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#cleanenergy

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# EDITOR'S NOTE

As the scorching summer months settle in, energy systems across the globe are under immense strain. From record-breaking temperatures to soaring electricity demand, this season continues to expose the fragility of traditional power infrastructure. Nowhere is this more evident than in Pakistan.

As Pakistan faces the intensifying grip of an energy crisis, recent developments have laid bare the structural inefficiencies and governance challenges plaguing the power sector. Load-shedding, inflated bills, and delayed reforms have made energy insecurity a daily reality for millions.

Yet, this is not just a national issue. Across the Global South — from South Asia to Africa — rising heat is testing the limits of outdated grids, fossil-fuel dependency, and centralized power systems. Climate change has turned energy access into a question of survival, particularly for vulnerable communities already battling poverty and environmental stress.

This summer, Clean Future explores how clean, distributed energy solutions are lighting the way forward. From solar-powered water pumps in rural Pakistan to decentralized microgrids in East Africa, innovation is happening — often at the grassroots. We also examine the policy shifts, financial models, and community-driven approaches that can help scale these solutions more equitably.

Sustainable energy is no longer a distant vision — it's the urgent foundation for climate resilience, economic justice, and long-term stability. The heat is rising, but so is the will to act.

Stay cool, stay hopeful — and stay informed.

# 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.

# ELECTRICITY OVERBILLING SCANDAL TRIGGERS FOR REGULATORY OVERHAUL

Following a probe ordered by Prime Minister Shehbaz Sharif, the Power Division confirmed widespread overbilling by Lahore Electric Supply Company (Lesco), resulting in disciplinary action against responsible officials. At a public hearing by Nepra, Additional Secretary for Power Mehfooz Bhatti stated that the inquiry findings were submitted to the PM and would be shared with the regulator after formal review.

Bhatti clarified that the federal government cannot abolish electricity duty — as previously announced — without consent from all provinces. So far, only two have responded to the proposal to end the duty from July 1, 2025.

The hearing also addressed concerns raised by consumers about overbilling by other Discos. Nepra officials noted that a previous investigation had revealed billing discrepancies that were initially contested but later confirmed through a second inquiry.

Discos have proposed a Rs1.80 per unit negative quarterly adjustment — amounting to Rs53.4 billion — to refund consumers for overcharges during August–October, driven by savings in capacity payments.

Industrial users criticized the recent 14% increase in electricity rates, citing declining competitiveness against regional players like India. They also called for the removal of cross-subsidies, which they estimate cost Rs137 billion annually.

Despite claims of improved efficiency, system losses rose to 18.3% in FY2025. Around 128,000 new connections and 4,000 net-metering requests remain delayed, while over 70,000 faulty meters still bill users on estimates.

Savings stemmed from reduced capacity payments, contract renegotiations, and lower interest rates, with Faisalabad, Lahore, and Multan reporting the highest reductions.

# PAKISTAN SECURES U.S. TARIFF AGREEMENT; TRUMP HIGHLIGHTS OIL COOPERATION DEAL

The United States and Pakistan have announced a trade agreement that Islamabad says will result in reduced tariffs and greater investment, though no specific tariff levels on Pakistani exports were disclosed.

“This agreement signals a new era of economic cooperation, particularly in energy, mining, IT, cryptocurrency, and other sectors,” Pakistan’s finance ministry stated following a concluding round of talks in Washington.
Islamabad framed the deal as part of a wider strategic partnership with the U.S., with Finance Minister Muhammad Aurangzeb—who led the talks—describing it as a comprehensive economic arrangement.

“For us, this was never just about immediate trade gains. It was always about aligning trade with broader investment goals,” Aurangzeb said in a video statement.

Pakistan was previously facing a potential 29% tariff, which was paused—like with other nations—pending negotiations before an August 1 deadline. Islamabad aimed for a lower tariff rate than its regional competitors: Vietnam, which was hit with a 20% tariff under Trump, and India, facing a possible 25%.

Pakistan’s trade surplus with the U.S. stood at about $3 billion in 2024, largely driven by textile exports. The United States remains the top destination for Pakistani textiles.
The finance ministry said the deal would lead to “reciprocal tariff reductions, especially benefiting Pakistani exports to the U.S.,” though it did not reveal the exact numbers.

Meanwhile, former U.S. President Donald Trump promoted a separate agreement aimed at tapping Pakistan’s oil potential. “We just finalized a deal with Pakistan to jointly develop their vast Oil Reserves,” Trump wrote on social media.

He added that the partners were in the process of selecting the lead oil company for the venture. However, Pakistan has struggled with offshore oil exploration in the past. Its estimated proven crude oil reserves range from 234 million to 353 million barrels, ranking it around 50th globally.

Shale oil development remains undeveloped in Pakistan, though a 2015 U.S. Energy Information Administration study estimated 9.1 billion barrels of technically recoverable shale oil in the country.
Oil remains Pakistan’s largest import, totaling $11.3 billion in the fiscal year ending June 30, 2025—nearly 20% of total imports, according to central bank data. The trade and energy agreements may also have diplomatic implications. The U.S. has sought to reduce Pakistan’s reliance on China, amid concerns over Beijing’s growing influence in the region.

# PAKISTAN INVITED TO INVEST IN ALGERIA'S $40 BILLION ENERGY PUSH

August 1, 2025 (MLN): Pakistan has been invited to invest in Algeria's rapidly expanding energy sector, which is set to receive $40 billion in investments from countries across Europe, Asia, and the Middle East. In a high-level meeting with Federal Minister for Commerce Jam Kamal Khan, Algerian Ambassador Dr. Brahim Romani highlighted his country's vast reserves of oil, gas, hydrogen, and electricity, urging Pakistan to seize strategic opportunities in Algeria's energy transformation and infrastructure development.

He also extended an invitation to Pakistan to participate in Algeria's first-ever INTRA-AFRICA Trade Fair, scheduled for September 4–10, 2025 in Algiers, where over 2,000 exhibitors from 140 countries including global financial institutions and development banks are expected to take part. Key areas of discussion included energy collaboration, investment promotion, and participation in Africa-focused trade platforms, said a press release issued yesterday.

Ambassador Romani noted that Algeria has emerged as the third-largest economy in Africa and remains a key exporter of natural gas to Europe, supplying countries like Italy, Spain, and Tunisia via undersea pipelines. He emphasized Algeria's unique geographic position and its established infrastructure, which can offer Pakistan direct access to over 10 African markets through air and land connectivity.

Minister Jam Kamal Khan welcomed the initiative and reaffirmed Pakistan's commitment to its "Look Africa" policy, which aims to deepen trade and economic ties with African nations.

# HUAWEI AND AE POWER PARTNER TO INTRODUCE ADVANCED ENERGY STORAGE SOLUTIONS

In a significant step toward advancing sustainable energy in Pakistan, Huawei and AE Power have forged a strategic partnership to introduce the LUNA2000-107kWh/167kWh/215kWh Commercial Battery Energy Storage System (BESS) to the local market. The agreement was formalized at a signing ceremony attended by AE Power CEO Rana Abbas and Huawei's Technical Sales Director, Mr. Kevin.

Huawei's LUNA2000 series represents its latest innovation in energy storage, offering efficient, reliable, and scalable solutions for commercial applications. This advanced BESS is set to play a crucial role in strengthening energy security and accelerating the adoption of renewable energy across Pakistan.

Expressing his enthusiasm, AE Power CEO Rana Abbas stated, "AE Power is dedicated to bringing top-tier solar power products to Pakistan, striving for a greener and more sustainable energy future. Our collaboration with Huawei aligns perfectly with our mission to deliver innovative energy solutions tailored to the evolving needs of commercial consumers."

Mr. Kevin emphasized Huawei's commitment to research and development, saying, "At Huawei, we continuously push the boundaries of innovation to develop products that meet the demands of the modern era. Our partnership with AE Power to launch the LUNA2000 series in Pakistan underscores our commitment to supporting the country's transition to sustainable energy solutions."

# PAKISTAN'S BOOM UNLOCKS BILLIONS IN CLIMATE FINANCE: PIDE

Pakistan is at a critical juncture in its efforts to combat climate change, with a unique opportunity to transform its renewable energy sector into a significant revenue stream. Dr. Nadeem Javaid, Vice Chancellor of the Pakistan Institute of Development Economics (PIDE), has emphasized the urgent need for integrating renewable energy with carbon credit markets, framing climate finance as both an environmental necessity and an economic opportunity.

"Climate change is no longer a distant concern—it is a pressing reality," Dr. Javaid stated. "The recent climate-induced disasters in Pakistan underscore the direct connection between environmental security and economic stability. We must implement bold policies and strategic investments to unlock our vast renewable energy potential."

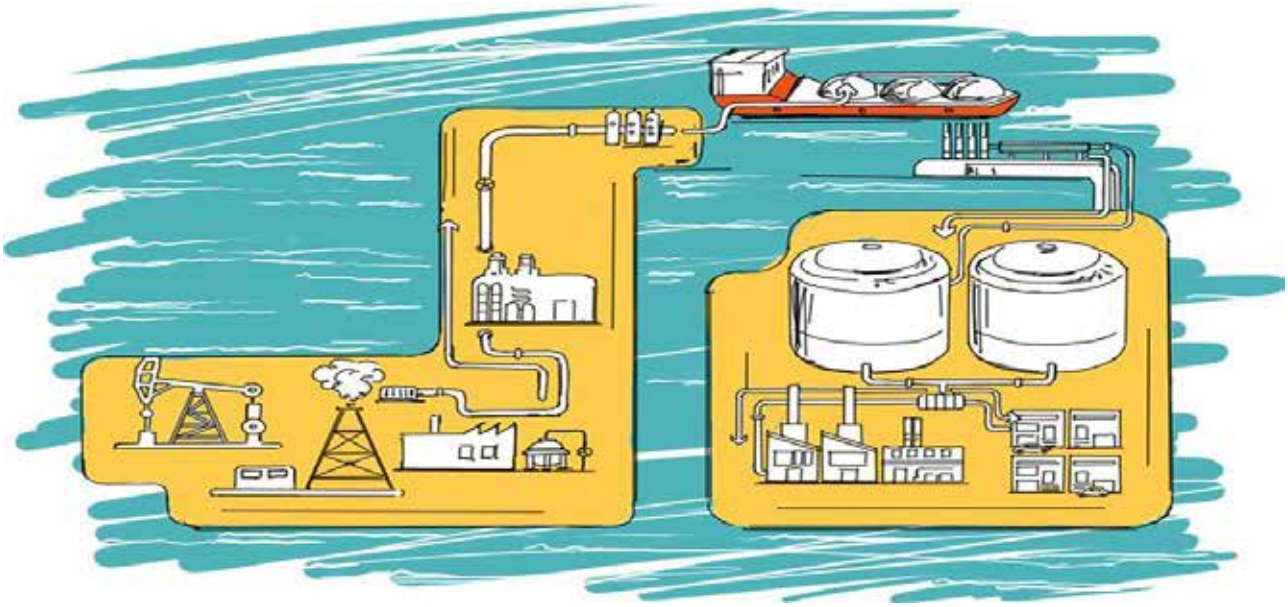
Aligning with this vision, PIDE has released an insightful knowledge brief titled "Unlocking Climate Finance: Potential Carbon Credits from Renewable Energy." Authored by Muhammad Faisal Ali, Research Fellow at PIDE, and Usama Abdul Rauf, Research Associate at RASTA, the brief outlines how Pakistan can leverage global carbon credit markets to generate revenue while addressing climate change.

At COP-29, developed nations pledged to increase climate finance to USD 300 billion annually. However, this still falls short by USD 1 trillion, highlighting the growing importance of carbon markets—mechanisms that allow corporations and countries to offset emissions by purchasing credits from nations investing in sustainable projects. Despite having abundant solar and wind resources, Pakistan has yet to fully capitalize on this opportunity. While policies for carbon trading exist, only 4.58% of Pakistan's electricity currently comes from renewables—a fraction of its vast potential. According to the knowledge brief, Pakistan's solar energy capacity exceeds 100,000 MW annually, especially in the Sunny Belt regions.

Expanding renewable energy and net metering could not only reduce dependence on imported energy but also unlock millions of dollars in carbon credit revenues. At present, consumers in Pakistan contribute approximately 481,863 MWh of solar electricity to the national grid. Given an emission reduction rate of 1 ton of CO2 per MWh, this equates to 475,840 tons of CO2 avoided annually—potentially generating USD 6.1 million in revenue at a conservative carbon price of USD 12.90 per ton. Future projections indicate that expanding off-grid renewable energy could increase earnings to between USD 21.5 million and USD 43 million, depending on market conditions. With greater investment, these figures could rise significantly.

The knowledge brief calls on policymakers, investors, and energy stakeholders to accelerate renewable energy adoption, strengthen carbon credit verification systems to align with international standards, and integrate with global carbon trading frameworks to position Pakistan as a key player in the international carbon market.

