از کم دو مرتبہ دو دو ماہ کے لئے انتخابی تربیت کا اہتمام کیا جائے۔ اور انتخابی تربیت کو سروس کا لازمی جز قرار دیا جائے۔ بہتر کارکردگی پر نقدی انعام اور اسناد سے نوازا جائے۔ اسکے ساتھ ہی تعلیمی اداروں میں طلبہ وطالبات کے لئے بھی نصاب میں الیکشن مراحل کو شامل کیا جائے۔ گزشتہ دنوں محمد علی جناح یونیورسٹی کی جین زی سوسائٹی نے سوسائٹی کے انتخابات کروائے جس میں پریزائیڈنگ افسر' ریٹرننگ افسر اور پولنگ ایجنٹس کی ذمہ داریاں طلبہ وطالبات نے نہایت احسن انداز میں نبھائیں اس طرح کے ایونٹس سال میں دو مرتبہ ہونے چاہئیں۔ اگر ملکی سطح پر تمام ہی جامعات بلکہ تعلیمی اداروں میں انتخابات ہوتے رہیں تو جہاں تربیت یافتہ عملہ بڑی تعداد میں میسر آسکے گا وہیں عوام میں رفتہ رفتہ ووٹ کی اہمیت کا شعور بڑھے گا۔ یہ ایک جمہوریت پسند معاشرے کی مضبوطی میں مددگار ہوگا۔ اسکے ساتھ ہی الیکٹرانک ووٹنگ مشین (ای وی ایم) کو اپنایا جائے تاہم یاد رہے کہ عمران خان حکومت قومی اسمبلی سے ای وی ایم کو منظور کروانے کے باوجود سینیٹ میں ناکامی سے دوچار ہوئی تھی۔ اس وقت الیکشن کمیشن کا اعتراض تھا کہ الیکٹرانک ووٹنگ مشین پورے ملک میں یکساں کامیاب نہیں ہوسکتی جبکہ اس میں ٹیمپرنگ بھی ہوسکتی ہے۔ الیکشن کمیشن نے اپنے تحفظات میں ان یورپی ملکوں کا بھی ذکر کیا تھا جہاں پر الیکٹرانک ووٹنگ کا استعمال اس مشین پر اٹھنے والے اعتراضات کی وجہ سے روک دیا گیا ہے۔ ان ملکوں میں جرمنی، ہالینڈ، اٹلی، فرانس اور آئرلینڈ شامل ہیں۔ اپوزیشن کا موقف تھا کہ ملک میں خواندگی کی شرح کم ہے۔ گاؤں دیہات سمیت اکثر علاقوں کے لوگ اے ٹی ایم مشین تک استعمال نہیں کرسکتے تو وہ ووٹ کے لئے مشین کیسے استعمال کریں گے۔

دلائل اور تحفظات کے باوجود ہمیں ٹیکنالوجی کے استعمال سے ووٹنگ کا عمل شفاف بنانے کے لیے اقدامات اٹھانے ہونگے۔ اس کے لئے الیکشن کمیشن انجینئرنگ جامعات اور کالجز سے مدد لے سکتا ہے جبکہ پانچ سال میں سالانہ بنیادوں پر انجینئرنگ کے طلباء کے درمیان بہتر سے بہتر اے وی ایم کی تیاری کے مقابلے کرا کے کوئی بہتر آپشن اپنا سکتا ہے۔ اس میں کوئی شک نہیں کہ موجودہ طریقہ ووٹنگ کے مقابلے میں ای وی ایم ترقی یافتہ ممالک تک میں ناکامی سے دوچار ہوا ہے تاہم یہ بھی حقیقت ہے کہ ایک تجربہ ناکام ہو تو دوسرا کیا جاتا ہے بجائے اسکے کہ بہتری کی کوشش ہی ترک کردی جائے۔ اس سلسلے میں یہ بھی تجویز ہے کہ الیکشن کمیشن کیساتھ قانون نافذ کرنے والے اداروں کے ماہرین کو مستقل بنیادوں پر تعینات کیا جائے جو الیکشن کو صاف و شفاف بنانے میں حقیقی کردار ادا کرسکیں۔ الیکشن کمیشن موجودہ طریقہ ووٹنگ کی شفافیت کے لیے خود بھی تربیت لیکیونکہ ایسا محسوس ہوتا ہے کہ الیکشن کمیشن کے اپنے ارکان بھی غیر تربیت یافتہ ہیں جو اتنے اہم معاملے پر کوئی ٹھوس اقدام نہیں اٹھا پاتے نتیجتاً پورا انتخابی عمل سوالیہ نشان بن جاتا ہے۔■

