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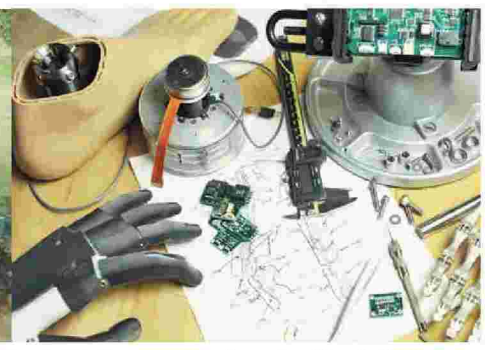
PEC's Make in Pakistan Policy Proposes 15-year Localization Plan

Aimed at controlling trade deficit through self-reliance and creating local industrial initiatives, the Pakistan Engineering Council (PEC) has proposed a policy titled 'Make in Pakistan' that the authors believe would improve the country's GDP growth, build the capacity of engineering professionals, and encourage investments.

The draft of the policy which is in circulation among engineering circles does not bear any names of the authors or the PEC committee that has undertaken this effort. Also, no major groups of the engineering fraternity knew about making such a policy. To the surprise of many, either no member of the management committee or scantly few had a hint.

The draft talks about the traditional woes of the country's economy entangled in a vicious circle that takes off from the increased dependency on import-based consumption leading to an extensive burden on Foreign Exchange reserves to dependence on global lenders and the consequences for the country and its people.



The policy proposes to revisit the existing situation in the manufacturing sector of Pakistan by Promoting a culture of Localization as a workable instrument in the form of Import substitution. For that matter, we need to create a healthy "Industrial Culture for Localization of Equipment / Products." To support this cause; Policy Framework for "MIP" is proposed as a viable, sustainable solution for economic reforms and a first step towards indigenization.

To get rid of the adverse impact on economic growth, the policy has proposed a under that maximizes localization of Production of Engineering Goods (EGs) through indigenous resources, and import substitution to cater to the domestic consumer & industry demands. taking solid steps through various measures to ensure "Technology Transfer and build Technology Acquisition Houses are ensured.

This plan also includes collaboration with advanced/ developed countries in a phased yet systematic manner. The policy also focuses on enhancing exports of Medium to Hi-tech products resulting in earning precious foreign exchange and job creation for youth, especially for Technicians, IT Professionals, Computer Scientists, Technologists, and Engineers.

The document identifies areas such as Automobiles and Components, Mining, Gemstones & Exploration, Agri-tech and Food Processing, Construction and Machinery, Energy Sector with a focus on Renewable Energy, Oil and Gas, IT and Software, Defense Manufacturing, Roads and Highways, Sports Industry, Leather Products, Medical and Healthcare Equipment, Biotechnology and Pharmaceutical, Electrical Equipment and Machinery, Media, Entertainment, Ports and Shipping Equipment, Textiles and Finished Derivative, Electronic Components, Systems and PCB Manufactur-

Contd on page 2

Supplement on
ELECTRICITY PAKISTAN
ENERGY I STORAGE I POWER
Please See Pages 5-7

"A hero is an ordinary individual who finds strength to persevere and endure, in spite of overwhelming obstacles."

- Christopher Reeve

PEC's Make in Pakistan Policy Proposes 15-year Localization Plan

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ing, Chemicals, Railway Industry, Domestic Appliances, Telecommunication Equipment, Artificial Intelligence, Product and Process Designing, Cutlery & Sanitary, Waste Management & Recycling.

The policy says the PEC will act as a statutory body for structuring the MIP policy framework, implementation, and periodic review.

In addition, the PEC proposes legal reforms and incentives to promote the manufacturing sector, such as offering tax breaks/rebates, simplifying regulatory processes, and easing foreign investment restrictions through the Act of Parliament for continuity and sustainability of MIP Policy for the entire 15 years.

PEC has been proposed to lead all regulatory bodies dealing with product certification standards, quality assurance, and implementation of good engineering practices (PNAC, EDB, DRAP, PSQCA CBTL, etc.) needs to be established to certify National R&D, perform conformity assessment, and issue product, process and services certification including software under PEC in collaboration with all stakeholders.

The Industrial Development Bank of Pakistan (IDBL) which was established in 2018 should be made effectively functional with the allocation of funds for financing the engineering industry to process development and automation, establishment of local test facilities, supervisory control, technology transfer and transition. Funding may be provided after thorough scrutiny on an ROI basis.

The promotion/posting and financial benefits of the Trade attachés of Pakistan embassies should be linked with the export performance to the country of their posting.

The policy paper has also talked about Improving the Business Environment for which it has suggested bolstering the manufacturing sector.

It says the government needs to address some critical concerns such as 1) Improving the ease of doing business, 2) Simplifying regulatory and bureaucratic procedures, 3) Removing unnecessary barriers to facilitate manufacturing and trade through Investor facilitation cells, provision of supporting platform for new start-ups and Coopting of regulatory measures for encouraging indigenization of products and technology. This initiative will create a conducive environment for local investors to establish their businesses in the country and attract Foreign Direct Investments (FDIs) in the manufacturing sector.

On Industry-Academia Collaboration, it talks about involving all the stakeholders by collaboration of industry and academia and providing a platform as a pool of experts, retired professors, and professionals for bridging the industry–academia gap by: 1) Development of technology diffusion & transfer cells, 2) Involving experts from industry and academia, 3) Demand-driven projects/ research papers by students and faculty, 4) Establishment of a pool of experts to support the industry on the format of JICA, CBI, etc, 5) Capacity building of lead auditors and consultants for all relevant international certifications, 6) The engineering companies/ entities, including design, manufacturing, consultancy, and execution to be regulated by PEC, 7) regulating of engineers, professionals, and faculty members to carry out research projects relevant to the need of the industry to the extent of commercialization., 8) promoting and providing financial benefits of the faculty engaged with successful completion of industrial project be considered 04 times the 01 research paper.

– Karachi: ER Report

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MoU signed for Karachi-Peshawar White Oil Pipeline Project

The stakeholders on the Consortium Formation for Machike-Thallian-Tarujabba White Oil Pipeline Project signed an MoU at the SIFC Secretariat.

The ceremony was witnessed by Minister for Power and Petroleum Muhammad Ali, Secretary (Petroleum Division) Momin Agha, and Secretary SIFC Jameel Qureshi. The heads of consortium entities i.e. MD Pakistan State Oil (PSO) Syed Muhammad Taha, DG Frontier Works Organisation (FWO) Major General Abdul Sami, MD Inter-State Gas Systems (Pvt) Ltd (ISGS) Nadeem Bajwa signed the historical memorandum of understanding.

The pipeline project is a testament to the commitment of the Petroleum Division and the Special Investment Facilitation Council (SIFC).

The Machike-Thallian-Taru Jabba White Oil Pipeline (MTT-WOP) aims to complement the oil pipeline backbone from Karachi to Peshawar apart from achieving the energy efficient movement of petroleum products as well as preventing adulteration and providing increased safety.

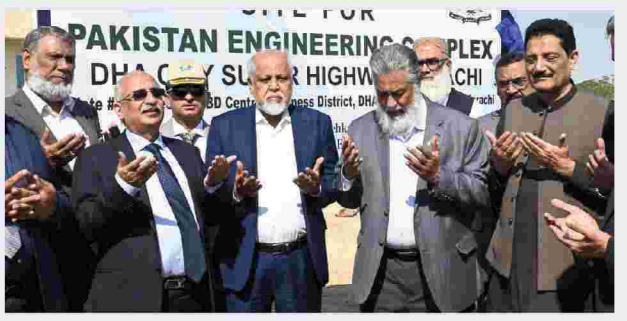
It will connect Punjab from Machike, near Lahore, to Tarujabba, near Peshawar.

The pipeline consists of two segments: Machike-Thallian and Thallian - Tarujabba along Motorway with connectivity options with Attock refinery, Chakpirana and Faqirabad. It completes the infrastructure supply chain from Karachi to Peshawar.

This may be called a flagship project spearheaded by FWO and jointly supported by PSO and ISGS.

The 477-km long pipeline aims at ensuring a smooth supply chain of petroleum products from Karachi to Peshawar with an initial carrying capacity of 7 MTPA extendable to 10 MTPA.

The pipeline shall contribute significantly towards the reduction of traffic congestion, environmental pollution, and transportation costs. --



The Pakistan Engineering Council (PEC) has purchased 11.4 acres of land in DHA city, Karachi for building a complex that will comprise IT Tower, Engineering Academy, Engineers Club, and PEC offices, according to the PEC Facebook page.

Why Are Most Engineers Opposed to Technologists' Registration With PEC?

By Asif H. Kazi

Breakthroughs and innovations in science, engineering, and technology are frequently celebrated and publicized under the caption "Science and Technology" while the crucial input of "Engineering" is always overlooked.

The work of engineers involves transforming laws of nature and principles as interpreted by scientists, into tangible and practical solutions. The design and manufacture of most products whether they be high-rise buildings, dams, bridges, powerhouses, ships, aircrafts, rockets, complex machines, giant computers, etc., require engineering which is a distinct and indispensable discipline. The prevailing disparity in recognition naturally leads to a sense of neglect among the engineers.

