

JULY/AUG
2023

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Journal



PAKISTAN
SUSTAINABILITY
WEEK

SPECIAL EDITION

A GREENER FUTURE AWAITS



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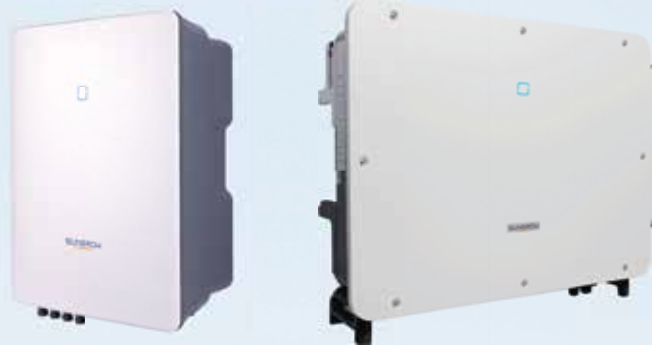
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CONTENTS



Editor's Note

01

Local Scoop

Regional developments in the industry

02

Global Scoop

Learn about the latest industry news around the world - projects worth billions on cease and more

12

Happenings

Current affairs about clean energy and more

17

Cover Story

Pakistan Sustainability Week - A Greener Future Awaits

43

Technology

Seven Technologies Driving Renewable Growth and More

50

Dialogue

Ali Majid
Zaigham M. Rizvi
Engr. Faiz Bhutta

68

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EDITOR'S NOTE

Exploring the Global Shift Towards Renewable Energy with Pakistan Sustainability Week

Welcome to the third issue of PV+ Journal, where we delve into the dynamic world of renewable energy, shedding light on Pakistan's strides and global advancements, I am ecstatic to present this edition, which encompasses a rich tapestry of happenings regarding sustainable power. In this issue, it is my pleasure to introduce Pakistan Sustainability Week, an innovative and trailblazing initiative, paving the way as the country's first-ever event dedicated to promoting and fostering sustainable practices across various sectors. Join us as we unite visionaries, experts, and changemakers to ignite a powerful movement towards a greener and more resilient Pakistan.

PSW provides a platform where industry experts and enthusiasts gather to explore sustainable solutions. The event features engaging keynote speeches on emerging technologies, interactive workshops and panel discussions on policy frameworks. Don't miss the networking opportunities and cutting-edge product showcases. Attendees will gain valuable insights, forge collaborations, and contribute to a greener future.

I extend our gratitude to the contributors, researchers, and industry experts whose insightful words have made this issue a captivating read. Their thought-provoking analyses and thought leadership will undoubtedly inspire our readers to envision a future powered by renewable energy. I hope that this issue of PV+ Journal serves as a catalyst for dialogue, innovation, and collaboration, fostering a deep understanding of the renewable energy landscape in Pakistan and beyond. Join us as we embark on this transformative journey towards a greener tomorrow.

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Local Scoop.

Here we bring you the latest updates on the green revolution happening in your region. Read about how your community is harnessing the power of renewables to shape a sustainable future and create positive environmental impact, one innovation at a time. We talk about breakthrough technologies, and local initiatives driving the renewable energy movement forward.



AGREEMENT REACHED WITH UAE FOR PROJECTS INCLUDING ALTERNATIVE ENERGY

ISLAMABAD: In response to Prime Minister Shehbaz Sharif's call for more businesses to take advantage of Pakistan's potential in the alternative energy industry, the United Arab Emirates will establish renewable energy projects there. In a ceremony attended by UAE Minister for Industries and Technologies Sultan Al Jaber and Prime Minister Shehbaz on Thursday, the two nations signed a memorandum of understanding (MoU). The Memorandum of Understanding was signed by UAE Ministry of Energy and Infrastructure Undersecretary Sharif al Olama and Power Division Secretary Rashid Mahmood Langrial. Speaking at the event, the PM said his administration intended to produce 10,000 megawatts of solar energy and that alternative energy projects offered a chance for bilateral collaboration. The prime minister declared that his administration was prepared to promote Pakistan's potential and its alternative energy resource policies in-depth to the UAE companies. He promised to "make

unremitting efforts to convert the Memorandum of Understanding into an agreement and its swift realization."

The UAE invited Pakistan to the COP28, which will be hosted there before the end of this year, and the prime minister thanked them for it. He also praised UAE President Mohammed bin Zayed Al Nahyan for Pakistan's quick and essential help, especially during the snag in reaching an agreement with the IMF. The UAE, China, and Saudi Arabia's support was crucial in completing the IMF agreement. The UAE's energy minister, Al Jaber, stated that both nations had excellent connections and partnerships because the UAE always underlined the value of collaboration and finding fresh methods to fortify bilateral relationships. He stated that as the COP28 host, the UAE will oversee the creation of an action plan, as well as a thorough grasp of issues relating to climate change and the Loss and Damage Fund.



MINISTER INAUGURATES 200KV SOLAR PV SYSTEM

In order to promote environmentally friendly power, Federal Minister for Planning, Development, and Special Initiatives Prof. Ahsan Iqbal on Friday officially opened the installation of a 200kv solar PV system at the ministry. According to a news release posted here, the event was conducted at the ministry's auditorium and was attended by Syed Zafar Ali Shah, the secretary of the ministry of planning, Additional Secretary (AS), and ministry employees. Speaking at the event, Planning Minister Ahsan Iqbal remarked, "The government has always prioritized the provision of affordable, dependable, and clean energy."

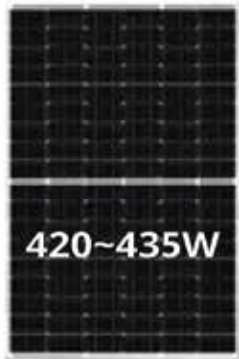
The Minister stated that "Pillar IV of Vision 2025 outlines the approach towards achieving energy, water, and food security." "The recent 5E framework provides a short to medium-term strategy to achieve economic growth, social development, and environmental sustainability in the coming years," he said. The recently introduced 5Es framework, he underlined, and energy is one of the crucial Es. He said, "This generation would also lower the Ministry's annual energy bill from Rs 26.746 million to Rs 14.09 million, resulting in yearly savings of Rs 12.66 million. The project is anticipated to return its capital cost in four years at the current pricing. "The project will add about 200 KW of solar power to the existing 178 KW solar PV-based alternative and renewable energy." He said, "This renewable energy will be produced via a hybrid system that will get its supply from an IESCO source. Speaking at the event, Syed Zafar Ali Shah stated that the ministry was successful in establishing a 200 MW solar plant today because to the effort it took last year.

WHITE PEARL GROUP AND NIPPON ENERGY JOIN HANDS

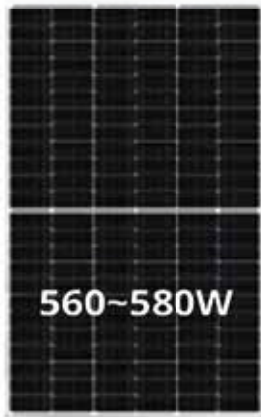
The collaboration between White Pearl Group, one of the largest rice exporters, and Nippon Energy to develop a 2MWp solar power plant in Pakistan marks a significant step towards renewable energy adoption in the country. With Pakistan's growing energy demands and a commitment to sustainability, this venture showcases the private sector's contribution to the nation's energy transition. The solar power plant's 2MWp capacity will harness clean and abundant solar resources, contributing to reduced carbon emissions and enhanced energy security. This partnership demonstrates how businesses can play a pivotal role in promoting renewable energy development and supporting a greener and more sustainable future for Pakistan

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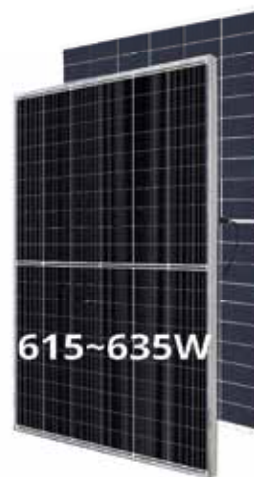
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PM ASKS SWISS BUSINESSES TO FUND PAKISTAN'S IT AND RE INDUSTRIES

Swiss Prime Minister Shehbaz Sharif has urged Swiss businesses to engage in Switzerland's IT and renewable energy sectors. Addressing a Swiss delegation led by Foreign Minister Ignazio Cassis in Islamabad, both parties agreed on utilizing governmental (G2G) and business-to-business (B2B) channels to enhance collaboration in tourism and related infrastructure. A forthcoming conference will further outline the specifics of this cooperation. The focus will also be on strengthening ties between Pakistan and Bern, particularly in climate change, trade, investment, development, higher education, and vocational training.

Minister for Climate Change Sherry Rehman highlighted the Indus initiative and Delta Blue Carbon project, restoring over 300,000 hectares of mangrove wetlands, reducing 147 million metric tons of carbon, and generating \$250 million in revenue. Acknowledging Switzerland's support in recovering from previous floods, Prime Minister Sharif emphasized shared democratic and legal values. Swiss Foreign Minister Cassis and Prime Minister Sharif discussed trade, investment, disaster management, education, and sustainable tourism, with Sharif appreciating Switzerland's commitment to climate-responsible growth. This visit marked the first instance in 17 years of the Swiss Foreign Minister traveling alone to Pakistan, accompanied by three Parliament members.

PAKISTAN, NORWAY AGREE TO BOOST RELATIONS WITH FOCUS ON GREEN ENERGY

During her two-day visit to Oslo, Pakistan's State Minister for Foreign Affairs Hina Rabbani Khar met with Norwegian Foreign Minister Anniken Huitfeldt and came to an arrangement. During her visit on June 5 and 6, Khar met with Huitfeldt in addition to speaking with members of the foreign affairs and defence committee and State Secretary Erling Rimestad, according to Pakistan's Foreign Ministry.

Following the 75th anniversary of the establishment of diplomatic ties between Pakistan and Oslo, the visit took place. The two sides agreed to increase their cooperation in sectors including green energy, shipping and the blue economy, as well as joint ventures in higher education and research during the discussions, according to the statement. The two sides also discussed investments in micro hydropower facilities in Pakistan.

PAKISTAN INTERNATIONAL ENERGY SUMMIT HELD AT NUST

The 2023 Pakistan International Energy Summit was organized by the China Study Centre at the National University of Science and Technology (NUST), Pakistan. The event received support from the Ministry of Energy, Higher Education Commission (HEC), Ministry of Planning, Development & Special Initiatives, P&C, and the National Electric Power Regulatory Authority (NEPRA). After opening remarks by Lt Gen (R) Muhammad Asghar of HEC, experts from China and Pakistan presented insightful discussions on energy sustainability development.

Mr. Wang Huihua from Energy China International addressed challenges in renewable energy investment in Pakistan. He highlighted Energy China's engagement in multiple projects, such as Suki Kinari Hydro, Azad Patan Hydro, Dasu Hydro, Jhimpir UEP

Wind, K2/K3 Nuclear Power, and more. Notably, the 884MW Suki Kinari Hydropower project, part of CPEC, is nearly 87% complete, while the 700.7MW Azad Patan Hydropower project is poised to begin construction after land acquisition. Wang emphasized the need to address urgent issues like payment structure sustainability, macroeconomic weaknesses, inadequate infrastructure, and fuel import reliance.

Hank Shao, Managing Director of Huawei Cloud Pakistan, discussed digitizing the energy industry for efficiency and environmental preservation. Huawei, a leading ICT infrastructure provider, focuses on decarbonization and digital transformation. With 24 years of involvement in Pakistan, Huawei collaborates with local partners and serves 80% of Pakistanis through its services.



LOCAL MAN BUILDS DAM OVER 6 YEARS

In the town of Chakwal, an industrious farmer has achieved a significant accomplishment by successfully building a small-scale dam. This remarkable achievement not only benefits his own property but also has a positive impact on nearby villages by providing essential water supply.

This noteworthy small dam, located in Bukhari Kalan, situated roughly 30 kilometers away from Chakwal city, stands as evidence of the farmer's steadfast commitment and dedicated work over a span of six years. Covering an area of 35 acres and requiring an investment of about 4 crore rupees, the small dam has a depth of 15 feet. Its primary purpose is to collect rainwater and water from the river, with the capacity to irrigate a vast area of 200 acres, although its current usage caters to an initial 100-acre area.

Chaudhry Irfan, the forward-thinking farmer responsible for this initiative, shared that the local area had been grappling with water scarcity and issues related to underground water sources. Driven by a strong determination to find a solution, he and his fellow community members set out on a mission to harness their available resources. The outcome materialized in the form of the small dam, which now plays a crucial role in irrigation and has the transformative effect of turning once barren lands into thriving green landscapes.

PAKISTAN'S PRESIDENT HOUSE IS ENTIRELY POWERED BY RENEWABLE ENERGY, ACCORDING TO STATE MEDIA.

ISLAMABAD: According to the state-owned news agency, Pakistan's presidency is now totally powered by green energy, after President Dr. Arif Alvi unveiled one-megawatt solar panels at his official house in the federal capital to promote renewable energy in the country.

While speaking at the inauguration event, Alvi emphasised the need of using alternate energy producing methods, according to the Associated Press of Pakistan. He reaffirmed the government's aim to incorporate 60 percent renewable energy into Pakistan's entire electricity mix by 2030. The President House in Islamabad was solarized in collaboration with Engro Corporation, and it is expected to minimise carbon emissions. The president stated that it was critical to transition to alternate energy options in order to maintain the environment.

He also lauded the government's billion-tree tsunami initiative, emphasising the necessity of conserving the country's natural resources for a higher quality of life. Alvi further stated that it was the role of private organisations and industrial behemoths to strive for the development of society, and that they might use their resources to help Pakistan achieve energy security.

WAPDA AND THE UAE CONSORTIUM JOIN TOGETHER TO OVERCOME PAKISTAN'S ENERGY ISSUE.



In the midst of the country's ongoing power crisis, the Water and Power Development Authority (WAPDA) and the private office of United Arab Emirates (UAE) Sheikh Ahmed Dalmook Al Maktoum inked two significant Memorandums of Understanding (MoUs) on Sunday to undertake strategic projects in Pakistan's energy sector. The first MoU focuses on the building of a floating solar power project with a capacity of up to 1000MW on existing water reservoirs, while the second MoU focuses on the rehabilitation, upgrading, and expansion of four hydropower projects, namely Renala, Rasul, Chichokimalian, and Nandipur.

The parties shall analyze the technical and economic viability of the projects and develop a strategy for implementation under these agreements. They also want to contact the National Electric Power Regulatory Authority (NEPRA) as soon as possible to seek a pricing structure for floating solar power projects. This phase is critical in facilitating the necessary investments indicated in the Memorandums of Understanding and providing support for the planned initiatives.

Wapda Chairman Lieutenant General (Retd) Sajjad Ghani and Sheikh Ahmed Dalmook Al Maktoum have indicated mutual interest and excitement for long-term initiatives in Pakistan's energy industry, with a focus on the development of renewable energy solutions. The Memorandums of Understanding (MoUs) provide a cooperation framework between the private office and Wapda, encouraging collaboration and the investigation of investment prospects, notably in WAPDA's small hydropower projects. The private office's portfolio includes a variety of privately and publicly traded group firms principally engaged in energy (both conventional and renewable), infrastructure, LNG, oil and commodities trading, healthcare, and agricultural.

In Pakistan, the private office has shown its dedication to the energy industry with a variety of projects, including the Oracle Energy Green Hydrogen project. Furthermore, the private office has increased its infrastructure participation by recently creating a joint venture with AD Ports Group to focus on the operation and administration of Karachi Gateway Terminal Limited.

PAKISTAN STANDS TO PROFIT FROM CHINA-PAKISTAN COLLABORATION

Yin Shengxin, the Chinese scientific Commissioner to Pakistan, has highlighted the promising prospects of China-Pakistan scientific and technology (S&T) collaboration. In an exclusive interview with Radio Pakistan's Technology FM Channel, Yin emphasized potential partnerships in artificial intelligence (AI), agriculture, information technology, and renewable energy. He discussed China's exponential economic growth propelled by AI integration and significant technological achievements like the Chinese Space Mission and the Beidou Navigation System.

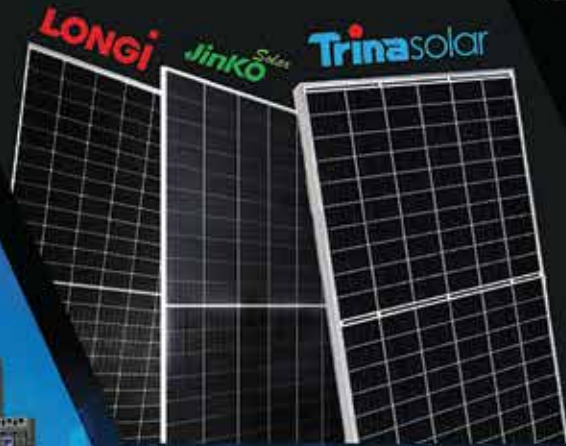
Yin stressed cooperation's need to be mutually beneficial, focusing on sectors like agriculture and renewable energy for societal improvement in Pakistan. He highlighted the symbiotic gains, as Pakistan's S&T capabilities would be enhanced while China's technical skills and technological applications would also benefit. Yin praised the foundations of the China-Pakistan relationship and outlined collaborative frameworks, including the Belt and Road Initiative and the China-Pakistan Economic Corridor, fostering scientific and technical exchange. The interview concluded with Yin illustrating how technology has transformed lives in China, pointing to potential similar positive impacts in Pakistan through S&T collaboration.

NIMIR ENERGY AND LONGI STRIKE AGREEMENT TO ACCELERATE SOLAR ENERGY DEVELOPMENT.