پاک ایران گیس پائپ لائن پر عمل

وفاقی کابینہ کی توانائی کمیٹی نے 2009 سے التوا میں پڑے پاک ایران گیس پائپ لائن منصوبے کے پہلے مرحلے کی منظوری دے دی ہے جس کے تحت ایرانی سرحد سے گوادر تک 80 کلومیٹر حصے پر کام ہوگا جبکہ دوسرے مرحلے کی منظوری کے بعد گوادر تا نواب شاہ اسے توسیع دی جائے گی اور مین لائن سے جوڑ دیا جائے گا۔ یہ ایک دوررس نتائج کا حامل منصوبہ ہے، اس کی تکمیل سے صنعتی اور گھریلو سطح پر کم وبیش دو دہائیوں سے جاری گیس کے شدید ترین بحران سے نکلنے میں مدد ملے گی۔ یہ معاہدہ 2009 میں ہوا تھا اور 2015 میں منصوبہ مکمل ہونا تھا تاہم ایران پر عائد امریکی پابندیوں کی وجہ سے پاکستان عمل درآمد نہ کرسکا۔ اس دوران ایران نے پاکستانی سرحد تک اپنے حصے کی 900 کلومیٹر طویل پائپ لائن تعمیر کرلی اور منصوبے کو سرد خانے میں دیکھ کر قانونی چارہ جوئی کی، جس کے تحت پاکستان کو اس کی تکمیل کیلئے ڈیڈ لائن دے رکھی ہے جس میں ستمبر 2024 تک توسیع دی گئی ہے۔

چند روز قبل یہ بات سامنے آئی تھی کہ حکومت پاکستان 18 ارب ڈالر جرمانے سے بچنے کیلئے اپنی سرزمین پر پائپ لائن بچھانا چاہتی ہے اور مالیاتی مسئلے سے نمٹنے کیلئے اس پراجیکٹ کو گیس انفرااسٹرکچر ڈویلپمنٹ سیس (جی آئی ڈی سی) سے فنڈ فراہم کئے جائیں گے۔ یہ بات باعث ستائش ہے کہ ایران نے پاکستان کو تکنیکی مہارت فراہم کرنے کی پیشکش کی ہے۔ یہ کل 1931 کلومیٹر پائپ لائن کا منصوبہ ہے جس کا 781 کلومیٹر حصہ پاکستان میں ہے۔ ایران سے گوادر گیس کی ترسیل اس سال ستمبر میں شروع ہونیکے روشن امکانات ہیں، تاہم باقی حصے کو مزید تاخیر کئے بغیر مکمل کرنے سے ہی مسئلہ حل ہوسکے گا اور گھریلو سطح کے ساتھ ساتھ صنعتی شعبے کو اس کی مطلوبہ سپلائی بحال ہونے کی توقع بیجا نہ ہوگی۔■

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مہمند ڈیم کا "ڈائی ورشن سسٹم" تکمیل کے قریب

چیئرمین واپڈا کا مہمند ڈیم کا دورہ، منصوبے کے تعمیراتی کاموں کا جائزہ لیا

اپریل میں ڈیم سائٹ پر دریائے سوات کا رخ موڑا جائیگا، سستی بجلی پیدا ہوگی، زراعت کے لیے پانی ذخیرہ، پشاور کو پینے کا پانی، سیلاب کی روک تھام ہوگی

مہمند ڈیم پراجیکٹ کا ڈائی ورشن سسٹم شیڈول کے مطابق تکمیل کے قریب ہے اور اپریل میں ڈیم سائٹ پر دریائے سوات کا رخ موڑ دیا جائے گا۔ چیئرمین واپڈا سجاد غنی نے خیبر پختونخوا کے ضلع مہمند میں دریائے سوات پر زیر تعمیر مہمند ڈیم پراجیکٹ کا دورہ کیا۔ چیئرمین واپڈا نے منصوبے کے اسپل وے، ڈائی ورشن ٹنلز اور پاور ہاؤس سمیت مختلف سائٹس کا دورہ کیا اور تعمیراتی سرگرمیوں کا جائزہ لیا۔

