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Green Affordability: Sustainable Solutions for a Bright Future



For decades, the transition to green energy has been shrouded in concerns about its economic viability. Fossil fuels, ingrained in our infrastructure and seemingly cheaper at the pump, seemed an insurmountable obstacle. However, a remarkable shift is taking place, rewriting the narrative surrounding renewable energy. The once-distant dream of cost-effective sustainability is rapidly becoming a tangible reality, offering a beacon of hope for our planet and our wallets.

This is not mere rhetoric. Technological advancements, economies of scale, and supportive policies are driving down the cost of solar, wind, and other green solutions. Solar panels, once a luxury item, are now cost-competitive with traditional electricity sources in many regions. Wind farms are generating power at record-low prices, and innovative storage solutions are smoothing out the variability of renewables. This cost decline isn't a blip; it's a sustained trend, paving the way for widespread adoption.

This transformation transcends mere economics. It represents a paradigm shift in our approach to energy production and consumption. By embracing green solutions, we can mitigate the catastrophic effects of climate change, ensure a healthier environment for future generations, and create new jobs in a thriving clean energy sector.

In the coming months, it should come to no surprise that the energy industry will delve deeper into this exciting evolution. They may explore the latest cost-saving breakthroughs in renewable technologies, showcase success stories from individuals and communities embracing green energy, and analyze the economic and environmental benefits of this essential transition.

In This Issue!

energyHQ's November 2023 issue covers the most recent developments and events pertaining to the energy industry, as well as including valuable insights, details and spec sheets / peer reviews related to latest technologies, innovations, products, services, and projects of relevance to the industry and its audience.

- Article on page 10 talks about China unveiling the Taihang-7 gas turbine for offshore energy innovation
- Article on page 15 focuses on how NUS researchers unveil highly flexible, self-healing conductive material
- Article on page 20 sheds the light on the internet of things in the energy industry

Additional content is also available covering the latest activities of manufacturers, importers, and exporters – worldwide!

We hope you benefit from this issue's content and find it useful & actionable for your business. For any comments, suggestions, or feedback please don't hesitate to contact me.

Best wishes,
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World Energy Digest



Egypt

Egypt's Green Energy Revolution: Shifting from Gas to Renewables

Egypt is undergoing a significant shift in its energy sector, moving from gas to renewable sources like wind and solar. Minister of Electricity and Renewable Energy, Mohamed Shaker, highlighted the strategic advantage of Egypt's location for accessing global markets and exporting green products. The NWFE program, in collaboration with development partners, aims to cut greenhouse gas emissions by 17 million tonnes annually.

Private sector involvement is a key focus, with plans to increase renewable energy capacity by 10 gigawatts. Shaker mentioned the successful implementation of 3.7 gigawatts of wind and solar projects with financing secured from development partners. The NWFE program also includes shutting down 5-gigawatt thermal power stations, with a target of 42% renewable energy by 2030. Shaker praised the updated nationally determined contributions (NDCs) and outlined ambitions for Egypt's green hydrogen strategy to capture 5-8% of the global market share by 2040, supported by the European Bank.



South Africa

World Bank Allocates \$1 Billion to Propel South Africa's Energy Transition

The World Bank Board is allocating a \$1 billion Development Policy Loan to assist South Africa in tackling its persistent energy crisis and facilitating a shift towards a low-carbon economy. The nation grappled with substantial electricity cuts in 2022, adversely affecting productivity and equating to 2-3% of GDP loss.

The loan's key focus lies in restructuring the power sector, including the disaggregation of Eskom, and promoting private investments in renewable energy. Its objectives encompass enhancing Eskom's efficiency, fostering job creation in the renewables sector, and providing support to vulnerable households amidst escalating electricity tariffs.

Beyond economic considerations, the operation addresses environmental issues by diminishing coal reliance, leading to potential improvements in air and water quality. This collaborative initiative involves partnerships with the African Development Bank, KfW Development Bank, and the Government of Canada.



UK

UK renewable energy sector could employ 210,000 by 2035

A recent report, REview23, sheds light on the promising economic prospects of the UK's renewable energy sector. The study, conducted by the Association for Renewable Energy and Clean Technology (REA), indicates that the industry, which employed over 140,700 individuals in the 2021/22 period, is poised for substantial growth.

Projections suggest a potential surge to 210,000 jobs and a market value of £46 billion by 2035. Despite this optimistic outlook, the report underscores challenges in achieving the country's net-zero commitments without robust government policies in areas like heat, transport, and circular bioresources. The key takeaway is the sector's ability to double its market value from £23 billion in 2022 to £46 billion by 2035, contingent on consistent government support for green initiatives. Dr Nina Skorupska, Chief Executive of the REA, emphasizes the urgent need to address policy gaps and unlock investment for a successful transition to clean energy.

Mexico

**Pemex Receives Unprecedented Government Support to Tackle Debt and Boost Refinery Project**

Mexico's state energy firm, Pemex, disclosed a substantial government injection of funds to enhance its financial stability, repay debts, and support the construction of a new refinery. The company, long burdened by a hefty tax load, received unprecedented aid of 55.9 billion pesos (\$3.2 billion) in October to bolster its financial standing, along with an additional 71.7 billion pesos for debt amortization during the quarter. CEO Octavio Romero emphasized the unparalleled support.

Pemex had previously secured \$5.8 billion for the Olmeca-Dos Bocas refinery by September's end. President Lopez Obrador advocates a gradual reduction of Pemex's profit-sharing tax from 40% to 30%, aiming to revive the struggling company. Despite critics suggesting a more diversified approach with private-sector investment in renewables, Pemex reported a 4.9% increase in crude oil production, averaging 1.85 million bpd in Q3. However, it also posted a net loss of 79.13 billion pesos, revenues of 462 billion pesos, and a financial debt of \$105.8 billion.



UAE

UAE's \$4.5 Billion Initiative Drives African Renewable Energy Transition Ahead of COP28

As COP28 approaches in Dubai, the focus on climate finance for low-income countries, particularly in Africa, intensifies. The urgency to combat climate change effects and align development with a 1.5°C warming limit is underscored by the African Development Bank's estimate of climate-related losses ranging from \$289.2 billion to \$440.5 billion.

Energy challenges persist, with only 31% access to electricity in Africa, predominantly relying on inefficient traditional biomass. COP28 emphasizes the potential of renewable energy adoption to mitigate climate change, with Africa seen as a global hub. However, financial barriers hinder progress, prompting the UAE to commit \$4.5 billion to fast-track renewable energy development in Africa.

AMEA Power, a UAE-based entity, actively contributes with over 1,600MW in clean energy projects across 19 African countries. As Africa seeks \$277 billion annually for its 2030 climate goals, strategic partnerships, expertise-sharing, and financial commitments are deemed crucial for a successful energy transition, aligning with COP28's vision for climate action.