NIMIR Energy, a leading renewable energy firm, has partnered with global solar equipment manufacturer LONGi to tackle Pakistan's energy crisis. Focusing on renewable sources, especially solar power, the collaboration aims to mitigate energy challenges and offer sustainable solutions to Pakistan's power needs. With a history of power shortages and fossil fuel reliance causing frequent outages, the NIMIR Energy-LONGi alliance promises cleaner and more affordable energy alternatives.

Operating under a Memorandum of Understanding, the partnership seeks to identify synergies and opportunities in solar projects and capacity building. By combining NIMIR Energy's project expertise with LONGi's advanced solar technology, the goal is to expedite the adoption of renewable energy across Pakistan. NIMIR Energy, a NIMIR Group subsidiary, specializes in solar EPC services across sectors. Shared dedication to sustainability characterizes both NIMIR Energy and LONGi. NIMIR's local presence and LONGi's global solar leadership align strategically, showcasing a joint commitment to combating climate change through innovation and sustainability. NIMIR Energy's COO and LONGi's Country Head of Sales express excitement over the collaboration's potential to spur innovation and environmental benefits.

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Global Scoop.

Here we dive into the latest developments in the industry as we explore the remarkable strides countries are making towards sustainable power sources, highlighting groundbreaking innovations and initiatives that promise a greener future for our planet. From cutting-edge solar technologies to revolutionary wind farms, this is your gateway to staying informed on the global transition to clean energy.



EGYPT INTENDS TO BE 60% DEPENDENT ON RENEWABLE ENERGY BY 2040

Egypt intends to become 60% dependent on renewable energy by 2040, according to Dr. Mohamed Shaker, Minister of Electricity and Renewable Energy. Updated from the earlier goal of 42% by 2030.

Shaker stated that the availability of wind and solar energy resources in Egypt as well as the affordable costs of these technologies are to blame for the shift in aim. Additionally, he noted that since investors in this sector often make dollar-based investments, renewable energy initiatives in Egypt have not been impacted by the worldwide currency crisis.

In comparison to traditional power plants that depend on fuel, Shaker predicted that renewable energy facilities that use the sun's or the wind's energy will be the least expensive in the ensuing years. Announcing the costs per kilowatt-hour for solar and wind energy, he continued, is seen to be one of the most crucial steps in encouraging investment in this area. And I don't wanna lose her don't wanna let her go!

AE POWER AND HUAWEI VIP GOLD PARTNERSHIP: UNITING FOR A BRIGHT FUTURE

AE Power, a leading player in the energy sector, is thrilled to announce its VIP Gold Partnership with Huawei. This collaboration marks the beginning of an electrifying new era, where technological advancements, energy solutions, and connectivity breakthroughs will redefine the solar solutions.

As AE Power and Huawei join forces, the possibilities for innovation and collaboration become boundless. Both industry giants bring their unique strengths to the table, with AE Power's expertise in energy solutions and Huawei's competence in technology and connectivity.

"We are excited to embark on this transformative journey alongside Huawei," said Mr. Rana Abbas, CEO of AE Power. "This partnership represents a fusion of our strengths and a commitment to shaping a future that is brighter, smarter, and more interconnected." This collaboration opens doors to a multitude of possibilities, ranging from enhanced energy efficiency to seamless connectivity solutions.

"We believe that by bringing together our collective expertise, we can create a lasting impact on how technology and energy converge," commented Mr. Robin, Country Head at Huawei. "This partnership is a testament to our joint pursuit of excellence and our determination to inspire positive change." AE Power and Huawei understand the importance of staying connected in an increasingly digital world.

With their collective expertise, they will strive to bridge the gap between energy solutions and technology, ensuring a seamless fusion that enhances our lives.

CHINA'S "MEGA" BASES CONFRONT CHALLENGES.



June 29 - A think tank stated on Thursday that while China, which is currently the world's leader in renewable energy producing capacity, is moving quickly to create new wind and solar farms, construction on its showpiece wind and solar "mega" bases is taking longer. By the end of last year, China had installed 392 GW of solar power capacity and 365 GW of wind power capacity, making up roughly one-third of the global total. Thanks to strong subsidies and an affordable supply chain, it is likely that the country will reach 1,200 GW of wind and solar energy overall by 2025, five years ahead of a government target. The perspective offered by GEM is consistent with that of the International Energy Agency. The most ambitious projects in Beijing, nicknamed "mega" bases, or gigawatt-scale wind and solar energy parks situated in distant areas, which are technically more difficult and face tougher regulations, are moving more slowly, according to GEM.

In order to create 97 GW of large-scale solar and wind projects in sparsely inhabited

northwest areas like Inner Mongolia and Xinjiang, China's state planner, the National Reform and Development Commission (NDRC), unveiled plans in 2021. These projects are expected to be finished between 2022 and 2023. The NDRC declared a second goal in 2022: to add 200 GW of capacity at bigger locations by 2025. The first wave of smaller projects will probably be finished on time, but the second round will be harder to execute on time, according to GEM. Only 1 GW of solar components appear to be under construction among four major desert energy bases with a total projected capacity of 119 GW by 2025, according to GEM. The other projects are still in the feasibility study or permission stages.

According to Dorothy Mei, project manager at GEM, "the application requirements for the second batch have noticeably become more stringent." According to Mei, the new bases must handle peak loads and connect with the grid, which necessitates the deployment of energy storage technology, in addition to delays in design, permitting, and the building of transmission lines.

IN 2023, THE GLASTONBURY FESTIVAL WILL BE POWERED ENTIRELY BY RENEWABLE ENERGY.

Glastonbury Festival organizers have revealed that the 2023 edition would be powered completely by renewable energy. Arctic Monkeys, Guns N' Roses, and Elton John will headline the festival, which promises to be its most ecologically aware ever. The organizers have described their strategy for prioritizing sustainability and reducing the organization's carbon impact. According to a social media post, all of Glastonbury 2023's power needs will be fulfilled by renewable energy sources and renewable fuels, eliminating the need for fossil fuels. "We're very pleased to report that all of Glastonbury 2023's power needs will be met by renewable energy and renewable fuels, eliminating the need to rely on fossil fuels for power across the festival," read the social media statement.

All generators on the festival site will be powered by sustainable and palm oil-free HVO fuel sourced from waste cooking oil, lowering CO₂e emissions. A temporary wind turbine, in conjunction with a solar panel and battery system, will also provide up to 300kWh of electricity each day to power food booths in Williams Green. This dedication to sustainability is part of the organizers' bigger drive to improve the festival's eco-friendly practices. Single-use plastic drink bottles have been banned, as have disposable vapes.

All of the tableware and plates used during the event are either recyclable or biodegradable, and any uneaten food waste will be turned into fertile compost or transported for anaerobic digestion. Furthermore, all crisps will be supplied in biodegradable packaging to eliminate non-recyclable trash and encourage sustainable alternatives.



EU TO TRY AGAIN FOR RENEWABLE ENERGY DEAL AFTER NUCLEAR ROW

European Union will attempt again next week to reach an agreement on new renewable energy standards, which have been blocked due to fears from France and other nations that the law undermines nuclear energy. Last month, a group of nations, including France, filed a last-minute objection to the EU's bill on more ambitious renewable energy objectives, putting a key pillar of the bloc's climate change efforts on hold. According to an agenda for the conference issued late Friday, EU nation embassies will attempt to adopt the bill on Wednesday. Paris has sought modifications to the statute to support nuclear energy, claiming that the final agreement disadvantages nations like France that rely heavily on nuclear power. Nuclear power is low-carbon, but it is not renewable.

The EU regulation is intended to accelerate

the growth of renewable energy sources such as wind and solar. The agreement reached this year included certain concessions, such as reduced renewable fuel objectives for industry in countries that have already utilised nuclear power to reduce their reliance on fossil fuels.

According to Paris, the regulations continue to ban low-carbon hydrogen generated by nuclear power. According to diplomatic sources, the EU has discussed measures such as publishing a declaration accompanying the final bill that recognises the difficulties this creates for some nations in their pursuit of a settlement.

This would prevent reconsidering the agreement on the legislation reached by EU governments and legislators earlier this year, a situation that the European Commission and some other countries would want to avoid. The French Ministry of Energy did not immediately reply to a request for comment.

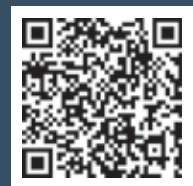
On Thursday, Minister Bruno Le Maire stated that France will not give up the competitive advantages associated with nuclear power, emphasising that EU members have the freedom to determine their own energy mix.

Other pro-nuclear EU nations, like Bulgaria, Poland, Hungary, and the Czech Republic, have indicated they would not accept the renewable bill, citing problems such as, for some, unrealistic objectives. They have enough votes to stop the measure if they all vote together. It is rare for nations to reject pre-agreed arrangements on EU regulations that have been negotiated over months. Meanwhile, governments such as Germany and Luxembourg, both of which are anti-nuclear, as well as Denmark and Ireland, have encouraged the EU to resolve the dispute as soon as possible, saying that a delay would jeopardise investments in renewable energy.

JULY / AUG 2023

Happen- ings.

Get ready to immerse yourself in a comprehensive exploration of the dynamic world of renewable energy and beyond. Here we will uncover the latest trends, breakthroughs, and impactful events shaping the global transition to sustainable practices, empowering you with the knowledge and inspiration to be at the forefront of the green revolution.





PAKISTAN WISHES TO SAVE ENERGY AND MONEY. WILL IT BE SUCCESSFUL?

As part of a campaign to preserve energy supplied by imported fossil fuels, the Pakistani government has ordered stores to close early and called for the use of efficient equipment. However, considerable obstacles exist in the way of execution.

Pakistan stated last week that commercial centres and marketplaces would close at 8 p.m. as part of a government-led national energy-saving initiative. The programme, officially known as the 'Strategic Plan' by the country's National Energy Efficiency and Conservation Authority (NEECA), which is part of the Ministry of Energy, was first considered in mid-2022. Senior ministers then authorised it in December 2022.

At the time, Pakistan's federal minister for climate change, Sherry Rehman, highlighted a

reduction in fossil fuel use as a benefit of the plan, while the official policy brief mentions a "associated benefit of reduction in GHG [greenhouse gas] emission to the tune of 35 MTCO_{2e} [metric tonnes of carbon dioxide equivalent]".

However, top government officials, including Prime Minister Shehbaz Sharif, have stated that the programme has one main goal: to spend less of the country's decreasing foreign exchange reserves on imported petroleum at a time when the Pakistani economy is on the edge of bankruptcy.

"Our current account deficit is growing," said Ahsan Iqbal, Pakistan's minister for planning and development, whose ministry is pushing the energy conservation campaign. We need to conserve every penny we can, and this plan is one answer."



RISING FUEL PRICES IN PAKISTAN

The Pakistani government's concern over rising energy prices originates from increased spending on imported petroleum. According to the government's annual economic study, Pakistan's oil import bill climbed by 95.9 percent to USD 17.03 billion from July 2021 to April 2022, up from USD 8.69 billion in the previous year. According to the poll, the astonishing growth is due to "higher oil prices in the global market...[and] massive depreciation of the Pakistani rupee [which] is making oil more expensive, triggering external sector pressure, and widening the country's

Under this proposal, Pakistan may save up to 15% of its energy and reduce its soaring import cost. The government is serious about the plan, and it is now being implemented.



Sardar Mohazzam

trade deficit."

While the government has set a date of July 1 for early market closures, deadlines for the remaining steps have yet to be announced.

Mohazzam stated that adopting these steps ahead of Pakistan's peak energy consumption in the summer months - which normally more than doubles to 29,000 MW in the summer months compared to 12,000 MW in the winter months, owing primarily to the usage of fans in the heat - will have a "significant impact."

However, while the government lays out its stance on energy conservation, concerns of execution and market resistance linger, and analysts wonder what the government is doing to reduce Pakistan's long-term reliance on fossil fuels.

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Obtaining support from Pakistan's provinces Despite the fact that Pakistan's energy efficiency plan was originally published six months ago, no specific timeframe for steps to be implemented was set, and execution has been a serious hurdle for the federal government. For example, after the policy's release, markets have stayed open at usual hours. The government's recent announcement of the 1 July deadline at a news conference suggests that the policy changes outlined six months ago are simply on paper.

Pakistan's defence minister, Khawaja Asif, told The Third Pole that the delay between the initial policy announcement and the July deadline was due to the difficulty in obtaining support from all province governments for the energy conservation plan. "We had a policy, and it was a particularly comprehensive one when it came to power," he explained, "but some provinces were not on board and actually mocked the policy."

Significant powers, including legislative and budgetary autonomy, have been delegated from the central government to the provinces with the enactment of the 18th Amendment to Pakistan's constitution in 2010.

"We proposed [the energy conservation policy] last year, when Pervez Elahi was chief minister of Punjab province." But there was a lot of opposition in Punjab," Asif stated.

Pervez Elahi is a member of the party of former Prime Minister Imran Khan. A political crisis in Pakistan has erupted since the expulsion of Imran Khan in April 2022, with the present administration and Khan's party at odds. When asked how the central government intends to persuade provincial governments to support the energy conservation plan, minister Ahsan Iqbal responded, "It is for this reason that we have referred the cabinet's decision [on the energy plan] to the National Economic Council." The provinces' chief ministers are now a party to the decision since the Council includes them." "None of us can afford to stay on this path any longer." We have the provinces' support and hope they will take a move in the right path," he continued.



THE ENERGY SAVING INITIATIVE HAS BEEN MET WITH CRITICISM AND OPPOSITION.

Sardar Mohazzam of the NEECA told The Third Pole that encouraging individuals to modify their attitude is still difficult. Commercial marketplaces in Pakistan frequently open late in the day and close late at night, making the government's move to require 8pm closures a difficult pill for traders to chew

"Implementing such measures necessitates a careful examination of the current political economy and social circumstances," Mohazzam stated.



Malik stated that the government should address the significant issue of circular debt in Pakistan's electricity industry, which she estimated to be worth USD 15 billion.

This refers to the recurring issue of unpaid electricity bills and inefficiencies in the energy sector, which involves a cycle in which power generation companies face payment delays, resulting in a lack of funds for fuel purchase and maintenance, ultimately affecting power supply and exacerbating the debt problem. Malik further observed that, in comparison to other nations, the quantity of energy utilised by each person in Pakistan is not large.

According to Shaheera Tahir, a researcher at the **Policy Research Institute for Equitable Development (PRIED)** in Islamabad, while the government's emphasis on energy conservation and efficiency is encouraging, the plan was implemented "after the crisis had already hit."



Shaheera Tahir, Researcher at PRIED

"By 2025, the plan aims to save 3 million tonnes of oil equivalent [a unit that quantifies the amount of energy released when one tonne of crude oil is burned]." "However, with the current pace of work, meeting the targets on time appears difficult," Tahir remarked. It was noted that while behavioral change initiatives appear promising, the efficient generation of power is being disregarded in present plans. "Coal is not discussed at all because of its negative environmental and social impacts." Despite the low efficiency of Thar coal [extracted in Pakistan's Thar area], we are seeing the construction of new power plants," Tahir remarked.

Saadia Qayyum, an energy specialist, voiced reservations about the plan's execution. "The plan has the right contours and the right intentions in place, but there is a question

mark about implementation: how are the authorities going to replace the fans or get the building codes implemented?"



Saadia Qayyum, Energy specialist

"There is a lack of capacity in the institutions," she explained. "We are quite late in realising the importance of energy efficiency." According to Pakistan's leadership, the energy plan must be implemented now or never. When asked about the implementation of the energy conservation plan, minister Ahsan Iqbal stated that it is one component of a larger approach.

"When you're bleeding, you need both emergency care and long-term therapy." They do not contradict each other. We need a speedy response to stop the bleeding in our economy, which is why this plan exists," Iqbal explained.

"This plan is different [than previous ones]

because there is a lot of pressure on." The monetary challenge is a powerful imperative. It will be a calamity if we do not improve our energy usage and consumption."

When The Third Pole brought up the fact that locally produced coal, particularly lignite, is very polluting, Iqbal said, "We are using ultra supercritical technology in these coal plants, so they have lower emissions." As technology advances, we are producing clean coal. The next generation of coal plants is environmentally friendly. We will utilise this energy as a base load and supplement it with solar and wind power."

When asked to put the minister's remark about 'clean coal' into context, environmental lawyer Ahmad Rafay Alam said, "What the hell is clean coal?" It's like saying mild smokes are good for you! This coal is everything but clean. According to a research conducted by the Centre of Research for Energy and Clean Air in 2020, up to 30,000 people might die prematurely as a result of air pollution emitted by Thar's coal plants. Consuming coal simply because we [Pakistan] have it is not a convincing argument. We have abundance of renewables, such as sun and solar, which are less expensive than other sources of power produced in Pakistan."



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13 ENERGY PROJECTS APPROVED DESPITE A LOW BID RESPONSE.

ISLAMABAD: The federal government has approved the implementation of 13 old renewable energy (RE) projects totaling 700 megawatts, known as Category-III projects, and has referred the matter to the Council of Common Interests (CCI) for formal approval, after bidding for a lot of 600MW solar projects in Muzaffargarh received a low investor response.

According to informed sources, a special cabinet committee led by Defence Minister Khawaja Asif recommended that the sponsors of 13 proposed RE plants in solar and wind technologies in Cat-III with tariffs approved by the National Electric Power Regulatory Authority (Nepa) be given the green light to begin developing their projects.

Power Minister Khurram Dastgir Khan, Commerce Minister Syed Naveed Qamar, and Human Rights Minister Riaz Hussain Pirzada were also members of the committee.

