

Electricity Transmission in the US Report

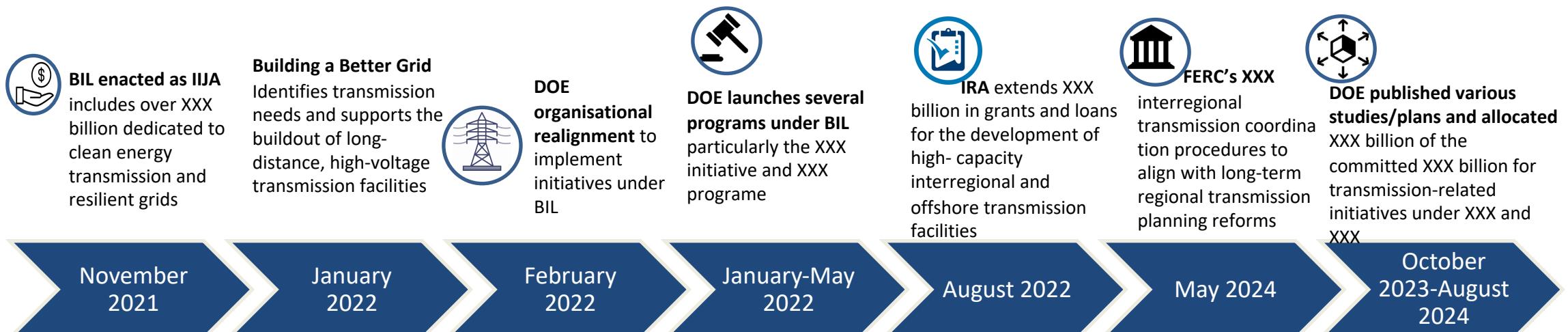
September 2024

Prepared by:

Global **Transmission** Report

Overview

- In 2021, the Biden Administration set ambitious climate goals of reaching 100% carbon-free electricity by 2035 and net-zero emissions by 2050. This put the spotlight on the urgent need for rebuilding and modernising the ageing electricity transmission grid, which is considered critical for integrating large-scale renewable energy projects.
- To support these goals, the **Bipartisan Infrastructure Law (BIL)**, enacted as the **Infrastructure Investment and Jobs Act (IIJA)** in November 2021, allocated substantial funding for grid modernisation. In early 2022, the **DOE** launched the “**Building a Better Grid**” initiative to drive the development of new high-capacity transmission lines across the country. Several DOE programs followed, implementing key provisions of the law.
- In August 2022, the **XXX billion Inflation Reduction Act (IRA)** was passed, offering **XXXX billion** in grants and loans to support interregional and offshore transmission projects.
- The **DOE** has also published important studies, including the **XXXX** and the **XXX**. It also released the final **XXX rule in XXX 2024** to improve federal environmental reviews and permitting processes.
- In May 2024, **FERC** issued **Order 1920**, aimed at improving grid efficiency, reliability, and affordability through enhanced regional transmission planning and fairer cost allocation.
- As of August 2024, **XXX** of the committed **XXX** under the BIL and IRA has been allocated for transmission-related initiatives.



SPP

- Service areas:** 14 states (~552,885 square miles)
- Installed capacity:** XXX MW (accredited capacity)



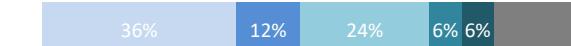
- Transmission network:** XXX miles (XXX km)
- Total members:** 107 (including 13 independent transmission companies)
- Key utilities:** Duke-American Transmission Company, GridLiance High Pains LLC, ITC Great Plains, NextEra Energy Transmission, and Transource

Western Non RTO/ISO region

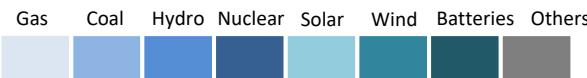
- Northwest Non-RTO/ISO Region:** Washington, Oregon, and Montana (parts outside CAISO/SPP, MISO), along with Idaho
- Southwest Non-RTO/ISO Region:** Arizona, Nevada (parts outside CAISO), New Mexico (parts outside SPP's WEIS), Utah