China

**EU Considers Probe into Chinese Wind Industry Amid Clean Energy Trade Tensions**

China's success in the wind industry is attracting the scrutiny of foreign trade officials, with the EU's acting competition commissioner considering an investigation into potential government aid for Chinese firms. This follows ongoing anti-subsidy probes into Chinese electric vehicles and challenges faced by its solar panel makers. Despite China's significant role in clean energy expansion, the EU aims to enhance self-sufficiency in clean tech and reduce dependence on Beijing.

The potential investigation into wind power's impact remains uncertain, with EU Commissioner for Energy Kadri Simson not ruling out a probe while emphasizing the importance of fair competition. Chinese wind companies, initially focused on the domestic market, are now targeting international buyers with competitive pricing. While EU measures may not immediately disrupt the Chinese market, they could pose barriers to future competition and growth.

Renewable Energy

07 Hydropower Valves



Corps Awards Contract for Overhaul of Two Butterfly Valves at Fort Peck Hydropower

Unico Mechanical Corp. has secured a contract from the U.S. Army Corps of Engineers for the refurbishment of two 216-inch-diameter butterfly valves and associated components at Fort Peck Dam and hydropower project in Fort Peck, Mt.

The refurbishment scope includes:

- Providing new disk seals, upper and lower trunnion housings, and bushings.
- Designing and building new Hydraulic Power Units (HPUs), hydraulic actuators, actuator linkages with integral locking mechanisms, bypass piping, associated valves, and working platforms.
- Conducting penstock inspection and applying coatings.

Valued at over \$9.1 million, Unico will handle all project activities in-house, encompassing the manufacturing of new and replacement valve components, site refurbishment, equipment installation, and plant commissioning. The expected completion date for the project is May 28, 2025. Fort Peck Lake, spanning 134 miles with over 1,500 miles of shoreline, features an earthen embankment, an outlet tunnel, two powerhouses, and a spillway with 16 gates. The powerhouses, completed in 1951 and 1961, collectively boast a capacity of 185.3 MW, generating an average of 1.1 billion kWh of electricity annually. In routine operations, the U.S. Army Corps of Engineers releases water through the powerhouse to generate power and manage reservoir levels. During heightened runoff periods, the outlet tunnel is utilized, and if necessary, additional water can be released through the spillway gates to mitigate flood risks.

Department of Energy is among those promoting the



development of new low-cost water pre-treatment systems for green hydrogen.

Meanwhile, work is continuing apace on more sophisticated systems that can push hydrogen directly from seawater and other unpurified sources.

In the latest development on that score, in November a team of researchers at the University of Cambridge published their findings on a new floating photovoltaic device that produces purified water in addition to green hydrogen.

Their floating solar device deploys a water-repellent nanostructured carbon mesh to help keep the photovoltaic layer afloat, while also protecting it from any impurities in the water below.

The PV part of the solar device is designed to absorb UV light, to power the electrolysis part of the operation. Meanwhile, other parts of the light spectrum pass through to the bottom layer, which produces pure vaporized water for electrolysis.

By Elizabeth Ingram

<https://www.hydroreview.com/>

Saving energy up to 21 % with Solar High Efficiency borehole pumping systems

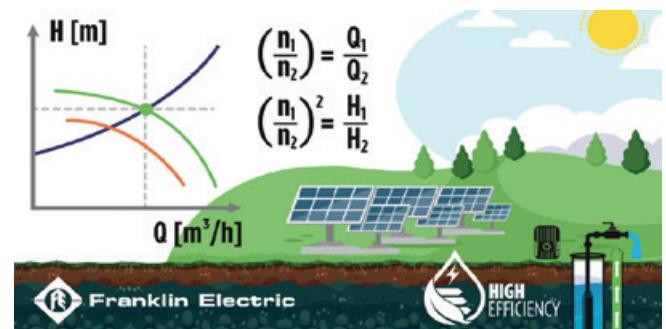
Superior efficiency through permanent magnet technology

In times of rising energy costs, new systems put more and more emphasis on the best possible efficiency. Here, Franklin Electric has set a new benchmark with its High Efficiency borehole systems (HES). Compared to standard asynchronous motors, energy savings of up to 21 % have been achieved in numerous systems installed worldwide. The key factor for energy savings and superior efficiency is the permanent magnet technology of the motor. Instead of a short-circuit induction type rotor, the high efficiency motor contains a permanent magnet rotor design with buried magnets. The system can be operated with grid or solar supply. The variable frequency drive (VFD) offered by Franklin Electric can be controlled remotely by using the Franklin Electric mobile app and a smart device. This not only allows operator monitoring, but also assistance from the Franklin Electric Service team to support the customer during commissioning, system setup, readjustment of parameters and application settings, or troubleshooting.

Voltage Speed Head

When operating a pump with solar energy, it is important to generate sufficient electrical power, but even more important is sufficient voltage. The pump speed and thus the system performance is determined by the electrical voltage. To generate enough voltage, you need to connect enough solar panels in series. This will generate the voltage level needed to operate at full speed. But if weather conditions change, the voltage can drop, causing the system to immediately reduce pump speed to keep running. This reduces the amount of water pumped, but not just linearly. Due to pump affinity laws, the pump head or pressure is reduced squared, which then leads to a further reduction in water flow as you run at a different pump operating point. If the solar system has not sized carefully, or if less efficient components are used, then the risk of running the pump in a dead-head situation increases. In such case, the pump is still operating, but it's not generating

enough head to overcome a certain level, and the result is that water flow stops. With the lower energy consumption of the High Efficiency System, you have an additional safety reserve that allows you to pump more water, or longer.



Advanced Solar Voltage boost

Franklin Electric has further enhanced its Solar systems and provides an advanced voltage boost function. The voltage boost feature makes it possible to size your system based on power rather than voltage, saving you up to 50% on solar panels compared to a standard system without the voltage boost feature. This further reduces the required number of solar pv-panel, initial investment and installation cost.

So the High Efficiency Borehole system has superior efficiencies to save energy and reduce operating costs by up to 21%. For solar applications, you can also significantly reduce the number of solar panels. You save even more money and have more water available for a longer time period.

Read more success stories of Solar applications on franklinwater.eu.

Oil & Gas

10 Submersible Rigs





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China's Technological Triumph: Unveiling the Taihang-7 Gas Turbine for Offshore Energy Innovation

China achieved a significant milestone in technological advancement with the successful development of its inaugural gas turbine tailored for offshore oil and gas platforms. Named Taihang-7, this groundbreaking turbine was inaugurated on a momentous Sunday within the confines of the Lufeng 8-1 floating oil and gas platform, situated in the South China Sea approximately 180 kilometers southeast of Shenzhen City. Marking a pivotal moment in China's industrial landscape, Taihang-7 stands as the nation's maiden self-designed gas turbine specifically engineered for deployment at sea.

Gas turbines serve as the primary power source for offshore rigs, and Taihang-7 boasts a capacity of 7 megawatts, enabling it to produce over 5 megawatt-hours of electricity within a single hour. This output is equivalent to the daily power consumption of 500 households, exemplifying the turbine's robust capabilities. Moreover, Taihang-7's environmental credentials shine as it yields nearly 80,000 tonnes less carbon dioxide annually compared to imported equipment of similar specifications.