According to these sources, a meeting of the Cabinet Committee on Energy (CCOE) convened by Prime Minister Shehbaz Sharif last week backed the action and resolved to send the subject to the CCI due to the scheme's inter-provincial character.

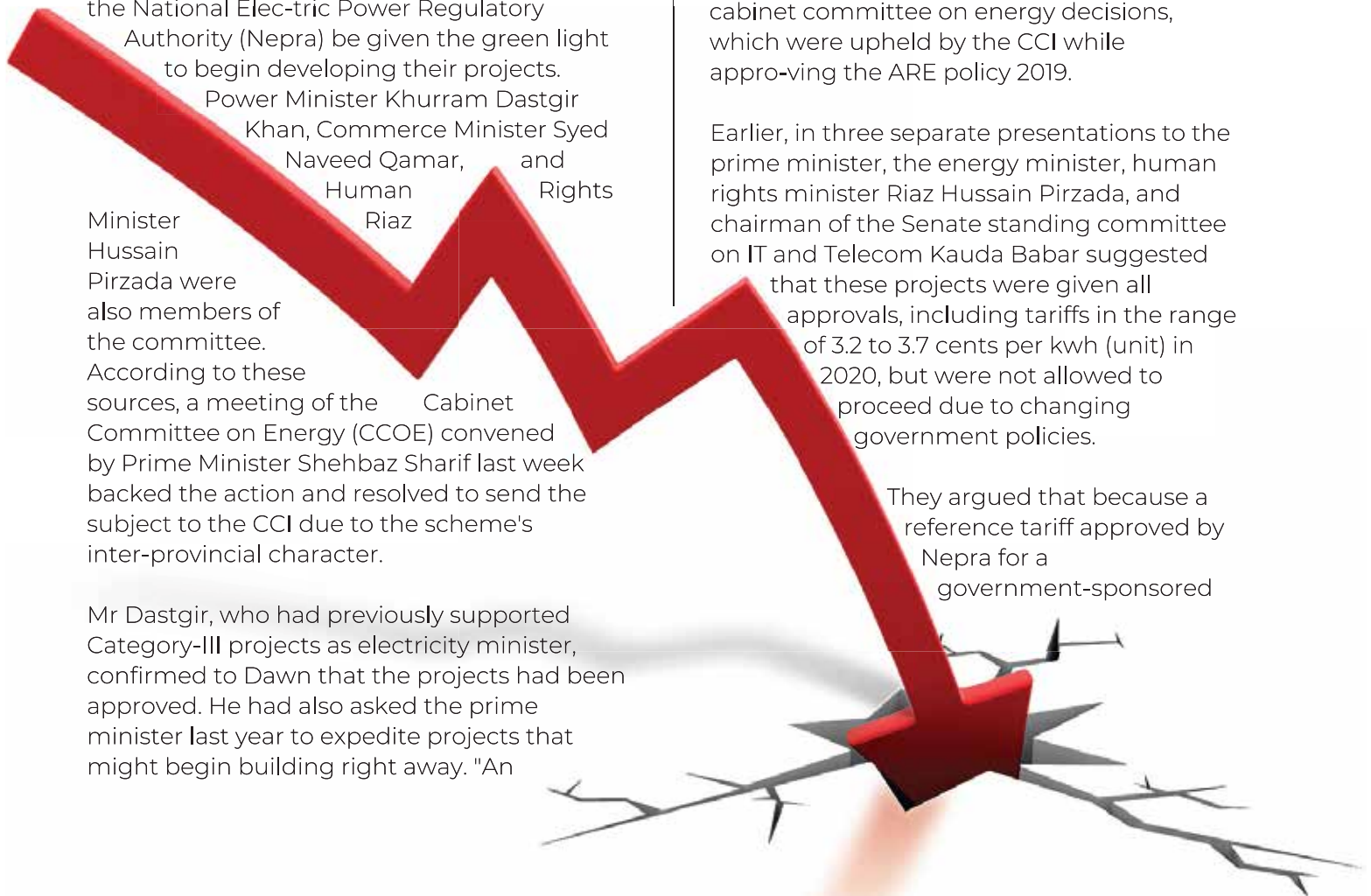
Mr Dastgir, who had previously supported Category-III projects as electricity minister, confirmed to Dawn that the projects had been approved. He had also asked the prime minister last year to expedite projects that might begin building right away. "An

inter-ministerial committee on stalled renewable energy projects formed by PM Shehbaz Sharif has submitted its report to the prime minister, with the recommendation that the report be put before the Council of Common Interests," he added.

In 2017-18, Nepa authorized the tariffs for these 13 Category-III solar and wind power projects with a combined capacity of 680MW, however development has yet to begin due to red tape. Interestingly, the Alternative Energy Development Board (AEDB) claimed as one of its responsibilities the development of alternative and renewable energy (ARE) projects listed under Category-III of the cabinet committee on energy decisions, which were upheld by the CCI while approving the ARE policy 2019.

Earlier, in three separate presentations to the prime minister, the energy minister, human rights minister Riaz Hussain Pirzada, and chairman of the Senate standing committee on IT and Telecom Kauda Babar suggested that these projects were given all approvals, including tariffs in the range of 3.2 to 3.7 cents per kwh (unit) in 2020, but were not allowed to proceed due to changing government policies.

They argued that because a reference tariff approved by Nepa for a government-sponsored



solar power block of 600mw at Muzaffargarh in Punjab was also in the same range and was still facing bidding and financial challenges, the private sector sponsors of 13 old projects in Sindh, KP, and Balochistan should be allowed to set up their plants to provide consumers with cheaper and cleaner energy. The government only recently re-advertised the 600MW Muzaffargarh solar power project. They reported that over \$600 million in investments appeared to be met with bureaucratic opposition. In October, Power Minister Khurram Dastgir recommended to Prime Minister Narendra Modi that "approval of Category-III projects... will be a swift jump towards renewable energy." In January, however, the prime minister formed a special committee on the topic, chaired by Khwaja Asif.

Minister Pirzada, a committee member, had stated that Shahjahan Mirza, CEO of AEDB/Private Power & Infrastructure Board, had been unable to provide any credible proposals and was "dragging his foot in typical

bureaucratic style."

According to Pirzada, the Cat-III projects also included 680mw of 13 advance stage wind and solar projects that had completed all requisite milestones of letters of support (LOS) as per the Alternative Energy Policy of 2006 and were awarded Nepra tariffs in the range of 3.2 to 3.85 cents per unit, which is "lowest in the history of Pakistan" and should be allowed to proceed. Other projects on the list that just have letters of intent (LOIs) and land should be handled differently.

In a recent decision, the Nepra stated that the first round of bidding for Cat-III projects was not completed as required by the ARE Policy 2006 and the April 2019 cabinet decision, despite the fact that the regulator had set a benchmark tariff of Rs6 per unit with a 2.5pc annual indexation. "If the bidding had taken place at that time, the projects could have been constructed at a lower tariff and with no exposure to foreign exchange fluctuations for the entire duration of the projects."

Siemens completes its first solar project in Pakistan



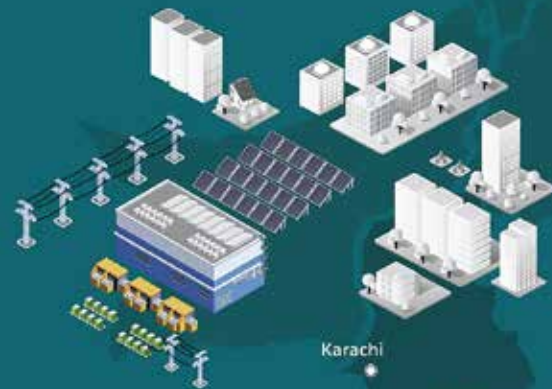
The **132 kilovolt-grid station** will transmit clean energy from Gharo solar plant, feeding it into K-Electric's power grid.



The project is needed to supply power for infrastructure development and residents of Karachi.



The grid station is equipped with **digital technology** that enhances controllability and reliability, while optimizing operating costs.





AGRIVOLTAICS AIMS TO ADDRESS PAKISTAN'S CHALLENGE OF MEETING FOOD AND ENERGY DEMANDS.

In a dramatic turn of events, Pakistani authorities successfully reached an agreement with the International Monetary Fund (IMF) just hours before the expiration of the previous program. This deal was crucial in avoiding a potential sovereign default, representing a significant breakthrough for the current government and the nation as a whole.

Following the IMF's announcement, financial support poured in from bilateral partners like Saudi Arabia and the United Arab Emirates, as well as multilateral institutions such as the World Bank and Asian Development Bank.

Despite the celebrations surrounding the resumption of the IMF facility, it's important to recognize that the nine-month Stand-By Agreement (SBA) only provides a temporary reprieve for the country. The \$3 billion disbursement in three tranches gives policymakers an opportunity to implement much-needed economic reforms that ensure sustainable, long-term growth and break free

from the cycle of economic instability.

One pressing concern for Pakistan is to build up foreign exchange reserves and control the outflow of foreign currency by reducing imports. While the recent fiscal year saw a decline in the import bill due to regulatory measures, being under an IMF program restricts the country's ability to manipulate trade controls in the future.

Although Pakistan's economy is heavily reliant on agriculture, the sector faces challenges such as low productivity and a decline in cultivatable land. As a result, the country continues to import agricultural products worth billions of US dollars. Similarly, Pakistan is a significant energy importer, spending billions on fuel imports each year.

To achieve self-sufficiency in food and energy, Pakistan must reduce its dependence on imports. One potential approach to achieving this goal is through agrivoltaics.

Agrivoltaics is a contemporary approach that combines agricultural practices, such as crop production, with solar energy production.

In this concept, solar panels are strategically placed above or alongside agricultural crops or livestock, creating a mutually beneficial synergy between agriculture and energy generation.

The idea of agrivoltaics emerged to address the competition for land between traditional agriculture and solar energy production, making it particularly suitable for countries like Pakistan, which possess high solar energy potential due to their geographic location and abundant sunlight.

One major advantage of agrivoltaics is its optimization of land usage, enabling farmers to generate renewable energy without compromising valuable agricultural land, a critical consideration in densely populated regions like Pakistan, where available land is

limited.

Research indicates that installing solar panels above crops can be advantageous for the plants, as the panels provide partial shading, mitigating the impact of extreme weather conditions such as direct sunlight, heatwaves, or heavy rain.

This shading helps control temperature and evaporation rates, leading to improved water retention and significantly reducing the need for irrigation. Moreover, certain crops, like leafy greens, herbs, and some fruits, actually thrive in partially shaded conditions.

Additionally, the solar power generated can be utilized on-site to power farm operations or fed back into the grid, thereby contributing to the overall renewable energy supply.

By embracing the increased usage of solar power, a crucial renewable energy source, Pakistan can reduce its carbon footprint and achieve its climate mitigation objectives.



PAKISTAN HAS AN UNMET 350,000MW POWER POTENTIAL.

The Knowledge Forum (TKF) and the Renewable Energy Coalition jointly hosted the event, titled "Energy Affordability in the Economic Crisis."

Energy, according to Prof. Dr. Qais Aslam of the University of Central Punjab (UCP) Business School in Lahore, is currently what separates industrialized economies from less developed ones. He noted that "the energy in Pakistan is neither cheap nor clean, driving up the cost of living, the cost of doing business, and the cost of consumption." He added that Pakistan has an unrealized capacity for producing 100,000 megawatts (MW) of electricity from Thar coal, 56,000 MW from hydropower, 150,000 MW from wind, and 50,000 MW from solar energy.

"Though there are hydro, solar, wind, waves, geysers, biogases, biomaterials, nuclear, coal, and gas resources here, the nation generates 60% of its electricity from imported oil. As a result, it spends desperately needed foreign currency, he added. The expert also mentioned line losses and electrical theft by the government, large corporations, and even the poor. According to him, this leads to a "vicious cycle of losses and inefficiency" that drives up the price of living and investing in Pakistan while driving up the cost of power use. The price of gas and power in Pakistan has increased as a result of the country's successive governments importing LNG at exorbitant prices. He said that as a remedy, Punjab should investigate adding more solar panels and building windmills all along the Makran Coast.

Dr. Sofia Anwar, dean of Government College University's Faculty of Economics and Management, spoke on how households deal with the energy issue. Because of the growing population and urbanisation, there is more demand for food, money, and transportation, according to the statement. "As more people choose to iron their clothing and refrigerate their food, energy usage is increasing. It takes energy to keep up with the speed of growth throughout time, she noted. She said, "And an increase in energy prices makes the budget constraint steeper.

As more and more households experience energy poverty, according to Dr. Khalid Waleed, research head for the Sustainable Development Policy Institute (SPDI), people are turning more and more frequently to traditional fuels like firewood, dip cakes, etc. According to him, the usage of such fuels contributes to indoor pollution, which can cause respiratory ailments.





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RENEWABLE ENERGY PRESENTS A SIGNIFICANT POSSIBILITY FOR EU-GULF COLLABORATION.

The EU's relations with the Gulf Cooperation Council members – Saudi Arabia, the United Arab Emirates, Qatar, Bahrain, Kuwait, and Oman — have been strong in several areas, including economics, security, and geopolitics. Nonetheless, there is a chance for the EU to improve its connections with the Gulf nations through more renewable energy cooperation. The GCC-EU relationship is founded on the Cooperation Agreement Document, which was signed in 1989 and included numerous areas, including commerce, investment, research, and regional cooperation, among others. The EU has also created various missions throughout the area to strengthen ties with the GCC, including the EU Delegation to Saudi Arabia, the EU Delegation to the United Arab Emirates, and the EU Delegation to Kuwait.

The EU-GCC Joint Cooperation Committee last year supported another agreement known as the Joint Cooperation Programme for the five-year period 2022-2027, which was a step in

the right direction. The EU appears to have realized that the GCC, which was formed to strengthen relations among its members, protect their sovereignty, and address general concerns about their affairs and interests, has evolved into a key international player capable of ushering in significant and positive changes not only in the region but also beyond.

The EU is the GCC's second-largest trading partner. According to the European Commission, "17.8 percent of GCC imports in 2020 came from the EU." As a result, the EU is the GCC's top import partner. In 2020, the EU was the GCC's fourth-largest export partner, accounting for 6.9 percent of total GCC exports. Total EU-GCC goods trade in 2020 was €97.1 billion (\$106 billion). The EU's imports were €29.6 billion, with petroleum and mining goods accounting for 62.8 percent (€18.6 billion) and chemicals accounting for 11.5 percent (€3.4 billion). The EU's exports reached €67.5 billion, with machinery and transport equipment accounting for 39.6 percent (€26.7

billion), chemicals accounting for 10.5 percent (10.4 billion), and agricultural and raw commodities accounting for 13.2 percent (€8.9 billion)."

The GCC has become a key international player that is capable of ushering in significant and positive changes
Dr. Majid Rafizadeh

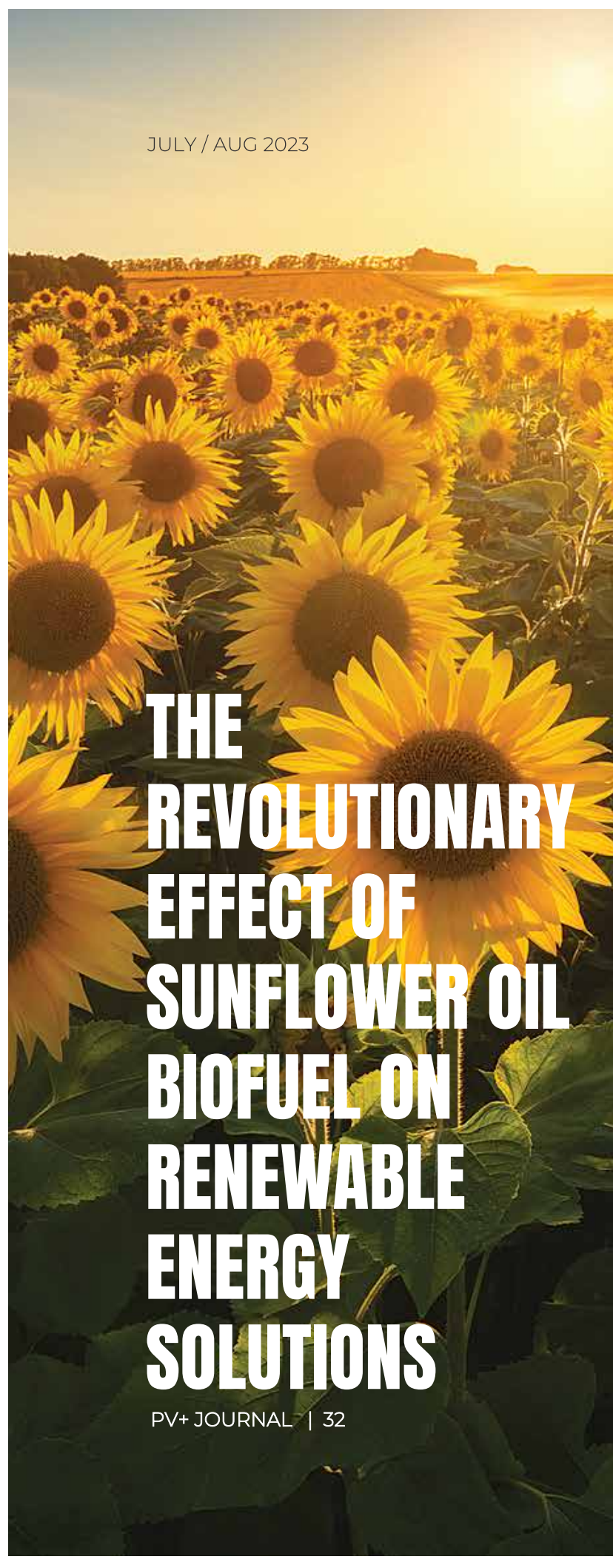
However, it is crucial to note that European leaders will be eager to discover other points of agreement on which to establish deeper and more constructive collaborations in other vital sectors, including renewable energy and climate change. For various reasons, the EU should seize this chance. To begin with, while the Gulf is well-known for its wealth of oil, it is also abundant in renewable energy resources such as wind and solar. Saudi Arabia, for example, is positioned in the centre of the so-called sun belt and hence has a high potential for solar energy production. Jeddah, Riyadh, and Dammam, three of the Kingdom's main cities, with an average irradiation of 5.78 kilowatt-hours per square metre per day, which is much higher than the world average. The second element is the Gulf countries' green goals and desire to combat climate change and reform their carbon-based economies. The area has seen a transformation in its awareness and acceptance of the fact that delaying action on climate change is no longer an option. Furthermore, there appears to be a growing recognition in the Gulf that technologies such as carbon capture and storage are required to maintain the oil business sustainable in the long run. There are also an increasing number of renewable energy projects and efforts in the Gulf. For example, Saudi Arabia and Bahrain have planned to increase the share of renewable energy in their energy mixes, while the UAE has committed to a 31% decrease in greenhouse gas emissions by 2030. Meanwhile, Saudi Arabia has unveiled

massively ambitious plans to develop NEOM, the world's first metropolis without roads - a strong indication of its resolve to reverse course in favour of a more ecologically friendly path. And Masdar's chairman, Sultan Al-Jaber, has stated that the UAE "aspires to play a central role in the emerging green hydrogen economy."

