

# ***WORLD POWER SYSTEMS REVIEW***

***1 June 2023***

**15 May 2023**

## **ISO-NE issues early analysis of Winter 2024-2025 operations with, without Everett LNG facility**

To better inform regional decision-making on power system reliability and key energy infrastructure, ISO New England recently conducted an [early analysis of Winter 2024-2025 power system operations](#), similar to analyses completed ahead of recent winters and focused on several weather scenarios seen in New England in the past decade.

The analysis looked at anticipated system operations, with and without the availability of liquefied natural gas (LNG) from the Everett Marine Terminal (EMT), one of the three LNG facilities serving New England. The results showed limited reliability risks in the short-term, with or without the EMT, provided other generating resources are available to respond.

Analyzing system operations with, without Everett

The ISO's analysis focused on Winter 2024-2025 because it will be the first without the Mystic Generating Station. The station's two remaining units, totaling 1,400 MW of capacity, are retiring in June 2024. Mystic is the LNG facility's largest customer, and the future of EMT is uncertain following the power plant's retirement. This analysis suggests that the region's electricity system can withstand the retirement of the EMT if oil or dual-fuel generators have sufficient oil supplies and gas generators are able to secure LNG from other suppliers, such as the St. John's Terminal in New Brunswick, Canada or the Northeast Gateway facility off the coast of Massachusetts. The analysis does not model extreme situations that have a very low probability of occurring.

The ISO predicated this analysis on several assumptions, including limited increases in consumer demand for electricity, continued rapid deployment of behind-the-meter solar resources, increased fuel supplies in the region under the Inventoried Energy Program (IEP), and an offshore wind project coming online as scheduled. While the analysis shows minimal energy shortfalls under severe winter weather, it also demonstrates that those shortfalls may not materialize if sufficient oil resources are available on cold days and operate at required levels.

Should an energy shortfall appear in the ISO's 21-day look-ahead forecast, the ISO's system operators have tools to mitigate the shortfall, such as coordinating with neighboring regions to increase imports, working with resource owners to replenish their fuel inventory levels, relying on market signals to conserve fuel, and initiating public appeals for conservation. The ISO does not have expertise on the gas system and, therefore, the local gas companies and pipeline operators will need to identify any operational concerns for their systems resulting from the potential closure of the Everett facility.

**ISO-NE**

<http://www.iso-ne.com/>

**15 May 2023**

## **Study: California Needs \$50B in Distribution Work for EVs**

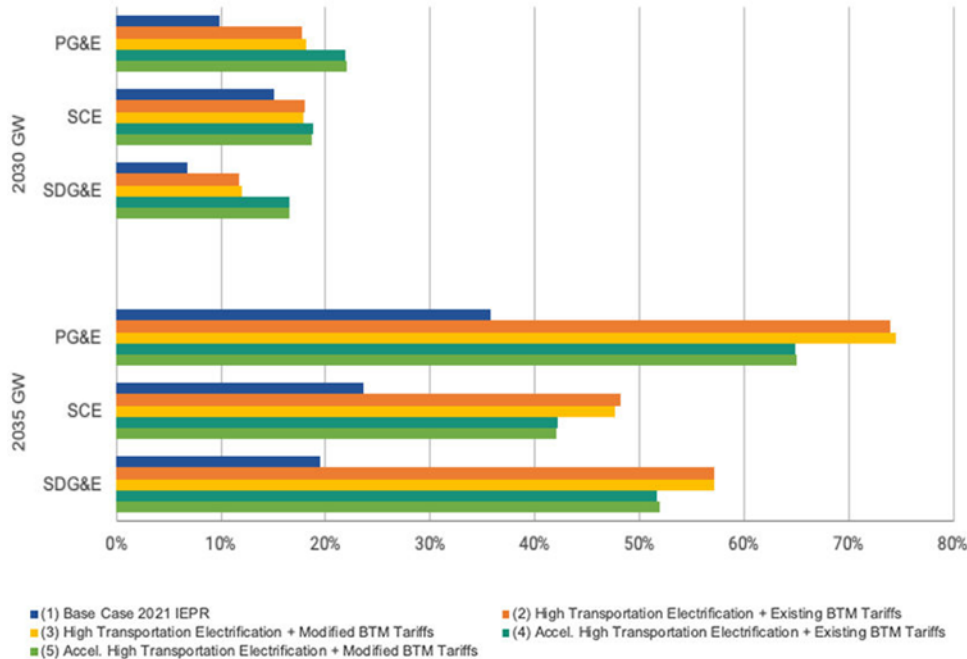
A study conducted for the California Public Utilities Commission finds that without mitigation, the distribution grids of the state's three large investor-owned utilities will require up to \$50 billion in upgrades by 2035, mainly to accommodate electric vehicle charging. The Electrification Impacts Study, performed by energy analytics firm Kevala, was commissioned by CPUC as part of its High Distributed Energy Resources Grid Planning rulemaking, which is intended to prepare the state for large-scale transportation and building electrification.

California law requires that all new vehicles sold in-state be zero-emitting by 2035, and the state Air Resources Board is weighing a ban on sales of new natural gas-powered space and water heaters for residential and commercial use. (See Calif. Considers Zero-

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emission Appliance Rules.) The study takes these high-electrification scenarios into account. Kevala and CPUC released the findings from its first part May 9 and plan to review the results in a public workshop May 17. The findings provide preliminary estimates of the impact of widespread transportation electrification on the grids of Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) using a “highly granular load forecast” for more than 12 million homes.