The role of technologists is also vital as would be clear from the following brief outline of the main functions of the three independent but essential disciplines to attain continued modernization and the creation of novel products:

SCIENTISTS

1. Interpretation and Formulation of Laws of Nature
2. Conducting Research
3. Developing Theories and Hypotheses
4. Developing Equations and Scientific Formulas
5. Updating Scientific Knowledge

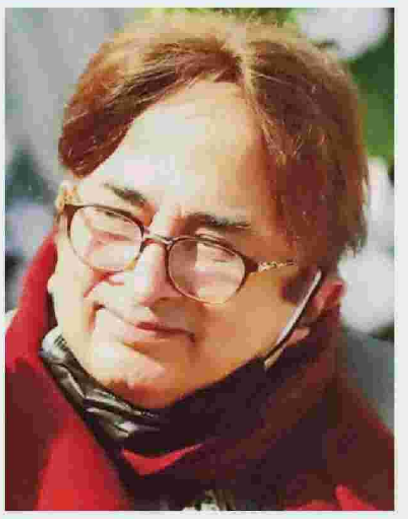
ENGINEERS

1. Applying Scientific Principles to Develop Products for the Benefit of Humanity
2. Designing and Developing Details of Products including Specifications, Drawings, and Technical Reports for Construction and Manufacturing
3. Overseeing the Construction/ Manufacture and Testing of Products for Performance
4. Trouble-Shooting in Existing Systems

TECHNOLOGISTS

1. Mastering Methods and Procedures in Manufacturing to Improve Efficiency and Productivity
2. Generating New Improved Technologies to Ensure Optimal Performance of Products
3. Scrutinizing Materials used in a Product and Suggesting any Changes in their Proportions and the need for any Additives for Improved Workability
4. Bridging any Gaps between Scientific and engineering Concepts and their Practical Implementation.

Engineers are rightfully concerned that frequently they are being squeezed between the scientists on the upstream side and technologists from the downstream such that the established disciplinary lines are gradually fading. Even though the scientific or technological communities cannot perform the work of engineers because they are not educated/ trained to do so, there is a natural feeling of uneasiness which is the main cause of so-called conflict with the technologists. The scientific council, the engineering council, and the technologists council must remain separate bodies to regulate their respective professions.



Leaving technologists registration with the NTC (National Technologists Council) rather than the PEC would thus be the right thing to do. Any attempt by the technologists to encroach upon the jurisdiction of engineering would not only be dangerous for the society but also be looked upon with suspicion and distrust by the engineers giving rise to further deepening of the discord between the two.

Educational institutions can play a pivotal role of emphasizing the importance of each of the three disciplines which are all vital for humanity. The three professions ought to recognize each others unique capabilities to be able to work together seamlessly. –

The writer is former Managing Director, Member Water (WAPDA) & Federal Secretary, Water Resources Div. GoP. Currently a Technical Advisor with Associated Consulting Engineers ACE Limited (ACE).

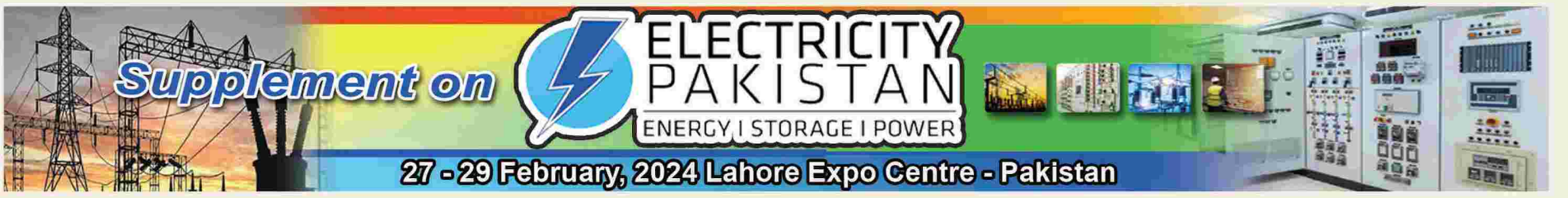
Academia Reengineering: Renovating, Innovating and Elevating the Higher Education Institutions

Dr Samreen Hussain's new book—Academia Reengineering: Renovating, Innovating and Elevating the Higher Education Institutions—focusing Pakistani higher education system is finally on Amazon. The book is co-authored by Dilawar Khan and Engr. Muhammad Zakir Shaikh. The book which is in electronic form would be available in hard covers after Eid, said Dr. Hussain.

Amazon says: This a groundbreaking book that delves into the transformative journey of revamping the higher education landscape in Pakistan. Authored by

experts in the field, this comprehensive work addresses the challenges and opportunities faced by academic institutions in the country, offering strategic insights and innovative solutions to propel them into a new era of excellence. The book not only critically examines the current state of higher education in Pakistan but also provides a roadmap for reengineering, fostering innovation, and elevating the quality of education to meet global standards. Through a blend of research, case studies, and practical recommendations, Academia Reengineering serves as a guide for policymakers, educators, and stakeholders committed to enhancing the educational experience and outcomes in Pakistan's higher education sector.

This book stands out as an indispensable resource for those seeking a holistic understanding of the complexities within the Pakistani higher education system and envisioning a future where academic institutions play a pivotal role in shaping the nation's intellectual and socio-economic landscape. Academia Reengineering is a call to action for all those passionate about transforming education, offering a compelling narrative that inspires change and encourages a collective effort to renovate, innovate, and elevate higher education institutions in Pakistan to new heights of excellence. -- ERMD



Following more cost-effective path to energy security

For the energy sector, Pakistan passed a federal law establishing the Pakistan Council of Renewable Energy Technologies in 2010 and another law promoting energy efficiency and conservation in 2016.

In terms of an institutional framework, the government established the Alternative and Renewable Energy Board in 2010, empowered to develop national strategies, policies, and plans for the utilization of alternative and renewable energy resources to achieve the targets set by the federal government.

In 2013, the Government of Pakistan issued the National Power Policy that provides an overall direction for energy policy in the country. It identified challenges including a huge supply-demand gap, increasing prices due to dependence on thermal fuel sources, and energy inefficiency; it set a target of reducing the supply-demand gap to zero and reducing transmission and distribution losses from approximately 23–25 % to 16% by 2017. This aim has clearly not been achieved to date, as Pakistan has not reached 100% access to energy across the country.

In 2019, a new policy on alternative and renewable energy was adopted. For the first time, the government set a quantifiable target of 20% contribution from green energy sources including solar, wind, and bagasse (a type of biofuel) by 2025 and 30% by 2030. In December 2020, then–Prime Minister Imran Khan announced at the Climate Ambition Summit that Pakistan would not build new coal plants. However, the challenge was to formalize this intention, and, in fact, several coal plants that were already permitted or under construction have continued to be developed.

The Government of Pakistan also approved a national-level policy on electric vehicles in 2019 with ambitious targets of 30% and 90% share in the sale of passenger vehicles and heavy-duty trucks by 2030 and 2040, respectively.

Recent developments

In February 2021, the Government of Pakistan released the National Electricity Plan that identified three main goals for the power sector – access to affordable energy, energy security, and sustainability. While it did not quantify any goals, the policy stressed diversification of the fuel mix in the country and optimizing energy resource utilization.

In the same year, Pakistan updated and submitted an enhanced NDC that committed to an overall 50% reduction of GHG emissions compared to BAU by 2030. Within this target, 15% of emissions reductions are unconditional, and the remaining 35% are conditional on international support and finance. This target thus represents an enhancement in ambition, in part because it includes an unconditional target for the first time. The NDC also emphasized mitigation

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targets including increasing the share of renewable energy in total electricity generation to 60% by 2030, placing a moratorium on new coal power plants, and generating no power from imported coal. There was also a target of increasing the share of electric vehicles (EVs) in all new vehicles sold to 30%. Pakistan stressed the need for international support to achieve its ambitious energy transition plan, which was estimated to cost USD 101 billion by 2030, and an additional USD 65 billion by 2040.

During COP26 in Glasgow, Scotland, in November 2021, Pakistan joined the Global Methane Pledge, agreeing to take voluntary actions to contribute to a collective effort to reduce global methane emissions at least 30% from 2020 levels by 2030.

Subsequently in 2022, the National Climate Change Policy was updated, highlighting a framework for the conservation of energy and reduction of GHG emissions from various heavy-emitting sectors including energy and the industrial sector (cement, steel, textile, and petrochemicals).

In 2022, the energy crisis worsened due to the country's heavy dependence on imported fossil fuels. In 2023, this led to country-wide power blackouts. As global fuel prices skyrocketed owing to the Russian invasion of Ukraine, Pakistan fell further into debt to meet its energy needs. Currently, 40% of its total energy supply is met with fossil fuel imports.

With the aim of reducing dependence on imported fossil fuels, the Government of Pakistan adopted framework guidelines on fast-track solar photovoltaic (PV) initiatives in March 2022. The program has been designed to replace fossil fuel–based power capacity with approximately 10 GW of solar power. However, no bids have yet been received. This could be the result of political uncertainty and a high-risk environment in the country's power sector. According to the latest Economic Survey for 2022–2023, the share of alternative and renewable energy in the country's installed capacity rose from zero in FY2014 to 6.8% in the current fiscal year. A draft policy is currently pending approval with the National Electric Power Regulatory Authority (NEPRA), which has projected the country's peak demand at 41,338 MW and an installed capacity of 69,372 MW by 2031 as the base case. Through this policy, Pakistan aims to generate 60% of its generation capacity from indigenous clean energy technologies.