California ISO

- Service areas:** 80% of California's and a small part of Nevada's grid (132,000 square miles)
- Installed capacity:** XXX MW



- Transmission network:** XXX circuit miles or XXX circuit km (ckm)
- Total members:** 400 [including utilities, generators, energy marketers, and load-serving entities (LSEs)]
- Key utilities:** LS Power, GridLiance West, San Diego Gas & Electric Company, Southern California Edison Company, and DCR Transmission

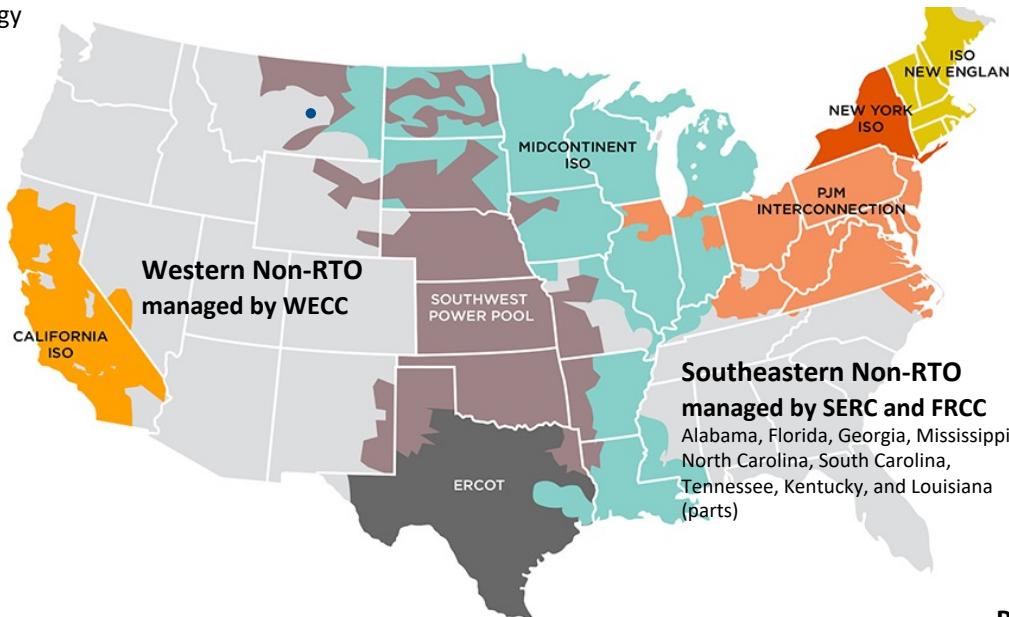


MISO

- Service areas:** 15 states (more than 1 million square miles)
- Installed capacity:** XXX GW



- Transmission network:** XXX miles (XXX km)
- Total members:** 197 (including 54 TSOs and 143 non-TSOs)
- Key utilities:** AEP Indiana Michigan, Ameren, Entergy, ITC Midwest, and, MidAmerican Energy



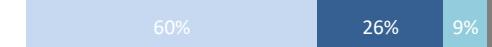
ERCOT

- Service areas:** Texas (200,000 square miles)
- Installed capacity:** XXX MW (represents operational capacity)
- Transmission network:** XXX miles (XXX km)
- Total members:** 300 (including 40-50 T&D providers)
- Key utilities:** AEP Texas, Centerpoint Energy, Cross Texas, Entergy, and LCRA Transmission Services



ISO New England

- Service areas:** New England state (~71,000 square miles)
- Installed capacity:** XXX MW



- Transmission network:** XXX miles (XXX km)
- Total members:** 272 [including 8 transmission owners]
- Key utilities:** Eversource; New England Power; Versant Power; Vermont Power; and Central Maine Power

New York ISO

- Service areas:** New York state (~54,556 square miles)
- Installed capacity:** XXX MW



- Transmission network:** XXX miles (XXX km)
- Total members:** 143 [including 6 transmission owners]
- Key utilities:** Central Hudson Gas & Electric Corp, Consolidated Edison Company of NY, National Grid, New York State Electric & Gas, and Orange & Rockland Utilities