Director of the Lufeng 8-1 platform, Yue Zongling, expressed pride in the achievement, highlighting its pivotal role in the region's energy infrastructure. With Taihang-7's integration, the platform now serves as the linchpin of the entire oil field grid, signifying a momentous stride in energy independence.

The engineers spearheading the development of Taihang-7 introduced innovative design concepts, enabling the turbine to operate efficiently on both diesel and gas—a pioneering feat in the industry. This dual-fuel capability positions Taihang-7 as the world's first of its kind, promising enhanced operational flexibility and cost efficiency. Gao Shuang, Deputy Manager of the Deepwater Engineering Center at the Shenzhen branch of



the China National Offshore Oil Corporation, lauded the turbine's cost-effectiveness, emphasizing its 15% lower price point compared to imported generators, coupled with reduced maintenance expenses.

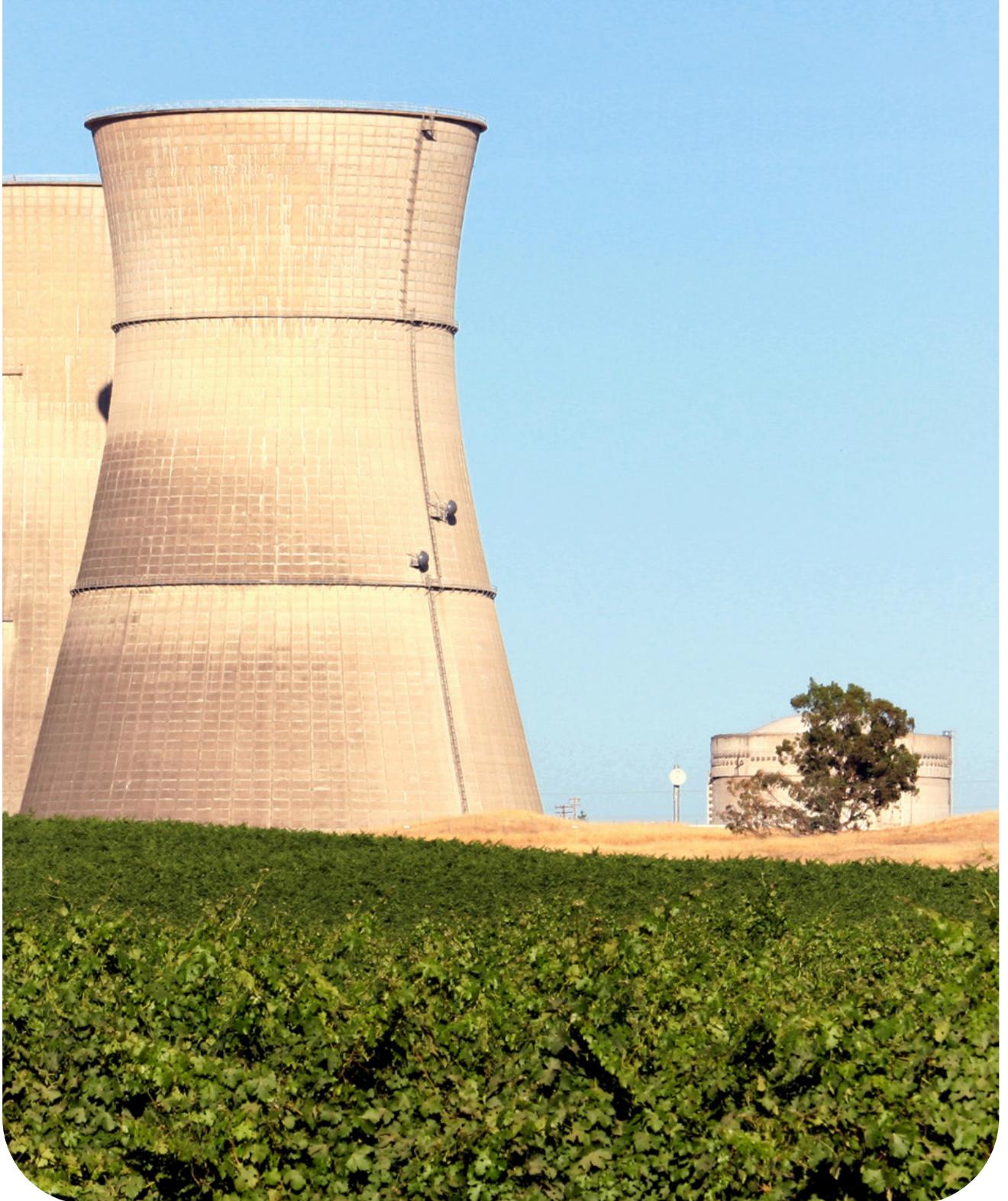
The development process of Taihang-7 was marked by a flurry of innovation, with the designers pioneering hundreds of new technologies, processes, standards, and materials. This relentless pursuit of excellence underscores China's commitment to indigenous technological prowess.

China's strides in gas turbine development extend beyond Taihang-7, encompassing a range of models catering to diverse operational requirements. Alongside Taihang-7, models such as Taihang-15, Taihang-25, and the heavy-duty Taihang-110 have been meticulously crafted, solidifying China's position as a leader in gas turbine manufacturing. Leveraging insights gleaned from space engine technology, Zhao Yong, Chief Designer of the gas turbine, highlighted the utilization of proprietary intellectual property, underpinning the success of China's energy projects.

By Gong Zhe
<https://news.cgtn.com/>

Nuclear

12 Shielded Trolley



Revolutionizing Nuclear Infrastructure: The Vital Role of the Polar Crane at Akkuyu Plant



The polar crane, boasting a lifting capacity of 390 tonnes and a diameter spanning 41.5 meters, stands as a pivotal asset in the lifecycle of unit 1 at the new nuclear power plant. Initially tasked with lifting and maneuvering during the assembly of the nuclear reactor, it will continue to play a crucial role in subsequent years, facilitating the reloading and inspection of the reactor, as well as delivering nuclear fuel to the specialized reloading machine.

Sergei Butskikh, First Deputy General Director of Akkuyu Nuclear JSC, emphasized the complexity of the crane, comprising various components such as a bridge, service trolley, control cabin with a touchscreen monitor, and specialized control cabinets. These components are strategically placed outside the sealed area of the reactor compartment, prioritizing safety above all else.

In parallel developments, TVEL's Central Design and Technological Institute (CPTI) announced the delivery of the first component for unit 1's earthquake-resistant fuel reloading machine. This critical component, the rail track, spans 26 meters in length and 8 meters in width, meticulously designed to prevent uncontrolled movements of equipment during seismic events and emergencies. The reloading machine, described as one of the most intricate systems within the reactor island complex, demands precision and accuracy in its operation, with a permissible error of only 2 millimeters in reaching the correct location.

Mikhail Tarasov, General Director of CPTI, highlighted the uniqueness of the project, particularly considering the specific conditions of the Akkuyu NPP construction site. With a commitment to delivering a comprehensive set of equipment for the first power unit by the end of 2023, CPTI is poised to fulfill its contractual obligations for all four power units, including those at the El Dabaa nuclear power plant in Egypt.