As the chair of the G77 in 2022, Pakistan leveraged its unique position to advocate for the establishment of a dedicated "loss and damage" fund at COP27 in Sharm el-Sheikh, Egypt. The country led the inclusion of loss and damage finance on the COP27 agenda for the first time and emphasized the urgent need for financial support to address the devastating impacts of climate catastrophes, such as floods and heat waves. This was instrumental in making the loss and damage fund one of the key successes of COP27, building the basis for governments to set up new funding arrangements and financially back developing countries.

In early 2023, taking a complete U-turn from the earlier commitment of a moratorium on new coal, the nation declared its plans to quadruple domestic coal-fired power, in a bid to reduce its dependence on imported gas to meet its energy needs. Pakistan's coal expansion has been primarily driven by bilateral support from China in the form of the ambitious multi-billion-dollar China-Pakistan Economic Corridor (CPEC) begun in 2013; 90% of the current coal capacity has been backed by China. Marking the 10-year anniversary of CPEC in July 2023, China and Pakistan signed several agreements to expand and expedite cooperation on the various projects that are currently under development with this partnership. Through the CPEC, China has invested around USD 25 billion and is projected to invest around USD 62 billion into the Pakistani economy by 2030. However, it is not clear how Pakistan intends to fund its coal expansion plans, as there might not be any support under the CPEC due to China's "no new coal overseas" pledge in 2021.

In August 2023, Pakistan submitted its National Adaptation Plan (NAP) to the United Nations Framework Convention on Climate Change (UNFCCC), in light of ongoing domestic political and economic turmoil. NAPs form an important part of the Paris Agreement regime, especially for climate-vulnerable countries such as Pakistan. Pakistan's NAP reflects the country's priority to address climate change–related challenges, especially in the aftermath of the 2022 floods and frequent heat waves in the country. It also comes amid reports that climate-related risks and environmental degradation could reduce Pakistan's GDP by at least 18% to 20% by 2050. The plan aims to center development around adaptation and mentions the urgent need to attract climate financing, engage the private sector, and ensure sustainable funding in the long term. However, it does not provide information on the details of these strategies or the necessary implementation steps.

Reading between the lines

While Pakistan's updated NDC is more ambitious than the previous 2016 submission — in part due to the addition of an unconditional target — the country could face considerable challenges in achieving these new targets. Meeting them would also require Pakistan to substantially reevaluate its institutional framework and deal with the economic crisis, only then could it focus on any effective climate action. To put things into perspective, in 2022, Pakistan's external debt amounted to 34.7% of the country's GDP. Such crippling levels of sovereign debt act as a huge obstacle for the country to meet its NDC targets. Rising sovereign debts have a direct impact on climate-vulnerable countries' economic capabilities, in the form of challenges to accessing finance due to low credit ratings and increased risk perception by investors.

Amid the sovereign debt crisis, in July 2023, the International Monetary Fund (IMF) approved a much sought-after USD 3 billion bailout package for Pakistan. The agreement went through after Pakistan agreed to austere conditions including budget revisions by increasing both taxes and the interest rate. While the deal has granted some immediate respite for the country, more concerted efforts may be needed to solve the structural problems that led to such defaults. The energy sector has been a cornerstone in the discussions with IMF, with the sector accumulating nearly USD 12.58 billion in debt. The IMF has sought steadfast policy implementation to overcome the various challenges faced by the sector.

Pakistan's efforts to scale up the share of renewable energy have seen considerable challenges including policy paralysis, high cost of capital, and lack of domestic financing. In FY2022 (July to April), renewable energy (excluding hydropower) accounted for only 3% of the total generation mix. Pakistan's decision to develop more domestic coal as an immediate response to reduce high dependency on imported oil and gas could further pose challenges in this regard.

Pakistan's dependence on China as a core funder for some of the coal projects under the Belt and Road Initiative and the CPEC has become more cumbersome as coal becomes increasingly financially unviable in light of the reducing costs of renewable energy in the country. This would mean Pakistan further defaulting on its commitments to China, unless China agrees to restructure these debts. Against such a backdrop, Pakistan must choose to switch to cleaner and more financially viable power sources. Some measures have been introduced such as the State Bank of Pakistan's concessionary financing scheme for renewables with a 6% interest rate. However, the impact has been limited due to administrative barriers and limited coverage of the policy.

To achieve any progress on coal phasedown, Pakistan would have to take concerted and synchronous efforts to tackle inefficient subsidies, policy inconsistencies, vested interests of coal players, and issues relating to circular debt within the power sector. Notably, regional initiatives such as the Energy Transition Mechanism (ETM) led by the Asian Development Bank (ADB) have been active in Pakistan and could partner in developing strategies to reduce dependency on coal and import of other fossil fuels. The devastating 2022 floods that resulted in a loss of more than USD 30 billion prompted the country to work toward better clean energy policies and finance frameworks, as can be seen with the fast-track PV initiative and the updated NCCP. Such measures would further solidify progress toward a just transition in the country.

What to watch for next

Pakistan faces the twin challenge of debt management and economic recovery from the devastating impacts of floods and heat waves. Deep policy reforms are

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KE, Hubco sign MoU to offtake Thar Coal-fired electricity

Committed to enabling access to affordable power and bolstering the energy security for its customers, the CEO of K-Electric (KE) Mr. Moonis Abdullah Alvi, and the CEO The Hub Power Company Limited (HUBCO) Mr. Kamran Kamal, signed a Memorandum of Understanding (MoU) to explore the opportunity for off-take of electricity following the conversion of HUBCO's Hub Plant to local Thar coal.

This is in line with KE's long-term strategy to induct power generation from indigenous sources into its energy mix. In this regard, the company is exploring the viability of Thar coal-based power generation projects. HUBCO's Hub Power station is a 1292 MW (4 X 323 MW), residual fuel oil-based plant, which has maintained high standards of operations since 1997. Both companies have shown their commitment to working collaboratively towards conducting the requisite efforts needed for the timely conversion and integration of the project with KE's network.

Sharing his thoughts on the occasion, CEO KE stated, "Today's signing is another reflection of our intent to tackle the energy trilemma head-on, enabling access to affordable and reliable power to our growing customer base. I feel great honor to mention that KE has proven itself to be a preferred off-taker for independent power producers in Pakistan.

This is only due to our superior creditworthiness and our history of fulfilling the commitments made with our stakeholders. We are looking at a future where we substitute our reliance on imported fossil fuels with indigenous sources, creating a more resilient power value chain. This is also the driving force behind the Power Acquisition Program that we have submitted with our Regulator, which is balancing baseload requirements with renewable energy."

CEO of HUBCO Mr. Kamran Kamal stated "The proposed conversion of Hub power plant to Thar coal will play a crucial role in decreasing reliance on imported fuels. While offering a sustainable energy solution for the people of Karachi, this project will also serve the continued use of the country's legacy power generation assets. This initiative is in line with our commitment to securing indigenous, reliable, and affordable energy supply and contributing towards achieving energy security for the country. The envisaged project will be executed after conducting required feasibility studies and obtaining all necessary corporate and regulatory approvals."

On the occasion, KE's Chief Financial Officer Mr. Aamir Ghaziani, Chief Strategy Officer Mr. Shahab Qader, and Head of Business Development Mr. Mudassir Zuberi were present, accompanied by Chief Financial Officer Mr. Muhammad Saqib and Vice President Operations Mr. Amjad Raja from HUBCO. Other senior members from both organizations were also present. – PR

Following more cost-effective path to energy security

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required to bring Pakistan out of the vicious circle of energy poverty and currency depreciation, starting with a renewed focus on developing domestic renewable energy sources. By doing so, Pakistan can attract more international financial support, follow a more cost-effective path to energy security, address the high cost and low investor interest in developing new coal plants, and at the same time be in alignment with its NDC commitments. The country will also need substantial international support so that it can invest in people-centric climate adaptation and resilience.

Pakistan has been working toward attracting more sustainable investments. For instance, in April 2023, in partnership with the United Nations (UN) Development Programme, the country presented a USD 2.84 billion investment portfolio at the UN Sustainable Development Goals Investment Fair. The portfolio includes initiatives in renewable energy, water conservation, and climate-resilient agriculture, aiming to attract international investors and donors; it is expected to help Pakistan mitigate climate change effects, enhance resilience, and foster green development. The recent IMF bailout may drive some private investment interest in the economy, but that is yet to materialize.

At the same time, there is great potential for Pakistan to develop market-based climate policy tools, including a domestic carbon market. The Pakistani Ministry of Climate Change (MoCC) has been developing a Measurement, Reporting, and Verification (MRV) system, a national carbon registry, and a domestic Emissions Trading System (ETS) framework. The establishment of the Pakistan Climate Change Fund and the

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Renewable Energy Integration: Engineering Solutions for a Sustainable Future

Engr. Dr. Muhammad Nawaz Iqbal

One crucial technical difficulty that is essential to a sustainable energy future is the integration of renewable energy methods into current power systems. The increasing need for sustainable energy has put engineers to work creating solutions that integrate renewable energy sources such as geothermal, hydro, wind, and solar power into the current energy infrastructure. Consideration must be given to the technical, financial, and regulatory aspects of this shift in a comprehensive manner. Optimizing the grid's integration of sporadic renewable energy sources, such as wind and solar electricity, is a problem for engineers. Because of their variability, creative energy storage methods are required to maintain a balance between supply and demand. Leading-edge engineering solutions to deal with the fluctuating nature of renewable energy production include battery technology, sophisticated systems for storing energy, and smart grid technologies.

