

# WORLD POWER SYSTEMS REVIEW

15 May 2024

1 May 2024

## New England's electricity use to increase steadily over next decade, according to 2024 CELT Report

A new report from ISO New England projects regional electricity consumption will increase by about 17% over the next decade, driven primarily by the accelerating electrification of heating systems and transportation.

Load forecasters at the ISO examined expected economic growth, historical weather patterns, projected adoption of technology like distributed solar photovoltaics (PV), electric vehicles (EVs) and air-source heat pumps, and state-level carbon reduction goals to develop the 2024-2033 Forecast Report of Capacity, Energy, Loads, and Transmission (CELT Report), which serves as a foundational resource for the ISO's system planning and reliability studies.

Components of the report include:

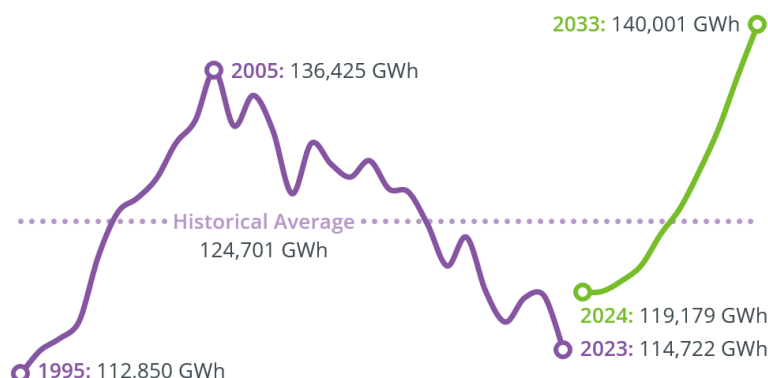
- A long-term forecast for energy consumption and peak demand, which accounts for the impacts of electrification, energy efficiency (EE), and behind-the-meter (BTM) PV generation
- The potential output of resources participating in the Forward Capacity Market (FCM), as well as the total generating capability of resources in the region
- A breakdown of the region's generators by fuel/unit classification
- A link to the listing of [transmission projects proposed, planned, and under construction](#)

Changes in regional electricity use since 1995

Net annual energy use in New England grew steadily between 1995 and 2005, driven primarily by increased economic growth and the use of air conditioning. Since 2005, net annual energy use has trended downward mainly due to an increase in energy efficiency from advanced cooling and heating technologies, energy-efficient appliances and lighting, and the increased prevalence of BTM solar generation.

However, ISO New England is predicting that trend will reverse in the next decade. The ISO is forecasting steady growth in net annual energy use as state policy goals for carbon emissions reductions drive the increased electrification of heating systems and transportation in the region.

### Historical and Forecast Net Energy Use



Improved input assumptions and methodology

The ISO's innovative load forecasters continually refine their methods and assumptions to keep pace with emerging trends.

# WORLD POWER SYSTEMS REVIEW

15 May 2024

Updates since the 2023 CELT Report include capturing the effect of new managed charging programs, which incentivize consumers to charge personal electric vehicles outside of peak demand hours.

ISO New England also continues to develop methods to better reflect the partial electrification of building heating, which assumes consumers will also use a non-electric, backup heating source during very cold weather. These improvements will provide a more accurate picture of how consumers use electric heat pumps, since these devices often supplement existing oil furnaces or woodstoves instead of replacing them.

Each year, the ISO assesses the accuracy of last year's predictions and modifies inputs accordingly. Over the past decade, the ISO has observed a decoupling of economic growth and demand for electricity; in recent years, this led energy models to over-forecast. As a result of this benchmarking, 2024's 10-year forecast curves for annual energy are slightly lower than those in the 2023 report, driven partly by a more nuanced approach to developing economic model inputs.

Victoria Rojo, lead data scientist on the ISO's Load Forecasting team, talks about the CELT Report in this ISO Minute video.

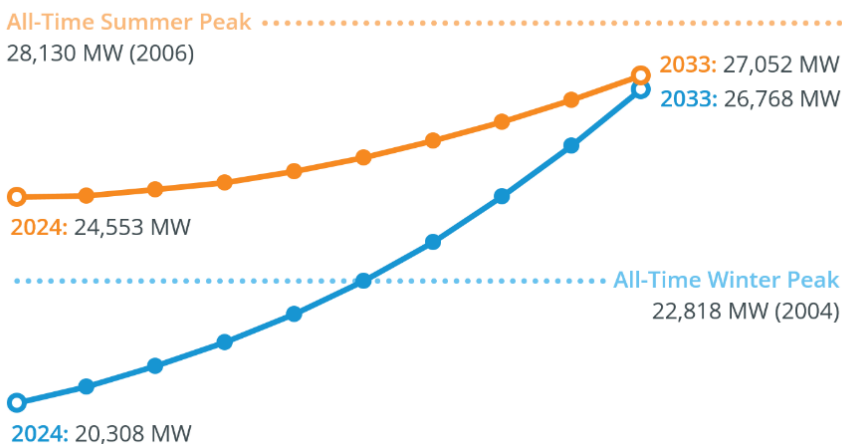
Results of the ISO's EE forecast and solar photovoltaic (PV) forecast are applied to the gross long-term forecast to develop a net long-term forecast. The net forecast represents actual energy to be served, since EE and BTM PV reduce the amount of electricity consumers draw from the bulk power system.

Overall electricity use in New England

Total Annual Use (GWh)	2024	2033
Net Forecast	119,179	140,001

- Net annual energy use is expected to grow by 1.8% annually over the 10-year period.
- Energy efficiency programs participating in the region's wholesale electricity markets are projected to reduce electricity use by 10,618 gigawatt-hours (GWh) this year and 11,210 GWh in 2033.
- BTM PV is projected to reduce consumption of grid electricity by 5,444 GWh this year, rising to 9,975 GWh in 2033.
- EVs are expected to account for 15,182 GWh of energy use in 2033, while heating electrification is expected to account for 7,996 GWh that year.