چیئرمین واپڈا نے مہمند ڈیم پر تعمیراتی پیش رفت کے حوالے سے پراجیکٹ آفس میں اجلاس کی صدارت بھی کی۔ پراجیکٹ انتظامیہ نے ڈائی ورشن اسکیم پر پیش رفت سمیت 12 سائٹس پر جاری تعمیراتی کام کی بریفنگ دی۔ مہمند ڈیم پراجیکٹ کی شیڈول کے مطابق تکمیل کی اہمیت کو اجاگر کرتے ہوئے چیئرمین واپڈا نے کنٹریکٹرز کو تاکید کی کہ ڈیم کو بروقت مکمل کرنے کیلئے درکار میٹریل کی فراہمی سے متعلق کاموں میں تیزی لائی جائے اور اس مقصد کے لیے اضافی وسائل بروئے کار لائے جائیں۔ مہمند ڈیم پراجیکٹ ایک کثیر المقاصد منصوبہ ہے، جس سے زراعت کیلئے پانی ذخیرہ ہوگا، سیلاب کی روک تھام میں مدد ملے گی۔ پشاور کو پینے کا پانی میسر ہوگا۔ ستی ماحول دوست پن بجلی پیدا ہوگی۔

منصوبے کی تکمیل 2026 میں شیڈول ہے۔ مہمند ڈیم میں پانی ذخیرہ کرنے کی صلاحیت 1.29 ملین ایکٹر فٹ ہے جس سے مہمند اور چارسدہ کے اضلاع میں 18 ہزار 1237 ایکٹر نئی اراضی زیر کاشت آئے گی اور ایک لاکھ 60 ہزار ایکڑ موجودہ اراضی کیلئے بھی اضافی پانی دستیاب ہوگا۔ مہمند ڈیم کی بجلی پیدا کرنے کی صلاحیت 800 میگاواٹ ہے۔ موبے سے نیشنل گرڈ کو سالانہ 2 ارب 86 کروڑ یونٹ بجلی دی جائے گی۔ منصوبے سے پشاور کو یومیہ 300 ملین گیلن پانی ملے گا۔ مہمند ڈیم پراجیکٹ کے سالانہ فوائد کا تخمینہ 51 ارب 60 کروڑ روپے ہے۔■

بلوچستان کے بعد سندھ میں تیل وگیس کے مزید ذخائر دریافت

سندھ میں تیل اور گیس کے نئے ذخائر دریافت ہوگئے جب کہ گزشتہ دنوں بلوچستان کے ضلع کوہلو سے بھی گیس کے ذخائر دریافت ہوئے تھے۔

آئل اینڈ گیس ڈیولپمنٹ کمپنی کی جانب سے بتایا گیا ہے کہ سندھ میں تیل اور گیس کا ذخیرہ او جی ڈی سی ایل کمپنی نے دریافت کیا ہے۔ ضلع خیرپور میں کنویں سے 14.3 ملین اسٹینڈرڈ کیوبک فٹ گیس یومیہ حاصل ہوگی۔

او جی ڈی سی ایل کی جانب سے پاکستان اسٹاک ایکسچینج کو لکھے گئے خط میں بتایا گیا ہے کہ مذکورہ کنویں سے یومیہ 93 بیرل خام تیل بھی حاصل ہوگا۔ نئی دریافت سے ملکی تیل و گیس کے ذخائر میں اضافہ ہوگا۔

واضح رہے کہ گزشتہ ہفتے ہی ماڑی پٹرولیم نے گیس کے نئے ذخائر دریافت کرنے کا اعلان کیا تھا جو بلوچستان کے ضلع کوہلو سے دریافت ہوئے۔ ابتدائی تخمینے کے مطابق یہاں سے یومیہ 64 لاکھ مکعب فٹ تک گیس حاصل ہوگی۔ گیس دریافت کے لیے 2516 میٹر تک کنویں کی کھدائی کی گئی۔

علاوہ ازیں گزشتہ ماہ او جی ڈی سی ایل کی جانب سے سندھ میں خام تیل کے بھاری ذخائر سے پیداوار حاصل کرنے کا کامیاب تجربہ کیا گیا۔ ترجمان کے مطابق سونو کنواں نمبر 9 میں کمپنی کی جانب سے 2350 میٹر تک گہری کھدائی کے بعد مطلوبہ پیداوار حاصل کی گئی۔ ابتدائی نتائج کے دوران کنویں سے 1850 بیرل یومیہ خام تیل کی پیداوار حاصل ہوئی جو سسٹم میں شامل کردی گئی ہے۔■