When integrating renewable energy, the stability and dependability of the electrical system are vital factors. The variability brought about by renewable sources requires engineers to design and execute grid management structures and systems that can handle it. This entails creating sophisticated control algorithms, models for energy forecasting, and grid storage options to keep the electrical infrastructure steady and robust. A significant engineering solution for successful integration of renewable energy is the development of decentralized and interconnected energy networks. In order to improve the grid's flexibility and dependability, engineers can build a network of dispersed energy resources. By lowering transmission losses and increasing the power system's overall resilience, this strategy makes it possible to use renewable energy more effectively. Upgrades to the current transmission as well as distribution infrastructure are also required for the incorporation of renewable energy sources. In order to distribute electricity from remote renewable energy installations to urban centers, engineers must develop and execute reliable, efficient grid systems. This calls for the construction of smart grids, high-capacity transmission lines, and sophisticated monitoring and control systems. In the engineering process, one of the most important factors to take into account is the economic feasibility of integrating renewable energy. The goal for engineers is to reduce the cost of renewable energy technologies so that they can compete more favorably with conventional fossil fuel sources. To attain economies of scale and raise overall cost-effectiveness, this entails improvements in the design, production, and implementation of renewable energy systems. The intermittent nature of renewable energy sources is addressed in large part by energy storage technology. In order to store surplus energy during times of high generation and discharge it during times of high demand, engineers are diligently working on novel storage methods, such as improved batteries, pumped hydro preservation, and thermal energy storage. The inherent unpredictability of renewable energy sources is mitigated and grid stability is enhanced by these storage solutions. One important technical approach to maximize the integration of renewable energy is the use of smart grid technologies. With the use of smart grids, the electricity system can be monitored, controlled, and communicated with in real time, facilitating dynamic changes to balance supply and demand. By facilitating more effective administration of dispersed energy resources, this intelligent grid architecture improves the efficiency and dependability of renewable energy integration.

Multiple renewable energy sources combined into a single hybrid system offers a comprehensive engineering solution. Engineers can design more dependable and consistent power generating profiles by combining complimentary sources, including wind and solar. By using this method, the total efficiency of renewable energy systems is increased and energy output is maximized. In isolated or off-grid locations in particular, micro grid systems provide robust and targeted energy solutions. Micro grids are scalable and decentralized methods of integrating renewable energy that are designed by engineers to work either independently or in tandem with the main power grid. These smaller-scale systems support larger environmental initiatives and improve energy security. Efficient management and observation mechanisms are essential for maximizing the efficiency of renewable energy resources. Engineers create complex automation technologies and algorithms to effectively monitor and regulate the functioning of renewable energy plants. Real-time changes, predictive maintenance, and the best possible use of renewable resources are made possible by these technologies. Global attempts to switch to renewable energy depend heavily on international cooperation and standards. To enable smooth integration across various energy systems, engineers work to create common technological criteria, interoperability protocols, and cooperative research projects. These

initiatives guarantee a unified strategy for the integration of renewable energy on a worldwide basis. Engineering issues, economic factors, and legal frameworks must all be taken into account in a holistic and multidisciplinary strategy to integrate renewable energy. The seamless integration of renewable energy sources into the current energy infrastructure is made possible by the creative solutions developed by engineers, which range from technologies for storing energy to smart grid systems. Future developments in engineering will continue to influence the field of renewable energy integration as the world moves toward a more sustainable energy future.■

Following more cost-effective path to energy security

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National Committee on Establishment of Carbon Markets further bolsters the country's commitment to carbon pricing and emissions trading, particularly in the power and industrial sectors. Such ongoing initiatives with international support have the potential to not only enable Pakistan to develop a domestic ETS but also to link it with international carbon markets for domestic tools in line with Article 6 of the Paris Agreement. Further actions are expected around capacity building for national stakeholders and development of Article 6 activities in the next few months.

Pakistan has been facing some challenges in operationalizing the CPEC, with China showing reluctance to include projects on water and climate resilience within the initiative's purview. Despite these challenges, Pakistan has succeeded in forging bilateral ties with other partners in 2023, to support its efforts on climate action and resilience building. In March 2023, the United States and Pakistan formed the "Green Alliance" framework to jointly work on boosting bilateral cooperation on sustainable development, clean energy, and climate action. This includes assistance in installing 10 GW of solar power and increasing the share of renewable energy to 60% by 2030. Along similar lines, Pakistan's Climate Change Minister Sherry Rehman met with the German Development Minister Svenja Schulze at the Petersburg Climate Dialogue and agreed to cooperate on climate issues including increasing its renewable energy contribution to the national grid. – Courtesy Asia Society Policy Institute/ ERMD

BISMILLAH HIR REHMAN NIR RAHEEM

MY FATHER

By Muhammad Tariq Haq | ESL

I must do well in every competition
- This was his sacred mission

Though he had many children
- Comfort of each one, was always his main concern.

When we suffered from an ailment
- He would lose his sleep even

Feeling our pain within,
- he would hide his tears often

He would not eat even
- Until we returned from our tuition or official obligation

When it was our turn
- His favours we could never return

He asked for nothing except one
- When he talked, we must listen

It was also God's commandment
- to parents, We must lower our wings with submission

and not "a single word" of provocation
- ever be spoken

Alas! we paid little attention
- and treated him like an ordinary citizen

Forget and forgive was his sermon
- He would repel evil with a good action

Your son will do to you, what by you is done
- He would often caution

He was an extraordinary person,
- now we make this confession

After he left us grieving in bereavement,
- came to us this realization.

My Lord! Be merciful to him as he was to his children when young
- This is for him, now, our supplication

May we, our parents and believers be pardoned
- on the day when the deeds will be reckoned (Amen)

Production of Ceramic Using Tape Casting Method for Artificial Bone Application

Dr. Sajid Hussain Siyal

Department of Metallurgy and Materials Engineering, DUET hosted a webinar featuring Dr. Yasmeen Tabak, a renowned expert in biomaterials research from the Scientific and Technological Research Council of Turkiye (Tubitak). The webinar focused on the production of ceramics using the tape casting method for artificial bone application, offering insights into cutting-edge developments in the field of orthopedic biomaterials.

At the start of the presentation, she briefed about The

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Professional Club Engineering Review

Challenges for Businesses in Pakistan

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

Businesses operating in Pakistan confront a myriad of obstacles including inadequate infrastructure, energy deficits, political volatility, corruption, restricted financial access, skill shortages, market fragmentation, intricate tax systems, security risks, and environmental concerns.

Resolving these challenges necessitates cooperative endeavors from both the public and private sectors, involving policy enhancements, infrastructure investments, governance fortification, and the creation of a more favorable business environment. There are also some notable challenges and problem areas that need to be considered.

INFRASTRUCTURE

Pakistan's infrastructure deficit is significant, with the World Bank estimating that the country needs to invest around $31 billion annually in infrastructure to bridge the gap. Inadequate infrastructure can result in productivity losses of up to 3.5% of GDP annually.

Energy Shortages: Pakistan faces a substantial energy shortfall, with peak electricity demand exceeding supply by around 5,000 to 7,000 megawatts. The energy crisis results in economic losses estimated at approximately 2% to 4% of GDP annually.

POLITICAL INSTABILITY

Pakistan has experienced periods of political instability, which can deter foreign direct investment (FDI) and disrupt business operations. The country ranked 134th out of 190 countries in the World Bank's Ease of Doing Business Index in 2020.

CORRUPTION & BUREAUCRACY

Corruption is widespread in Pakistan, with the country ranking 120th out of 180 countries in Transparency International's Corruption Perceptions Index. Bureaucratic red tape and inefficiencies contribute to delays in obtaining permits and licenses, impacting business operations.

ACCESS TO FINANCE

According to the World Bank, only around 7% of adults in Pakistan have access to formal financial services. The credit gap for small and medium-sized enterprises (SMEs) in Pakistan is estimated to be around $3.6 billion.

SKILL SHORTAGE

Pakistan faces a skills gap across various sectors, with the World Economic Forum's Human Capital Index ranking the country 134th out of 157 countries. Around 23 million children in Pakistan are out of school, contributing to the skills shortage.

INFRASTRUCTURE FOR INNOVATION

Pakistan lacks a robust innovation ecosystem, with only a few incubators and accelerators in operation. Research and development spending in Pakistan is relatively low, accounting for around 0.29% of GDP.

TAXATION & REGULATORY ENVIRONMENT

Pakistan has a complex tax system, with a high corporate tax rate of 29%, which can deter investment. Compliance with tax regulations can be challenging, with tax evasion estimated to be around 70% of total tax liabilities.

MARKET FRAGMENTATION

Pakistan's market is fragmented, with around 60% of the population residing in rural areas. Cultural and linguistic diversity presents challenges for businesses in reaching customers effectively across different regions.

ENVIRONMENTAL SUSTAINABILITY

Pakistan faces significant environmental challenges, including air pollution levels that exceed World Health Organization (WHO) guidelines by up to five times in some cities. The economic cost of environmental degradation in Pakistan is estimated to be around 6% of the GDP annually.

In the current environment in Pakistan, addressing challenges such as infrastructure deficits, energy shortages, political instability, corruption, and skill shortages requires a multifaceted approach involving government policies, private sector initiatives, and civil society engagement. Solutions include investment in infrastructure, diversification of energy sources, governance reforms, skills development, streamlining regulatory processes, improving access to finance, promoting innovation and entrepreneurship, implementing environmental sustainability measures, enhancing regional cooperation, and fostering community engagement and social responsibility. Collaborative efforts from stakeholders across sectors are crucial for creating a conducive business environment and fostering sustainable economic development in Pakistan.■

Production of Ceramic Using Tape Casting Method for Artificial Bone Application

Contd from page 9

Scientific and Technological Research Council of Turkiye, known as Tubitak. The company is the leading agency responsible for coordinating and promoting research and development activities in Turkey. Established in 1963, Tubitak operates under the auspices of the Ministry of Industry and Technology, with a mission to support scientific and technological advancement across various disciplines.