Situated in Turkey's southern Mersin province, the Akkuyu plant marks Turkey's inaugural foray into nuclear power generation. Under the build-own-operate (BOO) model, Rosatom is constructing four VVER-1200 reactors, with the first unit's physical start-up anticipated for the upcoming year. Upon completion, the 4800 MWe plant is projected to fulfill approximately 10% of Turkey's electricity demands, with all four units slated for operational readiness by the close of 2028.

<https://www.world-nuclear-news.org/>

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Generators



Stationary
Generators



Lighting
Equipment



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Generators



Material
Handling



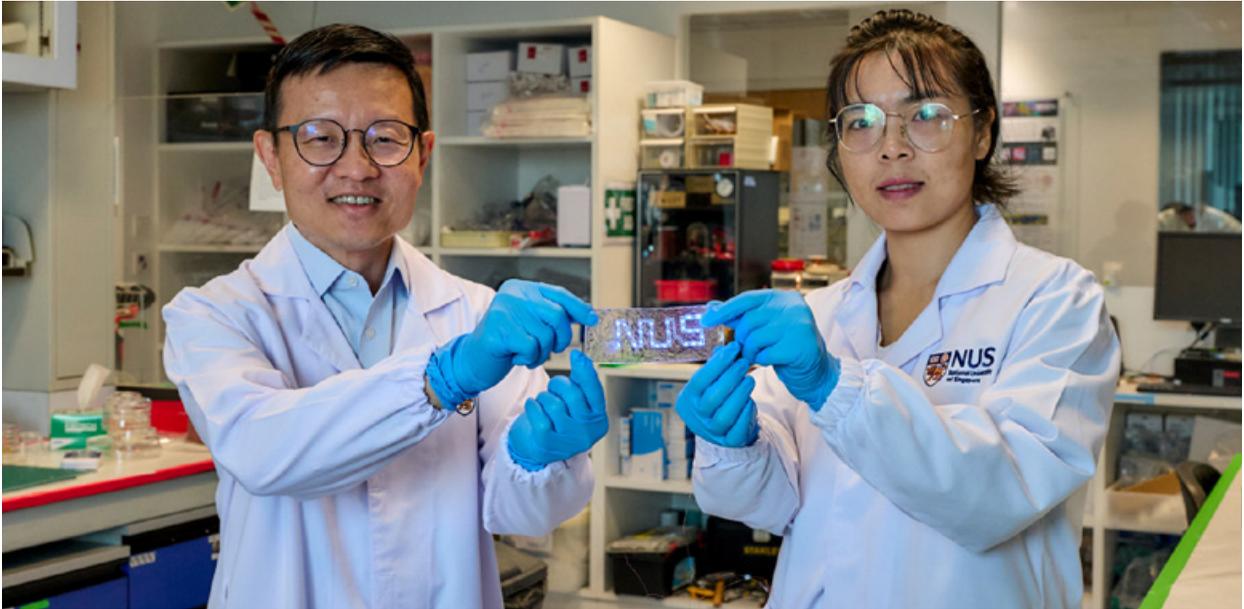
Racing
Team

Electric

15 Power Circuits



Breakthrough in Wearable Technology: NUS Researchers Unveil Highly Flexible, Self-Healing Conductive Material



Prof Lim Chwee Teck (left), Dr Chen Shuwen (right) and their team have developed a novel liquid-metal material suitable for making flexible and unbreakable circuitry for stretchable electronics

Researchers at the National University of Singapore (NUS) have unveiled a groundbreaking material poised to revolutionize wearable technology, soft robotics, and smart devices. Known as Bilayer Liquid-Solid Conductor (BiLiSC), this innovation combines exceptional flexibility, self-healing capabilities, and high conductivity, addressing the limitations posed by traditional conductive metals in electronic circuits.

BiLiSC boasts remarkable stretchability, capable of elongating up to 22 times its original length without compromising its electrical conductivity. This unprecedented electrical-mechanical property not only enhances comfort but also facilitates seamless interaction between humans and devices, opening up myriad possibilities for applications, particularly in healthcare wearables.

Professor Lim Chwee Teck, leading the research team at NUS, emphasized the importance of developing circuitry with robust performance and functionality for next-generation wearable, robotic, and smart devices. He highlighted how BiLiSC's liquid metal circuitry enables devices to endure significant deformation while maintaining electronic and functional integrity, thus ensuring longevity and reliability.

Comprising two layers, BiLiSC incorporates a self-assembled pure liquid metal for high conductivity even under strain, minimizing energy and signal loss during transmission. The second layer consists of a composite material containing liquid metal microparticles, capable of self-repairing upon breakage. The liquid metal flows into gaps, allowing the material to heal almost instantaneously while retaining its conductivity.

To ensure commercial viability, the NUS team devised a scalable and cost-efficient fabrication method for BiLiSC. This breakthrough, reported in *Advanced Materials* in November 2022, paves the way for widespread adoption in various applications.

BiLiSC's versatility extends to its use in wearable electronics, including pressure sensors, interconnections, heaters, and antennas for wireless communication. Laboratory experiments demonstrated superior performance, with a robotic arm equipped with BiLiSC interconnections exhibiting faster detection and response to pressure changes. Moreover, bending and twisting motions did not hinder signal transmission, showcasing BiLiSC's resilience compared to conventional materials.

Looking ahead, the NUS team is focused on further material innovation and process fabrication to enhance BiLiSC's capabilities. They aim to engineer an improved version that can be directly printed without templates, reducing costs and enhancing precision in fabrication.

In summary, BiLiSC represents a significant leap forward in wearable technology, offering unparalleled flexibility, self-healing, and conductivity. With its potential to transform a wide range of industries, from healthcare to robotics, BiLiSC is poised to redefine the possibilities of smart devices and pave the way for a more interconnected and resilient future.

<https://news.nus.edu.sg/>

Products

17 Green Energy Products



The TTSS Tower Revolutionizes Power Generation in Arid Climates



In the quest for sustainable energy solutions, researchers in Jordan and Qatar have collaborated on a groundbreaking technology poised to transform power generation in arid regions. Their creation, the TTSS (Transitional Tower Solar System), represents a fusion of innovation, efficiency, and environmental consciousness.

Traditional solar updraft towers have long been hailed as a promising avenue for renewable energy, harnessing the sun's heat to generate electricity through convective currents. However, limitations such as reliance solely on daylight and low thermal efficiency have hindered their widespread adoption. Recognizing these challenges, the researchers embarked on a journey to revolutionize this technology.

At the heart of the TTSS concept lies a combination of updraft and downdraft towers, each serving a distinct purpose yet synergistically enhancing overall efficiency. The updraft tower, akin to its conventional counterpart, utilizes sunlight to heat air, inducing an upward draft that spins turbines and generates electricity. However, the innovation lies in its integration with a downdraft tower.