The EU-GCC Economic Diversification Dialogue, which has been ongoing since 2019, focuses on exchanging expertise and experience to aid in the advancement of economic diversification policies. This leads us to another important benefit associated with EU-Gulf collaboration and investment in renewable energy: economic diversification. This has been a top priority for all GCC economies since they began extracting oil from the ground.

Furthermore, collaboration with Gulf states on renewable energy would greatly help the EU by reducing swings in the energy process. For example, the pandemic provided the first glimpse of price volatility in the energy sector. As a result, the growth of domestic, knowledge-based enterprises may be regarded as an urgent economic requirement rather than a pleasant bonus. Furthermore, the EU is one of the leading producers of solar power goods, and the Middle East is an ideal option for broad deployment of solar panels as a sustainable energy source.





THE REVOLUTIONARY EFFECT OF SUNFLOWER OIL BIOFUEL ON RENEWABLE ENERGY SOLUTIONS

PV+ JOURNAL | 32

The revolutionary impact of sunflower oil biofuel on renewable energy technologies is causing a stir in the sector, offering a promising alternative to conventional fossil fuels. As the world confronts the ever-increasing threat of climate change, the urgent need for sustainable and environmentally friendly energy sources has never been more pronounced. In the quest for green energy solutions, the remarkable potential of sunflower oil biofuel has emerged, poised to transform the renewable energy landscape.

Sunflower oil biofuel originates from the plentifully cultivated sunflower seeds worldwide. Its production involves a process called transesterification, in which sunflower oil reacts with alcohol to yield biodiesel and glycerol. The resulting biodiesel proves to be an eco-friendly and clean-burning renewable energy source that can seamlessly power diesel engines without requiring any adjustments.

The advantages of sunflower oil biofuel are diverse. Firstly, it offers a renewable energy source, ensuring continuous replenishment over time. Unlike fossil fuels, which deplete rapidly and take millions of years to form, sunflower oil biofuel is sustainable and can be continuously produced without harming the environment. Secondly, sunflower oil biofuel is carbon-neutral. The carbon dioxide released during its combustion is balanced by the amount absorbed by sunflowers during their growth, resulting in a net zero carbon footprint. This stands in stark contrast to fossil fuels, which release substantial amounts of carbon dioxide and other greenhouse gases, contributing to global warming and climate change. Furthermore, sunflower oil biofuel is less harmful to both human health and the environment compared to conventional diesel fuel. It poses lower risks in the event of spills or

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leaks and is more biodegradable. Additionally, the byproduct of biodiesel production, glycerol, finds application in various industries like cosmetics, pharmaceuticals, and food, enhancing the economic viability of sunflower oil biofuel.

The renewable energy sector has taken notice of the considerable potential of sunflower oil biofuel. Numerous countries, including the United States, Brazil, and European nations, are making substantial investments in research and development to optimize the production process and transform this biofuel into a commercially viable alternative to fossil fuels. Nonetheless, the path to widespread adoption of sunflower oil biofuel is not without challenges. Currently, the production process is more costly compared to conventional

diesel fuel, and there are concerns regarding the land use implications of cultivating sunflowers for biofuel production.

Nevertheless, ongoing research and technological advancements are expected to tackle these obstacles and open the doors for the extensive use of sunflower oil biofuel. In conclusion, sunflower oil biofuel represents a groundbreaking innovation in the renewable energy sector. Its potential to offer a sustainable, carbon-neutral, and less toxic alternative to fossil fuels positions it as a promising contender for the future of green energy. As research and development efforts persist, there is optimism that sunflower oil biofuel will play a pivotal role in driving the global transition towards a cleaner, greener, and more sustainable energy future.



WILL LOCAL AMBITION HELP OR HINDER THE GLOBAL ENERGY TRANSITION?

THE INFLATION REDUCTION ACT HAS FUELED A RENEWABLES COMPETITION, BUT IT MAY DISTORT INTERNATIONAL CAPITAL ALLOCATION AND CHANGE NET-ZERO TARGETS.



The global renewables industry is poised to take a giant leap ahead, as the desire for energy security and the current economic downturn combine to provide an excellent investment environment. Worldwide rivalry for gas supply, as well as legacy price ties between natural gas and renewables, have made markets increasingly conscious of the challenges posed by reliance on imported energy, worldwide competition for gas supply, and legacy pricing links between natural gas and renewables. As a result, adopting policies to stimulate the development of — and investment in — renewables has quickly surged to the top of political agendas.

Markets all around the globe are enacting legislation to increase domestic renewables generation and improve energy security, with the US Inflation Reduction Act being the most significant to yet. It provides a variety of incentives, credits, and subsidies for the research and commercialization of green technology, igniting a race to the top among worldwide markets keen to increase the competitiveness of their renewables industries. In response, major economies like as the European Union, China, and India have increased investment and upped renewables

ambitions.

Increased competition should hasten the development of emerging green technology and hasten the energy transition. However, other markets are concerned that they may fall further behind. While domestic renewable energy has the potential to accelerate the wider economies of markets, the additional demand on supply chains will need the formation of new alliances — and soon.

Despite these doubts, rising regulatory support for renewables is presenting a once-in-a-lifetime opportunity for the sector to boost demand and speed the global decarbonization push.

THE INFLUENCE OF MARKET ACTIVITIES ON GLOBAL NET-ZERO GOALS

Policy support for locally produced renewables brings with it both obstacles and opportunity. Domestically produced, low-cost, low-carbon, and, in certain circumstances, low-lead time energy based on local technology appears more appealing than ever to governments

throughout the world, with renewables at the centre of their energy plans.

For example, the US Inflation Reduction Act (the Act) prioritizes energy security and climate change with a combined investment of \$369 billion. Wind, solar, energy storage, carbon capture, utilization, and storage, clean hydrogen production, renewable natural gas, nuclear, and electric cars are all expected to benefit from the Act's incentives, credits, and subsidies. More than \$150 billion in capital investment has flooded into utility-scale projects in the first eight months following its adoption in August 2022 leading clean energy in the United States.

Foreign corporations have announced additional US renewable energy investments,



raising concerns that the Act may generate an imbalance in international capital allocation. As a result, other significant markets have had to react quickly to the legislation's possible implications.

The European Commission's relaxation of state-aid laws to ease subsidies for batteries, solar panels, wind turbines, heat pumps, electrolyzers, and carbon capture technologies, as well as the components and raw materials required to build them, is a great example. The European Union's REPowerEU programme was already aiming to improve energy security

by replacing Russian natural gas imports with renewables, hydrogen, and biomethane. The United Kingdom is likewise contemplating energy changes to separate gas and electricity.

To encourage investment in decarbonization, market competition is required to accelerate technical developments and reduce costs. This will help the worldwide energy shift.

India is boosting its renewables industry through a combination of aggressive government objectives and private-sector initiatives, while China is increasing activity in its dominating domestic market while focusing on exports where it already has a competitive edge, such as solar components. Other Asian markets, such as Malaysia and Indonesia, are considering how to keep local solar industry thriving in the face of rising competition from larger economies. Such competition has the potential to accelerate technology advancements and reduce prices, which should aid the energy transition and encourage the investment required to decarbonize and limit global temperature rises. Markets relying on renewables to help pull their economy out of a slump may gain from the need to develop local supply chains, creating employment, growing diverse businesses, raising GDP, and improving people's wellbeing.

However, if net-zero objectives are not to be missed, localized supply networks must be quickly developed or improved. Building these out will necessitate the formation of new organizations and alliances, which will take time, especially given that the International Monetary Fund anticipates economic growth to decrease in 2023 and only modestly rise in 2024.

Despite the modest growth forecast, the

investment environment for low-carbon technology has evolved in recent years as nations recover from the COVID-19 epidemic while setting increasingly aggressive decarbonization objectives. After seeing sustained double-digit growth for the first two years, energy transition transaction volumes have burst in the last two years, with additional growth forecast as money continues to pour into the industry. Following a record year in 2021, deal volumes across all investor segments in North America remained robust in 2022, although with a slight decrease in total volumes.

From Egypt's wind goals to Japan's desire to raise solar PV market share, these are the key developments. Developing policies to stimulate the deployment of renewables has moved to the top of many governments' priorities, and the need for energy security in a downturn has offered a plausible opportunity for large investment.

BREAKTHROUGHS ACROSS THE WORLD



NORMALIZED INDEX

Showcasing markets performing above expectations for their economic size. The RECAI uses various criteria to compare the attractiveness of renewables markets, such as the magnitude of development pipeline, that reflect the absolute size of the renewable investment opportunity. Hence, the index naturally benefits large economies. By normalizing with the gross domestic product, we can see which markets are performing above expectations for their economic size. In this way, the normalized index helps reveal ambitious plans in smaller economies, creating some attractive alternatives for potential investors.

FOSSIL FUEL ENERGY PRODUCTION HAS INCREASED. BUT RENEWABLES ARE ACCELERATING FASTER.



Year-on-year change in electricity generation in EU countries, by fuel type, Jan-Aug 2022 (TWh)

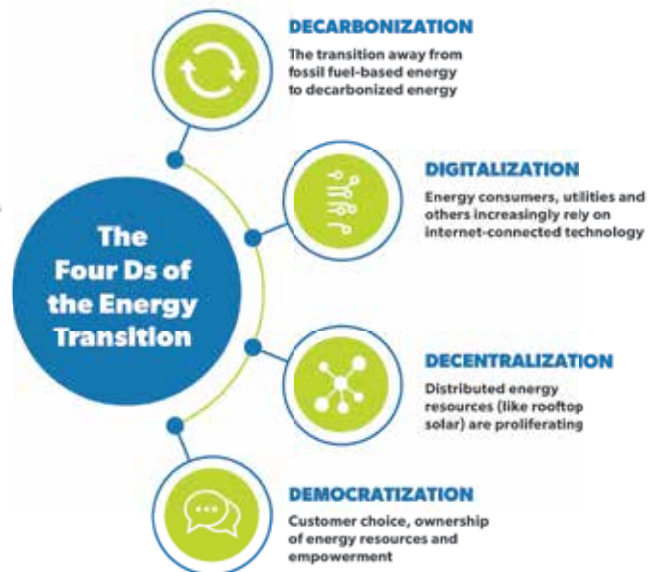
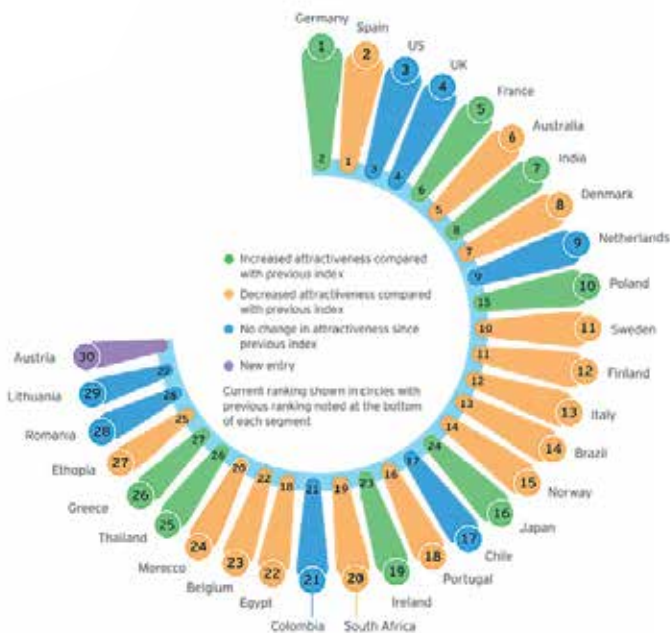
CORPORATE PPAS TRIUMPH ACROSS EUROPE DESPITE A DIFFICULT YEAR.

Prices have fallen as global markets have stabilised, and the PPA market is becoming more balanced. Corporate power purchase agreements (PPAs) will greatly outnumber utility PPAs in Europe by 2022, both in terms of capacity (7GW vs. 8.4GW) and transaction quantity (129 vs. 161 deals). This pattern is predicted to spread to other regions of the planet.

However, the previous year has not been easy for corporates, with unpredictable, sky-high pricing - combined with project scarcity - tipping the market in favour of sellers. Inflation also had an impact on PPA price structures, with few developers agreeing to no indexation - a restriction that has now been relaxed, with most now adopting flat nominal pricing.

Prices plummeted dramatically when global markets calmed in early 2023, and the PPA market began to rebalance. With wholesale power price futures generally decreasing in many markets relative to current prices, some countries at risk of increased cannibalization of renewables' capture prices, and developers needing long-term revenue security, the power of a long-term PPA is driving sellers back to corporates.

As "shaping" prices soar, physical and sleeved PPAs are losing appeal, while pay-as-you-go virtual PPAs have becoming the norm in many deregulated markets.



A **BOOM** IN THE
DEPLOYMENT OF
RENEWABLE ENERGY
PUTS THE
GLOBAL POWER
GRID ON
COURSE FOR THE
IEA'S **NET-ZERO**
ROADMAP.

According to the most recent analysis from RMI and the Bezos Earth Fund, the global energy grid can support ambitious net-zero paths by 2030 thanks to the rapid increase of solar, wind, and battery deployment. This rapid increase in renewable power is bringing about a number of positive outcomes, including more employment opportunities and supply security while also reducing the inflation of energy prices.

Additional study from Systems Change Lab, also released today, reveals that eight nations have already increased solar and wind power more quickly than what is required to keep global warming to 1.5°C, demonstrating the feasibility of a quick switch to renewable energy.

According to RMI, solar and wind power will provide almost a third of all worldwide electricity by 2030, up from about 12% in early July 2023. According to projections, solar and wind power generation will increase to 12,000–14,000 TWh by 2030, a 3–4 fold increase over 2022 levels. Additionally, it would go beyond prior demands made in the lead-up to COP28 for a doubling of all renewable energy capacity by 2030.

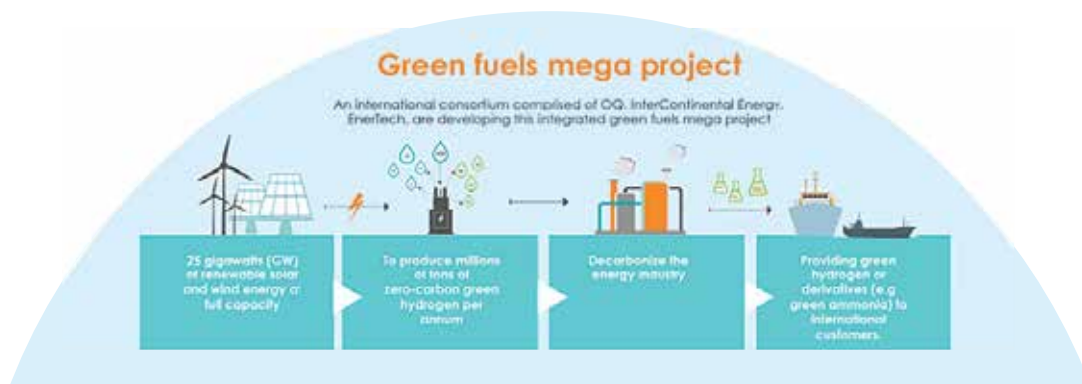
According to RMI study, as renewable power continues to outcompete hydrocarbons on price, the demand for electricity from fossil fuels will sharply drop, falling as much as 30%

from the high in 2022 by 2030.

According to research, China and Europe are leading the way in the adoption of sustainable energy technologies at a rate of exponential development. Nevertheless, there is a growing worldwide distribution of renewable energy deployment. By 2030, the combined global share of wind and solar energy has to climb by 29 percentage points, from 12% to 41%. According to RMI, the historically cheapest source of power will almost half in price once again by 2030, from over \$40 MWh to as little as \$20 MWh for solar.

Over the past ten years, the cost of renewable power has fallen precipitously, eliminating a significant obstacle to its broad adoption. According to BNEF statistics, costs for solar and batteries have decreased by 80% between 2012 and 2022, while costs for offshore and onshore wind have decreased by 73% and 57%, respectively.