جامعہ حبیب

طلباء نے 14 ماحولیاتی مشکلات کا حل پیش کردیا

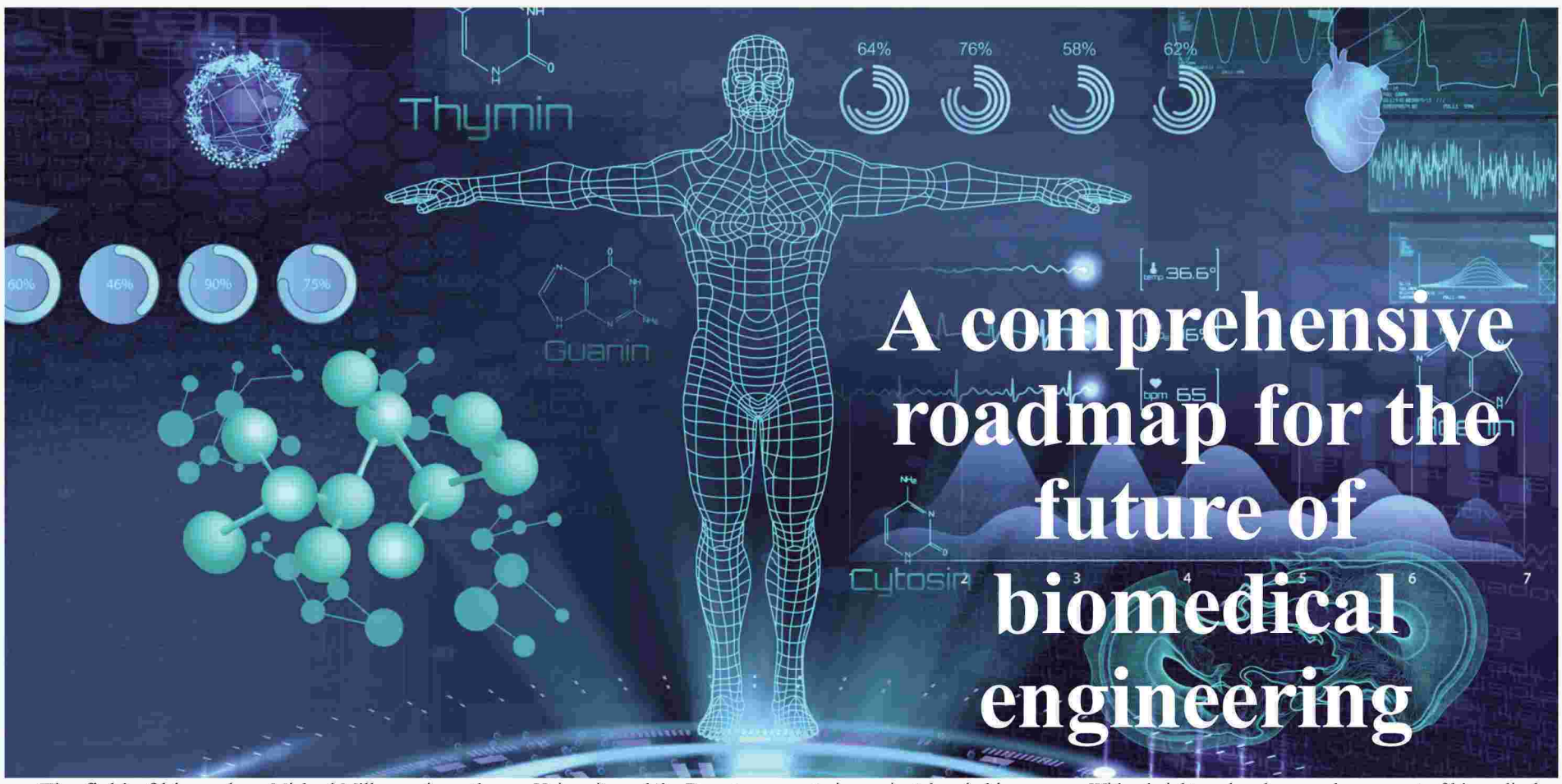
طلبا نے 48 گھنٹے میں پانی کی بچت ماحول دوست رہائش، کچرے کو کارآمد بنانے، ماحول دوست توانائی اور مسائل کا حل پیش کیا

انوینٹ فاردی پلینٹ مقابلے میں حبیب یونیورسٹی کے طلبہ وطالبات نے ٹیکساس اے اینڈ ایم یونیورسٹی کے اشتراک سے حصہ لیا تھا

حبیب یونیورسٹی کے طلبا نے ٹیکساس اے اینڈ ایم یونیورسٹی کے اشتراک سے عالمی سطح پر ماحولیاتی تحفظ کے لیے نئے حل (سلوشنز) کی تلاش کے مقابلے انوینٹ فار دی پلینٹ مقابلے میں حصہ لیا اپنی نوعیت کے منفرد مقابلے میں حبیب یونیورسٹی کے طلبا نے 48 گھنٹوں میں پانی کی بچت، سستی اور ماحول دوست رہائش کچرے کو کارآمد بنانے، زرعی ترقی، سماجی شمولیت، ماحول دوست توانائی کے ذرائع، ماحولیاتی امور سمیت مختلف مسائل کے حل پیش کیے۔