“It is important to highlight that this Part 1 analysis was conducted under unmitigated planning scenarios, which assume only traditional utility distribution infrastructure investments,” the study says. The study also assumed that existing time-of-use rates and behind-the-meter solar tariffs would be in place throughout the study period. “It did not consider alternatives or future potential mitigation strategies such as alternative time-variant rates or dynamic rates and flexible load management strategies,” the study says.

“Across these unmitigated load scenarios, Kevala estimates up to \$50 billion in traditional electricity distribution grid infrastructure investments by 2035,” it says. “This estimate reflects distribution grid needs across the PG&E, SCE and SDG&E service territories under the policy assumptions used in this report.” Two high transportation electrification scenarios would require the utilities to nearly double their current spending on feeder lines, transformer banks and substations, it says.

“Secondary transformer and service upgrades alone ... [comprise] an estimated \$15 billion of the \$50 billion ... and are currently not accounted for” in the investor-owned utilities’ annual assessments of grid needs, it says. “PG&E’s distribution circuits are projected to reach capacity sooner than SCE and SDG&E,” it says. “SDG&E is expected to have the least number of feeders reaching full capacity by 2035, with 22% compared to SCE’s 36% and PG&E’s 48% of feeders.”

The study forecasts that peak load will increase on the utilities’ distribution systems an average of 56% from 2025 to 2035 under all high-electrification and base-case scenarios. “This dramatic increase in peak load ... is primarily due to transportation electrification impacts, with over 60% of this demand coming from light-duty vehicles,” it says. “The average percent change in peak load from 2025 to 2035 for the high transportation electrification scenarios is more dramatic for PG&E (69%), followed by SDG&E (53%) and

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SCE (44%).” Among the study’s recommendations is that the utilities increase their distribution planning horizons to align with those of CAISO and the California Energy Commission, which stretch from 10 to 20 years. That would help them prepare more efficiently for a distribution grid that can incorporate DERs and manage load, it says.

“The substantial difference between the estimated capacity expansion costs, in the several tens of billions of dollars, in this study and the recent filings by the [utilities] suggest there is a disconnect between the data and the current planning process,” it says. Another recommendation is for the utilities to better incorporate the state’s policy goals in their distribution planning. A second part of the study will build on the first part’s findings, including by developing scenarios that reflect state policy goals, state agency targets and the Energy Commission’s demand forecast.

*RTO Insider*

<http://www.rtoinsider.com/>

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## **Rosatom connects second unit at 2.4GW Belarus NPP to grid**

Russian nuclear power company Rosatom has connected Unit 2 of Gen III+ with VVER-1200 of the 2.4GW Belarus nuclear power plant (NPP) to the power grid for the first time. Through the grid connection, the second unit of the nuclear power plant has delivered the first kilowatt-hours of electricity to the unified energy system of the Republic of Belarus. Located in Ostrovets, the Belarusian nuclear power plant has two VVER-1200 and is based on Russian Gen III+ design. It is the country’s first nuclear power plant and is said to completely meet the international standards and safety requirements of the International Atomic Energy Agency (IAEA). The first unit of the Belarusian nuclear plant was commissioned on 10 June 2021.

According to the company, the specialists will increase the reactor power by up to 50% in the coming days. Besides, they will conduct a series of dynamic tests to confirm the compliance of the thermal performance of the key equipment in the reactor and turbine compartments of the power unit with the design values. The tests at the nuclear power plant are expected to complete the first stage of the plant.

Upon receiving approval from the Department for Nuclear and Radiation Safety of the Ministry for Emergency Situations of the Republic of Belarus, specialists are anticipated to move forward to the final part of the nuclear plant commissioning which is its pilot operation. The final stage involves a phased stepwise increase of the reactor power up to 100% of the nominal value as well as dynamic tests in various operating modes with the main equipment shutdown including the blackout test at the power unit. Commissioning of the second unit of the Belarusian nuclear plant is expected in the autumn of this year. Once commissioned, the plant is expected to have a total electricity generation of nearly 18 billion kilowatt-hours per year.

*NS Energy*

<http://www.nsenerybusiness.com/>

**15 May 2023**

## **500-MW Hydrogen Power Plant Planned in Arkansas**

An Arkansas city known for its use of renewable energy announced plans to break ground this year on a power plant that would be part of the state’s first so-called “hydrogen hub.” Officials in Clarksville on May 12 signed an agreement with Syntex Industries, part of SyntexNRG, to design and build the Syntex Hydrogen Power Plant. The current timeline for the project calls for at least limited power generation to begin in 2025, with the plant completed in 2026. Plans call an initial investment of more than \$250 million in the first 50-

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MW phase of the project, with the facility expected to have more than 500 MW of generation capacity when complete, according to officials.

“Syntex has been working with Clarksville to develop methods to store excess renewable energy and regenerate it on demand. Recent technical developments and federal tax incentives have opened the door at last,” said Clarksville Mayor David Rieder in announcing the plant. “This project offers the infrastructure to support our growing economy and bring new high-paying ‘ecodustrial’ jobs to the area.” Rieder said Syntex wants to develop a “Hydrogen Power Grid” to pursue “the promise of renewable hydrogen for clean energy and fuels of transportation.” Syntex has said it also has plans for a solar power facility at the Clarksville site.

Tom Waggoner, managing director and CEO of Arkansas-based SyntexNRG, in a news release said hydrogen “offers a practical pathway to reduce greenhouse gases from power generation by storing energy from solar and wind when it would otherwise be unused.” Waggoner said, “Syntex is committed to facilitating the decarbonization of the economy with major investments in renewable energy, sustainable fuels, and energy-efficient housing in modern sustainable communities.”