PJM Interconnection

- Service areas:** 13 states (369,000 square miles)
- Installed capacity:** XXX MW



- Transmission network:** XXX miles (XXX km)
- Total members:** 1,105 (including 50 TSOs)
- Key utilities:** AEP, FirstEnergy, PECO Energy, PPL Electric Utilities, and NextEra Energy

Growth in transmission line length (1/2)

- At the end of 2023, the US high-voltage transmission network spans an estimated XXX circuit km. Transmission lines operating at 100 kV and above have witnessed a slow growth of 0.21% since 2017.
- Between 2017 and 2023, about XXX circuit km were added to the network, reflecting a slow pace of growth. Utilities have prioritized investments in upgrading existing infrastructure over constructing new transmission lines.
- Another key factor for slow network expansion is the extensive regulatory framework governing the construction of new transmission infrastructure. Utilities frequently encounter a complex approval process, resulting in substantial delays in the construction of new lines.

Figure 1: Growth in transmission line length, 2017–23 (circuit km)

CAGR (2017-21) = XXX%

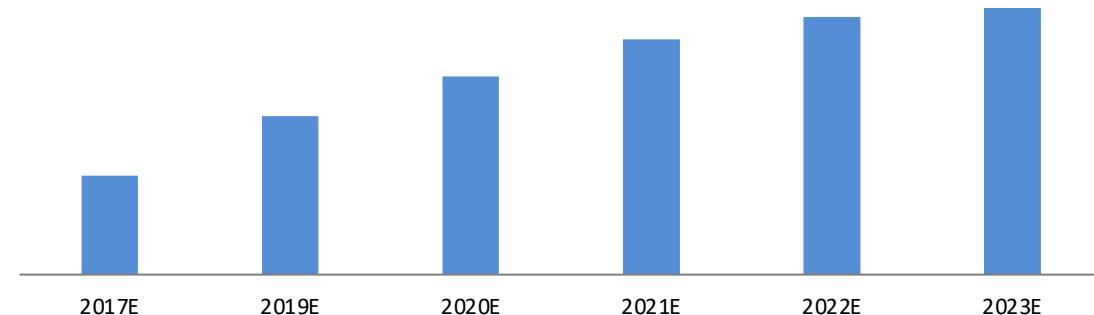
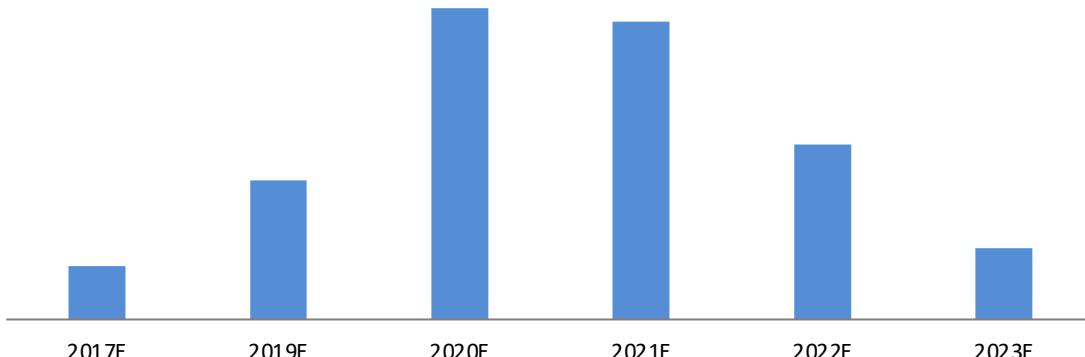


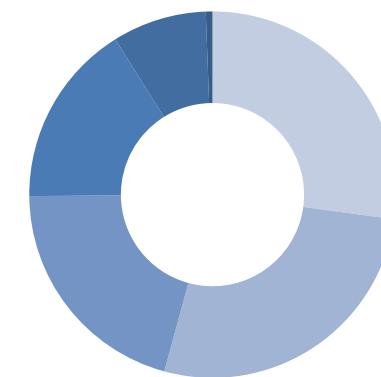
Figure 2: Addition in transmission network, 2017–23 (circuit km)