## Summer and Winter 50/50 Net Peak Forecast



# WORLD POWER SYSTEMS REVIEW

15 May 2024

Peak demand is a measure of the highest amount of electricity used in a single hour, and the CELT Report includes forecasts for both summer and winter peaks. Traditionally, the expected annual peak in New England occurs during the summer. ISO New England analysts use historical data on typical peak weather conditions to develop the 50/50 forecast, meaning there is a 50% chance that peak demand will be above or below the forecast. By 2033, ISO New England predicts the winter 50/50 net peak will nearly match the summer 50/50 net peak as the electrification of heating accelerates. The 90/10 forecast—which reflects hotter, more humid peak conditions in the summer and colder temperatures in the winter—means there is a 10% chance that peak demand will be higher than the forecast.

Summer Peak Demand (MW)	2024	2033
50/50 Net Forecast	24,553	27,052
90/10 Net Forecast	26,383	29,007

- Under typical summer weather conditions, net peak demand is expected to rise at an annual rate of 1%. For hotter weather, the net peak is expected to rise slightly less than 1% annually.
- The net forecast includes 50/50 summer peak demand reductions from BTM PV of 1,097 megawatts (MW) this year, rising to 1,284 MW in summer 2033.
- EE is expected to reduce 50/50 summer peak demand by 1,775 MW this year, and by 2,023 MW in 2033.
- Transportation electrification is expected to contribute 2,334 MW to 50/50 summer peak demand in 2033.

Winter Peak Demand (MW)	2024/2025	2033/2034
50/50 Net Forecast	20,308	26,768
90/10 Net Forecast	21,089	28,270

- Under typical winter conditions, net peak demand is expected to rise by an average of 3.1% annually through the winter of 2033/2034. For colder weather, the net peak is expected to increase by 3.3% annually.
- Transportation electrification is forecast to contribute 3,348 MW to the 50/50 winter peak and 3,440 MW to the 90/10 winter peak in 2033/2034.
- Heating electrification is projected to contribute 3,604 MW to the 50/50 winter peak and 4,356 MW to the 90/10 winter peak in 2033/2034.
- BTM PV does not reduce winter peak demand, because the peak typically occurs after sunset.

*Isonewswire*  
<http://isonewswire.com/>

1 May 2024

## Germany set to pay more coal plants to prevent blackouts

Germany's coal phase-out plans face a potential setback after the energy regulator predicted the country will need a lot more fossil-fuel power plants on standby to help keep the lights on in the coming years.

# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

The need for so-called reserve capacity to cover shortfalls in wind and solar generation during the 2026/27 winter period is set to reach 9.2 gigawatts, double the amount put aside for the last heating season, the regulator said Tuesday. That's even more than the 8.3 gigawatts of mainly coal-fired backup deployed in 2022, when Russia curbed pipelined natural gas supplies to Europe. While Germany hopes to phase out coal entirely by 2030 — eight years before a legal deadline — many companies have already warned it might not have enough alternative power sources to do so by then. The country's grid-reserve units are mainly coal and gas plants, with batteries only providing a fraction of the backup power. Germany shuttered its remaining nuclear plants last year.

Europe's largest economy has made huge strides in the transition to renewables — which now make up half of the country's generation — but it's still not enough to meet demand when the weather's calm and the sun isn't out. The need for more reserve plants is further heightened by delays in the country's grid expansion, which means electricity can't be fully transported to regions with high consumption.

To help shrink its reliance on coal, the government wants to build 10 gigawatts of new gas power plants that can later switch to hydrogen. However, as details of the program aren't even sketched out yet, it's unlikely that these units will be running before the end of the decade.

*Bloomberg*  
<http://www.bloomberg.com/>

**1 May 2024**

## **Nevada put big battery energy storage where a coal plant used to be**

Nevada utility NV Energy's largest battery energy storage system sits on a former coal-fired power plant site and will save customers a lot of money.

Swiss-US battery energy storage specialist Energy Vault (NYSE: NRGV) built the 220 MW/440 MWh grid-tied Reid Gardner Battery Energy Storage System (BESS) in Moapa, Nevada, 50 miles northeast of Las Vegas. Energy Vault will maintain the system. The new BESS is on the site of the former 557-megawatt (MW) coal-fired Reid Gardner Generating Station, which was demolished in 2019.

It's a two-hour energy storage system that stores and dispatches excess wind and solar power. It's charged and discharged daily and dispatches stored renewable energy at peak consumption hours to help meet demand. The Inflation Reduction Act covered 40% of the project's \$250 million cost. Cannon told KTNV that thanks to the new BESS, the utility's customers would see a 15-20% reduction in their bills by the end of 2024.

*Electrek*  
<http://electrek.co/>

**2 May 2024**

## **Japan's energy policies aim for increased zero-carbon electricity generation**

Over the last several years, the Japanese government has announced energy policies aimed to achieve carbon neutrality, or net-zero greenhouse gas (GHG) emissions, by 2050 by lowering emissions in the electric power, industrial, and transportation sectors. In the electric power sector, government policies set 2030 targets, which include accelerated investment in renewable capacity, increased use of nuclear generation, and reduced use of fossil fuels for electricity generation. Japan's government called the package of energy policies and their targets "ambitious." Energy security considerations may affect the progress and pace of decarbonization in the electric power sector.

Below, we examine policies affecting generation from non-fossil fuel sources, namely renewable sources and nuclear generation in the first part of a two-part series on Japan's

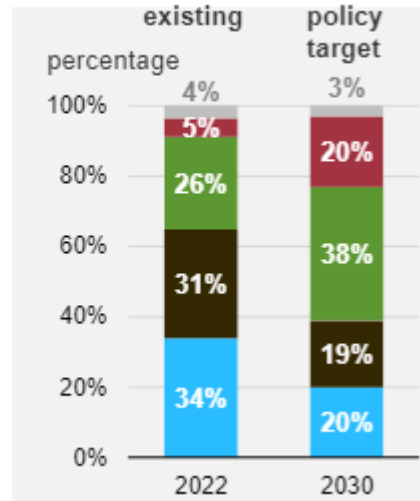
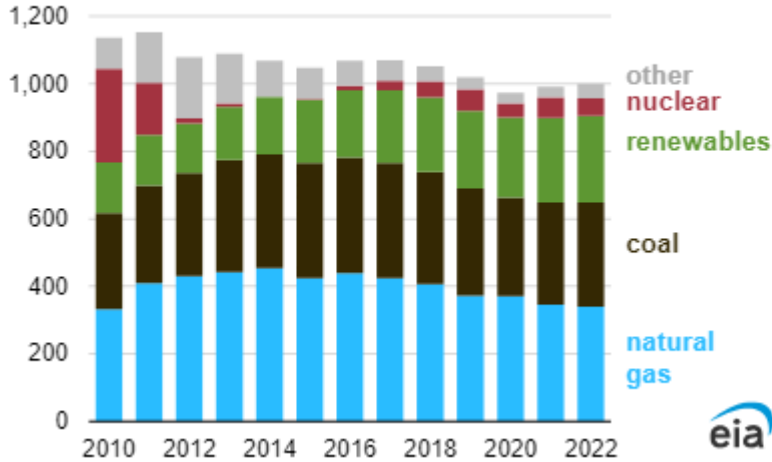
# WORLD POWER SYSTEMS REVIEW

15 May 2024

energy policies in the electric power sector. A second part will discuss policies affecting generation from fossil fuels, including liquefied natural gas, coal, and petroleum.

