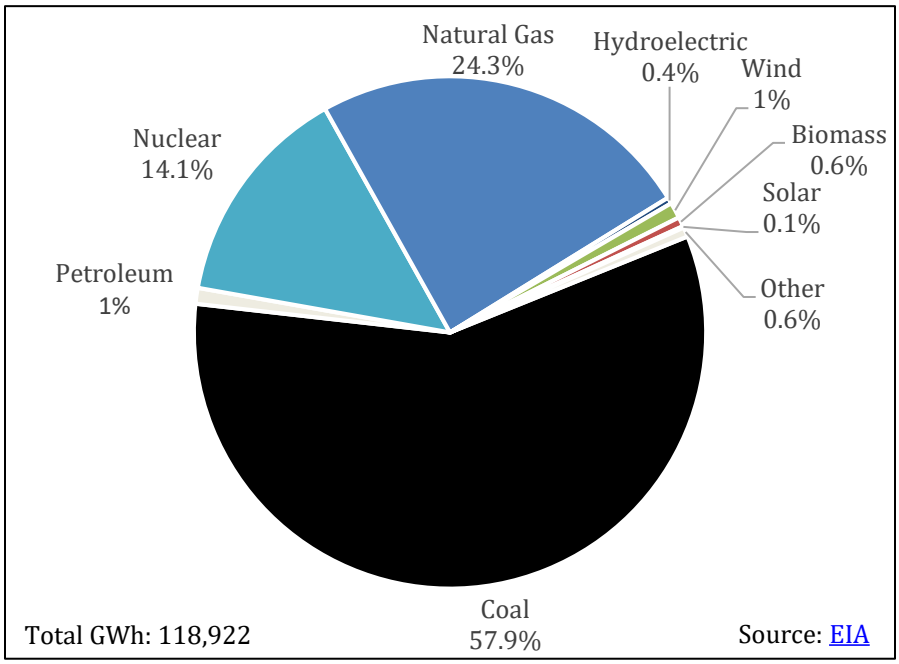
State Brief: Ohio

BACKGROUND

Ohio is the nation's 13th largest coal-producing state, shipping two-fifths of the coal mined in state out to other states by barge, truck, and rail. High demand, especially by the state's electric sector, requires that the state also import coal, primarily from neighboring states. In 2017, in-state natural gas production was 21 times greater than in 2012, and electric sector use was eight times greater than in 2008.

Ohio's Electricity Mix 2016



Ohio has the fourth-largest interstate system in the U.S., and transportation is the second largest consumer of energy in the state.

Renewable energy resources supply about 2.5 percent of Ohio's net electricity generation. The Buckeye State had 37 wind projects, with a combined capacity of 617 megawatts (MW), online by 2017. An additional 275 MW was under construction. Ohio's renewable portfolio standard (RPS) requires that the state's electric distribution utilities and electric service companies meet a 12.5% renewable energy target by 2027.

The Public Utilities Commission of Ohio (PUCO) regulates the state's electric and natural gas utilities. Bipartisan by law, the PUCO's five commissioners are appointed to a term of five years by the Governor. Ohio is currently under unified control with Republican majorities in both the House and Senate. Republican Governor John Kasich was elected in 2011.

In April 2018, the PUCO approved American Electric Power's (AEP) Electric Security Plan (ESP). The ESP Allocates over $20 million for an electric vehicle (EV) charging station program and for one or more microgrid projects. In addition, the ESP requires that AEP will build or enter into power purchase agreements (PPAs) for 900 MW of wind and solar. As of April 2018, Columbus was approximately halfway to its goal of raising $1 billion by 2020 to fund its 'smart-city initiative.' The city is using a $40 million grant from the Department of Energy to modernize its transportation network. AEP will spend approximately $200 million to modernize its grid and equip nearly 900,000 homes with smart meters. Honda and Ohio State University are collaborating to build an autonomous-vehicle test ground.

POLICY STRENGTHS AND OPPORTUNITIES[1]

The National Renewable Energy Laboratory (NREL) developed the notion of "policy stacking,"[2] an important framework for policymakers to consider. The basic idea behind policy stacking is that there is an interdependency and sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

[1] For more information on policy opportunities, please visit the SPOT for Clean Energy. For more information on specific policy actions related to these opportunities, please review the *Clean Energy Policy Guide for State Legislatures*.