Dr. Tabak provided an overview of ceramic materials commonly used in orthopedic applications, emphasizing their biocompatibility and structural properties resembling natural bone.

The webinar explored the significance of ceramic scaffolds in bone tissue engineering and the challenges associated with their fabrication.

Tape Casting Method:

The tape casting method was introduced as a versatile manufacturing technique for producing ceramic scaffolds with precise control over thickness and microstructure.

Dr. Tabak elaborated on the process of ceramic slurry preparation, casting onto flexible substrates, and subsequent drying and sintering stages.

Material Selection and Optimization:

The selection of ceramic powders, such as hydroxyapatite (HA) and tricalcium phosphate (TCP), was discussed in relation to their bioactivity and mechanical properties.

Dr. Tabak highlighted the importance of material optimization to enhance the performance and biocompatibility of ceramic scaffolds for bone regeneration.

Challenges and Future Directions:

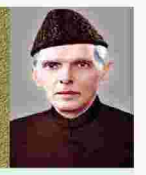
Challenges in ceramic scaffold fabrication, including porosity control, mechanical strength, and integration with host tissue, were addressed during the talk.

Future research directions were outlined, focusing on advanced manufacturing techniques, surface modifications, and biomimetic scaffold designs to overcome existing limitations.

Conclusion:

The talk on the production of ceramics using the tape casting method for artificial bone application provided attendees with valuable insights into the evolving landscape of orthopedic biomaterials research.

Dr. Yasmeen's expertise and contributions in the field underscore the potential of ceramic scaffolds to revolutionize orthopedic surgery and regenerative medicine. The webinar served as a platform for knowledge exchange and collaboration among researchers, students, paving the way for innovative solutions in bone tissue engineering.■



فرمانِ قائداعظمؒ

ایمان ، اتحاد ، تنظیم

اصول اور تفصیلات

گاندھی جی کہتے ہیں: "ہندوستان کو جیتے جی ٹکڑے ٹکڑے کیا جارہا ہے۔"
راج گوپال اچاریہ کہتے ہیں: "بچے کے دو ٹکڑے کیے جارہے ہیں۔"
قدرت نے پہلے ہی سے ہندوستان کو تقسیم کر رکھا ہے اور اس کے ٹکڑے ٹکڑے کر رکھے ہیں۔ ہندوستان کے نقشہ پر مسلم ہندوستان اور ہندو ہندوستان پہلے ہی سے موجود ہیں، نہ معلوم اس کے متعلق اتنا واویلا کیوں کیا جاتا ہے۔ وہ ملک ہے کہاں جس کے ٹکڑے ٹکڑے کیے جائیں گے؟ اور وہ قوم کہاں ہے جس کی قومیت فنا کی جانے کو ہے؟
وہ طاقت جس کے قبضہ قدرت میں آج ہندوستان ہے، وہ انگریزوں کی طاقت ہے اور یہ جو ایک خیال دماغوں میں بیٹھ گیا ہے کہ ہندوستان ایک متحدہ ملک ہے اور اس کی اپنی حکومت ہے، وہ صرف اس وجہ سے ہے کہ انگریز اس سارے ملک پر حکمران ہیں۔
(مسلم لیگ کانفرس، بمبئی۔ 26 مئی 1940ء)

آوازِ اقبال

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

تیری عمر رفتہ کی اک آن ہے عہد کہن
وادیوں میں ہیں تیری کالی گھٹائیں خیمہ زن
چوٹیاں تیری ثریا سے ہیں سرگرم سخن
تو زمیں پر اور پہنائے فلک تیرا وطن
چشمہ دامن ترا آئینہ سیال ہے
دامن موج ہوا جس کے لئے رومال ہے
ابر کے ہاتھوں میں رہوار ہوا کے واسطے
تازیانہ دے دیا برق سر کوہسار نے
اے ہمالہ کوئی بازی گاہ ہے تو بھی، جسے
دست قدرت نے بنایا ہے عناصر کے لئے
ہائے کیا فرط طرب میں جھومتا جاتا ہے ابر
فیل بے زنجیر کی صورت اڑا جاتا ہے ابر

ہوا، سورج اور پانی۔۔۔روشن پاکستان کے ضامن

پاکستان کو اللہ نے ہر طرح کے موسموں اور قدرتی وسائل سے نوازا ہے۔ ہمالیائی برف پوش پہاڑوں سے لے کر تھر اور چولستان کے لق ودق تپتے صحراؤں تک، پنجاب کے سرسبز میدانی علاقوں سے لے کر بلوچستان کے نیلے پانی کے ساحلوں تک، کہیں گھنے جنگلات کہیں شور مچاتے دریا، کہیں منجمد کر دینے والی ٹھنڈک کہیں جھلسا دینے والی دھوپ، کبھی کئی دن تک موسلا دھار بارش اور کہیں تیز چلتی ہواؤں کے طوفان۔ یہ سب اللہ کی نعمتیں ہیں مگر ہم اپنی نااہلی اور غیر ذمہ داری کے باعث ان نعمتوں کو زحمت میں تبدیل کر دیتے ہیں۔ انہیں قدرتی وسائل میں ایک ہے ہوا، جس سے انسان نے بجلی بنانا سیکھا۔

گزشتہ دنوں انسٹی ٹیوشن آف الیکٹریکل اینڈ الیکٹرانکس انجینئرز پاکستان کیساتھ گھارو میں ایک ونڈ پاور پراجیکٹ پر جانے کا موقع ملا جہاں بریفنگ کے دوران معلوم ہوا کہ ملک میں متبادل توانائی سے توانائی کا بڑا بحران قابو میں آسکتا ہے لیکن؟ لیکن یہی کہ حکمرانوں کی نااہلی ہی ہماری تباہی کی ذمہ دار ہے۔ بہرحال آتے ہیں اپنے موضوع کی طرف۔۔ونڈ پاور کا ایک تاریخی پس منظر بھی ہے، ہوا کا توانائی کے طور پر استعمال ساتویں صدی عیسوی میں ایران اور افغانستان سے چلتا آرہا ہے، مشرقی ایران کے قصبے نشتیبان میں اب بھی ایسی ونڈ چکی موجود ہیں جن سے زمین سے پانی نکالنے یا اناج پیسنے کا کام لیا جاتا تھا۔ اب بھی ہالینڈ میں ایک ہزار سے زائد ونڈ ملز موجود ہیں۔ پاکستان کے ونڈ اسٹیشن جھمپیر گھارو میں سات سے آٹھ سو کے قریب ونڈ ٹربائن نصب ہیں جو پاکستان کو ایک اعشاریہ آٹھ میگاواٹ بجلی فراہم کر رہے ہیں۔ کلین اور گرین انرجی منصوبے کے تحت دو ہزار پانچ میں وزارت سائنس وٹیکنالوجی کے تعاون سے پاکستان میں ونڈ پاور کے لئے ساحلی علاقوں کا سروے کیا گیا اور بلوچستان اور سندھ کے ساحلوں علاقوں میں ونڈ پاور کے لیے پوٹینشل پایا گیا تاہم اس حوالے سے سندھ کے ساحلی علاقے زیادہ موضوع پائے گئے۔

اگست دو ہزار چھ میں الٹرنیٹ انرجی ڈیولپمنٹ بورڈ (اے ای ڈی بی) نے چھپن کمپنیوں کو اس شعبے میں سرمایہ کاری کی پیشکش کی مگر بہت زیادہ رسپانس نہیں ملا۔ دو ہزار چھ میں فوجی فرٹیلائزر کمپنی نے ونڈ پاور کے لئے کوششوں کا آغاز کیا جس کے بعد ترک کمپنی زورلو بھی سامنے آگئی۔ 2007 میں ان دو کمپنیوں کو جھمپیر میں زمین الاٹ کی گئی تاہم دونوں کمپنیاں 2008 تک ایک میگاواٹ بھی نیشنل گرڈ میں نہیں دے سکیں۔ دو ہزار نو میں ترک کمپنی زورلو انرجی نے جرمنی کی تیار ایک اعشاریہ دو میگاواٹ کی بغیر گیئر والی پانچ ونڈ ٹربائنز لگائیں جن کی کل استعداد چھ میگاواٹ تھی اس پراجیکٹ کا افتتاح سابق وزیراعظم یوسف رضا گیلانی نے اپریل 2009 میں کیا اور حیدرآباد الیکٹرک سپلائی کمپنی کو چھ میگاواٹ بجلی کی فراہمی شروع کر دی گئی۔ ایف ایف سی نے نومبر 2009 میں ایف ایف سی انرجی لمیٹڈ کمپنی بنائی اور فروری دو ہزار دس میں جرمن کمپنی کے ساتھ معاہدے کے بعد پہلی ونڈ ٹربائن نے 25 جنوری دو ہزار بارہ میں کام شروع کیا۔ 22 دسمبر 2012 کو پاکستان کے سابق صدر آصف علی زرداری نے اس پراجیکٹ کا افتتاح کیا۔ اس طرح پاکستان کا پہلا ونڈ پاور 49.5 میگاواٹ گرین اینڈ کلین انرجی فراہم کرنے لگا۔ پراجیکٹ کی کل مالیت 133.5 ملین امریکی ڈالر تھی۔ اس کے بعد مزید پراجیکٹس لگتے رہے اور جھمپیر سے نیشنل گرڈ کو 100 میگاواٹ بجلی ونڈ پاور کے ذریعے نیشنل گرڈ کو ملنا شروع ہوگئی۔ جھمپیر کے 21 ونڈ پاور سے اب قومی گرڈ کو ایک ہزار اکیسا اعشاریہ چھ میگاواٹ بجلی رہی ہے۔