Japan's electricity generation by fuel type (2010–2022)

gigawatthours



## Electric power sector policies

Japan's 6th Strategic Energy Plan (released in 2021) and the GX (Green Transformation) Decarbonization Power Supply Bill (released in 2023) target increasing the share of non-fossil fuel generation sources to 59% of the generation mix by 2030 compared with 31% in 2022. Policies target an increase in the share of renewable generation sources including solar, wind, hydropower, geothermal, and biomass from 26% in 2022 to 36%–38% by 2030 and an increase in the share of nuclear generation from 5% in 2022 to 20%–22% by 2030.

Generation by fossil fuels (natural gas, coal, and petroleum) is set to decline from 69% in 2022 to 41% by 2030. The policies also could expand hydrogen and ammonia use in natural gas and coal co-fired power generation, in difficult-to-electrify end-use sectors, and in advanced carbon capture and storage technology development.

## Renewable energy resources

From 2018 to 2022, the share of renewable generation in Japan grew from 21% to 26%. Policies to increase its share are to be supported by:

Establishing renewable energy promotion zones (zones that meet specific criteria for developing renewable energy projects and that provide investment and licensing benefits)

Increasing investments in research and development focused on technology advancements, particularly in solar and wind

Accelerating development of offshore wind projects

Stimulating growth in the renewable capacity buildout through other initiatives

The targeted increase in renewable generation is paired with broad encouragement of battery storage. According to Japan's 6th Strategic Energy Plan, battery storage will be increased as a distributed source of electricity closer to end users and within microgrids.

This new policy calls for an increase in installed solar capacity from 79 gigawatts (GW) in 2022 to 108 GW by 2030. Initiatives include installing solar capacity on 50% of government buildings (6 GW), on corporate buildings and parking garages (10 GW), and on public land and promotion areas (4 GW). The targeted increase in Japan's wind capacity focuses on increasing offshore capacity from 0.14 GW in 2022 to 10 GW by 2030. In March 2024, the Japanese government approved a draft amendment to allow offshore wind turbines to be installed in Japan's exclusive economic zone.

## Nuclear power

# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

From 2018 to 2022, the share of nuclear generation remained at about 5% of total generation in Japan. Lawmakers approved the GX Decarbonization Power Supply Bill, which effectively maintains existing legal provisions that allow nuclear reactors to operate beyond the 40-year license to 60 years of operation. The bill also designated nuclear power as a main component of the country's baseload electricity generation. Japan also intends to maximize the use of existing reactors by restarting as many units as possible.

Japan's government has encouraged a collaborative effort between manufacturers and electric utilities to develop next-generation reactors, signaling a sustained role for nuclear power in Japan's electricity mix.

Before 2011, nuclear power accounted for about 30% of Japan's electricity mix, and the government had planned to increase that share to over 40% by 2017. After the 2011 Fukushima Daiichi accident, the Japanese government suspended operation of all nuclear reactors for mandatory inspections and safety upgrades. The reactors were systematically taken offline during planned refueling and maintenance outages; the last two units were suspended in 2013.

Nuclear restarts have proceeded slowly since the first two units were restarted in 2015. This hesitancy reflects, among other factors, continued public safety concerns, local court injunctions, comprehensive safety inspections, and lengthy authorization processes within changing regulatory requirements.

Japan has restarted 12 reactors and expects to restart two more units in 2024. Chugoku Electric Power Company announced that it will restart Shimane Unit 2 at its facility in the Matsue Prefecture in August. Tohoku Electric Power has announced plans to restart Onagawa Unit 2 in the Miyagi Prefecture of northeastern Japan in September.

We estimate that 24 GW of operating nuclear capacity will be required for nuclear generation to meet the policy target of 20% to 22% of total generation by 2030. By the end of 2024, a total of 12.6 GW of nuclear generating capacity is expected to be operating. An additional 11.4 GW of nuclear capacity will need to be restarted between 2025 and 2030 to meet the policy target.

**EIA**

<http://www.eia.gov/>

**2 May 2024**

## **'World's first' wooden wind turbine blades installed in Germany**

German wind turbine blade maker Voodin Blade Technology (Voodin) has announced the first-ever real installation of its wood-based blades on a wind turbine in Breuna, Germany.

These 63-foot (19.3-meter) long blades are made from something called laminated veneer lumber (LVL). This wood-based laminate material is considered more sustainable than existing fiberglass and other synthetic composites used to make wind turbine blades.

More importantly, the blades should be easier to decommission and recycle once their lifespan expires. Since most wind turbine blades have a shelf life of around 20 to 25 years, replacing and disposing of older blades will be a big headache in the coming years.

Currently, most wind turbine blades are buried at life's end as the material they are made of cannot be readily recycled. For this reason, blades made from wood, like Voodin's, could eliminate one of wind turbines' major Achilles heel: the inherent issues of manufacturing and disposing of their blades.

To this end, Voodin's wooden blades could be the perfect solution to bolster wind turbine technology's claimed green credentials. Composite materials, such as fiberglass and epoxy resin, cannot be reused, which results in wasted material after decommissioning. Wood, on the other hand, is a much more sustainable raw material.

# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

“At the end of their lifecycle, most blades are buried in the ground or incinerated. This means that—at this pace—we will end up with 50 million tonnes of blade material waste by 2050. With our solution, we want to help green energy truly become as green as possible,” says Tom Siekmann, CEO at Voodin Blade Technology.