"Clean energy's exponential expansion is an inexorable force that will increase consumers' purchasing power. Greater energy security and independence as well as long-term energy price deflation are advantages of fast renewable deployment, according to Kingsmill Bond, Senior Principal, RMI. "This is a manufactured technology. The more you install, the cheaper it gets," Bond added.



OMAN'S VAST RENEWABLE HYDROGEN POTENTIAL CAN PROVIDE SEVERAL BENEFITS ON ITS PATH TO NET ZERO EMISSIONS.

A RECENT IEA RESEARCH DELIVERED TO THE OMANI MINISTER DEMONSTRATES HOW OMAN'S ABUNDANT RENEWABLE RESOURCES AND LARGE GEOGRAPHICAL EXPANSES MIGHT POSITION THE COUNTRY AS A COMPETITIVE LOW-EMISSIONS HYDROGEN PROVIDER BY 2030.

According to a new IEA report released today, Oman's high-quality renewable energy resources and vast tracts of available land position it well to produce large quantities of low-emissions hydrogen - a fledgling industry today that can attract investment to diversify and expand the country's export revenues while reducing natural gas consumption and emissions.

During a roundtable discussion with top IEA officials and analysts at the Agency's headquarters in Paris, IEA Executive Director



Happenings

Fatih Birol delivered the new research, Renewable Hydrogen from Oman: A Producer Economy in Transition, to Oman's Minister of Energy and Minerals Salim Al Aufi. It is the first IEA analysis of its type to examine renewable hydrogen possibilities in a country that produces fossil fuels. The research relies on the IEA's continuing technical cooperation with Oman to help the country transition to a sustainable energy future. Oman wants to create at least one million tonnes of renewable hydrogen per year by 2030, up to 3.75 million



tonnes by 2040, and up to 8.5 million tonnes by 2050, which would be more than Europe's total hydrogen need today. In energy-equivalent terms, the 2040 hydrogen aim would represent 80% of Oman's current LNG exports, while the 2050 target would almost treble them.

"Oman is an oil and gas producer country that is taking an enlightened approach to its energy future, with a clear long-term vision and strong net zero ambitions," Dr Birol added.

"Renewable hydrogen is set to bring multiple benefits to Oman due to its enormous potential for low-cost solar and wind energy."

The IEA is delighted to be collaborating with Oman on policy and technical issues as the country advances on its path to a net zero economy and demonstrates to other producer countries what is feasible."

"From an energy standpoint, Oman is better known for its oil and gas development, but it is

also blessed with globally competitive solar and wind energy resources, and the most economically rational action for us is to embark on using this as the most viable and sustainable energy of tomorrow, including decarbonizing power generation, local industry, and hydrogen production for export," Minister Al Afi said. "We're delighted to be collaborating with the IEA on critical aspects of our transition, and we're encouraged by the insights provided by this report."

Oil and gas now make for over 60% of Oman's export revenue, while domestic natural gas provides for more than 95% of the country's electrical generation. Oman established a target of net zero emissions by 2050 in 2022 and began lowering the usage of fossil fuels in its domestic energy mix. According to an IEA estimate of the current worldwide project pipeline, Oman is on course to become the world's sixth biggest exporter of hydrogen and the Middle East's largest by 2030.

Oman's hydrogen projects will extract hydrogen from desalinated sea water using electrolyzers driven by renewable electricity. Oman has excellent solar PV and onshore wind resources, as well as massive quantities of suitable land for large-scale projects. It is also strategically located along key market routes connecting Europe and Asia, with existing fossil fuel infrastructure that may be utilized or repurposed for low-emissions fuels. Oman has substantial experience managing and exporting LNG and ammonia, both of which are immediately relevant to renewable hydrogen and hydrogen-based fuels. Oman is putting tangible steps in place to meet its lofty goals. In 2022, the government formed Hydrogen Oman (HYDROM) as an autonomous body to lead and administer its hydrogen policy. So far, 1 500 square kilometres of land have been set aside for development by 2030, with up to 40 times more territory identified for potential

long-term production. Six projects for renewable hydrogen have already been given land in the country's first such auction procedure.

Oman's renewable hydrogen exports would most likely be carried in the form of ammonia at first. While Oman already exports around 200 000 tonnes of ammonia per year, if it wants to become a significant international hydrogen supplier by 2030, its ammonia export capacity would need to be 20 to 30 times higher, requiring significant and timely investment, particularly in storage tanks and dedicated deepwater jetties.

Meeting Oman's hydrogen ambitions will necessitate a tremendous increase in renewable energy, with about 50 terawatt-hours of electricity required to reach the 2030 target, which is larger than the whole country's present electrical grid. This is intended to increase cost savings while also benefiting the country's electricity grid. Based on recently granted bid pricing in the region, utility solar PV and wind are likely already competitive with natural gas-fired electricity generation in Oman. According to the IEA report's estimate, Oman can accomplish its objectives of renewables reaching 20% of the country's power mix by 2030 - and 39% by 2040 - at a low cost.

To increase renewable hydrogen generation in Oman to 1 million tonnes by 2030, a total expenditure of roughly USD 33 billion will be required. According to the analysis, an extra USD 4 billion would be necessary to increase renewables' contribution in the national power mix to 20%. Achieving its goals and using one-third of renewable hydrogen for residential use will considerably help Oman's clean energy transition. The advantages include lowering domestic natural gas use by 3 billion cubic metres per year and eliminating 7 million tonnes of carbon dioxide emissions.

JULY / AUG 2023

Cover Story.

Welcome to the inaugural Pakistan Sustainability Week, a groundbreaking event set to take place from September 7th to 9th, 2023. This transformative week-long gathering will feature two remarkable exhibitions, namely "Solar Pakistan" and "Electricity Pakistan," showcasing cutting-edge advancements in renewable energy and electricity solutions. Join us as we pave the way for a more sustainable and energy-efficient future.





PAKISTAN SUSTAINABILITY WEEK

Alongside



A GREENER FUTURE AWAITS

OUR VISION

Pakistan Sustainability Week (PSW) is dedicated to accelerating global sustainable development in Pakistan and beyond.

Pakistan's geography is marked by vast open spaces, making it a prime location for Renewable Energy methods to flourish the country. Pakistan Sustainability Week will showcase various renewable energy sources contributing to the country's sustainable future such as Solar energy initiatives, Bioenergy projects, Hydro power and Wind Projects along with multiple innovative energy storage solutions.

WORKING TOWARDS A SAFER FUTURE

Energy is central to the climate crisis – and crucial to its resolution.

A major portion of the greenhouse gases that wrap the Earth and trap the sun's heat are produced by energy production, namely the combustion of fossil fuels to generate electricity and heat. Coal, oil, and gas are by far the most significant contributors to global climate change, accounting for more than 75% of world greenhouse gas emissions and almost 90% of total carbon dioxide emissions.

THE EVIDENCE IS CLEAR

To avert the worst effects of climate change, emissions must be cut in half by 2030 and reach net-zero by 2050. To do this, we must abandon our reliance on fossil fuels and invest in clean, accessible, inexpensive, sustainable, and dependable energy sources. Renewable energy sources, which are abundant all around us and are supplied by the sun, wind, water, waste, and heat from the Earth, are renewed by nature and produce little to no greenhouse gases or pollutants into the atmosphere.

Although fossil fuels continue to account for more than 80% of worldwide energy output, cleaner energy alternatives are gaining headway. Currently, renewable energy accounts for around 29 percent of total power production.

- 90% of the world's energy can come from renewable sources by 2050
- \$4.2 trillion potential annual savings due to reduced pollution.
- 85% decrease in cost of electricity due to solar power from 2010-2020.
- 99 million + of the population breathes polluted air today.
- 30 million new jobs can be created in the renewable energy sector.

	2001	2010	2020	2030	2040
Total Consumption (Million Tons Equivalent)	10,038	10,4549	11,425	12,352	13,310
Biomass	1080	1313	1791	2483	3271
Large Hydro	22.7	266	309	341	358
Geothermal	43.7	86	186	333	493
Small Hydro	9.5	19	49	106	189
Wind	4.7	44	266	542	688
Solar Thermal	4.1	1.5	66	244	480
Photovoltaic	0.1	2	24	221	784
Solar Thermal Electricity	0.1	0.4	3	16	68
Marine (Tidal/Wave/Ocean)	0.05	0.1	0.4	3	20
Total RES	1365,5	1745,5	2964,4	4289	6351
Renewable Energy Contribution Source (%)	13.6	16.6	23.6	34.7	47.7

(Source: Intechopen.com)

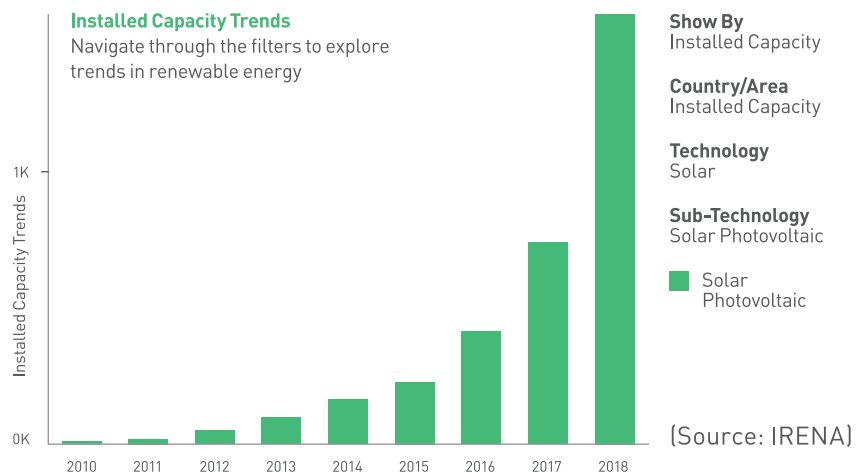
PAKISTAN – PUTTING IT INTO ACTION!

According to the National Electric Power Regulatory Authority's (NEPRA) 2021 yearly report, Pakistan's total installed power production capacity is 39772 MW, with thermal (fossil fuels) accounting for 63% of energy, hydro accounting for 25%, renewable (wind, solar, and biomass accounting for 5.4%), and nuclear accounting for 6.5%. Renewable energy (RE) resources have the potential to help close the shortfall in the current scenario. With the current government's emphasis on renewable energy, the Ministry of Energy has amended the existing Renewable Energy (RE) Policy 2019. According to the updated RE strategy, the government of Pakistan plans to obtain 60% of its energy from renewable sources, including hydro, by 2030, reducing Pakistan's reliance on imported petroleum products.

ABOUT SOLAR ENERGY

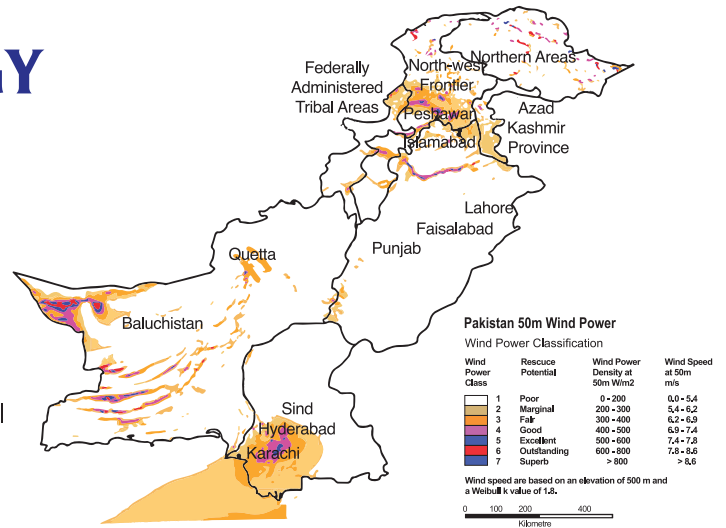
Average daily sunshine in Pakistan is nine and a half hours. After the government implemented a set of support policies to encourage the growth of renewable energy, solar power entered Pakistan's energy mix in 2013. According to the Pakistan Economic Survey, six solar power facilities with a combined capacity of 430 MW started operating commercially during the past five years and are presently supplying electricity to the grid. More businesses and industries in Pakistan are resorting to captive solar solutions as a result of increased power prices and an unstable grid supply. Larger cities have seen a sharp increase in the household installation of rooftop solar panels. Regulations for net metering for installations smaller than 1 MW went into force in September 2015. The GOP is aiming for at least 1 million subscribers and adding about 3000 MW of solar electricity through net metering, therefore this industry is headed towards rapid expansion shortly.

The World Bank has provided Sindh Solar Energy Project with \$100 million in financing to help independent power producers develop 400 MW of new solar power projects and provide partial grants to private sector companies for the commercial provision of Solar Home Systems to 200,000 households. This will increase renewable energy's share of Pakistan's energy mix.



ABOUT WIND ENERGY

Wind energy has significant potential in Pakistan's coastal belts of Sindh and Baluchistan (in southern Pakistan). The Pakistani government has created a wind energy corridor along the southern coasts of Sindh and Baluchistan. According to wind statistics published by Pakistan's Meteorological Department, Pakistan's coastal belt is 60km long (Gharo-Keti Bandar) and 180km long, with an exploitable potential of 50,000MW of energy generation via wind

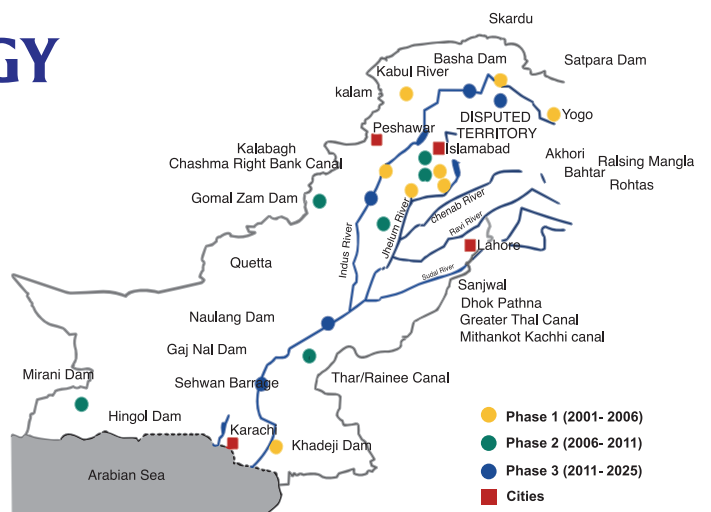


turbines. There are now 26 private wind farms in operation, totaling around 1335MW. In addition, ten wind projects totaling 510 MW have reached financial closure and are now under development. As the Government of Pakistan has adopted a RE Policy that aims to generate 60% of electricity from renewable resources by 2030.

Wind is mapped by the Pakistan Meteorological Department (PMD) and the National Renewable Energy Laboratories. Wind energy potential in Pakistan at 50 meters above sea level (ASL). Satellites and on-the-ground sensors provide this data. Wind studies conducted by the World Bank as part of ESMAP in Pakistan assisted in identifying the most essential places. Pakistan has a 300 GW wind energy potential.

ABOUT HYDRO ENERGY

With a revamped RE Policy, there is potential for the growth of small-mini-micro hydro power in addition to large hydro. GOP sees modest hydropower projects as a clean and affordable source of electricity. Small hydropower projects are mostly found in rural parts of Pakistan, notably in the north. GOP recently announced the Indicative Generation Capacity Expansion Plan (IGCEP), which defined new generation requirements based on capacity, fuel technology, and the use of



indigenous resources for power generation. This plan calls for the development of hydropower projects that will provide an extra 13000 MW of hydropower capacity by 2030, from a current capacity of 9000 MW - a 25% part of the whole mix.

WHAT IS PSW REALLY ABOUT?

PSW brings together leaders from various sectors, including heads of state, policy makers, industry leaders, investors, entrepreneurs, and youth, to discuss innovative solutions climate action. PSW provides a platform for stakeholders to share their experiences, showcase their sustainability initiatives, projects, learn from one another and collaborate on initiatives that promote sustainable development. The itinerary is filled with a series of conferences, workshops, and exhibitions, highlighting the latest trends in sustainable development and climate change mitigation.

One of the key objectives of Pakistan Sustainability Week is to raise awareness about the importance of sustainability and encourage attendees to take bold actions towards a sustainable future. Participants engage in lively discussions, sharing their own expertise, and exploring innovative approaches to sustainability as a team. The involvement of youth in the event is particularly crucial, students from local universities will be invited to showcase their ideas and creations, as they are the future leaders who will inherit the planet leading us into the new age of renewable technology. Our goal is to connect people from all walks of life and educate them about the importance of renewable energy.

PAKISTAN SUSTAINABILITY WEEK (PSW) – A REVOLUTION THAT IS POWERING OUR NATION TOWARDS A BRIGHTER TOMORROW!

HAPPENINGS

Pakistan Sustainability Week is going to be hosting the following concurrent events under its umbrella for the very first time in Pakistan.



13th International Renewable Energy Exhibition and Conference



6th International Exhibition for Energy Storage and Power industry

7-9 September 2023 | Karachi Expo Centre

The two events have a singular thing in common but with a vastly dynamic and informational playground regarding the renewable energy industry such as energy-efficient lighting solutions, promoting solar energy as a sustainable and viable alternative for power generation and focusing on the various aspects of electricity generation, distribution, and management. Helping create a healthier and greener planet.



JULY / AUG 2023

Tech - nology.