Note: XXX

Source: FERC's monthly Energy Infrastructure Update; Global Transmission Research's High-Voltage Projects Database

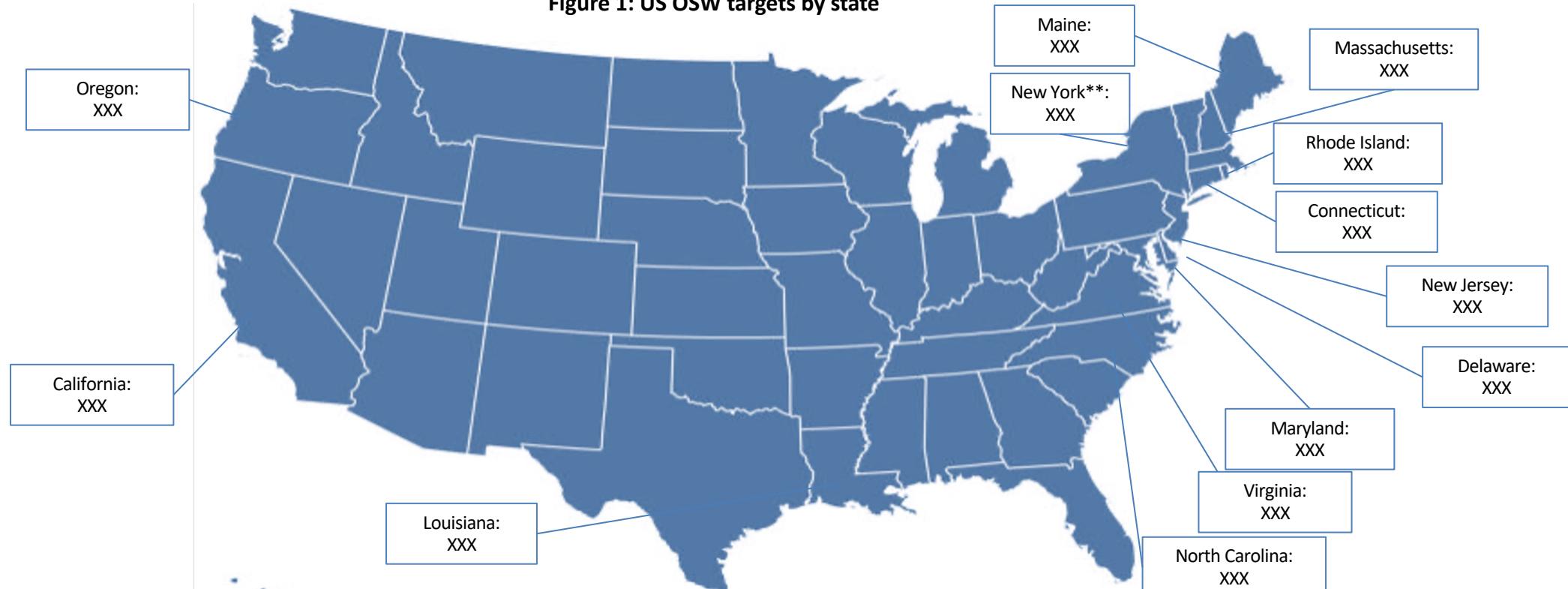
Figure 3: Voltage-wise break up, 2023 (%)



OSW targets by state

- At the state level, nine Eastern states have set ambitious OSW targets of over XXX GW by 2040. As of September 2024, three commercial-scale OSW projects are operational –Block Island Wind Farm in Rhode Island, South Fork Wind in New York and XXX MW of the Vineyard Wind in Massachusetts.
- Virginia, Massachusetts and New Jersey are advancing their projects, with significant developments underway. Delaware is expected to legislate XXX GW of OSW procurement.
- The West Coast is emerging as a critical player in the US OSW industry. California aims to generate 25 GW of OSW energy by 2045. BOEM has already awarded five lease areas for the development of floating OSW in California. It is expected to hold an auction for two lease areas in Oregon in October 2024.
- Louisiana aims to achieve XXX GW of OSW capacity by 2035 in the Gulf of Mexico. In August 2023, BOEM conducted the first OSW auction for the Gulf, with additional auctions planned for 2024, 2025, and 2027.