Voodin utilizes CNC milling machines that excel in creating intricate 3D shapes. As a result, the manufacturing process is highly automated, eliminating the need for molds in the production facilities. CNC milling technology also provides greater flexibility since it can be used to manufacture blades of any kind. Increasing the level of automation reduces the need for labor in manufacturing. As a result, manufacturing is no longer necessary in countries with lower labor costs.

This could also open up the possibility of production being relocated closer to wind farms, leading to a reduction in transportation costs and emissions caused by transportation. Wood, particularly LVL, is a highly durable material that outperforms composite materials currently used in various industries. Voodin has conducted extensive laboratory testing to guarantee the material’s ability to withstand the harshest conditions in onshore wind energy production. The company has installed the first set of prototype blades on an existing wind turbine near the city of Kassel in Breuna, Germany. The next step is to build bigger 197-foot (60-meter) and 263-foot (80-meter) blades.

*Interesting Engineering*  
<http://interestingengineering.com/>

**2 May 2024**

## **Kazakhstan, Azerbaijan, and Uzbekistan sign agreement on energy interconnection**

The energy ministries of Kazakhstan, Azerbaijan, and Uzbekistan signed a historic memorandum at the Tashkent International Investment Forum on May 1, marking a significant step towards interconnecting the energy grids of the three countries, reported the Kazakh Ministry of Energy.

The memorandum aims to determine the foundational terms of cooperation for the ambitious project of linking the energy systems of Azerbaijan, Kazakhstan, and Uzbekistan. A key component of the plan involves investigating the feasibility of laying a high-voltage cable along the seabed of the Caspian Sea alongside ventures within other territories. This strategic move seeks to optimize the trade of green energy among the three countries, harnessing technical and economic efficiencies.

Energy Minister of Kazakhstan Almasadam Satkaliyev emphasized that groundwork had been laid before the signing. “As part of the terms of reference, a proposed business model will be developed to facilitate international transmission corridors – financing, revenue flow and ownership – and for the sale of green energy to the countries of the European Union. Based on the above, a draft memorandum of cooperation on interconnection of the energy systems of Azerbaijan, Kazakhstan and Uzbekistan was developed between the energy ministries of the three countries,” said Satkaliyev.

As discussions progress, the Kazakh Energy Ministry affirms its readiness for full-fledged collaboration, underlining its dedication to realizing the shared vision of an interconnected energy network spanning the Caspian Sea and beyond.

*The Astana Times*  
<http://astanatimes.com/>

**2 May 2024**

## **UK’s 1st waterless hydro-energy storage to offer 2.5 times more power**

RheEnergy, a UK-based energy startup developing new high-density hydro storage technology, is setting up a 500kW demonstrator at a mining site near Plymouth. The first-of-

# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

its-kind facility aims to help decarbonize the site's energy consumption and is supported by the government's Longer Duration Energy Storage (LDES) Demonstration Programme.

Water-based energy storage isn't a radically new concept. Additional power generated from renewable energy plants can be used to pump water up from a lower reservoir to one located at a higher level.

When the energy supply is low, water from the higher reservoir is released back to the lower one, where it passes through turbines generating electricity. While the technology seems straightforward, Switzerland spent 14 years constructing one such energy storage system in the Alps. Even if the industry were willing to spend many years building such systems in other parts of the world, for the technology to be effective, one needs high mountains and ample water, which isn't available equally everywhere.

RheEnergise is looking to solve this problem by moving to a waterless system. The company has patented a fluid that is two and a half times denser than water and, therefore, needed in much lesser quantity to generate the same amount of power. According to the company's estimates, the energy generation capacity of its fluid is the same as that of water but at 40 percent volume. Therefore, the fluid can be stored in Olympic-sized pools instead of building large reservoirs. Further, the fluid's energy delivery capacity is higher. It can generate the same output as water even when the height differential between the tanks is 40 percent. This effectively means that the system can also be installed on smaller hills, making it easier to erect such infrastructure.

According to RheEnergise, there are 6,500 potential sites in the UK alone. It is building its first full-scale demonstrator at Cornwood near Plymouth, where kaolin is mined. The mineral has industrial applications and is used to make sanitary ware, tiles, and ceramics. Construction of the 500-kW demonstrator plant has already begun, and the site is expected to be operational by September of this year. When ready, the facility will support the mining plant's energy demands by supplying carbon-free electricity. Details on how much of the site's energy consumption will be offset this way or how much it costs to build and operate it aren't available. However, the company told New Atlas its technology is much cheaper than large-scale lithium-ion storage solutions.

Additionally, energy storage does not have the same problems as batteries that leak or degrade over time. So, energy can be stored for months or even years without losses. "The demonstrator is a trailblazing project for the LDES sector and will place us in a strong position to build commercial-scale projects in this country and overseas," said Stephen Crosher, Chief Executive Officer of RheEnergise, in the press release. "We have global interest in our technology, from as far as Australia and Chile. We would like to have our first 10MW grid-scale project in operation within two years."

*Interesting Engineering*

<http://interestingengineering.com/>

**6 May 2024**

## **Australia's second-largest pension fund blacklists thermal coal investments**

Australian pension giant Australian Retirement Trust said on Thursday it would stop investing in most thermal coal companies from July as part of a plan to hit net zero emissions across its portfolio by 2050. The A\$280 billion (\$183 billion) fund has introduced new rules to exclude any company which generates more than 10% of its revenue from the mining and sale of thermal coal, one of the most polluting energy sources. "As a global investor, Australian Retirement Trust is committed to achieving a net zero greenhouse gas emissions investment portfolio by 2050," it said in a statement. "Australian Retirement Trust applies exclusions in limited circumstances as part of its sustainable investment approach in accordance with members' best financial interest." The rule change puts thermal coal in the



# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

same category of excluded investments such as tobacco, cluster munitions and landmines, according to a notice, opens new tab on the fund's website.

However, the rule does not bar thermal coal investments made indirectly via money invested with other fund managers. It also does not apply to metallurgical coal, used in steel making. Climate activists celebrated the move and said Australian Retirement Trust was the largest Australian pension fund to halt thermal coal investments. "It's a tribute to the thousands of members who have demanded greater climate action from the fund," said Brett Morgan, superannuation funds campaigner at Market Forces. The change is unlikely to lead to big adjustments in its local portfolio given major Australian coal miners New Hope (NHC.AX), opens new tab or Whitehaven Coal (WHC.AX), opens new tab are already absent from its main fund, according to fund filings from December.