[2] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. http://www.nrel.gov/docs/fy13osti/56428.pdf.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, market preparation policies, remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, market creation policies, create a market and/or signal state support for clean energy technologies. Tier 3, market expansion policies, create incentives and other programs in order to expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

For example, before financial incentives for combined heat and power (CHP) will be successful, two key considerations for deployment are having clear interconnection standards and favorable stand-by rates for customers who opt to add CHP. In this example, states should adopt policies to address interconnection and stand-by rates before adopting financial incentive programs.

GRID MODERNIZATION

Policymakers can view grid modernization as creating a policy structure that supports and ties together many other initiatives, such as smart metering infrastructure, customer data management, energy storage, electric vehicle infrastructure, and utility business models.

In the last two decades, new digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers. Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency. On the customer's side of the meter, advanced metering infrastructure, dynamic pricing, and other emerging technologies allow an exchange of information and electricity between a consumer and their electric provider.

According to the Grid Modernization Index, Ohio ranks 22nd overall for grid modernization efforts. Launched in April 2017, the PUCO's PowerForward proceeding is intended to "chart a path forward for future grid modernization projects, innovative regulations, and forward-thinking policies." The last phase of the proceeding, which examined potential changes in the state's regulatory framework and included discussions of distributed energy resources (DERs) like electric vehicles and energy storage, concluded in March 2018. PUCO Chairman Asim Haque expects that the commission will release a follow-up report outlining recommendations for utility business model reforms and changes to state law.

There are additional supportive policies that Ohio's policymakers could adopt to promote grid modernization.

1. Build upon the PowerForward proceeding by developing a grid modernization strategy through a stakeholder process. States may also decide to require that utilities propose a ten-year grid modernization plan within a specified timeframe. Legislation could require that plans address cybersecurity, integrating DERs (including EVs and energy storage), and demand response and/or demand-side management (DSM) programs. Policymakers might also consider requiring that these plans outline a clear set of grid modernization goals and that they describe methods to measure, report, verify, and enforce progress towards those goals. The state can also provide incentives or cost recovery mechanisms for utilities that meet grid modernization goals.

2. Develop new utility business models. Utility regulation varies, to some extent, by a state's utilities commission. Most Commissioners and commission staff, however, still adhere to the regulatory principles outlined when utility companies were vertically integrated; experiencing increases in load, and had the ability to capitalize on economies of scale for new generation. These "natural monopolies" warranted a state regulatory body that could balance the tradeoff between efficiency (in the form of least cost production) and equity (consumer protection). Many have argued recently that the regulated utility industry needs a new set of principles that are more sophisticated, forward-planning, and incentive-based. The state could build upon the PowerForward proceeding by continuing the investigation of alternative ratemaking mechanisms and utility business models for utilities to support grid modernization, which includes promoting improved system efficiency, increased penetration of DERs, and enhanced affordability, reliability, and customer satisfaction. The state might also investigate performance-based regulation.

3. Utilities in Ohio have taken the lead in smart meter deployment, and the PUCO's recent order approving AEP's gridSMART Phase 2 project will bring smart meters to an additional 894,000 customers. Ohio does not have clear state policies governing customer data access and privacy protections. To address this, policymakers could develop legislation or rules that, at minimum, do the following: clarify who owns the energy data associated with customer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data by third parties. AEP facilitates customer access to energy data through the Green Button Connect program, and the state could expand access to this program.

The adoption of incentives for or a requirement to integrate a certain amount of energy storage on the grid alongside enhancing renewable energy and electric vehicle policies would support modernization efforts and improve the chances of successful grid modernization.

ENERGY STORAGE

Energy storage offers a unique opportunity to dynamically manage supply and demand while maximizing the value of grid resources. By deploying storage in strategic locations, utilities can more effectively manage their energy portfolios. First, storage provides management of intermittent demand – helping to flatten peak demand requirements for the utility. Second, the responsiveness of energy storage can allow the utility to implement voltage regulation and other ancillary services, which are useful for improving system efficiency. Third, storage can dispatch power to better integrate intermittent resources like renewable energy. Finally, energy storage can help the commercial sector avoid costly demand charges. As utilities around the country consider extending demand charges to the residential sector, this will become an even more important issue.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to a number of economic and environmental gains.

Storage provides multiple benefits to both the customer and the utility. State planning and regulatory policies can help maximize these benefits by 1) establishing a framework for easy integration of energy storage into the grid and 2) establishing a marketplace that monetizes the benefits of energy storage for cost effective investment.