Syntex officials have said they think the “most efficient and cost-effective way to deliver hydrogen across the globe” is through a grid of hydrogen power plants that could produce what they call pure “fresh” hydrogen within a radius of about 200 miles. Their plan also includes ammonia- or methanol-based hydrogen carriers “for long-term storage and cost-practical transportation.” The company has said it is committed to developing projects to provide “decarbonization at scale. Several companies are working on blending hydrogen with natural gas at existing power plants, including major turbine makers General Electric, Siemens, and Mitsubishi, along with engine manufacturers Wärtsilä and others. Energy analysts have said the U.S. Environmental Protection Agency’s new standards on power plant emissions also could spur development of more hydrogen-fueled facilities.

*Power Mag*

<http://www.powermag.com/>

**16 May 2023**

## **TotalEnergies launches battery energy storage project in Belgium**

TotalEnergies has announced the launch of its largest battery energy storage project in Europe. Located at its Antwerp refinery in Belgium, the battery project will have a power rating of 25MW and a capacity of 75 megawatt-hours, equivalent to the everyday power consumption of 10,000 households. TotalEnergies issued the following statement: “TotalEnergies is delighted to develop this storage project, which will compensate for the intermittency introduced by renewable energies and thus enable their development. Batteries are an effective response to the growing need for grid balancing.

“They can be deployed quickly, have a limited footprint and high reactivity. As a result, they can help meet the new challenges facing power grids today.” TotalEnergies battery subsidiary Saft will supply 40 Intensium Max High Energy lithium-ion containers for the project, which is set to come online by the end of next year. It will help to smooth power fluctuations in the national grid, ensuring its security and enabling more renewable electricity to be integrated into it.

The facility will also help meet the needs of the European and Belgian high-voltage transmission network. TotalEnergies integrated power senior vice-president Olivier Jouny stated: “This first storage project in Belgium – our largest in Europe – will help ensure the stability of the Belgian and European grids to allow for greater development of renewable energies. It fits in perfectly with the multi-energy strategy of TotalEnergies. “Backed by Saft’s battery energy storage system expertise, TotalEnergies intends to deploy storage solutions

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– notably in countries where we are actively developing renewable energies. “With its energy storage solutions, TotalEnergies supports the growth of renewable energy production in the European energy mix.”

*Power-Technology*

<http://www.power-technology.com/>

**17 May 2023**

## **French Parliament passes law to accelerate construction of new nuclear reactors**

Three months after adopting a renewable energies law, French lawmakers voted on a new law to accelerate procedures for constructing new nuclear reactors. This second legislation presented by the government was adopted in a final vote at the Assemblée Nationale on Tuesday, May 16. It was passed with votes from the ruling coalition, Les Républicains (conservative), the Rassemblement National (far right) and the Communists. One hundred members of the Assemblée from the Greens and radical left party La France Insoumise voted against the bill. The Socialists, who opposed the bill on first reading, abstained.

"Voting definitively on this text will allow our country to take a major environmental step forward by mobilizing all the decarbonization levers to fight climate change," said Agnès Pannier-Runnacher, the energy transition minister, during the vote at the Sénat on May 9. Here is an overview of the main points. The purpose of this new law, which is still awaiting enactment, is to buy time before the first concrete is laid for future nuclear reactors – the government would like to see at least six, and possibly eight more reactors built – while the EPR nuclear reactor construction site in Flamanville, western France, is still underway. The aim is to simplify administrative procedures and urban planning documents so that the construction sites' preparatory work (earthworks, fences, parking lots) can begin as soon as possible. That is without having to wait for the creation authorization decree, which is subject to the opinion of the Nuclear Safety Authority.

The possibility of saving time is not specified in the text. Still, according to the energy transition minister, these modifications could reduce the construction site of the future EPR 2 nuclear reactor by at least two years. The project owner, EDF, hopes to start preparatory work as early as June 2024 instead of 2026 at the Penly site in northern France. According to the government's most optimistic scenario, the first pair of new reactors is supposed to come into service by 2035. Provisions such as waivers of building permits, exemptions from the coastal law and expropriation mechanisms will be valid for 20 years for all construction projects located near existing nuclear power plants including small modular reactors.

In the long term, France aims for "zero net artificialization" to suspend the net increase in artificial surfaces. However, after a debate in the Sénat, the new reactors will not be included in the land protection calculations imposed on local authorities. Instead, they will be counted at the national level, subject to another law, expected to be passed before January 1, 2024.

*Le Monde*

<http://www.lemonde.fr/>

**17 May 2023**

## **Dutch Stop Offshore Wind Turbines to Protect Migratory Birds in ‘International First’**

According to the Dutch Government, this is the first time such a measure has been applied and is in line with the approach of the government and participating companies to increasingly focus on ecology and biodiversity in offshore wind farms.

The wind turbines' speed will be reduced to a maximum of two rotations per minute during the predicted night-time peak migration to give the birds a safe passage. The

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shutdown was part of a pilot phase, which could become standard this autumn and will also include wind farms that are still being built or will be constructed in the future.

“This is an international first, nowhere in the world are wind farms at sea shut down to protect birds during massive bird migration. We want to keep the impact of wind farms on nature as small as possible and we do this with this measure, among other things”, said Rob Jetten, the Dutch Minister for Climate and Energy Policy. At the end of 2022, a PhD student at the University of Amsterdam delivered a bird migration prediction model that predicts bird migration two days in advance.

The migration model uses weather data and various bird radars on the North Sea. A group of migratory bird experts also predicts the probability of large bird migration two days in advance which should give grid operator TenneT enough time to guarantee the stability of the high-voltage grid. “Twice a year, in spring and autumn, millions of birds migrate across the North Sea on some nights”, said Tim van Oijen from Vogelbescherming Nederland.