ٹیکساس اے اینڈ ایم یونیورسٹی کے اشتراک سے ہونے والے عالمی مقابلے انوینٹ فاردی پلانٹ میں پاکستان کی حبیب یونیورسٹی کے طلبا نے بھی شرکت کی، طلبا نے حبیب یونیورسٹی کی تخلیق گاہ پلے گراؤنڈ میں مسلسل اڑتالیس گھنٹوں تک پاکستان اور دنیا کے دیگر ترقی پذیر ملکوں کو درپیش ماحولیاتی مسائل کا حل نکالا، طلبا کے تخلیقی خیالات (آئیڈیاز) اساتذہ اور ماہرین پر مشتمل جیوری کے سامنے پیش کیے گئے اس سرگرمی کے تحت دنیا کے دیگر ملکوں کی ٹیموں اور ماہرین نے بھی ایک دوسرے کی معاونت کی، مقابلے میں حصہ لینے والے طلبا کا کہنا تھا کہ انھیں مسائل کو سمجھنے اور ان کا حل نکالنے کے لیے درکار تنقیدی سوچ کو عملی طور پر پرکھنے کا موقع ملا۔

حبیب یونیورسٹی کے طلبا اس سے قبل بھی چار مقابلوں میں پاکستان کی نمائندگی کر چکے ہیں۔ پانچویں مقابلے کا انعقاد 16 فروری شام چار بجے سے 18 فروری شام چار بجے تک کیا گیا اس دوران پچاس طلبا نے مختلف ٹیموں کی شکل میں یونیورسٹی میں قیام کرتے ہوئے 14 ماحولیاتی مشکلات کا حل پیش کیا اس ایونٹ نے طلبا کو نئے تصورات اور سلوشنز متعارف کرانے کے لیے مہارت حاصل کرنے کا موقع فراہم کیا۔■



A comprehensive roadmap for the future of biomedical engineering

The field of biomedical engineering anticipates an amazing future for the field, its researchers, and students.

IEEE, the world's largest technical professional organization dedicated to advancing technology for humanity, and the IEEE Engineering in Medicine and Biology Society (IEEE EMBS), recently published a detailed position paper on the field of biomedical engineering titled, "Grand Challenges at the Interface of Engineering and Medicine." The paper, published in the IEEE Open Journal of Engineering in Medicine and Biology (IEEE OJEMB), was written by a consortium of 50 renowned researchers from 34 prestigious universities around the world, and lays the foundation for a concerted worldwide effort to achieve technological and medical breakthroughs.

Representing the University of Pittsburgh in the position paper is Sanjeev G. Shroff, Interim U.S. Steel Dean of the Swanson School of Engineering; Distinguished Professor of and Gerald E. McGinnis Chair in Bioengineering; and Professor of Medicine.

"What we've accomplished here will serve as a roadmap for groundbreaking research to transform the landscape of medicine in the coming decade," said Dr. Michael Miller, senior author of the paper and professor and director of the Department of Biomedical Engineering at Johns Hopkins University. "The outcomes of the task force, featuring significant research and training opportunities, are poised to resonate in engineering and medicine for decades to come."

"Since the founding of our Department of Bioengineering 25 years ago, we have witnessed transformative advances and new technologies developed through partnerships between Pitt's Swanson School of Engineering, School of Medicine, School of Health and Rehabilitation Sciences, McGowan Institute for Regenerative Medicine, Brain Institute, and the University of Pittsburgh Medical Center (UPMC)," Dr. Shroff said. "The field of biomedical engineering is at a critical juncture in its evolution, with a need to reflect on the past and identify singular challenges that will continue to improve the human condition, These new Grand Challenges, developed through a global debate, will help guide our academic programs and research as well as prepare the next generation of bioengineers."

The position paper was the result of two years of discussion culminating in a two-day workshop organized by IEEE EMBS and the Department of Biomedical Engineering at Johns Hopkins University and the Department of Bioengineering at the University of California San Diego. Through the course of the workshop, the researchers identified five primary medical challenges that have yet to be addressed, but by solving them with advanced biomedical engineering approaches, can greatly improve human health. By focusing on these five areas, the consortium has laid out a roadmap for future research and funding.

The Five Grand Challenges Facing Biomedical Engineering

1. Bridging precision engineering and precision medicine for personalized physiology avatars

In an increasingly digital age, we have technologies that gather immense amounts of data on patients, which clinicians can add to or pull from. Making use of this data to develop accurate models of physiology, called "avatars" -- which take into account multimodal measurements and comorbidities, concomitant medications, potential risks and costs -- can bridge individual patient data to hyper-personalized care, diagnosis, risk prediction, and treatment. Advanced technologies, such as wearable sensors and digital twins, can provide the basis of a solution to this challenge.