Figure 1: US OSW targets by state



Note: *As of the Climate Action Plan of 2022 which is yet to be legislated. **Senate Bill S6327A seeks to increase the target to 20 GW by 2050. ***Yet to be signed into a law.

Source: DOE, Global Transmission Research

BOEM's initiatives for OSW deployment

- BOEM, under the DOI, is the lead federal agency responsible for OSW energy development. It approves commercial-scale OSW projects and holds auctions for the OSW projects. BOEM's leasing process involves public consultations, environmental assessments, and competitive auctions. After the award of the lease, it is also responsible for the approval of the site assessment plan (SAP) and the construction and operation plan (COP). The lessee is required to submit the SAP or a combined SAP and COP within 12 months of securing the lease. As part of the COP, the lessee must request one or more easements to install cables, pipelines, and other appurtenances on the OCS necessary to transmit the power to shore. Once the BOEM approves the COP, the developer is granted a 25-year commercial lease with a possibility of renewal beyond the initial 25 years.
- As of August 2024, BOEM has awarded XXX leases across XXX OSW competitive lease sales: XXX in the Atlantic, XXX in the Pacific, and XXX in the Gulf of Mexico, covering a total of XXX acres, having a potential for XXX GW installation capacity, and yielding USDXXX billion in total cash bids. It has initiated new leasing activities for OSW projects, expanding development areas to regions like the Central Atlantic and Gulf of Mexico. As of September 2024, BOEM has approved the construction of XXX OSW projects with more than XXX GW capacity.
- In April 2024, DOI finalised new regulations to modernise offshore renewable energy development, streamlining processes and reducing project costs over the next 20 years. The updates included improving certification processes and clarifying safety management systems, aiming to make OSW projects more efficient and cost-effective.

Projects that have already received COP from BOEM (up to September 2024)



Figure 2: BOEM's lease sales, by acres leased (%)

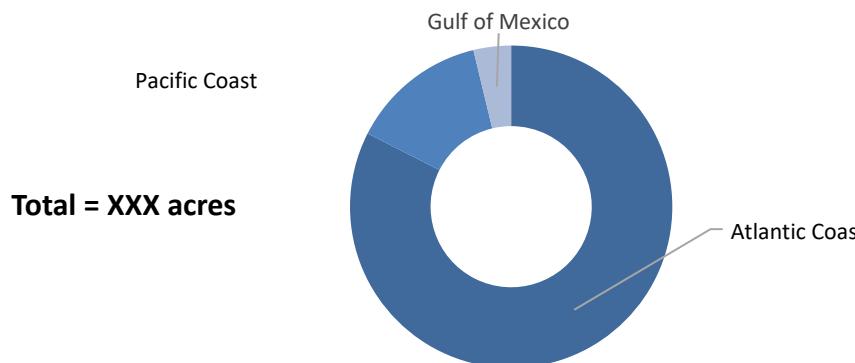
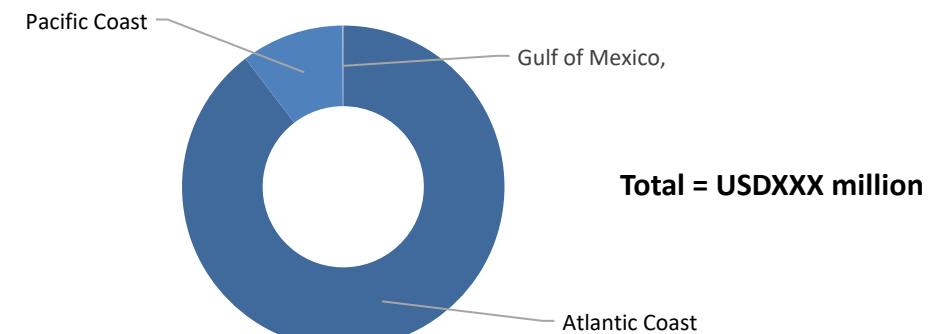


Figure 3: BOEM's lease sales, by total cash bid (%)