The April 2018 settlement leading to PUCO's order approving AEP's ESP includes a provision requiring that AEP assist Kroger and Walmart with DSM programs that utilize battery storage. Funding will be provided through AEP's energy efficiency and peak demand reduction plan. The Village of Minster is home to the nation's first municipal utility-owned solar-plus-storage project. Ohio currently does not have any polices to promote energy storage development. There are several opportunities for developing supportive state policies:

1. Amend existing interconnection policies to ensure that storage can connect to the grid through a transparent and simple process. The Interstate Renewable Energy Council (IREC) has produced a series of interconnection protocols that states can easily adopt. The state could establish best practices for interconnecting storage in statute, or legislation could provide an instruction to the PUC to update existing policy.

2. Instruct utilities to evaluate the value of energy storage in multiple strategic locations across the utility system and consider a requirement to deploy storage where it will be cost effective, or identify the price point at which it will become cost effective.

3. Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required that utilities evaluate the cost effectiveness of non-wires alternatives (NWAs) to large transmission and generation investments. Alternatively, states might want to require that utilities develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the greatest value.

4. Consider adding a mandatory energy storage procurement target or requirement for energy storage with a documented process for periodic review of progress towards that goal. Procurement targets can jump-start market creation, spur fast learning, and guide the development of a regulatory framework. Five states currently have energy storage goals that range from five megawatt hours (MWh) to two gigawatts (GW).

5. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment for storage. Incentives can be designed to decline as storage values become more readily monetized. Policymakers could allow utilities that provide incentives to customers to recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This should signal to customers the value of leveraging storage while better aligning customer costs with system costs. Financing energy storage installations for commercial customers would help reduce their demand charges. Policymakers might want to start first with a policy to incentivize solar system owners.

MAINSTREAMING RENEWABLES

As the renewable energy industry has matured, technology has improved, and global production of generating equipment has increased, renewable energy is increasingly seen as the least cost and lowest risk form of energy (excluding energy efficiency). A Bloomberg New Energy Finance report from this year predicts that at least 50% of total global electricity will be renewable by 2050. With increased deployment, utilities are learning more about how to integrate renewables effectively, investors are becoming more comfortable with the technologies, and building code officials are recognizing common standards and best practices. For these reasons, it is in the interests of policymakers to ensure that their states are well positioned to benefit from the transition to clean and sustainable energy resources.

To reduce barriers to customer and utility participation in the renewable energy market, Ohio might consider several policy options.

Customer-Oriented Policies

1. Interconnection, net metering, and streamlined permitting – In general, customers want a clear, streamlined, affordable, and predictable system for connecting renewable energy systems to the grid. To ensure this, Ohio's policymakers could consider requiring that utilities credit net excess generation at the customer's retail rate. Allowing aggregated net metering would be especially beneficial to the state's agricultural operations. Other applications for aggregated net metering include commercial properties and public entities like state and local governments, universities, and schools. The state might also consider establishing either statewide standards for streamlined permitting processes, or resources to support local governments that voluntarily implement a streamlined program, as Cleveland has done. State incentives, such as tax credits, financial incentives, or loans can be tied to systems that are established within a designated streamlined permitting jurisdiction.

2. Shared Renewables – Due to building and property attributes and ownership issues, many customers are unable to install renewable energy technologies. Allowing shared, or community, renewable energy projects addresses these barriers. These projects have multiple owners or subscribers who pay for a portion of the generation provided by the system. Consolidated Electric Cooperative's 100 kilowatt community solar array has been operational since 2016. To expand access to these types of projects, state policymakers might consider requiring that utilities contract a minimum capacity of shared renewables annually. Alternatively, legislation might direct the PUCO to develop a state-wide virtual net metering policy. Virtual net metering allows a customer to receive credits from a shared system as if the generation were on site. Virtual net metering is different from a power purchase agreement (PPA), which pays the customer for the proportion of power they produce. Because it is treated as a credit on the customer's bill, the customer can avoid the tax implications of a PPA payment - which can adversely affect the economics of the system (and may come as a surprise to the participant).

   Low credit ratings often deter participation in renewable energy markets; this can affect low- and moderate-income (LMI) households' adoption of renewable energy solutions. Supportive policies for shared renewables can be designed to encourage participation by LMI households; this can increase adoption of renewable technologies and reduce energy costs. Low-income participation can be encouraged either through a percentage

mandate for the overall annual contracted capacity, or by offering a higher rate of payment for the portion of shared solar capacity attributed to low-income customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program to provide recipients of assistance with participation in a shared renewable system.