اس وقت دنیا بھر میں متبادل توانائی پر تجربات ہو رہے ہیں خاص کر یورپی ممالک جبکہ سعودی عرب سمیت دیگر خلیجی ممالک شمسی توانائی اور ہوا کے ذریعے بجلی حاصل کر رہے ہیں لیکن افسوس کہ پاکستان اس ہوا، پانی اور سورج تینوں وسائل سے مالا مال ہونے کے باوجود اندھیروں میں ہے۔ پاکستان میں ونڈ پاور کے 36 پلانٹس موجود ہیں جو محض 1.6 گیگاواٹ بجلی پیدا کر رہے ہیں مگر آئی ای ای ای پی کے انجینئر عرفان صاحب کا کہنا تھا کہ ونڈ پاور سے پاکستان 400 گیگاواٹ بجلی پیدا کر سکتا ہے جو نہ صرف ملکی ضروریات کے لئے کافی ہوگی بلکہ اضافی بجلی فروخت بھی کی جاسکے گی۔ پھر کیا وجہ ہے کہ پاکستان قدرت کی اتنی بڑی نعمت سے مستفید نہیں ہو رہا؟ اسکی کئی وجوہات ہیں تاہم سب سے بڑا مسئلہ کک بیکس، یا کرپشن ہے۔ پاکستان کو ونڈ پاور اور سولر پینلز کے لئے درکار سامان درآمد کرنا پڑتا ہے جس کی وجہ سے کمپنیوں کو بجلی مہنگی پڑتی ہے جبکہ پیداوار اتنی مہنگی ہوجاتی ہے کہ کوئی انشورنس فرم ان پراجیکٹس کی انشورنس نہیں کرتی۔ پاکستان میں فوسل انرجی جیسے کوئلے اور تیل سے بجلی بہت مہنگی بنتی ہے جسکا براہ راست اثر عوام اور ملکی معیشت پر پڑتا ہے۔ نواز شریف اور مشرف کے ادوار میں بھی متبادل انرجی پر کام ہوا اور شمسی توانائی کے بڑے منصوبوں کے افتتاح ہوئے تاہم ملکی سیاسی بے چینی میں ان منصوبوں کو بھی نقصان پہنچا۔

دو ہزار پندرہ میں اس وقت کے وزیراعظم نواز شریف نے صوبہ پنجاب کے ضلع بہاولپور میں واقع قائداعظم سولر پارک کے پہلے یونٹ کا افتتاح کیا۔ یہ منصوبہ نہ صرف پاکستان میں شمسی توانائی کا سب سے بڑا منصوبہ قرار دیا گیا بلکہ سرکاری کمپنی قائداعظم سولر پاور نے دعویٰ کیا کہ یہ دنیا کا سب سے بڑا 'فوٹو والٹیک آزمائشی منصوبہ' بھی ہے۔ منصوبے سے ابتدائی طور پر 100 میگاواٹ جبکہ آئندہ دو سال کی مدت میں 1000 میگاواٹ بجلی پیدا کی جانی تھی۔ گیارہ ارب کی لاگت سے تیار منصوبے کی تکمیل میں 11 ماہ کا عرصہ لگا اور اس کے لیے 500 ایکڑ زمین مختص کی گئی اور وہاں چار لاکھ شمسی پینل نصب کیے گئے۔ مذکورہ منصوبہ چین کی مدد سے پورا ہوا جبکہ اس وقت چینی کمپنی نے پاکستان کو دو ارب روپے کی رعایت بھی دی۔ ہم دیکھیں تو اس وقت دنیا کے تمام ترقی یافتہ ممالک اپنی ضروریات کا بڑا حصہ سولر انرجی پر منتقل کر چکے ہیں۔ چین 131 گیگاواٹ بجلی پیدا کر کے دنیا میں پہلے نمبر پر ہے۔ امریکہ 51 گیگاواٹ کے ساتھ دوسرے نمبر پر ہے۔ اسی طرح جاپان 49.2 گیگاواٹ، جرمنی 42، اٹلی 19، بھارت 18، برطانیہ 12، فرانس آٹھ، آسٹریلیا سات اور اسپین 5.6 گیگاواٹ انرجی سولر سسٹم سے حاصل کر رہا ہے۔

افسوس یہ ہے کہ پاکستان میں بجلی کا نام سنتے ہی ذہن میں اندھیرے کا تصور آتا ہے جبکہ ہونا تو یہ چاہیئے تھا کہ اس بجلی کے تصور سے ہی خوشی اور توانائی محسوس ہوتی۔ ملک میں لوڈشیڈنگ اور بریک ڈاؤن کی متعدد وجوہات ہیں جن میں طلب ورسد میں فرق اور بجلی کی ترسیل کے نظام کی خرابی شامل ہے۔ امید ہے کہ آنے والی جمہوری حکومت اس جانب بھرپور توجہ دیگی اور ملک کو اندھیروں سے نکالے گی۔ ■

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گیس کی قلت، تھر کے کوئلے سے سنتھیٹک گیس پیدا کرنے کی تجویز

2 ارب ڈالر کی سرمایہ کاری سے 100 ایم ایم سی ایف ڈی گیس کی پیداوار ممکن، قیمت 8 سے 10 ڈالر فی ایم ایم بی ٹی یو ہوگی

گیس کے موجودہ ذخائر میں تیزی سے کمی کے نتیجے میں سالانہ 24 ارب ڈالر کی ایل این جی درآمد کرنا پڑ رہی ہے، ایم ڈی ایس ایس جی سی

سوئی سدرن گیس کمپنی نے ملک میں گیس کی قلت کے خاتمے اور مہنگی درآمدی ایل این جی کا مقامی اور کفایت بخش متبادل فراہم کرنے کے لیے تھر کے کوئلے سے سنتھیٹک گیس پیدا کرنے کی تجویز پیش کر دی ہے۔

سوئی سدرن گیس کمپنی نے حکومت کو تھر کے کوئلے سے سنتھیٹک گیس پیدا کرنے کے لیے جامع کول ٹو گیس پالیسی وضع کرنے کے لیے تجاویز بھی ارسال کر دی ہیں۔

صحافیوں سے ملاقات میں سوئی سدرن گیس کمپنی کے ایم ڈی عمران منیار نے کہا کہ پاکستان میں گیس کے نئے ذخائر دریافت نہ ہونے کی وجہ سے موجودہ ذخائر تیزی سے کم ہو رہے ہیں اور سالانہ 24 ارب ڈالر کی ایل این جی درآمد کرنا پڑ رہی ہے جو ملک کی معیشت پر بوجھ ہے، پاکستان کو توانائی کے شعبے میں خود کفیل بنانے کے لیے روایتی اور غیر روایتی طریقوں سے گیس حاصل کرنا ہوگی، اس مقصد کے لیے تھر میں پوشیدہ ایک لاکھ پچھتر ہزار ٹن کے ذخائر اہم کردار ادا کر سکتے ہیں۔ سوئی سدرن گیس کمپنی نے متبادل انرجی (اے ای) کا شعبہ تشکیل دیا ہے جو مقامی اور غیر ملکی فرمز کو تھر میں سنتھیٹک گیس کے پلانٹس لگانے کی ترغیب دے رہا ہے، سوئی سدرن گیس کمپنی اے ای متعدد ایم او یوز کے تحت ان پلانٹس سے سنتھیٹک نیچرل گیس خرید سکتی ہے۔

سوئی سدرن گیس کمپنی کی اسٹڈی کے مطابق تھر کے کوئلے سے 100 ایم ایم سی ایف ڈی گیس پیدا کرنے کے لیے 2 ارب ڈالر کی سرمایہ کاری درکار ہوگی، تھر کے کوئلے سے 8 سے 10 ڈالر فی ایم ایم بی ٹی یو قیمت پر گیس حاصل کی جا سکتی ہے اور مجموعی طور پر 1200 ایم ایم سی ایف ڈی گیس تھر کے کوئلے سے حاصل کی جا سکتی ہے، تاہم اس کے لیے جامع اور مربوط پالیسی فریم ورک کی ضرورت ہے

عمران منیار نے کہا کہ مختلف گیس فیلڈز میں دستیاب غیر استعمال شدہ غیر مخصوص شدہ 200 ایم ایم سی ایف ڈی گیس کی بھی نشاندہی کی گئی ہے، جس میں 10 ایم ایم سی ایف گیس کی سپلائی کے معاہدے طے کر لیے گئے ہیں جبکہ مزید 50 ایم ایم سی ایف گیس کی سپلائی کے لیے بات چیت حتمی مراحل میں ہے۔ اس اقدام سے قومی خزانے کو ایل این جی کی درآمد کی مد میں 220 ملین ڈالر سے ساڑھے چار ارب ڈالر تک کی بچت ہوگی۔