2. The pursuit of on-demand tissue and organ engineering for human health

Tissue engineering is entering a pivotal period in which developing tissues and organs on demand, either as permanent or temporary implants, is becoming a reality. To shepherd the growth of this modality, key advancements in stem cell engineering and manufacturing -- along with ancillary technologies such as gene editing -- are required. Other forms of stem cell tools, such as organ-on-a-chip technology, can soon be built using a patient's own cells and can make personalized predictions and serve as "avatars."

3. Revolutionizing neuroscience using artificial intelligence (AI) to engineer advanced brain-interface systems

Using AI, we can analyze the various states of the brain through everyday situations and real-world functioning to noninvasively pinpoint pathological brain function. Creating technology that does this is a monumental task, but one that is increasingly possible. Brain prosthetics, which supplement, replace or augment functions, can relieve the disease burden caused neurological conditions. Additionally, AI modeling of brain anatomy, physiology, and behavior, along with the synthesis of neural organoids, can unravel the complexities of the brain and bring us closer to understanding and treating these diseases.

4. Engineering the immune system for health and wellness

With a heightened understanding of the fundamental science governing the immune system, we can strategically make use of the immune system to redesign human cells as therapeutic and medically invaluable technologies. The application of immunotherapy in cancer treatment provides evidence of the integration of engineering principles with innovations in vaccines, genome, epigenome and protein engineering, along with advancements in nanomedicine technology, functional genomics and synthetic transcriptional control.

5. Designing and engineering genomes for organism repurposing and genomic perturbations

Despite the rapid advances in genomics in the past few decades, there are obstacles remaining in our ability to engineer genomic DNA. Understanding the design principles of the human genome and its activity can help us create solutions to many different diseases that involve engineering new functionality into human cells, effectively leveraging the epigenome and transcriptome, and building new cell-based therapeutics. Beyond that, there are still major hurdles in gene delivery methods for in vivo gene engineering, in which we see biomedical engineering being a component to the solution to this problem.

"This paper represents a major milestone in the advancement of biomedical engineering, which could only have been achieved through close collaboration rather than the work of many siloed individuals," said consortium member Dr. Metin Akay, founding chair of the Biomedical Engineering Department at the University of Houston and Ambassador of IEEE EMBS. "We have a shared commitment to advancing patient-centric technologies, and healthcare efficacy and accessibility -- which extends beyond academic institutions -- and elevating healthcare quality, reducing costs and improving lives worldwide."

"These grand challenges offer unique opportunities that can transform the practice of engineering and medicine," remarked Dr. Shankar Subramaniam, lead author of the taskforce, distinguished professor, Shu Chien-Gene Lay Department of Bioengineering at the University of California San Diego and past President of IEEE EMBS. "Innovations in the form of multi-scale sensors and devices, creation of humanoid avatars and the development of exceptionally realistic predictive models driven by AI can radically change our lifestyles and response to pathologies. Institutions can revolutionize education in biomedical and engineering, training the greatest minds to engage in the most important problem of all times -- human health." – SD/ERMD

New water batteries stay cool under pressure

A global team of researchers and industry collaborators led by RMIT University has invented recyclable 'water batteries' that won't catch fire or explode.

Lithium-ion energy storage dominates the market due to its technological maturity, but its suitability for large-scale grid energy storage is limited by safety concerns with the volatile materials inside.

Lead researcher Distinguished Professor Tianyi Ma said their batteries were at the cutting edge of an emerging field of aqueous energy storage devices, with breakthroughs that significantly improve the technology's performance and lifespan.

"What we design and manufacture are called aqueous metal-ion batteries -- or we can call them water batteries," said Ma, from RMIT's School of Science.

The team use water to replace organic electrolytes -- which enable the flow of electric current between the positive and negative terminals -- meaning their batteries can't start a fire or blow up -- unlike their lithium-ion counterparts.

"Addressing end-of-life disposal challenges that consumers, industry and governments globally face with current energy storage technology, our batteries can be safely disassembled and the materials can be reused or recycled," Ma said.

The simplicity of manufacturing processes for their water batteries helped make mass production feasible, he said.

"We use materials such as magnesium and zinc that are abundant in nature, inexpensive and less toxic than alternatives used in other kinds of batteries, which helps to lower manufacturing costs and reduces risks to human health and the environment."

What's the energy-storage and life-cycle potential?

The team has made a series of small-scale trial batteries for numerous peer-reviewed studies to tackle various technological challenges, including boosting energy storage capacity and the lifespan.

In their latest work, published in Advanced Materials, they've triumphed over a major challenge -- the growth of disruptive dendrites, which are spiky metallic formations that can lead to short circuits and other serious faults.