There are several additional policy options that Ohio might consider to promote renewable energy uptake by low- and moderate-income consumers. Generally, successful state policies should be tailored to these customers, be cost-effective and financially sustainable, have measurable performance indicators, and be flexible enough to allow later changes in design.

3. Corporate Procurement – Many Fortune 100 and 500 companies have established either climate goals or commitments to purchase renewable energy. Ohio is home to facilities for 61% of the Fortune 500 companies and 73% of the Fortune 100 companies that have such goals. Procter & Gamble, headquartered in Cincinnati, recently set a goal of 100% renewable energy by 2030. In 2017, Facebook announced that it would locate a new data center in New Albany, citing access to renewable energy as critical to its decision. JPMorgan Chase is building a 20 MW on-site solar system at its Polaris Corporate Center in Columbus. This project is part of the company's commitment to source 100% of its energy from renewable resources by 2020. In January 2018, Amazon announced that Columbus was one of 20 finalists out of 238 cities in North America that originally bid for the company's HQ2 project. Amazon has a long-term goal to achieve 100% renewable energy usage globally. In just the last four years, over nine GW of renewable contracts have been announced by corporate entities nationwide. In the first quarter of 2018 alone, corporations signed 14 agreements for over 1700 MW of renewable energy. This is leading policymakers to provide additional avenues for businesses to procure renewable energy.

   Ohio's policy allows companies to purchase renewable energy credits (RECs), provides access to renewable energy through the retail and wholesale markets, and develop or lease onsite renewable energy projects. State policy could be updated to address the Corporate Renewable Energy Buyers' Principles and Ohio's policymakers might consider developing a statewide shared renewables policy to support corporate procurement. In addition, it is prudent to integrate corporate renewable purchase commitments into the long-term plans that utilities submit to regulators to plan for resource needs over multiple decades. By integrating these renewable purchase commitments into utilities' plans, regulators can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas emissions and increase investments in clean energy resources. States might see an emissions or clean peak standard as the next step in a progression from an RPS. AEP and FirstEnergy recently announced CO_2 reduction targets. AEP, after meeting its 2020 target, set a goal of reducing carbon emissions 80% below 2000 levels by 2050. In 2017, FirstEnergy said that it would reduce carbon emissions 90% below 2005 levels by 2045. Statewide, Ohio benefitted from a 37.7% reduction in power sector carbon emissions between 2005 and 2015. To support utility adoption of clean energy technologies, Ohio's policymakers might consider the following:

1. Emissions standards can take a technology neutral approach that looks at the total emissions of the utility portfolio and drive emissions down with a combination of renewables, traditional fuels, efficiency, and technological advances. Emissions reductions can be achieved through 1) a carbon portfolio standard approach, or 2) a market-based approach. A portfolio emissions standard sets emissions reduction targets to be achieved over time. This can be implemented through the IRP process or by establishing a maximum allowable rate of emissions per unit. Under a market-based approach, a state or a group of states might set a certain emissions reduction target, for example, 20% below 1990 levels by 2040. This reduction is achieved by the distribution of annual emission allowances that decrease to the point that the standard is met in 2040. One of the advantages of a market-based program is that it is designed to reduce emissions in the most economically efficient manner possible. Such a standard can also address other concerns such as pollution, asthma risk, environmental justice, and water use.

2. Clean Peak Standards aim to increase the share of clean energy resources used to meet peak demand and decrease energy bills over the long-term by reducing peak demand in the hours when energy costs are highest. These objectives can be met through different policy options including: planning and procurement that focuses on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units;

incentives – including carve-outs in states with RPSs – for clean energy resources delivered during peak times; and/or adopting a new clean peak standard that sets a target for clean energy deliveries during peak times.

ELECTRIFICATION OF THE TRANSPORTATION SECTOR

An estimated 55% of new car sales will be electric by 2040. Therefore, a key part of building a modernized grid involves designing infrastructure that will facilitate easy connection of EVs to the grid. One of the most important barriers to increased adoption of EVs is the consumer's awareness of the availability of EV charging stations. Ultimately, drivers want to be sure that their car will get them where they need to go. Another important barrier to increased adoption of EVs is their higher up-front cost as compared to similar conventionally fueled vehicles. The good news is that both supportive policies for developing charging infrastructure and technological advancements have eased "range anxiety."