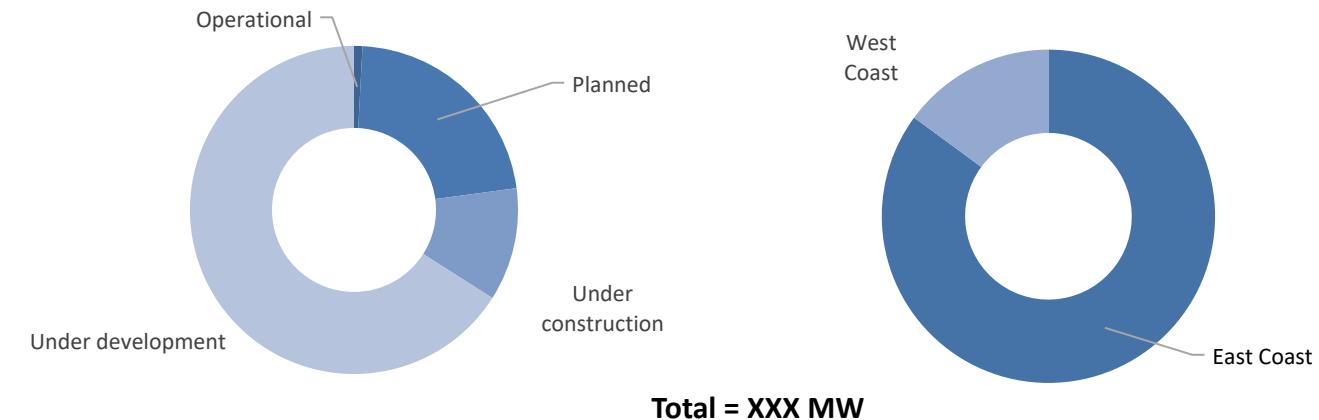


Note: * South Fork Wind and 136 MW of Vineyard Wind 1 and projects have been commissioned
 Source: DOE; Global Transmission Research

OSW capacity and transmission projects (1/3)

- As of **September 2024**, Global Transmission Report has tracked **XXX OSW projects** with a total capacity of **XXX GW**. Of these, **XXX projects** (three commercial and one pilot) with a combined capacity of **XXX MW** are currently operational.
- Of the remaining **XXX GW** of upcoming projects, the majority—**XXX GW**—are concentrated on the **East Coast**, while **XXX GW** are planned for the **West Coast**.
- Most of these projects, **XXX GW**, are under development, progressing through various stages of contracting, permitting, and site assessments. An additional **XXX GW** are planned, and **XXX GW** are already under construction.

Figure 5: OSW capacity in the US



However, the US OSW industry has faced some setbacks, with several high-profile projects being cancelled due to economic pressures and supply chain disruptions.

- 1.26 GW Empire Wind 2**, off the coast of New York, was cancelled by Equinor and BP in January 2024. The project was terminated due to inflation, rising interest rates, and supply chain disruptions affecting the overall feasibility.
- 966 MW Skipjack Wind**, an OSW project off the coast of New York, being developed by Ørsted, was removed from the developer's portfolio in December 2023. The project was cancelled due to increased supplier delays, rising US interest rates, and growing opposition from local communities.
- Ocean Wind I and II**, 2.25 GW OSW projects off the coast of New Jersey, were scrapped by Ørsted in November 2023. The projects were canceled because of supply chain issues and increased interest rates, which deteriorated the business case.
- Park City Wind**, an 804 MW OSW project in Massachusetts, was terminated by Avangrid and Connecticut utilities in October 2023. The decision was made after the developer concluded that economic conditions made the project unfinanceable.
- 1.2 GW South Coast Wind**, developed by Shell and Ocean Winds off the coast of Massachusetts and Rhode Island, was cancelled in August 2023 after the developer backed out of its PPAs. The project was deemed no longer financially viable due to inflation, higher interest rates, and supply chain constraints.
- 2 GW Revolution Wind 2 (formerly Bay State Wind)**, an OSW project off Rhode Island and Massachusetts, was cancelled when Rhode Island Energy pulled out of its PPA in July 2023. The utility cited higher expenses and uneconomical contract costs as the primary reasons for the project's cancellation.
- 1.23 GW Commonwealth Wind**, another OSW project in Massachusetts, was cancelled by Avangrid in July 2023. The cancellation was due to economic conditions, including supply chain disruptions, inflation, rising interest rates, and increased costs for wind equipment.