*Reuters*

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

**6 May 2024**

## **ACWA Power signs \$4.85 bln deal for central Asia's largest Wind Power Plant**

ACWA Power signed a Power Purchase Agreement (PPA) with the National Electric Grid of Uzbekistan for Central Asia's largest wind farm — the Aral 5GW Wind Independent Power Producer (IPP) project in the Karakalpakstan region. The agreement was signed on the sidelines of the Tashkent International Investment Forum held under the patronage of Uzbek President Shavkat Mirziyoyev. It was signed in the presence of Uzbek Prime Minister Abdulla Aripov and Saudi Energy Minister Prince Abdulaziz bin Salman Al Saud during a ceremony inaugurating two of ACWA Power's ongoing projects in the country: the 1.5GW Sirdarya CCGT plant and the first 100MW phase of the Riverside solar plant in the Tashkent region. Mirziyoyev also attended the ceremony.

As ACWA Power's 15th project in Uzbekistan, Aral Wind IPP solidifies the company's strong commitment to providing the renewable energy needed to meet the Central Asian country's ambitious aims to have 40% of its energy mix provided by renewables by 2030. Uzbekistan is ACWA Power's largest market after its home country of Saudi Arabia, and this latest project brings its total investment in the country to \$13.9 billion.

Founder and Chairman of the Board of ACWA Power Mohammad Abunayyan said: "This historic project will provide clean power to approximately 4.5 million houses in Uzbekistan, a country which is propelling its energy transition thanks to its ambitious and decisive leadership. We are proud to collaborate with Uzbekistan's government to export our low-carbon expertise beyond the borders of Saudi Arabia, improving the lives of millions in a country with whom we are honored to share close ties," he added. The Aral Wind IPP will be deployed in five phases. This flagship initiative will generate approximately 18,500 GWh of clean electricity annually, displacing 247 billion tons of CO2 over its lifetime and providing power to around four million homes, thus marking a pivotal step in Uzbekistan's green energy transition.

*Evwind*

<http://www.evwind.es/>

**6 May 2024**

## **New Jersey launches fourth offshore wind call**

The U.S. state of New Jersey has opened the fourth solicitation for offshore wind development, seeking to award up to 4 GW of new generation capacity. The application window for the fourth solicitation has been opened on April 30, and will accept application until July 10, 2024.

# WORLD POWER SYSTEMS REVIEW

15 May 2024

The fourth solicitation seeks to award between 1.2 GW and approximately 4 GW of offshore wind generation capacity. In the process of meeting New Jersey's procurement goals, the fourth solicitation aims to encourage competition, promote economic development, and combat climate impacts, all at the lowest reasonable cost and lowest risk to New Jersey ratepayers. "This latest solicitation is further proof of our commitment to building a strong and thriving offshore wind industry that will deliver undeniable economic and environmental benefits to our state, for both this generation and the next," said Governor Phil Murphy.

"After gathering valuable and robust feedback from stakeholders, the NJBPU is proud to release its fourth offshore wind SGD. We look forward to considering the next round of applications as we continue to combat the intensifying climate crisis and solidify New Jersey as a national offshore wind hub," added Christine Guhl-Sadovy, NJBPU President. In its most recent solicitation, on January 24, 2024, the board awarded two of New Jersey's largest offshore wind projects to date, the 1,342 MW Attentive Energy Two project and the 2,400 MW Leading Light Wind project. Together, the projects are anticipated to produce \$6.8 billion in economic benefits to the state, including roughly 4,350 new jobs in direct construction and maintenance of offshore wind farms, as well as jobs in the offshore wind supply chain and in related fields.

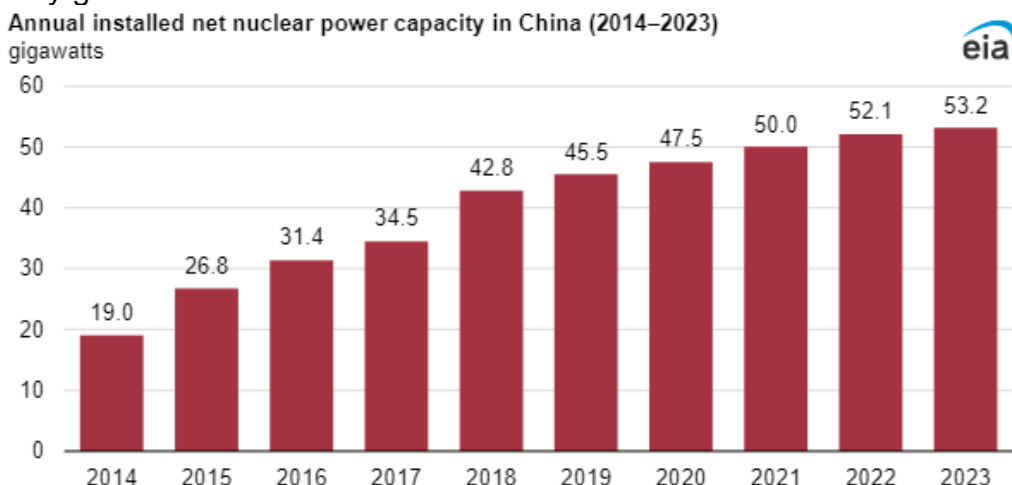
*Offshore Engineer*  
<http://www.oedigital.com/>

6 May 2024

## China continues rapid growth of nuclear power capacity

In the past 10 years, more than 34 gigawatts (GW) of nuclear power capacity were added in China, bringing the country's number of operating nuclear reactors to 55 with a total net capacity of 53.2 GW as of April 2024. An additional 23 reactors are under construction in China. The United States has the largest nuclear fleet, with 94 reactors, but it took nearly 40 years to add the same nuclear power capacity as China added in 10 years.

Despite rapid capacity growth in 2022, nuclear power made up only about 5% of China's cumulative power generation that year. Nuclear power accounts for about 18% of the electricity generation mix in the United States.