With the right policies, Pakistan can reshape its energy sector, attract climate finance, and build long-term economic resilience. As Dr. Javaid reaffirmed, "PIDE remains committed to delivering data-driven policy solutions that align with sustainable development goals and safeguard Pakistan's energy future."



# GAS POCKET DISCOVERED IN KARACHI DURING TEST WELL DRILLING

A gas pocket was recently discovered during the drilling of a test well in the Korangi Creek area of Karachi, according to a notice issued by real estate developer TPL Properties to the Pakistan Stock Exchange (PSX) on Thursday. Initial technical evaluations, supported by independent assessments from industry experts, suggest the gas is likely biogenic methane—typically formed through the natural decomposition of organic matter.

TPL Properties clarified that the find is not associated with any previously known natural gas reserves in the area. The company noted that due to the geological nature of the site, the gas pocket is expected to dissipate naturally over time, especially if it continues to burn. The test well is part of a broader, in-depth research initiative conducted in collaboration with leading national and international consulting firms. The study includes geotechnical analysis, soil composition and contamination testing, electrical resistivity surveys (ER), and a comprehensive Environmental and Social Impact Assessment (ESIA), among other baseline evaluations.

Supporting the findings, a Chinese study published in 2020 also highlighted the presence of gas and coal reserves in the Korangi Creek area. It identified three geological layers—Myosin, Paleocene, and Eocene rocks—beneath the surface. The Myosin layer, aged between 20 to 25 million years, contains underground sweet water and gas deposits.

The older layers tend to be richer in hydrocarbons. Drilling data from Korangi Creek and the Indus Delta area showed promising Total Organic Content (TOC) levels of 3 to 3.5%, along with kerogen type III—both indicators of potential methane and coal seam deposits. However, a separate four-year study by a Chinese research team concluded that oil and gas exploration off Karachi's coast has seen limited success due to the absence of structural traps—rock formations that typically contain and hold hydrocarbons.

The discovery follows a significant fire that broke out near an oil refinery in Korangi during the early hours of March 29. The blaze, which has been ongoing for over five days, prompted TPL Properties to initiate immediate response measures. The company has assured that all relevant stakeholders have been notified and that necessary actions are underway to manage the situation.


# PAKISTAN HESITANT ON IMF'S PROPOSED CARBON LEVY FOR CLEAN ENERGY TRANSITION

Pakistan has expressed reservations about implementing a carbon levy, a key proposal by the International Monetary Fund (IMF). The IMF has recommended this tax as part of its conditions for a $1 billion loan under the Resilience and Sustainable Facility (RSF), which aims to support climate-vulnerable nations in disaster preparedness and energy transition.

During initial discussions to finalize the RSF—focused on disaster resilience—government officials raised concerns about the levy's potential impact on business growth. The IMF delegation is currently in Pakistan to negotiate climate-related conditions for the loan, marking a shift from the usual balance-of-payments-focused financial assistance. A detailed session on the carbon tax is scheduled for today (Tuesday).

One of the proposed conditions includes imposing a carbon levy on fossil fuel-powered vehicles, specifically internal combustion engine (ICE) vehicles. The transport sector contributes roughly 10% of Pakistan's carbon dioxide emissions, and transitioning to cleaner alternatives will require substantial investment. The Ministry of Industries is drafting a five-year policy for New Energy Vehicles (NEVs), estimating that at least Rs 155 billion will be needed by 2030 to replace conventional vehicles with clean energy alternatives.

Pakistan currently imports nearly 80% of its oil for the transport sector. A shift to cleaner vehicles could lower emissions and reduce foreign exchange expenditures. However, the transition is costly, necessitating subsidies to make new vehicles and infrastructure more affordable. For instance, electric two-wheelers are up to twice as expensive as conventional motorcycles, while new-energy three-wheelers cost 123% more. The government aims to ensure that by 2030, up to 90% of new two- and three-wheeler purchases are powered by renewable energy.

To encourage this transition, the government is considering incentives such as exempting new-energy vehicles from federal excise duties, reducing sales tax, and offering zero withholding tax on NEV purchases. Additional proposals include bank financing for vehicles worth up to Rs 10 million, free registration, and toll-free access for new-energy cars. Plans also include establishing approximately 750 charging stations by 2030.

The IMF and World Bank view the carbon tax as essential for Pakistan's fiscal health, promoting a move away from fossil fuels. A World Bank report suggests that such a tax could widen the tax base by including informal economy producers while improving efficiency and driving renewable energy adoption.

The government has yet to make a final decision on the carbon levy, with approval required from Prime Minister Shehbaz Sharif. A clearer position is expected by the end of the week. Additionally, the new IMF facility will emphasize the gradual removal of subsidies for electric tube-wells, natural gas subsidies for fertilizers, and reforms in Pakistan's sugar industry.

# SOLAR PAKISTAN EXHIBITION HELD IN MULTAN FROM JULY 18–20

The Solar Pakistan Exhibition, a premier event showcasing solar energy technologies and sustainable power solutions, was held in Multan from July 18 to 20. The three-day event brought together industry leaders, manufacturers, policymakers, and renewable energy enthusiasts to highlight the latest advancements in solar technology and promote clean energy adoption in Pakistan.

With a strong focus on localized energy solutions for South Punjab, the exhibition featured a wide range of solar panels, inverters, batteries, and off-grid systems tailored for residential, agricultural, and industrial use. Several national and international companies participated, offering insights into innovative technologies and installation practices.

Organized to foster awareness and accelerate the shift toward renewable energy, the event also hosted technical seminars, live demonstrations, and expert panels. The exhibition was widely attended and praised for encouraging sustainable development and energy independence in the region.

# PAKISTAN TO DEVELOP TWO LARGE-SCALE SOLAR POWER PROJECTS IN JHANG

The federal government has added two major solar power projects, with a combined capacity of 2,800 MW, to the Indicative Generation Capacity Expansion Plan (IGCEP) for 2025–2035. According to Business Recorder, citing sources, these projects could potentially be awarded to Saudi Arabia's ACWA Power through a Government-to-Government (G2G) arrangement.

The National Grid Company of Pakistan Limited (NGC) has informed the Private Power and Infrastructure Board (PPIB) about the inclusion of the two projects—one of 1,000 MW and the other of 1,800 MW—to be developed by ACWA Power in the districts of Layyah, Jhang, and Muzaffargarh. These proposals are pending final approval from the National Electric Power Regulatory Authority (NEPRA).

Previously, the projects faced setbacks. In November 2023, ACWA Power declined to sign an agreement with Pakistan due to security concerns. However, following a visit from a delegation of Saudi investors, including ACWA representatives, and subsequent discussions with the Special Investment Facilitation Council (SIFC), interest in the projects was rekindled. Pakistan's embassy in Riyadh has also maintained communication with the company since then.

Still, hurdles remain. Saudi officials have expressed reservations over the handling of M/s Al-Jomaih's investment in K-Electric, which has led to broader hesitations among Saudi investors regarding future ventures in Pakistan. The matter is currently being addressed by Deputy Prime Minister Senator Ishaq Dar.

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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.

# OPEC+ SURPRISES MARKETS WITH ACCELERATED OUTPUT HIKE, OIL PRICES SLIDE

In an unexpected move, eight OPEC+ countries agreed on Thursday to fast-track their oil production increases, deciding to raise output by 411,000 barrels per day in May. The announcement triggered a sharp sell-off in oil markets, deepening earlier losses.

Brent crude, already down more than 4% following U.S. President Donald Trump's announcement of new tariffs on key trading partners, tumbled further to drop over 6%, falling below the $70 per barrel mark.

Originally, the group had planned a modest increase of 135,000 barrels per day for May as part of a gradual unwinding of a 2.2 million bpd output cut implemented earlier this month. However, following a virtual meeting on Thursday, the eight members—including Russia, Saudi Arabia, the UAE, Kuwait, Iraq, Algeria, Kazakhstan, and Oman—opted to front-load two additional months' worth of output increases into May.

OPEC cited "continuing healthy market fundamentals and a positive outlook" as justification for the steeper hike, while noting that future increases could be paused or reversed depending on market conditions.
The move is seen as a buffer against potential supply disruptions from Iran, as the U.S. ramps up pressure on Tehran. President Trump, a vocal critic of high oil prices since the beginning of his second term, is reportedly considering a visit to Saudi Arabia next month.

In total, OPEC+ still has 3.65 million bpd in output cuts in place until the end of 2026, maintaining a collective reduction of 5.85 million bpd—around 5.7% of global supply.

Focus Shifts to Compliance Issues
Analysts say the decision also reflects OPEC+'s intent to improve compliance with production quotas across member states.

"OPEC+ is doubling down on discipline. This forces underperforming members to align," said Amrita Sen, co-founder of Energy Aspects.
Kazakhstan, which has recently exceeded its production targets, has drawn criticism from within the group, particularly from top producer Saudi Arabia. Other members such as the UAE, Nigeria, and Gabon have also been slightly overproducing, though to a lesser extent.
Kazakh production may naturally decline this month after Russia ordered a partial shutdown of the CPC pipeline—Kazakhstan's primary export route—impacting output from major operators like Chevron and ExxonMobil.

The eight OPEC+ nations are scheduled to reconvene on May 5 to determine output levels for June.

# NORWAY'S SOVEREIGN WEALTH FUND ACQUIRES OFFSHORE WIND STAKES FOR $1.5 BILLION

Norway's sovereign wealth fund — the largest in the world — announced on Monday that it has purchased a 49% stake in two offshore wind farms currently under development in Germany and Denmark from RWE, in a deal valued at €1.4 billion ($1.5 billion).

The investment, made through Norges Bank Investment Management, covers RWE's Nordseecluster and Thor wind projects. The transaction is expected to close by early Q3 2025, with RWE retaining responsibility for the construction and future operation of both projects. Together, the Nordseecluster and Thor wind farms will have a combined capacity of 2.64 gigawatts, enough to supply electricity to over 2.6 million homes across Denmark and Germany, RWE stated in a separate release.

According to analysts at Bernstein, the transaction reduces RWE's net cash investment in the projects by roughly €4 billion and will result in a book gain of €150 million. The deal reflects a 12% premium over the capital expenditures incurred so far. "Today's farm-down move is a positive step toward reducing RWE's net capital expenditure as outlined in its FY2024 results, and helps mitigate future capex risks associated with these projects," Bernstein analysts noted. "However, RWE will continue to bear market price risks for the first 15 years of the projects' operations."

Earlier this month, RWE announced plans to scale back its investment program through 2030 by €10 billion — more than 20% — citing increasingly challenging conditions in the renewable energy sector that have made it harder to meet return expectations.

# WOODSIDE APPROVES $17.5 BILLION LOUISIANA LNG EXPORT PROJECT

Woodside Energy Group has announced a final investment decision (FID) for its massive $17.5 billion Louisiana LNG production and export facility in Calcasieu Parish.

The project, which represents the largest single foreign direct investment in Louisiana's history, will be capable of producing 16.5 million metric tons per annum (Mtpa) of LNG.