The team coated affected battery parts with a metal called bismuth and its oxide (otherwise known as rust) as a protective layer that prevented dendrite formation.

The result?

"Our batteries now last significantly longer -- comparable to the commercial lithium-ion batteries in the market -- making them ideal for high-speed and intensive use in real-world applications.

"With impressive capacity and extended lifespan, we've not only advanced battery technology but also successfully integrated our design with solar panels, showcasing efficient and stable renewable energy storage."

The team's water battery is closing the gap with lithium-ion technology in terms of energy density, with the aim of using as little space per unit of power as possible.

"We recently made a magnesium-ion water battery that has an energy density of 75 watt-hours per kilogram (Wh kg-1) -- up to 30% that of the latest Tesla car batteries."

This research is published in Small Structures.

"The next step is to increase the energy density of our water batteries by developing new nano materials as the electrode materials."

Ma said magnesium was likely to be the material of choice for future water batteries.

"Magnesium-ion water batteries have the potential to replace lead-acid battery in the short term -- like one to three years -- and to replace potentially lithium-ion battery in the long term, 5 to 10 years from now."

"Magnesium is lighter than the alternative metals, including zinc and nickel, has a greater potential energy density and will enable batteries with faster charging times and better capability to support power-hungry devices and applications."

Potential applications

Ma said the team's batteries were well suited for large-scale applications, making them ideal for grid storage and renewable energy integration -- especially in terms of safety considerations.

"As our technology advances, other kinds of smaller-scale energy storage applications such as powering people's homes and entertainment devices could become a reality."

Technology supported by peer-reviewed research, government funding and industry engagement

As part of an ARC Linkage project, Ma's team is continually developing their water batteries in collaboration with industry partner, GrapheneX, a tech innovator based in Sydney. -- SD

New world record for CIGS solar cells

Uppsala University is the new world record holder for electrical energy generation from CIGS solar cells. The new world record is 23.64 per cent efficiency. The measurement was made by an independent institute and the results are published in the journal Nature Energy.

The record results from a collaboration between the company First Solar European Technology Center (formerly known as Evolar) and solar cell researchers at Uppsala University.

"The measurements that we have made ourselves for this solar cell and other solar cells produced recently are within the margin of error for the independent measurement. That measurement will also be used for an internal calibration of our own measurement methods," says Marika Edoff, Professor of Solar Cell Technology at Uppsala University, who is responsible for the study.

The previous world record was 23.35 per cent (Solar Frontier, Japan), preceded by 22.9 per cent (ZSW, Germany). Uppsala University has held the record before, the first time being in the 1990s in the research collaboration Euro-CIS.

"At one time we also held the record for a series-connected prototype. Even though it's quite a long time since we held the cell record, we've often been just behind the best results and of course there are many relevant aspects to consider, such as the potential for scaling up to a large-scale process, where we have always been at the forefront," Edoff says.