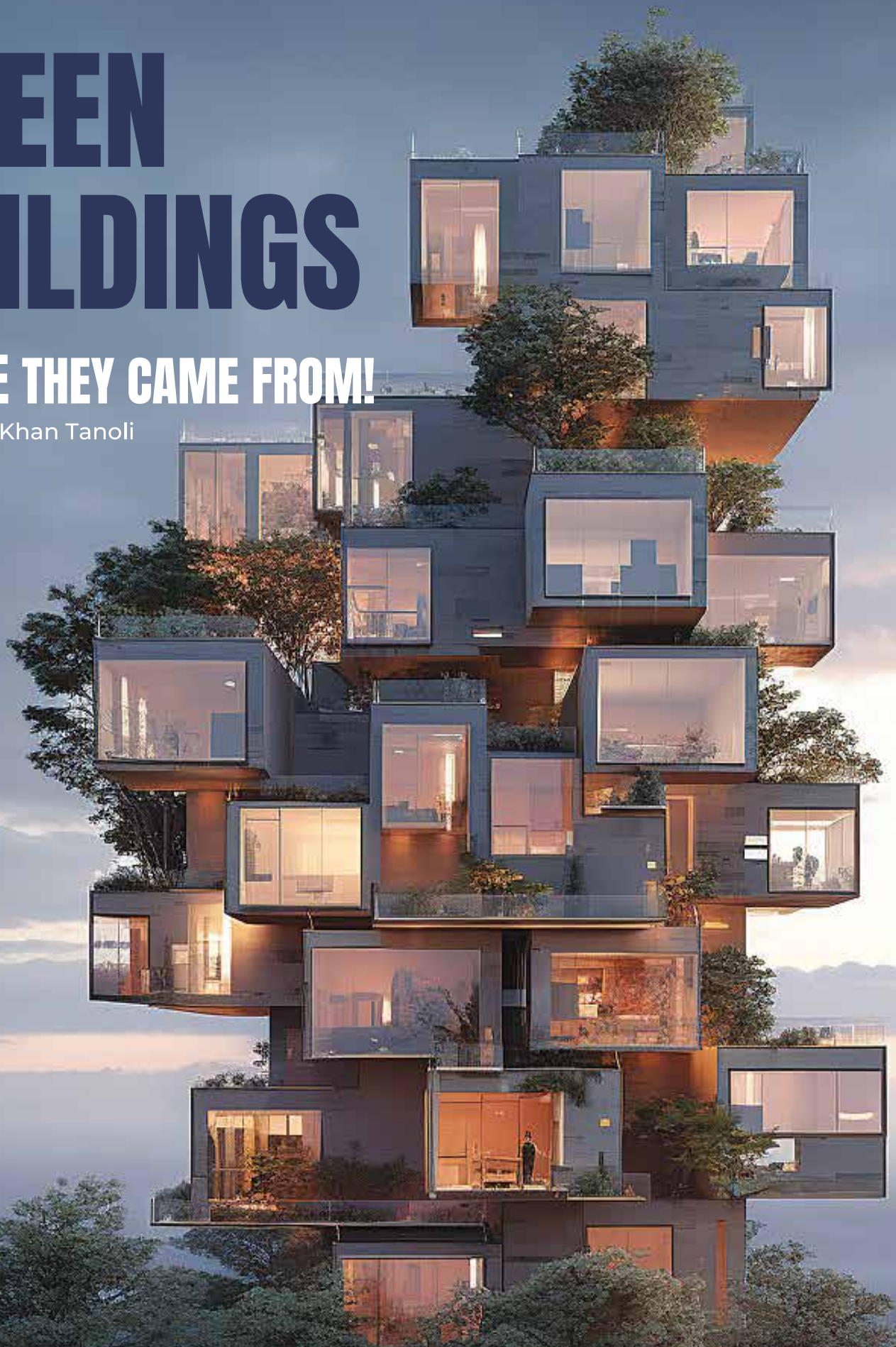
Step into the realm of innovation as we embark on a journey through the exciting world of clean energy technology. In this section, we delve into the latest advancements that are reshaping the energy landscape, showcasing the groundbreaking solutions and technologies that are driving us towards a sustainable future.



GREEN BUILDINGS

WHERE THEY CAME FROM!

By Saleem Khan Tanoli





Saleem Khan Tanoli

Editor in Chief | CEO, Fakt Group

As a passionate nature enthusiast finding solace in its embrace, I thrive on green landscapes that mirror my unwavering sustainability commitment. Deep love for my nation drives me, undoubtedly seen through both my personal and professional life. Advocating a greener future, I aspire to lead impactful clean energy ideas, nurturing both planet and homeland.

Green buildings, also known as sustainable or eco-friendly buildings, are at the forefront of the global movement towards environmental consciousness and resource conservation. These structures are thoughtfully designed and constructed to minimize their impact on the environment while promoting the health and well-being of occupants.

One key aspect of green buildings is their emphasis on energy efficiency. They incorporate innovative technologies such as solar panels, LED lighting, and advanced insulation to significantly reduce energy consumption. This not only lessens the burden

on the planet's resources but also results in lower utility bills for the building's occupants. Moreover, green buildings prioritize water conservation by implementing water-saving fixtures, rainwater harvesting systems, and efficient irrigation methods. This helps in mitigating water scarcity issues and reduces the strain on local water supplies.

Materials used in constructing green buildings are carefully chosen to have a minimal ecological footprint. Recycled and locally sourced materials are favored, reducing transportation-related emissions and promoting sustainable manufacturing practices.

Beyond their environmental benefits, green buildings foster a healthier indoor environment. Improved ventilation, non-toxic building materials, and abundant natural light enhance the overall well-being and productivity of the inhabitants. Studies have shown that such environments can positively impact occupant health, reducing sick days and enhancing overall quality of life. As the world becomes more conscious of climate change and environmental degradation, green buildings stand as a shining example of how sustainable practices can be seamlessly integrated into modern architecture. These structures offer a glimpse of a greener, more sustainable future, and their continued proliferation is crucial for a healthier planet and a brighter tomorrow.

A Foundation for Sustainable Architecture: Sun-Facing Orientation

Passive solar heating and solar energy, although essential aspects of "sustainable architectural design," do not receive much

relation to their inseparable issue of orientation towards the sun. I would like to explore the reasons behind the lack of popularity or neglect of this aspect.

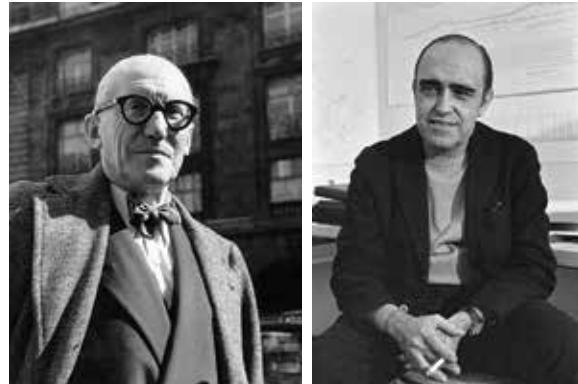
Traditionally, the orientation of living spaces towards the south-southeast (in the northern hemisphere) is a well-known practice. The longer sides of a building are oriented east-west to receive less inclined sun rays, while the shorter sides face east or west to capture more inclined sun rays. This orientation is favorable as it harnesses sunlight efficiently for natural heating, especially in colder climates.

Historically, the idea of south-facing buildings can be traced back to **Mies van der Rohe's** teachings at the Bauhaus, where examples of houses with living rooms exposed to sunlight from the south and southeast were showcased. However, before modernism, city planning was often formalistic and did not



Ludwig Mies van der Rohe
German-American Architect

consider sunlight as a crucial factor. Similarly, traditional architecture lacked the flexibility to choose the general orientation of buildings.



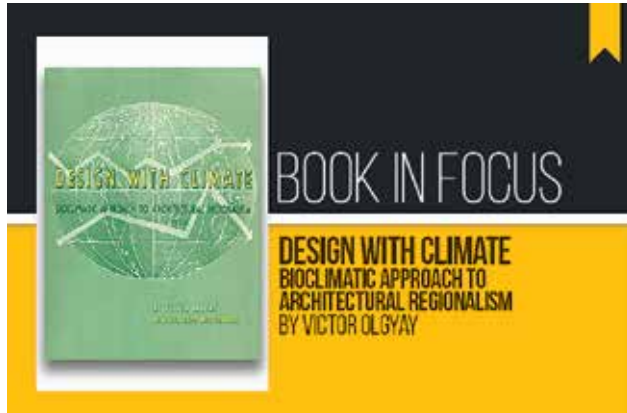
Le Corbusier
Swiss-French Architect

Oscar Niemeyer
Brazilian Architect

Le Corbusier, known for his formalistic approach, initially designed his high-rise cross plan housing blocks to allow for airplane passages. While he later adopted a north-south orientation for a project in Zlin, he still divided sunlight for both facades by insisting on double-loaded apartments for economic reasons. This led to confusion and a lack of consistency in his functional planning. Alternatively, some architects have advocated for north-facing orientations to avoid problems caused by direct sunlight. This approach, more prevalent in northern countries, utilizes diffused light from the north, akin to a sculptor's studio, but often lacks proper insulation.

After the interruption of Bauhaus education during World War II, the idea of south-oriented buildings seemed to fade. Le Corbusier's concepts gained more international recognition, as seen in the works of architects like **Niemeyer**. However, the excessive use of identical orientations in planned settlements led to monotony and totalitarian implications. Combining different orientations in one project, as seen in Parisian suburbs and some

eastern bloc developments, became a solution to address this issue.



Personal observations of various plattenbau (housing developments) revealed that north-south exposed linear blocks were well-maintained and economically viable in different parts of the world, including Istanbul. In contrast, east-west oriented blocks posed various problems such as heating issues in winter and excessive heat gain in summer, making sun control difficult.

In 1963, "**Design with Climate**" by **Victor Olgay** became a significant book that focused on environmental concerns and explained the disadvantages of west-east exposures and the advantages of south orientation for passive solar houses. Despite this knowledge, these principles have not been consistently applied in architecture, mainly due to site constraints. Architects may face challenges when the site's natural features force a west-oriented exposure.

The 1970s witnessed an energy crisis, and the use of inefficient glass architecture contributed to the problem. However, this crisis led to an intriguing architectural response known as post-modernism. Post-modernism reintroduced square windows alongside Le Corbusier's longitudinal

window, aiming to address the issues faced during that time.



Constantinos Apostolou Doxiadis
Greek Architect

Despite understanding correct building orientation thanks to Olgay, it appears these principles are not always applied in practice. The main hindrance seems to be the specific properties of the site. Architects may face challenges when designing buildings that are forced to have west exposure. Consequently, this raises questions about urban design and physical planning: Can cities be designed to promote environmentally sensitive and sustainable architecture? This is certainly achievable in planned new settlements.

Comparing different capital cities reveals varying attitudes towards orientation. Ankara's new plan, created by **Hermann Jansen**, adhered to the north-south direction with the Atatürk Boulevard, but lacked attention to building orientation. As a result, buildings in Ankara suffered from west exposure. Brasilia's plan, designed by Niemeyer, also neglected orientation, adopting a formalist bird wings plan, possibly influenced by Le Corbusier's concepts. Chandigarh, another city planned by Le Corbusier, employed a grid layout, surprisingly allowing for southeast-oriented architecture, although much of it remained unbuilt.

The most notable example of a well-planned orientation is **Doxiadis's** brilliant linear

planning for **Islamabad**. The carefully organized blocks and thoughtful arrangement of social spaces provided opportunities for southeast-oriented architecture in most lots, avoiding monotony in housing areas. Islamabad holds potential as a model for a sustainable city with its well-designed plan. It is hoped that this city can continue to develop while remaining a low-rise, exemplary illustration of sustainable urban development.

Implementation opportunities and challenges of the Policy Guidelines for the development of a Green Building Code in Pakistan



Sustainable Construction

Sustainable construction aims to transform the construction and infrastructure sector to achieve sustainable development while considering ecological, socioeconomic, and cultural aspects. On the other hand, green building involves adopting design approaches that are environmentally conscious and resource-efficient throughout a building's entire life cycle. The implementation of eco-friendly designs through integrated planning and collaboration among architects, engineers, city planners, contractors, policy makers, and clients can result in significant investments and an optimized design in terms of technology, materials, and energy conservation.

The introduction of Policy Guidelines for Green

Buildings in Pakistan reflects the immense potential they hold. These guidelines have been designed to support the achievement of Sustainable Development Goals within the construction industry. The national-level document, titled 'Policy Guideline for Green Building Code,' offers insights into how building construction can align with sustainable development objectives and serves as advisory guidance. Its main focus is on enhancing resource efficiency and promoting sustainable consumption and production practices. The development of this policy guideline was a collaborative effort involving key organizations such as the United Nations Environment Program (UN Environment), The European Union (EU), SWITCH-Asia Program, and the 10-year program on Sustainable Consumption & Production Patterns (10YFP) Secretariat. Financial support was provided by the United Nations Development Account (UNDA). Additionally, the Federal Ministry of Climate Change, Government of Pakistan, led the consultation process at the Federal and Provincial levels through the National SCP team.

This policy marks the initial stride by the Government of Pakistan towards raising awareness about sustainable buildings and actively addressing global climate change challenges. It outlines the essential criteria for eco-friendly buildings and offers an environmental standards checklist.

The pioneers of this movement are proud and gratified that the government has chosen the 'Sustainability in Energy & Environmental Development (SEED)' rating system, developed by the Pakistan GBC, as a reference for this benchmarking initiative aimed at promoting sustainability. The development of the 'Sustainability in Energy & Environmental Development (SEED)' rating system was made

possible through the continuous support and collaboration of many notable members, stakeholders, and leaders in Pakistan's construction industry. Notably, this rating system aligns with international building standards and fulfills the requirements of the Sustainable Development Goals (SDGs).

'Sustainability in Energy & Environmental Development (SEED)' stands as Pakistan's inaugural building rating tool, receiving recognition from the World Green Building Council as well. It emphasizes the significance of adhering to Green Building Design and Construction Guidelines, underscoring how such practices can enhance energy and water

Model Green Building Code Provisions for the Five Million Housing Programme in Pakistan

efficiency in both new and existing buildings. By doing so, it becomes a crucial step towards addressing Pakistan's energy and water crisis.

The Logistics

Pakistan is currently grappling with one of its most severe energy crises in history, causing public unrest and hampering economic activity. The compounding factors of rapid population growth, climate change, natural disasters, and the global energy crisis have raised alarming concerns regarding Pakistan's future energy supply. The existing power shortfall has exceeded 6000MW and is further exacerbated by an overreliance on furnace oil.

After decades of irresponsible exploitation of non-renewable energy sources, resulting in detrimental consequences like global warming, acid rain, and pollution, we have embarked on a mission to curb the insatiable demand for limited energy resources. This aims to mitigate the adverse impacts caused by our actions.

In Pakistan, residences contribute to approximately 50% of domestic electricity consumption for activities like heating, cooling, and lighting, predominantly from non-renewable sources. Thus, homebuilders play a pivotal role in addressing energy concerns. Green buildings integrate solar tactics, wind energy, roof ponds, rainwater harvesting, and cool roofs to notably curtail lighting and comfort-related energy usage. Energy-efficient homes not only save money through reduced utility bills but also offer improved insulation, while dual-pane windows ensure a quieter and cooler environment.

The Potential of Green Building in Pakistan
The journey towards sustainable construction commenced in 2005 after a 7.8-magnitude earthquake struck Northern Pakistan. The government swiftly constructed communities

using mud walls and robust bamboo roofs to preserve critical resources. This practice has recently gained traction in D.H.A. and Bahria Town's Phase 5 & 6, according to data from Lamudi, a Pakistani online real estate portal.

Pakistan holds immense potential in its renewable energy resources, with over 300 days of sunlight, substantial wind energy capacity along the Makran Coastline, and the possibility of converting cow-dung into energy due to its agricultural nature. Integrating these renewable resources with green building techniques could significantly diminish energy consumption. While the costs of green construction align with current practices, governmental education and incentivization are needed to promote energy reduction.

The Aga Khan Development Network (AKDN)

The Aga Khan Development Network (AKDN) is taking a significant step towards sustainable construction, as it announces the implementation of climate-friendly designs in their latest projects. Embracing a greener approach, AKDN's construction initiatives span 25 large-scale institutional buildings, over 1,000 school rooms, and 54 health facilities, creating a total built-up area exceeding 120,770 square meters.

With a commitment to delivering modern engineering and architectural solutions, AKDN's construction management services prioritize seismic resistance, proper lighting, thermal comfort, and ventilation. This move reflects the organization's dedication to integrating environmental consciousness in their development efforts.