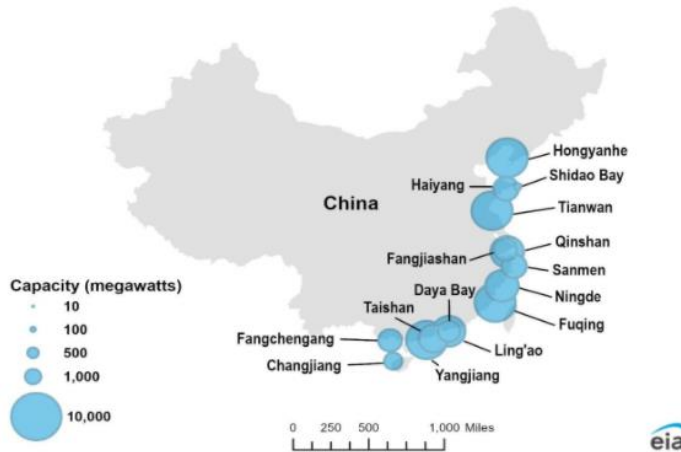
China implemented a long-term strategy in 2011 for nuclear power development to meet its electricity demand and to address environmental concerns. Given growing electricity demand over the last decade, China's utilities have increased development of all types of electricity generation. However, coal remains China's largest electricity generation source and is the source of much of the country's air pollution. More carbon dioxide has been emitted in China than in any other country since 2006. Although nuclear power

# WORLD POWER SYSTEMS REVIEW

15 May 2024

generation is a zero carbon-emitting technology, coal-fired power plants have significantly lower upfront capital costs and shorter construction times. Coal-fired capacity increased by 19.5 GW in China in 2022, bringing its total coal-fired capacity to 1,089 GW, despite the country's pledge to reduce coal consumption. In 2022, China had just over 52 GW of installed nuclear power capacity.

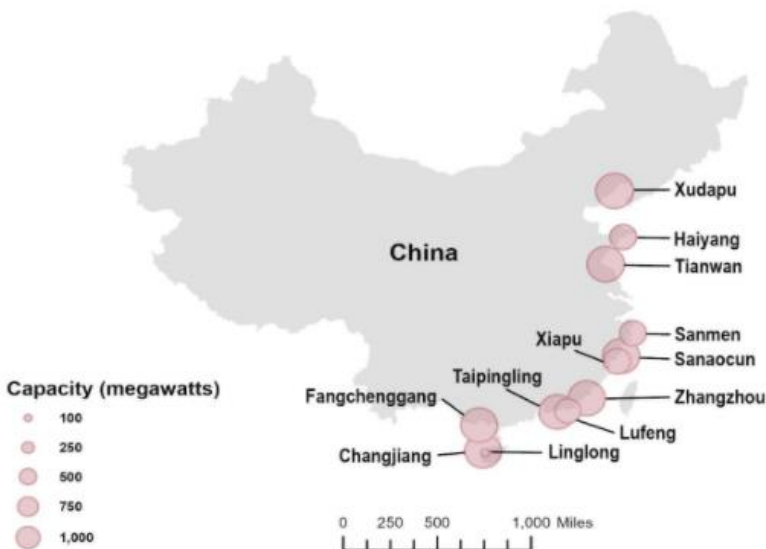
Operational nuclear power capacity in China, as of April 2024



China's nuclear fleet is concentrated near population centers in the eastern part of the country along the coast of the Pacific Ocean. Nuclear reactors are located from the Liaoning province in the north to the Hainan province in the south. The country's nuclear fleet consists mostly of pressurized water reactors (PWR), including the U.S. Westinghouse designed AP1000s, each with a capacity of 1,157 megawatts (MW), and the French Orano European Power Reactors, each with a capacity of 1,660 MW.

We estimate that the 23 reactors currently under construction in China will add about 23.7 GW to China's existing nuclear power capacity over the next decade. The reactor unit designs are mostly PWR. China is also building a Linglong-1 ACP100 reactor, a domestically designed small modular reactor based on AP1000 technology.

Nuclear power plants under construction in China, as of April 2024



EIA  
<http://www.eia.gov/>

# ***WORLD POWER SYSTEMS REVIEW***

***15 May 2024***

**8 May 2024**

## **Biden-Harris Administration announces initial list of high-priority areas for accelerated transmission expansion**

In a continued effort to expedite the build out of a resilient and reliable electric grid, today the U.S. Department of Energy (DOE) released a preliminary list of 10 potential National Interest Electric Transmission Corridors (NIETCs) to accelerate the development of transmission projects in areas that present an urgent need for expanded transmission. DOE also announced minimum eligibility criteria for direct loans under the Transmission Facility Financing (TFF) program. Supported by President Biden's Investing in America agenda, the TFF program can finance the development of billions of dollars of transmission projects in designated NIETCs. DOE is now seeking public input on both the preliminary list of potential NIETCs and the TFF program application and evaluation process.

"At more than a century old, our power grid is showing its age, leaving American consumers to bear the costs of maintaining it with frequent and longer power outages from extreme weather," said U.S. Secretary of Energy Jennifer M. Granholm. "The Biden-Harris Administration is leveraging every tool to expand transmission and deploy more reliable, affordable, and clean power in every pocket of the nation."

"In order to reach our clean energy and climate goals, we've got to build out transmission as fast as possible to get clean power from where it's produced to where it's needed," said John Podesta, Senior Advisor to the President for International Climate Policy. "As today's announcements demonstrate, the Biden-Harris administration is committed to using every tool at our disposal to accelerate progress on transmission permitting and financing and build a clean energy future."

"President Biden's leadership has sparked an unprecedented expansion in American manufacturing and clean energy, and we are building out the nation's power grid to keep pace with this historic growth," said Assistant to the President and National Climate Advisor Ali Zaidi. "Thanks to the President's vision, the United States is projected to build more new electric generation capacity this year than we have in two decades – and 96 percent of that will be clean. Building on last month's launch of a public-private mobilization to expand the capacity of the existing U.S. transmission network, upgrading 100,000 miles of power line, this step forward on corridors is the latest way the Biden-Harris Administration is accelerating grid expansion to deliver reliable, affordable power across the country. This is how we win the future, by harnessing new technologies to grow our economy, create hundreds of thousands of good-paying jobs, and protect the planet for generations to come."