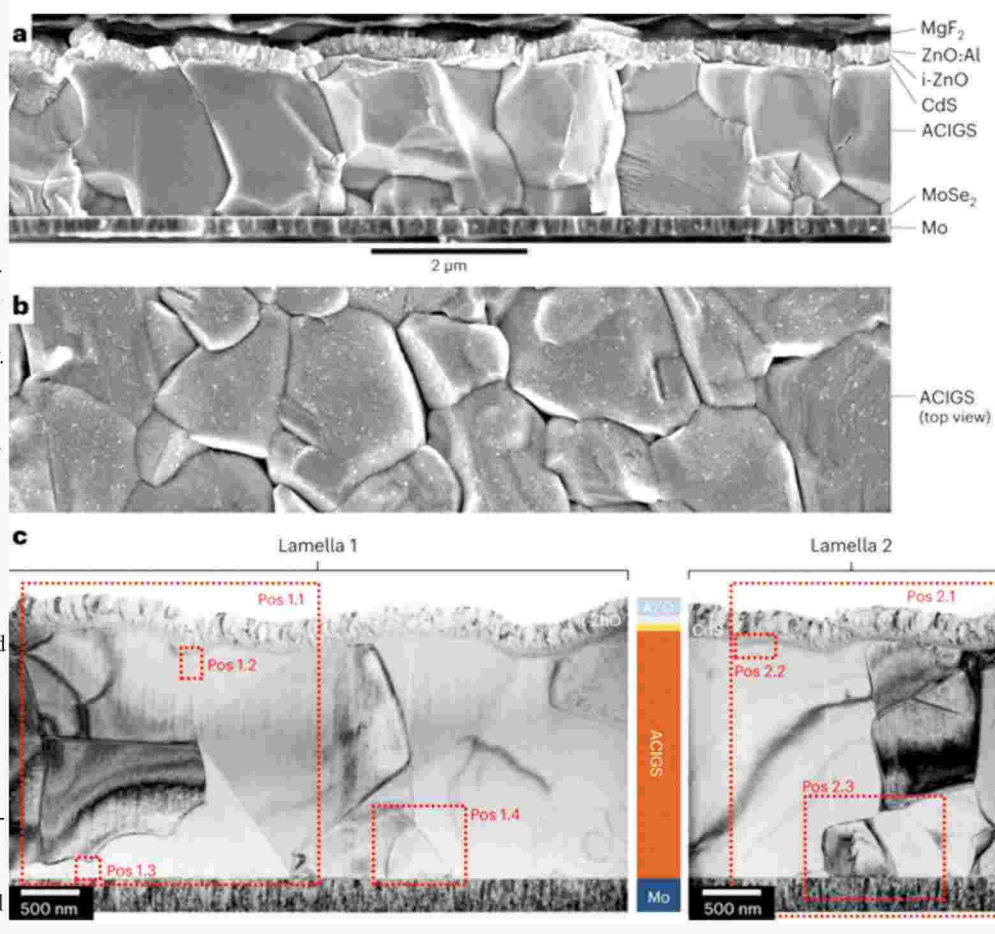
Solar cells are increasing rapidly worldwide and solar power accounted for just over 6 per cent of electricity around the globe in 2022 according to the International Energy Agency (IEA). The best solar modules of crystalline silicon, which is the most widely used material in solar cells, currently convert more than 22 per cent of sunlight to electric power and modern solar cells are both low cost and stable in the long term.

One target in solar cell research is to attain more than 30 per cent efficiency with reasonable production costs. The focus is very often on tandem solar cells, as being more efficient, but so far they have been too costly for large-scale use.

The world record of 23.64 per cent has been measured by the independent institute Fraunhofer ISE in Germany. The scholarly paper presents a thorough material and electrical analysis of the solar cell as well as a comparison with previous records for the same type of solar cell from other research institutions.

A solar cell's most important properties are the ability to absorb light and the ability to transport energy to an electrical load. For this to succeed, the material must be able to absorb an optimal portion of sunlight while avoiding wasting this energy by converting it into heat within the solar cell.

CIGS solar cells consist of a glass sheet made of normal window glass that has been coated with several different layers, each of which has a specific task. The material that absorbs the sunlight consists of copper, indium, gallium and selenide (hence the acronym CIGS), with additions of silver and sodium. This layer is placed in the actual solar cell, between a back contact of metallic molybdenum and a transparent front contact. To make the solar cell as efficient as possible in separating out electrons, the CIGS layer is treated with rubidium fluoride. The balance between the two alkali metals, sodium and rubidium, and the composition of the CIGS layer are key to the conversion efficiency, i.e. the share of the complete solar spectrum that is converted to electric power in the solar cell.



When measurement institutes conduct their tests, they measure the solar cell efficiency using filtered light that mimics the sun in both intensity and spectrum. During measurement, the solar cell is kept at a controlled temperature and the independent institutes regularly send calibration solar cells to one another. To be registered as a world record, an independent measurement is required, which in this case was carried out by the measurement institute Fraunhofer ISE.

"Our study demonstrates that CIGS thin-film technology is a competitive alternative as a stand-alone solar cell. The technology also has properties that can function in other contexts, such as the bottom cell of a tandem solar cell," Edoff says.

Several advanced measurement methods have been used to further understand the correlation between the efficiency and the solar cell structure: material from the solar cell has been characterised by nano-XRF (X-ray fluorescence spectroscopy) at the MAX IV facility in Lund, where a careful compositional analysis has been made. Transmission electron microscopy (TEM) at high resolution has been used to study cross sections of the solar cell, both composition as a function of depth and how the crystal grains are built up, as well as the interfaces between the layers. Using photoluminescence, the spectrum of the light emitted by the solar cell after excitation by a laser has been studied as a means to understanding how well the solar cell takes care of electrons internally. A solar cell that shines brightly has a lower share of internal heat losses than a solar cell that shines faintly. Finally, electrical measurement methods have been used to analyse the doping of the CIGS material.

"The fact that we now hold the world record means a lot for both Uppsala University and First Solar European Technology Center. For the CIGS technology, which is known for high reliability, a world record also means that it may offer a viable alternative for new applications in e.g. tandem solar cells. This is important for our research colleagues around the world. We hope that the analyses of the material and electric properties will provide a basis for further improvements in performance," Edoff concludes. -- SD