Ohio's Development Services Agency's Alternative Fuel Transportation Program provides financial assistance to businesses, non-profits, school districts, and local governments for the purchase of alternative fueling infrastructure. After receiving a one-time verification inspection, EVs are exempt from state emissions inspections. In April 2018, the PUCO approved AEP's $10 million electric vehicle supply equipment (EVSE) program, which will fund the installation of 375 charging stations and rebates for home and workplace installations. Dayton Power and Light agreed to provide up to $1 million to fund charging stations. There are a number of opportunities to expand the market for EVs in Ohio:

1. EV and EVSE Financing and Financial Incentives – Providing additional financial incentives and innovative financing options can help spur greater market penetration of EVs. Sales, property, and income tax credits are some of the simplest methods for addressing high up-front costs of EVs and EVSE. While sales tax credits are typically applied at the time of purchase, property and income tax credits may do less to address upfront cost barriers as receipt of the credit is typically removed in time from the purchase.[3] States have adopted other financial incentives including low-interest loans, grants, vouchers and rebates. A handful of states qualify EVSE under their property assessed clean energy (PACE) programs. A simple solution is to increase and expand existing tax credits to incentivize commercial, publicly available charging stations.

2. Charging Infrastructure Plan – Locating charging infrastructure is different from locating conventional fueling stations. For the most part, EVs are cars used for commuting and local trips. Furthermore, while a driver of a conventional vehicle stops only briefly at a gas station for the specific purpose of filling up, a driver of an EV is generally looking to refuel when they are parked for a longer period of time, for example when going shopping, going to a restaurant, or going to work. Charging infrastructure plans should target these types of locations and attempt to pair the appropriate level of charging infrastructure with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop such a plan through a stakeholder process.

   Ohio could also participate in a regional plan to promote EV adoption across multiple states. For example, eight Western state governors recently signed a memorandum of understanding to create a regional EV infrastructure plan (the REV West Plan). The Midcontinent Transportation Electrification Collaborative (M-TEC) aims to facilitate regional coordination. The group recently released a white paper outlining principles for utility program design.

3. Parking Infrastructure Requirements – In tandem with the development of a statewide plan, legislation could set requirements for EV parking infrastructure. Some states have adopted permitting standards for parking lots, requiring, for instance, that for every 100 parking spaces, there must be at least one EV charging space. Legislation could also incentivize utilities to develop make-ready locations. These locations supply power to the point where a utility or third-party developer might install an EV charging station. Ohio's statewide building energy codes could also be updated to include requirements for EV charging infrastructure.

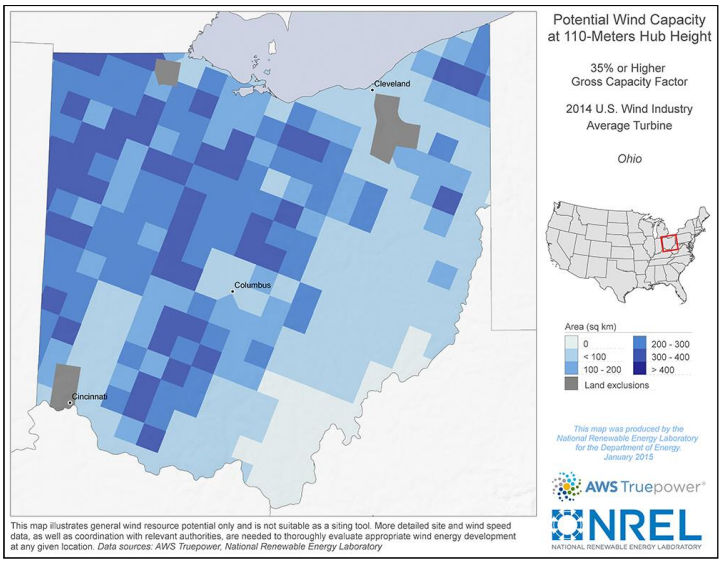
[3] A study by the Congressional Budget Office however suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles.