Additionally, AKDN is making strides in promoting green and climate-resilient construction practices. To achieve this, they have successfully developed green building

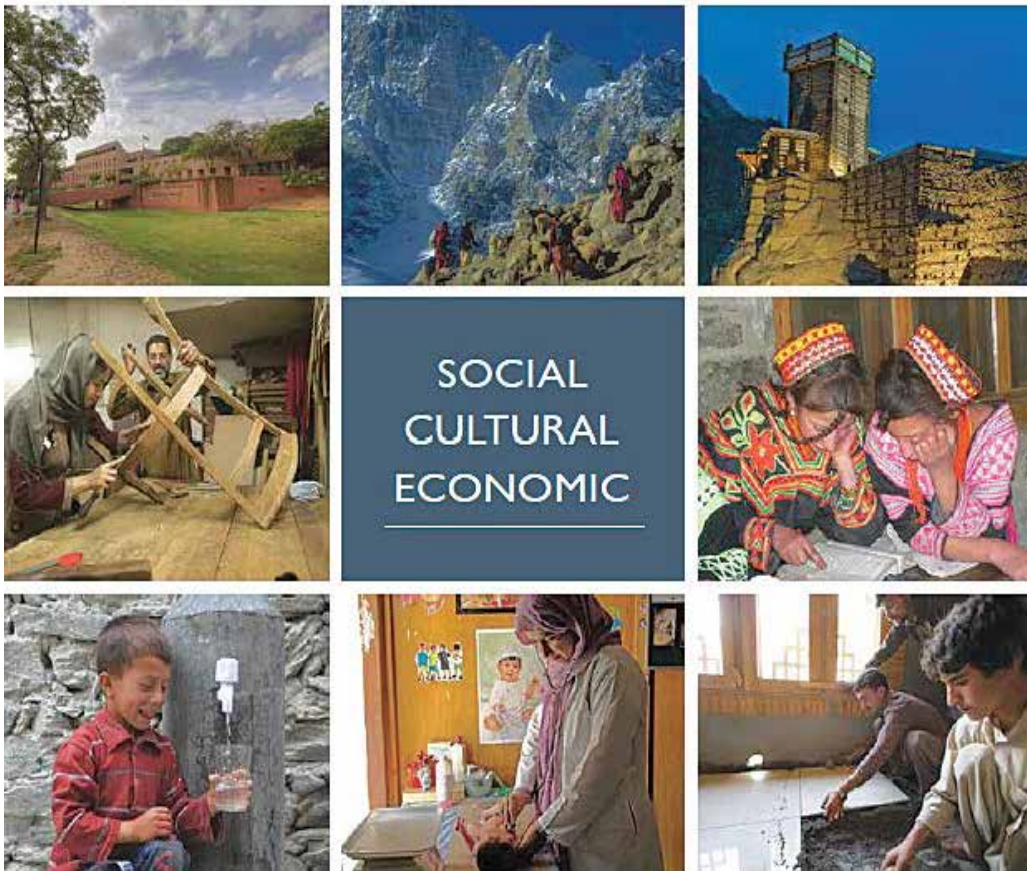
create awareness and encourage environmentally responsible approaches to construction across their projects. One notable example of AKDN's commitment to sustainability is the First Microfinance Building (FMFB) in Gilgit. Currently under construction, this architectural marvel is on track to be certified by both Leadership in Energy and Environmental Design (LEED) and Excellence in Design for Greater Efficiencies (EDGE). The FMFB sets the bar high for global sustainability standards.

To tackle the challenges posed by Gilgit's specific climatic conditions, the FMFB boasts a high-efficiency building envelope, skillfully engineered to reduce the need for extensive temperature control. Energy-efficient measures are being incorporated for mechanical heating and cooling, along with water-conserving faucets and fixtures. Solar panels and high-performance glazing will

further enhance the building's energy efficiency.

Furthermore, AKDN's dedication to sourcing locally has been demonstrated in the FMFB's construction materials. From the wooden screens on the façade to the stone detailing throughout the building, most raw materials are locally procured, supporting the community and minimizing the project's environmental footprint.

As AKDN forges ahead with its climate-friendly designs and sustainable practices, it sets a shining example for the construction industry, proving that environmental consciousness and modern architecture can go hand in hand. These initiatives are poised to leave a positive impact on the environment and communities, showcasing the organization's commitment to a greener and more sustainable future. ■



LEAD ACID BATTERY

KEY FEATURES

- Environmental High Reliability
- Widely Used
- Easy to Charge
- Excellent Adaptability
- Stable Performance
- Long Service Life
- Excellent Stability of Capacity
- Superior low-temperature
- Hermetically Sealed
- Maintenance-free

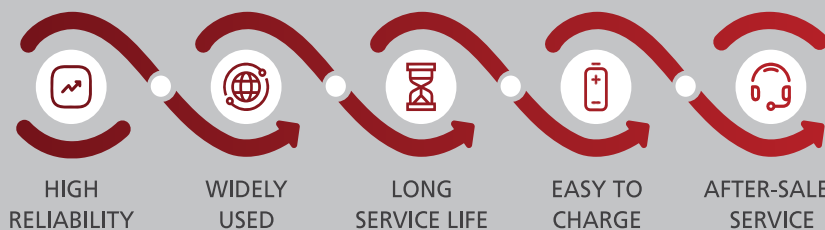
APPLICATIONS

- ⌘ Automotive (starting engines)
- ⌘ UPS for backup power
- ⌘ Renewable energy storage
- ⌘ Telecommunications
- ⌘ Marine and RV applications
- ⌘ Off-grid power systems
- ⌘ Golf carts
- ⌘ Emergency lighting
- ⌘ Medical equipment.



ONE-STOP SOLAR ENERGY SOLUTIONS

At Dongjin Battery, we have built factory for lead-acid batteries in Karachi. We take pride in offering more than just batteries; we provide comprehensive one-stop energy solutions tailored to meet your diverse requirements. Our commitment to excellence extends beyond individual products, ensuring seamless integration and efficiency across your entire energy ecosystem.



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DongjinBatteryPk
www.dongjin-battery.com

Waterwheels, 200 BC



Renewable energy, as opposed to fossil fuels such as gas, oil, or coal, first appeared in Europe around 2,000 years ago. Of course, this was a primitive version, but it laid the groundwork for today's technological marvels. It all began with 'waterwheels,' which simulate the workings of hydropower.

We're back in Europe, this time in the Netherlands, in 1590, when windmills were at their zenith of popularity. You've seen them: those colossal structures that represent a big portion of Dutch industry and culture. Windmills first appeared in the Middle East and Central Asia around 635 AD, in horizontal form and spanning broad areas of the Middle East and Central Asia. However, the technology that impacted today's wind turbines was developed in the Netherlands.



Windmills, 1590s

The world's first solar energy system is installed, 1860



Now we're headed to France, where French financier Augustin Mouchot created the world's first solar energy system in 1860. Mochet tested his 'sun metre' after predicting that our coal supply will run out one day (we believe he was correct). Here are some of the man's own words: "Despite the silence of modern writings, one should not believe that the concept of using solar heat for mechanical operations is new." On the contrary, one must acknowledge that this concept is quite ancient, and its steady evolution over ages has given rise to a variety of strange gadgets."

A BRIEF HISTORY OF RENEWABLE ENERGY

Windmills, Round II, 1887



Wind turbines were not produced until the end of the nineteenth century (1887), when they began to generate interest in and around Europe. Charles F. Brush created the first windmill used to produce electricity on a farm in Cleveland, Ohio, just a year later, in 1888. Denmark had 72 wind turbines providing energy by 1908. And by the 1930s, they had spread throughout the United States.

Albert Einstein, the famed physicist, invented the 'photoelectric effect,' which investigates how light-cells transport powerful kinds of energy that may be harnessed to power structures throughout the world. The photoelectric effect is best characterized as the emission of electrons when certain materials are exposed to light. In 1921, Einstein was given the Nobel Prize in Physics, specifically for his work on solar energy.



Albert Einstein and the 'photoelectric effect', 1905

Wind Turbines Become Commercial, 1927.

The first commercial wind turbines were sold in 1927 to a group of rural US farmers for a significant price (at the time).

This was the first time that renewable energy made a big commercial impression. People started to take notice.

Solar Launches Into Orbit, 1958.



The first US spacecraft to use solar energy as a power source was launched in 1958. The Vanguard 1 launched on St. Patrick's Day, leaving a legacy that is recognised alongside the American moon landing 11 years later.



7 TECHNOLOGIES DRIVING RENEWABLE GROWTH IN 2023

With so many advances, it's a marvel mankind isn't powered entirely by alternative energy methods. Green energy is booming, thanks to rising demand and dropping prices. It is prompting businesses to think broader and more creatively in order to create inventive ways to power the globe through a green lens.

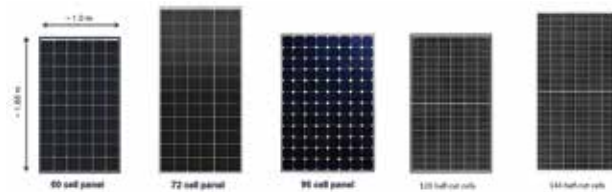
1. SOLAR PANEL ADVANCEMENTS

Everyone knows that solar panels are the way of the future, but they're on this list for a reason: they can't be prevented from getting even better. Engineers are always looking for methods to make structures more weather resistant and efficient to build. Here are some of the most talked-about solar panel breakthroughs that you might have overlooked.

Solar panels are typically seen on grassy plains or roofs, but what about floating over water? Introduce yourself to floatovoltaics. This significant breakthrough has become a reality thanks to examinations of how the panels influence aquatic life and the resolution of grounding and cable

management concerns. The best of the best worked it out, allowing people to develop more versatile energy gathering places - and it's cheaper.

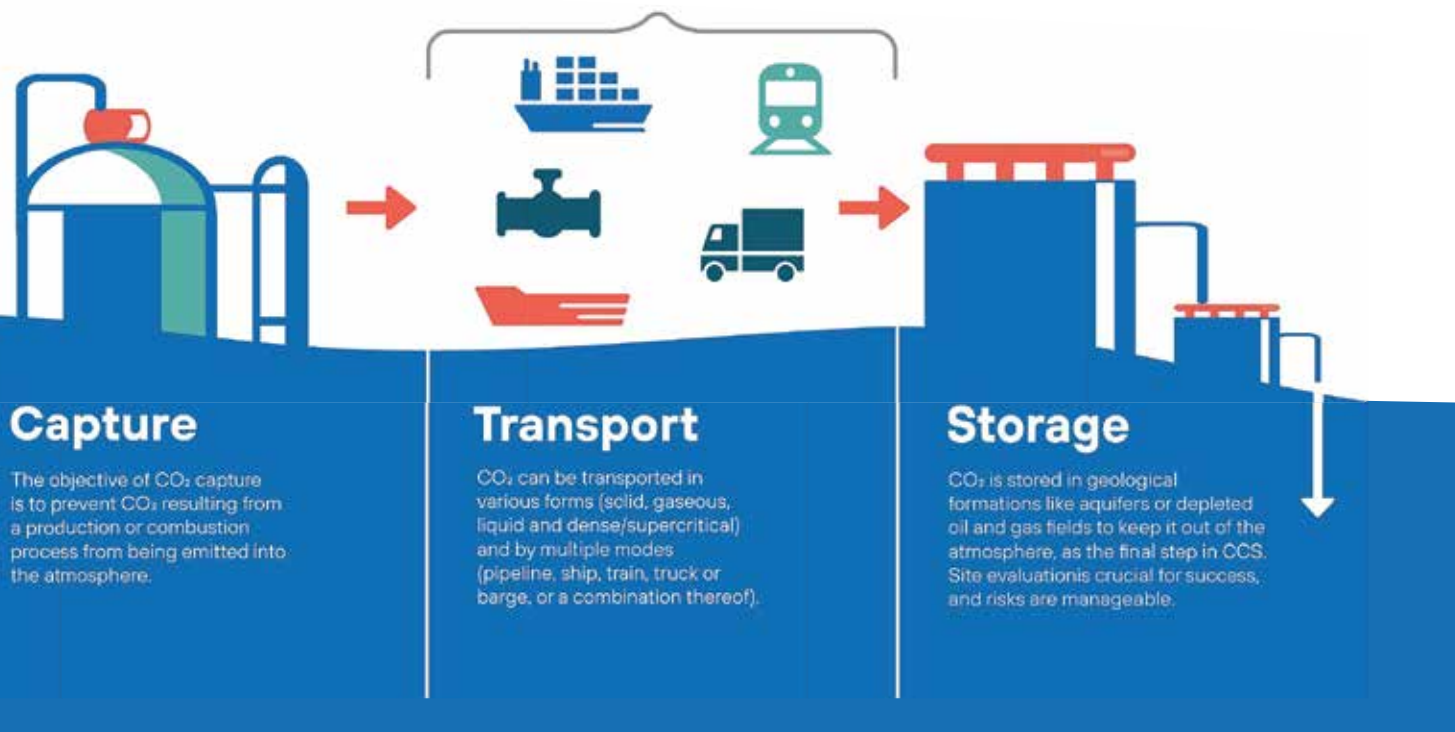
Humans have also progressed to the point where solar panels are directly integrated into building design. Building-integrated photovoltaics are adaptable, integrating thin-film or crystalline panels into facades. Assuming that no sun-blocking trees surround the structure, the panels might save a significant amount of money while also providing some thermal insulation. You don't have to trade beauty for a green attitude, especially if you opt to cover it with a solar skin - another cosmetic advancement in the area.



2. CCS (CARBON CAPTURE AND STORAGE)

CCS has been a source of contention in the alternative energy technology landscape due to a lack of regulatory backing and efficiency gaps. Both of these regions, thankfully, are receiving much-needed changes. Carbon capture practitioners frequently need to use other farming or industrial practises to complement its efficacy and lower its energy intensity. Carbon capture, for example, may remove carbon dioxide from the atmosphere, but what about plant ash? As a result, it cannot be the sole technology used.

However, advances in CCS are assisting in increasing its worth. One method is to reduce expenses and annoyance while enhancing its efficacy at removing carbon dioxide from flue gas. Multiple technologies are being tested in the area, including a mixed salt approach that can use less energy by running at room temperature while yet capturing more carbon dioxide than existing methods.



3. ELECTROLYZERS FOR GREEN HYDROGEN

Green hydrogen electrolyzers are currently available in onshore and offshore configurations. This is a critical improvement in hydrogen generation because the vast majority of hydrogen generated in the world is "grey," that is, made from fossil fuels such as natural gas. Other kinds of hydrogen, such as "blue" hydrogen produced through CCS, are more ecologically benign. However, "green" hydrogen is desirable since it is the most environmentally friendly. Water is separated into hydrogen and oxygen by electrolyzers. They are an excellent alternative energy technology since they are powered by wind turbines or other renewables, making them a net-zero choice for generating electricity. Though this is a new development, offshore green hydrogen electrolyzers have the potential to transform the industry, especially if subsequent advancements continue to cut manufacturing and operation costs.



4. POWER-TO-X

This alternative energy technique seems like something out of a science fiction movie, yet it's real. It's an umbrella phrase for breakthroughs in electrical conversion, such as converting it to heat or synthetic fuels. When this is combined with renewable energy, humanity have discovered something truly spectacular. Imagine producing green natural gas - that is what this technology is capable of.

One of the distinctive benefits of power-to-X energies is that they do not need much new infrastructure.

Manufacturing plants do not need to replace fuel systems if e-fuels are used in their stead. This saves energy and resources while allowing more green technologies and alternative energy plants to be developed to power renewables.



5. IOT (INTERNET OF THINGS)

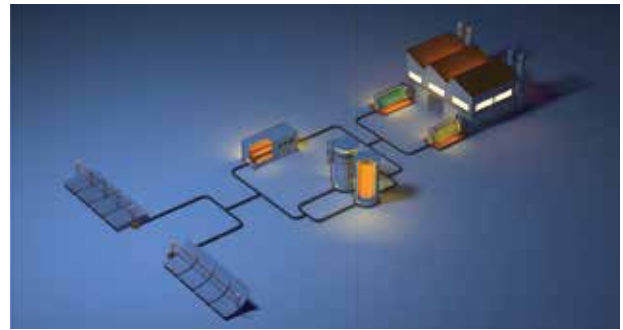
Though IoT is not technically a green technology, the data it provides supports renewable growth. IoT-connected devices, such as thermostats, enable the built environment to adjust to outdoor temperatures without the need for human intervention. Millions of data points are collected by IoT devices. They use machine learning to assist people in understanding the gaps in our present renewable energy research. Some argue that IoT is critical to meeting the United Nations' sustainable development objectives on time.

Digital waste is on the rise, especially as humans become increasingly dependent on technology every day. Nothing works quicker than the power combination of IoT and artificial intelligence (AI) to help reduce increasing demand.

7. ENERGY STORAGE

must discover ways to keep and distribute renewable energy to the masses in order to balance demand and output. This includes advancements such as pumped hydro, which may automatically release energy based on use surges.

For long-term sustainability, mankind must develop this technology. Energy storage may collaborate with IoT to collect insights on a wide range of optimizations, including how much extra storage it should set aside for the winter months.



6. ELECTRIC VEHICLE (EV) INNOVATIONS

The discourse about sustainability cannot overlook EVs, especially as lithium-ion batteries are the most contentious component of perhaps one of the most sustainable modes of individual transportation on the globe. Companies are experimenting with more sustainable recycling technologies while also attempting to enhance industrial efficiency.

Though EV batteries survive longer than some purchasers expect, recycling isn't as common owing to the risks and expensive prices.