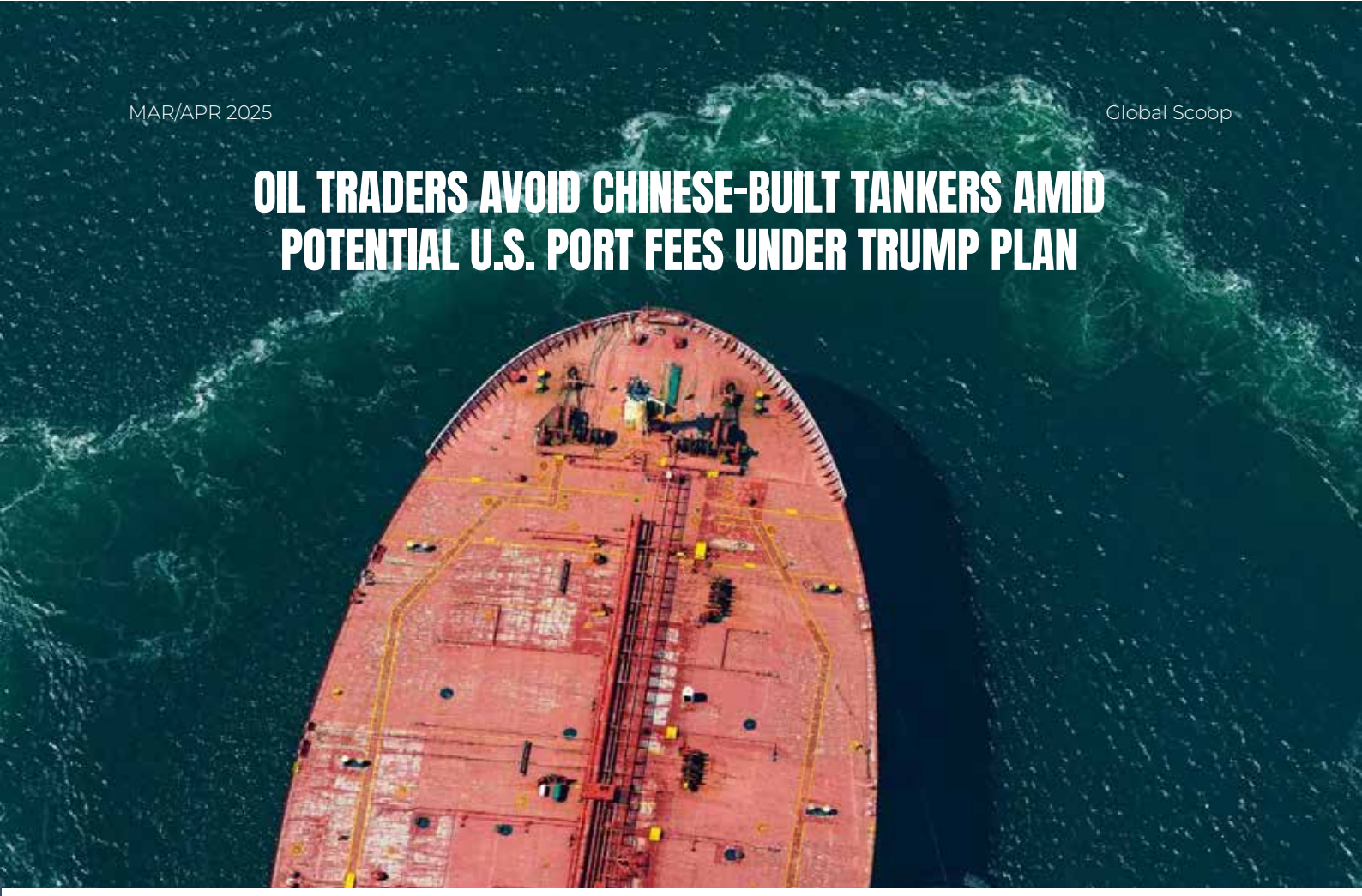
The facility, acquired from Houston-based Tellurian Inc. in 2024, was formerly known as the Driftwood LNG project. Construction is already underway, with first LNG production targeted for 2029.

The development includes three LNG trains with expansion capacity for two additional trains. The project is fully permitted for a total capacity of 27.6 Mtpa. Once operational, Woodside expects to control over 5% of global LNG supply, with their global portfolio delivering approximately 24 Mtpa in the 2030s.

The project's financing structure involves Stonepeak as an investor in Louisiana LNG Infrastructure LLC, contributing $5.7 billion towards capital expenditure, with an accelerated payment schedule of 75% in both 2025 and 2026. Woodside's share of the total capital expenditure is $11.8 billion.

According to Woodside CEO Meg O'Neill, "Louisiana LNG is a game-changer for Woodside, set to position our company as a global LNG powerhouse and enable us to deliver enduring shareholder returns." The project is expected to generate approximately $2 billion in annual net operating cash flow in the 2030s.

# OIL TRADERS AVOID CHINESE-BUILT TANKERS AMID POTENTIAL U.S. PORT FEES UNDER TRUMP PLAN



Oil traders are steering clear of chartering Chinese-built tankers due to concerns over a proposed U.S. plan that could impose hefty port fees on such vessels. The initiative, pushed by former President Donald Trump as part of a broader strategy to revive the American shipbuilding sector, has yet to be finalized but is already impacting global shipping decisions. The draft proposal from the Office of the U.S. Trade Representative (USTR) suggests imposing port-entry fees of up to $1.5 million on Chinese-built vessels, and up to $1 million on any vessel—regardless of origin—if its operator has Chinese-built ships in their fleet or on order.

Though still under review, the plan has sparked backlash across various industries, including strong opposition from U.S. agricultural exporters and the Agriculture Transportation Coalition, who warn it could disrupt supply chains and raise costs. Oil traders are among those already reacting. According to market sources cited by Bloomberg, charterers arranging shipments to or from U.S. ports are now actively avoiding Chinese-built tankers, opting instead for alternatives, especially South Korean-built vessels. These South Korean ships are reportedly being booked at higher rates due to the shift in demand. South Korea holds a larger share of the current global tanker fleet, but China dominates new construction, with more than 70% of tankers under construction worldwide being built in Chinese shipyards, according to Clarksons Research.

Shipping industry leaders warn the proposed fees could ultimately harm U.S. businesses. Joe Kramek, CEO of the World Shipping Council, testified at a recent USTR hearing that the plan could increase costs for U.S. exporters and consumers without effectively pressuring China to change its trade practices. “These proposals would raise prices, create inefficiencies in supply chains, and hurt sectors like agriculture that depend on competitive shipping costs,” Kramek said. “The ripple effects would be felt across the entire U.S. economy.”

# EUROPEAN COMMISSION GRANTS €52 MILLION TO RENEWABLE ENERGY PROJECTS IN FINLAND AND ESTONIA

The European Commission has awarded €52 million through the EU Renewable Energy Financing Mechanism (RENEWFM) to support nine renewable energy projects in Finland and Estonia, nearly exhausting the €52.4 million call budget. The initiative aims to boost the EU's renewable energy capacity while encouraging collaboration between Member States. The selected projects include seven solar photovoltaic (PV) developments in Finland and two onshore wind projects in Estonia, with a combined generation capacity of 445.65 megawatts (MW). All installations are scheduled to become operational between 2027 and 2028, contributing to the EU's broader climate and energy targets. Finland's solar expansion includes projects such as Laivakangas Solar Park in Tornio (€4.2 million), Lamminneva in Lappajärvi (€3.5 million), and Kouvola Lakiasuo (€7.7 million), which will transform disused lands like former peatlands and gravel pits into productive clean energy sites. Other solar initiatives include projects in Suonenjoki, Joroinen, Lålby, and Pori, each receiving between €1.1 million and €5.9 million in funding.

Estonia, meanwhile, will enhance its wind energy infrastructure through two significant projects. The Püssi Project will receive €9.8 million to develop a hybrid park combining wind and solar generation, while the Maima Wind Park has been allocated €8.2 million to build an onshore wind farm in the Põhja-Pärnumaa municipality. These projects are a testament to the EU's ongoing push for climate neutrality and renewable integration across borders. Beyond generating clean electricity, the funding is expected to support local economies, optimize land use, and promote technological advancement in the renewable energy sector.

# SPAIN'S GRID DENIES RENEWABLE ENERGY TO BLAME FOR MASSIVE BLACKOUT

Spain's national grid operator, Red Eléctrica de España (REE), has denied that solar power caused the country's worst blackout, amid growing political pressure on Prime Minister Pedro Sánchez to clarify the incident. REE attributed the disruption to two simultaneous generation failures at substations in the southwest, though their exact locations remain under investigation. REE President Beatriz Corredor, a former Socialist minister, defended the reliability of renewable energy, stating on Cadena SER radio that solar and wind technologies now function with stability comparable to traditional power systems. She dismissed speculation linking the outage to renewables and confirmed she had no intention of resigning.

Monday's blackout, which brought trains, airports, and elevators to a halt across Spain and Portugal, occurred when solar energy accounted for 53% of Spain's electricity generation, followed by wind (11%), and nuclear and gas (15%). Critics of Sánchez's coalition government, particularly the opposition People's Party, claim the administration's renewable energy push has compromised grid stability. Party spokesperson Miguel Tellado rejected the cyberattack theory and instead blamed REE's management, calling for an independent parliamentary inquiry. Meanwhile, energy expert Antonio Turiel warned that the grid's instability stems from rapid, uncoordinated integration of renewable systems without adequate stabilisation infrastructure. The government, which has committed €52 billion in grid upgrades by 2030 to meet rising demand from electric vehicles and data centres, now faces mounting scrutiny over its energy transition strategy and crisis response. While REE continues to investigate the technical cause, the blackout has reignited debates over the pace and planning of Spain's green energy rollout.

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# EQUINOR WEIGHS LEGAL ACTION AS TRUMP ADMINISTRATION HALTS $2.5 BILLION U.S. OFFSHORE WIND PROJECT

Norwegian energy giant Equinor is considering legal action against the U.S. government after the Trump administration abruptly ordered a halt to construction on its $2.5 billion Empire Wind offshore project off the coast of New York. The directive, issued last month by Interior Secretary Doug Burgum, instructs the company to “immediately halt all construction activities,” sparking concern across the renewable energy sector.

Equinor, which is majority-owned by the Norwegian government, had already invested nearly $2 billion into the project, which was nearly one-third complete. Once operational—originally scheduled for 2027—Empire Wind was expected to supply power to roughly 500,000 U.S. homes. “We invested in Empire Wind after receiving all required approvals,” said Equinor CEO Anders Opedal. “The halt order is unprecedented and, in our view, unlawful. We are actively seeking clarification from the U.S. administration and reviewing legal options.”

The project had received federal approval under the Biden administration in 2023 as part of a broader strategy to accelerate offshore wind development and reduce carbon emissions. However, on his first day back in office, President Trump ordered a comprehensive review of all offshore wind permitting and leasing, criticizing the previous administration’s regulatory process as rushed and incomplete.

That review has dealt a serious blow to the emerging U.S. offshore wind industry. Market values for major developers, including Equinor and Danish firm Ørsted, have dropped sharply. Ørsted, which is developing the Sunrise Wind and Revolution Wind projects off New York and Rhode Island, also faces uncertainty. Meanwhile, Dominion Energy is proceeding with plans for a wind farm off Virginia.

The Empire Wind suspension has affected around 1,500 jobs, and labor leaders warn of broader economic fallout. “Halting work that’s already underway jeopardizes thousands of good union jobs and undermines New York’s clean energy goals,” said Vincent Alvarez, president of the New York City Central Labor Council.

The New York State Energy Research and Development Authority condemned the move, calling it “shortsighted and politically motivated.” Equinor, which has operated in the U.S. for over 35 years with more than $60 billion invested across oil, gas, and renewables, now faces a complex legal and political landscape as it defends one of its most ambitious clean energy ventures to date.

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# 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.

# FROM CRISIS TO CLEAN POWER: HOW PAKISTAN QUIETLY TOPPED GLOBAL SOLAR IMPORTS

How Pakistan Quietly Emerged as the World's Largest Solar Importer There was no landmark legislation, no flood of international investments, and no prime ministerial declaration of a green transformation. Yet by the close of 2024, Pakistan had become one of the top importers of solar panels globally. The country, grappling with economic struggles and widespread energy poverty, has become an unlikely success story in clean energy.

Pakistan has secured its place among the world's leading solar markets, having brought in 17 gigawatts of solar panels in 2024 alone, according to the Global Electricity Review 2025 by UK-based energy think tank Ember. This figure is twice the volume of the previous year's imports and positions Pakistan among the top global purchasers of solar panels. What stands out most is that this growth isn't fueled by a sweeping national solar programme or major utility-scale developments.

Instead, the boom appears to be largely powered by rooftop installations on homes, small businesses, and commercial buildings aiming to secure more affordable and dependable electricity amid rising costs and routine blackouts. Ember's findings highlight that rooftop systems are proliferating across Pakistan as a practical solution for cheaper electricity.

**Local experts concur with this perspective.**

Muhammad Mustafa Amjad, program director at Renewables First, calls this expansion a "survival response" by those increasingly unable to rely on the national grid due to mismanagement and frequent outages.

"It represents a fundamental change," Amjad notes, "in the public's perception of energy in Pakistan."

Amjad estimates that Pakistan's solar panel

imports in FY 2024 equate to nearly half the country's peak electricity demand.

"Rooftop solar is quickly becoming the dominant energy source," he says. "To stay relevant, the national grid will need to undergo substantial transformation." Energy analyst Ubaid Ullah in Karachi points out that the shift is largely citizen-led. "Satellite images of urban areas now show rooftops covered in blue solar panels," he says.

In a country where the power grid is often unstable, solar has become a practical alternative. The spike in 2024 imports follows years of worsening load-shedding, fluctuating energy tariffs, and reliance on costly diesel generators and imported fuels. Instead of waiting for policy changes, many Pakistanis took energy matters into their own hands—installing solar systems without subsidies or centralised support.

**This makes Pakistan's solar growth pattern unique in global terms.**

In many countries, solar adoption is linked to climate commitments or international funding. Pakistan's case, however, is driven by economic necessity and grassroots demand rather than environmental diplomacy. The Ember report emphasizes that this growth is occurring largely "outside formal planning structures."

Experts say government involvement has been minimal. While some reforms like relaxed import rules and net metering approvals have helped, there hasn't been significant public spending or large-scale solar tenders to match the boom seen at the grassroots level. Despite the record imports, Pakistan's officially reported grid-connected solar capacity remains low, suggesting that much of the deployment is off-grid or behind-the-meter and thus excluded from official energy data.

This gap between actual installations and centralised planning is beginning to create problems. Utility companies and grid operators are struggling to manage the shift, especially as many high-paying users generate their own power during daylight and rely on the grid only for backup.