ایم ڈی ایس ایس جی سی نے کہا کہ کی پیٹرو پاور یونٹس قدرتی گیس سے بجلی پیدا کر رہے ہیں جبکہ چھوٹی ایکسپورٹ فرمز کو بجلی مہنگی مل رہی ہے جس سے ان کی مسابقت متاثر ہو رہی ہے اس فرق کو ختم کرنے کے لیے کی پیٹیو پاور کو دی جانے والی گیس کے ای کو دینے کی تجویز دی گئی ہے تاکہ پوری انڈسٹری کو یکساں قیمت پر بجلی مہیا کی جا سکے، انھوں نے کہا کہ آئی ایم ایف کے دباؤ پر گیس کی قیمت میں اضافہ کیا گیا حاصل ہونے والا ریونیو گیس کی تلاش پر خرچ ہو گا، تاہم بلوچستان کے غریب عوام مہنگی گیس کی قیمت برداشت نہیں کر سکتے۔ ■

زرعی انجینئر سڑکوں، فلائی اوورز اور انڈر پاسز کی تعمیر کا نگران بن گیا

میئر کراچی کو ترقیاتی کام زرعی انجینئرز کی نگرانی میں مکمل کرانے ہوں گے

حکومت نے اقربا پروری والا ڈلوں پر نوازشات کے تمام ریکارڈ توڑ دیے، سینئر افسران

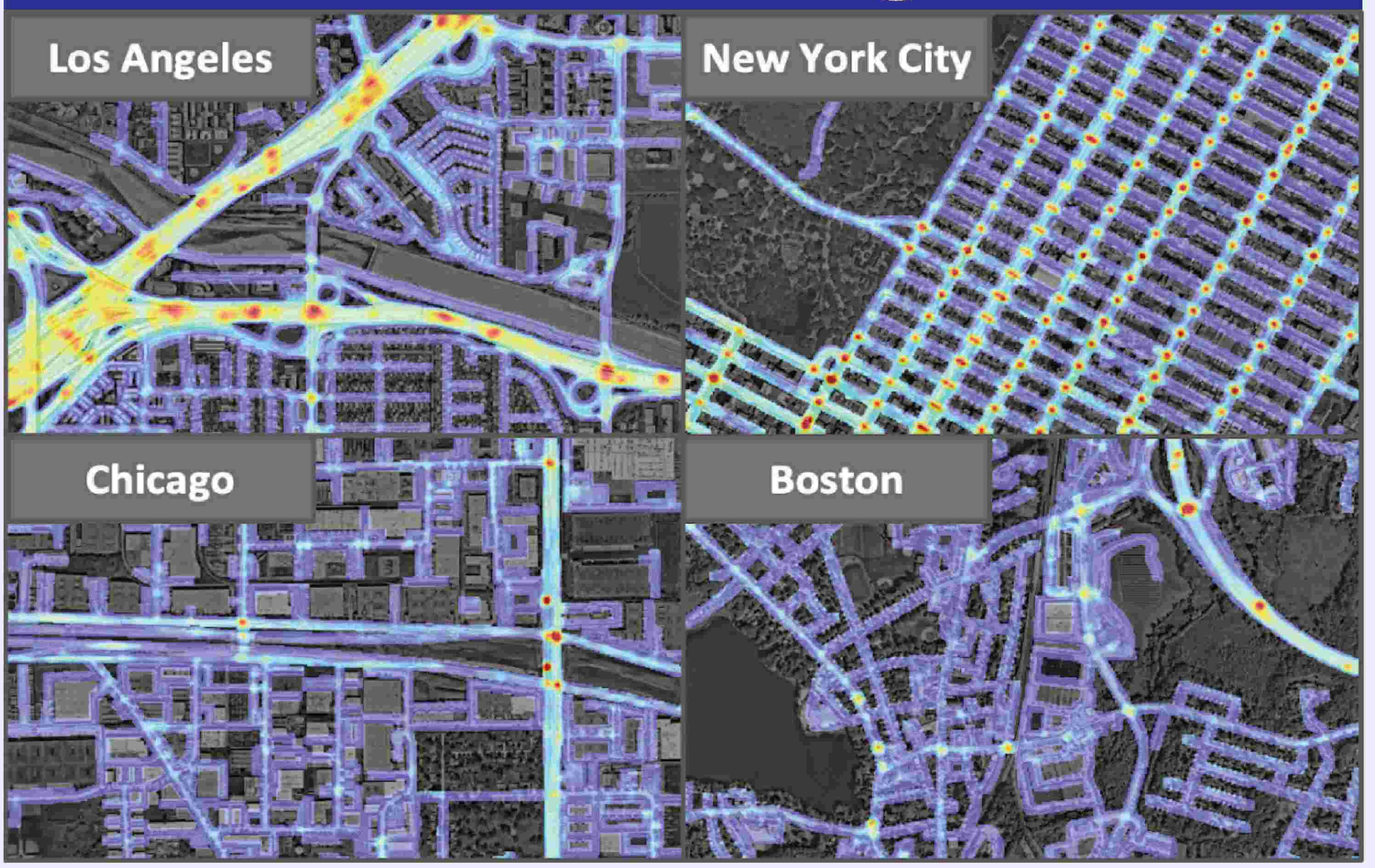
میئر کراچی کا شہر کو ترقی کی راہ پر گامزن کرنے کا خواب چکنا چور ہونے کا خدشہ ہے، سندھ حکومت نے زرعی انجینئر کو کراچی کی سڑکوں، فلائی اوورز اور انڈر پاسز کی تعمیر کا نگراں بنا کر شہر کے ترقیاتی منصوبوں اور ان کے معیار کے ساتھ ساتھ اربوں روپے کے ترقیاتی فنڈز کو بھی داؤ پر لگا دیا۔

بی ای ایگریکلچر کی ڈگری رکھنے والے زرعی انجینئر طارق حسین مغل کو سندھ حکومت نے بلدیہ عظمیٰ کراچی کے محکمہ انجینئرنگ میں چیف انجینئر سول گریڈ 20 کے اہم ترین عہدے پر تعینات کر رکھا ہے، میئر کراچی مرتضیٰ وہاب کو شہر کی سڑکیں، انڈر پاسز، فلائی اوورز کے ترقیاتی کام زرعی انجینئرز کی نگرانی میں مکمل کرانے ہوں گے۔

تفصیلات کے مطابق بلدیہ عظمیٰ کراچی کے محکمہ انجینئرنگ میں چیف انجینئر سول گریڈ 20 کے اہم ترین عہدے پر ایک زرعی انجینئر کی تعیناتی کا انکشاف ہوا ہے، ذرائع کا کہنا ہے کہ طارق حسین مغل کے پاس بی ای ای ایگریکلچر کی ڈگری ہے اور وہ ایک زرعی انجینئر ہیں جس کی تصدیق سندھ ایگریکلچر یونیورسٹی ٹنڈو جام کے ویری فکیشن آفیسر نے کے ایم سی کے سابق ڈائریکٹر پارکس کو ایک لیٹر نمبر 178 کے ذریعے کی تھی تاہم اس کے باوجود سندھ حکومت نے حیران کن طور پر طارق حسین مغل کو بلدیہ عظمیٰ کراچی میں چیف انجینئر سول گریڈ 20 کے اہم ترین عہدے پر تعینات کر رکھا ہے۔

بلدیہ عظمیٰ کراچی کے سینئر افسران اور سول انجینئرز کا کہنا ہے کہ سندھ حکومت نے ترقیاتی منصوبوں کی تعمیر اور مرمتی کاموں کیلیے غیر سنجیدگی کا بھرپور مظاہرہ کیا ہے۔ ■

Road features that predict crash sites identified in new machine-learning model



Issues such as abrupt changes in speed limits and incomplete lane markings are among the most influential factors that can predict road crashes, finds new research by University of Massachusetts Amherst engineers.

The study then used machine learning to predict which roads may be the most dangerous based on these features.

Published in the journal Transportation Research Record, the study was a collaboration between UMass Amherst civil and environmental engineers Jimi Oke, assistant professor; Eleni Christofa, associate professor; and Simos Gerasimidis, associate professor; and civil engineers from Egnatia Odos, a publicly owned engineering firm in Greece.

The most influential features included road design issues (such as changes in speed limits that are too abrupt or guardrail issues), pavement damage (cracks that stretch across the road and webbed cracking referred to as "alligator" cracking) and incomplete signage and road markings.

To identify these features, the researchers used a dataset of 9,300 miles of roads across 7,000 locations in Greece.

"Egnatia Odos had the real data from every highway in the country, which is very hard to find," says Gerasimidis.

Oke, who, with Christofa, is also a faculty member in the UMass Transportation Center, suspects the findings may stretch well beyond Greek borders.

"The problem itself is globally applicable -- not just to Greece, but to the United States," he says.

Differences in road designs may influence how variables rank, but given the intuitive nature of the features, he suspects that the features themselves would be important regardless of location.

"The indicators themselves are universal types of observations, so there's no reason to believe that they wouldn't be generalizable to the US." He also notes that this approach can be readily deployed on new data from other locations as well.

Importantly, it puts decades of road data to good use: "We have all these measures that we can use to predict the crash risk on our roads and that is a big step in improving safety outcomes for everyone," he says.

There are many future applications for this work. For starters, it will help future research home in on the important features to study.

"We had 60-some-odd indicators. But now, we can just really focus our money on capturing the ones that we need," says Oke.

"One could dig deeper to understand how a certain feature actually could contribute to crashes," and then measure to see if fixing the issue would actively reduce the number of incidents that occur.