“With the growth in the number of wind farms in the North Sea, it is extremely important that we do this in the most ecologically responsible way possible with minimal impact on the North Sea. The temporary shutdown of the turbines during bird migration contributes to this.”

Egmond aan Zee is the Netherlands’ first offshore wind farm, consisting of 36 Vestas V90-3.0 MW wind turbines located 10 to 18 kilometres off the Dutch coast. Ørsted’s first offshore wind farm in the Netherlands, Borssele 1 & 2, was fully commissioned in 2020. Located 22 kilometres off the coast of the province of Zeeland, the 752 MW project comprises 94 Siemens Gamesa 8 MW wind turbines. A year later, Borselle 2 & 3 became fully operational as well. Major offshore wind players are starting to invest in various technology and conducting several studies on bird protection. At the beginning of this year, Vattenfall reported the findings of a study into seabird behavior that employed a straightforward approach – recording seabirds that are flying near its Aberdeen Offshore Wind Farm. Ørsted also invested, together with its partners, in a “deep-tech” start-up Spoor that is developing an artificial intelligence (AI) system to monitor and track birdlife at offshore wind farms.

[Offshorewind.biz](http://www.offshorewind.biz)

<http://www.offshorewind.biz/>

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## **Germany to earmark 4 bln euros annually for power subsidy - economy minister**

Germany plans to earmark around 4 billion euros (\$4.40 billion) annually to subsidize electricity prices for energy-intensive industries, to support an industrial move away from fossil fuels and discourage firms from moving offshore. The government last year introduced electricity and gas price caps to shield industry and households from rising energy prices, but companies in Germany say electricity prices are still too high. "We want the industry to stay home in Germany and be given a transformation perspective. The industry electricity price is intended for this," Economy Minister Robert Habeck said in a news conference on Monday.

The government is discussing the details of the subsidy which the finance ministry opposes, but Habeck said the subsidy could cap prices at 6 cents per kilowatt hours (kWh), covering 80% of industrial firms' consumption. "This price will be calculated on the basis of the average exchange electricity price and then calculated down," Habeck said, adding that this would give companies incentive to look for cheaper energy prices from renewable energy sources on the market.

The subsidy, which would cost around 25 to 30 billion euros, should be phased out by 2030 and would be financed through the Economic Stabilisation Fund (ESF), originally

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introduced in 2020 to bail out airline Lufthansa during the pandemic. Earlier this month, the German finance ministry pushed back against the economy ministry's subsidy plan as the budget did not allow for it and existing funds could not be redirected.

Small and medium-sized firms in energy-intensive industries such as the metal and chemical sectors will be able to benefit from the support, he said. "If we don't pay this price, we may no longer have future industrial sectors in these energy-intensive areas in Germany and that would be a loss," Habeck added.

*Reuters*

<http://www.reuters.com/>

**19 May 2023**

## **The nine hours in which Spain made the 100% renewable dream a reality**

The Spanish power grid on Tuesday tasted an appetizer of the renewable energy banquet that is expected to flourish in the coming years. For nine hours, between 10 a.m. and 7 p.m., the generation of green electricity was more than enough to cover 100% of Spanish peninsular demand, a milestone that had already been reached on previous occasions, but not for such a prolonged period. The achievement — which was backed up by figures sent to EL PAÍS by the state electricity provider Red Eléctrica de España (REE) — took place, moreover, on a typical weekday, when the consumption pattern is higher, and not on a holiday or at the weekend, when demand falls sharply.

A huge drive in the installation of renewables — especially photovoltaics — is enabling Europe's fourth-largest economy to cover an increasing part of its electricity needs with renewable energy, something that not only substantially reduces the country's carbon footprint but also applies downward pressure on prices during daylight hours. Above all, it increases the incentives — both environmental and economic — to invest in storage and to electrify transport, industry, and heating, which are intensive in oil or natural gas consumption.

The fact that for a good part of Tuesday the Sun, wind and water generated more electricity than was demanded by companies and households in mainland Spain (in the Balearic and Canary Islands archipelagos, fossil generation is always greater) does not mean that nuclear, gas — whether combined cycle or cogeneration — and coal-fired plants stopped feeding energy into the system altogether. What it means is that, in that time slot, clean sources produced enough to cover all domestic needs. This apparent dissonance is explained both by exports to France, Portugal and, to a much lesser extent, Morocco and Andorra, and by the consumption of pumped hydro plants, which expend energy during the cheaper hours and generate when prices are higher, and whose data is not included in the figures provided by the REE.

Tuesday's renewable record was made possible by the confluence of exceptional photovoltaic and wind production. Not only because of the weather — it was a day of sunshine, wind and moderate temperatures, the most favorable conditions for both technologies to perform at their best — but also because of the strong increase in their total generation capacity in recent times, both in large installations and in the form of self-consumption. In the latter case, that of rooftop solar panels, the impact is twofold: they add supply by injecting their surpluses into the grid and reduce demand when there is sunshine.

"What is relevant is that this is not something cyclical, but on the way to being structural, both because of the fall in demand and, above all, because of the increase in photovoltaic generation," says Natalia Fabra, a professor of economics at the Carlos III University in Madrid and author of the Spanish proposal for the reform of the European electricity market. "There are many lessons to be learned from what happened on Tuesday: the importance of interconnections, because, with the ones at our disposal today, discharges

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cannot be used; the importance of storage; the need to accelerate electrification, which is lagging far behind; and the need to bring demand into the central hours of the day, which is when renewables produce more.”