The downdraft tower introduces a novel cooling mechanism employing mist to lower the temperature of the hot air exiting the updraft tower. This cooling process increases air density, causing it to sink and thereby driving a downdraft flow. This descending airflow, in turn, powers additional turbines, effectively doubling the energy output of the system.

One of the most significant advantages of the TTSS is its ability to operate day and night. Unlike traditional updraft towers, which are rendered inactive in the absence of sunlight, the incorporation of the downdraft tower ensures continuous electricity generation, making the technology highly reliable and versatile.

Moreover, simulations have revealed that the TTSS is capable of generating 2.14 times more power than conventional updraft towers, making it a highly efficient solution for renewable energy production. This increased output is achieved without compromising cost-effectiveness, as the innovative design optimizes resources while minimizing the need for larger, more expensive components.

While the TTSS holds immense potential for transforming energy landscapes, its suitability is particularly pronounced in hot, dry climates characteristic of regions like Jordan and Qatar. The cooling process necessitates water, making it ideal for areas where water scarcity is less of a concern. However, this reliance on water also presents a challenge, requiring a consistent supply for optimal operation.

As with any emerging technology, scalability remains a key area for further research and development. While initial simulations have showcased promising results, scaling up the TTSS to larger sizes demands meticulous exploration to ensure feasibility and efficacy on a broader scale.

“

Nikola Tesla, the renowned inventor and electrical engineer, made significant contributions to the development of electrical transformers. He is credited with the invention of the Tesla coil, which is a type of resonant transformer circuit used to produce high-voltage, low-current, high-frequency alternating-current electricity.





Services

21 Water Pumping



Panasonic and Reclaim Energy Launch High-Efficiency Heat Pump Water Heater in Australia



Panasonic, in collaboration with Reclaim Energy, has unveiled a cutting-edge heat-pump hot water system tailored for the Australian market. Boasting up to five times the efficiency of gas or traditional electric heating methods, this innovative solution promises to revolutionize water heating technology.

Scheduled for release in Australia come December, this joint offering combines Panasonic's renowned CO₂ Heat Pump with Reclaim Energy's expertise in hot water system design. Notably, it can heat water to temperatures reaching 80°C, catering to both residential and commercial needs.

At the heart of this system lies Panasonic's CO₂ Heat Pump, flaunting an impressive coefficient of performance of 6.1. In simpler terms, for every unit of electrical energy consumed, it yields a remarkable 6.1 units of heating energy. This unparalleled efficiency sets a new benchmark in sustainable heating solutions.

Australia's growing interest in heat pump technology is evident, with installations of air source heat pumps soaring by 70% compared to figures from the first half of 2022, as highlighted in a recent report by Australia's Clean Energy Regulator.

The mechanics behind the heat pump system are equally impressive: it harnesses heat from the ambient air through a heat exchanger, converting it into energy for the refrigerant. This energy is then transferred from the hot refrigerant to generate hot water, making for an eco-friendly and energy-efficient process.

Designed for external installation, both the heat pump unit and storage tank are engineered to withstand outdoor conditions, ensuring longevity and reliability in any environment.

Panasonic's track record speaks volumes, with approximately 2 million hot water heat pumps already installed in the Japanese market. This wealth of experience underscores their commitment to delivering top-tier solutions that set industry standards.

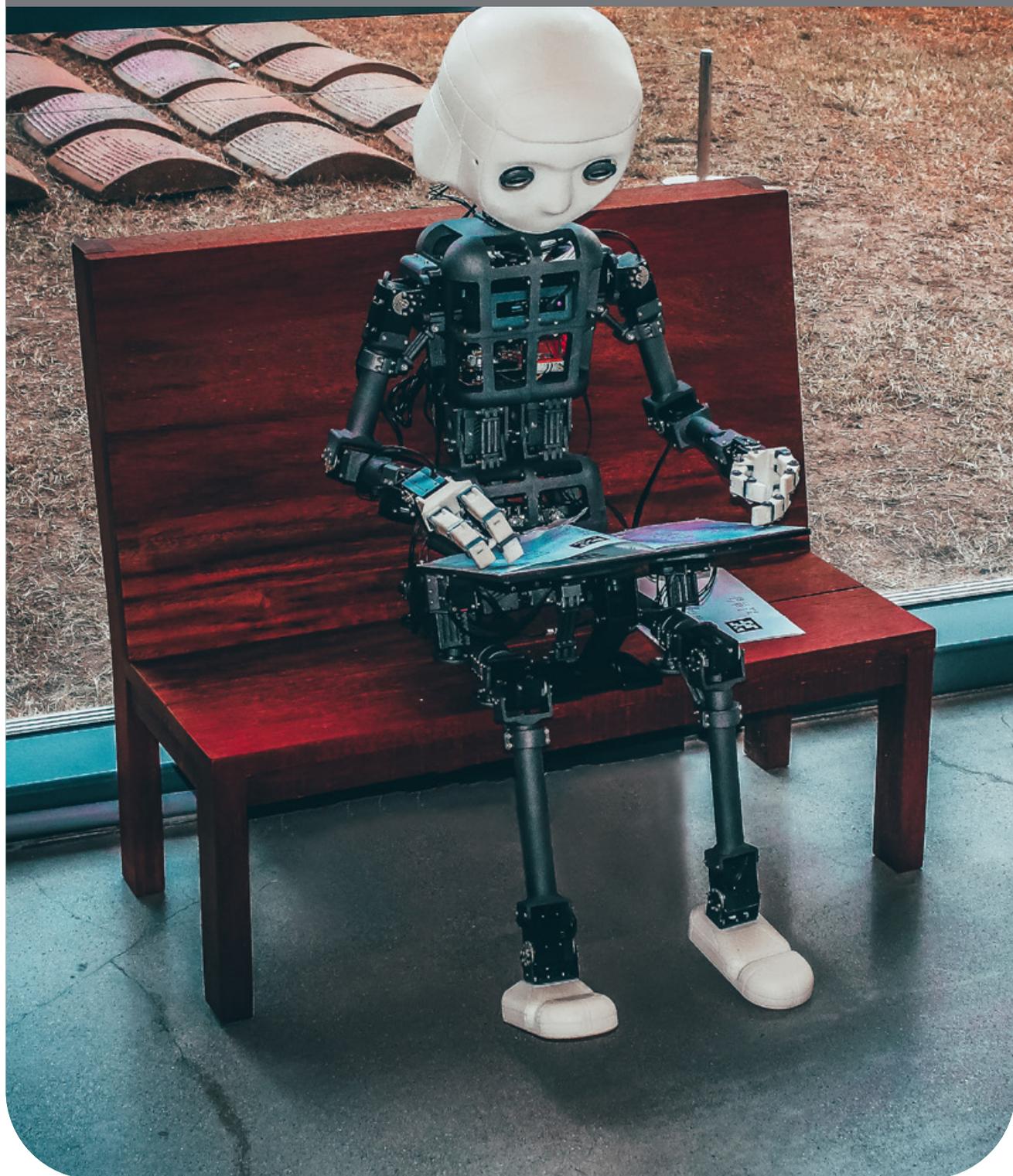
In essence, the collaboration between Panasonic and Reclaim Energy signifies a pivotal moment in the evolution of water heating technology in Australia, promising unmatched efficiency, sustainability, and performance for discerning consumers and businesses alike.