### **National Interest Electric Transmission Corridors**

The President's Bipartisan Infrastructure Law amended the Federal Power Act to clarify the Secretary of Energy's ability to designate any geographic area as a NIETC if it is determined that consumers are harmed, now or in the future, by a lack of transmission in the area and that the development of new transmission would advance important national interests for that region, such as increased reliability and reduced consumer costs.

A NIETC designation unlocks critical federal financing and permitting tools to spur transmission development, including direct loans through the TFF program, public-private partnerships through the Transmission Facilitation Program, and Federal siting and permitting authority of the Federal Energy Regulatory Commission (FERC) in certain limited circumstances. Developers and state and local siting authorities may also be able to leverage the environmental analysis conducted by DOE as part of the NIETC designation process to complete local siting and permitting processes, which could ultimately accelerate siting and permitting for transmission projects in these targeted, high-priority areas.

# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

DOE released final guidance on NIETC designation in December 2023, and initiated a four-phase process by inviting interested parties to suggest specific geographic areas where a NIETC designation may be particularly helpful in advancing transmission to meet significant regional need. After independent analysis and review of public input, DOE's preliminary list of potential NIETCs includes 10 narrow geographic areas spanning nine of the regions identified by DOE's 2023 National Transmission Needs Study.

The potential NIETCs:

- Include one or more potential transmission projects currently under development whose deployment could be accelerated by the tools unlocked by NIETC designation.
- Range in width from less than one mile to near 100 miles and in length from 12 to 780 miles.
- Often parallel existing rights of way such as state highways and high-voltage transmission lines.
- Have the potential to facilitate the integration of renewable energy resources such as wind and solar, including offshore wind generation in the Atlantic Ocean.
- Present the opportunity to increase transmission capacity between the Eastern and Western Interconnections--two otherwise largely disconnected grids.

The preliminary list includes maps of each potential NIETC. The maps should be viewed as rough approximations. The geographic boundaries of any potential NIETC that continues in the designation process may ultimately differ from what is presented in the preliminary list. Today's announcement is not designating any final NIETC.

Today's announcement initiates Phase 2 of the NIETC designation process, including opening a 45-day window for public comments on the geographic boundaries and potential impacts of NIETC designation on environmental, community, and other resources. For example, interested parties may provide information such as the location of wetlands, recreation areas, historic properties, residences, businesses, abandoned mines, and/or croplands.

Following Phase 2, DOE will prioritize which potential NIETCs move from the preliminary list to Phase 3, during which DOE will draft NIETC designation reports, conduct environmental reviews, proceed with government-to-government consultation with any impacted Tribal Nations as appropriate, and engage in robust public engagement. DOE anticipates announcing the narrowed list of potential NIETCs and initiating Phase 3 in the fall of 2024.

**Transmission Facility Financing Program**

The TFF program provides direct loans for eligible transmission projects within a NIETC. The Inflation Reduction Act appropriated \$2 billion which may cover the credit subsidy cost of those loans, unlocking billions in total loan volume under the program. DOE is currently seeking public input on the scope of eligible projects and project financing requirements, including feedback from utilities and project developers that are interested in seeking direct loan support through the program for a specific project in or near one of the potential NIETCs.

**DOE**

<http://www.energy.gov/>

**9 May 2024**

## **India projects biggest power shortfall in 14 years in June**

India is projecting its biggest power shortfall in 14 years in June after a slump in hydropower generation, its government told Reuters, and is racing to avoid outages by deferring planned plant maintenance and re-opening idled units. The deficit also follows

# WORLD POWER SYSTEMS REVIEW

15 May 2024

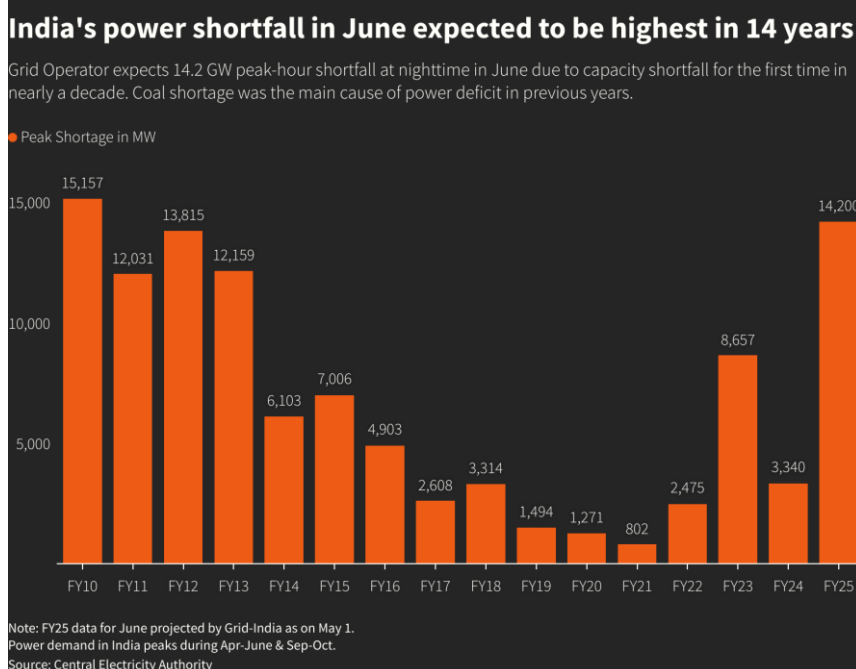
delays, a government source said, in the commissioning of 3.6 gigawatts (GW) of new coal-fired plants which had been targeted to be operational before March.

A peak shortage of 14 GW is forecast in June during nighttime hours, when solar capacity is offline, the Central Electricity Authority, the country's planning body for the power sector, told Reuters in a statement. "The planning process relies on worst-case scenarios," it said. The gap is the widest since 2009-10, according to publicly available government data. India's hydroelectricity output fell at the steepest pace in four decades in the year ended March 31, while renewable energy generation was flat.

Power Minister R K Singh held an emergency meeting last week to take stock of the situation, and decided to defer shutting down power plants for planned maintenance during June and revive 5 GW of idled coal plant capacity, two separate government sources present in the meeting said. "All efforts have been made to maximise generation, and with the measures in place it is expected that the power demand would be adequately met during the day and the non-solar hours in the coming months including June 2024," the statement said.