It is also noteworthy that the milestone of 100% green electricity coincided with the temporary inactivity of three of Spain’s seven nuclear reactors two for refueling and one due to a temporary “electrical anomaly.” “That meant that renewables had more room,” explains Xavier Cugat, project manager at a photovoltaic company who is at the origin of the statistic. “The nuclear closure schedule is not only carried out well, but it is also conservative: at the rate at which we are installing renewables, it could even be brought forward. What will provide more flexibility is hydropower and, within hydropower, pumping,” adds the expert.

“By 2030, Spain will have three fewer nuclear reactors and it turns out that renewables are solving the problem on their own,” says Pedro Fresco, former director of Energy Transition in the Valencia region. Not only is nuclear power contributing less but Spain’s waterfalls, another of the country’s biggest sources of electricity, are being severely hit by the drought, which is reducing productive capacity in many areas. “It is true that it is a one-off, and at a time of very good solar and wind production, but with very little water and with hydroelectric power at a technical minimum... even so, we are covering 100%. Where will we be in three years, when we will have between 10 and 15 gigawatts more of photovoltaic and another five of wind? There is a huge window of opportunity for hydrogen and electric cars, especially in the central hours of the day,” adds Fresco. “But we need strategies to take advantage of it.”

*El Pais*

<http://www.elpais.com/>

**21 May 2023**

## **SunZia Project Wins Final Approval, Signs Offtakers**

Pattern Energy’s SunZia transmission project, a 550-mile line from New Mexico to Arizona, has received route approval from the federal Bureau of Land Management, and construction is expected to start this summer, the company announced last week.

The BLM decision completes the National Environmental Policy Act (NEPA) process and was the last major approval needed for the project. The 525-kV transmission line is expected to be operating in 2026. The SunZia line will carry energy from Pattern Energy’s 3,500-MW SunZia Wind project in central New Mexico to south-central Arizona. From there, the wind energy will serve customers in Arizona and California. The idea is to supply wind energy to those states during the early evening, when demand is high but solar resources have dropped off.

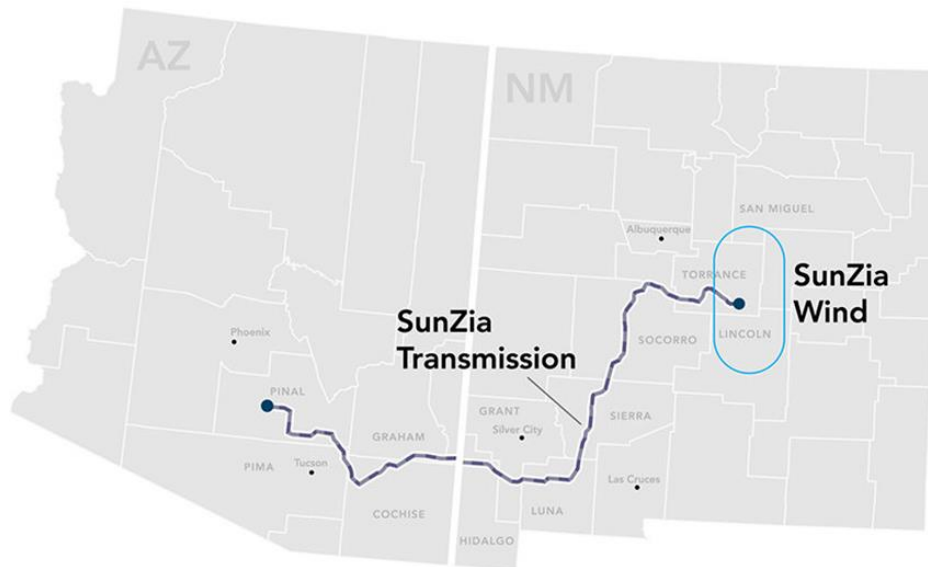
Pattern Energy announced last week that power purchase agreements have been signed with two California buyers of SunZia wind energy: Shell Energy North America LP and the Regents of the University of California. A Pattern Energy spokesman said the existing grid would be used to deliver the wind power from Arizona to California. “In addition, we will fund some upgrades to the grid to facilitate these deliveries,” the spokesman said.

The BLM record of approval was the final federal permit needed for SunZia transmission, a project that has been in the works for 16 years. The project has all state and local approvals and is now finalizing landowner permissions to start construction. Pattern Energy acquired the project from SouthWestern Power Group last year. Pattern Energy said SunZia Wind and Transmission combined will be the largest clean energy infrastructure project in U.S. history.



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Also, this month, Pattern Energy announced it had chosen contractors for engineering, procurement and construction of the SunZia Transmission and Wind projects. Quanta Services (PWR) will work on the transmission line. In addition, Blattner, which Quanta acquired in 2021, will work on the SunZia Wind project and an associated switchyard. The project will include the installation of more than 900 turbines, 10 substations, operations and maintenance facilities, and more than 100 miles of wind-generation transmission lines. Hitachi Energy will provide HVDC converter stations and digital control platforms for the transmission project. Construction of the wind project is expected to begin this year with a 2026 target date to start operations.

For the University of California system, the newly announced SunZia agreement is its first wind energy contract, and its largest renewable energy commitment so far, according to a release. The university signed its first utility-scale contracts for solar eight years ago.

The 85 MW of SunZia wind energy will be used by every UC campus and medical center. It will help the UC Clean Power Program meet the requirements of California's renewable portfolio standard. The UC Clean Power Program operates under California's Direct Access Program, in which customers buy electricity from a competitive provider instead of a regulated electric utility. The university system has more than 50 MW of on-campus green electricity projects. It also buys 60 MW of power from Five Points Solar PV Park and 20 MW from Giffen Solar Park, both in California. An additional 45 MW is expected from a solar facility coming online in 2025.