This pattern, often referred to as a "utility death spiral," can strain the financial viability of public energy providers and create demand spikes during evening hours. Ember's analysis warns that such rapid, decentralised solar growth needs to be matched with updated regulation and planning tools to avoid systemic stress.

"Comprehensive planning and regulatory updates are essential to support a smooth and stable energy transition," the report concludes.

Though solar has taken the spotlight, Pakistan's renewable energy mix is also expanding to include wind, hydro, and bioenergy. However, solar stands out due to its modular nature and minimal need for bureaucratic coordination. In a country long challenged by weak governance and infrastructure issues, solar's scalability has enabled rapid uptake without major public investment.

The record imports in 2024 highlight more than just rising interest—they reflect global price drops, particularly from Chinese suppliers who dominate the solar market.

As global prices fall and local fuel costs remain volatile, solar is becoming one of the most cost-effective energy options available in Pakistan Still, there are serious concerns about how the transition is unfolding. With limited oversight on quality, storage integration, and grid coordination, the long-term effectiveness of this transition could be at risk.

Without stronger data, clear strategies, and investments in grid modernization, the current growth trend may deepen existing disparities in energy access and reliability.

Yet the lesson from Pakistan's experience is clear: the clean energy shift is no longer exclusive to rich countries or major polluters. When economic conditions align and regulatory barriers are low, energy transitions can happen swiftly—even in countries where energy policy has lagged behind.

Pakistan's experience may be messy and uneven, but it has global relevance. It presents a glimpse of what energy shifts might look like across the Global South: decentralised, consumer-led, and driven by local realities. As Amjad puts it, Pakistan offers a preview of a new energy paradigm.

"For countries in the Global South," he explains, "this shows a bottom-up, people-powered, market-based energy transition—one that ensures equitable, distributed, and clean energy access."

Battery storage, he predicts, will likely follow solar's path: affordable, modular, and widely adopted at the grid's edge rather than its core. "As battery prices fall, the pace of transition will only quicken, especially with continued fuel price instability," he says.

Harjeet Singh, a strategic adviser to the Fossil Fuel Non-Proliferation Treaty Initiative, agrees. He sees Pakistan's story as proof that solar is both a green and economic solution.

"The incredible solar growth in Pakistan shows that this technology is no longer just for environmental reasons—it's an economic imperative," Singh says. "Faced with erratic fossil fuel prices and unreliable electricity, people are turning to solar as a cheaper, cleaner, and more stable option."

"This is not just about going green—it's about securing energy access, supporting economic resilience, and building energy independence from the ground up."

# UK AID BUDGET CUTS THREATEN CLIMATE FINANCE PLEDGE TO VULNERABLE NATIONS, EXPERTS WARN

The UK government has announced a reduction in its overseas aid budget, a move analysts warn will make it harder to fulfill its climate finance commitments to developing nations.

Prime Minister Keir Starmer revealed plans to cut the aid budget from 0.5% to 0.3% of national income, stating that this would allow the UK to increase defense spending by £13.4 billion per year from 2027.

The UK's climate finance commitments are funded through its aid budget, which had already been reduced from 0.7% to 0.5% in 2021, just before the COP26 climate summit in Glasgow.

Starmer is scheduled to travel to Washington on Thursday for a meeting with US President Donald Trump, who has been urging European nations to take on more responsibility for their own defense budgets.

International Aid Community in Shock
The decision has stunned the global development community, which is already grappling with Trump's freeze on USAID spending and significant aid cuts by Germany, Sweden, France, Belgium, and the Netherlands.

"A Catastrophic Blow" to Vulnerable Nations
International charities and aid organizations have strongly criticized the decision, calling it "a betrayal," "short-sighted," and "a catastrophic blow" that will worsen conditions in some of the world's most vulnerable countries.

With climate change impacts, humanitarian crises, and global instability on the rise, experts argue that stronger international cooperation is needed rather than a retreat from commitments.
"At a time when we've just had the hottest January on record and humanitarian crises are at an all-time high, the UK government's decision to slash its aid budget is deeply shameful," said Teresa Anderson of ActionAid International.

Tom Mitchell, Executive Director of the International Institute for Environment and Development (IIED), urged Starmer to look at alternative funding sources:

"Before cutting an already strained aid system that supports the world's most vulnerable, the UK should first eliminate harmful fossil fuel subsidies."
Climate Finance in Jeopardy?
The UK has pledged £11.6 billion ($14.7 billion) in climate finance for developing countries between 2021 and 2026. However, a report from the UK's

Independent Commission for Aid Impact warned that over half of the funding is set to be allocated in the final two years, making it difficult to meet the target—especially under a shrinking aid budget.

While Starmer's Labour government insists it remains committed to the pledge, experts fear climate finance could be at risk.
"Without clear assurances, climate finance could be on the chopping block," said Laetitia Pettinotti of ODI Global.

"Sweeping cuts without transparency are what we expect from Trump and Musk—Starmer needs to provide clarity."

Critical Climate Goals Under Threat
Wealthy nations, including the UK, are under pressure to increase climate finance contributions to help developing countries cut emissions and adapt to climate change.

At the COP29 climate summit in Azerbaijan, developed nations agreed to triple climate finance to $300 billion annually by 2035. However, the UK's decision to shrink its aid budget could make fulfilling its share of this commitment even harder.
"For struggling communities, this decision could be a matter of life and death," said Gareth Redmond-King of the UK's Energy and Climate Intelligence Unit (ECIU).

"Instead of increasing climate finance, the UK has just reduced the budget that funds it."

With crucial climate talks set to take place in Brazil in November, where nations will review their progress toward global climate goals, experts had anticipated new finance commitments from wealthy nations.

"Rich countries were expected to announce increased climate finance to build trust with developing nations," said Clare Shakya of The Nature Conservancy.
"If we fail to peak emissions near 1.5°C and halt biodiversity loss, we will face even greater security challenges. The timing of this decision could not be worse."

Starmer Defends the Decision
Speaking to UK lawmakers, Starmer acknowledged that the decision involved "extremely difficult and painful choices."

"This is not a decision I wanted to take or am happy to take," he said. "We will do everything we can to return to a world where this is not necessary and to rebuild our development capabilities."

He assured that the UK would continue providing humanitarian aid in Sudan, Ukraine, Gaza, and other crisis regions while maintaining its efforts to tackle climate change.


# BII AND HBL LAUNCH $75 MILLION FACILITY TO BOOST CLIMATE RESILIENCE AND AGRICULTURAL FINANCE IN PAKISTAN

British International Investment (BII), the UK's development finance institution and impact investor, has announced a $75 million finance facility in collaboration with Habib Bank Limited (HBL), Pakistan's largest and most prominent commercial bank. This strategic initiative is designed to enhance access to finance for farmers and agribusinesses across the country, while building climate resilience and enabling long-term sustainability in the agriculture sector.

Agriculture is not just an economic pillar of Pakistan—it is the backbone of rural livelihoods and food security. The sector contributes nearly 24% to the national GDP and provides employment to 37% of the population. Importantly, it is also the largest source of employment for women, making it a critical driver of inclusive development. Yet, despite its centrality, Pakistan's agricultural ecosystem faces systemic challenges. These include limited access to affordable finance, reliance on outdated tools and techniques, fragmented value chains, and growing exposure to climate-related risks such as floods, heatwaves, and shifting weather patterns.

Recognizing the urgency and scale of these challenges, the new BII-HBL facility aims to unlock financing that directly supports smallholder farmers and agribusinesses—two segments that are often underserved yet essential for the sector's resilience and growth. HBL has committed to channeling at least 50% of the $75 million facility towards smallholder farmers, who account for more than 90% of Pakistan's farming community.

These farmers, despite their vast numbers and importance, often struggle with access to formal credit, leaving them vulnerable to climate shocks, crop failures, and market fluctuations.

Beyond direct support to farmers, the facility will also cater to agribusinesses operating across the value chain—from input suppliers and processors to logistics providers and exporters. By strengthening each link in the chain, the facility aims to create a more efficient, climate-resilient, and commercially viable agricultural ecosystem. This includes promoting practices and technologies that reduce waste, improve productivity, and open up better market access for farmers.

A key feature of the facility is its focus on climate adaptation and sustainability. HBL plans to expand the use of solar-powered irrigation systems and promote environment-friendly technologies that reduce emissions and support water conservation. As Pakistan continues to experience the intensifying effects of climate change, such interventions will be vital in helping farmers adapt to shifting weather patterns and resource scarcity.

The initiative is also aligned with HBL's broader sustainability agenda, which integrates environmental, social, and governance (ESG) principles across its operations. Through this partnership with BII, HBL will continue to scale its inclusive finance offerings, including crop and livestock insurance, tailored loan products, and advisory services that help farmers mitigate risks and adopt climate-smart practices.

British High Commissioner to Pakistan, Jane Marriott CMG OBE, welcomed the initiative, stating:

"The agriculture sector is critical to Pakistan's economic stability and food security. Yet, it faces increasing challenges from climate change and limited financial inclusion. This partnership between BII and HBL addresses those gaps by enabling farmers to adopt more resilient and sustainable practices. It reflects the UK's long-term commitment to supporting Pakistan in building a greener, more inclusive future."

Habib Yousuf, BII's Regional Director for South Asia, also emphasized the importance of this initiative:

"BII is proud to partner with HBL to deliver much-needed financial support to Pakistan's farmers and agribusinesses. Our goal is to help build a more resilient agricultural sector—one that not only contributes to food security but also supports sustainable economic development. By promoting climate adaptation measures and strengthening value chains, we believe this facility will have a lasting impact on rural livelihoods and the broader economy."

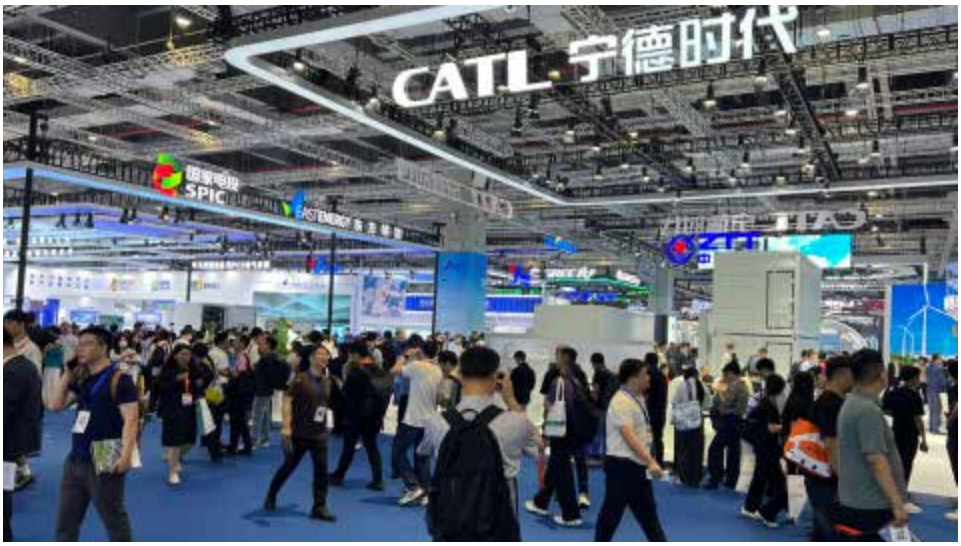
Maya Inayat Ismail, Chairperson of the HBL Sustainability Forum, underscored HBL's commitment to sustainability and inclusive growth:

"At HBL, sustainability is a core principle that guides everything we do—from responsible lending and inclusive banking to environmental stewardship. This facility will allow us to further scale our efforts in climate-smart financing, risk mitigation, and value chain development. Most importantly, it helps us support the people at the heart of Pakistan's food system—our farmers."

This partnership comes at a critical time. With increasing population pressures, food demand is rising, while climate change threatens agricultural productivity and water availability. According to recent reports, Pakistan is among the top 10 countries most vulnerable to climate change, and its agriculture sector is on the frontline of this crisis. Building resilience is no longer optional—it is essential.

The BII-HBL facility is a model of how public-private partnerships, supported by international development finance, can help bridge longstanding gaps in financing and innovation. By enabling greater access to capital and empowering farmers with the tools and knowledge they need, this initiative sets a precedent for how climate finance can be meaningfully deployed in emerging economies. As the world grapples with the dual challenges of food insecurity and climate change, partnerships like this one offer a blueprint for sustainable agricultural transformation—where finance, technology, and policy align to empower communities and protect the planet.

# SNEC 2025 WRAPS UP IN SHANGHAI AMID INDUSTRY CHALLENGES




The 2025 edition of the SNEC PV Power Expo, held in Shanghai, highlighted both the resilience and strain within China's solar sector amid growing overcapacity and shrinking margins. Despite a subdued atmosphere compared to previous years, the event remained well attended by domestic and international stakeholders, reflecting sustained interest in innovation and long-term energy transition goals.