By Bella Peacock

<https://www.pv-magazine.com/>

Cover Story

23 Superintelligent AI



Capalo AI Secures €500,000 Pre-Seed Funding to Accelerate Energy Storage Investments and Green Transition



Capalo AI team members

Finnish energy technology startup Capalo AI has recently secured €500,000 in Pre-Seed funding, marking a significant milestone for the company. Capalo AI is dedicated to revolutionizing energy storage investments by harnessing the power of artificial intelligence (AI), real-time data, and precise forecasting techniques.

The company's mission is to enhance the attractiveness of energy storage investments by optimizing their utilization in the most lucrative markets. One of the challenges in renewable energy production stems from the inherent volatility caused by unpredictable weather conditions. Capalo AI addresses this issue by leveraging advanced AI algorithms to optimize the usage of flexible energy assets, including energy storage systems and electric vehicle (EV) charging stations.

By efficiently managing these assets, Capalo AI facilitates the rapid expansion of weather-dependent renewable energy sources. This optimization of the energy grid's flexibility enables it to seamlessly adapt to fluctuations in production and demand. Consequently, both national grids and Capalo AI's customers benefit from improved grid stability and increased revenue generation.

The recent funding round, spearheaded by Innovestor Tech Fund and joined by Inventure VC, will enable Capalo AI to further develop its virtual power plant (VPP) and multi-market optimization AI. Additionally, the company

plans to expand its team by recruiting top-tier mathematicians and cloud service professionals.

Henri Taskinen, CEO and co-founder of Capalo AI, emphasized the dual benefits of their solution, stating, «Our solution simultaneously maximizes value for our customers and accelerates the green transition. With multi-market optimization, national grids can maintain a stable electricity frequency, reducing the need for reserve power plants that rely on fossil fuels and thereby lowering carbon dioxide emissions.»

Petri Laine, Partner at Innovestor Venture Capital, expressed confidence in Capalo AI's team and vision for a sustainable future, highlighting their commitment to supporting the company's journey. He emphasized that the investment in Capalo AI is more than just a financial decision; it signifies a dedication to driving the green transition forward.

With its innovative approach and strong backing from investors, Capalo AI is poised to play a significant role in shaping the future of renewable energy utilization and grid optimization.

By Cate Lawrence
<https://tech.eu/>

Technology

25 *The Internet of Energy (IoE)*



The Internet of Things in the Energy Industry



The Internet of Things (IoT) refers to the network of interconnected devices embedded with sensors, software, and other technologies, enabling them to collect and exchange data over the internet. In the energy industry, IoT plays a pivotal role in optimizing operations, enhancing efficiency, and improving sustainability. Through IoT-enabled smart meters, for instance, utility companies can remotely monitor energy consumption patterns, enabling better management of resources and reduction of wastage. Additionally, IoT facilitates predictive maintenance of energy infrastructure by continuously monitoring equipment health, thus minimizing downtime, and maximizing energy production. Moreover, IoT enables the integration of renewable energy sources into the grid by providing real-time data on energy generation and consumption, thereby supporting the transition towards a more sustainable energy ecosystem.

Smarter Grids: Real-time Monitoring and Self-healing Capabilities

One of the cornerstones of the IoT revolution in energy is the implementation of smarter grids. These grids are equipped with sensors deployed throughout the infrastructure, enabling real-time monitoring of power lines, transformers, and other critical components. By collecting vast amounts of data, utilities can proactively identify and address potential issues before they escalate into outages, significantly improving reliability.

Moreover, advanced systems equipped with self-healing capabilities can automatically reroute power around problems, minimizing the impact of outages and restoring service faster. These self-healing grids represent a

paradigm shift in grid resilience, ensuring uninterrupted power supply even in the face of disruptions.

Demand Response Programs: Empowering Consumers to Optimize Energy Use

IoT facilitates demand response programs, empowering consumers to actively participate in managing energy consumption. Through the deployment of smart meters and connected devices, consumers can enroll in programs that adjust their energy usage based on grid needs. By voluntarily reducing electricity consumption during peak demand periods, consumers not only contribute to grid stability but also benefit from reduced utility costs.

Renewable Energy Integration: Maximizing Efficiency and Reliability

The integration of renewable energy sources such as solar and wind power is another area where IoT is making significant strides. IoT sensors deployed in solar and wind farms optimize panel tilt, track weather conditions, and predict energy output with precision. By maximizing renewable energy generation, these technologies contribute to a more sustainable and diversified energy mix.

Furthermore, microgrids equipped with smart controls enable the seamless integration of various renewable sources, along with energy storage solutions such as smart batteries. These localized networks efficiently manage energy flow, ensuring reliable and resilient power supply even in decentralized settings.

Smart Homes and Buildings: Enhancing Energy Efficiency and Comfort

IoT-enabled devices are revolutionizing energy management within homes and buildings. Smart thermostats and lighting systems, for instance, learn user preferences and adjust settings automatically to optimize energy consumption without sacrificing comfort. Similarly, appliance monitoring allows consumers to track energy usage for individual devices, identify areas for savings, and control them remotely via smartphone apps or voice commands.

Moreover, building automation systems leverage IoT technology to optimize heating, ventilation, and air conditioning (HVAC) systems based on occupancy patterns and external factors such as weather conditions. By dynamically adjusting energy usage in response to changing requirements, these systems contribute to significant energy savings and operational efficiencies in both residential and commercial buildings.

Benefits of IoT in the Energy Industry: Efficiency, Cost Savings, and Sustainability

The widespread adoption of IoT in the energy industry brings forth a myriad of benefits. Enhanced efficiency, achieved through reduced energy waste and optimized production and distribution processes, translates into tangible cost savings for both consumers and energy providers alike. Moreover, the increased integration of renewable energy sources facilitated by IoT contributes to sustainability goals, reducing greenhouse gas emissions and mitigating environmental impact.

Furthermore, IoT empowers consumers by providing them with greater control over their energy usage and enabling informed decision-making. Through real-time access to energy consumption data and interactive platforms, consumers can actively manage their energy usage, leading to more sustainable and responsible energy practices.

Challenges and Considerations: Security, Interoperability, and Scalability

While the potential benefits of IoT in the energy industry are vast, several challenges and considerations must be addressed to realize its full potential. Security and privacy concerns surrounding the vast amounts of sensitive data collected by IoT devices remain paramount. Ensuring robust cybersecurity measures to protect against potential threats is essential to safeguarding critical infrastructure and consumer privacy.

Moreover, ensuring interoperability among different IoT devices and systems is crucial to facilitate seamless communication and

integration. Compatibility issues between disparate systems can hinder the effectiveness of IoT solutions and impede widespread adoption.

Additionally, the scalability and cost of deploying and managing large-scale IoT networks pose significant challenges for energy providers and infrastructure operators. Addressing these challenges requires innovative solutions and strategic investments to build robust, resilient, and future-proof IoT ecosystems.