*RTO Insider*  
<http://www.rtoinsider.com/>

**23 May 2023**

## **Nationalization of Electricite de France SA will be completed by June 8**

The French government has bought 98% of the French energy company Electricite de France SA (EDF) and plans to complete the acquisition of 100% of the shares by June 8, 2023 as part of the nationalization of the company. This is reported by foreign media with reference to an interview with the Minister of Economy, Finance, Industrial and Digital Sovereignty of France, Bruno Le Mayor (Bruno Le Maire). In July 2022, the French

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government announced its intention to nationalize EDF, one of the largest concerns in France, in order to support the company amid the energy crisis.

In early May 2023, the French Court of Appeal rejected the appeal of minority shareholders against the terms of the buyout of EDF, thus giving the "green light" for the nationalization of the company, as a result of which the government will be able to increase nuclear energy production to 350 TWh.

Currently, 35 nuclear reactors in France generate 40 GW of electricity, allowing the resumption of electricity exports, and 19 have been stopped for various reasons. On May 16, 2023, deputies of the French National Assembly supported a bill on the development of nuclear energy and accelerated construction of new reactors. In recent years, EDF has faced various problems related to an aging reactor fleet and cost overruns during the construction of new ones.

In 2022, E. Macron said that EDF would need a broad reorganization and government funding of tens of billions of euros to help the concern build from 6 to 14 new nuclear power plants by 2050, including EPR-2 reactors, the first of which should be laid in 2028 and put into operation in 2035. EDF is the largest state-owned energy company in France and the world's largest operator of nuclear power plants.

*AK&M*

<http://www.akm.ru/>

**25 May 2023**

## **Madrid to generate green hydrogen using recycled water, PV, biogas**

Madrid plans to open Spain's first green hydrogen plant to use reclaimed water. The plant will start operations in 2024 at the Arroyo Culebro Cuenca Media Alta wastewater treatment facility in Pinto. It will be built by Canal de Isabel II, a water-management company owned by the city of Madrid.

The project, with an initial capacity of approximately 80,000 kilograms of hydrogen per year, stands out for multiple reasons. Firstly, hydrogen will be produced from reclaimed water and undergo additional treatment through electrolysis. The Madrid government said that it will be the largest green hydrogen generation plant in Spain to use recycled water.

It will also combine two renewable technologies – solar generation and biogas cogeneration, using waste from the treatment plant itself. The oxygen generated during electrolysis will also enhance the purification treatment of wastewater, improving the facility's ability to handle the pollution produced by 1.2 million residents.

By implementing tertiary treatment, Canal de Isabel II will supply the required water to the electrolyzer, with 12 liters of water necessary to produce 1 kilogram of hydrogen. The project involves an investment of €7.3 million (\$7.8 million) and is expected to be completed in the next 13 months. In addition, the wastewater treatment plant will have the capacity to produce up to 30 million liters of conventional reclaimed water per day. It will use ultrafiltration membranes and reverse osmosis for purposes such as irrigating green areas or cleaning streets.

*pv-magazine*

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

**25 May 2023**

## **Clean energy investment is extending its lead over fossil fuels, boosted by energy security strengths**

Investment in clean energy technologies is significantly outpacing spending on fossil fuels as affordability and security concerns triggered by the global energy crisis strengthen the momentum behind more sustainable options, according to a new [IEA report](#). About USD

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2.8 trillion is set to be invested globally in energy in 2023, of which more than USD 1.7 trillion is expected to go to clean technologies – including renewables, electric vehicles, nuclear power, grids, storage, low-emissions fuels, efficiency improvements and heat pumps – according to the IEA’s latest World Energy Investment report. The remainder, slightly more than USD 1 trillion, is going to coal, gas and oil.

Annual clean energy investment is expected to rise by 24% between 2021 and 2023, driven by renewables and electric vehicles, compared with a 15% rise in fossil fuel investment over the same period. But more than 90% of this increase comes from advanced economies and China, presenting a serious risk of new dividing lines in global energy if clean energy transitions don’t pick up elsewhere.

“Clean energy is moving fast – faster than many people realise. This is clear in the investment trends, where clean technologies are pulling away from fossil fuels,” said IEA Executive Director Fatih Birol. “For every dollar invested in fossil fuels, about 1.7 dollars are now going into clean energy. Five years ago, this ratio was one-to-one. One shining example is investment in solar, which is set to overtake the amount of investment going into oil production for the first time.”

Led by solar, low-emissions electricity technologies are expected to account for almost 90% of investment in power generation. Consumers are also investing in more electrified end-uses. Global heat pump sales have seen double-digit annual growth since 2021. Electric vehicle sales are expected to leap by a third this year after already surging in 2022. Clean energy investments have been boosted by a variety of factors in recent years, including periods of strong economic growth and volatile fossil fuel prices that raised concerns about energy security, especially following Russia’s invasion of Ukraine. Enhanced policy support through major actions like the US Inflation Reduction Act and initiatives in Europe, Japan, China and elsewhere have also played a role.

Spending on upstream oil and gas is expected to rise by 7% in 2023, taking it back to 2019 levels. The few oil companies that are investing more than before the Covid-19 pandemic are mostly large national oil companies in the Middle East. Many fossil fuel producers made record profits last year because of higher fuel prices, but the majority of this cash flow has gone to dividends, share buybacks and debt repayment – rather than back into traditional supply.