While new product announcements, particularly for PV modules, were fewer, attention shifted to back-contact and perovskite prototypes, though TOPCon panels continued to dominate displays. Energy storage emerged as the standout theme, with several companies unveiling large-scale battery systems. Sungrow showcased its PowerTitan 3.0, while CATL and Gotion presented high-capacity concepts exceeding standard container sizes.

Industry leaders noted rising focus on storage over PV due to strong demand. Analysts observed fewer Western visitors, with increased participation from India, Pakistan, Southeast Asia, and the Middle East. The shift from feed-in tariffs to merchant models in China's power market added to market uncertainty and investor caution.

Safety and thermal management also gained prominence, with innovations like Svolt's liquid-cooled battery packs and Hithium's successful container burn tests. AI-driven monitoring systems, digital twins, and predictive maintenance tools were also on display, emphasizing smarter grid integration.

Meanwhile, lithium iron phosphate (LFP) remained the dominant battery chemistry, with enhancements underway to improve temperature resilience and lifespan.
Overall, the show underscored a sector in flux — innovative, yet navigating economic and structural pressures.

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# Sungrow Italy Receives Top Brand PV 2025 Award

At the recent KEY 2025 event at Rimini Expo Center, Sungrow made a strong impression while announcing a major milestone: Sungrow Italy has been honored with the prestigious Top Brand PV 2025 award from EUPD Research. This recognition underscores Sungrow's technological excellence in the Italian market and the outstanding support provided by its local team.

EUPD Research, a globally renowned market research firm, awards the Top Brand PV certification based on in-depth industry surveys evaluating brand perception, customer satisfaction, and market presence. This achievement reaffirms Sungrow's strong reputation among installers and partners in Italy, highlighting its commitment to quality, innovation, and customer support.

Sungrow's diverse product portfolio offers cutting-edge solutions for residential, commercial, and utility-scale applications, ensuring high efficiency, reliability, and seamless grid integration. Moreover, its local team of experts provides customized support at every stage of a project, from design and installation to after-sales service, further solidifying Sungrow's leadership in Italy's renewable energy sector.

Emilio Manzoni, Head of Sales PV and ESS at Sungrow Italy, expressed gratitude for the Top Brand PV 2025 award, emphasizing that it reflects both the company's advanced technology and the dedication of its local team. He reiterated Sungrow's role in advancing Italy's clean energy transition through innovative solutions, top-tier service, and strong partnerships.

This latest accolade adds to Sungrow's growing list of achievements in Italy, following previous recognitions such as Top Brand PV 2023 and SolarProsumer 2024. On a global scale, Sungrow was named the No. 1 PV Inverter Brand in global shipments by S&P Global Commodity Insights in 2024 and recognized as the No. 1 Bankable PV Inverter Brand by BloombergNEF. These continued accomplishments reinforce Sungrow's commitment to innovation, partner support, and a sustainable energy future.

# BP TO CUT RENEWABLE INVESTMENTS AND FOCUS ON OIL & GAS


BP is expected to announce a significant reduction in its renewable energy investments, shifting its focus toward expanding oil and gas production.

The energy giant is set to outline its new strategy following pressure from investors frustrated by its lower profits and share price compared to competitors. Both Shell and Norwegian firm Equinor have already scaled back their green energy investments. Meanwhile, former U.S. President Donald Trump's pro-fossil fuel stance has further encouraged a shift away from low-carbon projects.

The move has sparked concerns among environmental groups and some shareholders who fear an increase in fossil fuel production.
A Shift Away from Previous Climate Commitments
Five years ago, BP set ambitious goals to reduce oil and gas production by 40% by 2030, while significantly increasing its renewable energy investments. However, in 2023, the company revised its oil and gas reduction target to 25%, and now it is expected to abandon it entirely.

Additionally, BP is set to cut its renewable energy investments by more than half, a shift described by CEO Murray Auchincloss as a "fundamental reset". In 2024, BP reported a net income of $8.9 billion (£7.2 billion), down from $13.8 billion the previous year. Auchincloss is facing pressure from activist investors, including Elliott Management, which recently took a £4 billion stake in BP to push for greater oil and gas investment.

Underperformance Compared to Rivals
Since former CEO Bernard Looney unveiled BP's energy transition strategy in 2020, the company has delivered total shareholder returns of 36% over five years. In contrast, competitors Shell and ExxonMobil have seen returns of 82% and 160%, respectively.

BP's underwhelming financial performance has led to speculation that it could become a takeover target or consider moving its stock market listing to the U.S., where oil and gas companies generally command higher valuations.

Investor and Environmental Concerns
Not all shareholders support BP's strategic shift. Last week, a group of 48 investors urged BP to allow a vote on any plans to abandon its renewable energy commitments.

A spokesperson for Royal London Asset Management, one of the signatories, stated:
"As long-term shareholders, we recognize BP's past efforts toward energy transition but remain concerned about its continued investment in fossil fuel expansion."

Meanwhile, Greenpeace UK warned that BP could face strong opposition from both environmental activists and its own shareholders if it fully commits to fossil fuels.

Charlie Kronick, Senior Climate Adviser at Greenpeace UK, commented:
"Government policies will need to prioritize renewable power, and as extreme weather puts pressure on insurance models, policymakers will look to fossil fuel profits to fund recovery efforts. BP may want to reconsider this U-turn."

# The Photon Fiasco (That Worked)

In what some are now jokingly calling the Photon Fiasco, Pakistan's chaotic but massive solar leap shocked everyone — including itself. Fokus hailed it as "the most extreme expansion ever." Sometimes, energy desperation turns into solar domination In Germany, Pakistan is often associated with poverty and terrorism—an image that, like in many other places, is deeply misleading. The idea that Pakistan, often labeled as "poor," could install as much new photovoltaic capacity as wealthy Germany in 2024—over 16 GW—has left many questioning the numbers. For the first time, mainstream media outlets are reporting on a massive solar market shift even before the industry itself has fully analyzed it.

The reports are based on research from industry analyst Jenny Chase from BloombergNEF, who recently discussed Pakistan's solar growth in a TED Talk. Rather than relying solely on the notoriously unreliable Chinese export figures for solar modules, she examined satellite imagery to track actual installations. The findings reveal that Pakistan is now filled with photovoltaic systems. While some data gaps and uncertainties remain, one fact is clear: the country is experiencing a massive surge in solar energy adoption.

Both local and global industry experts are surprised, trying to understand the full extent of this growth and how to collect better data. At the same time, Pakistan's solar transformation could serve as a model for other nations that were previously overlooked in the renewable energy transition—or as a wake-up call for countries like Germany, proving that so-called "developing" nations can lead the way.

Skeptics, of course, are quick to question the

trend. Some dismiss it as "internet hype," while others argue that Pakistan's weak grid, lack of financing, and shortage of technical experts make such growth unsustainable. But despite these doubts, Pakistan—a country often portrayed as unstable, plagued by power shortages, and facing severe climate challenges—is pressing forward. As rising temperatures and droughts increase the demand for cooling, while conventional power plants struggle due to water shortages, solar energy is emerging as a critical solution.

Pakistan, with its 250 million people, is the fifth-largest country in the world by population. However, its GDP of $338 billion places it 46th globally—similar to the German state of Hesse, which has just 6.4 million people. The country's grid-connected electricity generation and consumption for 2024 is estimated at 110 TWh, yet surprisingly, this figure appears to be declining compared to 2023—a possible sign of the solar boom offsetting conventional energy demand. With annual solar radiation levels 1.5 to 2.5 times higher than European countries, Pakistan has enormous potential. If it successfully installs the projected 17 GW of new capacity in 2024, adding to the 26 GW total for 2023–24, this could generate 30 to 50 TWh of solar power annually—covering at least 30% of total electricity consumption in just two years.

This shift is entirely possible. When regulators and grid operators fail to act, individuals and businesses take matters into their own hands. In Pakistan, solar energy is increasingly seen as a plug-and-play solution—affordable, accessible, and easy to implement. Pakistanis are already accustomed to backup power systems, having relied on diesel generators and battery storage for years. Now, with solar panels and batteries cheaper and more widely available than ever, adoption is skyrocketing.

Favorable trade relations with China ensure no tariffs stand in the way of cheap solar imports. As a result, people are simply taking action—installing solar panels on rooftops, in fields, anywhere possible. If a system fails or needs adjustments, it's quickly fixed and reinstalled. The motivation to finally have cheap, reliable electricity is more than enough to drive this change.

This rapid rise of decentralized solar production is challenging the long-standing need for a traditional "super grid." With localized energy generation and storage at thousands of sites, concerns about blackouts are becoming irrelevant. If backup power (whether from batteries or generators) is already available, reliability improves dramatically.

If Pakistan—often dismissed as too poor or unstable—can achieve this, then many other nations can and will follow. For Germany and other countries engaged in slow, bureaucratic energy transitions, Pakistan is a real-world example of what's possible when action takes precedence over hesitation. Unlike Europe, where grids are seen as essential, Pakistan is proving that 24/7 decentralized energy solutions can work—at a fraction of the cost.

The shift toward photovoltaic-wind-storage hybrids is already happening on a massive scale in China, where gigawatt-sized systems are being deployed without grid connections to produce hydrogen. Similar setups can now be replicated worldwide, even on a smaller scale. Pakistan, however, seems to be moving at warp speed, leading the way with a truly XXL solar revolution.

I can't wait to see what further insights emerge from Pakistan and to understand the full scale of this "solar flash." As someone who has spent 33 years in the solar industry, I find this to be one of the most exciting and inspiring developments I've ever witnessed. I hope the people of Pakistan continue to benefit from this remarkable transformation—and honestly, I envy their "just do it, deal with the paperwork later" approach.

# GLOBAL RENEWABLE ENERGY CAPACITY EXPANDS BY 585 GW IN 2024: IRENA

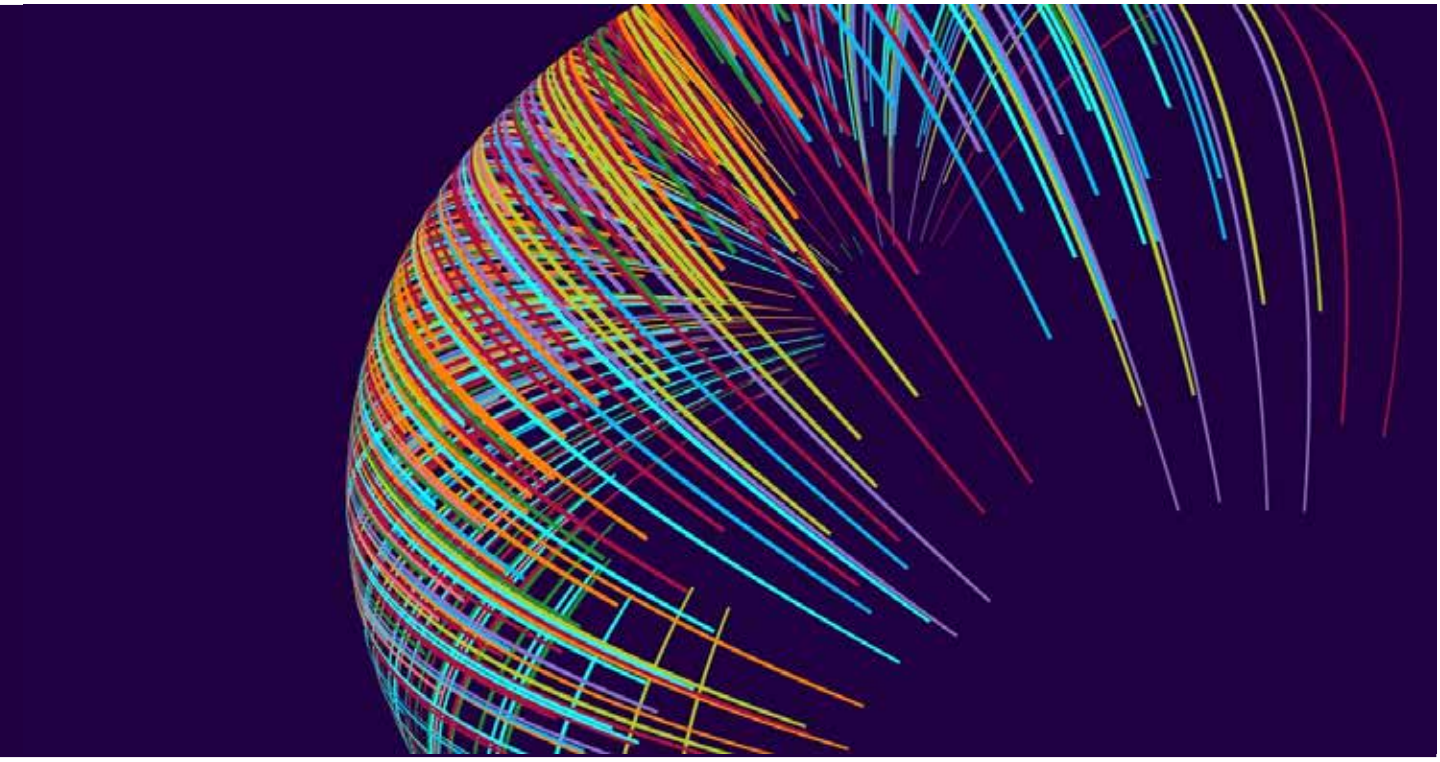
Global renewable energy capacity experienced a record annual growth rate of 15.1% in 2024, expanding by 585 gigawatts, according to a new analysis. In its latest report, the International Renewable Energy Agency (IRENA) stated that this surge raised the total installed renewable power capacity to 4,448 GW.