He also envisions how this could be used to train AI for real-time road condition monitoring.

"You could train models that can identify these features from images and then predict the crash risk as a first step towards an automated monitoring system, and also provide recommendations on what we should fix," he says.

Gerasimidis adds that this is an exciting, real-world application of AI. "This is a big initiative we are doing here and it has specific engineering outcomes," he says.

"The purpose was to do this AI study and bring it up to [Greek] officials to say 'look what we can do.' It is very difficult to use AI and come up with specific results that could be implemented, and I think this study is one of them. It is now up to the Greek officials to utilize these new tools to mitigate the huge problem of car crash fatalities. We are very eager to see our findings lead to improving this problem."

"This work could serve as the roadmap for future collaborations between academics and engineers on other topics," he adds. "The mathematical tools along with real data consist of a truly powerful combination when looking at societal problems." -- SD

Ambitious roadmap for circular carbon plastics economy

Researchers from the Oxford Martin Programme on the Future of Plastics, University of Oxford, have outlined ambitious targets to help deliver a sustainable and net zero plastic economy. In a paper published in Nature, the authors argue for a rethinking of the technical, economic, and policy paradigms that have entrenched the status-quo, one of rising carbon emissions and uncontrolled pollution.

Currently the global plastics system results in over 1 gigatonnes per annum (Gt/annum) of carbon dioxide equivalent emissions which is the same as the total combined emissions of Europe's three largest economies (UK, Germany and France). If left unchecked, these emissions could rise to 4-5 Gt/annum with other sources of pollution also causing concern.

Another problem is the lack of effective recycling -- in 2019, only 9% of the world's plastic waste was turned into new products through mechanical recycling.

The majority ended up in landfills or was incinerated, and a significant proportion was mismanaged, ending up polluting terrestrial and marine ecosystems.

The authors analyse the current and future global plastics system, proposing technical, legal, and economic interventions from now until 2050 to allow it to transition to net zero emissions and to reduce other negative environmental impacts.

The study includes a future scenario centred on four targets:

• Reducing future plastics demand by one half, substituting and eliminating overuse of plastic materials and products.

• Changing the way plastics are manufactured to replace fossil fuels as the hydrocarbon source to use only renewably raw materials, including waste biomass and carbon dioxide.

• For plastics which are recoverable, maximising recycling very significantly, targeting 95% recycling of those materials which are retrievable from wastes.

• Integrating plastic manufacturing and recycling with renewable power and minimising all other negative environmental impacts, including of additives.

• The authors emphasise the need for concerted action across all four target areas to ensure the global plastics systems curbs its climate impacts and meets UN Sustainable Development Goals.

• Charlotte Williams, Professor of Chemistry at the University of Oxford's Department of Chemistry and lead author said:

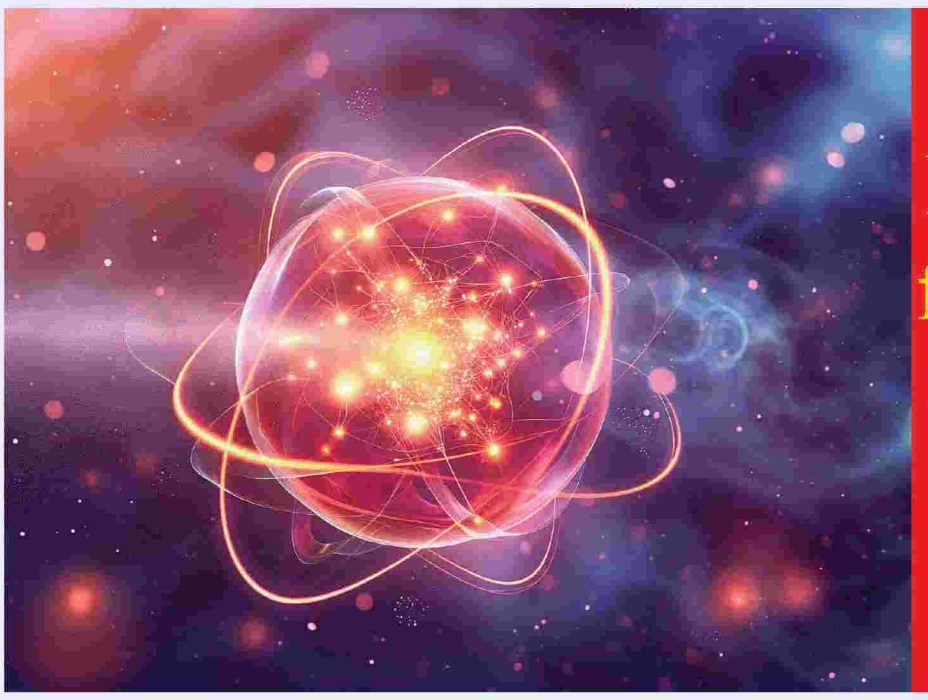
• 'We need plastics and polymers, including for future low emission technologies like electric vehicles, wind turbines, and for many essential everyday materials.

• Our current global plastics system is completely unsustainable, and we need to be implementing these series of very bold measures at scale, and fast.

• This is a solvable problem but it needs coherent and combined action, particularly from chemical manufacturers.'

• To successfully transition the plastics system, the authors set out principles to ensure 'smart materials design' and differentiate between plastics which are recoverable and irretrievable after use, noting that there is not a one size fits all solution. -- SD

Key advance for capturing carbon from the air



A chemical element so visually striking that it was named for a goddess shows a "Goldilocks" level of reactivity -- neither too much nor too little -- that makes it a strong candidate as a carbon scrubbing tool.

The element is vanadium, and research by Oregon State University scientists has demonstrated the ability of vanadium peroxide molecules to react with and bind carbon dioxide -- an important step toward improved technologies for removing carbon dioxide from the atmosphere.

The study is part of a $24 million federal effort to develop new methods for direct air capture, or DAC, of carbon dioxide, a greenhouse gas that's produced by the burning of fossil fuels and is associated with climate change.

Facilities that filter carbon from the air have begun to spring up around the globe but they're still in their infancy. Technologies for mitigating carbon dioxide at the point of entry into the atmosphere, such as at power plants, are more well developed. Both types of carbon capture will likely be needed if the Earth is to avoid the worst outcomes of climate change, scientists say.

In 2021 Oregon State's May Nyman, the Terence Bradshaw Chemistry Professor in the College of Science, was chosen as the leader of one of nine direct air capture projects funded by the Department of Energy. Her team is exploring how some transition metal complexes can react with air to remove carbon dioxide and convert it to a metal carbonate, similar to what is found in many naturally occurring minerals.

Transition metals are located near the center of the periodic table and their name arises from the transition of electrons from low energy to high energy states and back again, giving rise to distinctive colors. For this study, the scientists landed on vanadium, named for Vanadis, the old Norse name for the Scandinavian goddess of love said to be so beautiful her tears turned to gold.

Nyman explains that carbon dioxide exists in the atmosphere at a density of 400 parts per million. That means for every 1 million air molecules, 400 of them are carbon dioxide, or 0.04%.

"A challenge with direct air capture is finding molecules or materials that are selective enough, or other reactions with more abundant air molecules, such as reactions with water, will outcompete the reaction with CO2," Nyman said. "Our team synthesized a series of molecules that contain three parts that are important in removing carbon dioxide from the atmosphere, and they work together."

One part was vanadium, so named because of the range of beautiful colors it can exhibit, and another part was peroxide, which bonded to the vanadium. Because a vanadium peroxide molecule is negatively charged, it needed alkali cations for charge balance, Nyman said, and the researchers used potassium, rubidium and cesium alkali cations for this study.

She added that the collaborators also tried substituting other metals from the same neighborhood on the periodic table for vanadium.

"Tungsten, niobium and tantalum were not as effective in this chemical form," Nyman said. "On the other hand, molybdenum was so reactive it exploded sometimes."

In addition, the scientists substituted ammonium and tetramethyl ammonium, the former of which is mildly acidic, for the alkalis. Those compounds didn't react at all, a puzzler the researchers are still trying to understand.

"And when we removed the peroxide, again, not so much reactivity," Nyman said. "In this sense, vanadium peroxide is a beautiful, purple Goldilocks that becomes golden when exposed to air and binds a carbon dioxide molecule."

She notes that another valuable characteristic of vanadium is that it allows for the comparatively low release temperature of about 200 degrees Celsius for the captured carbon dioxide.

"That's compared to almost 700 degrees Celsius when it is bonded to potassium, lithium or sodium, other metals used for carbon capture," she said. "Being able to rerelease the captured CO2 enables reuse of the carbon capture materials, and the lower the temperature required for doing that, the less energy that's needed and the smaller the cost. There are some very clever ideas about reuse of captured carbon already being implemented -- for example, piping the captured CO2 into a greenhouse to grow plants."

Other Oregon State authors on the paper included Tim Zuehlsdorff, assistant professor of theoretical/physical chemistry, and postdoctoral researcher Eduard Garrido.

"I'm also really proud of the hard work of the graduate students in my lab, Zhiwei Mao and Karlie Bach, and undergraduate Taylor Linsday," Nyman said. "This is a brand new area for my lab, as well as for Tim Zuehlsdorff, who supervised Ph.D. student Jacob Hirschi on the computational studies to explain the reaction mechanisms. Starting a new area of study involves many unknowns."

Eric Walter of the Pacific Northwest National Laboratory and Casey Simons of the University of Oregon also took part in the study, which was published in Chemical Science, the flagship journal of the Royal Society of Chemistry. -- SD