Nonetheless, the expected rebound in fossil fuel investment means it is set to rise in 2023 to more than double the levels needed in 2030 in the IEA’s Net Zero Emissions by 2050 Scenario. Global coal demand reached an all-time high in 2022, and coal investment this year is on course to reach nearly six times the levels envisaged in 2030 in the Net Zero Scenario. The oil and gas industry’s capital spending on low-emissions alternatives such as clean electricity, clean fuels and carbon capture technologies was less than 5% of its upstream spending in 2022. That level was little changed from last year – though the share is higher for some of the larger European companies.

The biggest shortfalls in clean energy investment are in emerging and developing economies. There are some bright spots, such as dynamic investments in solar in India and in renewables in Brazil and parts of the Middle East. However, investment in many countries is being held back by factors including higher interest rates, unclear policy frameworks and market designs, weak grid infrastructure, financially strained utilities, and a high cost of capital. Much more needs to be done by the international community, especially to drive investment in lower-income economies, where the private sector has been reluctant to venture.

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## **Japan to try beaming solar power from space in mid-decade**

A new global race is heating up to develop technology for transmitting solar power collected in space to Earth, with a Japanese public-private partnership aiming to run a trial around fiscal 2025. Space-based solar power was proposed by an American physicist in 1968. The concept is to launch solar panels into space to generate electricity at an altitude of 36,000 kilometers.

The solar power is converted into microwaves -- the same electromagnetic radiation used in microwave ovens -- and sent down to ground-based receiving stations for conversion into electrical energy. Microwaves can pass through clouds, making for a stable supply of beamed-down power regardless of the time of day and weather.

In Japan, a group chaired by former Kyoto University President Hiroshi Matsumoto has been leading the research. In the 1980s, it was the first in the world to successfully transmit power via microwaves in space. Research continued after Kyoto University professor Naoki Shinohara took over, and in 2009 the group used an airship to transmit power from an altitude of 30 meters to a mobile phone on the ground. It is working to refine core technology for supplying power wirelessly.

An industry-government-academia project led by the Ministry of Economy, Trade and Industry kicked off in 2009 with Shinohara as head of the technology committee. It successfully ran microwave power transmission experiments horizontally in 2015 and vertically in 2018, both over a distance of 50 meters. Vertical transmission with distances between 1 km and 5 km will be attempted in the future. Shinohara is looking even further down the road. "If we can demonstrate our technology ahead of the rest of the world, it will also be a bargaining tool for space development with other countries," he said.

The group plans an experiment around fiscal 2025 to see if power can be transmitted from outer space to the ground. Small satellites will be used to send it to ground-based receiving stations from hundreds of kilometers away. Competitors are also moving toward commercialization. The U.S. Air Force Research Laboratory and the California Institute of Technology are each pursuing large-scale projects. Such parties as Chongqing University are developing the technology in China, and the European Space Agency is working out its own plans.

Energy crises have historically often led to increased interest in space-based solar. NASA and the U.S. Department of Energy considered it in the oil shock decade of the 1970s, though the idea lost steam as the crisis atmosphere faded. NASA renewed its efforts around 2000 as the Kyoto Protocol climate change treaty raised global awareness of environmental issues. The Japan Aerospace Exploration Agency got involved as well. Space-based solar has drawn renewed attention in recent years as more governments and businesses target net-zero carbon dioxide emissions.

But cost remains a major hurdle. Generating around 1 gigawatt -- the equivalent of one nuclear reactor -- with space-based solar would require panels equivalent in area to a square that measures 2 km on each side. Even with technological advances, installing this amount of capacity will likely cost more than 1 trillion yen (\$7.1 billion).

*Nikkei Asia*

<http://asia.nikkei.com/>

**29 May 2023**

## **Iraq set to commence electrical connection with Jordan in July**

Iraq is set to officially begin its electrical connection with Jordan in early July, reported the Iraqi News Agency. The Ministry of Electricity confirmed that the connection will be ready

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on July 1, with an initial capacity of 50 megawatts, reaching the Rutba district in Anbar Governorate to support the national grid.

Iraq has been actively pursuing agreements for electrical interconnections with neighbouring countries to address its power outage crises. Last year, the country signed an agreement with Saudi Arabia, and in the past month, the Minister of Electricity, Ziyad Ali Fadel, met with the Saudi Minister of Energy, Prince Abdulaziz bin Salman, to expand joint electrical connections. According to Ahmed Musa, the ministry's spokesman, the connection with Jordan was initially planned for June 1 but had to be postponed to July 1 due to weather conditions, difficult soil, and some issues on the Jordanian side.

Additionally, the connection with Turkey is ready pending appropriate pricing, and the connection with the Gulf will be ready in the near future. The interruption of Iranian gas supplies in January severely disrupted Iraq's electricity plans, resulting in a loss of over 7,000 megawatts. As a response, Iraq has been working on establishing electrical interconnections with the Gulf Cooperation Council (GCC) countries.

Five contracts for this interconnection have been signed, with the first phase expected to be operational within 12 months, supplying 1,000 megawatts. The recent government visit to Saudi Arabia further confirmed the expansion plans for the connection points at the Arar and Yusufiya stations. The electricity grid interconnection project between Iraq and Jordan is part of a broader initiative to establish a pan-Arab power market, connecting the GCC countries, Egypt, Jordan, and Iraq. This project, initiated in October, demonstrates Iraq's commitment to openness and cooperation with its regional counterparts. The project includes the construction of power facilities, such as an electricity transmission station and power cables in Al Qaim, undertaken by General Electric and an Iraqi company.