Despite this significant increase, IRENA cautioned that the pace of expansion remains insufficient to meet the global target of tripling installed renewable energy capacity by 2030, which would require reaching 11.2 terawatts. To stay on track, global renewable capacity must grow at an annual rate of 16.6%.

Earlier this month, the International Energy Agency (IEA) reported that renewable energy sources accounted for the largest share of international energy supply growth in 2024, making up 38%, followed by natural gas at 28%, coal at 15%, oil at 11%, and nuclear power at 8%. Additionally, IEA's estimate of new renewable installations surpassed IRENA's projections. According to the agency, global renewable installations reached a record high for the 22nd consecutive year, with approximately 700 GW added in 2024—80% of which came from solar photovoltaics.

Reflecting on these findings, IRENA Director-General Francesco La Camera emphasized the urgency of accelerating renewable energy expansion. "With just six years left to achieve the COP28 commitment of tripling installed renewable capacity by 2030, the world now needs to add over 1,120 GW annually for the remainder of the decade to stay on the 1.5-degree Celsius pathway," he stated. La Camera urged governments to utilize the next round of Nationally Determined Contributions to outline a clear roadmap for their renewable energy goals. He also called for stronger global cooperation to support developing nations in advancing their renewable ambitions.

"The continuous growth of renewables each year demonstrates their economic viability and scalability. However, while we keep setting new expansion records, regional disparities persist, and time is running out," La Camera noted. He further stressed that with energy security and economic



competitiveness now major global priorities, rapidly scaling up renewable power is both a business opportunity and a sustainable solution to energy challenges.

According to IRENA, solar and wind energy led the expansion in 2024, accounting for 96.6% of all net renewable additions. Solar energy alone represented more than three-quarters of this growth, surging by 32.2% to reach 1,865 GW, while wind energy increased by 11.1%.
China remained the largest contributor, adding 278 GW of solar capacity, followed by India with 24.5 GW. Commenting on IRENA's findings, UN Secretary-General António Guterres highlighted the transformative impact of renewables, stating: "Renewable energy is driving the decline of the fossil fuel era. Its record-breaking growth is creating jobs, reducing energy costs, and improving air quality."

He added, "Renewables rejuvenate economies. But the transition must be both faster and fairer, ensuring all nations can fully benefit from affordable, clean energy." The report also noted a resurgence in hydropower, which reached 1,283 GW in 2024, primarily due to growth in China. Meanwhile, global wind energy capacity climbed to 1,133 GW, fueled by expansions in the U.S. and China.

Bioenergy saw a rebound as well, with an increase of 4.6 GW in 2024 compared to 3 GW in the previous year, driven by China and France, each contributing 1.3 GW. Geothermal energy expanded by 0.4 GW, led by New Zealand, followed by Indonesia, Türkiye, and the U.S. Off-grid electricity capacity, excluding Eurasia, Europe, and North America, saw a near threefold increase, growing by 1.7 GW to reach 14.3 GW. La Camera noted that renewables now account for 46% of global installed power capacity.

"Despite this milestone, key questions remain about how to make renewables the dominant source of electricity generation, particularly in terms of grid flexibility and adaptation to variable renewable power," he said.

# LONGI STRENGTHENS MARKET LEADERSHIP IN SOUTHEAST ASIA WITH HI-MO X10 AND HPBC 2.0 INNOVATIONS


Since its debut, LONGi's Hi-MO X10 has gained significant traction in Southeast Asia, with customers showing keen interest in its technical capabilities. To highlight its innovations, LONGi organized the Southeast Asia Tour in Xi'an, hosting 103 guests, including 39 strategic partners from Thailand and Vietnam. At LONGi's global headquarters, attendees explored the advanced features and customer value offered by the Hi-MO X10 HPBC 2.0, designed to maximize benefits for the regional market.

**Hi-MO X10: High-Value Product Gains Recognition**

In a key session, Talisman Huo, Head of LONGi's Global Distributed Market and VP of the Emerging Markets Region, emphasized the company's growing presence in Southeast Asia's solar PV sector—achieving an 18% market share in Thailand and 20.2% in Vietnam. He highlighted LONGi's collaboration with over 15 major industry leaders and the deployment of HPBC 2.0 across more than 60 MW of projects and 20 installations. LONGi's continuous innovation and strong customer focus were underscored as central to its market dominance.

During the HPBC 2.0 Value Performance Data Analysis, Mr. Nattaphat, Product Solution Manager from LONGi's Southeast Asia office, shared: "The Hi-MO X10 outperforms the competition on every front. It features an outstanding 87.2% resistance to microcracks, just 8% shading loss, and over 2.3%

higher performance ratio in real-world projects—delivering faster investment returns of 4–5 years, especially in rooftop installations."

Visitors were shown the clear advantages of the Hi-MO X10, based on HPBC 2.0, through interactive demonstrations. LONGi highlighted its improved power output compared to TOPCon modules, with enhanced features like anti-shading and dust resistance.

**Hi-MO X10 Projects and Marketing Campaign Experience Sharing: Building a Booming Market Together**

Mr. Poonavich Suppanich, Co-founder of Heliotech Energy Solutions, shared details of a 1.28 MW project in Thailand. He noted that end-users favored the Hi-MO X10 due to its superior yield, shorter payback period, and high reliability. Similarly, Mr. Nguyen Khanh Toan, General Director of Hoang Ngan Phat Electric, discussed a 4.3 MW project in Vietnam. Rising electricity costs and ESG commitments prompted their client to pursue solar energy. The success of the Hi-MO X6 HPBC 1.0 in the first phase led to the adoption of the more advanced Hi-MO X10 HPBC 2.0 in the second phase due to its higher efficiency, safety, and adaptability.

**Recognition and Impact Across the Region**

These real-world case studies boosted confidence in the Hi-MO X10 and highlighted its potential in Southeast Asia's expanding PV sector. To honor their contributions, LONGi awarded Project Sharing Certificates to Mr. Suppanich and Mr. Toan. Additionally, the Excellent Marketing Certificate went to Mr. Saharat Preedawan, Managing and Marketing Manager of Solar Wing Energy. Solar Wing, known for prioritizing top-tier, tech-driven products, praised the performance of the Hi-MO X6 and was highly impressed by the Hi-MO X10 presentation. The product's superior features captured the attention of Solar Wing's CEO, encouraging the team to promote it widely.

# PENTAGREEN CAPITAL AND BII UNVEIL $80 MILLION INITIATIVE TO BOOST RENEWABLE ENERGY IN SOUTHEAST ASIA

Pentagreen Capital and British International Investment (BII) have launched an $80 million financing initiative to accelerate the development of utility-scale solar and battery storage projects across Southeast Asia. The collaboration, in partnership with ib vogt Singapore Pte. Ltd., a leading global renewable energy developer, aims to drive clean energy expansion in the region.

**Scaling Solar and Battery Storage Projects**

The newly established Development and Construction Facility (the Facility) will fund solar, hybrid solar, and battery storage projects in the Philippines, Indonesia, and other eligible Southeast Asian markets. Expected to unlock approximately $300 million in investments, the Facility will support projects delivering a combined 260 megawatt-peak (MWp) of solar capacity and 175 megawatt-hours (MWh) of battery storage. The first project under this initiative is a 100 MWp solar power plant in the Philippines. The Facility will provide essential mezzanine financing to fast-track its construction while complementing senior debt financing from HSBC.

**Meeting the Region's Rising Energy Needs**

According to the International Energy Agency (IEA), electricity demand in Southeast Asia is projected to grow by 4% annually until 2035. To align with climate goals, the region needs to scale up clean energy investments to $190 billion by 2035—five times the current levels. Renewable sources, including solar, wind, bioenergy, and geothermal, are expected to contribute significantly to the region's energy mix. Utility-scale hybrid solar and battery storage solutions are seen as critical for ensuring a stable clean energy supply. Battery storage enhances grid reliability by providing power during low-generation periods, such as nighttime or adverse weather conditions. Projects funded by the Facility are expected to generate approximately 400 gigawatt-hours (GWh) of clean electricity annually, preventing an estimated 257,000 tonnes of $CO_2$ emissions.

**Industry Leaders Highlight Key Milestone**

Nik Mehta, British High Commissioner to Singapore, reaffirmed the UK's commitment to mobilizing capital for a low-carbon future, noting that the initiative will drive sustainable growth, create jobs, and open new market opportunities in Southeast Asia. Marat Zapparov, CEO of Pentagreen Capital, described the initiative as a transformative partnership that will accelerate clean energy investments. He highlighted Indonesia and the Philippines as key target markets due to their strong renewable energy potential and supportive regulatory environments.

Rohit Anand, Regional Head (Southeast Asia) and Head of Infrastructure Equity, Asia at BII, emphasized that the initiative reinforces BII's commitment to advancing climate finance and supporting sustainable energy solutions in high-demand regions. David Ludwig, CEO of ib vogt APAC, underscored the role of innovative financing in unlocking the next phase of ib vogt's expansion in Southeast Asia.

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# SOLAR PAKISTAN 2025: A RECORD-BREAKING SHOWCASE OF CLEAN ENERGY INNOVATION

The highly anticipated SOLAR PAKISTAN 2025—the largest solar energy exhibition in South Asia—wrapped up with remarkable success at the Lahore Expo Centre, held from February 21 to 23. Organized by Fakt Exhibitions Pvt. Ltd., the event marked a major milestone for Pakistan's renewable energy sector, drawing over 350 exhibitors from 10 countries. This year's edition made history by utilizing all six exhibition halls of the venue for the very first time, underlining its position as the most expansive and comprehensive solar event in the region.

The exhibition attracted a diverse mix of industry leaders, policymakers, investors, and innovators, all united by a shared mission: accelerating Pakistan's transition to clean, sustainable energy. As the country grapples with energy security and climate resilience, SOLAR PAKISTAN 2025 emerged as a crucial platform for collaboration, knowledge exchange, and investment mobilization. Speaking at the event, Shah Jahan Mirza, Managing Director of the Private Power & Infrastructure Board (PPIB), described the exhibition as a "game-changer for sustainability." He highlighted its role in driving innovation and investment while catalyzing meaningful action to address climate change and ensure a greener future for Pakistan.

The event featured an impressive array of technological advancements, including high-efficiency solar panels, hybrid inverter systems, and smart grid solutions tailored to Pakistan's diverse energy landscape. Live demonstrations gave attendees hands-on experience with next-generation solar applications suited for residential, commercial, and agricultural use.

A central focus of SOLAR PAKISTAN 2025 was investment opportunity and dialogue. International investors and development agencies engaged in high-level discussions with Pakistani counterparts, exploring avenues to finance the country's growing portfolio of renewable energy projects. These interactions are expected to lay the groundwork for long-term partnerships and accelerated project implementation in the years ahead.

Saleem Khan Tanoli, CEO of Fakt Exhibitions, reflected on the event's broader impact, stating: "We didn't just showcase technology; we built partnerships to promote energy efficiency, economic growth, and environmental responsibility. By connecting global expertise with local needs, SOLAR PAKISTAN 2025 guided the way toward a sustainable and energy-secure future."

The Solar Pakistan Exhibition was also held in Multan from July 18 to 20, 2025, showcasing cutting-edge solar technologies and sustainable energy solutions. The event was slightly smaller in scale and attracted industry leaders, innovators, and stakeholders, highlighting Pakistan's growing commitment to clean energy and promoting regional adoption of solar power across residential and commercial sectors catering to a different region in pakistan.