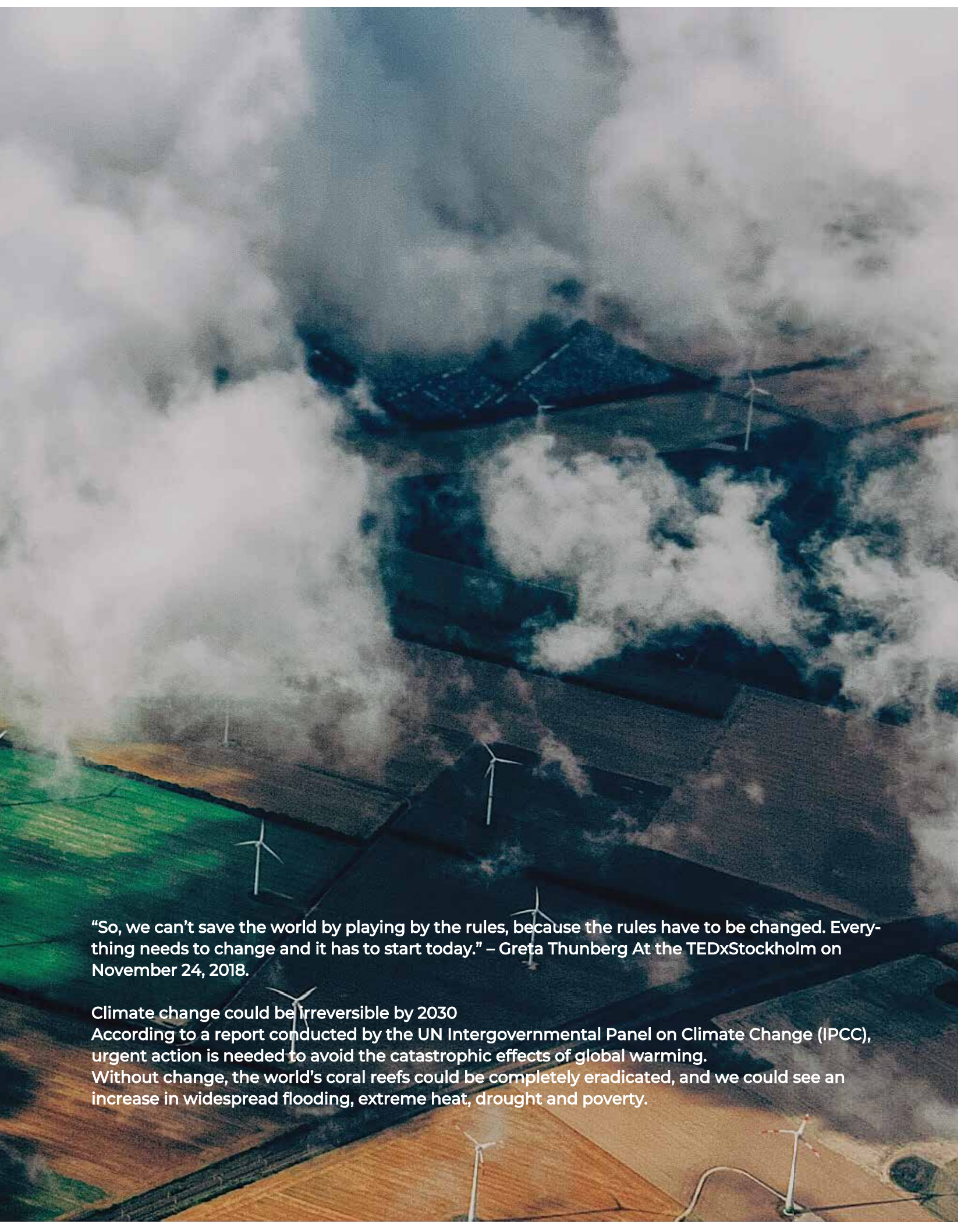
Existing battery recyclers already have the infrastructure in place, but only in a few areas across the world, such as China.

As a result, shipping becomes costly and potentially unproductive when the environmental impact is considered. Initiatives to establish more local infrastructure, implement more broad government regulations, and make a stronger argument for recycling will alter the scene in the next year.



PEOPLE ARE SUFFERING
PEOPLE ARE DYING
ENTIRE ECOSYSTEMS ARE
COLLAPSING

WE ARE AT THE BEGINNING
OF A MASS EXTINCTION AND
ALL YOU CAN TALK
ABOUT IS MONEY
AND FAIRY TALES
OF ETERNAL ECONOMIC GROWTH
HOW DARE YOU



“So, we can’t save the world by playing by the rules, because the rules have to be changed. Everything needs to change and it has to start today.” – Greta Thunberg At the TEDxStockholm on November 24, 2018.

Climate change could be irreversible by 2030

According to a report conducted by the UN Intergovernmental Panel on Climate Change (IPCC), urgent action is needed to avoid the catastrophic effects of global warming.

Without change, the world’s coral reefs could be completely eradicated, and we could see an increase in widespread flooding, extreme heat, drought and poverty.

JULY / AUG 2023

Dialogue

Meet Mr. Ali Majid, a seasoned professional serving as the Regional Sales Director for Longi Pakistan, driving sustainable solar solutions across the region. Joining him with an article is Mr. Zaigham Abbas Rizvi, a distinguished Senior Research Scientist, passionately engaged in shaping the discourse on renewable energy in Pakistan, fostering a greener and more resilient future. Together, their expertise promises enlightening insights into Pakistan's renewable energy landscape.





An Interview with Mr. Ali Majid, General Manager for Longi Pakistan

How would you evaluate the current state of renewable energy adoption and development in Pakistan? Are there any significant challenges or opportunities specific to the country?

Pakistan has made progress in adopting renewable energy sources, including solar, wind, and biomass. However, challenges remain, such as inadequate infrastructure and investment, policy inconsistencies, and energy sector reforms. Integrating renewables into the grid and raising public awareness are additional obstacles. Nonetheless, Pakistan has ample potential for renewable resources and opportunities for economic growth, job creation, and reduced dependence on imported fuels. With stable policies, improved

regulation, and increased investments, Pakistan can overcome challenges and fully exploit the potential of renewable energy for a sustainable future.

What are the most promising renewable energy sources or technologies in Pakistan that you believe can contribute significantly to the country's energy transition? How do they compare to traditional fossil fuel-based energy sources in terms of cost, reliability, and scalability?

The most promising renewable energy sources in Pakistan are solar and wind energy. Pakistan has abundant solar irradiation and

vast wind potential, making these technologies highly viable. In terms of cost, both solar and wind have become increasingly competitive compared to fossil fuel-based sources, especially with falling equipment prices and advancements in technology. While solar and wind energy may face intermittency challenges, advancements in energy storage technologies can enhance reliability. Moreover, their scalability potential is significant, allowing Pakistan to meet growing energy demands sustainably and reduce dependency on traditional fossil fuels.

What policy and regulatory measures have been implemented or are needed in Pakistan to support the growth of the renewable energy sector? How effective have these measures been in attracting investments and fostering innovation in the industry?

Pakistan has implemented several policy and regulatory measures to support the growth of the renewable energy sector. These include the introduction of feed-in tariffs, net metering, tax incentives, and renewable energy quotas. While these measures have shown some success in attracting investments and fostering innovation, challenges persist due to inconsistencies in policy implementation and a slow bureaucratic process. To further support the sector, Pakistan needs to ensure policy stability, create a transparent and efficient regulatory framework, and streamline approval processes. These efforts will enhance investor confidence, accelerate growth, and drive innovation in the renewable energy industry.

Could you provide examples of successful renewable energy projects in Pakistan that have made a substantial impact on the local community or the environment?

One successful renewable energy project in Pakistan is the Quaid-e-Azam Solar Park in Punjab. This solar park has a capacity of 1000 MW and has made a substantial impact on the local community and the environment. By harnessing solar energy, it has reduced carbon emissions, mitigated air pollution, and contributed to Pakistan's energy security. The key factors contributing to its success include a supportive policy framework, collaboration with international partners for financing and technology, and effective project management. Additionally, the project's location in a region with abundant solar resources played a crucial role in its success.

Considering the unique geographical and climatic characteristics of Pakistan, what specific challenges and opportunities exist for the integration of renewable energy sources into the existing energy infrastructure?

Pakistan's unique geographical and climatic characteristics offer both challenges and opportunities for integrating renewable energy sources into its existing energy infrastructure. The country's abundant solar and wind resources present opportunities for large-scale renewable projects. However, the intermittency of these sources requires solutions for energy storage and grid balancing. Challenges arise due to the need for upgrading the grid infrastructure to handle variable renewable inputs and addressing transmission losses. To ensure a smooth transition, Pakistan must focus on energy storage technologies, implement demand-response strategies, strengthen grid infrastructure, and invest in advanced smart grid solutions. Moreover, promoting distributed renewable energy systems and raising public awareness can drive a more efficient and sustainable energy future.

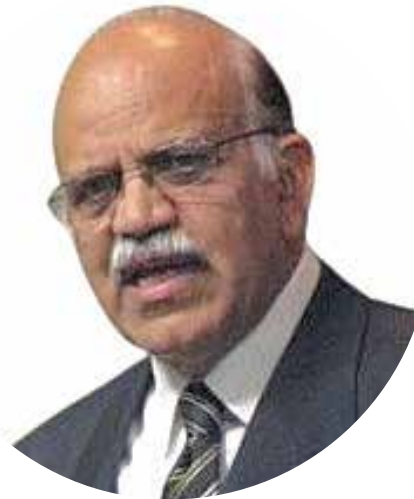
LONGi

LONGi World No.1 Solar Brand

GW+ Solar Panels Supplier
in Pakistan Market



LONGi Solar Pakistan @facebook



Renewable Energy Sources

By Mr. Zaigham M. Rizvi

Chairman - National Platform for Housing Research

Everyone around the globe needs energy/electricity. This is generally referred to as “Electrical Energy”. Historically we have been using the energy resources based on fossil fuels like oil, gas, coal, wood etc., but we never realized that all these sources of energy are depleting in nature, and would one day become short in availability, if not totally scarce. These are non-renewable, and we can regenerate or reproduce them according to our own plan, as their creation takes millions of years; so it is humanly impossible to produce them for our needs. But as the nature and our desire would have it, we need more and more of this energy.

Consumption of energy is fast expanding in a

geometrical progression, primarily for following two reasons:

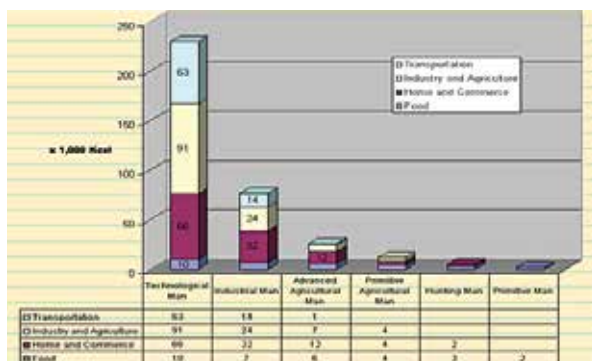
a) Growing Per-Capita Consumption: Growing need for energy needs in transport, industry, domestic needs and so on. The energy consumption of primitive man in Africa, about was about 2,000 Kcal in a year around one million years ago, which has now reached to 230,000 Kcal per day in America, 115 times increase by 1970. Today, growth rate of energy consumption is even much faster, resulting in fast depletion of traditional sources, the non-renewable sources of energy.

b) Population growth in geometrical progression: Population grows in a

geometrical progression (Malthusian Theory of population growth.) However, it was not that obvious when world population was small. The world population was around two billion at beginning of 19th Century, which reached to around four billion by mid of 19th Century and stands at around 8 billion as of today. It became obvious that even if the average population growth rate remains, say around 2% per annum, the 2% growth of two billion was a small figure (40 million in a year), viz-a-viz a 2% growth of eight billion populations as of today (160 million in a year). This population growth, obviously, creates greater pressure on traditional sources of energy.

The fast-growing per capita energy consumption, resulted by fast-growing number of people pushed for their fast extraction, which generates the obvious fear of depletion of reserves. The realization that these sources of energy are non-renewable visibly emerged by mid of 19th century, and thereafter the science got deeply engaged in developing alternate and renewable sources of energy, now termed as Renewable Energy Sources. The chart below (Fig-1) explains that further.

Daily consumption of energy: Historical Perspective (Fig-1)



The policy recommendations for use of RE vs NRE, keeping in view the limitations of

developing countries like Pakistan could be under a four level priority program:

Switch to local resources vs imported:

Be it fossil fuel or be it coal. It is sad to see that in Pakistan, claiming to be huge reserves of coal in Pakistan, is yet using imported coal. Any deficiency in specifications of local coal could be addressed by research and improved technology.

The import-based energy resources like fossil fuels, coal etc will adversely impact the macro-economics in terms increasing import bill. Pakistan is facing massive balance-of-trade deficit, and rising external debt.

Rising per unit cost: Electricity produced based on imported fossil fuel and coal will result in rising cost of per unit electricity production. Oil prices are rising in \$/Barrel of oil, and rising cost of \$ vs Rs. Therefore, the Rupee value of imported fossil fuel are showing a steep rise. The consumer has to bear it, either by direct payment, or through the taxes generated to fund subsidized oil price.

- Switch to Renewable vs Non-Renewable sources of energy
- Promote retail solutions like Solar Rooftop, Geothermal Water Heating, Energy efficient Green Housing.

Architects and engineers have to play a key role, alongside regulatory agencies to promote Green Housing Designs, for maximizing the availability of the air and sunlight, so as make houses energy efficient, and reduce load on energy/electricity consumption. At times, such energy efficient housing designs could lead to 30% energy saving.



Quality Of Solar PV System In Pakistan

By Engr. Faiz Bhutta

Solar PV Expert (Consultant and Trainer)

The assessment of solar PV system quality is a complex endeavor due to the rapid evolution of solar PV modules, inverters, and balance of system (BOS) technologies. A decade ago, solar PV systems in Pakistan featured Monofacial modules with a maximum output of 300 Wp and 15.6% efficiency. In contrast, modern systems employ Bifacial modules with outputs of 585 Wp and efficiency of 22.5%. Additional energy gains of 20% to 25% are possible based on surface albedo. Inverters have also undergone significant improvement, transitioning from Hybrid Inverters with batteries and 96% efficiency to high-quality string inverters boasting efficiency surpassing 99%. These advanced inverters include features like low

Total Dynamic Distortion and remote monitoring capabilities. BOS quality has similarly progressed over the years.

Nonetheless, benchmarking the evolving quality is challenging. Fortunately, the IEC standard IEC 61724 offers a way to measure solar PV system performance. Additionally, IEC standards have kept pace with technology shifts, with each edition bringing new components and insights. The standards for design qualification and safety of Solar PV modules transitioned from IEC 61215 and 61730:2017 to the present edition of IEC 61215:2021 and 62730:2021.

In the context outlined above, the quality of a solar PV system hinges on the entire value chain. Starting from survey and assessment, to system design, installation, commissioning, operation, and maintenance, each phase plays a critical role. Moreover, the quality of individual components like Solar PV Modules, Inverters, Mounting structures, safety features, protection mechanisms, PV Cables, and other BOS elements such as ducts, thimbles, LV panels, nuts, bolts, washers, and connectors significantly impacts overall system quality. A lapse in any part of this value chain can undermine the overall system quality.

The current landscape in Pakistan exhibits a range of practices within the solar PV industry. Among them, there are small companies that offer systems at exceptionally low prices while disregarding standards. These companies often outsource their work. On the other hand, medium-sized enterprises possess skilled teams for solar PV system design and installation. Though their prices might be slightly higher than those of small companies, their focus on quality is more evident. Large corporations concentrate solely on MW projects, employing their own specialized workforce for all stages, from design and installation to operation and maintenance. The diversity in company size and market positioning results in varying levels of solar PV system quality.

Having conducted evaluations as a consultant, I've observed persisting shortcomings in workmanship, solar PV mounting structures, safety measures, protection panels, PV cables, and related accessories like ducts, nuts, bolts, and washers. However, there has been noticeable progress as EPC (Engineering, Procurement, Construction) companies with trained personnel have emerged and are producing commendable results.

An additional concern revolves around suppliers and manufacturers, specifically their fulfillment of warranty claims. Often, while they vocally express high commitments, they fail to honor these when actual warranty claims are raised. This is often manifested through vague statements and ambiguous responses, creating challenges for clients.

Another aspect of quality pertains to the energy output of a solar PV system, measured in DC and AC kWh generation. This output varies based on the location of the system within Pakistan. While there are location-dependent discrepancies, it's generally agreed within the industry that AC kWh production in Pakistan should fall within the range of 3.6 kWh/KWp/Day to 5.5 kWh/KWp/Day, accounting for variations between northern and southern regions.

In summary, the quality of solar PV systems in Pakistan remains inconsistent due to factors like the quality of the value chain, components used, and geographical location. To ensure reliability, customers should establish energy delivery commitments and warranty terms through contracts. In addition, involving PEC (Pakistan Engineering Council) certified consultants is recommended to oversee the entire process, from initial surveys and assessments to ongoing performance monitoring post-commissioning.

GLOBAL EVENTS



Intersolar South America
Date: 29 – 31 August, 2023
Venue: Sao Paulo, Brazil



ASEAN Sustainable Energy Week
Date: 30 AUG - 1 Sep 2023
Venue: Bangkok, Thailand



Solar Pakistan
Date: 7-9 September 2023
Venue: Karachi Expo Center, Pakistan



Electricity Pakistan
Date: 7-9 September 2023
Venue: Karachi Expo Center, Pakistan

Global Events



Pakistan Sustainability Week
Date: 7-9 September 2023
Venue: Karachi Expo Center, Pakistan



RE+
Date: 11 - 14 September 2023
Venue: LAS VEGAS, NV



iGEM
Date: 2 - 5 November, 2023
Venue: Kuala Lumpur Convention Center Malaysia

RENEWABLE ENERGY OUTLOOK

HOW TO MEET KEY CLIMATE GOALS



SOLAR PV
8,519GW

43% share



ONSHORE WIND
5,044GW

25% share

2050

ENERGY MIX



OFFSHORE WIND
999GW
5% share



HYDROPOWER
1,822GW
9% share



OTHER RENEWABLES
1,667GW
8% share



NON-RENEWABLES
1,872GW
9% share

- GLOBAL GDP UP 2.5%
- GLOBAL EMPLOYMENT UP 0.2%
- HEALTH, SUBSIDY & CLIMATE-RELATED SAVING WORTH UP TO USD 160 TRILLION OVER 30 YEARS



**PAKISTAN
SUSTAINABILITY
WEEK**

**AN EVENT ON
ALTERNATIVE
ENERGY**

**27-29 FEBRUARY 2024
EXPO CENTRE, LAHORE**

**CREATING
A JOURNEY
FOR A GREENER
TOMORROW**



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ALONGSIDE