OSW capacity and transmission projects (1/2)

Table 4: Key upcoming OSW projects

Project Name	Installed capacity (MW)	Developer(s)	Distance from shore (km)	Status	Expected year of completion	Recipient state(s)
Atlantic Shores Bight	XXX	EDF, Shell	XXX	XXX	XXX	NA
Atlantic Shores North	XXX	EDF, Shell	XXX	XXX	XXX	New Jersey
Atlantic Shores South 1	XXX	EDF, Shell	XXX	XXX	XXX	New Jersey
Atlantic Shores South 2	XXX	EDF, Shell	XXX	XXX	XXX	New Jersey
Atlas Wind	XXX	Equinor	XXX	XXX	XXX	California
Attentive Energy Two	XXX	TotalEnergies, RL&P, Corio Generation	XXX	XXX	XXX	New Jersey
Beacon Wind 1	XXX	British Petroleum (BP)	XXX	XXX	XXX	NA
Beacon Wind 2	XXX	British Petroleum (BP)	XXX	XXX	XXX	NA
Block Island Wind Farm	XXX	Ørsted	XXX	XXX	XXX	Rhode Island
Bluepoint Wind	XXX	EDPR, Engie, GIP	XXX	XXX	XXX	NA
CADEMO	XXX	Floventis Energy	XXX	XXX	XXX	California
Cajun Wind	XXX	Vestus	XXX	XXX	XXX	Louisiana
California North Floating	XXX	California North Floating	XXX	XXX	XXX	California
Canopy Offshore Wind Farm	XXX	RWE	XXX	XXX	XXX	California
Coastal Virginia Offshore Wind	XXX	Dominion Energy	XXX	XXX	XXX	Virginia
Coastal Virginia Offshore Wind - Pilot	XXX	Dominion Energy	XXX	XXX	XXX	Virginia
Duke Energy Carolina Long Bay	XXX	Duke Energy Renewable	XXX	XXX	XXX	North Carolina

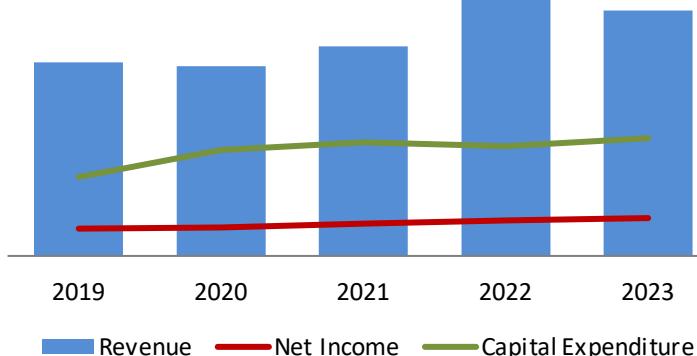
Note: *Represents transmission line length data; transmission line length data has been converted to km; NA – not available

Source: BOEM, Offshore Wind Power Hub, Global Transmission Research

Key facts

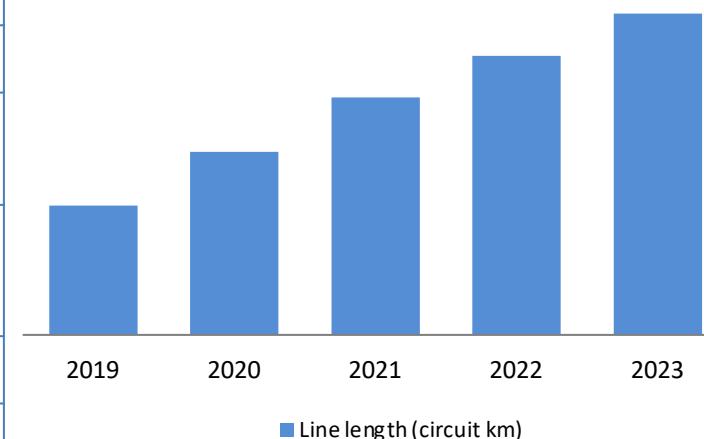
Headquarters	Missouri, US
Service area	Illinois and Missouri
Key affiliates and subsidiaries	Ameren Missouri, Ameren Illinois and Ameren Transmission Company of Illinois (ATXI)
Areas of business	Electricity generation, transmission and distribution; Gas distribution (Integrated energy utility)
Ownership	Investor-owned
Voltage level	69 kV–345 kV