Iraq's chronic power shortage has led to ongoing protests and challenges for the country, despite significant investments in infrastructure over the years. To address this issue, Iraq has been diversifying its energy sources and has signed agreements with multinational energy services companies like General Electric and Siemens, focusing on improving power infrastructure and developing clean energy projects. A deal with Total, a French company, aims to develop oil fields, produce gas, build energy infrastructure, and generate solar energy. While Jordan has excess electricity production, it has struggled to find export markets. However, recent efforts, including discussions with Iraq and other countries, indicate progress in expanding its electricity exports.

A deal to export electricity to Lebanon has faced delays due to funding issues, but other avenues for exporting Jordan's surplus energy are being explored. Planned connections with Turkey and the Gulf will further strengthen Iraq's power infrastructure, ensuring a more reliable electricity supply for the country's businesses and residents.

*Utilities*

<http://www.utilities-me.com/>

**30 May 2023**

## **German start-up wins initial funding for revolutionary fusion energy machine**

A German start-up has secured initial funding to develop a revolutionary fusion energy machine that it hopes can provide a future source of abundant, emissions-free power. Proxima Fusion, incorporated in January, aims to build a complex device known as a stellarator and is the latest company to join the emerging fusion industry's effort to generate electricity by fusing atoms. Although the amount of funding is small at only €7mn, it is significant as Proxima is the first fusion company to spin out of Germany's revered Max Planck Institute for Plasma Physics.

The institute is the home of the world's most advanced existing stellarator in Greifswald, in eastern Germany, built by government-funded scientists over the past 27

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years using supercomputers and advanced engineering. Little known outside the world of plasma physics, a stellarator is an alternative to the better known tokamak device, pioneered by Soviet scientists in the 1950s. Both use huge magnets to suspend a floating mass of hydrogen plasma as it is heated to extreme temperatures so the atomic nuclei fuse releasing energy. Until recently nearly all funding of so-called magnetic confinement fusion has been channelled into tokamaks such as the Joint European Torus in Oxford, England, or the Sparc device being built by the Bill Gates-backed Commonwealth Fusion Systems in Massachusetts. The twisted structure of the stellarator is more complicated to design and build than a traditional tokamak but produces a more stable plasma that could enable scientists to sustain the fusion reaction for longer.

“A tokamak is kind of easy to design, hard to operate, whereas a stellarator is super hard to design but once you’ve designed it, it’s way easier to operate,” said Ian Hogarth, co-founder of Plural Platform, which is leading the €7mn investment alongside Germany’s UVC Partners. The stellarator was conceived by the American physicist Lyman Spitzer in 1951 but largely abandoned after tokamak breakthroughs in the 1960s appeared to offer an easier route to fusion. Germany was one of a small number of countries that persevered with stellarator research, starting work on the Wendelstein 7-X at the Max Planck Institute in 1996, at a total cost to date of €1.3bn. “During the building of the machine, we learned how to build the machine,” Thomas Klinger, director of the institute’s Greifswald branch since 2001, told the Financial Times. The final design was the product of “tedious and exhausting research”, he added.

Then-chancellor Angela Merkel turned on the W 7-X for the first time in 2016 and the machine has since achieved a series of scientific breakthroughs. “They’ve basically done the impossible,” said Hogarth. “With 1990s computing resources they successfully designed a stellarator and now it’s setting records that basically are defining the whole field of magnetic confinement fusion.” The close relationship between Proxima and the Max Planck Institute has invited comparisons with Commonwealth Fusion, which was spun out of the Massachusetts Institute of Technology in 2018 and has since raised a record \$2bn from investors.

“We’re connected to an institution, which has more people [working on plasma physics] than MIT,” said Proxima chief executive Francesco Sciortino, who worked at the Max Planck Institute before setting up the company. “The question is, can we execute just as well, and really make this a European champion?” Despite the achievements of the W 7-X, Klinger said there was a long road from there to commercial power, which he cautioned could still be 25 years away.

While advances in materials science and a flood of private investment have raised hopes that abundant, emissions-free fusion energy can be connected to the grid by the 2030s, a fusion machine is yet to produce more energy than the system itself consumes. Philippe Larochelle at Bill Gates’s Breakthrough Energy Ventures, which has made four fusion investments, has backed both Commonwealth Fusion’s tokamak and a stellarator concept being developed by US-based Type One.

*Financial Times*  
<http://www.ft.com/>

**30 May 2023**

## **Vogtle 3 reaches full power**

The AP1000 unit reached first criticality in March and was connected to the electricity grid in April. It has been undergoing testing through the full range of plant operations at gradually increasing power levels in a process known as power ascension testing.

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The operation of the reactor, control systems for the reactor and support systems, and integrated plant operations are tested at each power level, with plant performance monitored under various conditions. Now the unit has reached 100% power, further tests must now be performed before it is available for reliable dispatch in accordance with its combined operating licence, Southern Company said.

"As we enter the final stages of start-up testing, reaching 100 percent power for the first time is an exciting milestone. It tells us we're close to finishing the unit safely and bringing it online to power Georgia homes and businesses with reliable, emissions-free energy for decades to come," Georgia Power President and CEO Kim Greene said.

It is now just over 10 years since construction of two Westinghouse AP1000s began at the site near Waynesboro. Work started on unit 3 in March 2013 and unit 4 in November of that year. Unit 4 completed hot functional testing - which confirms the reactor is ready to be loaded with nuclear fuel - earlier this month. The first fuel for unit 4 was delivered on 3 May, ahead of fuel loading later this year. Vogtle 4 is expected to enter service late this year or early in 2024.

Southern Nuclear and Georgia Power, both subsidiaries of Southern Company, took over management of the construction project in 2017 following Westinghouse's Chapter 11 bankruptcy. The units are co-owned by Georgia Power, Oglethorpe Power, MEAG Power and Dalton Utilities, and will be operated by Southern Nuclear.

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