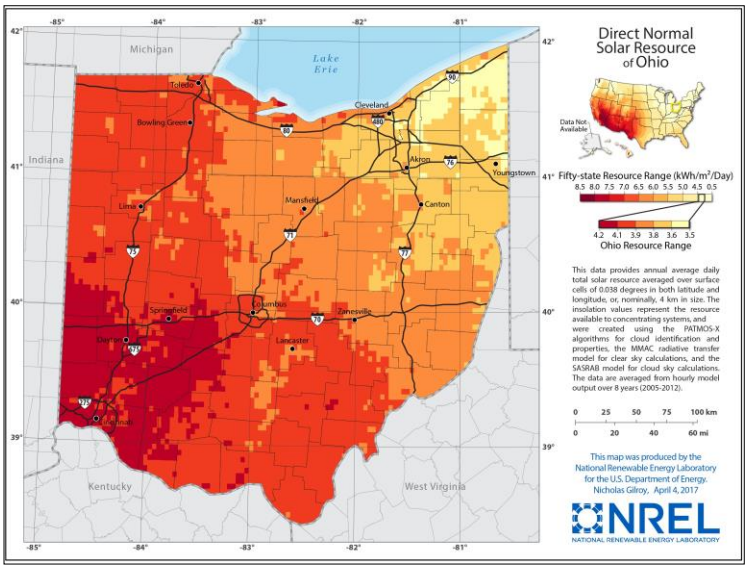
NEWS

- July 10, 2018: Exelon Bids $140M for FirstEnergy's Retail Business
- July 10, 2018: Ohio Officials Break Ground on World's Largest Autonomous Car Testing Facility
- July 9, 2018: Case Western Reserve to Receive More Than $10 Million for Energy Research Center
- July 9, 2018: Ohio Regulators Set Hearings on Two Solar Projects
- July 6, 2018: First Great Lakes Offshore Wind Project Scores Tentative Ohio Approval
- July 5, 2018: Ohio Power Siting Board Holding Hearing on 125 MW Solar Facility
- July 2, 2018: AEP Added to the Nasdaq CRD Global Sustainability Index
- June 26, 2018: CMS Energy to Add 2 Wind Energy Parks
- June 14, 2018: Ohio Bill Would Relax Wind Setbacks – and Clean Energy Standards
- June 13, 2018: Advanced Energy, Ohio Manufacturing are Crucial to National Defense, Policy Groups Say
- June 8, 2018: First Solar Breaks Ground on $400 Million Plant in Wood County
- June 8, 2018: Major Companies Envision a Clean Energy Boom in Ohio

OHIO'S WIND AND SOLAR RESOURCES

WIND https://windexchange.energy.gov/states/oh[4]
SOLAR https://www.nrel.gov/gis/solar.html





OTHER RESOURCES

- American Wind Energy Association (AWEA), Ohio: http://awea.files.cms-plus.com/FileDownloads/pdfs/Ohio.pdf
- Ohio Development Services Agency: https://development.ohio.gov/
- The American Council for an Energy-Efficient Economy State and Local Policy Database, Ohio: https://database.aceee.org/state/ohio
- The Database of State Incentives for Renewables and Efficiency, Ohio: http://programs.dsireusa.org/system/program?fromSir=0&state=OH
- U.S. Energy Information Administration, Ohio: https://www.eia.gov/state/?sid=OH
- National Renewable Energy Laboratory Biomass Maps: https://www.nrel.gov/gis/biomass.html
- U.S. Department of Energy's Alternative Fuels Data Center, Ohio: https://www.afdc.energy.gov/states/oh
- SPOT for Clean Energy, Ohio: https://spotforcleanenergy.org/state/ohio/
- Environmental Entrepreneurs (E2): https://www.e2.org/mapping-clean-energy-ohio/
- Advanced Energy Economy, Energy Roadmap OH: https://info.aee.net/advanced-energy-roadmap-for-ohio
- The GridWise Alliance, EVs - Driving Adoption, Capturing Benefits: http://gridwise.org/evs-driving-adoption-capturing-benefits/
- The Regulatory Assistance Project, Performance-Based Regulation: https://www.raponline.org/event/performance-based-regulation-the-power-of-outcomes-part-1/

[4] Please see your packet for a higher resolution wind energy capacity map.

Our Resources

CNEE Homepage: http://cnee.colostate.edu/

The SPOT for Clean Energy: https://spotforcleanenergy.org/

The Advanced Energy Legislation (AEL) Tracker: https://www.aeltracker.org/

Clean Energy Policy Guide for State Legislatures: http://cnee.colostate.edu/cleanenergypolicyguide/

The Energy Policy Podcast: http://energypodcast.colostate.edu/

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