Key financial indicators (USD million)

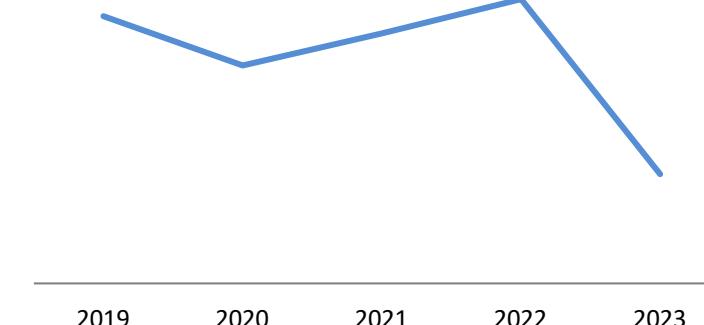


Note: XXX
Source: Ameren Corporation

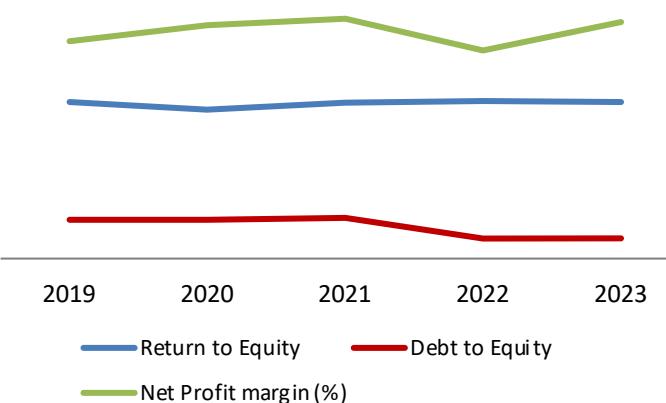
Growth in transmission network



Annual distributed electricity (TWh)



Key financial ratios



Planned capital expenditure, 2024–28 (USD million)

	2024	2025–28
Ameren Missouri	XXX	XXX
Ameren Illinois	XXX	XXX
ATXI	XXX	XXX
Total	XXX	XXX

Project pipeline analysis, by type of project

- Around XXX of the XXX% tracked projects (for which type of line data is available) will be set up as new build projects. This translates into a new build project length of XXX circuit km.
- Rebuild projects account for XXX% of the total tracked projects, totaling XXX circuit km of length.
- This is followed by a XXX% share of uprate projects for a line-length of 3,209 circuit km.
- Upgrade projects account for the remaining XXX% of the projects, totaling XXX circuit km.

Table 3: Projects by type of project in the report

	Number of projects	Total line length (ckm)
New build	XXX	XXX
Rebuild	XXX	XXX
Upgrade	XXX	XXX
Uprate	XXX	XXX
Total	XXX	XXX

Note: XXX

Source: Global Transmission Research

Figure 5: Projects by type of project (number of projects)

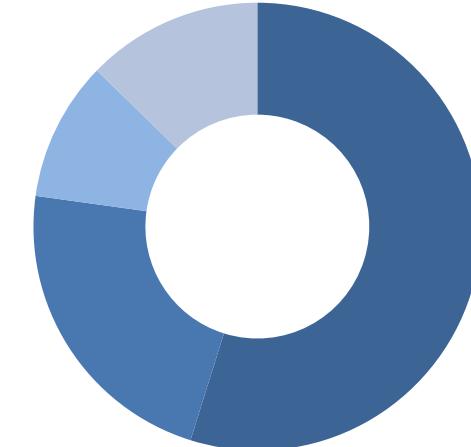


Figure 6: Projects by type of project (line length, circuit km)