Emerging Technologies in IoT for Energy: Unlocking New Possibilities

As IoT technology continues to evolve, several emerging technologies hold the potential to further revolutionize the energy industry. Blockchain technology, for instance, enables peer-to-peer energy trading, facilitating decentralized energy markets and promoting renewable energy adoption. Artificial intelligence (AI) and machine learning algorithms enable advanced demand forecasting, enhancing grid management and optimizing renewable energy integration.

Edge computing architectures bring computation and analytics closer to IoT devices, enabling real-time data processing and faster decision-making. Moreover, advancements in connectivity technologies such as 5G and Low-Power Wide-Area Networks (LoRaWAN) provide the foundation for robust and scalable IoT ecosystems, connecting millions of sensors and devices seamlessly.

Furthermore, quantum computing represents a paradigm shift in energy optimization, offering unprecedented computational power to tackle complex optimization problems and improve grid stability and renewable energy integration.

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Iran's Oil Production Surges Amidst Global Tensions



In a surprising turn of events, Iran's oil production has witnessed a remarkable surge, marking a significant milestone in the country's economic ambitions. According to recent reports, Iran has experienced a staggering 50% increase in oil production since 2021, reaching a current output of 3.3 million barrels per day (bpd). This surge not only surpasses pre-sanctions levels but also marks the highest production level since the imposition of US sanctions back in 2018.

The implications of this production boom are substantial, particularly in the realm of oil exports. With increased production comes a corresponding uptick in exports, providing a potential economic lifeline for Iran. Summer 2023 saw exports soar to their highest level since the sanctions were imposed, indicating a successful circumvention of restrictions and a promising economic outlook.

However, amidst these positive developments, challenges loom on the horizon. The United States, in a move that could potentially disrupt Iran's economic resurgence, has announced plans to tighten sanctions on Iran's oil industry. This tightening of sanctions is aimed at significantly reducing exports by over 1 million bpd, which could deal a severe blow to Iran's

oil income and have ripple effects throughout global oil markets.

The timing of this decision is particularly noteworthy, as it coincides with escalating tensions in the region, particularly the recent conflict between Israel and Hamas. Some analysts suggest a connection between regional tensions and the US decision to tighten sanctions, viewing it as a means to pressure Iran or signal disapproval of its actions.

The impact of these sanctions remains uncertain, but the potential consequences for Iran and the global oil market are significant. Iran, with its ambitious production goals and newfound economic momentum, now finds itself facing renewed challenges and uncertainties on the geopolitical stage. As the situation continues to unfold, the world watches closely, aware of the far-reaching implications of Iran's oil production surge amidst escalating global tensions.

Saudi Arabia Plans to Expand in the Energy World



Saudi Aramco, a leading figure in the oil industry, currently maintains a spare oil production capacity of 3 million barrels per day (bpd), allowing it to respond swiftly to changes in demand or supply disruptions. This capacity can be ramped up within a couple of weeks if needed, showcasing the company's flexibility in managing market fluctuations.

Recent reports indicate a pause in Saudi Aramco's plans to expand its production capacity to 13 million bpd. This decision appears to be influenced by government directives and rising project costs, raising questions about the company's future ability to rapidly increase production. Despite this, Saudi Arabia's strategic position within OPEC remains significant, as it continues to support market stability through voluntary production cuts, on top of agreements made within the OPEC+ framework.

OPEC forecasts suggest a steady rise in global oil demand, with projections of 2.4 million bpd growth in 2023 and 2.2 million bpd in 2024. However, concerns linger regarding potential downward revisions in demand forecasts for 2024, driven by factors such as geopolitical tensions and economic uncertainties.

This comes in as Saudi Arabia puts some focus onto the mining sector.

Saudi Arabia is planning on a significant economic transformation as part of its Vision 2030 agenda, aiming to diversify its economy beyond oil and gas. At the forefront

of this transformation is the push to elevate the mining sector to a key pillar alongside the traditional oil and gas industries. Vision 2030's strategy recognizes the importance of reducing reliance on oil revenues, increasing non-oil revenue streams, and advancing goals such as green transition, digitization, and technology development.

The cornerstone of this strategy is the ambitious goal to boost the mining sector's contribution to the Gross Domestic Product (GDP) from \$17 billion to \$75 billion by 2030. This expansion is expected to create jobs, decrease mineral imports, and bolster the country's competitiveness on the global stage. With an estimated \$1.3 trillion in mineral wealth, Saudi Arabia presents a promising opportunity for investors, with the government aiming to attract \$200 billion in investments by the end of the decade.

Central to this endeavor is the implementation of a new mining law designed to streamline regulations and attract investment. Additionally, the government is offering financial incentives to encourage participation in the sector. These initiatives, coupled with the establishment of the Ministry of Industry and Mineral Resources and an expanded geological survey, underscore Saudi Arabia's commitment to realizing its mining sector ambitions.

Russia Witnesses Growth in the Energy Sector Despite War and Sanctions



Exports and Revenue Trends:

Pipeline Gas: One of the standout trends is the impressive 13% increase in revenue from pipeline gas exports. This surge translates to roughly 8 million euros per day more than the preceding period. Several factors contribute to this growth, including heightened demand spurred by colder weather in Europe, despite efforts within the region to diversify energy sources. Additionally, limited alternatives, particularly in the availability of Liquefied Natural Gas (LNG), may have driven European buyers to rely more heavily on Russian gas to meet their needs.

LNG Exports: Revenue from LNG exports also experienced a notable 10% increase, equivalent to 4 million euros per day more. This growth is primarily attributed to a 9% rise in export volume, suggesting increased production or redirection of supplies to more lucrative markets. Furthermore, there has been a significant 27% surge in gas exports to Europe, despite ongoing sanctions and European endeavors to lessen dependence on Russian energy.

Stable Exports to India: Notably, Russia has maintained stable exports to India, defying the impact of sanctions. This underscores Russia's strategic focus on diversifying its export markets to mitigate the effects of Western restrictions.

Government Actions to Support Exports:

The Russian government has rolled out a comprehensive roadmap aimed at fortifying its energy export capabilities. This roadmap encompasses various measures, including:

- **Expanding Trade Finance:** Russian exporters are being provided with access to government-backed financing and credit guarantees, thereby easing financial barriers to exporting.
- **Simplifying Customs Procedures:** Efforts are underway to streamline customs processes, facilitating faster export of energy products and reducing bureaucratic hurdles.
- **Developing New Infrastructure:** Support is being extended for the construction of new pipelines and export terminals, with the objective of diversifying export routes and enhancing logistical capabilities.
- **Signing Long-Term Contracts:** Russian companies are being encouraged to engage in negotiations for long-term supply agreements with reliable partners, particularly in the burgeoning markets of Asia.

Scientific and Technical Cooperation with Pakistan:

Russia is also forging strategic partnerships to broaden its foothold in the global energy landscape. One such initiative involves planned scientific and technical cooperation with Pakistan. This collaboration aims to:

- **Share Expertise:** Facilitate knowledge exchange and technology transfer between Russian and Pakistani oil and gas companies, thereby enhancing both nations' capabilities.
- **Joint Exploration Projects:** Explore the potential for collaborative exploration and development projects in both countries, leveraging their respective strengths and resources.