SOLAR EXHIBITION IN THE REGION
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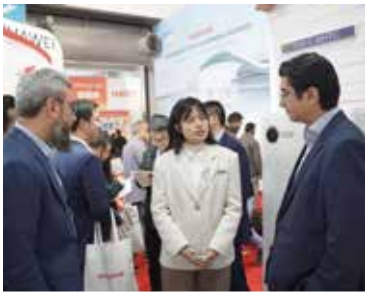


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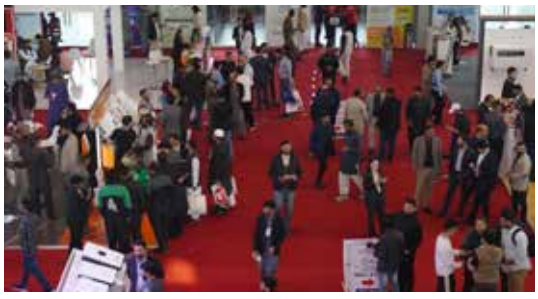


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Contract Signing Ceremony


# CONTROVERSIAL CANAL PROJECTS PAUSED AS CCI DEMANDS UNANIMOUS PROVINCIAL APPROVAL

Prime Minister Shehbaz Sharif convened the 52nd emergency session of the Council of Common Interests (CCI) at the Prime Minister's House in Islamabad, amid escalating concerns over India's water management practices and mounting inter-provincial tensions in Pakistan. The meeting, attended by all four provincial chief ministers, issued a unified and resolute response to what were termed India's "unilateral and irresponsible actions" in the wake of the Pahalgam incident.

The CCI, a constitutionally mandated platform for fostering inter-provincial coordination, underscored Pakistan's commitment to peace while asserting its right to defend national water interests. "Pakistan is a peaceful and responsible nation, but we are fully capable of safeguarding our rights," the council stated, referencing ongoing concerns surrounding alleged violations of the Indus Waters Treaty by India.

Significantly, the council resolved that no further canal projects would proceed without full consensus from all provincial governments, marking a temporary suspension of the federal government's February 2024 approval of new canals. The decision also invalidates a January 2024 certificate issued by the Indus River System Authority (IRSA) on water availability, which has now been returned for reassessment.

The Planning Division and IRSA were instructed to engage in wide-ranging consultations with all relevant stakeholders to ensure national cohesion. The CCI emphasized the binding nature of the 1991 Water Apportionment Accord and the National Water Policy 2018, affirming that any development plans must respect the constitutional rights of all provinces.

To advance sustainable water governance, the council approved the creation of a joint committee comprising representatives from both federal and provincial governments. This body will be tasked with formulating a long-term strategy for water resource management and agricultural development.

Framing water as "one of the country's most vital resources," the CCI characterized the decision as essential to preserving food security and inter-provincial harmony. The Prime Minister's Office also reaffirmed that any future infrastructure projects must align with existing consensus-based frameworks.

The CCI's ruling marks a significant win for advocates of provincial consultation but comes with a trade-off—delays to critical irrigation infrastructure at a time when Pakistan is facing acute climate stress and growing water scarcity. The session was convened earlier than planned after the Sindh government formally requested urgent deliberations. The originally scheduled May 2 meeting was brought forward, with Sindh Senior Minister Sharjeel Inam Memon confirming the revised agenda centered around the six proposed canals on the Indus River—an issue that has fueled tensions, especially between Sindh and Punjab. In addition to the chief ministers, the session was attended by Federal Law Minister Azam Nazeer Tarar, Finance Minister Muhammad Aurangzeb, and Federal Minister for Science and Health Mustafa Kamal.

Addressing a joint press conference with PPP Chairman Bilawal Bhutto Zardari, Prime Minister Shehbaz Sharif reaffirmed the government's position: no canal construction will proceed until the newly constituted committee achieves full consensus. "We are committed to consultation, not coercion," the premier stated.


# KE FCA FOR JAN: NEPRA ALLOWS RS3.021 NEGATIVE ADJUSTMENT, WITHHOLDS RS2BN

The National Electric Power Regulatory Authority (Nepra) has approved a negative Fuel Charges Adjustment (FCA) of Rs 3.0218 per unit for K-Electric (KE) consumers for January 2025, enabling a refund of approximately Rs 2.930 billion. However, the regulator has also decided to withhold Rs 2 billion from the total calculated negative FCA of Rs 4.930 billion.

A public hearing on the matter was held on March 20, during which consumers across all categories in Karachi voiced strong opposition to the inclusion of previously pending amounts in the current adjustment.

Nepra's decision allows the refund to be passed on in the billing cycle of April 2025. The adjustment will apply to all consumer categories, with the exception of lifeline consumers, domestic protected users, Electric Vehicle Charging Stations (EVCS), and pre-paid customers of all categories. The negative adjustment is provisional and subject to revision once KE's Multi-Year Tariff (MYT) for FY 2024–30 is finalized. Any cost differences identified under the approved MYT will be reconciled through future adjustments.

Nepra directed that the adjustment must be clearly indicated in consumer bills based on the units billed for January 2025. If any bills are issued for April 2025 prior to the notification of this decision, the adjustment may be reflected in the subsequent billing cycle. The regulator also emphasized that KE must comply with any court orders while implementing the FCA.

To avoid a future financial burden on consumers, Nepra noted that it had already withheld Rs 7.453 billion from the FCA amounts for November and December 2024 to cover pending costs. Despite this, an estimated Rs 6 billion remains unadjusted. To balance this, the Authority decided to retain Rs 2 billion from the January 2025 FCA refund. Additionally, Nepra acknowledged that KE has submitted another FCA request of negative Rs 6.662 billion (Rs 6.62/kWh) for February 2025, which could allow room to adjust remaining pending liabilities, if necessary.

In a separate note, Member (Technical) Rafique Ahmad Shaikh highlighted an 8% year-on-year decline in KE's electricity sales in January 2025, with industrial sales dropping 8.3%—the most significant decrease. He called for an urgent review by all stakeholders to identify and address the causes of the downturn.

Shaikh also pointed to delays in the interconnection between the National Transmission and Despatch Company (NTDC) and KE as a contributing factor to higher fuel costs. In January 2025, KE's power generation accounted for only 4% of the total energy mix, while 7% came from IPPs and 89% from NTDC. The NTDC's supply cost averaged Rs 11.15/kWh—markedly lower than KE's own generation cost of Rs 23.83/kWh.

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# CDWP REVIEWS REVISED DASU HYDROPOWER PROJECT, ENDORSES FOR ECNEC APPROVAL

On April 10, 2025, the Central Development Working Party (CDWP) reviewed the 2nd Revised Project Concept-I (PC-I) of the Dasu Hydropower Project (Stage-I), with a revised cost of Rs1,737 billion. The CDWP has recommended the project for consideration by the Executive Committee of the National Economic Council (ECNEC). Key observations and justifications are summarized below.

The project's cost has significantly escalated from the original Rs487 billion in 2014, primarily due to external macroeconomic pressures. Around 85% of the increase is attributed to the depreciation of the Pakistani Rupee—from Rs100/USD in 2014 to Rs280/USD in 2025—impacting contracts with foreign components. The remaining 15% results from expanded project scope and complexities in execution, including the relocation of the Karakoram Highway (KKH), awarded under International Competitive Bidding (ICB). Contracts are primarily in PKR, with limited foreign exchange exposure.

A dedicated and experienced WAPDA team, led by a full-time Project Director with 25 years of experience, is overseeing construction. The team includes 5 Chief Engineers, 13 Superintending Engineers, 57 Executive/Assistant Engineers, and over 15 supervisory officials. In addition, 130 engineers from top-tier international consulting firms, including Nippon Koei (Japan) and Dolsar (Turkey), are engaged, alongside an International Panel of Experts in dam design, geotechnics,

hydrology, seismology, and other disciplines. The Ministry of Water Resources and WAPDA, as sponsoring and executing agencies respectively, justified the cost increase and delays during the CDWP meeting. Originally approved in March 2014, the project was scheduled for completion by December 2019. However, land acquisition delays—resolved only in late 2019—pushed the actual start date to January 2020. The project has since faced additional hurdles including the COVID-19 pandemic, security incidents, floods, and resettlement challenges. The revised completion date is now November 2028.

The latest PC-I marks the first comprehensive revision since 2014. The increase to Rs1.73 trillion reflects the impact of land-related delays, currency depreciation, inflation-driven price escalations (40.3%), and variation orders (14.7%). The Interest During Construction (IDC) has risen from Rs106 billion to Rs479 billion due to the extended timeline.

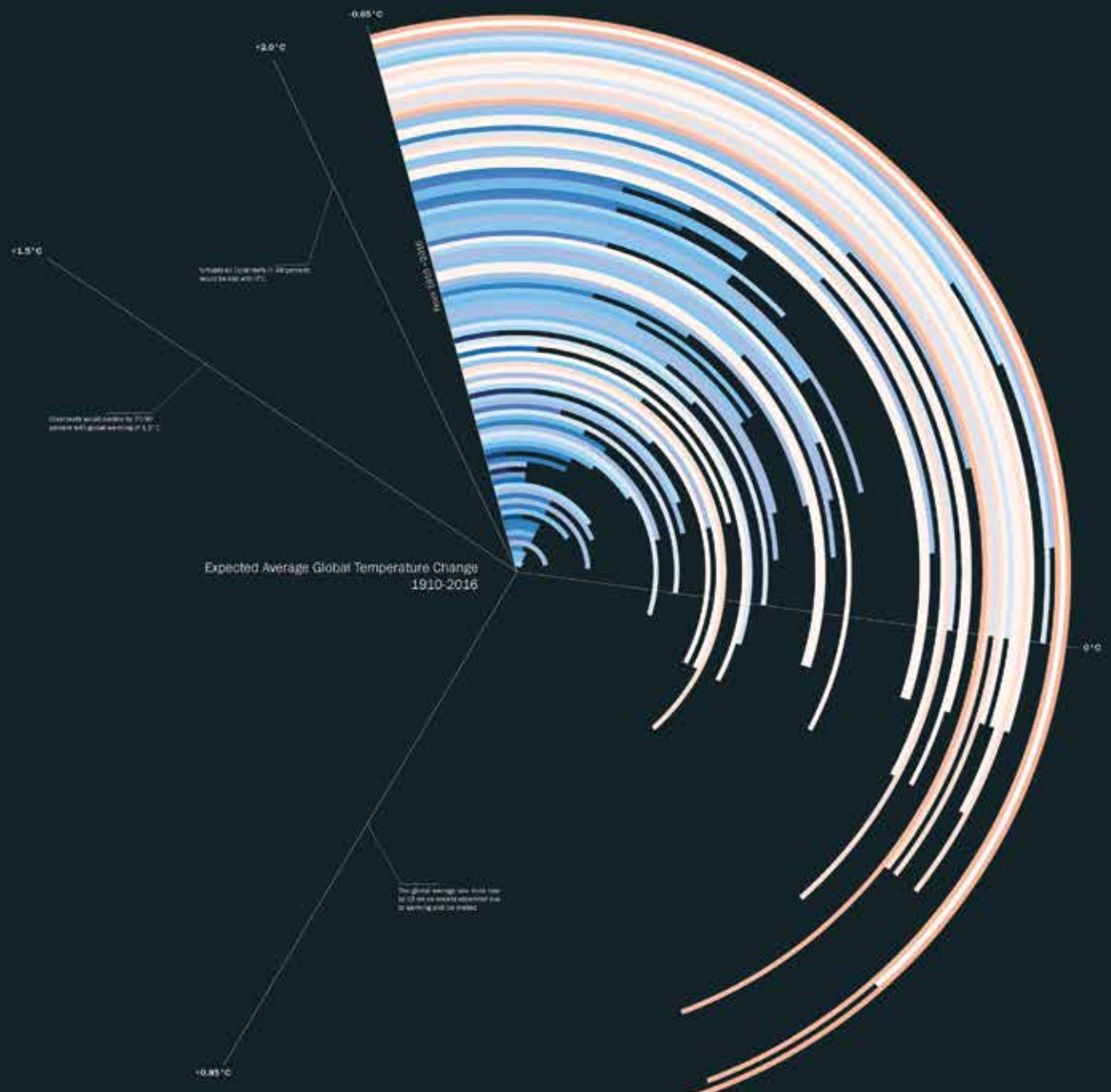
WAPDA has appointed a full-time General Manager as Project Director in line with ECNEC's directives. Project management is supported by a joint venture of Nippon Koei and Dolsar, led by a European Project Manager with 38 years of experience and World Bank approval. The consultant team oversees construction, environmental, and social compliance.

WAPDA continues to manage financial oversight, collaborating with the World Bank and other donor institutions. It remains Pakistan's only parastatal with international credit ratings (S&P, Moody's, Fitch), and has raised $500 million from global markets without sovereign guarantees. On June 10, 2024, the World Bank approved an additional $1 billion in financing under IDA credits 7563-PK, 7564-PK, and IBRD Loan 9680-PK, urging EAD to expedite agreement finalization to ensure concessional financing.

Procurement for road infrastructure followed ICB protocols, with contracts awarded in PKR but partial payments allowed in foreign currency. Due to complex terrain and land acquisition barriers, the KKH design was upgraded to include tunnels and bridges. The redesigned 62-km stretch aligns with CPEC standards and has been cleared by the World Bank and relevant Pakistani agencies. This segment, now part of the CPEC, will not require reconstruction by NHA, easing the fiscal burden on the government.