Grid administrator Grid-India projects maximum night-time demand of 235 GW in June, the statement said. On the supply side, nearly 187 GW of thermal capacity is available, and about 34 GW from renewable sources, according to government sources. The figures on power demand and capacity projections have not been previously reported. The power ministry last month invoked emergency rights for the first time to direct gas-based and imported coal-based power plants to operate at full capacity.

India has long defended use of coal, but Prime Minister Narendra Modi's administration had slowed capacity growth based on the heavily polluting fuel to focus on the green energy transition, with an eye to meeting 2070 net zero emission goals.



Plans to set up new coal power plants in the country, which is under pressure from rich economies to stop coal use, gathered momentum last year, but they will take a minimum of four years to start generation. Existing coal-fired power plants and solar plants will help the nation meet its electricity demand during daytime hours, one of the government sources said.

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

# **WORLD POWER SYSTEMS REVIEW**

**15 May 2024**

**9 May 2024**

## **Two Major Grid Operators Embark on Joint Planning Endeavor To Enhance Reliability**

PJM Interconnection and the Midcontinent Independent System Operator (MISO) announced today that the organizations will collaborate on an informational interregional transfer capability study, set to be performed during the second half of 2024.

Increasing transfer capability between regions may help to support greater grid resilience, particularly following extreme weather events and the influx of renewable generation resources with intermittent output.

Driven by input received by each organization from the Organization of PJM States (OPSI), the Organization of MISO States (OMS) and the Midwestern Governors Association (MGA), the study will identify potential opportunities for near-term transmission enhancements along the seam shared by PJM and MISO. “PJM looks forward to embarking on this study process with MISO as a path to increased coordination,” said Paul McGlynn, PJM Vice President – Planning. “Ensuring a reliable energy transition requires greater interdependence among regions and careful planning. Advancing this enhanced effort will benefit electricity consumers in each region.”

“MISO and PJM have a long history of working together to address operational and planning challenges in our regions,” said Aubrey Johnson, Vice President System Planning and Competitive Transmission at MISO. “As we continue to focus on our Reliability Imperative efforts, we understand the need to explore interregional planning, and with encouragement from OPSI, OMS and MGA, we will conduct a study that will address both near-term needs and create a model for future studies.”

Specifically, PJM and MISO will work together to explore opportunities to:

- Engage in joint transmission analysis and coordinated modeling
- Leverage planning processes to promote reliability and resiliency through holistic, efficient and cost-effective transmission planning for ratepayers

After the study’s conclusion in early 2025, both grid operators will share their findings with the Interregional Planning Stakeholder Advisory Committee, an organization established by PJM and MISO to review coordinated system planning activities with all stakeholder groups.

**MISO**

<http://www.misoenergy.org/>

**13 May 2024**

## **New seabed batteries could provide cheaper energy storage**

Energy storage company BaroMar is preparing to test a new kind of grid-level energy storage that relies on water to function. If it works, it will be a cheaper way to stabilize renewable energy over longer periods of time.

The world is gradually moving towards zero-carbon energy options, but the road ahead is not a straightforward one. To achieve net-zero emissions by 2050, around 80 percent of the world’s electricity will have to come from options like solar and wind power. For some, the prospect of moving towards zero-carbon grids may seem impossible – but some countries, like Portugal, Denmark, and Namibia are already doing so. However, to be applicable to everyone, new ways of storing and releasing energy produced from these new technologies will need to be improved to keep up with demand. These demands will vary depending on location – some may need almost constant supply, even on overcast days, while others may experience peaks and troughs throughout the day.

At the same time, energy will need to be stored for (forgive the pun) the rainy days of winter or other seasonal low points where wind power may not make up for the loss of solar

# ***WORLD POWER SYSTEMS REVIEW***

***15 May 2024***

power. This is where BaroMar's new compressed air energy storage (CAES) alternative may come in handy. The technology for CAES has been around for about 40 years and is known to be quite a good cost-effective way to store energy and to ensure that the grid remains stable. Traditionally, the process involves compressing and storing ambient air under pressure in underground reservoirs, like caves or old salt mines. When energy is needed, it can be released using turbines that drive a generator to recover it. BaroMar believes their alternative approach can outperform this older method and store energy for long-durations using low-tech equipment.

The answer is water. The company plans to set up plants near coastlines with access to deep water, the pressure from which will replace the high-pressure tanks used in traditional CAES. This approach is much cheaper.

So rather than imagining slick sophisticated tanks of pressurized air, imagine large concrete and steel tanks weighed down by cages filled with rocks. These would be submerged at around 200-700 meters (650-2,300 feet). Each tank has water-permeable valves that fill them with seawater, at least to start with. Then, when energy needs to be stored, the nearby compressor and generator (which is on land) feed air down into the tanks through a hose at around 20-70 bar (290-1,015 psi), depending on the depth. As the air enters the tanks, it forces water out.

Then, when energy needs to be extracted, the air is allowed to return up the hose where it powers a thermal recovery system and then a turbo expander, driving a generator.

Back at the sea floor, the tanks fill back up with water and await further use. This system, especially the tanks, is said to be significantly cheaper to produce because the pressure from the seawater acts as a stabilizer.

"The tanks are designed to resist loads imposed by the marine environment as well as the compressed air and hydrostatic water pressure, during both installation and operational conditions," a spokesperson for Jacobs, who has teamed up with BaroMar, explained to CleanTechnica. Jacobs is preparing a pilot project for the new system to be installed in Cyprus with the target of reaching a round-trip efficiency - the combined loss of energy added to and withdrawn from an energy store - of around 70 percent. If achieved, this would be around the same efficiency as the world's largest traditional CAES station in China.

However, this water-based pilot project will not be able to achieve the level of energy stored at the Chinese plants. It will initially store around 4 MWh (compared to the 100-MW, 400 MW/h capacity in Zhangjiakou, China). Despite its promises, there will be challenges ahead. These relate to anything designed to exist underwater for decades, which require extensive feasibility studies, geophysical research, and geotechnological and bathymetric surveying to make sure the tanks can be built and can operate at great depths.

Still, if BaroMar's claims are correct, this new system would be extremely appealing to many cities across the world and could represent a far cheaper and easily scalable solution. Let's see how they get on.

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