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Coming Events

E-World

Essen, Germany
20 - 22 Feb 2024

<https://www.e-world-essen.com/en/>

E-world energy & water is the place where the European energy industry comes together. Serving as an information platform for the energy sector, E-world is gathering international decision makers in Essen each year.

Vibrant Green Energy Expo 2023

Mahatma Mandir, Gandhinagar, India
14 - 16 Dec 2023

<https://vgeexpo.com/>

VGEE is India's foremost B2B exhibition for solar energy, wind energy, bioenergy, energy storage, and hybrid vehicles. The upcoming Vibrant Green Energy Expo is expected to draw exhibitors...

Neckar-ALB Regenerative 2024

volksbankmesse Balingen, Balingen, Germany
09 - 10 Mar 2024

<https://www.neckar-alb-regenerativ.de/>

On the expert stage, experts from the energy, construction and mobility sectors will answer questions from the moderators and energy consultants from the Zollernalb Energy Agency. The experts will talk about current topics...

POWER TOOLEX 2024

Milan Mela, Kolkata, India
15 - 17 Mar 2024

<https://powertoolex.com/>

POWERTOOLEX is a pure B2B exhibition focusing on the fast-growing hand tools and power tools sector in India. The goal of the POWERTOOLEX is to bring buyers and sellers together in an interactive environment to conduct business...

Saudi Arabia Smart Grid Conference 2023

Hilton Riyadh Hotel & Residences, Saudi Arabia
18 - 20 Dec 2023

<https://saudi-sg.com/>

The Saudi Arabia Smart Grid Conference offers a chance to showcase products, services, ideas, and businesses to the regional governmental, scientific, business, and technological community. Topics covered include artificial...

International Conference on Application of Renewable Energy and Environmental Sustainability (ICAREES-24)

Rome, Italy
09 Jan 2024

<https://researchsociety.co/event/>

ICAREES-24 catalyzes progress in renewable energy and environmental sustainability. Uniting global researchers, the event addresses challenges, fosters collaboration, and shapes policies for steadfast growth.

Intersolar North America/Energy Storage North America (ISNA/ESNA)

San Diego, California, USA
17 - 19 Jan 2024

<https://www.intersolar.us/energy-global/>

The ISNA/ESNA convention is a three-day stream of discovery where renewable energy experts connect, share insights, and acquire recent developments in the energy transition journey.

International Conference on Smart Grid Systems 2023

Barcelona, Spain
18 - 19 Dec 2023

<https://waset.org/smart-grid-systems-conference-in-december-2023-in-barcelona>

The International Conference on Smart Grid Systems intends to unite academic scientists, researchers, and scholars to exchange their experience...

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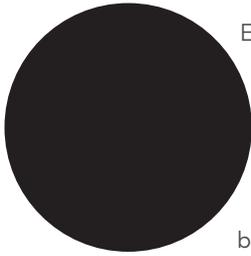
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Industry Will Use CCS Where It Makes the Best Business Sense



Europe's net-zero goals will almost certainly not be achieved without significant deployment of carbon capture and storage (CCS) technology, writes Chris Davies. Suggesting that use of CCS should be limited even before it has begun is hardly the best way to solve the climate crisis, he argues.

Chris Davies is the Director of CCS Europe, an advocacy and communications body.

What's the purpose of carbon capture and storage (CCS) technology? Why should we spend billions of euros building plants that can capture CO₂ emitted from industrial installations, only to have it transported and then injected into rock deep underground where it will stay forever?

Where is the economic logic in doing such a thing? How can it make business sense?

The only reason is to help curb climate change. We now regard CO₂ as an industrial pollutant causing harm. We need CCS to prevent CO₂ emissions entering the atmosphere, and we need it to reduce concentrations already in the atmosphere by capturing CO₂ from biogenic sources.

So it is strange to read that CCS "might be used for too many purposes", and that it should be reserved only for truly "unavoidable emissions", as an opinion piece recently published in EURACTIV claimed.

The suggestion is that CCS is some kind of get-out-of-jail-free card, whose use will perpetuate bad practice. It is not, and there is no need to impose self-defeating restraints on its deployment.

CCS costs will vary with the source of emissions, the location of storage sites and the development of the technology. Even so, every CCS operation will require capital investment of many hundreds of billions of euros.

Such investment would be a major business decision for any company, and if there are any alternative means of achieving the emissions-reduction goals, it must make sense for these to be pursued.

Where does the assumption come from that business leaders might turn to CCS instead of supporting the development of other technologies, as a recent vote by the European Parliament's Environment Committee appears to suggest?

Why would they do this? Anyone charged with making an investment decision is surely going to opt for whatever technology can do the job at the lowest possible cost.

We might all wish that every promising research finding will develop into an innovation capable of eliminating emissions from industry. But we must make use of what we have now rather than delay in the hope that a magic unicorn will soon appear. Time is not on our side.

Some environmentalists claim CCS is being promoted by fossil fuel suppliers to perpetuate their business. If so, there is little to show for it.

The oil and gas majors talk the talk but their record of actual investment in CCS does not begin to compare with the amounts they have spent identifying new sources of their product.

Now the European Commission, through the Net Zero Industry Act, is having to force the oil and gas companies to create CO₂ storage sites.

The truth is that, far from perpetuating the use of fossil fuels in power production, the application of CCS adds a significant expense to production.

Fossil fuel electricity may well be needed as a back up in national energy systems but the cost of CO₂ abatement must make investment in alternative energy sources look even more attractive. CCS and renewables are on the same side.

Carbon Capture and Storage Europe is an advocacy body that exists to argue the case for the technology's deployment, but our members are not narrow-minded enthusiasts. They accept that CCS will be used when it has to be used, not because they think it somehow superior to alternative means of curbing emissions.

With current technology, net-zero goals will almost certainly not be achieved without significant CCS deployment. The Intergovernmental Panel on Climate Change has made this point repeatedly. Suggesting that use of CCS should be limited even before it has begun is hardly the best way to solve the climate crisis.

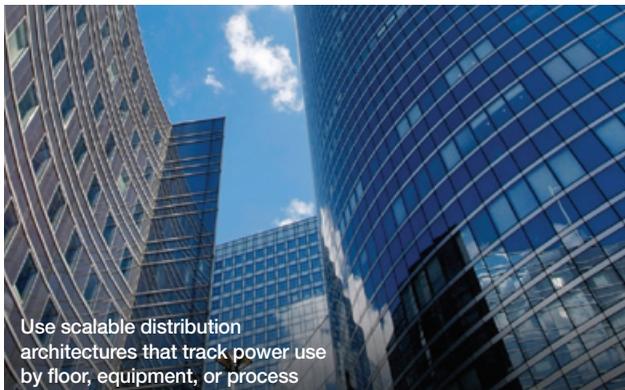
By Chris Davies



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