WAPDA remains committed to decarbonization and energy affordability. It currently delivers over 32 billion electricity units annually at Rs3.71/unit—helping reduce consumer energy costs and Pakistan's reliance on imported fuels.

"WHAT YOU DO MAKES A DIFFERENCE, AND YOU HAVE TO DECIDE WHAT KIND OF DIFFERENCE YOU WANT TO MAKE" - **JANE GOODALL**




This is expected average Global Temperature change.
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# CHINA SURPASSES GLOBAL NUCLEAR CAPACITY RANKINGS, EYES LEADERSHIP BY 2030

China has officially become the world leader in overall nuclear power capacity, according to the newly released China Nuclear Energy Development Report 2025. The report, unveiled in Beijing during the Spring International Forum on Sustainable Nuclear Energy Development, highlights the nation's rapid expansion in nuclear infrastructure and outlines ambitions to further solidify its role in global clean energy leadership by 2030.

As of the end of 2024, China had 102 nuclear reactors either operational, under construction, or approved for development, with a total installed capacity of 113 million kilowatts. This marks the first time China has topped the global rankings in terms of overall nuclear capacity—a milestone that energy experts say reflects years of strategic investment and policy continuity.

"China's nuclear energy development is entering a new phase of strategic opportunity," said Yang Changli, rotating chairman of the China Nuclear Energy Association (CNEA). He projected that by 2030, the country's operational nuclear power capacity would reach 110 million kilowatts, making nuclear energy a core pillar of China's decarbonization and energy security strategies.

In a significant move, China's State Council on Sunday approved the construction of 10 new nuclear reactors, including Phase III of the Sanmen Nuclear Power Plant in Zhejiang Province. The total investment for these projects exceeds 200 billion yuan ($27.4 billion). This marks the fourth consecutive year in which China has authorized at least 10 new reactors—underscoring nuclear power's central role in the country's clean energy transition.

Currently, China is building 28 nuclear reactors with a combined capacity of 33.65 million kilowatts, while 58 reactors are already operational with a total capacity of nearly 61 million kilowatts. "The sector has entered a peak period of large-scale construction," said Dong Baotong, Vice-Minister of Ecology and Environment. He noted that China has more nuclear units under construction than the rest of the world combined.

Investment in nuclear power engineering surged to a record 146.9 billion yuan in 2024—up 52 billion yuan from the previous year. With a fast-track approval process and maturing technology, analysts at CITIC Securities estimate that nuclear power investment could rise to 231 billion yuan by 2025, further energizing domestic supply chains and accelerating China's emissions targets.

### Prioritizing Safety Amid Expansion

Amid this rapid expansion, Chinese authorities continue to underscore the importance of safety. The State Council reaffirmed its commitment to the highest global standards, mandating strict oversight in design, construction, and operations. According to the World Association of Nuclear Operators, China's safety performance ranks among the highest globally.

Hou Yingdong, an official with the Ministry of Ecology and Environment, stated that mainland nuclear plants have accumulated over 600 reactor-years of safe operation. He emphasized that all nuclear facilities are sited away from earthquake-prone zones and are engineered to withstand extreme natural disasters. "China's nuclear safety protocols account for all major risk factors, including heavy rain, floods, and tsunamis," he said. China also operates the world's most extensive radiation monitoring network. Data from recent years confirm that radiation levels around nuclear facilities have remained consistently within safe parameters.

### A Push for Technological Independence

China's push for technological self-sufficiency in the nuclear sector has also seen marked success. According to CNEA, by 2024, all major nuclear power equipment is domestically produced, and the country has full control over key component technologies. Breakthroughs in indigenous research and development continue to enhance China's competitive edge in nuclear innovation. One of the flagship achievements is the Hualong One reactor—a third-generation nuclear technology developed entirely in China. With full intellectual property rights and a growing international footprint, Hualong One has become the most widely adopted Gen-III nuclear reactor in the world in terms of active and under-construction units.

Four of the newly approved reactors will use Hualong One technology, operated by China General Nuclear Power Corp (CGN). Following these approvals, a total of 41 Hualong One units are now in operation or under construction both in China and abroad.

### Future Outlook

As China doubles down on its clean energy targets, nuclear power is set to play an increasingly strategic role. The National Energy Administration has already stated that the majority of future power generation growth will come from non-fossil sources, with nuclear, wind, and solar forming the core of the nation's evolving energy mix. China's growing leadership in nuclear energy not only strengthens its domestic energy security but also positions the country as a key global player in the export of nuclear technology and expertise. With momentum building across investment, construction, and innovation, China's nuclear journey appears well on track to redefine global standards for sustainable energy.

# Dialogue.

In this edition we interview the CEO of FAKT Exhibitions, Saleem Khan Tanoli, the man behind the largest solar exhibition in the the history of the region, Solar Pakistan.

# ENHANCING THE RELIABILITY OF SOLAR PV SYSTEMS WITH BATTERY ENERGY STORAGE SYSTEMS (BESS)

By Engr. Faiz Bhutta

Solar energy, while clean and sustainable, is inherently variable due to spatial diversity and weather-related conditions such as cloud cover, seasonal variation, and daylight hours. This inherent intermittency creates challenges in maintaining a stable and reliable power supply.

To address this, alternative solutions are essential for ensuring the continuity, reliability, and performance of solar PV systems. One of the most promising and effective solutions is the integration of Battery Energy Storage Systems (BESS), which now form a critical component in both off-grid and grid-connected solar PV architectures.
In off-grid systems, BESS serves as a backbone for uninterrupted power supply. It stores excess solar energy generated during the day and releases it at night or during periods of low solar insolation.

This allows off-grid users—often in remote or rural areas with no access to conventional electricity grids—to experience consistent and dependable electricity. Furthermore, BESS helps manage load fluctuations and ensures that sensitive equipment and critical loads are not disrupted by voltage or frequency inconsistencies.

In grid-connected systems, BESS delivers a wide range of operational advantages. It offers emergency backup power during blackouts and grid failures, ensuring continuity for homes, businesses, and critical infrastructure. It supports frequency regulation by instantly responding to fluctuations caused by changes in power demand or supply. BESS also contributes to cost-efficiency by storing electricity when tariffs are low and discharging during peak pricing hours, thereby reducing energy bills. During grid faults or disturbances, BESS can provide immediate support, enhancing grid resilience. It is also instrumental in black start conditions, where it helps restart power systems in the absence of grid power, especially in industrial environments.

Contrary to common belief, BESS is not limited to batteries alone. It is an integrated energy management system comprising lithium-ion battery racks or alternative chemistries such as flow batteries, along with power conditioning units (PCUs), battery management systems (BMS), fire safety systems, thermal management setups, and digital monitoring platforms. Modern BESS solutions come pre-engineered in modular containers with plug-and-play functionality, enabling rapid deployment at scale, particularly in utility and commercial projects.

The design and implementation of a BESS depend on multiple influencing factors—technical, financial, environmental, and regulatory. Technical aspects include the battery chemistry, energy and power ratings, discharge rate, cycle life, and integration method. Financial considerations cover initial capital expenditure, operating costs, levelized cost of storage (LCOS), return on investment, and expected revenue from ancillary services or energy arbitrage. Environmental and safety concerns are increasingly significant, requiring robust thermal management, fire protection, and sustainable disposal plans. Policy and regulatory frameworks also guide BESS deployment. In many regions, including Spain, specific mandates require solar installations above a certain capacity to include BESS systems, typically equivalent to at least 5% of the solar system's size. These policies are designed to improve grid flexibility, manage over-generation, and accelerate the adoption of renewable energy without compromising system stability.

As we transition toward cleaner and more decentralized power systems, the role of BESS continues to grow. It not only makes solar energy more viable by mitigating intermittency but also enhances energy independence and security. With the right combination of technology, design, and operational strategy, BESS will play a pivotal role in shaping the future of energy infrastructure.
In conclusion, BESS significantly strengthens the reliability and performance of solar PV systems by addressing the core challenges of intermittency, grid instability, and energy quality. It transforms variable solar power into a consistent and manageable energy source, making it a vital asset for both individuals and institutions investing in long-term energy solutions.

## About the Author

Engr. Faiz Bhutta is a seasoned Solar PV expert and CEO of Techfa Consulting, a firm registered with the Pakistan Engineering Council. He is an accredited trainer with Traccert Canada and GIZ Pakistan, with over 35 years of experience in national and international organizations at both technical and managerial levels.
He is the founding chairman of the Pakistan Solar Association, founder of the Punjab Chapter of REAP (Renewable and Alternative Energy Association of Pakistan), and the founding president of the AEE (Association of Energy Engineers) Pakistan Chapter. He is active as a consultant, trainer, and speaker. He can be reached at faiz.bhutta@gmail.com.

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Venue: Karachi Expo Centre

RE+
Date: 8 – 11 September 2025
Venue: Las Vegas, NV

WETEX & DSS
Date: 30 Sep to 02 Oct, 2025
Venue: Dubai World Trade Centre (DWTC)

SOLAR PAKISTAN
Date: 17 - 19 July, 2026
Venue: Lahore

SNEC
Date: 3 – 5 JUNE, 2026
Venue: Shanghai, China

Intersolar Europe Exhibition
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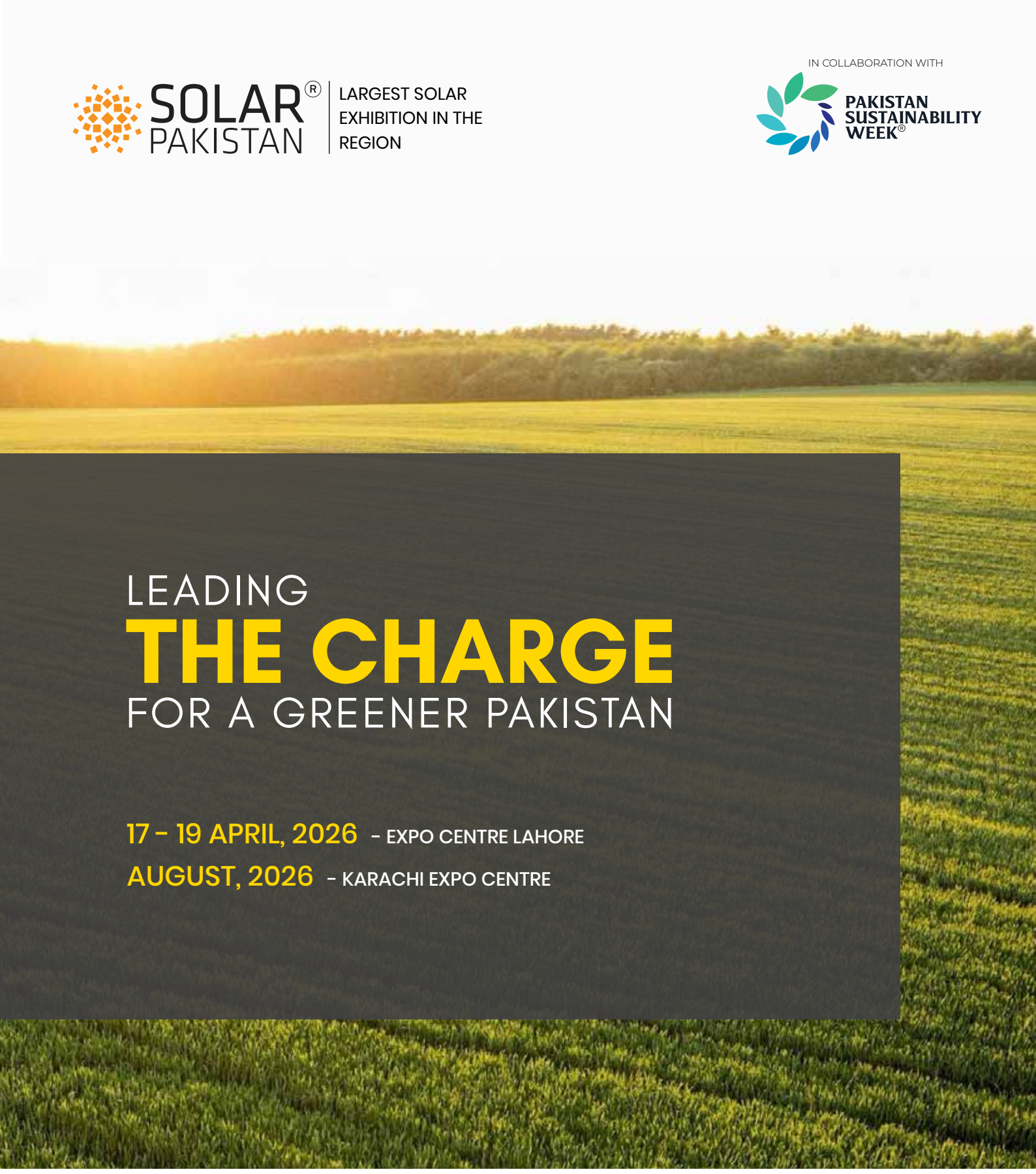

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